PNNL-16522

Pacific Northwest
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Borehole Data Package for Nine CY 2006 Polyphosphate Treatability Testing Wells, 300-FF-5 Operable Unit, Hanford Site, Washington

B. A. Williams

March 2007

Prepared for the U.S. Department of Energy
under Contract DE-AC05-76RL01830

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Richland, Washington 99352

Summary

Nine new *Comprehensive Environmental Response, Compensation, and Liability Act* (CERCLA) groundwater monitoring wells were installed in the 300-FF-5 Operable Unit (OU) in calendar year 2006 to fulfill commitments for the EM-20 funded polyphosphate treatability test. These nine new performance monitoring wells were drilled into the uppermost unconfined aquifer, to the Hanford formation (fm.) – Ringold Formation (Fm.) contact boundary (Hanford – Ringold contact) (~50 ft bgs), and completed within the permeable Hanford fm. unit 1 gravel-dominated sequence (Hanford fm. unit 1).

The overall objective of the polyphosphate treatability test is to evaluate the efficacy of using polyphosphate injections to treat 300 Area uranium contaminated groundwater in situ. The objective of this work was to install the performance monitoring network surrounding the existing treatability injection well C5000 (399-1-23) in support of the implementation of a field scale demonstration of the polyphosphate technology.

These new wells were installed to collect treatability performance data in support of the polyphosphate injections and may also be used to supplement the water quality monitoring network for the 300-FF-5 OU. Recent work completed under a 300-FF-5 OU limited field investigation (LFI) determined that aqueous uranium contamination in groundwater migrates through the aquifer in the uppermost permeable portion of the unconfined aquifer constrained within the Hanford fm. unit 1 that exists in the saturated sediments above the Hanford – Ringold contact. The nine new polyphosphate performance monitoring wells were screened across all or portions of this uppermost interval.

This report supplies the information obtained during drilling, characterization, and installation of the new groundwater performance monitoring wells.

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1.0 Introduction

Nine new *Comprehensive, Environmental Response, Compensation, and Liability Act* (CERCLA) groundwater monitoring wells were installed in the 300 Area within the 300-FF-5 Groundwater Operable Unit (OU) in calendar year 2006 to fulfill commitments for a proposed polyphosphate injection monitoring network (Figure 1.1). These new wells were installed to collect treatability performance data in support of the polyphosphate injections to be performed in well 399-1-23 (C5000). These wells may also provide supplemental groundwater monitoring data for the 300-FF-5 OU groundwater monitoring network.

This report provides the information obtained during drilling, characterization, and installation of these new CERCLA groundwater monitoring wells in the 300-FF-5 OU.

1.1 New Groundwater Monitoring Wells

Nine new groundwater monitoring wells (Table 1.1) were installed between November and December 2006. The relative location of these wells is shown on the location map in Figure 1.1. The new wells were constructed to the specifications and requirements described in Washington Administrative Code (WAC) 173-160, the *Site Characterization Plan: Uranium Stabilization through Polyphosphate Injection,* (Vermeul et al. 2006), and specifications provided by Fluor Hanford, Inc. (FHI), Richland, Washington. During drilling and construction of the wells, sampling and analysis activities were conducted to support field screening for radiological and chemical contaminants and to collect near continuous sediment samples for geologic description.

This document provides a compilation of all available borehole data and well information obtained during drilling, well construction, and well development. The Appendix contains the Well Summary Sheets, the Well Construction Summary Reports, the geologist's borehole logs, the well development records, and the final well survey results.

Additional well construction documentation is on file with FHI. The Hanford Well Information System (HWIS) [http://apweb02/cfroot/rapidweb/phmc/cp/hwisapp/] contains electronic drilling and construction records for this well.

English units are used in this report, with the exception of well survey results (located in Table 2.2 and the Appendix) to describe drilling and well completion activities because that is the system of units used by drillers to measure and report depths and well construction measurements. Conversion to metric can be done by multiplying feet by 0.3048 to obtain meters or by multiplying inches by 2.54 to obtain centimeters.

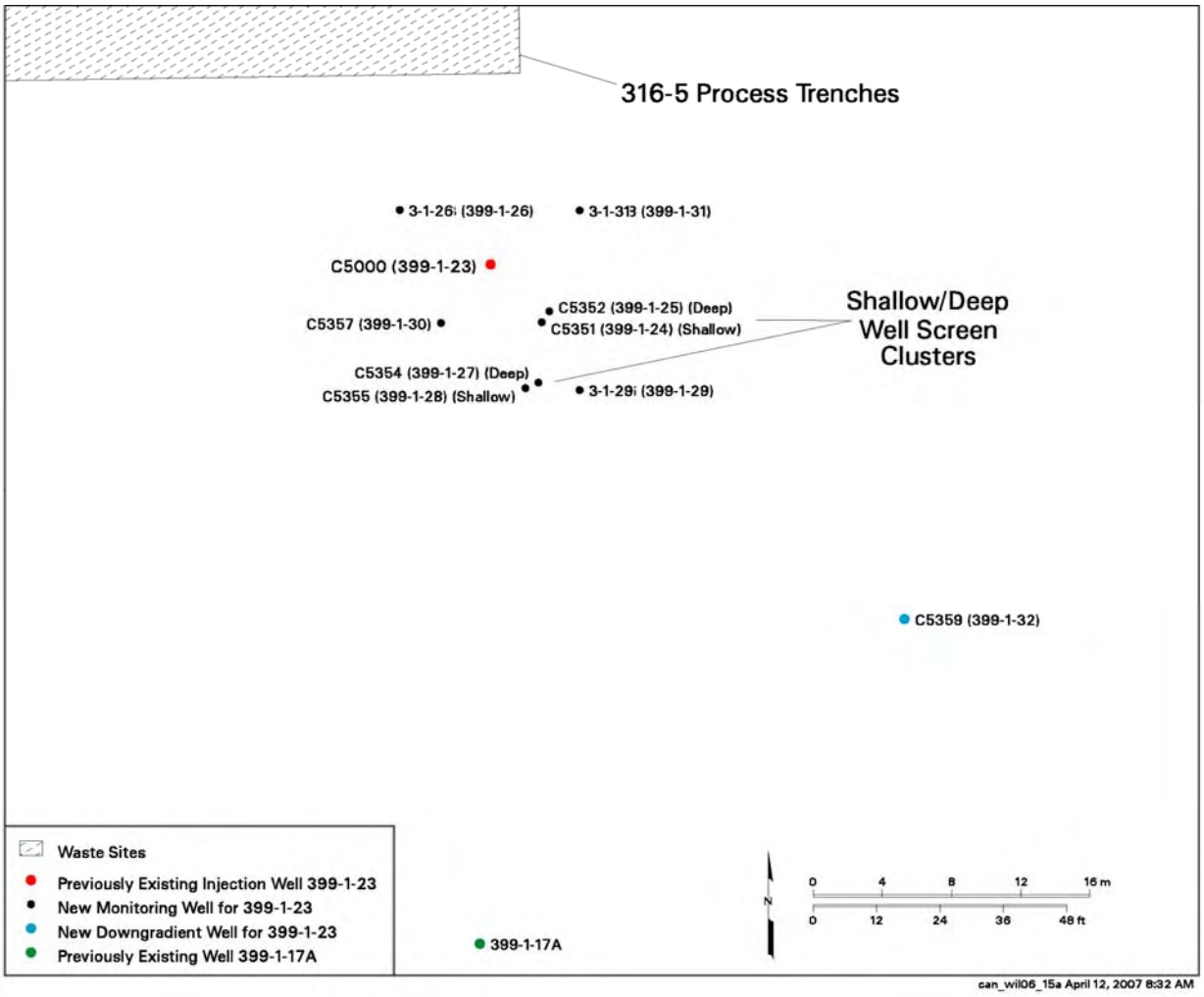

Figure 1.1. Location Map Showing the Relative Locations of Nine New Polyphosphate Performance Monitoring Wells Surrounding New Injection Well 399-1-23 (C5000), 300-FF-5 Operable Unit

Table 1.1. Polyphosphate Treatability Well Identification and Borehole Information, 300-FF-5 Operable Unit

Well Name	Well ID	Surface Elevation (ft)	Total Drill Depth (ft bgs)	DTW (ft bgs)	H/R Contact (ft bgs)	Saturated Hanford fm. (ft)	Elevation H/R (ft)	Screen Interval/Length (ft bgs [and ft])
399-1-23[(a)]	C5000	378.84	116	34.5	51	16.5	327.84	25-50 (25 ft)
399-1-24	C5351	379.35	42	33.8	NDE	NDE	NDE	32-37 (5 ft)
399-1-25	C5352	379.27	50	34.3	48.2	13.9	331.07	42-47 (5 ft)
399-1-26	C5353	378.82	50.5	33.8	48.5	14.7	330.32	29-49 (20 ft)
399-1-27	C5354	379.59	50	34.9	48	13.1	331.60	42-47 (5 ft)
399-1-28	C5355	379.64	40.5	34	NDE	NDE	NDE	32-37 (5 ft)
399-1-29	C5356	379.60	51	35	49	14	330.60	29-49 (20 ft)
399-1-30	C5357	379.38	50.5	33.6	49.75	14.75	329.63	29-49 (20 ft)
399-1-31	C5358	379.03	51	33.7	48.5	14.8	330.53	29-49 (20 ft)
399-1-32	C5359	378.21	50.5	32.5	43	10.5	335.21	29-44 (15 ft)

(a) Pre-existing 6-inch-diameter injection well, all other wells are new and 4 inches in diameter. All screens completed with 20 slot wire-wrap stainless steel and 10-20 mesh silica sand pack.
bgs = Below ground surface
H/R = Hanford – Ringold contact boundary.
NDE = Not deep enough.

2.0 Well Installation

The nine new wells including the existing central injection well (Table 1.1) are located in the northern portion of the 300 Area, just south of the decommissioned 316-5 process trenches and northeast of the 399-1-17 well cluster (Figure 1.1). The wells are downgradient of the disposal end of the decommissioned 316-5 process trenches and will (1) provide polyphosphate treatability performance data during the polyphosphate injections into the central injection well 399-1-23 (C5000) and (2) help differentiate upgradient groundwater contamination emanating from the area near the 316-5 process trenches with contaminants released in other 300 Area waste disposal ponds. The new wells monitor the uppermost unconfined aquifer (Hanford fm. unit 1).

2.1 Drilling and Sampling

Wells 399-1-24 through 399-1-32 (nine total) were drilled with a sonic drill rig from surface to a total depth between 40 and 51 feet below ground surface (bgs) (Table 1.1). The drilling depth objective was to drill to a depth at least as deep as the Hanford – Ringold contact. Temporary 8 1/4-inch-outside-diameter (OD) casing was used during drilling to total depth. Drilling of the first well, 399-1-24, commenced on November 16, 2006, and total depth of the last well to be drilled, 399-1-32, was reached on December 1, 2006.

During drilling of each borehole, nearly continuous core barrel sediment samples were collected in plastic bags to support the subsurface lithologic/geologic descriptions from ground surface to total depth. The water table was encountered at approximately 34 feet bgs (Table 1.1). The geologist's borehole logs in the Appendix provide the lithologic description of sediments encountered during drilling.

Sediments encountered during drilling included surficial recent and/or man-made fill material from approximately 3 to 5.5 feet bgs. Below these surficial deposits were predominantly unconsolidated gravel dominated sediments of the Hanford fm. unit 1 ranging in thickness from approximately 31 to 46 feet. The Hanford – Ringold contact boundary ranged in depth between approximately 43 and 50 feet bgs in the new boreholes (Table 1.1).

The Ringold Fm. unit 5 that lies beneath the Hanford fm. is composed of mostly gravelly silty sand to sand. With the exception of two shallow well pairs, the wells were drilled a few feet into the Ringold Fm. to a total depth of approximately 51 feet bgs (Table 1.1); therefore, only the upper few feet of Ringold Fm. sediments were encountered. The field geologist's detailed borehole log, along with the well construction summary report, as-built diagram, well development records, and well survey results are included in the Appendix.

The borehole and drill cuttings were monitored regularly for organic vapors and radioisotope contaminants (i.e., gamma). Results of this monitoring revealed no contamination was present.

2.2 Well Completion

The permanent casings and screens were installed in the new wells between November and December 2006. Each well was completed with a continuous wire-wrap stainless steel screen and stainless steel casing. The annular space around each screen was backfilled with silica sand and the remainder of the annular space above the screen interval (behind the stainless steel casing) was sealed with bentonite and cement grout (Appendix). The well completion details are summarized in Table 2.1.

Wells 399-1-26 (C5353), 399-1-29 (C5356), 399-1-30 (C5357), and 399-1-31 (C5358) were completed with 20-foot-long, 4-inch-inside-diameter (ID), stainless steel, continuous wire-wrap 20 slot (0.02-inch slot) screens placed to monitor the entire thickness of the saturated Hanford fm. from the high water level to the Hanford – Ringold contact (Table 1.1). These wells screen the entire uppermost permeable portion of the unconfined aquifer above the Ringold Fm. contact.

Wells 399-1-24 (C5351) and 399-1-25 (C5352) comprise a cluster of two wells, screened within the upper 10 feet, and lower 10 feet of the approximately 20-foot-thick saturated Hanford fm., respectively. These wells were completed with 5-foot-long, 4-inch-ID, stainless steel, continuous wire-wrap 20 slot (0.02-inch slot) screens (see as-build diagrams in Appendix).

Wells 399-1-27 (C5354) and 399-1-28 (C5355) comprise a second well cluster, similar to wells 399-1-24 and 399-1-25, and are screened within the lower 10 feet, and upper 10 feet of the uppermost permeable portion of the unconfined aquifer (Hanford fm.), respectively. These wells were also completed with 5-foot-long, 4-inch-ID, stainless steel, continuous wire-wrap 20 slot (0.02-inch slot) screens (Appendix).

Table 2.1. 300-FF-5 Polyphosphate Treatability Test Well Completions

Well Name	Well ID	Total Drill Depth (ft bgs)	DTW [H/R Contact] (ft bgs)	Screen[(a)] Interval/Length (ft bgs (and ft))	Sand Filter Pack Interval (ft bgs)	3/8 Inch Bentonite Pellet Annular Seal (ft bgs)	Bentonite Crumble Annular Seal[(b)] (ft bgs)
399-1-23*	C5000	116	34.5[51]	25-50 (25 ft)	20-54.4	14.4-20	10.8-14.4
399-1-24	C5351	42	33.8[NDE]	32-37 (5 ft)	29.9-38	28-29.9	38-42, 9.7-28
399-1-25	C5352	50	34.3[48.2]	42-47 (5 ft)	39.9-49.5	30-39.9	10.5-30
399-1-26	C5353	50.5	33.8[48.5]	29-49 (20 ft)	26.5-50.5	18.5-26.5	9-18.5
399-1-27	C5354	50	34.9[48]	42-47 (5 ft)	38-48.1	48.1-50, 28.5-38	10-28.5
399-1-28	C5355	40.5	34[NDE]	32-37 (5 ft)	30-39	39-40.5, 22-30	10-22
399-1-29	C5356	51	35[49]	29-49 (20 ft)	26.7-50	50-51, 19-26.7	10-19
399-1-30	C5357	50.5	33.6[49.75]	29-49 (20 ft)	27-50	50-50.5, 19-27	10-19
399-1-31	C5358	51	33.7[48.5]	29-49 (20 ft)	27-50	50-51, 19-27	10-19
399-1-32	C5359	50.5	32.5[43]	29-44 (15 ft)	26.5-45.5	45.5-50.5, 19.5-26.5	9-19.5

* Existing 6-inch-diameter injection well, all other wells 4 inches in diameter. All screens completed with 20 slot wire-wrap stainless steel and 10-20 mesh silica sand pack.
bgs = Below ground surface.
H/R = Hanford – Ringold contact boundary.
NDE = Not deep enough.
(a) All screen are 20-slot stainless steel, continuous wire wrap.
(b) Surface seal is composed of Portland Cement from top of crumble seal to surface.

Well 399-1-32, the farthest east and downgradient from the injection well, was completed with a 15-foot-long, 4-inch-ID, stainless steel, continuous wire-wrap 20 slot (0.02-inch slot) screens placed to monitor the entire thickness of the saturated Hanford fm. from the high water level to the Hanford – Ringold contact (Table 1.1). The Hanford – Ringold contact was encountered several feet shallower in this well and drilling recovered approximately 7.5 feet of Ringold sand that is comparable to the Ringold undifferentiated fine grained unit found in the newly installed nearby well 399-3-18 (C4999) (Appendix).

In each new well a 1-foot-long, 4-inch-ID stainless steel sump is attached to the bottom of the screen and extends approximately 1.35 feet below the screen bottom (Appendix). The permanent well casings are 4-inch-ID, stainless steel, and extend from the top of the screen interval to approximately 2 feet above ground surface (Appendix).

The screen filter pack is composed of 10-20 mesh silica sand placed from total depth to approximately 2 to 4 feet above the screen interval of each well. The sand pack was developed with a surge block to settle the sand in each well before adding the bentonite seal material. The annular seals are composed of a 2- to 5-foot length of 3/8-inch bentonite pellets placed from the top of the sand pack, followed by granular bentonite crumbles placed to approximately 10 feet bgs. The surface seals are composed of Portland cement grout from approximately 10 feet bgs to ground surface. Approximately 4-foot by 4-foot by 6-inch concrete pads were placed around the wells at the surface. The pads for the paired well (shallow-deep completions) clusters were combined to form one large pad because of the close well spacing between the two wells. Protective well head casings with locking caps, four protective and removable steel posts, and brass markers stamped with well identification numbers and Hanford well numbers were set into the concrete pads.

The vertical and horizontal coordinates of the nine wells were surveyed by Fluor Government Group (FGG) on December 12, 2006 (Appendix). A second survey of the new wells was conducted on February 16, 2007, to incorporate the elevations and horizontal coordinates of other existing wells surrounding the nine new wells. This second set of survey coordinates will be used as the official survey data set for the nine new wells and for the existing wells that were included in the survey (Appendix). The horizontal position of the wells were referenced to FGG horizontal control monuments. The coordinates are Washington Coordinate System, South Zone, NAD83(91) datum. The vertical datum is NAVD88 and is based on FGG vertical control monuments. Elevation survey data are included in Table 2.2 and the complete survey reports are included in the Appendix.

Table 2.2. Survey Data for Nine New Polyphosphate Monitoring Wells, 300-FF-5 Operable Unit

Well Name (Well ID)	Easting (meters)	Northing (meters)	Elevation (meters)
399-1-24 (C5351)	594116.45	116449.68	115.621
399-1-25 (C5352)	594116.88	116450.35	115.595
399-1-26 (C5353)	594108.27	116456.21	115.459
399-1-27 (C5354)	594116.23	116446.18	115.693
399-1-28 (C5355)	594115.57	116445.84	115.707
399-1-29 (C5356)	594118.67	116445.75	115.697
399-1-30 (C5357)	594110.62	116449.68	115.630
399-1-31 (C5358)	594118.66	116456.15	115.522
399-1-32 (C5359)	594137.47	116432.44	115.273

2.3 Well Development and Pump Installation

The nine new wells were developed on December 6-8, 2006. These wells were developed by pumping groundwater from one or two different intervals within the screen interval, depending on screen length, using a temporary, Redi-Flo-3 Grundfos™ submersible pump. The initial depth to water, turbidity, specific conductance, pH, temperature, and volume of groundwater pumped were measured in each well during development (Appendix). Well development was completed after the field parameters stabilized. Table 2.3 summarizes the well development results for each well, including pump intake depth, pump rate, pump run time, total volume pumped, final turbidity (NTU), pH, specific conductance, and temperature readings.

There were no dedicated sampling pumps installed in the new wells for this project.

Table 2.3. Well Development Information for Nine New Polyphosphate Monitoring Wells

Well Number	Pump Rate (gpm)	Pump Intake Depth (ft btc)	Pumping Run Time (min)	Total Volume Pumped (gal)	Final Field Readings
399-1-24	23	35	17	370	43.7 NTU, 484 µsm/cm, 14.9°C, pH = 7.55
399-1-25	33	45	15	500	107 NTU, 484 µsm/cm, 14.6°C, pH = 7.50
399-1-26	26.6	45	61	1620	2.24 NTU, 480 µsm/cm, 14.9°C, pH = 7.60
399-1-26	26.2	38	55	1,470	1.21 NTU, 483 µsm/cm, 14.5°C, pH = 7.55
399-1-27	2.3	45	108	230	47.2 NTU, 492 µsm/cm, 14.8°C, pH = 7.75
399-1-28	20	35	32	640	18.9 NTU, 485 µsm/cm, 14.8°C, pH = 7.52
399-1-29	19	45	67	1,290	6.25 NTU, 482 µsm/cm, 14.3°C, pH = 7.61
399-1-29	19	38	68	1,290	1.32 NTU, 481 µsm/cm, 14.4°C, pH = 7.63
399-1-30	24	45	20	480	9.71 NTU, 483 µsm/cm, 14.8°C, pH = 7.57
399-1-30	25.5	38	18	460	2.13 NTU, 486 µsm/cm, 14.6°C, pH = 7.61
399-1-31	24.4	45	68	1,660	1.72 NTU, 480 µsm/cm, 14.1°C, pH = 7.51
399-1-31	29.1	38	33	960	2.55 NTU, 480 µsm/cm, 14.9°C, pH = 7.49
399-1-32	20	40	39	950	2.87 NTU, 485 µsm/cm, 14.0°C, pH = 7.42
399-1-32	24	37	19	460	2.06 NTU, 483 µsm/cm, 14.1°C, pH = 7.51

ft btc = Feet below top of casing.
N/A = Not available.
NTU = Nephelometric turbidity unit.

3.0 Sampling and Analysis During Drilling

This section describes the collection and analysis of sediment samples during drilling the nine new boreholes.

3.1 Field Screening

The drill cuttings from the wells were screened in the field for volatile organics and beta-gamma activity by radiation control technicians and site safety staff.

Radiation and organic screening of cuttings revealed only natural background levels. No actions were required.

3.2 Sediment Sampling

Sediment samples were collected for lithologic description at approximately 5-foot-depth intervals from surface to total depth in each borehole. The samples were obtained from near continuous borehole cuttings that were collected in plastic sleeves as they were extruded from the drill pipe at the surface. The geologic descriptions of these samples are contained in the wellsite geologist's borehole logs in the Appendix. No additional sampling was conducted during drilling in these boreholes.

3.3 Hydrogeologic Description of New Boreholes

The borehole logs (Appendix) for the nine new wells were evaluated to determine the stratigraphic contacts and key lithologic changes where possible. These results were compared to borehole investigation results from well 399-1-23 (C5000) in Williams et al. (2007).

Recent surficial sediments composed of reworked Hanford, eolian deposits, or man-made fill overlie the 300 Area and range in thickness from 1 foot to greater then 20 feet bgs. Beneath the surficial deposits, the Hanford fm. unit 1 comprises the entire vadose zone and the uppermost portion of the unconfined aquifer in all of the wells. The Hanford fm. unit 1 ranges up to approximately 46 feet thick, and is composed of unconsolidated sediments ranging in grain size from cobble to pebble gravel, coarse to fine grained sand, silty sand, and silt. There are no distinguishable hydrostratigraphic changes within the vadose zone. There does appear to be a couple intervals within some of the wells, around 10 feet bgs, and between 20 and 30 feet bgs, where an increase in fine-grained size material occurs within the gravel dominated sequence; these intervals commonly have an increase in fine sand, silt, and minor amounts of clay and may reduce the permeability of some intervals within the vadose zone (Appendix). It is not clear whether these fine-grained intervals are a result of mixing between the Hanford and Ringold Fm. sediments (Ringold rip-up clasts). In all the wells, from approximately 36 feet bgs to the Ringold Fm., the Hanford fm. consists predominantly of coarse sandy gravel to gravel. A more open framework, i.e., clast supported structure; composed of predominantly gravel to slightly sand gravel is reported in wells 399-1-24, 399-1-26, 399-1-30, and 399-1-31 in the lower Hanford fm. from approximately 36 feet bgs down to the Hanford – Ringold contact; where present the matrix sand is composed of medium to coarse sand.

The Ringold Fm. unit 5 contact with the overlying Hanford fm. is at approximately 48 feet bgs. In all of the wells this unit contact was distinguished by a distinct color change, decrease in gravel size and content, and a significant increase in fine sand. This sand unit is believed to be part of the Ringold Fm. unit 5 (undesignated fine-grained unit) and is hydrogeologically part of the lower portion of the unconfined aquifer beneath the 300-FF-5 OU. The selection of this contact is based on lithologic changes identified by the wellsite geologist's sample descriptions, and direct examination of near-continuous sediment core samples. In some cases this contact is gradational and may actually reflect a zone of mixing with the overlying Hanford fm. gravel. This zone of mixing can range up to several feet thick.

The eastern most well, 399-1-32, encountered the Hanford – Ringold contact approximately 4 to 5 feet higher in elevation than in the other new wells (Table 1.1). Approximately 7.5 feet of fairly uniform, Ringold Fm. sand with only minor amounts of gravel was recovered from the core barrel below the contact. The contact appears fairly well defined in this well and strongly suggests that the Ringold Fm. sand encountered in the other wells reflect the same unit. In well 399-1-32, there is a visual color transition in the sand with depth that indicates reducing conditions; in addition this lower sand interval contains black pieces of woody material (Figure 3.1).

The thickness of the uppermost unconfined aquifer (Hanford fm. unit 1) was determined in each new well (Table 1.1). More details about the hydrogeology and uppermost aquifer system and groundwater conditions within the area are available in the limited field investigation report (Williams et al. 2007).

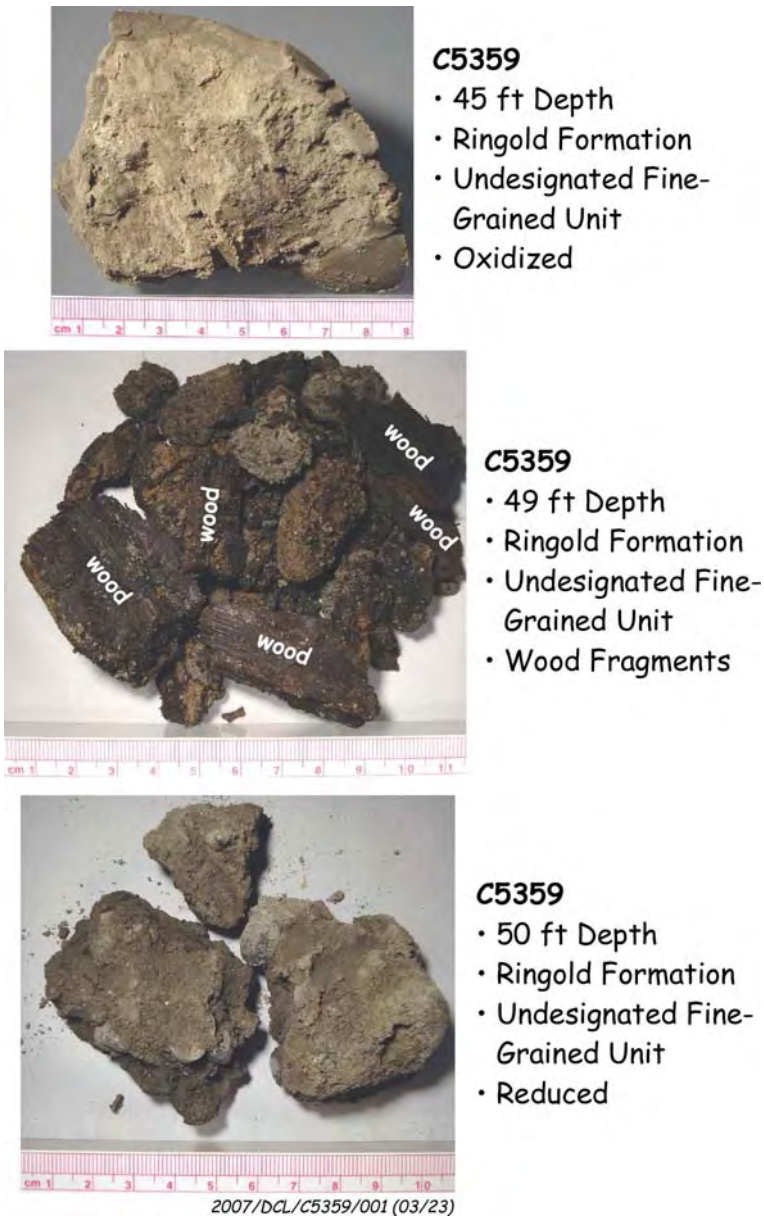

Figure 3.1. Photographs showing Grab Samples of the Ringold Formation Undesignated Fine-Grained Unit from Well 399-1-32 (C5359).

4.0 References

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NAVD88. 1988. North American Vertical Datum of 1988.

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WAC 173-160. "Minimum Standards for Construction and Maintenance of Wells." *Washington Administrative Code*, Olympia, Washington.

Appendix

Geologic Logs, Well Construction, and Completion Documentation

Well 399-1-24 (C5351)

WELL SUMMARY SHEET

Start Date: 11-16-06
Finish Date: 11-16-06
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Well ID: C5351		Well Name: 399-1-24	
Location: 300 - FF - 5		Project: Polyphosphate Treatability Test	
Prepared By: Michael E. Caron	Date: 12-5-06	Reviewed By: L. D. Walker	Date: 12/13/06
Signature:		Signature:	

CONSTRUCTION DATA

Description	Diagram
8" OD temporary casing	
~~@ 12-8-06~~ ~~1.94 bgs~~ 9.7': neat Portland cement grout with 5% bentonite	
- 8" ss protective casing 3.01' ags → 1.99' bgs @ 12-5-06	
4 3/8" ID ss type 304/~~304L~~ 316 sch. 10 riser: +1.94' to 32'	
~~28~~ @ 12-5-06 9.7-~~29.9~~ ~~29.9~~: bentonite crumbles	
~~28 - 29.9~~ ~~29.9 - 38~~: 3/8" bentonite pellets @ 12-5-06	
29.9 - 38': 10-20 mesh Colorado silica sand	
38-42': 3/8" bentonite pellets	
4 3/8" ID ss type 304/316 20-slot wire wrap screen: 32-37'	
4 3/8" ID ss type 304/316 sch. 10 sump: 37 - 37.35'	
All temporary casing removed. Depths in feet below ground surface.	
centralizers	

GEOLOGIC/HYDROLOGIC DATA

Depth in Feet	Graphic Log	Lithologic Description
0		0-0.5': crushed gravel drill pad
		0.5-4.3': fill; crushed gravel, gravel, sand
10		4.3-11': Hanford fm. sandy gravel
		11-12': Hanford fm. silty sandy gravel, clay-altered
		12-22': Hanford fm. sandy gravel
20		22-28': Hanford fm. silty sandy gravel, clay-altered
		28-36': Hanford fm. sandy gravel
30		36-42': Hanford fm. gravel (< 20% sand)
		- water level = 33.8' (11-30-06)
40		TD = 42'
50		

A-6003-643 (03/03)

BOREHOLE LOG

Page 1 of 2

Date: 11-16-06

Well ID: C 5351 | Well Name: 399-1-24 | Location: 300-FF-5

Project: Polyphosphate Treatability Test | Reference Measuring Point: ground surface

Depth (Ft.)	Sample Type No.	Sample Blows Recovery	Graphic Log	Sample Description: Group Name, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl	Comments: Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
0				0-0.5' - gravel pad	sonic - 6" drive barrel, 8" casing
				0-4.3' - fill - mixed sand and gravel	
				4.3-11.0 - sandy gravel - coarse sand, gravel with cobbles to 1-2", mostly well-rounded to sub-rounded basalts	
5				- ~50% sand, 50% cobbles	
				- generally well-sorted	
				11.0-12.0 silty sandy gravel, fines are very dark colored	
				12.0-22 sandy gravel, sandy fraction is very coarse sand, well-rounded basalt cobbles to ≈ 3" in diameter	
10				- soil moisture increases from ≈ 18', quite well by 34.5'	
				- 22-28' - fairly abundant clays, basalt cobbles to 4-5" in diameter, moderate reaction to HCl	
15				- 28-36' - sandy gravel as above	
				- well rounded Basalt-dominated cobbles, average cobble size ≈ 1.5"	
				- 36-42' (TD) - gravel with < 20% sandy matrix - cobbles are well-rounded, average size is ≈ 2", sand matrix is medium to coarse-grained - cobbles are quite well-sorted - overall color is ~ 5Y/5/1	
20					
25					
30					
				- water level = 33.8' (measured 11-17-06)	
35					

Reported By: Michael E. Caron | Reviewed By: L.D. Walker

Title: Senior Geologist | Title: Geologist

Signature: [signature] | Date: 11-16-06 | Signature: [signature] | Date: 12/13/06

11-16-06

A-6003-642 (03/03)

BOREHOLE LOG

Page 2 of 2
Date: 11-16-06

Well ID: C5351	Well Name: 399-1-24	Location: 300-FF-5
Project: Polyphosphate Treatability Test		Reference Measuring Point: ground surface

Depth (Ft.)	Sample Type No.	Sample Blows Recovery	Graphic Log	Sample Description: Group Name, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl	Comments: Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
40					sonic - 6" drive barrel, 8" casing
				TD = 42'	
45					

Reported By: Michael E. Caron	Reviewed By: L.D. Walker
Title: Senior Geologist	Title: Geologist
Signature:	Date: 11-16-06
	Signature: L.D. Walker
	Date: 12/13/06

11-16-06

A-6003-642 (03/03)

@ 11-16-06

FIELD ACTIVITY REPORT NO. 1 - DRILLING PLAN

Page 1 of 2 1

Date: 11-16-06

Purpose: Polyphosphate Treatability Test | Location: 300 - FF - 5

Well ID: C5358 @ 21 11-16-06 | Well Name: 399-1-~~36~~ @ 35 24 11-16-06

Drilling Co.: Prosonic | Rig No.: SR-071 | Rig Make/Mod.: Prosonic Sonic Rig

Casing String No. (1) 2 3 4	Drilling Method	Circulation	D.H. Hammer
Casing Size 8"	Auger	Air ____ Water/Mud ____	Make
Grade	Rotary	Reverse ____ Direct ____	Model
Lbs.Per Ft. 35	Tubex	Vol: cfm	Choke
Material carbon steel	Cable Tool	gpm	Casing Hammer
Type:	Sonic ✓	Pressure ____ psi	Make
Welded ____ (Thd.)	A.R. w/Sonic	Drill Pipe O.D.	Model
Planned / Actual	Geoprobe	Tool Joint Size	Bit Size
Set At: 42' / 40'±2'	Other:	Additives	Type
Shoe OD/ID 8.25"/7.75"			Nozzles
Reference Measuring Point:			Rod Size
GROUND LEVEL			

Drig. Co. | Rig No.: | Rig Make/Mod.:

Casing String No. 1 2 3 4	Drilling Method	Circulation	D.H. Hammer
Casing Size	Auger	Air ____ Water/Mud ____	Make
Grade	Rotary	Reverse ____ Direct ____	Model
Lbs.Per Ft.	Tubex	Vol: cfm	Choke
Material	Cable Tool	gpm	Casing Hammer
Type:	Sonic	Pressure ____ psi	Make
Welded ____ Thd.	A.R. w/Sonic	Drill Pipe O.D.	Model
Planned / Actual	Geoprobe	Tool Joint Size	Bit Size
Set At: /	Other:	Additives	Type
Shoe OD/ID			Nozzles
Reference Measuring Point:			Rod Size
GROUND LEVEL			

Comments/Remarks:

Estimated Depth to Water

Reported By: Michael E. Caron

Name/Title: Senior Geologist

Signature:

Date: 11 @ 11-16-06

11-16-06

A-6003-650 (04/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 2			
Date: 11-16-06			
Well ID:	C5358~~2~~1	Well Name:	399-1-~~31~~ ~~25~~ 24
Location:	300-FF-5	Report No.:	① 11-16-06

Start	Finish	Total
Time 0600	Time 1530	Time 930
Hole Depth/Csg 0 / 0	Hole Depth/Csg 42 / 42	Hole Depth/Csg 42 / 42

Reference Measuring Point: **GROUND SURFACE**	Casing String No. ①2 3 4 ____ Rod Size: 8" OD See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
	0600	- geologist + drillers on site
	0650	- POD at wellsite (3 drillers, BTR, geologist)
	0805	- start drilling with 20' core barrel, drive to 16'
		- sprayed drive tube with water to cool at 11'
	0835	- add 6" bit + 10.00 length of 8" casing - tubular tally = 8.5'
	0845	- am RCT check - all < background
0840	~~0840~~ 0857 11-16-06	- push 8" casing to 16' (add 10.0', tally = 18.5')
	0858	- trip in 20' drive barrel, clean out casing to 16'
0905	0930	- drive core barrel to 36', easy (fast) drilling from 16-24', then
		much slower
0935		- add 10.00' of 8" casing, tubular tally = 30.5'
09.40		- add 10.00' of 8" casing, tubular tally = 40.5', stick up is
		~ 4', casing shoe is ~ 36.5' bgs
09:40	0950	- trip in core barrel, clean out casing to 36'
	0950	- attempt to tag water - no water at 36'
	0955	- water level in C5000 = 33.5' bgs
0955	1000	- drive core barrel to 42' after adding 5' casing - tally = 45.5'
1010	1030	- drive casing to 42', clean out to 42'
1030	12:15	- drillers clean up, leave site for lunch + stainless well materials
12:20	12:55	- drillers decon stainless steel casing and screen
	10:30	- straightness test with 20' x 6" core barrel - pass
	1300	- tagged water level at 34.2'
	1315	- add bentonite pellets in interval 42-38' (3 buckets)
	1320	- install sump, screen, and casing - centralizers installed

Reported By: Michael E. Caron		Reviewed By: L.D. Walker	
Title: Senior Geologist	Date: 11-16-06	Title: Geologist	Date: 12/13/06
Signature: [signature]		Signature: LD Walker	

A-6003-651 (04/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 2 of 2

Continuation Page

Date: 11-16-02

Well Name: ~~C5351~~ (@ 12-11-06) 399-1-24

Well ID: ~~399-1-24~~ (@ 12-11-06) C5351

Location: 300-FF-5

Continuation of Report No.: (1)

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth
		at top and bottom of screen and at 10' bgs
13:35	13:40	- add 4 bags of 10-20 Colorado silica sand, stainless steel
		casing stick up = 3'
	1345	- drillers remove 5' length of 8" casing
	1355	- sand level tagged at 31.5' bgs
1402	1425	- surge filter pack with dual block surger - sand fell out less
		than 0.1' in last 15 minutes
	1400	- pm RCT check - < background.
	1430	- bring sand level up to 29.9' (2 bags)
	1435	- add ~~pea~~ bentonite pellets to bring level to ~ 28' (1 bucket)
	1440	- remove 10' length of 8" casing
1445	1450	- add bentonite pellets to 22' bgs (1 bucket)
	1450	- remove 10' length of 8" casing
1450		- add bentonite crumbles to ~ 26' bgs (1 bag)
	1452	- remove 10' of casing
	1455	- add bentonite crumbles to 9.7' bgs (2 bags)
1500	1510	- mix grout for surface seal - mix = 20 gallons water, 2
		bags of Portland Cement, 5% ground bentonite - inject one
		mix - grout seal in ≈ 3.5' bgs
	1512	- remove 10' of casing
	1514	- remove 10' of casing + bit (all out)
	1530	- left site for day (drillers will move rig and set up on next
		hole)
		not used @
		- note - centralizers at top & bottom of screen and at 10' bgs
		Not used @

Reported By: Michael E. Carn

Title: Senior Geologist Date: 11-16-06

Signature:

Reviewed By: L.D. Walker

Title: Geologist Date: 12/13/06

Signature:

A-6003-652 (04/03)

FIELD ACTIVITY REPORT

TUBULAR GOODS TALLY

Page 1 of 1

Date: 11-16-06

Well Name: 399-1 - 24 | Well ID: C5351

TEMPORARY				PERMANENT*						SCREEN/CAP*		
Jt. #	Length (ft.)	Jt. #	Length (ft.)	Jt. #	Length (ft.)	C	Jt. #	Length (ft.)	C	Jt. #	Length (ft.)	C
1	0.50 (bit)	21		1			21	10.00 (casing)	C	1	0.35 (cap)	
2	10.00 (casing)	22		2			22	10.01 ✓		2	4.99 (screen)	C
3	10.00 (✓)	23		3			23	10.01 ✓	C	3		
4	10.00 ✓	24		4			24	5.00 ✓		4		
5	10.00 ✓	25		5			25			5		
6	5.00 ✓	26		6			26			6		
7		27		7			27			7		
8		28		8			28			8		
9		29		9			29			9		
10		30		10			30			10		
11		31		11			31			11		
12		32		12			32			12		
13		33		13			33			13		
14		34		14			34			14		
15		35		15			35			15		
16		36		16			36			16		
17		37		17			37			17		
18		38		18			38			18		
19		39		19			39			19		
20		40		20			40			20		
Tot	45.50	Tot		Tot			Tot	35.02		Tot	5.34	

*Indicate those joints with centralizers with a C in the available box.
ALL Casing length shall be measured to the nearest 0.01 ft.

Comments/Remarks:

Temporary: O.D./I.D. 8" / 7.25" | Permanent: O.D./I.D. 4.5" / 4 3/8" | Screen: O.D./I.D. 4.5" / 4 3/8"

bit = 6" in length, OD = 8.25", ID = 7.25"

drive barrel - 7" OD, 6" ID

Reported By: Michael E. Caron | Reviewed By: L. D. Walker

Title: Senior Geologist | Date: 11-16-06 | Title: Geologist | Date: 12/13/06

Signature: MEC | Signature: LD Walker

A-6003-655 (04/03)

WELL DEVELOPMENT AND TESTING DATA

Well Name: 399-1-24 ~~C5351~~ e 12-11-06	Well ID: C5331 ~~399-1-24~~ @ 12-11-06	Well Location: 300-FF-5	Date: 12-~~1~~7-06

Reference Measuring Point (unless otherwise noted): TOP OF OUTER CASING (TOC)

Has the well been surveyed? ○ Yes ☑ No — Does the well have a cement pad? ☑ Yes ○ No

PART 1

STATIC WATER LEVEL:	
Start of Job	33.65
End of Job	33.60
DEPTH TO BOTTOM:	
Start of Job	37.3′
End of Job	37.3

PART 2

WELL DEVELOPMENT DATA

Pump Model	Redi-flow 3
Intake Depth	35′
Starting Turbidity	over limit (>1000)

Pump Start	Stop	Flow Rate
1522	1538	23

Total Pumped	370 gal
Final Turbidity	43.7
XD SN/Range (PSI)	

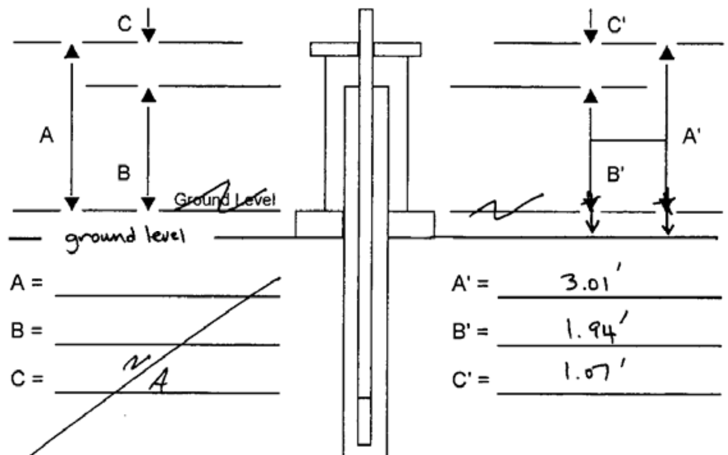
PART 3

INSTANTANEOUS SLUG TEST (N/A)

Static Water Level (TOC)	
Transducer Depth	
Baseline Start	
Injection Start	
Baseline Start	
Withdrawal Start	
Slug Volume	
XD SN/Range (PSI)	

PART 4

Last Recorded Measurements Date: NA	Current Measurements Date: 12-6-06



A = N/A	A' = 3.01′
B =	B' = 1.94′
C =	C' = 1.07′

Are there any reference marks on the casing strings? ○ Yes ☑ No

PART 5

COMMENTS:

Prepared by (print name): Michael E. Caron	Signature: [signature]	Date: 12-7-06
Reviewed by (print name): L.D. Walker	Signature: [signature]	Date: 12-13-06

A-6003-644 (03/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 1

Date: 12-7-06

Well ID: C5351	Well Name: 399-1-24
Location: 300 - FF-5	Report No.: (2)

Start	Finish	Total
Time 1513	Time 1538	Time 0025
Hole Depth/Csg NA / NA	Hole Depth/Csg NA / NA	Hole Depth/Csg NA / NA

Reference Measuring Point: GROUND SURFACE

Casing String No. 1 2 3 4 _____ Rod Size: See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
	1513	- flowmeter - 9810 gal.
	1522	- start test #1 (Bullwinkle), probe = out of water
		time pH conductivity temp turbidity probe
		1523 7.56 @12-7 ~~0.488~~ 0.488 13.8° over limit not in use
		1528 7.48 0.487 14.7° 216 ✓
		1533 7.55 0.484 15° 99.7 ✓
		1537 7.55 0.484 14.9° 43.7 ✓
	1538	- stop pump test - draw down (e-tape) = 1.5'
		- flow meter = 10180

Not Used @

Reported By: Michael E. Carm		Reviewed By: L.D. Walker	
Title: Senior Geologist	Date: 12-7-06	Title: Geologist	Date: 12/13/06
Signature:		Signature:	

A-6003-651 (04/03)

WELL CONSTRUCTION SUMMARY REPORT

Start Date: 11-16-06
Finish Date: 11-16-06
Page 1 of 1

Well ID: C5351	Well Name: 399-1-24	Approximate Location:	300-FF-5
Project: Polyphosphate Treatability Test		Other Companies:	FH, GRAM, INC.
Drilling Company: Prosonic		Geologist(s):	Michael E. Caron
Driller: Aaron Adams	License #: 2831T		

TEMPORARY CASING AND DRILL DEPTH			DRILLING METHOD	HOLE DIAMETER (in.) / INTERVAL (ft)
*Size/Grade/Lbs. Per Ft.	Interval	Shoe O.D./I.D.	Auger:	Diameter ____ From ____ to ____
8" / carbon steel	0 - 42'	8.25"/7.25"	Cable Tool:	Diameter ____ From ____ to ____
	____ - ____		Air Rotary:	Diameter ____ From ____ to ____
	____ - ____		A.R. w/Sonic:	Diameter ____ From ____ to ____
	____ - ____		Sonic	Diameter 8" From 0 to 42
	____ - ____			Diameter ____ From ____ to ____
*Indicate Welded (W) - Flush Joint (FJ) Coupled (C) & Thread Design				Diameter ____ From ____ to ____
FJ				
			Drilling Fluid:	- none -
Total Drilled Depth: 42'	Hole Dia @ TD:	8.25"	Total Amt. Of Water Added During Drilling:	- 0 -
Well Straightness Test Results:	pass		Static Water Level: 33.8'	Date: 11-17-06

GEOPHYSICAL LOGGING

Sondes (type)	Interval	Date	Sondes (type)	Interval	Date
	____ - ____			____ - ____	
2	____ - ____		3	____ - ____	
1	____ - ____		4	____ - ____	

COMPLETED WELL

Size/Wt./Material	Depth @ 11-16-06	Thread	Slot Size	Type	Interval Annular Seal/Filter Pack	Volume	Mesh Size
4" Stainless	0 - ~~42~~ 37.3			bentonite pellets	38 - 42	3 buckets	
	____ - ____			10-20 Colorado Silica sand	29.2 - 38	5 bags	
	____ - ____			bentonite pellets	22 - 29.2	2 buckets	
	____ - ____			bentonite crumbles	9.7 - 22	3 bags	
	____ - ____			Portland cement grout	____ - 9.7	20 gal	

OTHER ACTIVITIES

Aquifer Test:	Date:	Well Decommission:	Yes:	No:	Date:
Description:		Description:			

WELL SURVEY DATA (if applicable) Not yet surveyed at this time

	Protective Casing Elevation:
Washington State Plane Coordinates:	Brass Survey Marker Elevation:

COMMENTS / REMARKS

Reported By: Michael E. Caron Title: Senior Geologist Signature: Date: 11-16-06

A-6003-658 (04/03)

Well 399-1-25 (C5352)

WELL SUMMARY SHEET

Start Date: 11-17-06
Finish Date: 11-17-06
Page 1 of 1

Well ID: C5352	Well Name: 399-1-25
Location: 300 - FF - 5	Project: Polyphosphate Treatability Test
Prepared By: Michael E. Caron Date: 12-5-06	Reviewed By: L. D. Walker Date: 12/13/06
Signature:	Signature:

CONSTRUCTION DATA

Description	Diagram
8" OD temporary casing	
8" ss protective casing, 29.85 - 20.3' bgs	
0 - 10.5': neat Portland cement grout with 5% bentonite	
4 3/8" ID ss type 304/316 sch. 10 riser: +1.95' to 42'	
10.5 - 30': bentonite crumbles	
30 - 39.9': 3/8" bentonite pellets	
39.9 - 49.5': 10-20 mesh Colorado silica sand	
49.5 - 50': natural slough	
42 - 47': 4 3/8" ID ss type 304/316 20-slot wire wrap screen	
47 - 47.35': 4 3/8" ID ss type 304/316 sch. 10 sump: 47 - 47.35'	
All temporary casing removed. Depths in feet below ground surface.	
centralizers	

GEOLOGIC/HYDROLOGIC DATA

Depth in Feet	Graphic Log	Lithologic Description
0		0 - 0.5': crushed gravel drill pad
		0.5 - 5': fill; crushed gravel, gravel, sand
10		5 - 20': Hanford fm. sandy gravel
		20-22': Hanford fm. silty sandy gravel, clay - altered
20		22-24': Hanford fm. sandy gravel
		24-29': Hanford fm. silty sandy gravel, clay - altered
30		29 - 48.2': Hanford fm. sandy gravel
		48.2 - 50': Ringold Fm. sand and silty sandy gravel
40		water level = 34.3' (11-30-06)
		TD = 50'
50		

A-6003-643 (03/03)

BOREHOLE LOG

Page 1 of 2

Date: 11-17-06

Well ID: C 5352 | Well Name: 399-1-25 | Location: 300-FF-5

Project: Polyphosphate Treatability Test | Reference Measuring Point: ground surface

Depth (Ft.)	Sample Type No.	Sample Blows Recovery	Graphic Log	Sample Description: Group Name, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl	Comments: Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
0					Sonic - 6" drive barrel, 8" casing
				0-0.5' - gravel pad	
				0.5-5.0' - fill, mixed sand, gravel and crushed rock	
				5.0-7.0' - coarse gravel (sandy gravel) (sG) - 40-50% medium sand, cobbles average 2.5-3" in diameter, mostly basalt	
5				7-11.5' - (sG) - sandy gravel, clast size generally <1", >60% med. sand, cobbles more heterolithic and sub-angular to sub-rounded	
10				11.5-12.5' - as above	
				12.5-14.0' - very coarse clast-supported gravel (sG) - 20-40% med. sand, basalt cobbles to >6", cobbles are moderately to well-rounded and poorly sorted	
15				14.0-30 sandy gravel (sG) with very coarse sand matrix, sand is 40-60%, cobbles <1" in diameter, sub-angular to sub-rounded	
				20-22 - strong clay alteration	
20				24-29 - strong clay alteration	
				30-36 - coarse sandy gravel (sG) - coarse sand matrix (>60%) - cobbles generally <1" in dia.	
25				36-48.2' - as above (sG) - sand med. to coarse grained, cobbles variable in size but mostly @ 1" to 2" in diameter	
30					
35					water level = 34.3' (11-20-06)

Reported By: Michael E. Caron | Title: Senior Geologist | Signature: | Date: 11-17-06

Reviewed By: L.D. Walker | Title: Geologist | Signature: | Date: 12/13/06

A-6003-642 (03/03)

BOREHOLE LOG

Page 2 of 2
Date: 11-17-06

Well ID: C5352 | Well Name: 399-1-25 | Location: 300 - FF- 5

Project: Polyphosphate Treatability Test | Reference Measuring Point: ground surface

Depth (Ft.)	Sample Type No.	Sample Blows Recovery	Graphic Log	Sample Description: Group Name, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl	Comments: Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
40					Sonic
				48.2-50' (TD) Ringold Fm - sandy gravel (sG) fining downward into sand (S) and silty sand (mS) - finer sediments (49-50') has a silty component that has gone to clays - cobbles in coarser fraction are well-rounded and heterolithic, with a significant fraction of andesitic volcanics - sand ranges from medium- to fine grained and is gravel-dominated - sand has a well-developed iron oxide coating - overall color is 10YR-4/6 - few clay-altered sub-angular clasts, most likely after shales or siltstones - archive samples collected from Ringold Fm at 49' bgs and from Hanford fm at 47' bgs	6" drive barrel / 8" casing
45					
50					
				TD = 50' bgs	

Reported By: Michael E. Carrn | Reviewed By: L. D. Walker

Title: Senior Geologist | Title: Geologist

Signature: [signature] | Date: 11-17-06 | Signature: [signature] | Date: 12/13/06

A-6003-642 (03/03)

FIELD ACTIVITY REPORT NO. 1 - DRILLING PLAN

Page 1 of 1

Date: 11-17-06

Purpose: Polyphosphate Treatability Test | Location: 300 - FF - 5

Well ID: C 5352 | Well Name: 399 - 1 - 25

Drilling Co.: Prosonic | Rig No.: SR-071 | Rig Make/Mod.: Prosonic Sonic Rig

Casing String No. (1) 2 3 4	Drilling Method	Circulation	D.H. Hammer
Casing Size 8"	Auger	Air ___ Water/Mud ___	Make
Grade	Rotary	Reverse ___ Direct ___	Model
Lbs.Per Ft.	Tubex	Vol: cfm	Choke
Material carbon steel	Cable Tool	gpm	Casing Hammer
Type:	Sonic ✓	Pressure ___ psi	Make
Welded ___ (Thd.)	A.R. w/Sonic	Drill Pipe O.D.	Model
Planned / Actual	Geoprobe	Tool Joint Size	Bit Size
Set At: 50±2/ 50	Other:	Additives	Type
Shoe OD/ID 8.25/7.25		— none —	Nozzles
Reference Measuring Point: GROUND LEVEL			Rod Size

Drig. Co. | Rig No.: | Rig Make/Mod.:

Casing String No. 1 2 3 4	Drilling Method	Circulation	D.H. Hammer
Casing Size	Auger	Air ___ Water/Mud ___	Make
Grade	Rotary	Reverse ___ Direct ___	Model
Lbs.Per Ft.	Tubex	Vol: cfm	Choke
Material	Cable Tool	gpm	Casing Hammer
Type:	Sonic	Pressure ___ psi	Make
Welded ___ Thd.	A.R. w/Sonic	Drill Pipe O.D.	Model
Planned / Actual	Geoprobe	Tool Joint Size	Bit Size
Set At: /	Other:	Additives	Type
Shoe OD/ID			Nozzles
Reference Measuring Point: GROUND LEVEL			Rod Size

Comments/Remarks:

Estimated Depth to Water - measured at 33.8' bgs in proximal well C5351 11-17-06

Reported By: Michael E. Caron

Name/Title: Senior Geologist

Signature: MEC | Date: 11-17-06

A-6003-650 (04/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 2

Date: 11-17-06

Well ID: C5352	Well Name: 399-1-25
Location: 300-FF-5	Report No.: 11-17-06 ~~@~~ (1)

Start	Finish	Total
Time 0600	Time 1520	Time 1120
Hole Depth/Csg 0 / 0	Hole Depth/Csg 50 / 0	Hole Depth/Csg 50 / N/A

Reference Measuring Point: GROUND SURFACE

Casing String No. (1) 2 3 4 _____ Rod Size: 8"
See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
	0600	- POD at site trailer (3 drillers, BTR, geologist)
	0655	- measure water level in C5351 = 33.8', permanent casing
		stickup = 3.15' above ground surface
0715	0840	- drillers work to repair problem with one of the rig leveling jacks
0853		- start drilling with 6" core barrel - 10' in length
	0903	- add additional 10' core barrel
	0930	- push casing and bit to 16.0' (tubular tally = 20.5')
	0800	- am RCT check - nothing to survey, return at 1030, all < background
	0945	- clean out casing to 16'
	0950	- resume drilling - PNNL grab sample from 32-34'
	1005	- add 10' casing (tubular tally = 40.5')
	1007	- resume drilling, push core barrel to 50'
	10:15	- ~~add 10' casing~~ @ 11-17-06 add 15' casing (tubular tally = 55.5'
	1035	- clean out casing to 50'
	1050	- break for lunch
	1040	- well straightness test with 6" x 20' core barrel - pass
	1208	- pull casing back 2' to 48', bottom of hole tagged at 49.5'
	1215	- construct well with 4" stainless steel
		- centralizers installed at top and bottom of screen and 25'
		above the top of the screen - screen is initially set at
		42-47', nominal stickup is 3'
	1240	- add 2 bag 10-20 filter pack sand, pull 8" casing back, remove
		5' casing joint - tubular tally = 50.5', stickup = ~5'

Reported By: Michael E. Caron	Reviewed By: L.D. Walker
Title: Senior Geologist Date: 11-17-06	Title: Geologist Date: 12/13/06
Signature:	Signature:

A-6003-651 (04/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 2 of 2

12-11-06 Continuation Page

Date: 11-17-06

Well Name: ~~C 5352~~ 399-1-25 (12-11-06) Well ID: ~~399-1-25~~ (12-11-06) C5352

Location: 300 - FF - 5 Continuation of Report No.: ~~(2)~~ (1) 11-17-06

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth
	1251	- add 1.5 bags 10-20 filter pack sand, fill level = 39'11"
		- bottom of casing is ~ 45', 5' of overlap
	1325	- drillers lose stainless steel tape on centralizer while retrieving tape - after consultation with Chris Wright, determination was made to leave tape weight in well
	1342	- pull 8" casing back ≈ 3.5' (bottom of casing at 41.5')
	1347	- add bentonite pellets to 7' inside casing - lose 2nd weight (stainless steel bailer) at 34.5' bgs
	1350	- pull off 10' length of casing (8"), tubular tally = 40.5', stickup ≈ 4.5', bottom of casing is ≈ 36' bgs
	1405	- add bentonite pellets to 30' bgs - total = 2.5 buckets
	1406	- pull 8" casing back ~ 5'
	1407	- add bentonite (11-17-06) crumbles (3 bags)
	1410	- pull off 10' length of 8" casing - tubular tally = 30.5'
	1412	- add bentonite crumbles (6 bags), fill depth = 21 ft
	1430	- pull 8" casing back ~ 5'
	1432	- add bentonite crumbles (2 bags)
	1435	- pull off 10' length of 8" casing - tubular tally = 20.5'
	1438	- add bentonite crumbles (2 bags) - fill depth = 10.5'
	1442	- mix 5% bentonite/Portland cement - 2 bags cement + 20 gallons water - inject grout @
	1445	- pull off 10' length of 8" casing - tubular tally = 10.5'
	1447	- inject grout, level is ≈ 3' bgs
	1449	- pull of 10' length of 8" casing + bit - all out
	1505	- measured water level in C5351 at 33.9'
	1520	- left site for day
		- not used @
1205	*1220	Surge well, sand level drops total of 0.25 ft, drops <0.1 ft in last 15 minutes

Reported By: Michael E. Carn

Title: Senior Geologist Date: 11-17-06

Signature:

Reviewed By: L.D. Walker

Title: Geologist Date: 12/13/06

Signature:

A-6003-652 (04/03)

FIELD ACTIVITY REPORT
TUBULAR GOODS TALLY

Page 1 of 1

Date: 11-17-06

Well Name: 399-1-25 | Well ID: C5352

TEMPORARY				PERMANENT*						SCREEN/CAP*		
Jt. #	Length (ft.)	Jt. #	Length (ft.)	Jt. #	Length (ft.)	C	Jt. #	Length (ft.)	C	Jt. #	Length (ft.)	C
1	0.50 (bit)	21		1			21	0.35 (sump)		1		
2	10.00 (casing)	22		2			22	4.99 (screen)	C	2		
3	10.00	23		3			23	10.01 (casing)		3		
4	10.00	24		4			24	10.01 ✓		4		
5	10.00	25		5			25	10.00 ✓	C	5		
6	10.00	26		6			26	10.01 ✓		6		
7	5.00	27		7			27	4.99 ✓		7		
8		28		8			28			8		
9		29		9			29			9		
10		30		10			30			10		
11		31		11			31			11		
12		32		12			32			12		
13		33		13			33			13		
14		34		14			34			14		
15		35		15			35			15		
16		36		16			36			16		
17		37		17			37			17		
18		38		18			38			18		
19		39		19			39			19		
20		40		20			40			20		
Tot	55.50	Tot		Tot			Tot	50.36		Tot		

*Indicate those joints with centralizers with a C in the available box.
ALL Casing length shall be measured to the nearest 0.01 ft.

Comments/Remarks:

Temporary: O.D./I.D. 8"/7.25" | Permanent: O.D./I.D. 4.5" / 4 3/8" | Screen: O.D./I.D. 4.5"/4 3/8"

Core barrel = 7" OD, 6" ID
bit = 6" in length, 8.25" OD, 7.25" ID

Reported By: Michael E. Caron
Title: Senior Geologist | Date: 11-17-06
Signature:

Reviewed By: L.D. Walker
Title: Geologist | Date: 12/13/06
Signature:

A-6003-655 (04/03)

WELL DEVELOPMENT AND TESTING DATA

Well Name: 399-1-25 ~~C5352~~ 12-11-06	Well ID: C5352 ~~399-1-25~~ 12-11-06	Well Location: 300-FF-5	Date: 12-7-06

Reference Measuring Point (unless otherwise noted): TOP OF OUTER CASING (TOC)

Has the well been surveyed? ○ Yes ⊘ No | Does the well have a cement pad? ⊘ Yes ○ No

PART 1

STATIC WATER LEVEL:

Start of Job	35.55
End of Job	33.60

DEPTH TO BOTTOM:

Start of Job	47.2
End of Job	47.2

PART 2

WELL DEVELOPMENT DATA

Pump Model	Rediflow 3
Intake Depth	45'
Starting Turbidity	over limit (>1000)

Pump Start	Stop	Flow Rate
1435	1450	33 gpm

Total Pumped	500 gal.
Final Turbidity	107
XD SN/Range (PSI)	

PART 3

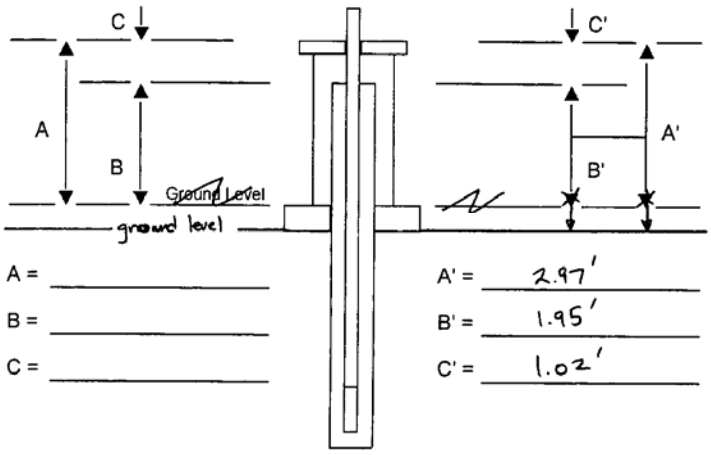
INSTANTANEOUS SLUG TEST

Static Water Level (TOC)	
Transducer Depth	
Baseline Start	
Injection Start	N/A
Baseline Start	
Withdrawal Start	
Slug Volume	
XD SN/Range (PSI)	

PART 4

Last Recorded Measurements Date: NA

Current Measurements Date: 12-6-06



A = _____ A' = 2.97'

B = _____ B' = 1.95'

C = _____ C' = 1.02'

Are there any reference marks on the casing strings? ○ Yes ⊘ No

PART 5

COMMENTS:

Prepared by (print name): Michael E. Caron	Signature:	Date: 12-7-06
Reviewed by (print name): L. D. Walker	Signature:	Date: 12-13-06

A-6003-644 (03/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 1

Date: 12-7-06

Well ID: C5352 | Well Name: 399-1-25

Location: 300-FF-5 | Report No.: (2)

Start	Finish	Total
Time 1405	Time 1455	Time 0050
Hole Depth/Csg NA / NA	Hole Depth/Csg NA / NA	Hole Depth/Csg NA / NA

Reference Measuring Point: GROUND SURFACE

Casing String No. 1 2 3 4 _____ Rod Size: See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
	1405	- decon pump - flowmeter = 9310
	1407	- trip in pump, set pump inlet at ~45', probe = 9.191
	1435	- start test # 9 10 g in 24 sec
		time pH conductivity temp turbidity probe
		1436 7.64 0.482 13.7° over limit 2.906
		1441 7.58 0.487 14.7° 385 1.003
		1446 7.56 0.486 14.8° 155 0.500
		1451 7.50 0.484 14.6° 107 0.034 (out of water?)
	1450	- stop test # 9 - no recovery test
		- drawdown test stopped on advice of PNNL (Williams)
		- flowmeter ~~test~~ = 9810 @ 12-7-06
		Not Used

Reported By: Michael E. Caron | Reviewed By: L.D. Walker

Title: Senior Geologist | Date: 12-7-06 | Title: Geologist | Date: 12-13-06

Signature: | Signature: LD Walker

A-6003-651 (04/03)

WELL CONSTRUCTION SUMMARY REPORT

Start Date: 11-17-06
Finish Date: 11-17-06
Page 1 of 1

Well ID: C5352	Well Name: 399-1-25	Approximate Location:	300-FF-5
Project: Polyphosphate Treatability Test		Other Companies:	GRAM, INC.
Drilling Company: Prosonic		Geologist(s):	Michael E. Caron
Driller: Aaron Adams	License #: 0831		

TEMPORARY CASING AND DRILL DEPTH			DRILLING METHOD	HOLE DIAMETER (in.) / INTERVAL (ft)
*Size/Grade/Lbs. Per Ft.	Interval	Shoe O.D./I.D.	Auger:	Diameter ____ From ____ to ____
8" OD carbon steel	0 - 50	8.25"/7.25"	Cable Tool:	Diameter ____ From ____ to ____
	____ - ____		Air Rotary:	Diameter ____ From ____ to ____
	____ - ____		A.R. w/Sonic:	Diameter ____ From ____ to ____
	____ - ____		Sonic	Diameter 8" From 0 to 50'
	____ - ____			Diameter ____ From ____ to ____
*Indicate Welded (W) - Flush Joint (FJ) Coupled (C) & Thread Design				Diameter ____ From ____ to ____
FJ				

Drilling Fluid:	- none -		
Total Drilled Depth: 50'	Hole Dia @ TD: 50'	Total Amt. Of Water Added During Drilling:	- none -
Well Straightness Test Results:	pass 11-17-06	Static Water Level: 34.3'	Date: 11-20-06

GEOPHYSICAL LOGGING

Sondes (type)	Interval	Date	Sondes (type)	Interval	Date
	____ - ____			____ - ____	
	____ - ____			____ - ____	
	____ - ____			____ - ____	

COMPLETED WELL

Size/Wt./Material	Depth	Thread	Slot Size	Type	Interval Annular Seal/Filter Pack	Volume	Mesh Size
4" stainless	0 - 47.3'		20	10-20 Colorado silica sand	39.9 - 49.5	35 bags	
	____ - ____			bentonite pellets	30 - 39.5	2.5 buckets	
	____ - ____			bentonite crumbles	10.5 - 30	10 bags	
	____ - ____			neat Portland cement	7 - 10.5	20 gal.	
	____ - ____				____ - ____		

OTHER ACTIVITIES

Aquifer Test:	Date:	Well Decommission:	Yes:	No:	Date:
Description:		Description:			

WELL SURVEY DATA (if applicable) Not surveyed at this time

	Protective Casing Elevation:
Washington State Plane Coordinates:	Brass Survey Marker Elevation:

COMMENTS / REMARKS

Reported By:	Title:	Signature:	Date:
Michael E. Caron	Senior Geologist		11-17-06

A-6003-658 (04/03)

Well 399-1-26 (C5353)

WELL SUMMARY SHEET

Start Date: 11-20-06
Finish Date: 11-20-06
Page 1 of 1

Well ID:	C5353	Well Name:	399-1-26
Location:	300-FF-5	Project:	Polyphosphate Treatability Test
Prepared By:	Michael E. Caron	Reviewed By:	L.D. Walker
Date:	12-5-06	Date:	12-13-06
Signature:		Signature:	

CONSTRUCTION DATA

Description	Diagram
8" OD temporary casing	
8"ss protective casing: 3.11ags → 1.58bgs	
0 - 9.0': neat Portland cement grout with 5% bentonite	
9-18.5': bentonite crumbles	
18.5-26.5': 3/8" bentonite pellets	
26.5-50.5': 10-20 mesh Colorado silica sand	
4 3/8" ID ss type 304/316 sch 10 riser: +1.35' → 29'	
4 3/8" ID ss type 304/316 20-slot wire-wrap screen; 29-49'	
4 3/8" ID ss type 304/316 sch.10 sump: 49-49.35'	
All temporary casing removed. Depths in feet below ground surface.	
centralizers	

GEOLOGIC/HYDROLOGIC DATA

Depth in Feet	Graphic Log	Lithologic Description
0		0-0.5': crushed gravel drill pad
		0.5-4': sandy fill
		~~4-18.5': Hanford fm. sandy gravel~~ @ 12-5-07
10		4-7': Hanford fm. silty sandy gravel
		7-18.5': Hanford fm. sandy gravel
		18.5-30': Hanford fm. silty sandy gravel
20		30-48.5': Hanford fm. sandy gravel
		48.5-50.5': Ringold Fm. sandy gravel
30		- water level = 33.8' (11-30-06)
		TD = 50.5'
40		
50		

A-6003-643 (03/03)

BOREHOLE LOG

Page 1 of 2

Date: 11-21-06

Well ID: C5353 | Well Name: 399-1-26 | Location: 300 Area

Project: Polyphosphate Treatability Test | Reference Measuring Point: Ground Surface

Depth (Ft.)	Sample Type No.	Sample Blows Recovery	Graphic Log	Sample Description: Group Name, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl	Comments: Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
0				0-0.5': crushed rock	Sonic drilling w/ 8" O.D. casing w/ an 8¼" O.D. shoe.
				0.5'-4.0': Silty sand m S Med-sort. pl. brown w/ 80% S, 20% M	
				4.0'-7.0': Silty Sandy Gravel (msG) Poorly sorted w/ 50% ang-sub-rnd m-f cobbles & pebbles, 30% m-f ang. S & 20% silt. Light brownish gray (2.5Y, 6/2 dry), dk grayish brn (2.5Y, 4/2, moist).	
5					
10				7.0-18.5': Sandy Gravel (sG) Poorly sorted clast supported w/ 80% m-c sub-rnd. pebbles (mostly basalt) 15-20% S & <5% M. • cobbles present 10'->1g cobble (8" diameter) @ 15' • 9.4' M fraction increases to ~10%	
15					
20				18.5-30': Silty Sandy Gravel Poorly-sort., clast supported w/ up to 70% ang to sub-rnd pebbles/cobbles. Matrix is 15% M / 15% S, dark grey (2.5Y, 4/1), very moist & clay like.	
25				30'-48.5': Sandy Gravel 60% vf-vc pebbles & small cobbles ang-sub-rnd (mostly basalt) w/ 35%-30% ang matic S (>60% basalt) & 5-10% silt. • Silt fraction decreases with depth • S & M decrease with depth • ~40' clast supported 78080 gravel	
30					
35					

Reported By: Jake Horner | Title: Geologist | Signature: Jake Horner | Date: 11-21-06

Reviewed By: L.D. Walker | Title: Geologist | Signature: LD Walker | Date: 12/13/06

A-6003-642 (03/03)

BOREHOLE LOG

Page 2 of 2

Date: 11/21/06

Well ID: C5353 | Well Name: 399-1-26 | Location: 300 Area

Project: Polyphosphate Treatability Test | Reference Measuring Point: Ground Surface

Depth (Ft.)	Sample Type No.	Sample Blows Recovery	Graphic Log	Sample Description: Group Name, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl	Comments: Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
40				48.5' - : Sandy Gravel (sGr) Ringold Fm. - 60-70% well-rnd heterolithic med.-coarse pebbles & small cobbles w/ 30-40% med-fn sub-angular felsic S(>80% felsic) lt olive brn (2.5y, 5/3) w/ 3-5% micas	Start drilling w/ 8" OD. casing w/ an 8¼" OD. shoe
45					
50				TD = 50.5' bgs	

Reported By: Jake Horner | Title: Geologist | Signature: [signature] | Date: 11/21/06

Reviewed By: L.D. Walker | Title: Geologist | Signature: [signature] | Date: 12/13/06

A-6003-642 (03/03)

FIELD ACTIVITY REPORT NO. 1 - DRILLING PLAN

Page 1 of 1

Date: 11-21-06

Purpose: Polyphosphate Treatability Test

Location: 300 Area

Well ID: C5353

Well Name: 399-1-26

Drilling Co.: Prosonic

Rig No.: SR-071

Rig Make/Mod.: Prosonic

Casing String No. (1) 2 3 4	Drilling Method	Circulation	D.H. Hammer
Casing Size 8"/7.25"	Auger	Air ___ Water/Mud ___	Make
Grade	Rotary	Reverse ___ Direct ___	Model
Lbs.Per Ft.	Tubex	Vol: cfm	Choke
Material Carbon Steel	Cable Tool	gpm	Casing Hammer
Type:	Sonic ✓	Pressure ___ psi	Make
Welded ___ (Thd)	A.R. w/Sonic	Drill Pipe O.D.	Model
Planned / Actual	Geoprobe	Tool Joint Size	Bit Size
Set At: ~52' /	Other:	Additives	Type
Shoe OD/ID 8.25"/7.25"			Nozzles
Reference Measuring Point:			Rod Size
GROUND LEVEL			

Drlg. Co. | Rig No.: | Rig Make/Mod.:

Casing String No. 1 (2) 3 4	Drilling Method	Circulation	D.H. Hammer
Casing Size 4"	Auger	Air ___ Water/Mud ___	Make
Grade	Rotary	Reverse ___ Direct ___	Model
Lbs.Per Ft.	Tubex	Vol: cfm	Choke
Material Stainless Steel	Cable Tool	gpm	Casing Hammer
Type:	Sonic	Pressure ___ psi	Make
Welded ___ (Thd)	A.R. w/Sonic	Drill Pipe O.D.	Model
Planned / Actual	Geoprobe	Tool Joint Size	Bit Size
Set At: 49' / 49'	Other:	Additives	Type
Shoe OD/ID n/a			Nozzles
Reference Measuring Point:			Rod Size
GROUND LEVEL			

Comments/Remarks:

4" string is permanent casing

Estimated Depth to Water

~34' bgs

Reported By: Jake Horner

Name/Title: Geologist

Signature: John Horner

Date: 11-21-06

A-6003-650 (04/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Date: 11/21/06

Well ID: C5353 | Well Name: 399-1-26

Location: 300 Area | Report No.: 1

Start	Finish	Total
Time 0630	Time 1535	Time 9 hrs
Hole Depth/Csg Ø / Ø	Hole Depth/Csg 50.5' / 50' ①	Hole Depth/Csg 50.5' / 50'

Reference Measuring Point: GROUND SURFACE

Casing String No. ①② 3 4 ____ See Report No. 1

Rod Size: ① – 8" O.D. Temp. ② – 4.5" O.D. Perm.

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
0630	0650	PRD meeting
0650	0738	Move drill rig from C5358 over to C5353
	0735	Tagged DTW in well C5358 @ 34.1' bgs
0738	0745	Push ~~20'~~ 10' @ 11/21/06 core barrel from Ø'-6' bgs
0745	0755	Push 20' core barrel from 6'-11' bgs
0755	0810	Push to 15.5' & stopped on small boulder
0810	0830	Advancing 20' 8" casing Tolley = 20.5'
		• cleanout while advancing casing
0830	0841	drilling from 15.5' – 36' bgs
0841	0905	Borehole cleanout
0905	0910	Add up & advance casing to ~36' bgs Tolley = 40.5'
0910	0920	drilling from 36' – 50.5' bgs
0920	0945	Borehole cleanout & advance casing to 50' bgs Tolley = 50.5'
0945	1005	Prepare to trip in SS screen & liner (20' screen)
		• Total length screen/cap/riser = 55.29'
1005	1020	Trip in SS
1020	1115	Lunch break
1115	1125	Prep work
1125	1130	Adding 5' stickup to 8" temp. casing
1130	1133	Adding 10-20 mesh silica sand (2 bags) & then set SS string on bottom (~50' bgs)
1133	1138	Trip in surge block tag S @ 44.7' bgs
1138	1145	Surging with temp. casing still on bottom, which doesn't make any sense. (Intv. = 46-49' bgs)

Reported By: Jake Horner | Reviewed By: L.D. Walker

Title: Geologist | Date: 11-21-06 | Title: Geologist | Date: 12/15/06

Signature: Jake Horner | Signature: L.D. Walker

A-6003-651 (04/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Continuation Page

Date: 11-21-06

Well Name: 399-1-26 | Well ID: C5853

Location: 300 Area | Continuation of Report No.: 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth
1145	1150	Stop surging & backpull casing
1150	1207	backpulled 3.5' & add 1 bag sand then resume surging from 46'-49' bgs
		• Sand dropped from 50.7'-50.8' TOC
1207	1213	Backpull casing to 45.5' bgs
1213	1232	Surging 43'-48' bgs
		• Sand dropped from 43.4' to 43.45' in total time
1232	1240	Add 1 bag sand & backpull to 42' bgs, add ½ bag & tag sand @ 40' bgs (2' overlap)
1240	1255	Surging 40-45' bgs, sand dropped to 40.1' bgs in 15 min.
1255		Add 2.5 bags sand & backpull to 35.5' bgs
	1300	& then add 1 bag sand, tag @ 33.2' bgs
1300	1320	Surge 37'-42' bgs, sand dropped 0.3' in 5 min & was stable for 15 min.
1330	1345	Surge 34'-39' (<0.1' in 15 min.)
1320	1330	Added 2.5 bags sand & backpulled to 32.5' bgs
1345	1350	Added 1.5 bags sand & tag @ 26.5' bgs
1350	1354	Add 5gal (1 bucket) bent. pellets (3/8")
1354	1358	Backpull casing to 25' bgs & add ½ bucket pellets
1358	1415	Surging from 33'-38' bgs (DTW = ~~33~~ 34' bgs)
		• No change in tag while surging
1415	1420	Adding 1½ buckets pellets
		• tag @ 19.0' bgs
1420	1422	Backpull casing to 20' bgs
1422	1425	Add 1 bucket pellets
		• tag @ 18.5' bgs
1425	1428	Adding bent. crumbles (3 bags)
1428	1430	Backpull casing to 10' bgs
		• tag @ 9' bgs

Reported By: Jake Horner | Title: Geologist | Date: 11-21-06

Signature: Jake Horner

Reviewed By: L.D. Walker | Title: Geologist | Date: 12/13/06

Signature: LD Walker

A-6003-652 (04/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Continuation Page

Page 3 of 3

Date: 11-21-06

Well Name: 399-1-26

Well ID: ~~C5307~~ C5353 (@ 11-21-06)

Location: 300 Area

Continuation of Report No.: 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth
1430	1430	Prepare to mix grout
1430	1435	Mixing & pumping grout (2 x 94# bags w/ ~ 1 gal. bent.)
1435	1440	Backfill casing 5', check grout level & then remove last 5' of casing
1440	1450	Mixing another batch grout to top off nearby wells
1450	1510	Rinse off ss stickup & hose off drill rig
1510	1535	Move over & set up equipment on next well site (c5357)
		* Removed 4.98' ss casing, leaving 0.5' stickup
		total length ss = 50.27' - 0.5' stickup = 49.77' bgs
		screen interval = 29.42' - 49.45' bgs (@ 11-21-06)
		Summary of backfill: 10-20 s - 26.5' - 50.5'
		Bent. pell. - 18.5' - 26.5'
		Bent. crumb. - 9.0' - 18.5'
		cement - — - 9.0'

not used

11/21/06

Reported By: Jake Horner

Title: Geologist Date: 11-21-06

Signature: John Horner

Reviewed By: L. D. Walker

Title: Geologist Date: 12/13/06

Signature: L D Walker

A-6003-652 (04/03)

WELL DEVELOPMENT AND TESTING DATA

Well Name: 399-1-26 ~~C5353~~ @ 12-11-06	Well ID: C5353 ~~399-1-26~~ @ 12-11-06	Well Location: 300 - FF- 5	Date: 12-6-06

Reference Measuring Point (unless otherwise noted): TOP OF OUTER CASING (TOC)

Has the well been surveyed? ○ Yes ⊘ No | Does the well have a cement pad? ⊘ Yes ○ No

PART 1

STATIC WATER LEVEL:

Start of Job	34.4'
End of Job	not measured

DEPTH TO BOTTOM:

Start of Job	not measured
End of Job	not measured

PART 2

WELL DEVELOPMENT DATA

Pump Model	Rediflow 3
Intake Depth	45' ± 38'
Starting Turbidity	38.0 ± 3.67 NTU

Pump Start	Stop	Flow Rate
1000	1101	26.6 gpm
1119	1214	26.2 gpm

Total Pumped	3060 gal
Final Turbidity	2.24 ± 1.21 NTU
XD SN/Range (PSI)	

PART 3

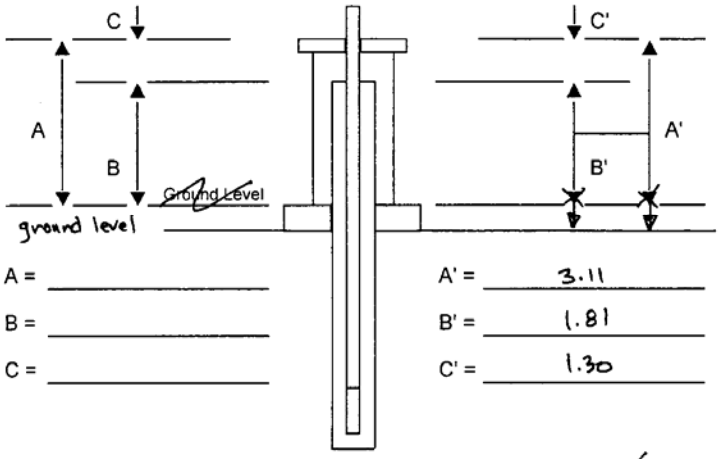
INSTANTANEOUS SLUG TEST

Static Water Level (TOC)	
Transducer Depth	
Baseline Start	
Injection Start	N/A
Baseline Start	
Withdrawal Start	
Slug Volume	
XD SN/Range (PSI)	

PART 4

Last Recorded Measurements Date: NA

Current Measurements Date: 12-6-06



A = _____ A' = 3.11

B = _____ B' = 1.81

C = _____ C' = 1.30

Are there any reference marks on the casing strings? ○ Yes ⊘ No

PART 5

COMMENTS:

Prepared by (print name): Michael E. Caron	Signature: Senior Geologist	Date: 12-6-06
Reviewed by (print name): L. D. Walker	Signature: L D Walker	Date: 12-13-06

A-6003-644 (03/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 2 @ 12-6-06

Date: 12-6-06

Well ID: C5353	Well Name: 399-1-26
Location: 300-FF-5	Report No.: (2)

Start	Finish	Total
Time 0730	Time 1220	Time 0450
Hole Depth/Csg NA / NA	Hole Depth/Csg NA / NA	Hole Depth/Csg NA / NA

Reference Measuring Point: GROUND SURFACE

Casing String No. 1 2 3 4 ____ Rod Size: See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
	0730	- on site
	0755	- well head measurements: protective
		1. permanent casing above concrete pad = 2.65'
		2. pad = 0.46'
		3. top of protective casing to top of 4" permanent casing = 1.3', @12-6-06 protect permanent casing stick up is 1.76'
		- water level = 34.4', initial probe reading = 10.906'
	0805	calibrations: standard / reading
		① turbidity meter: 4.37 / 4.38
		(Hach 2100P) 43.0 / 42.9
		54.5 / 54.5
		② pH meter: 7.00 / 7.04
		10.00 / 10.13
		③ conductivity meter: 14.19 / @12-16-06 ~~14.04~~ 14.15
		(Orion 135 A)
		- probe is 1.9' above center of pump inlet screen, inlet @ 45' bgs
	1000	- start test #1 (drawdown) - start pump at 10.00, 26 gpm.

time	pH	conductivity	turbidity	temp. (°C)	probe
1003	7.13	0.493 mS	38.0 NTU	14.3°	
1008	7.63	0.482 mS	12.0 ✓	15.2°	
1013	@12-6-06 ~~8.~~ 7.58	0.481 ✓	8.23 ✓	15.2°	
1019	7.54	0.481 ✓	4.83 ✓	@12-6-06 ~~7.54~~ 14.7°	11.234
1025	7.57	0.482 ✓	3.65 ✓	14.7°	11.252
1030	7.51	0.484	3.53 ✓	14.6°	11.285

Reported By: Michael E. Caron		Reviewed By: L. D. Walker	
Title: Senior Geologist	Date: 12-6-06	Title: Geologist	Date: 12-13-06
Signature:		Signature:	

A-6003-651 (04/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Continuation Page

Date: 12-6-06

Well Name: ~~C5353~~ 12-11-06 399-1-26

Well ID: ~~399-1-26~~ 12-11-06 C5353

Location: 300-FF-5

Continuation of Report No.: (2)

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth

time	pH	conductivity	turbidity	temp (°C)	probe
1035	7.50	0.482 mS	3.31 NTU	15.1°	11.315
1040	7.54	0.482 ✓	3.15 ✓	14.8°	11.359
1045	7.55	0.483 ✓	2.83	14.8°	11.395
1050	7.53	0.479 ✓	2.39	15.0°	11.413
1055	7.55	0.481 ✓	2.44	14.9°	11.461
1100	7.60	0.480 ✓	2.24	14.9°	11.443
1101		- start recovery test (test #2)			
1112		- end recovery test - probe = 11.608'			
		- total water pumped = 1620 gal = 27 gpm			
1115		- pull pump up 7', inlet at 38' bgs			
1119		- test #3 - initial probe reading = 4.153'			

time	pH	conductivity	turbidity	temp (°C)	probe
12-6-06 1124	7.54	0.482 mS	3.67 NTU	14.0°	4.230
@ ~~1129~~ 1129	7.55	0.482 ✓	1.88 ✓	14.8°	4.313
1134	7.61	0.481 ✓	1.47 ✓	15.0°	4.381
1139	7.62	0.481 ✓	2.65 ✓	15.0°	4.455
1144	7.66	0.484 ✓	1.28 ✓	14.9°	4.517
1149	7.48	0.481 ✓	1.14 ✓	15.3°	4.550
1154	7.60	0.482 ✓	1.07 ✓	14.9°	4.648
1159	7.64	0.483 ✓	1.29 ✓	14.9°	4.704
1204	7.65	0.484 ✓	1.27 ✓	15.2°	4.778
1209	7.55	0.480 ✓	1.36 ✓	14.8°	4.828
1214	7.64	0.483 ✓	1.21	14.5°	4.876
1219		start recovery test #4, flow meter = 3090 gal.			
1220		end test #4, probe = 5.079'			

Not Used @

Reported By: Michael E. Carm

Title: Senior Geologist Date: 12-6-06

Signature:

Reviewed By: L.D. Walker

Title: Geologist Date: 12/12/06

Signature:

A-6003-652 (04/03)

FIELD ACTIVITY REPORT

TUBULAR GOODS TALLY

Page 1 of 1

Date: 11-21-06

Well Name: 399-1-26 | Well ID: C5353

TEMPORARY				PERMANENT*						SCREEN/CAP*		
Jt. #	Length (ft.)	Jt. #	Length (ft.)	Jt. #	Length (ft.)	C	Jt. #	Length (ft.)	C	Jt. #	Length (ft.)	C
1	0.5' bit	21		1	9.99	C	21			1	0.35 cap	C
2	10.0'	22		2	10.0		22			2	9.98 screen	
3	10.0'	23		3	10.0	C	23			3	9.99 screen	C
4	10.0'	24		4	~~9.98~~ 4.98		24			4		
5	10.0'	25		5	RD 11-21-06		25			5		
6	10.0'	26		6			26			6		
7		27		7			27			7		
8		28		8			28			8		
9		29		9			29			9		
10		30		10			30			10		
11		31		11			31			11		
12		32		12			32			12		
13		33		13			33			13		
14		34		14			34			14		
15		35		15			35			15		
16		36		16			36			16		
17		37		17			37			17		
18		38		18			38			18		
19		39		19			39			19		
20		40		20			40			20		
Tot	50.5	Tot		Tot	~~39.97~~ 35.97'		Tot			Tot	20.32'	

*Indicate those joints with centralizers with a C in the available box. RD 11-21-06

ALL Casing length shall be measured to the nearest 0.01 ft.

Comments/Remarks:

Temporary: O.D./I.D. 8" / 7.25" | Permanent: O.D./I.D. 4" ID sched. 10 | Screen: O.D./I.D. 4" ID

Shoe = 0.5' with 8.25"/7.25" O.D./I.D

Core barrel = 7"/6" O.D./I.D.

Reported By: Jake Horner | Reviewed By: L. D. Walker

Title: Geologist | Date: 11-21-06 | Title: Geologist | Date: 12/13/06

Signature: Jake Horner | Signature: LD Walker

A-6003-655 (04/03)

WELL CONSTRUCTION SUMMARY REPORT

Start Date: 11-21-06
Finish Date: 11-21-06
Page 1 of 1

Well ID: C5353	Well Name: 399-1-26	Approximate Location: 300 Area	
Project: Polyphosphate Treatability Test		Other Companies: GRAM, FH	
Drilling Company: Prosonic		Geologist(s): J. Horner	
Driller: Aaron Adams	License #: 0871		

TEMPORARY CASING AND DRILL DEPTH			DRILLING METHOD	HOLE DIAMETER (in.) / INTERVAL (ft)
*Size/Grade/Lbs. Per Ft.	Interval	Shoe O.D./I.D.	Auger:	Diameter ____ From ____ to ____
8"	0 - 50.5'	8¼" / 7¼"	Cable Tool:	Diameter ____ From ____ to ____
	____ - ____		Air Rotary:	Diameter ____ From ____ to ____
	____ - ____		A.R. w/Sonic:	Diameter ____ From ____ to ____
	____ - ____		Sonic	Diameter 8" From 0 to 50.5
	____ - ____			Diameter ____ From ____ to ____
*Indicate Welded (W) - Flush Joint (FJ) Coupled (C) & Thread Design				Diameter ____ From ____ to ____

		Drilling Fluid: NA	
Total Drilled Depth: 50.5'	Hole Dia @ TD: 8¼"	Total Amt. Of Water Added During Drilling: NA	
Well Straightness Test Results:		Static Water Level: 33.8'	Date: 11-30-06

GEOPHYSICAL LOGGING

Sondes (type)	Interval	Date	Sondes (type)	Interval	Date
	____ - ____			____ - ____	
	____ - ____			____ - ____	
	____ - ____			____ - ____	

COMPLETED WELL

Size/Wt./Material	Depth	Thread	Slot Size	Type	Interval Annular Seal/Filter Pack	Volume	Mesh Size
4" stainless	0 - 49.8		20	~~bentonite pellets~~ @ 11-21-06	____ - ____		
	____ - ____			10-20 silica sand	26.5 - 50.5		
	____ - ____			bentonite pellets	18.5 - 26.5		
	____ - ____			bentonite crumbles	9 - 18.5		
	____ - ____			neat Portland cement	____ - ~~10~~ 9 @ 11-21-06		

OTHER ACTIVITIES

Aquifer Test:	Date:	Well Decommission:	Yes:	No:	Date:
Description:		Description:			

WELL SURVEY DATA (if applicable) not yet surveyed at this time

	Protective Casing Elevation:
Washington State Plane Coordinates:	Brass Survey Marker Elevation:

COMMENTS / REMARKS

Reported By:	Title:	Signature:	Date:
J. Horner	Geologist	John Horner	12-4-06

A-6003-658 (04/03)

Well 399-1-27 (C5354)

WELL SUMMARY SHEET

Start Date: 11-28-06
Finish Date: 11-29-06
Page 1 of 1

Well ID:	C5354	Well Name:	399-1-27
Location:	300-FF-5	Project:	Polyphosphate Treatability Test
Prepared By:	Michael E. Caron	Date: 12-5-06	Reviewed By: L. D. Walker	Date: 12/13/06
Signature:	MEC	Signature:	LDW

CONSTRUCTION DATA

Description	Diagram
8" OD temporary casing	
8" protective casing: 3.18' ags → 1.82' bgs	
0 - 10': neat Portland cement grout with 5% bentonite	
4 3/8" ID SS type 304/316 sch. 10 riser: +1.92' → 42'	
4 3/8" ID SS type 304/316 20-slot wire wrap screen: 42 - 47'	
4 3/8" ID SS type 304/316 sch. 10 sump: 47 - 47.35'	
10 - 28.5': bentonite crumbles	
28.5 - 38': 3/8" bentonite pellets	
38 - 48.1': 10-20 mesh Colorado silica sand	
48.1 - 50': 3/8" bentonite pellets	
All temporary casing removed. Depths in feet below ground surface.	
centralizers	

GEOLOGIC/HYDROLOGIC DATA

Depth in Feet	Graphic Log	Lithologic Description
0		0-0.5': crushed gravel drill pad
		0.5-5': fill, sand, gravel, crushed gravel
		5-20': Hanford fm. sandy gravel
10		
		20-24': Hanford fm. silty sandy gravel, clay-altered
20		24-26': Hanford fm. sandy gravel
		26-28.5': Hanford fm. silty sandy gravel, clay-altered
30		28.5-48': Hanford fm. sandy gravel
		48-50': Ringold fm. sand
40		- water level = 34.9'
		- TD = 50'
50		

A-6003-643 (03/03)

BOREHOLE LOG

Page 1 of 2
Date: 11-28-06

Well ID: C5354 | Well Name: 399-1-27 | Location: 300-FF-5

Project: Pdyphosphate Treatability Test | Reference Measuring Point: ground surface

Depth (Ft.)	Sample Type No.	Sample Blows Recovery	Graphic Log	Sample Description: Group Name, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl	Comments: Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
0				0-0.5': gravel pad	sonic, ~~mud~~ 7"
				0.5-5.0: fill (gravel, sand, crushed rock)	drive barrel
				5.0-20': sandy gravel (sG), med. to coarse sand, coarse to v. coarse from 10-16', cobbles up to 5" in diameter, mostly well-rounded basalt	
5					
				20-24: silty sandy gravel (msG), strong clay alteration	
10					
				24-26': sandy gravel (sG), coarse sandy matrix, mostly basalt cobbles to 2", poorly sorted	
15					
				26-28.5': silty sandy gravel (msG), strong clay alteration	
				28.5-36': sandy gravel (sG), cobbles to ~ 2", well-rounded, poorly sorted, mostly basalt	
20					
				36-48': sandy gravel (sG), cobbles variable to ~ 3", mostly well-rounded basalts, med. to coarse sand matrix	
25					
30					
35					

Reported By: Michael E. Caron | Reviewed By: L.D. Walker

Title: Senior Geologist | Title: Geologist

Signature: [signature] | Date: 11-28-06 | Signature: [signature] | Date: 12/13/06

A-6003-642 (03/03)

BOREHOLE LOG

Page 2 of 2
Date: 11-28-06

Well ID: C5354	Well Name: (@ 11-28-06) C 399-1-27	Location: 300-FF-5
Project: Polyphosphate Treatability Test		Reference Measuring Point: ground surface

Depth (Ft.)	Sample Type No.	Sample Blows Recovery	Graphic Log	Sample Description: Group Name, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl	Comments: Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
40				36-48': sandy gravel (sG), cobbles variable to 3" diameter, mostly well-rounded basalt, med. to coarse sand matrix	sonic, 7" drive barrel
45					
50				48-50': Ringold Fm. sand with relatively sparse gebbles (S) - strongly oxidized from 48-49', grey unoxidized sands from 49-50'	

Reported By: Michael E. Caron		Reviewed By: L.D. Walker	
Title: Senior Geologist		Title: Geologist	
Signature:	Date: 11-28-06	Signature:	Date: 12/14/06

A-6003-642 (03/03)

FIELD ACTIVITY REPORT NO. 1 - DRILLING PLAN

Page 1 of 1

Date: 11-28-06

Purpose: Polyphosphate Treatability Test

Location: 300 - FF - 5

Well ID: C5354

Well Name: 399-1-27

Drilling Co.: Prosonic

Rig No.: SR-071

Rig Make/Mod.: Prosonic Sonic Rig

Casing String No. (1) 2 3 4	Drilling Method	Circulation	D.H. Hammer
Casing Size 8"	Auger	Air ____ Water/Mud ____	Make
Grade	Rotary	Reverse ____ Direct ____	Model
Lbs.Per Ft. 35	Tubex	Vol: cfm	Choke
Material Carbon steel	Cable Tool	gpm	Casing Hammer
Type:	Sonic	Pressure ____ psi	Make
Welded ____ (Thd.)	A.R. w/Sonic	Drill Pipe O.D.	Model
Planned / Actual	Geoprobe	Tool Joint Size	Bit Size
Set At: 50±2 / 50.5	Other:	Additives	Type
Shoe OD/ID 8.25" / 7.25"			Nozzles
Reference Measuring Point: GROUND LEVEL			Rod Size

Drig. Co.	Rig No.:	Rig Make/Mod.:

Casing String No. 1 2 3 4	Drilling Method	Circulation	D.H. Hammer
Casing Size	Auger	Air ____ Water/Mud ____	Make
Grade	Rotary	Reverse ____ Direct ____	Model
Lbs.Per Ft.	Tubex	Vol: cfm	Choke
Material	Cable Tool	gpm	Casing Hammer
Type:	Sonic	Pressure ____ psi	Make
Welded ____ Thd.	A.R. w/Sonic	Drill Pipe O.D.	Model
Planned / Actual	Geoprobe	Tool Joint Size	Bit Size
Set At: /	Other:	Additives	Type
Shoe OD/ID			Nozzles
Reference Measuring Point: GROUND LEVEL			Rod Size

Comments/Remarks:

Estimated Depth to Water

Reported By: Michael E. Caron

Name/Title: Senior Geologist

Signature:

Date: 11-29-06

A-6003-650 (04/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 1

Date: 11-28-06

Well ID: C 5354	Well Name: 399 - 1 - 37
Location: 300 - FF - 5	Report No.: ~~1~~ @ 11-28-06 (1)

Start	Finish	Total
Time 0904	Time 1400	Time 0456
Hole Depth/Csg -0- / -0-	Hole Depth/Csg 50.0 / 36	Hole Depth/Csg 50.0 / 36

Reference Measuring Point: GROUND SURFACE

Casing String No. (1) 2 3 4 ____ Rod Size: 8" casing
See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
	0904	- commence driving 7" drive barrel, advance to 16'
	0930	- am RCT & IHT check, all ok
	0935	- add 6" bit + 10' of 8' casing
	0937	- add 10' of casing, drive to 16', problems with boulders
	1002	- resume drilling with 7" drive barrel, clean out to 16'
	1012	- add 20' rods, drive barrel advanced to 36'
	1030	- add 20' 8" casing, drive to 36', clean out
	1040	- add 20' drilling rods, drive 7" drive barrel to ~ 45'
	1100	- shut down due to problem with sonic drill head - driller will tear down & inspect after lunch
	1045	- site visit from C. Wright, W. Thackaberry, J. Borghese, + one other FH took lead
	1345	- resume drilling, push core barrel to TD (50')
	1400	- rig needs gasket on head, driller will replace in the morning. - done for day - left site

Not Used @

Reported By: Michael E. Caron		Reviewed By: L.D. Walker	
Title: Senior Geologist	Date: 11-28-06	Title: Geologist	Date: 12-13-06
Signature:		Signature:	

A-6003-651 (04/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 2

Date: 11-29-06

Well ID: C5354	Well Name: 399-1-27
Location: 300-FF-5	Report No.: @ 11-29-06 (8) (2)

Start	Finish	Total
Time 0830	Time 1150	Time 320
Hole Depth/Csg 50.5 / 36	Hole Depth/Csg 50.5 / 0	Hole Depth/Csg 0 / -36

Reference Measuring Point: GROUND SURFACE

Casing String No. 1 2 3 4 _____ Rod Size: See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
	0830	- geologist on site, drillers finishing installation of gaskets on drilling head.
	0840	- trip out drive barrel string
	0843	- add 15 ft of 8" casing - tubular tally = 55.5'
	0847	- pull off 5' length of 8" casing - tubular tally = 50.5'
		- stickup is ~ 1.5', bit is set at ~ 49' bgs
	0850	- clean out borehole to depth of 49' bgs
	0938	- trip in stainless steel permanent casing, centralizers installed at top and bottom of screen and at 12' bgs, stickup is set at 3.3' (3' 4"), bottom of screen is at 47' bgs
	0730	- am RCT check - nothing to survey
	1005	- add 1.5 buckets of bentonite pellets - bottom of hole = 48.1'
	1010	- add 3 bags of sand @ 11-29-06
	1012	- put back on 5' length of 8" casing, pull casing back 5', remove 5' casing
		bottom of casing at ~~45'~~ @ 11-29-06 44'
1025	1040	- surge interval from 47 - 44', sand fell out < 0.1' in 15 min.
		- sand level is ~ ~~38'~~ @ 11-29-06 38' bgs
	1050	- add bentonite pellets (1.5 buckets)
	1052	- remove 10' length of casing, tally = 40.5', 5' stickup
	1055	- add 2 buckets of bentonite pellets, tag bottom at 28.5'
	1057	- ~~remove 10' length of casing~~ @ 11-29-06 pull casing back 5'
	1058	- add 3 bags of bentonite crumbles
	1100	- remove 10' length of casing, tally = 30.5', 5' stickup
	1105	- add 3 bags of bentonite crumbles

Reported By: Michael E. Caron		Reviewed By: L. D. Walker	
Title: Senior Geologist	Date: 11-29-06	Title: Geologist	Date: 12-13-06
Signature:		Signature:	

A-6003-651 (04/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Continuation Page

Date: 11-29-06

Well Name: ~~C5354~~ 12-11-06 399-1-27

Well ID: ~~399-1-27~~ 12-11-06 C5354

Location: 300-FF-5

Continuation of Report No.: ~~1~~ 11-29-06 (2)

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth
	1106	- pull casing back 5'
	1107	- add 3 bags of bentonite crumbles
	1110	- pull of 10' of casing, tally = 20.5', stick up = 5'
	1114	- pull casing back 5'
	1115	- add 1/2 bag of bentonite crumbles, bottom tagged at 10' bgs
	1120	- mix grout for surface seal, 20 gal. water, 2 sacks Portland cement, 5% ~~gyp~~ 11-29-06 bentonite
	1030	- ~~gyp~~ @ 11-29-06 visit from Prssmic mgr
	1125	- inject grout
	1128	- mix additional grout (20 gal. water, 2 sacks Portland cement, 5% bentonite, inject at well C5357, grout level brought to 2' bgs
	1131	- remove 10' length of casing, tally = 10.5', stickup = 5'
	1134	- inject additional grout at well C5354
	1142	- remove remaining 10' of casing and bit - all out of hole
	1150	- break for lunch
		Not Used @

Reported By: Michael E. Caron

Title: Senior Geologist Date: 11-29-06

Signature:

Reviewed By: L.D. Walker

Title: Geologist Date: 12-13-06

Signature:

A-6003-652 (04/03)

WELL DEVELOPMENT AND TESTING DATA

Well Name: 399-1-27 ~~C5354~~ @ 12-11-06	Well ID: C5354 ~~399-1-27~~ @ 12-11-06	Well Location: 300 – ~~FF~~ – 5	Date: 12-7-06

Reference Measuring Point (unless otherwise noted): TOP OF OUTER CASING (TOC)

Has the well been surveyed? ○ Yes ⊘ No | Does the well have a cement pad? ⊘ Yes ○ No

PART 1

STATIC WATER LEVEL:

Start of Job	34.90
End of Job	

DEPTH TO BOTTOM:

Start of Job	@ ~~12-7-06~~ ~~37.05~~ 46.3
End of Job	46.3

PART 2

WELL DEVELOPMENT DATA

Pump Model	Rediflow 3
Intake Depth	45'
Starting Turbidity	over limit (> 1000)

Pump Start	Stop	Flow Rate
1204	1342	2.3 gpm

Total Pumped	230 gal
Final Turbidity	47.2
XD SN/Range (PSI)	5219 / 20 psi

PART 3

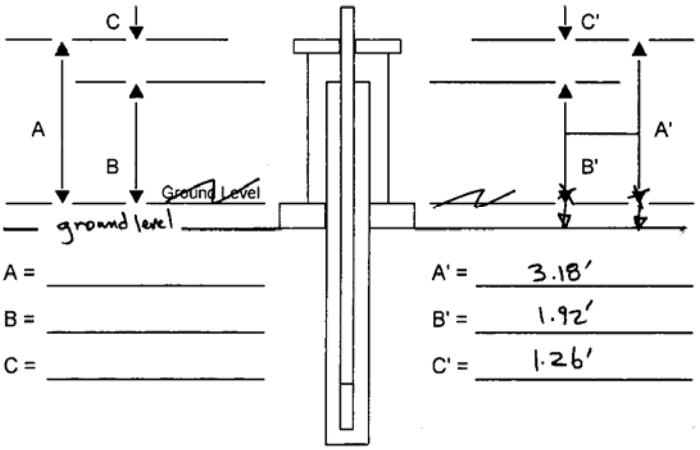
INSTANTANEOUS SLUG TEST

Static Water Level (TOC)	
Transducer Depth	
Baseline Start	
Injection Start	N/A
Baseline Start	
Withdrawal Start	
Slug Volume	
XD SN/Range (PSI)	

PART 4

Last Recorded Measurements Date: NA

Current Measurements Date: 12-6-06



A = _____ A' = 3.18'

B = _____ B' = 1.92'

C = _____ C' = 1.26'

Are there any reference marks on the casing strings? ○ Yes ⊘ No

PART 5

COMMENTS:

Prepared by (print name): Michael E. Carm	Signature:	Date: 12-7-06
Reviewed by (print name): L.D. Walker	Signature:	Date: 12/13/06

A-6003-644 (03/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 1

Date: 12-7-06

Well ID: ~~C5355~~ C5354 (@ 1207)

Well Name: 399-1-~~28~~ 27 (@ 1207)

Location: 300 - FF - 5

Report No.: (3)

Start	Finish	Total
Time 1204	Time 1254	Time 0050
Hole Depth/Csg NA / NA	Hole Depth/Csg NA / NA	Hole Depth/Csg NA / NA

Reference Measuring Point: GROUND SURFACE

Casing String No. 1 2 3 4 _____ Rod Size: See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)						
	1204	- start test #7, flowmeter = 9080, probe = 9.137						
		time	pH	conductivity	temp.	turbidity	probe	
		1206	8.19	0.842	12.9	offscale	0.088	(out of water.)
		1212 (@ 1209)	7.95	0.603	14.9°	✓	0.077	✓
		1218	7.85	0.547	16.1°	666	0.063	✓
		1226	7.82	0.526	15.7°	433	0.087	✓
		1231	7.81	0.516	15.7°	440	0.091	✓
		1236	7.80	0.509	15.5°	292	0.103	✓
		1241	7.79	0.504	15.4°	214	0.061	✓
		1246	7.85	0.498	15.7°	183	0.062	✓
		1252	7.76	0.499	15.3°	139	0.070	✓
		1302	7.81	0.492	15.1°	69.8	0.075	✓
		1307	7.77	0.496	15.4°	98.5	0.069	✓
		1312	7.75	0.492	15.8°	66.1	0.073	✓
		1317	7.70	0.496	15.2°	105	0.067	✓
		1322	7.68	0.497	15.6°	101	0.069	✓
		1327	7.73	0.495	15.4°	71.5	0.067	✓
		1332	7.75	0.491	15.9°	65.4	0.067	✓
		1337	7.75	0.492	14.8°	@ 1207 47.2	0.066	✓
	1342	- stop test #7, flowmeter = 9310, 2.3 gpm						
	1342	- start test #8						
	1354	- stop test #8						
		@ Not Used						

Reported By: Michael E. Carm

Title: Senior Geologist Date: 12-7-06

Signature:

Reviewed By: L.D. Walker

Title: Geologist Date: 12-13-06

Signature:

A-6003-651 (04/03)

FIELD ACTIVITY REPORT

TUBULAR GOODS TALLY

12-11-06 ~~C-5354~~ 399-1-27 @ 12-11-06

Page 1 of 1

Date: 11-28-06

Well Name: ~~C-5354~~ 399-1-27 @ Well ID: ~~399-1-27~~ @ C 5354

	TEMPORARY			PERMANENT*						SCREEN/CAP*		
Jt. #	Length (ft.)	Jt. #	Length (ft.)	Jt. #	Length (ft.)	C	Jt. #	Length (ft.)	C	Jt. #	Length (ft.)	C
1	0.5 (bit)	21		1			21	10.00 (casing)		1	0.35 (cap)	
2	10.00 (casing)	22		2			22	10.00 ✓		2	4.99 (scr.)	
3	10.00 ✓	23		3			23	10.00 ✓		3		
4	10.20 ✓	24		4			24	9.99 ✓		4		
5	10.00 ✓	25		5			25	5.00 ✓		5		
6	5.00 ✓	26		6			26			6		
7	10.00	27		7			27			7		
8		28		8			28			8		
9		29		9			29			9		
10		30		10			30			10		
11		31		11			31			11		
12		32		12			32			12		
13		33		13			33			13		
14		34		14			34			14		
15		35		15			35			15		
16		36		16			36			16		
17		37		17			37			17		
18		38		18			38			18		
19		39		19			39			19		
20		40		20			40			20		
Tot	55.5'	Tot		Tot			Tot	44.99		Tot	5.34	

*Indicate those joints with centralizers with a C in the available box.
ALL Casing length shall be measured to the nearest 0.01 ft.

Comments/Remarks:

Temporary: O.D./I.D. 8" / 7.25' | Permanent: O.D./I.D. 4.5" / 4 3/8" | Screen: O.D./I.D. 4.5" / 4 3/8"

bit = 6" in length, OD = 8.25", ID = 7.25"

drive barrel = 7" OD, 6" ID

Reported By: Michael E. Caron
Title: Senior Geologist Date: 11-28-06
Signature:

Reviewed By: L.D. Walker
Title: Geologist Date: 12/14/06
Signature: LD Walker

A-6003-655 (04/03)

WELL CONSTRUCTION SUMMARY REPORT

Start Date: 11-28-06
Finish Date: 11-29-06
Page 1 of 1

Well ID: C5354	Well Name: 399-1-27	Approximate Location:	300-FF-5
Project: Polyphosphate Treatability Test		Other Companies:	FH, GRAM
Drilling Company: Prosonic		Geologist(s):	M.E. Caron
Driller: Aaron Adams	License #: 2831		

TEMPORARY CASING AND DRILL DEPTH			DRILLING METHOD	HOLE DIAMETER (in.) / INTERVAL (ft)
*Size/Grade/Lbs. Per Ft.	Interval	Shoe O.D./I.D.		
8" / 35	0 - 50.5	8.25" / 7.25"	Auger:	Diameter ____ From ____ to ____
	____ - ____		Cable Tool:	Diameter ____ From ____ to ____
	____ - ____		Air Rotary:	Diameter ____ From ____ to ____
	____ - ____		A.R. w/Sonic:	Diameter ____ From ____ to ____
	____ - ____		Sonic	Diameter 8 From 0 to 50.5
	____ - ____			Diameter ____ From ____ to ____
*Indicate Welded (W) - Flush Joint (F.J) Coupled (C) & Thread Design				Diameter ____ From ____ to ____

		Drilling Fluid:	— none —
Total Drilled Depth: 50.5'	Hole Dia @ TD: 8.25'	Total Amt. Of Water Added During Drilling:	- none -
Well Straightness Test Results: pass (20'x7" drive barrel)		Static Water Level: 34.9'	Date: 11-29-06

GEOPHYSICAL LOGGING

Sondes (type)	Interval	Date	Sondes (type)	Interval	Date
	____ - ____			____ - ____	
	____ - ____			____ - ____	
	____ - ____			____ - ____	

COMPLETED WELL

Size/Wt./Material	Depth	Thread	Slot Size	Type	Interval Annular Seal/Filter Pack	Volume	Mesh Size
4" stainless steel	0 - 47.3		20	bentonite pellets	48.1 - 50	1.5 buckets	
	____ - ____			10-20 Colorado silica sand	38 - 48.1	3 bags	
	____ - ____			bentonite pellets	28.5 - 38	3.5 buckets	
	____ - ____		bentonite granules	~~10-20 Colorado silica sand~~ @ 11-29-06	10 - 28.5	8.5 bags	
	____ - ____			Portland cement grout	____ - 10		

OTHER ACTIVITIES

Aquifer Test:	Date:	Well Decommission:	Yes:	No:	Date:
Description: NA		Description: NA			

WELL SURVEY DATA (if applicable) Not yet surveyed at this time

	Protective Casing Elevation:
Washington State Plane Coordinates:	Brass Survey Marker Elevation:

COMMENTS / REMARKS

Reported By: Michael E. Caron Title: Senior Geologist Signature: Date: 11-29-06

A-6003-658 (04/03)

Well 399-1-28 (C5355)

WELL SUMMARY SHEET

Start Date: 11-29-06
Finish Date: 11-30-06
Page 1 of 1

Well ID: C5355	Well Name: 399-1-28
Location: 300-FF-5	Project: Polyphosphate Treatability Test
Prepared By: Michael E. Caron	Date: 12-5-06
Reviewed By: L. D. Walker	Date: 12/14/06
Signature:	Signature:

CONSTRUCTION DATA

Description	Diagram
8" OD temporary casing	
8" protective casing: 3.12' ags → 1.88' bgs	
0-10': neat Portland cement grout with 5% bentonite	
4 3/8" ID ss type 304/316 sch 10 riser: +1.86 → 32'	
4 3/8" ID ss type 304/316 20-slot wire wrap screen: 32 → 37'	
4 3/8" ID ss type 304/316 sch. 10 sump: 37 → 37.35'	
10 → 22': bentonite crumbles	
22 → 30': 3/8" bentonite pellets	
30 → 39': 10-20 mesh Colorado silica sand	
39 → 40.5': 3/8" bentonite pellets	
All temporary casing removed.	
Depths in feet below ground surface (bgs).	
c c centralizers	

GEOLOGIC/HYDROLOGIC DATA

Depth in Feet	Graphic Log	Lithologic Description
0		
		0-0.5': crushed gravel drill pad
		0.5-4.5': fill; crushed rock, sand, sparse gravel @ 12-8-06
		4.5-9': Hanford fm. sandy gravel
10		9-10': Hanford fm. silty sandy gravel, clay-altered
		10-27: Hanford fm. sandy gravel
20		
		27-30: Hanford fm. silty sandy gravel, clay-altered
30		30-40.5': Hanford fm., sandy gravel
		- water level = 34.0'
40		- TD = 40.5'
50		

A-6003-643 (03/03)

BOREHOLE LOG

Page 1 of 2
Date: 11-29-06

Well ID: C5355 | Well Name: 399-1-28 | Location: 300 - FF - 5

Project: Polyphosphate Treatability Test | Reference Measuring Point: ground surface

Depth (Ft.)	Sample Type No.	Sample Blows Recovery	Graphic Log	Sample Description: Group Name, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl	Comments: Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
0				0-0.5': gravel pad	sonic, 7" drive barrel
				0.5-2': crushed rock fill, sandy matrix	
				2-4.5': sand with sparse pebbles - probably fill	
5				4.5-9': sandy gravel (sG), mod. sand matrix, cobbles to ~3" max, sub- to well-rounded, mostly basalt	
10				9-10': silty sandy gravel (msG), silts altered to clay	
				10-27': sandy gravel (sG) mod. to coarse sand, cobbles to 6", sub- to well-rounded, mostly basalt. 11-29-06	
15					
				27-30': silty sandy gravel, strong clay alteration (msG)	
20				30-36': sandy gravel (sG), generally coarse sand matrix, cobbles up to 4" in diameter, locally matrix zones (<1') with pebbles <1", pebbles mostly basalt, sub-rounded to well-rounded	
25					
				36-40.5': sandy gravel (sG) as above	
30					
35					

Reported By: Michael E. Carm | Title: Senior Geologist | Signature: [signature] | Date: 11-29-06

Reviewed By: L.D. Walker | Title: Geologist | Signature: [signature] | Date: 12/14/06

A-6003-642 (03/03)

BOREHOLE LOG

Page 2 of 2

Date: 11-29-06

Well ID: C5355 | Well Name: 399-1-28 | Location: 300-FF-5

Project: Polyphosphate Treatability Test | Reference Measuring Point: ground surface

Depth (Ft.)	Sample Type No.	Sample Blows Recovery	Graphic Log	Sample Description: Group Name, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl	Comments: Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
40				30-40.5': Sandy gravel (sG)	sonic, 7" drive barrel
					TD = 40.5'
45					
50					

Reported By: Michael E. Carm | Title: Senior Geologist | Signature: | Date: 11-27-06

Reviewed By: L.D. Walker | Title: Geologist | Signature: | Date: 12/14/06

A-6003-642 (03/03)

FIELD ACTIVITY REPORT NO. 1 - DRILLING PLAN

Page 1 of 1

Date: 11-29-06

Purpose: Polyphosphate Treatability Test

Location: 300 - FF-5

Well ID: C5355

Well Name: 399-1-28

Drilling Co.: Bill Pro Sonic

Rig No.: SR-071

Rig Make/Mod.: Prosonic Sonic rig

Casing String No. (1) 2 3 4	Drilling Method	Circulation - none -	D.H. Hammer
Casing Size 8"	Auger	Air ____ Water/Mud ____	Make
Grade	Rotary	Reverse ____ Direct ____	Model
Lbs.Per Ft. 35	Tubex	Vol: cfm	Choke
Material carbon steel	Cable Tool	gpm	Casing Hammer
Type:	Sonic ✓	Pressure ____ psi	Make
Welded ____ (Thd.)	A.R. w/Sonic	Drill Pipe O.D.	Model
Planned / Actual	Geoprobe	Tool Joint Size	Bit Size
Set At: /	Other:	Additives	Type
Shoe OD/ID 8.25"/7.25"			Nozzles
Reference Measuring Point: GROUND LEVEL			Rod Size

Drig. Co.	Rig No.:	Rig Make/Mod.:

Casing String No. 1 2 3 4	Drilling Method	Circulation	D.H. Hammer
Casing Size	Auger	Air ____ Water/Mud ____	Make
Grade	Rotary	Reverse ____ Direct ____	Model
Lbs.Per Ft.	Tubex	Vol: cfm	Choke
Material	Cable Tool	gpm	Casing Hammer
Type:	Sonic N	Pressure ____ psi	Make
Welded ____ Thd.	A.R. w/Sonic A	Drill Pipe O.D.	Model
Planned / Actual	Geoprobe	Tool Joint Size	Bit Size
Set At: /	Other:	Additives	Type
Shoe OD/ID			Nozzles
Reference Measuring Point: GROUND LEVEL			Rod Size

Comments/Remarks:

Estimated Depth to Water 34'

Reported By: Michael E. Carm

Name/Title: Senior Geologist

Signature:

Date: 11-29-06

A-6003-650 (04/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 1

Date: 11-29-06

Well ID: C5355	Well Name: 399-1-28
Location: 300-FF-5	Report No.: ~~1~~ @ 11-29-06 (1)

Start	Finish	Total
Time 1305	Time 1630	Time 325
Hole Depth/Csg 0 / 0	Hole Depth/Csg ~~40.5~~ / 33	Hole Depth/Csg 40.5 / 33

Reference Measuring Point: GROUND SURFACE

Casing String No. (1) 2 3 4 ____ Rod Size: 8"
See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
	1305	- commence drilling with 7" drive barrel, drive to 16'
	1325	- add bit + 10' of 8" casing, tally = 10.5'
	1328	- add 10' of casing, tally = 20.5', advance to 16'
	1342	- PMPCT check - all < 2x background
	1345	- advance drive barrel to 36'
	1405	- add 20' of casing, tally = 40.5', advance to ~~36~~ 37' @ 11-29-06
	1415	- advance drive barrel to 40.5'
	1450	- trip in 4" stainless steel string, centralizers at top and bottom of screen and at 12' bgs, bottom of screen set at 37' (3.3' of stickup)
	1520	- add 1/2 bucket of bentonite, 3 bags of sand
	1530	- add 5' casing joint, pull casing back 4', remove 5' joint - bottom of casing at 33', tally = 40.5'
	1430	- PM IHT check - all less than detection
1555	1610	- surge interval from 33-37', sand fell out less tho 0.1' in 15 minutes
	1630	- left site
		Not Used @

Reported By: Michael E. Caron		Reviewed By: L.D. Walker	
Title: Senior Geologist	Date: 11-29-06	Title: Geologist	Date: 12/14/06
Signature:		Signature:	

A-6003-651 (04/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Date: 11-30-06

Well ID: C5355	Well Name: 399-1-28
Location: 300 - ~~FF~~ 5	Report No.: ~~10~~ @ 11-30-06 (2)

Start	Finish	Total
Time 0630	Time 0917	Time 0247
Hole Depth/Csg 50.5 / 33	Hole Depth/Csg 50.5 / 0	Hole Depth/Csg 6 / -33

Reference Measuring Point: GROUND SURFACE

Casing String No. (1) 2 3 4 ____ Rod Size: 8"
See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
	0630	- PoD at site trailer (TBTR, 3 drillers, geologist)
	0732	- add 1.5 bags of sand, tag level at 30'
	0734	- add 1.5 buckets of bentonite pellets
	0738	- remove 10' length of casing, tubular tally = 30.5',
		stickup = 5', bottom of casing at 25.5'
	0742	- add 2 buckets of bentonite pellets, tag bottom at 21.5'
	0746	- add 1 bags of bentonite crumbles
	0748	- remove 10' length of ~~bentonite~~ @ 10-30-06 casing, tally = 20.5', stickup
		= 5', bottom of casing at 15.5'
	0752	- add 2 bags of bentonite crumbles, bring level to 10'
	0754	- ~~remove 10' length of~~ @ 11-30-06 pull casing back 5', stickup = 9', bottom
		of casing is at 11.5'
	0805	- remove all casing from hole
		- not enough water left in tank on truck to mix grout
	0820	- rig offsite to fill water tank
	0830	- water levels : C5353 = 33.5'
		C5357 = 34.5'
		C5351 = @ 11-30-06 ~~34.8~~ 34.3
		C5352 = ~~34.8~~ 34.3
		C5358 = 34.0
	0847	- drill rig back on site
	0908	- mix grout (20 gal water, 2 sacks Portland cement, 5# bentonite
	0915	- inject grout
	0915	- PNNL/Duratek on site to pull pump in original well

Reported By: Michael E. Carm		Reviewed By: L.D. Walker	
Title: Senior Geologist	Date: 11-30-06	Title: Geologist	Date: 12/14/06
Signature:		Signature:	

A-6003-651 (04/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Continuation Page

Page 2 of 2

Date: 11-30-06

Well Name: ~~C5355 @ 12-11-06~~ 399-1-28

Well ID: ~~399-1-28 @ 12-11-06~~ C5355

Location: 300 - FF - 5

Continuation of Report No.: 11-30-06 ~~(1)~~ (2)

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth
	0917	- mix additional grout, injection at C5354 and C5355.
		- rig set up on C5356

Not Used @

Reported By: Michael E. Caron

Title: Senior Geologist Date: 11-30-06

Signature:

Reviewed By: L.D. Walker

Title: Geologist Date: 12/14/06

Signature:

A-6003-652 (04/03)

WELL DEVELOPMENT AND TESTING DATA

Well Name: 399-1-28 ~~C5355~~ @ 12-11-06	Well ID: C5355 ~~399-1-28~~ @ 12-11-06	Well Location: 300-FF-5	Date: 12-7-06

Reference Measuring Point (unless otherwise noted): TOP OF OUTER CASING (TOC)

Has the well been surveyed? ○ Yes ⊘ No | Does the well have a cement pad? ⊘ Yes ○ No

PART 1

STATIC WATER LEVEL:

Start of Job	34.15
End of Job	34.00

DEPTH TO BOTTOM:

Start of Job	37.05
End of Job	37.05

PART 2

WELL DEVELOPMENT DATA

Pump Model	Rediflow 3
Intake Depth	35'
Starting Turbidity	870

Pump Start	Stop	Flow Rate
1059	1131	20 gpm

Total Pumped	640 gal
Final Turbidity	18.9
XD SN/Range (PSI)	

PART 3

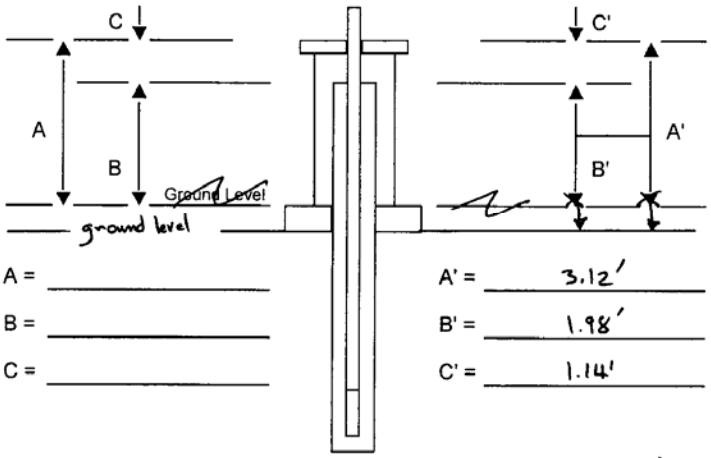
INSTANTANEOUS SLUG TEST

Static Water Level (TOC)	
Transducer Depth	
Baseline Start	
Injection Start	
Baseline Start	NA
Withdrawal Start	
Slug Volume	
XD SN/Range (PSI)	

PART 4

Last Recorded Measurements Date: NA

Current Measurements Date: 12-7-06



A = ____ A' = 3.12'

B = ____ B' = 1.98'

C = ____ C' = 1.14'

Are there any reference marks on the casing strings? ○ Yes ⊘ No

PART 5

COMMENTS:

Prepared by (print name): Michael E. Caron	Signature:	Date: 12-7-06
Reviewed by (print name): L.D. Walker	Signature:	Date: 12-14-06

A-6003-644 (03/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 1

Date: 12-7-06

Well ID: ~~C5354~~ 12-7-06 @ C5355

Well Name: 399-1-~~37~~ 12-7-06 @ 28

Location: 300 - FF - 5

Report No.: (3)

Start	Finish	Total
Time 1059	Time 1141	Time 0042
Hole Depth/Csg NA / NA	Hole Depth/Csg NA / NA	Hole Depth/Csg NA / NA

Reference Measuring Point: GROUND SURFACE

Casing String No. 1 2 3 4 ____ Rod Size: See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
	1059	- start test # 5 - flowmeter = 8440
		time pH conductivity temp turbidity probe
		1104 7.53 0.491 mS 15.5°C 870 NTU 0.079
		1109 7.52 0.487 15.3° 340 0.095
		1114 7.52 0.485 15.2° 67.6 0.081
		1119 7.51 0.485 14.9° 33.5 0.108
		1124 7.50 0.486 14.9° 24.7 0.117
		1129 7.52 0.485 14.8° 18.9 0.111
	1131	- stop test # 5 - flowmeter = 9050, 610 gal., 20 gpm
	1131	- start test # 6
	1141	- stop test # 6
	note:	* - probe is most likely out of the water for this drawdown, datalogger data may be suspect.
		- flowmeter = 9050
		Not Used @

Reported By: Michael E. Carm

Title: Senior Geologist Date: 12-7-06

Signature:

Reviewed By: L.D. Walker

Title: Geologist Date: 12/14/06

Signature:

A-6003-651 (04/03)

FIELD ACTIVITY REPORT

TUBULAR GOODS TALLY

Page 1 of 1

Date: 11-29-06

Well Name: ~~C5355~~ @ 12-11-06 399-1-28

Well ID: ~~399-1-28~~ @ 12-11-06 C5355

TEMPORARY				PERMANENT*						SCREEN/CAP*		
Jt. #	Length (ft.)	Jt. #	Length (ft.)	Jt. #	Length (ft.)	C	Jt. #	Length (ft.)	C	Jt. #	Length (ft.)	C
1	0.5 (bit)	21		1			21	9.99 (casing)		1	0.34 (cap)	
2	10.00 (casing)	22		2			22	10.00 ✓		2	4.98 (scr)	
3	10.00 ✓	23		3			23	10.00 ✓		3		
4	10.00 ✓	24		4			24	4.49 ✓		4		
5	10.00	25		5			25	~~5.00~~ @ 10-29-06		5		
6		26		6			26			6		
7		27		7			27			7		
8		28		8			28			8		
9		29		9			29			9		
10		30		10			30			10		
11		31		11			31			11		
12		32		12			32			12		
13		33		13			33			13		
14		34		14			34			14		
15		35		15			35			15		
16		36		16			36			16		
17		37		17			37			17		
18		38		18			38			18		
19		39		19			39			19		
20		40		20			40			20		
Tot	40.5	Tot		Tot			Tot	~~34.98~~ @ 10-29-06		Tot	5.32	

*Indicate those joints with centralizers with a C in the available box.
ALL Casing length shall be measured to the nearest 0.01 ft.

Comments/Remarks:

Temporary: O.D./I.D. 8"/7.25" | Permanent: O.D./I.D. 4.5"/4 3/8" | Screen: O.D./I.D. 4.5"/4 3/8"

bit = 6" in length, OD = 8.25", ID = 7.25"

drive barrel - 7" OD, 6" ID

Reported By: Michael E. Caron
Title: Senior Geologist Date: 11-29-06
Signature:

Reviewed By: L.D. Walker
Title: Geologist Date: 12/14/06
Signature: L.D. Walker

A-6003-655 (04/03)

@ 11-30-06

WELL CONSTRUCTION SUMMARY REPORT

Start Date: 11-29-06
Finish Date: 11-30-06
Page 1 of 1

Well ID: C5355	Well Name: 399-1-28	Approximate Location:	300 - FF-5
Project: Polyphosphate Treatability Test		Other Companies:	FH, GRAM
Drilling Company: Prosonic		Geologist(s):	M. E. Caron
Driller: Aaron Adams	License #: 0871		

TEMPORARY CASING AND DRILL DEPTH			DRILLING METHOD	HOLE DIAMETER (in.) / INTERVAL (ft)
*Size/Grade/Lbs. Per Ft.	Interval	Shoe O.D./I.D.		
8"/carbon steel/35	0 - 40.5	8.25"/7.25"	Auger:	Diameter ____ From ____ to ____
	____ - ____		Cable Tool:	Diameter ____ From ____ to ____
	____ - ____		Air Rotary:	Diameter ____ From ____ to ____
	____ - ____		A.R. w/Sonic:	Diameter ____ From ____ to ____
	____ - ____		Sonic	Diameter 8.25 From 0 to 40.5
	____ - ____			Diameter ____ From ____ to ____
*Indicate Welded (W) - Flush Joint (FJ) Coupled (C) & Thread Design				Diameter ____ From ____ to ____

Total Drilled Depth: 40.5	Hole Dia @ TD: 8.25"	Drilling Fluid:	- none -
Well Straightness Test Results:	Pass - 20' x 7" drive barrel	Total Amt. Of Water Added During Drilling:	- none -
		Static Water Level: 34.0	Date: 11-30-06

GEOPHYSICAL LOGGING

Sondes (type)	Interval	Date	Sondes (type)	Interval	Date
	____ - ____			____ - ____	
	____ - ____			____ - ____	
	____ - ____			____ - ____	

COMPLETED WELL

Size/Wt./Material	Depth @ 11-30-06	Thread	Slot Size	Type	Interval Annular Seal/Filter Pack	Volume	Mesh Size
4" / stainless steel	0 - ~~40.5~~			bentonite pellets	~~38~~ - ~~40.5~~	1/2 bucket	
	____ - ~~37.3~~			10-20 silica sand	30 - 38	4.5 bags	
	____ - ____			bentonite pellets	21.5 - 30	2 buckets	
	____ - ____			bentonite pellets (@ 1.50 dry crumbles)	10 - 21.5	3 bags	
	____ - ____			Portland cement grout	____ - 10	20 gal.	

OTHER ACTIVITIES

Aquifer Test:	Date:	Well Decommission:	Yes:	No:	Date:
Description: NA		Description: NA			

WELL SURVEY DATA (if applicable)

Not yet surveyed at this time

	Protective Casing Elevation:
Washington State Plane Coordinates:	Brass Survey Marker Elevation:

COMMENTS / REMARKS

Reported By:	Title:	Signature:	Date:
Michael E. Caron	Senior Geologist		11-30-06

A-6003-658 (04/03)

Well 399-1-29 (C5356)

WELL SUMMARY SHEET

Start Date: 11-30-06
Finish Date: 12-1-06
Page 1 of 1

Well ID:	C5356	Well Name:	399-1-29
Location:	300-FF-5	Project:	Polyphosphate Treatability Test
Prepared By:	Michael E. Caron	Date: 12-8-06	
Reviewed By:	L. D. Walker	Date: 12/14/06	
Signature:		Signature:	

CONSTRUCTION DATA

Description	Diagram
8" OD temporary casing	
8" protective casing: 3.21 ags → 1.79' bgs	
0 → 10': neat Portland cement grout with 5% bentonite	
4 3/8" ID SS type 304/316 sch. 10 riser: +1.86' @ 12-8 → 29'	
4 3/8" ID SS type 304/316 20-slot wire wrap screen: 29 → 49'	
4 3/8" ID SS type 304/316 sch. 10 sump: 49 → 49.35'	
10 → 19': bentonite crumbles	
19 → 26.7': 3/8" bentonite pellets	
26.7 → 50': 10-20 mesh Colorado silica sand	
50 → 51': 3/8" bentonite pellets	
All temporary casing removed	
Depths in feet below ground surface.	
centralizers	

GEOLOGIC/HYDROLOGIC DATA

Depth in Feet	Graphic Log	Lithologic Description
0		
		0-0.5': gravel drill pad (crushed)
		0.5-5.5': fill; sand, gravel, crushed rock
		5.5-10': Hanford fm. sandy gravel
10		10-11': Hanford fm. silty sandy gravel, clay-altered
		11-25': Hanford fm. sandy gravel
20		
		25-26': Hanford fm. silty sandy gravel, clay-altered
		26-29': Hanford fm. sandy gravel
30		29-30': Hanford fm. silty sandy gravel, clay-altered
		30-49': Hanford fm. sandy gravel
40		
		Fm. @ 12-8-06
		49-51': Ringold fm. Sand
		@ 12-8-06
50		
		- water level = 35.0'
		TD = 51'

A-6003-643 (03/03)

BOREHOLE LOG

Page 1 of 2

Date: 11-30-06

Well ID: C5356 | Well Name: 399-1-29 | Location: 300 - FF - 5

Project: Polyphosphate Treatability Test | Reference Measuring Point: ground surface

Depth (Ft.)	Sample Type No.	Sample Blows Recovery	Graphic Log	Sample Description: Group Name, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl	Comments: Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
0					Sonic, 7" drive barrel
				0-0.5': gravel pad	
				0.5-2': fill - crushed rock, sand and gravel	
5				2-4.0': fill - sand with sparse small pebbles	
				4.0'-4.5' ÷ fill - crushed rock	
				4.5-5.5: sandy fill	
10				~~5.5-15'~~ @ 11-30-06	
				5.5-16': sandy gravel (sG), medium sand, cobbles to 2-4", avg. 1-2", well-rounded, mostly basalt, clay-rich layer (silts?) from 10-11' (msG layer?)	
15				16-25: sandy gravel (sG), med. sand, poorly sorted cobbles to ~3", well rounded, mostly basalt	
				25-26: silty sandy gravel (msG) with strong clay component	
20				26-~~30~~ 29 @ 11-30-06: sandy gravel (sG), coarse sand matrix, cobbles 1-2" in diameter, sub-rounded, mostly basalt	
25				29-30: silty sandy gravel (msG) with strong clay component	
				30-49: sandy gravel (sG), coarse sand matrix, cobbles 1-3" in diameter, generally well-rounded	
30					
35					

Reported By: Michael E. Caron | Title: Senior Geologist | Signature: [signature] | Date: 11-30-06

Reviewed By: L.D. Walker | Title: Geologist | Signature: [signature] | Date: 12/14/06

A-6003-642 (03/03)

BOREHOLE LOG

Page 2 of 2

Date: 11-30-06

Well ID: C5356 | Well Name: 399-1-29 | Location: 300 - FF-5

Project: Polyphosphate Treatability Test | Reference Measuring Point: ground surface

Depth (Ft.)	Sample Type No.	Sample Blows Recovery	Graphic Log	Sample Description: Group Name, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl	Comments: Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
40				30-49': sandy gravel (sG), coarse sand matrix, cobbles 1-3" in diameter, generally well-rounded	Sonic, 7" drive barrel
45					
50				49-51': sand (S) with sparse pebbles to ~0.5" - Ringold, well-oxidized, med. sand	TD = 51'

Reported By: Michael E. Carm | Title: Senior Geologist | Signature: | Date: 11-30-06

Reviewed By: L.D. Walker | Title: Geologist | Signature: | Date: 12/14/06

A-6003-642 (03/03)

FIELD ACTIVITY REPORT NO. 1 - DRILLING PLAN

Page 1 of 1

Date: 11-30-06

Purpose: Polyphosphate Treatability Test

Location: 300 - FF - 5

Well ID: C5356

Well Name: 399-1-29

Drilling Co.: Prosonic

Rig No.: SR-071

Rig Make/Mod.: Prosonic Sonic Rig

Casing String No. (1) 2 3 4	Drilling Method	Circulation NA	D.H. Hammer NA
Casing Size 8"	Auger	Air ___ Water/Mud ___	Make
Grade	Rotary	Reverse ___ Direct ___	Model
Lbs.Per Ft. 35	Tubex	Vol: cfm	Choke
Material Carbon steel	Cable Tool	gpm	Casing Hammer
Type:	Sonic ✓	Pressure ___ psi	Make
Welded ___ (Thd.)	A.R. w/Sonic	Drill Pipe O.D.	Model
Planned / Actual	Geoprobe	Tool Joint Size	Bit Size
Set At: /	Other:	Additives	Type
Shoe OD/ID			Nozzles
Reference Measuring Point: GROUND LEVEL			Rod Size

Drlg. Co. | Rig No.: | Rig Make/Mod.:

Casing String No. 1 2 3 4	Drilling Method	Circulation	D.H. Hammer
Casing Size	Auger	Air ___ Water/Mud ___	Make
Grade	Rotary	Reverse ___ Direct ___	Model
Lbs.Per Ft.	Tubex	Vol: cfm	Choke
Material	Cable Tool	gpm	Casing Hammer
Type:	Sonic NA	Pressure ___ psi	Make
Welded ___ Thd.	A.R. w/Sonic	Drill Pipe O.D.	Model
Planned / Actual	Geoprobe	Tool Joint Size	Bit Size
Set At: /	Other:	Additives	Type
Shoe OD/ID			Nozzles
Reference Measuring Point: GROUND LEVEL			Rod Size

Comments/Remarks:

Estimated Depth to Water

Reported By: Michael E. Caron

Name/Title: Senior Geologist

Signature:

Date: 11-30-06

A-6003-650 (04/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Date: 11-30-06

Well ID: C5356	Well Name: 399-1-29
Location: 300-FF-5	Report No.: (1)

Start	Finish	Total
Time 0943	Time 1600 11-30-06	Time 0617
Hole Depth/Csg -0- / -0-	Hole Depth/Csg @ 11-30-06 ~~47~~ 51 / @ ~~51~~ 46	Hole Depth/Csg 51 / 46

Reference Measuring Point: GROUND SURFACE

Casing String No. (1) 2 3 4 ____ Rod Size: 8"
See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
	0943	- commence drilling with 7" drive barrel - advance to 16'
	1002	- AM IHT survey 11-30-06 - all less than detection
	1015	- add 20.5' of ~~18~~ 8" casing, advance to 16' bgs
	1016	- AM RCT survey - all sediments < 2x background
	1030	- resume drilling with 7" drive barrel, advance to 36'
	1045	- add 20' of casing, tally = 40.5', advance to 36'
	1100	- resume drilling with 7" drive barrel, advance to 51' (TD)
	1120	- add 10' of casing, advance to 50.5'
	1155	- install 4" casing string, 20' of 20-slot screen set at 49-29', centralizers set at top and bottom of screen and at 10' bgs, stickup set at 6'4" (6.35')
	1220	- break for lunch
	1315	- add 1/2 bucket of bentonite pellets, tag bottom at 50'
	1317	- add sand (2 bags)
	1325	- permanent casing came up ~3' while extracting permanent casing - drillers will extract stainless steel permanent casing, clean out hole, and reinstall - drillers pumped in ~200 gal. of potable water to free up the screen
	1517	- add 1/2 bucket of bentonite pellets, tag bottom at 50'
	1518	- add 2 bags of sand
	1523	- pull casing back 2'
	1524	- add 1.5 bags sand
	1526	- pull casing back 1' (3' of screen exposed)
1540	1545	- surge interval from 49-46', sand fell less than 0.1' in 15 minutes

Reported By: Michael E. Carm		Reviewed By: L.D. Walker	
Title: Senior Geologist	Date: ~~12-1-06~~ @ 11-30-06	Title: Geologist	Date: 12/14/06
Signature:		Signature:	

A-6003-651 (04/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Continuation Page

Page 2 of 2

Date: 11-30-06

Well Name: ~~C-5356 @ 12-11-06~~ 399-1-29

Well ID: ~~399-1-29 @ 12-11-06~~ C5356

Location: 300 - FF- 5

Continuation of Report No.: (1)

Time/Depth		Description of Activities/Operations with Depth
From	To	
	1600	- left site for day

Not Used @

Reported By: Michael E. Carm		Reviewed By: L.D. Walker	
Title: Senior Geologist	Date: 11-30-06	Title: Geologist	Date: 12/14/06
Signature:		Signature:	

A-6003-652 (04/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 2

Date: 12-1-06

Well ID: C5356	Well Name: 399-1-29
Location: 300-FF-5	Report No.: (2)

Start	Finish	Total
Time 0630	Time 1030	Time 0400
Hole Depth/Csg ~~47~~ 51 @12-1-06 / ~~51~~ 47 @12-1-06	Hole Depth/Csg 51 / ~47	Hole Depth/Csg 0 / ~47

Reference Measuring Point: GROUND SURFACE

Casing String No. (1) 2 3 4 ____ See Report No. 1 Rod Size: 8"

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
	0630	- POD at site trailer (three drilling crew, BTR, geologist)
	0735	- add 1 bag sand
	0742	- pull casing back, stickup = 6.5', ~~screen~~ casing @12-6-06 exposed from 44-49'
0745	0800	- surge interval from 44-47', sand fell out less than 0.1' in 15 minutes
	0804	- add 1 bags of sand
	0806	- pull casing back ~3', stickup = 8.5', screen exposed from 42-49'
	0808	- add 1/2 bag of sand
0814	0830	- surge interval from 42-45', sand fell out less than 0.1' in 15 minutes
	0833	- add 2 bags sand
	0835	- pull off 10' length of casing, tally = 40.5', stickup = 5', bottom of casing @12-1-06 = 35.5', screen exposed from 35.5'-49'
	0840	- add 1 ~~1/2~~ bag sand, sand level at 33' bgs
0847	0902	- surge interval from 38-42', sand fell out less than 0.1' in 15 minutes
	0904	- add 1.5 bags sand
	0906	- pull casing back 2', screen exposed from 33.5-49'
0910	0925	- surge interval from 34-38', sand fell out less than 0.1' in 15 minutes
	0928	- add ~~1.5~~ 1.0 @12-6-06 bags sand
	0930	- pull casing back 3', add 1/2 bag sand, tag bottom at 26.7'
	0933	- add 2 bucket of bentonite pellets
	0937	- remove 10' length of casing, tubular tally = 30.5', stickup = 5'
	0940	- add 1/2 bucket bentonite pellets
	0942	- add ~~1~~ 1/2 @12-6-06 bags bentonite crumbles

Reported By: Michael E. Caron		Reviewed By: L.D. Walker	
Title: Senior Geologist	Date: 12-1-06	Title: Geologist	Date: 12/14/06
Signature: MEC		Signature: LD Walker	

A-6003-651 (04/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Continuation Page

Page 2 of 2

Date: 12-1-06

Well Name: ~~C5356 @ 12-11-06~~ 399-1-26

Well ID: C5356 ~~399-1-29 @ 12-11-06~~ @ 12-1-06

Location: 300-~~FF~~-5

Continuation of Report No.: (3)

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth
	0945	- pull casing back 3'
	0947	- add 2 bags ~~bentonite~~ crumbles - obvious "hole" in taking more bentonite than anticipated
	0951	- remove 10' length of casing, tubular tally = 20.5', stickup = 5'
	0956	- add 2 bags bentonite crumbles
	0959	- pull casing back 3'
	10.05	- mix grout (2 sacks Portland cement, 20 gal. water, 5% ~~bentonite~~)
	1007	- inject grout at C5356
	1009	- mix grout (2 sacks Portland cement, 20 gal. water)
	1010	- inject grout at C5354 and C5355
	1019	- remove 10' length of casing - tally = 10.5'
	1021	- remove 10.5 of casing - all out of hole
	1030	- rig moved to well C5359

Not Used @

Reported By: Michael E. Caron

Title: Senior Geologist Date: 12-1-06

Signature:

Reviewed By: L.D. Walker

Title: Geologist Date: 12/14/06

Signature: LD Walker

A-6003-652 (04/03)

WELL DEVELOPMENT AND TESTING DATA

Well Name: 399-1-29 C5356 @ 12-11-06	Well ID: C5356 399-1-29 @ 12-11-06	Well Location: 300-FF-5	Date: 12-7-06

Reference Measuring Point (unless otherwise noted): TOP OF OUTER CASING (TOC)

Has the well been surveyed? ○ Yes ⊘ No

Does the well have a cement pad? ⊘ Yes ○ No

PART 1

STATIC WATER LEVEL:

Start of Job	35.0
End of Job	34.15

DEPTH TO BOTTOM:

Start of Job	49.2
End of Job	49.1

PART 2

WELL DEVELOPMENT DATA

Pump Model	Rediflow 3
Intake Depth	45' / 38'
Starting Turbidity	17.0 / 4.78

Pump Start	Stop	Flow Rate
0740	0847	19 gpm
0905	1013	19 gpm

Total Pumped	2580 gal.
Final Turbidity	6.25 / 1.32
XD SN/Range (PSI)	

PART 3

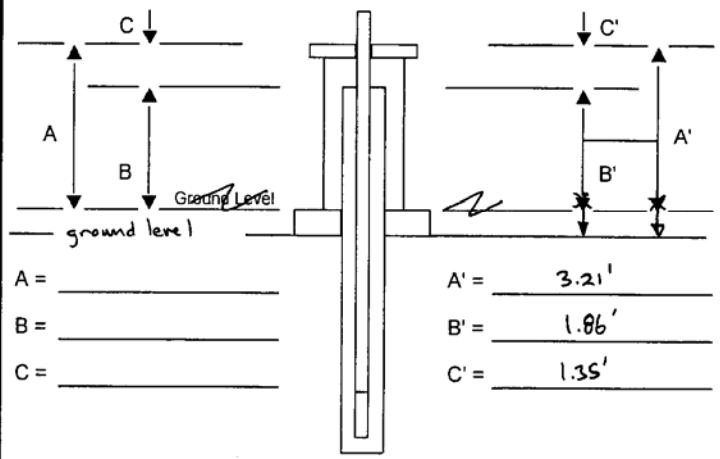
INSTANTANEOUS SLUG TEST

Static Water Level (TOC)	
Transducer Depth	
Baseline Start	N/A
Injection Start	
Baseline Start	
Withdrawal Start	
Slug Volume	
XD SN/Range (PSI)	

PART 4

Last Recorded Measurements Date: NA

Current Measurements Date: 12-7-06



A = _____ A' = 3.21'

B = _____ B' = 1.86'

C = _____ C' = 1.35'

Are there any reference marks on the casing strings? ○ Yes ⊘ No

PART 5

COMMENTS:

Prepared by (print name): Michael E. Carm	Signature:	Date: 12-7-06
Reviewed by (print name): L.D. Walker	Signature:	Date: 12-14-06

A-6003-644 (03/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Date: 12-7-06

Well ID: C5356	Well Name: 399-1-29
Location: 300-FF-5	Report No.: (3)

Start	Finish	Total
Time 0630	Time 1032	Time 0402
Hole Depth/Csg NA / NA	Hole Depth/Csg NA / NA	Hole Depth/Csg NA / NA

Reference Measuring Point: GROUND SURFACE

Casing String No. 1 2 3 4 _____ Rod Size: See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
	0630	-POD at site trailer (3 drill crew, BTR, 2 geologists)
	0720	- instrument calibration
		① turbidity meter — standard 4.37 — reading ~~4.52~~ 4.49
		standard 43.0 — reading 43.8
		standard 545 — reading 549
		② pH meter — standard 10.0 — reading 10.12
		standard 7.0 — reading 7.13
		③ Conductivity Meter — standard 1.419 — reading 1.406
	0735	- initial probe reading = 10.675, flow meter 5750
	0740	- Test #1 started

time	pH	conductivity	temp	turbidity	probe
0745	7.32	0.489	14.0°	17.0	10.528
0750	7.49	0.482	14.3°	7.03	10.535
0755	7.48	0.479	14.4°	4.94	10.543
0800	7.51	0.478	14.3°	11.5	10.562
0805	7.60	0.483	14.2°	5.91	10.593
0810	7.60	0.484	14.4°	8.33	10.787
0815	7.61	0.484	14.0°	6.22	10.642
0820	7.60	0.481	14.4°	7.21	10.671
0825	7.60	0.484	14.3°	6.72	10.685
0830	7.61	0.491	14.4°	6.60	10.652
0835	7.60	0.486	14.2°	5.84	10.690
0840	7.62	0.481	14.2°	5.62	10.699

Reported By: Michael E. Carm	Reviewed By: L.D. Walker
Title: Senior Geologist — Date: 12-7-06	Title: Geologist — Date: 12/14/06
Signature:	Signature:

A-6003-651 (04/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Continuation Page

Page 2 of 2

Date: 12-7-06

Well Name: ~~C5356 @ 12-11-06~~ 399-1-29

Well ID: ~~399-1-29 @ 12-11-06~~ C5356

Location: 300-FF-5

Continuation of Report No.: (3)

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth
		Time pH cond. temp. turb. Probe
		845 7.61 0.482 14.3° 6,25 10.873
	0847	Test #2 started Recover for 10 min.
		Test #2 Stopped @ 0900
	0900	Raised pump up 7' Prepping to begin 2nd pump interval
	0903	Initial probe reading = 3.502 , Flowmeter 7040
	0905	Test #3 started
		Time: pH: Conductivity temp. turb. probe.
		0910 7.70 0.480 13.8° 4.78 3.562
		0915 7.61 0.482 15.2° 3.03 3.603
		0920 7.62 0.483 14.4° 2.19 3.683
		0925 7.66 0.484 14.5° 1.81 3.719
		0930 7.65 0.485 14.5° 1.73 3.796
		0935 7.66 0.483 14.3° 1.48 3.867
		0940 7.66 0.483 14.5° 1.66 3.891
		0945 7.60 0.484 14.6° 1.43 3.891
		0950 7.62 0.485 14.6° 1.76 4.029
		0955 7.66 0.483 14.5° 1.30 4.105
		10:00 7.63 0.482 14.4° 1.31 4.156
		10:05 7.66 0.483 14.6° 1.35 4.242
		10:10 7.63 0.481 14.4° 1.32 4.295
	10:13	Test #4 @ 12-7-06 started Recovery for 10 min.
	10:25	Flow meter = 8830
	10:26	Test #4 stopped Back pulling pump
	10:30	Tagged water @ ~~33'.995~~ 34' 1.5"
	10:32	Decon Pump
		Not Used

Reported By: Michael E. Caron

Title: Senior Geologist Date: 12-7-06

Signature:

Reviewed By: L.D. Walker

Title: Geologist Date: 12/14/06

Signature:

A-6003-652 (04/03)

FIELD ACTIVITY REPORT

TUBULAR GOODS TALLY

Page 1 of 1

Date: 11-30-06

Well Name: C5356 @ 12-11-06 399-1-29 Well ID: ~~399-1-29~~ @ 12-11-06 C5356

TEMPORARY				PERMANENT*						SCREEN/CAP*		
Jt. #	Length (ft.)	Jt. #	Length (ft.)	Jt. #	Length (ft.)	C	Jt. #	Length (ft.)	C	Jt. #	Length (ft.)	C
1	0.5 (bit)	21		1			21	10.00 (casing)		1	0.35 (cap)	
2	10.00 (casing)	22		2			22	10.00 ✓		2	10.00 (scr)	C
3	10.00 ✓	23		3			23	10.01 ✓	C	3	10.00 ✓	C
4	10.00 ✓	24		4			24	5.02 ✓		4		
5	10.00 ✓	25		5			25			5		
6	10.00 ✓	26		6			26			6		
7		27		7			27			7		
8		28		8			28			8		
9		29		9			29			9		
10		30		10			30			10		
11		31		11			31			11		
12		32		12			32			12		
13		33		13			33			13		
14		34		14			34			14		
15		35		15			35			15		
16		36		16			36			16		
17		37		17			37			17		
18		38		18			38			18		
19		39		19			39			19		
20		40		20			40			20		
Tot	50.5	Tot		Tot			Tot	35.02		Tot	20.35	

*Indicate those joints with centralizers with a C in the available box.
ALL Casing length shall be measured to the nearest 0.01 ft.

Comments/Remarks:

Temporary: O.D./I.D. 8" / 7.25" | Permanent: O.D./I.D. 4.5" / 4 3/8" | Screen: O.D./I.D. 4.5" / 4 3/8"

bit length = 6", ID = 8.25", OD = 7.25"

drive barrel, 7" OD, 6" ID

Reported By: Michael E. Carm
Title: Senior Geologist Date: 11-29-06
Signature:

Reviewed By: L.D. Walker
Title: Geologist Date: 12/4/06
Signature: LD Walker

30
11-30-06

A-6003-655 (04/03)

WELL CONSTRUCTION SUMMARY REPORT

Start Date: 11-30-06
Finish Date: 12-1-06
Page 1 of 1

Well ID: C5356	Well Name: 399-1-29	Approximate Location:	300 - FF- 5
Project: Polyphosphate Treatability Test		Other Companies:	FH, GRAM
Drilling Company: ProSonic		Geologist(s):	M. E. Caron
Driller: Aaron Adams	License #: 0831		

TEMPORARY CASING AND DRILL DEPTH			DRILLING METHOD	HOLE DIAMETER (in.) / INTERVAL (ft)
*Size/Grade/Lbs. Per Ft.	Interval (LW-12-19-06)	Shoe O.D./I.D.	Auger:	Diameter ____ From ____ to ____
8" / 35	50 - 51'	8.25"/7.25"	Cable Tool:	Diameter ____ From ____ to ____
	____ - ____		Air Rotary:	Diameter ____ From ____ to ____
	____ - ____		A.R. w/Sonic:	Diameter ____ From ____ to ____
	____ - ____		Sonic	Diameter 8.25" From 0 to 51'
	____ - ____			Diameter ____ From ____ to ____
*Indicate Welded (W) - Flush Joint (FJ) Coupled (C) & Thread Design				Diameter ____ From ____ to ____

		Drilling Fluid:	— none —
Total Drilled Depth: 51.0'	Hole Dia @ TD: 8.25"	Total Amt. Of Water Added During Drilling:	- none -
Well Straightness Test Results: pass (11-30-06)		Static Water Level: 35.0	Date: 12-1-06

GEOPHYSICAL LOGGING

Sondes (type)	Interval	Date	Sondes (type)	Interval	Date
	____ - ____			____ - ____	
	____ - ____			____ - ____	
	____ - ____			____ - ____	

COMPLETED WELL

Size/Wt./Material	Depth	Thread	Slot Size	Type	Interval Annular Seal/Filter Pack	Volume	Mesh Size
4" / stainless steel	0 - 49.3		20	bentonite pellets	50 - 51	1/2 bucket	
	____ - ____			10-20 Colorado silica sand	26.7 - 50	12 bags	
	____ - ____			bentonite pellets	19 - 26.7	3 buckets	
	____ - ____			bentonite crumbles	10 - 19	10 bags	
	____ - ____			Portland cement grout	0 - 10	20 gal	

OTHER ACTIVITIES

Aquifer Test:	Date:	Well Decommission:	Yes:	No:	Date:
Description: NA		Description: NA			

WELL SURVEY DATA (if applicable) Not yet surveyed

	Protective Casing Elevation: at this time
Washington State Plane Coordinates:	Brass Survey Marker Elevation:

COMMENTS / REMARKS

Reported By:	Title:	Signature:	Date:
Michael E. Caron	Senior Geologist		11-30-06

A-6003-658 (04/03)

Well 399-1-30 (C5357)

WELL SUMMARY SHEET

Start Date: 11-27-06
Finish Date: 11-28-06
Page 1 of 1

Well ID:	C5357	Well Name:	399-1-30
Location:	300-FF-5	Project:	Polyphosphate Treatability Test
Prepared By:	Michael E. Carm	Date: 12-8-06	Reviewed By: L.D. Walker	Date: 12/14/06
Signature:			Signature:

CONSTRUCTION DATA

Description	Diagram
8" OD temporary casing	
8" protective casing: 2.87' ags → 2.13' bgs	
0 → 10': neat Portland cement grout with 5% bentonite	
4 3/8" ID ss type 304/316 sch. 10 riser: +1.8' → 29'	
4 3/8" ID ss type 304/316 20-slot wire wrap screen: 29 → 49'	
4 3/8" ID ss type 304/316 sch. 10 sump: 49 → 49.35'	
10 → 19': bentonite crumbles	
19 → 27': 3/8" bentonite pellets	
27 → 50': 10-20 mesh Colorado silica sand	
50 → 50.5': 3/8" bentonite pellets	
All temporary casing removed. Depths in feet below ground surface.	
℄ ⊳ centralizers	

GEOLOGIC/HYDROLOGIC DATA

Depth in Feet	Graphic Log	Lithologic Description
0		0-0.5': crushed gravel drill pad
		0.5-4': fill; sand, gravel, crushed rock
10		4-27': Hanford fm. sandy gravel
20		
30		27-34': Hanford fm. silty sandy gravel, clay-altered
		34-49.75': Hanford fm. sandy gravel
40		
		49.75-50.5': Ringold Fm. gravelly sand
50		- water level = 33.6'
		- TD = 50.5'

A-6003-643 (03/03)

BOREHOLE LOG

Page 1 of 2
Date: 11-27-06

Well ID: C5357 | Well Name: 399-1-30 | Location: 300-FF-5

Project: Polyphosphate Treatability Test | Reference Measuring Point: ground surface

Depth (Ft.)	Sample Type No.	Sample Blows Recovery	Graphic Log	Sample Description: Group Name, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl	Comments: Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
0					Sonic drilling
				0 - 0.5': gravel pad	8.25" OD
					7" drive barrel
				0.5 - 4.0': fill - crushed rock, gravel, sand	
5				4.0 - 16.0: sandy gravel (sG) - med. sand, clast-supported cobbles, to 4", sub-rounded to well-rounded, mostly basalt overall color = 2.5YR-5/1, finer gravel (<1") from 8.5'-10.0'	
10	grab				
				16-27': sandy gravel (sG) with coarse sand matrix - sand is 60-80% basalt, remainder mostly quartz, cobbles variable to 2-3", mostly basalt	
15					
				27-34': sandy gravel (sG) with well-developed clay component in the matrix	
20	grab			34-49.75: sandy gravel (sG), clast-supported, sand matrix mostly medium-grained, cobbles sub- to well-rounded, <1" to >4", mostly basalt	
25					
30	grab				
35					
	grab				

Reported By: Michael E. Caron | Reviewed By: L.D. Walker

Title: Senior Geologist | Title: Geologist

Signature: [signature] | Date: 11-27-06 | Signature: [signature] | Date: 12/14/06

A-6003-642 (03/03)

BOREHOLE LOG

Page 2 of 2

Date: 11-27-06

Well ID: C5357	Well Name: 399-1-30	Location: 300-FF-5
Project: Polyphosphate Treatability Test		Reference Measuring Point: ground surface

Depth (Ft.)	Sample Type No.	Sample Blows Recovery	Graphic Log	Sample Description: Group Name, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl	Comments: Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
40	grab (cont.)			34-49.75 @ 11-27-06: sandy gravel (sG), clast-supported, sand matrix mostly medium-grained, cobbles sub-rounded to well-rounded, <1" to 4", mostly basalt	Sonic 8.25" OD shoe 7" drive barrel
45					
50	grab			49.75 - 50.5: gravelly sand (gS), Ringold Fm, well-oxidized, color is about 10YR 5/3, medium sand, relatively sparse cobbles to 1", well-rounded.	TD = 50.5'

Reported By: Michael E. Caron		Reviewed By: L. D. Walker	
Title: Senior Geologist		Title: Geologist	
Signature:	Date: 11-27-06	Signature:	Date: 12/14/06

A-6003-642 (03/03)

FIELD ACTIVITY REPORT NO. 1 - DRILLING PLAN

Page 1 of 1

Date: 11-27-06

Purpose: Polyphosphate Treatability Test

Location: 300-FF-5

Well ID: C5357

Well Name: 399-1-30

Drilling Co.: Prosonic

Rig No.: SR-071

Rig Make/Mod.: Prosonic Sonic Rig

Casing String No. (1) 2 3 4	Drilling Method	Circulation	D.H. Hammer
Casing Size 8"	Auger	Air ___ Water/Mud ___	Make
Grade	Rotary	Reverse ___ Direct ___	Model
Lbs.Per Ft. 35	Tubex	Vol: cfm	Choke
Material carbon steel	Cable Tool	gpm	Casing Hammer
Type:	Sonic ✓	Pressure ___ psi	Make
Welded ___ (Thd)	A.R. w/Sonic	Drill Pipe O.D.	Model
Planned / Actual	Geoprobe	Tool Joint Size	Bit Size
Set At: 52 /	Other:	Additives	Type
Shoe OD/ID 8.25"/7.75"			Nozzles
Reference Measuring Point: GROUND LEVEL			Rod Size

Drlg. Co. | Rig No.: | Rig Make/Mod.:

Casing String No. 1 2 3 4	Drilling Method	Circulation	D.H. Hammer
Casing Size	Auger	Air ___ Water/Mud ___	Make
Grade	Rotary	Reverse ___ Direct ___	Model
Lbs.Per Ft.	Tubex	Vol: cfm	Choke
Material	Cable Tool	gpm	Casing Hammer
Type:	Sonic	Pressure ___ psi	Make
Welded ___ Thd.	A.R. w/Sonic N/A	Drill Pipe O.D.	Model
Planned / Actual	Geoprobe	Tool Joint Size	Bit Size
Set At: /	Other:	Additives	Type
Shoe OD/ID			Nozzles
Reference Measuring Point: GROUND LEVEL			Rod Size

Comments/Remarks:

Estimated Depth to Water

Reported By: Michael E. Carn

Name/Title: Senior Geologist

Signature:

Date: 11-27-06

A-6003-650 (04/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 2

Date: 11-27-06

Well ID: C5357 | Well Name: 399-1-30

Location: 300-FF-5 | Report No.: 11-27-06 (B) (C) (1)

Start	Finish	Total
Time 0630	Time 0430	Time 1000
Hole Depth/Csg 0 / 0	Hole Depth/Csg 50.5 / all out	Hole Depth/Csg 50.5 / —

Reference Measuring Point: GROUND SURFACE

Casing String No. (1) 2 3 4 ____ See Report No. 1 | Rod Size: 8" casing

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
	0630	- POD at site trailer (3 drill crew, BTR, geologist)
0700	1000	- offsite - driller's helper in training
	1004	- commence drilling with 7" drive barrel, drill to 16'
	1030	- add bit + 2 lengths casing (tally = 20.5'), drive to 16'
	1045	- clean out borehole with drive barrel to 16'
	1048	- add 20' of rods to 20' drive barrel, resume drilling, drill to 36'
	1100	- add 20' of 8" casing, drive to 36'
	1105	- add 20' of rods to drive barrel string, clean out to 36'
	1110	- drill to TD at 50.5'
	1125	- clean borehole out to 36' with 7" drive barrel
	1157	- trip in stainless steel well string
		- centralizers at top and bottom of screen and at 12' bgs, stick up is set at 6' so screen is from 29' to 49'
	1217	- am RCT check - no access since no hard hat available
1220	1315	- drillers take lunch break
	1243	- measure water level in well C5353 at 34.9'
	1318	- add ~ 1/4 bucket of bentonite pellets, tag at 50'
	1319	- add 2 bags of 10-20 Colorado silica sand, sand level 6' up inside casing
	1326	- pull 8" casing back 3', 2' of overlap inside casing
1331	1346	- surge interval from 47-50', sand fell out less than 0.1'
	1350	- add 2 bags sand, pull casing back 2', remove 5' joint (tubular tally = 50.5')

Reported By: Michael E. Carm | Title: Senior Geologist. | Date: 11-27-06 | Signature: [signature]

Reviewed By: L.D. Walker | Title: Geologist | Date: 12/14/06 | Signature: [signature]

A-6003-651 (04/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Continuation Page

Page 2 of 2

Date: 11-27-06

Well Name: ~~C5357~~ @ 12-1-06 399-1-30

Well ID: ~~399-1-30~~ @ 12-1-06 C5357

Location: 300-FF-5

Continuation of Report No.: ~~@ 11-27-06~~ (1)

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth
	1352	- pull casing back 1', bit at ~44', ~2' overlap
1359	1445	- surge interval from 44 – 47', required 2 more bags of sand to maintain overlap, sand fell out less than 0.1' in last 15 minutes
	1453	- add 1.5 bags of sand, pull casing back 3', bottom of casing at 41.5'
1455	1510	- surge interval from 41.5 - 44', sand fell out less than 0.1' in 15 minutes
	1516	- remove 10' length of casing - tubular tally = 40.5'
		- bottom of casing at ~34', about 4' of overlap
1521	1536	- surge interval from 35 - 41.5', sand fell out less than 0.1' in 15 minutes
	1500	- pm RCT check - all < background
	1043	- am HHT check - all < detection
	1542	- add 1 bag of sand, pull 8" casing back 3', bottom of casing at ~31', add 1/2 more bag sand, overlap = 1.7'
1547	1602	- surge interval from 35-38', sand fell out less than 0.1' in 15 minutes
	1607	- add 1 bags @ 11-27-06 of sand, add 2 buckets of bentonite pellets
		- sand level at ~~29'~~ @ 27' 11-27-06 - remove 10' length of 8" casing, tally = 30.5'
	1615	- add bucket of ~~pellets~~ @ 11-27-06 bentonite pellets, pellet level at 18'
	1620	- pull casing back 4', bentonite pellets at 18.7' bgs
		- add 2 bags of bentonite crumbles, pull off 10' length of casing - tally = 20.5'
	1627	- add 1 bags of bentonite crumbles, filled to 10' bgs
	1629	- pull casing back 4'
	1630	- done for day - left site
		not used @

Reported By: Michael E. Carm

Title: Senior Geologist Date: 11-27-06

Signature: ME

Reviewed By: L. D. Walker

Title: Geologist Date: 12/14/06

Signature: LD Walker

A-6003-652 (04/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 2

Date: 11-28-07

Well ID: C5357	Well Name: 399-1-30
Location: 300-FF-5	Report No.: ~~1~~ 2

Start	Finish	Total
Time 0630 @ 11-28-06	Time 0845	Time 0145
Hole Depth/Csg 50.5 / ~~12.0~~ ~0	Hole Depth/Csg 50.5 / ~~-12~~ ~0 @ 11-28-06	Hole Depth/Csg -0- / -0-

Reference Measuring Point: GROUND SURFACE

Casing String No. 1 2 3 4 ____ See Report No. 1

Rod Size: all casing (temp) out of hole

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
	0630	- POD at site trailer (3 drill crew, BTR, geologist)
	0700	- warming up drill rig (T = ~15°), tubular tally = 20.5' of 8" temporary casing, stickup is ~ 8.5', bit is ~ 12' bgs @ 11-28-06
	0835	- mix grout for surface seal (20 gal. H_2O, 2 bags Portland cement, 5% bentonite), inject grout
	0742	- pull off 10' length of 8" casing, tally = 10.5'
	0745	- pull remaining temporary casing out of hole, tally = 0'
	0810	- remove 5' length of 4" permanent casing, stickup is ≈ 1'
		- prepare to move rig to next hole

not used @

Reported By: Michael E. Caron		Reviewed By: L.D. Walker	
Title: Senior Geologist	Date: 11-28-06	Title: Geologist	Date: 12/14/06
Signature:		Signature:	

A-6003-651 (04/03)

WELL DEVELOPMENT AND TESTING DATA

Well Name: 399-1-30 ~~C5357~~ @ 12-1-06	Well ID: C5357 ~~399-1-30~~ @ 12-1-06	Well Location: 300-FF-5	Date: 12-7-06

Reference Measuring Point (unless otherwise noted): TOP OF OUTER CASING (TOC)

Has the well been surveyed? ○ Yes ☑ No

Does the well have a cement pad? ☑ Yes ○ No

PART 1

STATIC WATER LEVEL:

Start of Job	33.6
End of Job	33.75

DEPTH TO BOTTOM:

Start of Job	50.0
End of Job	50.0

PART 2

WELL DEVELOPMENT DATA

Pump Model	
Intake Depth	
Starting Turbidity	31.3 / 17.5

Pump Start	Stop	Flow Rate
1603	1623	24 gpm
1629	1647	25.5 gpm

Total Pumped	12-7-06 940 gal
Final Turbidity	9.71 ~~9.71~~ / 2.13
XD SN/Range (PSI)	

PART 3

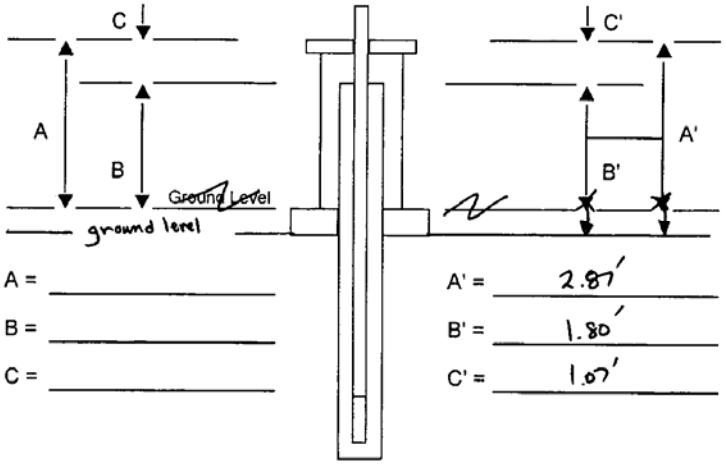
INSTANTANEOUS SLUG TEST

Static Water Level (TOC)	
Transducer Depth	
Baseline Start	N
Injection Start	A
Baseline Start	
Withdrawal Start	
Slug Volume	
XD SN/Range (PSI)	

PART 4

Last Recorded Measurements Date: NA

Current Measurements Date: 12-7-06



A = _____

B = _____

C = _____

A' = 2.87'

B' = 1.80'

C' = 1.07'

Are there any reference marks on the casing strings? ○ Yes ☑ No

PART 5

COMMENTS:

Prepared by (print name): Michael E. Caron	Signature:	Date: 12-7-06
Reviewed by (print name): L.D. Walker	Signature: L.D. Walker	Date: 12/14/06

A-6003-644 (03/03)

@ 12-7-06 @

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 21 of 21

Date: 12-7-06

Well ID:	C5357	Well Name:	399-1-30
Location:	300-FF-5	Report No.:	(2)

	Finish	Total
Time	15	Time 1700	Time 0105
Hole Depth/Csg	NA /	Hole Depth/Csg NA / NA	Hole Depth/Csg NA / NA

Reference Measuring Point: GROUND SURFACE

1 2 3 4 ____ Rod Size:

See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
	1555	- flow meter = 10,180, probe = 10.894
		- pump inlet set at 45'
	1603	- start test #2 (Bullwinkle), probe = 10.996 (test#1 not used)
	12-7 @ 1600	time 1607 / pH 7.49 / conductivity 0.483 / temp 13.9° / turbidity 31.3 / probe 11.026 / pump 24 gpm
		1611 / 7.54 / 0.485 / 14.8° / 19.2 / 11.091
		1617 / 7.58 / 0.480 / 14.6° / 8.83 / 11.162
		1621 / 7.57 / 0.483 / 14.8° / 9.71 / 11.197
	1623	- stop test #2 - no recovery test (getting dark)
	1625	- pull pump up 7' - inlet set at 38'
	1629	- start test #3, probe = 3.923, flowmeter = 10,660
		time / pH / conductivity / temp / turbidity / probe / pump
	1	1630 / 7.56 / 0.486 / 14.0° / 17.5 / 3.983 / 25 gpm
		1635 / 7.52 / 0.486 / 14.7° / 4.16 / 4.039
		1640 / 7.54 / 0.484 / 14.6° / 3.09 / 4.089
		1645 / 7.61 / 0.486 / 14.6° / 2.13 / 4.184
	1647	- stop test #3, flowmeter = 11,120, total = 940 gallons
	1647	- start test #4 @ 12-7-06
	1655	- stop test # 4
	1700	- left site

Not Used @

Reported By:	Michael E. Caron	Reviewed By:	L.D. Walker
Title:	Senior Geologist	Date: 12-7-06	Title: Geologist	Date: 12/14/06
Signature:			Signature:

A-6003-651 (04/03)

FIELD ACTIVITY REPORT

TUBULAR GOODS TALLY

Page 1 of 1

Date: 11-27-06

Well Name: ~~C5357 @ 12-11-06~~ 399-1-30 Well ID: ~~399-1-30-P 12-11-06~~ C5357

TEMPORARY				PERMANENT*						SCREEN/CAP*		
Jt. #	Length (ft.)	Jt. #	Length (ft.)	Jt. #	Length (ft.)	C	Jt. #	Length (ft.)	C	Jt. #	Length (ft.)	C
1	0.5' (bit)	21		1			21	10.00	C	1	0.35 (cap)	
2	10.00 (casing)	22		2			22	10.01		2	9.99 (scr.)	C
3	10.00 ✓	23		3			23	10.02	C	3	9.97 ✓	
4	10.00 ✓	24		4			24	5.00		4		
5	10.00 ✓	25		5			25			5		
6	10.00 ✓	26		6			26			6		
7	5.00 ✓	27		7			27			7		
8		28		8			28			8		
9		29		9			29			9		
10		30		10			30			10		
11		31		11			31			11		
12		32		12			32			12		
13		33		13			33			13		
14		34		14			34			14		
15		35		15			35			15		
16		36		16			36			16		
17		37		17			37			17		
18		38		18			38			18		
19		39		19			39			19		
20		40		20			40			20		
Tot	55.5'	Tot		Tot			Tot	35.03		Tot	20.31	

*Indicate those joints with centralizers with a C in the available box.
ALL Casing length shall be measured to the nearest 0.01 ft.

Comments/Remarks:

Temporary: O.D./I.D. 8" / 7.25" Permanent: O.D./I.D. 4.5" / 4 3/8" Screen: O.D./I.D. 4.5" / 4 3/8"

bit = 6" in length, OD = 8.25", ID = 7.25"

drive barrel = 7" OD, 6" ID

Reported By: Michael E. Carm Reviewed By: L.D. Walker

Title: Senior Geologist Date: 11-27-06 Title: Geologist Date: 12/14/06

Signature: MEC Signature: LD Walker

A-6003-655 (04/03)

WELL CONSTRUCTION SUMMARY REPORT

Start Date: 11-27-06
Finish Date: 11-28-06
Page 1 of 1

Well ID: C5357	Well Name: 399-1-30	Approximate Location:	300-FF-5
Project: Polyphosphate Treatability Test		Other Companies:	FH, GRAM
Drilling Company: Prosonic		Geologist(s):	M.E. CARON
Driller: Aaron Adams	License #: 2831		

TEMPORARY CASING AND DRILL DEPTH			DRILLING METHOD	HOLE DIAMETER (in.) / INTERVAL (ft)
*Size/Grade/Lbs. Per Ft.	Interval	Shoe O.D./I.D.	Auger:	Diameter ____ From ____ to ____
8" carbon steel, ~35 lbs/ft	0 - 50.5	8.25"/7.25"	Cable Tool:	Diameter ____ From ____ to ____
	____ - ____		Air Rotary:	Diameter ____ From ____ to ____
	____ - ____		A.R. w/Sonic:	Diameter ____ From ____ to ____
	____ - ____		Sonic	Diameter 8.25" From 0 to 50.5
	____ - ____			Diameter ____ From ____ to ____
*Indicate Welded (W) - Flush Joint (FJ) Coupled (C) & Thread Design				Diameter ____ From ____ to ____
FJ				
			Drilling Fluid:	- none -
Total Drilled Depth: 50.5'	Hole Dia @ TD: 8.25"		Total Amt. Of Water Added During Drilling:	- none -
Well Straightness Test Results: Passed			Static Water Level: 33.6'	Date: 11-28-06

GEOPHYSICAL LOGGING

Sondes (type)	Interval	Date	Sondes (type)	Interval	Date
	____ - ____			____ - ____	
	____ - ____			____ - ____	
	____ - ____			____ - ____	

COMPLETED WELL

Size/Wt./Material	Depth	Thread	Slot Size	Type	Interval Annular Seal/Filter Pack	Volume	Mesh Size
4" stainless	0 - 49.3	20		bentonite pellets	50 - 50.5	1/2 bucket	
	____ - ____			10-20 Colorado silica sand	27 - 50	10 bags @ 11-28-06	
	____ - ____			bentonite pellets	18 - 20	3 buckets	
	____ - ____			bentonite crumbles	10 - 18	3 bags	
	____ - ____			cement grout	____ - 10	20 gal.	

OTHER ACTIVITIES

Aquifer Test:	Date:	Well Decommission:	Yes:	No:	Date:
Description: NA		Description: NA			

WELL SURVEY DATA (if applicable) Not yet surveyed at this time

	Protective Casing Elevation:
Washington State Plane Coordinates:	Brass Survey Marker Elevation:

COMMENTS / REMARKS

Reported By:	Title:	Signature:	Date:
Michael E. Caron	Senior Geologist		11-27-06

A-6003-658 (04/03)

Well 399-1-31 (C5358)

WELL SUMMARY SHEET

Start Date: 11-20-06
Finish Date: 11-20-06
Page 1 of 1

Well ID: C5358	Well Name: 399-1-31
Location: 300-FF-5	Project: Polyphosphate Treatability Test
Prepared By: Michael E. Caron, Date: 12-8-06	Reviewed By: L. D. Walker, Date: 12/14/06
Signature:	Signature:

CONSTRUCTION DATA

Description	Diagram
8" OD temporary casing	
8" protective casing: 2.87' ags → 2.13' bgs	
0 → 10': neat Portland cement grout with 5% bentonite	
4 3/8" ID SS type 304/316 sch 10 riser: + 2.02' → 29'	
4 3/8" ID SS type 304/316 20-slot wire wrap screen: 29 → 49'	
4 3/8" ID SS type 304/316 sch. 10 Sump: 49 → 49.35'	
10 → 19': bentonite crumbles	
19 → 27': 3/8" bentonite pellets	
27 → 50': 10-20 mesh Colorado silica sand	
50 → 51': 3/8" bentonite pellets	
All temporary casing removed.	
Depths in feet below ground surface	
centralizers	

GEOLOGIC/HYDROLOGIC DATA

Depth in Feet	Graphic Log	Lithologic Description
0		0-0.5': crushed gravel drill pad
		0.5-4.5': fill; sand, gravel, crushed rock
10		4.5-20': Hanford fm. sandy gravel
20		20-28': Hanford fm. silty sandy gravel, clay-altered
30		28-30': Hanford fm. silt, strong clay alteration
		30-48.5': Hanford fm. sandy gravel
40		48.5-51': Ringold Fm. sandy gravel and sand
50		- water level = 33.7'
		- TD = 51'

A-6003-643 (03/03)

@ 11-20-06

BOREHOLE LOG

Page 21 of 2
Date: 11-20-06

Well ID: C5358 | Well Name: 399-1-31 | Location: 300-FF-5

Project: Polyphosphate Treatability Test | Reference Measuring Point: ground surface

Depth (Ft.)	Sample Type No.	Sample Blows Recovery	Graphic Log	Sample Description: Group Name, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl	Comments: Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
0				0-0.5' - drill pad	sonic, 6" drive barrel
				0.5-4.5' - fill (sand, gravel, crushed rock)	
				4.5-14' - sandy gravel (sG) of the Hanford fm - well-rounded basalt cobbles to 3" - generally increase in size with depth - coarse sand matrix, color = 5YR-4/1	
5					
				14-16' - sandy gravel (sG) - cobbles generally <1" in diameter, very coarse sand matrix, ~60% basalt clasts, 40% quartz	
10				16-20' - as above	
				20-30' - clay content (silt?) increases with depth - 28-30' interval is massive clay (silt interval), color = 2.5YR-5/1	
15				30-36' - sandy gravel (sG), very coarse sand matrix, poorly sorted cobbles to 3-4"	
				36-48.5' sandy gravel, mostly clast-supported, average cobble size is ~1", well rounded, med. sand matrix	
20					
				48.5-51' - Ringold Fm sediments - oxidized sandy gravel from 48.5-49.5' - matrix color is 10YR-5/6 - med → coarse sand, gravel dominated - color from 49.5-51' is Gley 1 - 4/10Y	
25					
30					
35					

Reported By: Michael E. Caron | Title: Senior Geologist | Signature: [signature] | Date: 11-20-06

Reviewed By: L.D. Walker | Title: Geologist | Signature: [signature] | Date: 12/14/06

A-6003-642 (03/03)

BOREHOLE LOG

Page 2 of 2
Date: 11-20-06

Well ID: C5358 | Well Name: 399-1-31 | Location: 300-FF-5

Project: Polyphosphate Treatability Test | Reference Measuring Point: ground surface

Depth (Ft.)	Sample Type No.	Sample Blows Recovery	Graphic Log	Sample Description: Group Name, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl	Comments: Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
40				36 → 48.5': Sandy GRAVEL (SG)	sonic, 6" drive
				Description on previous	barrel
				Page	
45				48.5' → 51': Ringold Fm	
				Sandy GRAVEL	
				-description on previous page	
50				TD = 51'	

Reported By: Michael E. Carn | Title: Senior Geologist | Signature: [signature] | Date: 11-20-06

Reviewed By: L. D. Walker | Title: Geologist | Signature: [signature] | Date: 12/14/06

A-6003-642 (03/03)

FIELD ACTIVITY REPORT NO. 1 - DRILLING PLAN

Page 1 of 1

Date: 11-20-06

Purpose: Polyphosphate Treatability Test

Location: 300-FF-5

Well ID: C5358

Well Name: 399-1-31

Drilling Co.: ~~399-1-31~~ 11-20-06 Prosonic

Rig No.: SR-071

Rig Make/Mod.: Prosonic Sonic Rig

Casing String No. (1) 2 3 4	Drilling Method	Circulation	D.H. Hammer
Casing Size 8"	Auger	Air ___ Water/Mud ___	Make
Grade	Rotary	Reverse ___ Direct ___	Model
Lbs.Per Ft.	Tubex	Vol: cfm	Choke
Material carbon steel	Cable Tool	gpm	Casing Hammer
Type:	Sonic ✓	Pressure ___ psi	Make
Welded ___ (Thd.)	A.R. w/Sonic	Drill Pipe O.D.	Model
Planned / Actual	Geoprobe	Tool Joint Size	Bit Size
Set At: 52 ~~50.5~~ @ 11-20-06 / 50.5	Other:	Additives	Type
Shoe OD/ID 8.25" / 7.25"		- none -	Nozzles
Reference Measuring Point:			Rod Size
GROUND LEVEL			

Drlg. Co. | Rig No.: | Rig Make/Mod.:

Casing String No. 1 (2) 3 4	Drilling Method	Circulation	D.H. Hammer
Casing Size 4"	Auger	Air ___ Water/Mud ___	Make
Grade	Rotary	Reverse ___ Direct ___	Model
Lbs.Per Ft.	Tubex	Vol: cfm	Choke
Material stainless steel	Cable Tool	gpm	Casing Hammer
Type:	Sonic	Pressure ___ psi	Make
Welded ___ (Thd.)	A.R. w/Sonic	Drill Pipe O.D.	Model
Planned / Actual	Geoprobe	Tool Joint Size	Bit Size
Set 49 / 49	Other:	Additives	Type
Shoe OD/ID n/a			Nozzles
Reference Measuring Point:			Rod Size
GROUND LEVEL			

Comments/Remarks:

4" permanent casing

Estimated Depth to Water: 34'

Reported By: Michael E. Caron

Name/Title: Senior Geologist

Signature:

Date: 11-20-06

A-6003-650 (04/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 3

Date: 11-20-06

Well ID: C5358	Well Name: 399-1-31
Location: 300-FF-5	Report No.: @ 11-20-06 (3) (1)

Start	Finish	Total
Time 0630	Time 1630	Time 10
Hole Depth/Csg 0 / 0	Hole Depth/Csg 51 / 0	Hole Depth/Csg 51 / NA

Reference Measuring Point: GROUND SURFACE

Casing String No. (1) 2 3 4 ____ Rod Size: 8"
See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
	0630	- POD at site trailer
	0705	- at drill site
	0735	- water level in well C5352 = 34.3'
	0747	- commence drilling with 6" drive barrel
	0821	- add bit + 20' 8" casing (tally = 20.5')
		- drive casing to 16' bgs
	0840	- am RCT check, all < background
	0845	- resume drilling with drive barrel
	0907	- add 20' of 8" casing (tally = 40.5') @ 11-20-06, bit at 36'
	0912	- resume drilling with 6" drive barrel
	0918	- waste management on site - checking drums
	0938	- push 8" casing to 50.5' (tubular tally = 50.5'), clean out borehole to 50.5
1020	1038	- trip in stainless steel well tubing and screen - stabilizers at 48.5', 28.5' (top/bottom of screen) and 10' bgs
		- screen set in interval from 29-49' bgs, bottom of sump set 49.35' bgs, stickup is 5' 10"
10:55	11:45	- break for lunch
	1150	- add < 1/4 bucket bentonite pellets, tag bottom at 50'
	1159	- add 10-20 Colorado silica sand, tag bottom at 45' (25 bags of sand)
1203	1223	- surge well with dual block surger - sand fell out 0.15' in first 5 minutes, stable thereafter - interval = 46-49'
	1225	- add 1.5 bags sand, tag bottom at 42'

Reported By: Michael E. Caron		Reviewed By: L.D. Walker	
Title: Senior Geologist	Date: 11-20-06	Title: Geologist	Date: 12/14/06
Signature: MEC		Signature: LD Walker	

A-6003-651 (04/03)

FIELD ACTIVITY REPORT - DAILY DRILLING
Continuation Page

Page 2 of 3 (11-20-06)

Date: 11-20-06

Well Name: ~~C5358~~ @ 12-11-06 399-1-31

Well ID: 399-1-31 @ 12-11-06 C5358

Location: 300-FF-5

Continuation of Report No. (2) 11-20-06 (3) (1)

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth
	1225	- pm RCT check - all < background
1230	1250	- surge interval from 43-46', sand fell out 0.3' in 5 min, stable thereafter
	1252	- pull 8" casing back 4', bottom of casing = 46.5', overlap = 4.2'
	1257	- add 2 bags 10-20 sand, tag bottom at 39.2
1300	1330	- surge interval from 40-43', sand fell out 0.4' in 15 min, stable thereafter
	1345	- pull off 5' of 8" casing, stick up = 5', tally = 50', bottom of casing = 45'
	1348	- add 2 bags sand, tag bottom at 36'
	→	- 5' joint added after TD
1355	1455	- surge interval from 37-40', sand fell out 1.35', still falling at > 0.1'/15 minutes at 1 hour mark
	1502	- pull 8" casing back 3', bottom of casing is at ~42', tag bottom at 38'
	1505	- add 3 bags of sand, pull off 10' of 8" casing, bottom of casing is 35.5', tubular tally = 40.5', tag bottom at 34', add 1 bag of sand, tag bottom at 31.7'
1521	1536	- surge interval from 34-37', sand fell out < 0.1' @ 11-20-06
	1545	- pull casing back 5', tag bottom at 349.5'
		- add sand (1.5 bags), tag bottom at 27.25' 11-20-06
		- add 1 buckets of bentonite pellets, ~~tag bottom at~~ @
	1552	- pull off 10' length of 8" casing, bottom of casing is 35.5'
		- add 1.25 buckets of bentonite pellets, tag bottom at 19'
	1557	- pull casing back 5', add 3 bags of bentonite crumbles, tag bottom at 10'
	1602	- pull off 10' length of 8" casing, add 1 bag of bentonite crumbles tag bottom at 10'
	1607	- mix neat Portland cement grout, 30 gal water, 5% bentonite, 3 bags cement

Reported By: Michael E. Caron

Title: Senior Geologist Date: 11-20-06

Signature: MEC

Reviewed By: L.D. Walker

Title: Geologist Date: 12/14/06

Signature: LD Walker

A-6003-652 (04/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Continuation Page

Page 3 of 3

Date: 11-20-06

Well Name: ~~C5358 @ 12-11-06~~ 399-1-31

Well ID: ~~399-1-31 @ 12-11-06~~ C5358

Location: 300-FF-5

Continuation of Report No.: @ 11-20-06 (3) (1)

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth
	1610	- inject grout, 2' above ground but settling
	1612	- remove 10' of 8" casing,
	1615	- mix grout - 10 gal water, 5# bentonite, 1 bg cement
	1616	- inject grout in annular space for well C5352
	1622	- remove remaining casing + bit (all out), grout has settled to below surface.
	1630	- left site for day.
	1627	- drillers remove 5' length of stainless casing

Not used @

Reported By:	Michael E. Carn	Reviewed By:	L.D. Walker
Title:	Senior Geologist	Title:	Geologist
Date:	11-20-06	Date:	12/14/06
Signature:		Signature:	

A-6003-652 (04/03)

WELL DEVELOPMENT AND TESTING DATA

Well Name: 399-1-31 C5358 @ 12-11-06	Well ID: C5358 399-1-31 @ 12-11-06	Well Location: 300-FF-5	Date: 12-6-06

Reference Measuring Point (unless otherwise noted): TOP OF OUTER CASING (TOC)

Has the well been surveyed? ○ Yes ☑ No

Does the well have a cement pad? ☑ Yes ○ No

PART 1

STATIC WATER LEVEL:

Start of Job	33.67
End of Job	

DEPTH TO BOTTOM:

Start of Job	Not measured
End of Job	

PART 2

WELL DEVELOPMENT DATA

Pump Model	Redi flow 3
Intake Depth	45' & 38'
Starting Turbidity	24.7 & 10.5 NTU

Pump Start	Stop	Flow Rate
1310	1418	24.4 gpm
1433	1506	29.1 gpm

Total Pumped	2620
Final Turbidity	1.72 & 2.55 NTU
XD SN/Range (PSI)	

PART 3

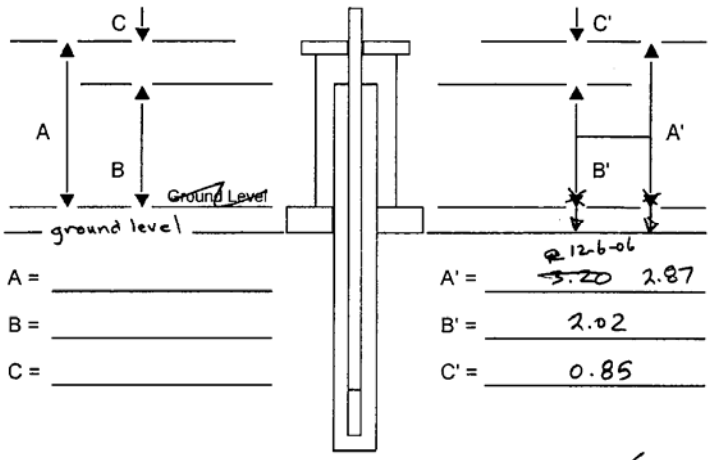
INSTANTANEOUS SLUG TEST

Static Water Level (TOC)	
Transducer Depth	
Baseline Start	
Injection Start	NA
Baseline Start	
Withdrawal Start	
Slug Volume	
XD SN/Range (PSI)	

PART 4

Last Recorded Measurements Date: NA

Current Measurements Date: 12-6-06



A = _____

B = _____

C = _____

@ 12-6-06

A' = ~~3.20~~ 2.87

B' = 2.02

C' = 0.85

Are there any reference marks on the casing strings? ○ Yes ☑ No

PART 5

COMMENTS:

Prepared by (print name): Michael E. Carm	Signature:	Date: 12-6-06
Reviewed by (print name): L.D. Walker	Signature: L D Walker	Date: 12-14-06

A-6003-644 (03/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 2

Date: 12-6-06

Well ID: C5358	Well Name: 399-1-31
Location: 300-FF-5	Report No.: ⑤

Start	Finish	Total
Time 1300	Time 1530	Time 2.30
Hole Depth/Csg NA / NA	Hole Depth/Csg NA / NA	Hole Depth/Csg NA / NA

Reference Measuring Point: GROUND SURFACE

Casing String No. 1 2 3 4 ____ Rod Size: See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
	1300	- well head measurements to
		① ~~perm~~ protective casing above pad = 2.35'
		② pad = 0.52'
		③ protective to permanent = 0.85'
		- water level = 33.67'
		- probe is 1.9' above pump inlet, inlet is set at 45' bgs ; initial probe = 11.411
	1310	- test #5 (drawdown) - start time = 1310, flowmeter = 3090 gal.

time	pH	conductivity (mS)	turbidity (NTU)	temp (°C)	probe
1315	7.56	0.481	24.7	15.0°	11.518
1320	7.55	0.487	10.03	14.4°	11.643
1325	7.54	0.483	7.68	14.9°	11.711
1330	7.57	0.479	5.10	15.2°	11.761
1335	7.56	0.481	4.35	14.8°	11.824
1340	7.54	0.486	4.50	14.8°	11.901
1345	7.55	0.481	3.91	14.4°	11.949
1350	7.55	0.484	3.30	14.3°	12.005
1355	7.55	0.483	3.00	14.8°	12.044
1400	7.53	0.481	2.41	14.1°	12.100
1405	7.53	0.480	2.41	14.8°	12.142
1410	7.45	0.482	2.40	14.5°	12.168
1415	7.51	0.480	1.72	14.1°	12.180

	1418	end test #5, probe reading = 12.186', end flowmeter = 4750
	1418	start test #6 (recovery)
	1429	stop test #6 ✓, probe = 12.233

Reported By: Michael E. Caron		Reviewed By: L.D. Walker	
Title: Senior Geologist	Date: 12-6-06	Title: Geologist	Date: 12/4/06
Signature:		Signature:	

A-6003-651 (04/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Continuation Page

Page 2 of 2

Date: 12-6-06

Well Name: ~~C5358 @ 12-11-06~~ 399-1-32

Well ID: ~~399-1-32 @ 12-11-06~~ C5358

Location: 300-FF-5

Continuation of Report No.: (2)

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth
	1430	@ ~~start~~ pull up pump 7', inlet at 38' bgs, flowmeter = 4750 gal
	1433	- start test # 7

time	pH	conductivity	turbidity	temp	probe
1438	7.47	0.482	10.5	14.3°	4.161
1443	7.56	0.484	4.63	14.4°	4.267
1448	7.48	0.484	4.45	14.5°	4.338
1453	7.49	0.481	3.51	14.6°	4.451
1458	7.51	0.483	2.94	14.9°	4.551
1503	7.49	0.460	2.55	14.9°	4.676

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth
	1506	~~stop~~ test # 7, flowmeter = 5710
	1506	start test # 8 (recovery), probe = 4.756
	1516	stop test # 8
	1520	- well head measurements (1) (2) (3) (see page 1)

well:

	C5357	C5352	C5351	C5354	C5355	C5356	C5359
(1)	2.42	12-6 @ ~~C5358~~ 2.47	2.51	2.66	2.54	2.69	2.47
(2)	0.45	0.50	0.50	0.58	0.58	0.52	0.64
(3)	1.07	1.02	1.13	1.26	1.14	1.35	1.10

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth
	1530	- left site for day

Not Used @

Reported By: Michael E. Carm		Reviewed By: L.D. Walker	
Title: Senior Geologist	Date: 12-6-06	Title: Geologist	Date: 12/14/06
Signature:		Signature:	

A-6003-652 (04/03)

FIELD ACTIVITY REPORT

TUBULAR GOODS TALLY

Page 1 of 1

Date: 11-20-06

Well Name: ~~C5358~~ 12-11-06 399-1-31

Well ID: ~~399-1-31~~ e 12-11-06 C5358

TEMPORARY				PERMANENT*						SCREEN/CAP*		
Jt. #	Length (ft.)	Jt. #	Length (ft.)	Jt. #	Length (ft.)	C	Jt. #	Length (ft.)	C	Jt. #	Length (ft.)	C
1	0.50 (bit)	21		1			21	~~11-20-06~~ 0.35 (Sump)	C	1	9.99	C
2	10.00 (casing)	22		2			22	9.99	C	2	9.97	
3	10.00 ✓	23		3			23	9.97		3	0.35 (Sump)	C
4	10.00 ✓	24		4			24	10.00	C	4		
5	10.00 ✓ 11-20-06	25		5			25	5.00		5		
6	~~5.00~~ ✓ R	26		6			26			6		
7	10.00	27		7			27			7		
8		28		8			28			8		
9		29		9			29			9		
10		30		10			30			10		
11		31		11			31			11		
12		32		12			32			12		
13		33		13			33			13		
14		34		14			34			14		
15		35		15			35			15		
16		36		16			36			16		
17		37		17			37			17		
18		38		18			38			18		
19		39		19			39			19		
20		40		20			40			20		
Tot	50.50	Tot		Tot			Tot	34.96		Tot	20.31	

*Indicate those joints with centralizers with a C in the available box.
ALL Casing length shall be measured to the nearest 0.01 ft.

Comments/Remarks:
- centralizers set at top / bottom of screen and ~ 10' bgs

Temporary: O.D./I.D. 8" / 7.25"

Permanent: O.D./I.D. 4.5" / 4 3/8"

Screen: O.D./I.D. 4.5" / 4 3/8"

bit = 6" in length, 8.25" OD, 7.25" ID

drive barrel = 7" OD, 6" ID

Reported By: Michael E. Carm

Title: Senior Geologist Date: 11-20-06

Signature:

Reviewed By: L.D. Walker

Title: Geologist Date: 12/14/06

Signature: LD Walker

A-6003-655 (04/03)

WELL CONSTRUCTION SUMMARY REPORT

Start Date: 11-20-06
Finish Date: 11-20-06
Page 1 of 1

Well ID: C5358	Well Name: 399-1-31	Approximate Location: 300-FF-5	
Project: Polyphosphate Treatability Test		Other Companies: GRAM, FH.	
Drilling Company: Procore		Geologist(s): M. E. CARON	
Driller: Aaron Adems	License #: 0831		

TEMPORARY CASING AND DRILL DEPTH			DRILLING METHOD	HOLE DIAMETER (in.) / INTERVAL (ft)
*Size/Grade/Lbs. Per Ft.	Interval	Shoe O.D./I.D.	Auger:	Diameter ____ From ____ to ____
8"	0 - 51'	8.25" / 7.25"	Cable Tool:	Diameter ____ From ____ to ____
	____ - ____		Air Rotary:	Diameter ____ From ____ to ____
	____ - ____		A.R. w/Sonic:	Diameter ____ From ____ to ____
	____ - ____		Sonic	Diameter 8 From 0 to 51'
	____ - ____			Diameter ____ From ____ to ____
*Indicate Welded (W) - Flush Joint (FJ) Coupled (C) & Thread Design				Diameter ____ From ____ to ____

		Drilling Fluid: NA	
Total Drilled Depth: 51.0'	Hole Dia @ TD: 8.25"	Total Amt. Of Water Added During Drilling: NA	
Well Straightness Test Results: passed		Static Water Level: 33.7'	Date: 11-20-06

GEOPHYSICAL LOGGING

Sondes (type)	Interval	Date	Sondes (type)	Interval	Date
	____ - ____			____ - ____	
	____ - ____			____ - ____	
	____ - ____			____ - ____	

COMPLETED WELL

Size/Wt./Material	Depth	Thread	Slot Size	Type	Interval Annular Seal/Filter Pack	Volume	Mesh Size
4" stainless	0 - 49.3		20	bentonite pellets	50 - 50.5	1/4 bucket	
	____ - ____			10-20 Colorado sand	27 - 50	13.5 bags	
	____ - ____			bentonite pellets	19 - 27	225 buckets	
	____ - ____			bentonite crumbles	10 - 19	4 bags	
	____ - ____			neat Portland cement	0 - 10	20 gal	

OTHER ACTIVITIES

Aquifer Test:	Date:	Well Decommission:	Yes:	No:	Date:
Description:		Description:			

WELL SURVEY DATA (if applicable)

Not yet surveyed at this time

	Protective Casing Elevation:
Washington State Plane Coordinates:	Brass Survey Marker Elevation:

COMMENTS / REMARKS

Reported By:	Title:	Signature:	Date:
Michael E. Caron	Senior Geologist		11-20-06

A-6003-658 (04/03)

Well 399-1-32 (C5359)

WELL SUMMARY SHEET

Start Date: 12-1-06
Finish Date: 12-4-06
Page 1 of 1

Well ID: C5359
Well Name: 399-1-32
Location: 300-FF-5
Project: Polyphosphate Treatability Test
Prepared By: Michael E. Caron
Date: 12-11-06
Reviewed By: L. D. Walker
Date: 12/14/06
Signature:
Signature:

CONSTRUCTION DATA

Description	Diagram
8" OD temporary casing	
8" protective casing: 3.11' ags → 1.89' bgs	
0 → 10': neat Portland cement with 5% bentonite @ 12-8-06	
4 3/4" ID SS type 304/316 sch. 10 riser: +2.01 → 29'	
4 3/8" ID SS type 304/316 20-slot wire wrap screen: 29 → 44'	
4 3/8" ID SS type 304/316 sch. 10 sump: 44 → 44.35'	
9 → ~~26.5~~ 19.5': bentonite crumbles @ 12-11-06	
~~26.5 → 45.5'~~:	
19.5 → 26.5': 3/8" bentonite pellets and bentonite chips	
26.5 → 45.5': 10-20 mesh Colorado silica sand	
45.5 → 50.5': 3/8" bentonite pellets	
All temporary casing removed.	
Depths in feet below ground surface.	
centralizers	

GEOLOGIC/HYDROLOGIC DATA

Depth in Feet	Graphic Log	Lithologic Description
0		0-3': fill; sand with sparse pebbles
		3-9': Hanford fm. sandy gravel
10		9-11.5': Hanford fm. silty sandy gravel, clay-altered
		11.5-18': Hanford fm. sandy gravel
20		18-20': Hanford fm. silty sandy gravel, clay-altered
		20-33.5': Hanford fm. sandy gravel
30		33.5-35': Hanford fm. silty sandy gravel, clay-altered
		35-43': Hanford fm. sandy gravel
40		43-50.5': Ringold Fm. Sand
50		- water level = 32.5'
		TD = 50.5'

A-6003-643 (03/03)

BOREHOLE LOG

Page 1 of 2
Date: 12-1-06

Well ID: C5359 | Well Name: 399-1-32 | Location: 300-FF-5

Project: Polyphosphate Treatability Test | Reference Measuring Point: ground surface

Depth (Ft.)	Sample Type No.	Sample Blows Recovery	Graphic Log	Sample Description: Group Name, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl	Comments: Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
0					Sonic, 7" drive barrel
				0-3': sandy fill, sparse pebbles	
				3-9': sandy gravel, medium sand, poorly-sorted, well-rounded basalt cobbles to 5", clast-supported (sG)	
5				9-11.5': silty sandy gravel (msG), silty fraction strongly clay-altered	
				11.5-15': sandy gravel (sG), medium sand, cobbles to 3" (one much larger - drilled through)	
10				15-18': sandy gravel (sG), coarse sand, cobbles 1-3", well-rounded, mostly basalt, better sorting than sG closer to surface.	
15				18-20': silty sandy gravel (msG), strong clay component	
				20-33.5': sandy gravel (sG), med to coarse sand, very poorly sorted cobbles to > 6", generally well-rounded, mostly basalt	
20				33.5-~~43~~ 35' @ 12-1-06: silty sandy gravel (msG), mod. to strong clay component	
25				35-43': sandy gravel, same as interval from 20-33.5' (sG)	
30				43-50.5: Ringold sand (S), sparse to moderate pebbles @ 12-1-06 cobbles to 2" throughout, clay from 43-44', reduced (gray) from 50.5 to 49, some wood fragments, oxidized (orange) from 43-49'	
35					

Reported By: Michael E. Caron | Reviewed By: L.D. Walker

Title: Senior Geologist | Title: Geologist

Signature: | Date: 12-1-06 | Signature: | Date: 12/14/06

A-6003-642 (03/03)

BOREHOLE LOG

Page 2 of 2
Date: 12-1-06

Well ID: C5359 | Well Name: 399-1-32 | Location: 300-FF-5

Project: Polyphosphate Treatability Test | Reference Measuring Point: ground surface

Depth (Ft.)	Sample Type No.	Sample Blows Recovery	Graphic Log	Sample Description: Group Name, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl	Comments: Depth of Casing, Drilling Method, Method of Driving Sampling Tool, Sampler Size, Water Level
40				35-43': sandy gravel (sG), med. to coarse sand, very poorly sorted cobbles to >6", generally well-rounded, mostly basalt	Sonic, 7" drive barrel
45				43-50.5': Ringold sand (S), sparse to moderate cobbles to 2" throughout, clay from 43-44', oxidized (orange) from 43-49', reduced (gray) from 50.5 to 49', some wood fragments	TD = 50.5'
50					

Reported By: Michael E. Carm | Title: Senior Geologist | Signature: | Date: 12-1-06

Reviewed By: L. D. Walker | Title: Geologist | Signature: | Date: 12/14/06

A-6003-642 (03/03)

FIELD ACTIVITY REPORT NO. 1 - DRILLING PLAN

Page 1 of 1

Date: 12-1-06

Purpose: Polyphosphate Treatability Test

Location: 300-FF-5

Well ID: C5359

Well Name: 399-1-32

Drilling Co.: Prosonic

Rig No.: SR-071

Rig Make/Mod.: Prosonic Sonic Rig

Casing String No. (1) 2 3 4	Drilling Method	Circulation	D.H. Hammer
Casing Size 8"	Auger	Air ___ Water/Mud ___	Make
Grade	Rotary	Reverse ___ Direct ___	Model
Lbs.Per Ft. 35	Tubex	Vol: cfm	Choke
Material carbon steel	Cable Tool	gpm	Casing Hammer
Type:	Sonic ✓	Pressure ___ psi	Make
Welded ___ (Thd.)	A.R. w/Sonic	Drill Pipe O.D.	Model
Planned / Actual	Geoprobe	Tool Joint Size	Bit Size
Set At: 52±2 / 50.5	Other:	Additives none	Type
Shoe OD/ID 8.25" / 7.25"			Nozzles
Reference Measuring Point: GROUND LEVEL			Rod Size

Drig. Co. | Rig No.: | Rig Make/Mod.:

Casing String No. 1 2 3 4	Drilling Method	Circulation	D.H. Hammer
Casing Size	Auger	Air ___ Water/Mud ___	Make
Grade	Rotary	Reverse ___ Direct ___	Model
Lbs.Per Ft.	Tubex	Vol: cfm	Choke
Material	Cable Tool	gpm	Casing Hammer
Type:	Sonic N/A	Pressure ___ psi	Make
Welded ___ Thd.	A.R. w/Sonic	Drill Pipe O.D.	Model
Planned / Actual	Geoprobe	Tool Joint Size	Bit Size
Set At: /	Other:	Additives	Type
Shoe OD/ID			Nozzles
Reference Measuring Point: GROUND LEVEL			Rod Size

Comments/Remarks:

Estimated Depth to Water

Reported By: Michael E. Caron

Name/Title: Senior Geologist

Signature: [signature]

Date: 12-1-06

A-6003-650 (04/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 1

Date: 12-1-06

Well ID: C5359 | Well Name: 399-1-32

Location: | Report No.: 1

Start	Finish	Total
Time 1215	Time 1445	Time 230
Hole Depth/Csg 0 / 0	Hole Depth/Csg 50.5 / 47	Hole Depth/Csg 50.5 / 47

Reference Measuring Point: GROUND SURFACE

Casing String No. (1) 2 3 4 ____ Rod Size: 8"

See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
	1215	- commence drilling with 7" drive barrel, advance to 16'
	1250	- add 2 lengths casing + bit (tally = 20.5'), advance to 16'
	1305	- resume drilling with 7" drive barrel, advance to 36'
1200		- PM RCT surveys
	1310	- PM HHT survey, all reading < detection
	1325	- add 20' of casing, advance to 36'
	1330	- resume drilling with 7" drive barrel, advance to 50.5'
	1420	- clean out borehole to 46', add 10' of casing, advance to 47'
	1445	- done for day - drillers need to get 5' length of 20 slot screen to set well in interval from 44-29'.

Not Used @

Reported By: Michael E. Caron

Title: Senior Geologist | Date: 12-1-06

Signature:

Reviewed By: L.D. Walker

Title: Geologist | Date: 12/14/06

Signature:

A-6003-651 (04/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 2

Date: 12-4-06

Well ID: C5359 | Well Name: 399-1-32

Location: 300 - ~~FF~~ 5 | Report No.: (2)

Start	Finish	Total
Time 0630	Time 1415	Time 445
Hole Depth/Csg 50.5 / 47	Hole Depth/Csg 50.5 / 0	Hole Depth/Csg 50.5 / NA

Reference Measuring Point: GROUND SURFACE

Casing String No. (1) 2 3 4 ____ Rod Size: 8"

See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
	0630	- on site at site trailer
	0700	- PoD at site trailer (drillers arrived late because they needed to pick up 5' screen) - PoD attendees include 3 drillers, BTR, geologist
	0800	- decon stainless steel screen
	0830	- trip in stainless steel screen and casing, set screen at 39-44', stickup = 6' 4", centralizers at top and bottom of screen and at 41' bgs
	0847	- add 1 buckets of bentonite pellets, bring level to 45.5' bgs
	0852	- add 2 bags of 10-20 Colorado silica sand
	0855	- pull casing back 3', casing at 45', 2.5' overlap
	0859	- add 2 bags of sand
	0900	- pull casing back 35', bottom of casing at 42', screen exposed from 41.5 - 44'
0905	0920	- surge interval from 41.5 - 44', sand fell out less than 0.1' in 15 minutes
	0923	- add 2 bags sand, remove 10' length of casing, tally = 42.5' bottom of casing at 35'
	0928	- add 1 bag of sand.
0930	0947	- surge interval from 41.5 - 38', sand fell out less than 0.1' in last 15 minutes
0948	1002	- surge interval from 38 - 35', sand fell out less than 0.1' in 15 minutes
~~0948~~ @ 12-4-06	1002 @	
	1004	- add 1.5 bags sand
	1007	- pull casing back 3'

Reported By: Michael E. Carr | Reviewed By: L.D. Walker

Title: Senior Geologist | Date: 12-4-06 | Title: Geologist | Date: 12/14/06

Signature: | Signature:

A-6003-651 (04/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Continuation Page

Date: 12-4-06

Well Name: ~~C5359~~ @ 12-11-06 399-1-32

Well ID: ~~399-1-32~~ @ 12-11-06 C5359

Location: 300-FF-5

Continuation of Report No.: (2)

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth
	1008	- add 1.5 bags sand, tag bottom at 27'
	1010	- AM RCT check, no cuttings to survey
	1012	- pull casing back 3', tag sand level at 26.5'
	1014	- add 2 buckets of bentonite pellets
	1017	- remove 10' casing, tally = 30.5', bottom = 25', tag bentonite at 24'
	1021	- switch to bentonite chips (out of pellets), add 3 bags of chips
	1025	- pull casing back 3', tag bottom at 19.5'
	1028	- add 2 bags of bentonite crumbles
	1029	- remove 10' of casing, tally = 20.5', bottom = 15', tag bentonite at 15'
	1032	- add 2 bags bentonite crumbles, tag bottom at 9'
	1035	- pull casing back 3'
	1047	- mix grout (2 sacks cement, 5% bentonite, 20 gal water)
	1050	- inject grout
	1053	- mix grout (1 sack cement, 5% bentonite, 10 gal water)
	1055	- inject grout
	1059	- remove 10' of casing, tally = 10.5'
	1102	- remove 10.5' of casing (incl. bit), all out of hole
	1115	- left site for the day

Not Used

Reported By: Michael E. Carm		Reviewed By: L.D. Walker	
Title: Senior Geologist	Date: 12-4-06	Title: Geologist	Date: 12/14/06
Signature: MEC		Signature: LD Walker	

A-6003-652 (04/03)

WELL DEVELOPMENT AND TESTING DATA

Well Name: 399-1-32 ~~C5359~~ @ 12-11-06	Well ID: C5359 ~~399-1-32~~ @ 12-11-06	Well Location: 300-FF-5	Date: 12-8-06

Reference Measuring Point (unless otherwise noted): TOP OF OUTER CASING (TOC)

Has the well been surveyed? ○ Yes ⊘ No | Does the well have a cement pad? ⊘ Yes ○ No

PART 1

STATIC WATER LEVEL:

Start of Job	32.45
End of Job	32.50

DEPTH TO BOTTOM:

Start of Job	44.2
End of Job	44.2

PART 2

WELL DEVELOPMENT DATA

Pump Model	Redi-flow 3
Intake Depth	40' / 37'
Starting Turbidity	322 / 6.69 NTU

Pump Start	Stop	Flow Rate
0839	@ 12-11-06 ~~0918~~ 0918	@ 12-11-06 ~~24~~ 20
0931	0950	24

Total Pumped	1410 gal
Final Turbidity	2.87 / 2.06 NTU
XD SN/Range (PSI)	

PART 3

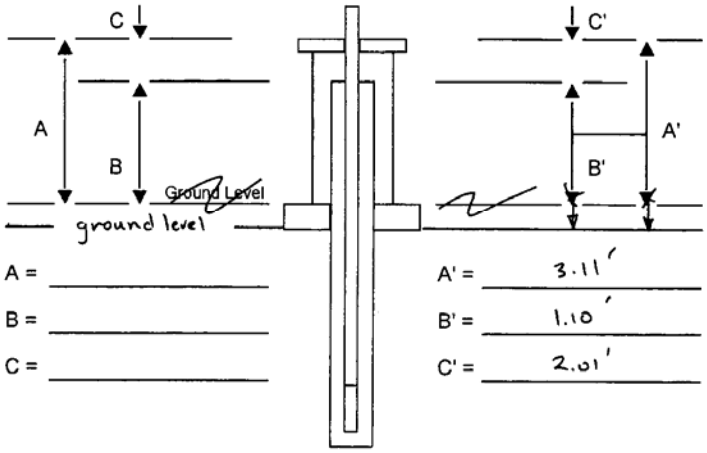
INSTANTANEOUS SLUG TEST

Static Water Level (TOC)	
Transducer Depth	
Baseline Start	
Injection Start	N/A
Baseline Start	
Withdrawal Start	
Slug Volume	
XD SN/Range (PSI)	

PART 4

Last Recorded Measurements Date: NA

Current Measurements Date: 12-8-06



A = _____ A' = 3.11'

B = _____ B' = 1.10'

C = _____ C' = 2.01'

Are there any reference marks on the casing strings? ○ Yes ⊘ No

PART 5

COMMENTS:

Prepared by (print name): Michael E. Caron	Signature:	Date: 12-11-06
Reviewed by (print name): L.D. Walker	Signature: L D Walker	Date: 12-14-06

A-6003-644 (03/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Page 1 of 2

Date: 12-8-06

Well ID: C5359 | Well Name: 399-1-32

Location: 300-FF-5 | Report No.: 2

Start	Finish	Total
Time 0645	Time 1030	Time 0345
Hole Depth/Csg NA / NA	Hole Depth/Csg NA / NA	Hole Depth/Csg NA / NA

Reference Measuring Point: GROUND SURFACE

Casing String No. 1 2 3 4 ____ Rod Size: See Report No. 1

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth (Attach applicable drawings and document straightness test results)
	0645	- on site for walkdown
	0810	- calibrate instruments
		turbidity meter — standard 4.37 — reading 4.29
		standard 43.0 — reading 44.2
		standard 545 — reading 548
		pH meter — 10 — 10.02
		7 — 7.06
		conductivity meter — 1.419 — 1409
	0820	- flowmeter = 11,120, probe = 4.942, screen (pump) set at 40'
	0839	- start test #5 (Jeff)
		time 0840 — pH 7.39 — conductivity 0.496 — temp 13.0° — turbidity 322 — probe 5.156 — pump 20 gpm
		0845 — 7.47 — 0.487 — 14.1° — 7.87 — 5.171
		0850 — 7.45 — @29 0.483 — 14.7° — 3.65 — 5.192
		0855 — 7.46 — 0.488 — 14.4° — 1.97 — 5.213
		0900 — 7.43 — 0.487 — 14.2° — 4.79 — 5.293 — etape = 32.55
		0905 — 7.47 — 0.484 — 14.4° — 3.14 — 5.340
		0910 — 7.51 — 0.485 — 13.8° — 2.79 — 5.477
		0915 — 7.42 — 0.485 — 14.0° — 2.87 — 5.595 — e-tape = 32.45
	0918	- stop test #5, flowmeter = 12070, 950 gallons
	0918	- start test #6
	0927	- probe = 5.654
	0930	- pull pump up 3', inlet set at 37'

Reported By: Michael E. Caron | Title: Senior Geologist | Date: 12-8-06 | Signature: [signature]

Reviewed By: L. D. Walker | Title: Geologist | Date: 12/14/06 | Signature: LD Walker

A-6003-651 (04/03)

FIELD ACTIVITY REPORT - DAILY DRILLING

Continuation Page

Page 2 of 2

Date: 12-8-06

Well Name: ~~C5359~~ @ 12-11-06 399-1-32

Well ID: ~~399-1-32~~ @ 12-11-06 C5359

Location: 300-FF-5

Continuation of Report No.: (2)

Time/Depth From	Time/Depth To	Description of Activities/Operations with Depth
	0931	start test #7, probe = 2.646, flowmeter = 12070
		time pH conductivity temp turbidity probe pumprate
		0933 7.55 0.506 11.4° 6.69 2.709 22 gpm
		0938 7.55 0.484 14.5° 4.30 2.839
		0943 7.51 0.483 14.4° 1.95 2.919
		0948 7.51 0.483 14.1° 2.06 3.069
	0950	stop test #7, flowmeter = 12530
	0950	start test #8
	1000	stop test #8
	1030	- left site

Not Used @

Reported By: Michael E. Caron

Title: Senior Geologist Date: 12-8-06

Signature:

Reviewed By: L. D. Walker

Title: Geologist Date: 12/14/06

Signature: LD Walker

A-6003-652 (04/03)

FIELD ACTIVITY REPORT

TUBULAR GOODS TALLY

Page 1 of 1

Date: 12-1-06

Well Name: ~~C5359@ 12-11-06~~ 399-1-32

Well ID: ~~399-1-32@12-11-06~~ C5359

TEMPORARY				PERMANENT*						SCREEN/CAP*		
Jt. #	Length (ft.)	Jt. #	Length (ft.)	Jt. #	Length (ft.)	C	Jt. #	Length (ft.)	C	Jt. #	Length (ft.)	C
1	0.5 (bit)	21		1			21	10.01 (casing)		1	0.35 (cap)	
2	10.00 (casing)	22		2			22	10.00 ✓		2	4.97 (scr)	C
3	10.00 ✓	23		3			23	10.00 ✓	C	3	9.98 ✓	C
4	10.00 ✓	24		4			24	5.00 ✓		4		
5	10.00 ✓	25		5			25			5		
6	10.00 ✓	26		6			26			6		
7		27		7			27			7		
8		28		8			28			8		
9		29		9			29			9		
10		30		10			30			10		
11		31		11			31			11		
12		32		12			32			12		
13		33		13			33			13		
14		34		14			34			14		
15		35		15			35			15		
16		36		16			36			16		
17		37		17			37			17		
18		38		18			38			18		
19		39		19			39			19		
20		40		20			40			20		
Tot	50.05	Tot		Tot			Tot	35.01		Tot	15.30	

*Indicate those joints with centralizers with a C in the available box.
ALL Casing length shall be measured to the nearest 0.01 ft.

Comments/Remarks:

Temporary: O.D./I.D. 8" / 7.25"

Permanent: O.D./I.D. 4.5" / 4 3/8"

Screen: O.D./I.D. 4.5" / 4 3/8"

bit = 6" in length, OD = 8.25", ID = 7.25"

drive barrel - 7" OD, 6" ID

Reported By: Michael E. Caron

Title: Senior Geologist Date: 12-4-06

Signature:

Reviewed By: L. D. Walker

Title: Geologist Date: 12/14/06

Signature:

A-6003-655 (04/03)

WELL CONSTRUCTION SUMMARY REPORT

Start Date: 12-1-06
Finish Date: 12-4-06
Page 1 of 1

Well ID: C5359	Well Name: 399-1-32	Approximate Location:	300-FF-5
Project: Polyphosphate Treatability Test		Other Companies:	FH, GRAM
Drilling Company: Prosonic		Geologist(s):	M.E. Caron
Driller: Aaron Adams	License #: 0831		

TEMPORARY CASING AND DRILL DEPTH			DRILLING METHOD	HOLE DIAMETER (in.) / INTERVAL (ft)
*Size/Grade/Lbs. Per Ft.	Interval	Shoe O.D./I.D.		
8" / 35 lbs	0 -	8.25"/7.25"	Auger:	Diameter ___ From ___ to ___
	-		Cable Tool:	Diameter ___ From ___ to ___
	-		Air Rotary:	Diameter ___ From ___ to ___
	-		A.R. w/Sonic:	Diameter ___ From ___ to ___
	-		Sonic	Diameter 8" From 0 to 50.5'
	-			Diameter ___ From ___ to ___
*Indicate Welded (W) - Flush Joint (FJ) Coupled (C) & Thread Design				Diameter ___ From ___ to ___

		Drilling Fluid:	— none —
Total Drilled Depth: 50.5'	Hole Dia @ TD: 8.25"	Total Amt. Of Water Added During Drilling:	— 0 —
Well Straightness Test Results: pass		Static Water Level: 32.50'	Date: 12-8-06

GEOPHYSICAL LOGGING

Sondes (type)	Interval	Date	Sondes (type)	Interval	Date
	-			-	
	-			-	
	-			-	

COMPLETED WELL

Size/Wt./Material	Depth	Thread	Slot Size	Type	Interval Annular Seal/Filter Pack	Volume	Mesh Size
4" stainless	0 - 44.35		20	bentonite pellets	~~48.45~~ - 50.5	1 bucket	
	-			Colorado silica sand 10-20	26.5 - ~~48.45~~	10 bags	
	-			bentonite pellets	19.5 - 26.5	7 buckets	
	-			bentonite crumbles	9 - 19.5	2 bags	
	-			neat Portland cement	0 - 9	20 gal.	

OTHER ACTIVITIES

Aquifer Test:	Date:	Well Decommission:	Yes:	No:	Date:
Description:		Description:			

WELL SURVEY DATA (if applicable)

Not yet surveyed at this time

	Protective Casing Elevation:
Washington State Plane Coordinates:	Brass Survey Marker Elevation:

COMMENTS / REMARKS

Reported By:	Title:	Signature:	Date:
Michael E. Caron	Senior Geologist		12-11-06

A-6003-658 (04/03)

Survey Data Report

SURVEY DATA REPORT				Request No. 072-154
Project No.	Title: Civil Survey of 22 Wells / North Side of 300 Area			File No. 3AT10R28
Job No. 65400811.1224710 CA10	Prepared By N.P. Fastabend	Date 2/19/07	Reviewer SAW-	Page 1 of 23

DESCRIPTION OF WORK	DISTRIBUTION	SDR	PLOT	DWG
Civil Survey for horizontal and vertical position of Wells C5000, C5351-C5359, A5018, A5020, A5021, A5025, A5035, A5040, A5043-A5045, A5411, A5412 and A5414. Horizontal Datum: NAD83/91 (Meters) Vertical Datum: NAVD88 (Meters)	Survey File	OR		
	C.S. Wright	1		
	B.J. Howard	1		
	G.G. Kelty	1		

SURVEY RESULTS AND COMMENTS

See Attached Well Survey Data Report Sheets

NOTE: This Survey was performed under the supervision of a Licensed Professional Land Surveyor registered in the State of Washington.

E-NW-246 (09/04)

WELL SURVEY DATA REPORT

Project:	**Prepared By:** N.P. Fastabend **Company:** FGG
Date Requested: 1/24/07	**Requestor:** C.S. Wright (FH)
Date of Survey: 2/16/07	**Surveyor:** N.P. Fastabend FGG Survey Dept.
ERC Point of Contact:	**Survey Co. Point of Contact:** J.M. Schwing (FGG)
Description of Work: Civil Survey of Groundwater Monitoring Well #C5000 (399-1-23)	**Horizontal Datum:** NAD83(91)
	Vertical Datum: NAVD88
	Units: METERS
	Hanford Area Designation: 300A

Coordinate System: Washington State Plane Coordinates (South Zone)

Horizontal Control Monuments: GABLEMTN (FH), 300-70 (FGG)

Vertical Control Monuments: 300-28 (FGG), 300-60 (FGG)

Well ID	Well Name	Easting	Northing	Elevation	
C5000	399-1-23	594113.51	116453.15		Center of Casing
				115.987	Top Inner 4" Casing, S. Edge
				116.308	Top Outer 8" Casing, S. Edge
				115.466	Brass Survey Marker

Notes:

EQUIPMENT USED: TRIMBLE GPS 5800 RTK
TRIMBLE DiNi 12 LEVEL

Surveyor Statement:
I, Larry A. Henke, a Professional Land Surveyor registered in the State of Washington (Registration No. 38975), hereby certify that this report is based on a field survey performed in February, 2007 under my direct supervision, and that the data contained here is true and correct.

Original to:
Distribution by DIS:

WELL SURVEY DATA REPORT

Project:	**Prepared By:** N.P. Fastabend **Company:** FGG
Date Requested: 1/24/07	**Requestor:** C.S. Wright (FH)
Date of Survey: 2/16/07	**Surveyor:** N.P. Fastabend FGG Survey Dept.
ERC Point of Contact:	**Survey Co. Point of Contact:** J.M. Schwing (FGG)
Description of Work: Civil Survey of Groundwater Monitoring Well #C5351 (399-1-24)	**Horizontal Datum:** NAD83(91)
	Vertical Datum: NAVD88
	Units: METERS
	Hanford Area Designation: 300A

Coordinate System: Washington State Plane Coordinates (South Zone)

Horizontal Control Monuments: GABLEMTN (FH), 300-70 (FGG)

Vertical Control Monuments: 300-28 (FGG), 300-60 (FGG)

Well ID	Well Name	Easting	Northing	Elevation	
C5351	399-1-24	594116.45	116449.68		Center of Casing
				116.056	Top Inner 4" Casing N. Edge
				116.366	Top Outer 8" Casing, N. Edge
				115.621	Brass Survey Marker

Notes: Brass survey marker in concrete pad in poor condition.

EQUIPMENT USED: TRIMBLE GPS 5800 RTK
TRIMBLE DiNi 12 LEVEL

Surveyor Statement:
I, Larry A. Henke, a Professional Land Surveyor registered in the State of Washington (Registration No. 38975), hereby certify that this report is based on a field survey performed in February, 2007 under my direct supervision, and that the data contained here is true and correct.

Original to:
Distribution by DIS:

WELL SURVEY DATA REPORT

Project:	**Prepared By:** N.P. Fastabend **Company:** FGG
Date Requested: 1/24/07	**Requestor:** C.S. Wright (FH)
Date of Survey: 2/16/07	**Surveyor:** N.P. Fastabend FGG Survey Dept.
ERC Point of Contact:	**Survey Co. Point of Contact:** J.M. Schwing (FGG)
Description of Work: Civil Survey of Groundwater Monitoring Well #C5352 (399-1-25)	**Horizontal Datum:** NAD83(91)
	Vertical Datum: NAVD88
	Units: METERS
	Hanford Area Designation: 300A

Coordinate System: Washington State Plane Coordinates (South Zone)

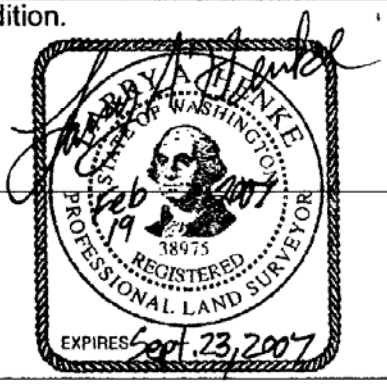
Horizontal Control Monuments: GABLEMTN (FH), 300-70 (FGG)

Vertical Control Monuments: 300-28 (FGG), 300-60 (FGG)

Well ID	Well Name	Easting	Northing	Elevation	
C5352	399-1-25	594116.88	116450.35		Center of Casing
				116.030	Top Inner 4" Casing, N. Edge
				116.374	Top Outer 8" Casing, N. Edge
				115.595	Brass Survey Marker

Notes: Brass survey marker in concrete pad in poor condition.

EQUIPMENT USED: TRIMBLE GPS 5800 RTK
TRIMBLE DiNi 12 LEVEL



Surveyor Statement:
I, Larry A. Henke, a Professional Land Surveyor registered in the State of Washington (Registration No. 38975), hereby certify that this report is based on a field survey performed in February, 2007 under my direct supervision, and that the data contained here is true and correct.

Original to:
Distribution by DIS:

WELL SURVEY DATA REPORT

Project:	**Prepared By:** N.P. Fastabend **Company:** FGG
Date Requested: 1/24/07	**Requestor:** C.S. Wright (FH)
Date of Survey: 2/16/07	**Surveyor:** N.P. Fastabend FGG Survey Dept.
ERC Point of Contact:	**Survey Co. Point of Contact:** J.M. Schwing (FGG)
Description of Work: Civil Survey of Groundwater Monitoring Well #C5353 (399-1-26)	**Horizontal Datum:** NAD83(91)
	Vertical Datum: NAVD88
	Units: METERS
	Hanford Area Designation: 300A

Coordinate System: Washington State Plane Coordinates (South Zone)

Horizontal Control Monuments: GABLEMTN (FH), 300-70 (FGG)

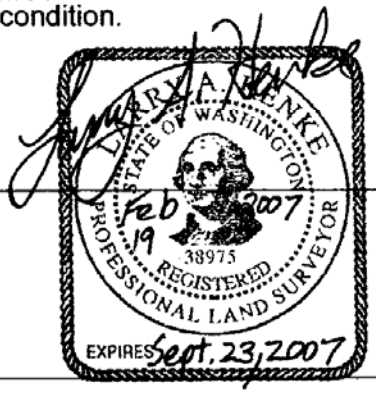
Vertical Control Monuments: 300-28 (FGG), 300-60 (FGG)

Well ID	Well Name	Easting	Northing	Elevation	
C5353	399-1-26	594108.27	116456.21		Center of Casing
				115.872	Top Inner 4" Casing, N. Edge
				116.269	Top Outer 8" Casing, N. Edge
				115.459	Brass Survey Marker

Notes: Brass survey marker in concrete pad in poor condition.

EQUIPMENT USED: TRIMBLE GPS 5800 RTK
TRIMBLE DiNi 12 LEVEL

Surveyor Statement:
I, Larry A. Henke, a Professional Land Surveyor registered in the State of Washington (Registration No. 38975), hereby certify that this report is based on a field survey performed in February, 2007 under my direct supervision, and that the data contained here is true and correct.



Original to:
Distribution by DIS:

WELL SURVEY DATA REPORT

Project:	**Prepared By:** N.P. Fastabend **Company:** FGG
Date Requested: 1/24/07	**Requestor:** C.S. Wright (FH)
Date of Survey: 2/16/07	**Surveyor:** N.P. Fastabend FGG Survey Dept.
ERC Point of Contact:	**Survey Co. Point of Contact:** J.M. Schwing (FGG)
Description of Work: Civil Survey of Groundwater Monitoring Well #C5354 (399-1-27)	**Horizontal Datum:** NAD83(91)
	Vertical Datum: NAVD88
	Units: METERS
	Hanford Area Designation: 300A

Coordinate System: Washington State Plane Coordinates (South Zone)

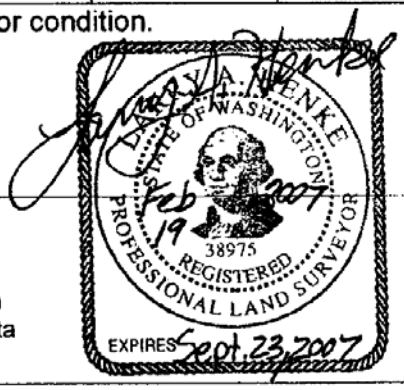
Horizontal Control Monuments: GABLEMTN (FH), 300-70 (FGG)

Vertical Control Monuments: 300-28 (FGG), 300-60 (FGG)

Well ID	Well Name	Easting	Northing	Elevation	
C5354	399-1-27	594116.23	116446.18		Center of Casing
				116.109	Top Inner 4" Casing, N. Edge
				116.486	Top Outer 8" Casing, N. Edge
				115.693	Brass Survey Marker

Notes: Brass survey marker in concrete pad in poor condition.

EQUIPMENT USED: TRIMBLE GPS 5800 RTK
TRIMBLE DiNi 12 LEVEL



Surveyor Statement:
I, Larry A. Henke, a Professional Land Surveyor registered in the State of Washington (Registration No. 38975), hereby certify that this report is based on a field survey performed in February, 2007 under my direct supervision, and that the data contained here is true and correct.

Original to:
Distribution by DIS:

WELL SURVEY DATA REPORT

Project:	**Prepared By:** N.P. Fastabend **Company:** FGG
Date Requested: 1/24/07	**Requestor:** C.S. Wright (FH)
Date of Survey: 2/16/07	**Surveyor:** N.P. Fastabend FGG Survey Dept.
ERC Point of Contact:	**Survey Co. Point of Contact:** J.M. Schwing (FGG)
Description of Work: Civil Survey of Groundwater Monitoring Well #C5355 (399-1-28)	**Horizontal Datum:** NAD83(91)
	Vertical Datum: NAVD88
	Units: METERS
	Hanford Area Designation: 300A

Coordinate System: Washington State Plane Coordinates (South Zone)

Horizontal Control Monuments: GABLEMTN (FH), 300-70 (FGG)

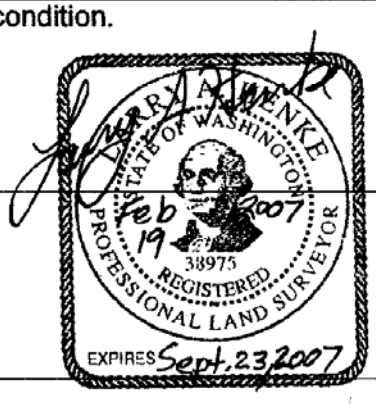
Vertical Control Monuments: 300-28 (FGG), 300-60 (FGG)

Well ID	Well Name	Easting	Northing	Elevation	
C5355	399-1-28	594115.57	116445.84		Center of Casing
				116.132	Top Inner 4" Casing, N. Edge
				116.479	Top Outer 8" Casing, N. Edge
				115.707	Brass Survey Marker

Notes: Brass survey marker in concrete pad in poor condition.

EQUIPMENT USED: TRIMBLE GPS 5800 RTK
TRIMBLE DiNi 12 LEVEL

Surveyor Statement:
I, Larry A. Henke, a Professional Land Surveyor registered in the State of Washington (Registration No. 38975), hereby certify that this report is based on a field survey performed in February, 2007 under my direct supervision, and that the data contained here is true and correct.



Original to:
Distribution by DIS:

WELL SURVEY DATA REPORT

Project:	**Prepared By:** N.P. Fastabend **Company:** FGG
Date Requested: 1/24/07	**Requestor:** C.S. Wright (FH)
Date of Survey: 2/16/07	**Surveyor:** N.P. Fastabend FGG Survey Dept.
ERC Point of Contact:	**Survey Co. Point of Contact:** J.M. Schwing (FGG)
Description of Work: Civil Survey of Groundwater Monitoring Well #C5356 (399-1-29)	**Horizontal Datum:** NAD83(91)
	Vertical Datum: NAVD88
	Units: METERS
	Hanford Area Designation: 300A

Coordinate System: Washington State Plane Coordinates (South Zone)

Horizontal Control Monuments: GABLEMTN (FH), 300-70 (FGG)

Vertical Control Monuments: 300-28 (FGG), 300-60 (FGG)

Well ID	Well Name	Easting	Northing	Elevation	
C5356	399-1-29	594118.67	116445.75		Center of Casing
				116.115	Top Inner 4" Casing, N. Edge
				116.521	Top Outer 8" Casing, N. Edge
				115.697	Brass Survey Marker

Notes: Brass survey marker in concrete pad in poor condition.

EQUIPMENT USED: TRIMBLE GPS 5800 RTK
TRIMBLE DiNi 12 LEVEL

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Project:	**Prepared By:** N.P. Fastabend **Company:** FGG
Date Requested: 1/24/07	**Requestor:** C.S. Wright (FH)
Date of Survey: 2/16/07	**Surveyor:** N.P. Fastabend FGG Survey Dept.
ERC Point of Contact:	**Survey Co. Point of Contact:** J.M. Schwing (FGG)
Description of Work: Civil Survey of Groundwater Monitoring Well #C5357 (399-1-30)	**Horizontal Datum:** NAD83(91)
	Vertical Datum: NAVD88
	Units: METERS
	Hanford Area Designation: 300A

Coordinate System: Washington State Plane Coordinates (South Zone)

Horizontal Control Monuments: GABLEMTN (FH), 300-70 (FGG)

Vertical Control Monuments: 300-28 (FGG), 300-60 (FGG)

Well ID	Well Name	Easting	Northing	Elevation	
C5357	399-1-30	594110.62	116449.68		Center of Casing
				116.048	Top Inner 4" Casing, N. Edge
				116.375	Top Outer 8" Casing, N. Edge
				115.630	Brass Survey Marker

Notes: Brass survey marker in concrete pad in poor condition.

EQUIPMENT USED: TRIMBLE GPS 5800 RTK
TRIMBLE DiNi 12 LEVEL

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Date Requested: 1/24/07	**Requestor:** C.S. Wright (FH)
Date of Survey: 2/16/07	**Surveyor:** N.P. Fastabend FGG Survey Dept.
ERC Point of Contact:	**Survey Co. Point of Contact:** J.M. Schwing (FGG)
Description of Work: Civil Survey of Groundwater Monitoring Well #C5358 (399-1-31)	**Horizontal Datum:** NAD83(91)
	Vertical Datum: NAVD88
	Units: METERS
	Hanford Area Designation: 300A

Coordinate System: Washington State Plane Coordinates (South Zone)

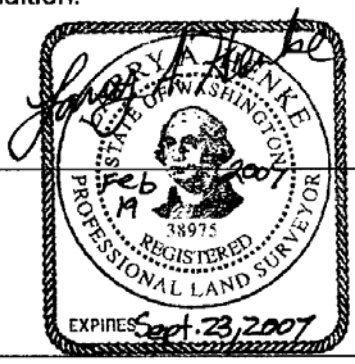
Horizontal Control Monuments: GABLEMTN (FH), 300-70 (FGG)

Vertical Control Monuments: 300-28 (FGG), 300-60 (FGG)

Well ID	Well Name	Easting	Northing	Elevation	
C5358	399-1-31	594118.66	116456.15		Center of Casing
				115.982	Top Inner 4" Casing, N. Edge
				116.236	Top Outer 8" Casing, N. Edge
				115.522	Brass Survey Marker

Notes: Brass survey marker in concrete pad in poor condition.

EQUIPMENT USED: TRIMBLE GPS 5800 RTK
TRIMBLE DiNi 12 LEVEL



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Date Requested: 1/24/07	**Requestor:** C.S. Wright (FH)
Date of Survey: 2/16/07	**Surveyor:** N.P. Fastabend FGG Survey Dept.
ERC Point of Contact:	**Survey Co. Point of Contact:** J.M. Schwing (FGG)
Description of Work: Civil Survey of Groundwater Monitoring Well #C5359 (399-1-32)	**Horizontal Datum:** NAD83(91)
	Vertical Datum: NAVD88
	Units: METERS
	Hanford Area Designation: 300A

Coordinate System: Washington State Plane Coordinates (South Zone)

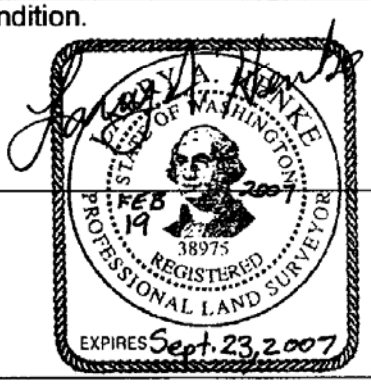
Horizontal Control Monuments: GABLEMTN (FH), 300-70 (FGG)

Vertical Control Monuments: 300-28 (FGG), 300-60 (FGG)

Well ID	Well Name	Easting	Northing	Elevation	
C5359	399-1-32	594137.47	116432.44		Center of Casing
				115.691	Top Inner 4" Casing, N. Edge
				116.028	Top Outer 8" Casing, N. Edge
				115.273	Brass Survey Marker

Notes: Brass survey marker in concrete pad in poor condition.

EQUIPMENT USED: TRIMBLE GPS 5800 RTK
TRIMBLE DiNi 12 LEVEL



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Date of Survey: 2/16/07	**Surveyor:** N.P. Fastabend FGG Survey Dept.
ERC Point of Contact:	**Survey Co. Point of Contact:** J.M. Schwing (FGG)
Description of Work: Civil Survey of Groundwater Monitoring Well #A5018 (399-1-1)	**Horizontal Datum:** NAD83(91)
	Vertical Datum: NAVD88
	Units: METERS
	Hanford Area Designation: 300A

Coordinate System: Washington State Plane Coordinates (South Zone)

Horizontal Control Monuments: GABLEMTN (FH), 300-70 (FGG)

Vertical Control Monuments: 300-28 (FGG), 300-60 (FGG)

Well ID	Well Name	Easting	Northing	Elevation	
A5018	399-1-1	594359.96	116588.84		Center of Casing
				115.844	Top Pump Baseplate, N. Edge
				115.834	Top of Casing, N. Edge
				115.065	Brass Survey Marker

Notes:

EQUIPMENT USED: TRIMBLE GPS 5800 RTK
TRIMBLE DiNi 12 LEVEL

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Date of Survey: 2/16/07	**Surveyor:** N.P. Fastabend FGG Survey Dept.
ERC Point of Contact:	**Survey Co. Point of Contact:** J.M. Schwing (FGG)
Description of Work: Civil Survey of Groundwater Monitoring Well #A5020 (399-1-11)	**Horizontal Datum:** NAD83(91)
	Vertical Datum: NAVD88
	Units: METERS
	Hanford Area Designation: 300A

Coordinate System: Washington State Plane Coordinates (South Zone)

Horizontal Control Monuments: GABLEMTN (FH), 300-70 (FGG)

Vertical Control Monuments: 300-28 (FGG), 300-60 (FGG)

Well ID	Well Name	Easting	Northing	Elevation	
A5020	399-1-11	594109.81	116660.16		Center of Casing
				116.160	Top Pump Baseplate, N. Edge
				116.156	Top of Casing, N. Edge
				115.676	Brass Survey Marker

Notes:

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Date of Survey: 2/16/07	**Surveyor:** N.P. Fastabend FGG Survey Dept.
ERC Point of Contact:	**Survey Co. Point of Contact:** J.M. Schwing (FGG)
Description of Work: Civil Survey of Groundwater Monitoring Well #A5021 (399-1-12)	**Horizontal Datum:** NAD83(91)
	Vertical Datum: NAVD88
	Units: METERS
	Hanford Area Designation: 300A

Coordinate System: Washington State Plane Coordinates (South Zone)

Horizontal Control Monuments: GABLEMTN (FH), 300-70 (FGG)

Vertical Control Monuments: 300-28 (FGG), 300-60 (FGG)

Well ID	Well Name	Easting	Northing	Elevation	
A5021	399-1-12	594040.22	116548.51		Center of Casing
				118.198	Top Pump Baseplate, N. Edge
				118.195	Top of Casing, N. Edge
				117.466	Brass Survey Marker

Notes:

EQUIPMENT USED: TRIMBLE GPS 5800 RTK
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Date of Survey: 2/16/07	**Surveyor:** N.P. Fastabend FGG Survey Dept.
ERC Point of Contact:	**Survey Co. Point of Contact:** J.M. Schwing (FGG)
Description of Work: Civil Survey of Groundwater Monitoring Well #A5025 (399-1-16A)	**Horizontal Datum:** NAD83(91) **Vertical Datum:** NAVD88 **Units:** METERS **Hanford Area Designation:** 300A

Coordinate System: Washington State Plane Coordinates (South Zone)

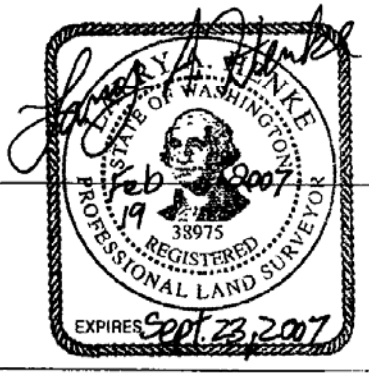
Horizontal Control Monuments: GABLEMTN (FH), 300-70 (FGG)

Vertical Control Monuments: 300-28 (FGG), 300-60 (FGG)

Well ID	Well Name	Easting	Northing	Elevation	
A5025	399-1-16A	594318.11	116414.16		Center of Casing
				117.303	Top Pump Baseplate, E. Edge
				117.300	Top of Casing, E. Edge
				116.906	Brass Survey Marker

Notes:

EQUIPMENT USED: TRIMBLE GPS 5800 RTK
TRIMBLE DiNi 12 LEVEL



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Date Requested: 1/24/07	**Requestor:** C.S. Wright (FH)
Date of Survey: 2/16/07	**Surveyor:** N.P. Fastabend FGG Survey Dept.
ERC Point of Contact:	**Survey Co. Point of Contact:** J.M. Schwing (FGG)
Description of Work: Civil Survey of Groundwater Monitoring Well #A5035 (399-1-2)	**Horizontal Datum:** NAD83(91)
	Vertical Datum: NAVD88
	Units: METERS
	Hanford Area Designation: 300A

Coordinate System: Washington State Plane Coordinates (South Zone)

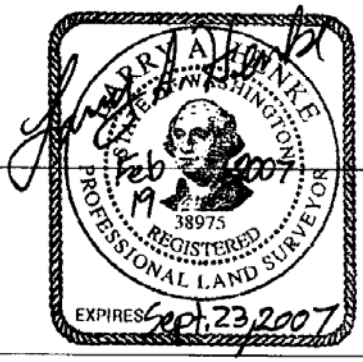
Horizontal Control Monuments: GABLEMTN (FH), 300-70 (FGG)

Vertical Control Monuments: 300-28 (FGG), 300-60 (FGG)

Well ID	Well Name	Easting	Northing	Elevation	
A5035	399-1-2	594082.36	116329.53		Center of Casing
				118.981	Top Pump Baseplate, N. Edge
				118.975	Top of Casing, N. Edge
				118.201	Brass Survey Marker

Notes:

EQUIPMENT USED: TRIMBLE GPS 5800 RTK
TRIMBLE DiNi 12 LEVEL



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Date Requested: 1/24/07	**Requestor:** C.S. Wright (FH)
Date of Survey: 2/16/07	**Surveyor:** N.P. Fastabend FGG Survey Dept.
ERC Point of Contact:	**Survey Co. Point of Contact:** J.M. Schwing (FGG)
Description of Work: Civil Survey of Groundwater Monitoring Well #A5040 (399-1-7)	**Horizontal Datum:** NAD83(91)
	Vertical Datum: NAVD88
	Units: METERS
	Hanford Area Designation: 300A

Coordinate System: Washington State Plane Coordinates (South Zone)

Horizontal Control Monuments: GABLEMTN (FH), 300-70 (FGG)

Vertical Control Monuments: 300-28 (FGG), 300-60 (FGG)

Well ID	Well Name	Easting	Northing	Elevation	
A5040	399-1-7	594260.06	116335.09		Center of Casing
				118.558	Top of Casing, W. Edge
					Brass Survey Marker (Destroyed)

Notes: Temporary Plate on Casing, Brass Survey Marker Destroyed.

EQUIPMENT USED: TRIMBLE GPS 5800 RTK
TRIMBLE DiNi 12 LEVEL

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Date of Survey: 2/16/07	**Surveyor:** N.P. Fastabend FGG Survey Dept.
ERC Point of Contact:	**Survey Co. Point of Contact:** J.M. Schwing (FGG)
Description of Work: Civil Survey of Groundwater Monitoring Well #A5043 (399-2-1)	**Horizontal Datum:** NAD83(91)
	Vertical Datum: NAVD88
	Units: METERS
	Hanford Area Designation: 300A

Coordinate System: Washington State Plane Coordinates (South Zone)

Horizontal Control Monuments: GABLEMTN (FH), 300-70 (FGG)

Vertical Control Monuments: 300-28 (FGG), 300-60 (FGG)

Well ID	Well Name	Easting	Northing	Elevation	
A5043	399-2-1	594467.21	116121.21		Center of Casing
				115.412	Top Pump Baseplate, N. Edge
				115.399	Top of Casing, N. Edge
				114.666	Brass Survey Marker

Notes:

EQUIPMENT USED: TRIMBLE GPS 5800 RTK
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Date of Survey: 2/16/07	**Surveyor:** N.P. Fastabend FGG Survey Dept.
ERC Point of Contact:	**Survey Co. Point of Contact:** J.M. Schwing (FGG)
Description of Work: Civil Survey of Groundwater Monitoring Well #A5044 (399-2-2)	**Horizontal Datum:** NAD83(91)
	Vertical Datum: NAVD88
	Units: METERS
	Hanford Area Designation: 300A

Coordinate System: Washington State Plane Coordinates (South Zone)

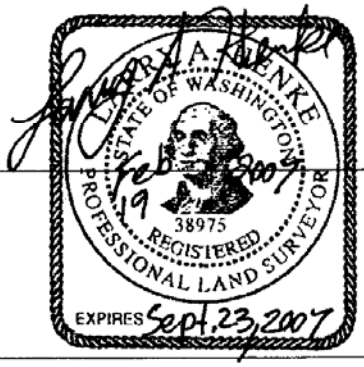
Horizontal Control Monuments: GABLEMTN (FH), 300-70 (FGG)

Vertical Control Monuments: 300-28 (FGG), 300-60 (FGG)

Well ID	Well Name	Easting	Northing	Elevation	
A5044	399-2-2	594385.69	116282.61		Center of Casing
				116.095	Top Casing, N. Edge Fnd. Stamped "X"
				115.324	Brass Survey Marker

Notes: Pump Baseplate not fixed in position.

EQUIPMENT USED: TRIMBLE GPS 5800 RTK
TRIMBLE DiNi 12 LEVEL



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Date of Survey: 2/16/07	**Surveyor:** N.P. Fastabend FGG Survey Dept.
ERC Point of Contact:	**Survey Co. Point of Contact:** J.M. Schwing (FGG)
Description of Work: Civil Survey of Groundwater Monitoring Well #A5045 (399-2-3)	**Horizontal Datum:** NAD83(91)
	Vertical Datum: NAVD88
	Units: METERS
	Hanford Area Designation: 300A

Coordinate System: Washington State Plane Coordinates (South Zone)

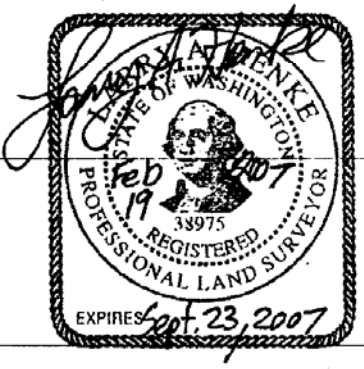
Horizontal Control Monuments: GABLEMTN (FH), 300-70 (FGG)

Vertical Control Monuments: 300-28 (FGG), 300-60 (FGG)

Well ID	Well Name	Easting	Northing	Elevation	
A5045	399-2-3	594377.44	116220.46		Center of Casing
				115.456	Top Casing, N. Edge Fnd. Stamped "X"
					Brass Survey Marker

Notes: Pump Baseplate not fixed in position. No Brass Survey Marker Found.

EQUIPMENT USED: TRIMBLE GPS 5800 RTK
TRIMBLE DiNi 12 LEVEL



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Date of Survey: 2/16/07	**Surveyor:** N.P. Fastabend FGG Survey Dept.
ERC Point of Contact:	**Survey Co. Point of Contact:** J.M. Schwing (FGG)
Description of Work: Civil Survey of Groundwater Monitoring Well #A5411 (399-1-10A)	**Horizontal Datum:** NAD83(91)
	Vertical Datum: NAVD88
	Units: METERS
	Hanford Area Designation: 300A

Coordinate System: Washington State Plane Coordinates (South Zone)

Horizontal Control Monuments: GABLEMTN (FH), 300-70 (FGG)

Vertical Control Monuments: 300-28 (FGG), 300-60 (FGG)

Well ID	Well Name	Easting	Northing	Elevation	
A5411	399-1-10A	594346.53	116733.99		Center of Casing
				114.898	Top Pump Baseplate, S. Edge
				114.895	Top of Casing, S. Edge
				114.377	Brass Survey Marker

Notes:

EQUIPMENT USED: TRIMBLE GPS 5800 RTK
TRIMBLE DiNi 12 LEVEL

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Date Requested: 1/24/07	**Requestor:** C.S. Wright (FH)
Date of Survey: 2/16/07	**Surveyor:** N.P. Fastabend FGG Survey Dept.
ERC Point of Contact:	**Survey Co. Point of Contact:** J.M. Schwing (FGG)
Description of Work: Civil Survey of Groundwater Monitoring Well #A5412 (399-1-13A)	**Horizontal Datum:** NAD83(91)
	Vertical Datum: NAVD88
	Units: METERS
	Hanford Area Designation: 300A

Coordinate System: Washington State Plane Coordinates (South Zone)

Horizontal Control Monuments: GABLEMTN (FH), 300-70 (FGG)

Vertical Control Monuments: 300-28 (FGG), 300-60 (FGG)

Well ID	Well Name	Easting	Northing	Elevation	
A5412	399-1-13A	593910.41	116557.26		Center of Casing
				119.467	Top Pump Baseplate, N. Edge
				119.464	Top of Casing, N. Edge
				118.622	Brass Survey Marker

Notes:

EQUIPMENT USED: TRIMBLE GPS 5800 RTK
TRIMBLE DiNi 12 LEVEL

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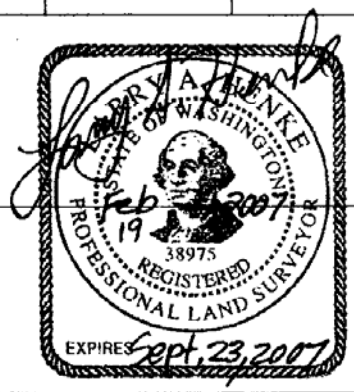

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Date of Survey: 2/16/07	**Surveyor:** N.P. Fastabend FGG Survey Dept.
ERC Point of Contact:	**Survey Co. Point of Contact:** J.M. Schwing (FGG)
Description of Work: Civil Survey of Groundwater Monitoring Well #A5414 (399-1-21A)	**Horizontal Datum:** NAD83(91)
	Vertical Datum: NAVD88
	Units: METERS
	Hanford Area Designation: 300A

Coordinate System: Washington State Plane Coordinates (South Zone)

Horizontal Control Monuments: GABLEMTN (FH), 300-70 (FGG)

Vertical Control Monuments: 300-28 (FGG), 300-60 (FGG)

Well ID	Well Name	Easting	Northing	Elevation	
A5414	399-1-21A	594160.75	116183.88		Center of Casing
				117.568	Top Pump Baseplate, N. Edge
				117.563	Top of Casing, N. Edge
				116.795	Brass Survey Marker

Notes:

EQUIPMENT USED: TRIMBLE GPS 5800 RTK
TRIMBLE DiNi 12 LEVEL

Surveyor Statement:
I, Larry A. Henke, a Professional Land Surveyor registered in the State of Washington (Registration No. 38975), hereby certify that this report is based on a field survey performed in February, 2007 under my direct supervision, and that the data contained here is true and correct.

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