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WEBB HILL BIOSOLIDS FACILITY HYDROGEOLOGIC INVESTIGATION - PHASE 2

Mason County, Washington

Prepared for: Mason County Department of Community Development on behalf of the WRIA 16 Planning Unit

Washington State Department of Ecology Grant No. G0800485

Project No. 070041-004-13A • June 30, 2008 Interim Report

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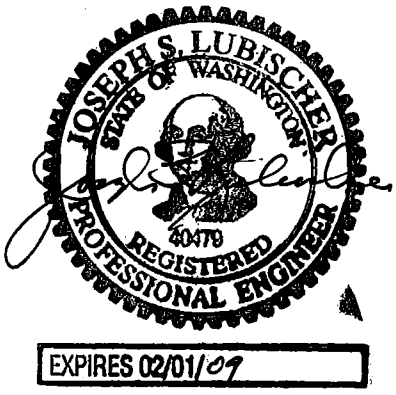

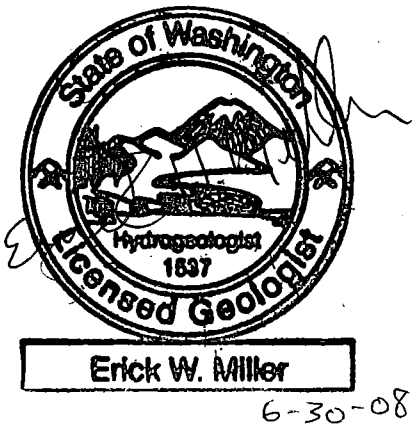

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Acronyms

bgs	below ground surface
^{14}C	radioactive carbon isotope with atomic mass 14
CFC	chlorofluorocarbon
DNR	Washington Department of Natural Resources
DOH	Washington State Department of Health
Ecology	Washington State Department of Ecology
GWQC	Ground Water Quality Criteria
^{3}H	tritium, radioactive hydrogen isotope with atomic mass 3
^{3}He	non-radioactive helium isotope with atomic mass 3
HCDOP	Hood Canal Dissolved Oxygen Program
MCL	maximum contaminant level
mg/L	milligrams per liter
NTU	nephelometric unit
QAPP	Quality Assurance Project Plan
SF_6	sulphur hexafluoride
SMCL	secondary maximum contaminant level
TKN	total Kjeldahl nitrogen
TOC	total organic carbon; top of casing
TP	total phosphorus
µS/cm	microSiemens per centimeter
USEPA	U.S. Environmental Protection Agency
USGS	U.S. Geological Survey
WAC	Washington Administrative Code

Executive Summary

The BioRecycling Corporation's Webb Hill Facility is a state permitted biosolids treatment and land application facility on Webb Hill Road in Mason County, Washington. The Webb Hill facility was initially used as a Christmas tree farm and converted to biosolids application in September 1985. In about 1994, business ownership transferred from Solganics to the current operator BioRecycling Corp. This report presents the findings of the Phase 2 hydrogeologic investigation of the facility. The objectives of this investigation are to expand evaluation of impacted groundwater beneath the facility and to refine the groundwater flow (transport) directions and horizontal gradients on and off the site. Monitoring wells MW-1 through MW-4 were installed as part of the Phase I investigation in May 2007 by Aspect Consulting, LLC under contract to Mason County. In November 2007 monitoring well MW-5 was installed by BioRecycling's contractor Pacific Groundwater Group, Inc.

Under this Phase 2 program, two additional groundwater monitoring wells (MW-6 and MW-7) were installed at the facility using rotary-sonic drilling method. This drilling method allowed collection of continuous soil core and identification of perched zones. Well screens were 25 feet long to minimize effects of vertical gradients, but set 15 feet below estimated low water level to prevent the wells from seasonally going dry, as had occurred in MW-1, MW-2, MW-3, and MW-4 as a result of an unexpectedly large drop in water level during the first year of observation.

The new monitoring wells reinforce previous geologic interpretations of a thin layer of recessional soil over stratified glacial deposits, where the glacial deposits are highly variable, both laterally and vertically. The glacial soils are interpreted to have been deposited in a dynamic sub-glacial environment and include weakly cemented tills, sand and gravel fluvial layers, and some silt units.

Groundwater flow direction in the regional aquifer continued to be southwesterly throughout the last year of measurements (Table 3.1 and Figure 3.1). The groundwater gradient varies from 0.002 feet per foot (ft/ft) (about an 11-foot decline in groundwater level per mile) at the site to 0.007 ft/ft (37 feet per mile) southwest of the site. Greater regional definition of flow directions would be useful, particularly northeast of the site, northwest and southeast of the currently defined groundwater contours, and further southwest toward Purdy Creek.

Groundwater quality impacts beneath the facility are indicated by elevated nitrate concentrations, elevated specific conductance, and changes in major ion concentration and chemistry. Increases in specific conductance are well correlated with elevated nitrate concentrations. All available nitrate data for the existing wells are presented on Figure 3.1.

Maximum nitrate concentration in groundwater is listed by the Washington Department of Ecology (Ecology) groundwater quality criteria (GWQC), Washington Administrative

Code (WAC) 173-200, *Water Quality Standards for Ground Water of the State of Washington*). The allowable maximum contaminant level (MCL) of nitrate in drinking water is specified by Washington Department of Health, WAC 246-290-310, *Public Water Supplies*. In both cases, maximum nitrate concentration is 10 milligrams as nitrogen per liter (mg/L).

Exceedance of GWQC and MCL for nitrate was observed at monitoring well MW-6 (11.9 mg/L). Nitrate concentration at monitoring well MW-5 (4.0 mg/L) is elevated over background conditions. Nitrate at well MW-7 (0.7 mg/L) may be within background levels.

The USGS recently reported results of environmental tracer analyses for samples collected from Webb Hill facility wells MW-1 through 4. Sulphur hexafluoride (SF_6) concentrations were found to be equivalent to atmospheric conditions in the late 1990s to early 2000's. USGS analyses for compounds typically found in waste water yielded few detections and the data was not considered to be of substantial use.

Results from USGS testing and also recently submitted dating samples for MW-5, MW-6, and MW-7 collected as part of this investigation will be reviewed in a future Aspect Consulting memorandum.

Conclusions based on the investigations to date are:

- Nitrate impacted groundwater is moving in a southwesterly direction from the biosolids application site;
- Nitrate concentration in groundwater exceeded the statutory limit of 10 mg/L along the site boundary at MW-6 and was near exceedance at MW-4. Both wells are located along the southern boundary; and
- Groundwater was not impacted at two off-site domestic supply wells located about 4,200 and 6,200 feet southwest of the site.

The following recommendations for additional work are presented. The intention of the recommendations is to use existing water-supply wells wherever possible and consider new well installation only if necessary:

- Define extent of impacts downgradient of facility through installation of an additional monitoring well downgradient of impacted well MW-6;
- Confirm groundwater flow direction in the northeast corner of the facility through a suitable off-site well or a new monitoring well, if a suitable off-site well cannot be identified. Depending on the groundwater elevation identified, water quality characterization may also be warranted.
- Expand definition of off-site groundwater flow paths by identifying additional off-site wells west, southwest, and south of the facility for water level measurements; and
- Continue water level and water quality monitoring for on-site and off-site wells and also continue annual data review.

1 Introduction

Aspect Consulting, LLC is contracted to perform a hydrogeologic investigation of the Bio Recycling Corporation's biosolids recycling facility located on Webb Hill Road in Mason County, Washington (Figure 1.1). This work is being performed cooperatively with the Webb Hill Technical Committee, Mason County, U.S. Environmental Protection Agency (USEPA), and U.S. Geological Survey (USGS). The Bio Recycling Webb Hill facility is a biosolids treatment and land application facility permitted to accept Class B biosolids and untreated sewage sludge. The facility is designated as a Regional Septage Management Facility. Biosolids treated at the facility originate from private septic tanks and area sewage treatment facilities.

An initial investigation of the facility was performed by Aspect Consulting in April and May of 2007 that included the installation and sampling of four groundwater monitoring wells (Aspect Consulting, 2007). Results of the initial investigation indicated that the site was underlain by a regional unconfined aquifer within stratified glacial deposits. Groundwater flow direction was found to be southwesterly. Groundwater quality impacts were identified beneath the facility including nitrate concentrations of 13.3 mg/L in one monitoring well (MW-1) in excess of the maximum contaminant level (MCL) of 10 mg/L. The 2007 Aspect Consulting report also summarized site history and operations and previous investigations.

Pacific Groundwater Group (PGG) under contract to BioRecycling observed installation of one monitoring well (MW-5), two 50-foot boreholes (L-1 and L-2) equipped with soil moisture sensors and lysimeters, and nine additional boreholes in November and December 2007. Installation results were summarized in a draft technical memorandum (PGG, 2007). The PGG investigation also indicated a southwesterly groundwater flow direction.

In addition to these investigations, Mason County Public Health has sampled and analyzed two off-site wells for nitrate concentration.

The objective of this Phase 2 investigation is to further evaluate groundwater conditions at the facility and better define the groundwater flow (transport) direction at the site. To accomplish these objectives, the following work elements were performed:

- Development of Quality Assurance Project Plan (Aspect Consulting, 2008);
- Installation of two groundwater monitoring wells using rotary-sonic drilling methods;
- Preparation of detailed geologic logs and stratigraphic analysis;
- Well development;
- Sampling and analysis for major ions and nitrogen compounds at the two new wells, MW-6 and MW-7, and previously installed well MW-5;

- Groundwater sample collection and dating using Carbon 14 (^{14}C), tritium/helium 3 ratio ($^{3}H/^{3}He$), chlorofluorocarbon ratios (CFC), and sulfur hexafluoride (SF_6);
- Performance of one round of water levels from the on-site wells;
- Development of groundwater elevation contours; and
- Survey of the two new monitoring wells and two off-site wells identified to us by Mason County Public Health.

Results of this investigation are presented in this technical memorandum. Groundwater dating results will not be available for several months and will be presented in a separate memorandum. The remainder of this memorandum is organized into the following sections:

- Section 2 presents a summary of field activities;
- Section 3 describes site geologic and hydrogeologic conditions;
- Section 4 discusses results of water quality sampling and testing;
- Section 5 details conclusions and recommendations of the investigation; and
- Appendices, wherein Appendix A presents a detailed description of field activities (well installation, surveying, and sampling); Appendix B has available boring and well logs; Appendix C contains laboratory analytical reports; and Appendix D contains the USGS groundwater dating and water quality results (USGS, 2008) for wells MW-1, MW-2, MW-3, and MW-4. The USGS dating results will be incorporated in a forthcoming memorandum on groundwater age, to be prepared upon completion of dating analyses for wells MW-5 through MW-7.

2 Investigative Methods

2.1 Drilling and Monitoring Well Installation

Two monitoring wells (MW-6 and MW-7) were installed at the facility using a rotary-sonic drilling method. Boart Longyear Company of Fife, Washington was contracted to complete this task. Geologic monitoring during drilling was performed by Aspect Consulting personnel. The rotary-sonic method produces near-continuous cores that allow detailed stratigraphic analysis. All drilling and related activities were performed in accordance with Quality Assurance Project Plan (Aspect Consulting, 2008) and Washington state regulations (Washington Administrative Code [WAC] 173-160, *Minimum Standards for Construction and Maintenance of Wells)*. Drilling, well installation, well development, and soil and water sampling are discussed in detail in Appendix A, Sections A.1 and A.2.

A reconnaissance site visit was held on April 28, 2008, with drilling contractors, Aspect Consulting, and Mason County Department of Community Development to observe site features, discuss monitoring well locations, and evaluate access to proposed locations. Options for well locations, including one off-site alternative, were staked at this time.

Monitoring well drilling, installation, and development was performed between May 20 and June 3, 2008. The first boring, MW-6a, was decommissioned after the PVC well casing separated during installation. MW-6 was successfully redrilled 50 feet to the east of MW-6a. Monitoring wells were completed with 2-inch Schedule 40 PVC casing and machine slotted screen. Screens were 25-foot long with bottom of screen set about 30 feet below the water table at time of drilling.

The well construction followed criteria specified in the Quality Assurance Project Plan (QAPP) (Sections 3.1 and 3.2 in Aspect Consulting, 2008):

- Minimize influence of vertical gradient on static water level;
- Screen through interval most likely to be impacted; and
- Maintain a minimum of 15 feet of saturated screen during the seasonal low groundwater period.

Minimizing effect of vertical gradient requires minimizing the length of screen. Intercepting the zone of impact was met by screening as high as possible in the aquifer within the constraint imposed by the third requirement of maintaining a saturated portion of screen during low water levels. At time-of-drilling, water levels were estimated to be 15 feet above seasonal low. Therefore, the bottoms of well screens were set at 30 feet below water level at time-of-drilling, i.e. 15 feet to estimated seasonal low plus 15 feet of saturated screen.

No perched groundwater was encountered during drilling.

Both MW-6 and MW-7 met the alignment test by passing a 1.66-inch by 4.2 foot long slug to the bottom of the wells.

Monitoring wells MW-5, MW-6, and MW-7 were developed by surging with a bailer and then pumping until the discharge was sand free and turbidity was less than 50 nephelometric units (NTUs). Development of MW-5 was performed by the driller, but not supervised by Aspect Consulting as the work was under contract with Pacific Groundwater Group, Inc.

Wells MW-6 and MW-7 were surveyed by a licensed surveyor, MacLearnsberry, Inc., to top-of-casing after well installations were completed (Appendix 3.1). Depth-to-water measurements were made with an electronic water-level indicator to the nearest 0.01 foot.

2.2 Groundwater Sampling

Monitoring wells MW-5, MW-6, and MW-7 were sampled on June 10 through June 12, 2008, using low-flow sampling protocol as specified in the QAPP (Aspect Consulting, 2008). Intake of the sample pump was placed 5, 15, and 12 feet below the water surface for MW-5, MW-6, and MW-7, respectively. Sampling procedures are detailed in Appendix A, Section A.3.3.

Field parameters of temperature, specific conductivity, dissolved oxygen, pH, Eh, and turbidity were measured during sampling. Laboratory-prepared sample containers for wet chemistry analyses were filled, cooled in an ice bath, stored in insulated coolers with cold packs to keep samples at less than 4°C, and submitted under chain-of-custody to a Washington-certified environmental laboratory (Columbia Analytical Services, Inc., Kelso, Washington) for the analysis of inorganic constituents, dissolved metals, total organic carbon (TOC), nitrate, nitrite, ammonia, total Kjeldahl nitrogen (TKN), and total phosphorous. Samples for metals analyses were field filtered. Analytical results and field measured parameters are discussed in Section 4.

Samples for groundwater dating by ^{14}C, $^{3}H/^{3}He$ ratio, CFC, and SF_6 techniques were taken in specified containers. For CFC and SF_6 samples, collection procedures recommended by the USGS Reston Chlorofluorocarbon Laboratory and by the Department of Geology and Geophysics, University of Utah, were followed. Diffusion samplers for noble gas collection were installed immediately after groundwater sampling, June 10, 11, and 12, 2008, and removed on June 19, 2008. Additional details are provided in Appendix A, Section A.3.3.

2.3 Wellhead Surveys

Wellheads MW-6 and MW-7 were surveyed in June 2007 by MacLearnsberry, Inc. of Bainbridge Island, Washington. Monitoring wells were surveyed to top of PVC casings as marked and notched. Two off-site wells (Biser and Williams) were surveyed on June 19, 2008. Survey data is presented in Table 2.1. Data for MW-5, also surveyed by MacLearnsberry, Inc., was provided by Pacific Groundwater Group, Inc. The surveyor's reports for MW-6, MW-7, and off-site wells are presented in Appendix A 3.1 and Figure A-1.

3 Facility Hydrogeology

The Webb Hill facility is underlain by a complex sequence of glacial deposits. These deposits, and the occurrence and movement of water within them, have previously been described in the Phase 1 report (Aspect Consulting, 2007b). Since that report, two lysimeters and three additional monitoring wells have been installed at the site: L-1, L-2, and MW-5 by Pacific Groundwater Group, Inc. and MW-6 and MW-7 by Aspect Consulting, LLC.

3.1 Geologic Investigation

Detailed geologic data was obtained during the drilling and logging boreholes using rotary-sonic drilling method and continuous sampling. Detailed geologic logs for all monitoring wells and the two lysimeters are presented in Appendix B. Also included is the Well Drilling Report for the off-site Biser well; no log has been located for the off-site Williams well.

The subsurface geology in the new borings fits the previous description of a thin layer of recessional soil over stratified glacial deposits, where the latter are highly variable both laterally and vertically. The glacial materials are interpreted to have been deposited in a dynamic sub-glacial environment and include weakly cemented tills, sand and gravel fluvial layers, and some silt units. Variation in soil types in the continuous sample core was frequently noted on a scale of less than half a foot. As at previous borings, the occurrence of fairly clean (low silt) sands and gravels increased with depth, but the elevation of transition varied.

Relatively thick upper till units and thin lower till units were identified during the drilling at MW-7. Relatively thick till was present starting at 20 feet below ground surface (bgs) with thinner till units and lenses present to about 140 feet bgs. The upper till consisted of 2.5 and 32.5 foot layers, while the 10 lower layers varied from 1 to 8 feet in thickness. This stratigraphic assemblage is similar to that identified in MW-2 where the upper till layer also starts at 20 feet bgs and at is relatively thick (15 feet) compared to the 11 lower layers, which were typically about 1 foot thick.

Soils at MW-6 were primarily characterized by the log for decommissioned boring MW-6a. Till in MW-6a was identified at a depth of 12.5 feet in two layers of 21.5 and 5 feet thick. Although separated by only 50 feet, lateral heterogeneity was observed between the borings MW-6a and MW-6.

No thick silt layers were noted in either MW-6 or MW-7, as opposed to the 1.5- to 10.5-foot silt layers (non-till) found in MW-4.

3.2 Groundwater Occurrence

No perched groundwater was identified during the drilling of MW-6a, MW-6, or MW-7.

The uppermost regional aquifer at the site is generally unconfined. Water level measurements over the past year (Table 3.1) show a significant variation which is estimated at 28 feet, from May to December 2007 (Aspect Consulting, 2008). Monitoring wells MW-1 through MW-4 are dry seasonally as a result of the water level fluctuations. A large unrecovered decline in water levels was noted between spring 2007 and spring 2008. For example, at MW-1 water elevation varied from approximately 299 feet in May 2007 to 285 feet in May 2008. Contributing factors to differences in recharge may include variations in precipitation and changes in biosolids application. No significant changes in withdrawals are expected.

A full round of on-site water levels was taken on June 12, 2008. Groundwater contour elevations were developed with the Surfer™ program (Golden Software, 2002) using the Kriging technique. Groundwater contours for June 12, 2008, are presented in Figure 3.1. All available nitrate results are also included.

The general flow direction continues to be southwesterly, generally in line with the northeast-southwest glacially formed ridges (drumlinoids) observable in the topographic base map in Figure 3.1. The coincidence of groundwater flow direction with the orientation of the drumlinoids supports the hypothesis that the depositional environment created lateral anisotropy within the aquifer

The contour gradient appears to have a fairly uniform gradient (evenly spaced contours) of 0.007 ft/ft in the region from MW-7 to the Williams well. Northeast of MW-2, the gradient is lower (a more horizontal water surface), about 0.002 ft/ft, over the main portion of the biosolids site The 0.002 ft/ft gradient at the site is the same as estimated during the Phase 1 investigation (Aspect Consulting, 2007b).

4 Groundwater Quality

This section provides a presentation and discussion of groundwater quality at the Webb Hill Biosolids Facility for sampling of MW-5, MW-6, and MW-7 performed June 10 through June 12, 2008. Table 4.1 summarizes the June 2008 groundwater analytical data. Sample results from May 2007 and January 2008 are also included in the table.

Data validation, performed by Aspect Consulting using criteria specified in the QAPP, is discussed in Appendix C.1 and the laboratory analytical reports are included in Appendix C.2.

Groundwater samples were analyzed for the following parameters using EPA or standard methods as specified below:

Field Parameters
- Turbidity
- Temperature
- pH
- Specific Conductance
- Dissolved Oxygen
- Eh

Dissolved Metals
- Iron (EPA Method 200.7)
- Manganese (EPA Method 200.7)

Nutrients
- Ammonia as N (SM4500)
- Nitrate as N (EPA 300.0)
- Nitrite as N (subtraction of nitrate from nitrate+nitrite)
- Nitrate+nitrite (EPA 353.2)
- Total Kjeldahl Nitrogen (ASTM D 1426-93B)
- Phosphorous (EPA 365.3)

Major Ions
- Calcium (EPA 200.7)
- Magnesium (EPA 200.7)
- Potassium (EPA 200.7)
- Sodium (EPA 200.7)
- Chloride (EPA 300.0)
- Sulfate (EPA 300.0)
- Bicarbonate Alkalinity (SM 2320B)
- Carbonate Alkalinity (SM 2320B)

Miscellaneous Conventional Chemistry Parameters

Bromide (EPA 300.0)
Fluoride (EPA 340.2)
Total Organic Carbon (EPA 415.1)

A discussion of the conventional groundwater chemistry and distribution of detected analytes is presented below (Section 4.1) followed by a comparison of analytes with Washington state groundwater quality criteria and drinking water standards (Section 4.2). Wells MW-1 through MW-4 were not resampled as part of the Phase 2 investigation. Therefore, the June 2008 water quality results for MW-5, MW-6 and MW-7 are compared with the May 2007 data for MW-1, MW-2, MW-3, MW-4, and WS-2 (Section 4.1).

4.1 Nitrate Occurrence and Conventional Chemistry

Nitrate and major ion data indicate water quality impacts are occurring at the facility boundary. A summary of groundwater quality data at the facility is presented on Table 4.1 and all available nitrate values are posted on Figure 3.1.

To date, the wells have been analyzed for nitrates at different times: MW-1, MW-2, MW-3, MW-4, and WS-2 in May 2007; Williams and Biser wells in November 2007; MW-5 in January 2008; and MW-5, MW-6, and MW-7 in June 2008. For future monitoring, after sampling pumps have been installed and regular sampling starts, all wells should be sampled within the same two week period.

Greatest water quality impacts at the site boundary were identified at monitoring wells MW-1, MW-4, MW-5, and MW-6 where nitrate (measured as nitrogen content, i.e., nitrate-N) was detected at concentrations of 13.3mg/L (May 2007), 9.8 mg/L (May 2007), 4.0 mg/L (June 2008) and 11.9 mg/L (June 2008), respectively. These wells are located hydraulically downgradient of biosolids application areas and have elevated major ion and nitrate data compared to previously collected data in upgradient monitoring well MW-3. Monitoring well MW-7 had a low nitrate detection (0.7 mg/L) similar to MW-2 (0.8 mg/L), but may prove to be within background conditions with continued monitoring[1]. Water quality test results for each new well (MW-5, MW-6, and MW-7) are discussed below.

MW-5

In general, water quality in this well indicates an impact above the upgradient conditions , observed at monitoring well MW-3. The nitrate concentration in MW-5 is greater than in wells along the northwest facility boundary (WS-2, MW-2 and MW-7), but less than concentrations in wells located in the center of or downgradient to the site (MW-1, MW-4, and MW-6).

[1] Background nitrate concentrations in western Washington can be very low, including non-detect levels such as observed in MW-3. However, additional sampling, both spatially and temporally, would be required to specify the local background nitrate concentrations and variation in the Webb Hill area.

Monitoring well MW-5 lies near the southwest corner of the facility and close to the south boundary (Figure 3.1). Well MW-5 was installed in December 2007 and initially sampled in January 2008. The well had a nitrate-N concentration of 6.9 mg/L in January 2008 (Table 4.1). In the June 2008 sampling, nitrate-N was detected at 4.0 mg/L. The seasonal variation in nitrates is consistent with a dilution effect, as nitrate concentration is inversely related to seasonal water level fluctuation where higher concentrations correspond to lower water levels. However, variable rates of nitrogen application could also affect groundwater nitrate measurements. Specific conductance (152 umhos /cm) and major ion concentrations (Table 4.1) are generally consistent with the nitrate concentrations and reflect a greater water quality impact than at upgradient well MW-3 and wells WS-2, MW-2 and MW-7 along the northwest facility boundary, but a lesser impact than observed at wells MW-1, MW-4 and MW-6.

The pH in wells MW-1 through MW-4 ranged from about 6 to 7.5 with lowest pH occurring in the more impacted wells. The pH measured in wells MW-5 through MW-7 ranged from 8.2 to 8.4, but showed the same pattern of lowest pH occurring in the more impacted wells. Field calibration records were reviewed for the pH meter and no anomalies were identified.

MW-6

Of the recently installed wells, MW-6 shows the greatest water quality impact. This well is located downgradient of Field 4 and portion of Field 3 at the south facility boundary. Nitrate concentrations in this well were measured at 11.9 mg/L. Similar to MW-1 and MW-4, major ions and specific conductance are elevated in this well relative to upgradient conditions measured at MW-3.

MW-7

Monitoring well MW-7 is located on the westerly boundary of the facility, approximately 1,300 feet due south of MW-2. MW-7 is downgradient of Field 10 and portions of Fields 1 and 2. Water quality in this well is similar to that identified in monitoring wells MW-2 and WS-2 in the May 2007 sample event. Specific conductance, major ions, iron, and manganese concentrations are similar between these wells.

4.2 Comparison with Regulatory Standards

Water quality standards for analytes are presented in Table 4.1. The Maximum Contaminant Level (MCL) is a health-based standard used to determine the maximum permissible level of a contaminant in water delivered to any user of a public water drinking system. The Secondary Maximum Contaminant Level (SMCL) is a guideline based on factors other than health effects. SMCLs control aesthetic qualities of water such as taste, odor, or staining characteristics. MCLs and SMCLs listed in Table 4.1 were obtained from drinking water standards listed by Department of Health (DOH) in WAC 246-290.

The State of Washington has developed water quality standards for groundwater of the state (Ground Water Quality Criteria or GWQC) (WAC 173-200). The goals of the water quality standards are "*to maintain the highest quality of the state's ground waters and*

protect existing and future beneficial uses of the ground water through reduction or elimination of the discharge of contaminants to the state's ground waters and protect existing and future beneficial uses of the ground water through reduction or elimination of the discharge of contaminants to the state's ground waters". The implementing rule, WAC 173-200, establishes water quality criteria for protection of the environment, human health, and current and future beneficial uses of ground water. Under WAC 173-200, enforcement limits are defined on a site specific basis but are generally less than the numeric criteria.

In Table 4.1, GWQC exceedances are indicated with a shaded pattern and MCL or SMCL exceedances are indicated with a bold outline.

For the constituents analyzed, primary GWQCs and/or MCLs have been established for nitrate, nitrite, and fluoride. The GWQC and MCL for nitrate (10 mg/L) were exceeded in monitoring well MW-6 (11.9 mg/L) in the June 2008 sample event

For the analytes tested, secondary groundwater criteria and/or drinking water SMCLs have been established for pH, iron, manganese, chloride, sulfate, and fluoride. No secondary standards were exceeded in the June 2008 sample event.

5 USGS Sampling and Analysis

Groundwater samples were obtained from Wells MW-1, MW-2, MW-3, and MW-4 in July 2007 by Steve Cox, USGS. These samples were submitted for analyses of sulphur hexafluoride (SF_6), tritium-helium ratio ($^3H/^3He$), and a selected suite of 61 compounds typically found in domestic and industrial wastewater. Results or status of these tests are presented in Appendix D (USGS, 2008).

SF_6 results were successfully obtained for three samples (MW-1, MW-2, and MW-4). The SF_6 concentrations were equivalent to atmospheric conditions in the late 1990s to early 2000's. The USGS letter report indicates "Refinements to the estimates of recharge date could be made if information was available on groundwater temperature at point of recharge and measurement to determine if excess air was incorporated during the recharge process" (USGS, 2008).

The analyses for ^3H and ^3He are forthcoming.

Analyses for waste water compounds in wells MW-1, MW-3, and MW-4 are included in Appendix D. There were few detections and therefore the data was not considered to be of substantial use (USGS, 2008).

6 Summary of Findings and Recommendations

6.1 Summary of Findings

1. Subsurface soils at the biosolids facility are generally characterized as a thin layer of recessional outwash underlain by laterally and vertically heterogeneous glacial deposits. The glacial deposits are interpreted to have formed predominantly in a dynamic subglacial environment. Till layers varying from less than 1-foot to over 30 feet were found interbedded with clean and debris rich sands and gravels.

2. The regional aquifer is present beneath the site under unconfined conditions at about elevation 300 feet. The aquifer is at least 55 feet thick. Groundwater flow within the unconfined regional aquifer is toward the southwest, in line with the drumlinoid surface features. Gradient at the site is low at 0.002 ft/ft, steepening to a gradient of 0.007 ft/ft between MW-7 and the Williams well.

3. No perched groundwater was identified in monitoring wells MW-6 or MW-7. Perched groundwater had been previously identified in monitoring well borings MW-1 through MW-4, although none of the perched zones were found to correlate between boreholes.

4. Water quality impacts are found in wells located downgradient of biosolids application areas. In the June 2008 sampling of wells MW-5, MW-6, and MW-7, nitrate concentrations above 1 mg/L as nitrogen occurred in MW-5 (4.0 mg/L) and MW-6 (11.9 mg/L). Nitrate concentrations elevated above 1 mg/L were previously identified in MW-1 (13.3 mg/L) and MW-4 (9.8 mg/L) in the May 2007 sample event. The Ecology groundwater criteria (WAC 173-200) and the DOH MCL for nitrate in groundwater are 10 mg/L. Slightly elevated nitrate concentrations were identified at monitoring well MW-7 (0.7 mg/L) and previously at MW-2 (0.8 mg/L) and on-site supply well WS-2 (0.7 mg/L). These wells may prove to be within background conditions with additional sampling.

5. USGS dating analysis of wells MW-1, MW-2, and MW-4 found sulphur hexafluoride (SF_6) concentrations equivalent to atmospheric conditions in the late 1990s to early 2000's. Tritium and helium ($^3H/^3He$) analyses have been delayed. Results from USGS testing and also recently submitted dating samples for MW-5, MW-6, and MW-7 will be reviewed in a future Aspect Consulting memorandum that presents results of groundwater age dating samples collected from wells MW-5, MW-6, and MW-7 in this investigation.

6. USGS analyses for compounds typically found in waste water yielded few detections.

6.2 Recommendations

Because of the exceedance of the numeric criteria for nitrate concentrations under WAC 173-200 in groundwater at the Webb Hill biosolids recycling facility, needs remain for:

- Definition of extent of impacts downgradient of facility;
- Confirm groundwater flow direction and background water quality in the northeast corner of the facility;
- Expanded definition of off-site groundwater flow paths; and,
- Continued monitoring and annual data review

These recommendations are detailed below.

6.2.1 Define Extent of Downgradient Impacts

Nitrate concentrations exceeded the MCL at the property boundary at well MW-6. Further definition of extent of impacts down-gradient of the facility is recommended through an additional monitoring well located downgradient of MW-6.

6.2.2 Confirm Groundwater Flow Direction and Background Water Quality in Northeast Corner of Facility

Existing data indicates a southwesterly groundwater flow direction beneath the site which suggests background water quality conditions are present in the northeast corner of the facility; however, the northeast corner of the facility is located close to a topographic divide that may also be a groundwater divide. To confirm that a southwesterly groundwater flow direction is present in this area of the facility and background water quality conditions are present, we recommend that a suitable off-site well northeast of the facility be identified, the water level measured, the well surveyed, and, if warranted, the well sampled. If no suitable off-site well can be identified or if a suitable off-site well indicates the potential for north to easterly flow from the northeast corner of the facility, then an on-site monitoring well should be installed in the northeast corner of the facility and monitored.

6.2.3 Expand Definition of Off-Site Flow Paths

Regional, off-site groundwater flow paths are currently characterized by the Biser and Williams wells that lie in close proximity to one another. To better define off-site regional flow patterns and groundwater discharge areas, additional off-site wells should be incorporated into the water level measurement program. Three general areas for these wells have been identified as follows: (1) northwest of the Williams well and west of MW-5, (2) east of the Williams well and south of MW-6 and MW-4, and (3) a location between the Biser well and the Brockdale area. Practically, these target areas for monitoring will be limited by the availability of off-site wells and the network adjusted based on this availability.

Criteria for inclusion of new off-site wells in the monitoring network include:

- Completion in the uppermost regional aquifer; and,
- Owner permission for quarterly water level measurement and, possibly, sampling and surveying.

6.2.4 Continue Monitoring and Annual Data Review

Continued water level and water quality monitoring are recommended to identify seasonal and potentially year to year changes in groundwater flow directions and groundwater quality. Specific monitoring recommendations are as follows:

Water Level Monitoring

- Continue monitoring water levels in wells MW-1, MW-2, MW-3, MW-4, MW-5, MW-6, MW-7, WS-2, and off-site wells on a monthly basis for one year and quarterly thereafter. Water level monitoring would be greatly facilitated by the installation of pressure transducers and dataloggers in the site monitoring wells.
- Continue monitoring water levels in off-site Biser and Williams wells. These wells provide good monitoring points about 4,200 and 6,200 feet, respectively, southwest and downgradient of the site. Incorporate additional off-site wells into the monitoring network as recommended in 6.2.1, 6.2.2, and 6.2.3 above.
- If flow patterns cannot be determined through the use of off-site wells, then additional monitoring wells should be considered.

On-Site Water Quality Assessments

- Start water quality monitoring on a quarterly basis at wells MW-1, MW-2, MW-3, MW-4, MW-5, MW-6, MW-7, and WS-2. Use of dedicated in-well sampling pumps is recommended. The water quality analytical testing scheme should be based on review of potential sources. Since metals may concentrate in biosolids, the analytical testing should include analysis for dissolved metals as a screening measure.
- Determine seasonal variation in nitrate concentrations.
- Sample all wells within the same two week period and coordinate off-site sampling during that same period.

Off-Site Water Supply Water Quality Assessments

- Install an off-site monitoring well downgradient of MW-6 to define the extent of off-site impacts. This information will be useful in evaluating water quality impacts to future domestic supply wells.
- As a precautionary measure, perform at least semi-annual sampling of potable water supply wells downgradient of the site for nitrate concentrations (see criteria in 5.2.1). Sampling should be done at seasonal high (late April to early May) and low water levels (December). The downgradient extent to which off-site wells are monitored for water quality should be determined based on identification of wells that indicate a return to background nitrate levels. The analytical testing scheme should be based on

analytes detected in the facility monitoring wells and should include nitrate analysis as a minimum.

- Sample all wells within the same two week period and coordinate with the on-site sampling schedule.

Annual Review

Annually review the water quality and the water level data for monitoring wells and off-site wells. Also review surface water quality data.

- Review water level data and update groundwater elevation contours and flow paths.
- Review groundwater and surface water quality data. Assess whether installation of additional monitoring wells, on-site or off-site, is necessary to determine extent of nitrate impacted groundwater.
- If analyte concentrations vary significantly between quarters, implement a monthly monitoring program for a 1-year period.
- Review the monitoring and analytical testing scheme and make appropriate recommendations for modification.

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Limitations

Work for this project was performed and this report prepared in accordance with generally accepted professional practices for the nature and conditions of work completed in the same or similar localities, at the time the work was performed. It is intended for the exclusive use of Mason County Department of Community Development, on behalf of WRIA 16 Planning Unit for specific application to the referenced property. This report does not represent a legal opinion. No other warranty, expressed or implied, is made.

Table 2.1 - Monitoring Well Completion Summary

Webb Hill Hydrogeologic Investigation - Phase 2
Mason County, Washington

Well ID	Installation Date	Well Location Coordinates[1]		Ground Surface Elevation[2]	Monument Elevation[2]	Stickup	Top of Casing		Total Boring Depth	Well Depth[3]	Screen Length	Screen Interval Depth	Filter Pack Interval Depth
		Northing	Easting				Elevation[2,3]	Elevation Difference[4]					
		(feet)	(feet)	(feet)	(feet)	(feet)	(feet)	(feet)	(feet bgs)	(feet bgs)	(feet)	(feet bgs)	(feet bgs)
MW-1	4/26/07	730844	993069	402.51	406.35	3.06	405.57	0.01	125	124.8	19.5	105.0 to 124.5	102.5 to 125.0
MW-2	5/3/07	731148	991371	443.97	447.17	2.76	446.73	0.01	168	168.7	24.5	143.9 to 168.4	140.6 to 166.0
MW-3	4/24/07	732495	992946	465.84	469.14	2.71	468.55	0.01	187	185.3	24.5	160.5 to 185.0	154.9 to 187.0
MW-4	4/30/07	729408	994200	375.99	379.89	3.25	379.24	0.01	105	97.7	24.5	72.9 to 97.4	68.2 to 96.0
MW-5	12/4/07	728694	990367	411.54	-	1.64	413.18	0.25	165	161.0	20	140.7 to 160.7	137.0 to 161.0
MW-6	5/28/08	728588	992589	397.46	400.33	2.81	400.27	-	146	145.2	24.6	120.2 to 144.8	117.0 to 145.0
MW-7	5/30/08	729866	991229	418.55	421.58	2.78	421.33	-	170	170.6	24.6	145.4 to 170.0	141.7 to 170.6
WS-2[5]	4/18/00	731673	992697	444.85	-	1.9	446.75	0.03	197	197	6	191 to 197	None
Biser	10/10/94	725206	987893	-	-	-	332.28	-	110	110	10	100 to 105	None
Williams	-	726239	988343	-	-	-	337.20	-	-	-	-	-	-
Bench Mark	5/9/07	731757	992859	446.32	-	-	446.32	0.00	-	-	-	-	-

Notes

[1]Well location coordinates are in Washington State Plane South NAD83 (2007) coordinate system using U.S. feet.

[2]Elevations are NAVD88 (1996) using U.S. feet.

[3]Measuring points for both PVC and steel casings were marked and notched.

[4]Indicates elevation difference from previous surveys.

[5]Below grade information taken from state Water Well Report. The reported casing depth of 193.2 ft bgs may be inconsistent with the screen interval of 191 to 197 feet indicated on log.

Abbreviations

bgs = below ground surface

Table 3.1 - Groundwater Levels

Webb Hill Hydrogeologic Investigation - Phase 2
Mason County, Washington

Well Name		MW-1		MW-2		MW-3		MW-4		MW-5		MW-6		MW-7		Water Supply- 2		Biser		Williams	
Ground Surface Elevation (ft MSL)		402.51		443.97		465.84		375.99		411.54		397.46		418.55		444.85		-		-	
Casing Stickup above Ground Surface (ft)		3.06		2.76		2.71		3.25		1.64		2.81		2.78		1.9		-		-	
Casing Elevation (ft)		405.57		446.73		468.55		379.24		413.18		400.27		421.33		446.75		332.28		337.20	
Top of Screen Elevation (ft MSL)		297.51		300.07		305.34		303.09		270.84		277.26		273.15		253.85		-		-	
Bottom of Screen Elevation (ft MSL)		278.01		275.57		280.84		278.59		250.84		252.66		248.55		247.85		-		-	
Date	Entity	Depth (ft bTOC)	Elevation (ft, MSL)	Depth (ft bTOC)	Elevation (ft, MSL)	Depth (ft bTOC)	Elevation (ft, MSL)	Depth (ft bTOC)	Elevation (ft, MSL)	Depth (ft bTOC)	Elevation (ft, MSL)	Depth (ft bTOC)	Elevation (ft, MSL)	Depth (ft bTOC)	Elevation (ft, MSL)	Depth (ft bTOC)	Elevation (ft, MSL)	Depth (ft bTOC)	Elevation (ft, MSL)	Depth (ft bTOC)	Elevation (ft, MSL)
5/23/2007	Aspect	106.92	298.65	149.98	296.75	168	300.55	80.37	298.87	-	-	-	-	-	-	147.49	299.26	-	-	-	-
5/30/2007	Aspect	-	-	150.55	296.18	168.56	299.99	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5/31/2007	Aspect	107.64	297.93	150.68	296.05	168.66	299.89	81.18	298.06	-	-	-	-	-	-	148.14	298.61	-	-	-	-
6/27/2007	MCPH	110.37	295.2	154.09	292.64	171.56	296.99	83.895	295.345	-	-	-	-	-	-	-	-	-	-	-	-
9/26/2007	MCPH	122.6	282.97	166.575	280.155	184.02	284.53	94.735	284.505	-	-	-	-	-	-	-	-	-	-	-	-
11/21/2007	PGG	Dry	< 278.01	Dry	< 275.57	Dry	< 280.84	Dry	< 278.59	-	-	-	-	-	-	-	-	-	-	-	-
12/3/2007	PGG	-	-	-	-	-	-	-	-	154.89	258.29	-	-	-	-	-	-	-	-	-	-
1/22/2008	PGG	Dry	< 278.01	Dry	< 275.57	Dry	< 280.84	95.82	283.42	152.68	260.5	-	-	-	-	-	-	-	-	-	-
1/23/2008	PGG	-	-	-	-	-	-	95.04	284.2	152.04	261.14	-	-	-	-	172.5	274.25	-	-	-	-
3/13/2008	PGG	120.44	285.13	163.73	283	182.4	286.15	91.55	287.69	141.54	271.64	-	-	-	-	-	-	-	-	-	-
4/21/2008	PGG	119.03	286.54	-	-	180.09	288.46	91.16	288.08	-	-	-	-	-	-	-	-	-	-	-	-
4/22/2008	PGG	119.14	286.43	161.62	285.11	-	-	-	-	140.53	272.65	-	-	-	-	160.71	286.04	80.22	252.06	83.85	253.35
5/21/2008	PGG	120.05	285.52	162.73	284	-	-	92.46	286.78	141.28	271.9	-	-	-	-	161.88	284.87	81.80	250.48	85.20	252.00
6/12/2008	Aspect	121.43	284.14	164.27	282.46	182.44	286.11	94.02	285.22	143.33	269.85	119	281.27	143.61	277.72	162.08	284.67	83.43	248.85	86.83	250.37

Notes
Shaded groundwater levels for the Biser and Williams domestic wells were calculated based on an average groundwater level change for MW-1, MW-2, MW-4 and MW-5 between the May 21st and June 12th 2008 measurements.
Depth to groundwater was measured from the top of casing.
The elevation datum is NAVD88 (1996).

Abbreviations
bTOC = Below Top of Casing
MSL = Mean Sea Level

Table 4.1 - Groundwater Quality Summary

Webb Hill Hydrogeologic Investigation - Phase 2
Mason County, Washington

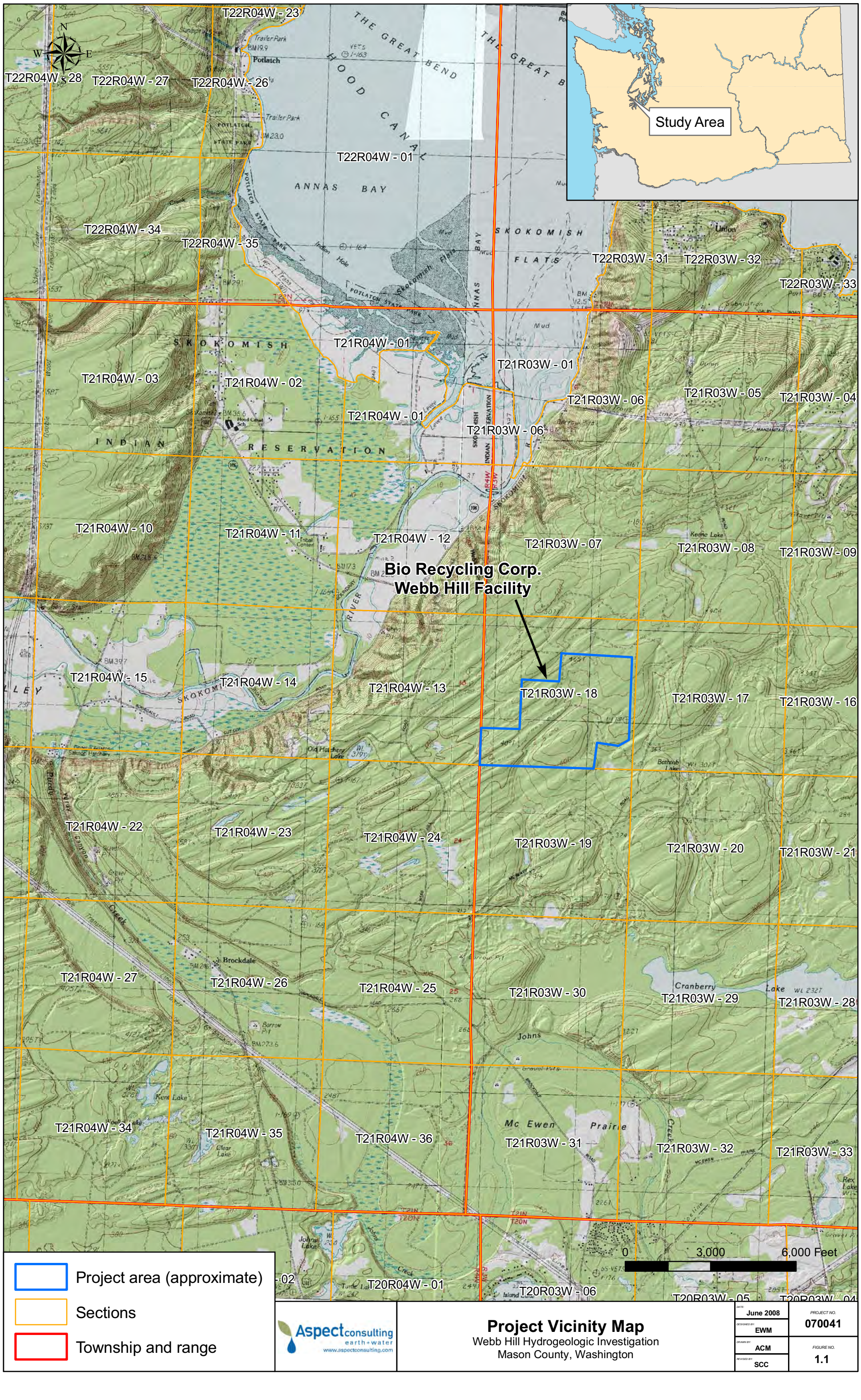
Parameter or Chemical	Units	DOE Groundwater Quality Criteria[1] Primary	DOE Groundwater Quality Criteria[1] Secondary	DOH Drinking Water Standard[2] MCL	DOH Drinking Water Standard[2] SMCL	May 2007 Sampling Event[8,9] MW-1 5/31/07	MW-1 (Blind Dup.) 5/31/07	MW-2 5/30/07	MW-3 5/30/07	MW-4 5/31/07	WS-2 5/31/07	January 2008 Sampling Event[8,9,10] L-1 1/23/08	L-2 1/23/08	MW-5 1/23/08	June 2008 Sampling Event[8,9] MW-5 6/10/08	MW-6 6/12/08	MW-7 6/11/08
Field Parameters																	
Temperature	°C	-	-	-	-	14.08	-	13.58	15.44	15.37	10.58	-	-	-	10.16	9.98	10.59
pH	pH	-	6.5 to 8.5	-	-	6.66	-	7.11	7.28	6.55	7.49	-	-	-	8.39	8.18	8.44
Specific Conductance	µS/cm	-	-	-	-	374	-	95	82	299	101	-	-	-	152	253	98
Dissolved Oxygen	mg/L	-	-	-	-	8.85	-	8.81	9.71	8.65	10.83	-	-	-	9.37	9.43	9.55
Eh	mV	-	-	-	-	140.1	-	118.7	91.6	148	122.1	-	-	-	83.7	135.2	150.7
Turbidity	NTU	-	-	-	-	1.51	-	2.99	33.80	1.46	1.19	-	-	-	0.46	0.76	1.05
Dissolved Metals																	
Calcium	mg/L	-	-	-	-	40.4	40.2	10.1	9.15	31.6	10.7	-	-	-	15.5	24.4	10.1
Iron	mg/L		0.3	-	0.3	0.150 U	0.150 U	0.150 U	0.150 U	0.150 U	0.150 U	-	-	-	0.010 U	0.005 J	0.010 U
Magnesium	mg/L	-	-	-	-	17.8	17.8	4.86	3.99	13.3	5.39	-	-	-	7.45	11.7	4.95
Manganese	mg/L	-	0.05	-	0.05	0.0100 U	0.0100 U	0.0100 U	**0.0798**	0.0100 U	0.0100 U	-	-	-	0.0011 J	0.0056	0.0138
Potassium	mg/L	-	-	-	-	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	-	-	-	1.00 U	0.41 J	1.00 U
Sodium	mg/L	-	-	20[3]	-	6.25	6.22	3.40	3.29	6.02	3.36	-	-	-	3.86	4.63	3.11
Conventional Chemistry Parameters																	
Bicarbonate Alkalinity	mg/L as $CaCO_3$	-	-	-	-	69.6	70.4	39.8	41.4	50.8	44.6	-	-	-	48	50	29
Carbonate Alkalinity	mg/L as $CaCO_3$	-	-	-	-	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	-	-	-	1.00 U	1.00 U	1.00 U
Hydroxide Alkalinity[4]	mg/L as $CaCO_3$	-	-	-	-	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	-	-	-	-	-	-
Chloride	mg/L	-	250	-	250	15.5	15.6	2.22	1.71	15.8	2.22	88.8	38.8	11	6.9	15.7	3.8
Sulfate	mg/L	-	250	-	250	17.5	17.5	1.95	0.870	13.7	1.66	**274.0**	110	4.8	2.0	6.7	0.9
Bromide	mg/L	-	-	-	-	0.400 U	0.400 U	0.400 U	0.400 U	0.400 U	0.400 U	-	-	-	0.012 J	0.012 U	0.012 J
Ammonia as Nitrogen	mg/L as N	-	-	-	-	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.256	0.050	0.327	0.080	0.120	0.020 J
Nitrate as Nitrogen[5]	mg/L as N	10	-	10	-	**13.3**	**14.1**	0.785	0.0100 U	**9.78**	0.713	0.403	**27.8**	**6.9**	**4.0**	**11.9**	0.7
Nitrite as Nitrogen[6]	mg/L as N	-	-	1	-	0.0100 U	0.0100 U	0.0100 U	0.0100 U	0.0100 U	0.0100 U	0.04	0.13	0.32	0.09	0.10	0.13
Nitrate-Nitrite	mg/L as N	-	-	-	-	13.3	14.1	0.785	0.0100 U	9.78	0.713	0.44	27.90	7.22	4.09	12.00	0.83
Total Kjeldahl Nitrogen[7]	mg/L as N	-	-	-	-	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	0.65 J	0.60 R	1.27 J	0.80	2.00	1.00
Phosphorus	mg/L	-	-	-	-	0.0620	0.0430	0.155	0.0880	0.0310	0.0800	-	-	-	0.0100	0.0100	0.0200
Fluoride	mg/L	4	-	4	2	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	-	-	-	0.011 J	0.010 U	0.021 J
Total Organic Carbon	mg/L	-	-	-	-	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	9.14	3.72	1.50 U	1.00	1.00	0.70

Notes

[1]From Table 1 - Groundwater Quality Criteria in WAC 173-200.
[2]MCLs (Maximum Contaminant Levels) and SMCLs (Secondary Maximum Contaminant Levels) from WAC 246-290-310.
[3]20 mg/L is listed as a "level of concern" and is not an MCL.
[4]During the June 2008 sampling event, Hydroxide Alkalinity was not analyzed.
[5]Values greater than 1 mg/L are in bold.
[6]For the June 2008 sampling event, Nitrite was calculated as the difference between the laboratory reported results for Nitrate + Nitrite and Nitrate.
[7]For the January 2008 sampling event, Total Kjeldahl Nitrogen results (with dot pattern) were suspected of being inaccurate, as a quality control spike showed significant matrix interference. Reporting limit = 0.6 mg/L. (Pacific Groundwater Group and Bennett-Cumming, 2008).
[8]Concentrations in shaded cells exceed Groundwater Quality Criteria in WAC 173-200.
[9]Concentrations located within thick borders exceed Drinking Water Standard MCLs or SMCLs.
[10]Pacific Groundwater Group (2008).

Abbreviations

U - The compound was analyzed for, but was not detected ("Non-detect") at or above the Minimum Reporting Limit (MRL) or Minimum Detection Limit (MDL).
J - The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
R - The laboratory-reported result for L-2 was non-detect at 0.6 mg/L. Result was rejected by Pacific Groundwater Group due to 0% matrix spike recovery. (Pacfic Groundwater Group and Bennett-Cumming, 2008).
DOE - Washington Department of Ecology
DOH - Washington Department of Health



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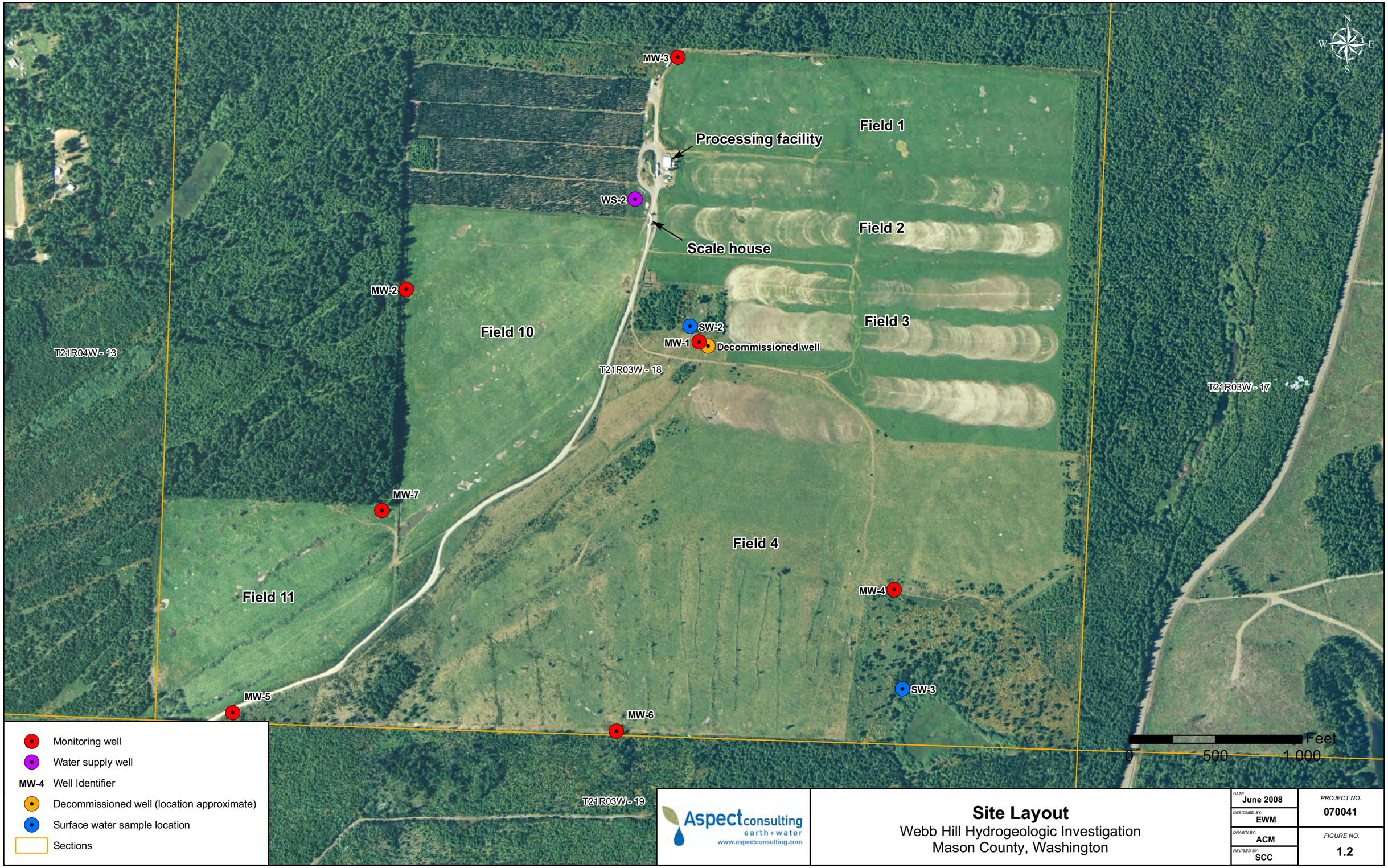
Project Vicinity Map

Webb Hill Hydrogeologic Investigation
Mason County, Washington

DATE: June 2008	PROJECT NO. 070041
DESIGNED BY: EWM	
DRAWN BY: ACM	FIGURE NO. 1.1
REVISED BY: SCC	

T:\projects_8\mason_county\ProjectVicinity_06-2008.mxd



- Monitoring well
- Water supply well
- **MW-4** Well Identifier
- Decommissioned well (location approximate)
- Surface water sample location
- Sections

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Site Layout

Webb Hill Hydrogeologic Investigation
Mason County, Washington

DATE: June 2008	PROJECT NO. 070041
DESIGNED BY: EWM	
DRAWN BY: ACM	FIGURE NO. 1.2
REVISED BY: SCC	

T:\projects_8\mason_county\SiteLayout_06-2008

T21R04W - 09
T21R04W - 10
T21R04W - 11
T21R04W - 12
T21R03W - 07
T21R03W - 08
T21R04W - 16
T21R04W - 15
T21R04W - 14
T21R04W - 13
T21R03W - 18
T21R03W - 17
T21R04W - 23
T21R04W - 24
T21R03W - 19
T21R03W - 20
T21R04W - 26

MW-3
286.11
< 0.1
5/30/07

WS-2
284.67
0.71
5/31/07

MW-2
282.46
0.79
5/30/07

MW-1
284.14
13.3
5/31/07

MW-7
277.72
0.7
6/11/08

MW-5
269.85
4.0 - 6/10/08
6.9 - 1/23/08

MW-4
285.22
9.8
5/31/07

MW-6
281.27
11.9
6/12/08

Williams
250.37
< 1.0
11/19/07

Biser
248.85
< 1.0
11/19/07

Groundwater flow direction

Groundwater Elevation Contour

Monitoring well

Water supply well

MW-4 Well Identifier

284.14 Groundwater Elevation in Feet
13.3 Nitrate, mg/L
5/31/07 Nitrate Sample Date

Project area

Sections

Notes
- Groundwater elevation contours were prepared from monitoring well data by Kriging using Surfer 8 (Golden Software, 2002).
- Data from supply well WS-2 was not used in contouring.
- Groundwater elevations in Biser and Williams wells are based on measurements taken May 21, 2008.
- All nitrate results available to date are posted on this figure.

0 2,000 4,000 Feet

Aspect consulting
earth + water
www.aspectconsulting.com

Groundwater Elevation Contours - June 12, 2008

Webb Hill Hydrogeologic Investigation
Mason County, Washington

DATE: June 2008	PROJECT NO. 070041
DESIGNED BY: EWM	
DRAWN BY: ACM	FIGURE NO. 3.1
REVISED BY: SCC	

T:\projects_8\mason_county\gw_contours_06-2008.mxd

APPENDIX A

Exploration Methods

A.1 Drilling

A.1.1 Overview and Drilling Preparation

Well MW-6 was located near the center of the south property line as recommended in the Phase 1 investigative report (Figure 5.1 in Aspect Consulting, 2007b). MW-7 was located in the northeast corner of Field 11. The locations were reviewed by Mason County and Bio Recycling personnel and approved with respect to existing operations and subsurface waste lines. MW-6 was not accessible for a truck mounted rotary-sonic drill rig and therefore a track mounted rotary-sonic drill rig was utilized. The borings were drilled from existing grade without any modifications.

A.1.2 Drilling Procedures

Three borings were drilled using rotary-sonic equipment by Boart Longyear Company, Fife, Washington. Drilling activities took place from May 20 through May 30, 2008. Borings are identified as MW-6a, MW-6, and MW-7. The first boring, MW-6a, was abandoned after the PVC well casing separated during installation of a ¾-inch bentonite chip seal and bentonite was found within the screened zone during clean-out of the hole. The borehole was decommissioned by drilling out the monitoring well installation and backfilling the borehole with bentonite chips as the drill casing was retracted. MW-6 was successfully redrilled 50 feet to the east of MW-6a.

Drill casing was 5.56-inch outside diameter (OD) and the borehole was nominally 6-inch diameter. The drill bit and core barrel were advanced into the formation and a core sample approximately 3 inches in diameter retrieved. Temporary drill casing was then advanced into the hole and slough removed before drilling ahead to procure another sample. Drilling runs were typically 10 feet long.

A.1.3 Groundwater Sampling During Drilling

Per Section 6.1 of the Quality Assurance Project Plan (Aspect Consulting, 2008), the driller was requested to identify any perched water and the on-site Aspect Consulting representative inspected soil cores for evidence of perched water. No perched water was found, although moist soils indicative of wetting fronts were encountered.

A.1.4 Soil Sample Collection

Samples were vibrated from the core barrel into polyethylene sheet tubes and sample depths estimated by the driller. Samples were moved away from the drill rig in approximately 2.5-foot lengths.

A.1.5 Sampling Logging

Cores were laid end-to-end, recovery measured for each sample run, and samples photographed with depth markers and stadia rod. In the field, soil descriptions were written on standard forms, grab samples taken at lithologic changes or at least every 5 feet, and chip trays prepared. Cores were retained on-site until completion of well development, but were severely disturbed by cattle.

A.2 Well Installation and Development

A.2.1 Well Installation

Wells were constructed using threaded Schedule 40 PVC pipe and machine slotted screen. Slot size was 0.020 inches wide by 0.13 feet long with three slots per row and rows at 0.012 feet on center. Overall screen length was 24.6 feet.

The screen zone was filter packed with 10/20 Colorado silica sand and topped with nominally 1 foot of 20/40 Colorado silica sand to inhibit grout migration. The remainder of the annulus was sealed to ground surface with bentonite. A nominal 10 foot layer of unhydrated bentonite as ¼-inch pellets (PDSCo Pel-Plug™) and 3/8-inch chips (Halliburton Holeplug™) was placed above the sand. The remaining annulus was filled with bentonite grout (Baroid Quik-Grout™) placed by 1-inch tremie pipe. Grout was prepared by power mixing bentonite powder in a 55-gallon drum with a known volume of water. Bentonite chips were used to fill any remaining open hole near the surface and the upper two feet filled with concrete to set the monument.

Details of well construction are provided on the boring logs in Appendix B. Monument, casing, and ground surface elevations are included in Table 2.1.

Well monuments were 5-foot long square steel with a hinged, locking lid and protected by three 7-foot long steel bollards. Monument and bollards were all set in concrete.

A.2.2 Alignment Testing

Wells were tested for satisfactory alignment by dropping slugs, or dummies, downhole. Both MW-6 and MW-7 passed the largest 1.66-inch diameter by 4.2-foot long slug to the bottom of the well.

A.2.3 Well Development

Wells MW-5, MW-6, and MW-7 were developed from June 2 through June 3, 2007 by mechanical surging followed by pumping. (Development of MW-5 was also performed at this time by the driller, but under contract with Pacific Groundwater Group.) Surging was done by hand oscillating a 3-foot bailer on a 3/8-inch nylon rope and pulley with a 3 foot

stroke at a rate of 30 strokes per minute. Surging was done at eight successive positions within the nominal 25-foot well screen for 7.5 minutes at each station, with an extra 7.5 minutes spent at the bottom of MW-6 due to slight heave at the bottom of that well. (MW-5 was swabbed at seven stations.) Sand content was measured using an Imhoff cone at end of swabbing as 3.0, 2.2 and 2.0 mg/L for MW-5, MW-6, and MW-7 respectively.

Wells MW-6 and MW-7 were then pumped at 3.5 gpm for one hour with a Grundfos RediFlo-2 pump until turbidity was approximately 50 NTU at each station as measured with a Hach 2100P turbidimeter. MW-5 was pumped for 47 minutes.

A.3 Groundwater Level Measurements and Sampling

A.3.1 Survey

Wellheads MW-6 and MW-7 were surveyed in June 2008 by MacLearnsberry, Inc. of Bainbridge Island, Washington. Monitoring wells were surveyed to top of PVC casings. Casings were marked and notched. Two off-site wells (Biser and Williams) were surveyed on June 19, 2008. The surveyor's report is presented in Figure A-1.

A.3.2 Groundwater Level Measurements

Groundwater levels were measured with a Waterline Model 300 level indicator to the nearest 0.01 feet. Reference point in all cases was top of casing, where the measuring point was marked and notched.

Water level was measured at all on-site wells (seven monitoring wells and the supply well) on June 12, 2008. These data are reported in Table 3.1.

A.3.3 Groundwater Sampling

Groundwater samples from MW-5, MW-6, and MW-7 were obtained on June 10 through June 12, 2007 using low flow sampling methodology as specified in the QAPP (Aspect Consulting, 2008).

Monitoring wells were pumped using a QED Environmental, Inc. SamplePro bladder pump. Air source was a Mi-T-M Corporation Model AC1-PH55-08M air compressor. Dedicated bladders and tubing were used for each well. The discharge lines were ¼-inch Nylon 6 tubing; the bladders were polyethylene. The bladders and nylon tubing were bagged, labeled, and retained for possible future use.

Pump intakes were set at 5, 15, and 12 feet below initial water level for MW-5, MW-6, and MW-7, respectively. Flow rates were 0.20, 0.25, and 0.27 lpm (0.053, 0.066, and 0.071 gpm). Drawdowns were very low at 0.16, 0.00, and 0.01 feet.

Wells were purged until all water quality parameters had stabilized. Parameters were monitored with a calibrated YSI 556 multi-parameter instrument. Measured parameters were temperature, specific conductance, dissolved oxygen, pH, and Eh (ORP). Samples were taken after parameters had stabilized to ± 0.1 °C, 1 µS/cm, 2 percent mg/l DO, 0.05 pH, and 10 mV Eh or better over previous three readings taken 3 to 5 minutes apart. The Eh values were the slowest to stabilize and were recorded when dropping at rates of less than 0.3, 0.4, and 0.7 mV/min for MW-5, MW-6, and MW-7, respectively. The wells were purged for 81, 108, and 143 minutes, respectively. An additional 2.5 to 3 hours was spent filling sample bottles.

Samples for wet chemistry were pre-cooled in an ice bath, stored in insulated coolers with cold packs to keep samples at less than 4°C, and sent to Columbia Analytical Services, Inc. within not more than 44 hours of sampling. Samples for metals analysis were field filtered with Enviro-Tech 0.45 micron filters.

Samples for age dating were collected in specified containers (wide mouth polyethylene with NaOH for ^{14}C, 500 ml polyethylene for ^{3}H, 125 ml clear glass with foil cap for CFC, and 1 L amber glass with cone-seal cap for SF_6). Samples for CFC and SF_6 analysis were filled last and two liters of groundwater were flowed through each glass bottle. CFC bottles were filled and capped under water. All caps were secured with electrical tape.

As CFC and SF_6 compounds tend to adsorb onto polyethylene and Teflon components, food grade ¼-inch Nylon 6 tubing and stainless steel couplings were used for the discharge line. Bladders used in the sampling pump were polyethylene. The surface area of the bladder represented 2.5 percent to 3 percent of the total surface area (bladder plus tubing) to which the groundwater was exposed. To additionally minimize any effects, bladders for MW-7 and MW-6 were conditioned in the wells for 1 and 2 days, respectively, prior to sampling.

Diffusion samplers for noble gas analysis were installed in each well after sampling. All were removed on June 19, 2008.

Samples for ^{14}C analysis were sent to Beta Analytic, Inc., Miami, Florida; for SF_6 analysis to Steve Cox, USGS at Tacoma, Washington, for transfer to the USGS Reston Chlorofluorocarbon Laboratory; and for CFC and $^{3}H/^{3}He$ ratio dating to Department of Geology and Geophysics, University of Utah, in Salt Lake City.

Wet chemistry laboratory results are reported in Appendix C and discussed in Section 4. Age dating laboratory results will be presented and discussed in a supplementary report.

FIGURE A-1

MACLEARNSBERRY, INC.
Land Surveyors ° Planners ° Civil Engineers

159 Wyatt Way NE
Bainbridge Island, WA 98110
206 842-5514

P.O. Box 65382
Port Ludlow, WA 98365
360 437-0430

Joseph Lubischer, PE
Aspect Consulting, LLC
179 Madrone Lane North
Bainbridge Island, WA 98110

Friday, June 27, 2008

Re: Webb Hill Monitoring Well Survey

Dear Joe:

Accompanying is our map depicting the results of our measurements of wells 6 and 7 at Webb Hill, along with diagrams of the positional tolerances.

The network of GPS stations from which the measurements of this project are taken is maintained by the Washington State Department of Transportation. This past year, they have been in the process of updating the network from NAD83 1991 to NAD83 2007. All updated stations, including the ones used for this project, now have new horizontal and vertical coordinates. In order to continuing using these stations, we have transformed our coordinates to WSDOT's.

In addition, we are now using ellipsoidal values rather than orthometric values. Various public agencies are using different geoid models to report orthometric elevations and we are having difficulty finding reliable conversion processes. The current project datum is thus 70.89 feet lower than the datum we used last year.

Feel free to call me with any comments or questions.

Sincerely,

Bruce MacLearnsberry, PLS

encl.

facsimile: 206 780-2408

e-mail: bruce@sealandsurvey.com

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Land Surveyors ∘ Planners ∘ Civil Engineers

159 Wyatt Way NE
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206 842-5514

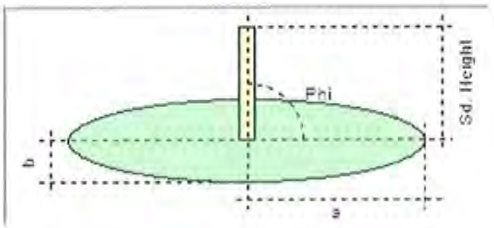
P.O. Box 65382
Port Ludlow, WA 98365
360 437-0430

Webb Hill
Aspect Consulting
Job No. 8033
Double-Vector, Dual-Frequency Static GPS

Monitoring Well No. 6

M0:	0.0196	fts				
Qxx:	11:	3.66717982	12:	0.0	13:	0.0
			22:	0.32809985	23:	0.0
					33:	0.00236025

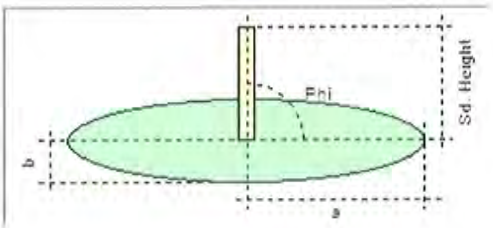
Semi-major (a):	0.0375	fts
Semi-minor (b):	0.0112	fts
Orientation (Phi):	0° 0' 0.0"	
Sd. Height:	0.001	fts



Monitoring Well No. 7

M0:	0.0169	fts				
Qxx:	11:	0.5553363	12:	0.0	13:	0.0
			22:	0.00775142	23:	0.0
					33:	1.71845615

Semi-major (a):	0.0126	fts
Semi-minor (b):	0.0015	fts
Orientation (Phi):	0° 0' 0.0"	
Sd. Height:	0.0221	fts



facsimile: 206 780-2408

e-mail: bruce@sealandsurvey.com

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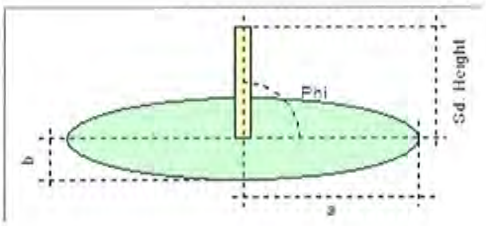
360 437-0430

Webb Hill
Aspect Consulting
Job No. 8033
Double-Vector, Dual-Frequency Static GPS

Biser Well

M0:	0.0094	fts				
Qxx:	11:	0.00016233	12:	0.0	13:	0.0
			22:	0.24477921	23:	0.0
					33:	1.87752926

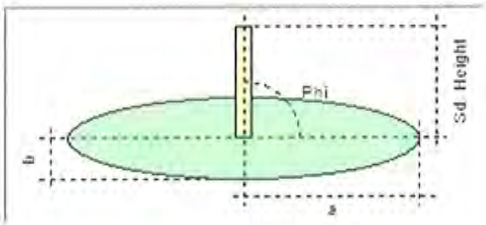
Semi-major (a):	0.0046	fts
Semi-minor (b):	0.0001	fts
Orientation (Phi):	90° 0' 0.0"	
Sd. Height:	0.0129	fts



Williams Well

M0:	0.0222	fts				
Qxx:	11:	0.00432681	12:	0.0	13:	0.0
			22:	0.00459746	23:	0.0
					33:	1.99553788

Semi-major (a):	0.0015	fts
Semi-minor (b):	0.0015	fts
Orientation (Phi):	90° 0' 0.0"	
Sd. Height:	0.0313	fts



facsimile: 206 780-2408

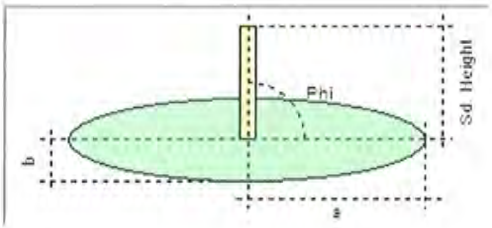
e-mail: bruce@sealandsurvey.com

Webb Hill
Aspect Consulting
Job No. 8033
Double-Vector, Dual-Frequency Static GPS

Monitoring Well No. 6

M0:		0.0196	fts			
Qxx:	11:	3.66717982	12:	0.0	13:	0.0
			22:	0.32809985	23:	0.0
					33:	0.00236025

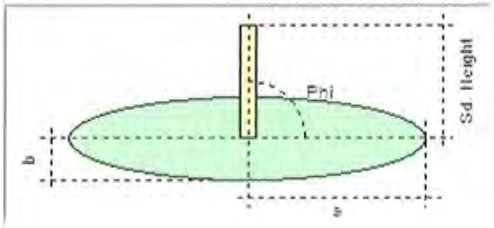
Semi-major (a):	0.0375	fts
Semi-minor (b):	0.0112	fts
Orientation (Phi):	0° 0' 0.0"	
Sd. Height:	0.001	fts



Monitoring Well No. 7

M0:		0.0169	fts			
Qxx:	11:	0.5553363	12:	0.0	13:	0.0
			22:	0.00775142	23:	0.0
					33:	1.71845615

Semi-major (a):	0.0126	fts
Semi-minor (b):	0.0015	fts
Orientation (Phi):	0° 0' 0.0"	
Sd. Height:	0.0221	fts



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360 437-0430

Webb Hill Well Monitoring Survey
For Aspect Consulting/Mason County

Job No. 8033
June 27, 2008

Static GPS Individual Resolved Vector Solutions

MW-6

Reference Station	Epoch	Posn. Diff.	Hgt. Diff.	Posn.+Hgt. Diff.	Posn. Qlty.	Hgt. Qlty.	Posn.+Hgt. Qlty.	Latitude	Longitude	Height (Ellipsoidal)
WSDOT CRANBERRY	06/18/2008 12:03:25	0.0197	0.0009	0.0197	0.0011	0.0018	0.0021	47°18'06.50267" N	123°06'41.24878" W	329.38
WSDOT GP23101-28	06/23/2008 14:08:22	0.0811	-0.0011	0.0811	0.0020	0.0020	0.0028	47°18'06.50171" N	123°06'41.24845" W	329.39

MW-7

WSDOT CRANBERRY	06/18/2008 13:03:24	0.0058	0.0160	0.0170	0.0008	0.0014	0.0016	47°18'18.66903" N	123°07'01.57998" W	350.42
WSDOT GP23101-28	06/23/2008 14:58:14	0.0276	-0.0305	0.0412	0.0016	0.0019	0.0025	47°18'18.66870" N	123°07'01.58003" W	350.47

Biser

WSDOT CRANBERRY	06/19/2008 12:55:26	0.0094	-0.0282	0.0297	0.0017	0.0033	0.0037	47°17'31.05834" N	123°07'45.44250" W	270.17
WSDOT GP23101-28	06/23/2008 12:22:02	0.0023	0.0059	0.0063	0.0008	0.0015	0.0017	47°17'31.05833" N	123°07'45.44267" W	270.14

Williams

WSDOT CRANBERRY	06/19/2008 12:09:11	0.0008	0.0125	0.0125	0.0007	0.0012	0.0014	47°17'41.78441" N	123°07'41.54618" W	265.23
WSDOT GP23101-28	06/23/2008 16:05:38	0.0056	-0.0786	0.0788	0.0019	0.0030	0.0035	47°17'41.78436" N	123°07'41.54624" W	265.32

All units above except latitudes and longitudes are U.S. survey feet.

תנו יכד בצין אבן בתן פנת יקרת מוסד מוסד המאמין לא יחיש. ושמתי משפט לקו וצדקה למשקלת
Ο δε ποιων την αληθειαν ερχεται προς το φως ινα φανερωθη αυτου τα εργα

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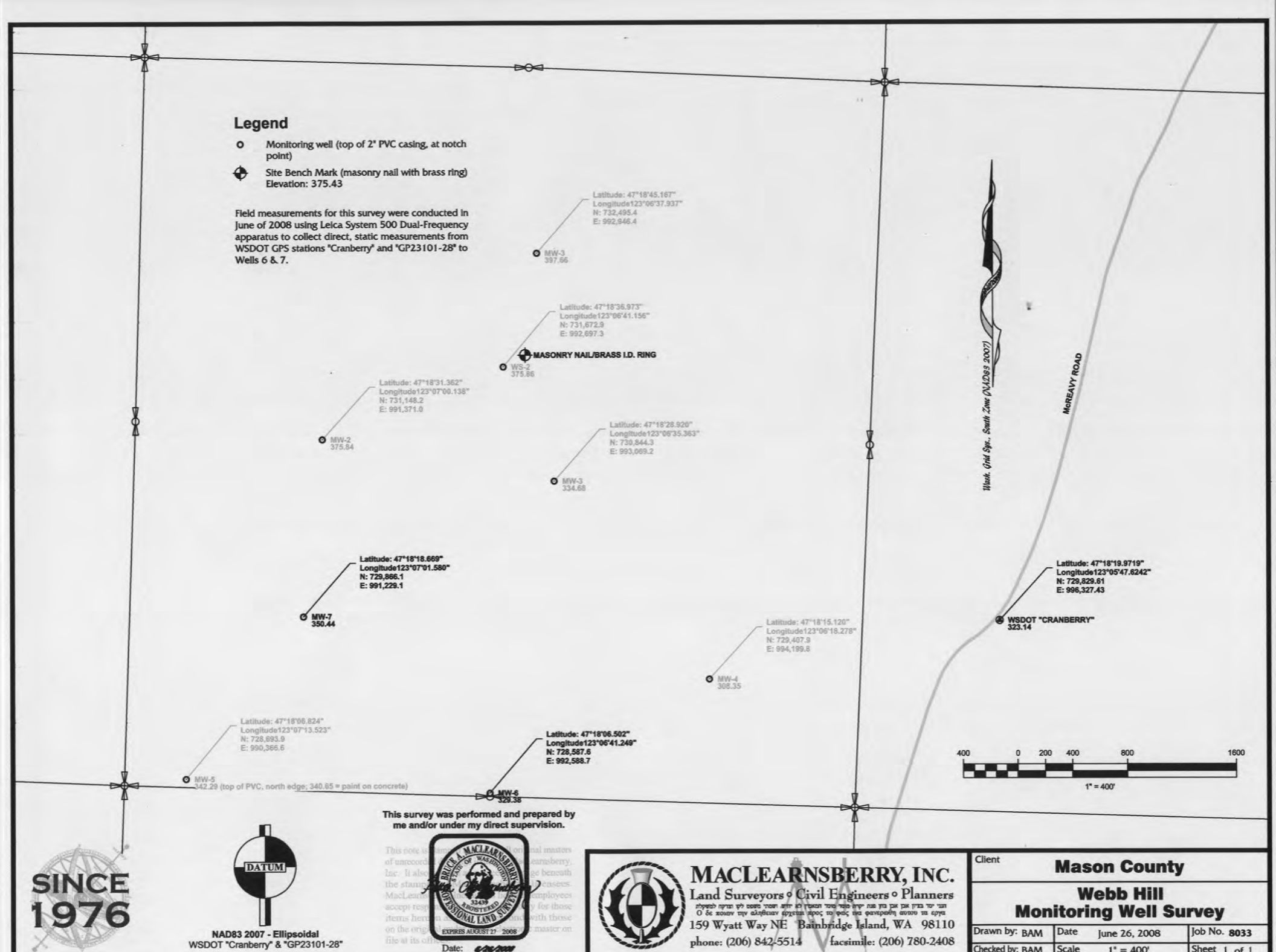
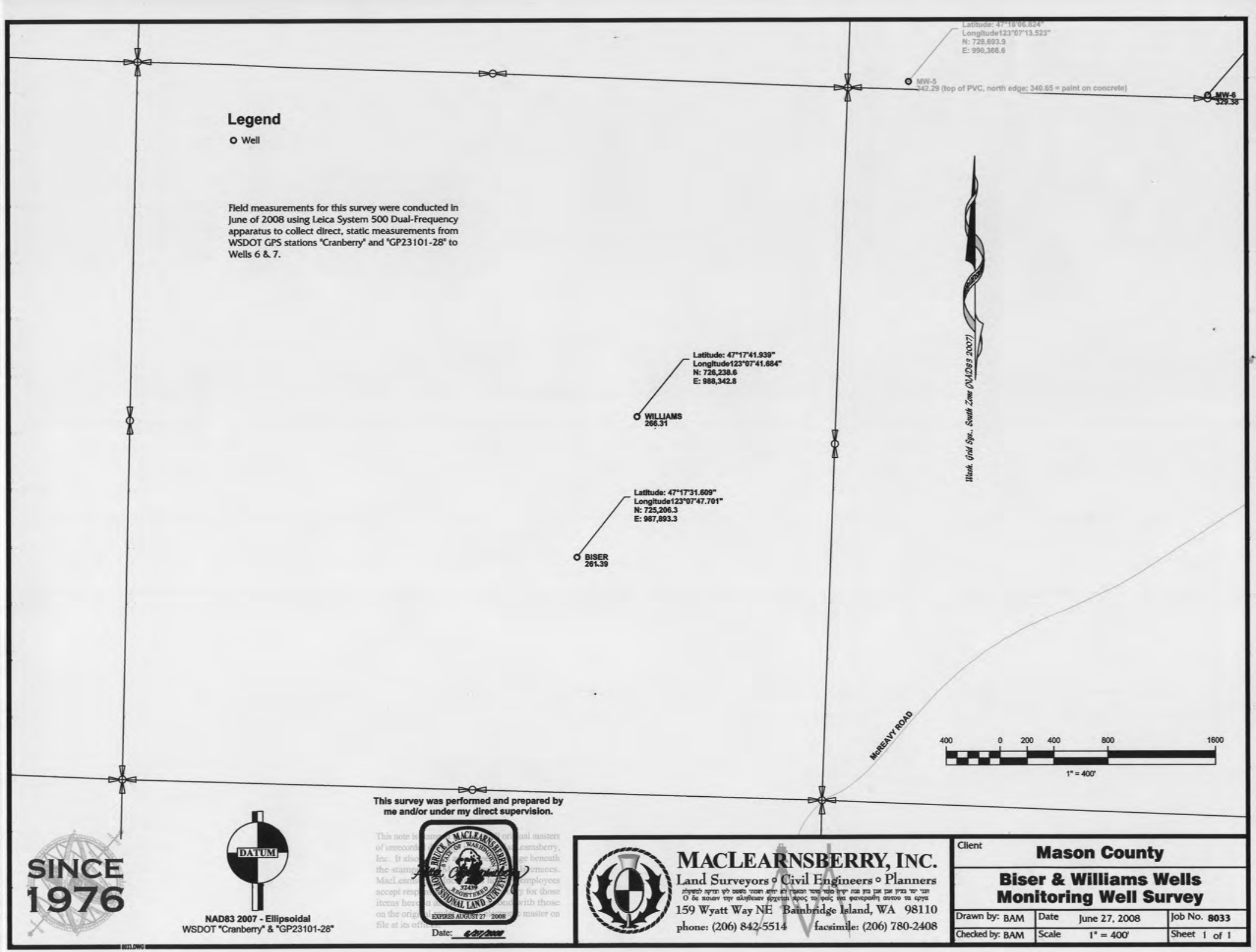

Legend
Monitoring well (top of 2" PVC casing, at notch point)
Site Bench Mark (masonry nail with brass ring) Elevation: 375.43
Field measurements for this survey were conducted in June of 2008 using Leica System 500 Dual-Frequency apparatus to collect direct, static measurements from WSDOT GPS stations "Cranberry" and "GP23101-28" to Wells 6 & 7.
Latitude: 47°18'45.167"
Longitude123°06'37.937"
N: 732,495.4
E: 992,946.4
MW-3
397.66
Latitude: 47°18'36.973"
Longitude123°06'41.156"
N: 731,672.9
E: 992,697.3
MASONRY NAIL/BRASS I.D. RING
WS-2
375.86
Latitude: 47°18'31.362"
Longitude123°07'00.138"
N: 731,148.2
E: 991,371.0
MW-2
375.84
Latitude: 47°18'28.920"
Longitude123°06'35.363"
N: 730,844.3
E: 993,069.2
MW-3
334.68
Latitude: 47°18'18.669"
Longitude123°07'01.580"
N: 729,866.1
E: 991,229.1
MW-7
350.44
Latitude: 47°18'15.120"
Longitude123°06'18.278"
N: 729,407.9
E: 994,199.8
MW-4
308.35
Latitude: 47°18'19.9719"
Longitude123°05'47.6242"
N: 729,829.61
E: 996,327.43
WSDOT "CRANBERRY"
323.14
Wash. Grid Sys., South Zone (NAD83 2007)
McREAVY ROAD
Latitude: 47°18'06.824"
Longitude123°07'13.523"
N: 728,893.9
E: 990,366.6
MW-5
342.29 (top of PVC, north edge; 340.65 = paint on concrete)
Latitude: 47°18'06.502"
Longitude123°06'41.249"
N: 728,587.6
E: 992,588.7
MW-6
329.38
400 0 200 400 800 1600
1" = 400'
SINCE 1976
DATUM
NAD83 2007 - Ellipsoidal
WSDOT "Cranberry" & "GP23101-28"
This survey was performed and prepared by me and/or under my direct supervision.
BRUCE A. MACLEARNSBERRY
STATE OF WASHINGTON
32439
REGISTERED
PROFESSIONAL LAND SURVEYOR
EXPIRES AUGUST 27 2008
Date: 6/26/2008
MACLEARNSBERRY, INC.
Land Surveyors ○ Civil Engineers ○ Planners
159 Wyatt Way NE Bainbridge Island, WA 98110
phone: (206) 842-5514 facsimile: (206) 780-2408
Client
Mason County
Webb Hill
Monitoring Well Survey
Drawn by: BAM
Date June 26, 2008
Job No. 8033
Checked by: BAM
Scale 1" = 400'
Sheet 1 of 1
8033.DWG



SINCE 1976

DATUM

NAD83 2007 - Ellipsoidal
WSDOT "Cranberry" & "GP23101-28"

This survey was performed and prepared by me and/or under my direct supervision.

BRUCE A. MACLEARNSBERRY
STATE OF WASHINGTON
32439
REGISTERED PROFESSIONAL LAND SURVEYOR
EXPIRES AUGUST 27, 2008

Date: 6/27/2008

MACLEARNSBERRY, INC.
Land Surveyors ◦ Civil Engineers ◦ Planners
159 Wyatt Way NE Bainbridge Island, WA 98110
phone: (206) 842-5514 facsimile: (206) 780-2408

Client: **Mason County**

Biser & Williams Wells Monitoring Well Survey

Drawn by: BAM	Date June 27, 2008		Job No. 8033
Checked by: BAM	Scale 1" = 400'		Sheet 1 of 1

APPENDIX B

Monitoring Well and On-Site Water Supply Well Logs

Coarse-Grained Soils - More than 50%[1] Retained on No. 200 Sieve	Gravels - More than 50%[1] of Coarse Fraction Retained on No. 4 Sieve	≤5% Fines[5]	GW	Well-graded gravel and gravel with sand, little to no fines
			GP	Poorly-graded gravel and gravel with sand, little to no fines
		≥15% Fines[5]	GM	Silty gravel and silty gravel with sand
			GC	Clayey gravel and clayey gravel with sand
	Sands - 50%[1] or More of Coarse Fraction Passes No. 4 Sieve	≤5% Fines[5]	SW	Well-graded sand and sand with gravel, little to no fines
			SP	Poorly-graded sand and sand with gravel, little to no fines
		≥15% Fines[5]	SM	Silty sand and silty sand with gravel
			SC	Clayey sand and clayey sand with gravel
Fine-Grained Soils - 50%[1] or More Passes No. 200 Sieve	Silts and Clays Liquid Limit Less than 50		ML	Silt, sandy silt, gravelly silt, silt with sand or gravel
			CL	Clay of low to medium plasticity; silty, sandy, or gravelly clay, lean clay
			OL	Organic clay or silt of low plasticity
	Silts and Clays Liquid Limit 50 or More		MH	Elastic silt, clayey silt, silt with micaceous or diatomaceous fine sand or silt
			CH	Clay of high plasticity, sandy or gravelly clay, fat clay with sand or gravel
			OH	Organic clay or silt of medium to high plasticity
Highly Organic Soils			PT	Peat, muck and other highly organic soils

Terms Describing Relative Density and Consistency

	Density	SPT[2] blows/foot
Coarse-Grained Soils	Very Loose	0 to 4
	Loose	4 to 10
	Medium Dense	10 to 30
	Dense	30 to 50
	Very Dense	>50
	Consistency	**SPT[2] blows/foot**
Fine-Grained Soils	Very Soft	0 to 2
	Soft	2 to 4
	Medium Stiff	4 to 8
	Stiff	8 to 15
	Very Stiff	15 to 30
	Hard	>30

Test Symbols

G = Grain Size
M = Moisture Content
A = Atterberg Limits
C = Chemical
DD = Dry Density
K = Permeability

Component Definitions

Descriptive Term	Size Range and Sieve Number
Boulders	Larger than 12"
Cobbles	3" to 12"
Gravel	3" to No. 4 (4.75 mm)
Coarse Gravel	3" to 3/4"
Fine Gravel	3/4" to No. 4 (4.75 mm)
Sand	No. 4 (4.75 mm) to No. 200 (0.075 mm)
Coarse Sand	No. 4 (4.75 mm) to No. 10 (2.00 mm)
Medium Sand	No. 10 (2.00 mm) to No. 40 (0.425 mm)
Fine Sand	No. 40 (0.425 mm) to No. 200 (0.075 mm)
Silt and Clay	Smaller than No. 200 (0.075 mm)

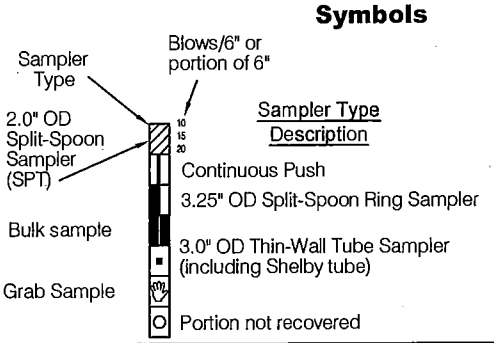
[3] Estimated Percentage

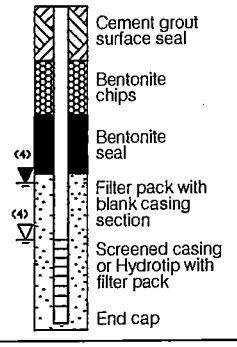
Percentage by Weight	Modifier
<5	Trace
5 to 15	Slightly (sandy, silty, clayey, gravelly)
15 to 30	Sandy, silty, clayey, gravelly)
30 to 49	Very (sandy, silty, clayey, gravelly)

Moisture Content

Dry - Absence of moisture, dusty, dry to the touch
Slightly Moist - Perceptible moisture
Moist - Damp but no visible water
Very Moist - Water visible but not free draining
Wet - Visible free water, usually from below water table

Symbols





(1) Percentage by dry weight
(2) (SPT) Standard Penetration Test (ASTM D-1586)
(3) In General Accordance with Standard Practice for Description and Identification of Soils (ASTM D-2488)
(4) Depth of groundwater — ATD = At time of drilling; Static water level (date)
(5) Combined USCS symbols used for fines between 5% and 15% as estimated in General Accordance with Standard Practice for Description and Identification of Soils (ASTM D-2488)

Classifications of soils in this report are based on visual field and/or laboratory observations, which include density/consistency, moisture condition, grain size, and plasticity estimates and should not be construed to imply field or laboratory testing unless presented herein. Visual-manual and/or laboratory classification methods of ASTM D-2487 and D-2488 were used as an identification guide for the Unified Soil Classification System.

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Exploration Log Key

DATE
DESIGNED BY
DRAWN BY
REVISED BY

PROJECT NO.

FIGURE NO.
B-1

Q:_ACAD Standards\Standard Details\Exploration Log Key B1.dwg

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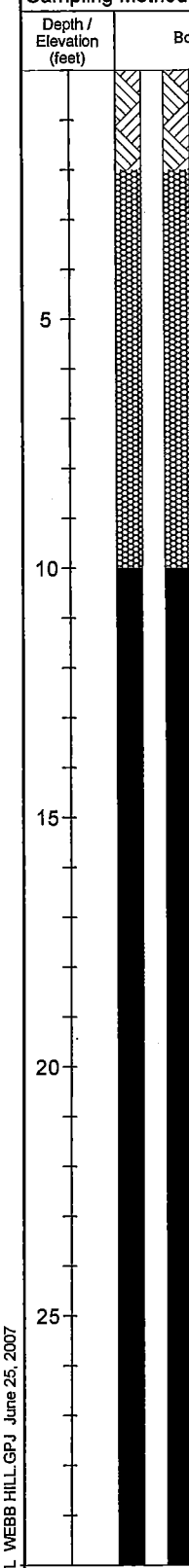
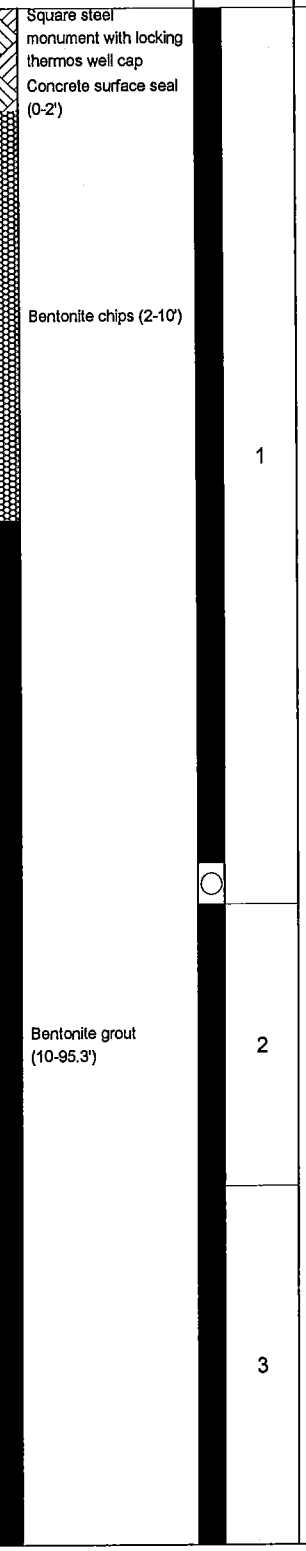
Monitoring Well Construction Log

Project Number	Well Number	Sheet
070041-001	MW-1	1 of 5

Project Name	Webb Hill Biosolids Facility	Ground Surface Elev	
Location	Mason County, WA	Top of Casing Elev.	
Driller/Method	Boart Longyear / Rotosonic	Depth to Water	104.6 - 5/31/2007
Sampling Method	Continuous	Start/Finish Date	4/23/2007-4/26/2007





Depth / Elevation (feet)	Material Type	Description	Depth (ft)
		TOPSOIL Slightly moist, dark brown GRAVEL (GP); gravel is fine; abundant organics, roots	
		RECESSIONAL OUTWASH Slightly moist, brown, slightly silty, very gravelly SAND (SP-SM); sand is fine to coarse; gravel is fine, subrounded to rounded	
		Slightly moist, brown, silty, gravelly SAND (SM); sand is fine to coarse; gravel is fine to coarse (60mm), subrounded to rounded 3-4.5' gravel is subangular to rounded (35mm)	
5		**STRATIFIED GLACIAL DEPOSITS** **till** Slightly moist, brown to gray, silty sandy GRAVEL (GM)	5
		glaciofluvial Slightly moist, dark brown, silty,gravelly SAND (SM)	
		till Slightly moist, dark brown, silty,gravelly SAND (SM) Drilling fractured rock: dark brown with maroon tinge, angular gravel	
		glaciofluvial Slightly moist, dark brown, slightly silty, gravelly SAND (SW-SM); gravel is subrounded to rounded Very gravelly Cobble at 11' Cobble at 12'	
10			10
15		Slightly moist to dry, brown, silty, very gravelly SAND (SM); sand is fine to coarse; gravel is fine to coarse (40mm), subrounded to rounded	15
		Trace clay	
20		Dark brown, increased moisture 22 to 22.5'	20
		Slightly moist, dark brown to gray, slightly clayey, silty, gravelly SAND (SM); sand is fine to coarse; gravel is fine to coarse, subrounded to rounded	
25		Dark brown at 25' Cobble at 26' Trace clay at 28'	25

Sampler Type:
- ○ No Recovery
- ■ Bulk Sample

PID - Photoionization Detector (Headspace Measurement)
- ▼ Static Water Level
- ▽ Water Level (ATD)

Logged by: JMS/JSL

Approved by: EWM

Figure No. B-2

MONITORING WELL WEBB HILL.GPJ June 25, 2007

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Monitoring Well Construction Log

Project Number	Well Number	Sheet
070041-001	MW-1	2 of 5

Project Name	Webb Hill Biosolids Facility	Ground Surface Elev	
Location	Mason County, WA	Top of Casing Elev.	
Driller/Method	Boart Longyear / Rotosonic	Depth to Water	104.6 - 5/31/2007
Sampling Method	Continuous	Start/Finish Date	4/23/2007-4/26/2007

Depth / Elevation (feet)	Borehole Completion	Sample Type/ID	Tests	PID (ppm)	Blows/ 6"	Material Type	Description	Depth (ft)
35		4					Moist, brown to light brown, silty, slightly gravelly SAND (SM); trace clay, sand is fine to coarse, predominantly medium to coarse; gravel is fine to coarse (40mm), predominantly fine, subrounded to rounded Gravelly at 31' Slightly moist at 32'	35
							No clay, yellow ochre tones at 37'	
							Trace silt at 38' (SW)	
40							Slightly silty at 39' (SW-SM) Light brown to brown at 40'	40
							Brown at 41'	
							Dark brown, increase silt at 42'	
							Trace clay 43-49.5', decreasing 46-49.5'	
45	Bentonite grout (10-95.3')	5					Light and dark brown at 46' Dark brown at 46.5'	45
							Light and dark brown at 48.5'	
50							Slightly moist to moist, brown SAND (SW); trace silt; trace gravel; sand is fine to coarse; gravel is fine to coarse (20mm)	50
							Slightly moist, dark brown and gray, slightly silty, gravelly SAND (SW-SM); sand is fine to coarse; gravel is fine to coarse (50mm)	
		6					Trace silt at 53.5' (SW)	
55							Slightly silty at 56.3' (SW-SM)	55
							Trace silt at 57' (SW)	
		7					Moist, slightly silty, very gravelly, cobble (SW-SM) Slightly moist at 59.7'	

Sampler Type:
- No Recovery
- Bulk Sample

PID - Photoionization Detector (Headspace Measurement)

- Static Water Level
- Water Level (ATD)

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Approved by: EWM

Figure No. B-2

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Monitoring Well Construction Log

Project Number	Well Number	Sheet
070041-001	MW-1	3 of 5

Project Name	Webb Hill Biosolids Facility	Ground Surface Elev	
Location	Mason County, WA	Top of Casing Elev.	
Driller/Method	Boart Longyear / Rotosonic	Depth to Water	104.6 - 5/31/2007
Sampling Method	Continuous	Start/Finish Date	4/23/2007-4/26/2007

Depth / Elevation (feet)	Borehole Completion	Sample Type/ID	Tests	PID (ppm)	Blows/ 6"	Material Type	Description	Depth (ft)
		7					Trace silt (SW)	
							Slightly silty (SW-SM)	
65							Slightly moist, dark brown, very gravelly SAND (SW); trace silt; sand is fine to coarse; gravel is fine to coarse (55 mm), predominantly fine	65
70		8						70
75	Bentonite grout (10-95.3')	9						75
80								80
							Increase sand 83.5 to 84'	
85	Perched water level 86.3' 4/24/2007	10					Slightly silty (SW-SM) Trace silt (SW)	85

Sampler Type:
- No Recovery
- Bulk Sample

PID - Photoionization Detector (Headspace Measurement)

- Static Water Level
- Water Level (ATD)

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Figure No. B- 2

MONITORING WELL WEBB HILL.GPJ June 25, 2007

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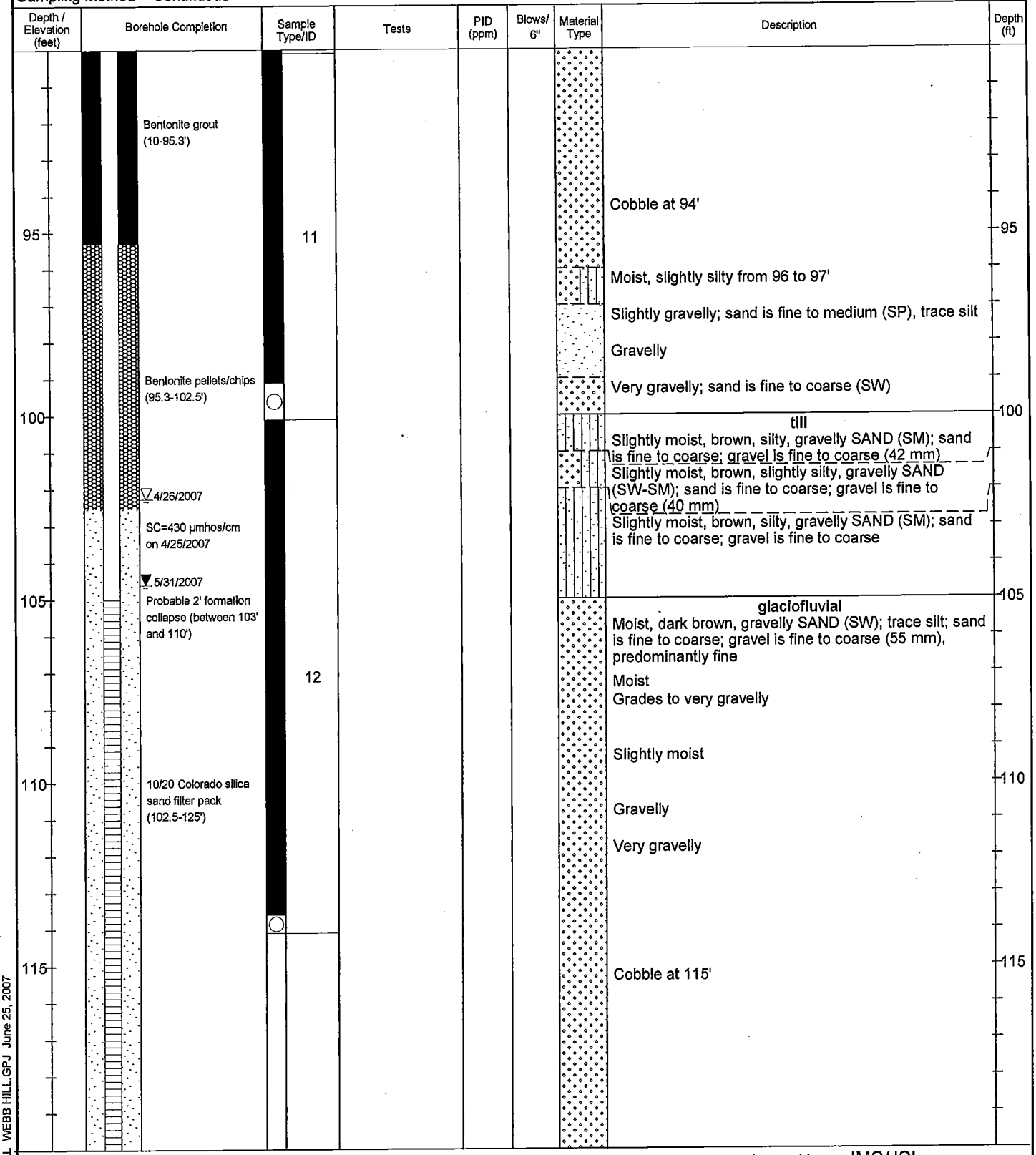
Monitoring Well Construction Log

Project Number	Well Number	Sheet
070041-001	MW-1	4 of 5

Project Name	Webb Hill Biosolids Facility	Ground Surface Elev	
Location	Mason County, WA	Top of Casing Elev.	
Driller/Method	Boart Longyear / Rotosonic	Depth to Water	104.6 - 5/31/2007
Sampling Method	Continuous	Start/Finish Date	4/23/2007-4/26/2007



Sampler Type:
- No Recovery
- Bulk Sample

PID - Photoionization Detector (Headspace Measurement)
- Static Water Level
- Water Level (ATD)

Logged by: JMS/JSL
Approved by: EWM
Figure No. B-2

MONITORING WELL WEBB HILL.GPJ June 25, 2007

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Monitoring Well Construction Log

Project Number	Well Number	Sheet
070041-001	MW-1	5 of 5

Project Name	Webb Hill Biosolids Facility	Ground Surface Elev	
Location	Mason County, WA	Top of Casing Elev.	
Driller/Method	Boart Longyear / Rotosonic	Depth to Water	104.6 - 5/31/2007
Sampling Method	Continuous	Start/Finish Date	4/23/2007-4/26/2007

Depth / Elevation (feet)	Borehole Completion	Sample Type/ID	Tests	PID (ppm)	Blows/ 6"	Material Type	Description	Depth (ft)
	2" schedule 80 PVC slotted pipe 0.020" slot size (105.2-124.6')						Slightly silty (SW-SM) Trace silt (SW)	
							Slightly silty (SW-SM)	
	2" PVC pipe cap							
125							Trace silt (SW)	125
							Bottom of hole at 125'.	
130								130
135								135
140								140
145								145

Sampler Type:
- No Recovery
- Bulk Sample

PID - Photoionization Detector (Headspace Measurement)
- Static Water Level
- Water Level (ATD)

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Monitoring Well Construction Log

Project Number	Well Number	Sheet
070041-001	MW-2	1 of 6

Project Name	Webb Hill Biosolids Facility	Ground Surface Elev	
Location	Mason County, WA	Top of Casing Elev.	
Driller/Method	Boart Longyear / Rotosonic	Depth to Water	147.9 - 5/31/2007
Sampling Method	Continuous	Start/Finish Date	4/30/2007-5/3/2007

Depth / Elevation (feet)	Borehole Completion	Sample Type/ID	Tests	PID (ppm)	Blows/ 6"	Material Type	Description	Depth (ft)
	Square steel monument with locking thermos well cap Concrete surface seal (0-2') Soil (2-4') Bentonite chips (4-10') Bentonite grout (10-131')	1 2 3 4 5 6 7					**FILL (Reworked Glacial Deposits)** Slightly moist, yellow red/brown, silty, gravelly SAND (SM); sand is predominantly fine to medium, gravel is fine to coarse (60mm), subrounded/rounded, 30% felsic	
							Slightly moist, gray, slightly silty, very gravelly SAND (SW-SM); sand is fine to coarse, gravel is fine to coarse (70mm), subangular/subrounded, 15% felsic	5
5							**RECESSIONAL OUTWASH** Moist/very moist, slightly silty, slightly gravelly SAND (SP-SM); sand is fine to medium predominantly fine, fairly well sorted, gravel is fine to coarse (60mm), subrounded/rounded, 10% felsic, gradational decrease in gravel	
10							**STRATIFIED GLACIAL DEPOSITS** **glaciofluvial** Moist, dark brown/gray, slightly silty, very sandy GRAVEL (GW-GM); sand is fine to coarse but predominantly coarse, gravel is fine to coarse (50mm), subrounded/rounded, 15% felsic	10
15							Dry, dark brown/brown, silty, gravelly SAND (SM); sand is fine to coarse predominantly fine to medium, gravel is fine to coarse (50mm), subrounded/rounded, 20% felsic Moist, dark brown/gray, slightly silty, sand predominantly medium to coarse, <10% felsic	15
20							**till** Moist, yellow red/dark brown, silty, very sandy GRAVEL (GM); matrix supported, sand is fine to coarse, gravel is fine to coarse (60mm), subrounded/rounded, 20% felsic	20
							Dry, dark brown/brown, silty, very gravelly SAND (SM); matrix supported, sand is fine to coarse, gravel is fine to coarse (50mm), subrounded/rounded, 15% felsic	
25							Dry/slightly moist, yellow red/brown, silty, very sandy GRAVEL (GM); matrix supported, gravel (70mm), subrounded/rounded, 15% felsic	25
							Dry, light gray/brown, silty, very sandy GRAVEL (GM); with cobblesmatrix supported, sand is fine to coarse predominantly fine to medium, gravel is fine to coarse (90mm), subrounded/rounded, 20% felsic	

Sampler Type:
- ○ No Recovery
- ■ Bulk Sample

PID - Photoionization Detector (Headspace Measurement)

- ▼ Static Water Level
- ▽ Water Level (ATD)

Logged by: JMS/JSL

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Figure No. B- 3

MONITORING WELL WEBB HILL.GPJ June 25, 2007

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Monitoring Well Construction Log

Project Number	Well Number	Sheet
070041-001	MW-2	2 of 6

Project Name	Webb Hill Biosolids Facility	Ground Surface Elev	
Location	Mason County, WA	Top of Casing Elev.	
Driller/Method	Boart Longyear / Rotosonic	Depth to Water	147.9 - 5/31/2007
Sampling Method	Continuous	Start/Finish Date	4/30/2007-5/3/2007

Depth / Elevation (feet)	Borehole Completion	Sample Type/ID	Tests	PID (ppm)	Blows/ 6"	Material Type	Description	Depth (ft)
35		7						35
		8					**glaciofluvial** Slightly moist/moist, yellow red/red brown, slightly silty, very sandy GRAVEL (GW-GM); sand is fine to coarse predominantly medium to coarse, subangular/subrounded, gravel is fine to coarse (60mm), subrounded/rounded <10% felsic Silty, very sandy gravel lens (6") at 37.5'	
40		9					Dry/slightly moist, dark brown/brown, silty, very sandy GRAVEL (GM); sand is fine to coarse predominantly fine to medium, gravel is fine to coarse rounded, 15% felsic, matrix supported	40
							Slightly moist, red brown/yellow red, slightly silty, very sandy GRAVEL (GW-GM); sand is fine to coarse predominantly medium to coarse, gravel is fine to coarse, subrounded/rounded, 15% felsic	
45	Bentonite grout (10-131')						Slightly moist, dark brown, silty, very gravelly, SAND (SM); sand is fine to coarse, gravel is fine to coarse (40mm), subrounded/rounded, 10% felsic (gravelly 45-45.5')	45
							Trace clay	
50		10					Slightly moist/moist brown/dark brown, slightly clayey, silty, gravelly, SAND (SM); sand is fine to coarse, gravel is fine to coarse predominantly fine (60mm), rounded/subrounded, 10% felsic, matrix supported	50
55		11					Slightly moist, dark brown, slightly silty, slightly gravelly, SAND (SW-SM); sand is fine to coarse, gravel is fine to coarse, subrounded/rounded, 10% felsic Slightly moist, dark brown, slightly silty, very gravelly, SAND (SW-SM); sand is fine to coarse, gravel is fine to coarse (60mm), subangular/rounded, <10% felsic, matrix supported Slightly moist/moist	55

Sampler Type:
- ○ No Recovery
- ■ Bulk Sample

PID - Photoionization Detector (Headspace Measurement)

- ▼ Static Water Level
- ▽ Water Level (ATD)

Logged by: JMS/JSL

Approved by: EWM

Figure No. B- 3

MONITORING WELL WEBB HILL.GPJ June 25, 2007

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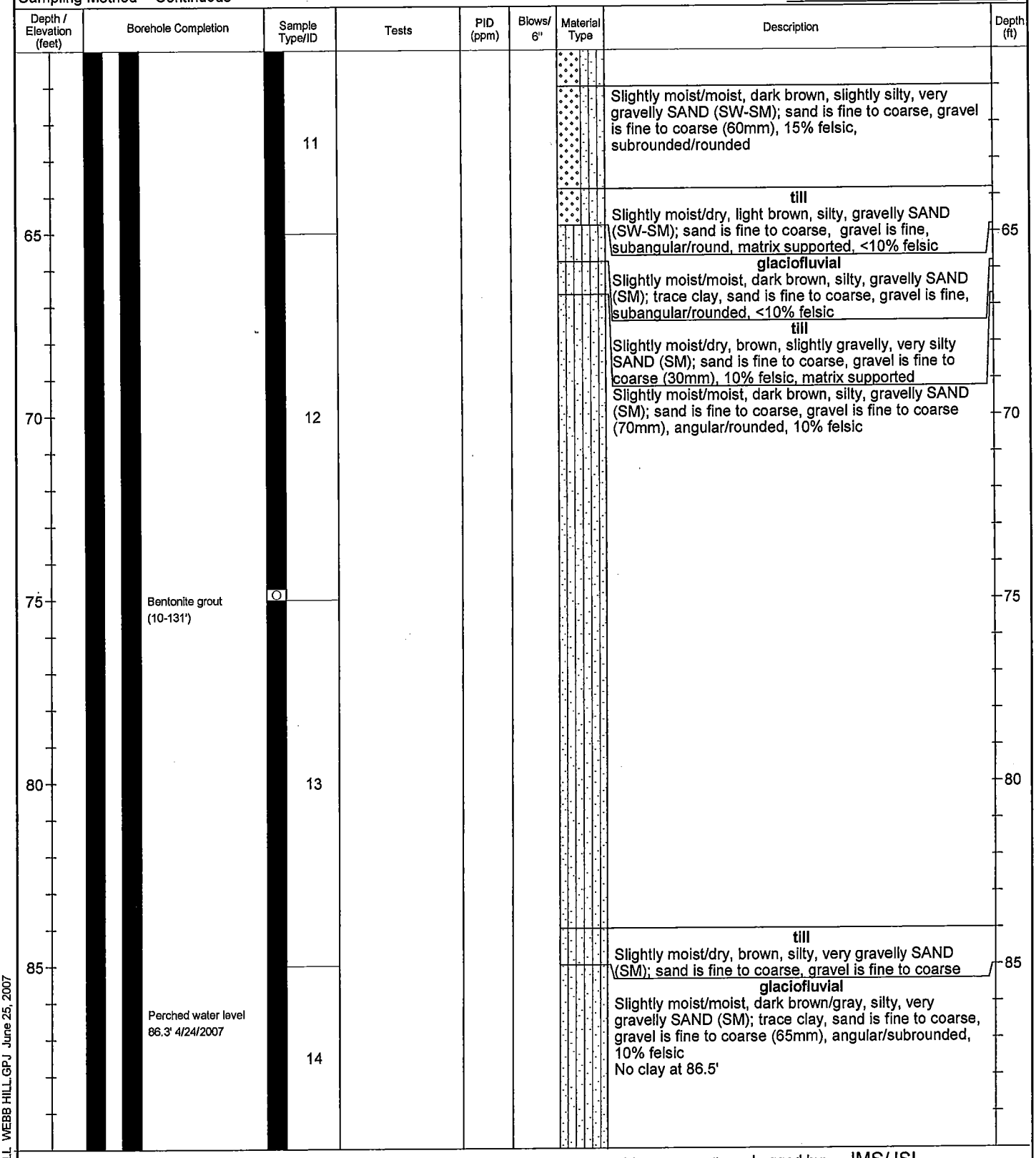
Monitoring Well Construction Log

Project Number	Well Number	Sheet
070041-001	MW-2	3 of 6

Project Name: Webb Hill Biosolids Facility
Location: Mason County, WA
Driller/Method: Boart Longyear / Rotosonic
Sampling Method: Continuous

Ground Surface Elev:
Top of Casing Elev.:
Depth to Water: 147.9 - 5/31/2007
Start/Finish Date: 4/30/2007-5/3/2007



Sampler Type:
- No Recovery
- Bulk Sample

PID - Photoionization Detector (Headspace Measurement)
- Static Water Level
- Water Level (ATD)

Logged by: JMS/JSL
Approved by: EWM
Figure No. B- 3

_MONITORING WELL_WEBB HILL.GPJ June 25, 2007

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Monitoring Well Construction Log

Project Number	Well Number	Sheet
070041-001	MW-2	4 of 6

Project Name	Webb Hill Biosolids Facility	Ground Surface Elev	
Location	Mason County, WA	Top of Casing Elev.	
Driller/Method	Boart Longyear / Rotosonic	Depth to Water	147.9 - 5/31/2007
Sampling Method	Continuous	Start/Finish Date	4/30/2007-5/3/2007

Depth / Elevation (feet)	Borehole Completion	Sample Type/ID	Tests	PID (ppm)	Blows/ 6"	Material Type	Description	Depth (ft)
		15					Boulder	
		16					**till** Slightly moist/dry, brown, silty, gravelly SAND (SM); sand is fine to coarse, gravel is fine to coarse predominantly fine (30mm)	
95		17					**glaciofluvial** Moist/very moist, dark brown, very sandy GRAVEL (GP); trace silt, sand is fine to coarse, gravel is fine to coarse predominantly fine (55mm), subangular/rounded, 10% felsic	95
							till Slightly moist/dry, brown, silty, gravelly SAND (SM); sand is fine to coarse, gravel is fine to coarse (40mm)	
							glaciofluvial Slightly moist, dark brown, slightly silty, very gravelly SAND (SW-SM); sand is fine to coarse, gravel is fine to coarse (48mm), subangular/rounded, <10% felsic, matrix supported	
100	Perched water level 101.7 5/1/2007 Hole drilled to 105' SC=300 µmhos/cm	18					Slightly moist/moist, dark brown/yellow red/gray, silty, very gravelly/gravelly SAND (SM); sand is fine to coarse, gravel is fine to coarse (55mm), subrounded/rounded, <5% felsic	100
105	Bentonite grout (10-131')	19					Slightly moist, dark brown, very gravelly SAND (SW); trace silt, sand is fine to coarse predominantly fine to medium, gravel is fine to coarse (30mm), subangular/subrounded, <5% felsic	105
							Slightly silty, sand is fine to course at 105.5'	
							Very silty, gravelly SAND (SM); sand is fine to coarse	
							Slightly moist, brown, slightly silty, slightly gravelly SAND (SW-SM); gravel is fine (<1/4")	
							till (106.7-107.3') as till at 112', gravel is fine	
							glaciofluvial (107.3-110') as glaciofluvial at 112.5'	
110		20					**till** (110-110.5') as till at 112', gravel is fine	110
							glaciofluvial (110.5-111') as glaciofluvial at 112.5'	
							till (111-111.5') as till at 112'	
							glaciofluvial (111.5-112') as glaciofluvial at 112.5'	
	Perched water level 112.9 5/1/2007 Hole drilled to 115' SC=150 µmhos/cm						**till** Slightly moist/dry, dark brown/brown, silty, gravelly SAND (SM); sand is fine to coarse, gravel is fine to coarse (20-60mm), subangular/rounded, 5-10% felsic	
115		21					**glaciofluvial** Slightly moist/moist, dark brown/brown, slightly silty/trace silt, gravelly/very gravelly SAND (SW-SM to SW); sand is fine to coarse, gravel is fine to coarse (30-65mm), subangular/subrounded, 5-10% felsic	115

Sampler Type:
- No Recovery
- Bulk Sample

PID - Photoionization Detector (Headspace Measurement)
- Static Water Level
- Water Level (ATD)

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Figure No. B- 3

MONITORING WELL_WEBB HILL.GPJ June 25, 2007

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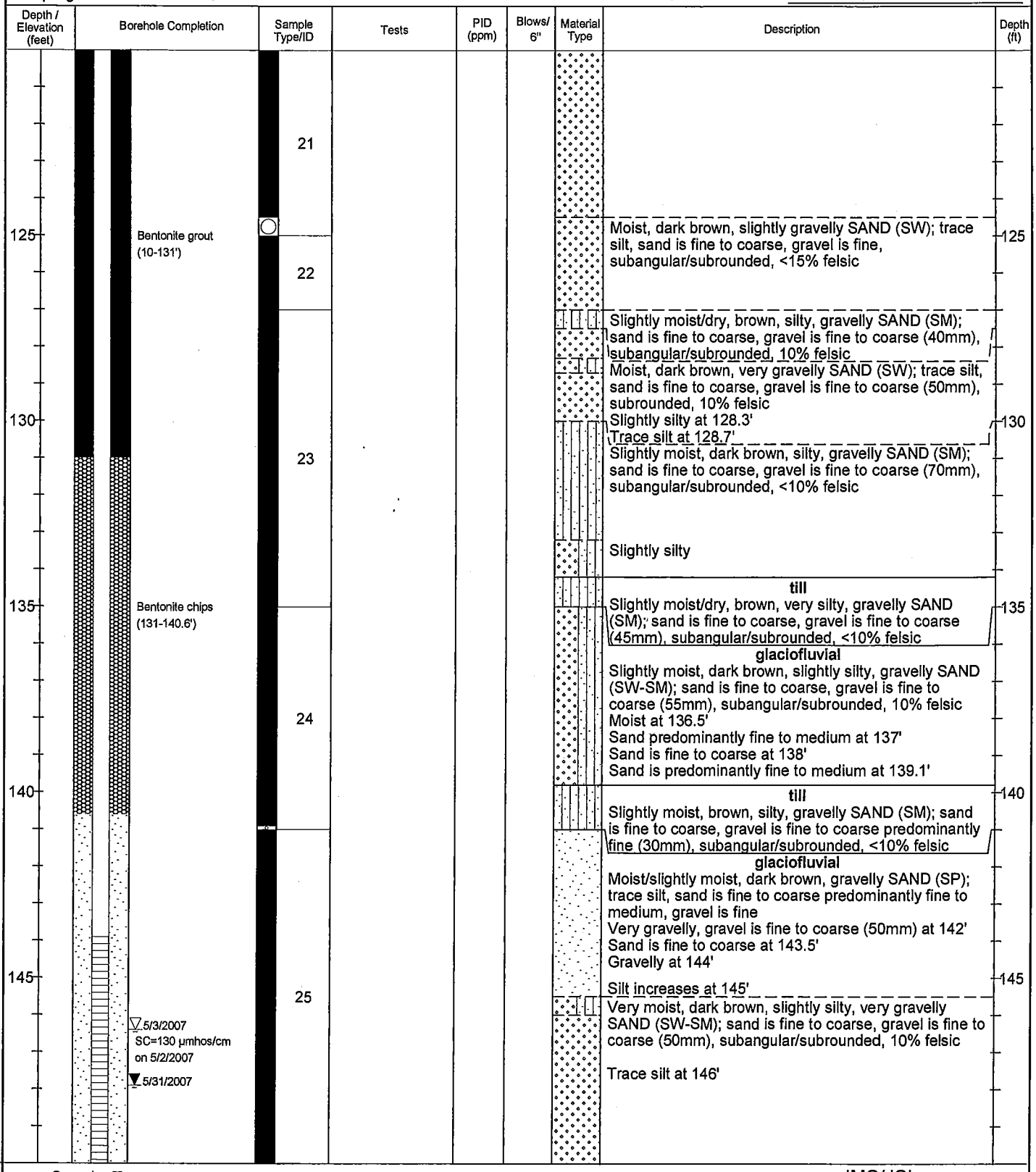
Monitoring Well Construction Log

Project Number	Well Number	Sheet
070041-001	MW-2	5 of 6

Project Name	Webb Hill Biosolids Facility	Ground Surface Elev	
Location	Mason County, WA	Top of Casing Elev.	
Driller/Method	Boart Longyear / Rotosonic	Depth to Water	147.9 - 5/31/2007
Sampling Method	Continuous	Start/Finish Date	4/30/2007-5/3/2007



Sampler Type:
- No Recovery
- Bulk Sample

PID - Photoionization Detector (Headspace Measurement)

- Static Water Level
- Water Level (ATD)

Logged by: JMS/JSL

Approved by: EWM

Figure No. B- 3

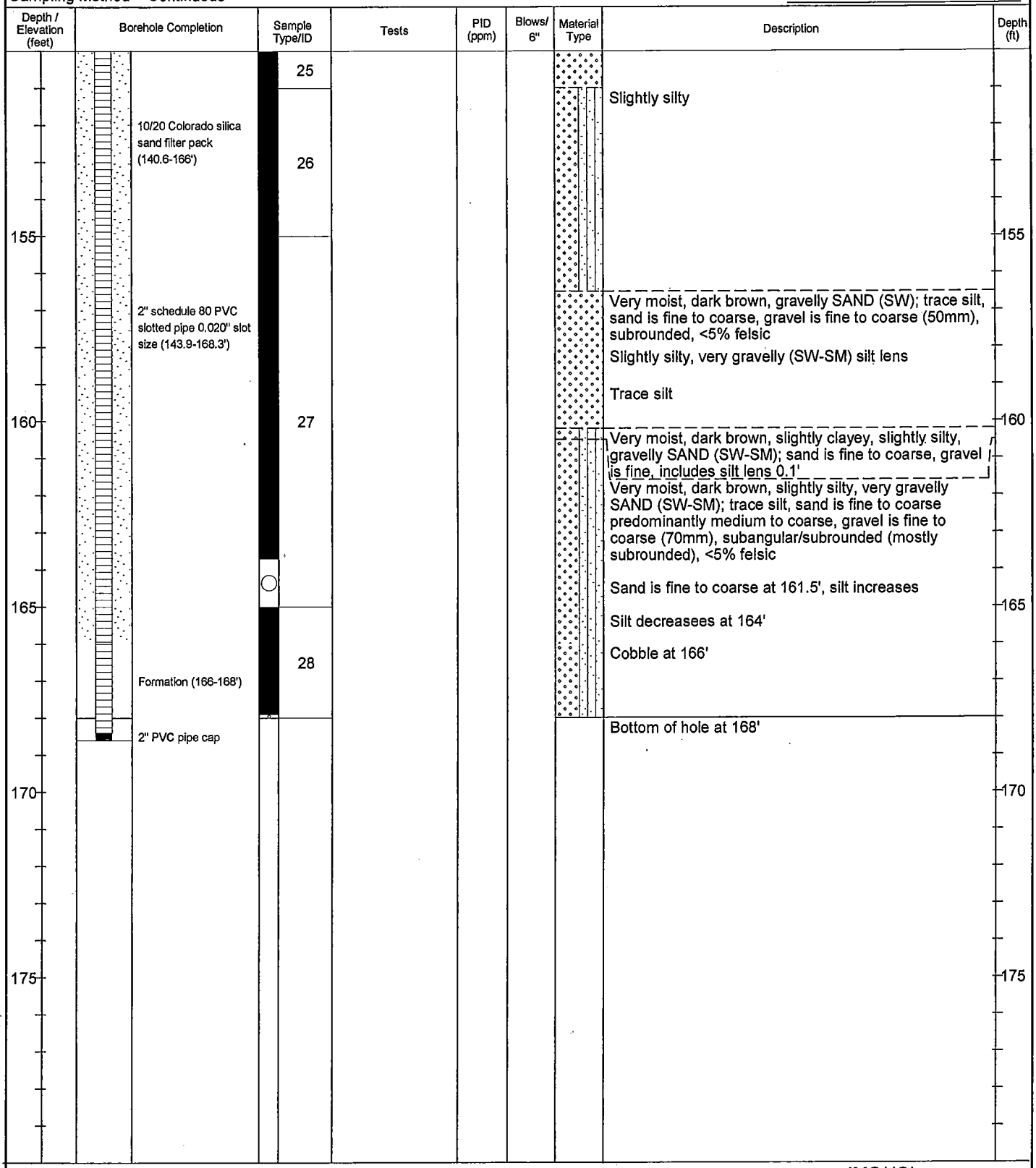
MONITORING WELL WEBB HILL.GPJ June 25, 2007

Aspect consulting
IN-DEPTH PERSPECTIVE

Monitoring Well Construction Log

Project Number	Well Number	Sheet
070041-001	MW-2	6 of 6

Project Name	Webb Hill Biosolids Facility	Ground Surface Elev	
Location	Mason County, WA	Top of Casing Elev.	
Driller/Method	Boart Longyear / Rotosonic	Depth to Water	147.9 - 5/31/2007
Sampling Method	Continuous	Start/Finish Date	4/30/2007-5/3/2007



Sampler Type:
- No Recovery
- Bulk Sample

PID - Photoionization Detector (Headspace Measurement)

- Static Water Level
- Water Level (ATD)

Logged by: JMS/JSL

Approved by: EWM

Figure No. B- 3

_MONITORING WELL_WEBB HILL.GPJ June 25, 2007

Aspect consulting
IN-DEPTH PERSPECTIVE

Monitoring Well Construction Log

Project Number	Well Number	Sheet
070041-001	MW-3	1 of 7

Project Name	Webb Hill Biosolids Facility	Ground Surface Elev	
Location	Mason County, WA	Top of Casing Elev.	
Driller/Method	Boart Longyear / Rotosonic	Depth to Water	166 - 5/31/2007
Sampling Method	Continuous	Start/Finish Date	4/17/2007-4/23/2007

Depth / Elevation (feet)	Borehole Completion	Sample Type/ID	Tests	PID (ppm)	Blows/ 6"	Material Type	Description	Depth (ft)
	Square steel monument with locking thermos well cap Concrete surface seal (0-1')	1					**RECESSIONAL OUTWASH** Dry, yellow red, slightly silty, gravelly SAND (SW-SM); sand is fine to medium, gravel is fine to coarse, rounded, roots.	
							Dry, light gray/yellow red, silty, very gravelly SAND (SM); sand is fine to coarse, predominantly coarse; gravel is fine to coarse (40 mm), rounded to well rounded.	
5		2						5
	Bentonite chips (1-10')						**STRATIFIED GLACIAL DEPOSITS** **till** Slightly moist, dark brown/yellow red, slightly sandy, gravelly SILT (ML); sand is fine; gravel is fine to coarse (80 mm), matrix supported.	
10		3					Slightly moist, dark brown, sandy, very gravelly SILT (ML); sand is fine to medium; gravel is fine to coarse (40 mm), subrounded/rounded, matrix supported.	10
							Slightly moist, dark brown, sandy SILT (ML) with trace gravel; sand is fine; gravel is fine, matrix supported.	
15		4					**glaciofluvial** Dry, dark brown, slightly silty, gravelly SAND (SW-SM); sand is fine to coarse; gravel is fine to coarse (50 mm), subrounded/rounded, predominantly matrix supported.	15
							Dry, dark brown/yellow red, slightly silty, sandy GRAVEL (GW-GM); sand is fine to coarse; gravel is fine to coarse (60 mm), subrounded to rounded.	
20	Bentonite grout (10-139.4')	5					Dry/slightly moist, dark brown/yellow red, silty, very sandy GRAVEL (GM) sand is fine to coarse; gravel is fine to coarse (35 mm), subrounded to rounded.	20
25		6					Dry, yellow red/brown, silty, very sandy, GRAVEL (GM); sand is fine to coarse, gravel is fine to coarse,	25
							Dry, dark brown/yellow red/ trace gray-blue, silty, very sandy, GRAVEL (GM); sand is fine to coarse, gravel is fine to coarse (40mm), subrounded to rounded, primarily mafic origin	

Sampler Type:
- No Recovery
- Bulk Sample

PID - Photoionization Detector (Headspace Measurement)
- Static Water Level
- Water Level (ATD)

Logged by: JMS/JSL

Approved by: EWM

Figure No. B-4

MONITORING WELL WEBB HILL.GPJ June 25, 2007

Aspect consulting
IN-DEPTH PERSPECTIVE

Monitoring Well Construction Log

Project Number	Well Number	Sheet
070041-001	MW-3	2 of 7

Project Name	Webb Hill Biosolids Facility	Ground Surface Elev	
Location	Mason County, WA	Top of Casing Elev.	
Driller/Method	Boart Longyear / Rotosonic	Depth to Water	166 - 5/31/2007
Sampling Method	Continuous	Start/Finish Date	4/17/2007-4/23/2007

Depth / Elevation (feet)	Borehole Completion	Sample Type/ID	Tests	PID (ppm)	Blows/ 6"	Material Type	Description	Depth (ft)
		7					Dry, dark brown/yellow red, slightly silty, very gravelly, SAND (SP-SM); sand is fine to coarse predominantly coarse, gravel is fine to coarse (75mm), predominantly mafic (80%)	
35							Dry, dark brown/yellow red, slightly silty, gravelly, SAND (SW-SM); sand is fine to coarse, gravel is fine to coarse with small cobbles (85mm), rounded/subrounded, predominantly mafic (90%)	35
		8					Dry, dark brown, slightly silty, very sandy, GRAVEL (GW-GM); sand is fine to coarse predominantly medium, gravel is fine to coarse (70mm), subrounded to rounded; presence of quartzite and granite (20%)	
40							Dry, dark brown, silty, gravelly, SAND (SM); sand is fine to coarse, gravel is fine to coarse, small cobbles (100mm), subrounded/rounded, presence of quartzite and granite (10%)	40
							Dry, dark brown, slightly silty, sandy, GRAVEL (GW-GM); sand is fine to coarse, gravel is fine to coarse, subrounded/rounded	
45	Bentonite grout (10-139.4')						Dry/slightly moist, dark brown/yellow red, slightly silty, very gravelly, SAND (SW-SM); sand is fine to coarse, gravel is fine to coarse (70mm), rounded/subrounded, <10% felsic	45
		9						
50								50
							Slightly moist/moist, dark brown/yellow red, silty, gravelly, SAND (SM); sand is fine to coarse, gravel is fine to coarse (30mm), rounded, <10% felsic	
55							Dry, dark brown with yellow red oxidization, slightly silty, gravelly, SAND (SW-SM); sand is fine to coarse, gravel is fine to coarse, subrounded/rounded, 20% felsic, 2' boulder present	55
		10						
		11					Slightly moist/moist, dark brown, slightly silty, gravelly, SAND (SP-SM); sand is fine to coarse predominantly	

Sampler Type:
- No Recovery
- Bulk Sample

PID - Photoionization Detector (Headspace Measurement)
- Static Water Level
- Water Level (ATD)

Logged by: JMS/JSL

Approved by: EWM

Figure No. B-4

MONITORING WELL WEBB HILL.GPJ June 25, 2007

Aspect consulting
IN-DEPTH PERSPECTIVE

Monitoring Well Construction Log

Project Number	Well Number	Sheet
070041-001	MW-3	3 of 7

Project Name	Webb Hill Biosolids Facility	Ground Surface Elev	
Location	Mason County, WA	Top of Casing Elev.	
Driller/Method	Boart Longyear / Rotosonic	Depth to Water	166 - 5/31/2007
Sampling Method	Continuous	Start/Finish Date	4/17/2007-4/23/2007

Depth / Elevation (feet)	Borehole Completion	Sample Type/ID	Tests	PID (ppm)	Blows/ 6"	Material Type	Description	Depth (ft)
65	Probable formation collapse (8' cumulative between 157.3 & 177.4')	11					medium to coarse, subangular/subrounded, gravel is fine to coarse (80mm), subrounded/rounded, ~15% felsic Slightly gravelly sand pocket, sand is medium to coarse	65
70		12					Slightly moist/moist, dark brown, slightly silty, gravelly, SAND (SP-SM); sand is fine to coarse predominantly medium, gravel is fine to coarse (50mm), rounded/subrounded, ~15% felsic Silty Moist, dark brown, slightly silty, very gravelly, SAND (SP-SM); sand is fine to coarse but predominantly medium to coarse, rounded/subrounded, gravel is fine to coarse (70mm), subrounded/rounded, ~10% felsic	70
75	Bentonite grout (10-139.4')						Slightly moist, dark brown, silty, very sandy, GRAVEL (GM); sand is fine to coarse predominantly fine to medium, gravel is fine to coarse (50mm), subrounded/rounded, ~15% felsic, matrix supported	75
80		13					Slightly moist/dry, dark brown, slightly silty, very gravelly, SAND (SW-SM); sand is fine to coarse, gravel is fine to coarse (80mm), subrounded, ~10% felsic	80
85		14					Slightly moist-moist, dark brown, slightly silty, very sandy, GRAVEL (GW-GM); sand is fine to coarse, gravel is fine to coarse (40mm), subrounded/rounded, <10% felsic Decreasing silt, increase in medium sand	85

Sampler Type:
- No Recovery
- Bulk Sample

PID - Photoionization Detector (Headspace Measurement)
- Static Water Level
- Water Level (ATD)

Logged by: JMS/JSL

Approved by: EWM

Figure No. B- 4

MONITORING WELL WEBB HILL.GPJ June 25, 2007

Aspect consulting
IN-DEPTH PERSPECTIVE

Monitoring Well Construction Log

Project Number	Well Number	Sheet
070041-001	MW-3	4 of 7

Project Name	Webb Hill Biosolids Facility	Ground Surface Elev	
Location	Mason County, WA	Top of Casing Elev.	
Driller/Method	Boart Longyear / Rotosonic	Depth to Water	166 - 5/31/2007
Sampling Method	Continuous	Start/Finish Date	4/17/2007-4/23/2007

Depth / Elevation (feet)	Borehole Completion	Sample Type/ID	Tests	PID (ppm)	Blows/ 6"	Material Type	Description	Depth (ft)
	▽	14						
95							Wet, dark brown and yellow red, gravelly, SAND (SP); trace silt, sand is fine to coarse predominantly medium to coarse, gravel is fine to coarse (50mm), rounded/subrounded, 20% felsic	95
							Decreasing silt	
100	Bentonite grout (10-139.4')	15						100
							Very gravelly	
	Perched water Ephemeral	○						
105							Wet (top) to moist (bottom), gray, silty, gravelly, SAND (SM), sand is fine to coarse, gravel is fine to coarse (30mm), subrounded/rounded	105
		16					Slightly moist to moist, dark brown, slightly silty, gravelly, SAND (SP-SM); sand is fine to coarse, gravel is fine to coarse (55mm), subrounded/rounded, 20% felsic	
110	Drill casing (105-125')							110
		17						
115							Moist, dark brown, very gravelly, SAND (SW); trace silt, sand is fine to coarse, gravel is fine to coarse (55mm), subrounded/rounded	115
		18						
							Slightly moist, dark brown, very sandy, GRAVEL (GW); trace silt, sand is fine to coarse, gravel is fine to coarse	

Sampler Type:
○ No Recovery
■ Bulk Sample

PID - Photoionization Detector (Headspace Measurement)
▼ Static Water Level
▽ Water Level (ATD)

Logged by: JMS/JSL
Approved by: EWM
Figure No. B- 4

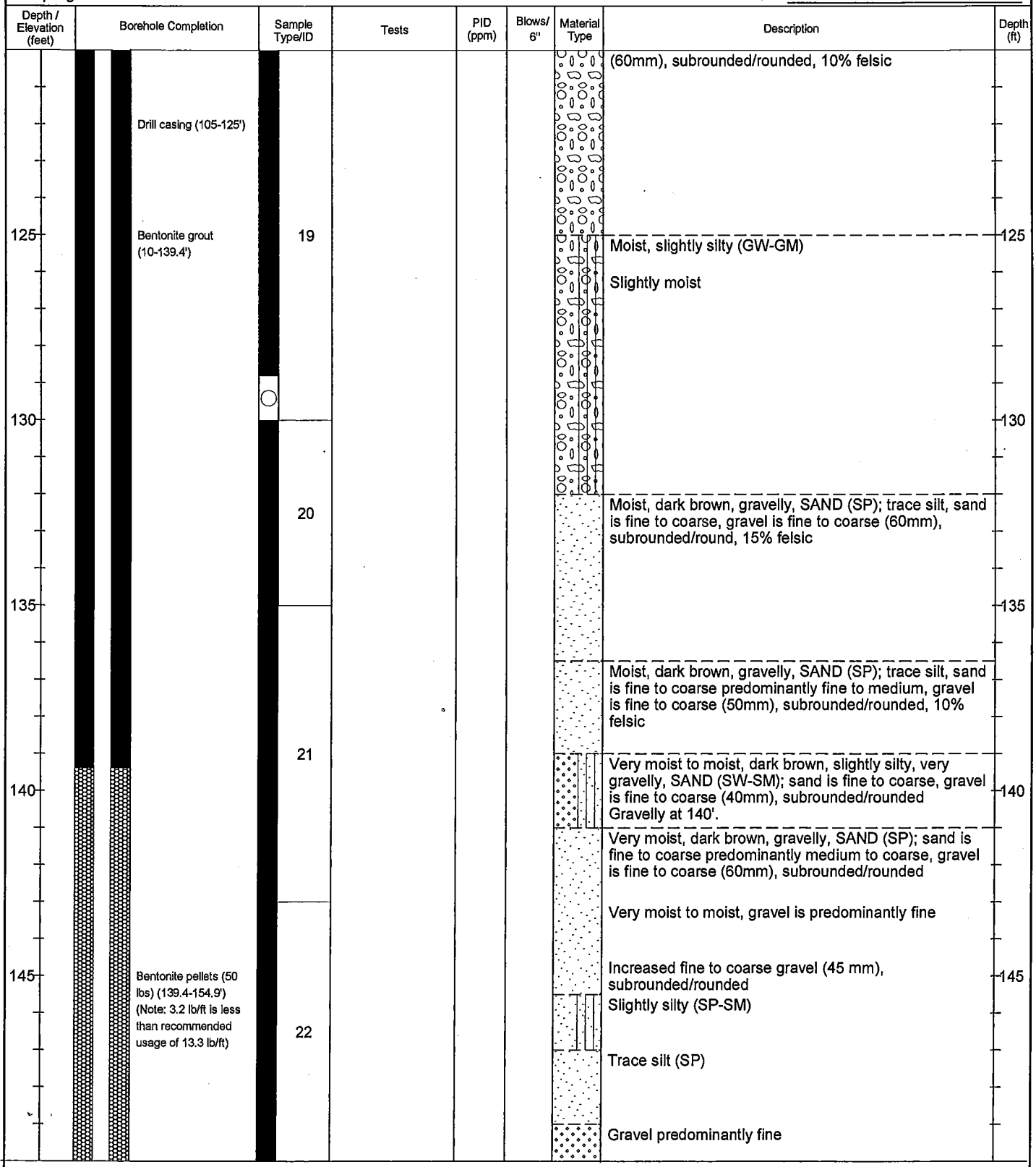
MONITORING WELL WEBB HILL.GPJ June 25, 2007

Aspect consulting
IN-DEPTH PERSPECTIVE

Monitoring Well Construction Log

Project Number	Well Number	Sheet
070041-001	MW-3	5 of 7

Project Name	Webb Hill Biosolids Facility	Ground Surface Elev	
Location	Mason County, WA	Top of Casing Elev.	
Driller/Method	Boart Longyear / Rotosonic	Depth to Water	166 - 5/31/2007
Sampling Method	Continuous	Start/Finish Date	4/17/2007-4/23/2007



Sampler Type:
- ○ No Recovery
- ■ Bulk Sample

PID - Photoionization Detector (Headspace Measurement)

- ▼ Static Water Level
- ▽ Water Level (ATD)

Logged by: JMS/JSL

Approved by: EWM

Figure No. B- 4

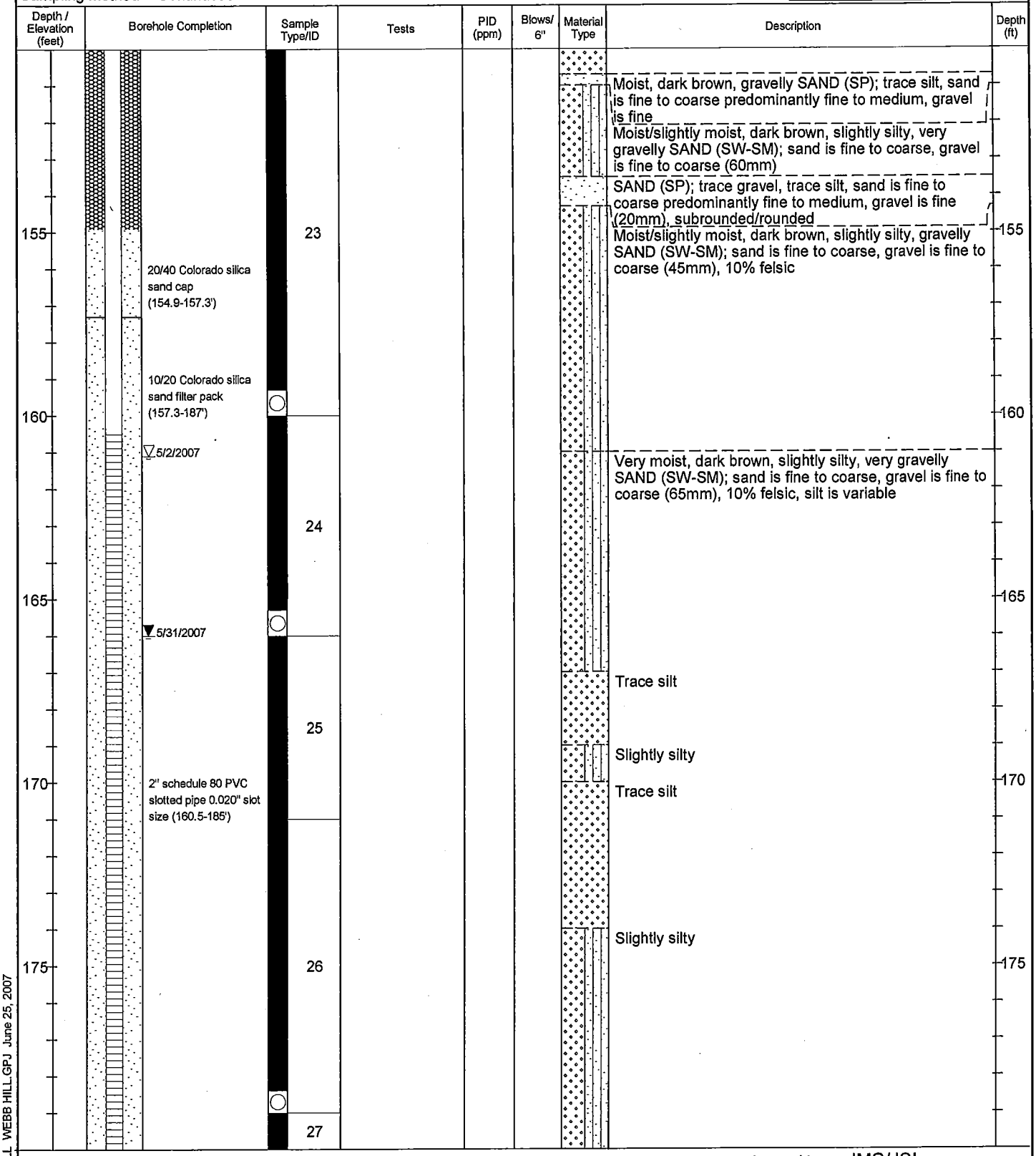
MONITORING WELL WEBB HILL.GPJ June 25, 2007

Aspect consulting
IN-DEPTH PERSPECTIVE

Monitoring Well Construction Log

Project Number	Well Number	Sheet
070041-001	MW-3	6 of 7

Project Name	Webb Hill Biosolids Facility	Ground Surface Elev	
Location	Mason County, WA	Top of Casing Elev.	
Driller/Method	Boart Longyear / Rotosonic	Depth to Water	166 - 5/31/2007
Sampling Method	Continuous	Start/Finish Date	4/17/2007-4/23/2007



Sampler Type:
- No Recovery
- Bulk Sample

PID - Photoionization Detector (Headspace Measurement)
- Static Water Level
- Water Level (ATD)

Logged by: JMS/JSL

Approved by: EWM

Figure No. B-4

MONITORING WELL WEBB HILL.GPJ June 25, 2007

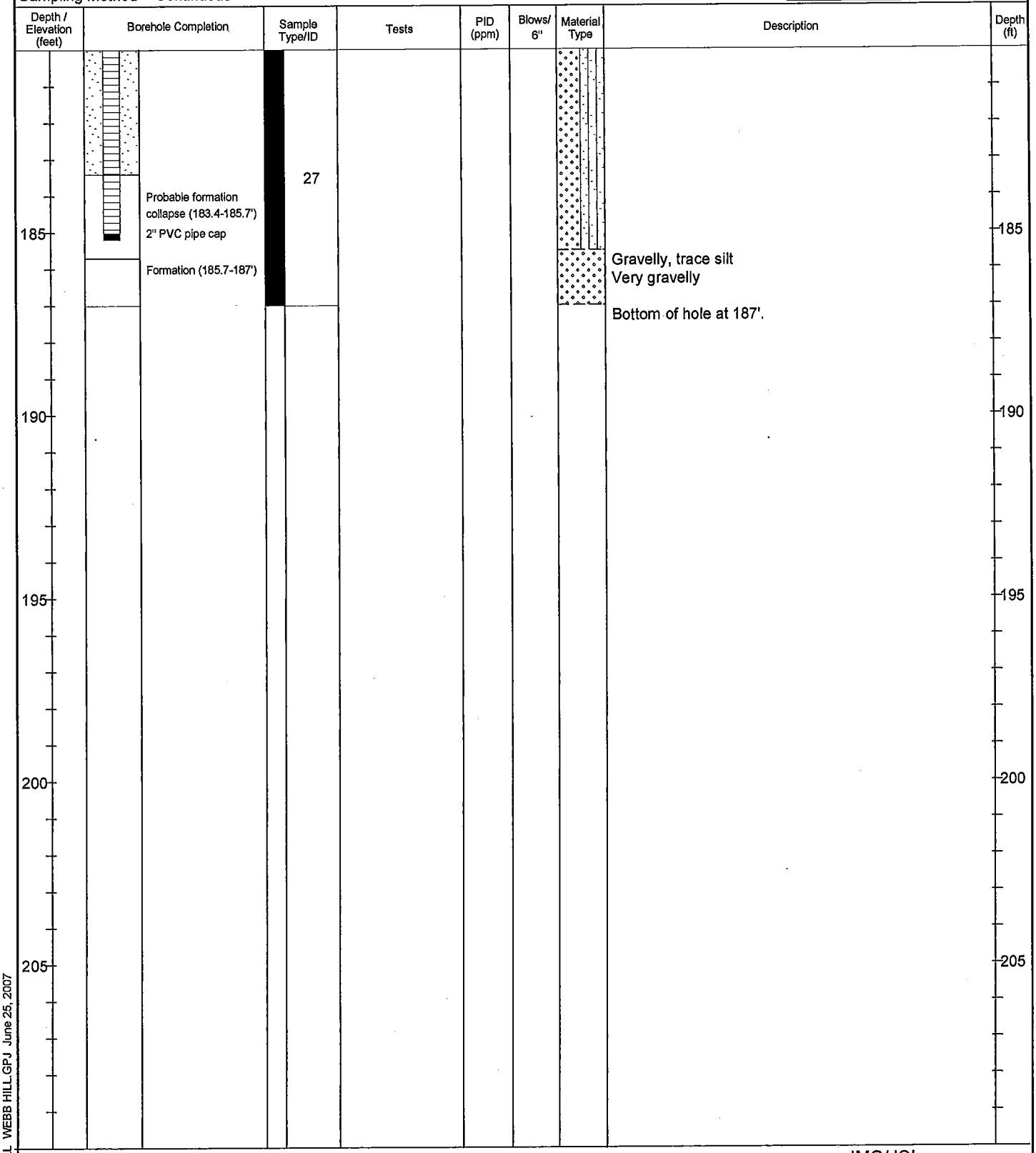
Aspect consulting
IN-DEPTH PERSPECTIVE

Monitoring Well Construction Log

Project Number	Well Number	Sheet
070041-001	MW-3	7 of 7

Project Name: Webb Hill Biosolids Facility
Location: Mason County, WA
Driller/Method: Boart Longyear / Rotosonic
Sampling Method: Continuous

Ground Surface Elev:
Top of Casing Elev.:
Depth to Water: 166 - 5/31/2007
Start/Finish Date: 4/17/2007-4/23/2007



Sampler Type:
No Recovery
Bulk Sample

PID - Photoionization Detector (Headspace Measurement)
Static Water Level
Water Level (ATD)

Logged by: JMS/JSL
Approved by: EWM
Figure No. B-4

_MONITORING WELL_WEBB HILL.GPJ June 25, 2007

Aspect consulting
IN-DEPTH PERSPECTIVE

Monitoring Well Construction Log

Project Number	Well Number	Sheet
070041-001	MW-4	1 of 4

Project Name	Webb Hill Biosolids Facility	Ground Surface Elev	
Location	Mason County, WA	Top of Casing Elev.	
Driller/Method	Boart Longyear / Rotosonic	Depth to Water	77.9 - 5/31/2007
Sampling Method	Continuous	Start/Finish Date	4/26/2007-4/30/2007

Depth / Elevation (feet)	Borehole Completion	Sample Type/ID	Tests	PID (ppm)	Blows/ 6"	Material Type	Description	Depth (ft)
	Square steel monument with locking thermos well cap Concrete surface seal (0-2')	1					**RECESSIONAL OUTWASH** Slightly moist, yellow red, silty, very sandy GRAVEL (GM); sand is fine to coarse, subrounded, gravel is fine to coarse (60mm), subrounded/rounded, 15% felsic, matrix supported	
							Slightly moist, gray/dark brown, slightly silty, very sandy GRAVEL (GW-GM); sand is fine to coarse predominantly medium to coarse, subrounded, gravel is fine to coarse (50mm), subrounded/rounded, clast supported, 15% felsic	
5							**STRATIFIED GLACIAL DEPOSITS** **glaciofluvial** Slightly moist, dark brown/gray, slightly sandy, very gravelly SILT (ML); sand is fine, gravel is fine to coarse (80mm), subrounded/rounded, matrix supported, 10% felsic	5
	Bentonite chips (2-10')	2					Moist, dark brown, silty, sandy GRAVEL (GM); sand is predominantly fine to medium, gravel is fine to coarse (60mm), subrounded/rounded 50% felsic	
10							Slightly moist, yellow red, slightly sandy, very silty GRAVEL (GM); sand is fine to medium, gravel is fine to coarse (80mm), rounded, 35% felsic, matrix supported	10
		3					Moist, yellow red, clayey SILT (MH) bedding, ~1'	
15							Slightly moist, yellow red, sandy, very silty GRAVEL (GM); sand predominantly fine to medium, gravel is fine to coarse (40mm), rounded, 30% felsic	15
	Perched water level 16' 4/27/2007 Hole drilled to 18' SC=250 µmhos/cm	4						
							Slightly moist, yellow red/red brown, slightly silty, very gravelly SAND (SP-SM); sand is fine to medium, gravel is fine to coarse (60mm), rounded	
20	Bentonite grout (10-61')						Very moist, yellow red, slightly sandy, silty, very clayey GRAVEL (GM); sand is fine to medium, gravel is fine to coarse (75mm), subrounded/rounded, 25% felsic, matrix supported	20
	Perched water level 22.5' 4/27/2007 Hole drilled to 31.5'	5					Brown/dark brown	
25							Slightly moist, dark brown/brown, slightly sandy, gravelly SILT (ML); sand is fine to medium, gravel is fine to coarse (70mm), rounded, matrix supported, 20% felsic	25
		6						

Sampler Type:
- No Recovery
- Bulk Sample

PID - Photoionization Detector (Headspace Measurement)
- Static Water Level
- Water Level (ATD)

Logged by: JMS/JSL
Approved by: EWM
Figure No. B- 5

MONITORING WELL WEBB HILL.GPJ June 25, 2007

Aspect consulting
IN-DEPTH PERSPECTIVE

Monitoring Well Construction Log

Project Number	Well Number	Sheet
070041-001	MW-4	2 of 4

Project Name	Webb Hill Biosolids Facility	Ground Surface Elev	
Location	Mason County, WA	Top of Casing Elev.	
Driller/Method	Boart Longyear / Rotosonic	Depth to Water	77.9 - 5/31/2007
Sampling Method	Continuous	Start/Finish Date	4/26/2007-4/30/2007

Depth / Elevation (feet)	Borehole Completion	Sample Type/ID	Tests	PID (ppm)	Blows/ 6"	Material Type	Description	Depth (ft)
		6					Wet, brown, silty, sandy, GRAVEL (GM); sand is fine to coarse, gravel is fine to coarse predominantly fine (40mm), subangular/rounded, <10% felsic	
		7					Moist, brown/yellow red, slightly sandy, very gravelly SILT (ML); sand is fine to coarse, gravel is fine to coarse (40mm), subrounded/rounded, matrix supported, 15% felsic	
35							Olive gray, coarse sand bedding, 0.5' at 34' Slightly moist at 35'	35
		8					Slightly moist, dark brown/light brown, slightly sandy, gravelly SILT (ML); sand is fine to coarse, gravel is fine to coarse (45mm), angular/subangular, <5% felsic	
40							Slightly moist, dark brown, sandy, gravelly SILT (ML); sand is fine to coarse, gravel is fine, subrounded/rounded, matrix supported, 20% felsic	40
		9					Slightly moist, light gray/dark brown, slightly sandy, gravelly SILT (ML); sand is fine to coarse, gravel is fine to coarse predominantly fine (30mm), angular/rounded, matrix supported	
45	Bentonite grout (10-61')						Slightly moist, red brown/dark brown, silty, gravelly SAND (SM); sand is fine to coarse predominantly medium to coarse, gravel is fine to coarse (60mm), subrounded/rounded, 20% felsic	45
		10					Slightly moist, dark brown, sandy, gravelly SILT (ML); sand is fine to coarse predominantly fine to medium, gravel is fine to coarse predominantly fine (50mm), angular/subrounded, matrix supported, <10% felsic	
50							Slightly moist, yellow red/dark brown, silty, gravelly SAND (SM); sand is fine to coarse, gravel is fine to coarse (60mm), subrounded/rounded, 10% felsic, matrix supported Light brown, slightly clayey, silty, sandy GRAVEL (GM); bedding, 0.5', sand is fine to coarse, gravel is fine to coarse	50
55		11					Slightly moist, gray/dark brown, gravelly SAND (SP); trace silt, sand is fine to coarse predominantly medium to coarse, gravel is fine to coarse (55mm), subrounded/rounded, 20% felsic	55
							Slightly moist, yellow red/dark brown, sandy, gravelly	

Sampler Type:
- No Recovery
- Bulk Sample

PID - Photoionization Detector (Headspace Measurement)
- Static Water Level
- Water Level (ATD)

Logged by: JMS/JSL

Approved by: EWM

Figure No. B- 5

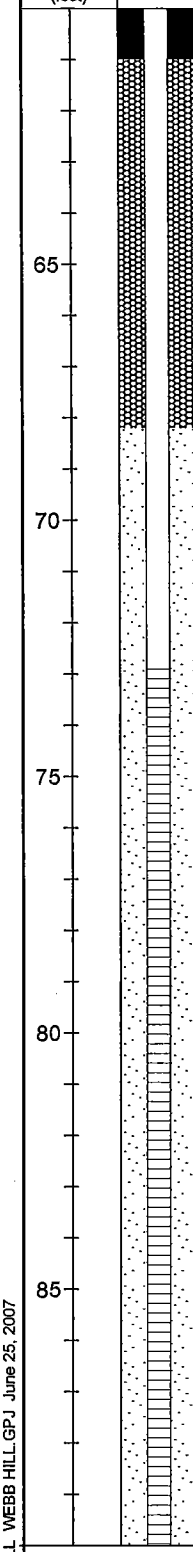
MONITORING WELL WEBB HILL.GPJ June 25, 2007

Aspect consulting
IN-DEPTH PERSPECTIVE

Monitoring Well Construction Log

Project Number	Well Number	Sheet
070041-001	MW-4	3 of 4

Project Name	Webb Hill Biosolids Facility	Ground Surface Elev	
Location	Mason County, WA	Top of Casing Elev.	
Driller/Method	Boart Longyear / Rotosonic	Depth to Water	77.9 - 5/31/2007
Sampling Method	Continuous	Start/Finish Date	4/26/2007-4/30/2007



Depth / Elevation (feet)	Sample Type/ID	Tests	PID (ppm)	Blows/ 6"	Material Type	Description	Depth (ft)
	12					SILT (ML); sand is fine to coarse, gravel is fine to coarse (30mm), subrounded/rounded, 30% felsic	
65	13					Slightly moist, dark brown, slightly silty, very gravelly SAND (SP-SM); sand is fine to coarse predominantly medium to coarse, gravel is fine to coarse (80mm), occasional cobbles	65
						Slightly moist, dark brown, gravelly SAND (SW); trace silt, sand is fine to coarse, gravel is fine to coarse	
						Slightly moist, brown/dark brown, silty, gravelly SAND (SM); sand is fine to coarse, gravel is fine to coarse (60mm), angular/rounded, <10% felsic	
						Light brown, slightly clayey, 0.7'	
70						**till** Sandy, gravelly SILT (ML)	70
	14					**glaciofluvial** Slightly moist, brown/dark brown, silty, gravelly SAND (SM); sand is fine to coarse, gravel is fine to coarse (60mm), angular/rounded, <10% felsic	
						till Sandy, gravelly SILT (ML)	
75						**glaciofluvial** Slightly moist, brown/dark brown, silty, gravelly SAND (SM); sand is fine to coarse, gravel is fine to coarse (60mm), angular/rounded, <10% felsic	75
						Very moist/wet, brown/dark brown, slightly silty, very sandy GRAVEL (GW-GM); sand is medium to coarse predominantly coarse, angular, gravel is fine to coarse (40mm), subrounded/rounded	
						Slightly sandy, gravelly, silty CLAY (CL) bedding, 0.5', sand is fine to coarse, gravel is fine (77-77.5')	
80	15					Very moist, brown/dark brown, slightly silty, very gravelly SAND (SW-SM); sand is fine to coarse, subrounded, gravel is fine to coarse (50mm), rounded, 15% felsic	80
						Light brown, sandy, gravelly, silty CLAY (CL), 1'	
85	16					Very moist, dark brown, gravelly SAND (SW); sand is medium to coarse, rounded, gravel is fine, rounded, 1'	85

Sampler Type:
- No Recovery
- Bulk Sample

PID - Photoionization Detector (Headspace Measurement)
- Static Water Level
- Water Level (ATD)

Logged by: JMS/JSL
Approved by: EWM
Figure No. B- 5

MONITORING WELL WEBB HILL.GPJ June 25, 2007

Aspect consulting
IN-DEPTH PERSPECTIVE

Monitoring Well Construction Log

Project Number	Well Number	Sheet
070041-001	MW-4	4 of 4

Project Name	Webb Hill Biosolids Facility	Ground Surface Elev	
Location	Mason County, WA	Top of Casing Elev.	
Driller/Method	Boart Longyear / Rotosonic	Depth to Water	77.9 - 5/31/2007
Sampling Method	Continuous	Start/Finish Date	4/26/2007-4/30/2007

Depth / Elevation (feet)	Borehole Completion	Sample Type/ID	Tests	PID (ppm)	Blows/ 6"	Material Type	Description	Depth (ft)
		16					Very moist, dark brown, slightly silty, very gravelly SAND (SP-SM); sand is fine to coarse predominantly medium to coarse, subangular/subrounded, gravel is fine to coarse (50mm), subrounded/rounded, clast supported, 40% felsic	
							Very moist, dark brown, SAND (SP); trace silt, trace gravel, sand is medium	
95							Very moist, dark brown, very gravelly SAND (SP); trace silt, sand is medium to coarse, gravel is fine to coarse predominantly fine (30mm), rounded, ~20% felsic	95
	2" PVC pipe cap							
	Formation (96-105')							
100		17					Very moist, dark brown, slightly silty, very gravelly SAND (SP-SM); sand is fine to coarse predominantly coarse, gravel is fine to coarse (65mm), rounded, 25% felsic	100
105							Bottom of hole at 105'.	105
110								110
115								115

Sampler Type:
- No Recovery
- Bulk Sample

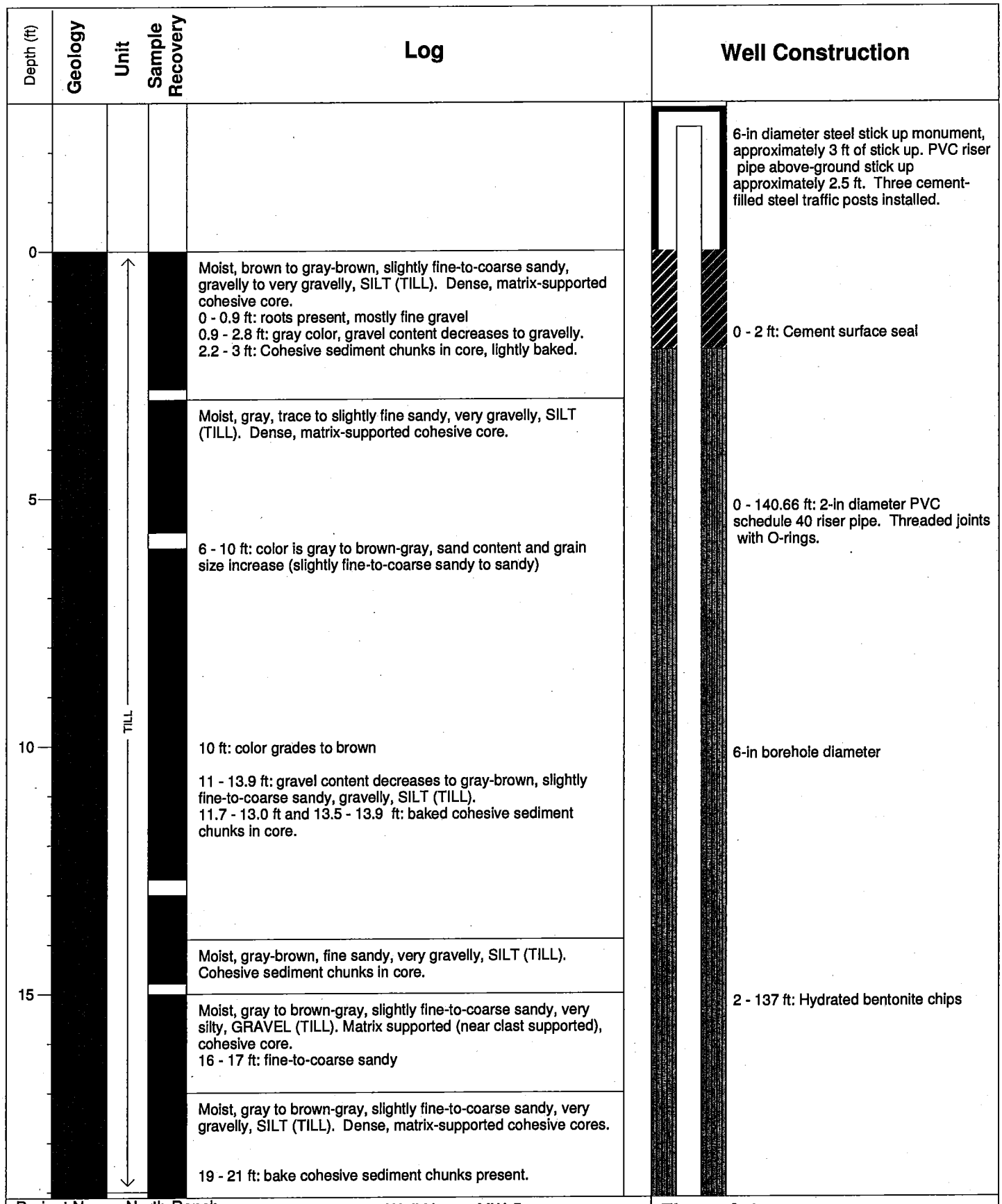
PID - Photoionization Detector (Headspace Measurement)
- Static Water Level
- Water Level (ATD)

Logged by: JMS/JSL

Approved by: EWM

Figure No. B- 5

MONITORING WELL WEBB HILL.GPJ June 25, 2007

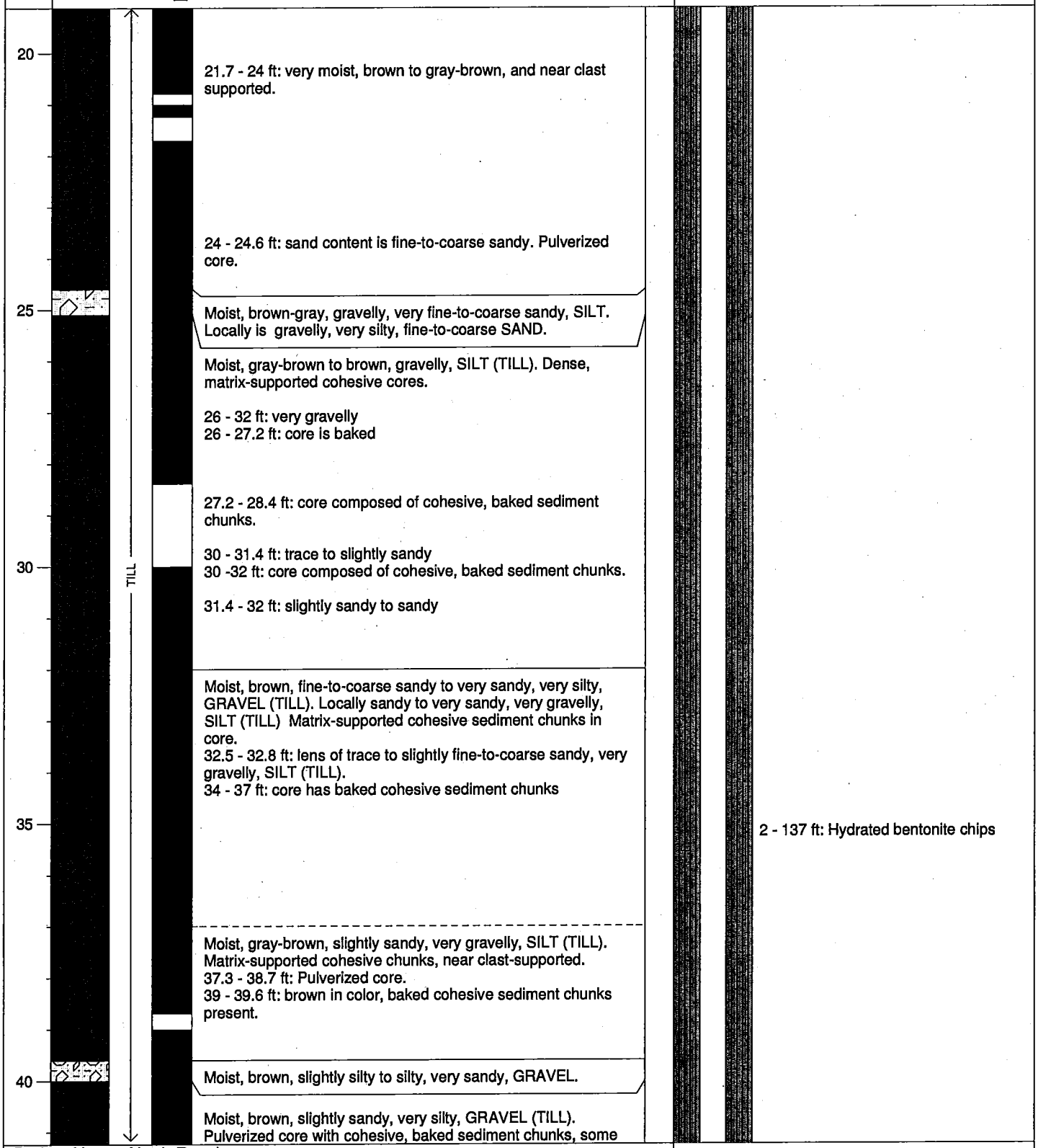


Project Name: North Ranch
Drilling Method: 6" Sonic
Driller: Rodney Labrosse
Firm: Cascade Drilling
Consulting Firm: Pacific Groundwater Group
Logged by: Glenn Mutti
Location: North Ranch Biorecycling, Mason Co.

Well Name: MW-5
Ecology ID: BAL059
MP Elevation:
Datum:
Installed: 11/28 - 12/4/2007
DTW: 153.25 ft BGS, 12/3/2007

Figure A-1
GEOLOGIC LOG AND AS-BUILT FOR MONITORING WELL MW-5
North Ranch
Shelton, Washington
JS0712, 12/2007
PgG

Figure No. B-6

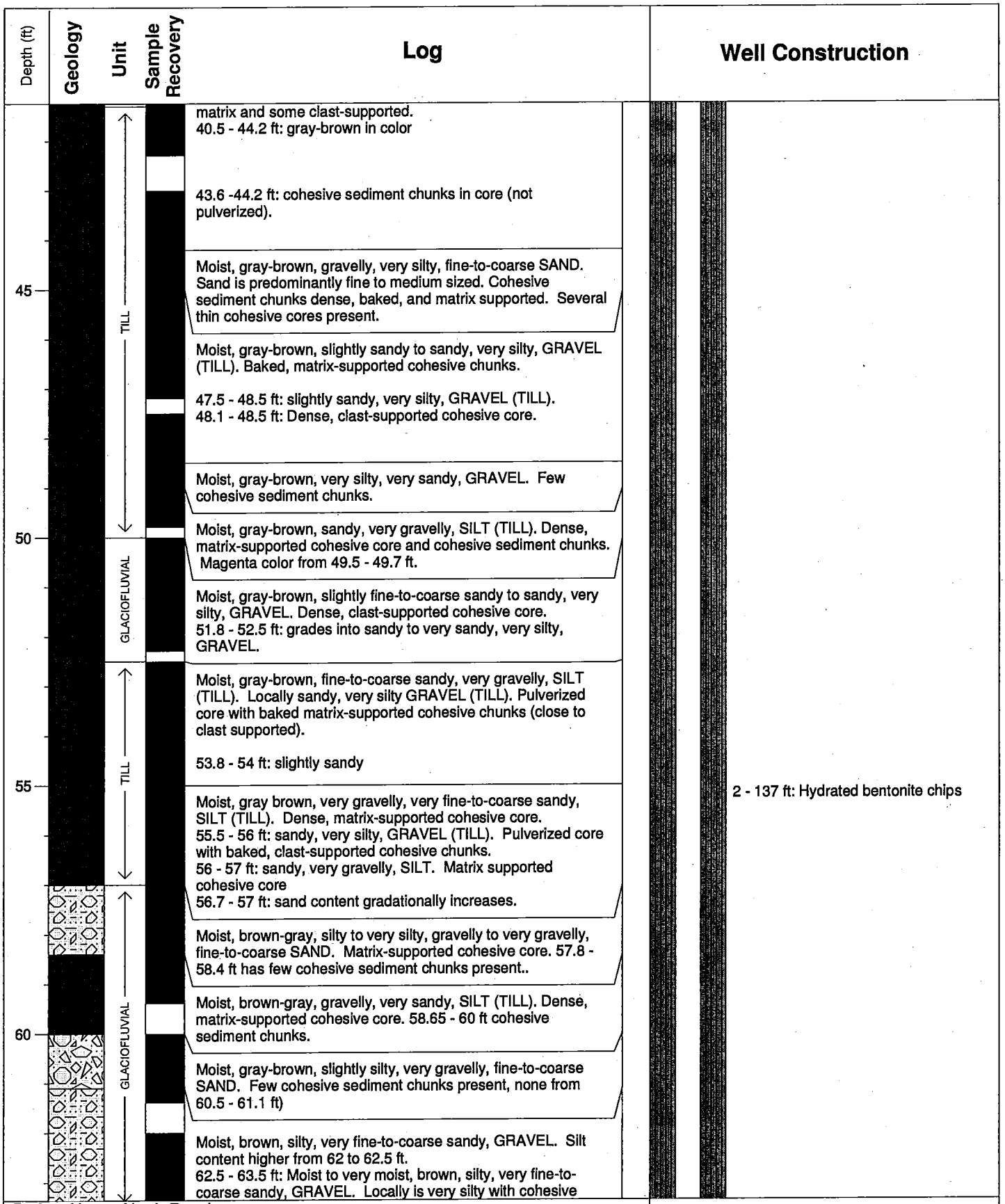


Project Name: North Ranch
Drilling Method: 6" Sonic
Driller: Rodney Labrosse
Firm: Cascade Drilling
Consulting Firm: Pacific Groundwater Group
Logged by: Glenn Mutti
Location: North Ranch Biorecycling, Mason Co.

Well Name: MW-5
Ecology ID: BAL059
MP Elevation:
Datum:
Installed: 11/28 - 12/4/2007
DTW: 153.25 ft BGS, 12/3/2007

Figure A-1
GEOLOGIC LOG AND AS-BUILT FOR MONITORING WELL MW-5
North Ranch
Shelton, Washington
JS0712, 12/2007
PgG

Figure No. B-6

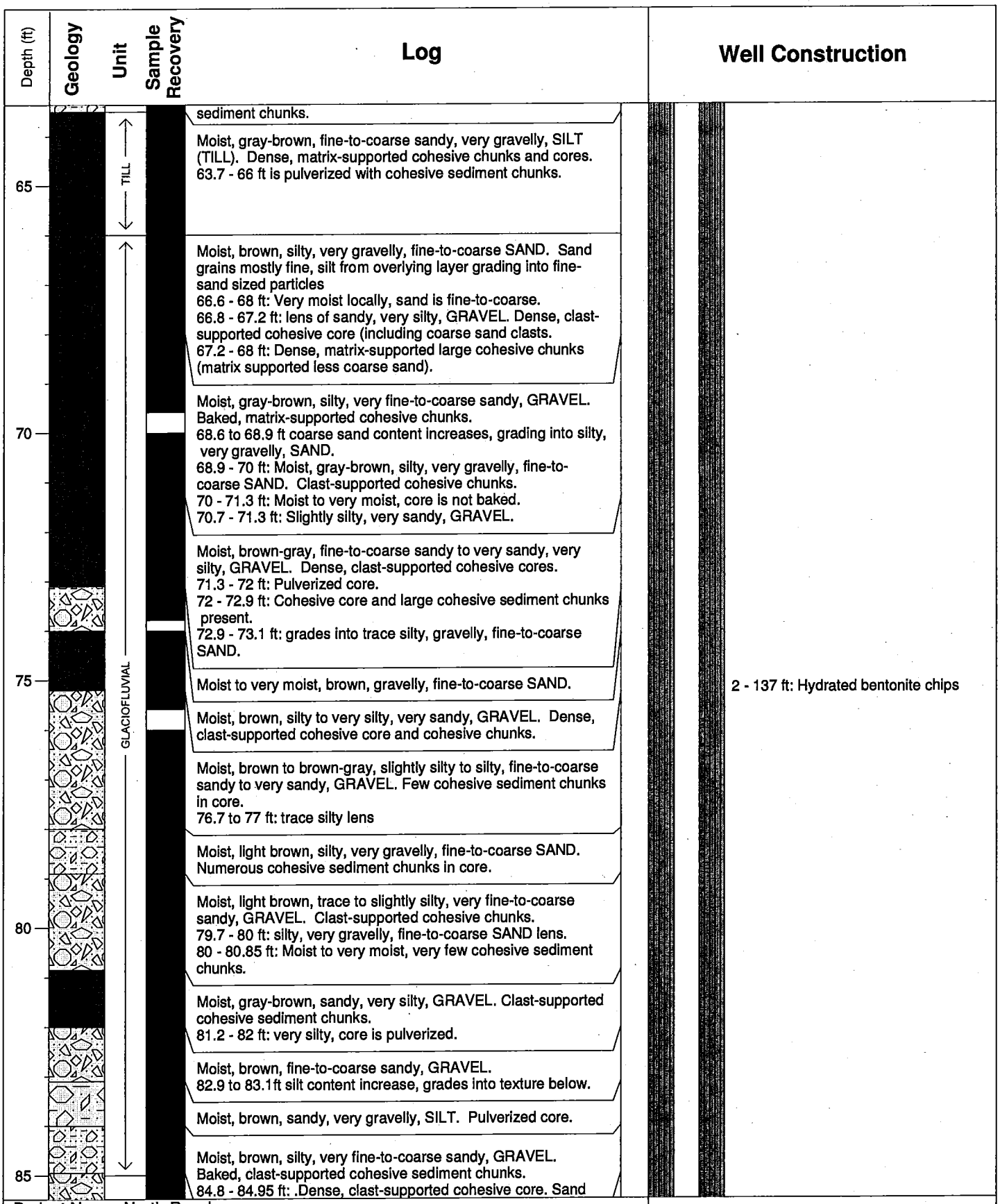


Project Name: North Ranch
Drilling Method: 6" Sonic
Driller: Rodney Labrosse
Firm: Cascade Drilling
Consulting Firm: Pacific Groundwater Group
Logged by: Glenn Mutti
Location: North Ranch Biorecycling, Mason Co.

Well Name: MW-5
Ecology ID: BAL059
MP Elevation:
Datum:
Installed: 11/28 - 12/4/2007
DTW: 153.25 ft BGS, 12/3/2007

Figure A-1
GEOLOGIC LOG AND AS-BUILT FOR MONITORING WELL MW-5
North Ranch
Shelton, Washington
JS0712, 12/2007
PgG

Figure No. B-6

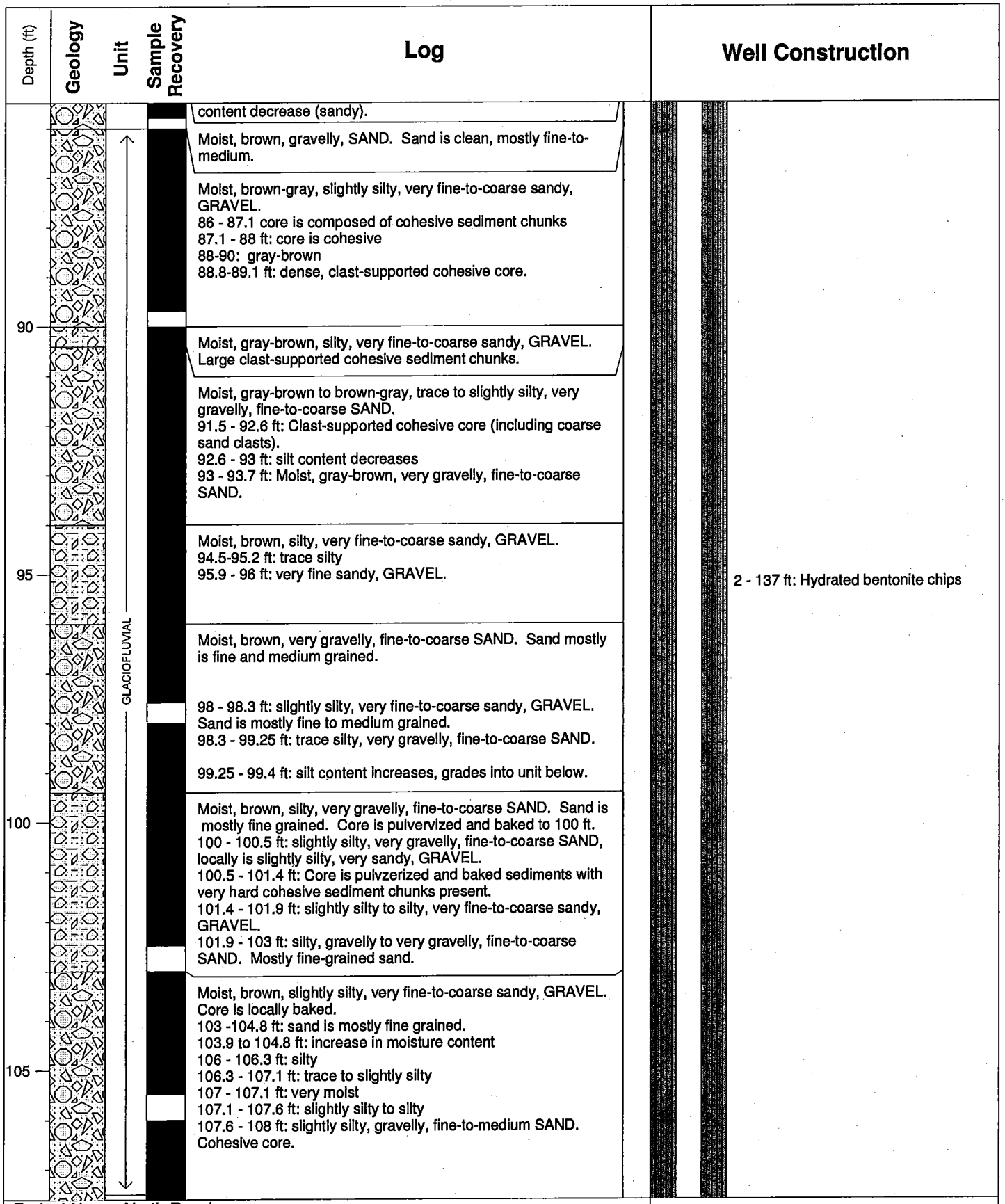


Project Name: North Ranch
Drilling Method: 6" Sonic
Driller: Rodney Labrosse
Firm: Cascade Drilling
Consulting Firm: Pacific Groundwater Group
Logged by: Glenn Mutti
Location: North Ranch Biorecycling, Mason Co.

Well Name: MW-5
Ecology ID: BAL059
MP Elevation:
Datum:
Installed: 11/28 - 12/4/2007
DTW: 153.25 ft BGS, 12/3/2007

Figure A-1
GEOLOGIC LOG AND AS-BUILT FOR MONITORING WELL MW-5
North Ranch
Shelton, Washington
JS0712, 12/2007
PgG

Figure No. B-6

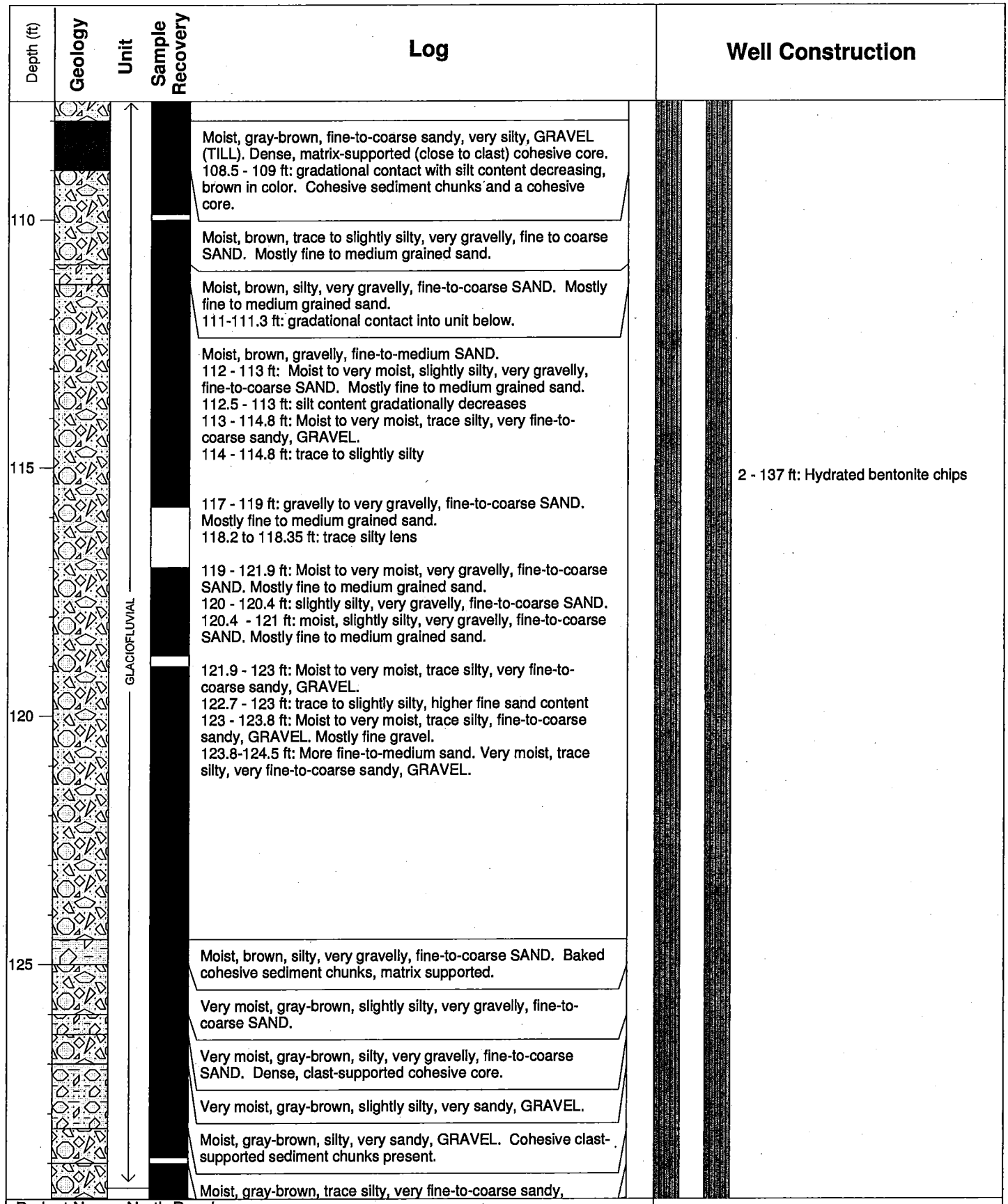


Project Name: North Ranch
Drilling Method: 6" Sonic
Driller: Rodney Labrosse
Firm: Cascade Drilling
Consulting Firm: Pacific Groundwater Group
Logged by: Glenn Mutti
Location: North Ranch Biorecycling, Mason Co.

Well Name: MW-5
Ecology ID: BAL059
MP Elevation:
Datum:
Installed: 11/28 - 12/4/2007
DTW: 153.25 ft BGS, 12/3/2007

Figure A-1
GEOLOGIC LOG AND AS-BUILT FOR MONITORING WELL MW-5
North Ranch
Shelton, Washington
JS0712, 12/2007
PgG

Figure No. B-6

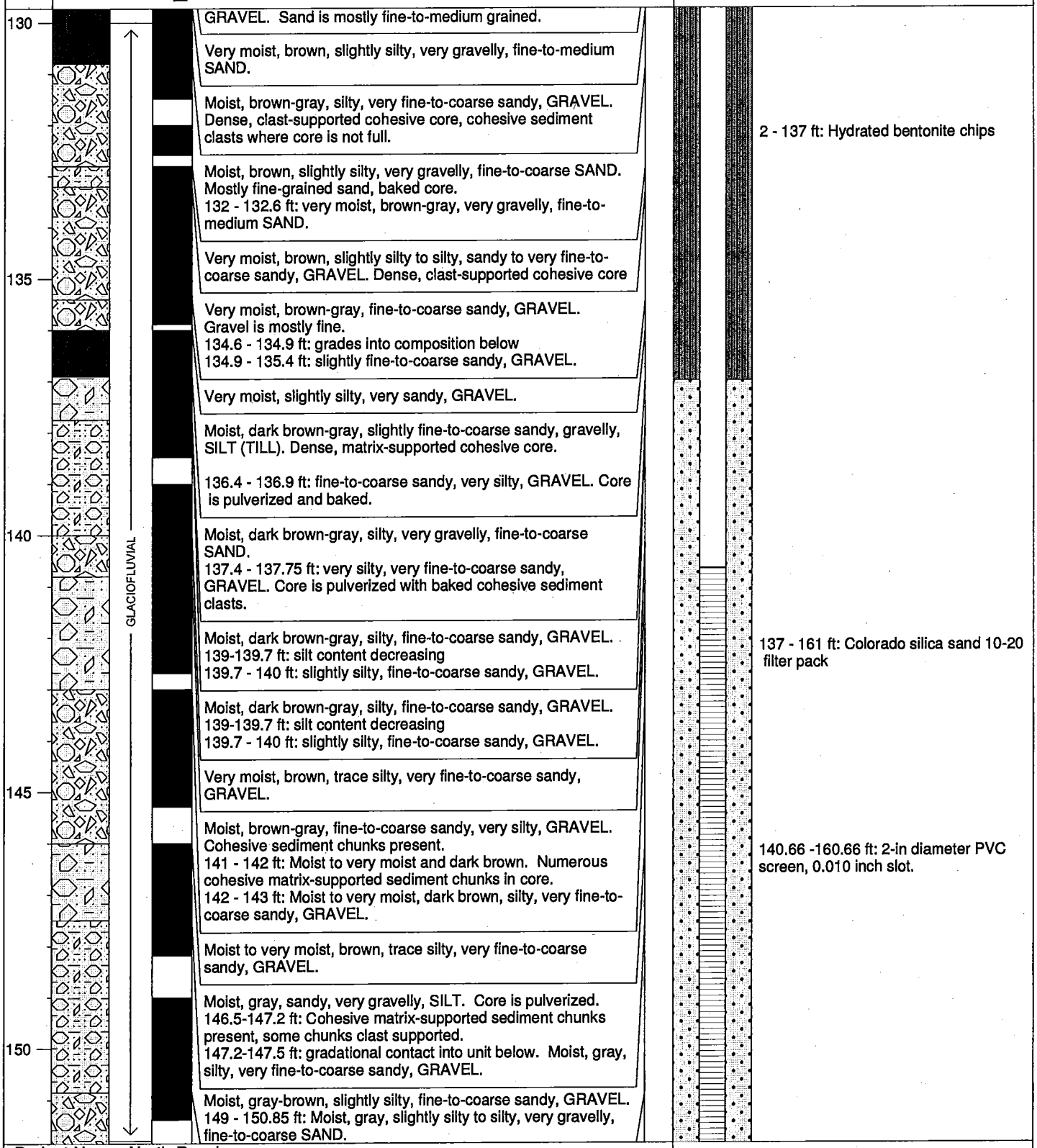


Project Name: North Ranch
Drilling Method: 6" Sonic
Driller: Rodney Labrosse
Firm: Cascade Drilling
Consulting Firm: Pacific Groundwater Group
Logged by: Glenn Mutti
Location: North Ranch Biorecycling, Mason Co.

Well Name: MW-5
Ecology ID: BAL059
MP Elevation:
Datum:
Installed: 11/28 - 12/4/2007
DTW: 153.25 ft BGS, 12/3/2007

Figure A-1
GEOLOGIC LOG AND AS-BUILT FOR MONITORING WELL MW-5
North Ranch
Shelton, Washington
JS0712, 12/2007
PgG

Figure No. B-6

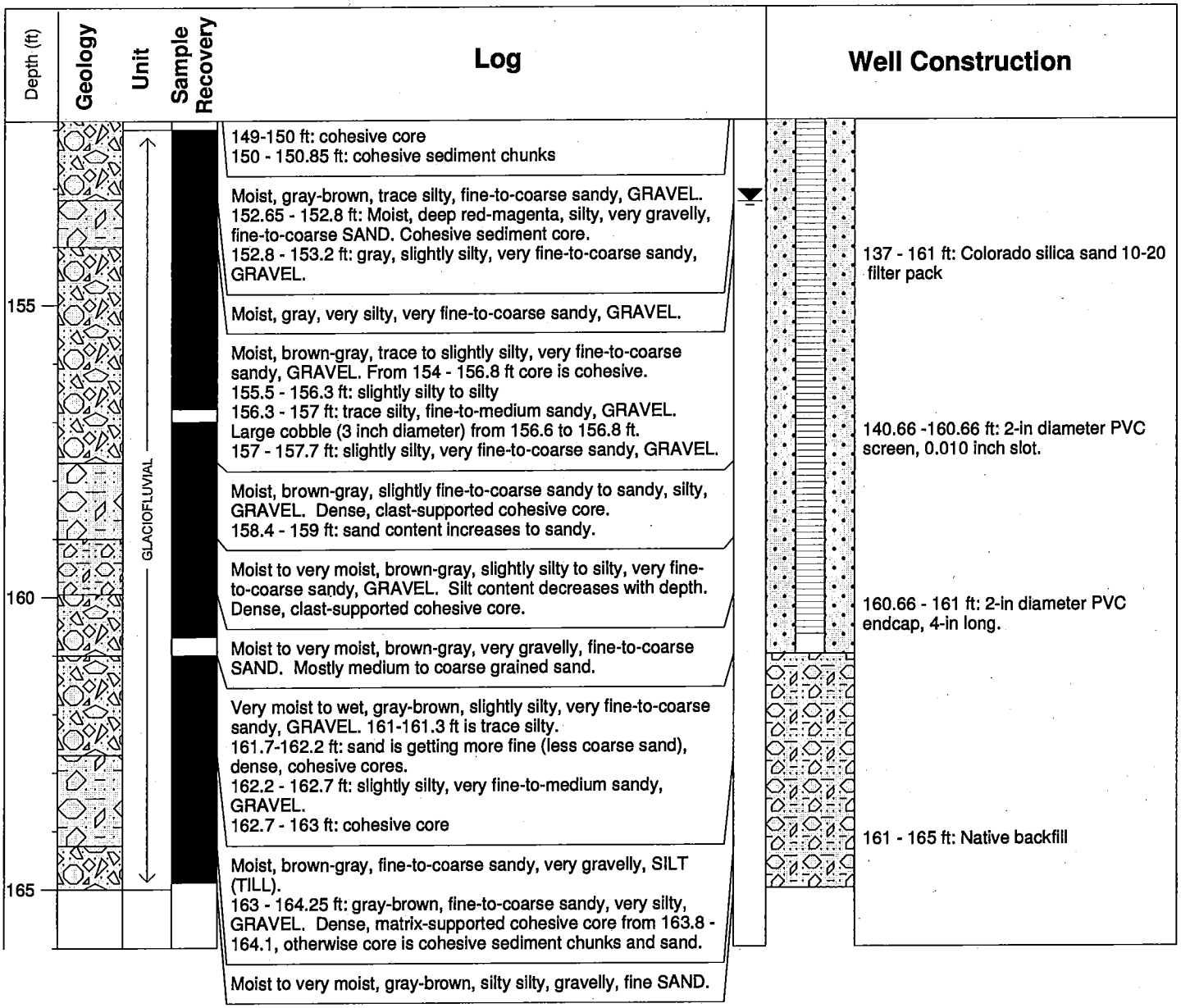


Project Name: North Ranch
Drilling Method: 6" Sonic
Driller: Rodney Labrosse
Firm: Cascade Drilling
Consulting Firm: Pacific Groundwater Group
Logged by: Glenn Mutti
Location: North Ranch Biorecycling, Mason Co.

Well Name: MW-5
Ecology ID: BAL059
MP Elevation:
Datum:
Installed: 11/28 - 12/4/2007
DTW: 153.25 ft BGS, 12/3/2007

Figure A-1
GEOLOGIC LOG AND AS-BUILT FOR MONITORING WELL MW-5
North Ranch
Shelton, Washington
JS0712, 12/2007
PgG

Figure No. B-6



Project Name: North Ranch Drilling Method: 6" Sonic Driller: Rodney Labrosse Firm: Cascade Drilling Consulting Firm: Pacific Groundwater Group Logged by: Glenn Mutti Location: North Ranch Biorecycling, Mason Co.	Well Name: MW-5 Ecology ID: BAL059 MP Elevation: Datum: Installed: 11/28 - 12/4/2007 DTW: 153.25 ft BGS, 12/3/2007	**Figure A-1** **GEOLOGIC LOG AND AS-BUILT FOR MONITORING WELL MW-5** North Ranch Shelton, Washington JS0712, 12/2007 PgG

Figure No. B-6

Aspect consulting
IN-DEPTH PERSPECTIVE

Monitoring Well Construction Log

Project Number	Well Number	Sheet
070041-001	MW-6	1 of 5

Project Name	Webb Hill Biosolids Facility	Ground Surface Elev	397.46
Location	Mason County, WA	Top of Casing Elev.	400.27
Driller/Method	Boart Longyear / Rotosonic	Depth to Water (ft BGS)	116.19 - 6/12/2008
Sampling Method	Continuous where sampled	Start/Finish Date	5/21/2008-5/28/2008

Depth / Elevation (feet)	Borehole Completion	Sample Type/ID	Tests	PID (ppm)	Blows/ 6"	Material Type	Description	Depth (ft)
	Square steel monument with locking thermos well cap Concrete surface seal (0-2')						**RECESSIONAL OUTWASH**	
395								
	Bentonite grout (2-106.8')							
5							**STRATIFIED GLACIAL DEPOSITS**	5
390								
							glaciofluvial	
10							Slightly moist, yellow-red/brown, silty, very sandy GRAVEL (GM); predominantly fine sand, well sorted; fine to coarse gravel (35 mm), rounded to subangular	10
385		1					Slightly moist, brown, gravelly SAND (SP); predominantly fine sand, well sorted; fine to coarse gravel (50 mm), rounded to subrounded	
							Slightly moist, brown, sandy, gravelly SILT (ML); predominantly fine sand; fine to coarse gravel (65 mm), rounded to subangular	
15								15
380								
20								20
375								
25							Dry/slightly moist, brown/dark brown, sandy, very gravelly SILT (ML); fine to coarse sand, poorly sorted, fine to coarse gravel (50 mm), rounded to subangular, matrix supported	25
370		2					Dry/slightly moist, dark brown, silty, gravelly SAND (SM); fine to coarse sand, poorly sorted; fine to coarse gravel (45 mm), rounded to subangular	

Sampler Type:
- ◯ No Recovery
- ■ Bulk Sample

PID - Photoionization Detector (Headspace Measurement)

▼ Static Water Level

▽ Water Level (ATD)

Logged by: JMS/JSL

Approved by: EWM

Figure No. B- 7

MONITORING WELL WEBB HILL.GPJ June 30, 2008

Aspect consulting
IN-DEPTH PERSPECTIVE

Monitoring Well Construction Log

Project Number	Well Number	Sheet
070041-001	MW-6	2 of 5

Project Name	Webb Hill Biosolids Facility	Ground Surface Elev	397.46
Location	Mason County, WA	Top of Casing Elev.	400.27
Driller/Method	Boart Longyear / Rotosonic	Depth to Water (ft BGS)	116.19 - 6/12/2008
Sampling Method	Continuous where sampled	Start/Finish Date	5/21/2008-5/28/2008

Depth / Elevation (feet)	Borehole Completion	Sample Type/ID	Tests	PID (ppm)	Blows/ 6"	Material Type	Description	Depth (ft)
365								
35								35
360								
							Large boulder	
40							**till**	40
							Dry/slightly moist, dark brown, sandy, very gravelly SILT (ML); fine to coarse sand; fine to coarse gravel (45 mm), rounded to subangular, matrix supported	
355		3						
							Dry/slightly moist, dark brown, slightly clayey, silty, sandy GRAVEL (GM-GC); fine to coarse sand, poorly sorted; fine to coarse gravel (50 mm), rounded to subangular, matrix supported	
45								45
350								
50								50
345								
							glaciofluvial	
55							Slightly moist/moist, yellow-red, silty, very sandy GRAVEL (GM); fine to coarse sand, poorly sorted; fine to coarse gravel (60 mm), rounded to subrounded	55
							Slightly moist, dark brown, slightly silty, very gravelly SAND (SW-SM); fine to coarse sand; fine to coarse gravel (50 mm), rounded to subangular	
340		4					Slightly moist/moist, dark brown, silty, very sandy GRAVEL (GM); fine to coarse sand; fine to coarse gravel (50 mm)	

Sampler Type:
- No Recovery
- Bulk Sample

PID - Photoionization Detector (Headspace Measurement)

- Static Water Level
- Water Level (ATD)

Logged by: JMS/JSL

Approved by: EWM

Figure No. B- 7

MONITORING WELL WEBB HILL.GPJ June 30, 2008

Aspect consulting
IN-DEPTH PERSPECTIVE

Monitoring Well Construction Log

Project Number	Well Number	Sheet
070041-001	MW-6	3 of 5

Project Name	Webb Hill Biosolids Facility	Ground Surface Elev	397.46
Location	Mason County, WA	Top of Casing Elev.	400.27
Driller/Method	Boart Longyear / Rotosonic	Depth to Water (ft BGS)	116.19 - 6/12/2008
Sampling Method	Continuous where sampled	Start/Finish Date	5/21/2008-5/28/2008

Depth / Elevation (feet)	Borehole Completion	Sample Type/ID	Tests	PID (ppm)	Blows/ 6"	Material Type	Description	Depth (ft)
335								
65								65
330								
70							**till** Dry/slightly moist, brown, sandy, very gravelly SILT (ML); fine to coarse sand, poorly sorted; fine to coarse gravel (30 mm), rounded to subangular, matrix supported.	70
325		5					**glaciofluvial** Slightly moist/moist, dark brown, slightly silty, very sandy GRAVEL (GW-GM); fine to coarse sand, poorly sorted; fine gravel to cobbles (90 mm), rounded to subrounded	
75								75
320								
80								80
315								
85							Moist, dark brown, slightly silty, very sandy GRAVEL (GW-GM); predominantly medium to coarse sand; fine to coarse gravel (55 mm), rounded to subangular	85
310		6						

Sampler Type:
- ◯ No Recovery
- ■ Bulk Sample

PID - Photoionization Detector (Headspace Measurement)

▼ Static Water Level

▽ Water Level (ATD)

Logged by: JMS/JSL

Approved by: EWM

Figure No. B- 7

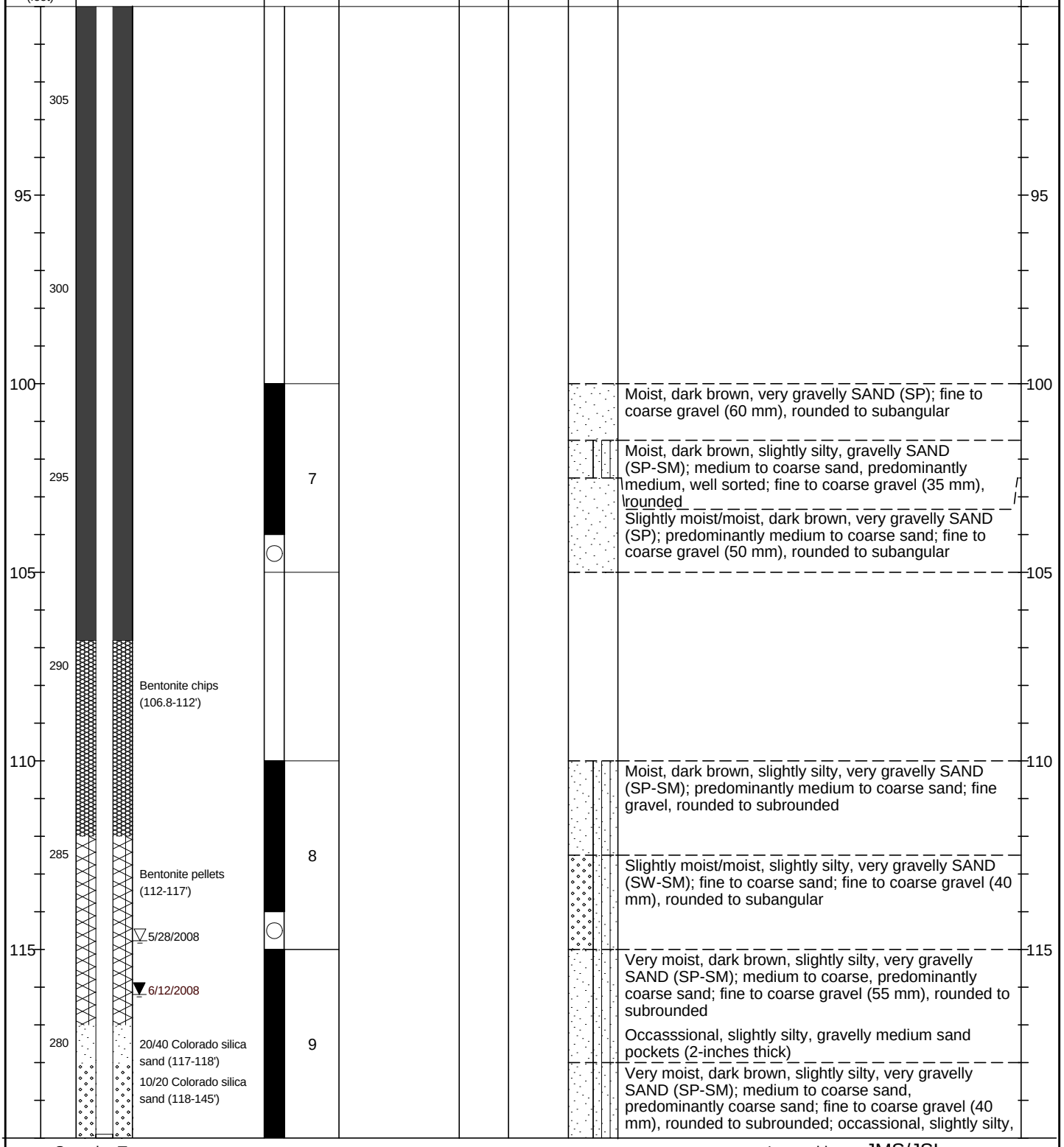
MONITORING WELL WEBB HILL.GPJ June 30, 2008

Aspect consulting
IN-DEPTH PERSPECTIVE

Monitoring Well Construction Log

Project Number	Well Number	Sheet
070041-001	MW-6	4 of 5

Project Name	Webb Hill Biosolids Facility	Ground Surface Elev	397.46
Location	Mason County, WA	Top of Casing Elev.	400.27
Driller/Method	Boart Longyear / Rotosonic	Depth to Water (ft BGS)	116.19 - 6/12/2008
Sampling Method	Continuous where sampled	Start/Finish Date	5/21/2008-5/28/2008



Sampler Type:
- No Recovery
- Bulk Sample

PID - Photoionization Detector (Headspace Measurement)

- Static Water Level
- Water Level (ATD)

Logged by: JMS/JSL

Approved by: EWM

Figure No. B- 7

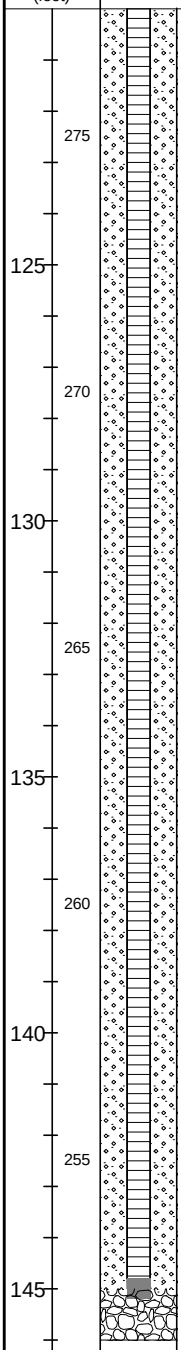
MONITORING WELL WEBB HILL.GPJ June 30, 2008

Monitoring Well Construction Log

Aspect consulting — IN-DEPTH PERSPECTIVE

Project Number	Well Number	Sheet
070041-001	MW-6	5 of 5

Project Name	Webb Hill Biosolids Facility	Ground Surface Elev	397.46
Location	Mason County, WA	Top of Casing Elev.	400.27
Driller/Method	Boart Longyear / Rotosonic	Depth to Water (ft BGS)	116.19 - 6/12/2008
Sampling Method	Continuous where sampled	Start/Finish Date	5/21/2008-5/28/2008



Depth / Elevation (feet)	Sample Type/ID	Tests	PID (ppm)	Blows/ 6"	Material Type	Description	Depth (ft)
275	9					gravelly, medium SAND (SP-SM) pockets (2-inches thick)	
125						Very moist, brown, slightly silty, very sandy GRAVEL (GW-GM); fine to coarse sand; fine to coarse gravel (60 mm), rounded to subrounded	125
270						Very moist, gray, gravelly SAND (SP); trace silt; fine to coarse sand, predominantly fine to medium; fine to coarse gravel, predominantly fine (30 mm), rounded to subrounded	
						Very moist/wet, brown, slightly silty, very sandy GRAVEL (GW-GM); fine to coarse sand; fine gravel, subrounded; transition at 127 ft to fine to coarse gravel (45 mm), rounded to subrounded	
130						Very moist/wet, brown, slightly silty, very gravelly SAND (SW-SM); fine to coarse sand; fine to coarse gravel (60 mm), predominantly fine; subrounded to rounded	130
265	10					Silty (SM) at 131.3 ft	
						Very moist/wet, brown, slightly silty, very sandy GRAVEL (GW-GM); fine to coarse sand, fine gravel to cobbles (90 mm), rounded to subrounded	
135						Very moist/wet, brown, slightly silty, very gravelly SAND (SW-SM); fine to coarse sand; fine to coarse gravel (60 mm)	135
260							
140						Wet, gray, slightly gravelly SAND (SP); trace silt; fine to coarse sand, predominantly medium to coarse; fine to coarse gravel (40 mm), rounded to subrounded	140
255	11					Wet, brown, slightly silty/clayey, sandy GRAVEL (GW-GC); predominantly medium to coarse sand; fine to coarse gravel (60 mm), rounded to subrounded	
						Gray, trace silt (GW); fine to coarse sand	
145						Silty (GM); predominantly medium to coarse sand	145
250							

Sampler Type:
- No Recovery
- Bulk Sample

PID - Photoionization Detector (Headspace Measurement)

- Static Water Level
- Water Level (ATD)

Logged by: JMS/JSL

Approved by: EWM

Figure No. B- 7

MONITORING WELL WEBB HILL.GPJ June 30, 2008

Aspect consulting
IN-DEPTH PERSPECTIVE

Monitoring Well Construction Log

Project Number	Well Number	Sheet
070041-001	MW-6a	1 of 5

Project Name	Webb Hill Biosolids Facility	Ground Surface Elev	
Location	Mason County, WA	Top of Casing Elev.	
Driller/Method	Boart Longyear / Rotosonic	Depth to Water (ft BGS)	
Sampling Method	Continuous	Start/Finish Date	5/19/2008-5/21/2008

Depth / Elevation (feet)	Borehole Completion	Sample Type/ID	Tests	PID (ppm)	Blows/ 6"	Material Type	Description	Depth (ft)
0	Abandoned boring Concrete (0-1') Bentonite chips (1-140')	1					**RECESSIONAL OUTWASH** Dry/slightly moist, yellow-red/brown, silty, very gravelly SAND (SM); fine to coarse sand, poorly sorted; fine to coarse gravel (45 mm), rounded to angular	0
5		2					**STRATIFIED GLACIAL DEPOSITS** **till** Slightly moist/moist, dark brown, slightly silty, very sandy GRAVEL(GW-GM); fine to coarse sand, poorly sorted; fine to coarse gravel (60 mm), rounded to angular (weathered till) Moist, light gray, slightly sandy, gravelly SILT (ML); fine gravels (20 mm), predominantly rounded, matrix supported Slightly moist, sandy, very silty GRAVEL (GM); fine to coarse sand, poorly sorted; fine to coarse gravel (50 mm), subrounded to rounded	5
10		3					**glaciofluvial** Slightly moist/moist, dark brown/gray, gravelly, very silty SAND (SM); predominantly fine to medium sand; fine to coarse gravel (65 mm), subrounded to subangular Moist, dark brown, slighlty sandy, very gravelly SILT (ML); predominantly fine sand; fine to coarse gravel (50 mm), rounded to subangular, matrix supported **till** Slighlty moist, dark brown, silty, sandy GRAVEL (GM); predominantly medium to coarse sand; fine to coarse gravel (50 mm), subrounded to subangular; scattered pockets of matrix supported gravelly silt	10
15		4					Dry/slightly moist, dark brown, silty, gravelly SAND (SM); fine to coarse sand, poorly sorted; fine to coarse gravel (65 mm), rounded to subangular	15
20							Slightly moist, brown/dark brown, slightly sandy, very gravelly SILT (ML); predominantly fine sand; fine gravel, rounded to subrounded, matrix supported	20
25		5					Slightly moist, dark brown, silty, very gravelly SAND (SM); fine to coarse sand, poorly sorted; fine to coarse gravel (30 mm); rounded to subrounded	25

Sampler Type:
- ○ No Recovery
- ■ Bulk Sample

PID - Photoionization Detector (Headspace Measurement)

▼ Static Water Level

▽ Water Level (ATD)

Logged by: JMS/JSL

Approved by: EWM

Figure No. B- 8

MONITORING WELL WEBB HILL.GPJ June 27, 2008

Aspect consulting
IN-DEPTH PERSPECTIVE

Monitoring Well Construction Log

Project Number	Well Number	Sheet
070041-001	MW-6a	2 of 5

Project Name	Webb Hill Biosolids Facility	Ground Surface Elev	
Location	Mason County, WA	Top of Casing Elev.	
Driller/Method	Boart Longyear / Rotosonic	Depth to Water (ft BGS)	
Sampling Method	Continuous	Start/Finish Date	5/19/2008-5/21/2008

Depth / Elevation (feet)	Borehole Completion	Sample Type/ID	Tests	PID (ppm)	Blows/ 6"	Material Type	Description	Depth (ft)
							Slightly moist, red-brown, sandy, very gravelly SILT (ML); fine to coarse sand, poorly sorted; fine to coarse gravel (40 mm), rounded to subrounded, matrix supported	
35	Checked for perched water (none)	6					**glaciofluvial** Very moist, red-brown/dark brown, slightly silty, very gravelly SAND (SP-SM), predominantly medium to coarse sand, moderately well sorted; fine to coarse gravel (40 mm), rounded to subrounded	35
							Moist, red-brown, silty, sandy GRAVEL (GM); fine to coarse sand; fine to coarse gravel, subrounded to subangular, clast supported	
							till Slightly moist, brown/dark brown, silty, very sandy GRAVEL (GM); fine to coarse sand; fine to coarse gravel (70 mm), round to subangular, matrix supported	
40	Casing at 17 ft; checked for water (none)	7					Slightly moist, brown/dark brown, sandy, very gravelly SILT (ML); fine to coarse sand; fine to coarse gravel (50 mm), rounded to subangular, matrix supported	40
							glaciofluvial Slightly moist, dark brown, silty/clayey, sandy GRAVEL (GC); fine to coarse sand, poorly sorted; fine to coarse gravel (50mm), rounded to subrounded	
45		8						45
							Slightly moist, magenta, sandy, very silty GRAVEL (GM); fine to coarse sand; fine to coarse gravel, rounded to subangular, clast supported	
50	Casing at 37 ft; checked for water (none)						Slightly moist/moist, red brown/dark brown, slightly sandy, very silty GRAVEL (GM); fine to coarse sand; fine gravel, rounded to subrounded	50
							Moist/very moist, dark brown/dark gray, slightly silty, very gravelly SAND (SP-SM); predominantly medium to coarse sand; fine to coarse gravel (50 mm), rounded to subrounded	
55		9					Moist, gray, silty, very sandy GRAVEL (GM); fine to coarse sand, poorly sorted; fine to coarse gravel (60 mm), rounded to subangular	55
							Slightly moist/moist, gray/dark brown, slightly silty, very gravelly SAND (SP-SM); predominantly medium to coarse sand, moderately well sorted; fine to coarse gravel (45 mm)	

Sampler Type:
- ◯ No Recovery
- ■ Bulk Sample

PID - Photoionization Detector (Headspace Measurement)

- ▼ Static Water Level
- ▽ Water Level (ATD)

Logged by: JMS/JSL

Approved by: EWM

Figure No. B- 8

MONITORING WELL WEBB HILL.GPJ June 27, 2008

Aspect consulting
IN-DEPTH PERSPECTIVE

Monitoring Well Construction Log

Project Number	Well Number	Sheet
070041-001	MW-6a	3 of 5

Project Name	Webb Hill Biosolids Facility	Ground Surface Elev	
Location	Mason County, WA	Top of Casing Elev.	
Driller/Method	Boart Longyear / Rotosonic	Depth to Water (ft BGS)	
Sampling Method	Continuous	Start/Finish Date	5/19/2008-5/21/2008

Depth / Elevation (feet)	Borehole Completion	Sample Type/ID	Tests	PID (ppm)	Blows/ 6"	Material Type	Description	Depth (ft)
		10					Slightly moist/moist, red-brown/gray, silty, very sandy GRAVEL (GM); predominantly medium to coarse sand; fine to coarse gravel (60 mm), rounded to subrounded	
65								65
		11					Moist, red-brown/dark-brown, slightly silty/clayey, very gravelly SAND (SP-SC); predominantly medium to coarse sand; fine to coarse gravel (60 mm), rounded to subrounded	
							Moist, red-brown/dark brown, slightly silty, very gravelly SAND (SP-SM); predominantly medium to coarse sand; fine to coarse gravel (40 mm)	
70								70
		12					Moist, red-brown/dark brown, slightly silty, very sandy GRAVEL (GW-GM); predominantly medium to coarse sand; fine to coarse gravel (50 mm), rounded to subrounded	
							Sandy, gravelly SILT (ML) interbed (6-inches thick)	
75							Gravelly SAND (SP) interbed (6-inches thick)	75
							Moist, gray/dark brown, very gravelly SAND (SP); predominantly medium to coarse sand; fine to coarse gravel (40 mm), rounded to subrounded	
							Very moist, gray/dark brown, very gravelly SAND (SP);	
80	Casing at 57 ft; checked for water (none)							80
		13					Moist, dark brown/gray, slightly silty, very sandy GRAVEL (GW-GM); predominantly medium to coarse sand; fine to coarse gravel (40 mm), rounded to subangular	
85								85
		14					Moist, dark brown, very gravelly SAND (SP); predominantly medium, well sorted sand; fine to coarse gravel (55 mm)	
							Moist, dark brown, silty, very sandy GRAVEL (GM); fine to coarse sand, poorly sorted, fine to coarse gravel (40 mm), rounded to subrounded	
							Moist, dark brown/gray, slightly silty, very sandy GRAVEL (GW-GM); predominantly medium sand; fine	

Sampler Type:
- ○ No Recovery
- ■ Bulk Sample

PID - Photoionization Detector (Headspace Measurement)

▼ Static Water Level

▽ Water Level (ATD)

Logged by: JMS/JSL

Approved by: EWM

Figure No. B- 8

MONITORING WELL WEBB HILL.GPJ June 27, 2008

Aspect consulting
IN-DEPTH PERSPECTIVE

Monitoring Well Construction Log

Project Number	Well Number	Sheet
070041-001	MW-6a	4 of 5

Project Name	Webb Hill Biosolids Facility	Ground Surface Elev	
Location	Mason County, WA	Top of Casing Elev.	
Driller/Method	Boart Longyear / Rotosonic	Depth to Water (ft BGS)	
Sampling Method	Continuous	Start/Finish Date	5/19/2008-5/21/2008

Depth / Elevation (feet)	Borehole Completion	Sample Type/ID	Tests	PID (ppm)	Blows/ 6"	Material Type	Description	Depth (ft)
							to coarse gravel (65 mm), rounded to subrounded	
		14					Moist, dark brown, slightly silty, very sandy gravel (GW-GM); fine to coarse sand, poorly sorted; fine to coarse gravel (40 mm), rounded to subrounded	
95							Moist, dark gray/dark brown, slightly silty, very sandy GRAVEL (GW-GM); predominantly medium to coarse sand; fine to coarse gravel (60 mm), rounded to subangular	95
		15					Moist, dark brown, very gravelly SAND (SP); predominantly medium, well sorted sand; fine to coarse gravel (70 mm), rounded to subrounded	
100							Moist, dark brown, very sandy GRAVEL (GW); predominantly medium, well sorted sand; fine to coarse gravel (40 mm), rounded to subrounded	100
							Slgithly moist, dark brown, slightly silty, very gravelly SAND (SW-SM); fine to coarse sand, poorly sorted; fine to coarse gravel (60 mm), rounded to angular	
105		16					Slightly moist, yellow-red/dark brown, silty, very sandy GRAVEL (GM); fine to coarse sand, poorly sorted; fine to coarse gravel (50 mm), rounded to subangular	105
110							Very moist, dark brown/gray, slightly silty, very gravelly SAND (SP-SM); predominantly medium to coarse sand; fine to coarse gravel (60 mm), rounded to subrounded	110
115	▽5/20/2008	17					Slightly moist/moist, gray/dark brown, silty, very gravelly SAND (SM); predominantly medium to coarse sand; fine to coarse gravel (40 mm), rounded to subrounded	115

Sampler Type:
○ No Recovery
■ Bulk Sample

PID - Photoionization Detector (Headspace Measurement)

▼ Static Water Level
▽ Water Level (ATD)

Logged by: JMS/JSL

Approved by: EWM

Figure No. B- 8

MONITORING WELL WEBB HILL.GPJ June 27, 2008

Aspect consulting
IN-DEPTH PERSPECTIVE

Monitoring Well Construction Log

Project Number	Well Number	Sheet
070041-001	MW-6a	5 of 5

Project Name	Webb Hill Biosolids Facility	Ground Surface Elev	
Location	Mason County, WA	Top of Casing Elev.	
Driller/Method	Boart Longyear / Rotosonic	Depth to Water (ft BGS)	
Sampling Method	Continuous	Start/Finish Date	5/19/2008-5/21/2008

Depth / Elevation (feet)	Borehole Completion	Sample Type/ID	Tests	PID (ppm)	Blows/ 6"	Material Type	Description	Depth (ft)
125	Casing at 117 ft; checked for water (none)	18					Wet, gray/dark brown, slightly silty, very sandy GRAVEL (GW-GM); predominantly medium to coarse sand, moderately well sorted; fine to coarse gravel (55 mm), rounded to subrounded; scattered gravelly sand pockets with medium, well sorted sand (6-inches thick)	125
							Wet, gray, slightly silty, very gravelly SAND (SP-SM); predominantly medium to coarse sand; fine to coarse gravel (60 mm)	
130	Casing at 117 ft; ATD of 116.3 ft						Wet, gray/dark brown, slightly silty, very sandy GRAVEL (GW-GM); predominantly medium to coarse sand, moderately well sorted; fine to coarse gravel (65 mm), rounded to subrounded; scattered, slightly silty, slightly sandy GRAVEL (GP-GM) pockets with fine gravel (4-inches thick)	130
135		19					Wet, gray/dark brown, slightly silty, very sandy GRAVEL (GW-GM); predominantly medium to coarse sand; fine to coarse gravel (70 mm), rounded to subrounded; occassional, slightly silty, slightly sandy GRAVEL (GP-GM) pockets with fine gravel (6-inches thick)	135
							Wet, gray, gravelly SAND (SP); well sorted medium sand; fine gravel	
140	Heave (140-146')						Wet, brown/gray, silty, very sandy GRAVEL (GM); predominantly medium to coarse sand; fine to coarse gravel (25 mm) (Sluff?)	140
		20					Wet, slightly silty, very sandy GRAVEL (GW-GM); predominantly medium to coarse sand, moderately well sorted; fine to coarse gravel (50 mm), subrounded to rounded	
145								145

Sampler Type:
- ○ No Recovery
- ■ Bulk Sample

PID - Photoionization Detector (Headspace Measurement)

- ▼ Static Water Level
- ▽ Water Level (ATD)

Logged by: JMS/JSL

Approved by: EWM

Figure No. B- 8

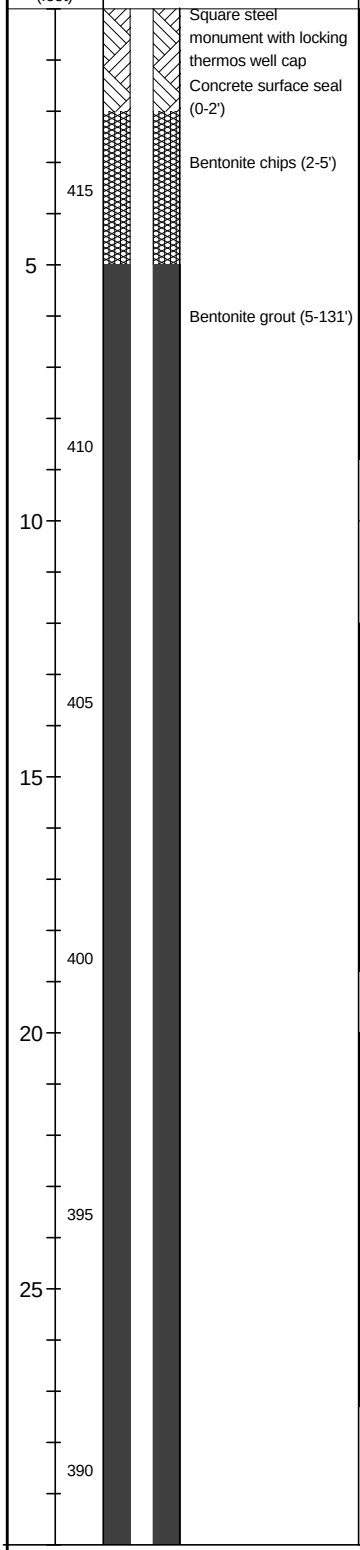
MONITORING WELL_WEBB HILL.GPJ June 27, 2008

Aspect consulting
IN-DEPTH PERSPECTIVE

Monitoring Well Construction Log

Project Number	Well Number	Sheet
070041-001	MW-7	1 of 6

Project Name	Webb Hill Biosolids Facility	Ground Surface Elev	418.55
Location	Mason County, WA	Top of Casing Elev.	421.33
Driller/Method	Boart Longyear / Rotosonic	Depth to Water (ft BGS)	140.83 - 6/12/2008
Sampling Method	Continuous, except for 10' to 12' depth	Start/Finish Date	5/29/2008-5/30/2008



Depth / Elevation (feet)	Sample Type/ID	Tests	PID (ppm)	Blows/ 6"	Material Type	Description	Depth (ft)
						TOPSOIL Dry, yellow-red, silty gravelly SAND (SM), predominantly fine sand.	
						RECESSIONAL OUTWASH Dry/slightly moist, brown/gray, slightly silty, very gravelly SAND (SW-SM); fine to coarse sand, fine to coarse gravel (60 mm), round to subround.	
	1						
						Cobble.	
						STRATIFIED GLACIAL DEPOSITS **till** Moist, brown, sandy, very silty GRAVEL (GM); fine to coarse sand; fine to coarse gravel (50 mm), round to subround.	
	2					**glaciofluvial** Moist, brown, silty, gravelly SAND (SM); fine to coarse sand; fine to coarse gravel (40 mm), subround to round.	
						till Moist, brown, very silty SAND (SP); fine sand (weakly cemented).	
						Moist, brown, silty, sandy GRAVEL (GM); fine to coarse sand; fine to coarse gravel (40 mm), subround to round.	
						Dry, light gray, sandy, gravelly SILT (ML); fine to coarse sand; fine to coarse gravel (50 mm), subround to round.	
						Slightly moist, brown, silty, gravelly SAND (SM); fine to coarse sand; fine to coarse gravel (60 mm), subround to round.	
	3					Slightly moist, brown, silty, sandy GRAVEL (GM); fine to coarse sand predominantly fine to medium; fine to coarse gravel (65 mm), subround to round.	

Sampler Type:
- No Recovery
- Bulk Sample

PID - Photoionization Detector (Headspace Measurement)

- Static Water Level
- Water Level (ATD)

Logged by: JSL

Approved by: EWM

Figure No. B- 9

MONITORING WELL WEBB HILL.GPJ June 30, 2008

Aspect consulting
IN-DEPTH PERSPECTIVE

Monitoring Well Construction Log

Project Number	Well Number	Sheet
070041-001	MW-7	2 of 6

Project Name	Webb Hill Biosolids Facility	Ground Surface Elev	418.55
Location	Mason County, WA	Top of Casing Elev.	421.33
Driller/Method	Boart Longyear / Rotosonic	Depth to Water (ft BGS)	140.83 - 6/12/2008
Sampling Method	Continuous, except for 10' to 12' depth	Start/Finish Date	5/29/2008-5/30/2008

Depth / Elevation (feet)	Borehole Completion	Sample Type/ID	Tests	PID (ppm)	Blows/ 6"	Material Type	Description	Depth (ft)
385							Trace clay (30.5 to 30.7 ft).	
35		4					Trace clay (32 to 32.5 ft).	35
380							Trace clay (37 to 37.5 ft). Slightly moist, brown, sandy, very gravelly SILT (ML), fine to coarse sand, fine to coarse gravel (60 mm), subround to round.	
40							Brown, slightly moist, slightly silty, very sandy GRAVEL (GW-GM); fine to coarse sand, fine to coarse gravel (75 mm), subround to round.	40
375							Silty (GM) (43 ft).	
45		5					Slightly moist, brown, slightly silty, very gravelly SAND (SW-SM).	45
							Cobble.	
370							Cobble.	
50							**glaciofluvial** Slightly moist, brown, slightly silty, very sandy GRAVEL (GW-GM); fine to coarse sand, fine to coarse gravel (50 mm), subround to round.	50
365								
55		6					Till lense (56 ft).	55
360							Moist, brown, slightly silty, gravelly SAND (SW-SM); fine to coarse sand; fine to coarse gravel (50 mm), subround to round.	

Sampler Type:
- ◯ No Recovery
- ■ Bulk Sample

PID - Photoionization Detector (Headspace Measurement)

▼ Static Water Level

▽ Water Level (ATD)

Logged by: JSL

Approved by: EWM

Figure No. B- 9

MONITORING WELL WEBB HILL.GPJ June 30, 2008

Aspect consulting
IN-DEPTH PERSPECTIVE

Monitoring Well Construction Log

Project Number	Well Number	Sheet
070041-001	MW-7	3 of 6

Project Name	Webb Hill Biosolids Facility	Ground Surface Elev	418.55
Location	Mason County, WA	Top of Casing Elev.	421.33
Driller/Method	Boart Longyear / Rotosonic	Depth to Water (ft BGS)	140.83 - 6/12/2008
Sampling Method	Continuous, except for 10' to 12' depth	Start/Finish Date	5/29/2008-5/30/2008

Depth / Elevation (feet)	Borehole Completion	Sample Type/ID	Tests	PID (ppm)	Blows/ 6"	Material Type	Description	Depth (ft)
65 / 355		7					Slightly moist, brown, silty very gravelly SAND (SM); trace clay; fine to coarse sand; fine to coarse gravel (75 mm), subround to round.	65
							till Dry, gray, slightly sandy SILT (ML); trace gravel with cobble; fine to coarse sand; fine gravel; "till-like".	
							glaciofluvial Slightly moist, brown, slightly silty, gravelly SAND (SW-SM); fine to coarse sand; fine to coarse gravel (48 mm), subround to round. Silty (SM) (65 ft). Slightly silty (SW-SM) (67 ft). Very gravelly (68 ft).	
70 / 350								70
75 / 345		8					**till** Slightly moist, brown/gray, sandy, gravelly SILT (ML); fine to coarse sand; fine to coarse gravel (70 mm), subround to round.	75
							glaciofluvial Slightly moist, brown, slightly silty, very gravelly SAND (SW-SM); fine to coarse sand; fine to coarse gravel (70 mm), subround to round.	
80 / 340							Dry/slightly moist, light brown, sandy, gravelly SILT (ML), fine to coarse sand; fine to coarse gravel (40 mm), subround to round.	80
							Slightly moist, dark brown, slightly gravelly, very sandy SILT (ML); trace clay; fine to coarse sand; fine to coarse gravel (70 mm), subround to round.	
							till Slightly moist, dark brown/gray, gravelly, very silty SAND (SM); fine to coarse sand; fine to coarse gravel (75 mm), subround to round. Cobble.	
85 / 335		9					**glaciofluvial** Moist, dark brown, slightly silty, very gravelly SAND (SW-SM); fine to coarse sand, fine to coarse gravel (30mm) subrounded.	85
							till Dry/slightly moist, light brown/gray, gravelly, very silty SAND (SM); fine to coarse sand; fine to coarse gravel (40 mm), subrounded to rounded.	
330							**glaciofluvial** Moist/slightly moist, dark brown, slightly silty, very gravelly SAND (SW-SM); fine to coarse sand; fine to	

Sampler Type:
- ○ No Recovery
- ■ Bulk Sample

PID - Photoionization Detector (Headspace Measurement)

- ▼ Static Water Level
- ▽ Water Level (ATD)

Logged by: JSL

Approved by: EWM

Figure No. B- 9

MONITORING WELL WEBB HILL.GPJ June 30, 2008

Aspect consulting
IN-DEPTH PERSPECTIVE

Monitoring Well Construction Log

Project Number	Well Number	Sheet
070041-001	MW-7	4 of 6

Project Name	Webb Hill Biosolids Facility	Ground Surface Elev	418.55
Location	Mason County, WA	Top of Casing Elev.	421.33
Driller/Method	Boart Longyear / Rotosonic	Depth to Water (ft BGS)	140.83 - 6/12/2008
Sampling Method	Continuous, except for 10' to 12' depth	Start/Finish Date	5/29/2008-5/30/2008

Depth / Elevation (feet)	Borehole Completion	Sample Type/ID	Tests	PID (ppm)	Blows/ 6"	Material Type	Description	Depth (ft)
							coarse gravel (50 mm), subrounded.	
							till Dry, light brown, gravelly, silty SAND (SM).	
							Slightly moist, dark brown/brown, slightly silty, very gravelly SAND (SW-SM); fine to coarse sand; fine to coarse gravel (40 mm), subrounded.	
325							Increase in sand content and decrease in silt content.	
95		10					Dry/slightly moist, light brown, very gravelly, very silty SAND (SM); fine to coarse sand, fine to coarse gravel (50 mm), subrounded.	95
							glaciofluvial Slightly moist, brown, slightly silty, gravelly SAND (SW-SM).	
320							**till** Dry/slightly moist, light brown, very gravelly, very silty SAND (SM); fine to coarse sand, fine to coarse gravel (50 mm), subrounded.	
100							Slightly moist, dark brown, silty, gravelly SAND (SM); fine to coarse sand; fine to coarse gravel (75 mm), subrounded.	100
		11					Increase in sand content (98.5 ft). Brown-yellow, slightly silty; fine to coarse gravel (70 mm) predominantly fine (SW-SM) (99.2 ft). Brown yellow with magenta (99.5 ft). Dark brown, silty (SM) (99.7 ft). Slightly silty (SW-SM) (102.5 ft). Silty (SM) (103 ft).	
315								
105							**glaciofluvial** Slightly moist, dark brown, gravelly SAND (SP); trace silt; fine to coarse sand, predominantly medium; fine gravel. Slightly silty, fine to coarse gravel (50 mm), subrounded (SP-SM) (106 ft). Trace silt (SP) (106.5 ft). Slightly silty (SP-SM) (107 ft). Trace silt (SP) (108 ft).	105
310							Slightly moist, dark brown, slightly silty, very gravelly SAND (SW-SM); fine to coarse sand; fine to coarse gravel (30 mm), subrounded.	
110		12					Slightly moist, dark brown, gravelly SAND (SP/SW); trace silt; fine to coarse sand, predominantly fine to medium (at 110 ft); fine to coarse gravel (35 mm), subrounded. Fine to coarse sand (111 ft). Fine to coarse sand predominantly fine to medium; fine gravel (112.5 ft). Fine to coarse sand (113 ft).	110
305							**till** Slightly moist, dark brown, silty, gravelly SAND (SM).	
115							Very silty (114.4 ft). Dark brown with magenta (114.9 ft).	115
		13					**glaciofluvial** Slightly moist, dark brown, gravelly SAND (SW); trace silt; fine to coarse gravel (30 mm), subrounded. Slightly gravelly (116 to 116.8 ft).	
300							**till** Slightly moist, light brown, slightly silty, very gravelly SAND (SM); fine to coarse sand; fine to coarse gravel (35 mm) subrounded.	

Sampler Type:
- ◯ No Recovery
- ■ Bulk Sample

PID - Photoionization Detector (Headspace Measurement)

- ▼ Static Water Level
- ▽ Water Level (ATD)

Logged by: JSL

Approved by: EWM

Figure No. B- 9

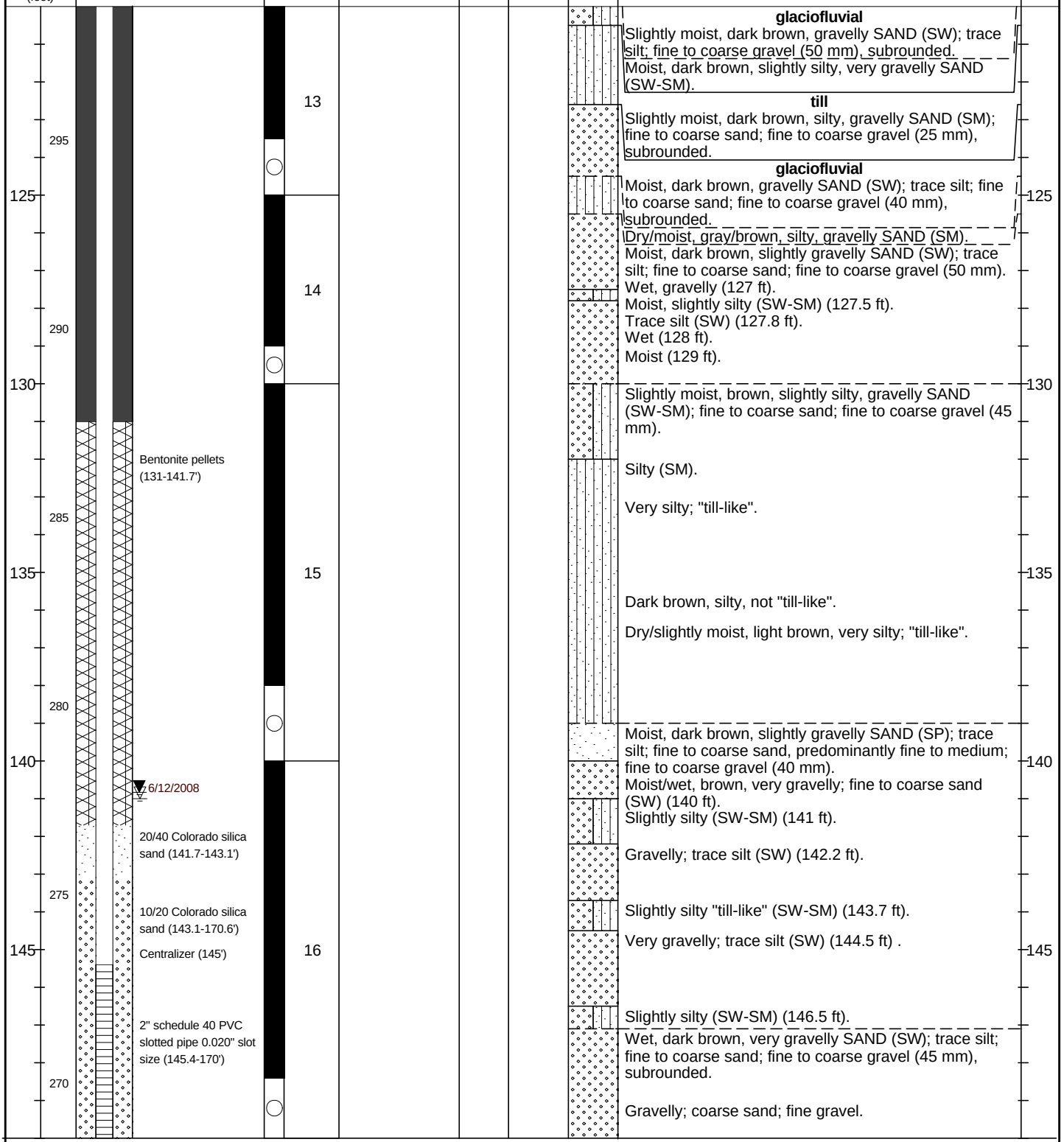
MONITORING WELL WEBB HILL.GPJ June 30, 2008

Aspect consulting
IN-DEPTH PERSPECTIVE

Monitoring Well Construction Log

Project Number	Well Number	Sheet
070041-001	MW-7	5 of 6

Project Name	Webb Hill Biosolids Facility	Ground Surface Elev	418.55
Location	Mason County, WA	Top of Casing Elev.	421.33
Driller/Method	Boart Longyear / Rotosonic	Depth to Water (ft BGS)	140.83 - 6/12/2008
Sampling Method	Continuous, except for 10' to 12' depth	Start/Finish Date	5/29/2008-5/30/2008



Sampler Type:
- No Recovery
- Bulk Sample

PID - Photoionization Detector (Headspace Measurement)

- Static Water Level
- Water Level (ATD)

Logged by: JSL

Approved by: EWM

Figure No. B- 9

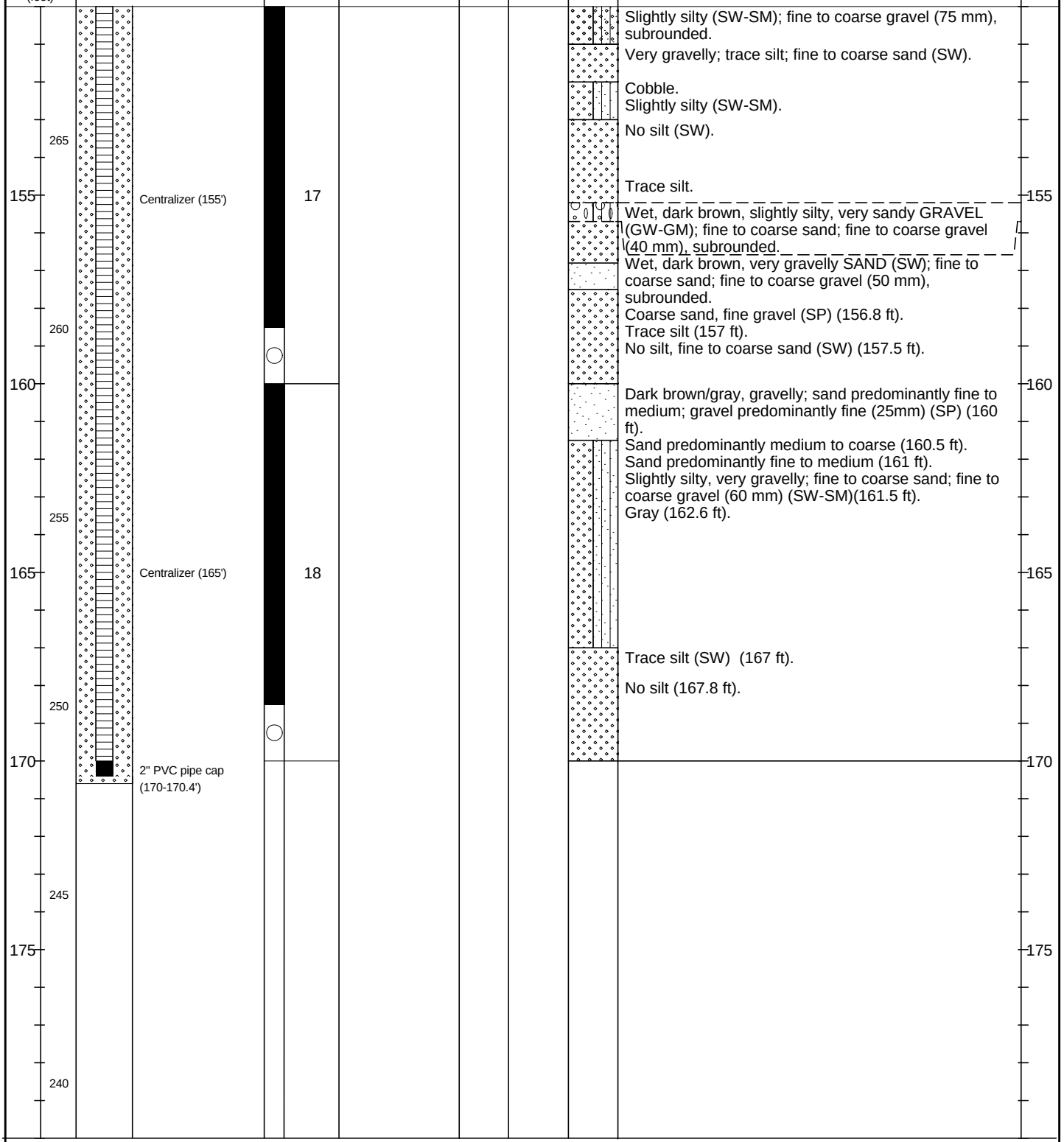
MONITORING WELL WEBB HILL.GPJ June 30, 2008

Aspect consulting
IN-DEPTH PERSPECTIVE

Monitoring Well Construction Log

Project Number	Well Number	Sheet
070041-001	MW-7	6 of 6

Project Name	Webb Hill Biosolids Facility	Ground Surface Elev	418.55
Location	Mason County, WA	Top of Casing Elev.	421.33
Driller/Method	Boart Longyear / Rotosonic	Depth to Water (ft BGS)	140.83 - 6/12/2008
Sampling Method	Continuous, except for 10' to 12' depth	Start/Finish Date	5/29/2008-5/30/2008



Sampler Type:
- No Recovery
- Bulk Sample

PID - Photoionization Detector (Headspace Measurement)

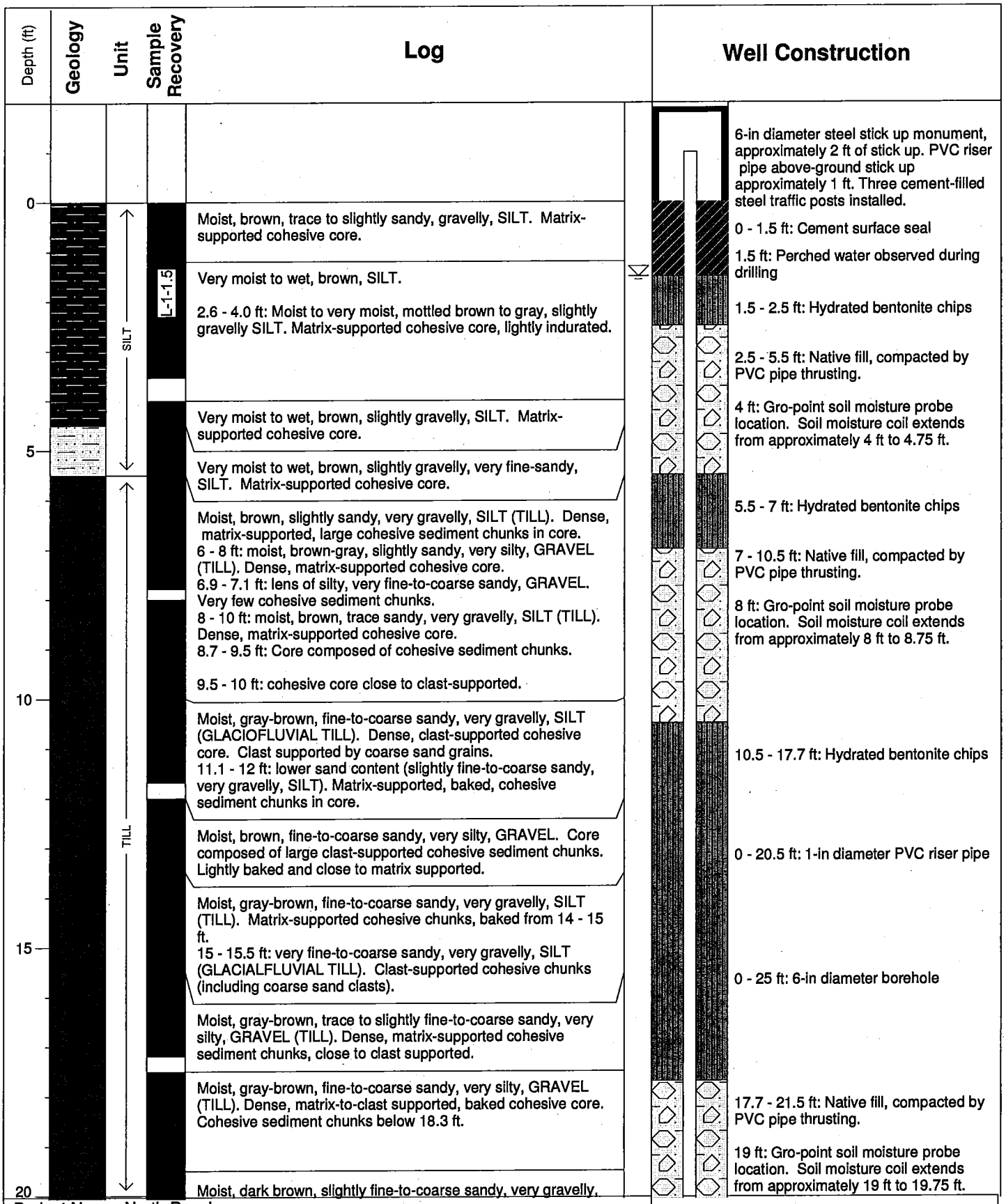
- Static Water Level
- Water Level (ATD)

Logged by: JSL

Approved by: EWM

Figure No. B- 9

MONITORING WELL WEBB HILL.GPJ June 30, 2008



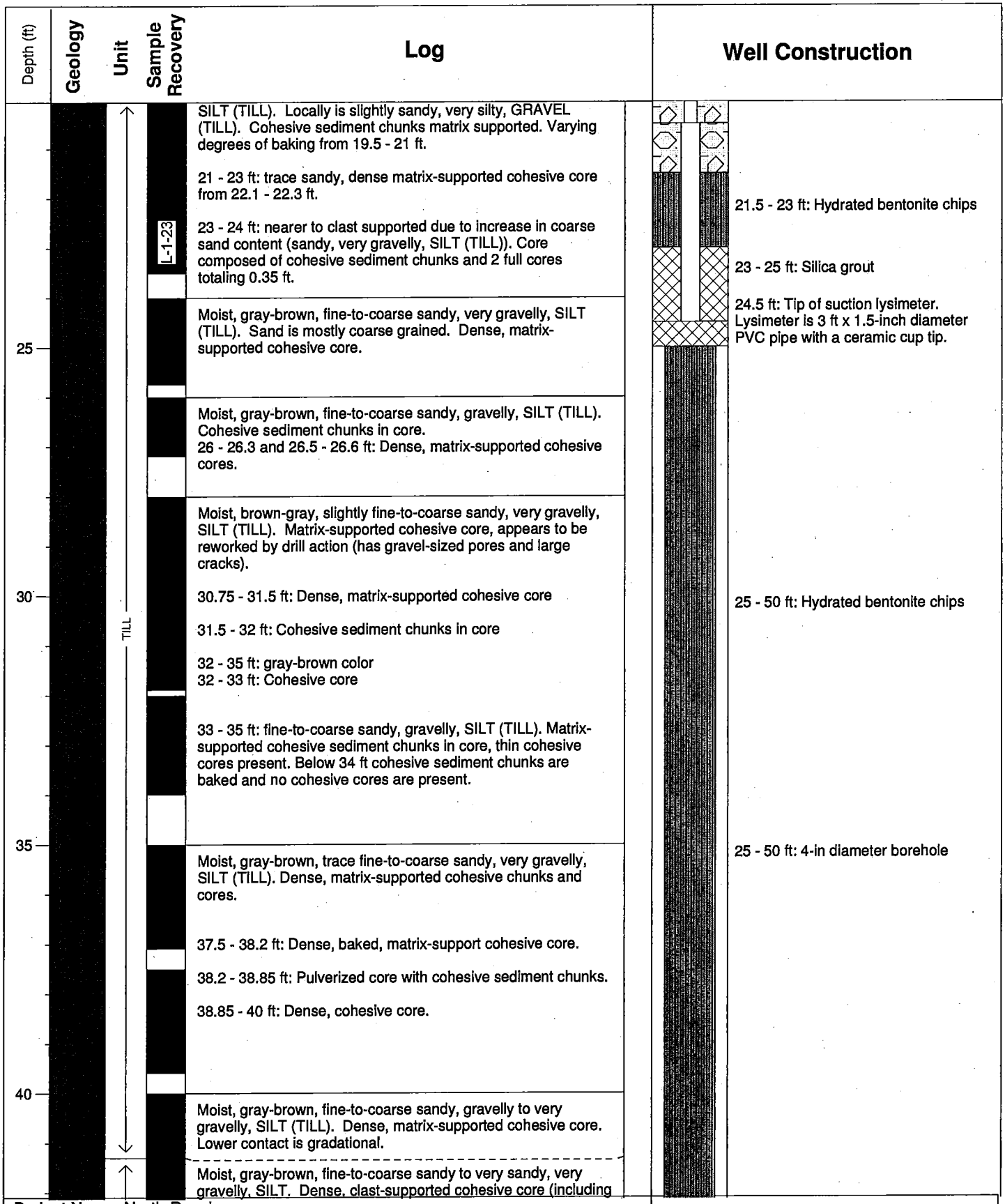
Project Name: North Ranch
Drilling Method: 6" Sonic
Driller: Rodney Labrosse
Firm: Cascade Drilling
Consulting Firm: Pacific Groundwater Group
Logged by: Glenn Mutti
Location: North Ranch Biorecycling, Mason Co.

Boring Name: L-1
Ecology ID: BAL058
MP Elevation:
Datum:
Installed: 11/27 - 11/28/2007
DTW:

Figure A-2
GEOLOGIC LOG AND AS-BUILT FOR LYSIMETER L-1
North Ranch
Shelton, Washington
JS0712, 12/2007

PgG

Figure No. B-10



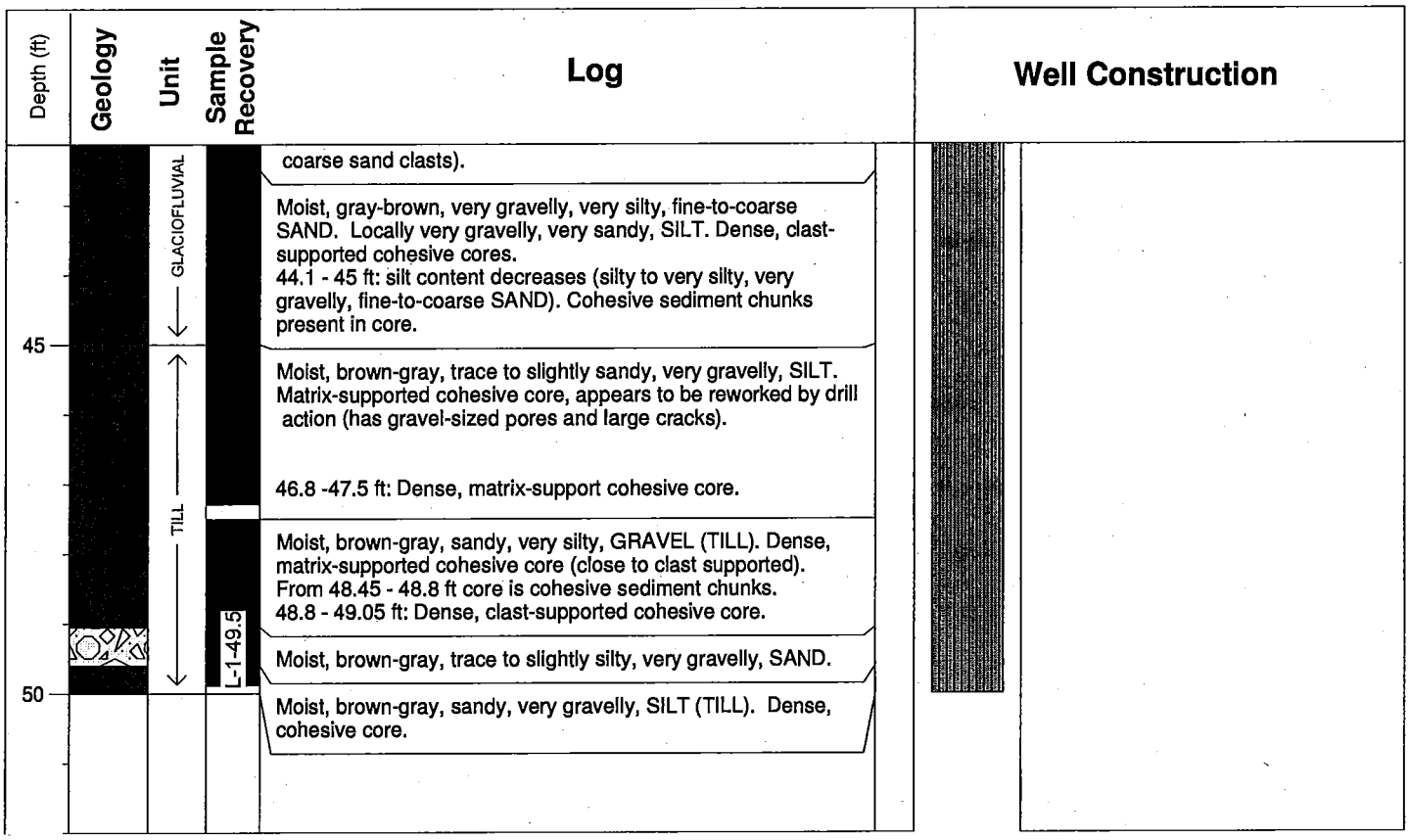
Project Name: North Ranch
Drilling Method: 6" Sonic
Driller: Rodney Labrosse
Firm: Cascade Drilling
Consulting Firm: Pacific Groundwater Group
Logged by: Glenn Mutti
Location: North Ranch Biorecycling, Mason Co.

Boring Name: L-1
Ecology ID: BAL058
MP Elevation:
Datum:
Installed: 11/27 - 11/28/2007
DTW:

Figure A-2
GEOLOGIC LOG AND AS-BUILT FOR LYSIMETER L-1
North Ranch
Shelton, Washington
JS0712, 12/2007

PgG

Figure No. B-10



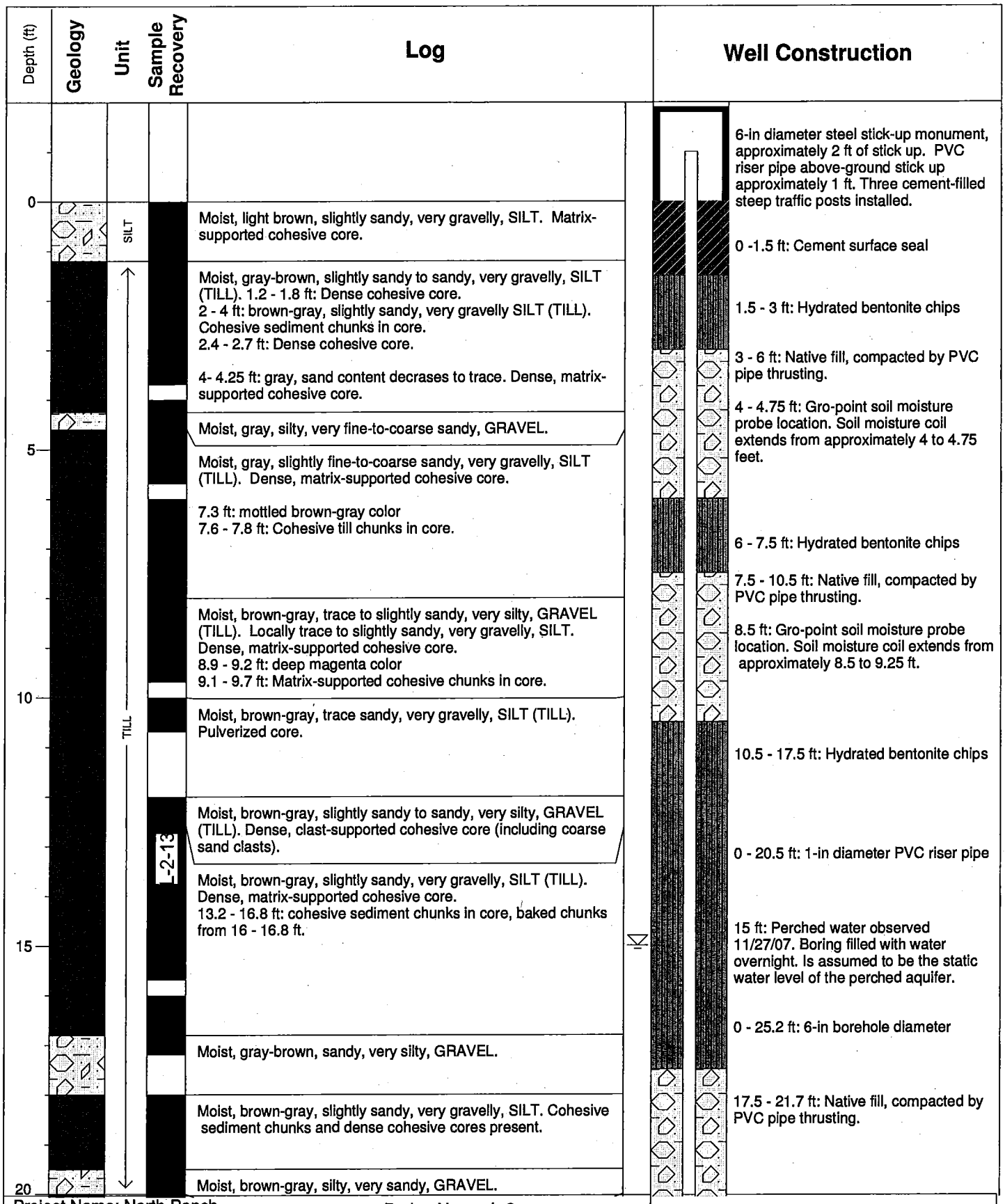
Project Name: North Ranch
Drilling Method: 6" Sonic
Driller: Rodney Labrosse
Firm: Cascade Drilling
Consulting Firm: Pacific Groundwater Group
Logged by: Glenn Mutti
Location: North Ranch Biorecycling, Mason Co.

Boring Name: L-1
Ecology ID: BAL058
MP Elevation:
Datum:
Installed: 11/27 - 11/28/2007
DTW:

Figure A-2
GEOLOGIC LOG AND AS-BUILT FOR LYSIMETER L-1
North Ranch
Shelton, Washington
JS0712, 12/2007

PgG

Figure No. B-10

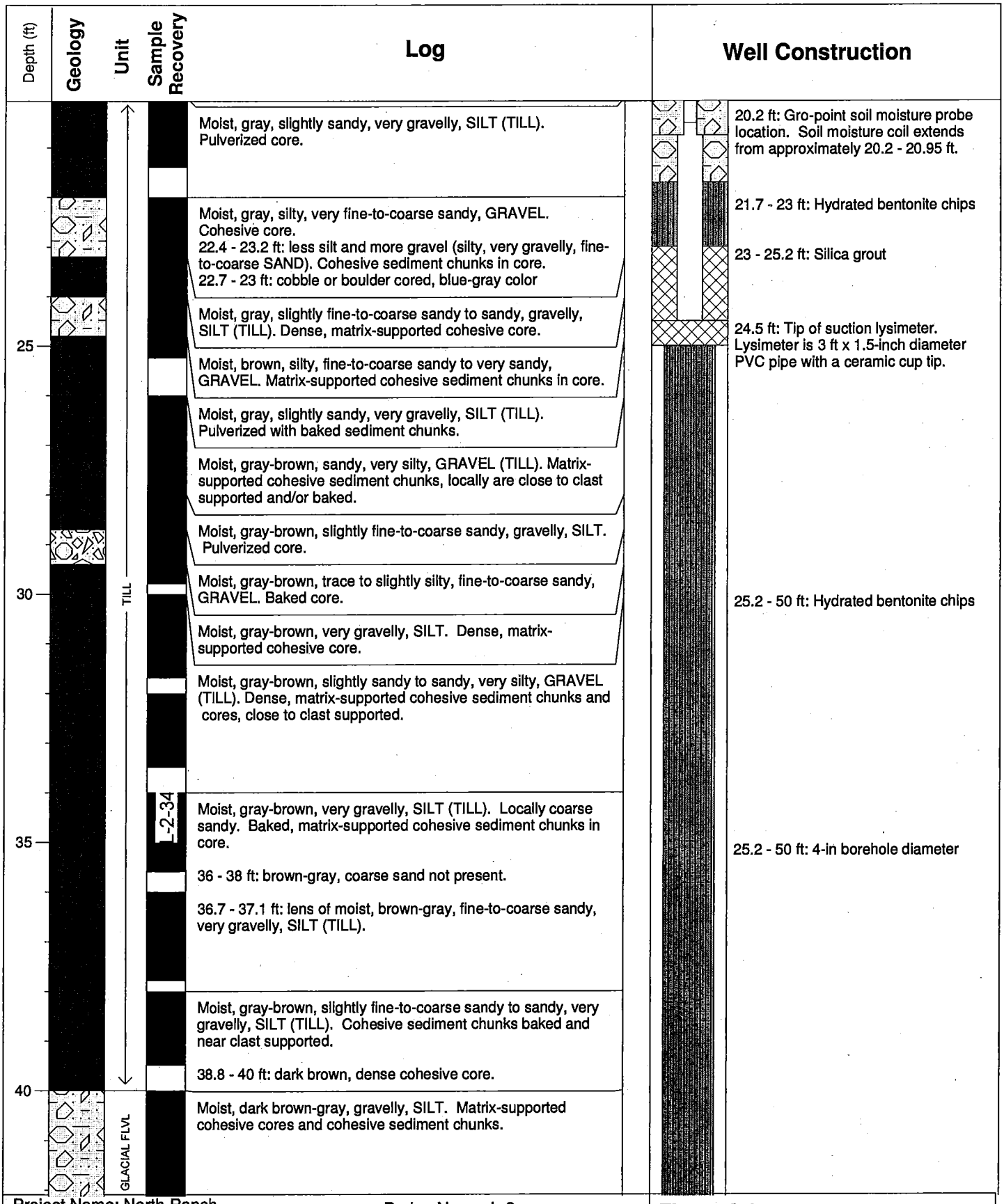


Project Name: North Ranch
Drilling Method: 6" Sonic
Driller: Rodney Labrosse
Firm: Cascade Drilling
Consulting Firm: Pacific Groundwater Group
Logged by: Glenn Mutti
Location: North Ranch Biorecycling, Mason Co.

Boring Name: L-2
Ecology ID: BAL057
MP Elevation:
Datum:
Installed: 11/26 - 11/27/2007
DTW:

Figure A-3
GEOLOGIC LOG AND AS-BUILT FOR LYSIMETER L-2
North Ranch
Shelton, Washington
JS0712, 12/2007
PgG

Figure No. B-11



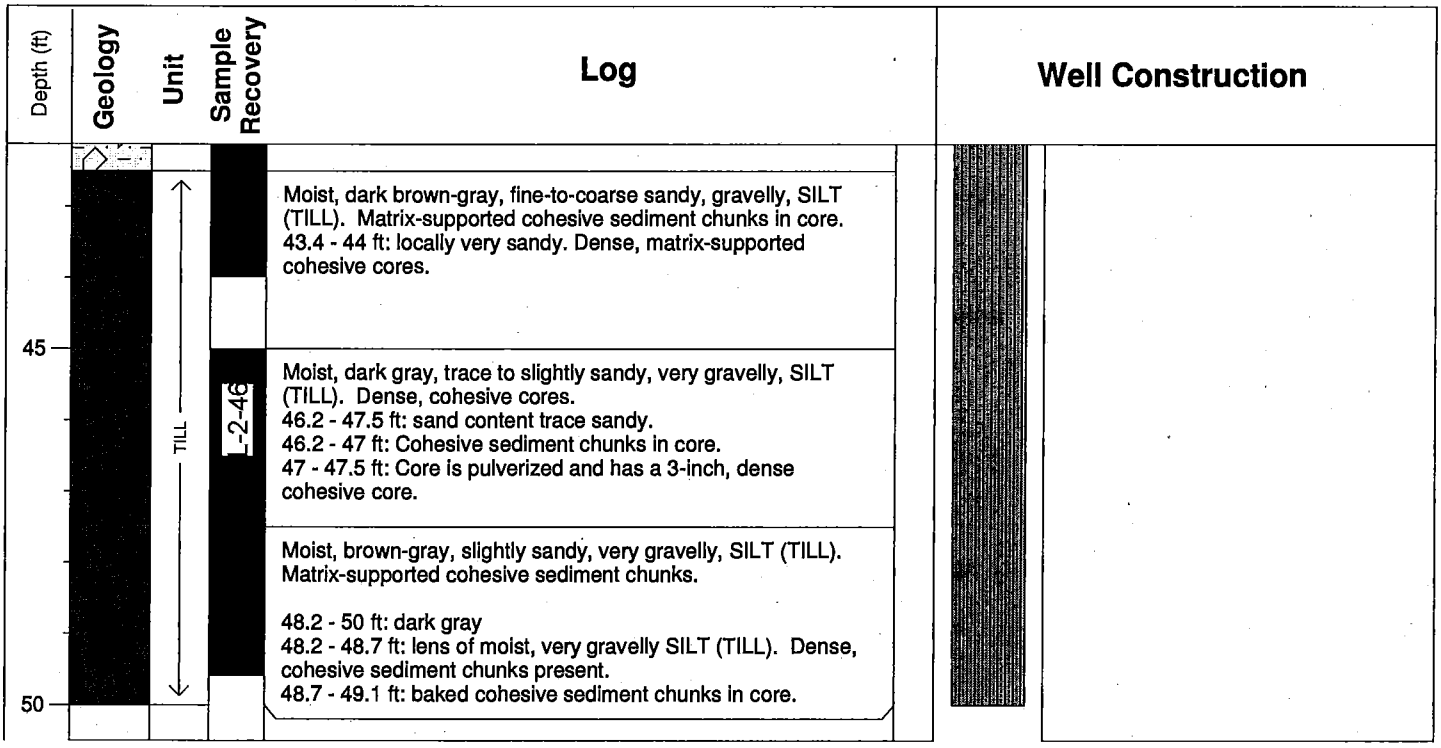
Project Name: North Ranch
Drilling Method: 6" Sonic
Driller: Rodney Labrosse
Firm: Cascade Drilling
Consulting Firm: Pacific Groundwater Group
Logged by: Glenn Mutti
Location: North Ranch Biorecycling, Mason Co.

Boring Name: L-2
Ecology ID: BAL057
MP Elevation:
Datum:
Installed: 11/26 - 11/27/2007
DTW:

Figure A-3
GEOLOGIC LOG AND AS-BUILT FOR LYSIMETER L-2
North Ranch
Shelton, Washington
JS0712, 12/2007

PgG

Figure No. B-11



Project Name: North Ranch
Drilling Method: 6" Sonic
Driller: Rodney Labrosse
Firm: Cascade Drilling
Consulting Firm: Pacific Groundwater Group
Logged by: Glenn Mutti
Location: North Ranch Biorecycling, Mason Co.

Boring Name: L-2
Ecology ID: BAL057
MP Elevation:
Datum:
Installed: 11/26 - 11/27/2007
DTW:

Figure A-3
GEOLOGIC LOG AND AS-BUILT FOR LYSIMETER L-2
North Ranch
Shelton, Washington
JS0712, 12/2007

PgG

Figure No. B-11

WS-2

WATER WELL REPORT

STATE OF WASHINGTON

Start Card No. WI124738
Unique Well I.D. # AFK643
Water Right Permit No.

(1) OWNER: Name BIO RECYCLING Address PO BOX 982 CENTRALIA, WA 98531-

(2) LOCATION OF WELL: County MASON - SE 1/4 NW 1/4 Sec 18 T 21 N., R 3 W

(2a) STREET ADDRESS OF WELL (or nearest address) WEBB HILL ROAD, SHELTON

(3) PROPOSED USE: DOMESTIC

(4) TYPE OF WORK: Owner's Number of well (If more than one)
NEW WELL Method: ROTARY

(5) DIMENSIONS: Diameter of well 6 inches
Drilled 197 ft. Depth of completed well 197 ft.

(6) CONSTRUCTION DETAILS:
Casing installed: 6 * Dia. from +2 ft. to 193.2 ft.
WELDED CASING * Dia. from ft. to ft.
* Dia. from ft. to ft.

Perforations: NO
Type of perforator used
SIZE of perforations in. by in.
perforations from ft. to ft.
perforations from ft. to ft.
perforations from ft. to ft.

Screens: YES
Manufacturer's Name HOUSTON
Type SLOTTED Model No.
Diam. 5 slot size .030 from 197 ft. to 191 ft.
Diam. slot size from ft. to ft.

Gravel packed: NO Size of gravel
Gravel placed from ft. to ft.

Surface seal: YES To what depth? 20 ft.
Material used in seal BENTONITE
Did any strata contain unusable water? NO
Type of water? Depth of strata ft.
Method of sealing strata off

(7) PUMP: Manufacturer's Name
Type H.P.

(8) WATER LEVELS: Land-surface elevation above mean sea level ... ft.
Static level 146 ft. below top of well Date 04/18/00
Artesian Pressure lbs. per square inch Date
Artesian water controlled by

(9) WELL TESTS: Drawdown is amount water level is lowered below static level.
Was a pump test made? NO If yes, by whom?
Yield: gal./min with ft. drawdown after hrs.

Recovery data

Time	Water Level	Time	Water Level	Time	Water Level

Date of test / /
Bailer test gal/min. ft. drawdown after hrs.
Air test 40 gal/min. w/ stem set at 180 ft. for 1 hrs.
Artesian flow g.p.m. Date
Temperature of water Was a chemical analysis made? NO

(10) WELL LOG

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change in formation.

MATERIAL	FROM	TO
LOOSE PACKED SAND PEA GRAVEL	0	5
LOOSE PACKED SAND GRAVEL	5	28
SAND & GRAVEL BRN CLAY BINDER HARD PAN	28	54
PACKED COURSE SAND GRAVEL	54	87
MULTI-COLOR GRV LOOSE COURSE SAND	87	151
LOOSE MULTI-COLOR GRV COURSE SAND	151	160
MULTI-COLOR GRV COURSE SAND WATER	160	197

RECEIVED
MAY - 1 2000
DEPARTMENT OF ECOLOGY
WELL DRILLING UNIT

Work started 04/17/00 Completed 04/18/00

WELL CONSTRUCTOR CERTIFICATION:
I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

NAME ARCADIA DRILLING INC.
(Person, firm, or corporation) (Type or print)

ADDRESS SE 170 WALKER PARK RD

[SIGNED] _____ License No. 2053

Contractor's Registration No. ARCADDIO98K1 Date 04/18/00

Figure No. B-12

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

WELL REPORT

STATE OF WASHINGTON

Start card number W060740

(1) Name BIO RECYCLING Address 18506 SARGENT ROAD, ROCHESTER

(2) Location of well, County- MASON 1/4 1/4 Sec 18 Tn 21 R 3WWM
(2a) Street address of well- OFF WEBB HILL ROAD

(3) Proposed use- COMMERCIAL

(4) Type of work --
Number of well ONE
NEW CONSTRUCTION
Method of drill ROTARY

(5) Dimensions -- Diameter of well 6"
Drilled 160 ' Completed 158'

(6) Construction details --
Casing 6" from +2 ' to 158 '
from ' to '
Welded YES Liner installed NO
Perforations - NO
Type of perforater
Size of perforations " by "
holes from ' to '
holes from ' to '
Screen NO
Manufacturer's Name
Type
Diam. "
Slot size " from ' to '
Slot size " from ' to '
Gravel packed No
Surface seal YES to 18+ feet
Material used in seal BENTONITE
Any unusable water? NO
Type of water
Where?
Method of seal

(7) Water Levels
Elevation above sea level
Static water level '
Artesian pressure

(8) Well tests
Air test;
40+ gpm bit at 150' for 1 hr.
Was pump test made NO
(if yes see attached)

COMMENTS

DESCRIPTION
WELL LOG or ABANDONMENT PROCEDURES

MATERIALS	FROM	TO
SAND,GRAVEL W/SMALL BOULDRS	0	24
SAND,GRAVEL	24	160
	160	

RECEIVED
'95 SEP -8 P1:14
DEPARTMENT OF ECOLOGY
S.W. REGIONAL OFFICE

STARTED 6/22/95 COMPLETED 6/26/95

WELL CONSTRUCTERS CERTIFICATION
I accept responsibility for construction of this well and its compliance with all Washington well construction standards. The information reported above is true to my best knowledge and belief.

KING BROS. DRILLING INC.
644 SHOREY ROAD
CHEHALIS, WASHINGTON 98532
206-748-3798
Contractors number KING BDI 124 DC

C D King

GERALD E. BLUHM License# 2116
DATE MONDAY JUNE 26, 1995

Figure No. B-13

WATER WELL REPORT

STATE OF WASHINGTON

Start Card No. A49208
Unique Well I.D. # N/A
Water Right Permit No.

(1) OWNER: Name BIO RECYCLING Address PO BOX 982 CENTRALIA, WA 98531-

(2) LOCATION OF WELL: County MASON - SE 1/4 NW 1/4 Sec 18 T 21 N., R 3 (W)
(2a) STREET ADDRESS OF WELL (or nearest address) WEBB HILL ROAD, SHELTON]

(3) PROPOSED USE: DOMESTIC

(4) TYPE OF WORK: Owner's Number of well (If more than one)
DECOMMISSION Method: ROTARY

(5) DIMENSIONS: Diameter of well 6 inches
Drilled ft. Depth of completed well 160 ft.

(6) CONSTRUCTION DETAILS:
Casing installed: 6 " Dia. from ft. to 160.6 ft.
WELDED CASING " Dia. from ft. to ft.
" Dia. from ft. to ft.

Perforations: YES
Type of perforator used AIR PERFORATOR
SIZE of perforations 1/4 in. by 1 in.
2560 perforations from 150 ft. to 0 ft.
perforations from ft. to ft.
perforations from ft. to ft.

Screens: NO
Manufacturer's Name
Type Model No.
Diam. slot size from ft. to ft.
Diam. slot size from ft. to ft.

Gravel packed: NO Size of gravel
Gravel placed from ft. to ft.

Surface seal: NO To what depth? ft.
Material used in seal
Did any strata contain unusable water? NO
Type of water? Depth of strata ft.
Method of sealing strata off

(7) PUMP: Manufacturer's Name
Type H.P.

(8) WATER LEVELS: Land-surface elevation above mean sea level ... ft.
Static level 105 ft. below top of well Date 05/01/00
Artesian Pressure lbs. per square inch Date
Artesian water controlled by

(9) WELL TESTS: Drawdown is amount water level is lowered below static level.
Was a pump test made? NO If yes, by whom?
Yield: gal./min with ft. drawdown after hrs.

Recovery data
Time Water Level Time Water Level Time Water Level

Date of test / /
Bailer test gal/min. ft. drawdown after hrs.
Air test gal/min. w/ stem set at ft. for hrs.
Artesian flow g.p.m. Date
Temperature of water Was a chemical analysis made? NO

(10) WELL LOG

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change in formation.

MATERIAL	FROM	TO
Perforated 4 sides of casing		
Filled with Bentonite Slurry topped off with Hole Plug		

RECEIVED
JUN 02 2000
DEPARTMENT OF ECOLOGY
WELL DRILLING UNIT

Work started 05/01/00 Completed 05/01/00

WELL CONSTRUCTOR CERTIFICATION:
I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

NAME ARCADIA DRILLING INC.
(Person, firm, or corporation) (Type or print)

ADDRESS SE 170 WALKER PARK RD

[SIGNED] _____ License No. 2053

Contractor's
Registration No. ARCADIO98K1 Date 05/02/00

Figure No. B-13

21N4W 24Q

Start Card No. W 054532

UNIQUE WELL I.D. # AAW 361

Water Right Permit No.

File Original and First Copy with Department of Ecology
Second Copy — Owner's Copy
Third Copy — Driller's Copy

WATER WELL REPORT

STATE OF WASHINGTON

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

(1) OWNER: Name Mark Biser Address 4610 Daniels St. Vancouver, WA 98663

(2) LOCATION OF WELL: County Mason SW 1/4 SE 1/4 Sec 24 T. 21N N., R. 4W W.M.

(2a) STREET ADDRESS OF WELL (or nearest address) E 241 Webb Hill Rd.

(3) PROPOSED USE: ☒ Domestic ☐ Industrial ☐ Municipal ☐ ☐ Irrigation ☐ Test Well ☐ Other ☐ ☐ DeWater

(4) TYPE OF WORK: Owner's number of well (if more than one)

Abandoned ☐ New well ☒ Method: Dug ☐ Bored ☐ Deepened ☐ Cable ☒ Driven ☐ Reconditioned ☐ Rotary ☐ Jetted ☐

(5) DIMENSIONS: Diameter of well 6 inches. Drilled 110 feet. Depth of completed well 110 ft.

(6) CONSTRUCTION DETAILS:

Casing Installed: 6" Diam. from 0 ft. to 100 ft.
Welded ☒ Diam. from ft. to ft.
Liner Installed ☐ Diam. from ft. to ft.
Threaded ☐

Perforations: Yes ☐ No ☒
Type of perforator used
SIZE of perforations in. by in.
perforations from ft. to ft.
perforations from ft. to ft.
perforations from ft. to ft.

Screens: Yes ☒ No ☐
Manufacturer's Name Cook
Type Stainless wire wrap Model No.
Diam. 5" Slot size 40 from 100 ft. to 105 ft.
Diam. 5" Slot size 40 from 105 ft. to 110 ft.

Gravel packed: Yes ☐ No ☒ Size of gravel
Gravel placed from ft. to ft.

Surface seal: Yes ☒ No ☐ To what depth? 18 ft.
Material used in seal Bentonite
Did any strata contain unusable water? Yes ☐ No ☒
Type of water? Depth of strata
Method of sealing strata off

(7) PUMP: Manufacturer's Name Goulds
Type: sub. H.P. 3/4

(8) WATER LEVELS: Land-surface elevation above mean sea level ft.
Static level 94 ft. below top of well. Date
Artesian pressure lbs. per square inch Date
Artesian water is controlled by (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes ☐ No ☒ If yes, by whom?
Yield: gal./min. with ft. drawdown after hrs.
" " " "
" " " "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test
Bailer test 10 gal./min. with 1 ft. drawdown after 2 hrs.
Airtest gal./min. with stem set at ft. for hrs.
Artesian flow g.p.m. Date
Temperature of water Was a chemical analysis made? Yes ☐ No ☐

(10) WELL LOG or ABANDONMENT PROCEDURE DESCRIPTION

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information.

MATERIAL	FROM	TO
Brown conglomerate	0	5
Sand & gravel	5	55
Sand & gravel w/ some water	55	57
Cemented sand & gravel	57	60
Sand & gravel w/ water	60	61
Sand & gravel	61	95
Sand & gravel w/ water	95	110
	00 10	95 100

Work Started 10/1/94 19. Completed 10/10/94 19

WELL CONSTRUCTOR CERTIFICATION:

I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

NAME Davis Drilling (PERSON, FIRM, OR CORPORATION) (TYPE OR PRINT)

Address Belfair, WA 98528

(Signed) Jon Davis (WELL DRILLER) License No. 1884

Contractor's Registration No. DAVIS1100A Date Oct. 1994 19

(USE ADDITIONAL SHEETS IF NECESSARY)

ECL 050-1-20 (2/93)

Figure No. B-14

APPENDIX C

Groundwater Chemistry: Data Validation and Laboratory Reports

C.1 DATA VALIDATION

C.1 Data Validation

Laboratory analyses were performed by Columbia Analytical Services, Inc., Kelso, Washington. Analytical data and quality control reports are provided in Appendix C.2 and additional quality assurance reports by laboratory are on file. The analytical test results are discussed in Section 4.

Samples were packed in coolers with cold packs and shipped to the test laboratory for delivery within not more than 44 hours from time of sampling. No deviation from required holding temperature was noted by the laboratory.

Samples were analyzed for nitrate within the required 48 hour holding time. All other lab tests were completed within 9 days from time of sampling.

Results of laboratory verification tests–laboratory blank, laboratory control spike (LCS), laboratory duplicate, and matrix spike–were all within acceptable limits, as specified in the QAPP, for all analytes except as noted:

- Duplicate analyses of total phosphorus (TP) and total organic carbon (TOC) for MW-5 differed by 50 percent and 22 percent, respectively. However, the relative percent difference criterion is not applicable because analyte concentrations were not significantly greater than the minimum reporting limits (MRLs).

C.2 LABORATORY REPORTS

1317 South 13th Avenue Kelso, Washington 98626 (360) 577-7222 (360) 636-1068 fax

Columbia Analytical Services INC.
An Employee - Owned Company

June 24, 2008 Analytical Report for Service Request No: K0805184

Erick Miller
Aspect Consulting
179 Madrone Lane North
Bainbridge Island, WA 98110

RE: Webb Hill Biosolids Facility/070041

Dear Erick:

Enclosed are the results of the rush samples submitted to our laboratory on June 12, 2008. For your reference, these analyses have been assigned our service request number K0805184.

All analyses were performed according to our laboratory's quality assurance program. Where applicable, the methods cited conform to the Methods Update Rule (effective 4/11/2007), which relates to the use of analytical methods for the drinking water and waste water programs. The test results meet requirements of the NELAC standards. Exceptions are noted in the case narrative report where applicable. All results are intended to be considered in their entirety, and Columbia Analytical Services, Inc. (CAS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please call if you have any questions. My extension is 3376. You may also contact me via Email at GSalata@caslab.com.

Respectfully submitted,

Columbia Analytical Services, Inc.

Gregory Salata, Ph.D.
Project Chemist

GS/ss

Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Inorganic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result.
E	The result is an estimate amount because the value exceeded the instrument calibration range.
J	The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
U	The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
i	The MRL/MDL has been elevated due to a matrix interference.
X	See case narrative.

Metals Data Qualifiers

#	The control limit criteria is not applicable. See case narrative.
B	The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
E	The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
M	The duplicate injection precision was not met.
N	The Matrix Spike sample recovery is not within control limits. See case narrative.
S	The reported value was determined by the Method of Standard Additions (MSA).
U	The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
W	The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
i	The MRL/MDL has been elevated due to a matrix interference.
X	See case narrative.
*	The duplicate analysis not within control limits. See case narrative.
+	The correlation coefficient for the MSA is less than 0.995.

Organic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
A	A tentatively identified compound, a suspected aldol-condensation product.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result.
C	The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
D	The reported result is from a dilution.
E	The result is an estimate amount because the value exceeded the instrument calibration range.
J	The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
N	The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
P	The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results (25% for CLP Pesticides).
U	The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
i	The MRL/MDL has been elevated due to a chromatographic interference.
X	See case narrative.

Additional Petroleum Hydrocarbon Specific Qualifiers

F	The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
L	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
H	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
O	The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
Y	The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
Z	The chromatographic fingerprint does not resemble a petroleum product.

Columbia Analytical Services, Inc.
Kelso, WA
State Certifications, Accreditations, and Licenses

Program	Number
Alaska DEC UST	UST-040
Arizona DHS	AZ0339
Arkansas - DEQ	88-0637
California DHS	2286
Colorado DPHE	-
Florida DOH	E87412
Hawaii DOH	-
Idaho DHW	-
Indiana DOH	C-WA-01
Louisiana DEQ	3016
Louisiana DHH	LA050010
Maine DHS	WA0035
Michigan DEQ	9949
Minnesota DOH	053-999-368
Montana DPHHS	CERT0047
Nevada DEP	WA35
New Jersey DEP	WA005
New Mexico ED	-
North Carolina DWQ	605
Oklahoma DEQ	9801
Oregon - DHS	WA200001
South Carolina DHEC	61002
Utah DOH	COLU
Washington DOE	C1203
Wiseonsin DNR	998386840
Wyoming (EPA Region 8)	-

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	Aspect Consulting	**Service Request No.:**	K0805184
Project:	Webb Hill Biosolids Facility/070041	**Date Received:**	06/12/08 to 06/13/08
Sample Matrix:	Water		

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of Columbia Analytical Services, Inc. (CAS). This report contains analytical results for samples designated for Tier III validation deliverables including summary forms and all of the associated raw data for each of the analyses. When appropriate to the method, method blank results have been reported with each analytical test.

Sample Receipt

Three water samples were received for analysis at Columbia Analytical Services on 06/12/08 to 06/13/08. The samples were received in good condition and consistent with the accompanying chain of custody form. The samples were stored in a refrigerator at 4°C upon receipt at the laboratory.

General Chemistry Parameters

Phosphorus, Total by EPA 365.3
Carbon, Total Organic by EPA 415.1
The Relative Percent Difference (RPD) criterion for the replicate analysis of Total Phosphorus and Total Organic Carbon in sample MW-5 is not applicable because the analyte concentration was not significantly greater than the Method Reporting Limit (MRL). Analytical values derived from measurements close to the detection limit are not subject to the same accuracy and precision criteria as results derived from measurements higher on the calibration range for the method.

No other anomalies associated with the analysis of these samples were observed.

Total Metals

No anomalies associated with the analysis of these samples were observed.

Approved by _____ **Date** 6/24/08

CHAIN OF CUSTODY

SR#: K0805184

Columbia Analytical Services INC.
An Employee - Owned Company

1317 South 13th Ave. • Kelso, WA 98626 • (360) 577-7222 • (800) 695-7222x07 • FAX (360) 636-1068

PAGE _____ OF _____ COC #_____

PROJECT NAME: Webb Hill
PROJECT NUMBER: 070041
PROJECT MANAGER: Erick Miller
COMPANY/ADDRESS: Aspect Consulting
179 Madrone Lane N
CITY/STATE/ZIP: Bainbridge Is. WA 98110
E-MAIL ADDRESS: jlobischer@aspectconsulting.com
PHONE #: 206-780-7721 FAX#:
SAMPLER'S SIGNATURE: Joseph Lobischer

SAMPLE I.D.	DATE	TIME	LAB I.D.	MATRIX	NUMBER OF CONTAINERS	Semivolatile Organics by GC/MS 625☐ 8270☐ 8270LL☐	Volatile Organics 624☐ 8260☐ 8021☐ BTEX☐	Hydrocarbons (*see below) Gas☐ Diesel☐ Oil☐ ☐ Fuel Fingerprint (FIQ) ☐ NW-HCID Screen	Oil & Grease/TRPH 1664 SGT☐ 1664 HEM☐	PCB's Aroclors☐ Congeners☐	Pesticides/Herbicides 608☐ 8081A☐ 8141A☐ 8151A☐	Chlorophenolics - 8151M Tri☐ Tetra☐ PCP☐	PAHS 8310☐ SIM☐	Metals, Total or Dissolved (See list below)	Cyanide☐	pH Cond. (Cl, SO_4, PO_4, F, NO_2, NO_3) Hex-Chrom☐	BOD, TSS, NH_3-N COD (circle) TDS (circle) (Total-P, TKN, NO_2+NO_3) DOC (circle)	TOX 9020☐ AOX 1650☐ 506☐	Fluoride Bromide	Ethylene Glycol	Carbonate Bicarbonate			REMARKS
MW-5	6/10/08				4								✓			✓	✓		✓	✓				
MW-7	6/11/08	11:40			4								✓			✓	✓		✓	✓				

REPORT REQUIREMENTS

___ I. Routine Report: Method Blank, Surrogate, as required
___ II. Report Dup., MS, MSD as required
✓ III. Data Validation Report (includes all raw data)
___ IV. CLP Deliverable Report
✓ V. EDD

INVOICE INFORMATION
P.O. # 070041
Bill To: Aspect

TURNAROUND REQUIREMENTS
____ 24 hr. ____ 48 hr.
✓ 5 Day
____ Standard (10-15 working days)
____ Provide FAX Results
Requested Report Date

Circle which metals are to be analyzed:

Total Metals: Al As Sb Ba Be B (Ca) Cd Co Cr Cu (Fe) Pb (Mg) (Mn) Mo Ni (K) Ag (Na) Se Sr Tl Sn V Zn Hg

Dissolved Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

*INDICATE STATE HYDROCARBON PROCEDURE: AK CA WI NORTHWEST OTHER:_____ (CIRCLE ONE)

SPECIAL INSTRUCTIONS/COMMENTS:
Report with other samples from this project.

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
Signature: Joseph Lobischer	Signature:	Signature:	Signature:
Date/Time: 6/11/08 15:00	Date/Time: 6/12/08 0930	Date/Time:	Date/Time:
Printed Name: Joseph Lobischer	Printed Name:	Printed Name:	Printed Name:
Firm: Aspect	Firm: CAS	Firm:	Firm:

RCOC #1 06/03

CHAIN OF CUSTODY

Columbia Analytical Services INC. — An Employee - Owned Company

1317 South 13th Ave. • Kelso, WA 98626 • (360) 577-7222 • (800) 695-7222x07 • FAX (360) 636-1068

SR#: K0805184

PAGE ______ OF ______ COC # ______

PROJECT NAME: Webb Hill
PROJECT NUMBER: 070041
PROJECT MANAGER: Erick Miller
COMPANY/ADDRESS: Aspect Consulting, 179 Madrone Lane N
CITY/STATE/ZIP: Bainbridge Is, WA 98110
E-MAIL ADDRESS: jlubischer@aspectconsulting.com
PHONE #: 206-780-7774 FAX#:
SAMPLER'S SIGNATURE: [signature]

SAMPLE I.D.	DATE	TIME	LAB I.D.	MATRIX	NUMBER OF CONTAINERS	Semivolatile Organics by GC/MS 625☐ 8270☐ 8270LL☐	Volatile Organics 624☐ 8260☐	Hydrocarbons (*see below) Gas☐ 8021☐ BTEX☐	Fuel Fingerprint (FIQ) ☐ Diesel☐ Oil☐ ☐ NW-HCID Screen	Oil & Grease/TRPH 1664 HEM☐ 1664 SGT☐	PCB's Aroclors☐ Congeners☐	Pesticides/Herbicides 608☐ 8081A☐ 8141A☐ 8151A☐	Chlorophenolics - 8151M Tri☐ Tetra☐ PCP☐	PAHS 8310☐ SIM☐	Metals, Total or Dissolved (See list below)	Cyanide☐	pH, Cond, Cl, SO4, PO4, F, NO2, NO3, Hex-Chrom☐	NH3-N, COD, BOD, TSS, TDS (circle), Total-P, TKN, TOC, DOC (circle), NO2+NO3	TOX 9020☐ AOX 1650☐ 506☐	bromide	carbonate, bicarbonate, HCO3, CO3		REMARKS
MW-6	6/12/08	11:00			4										✓		✓	✓		✓	✓		

REPORT REQUIREMENTS

___ I. Routine Report: Method Blank, Surrogate, as required
___ II. Report Dup., MS, MSD as required
___ III. Data Validation Report (includes all raw data)
___ IV. CLP Deliverable Report
___ V. EDD

INVOICE INFORMATION

P.O. # ______
Bill To: ______

TURNAROUND REQUIREMENTS

___ 24 hr. ___ 48 hr.
___ 5 Day
___ Standard (10-15 working days)
___ Provide FAX Results
______ Requested Report Date

Circle which metals are to be analyzed:

Total Metals: Al As Sb Ba Be B (Ca) Cd Co Cr Cu (Fe) Pb (Mg) (Mn) Mo Ni (K) Ag (Na) Se Sr Tl Sn V Zn Hg

Dissolved Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

*INDICATE STATE HYDROCARBON PROCEDURE: AK CA WI NORTHWEST OTHER:______ (CIRCLE ONE)

SPECIAL INSTRUCTIONS/COMMENTS:
Report with previous samples from this project.
All HNO_3 bottles were 0.45μ filtered in the field.

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
Signature: [signature] Date/Time: 6/12/08 15:20	Signature: [signature] Date/Time: 6/13/08 0930	Signature ______ Date/Time ______	Signature ______ Date/Time ______
Printed Name: Joseph Lubischer Firm:	Printed Name: [illegible] Firm: CAS	Printed Name ______ Firm ______	Printed Name ______ Firm ______

RCOC #1 06/03

Columbia Analytical Services, Inc.
Cooler Receipt and Preservation Form

PC: Meg

Client / Project: Aspect Service Request K08 05184

Received: 6/13/08 Opened: 6/13/08 By: A.J

1. Samples were received via? *US Mail* (Fed Ex) *UPS* *DHL* *GH* *GS* *PDX* *Courier* *Hand Delivered*
2. Samples were received in: (circle) (Cooler) *Box* *Envelope* *Other* _____ *NA*
3. Were custody seals on coolers? NA (Y) N If yes, how many and where? 1F
   If present, were custody seals intact? (Y) N If present, were they signed and dated? (Y) N
4. Is shipper's air-bill filed? If not, record air-bill number: _____ NA Y N

5. Temperature of cooler(s) upon receipt (°C):	3.0			
Temperature Blank (°C):	6.3			
6. If applicable, list Chain of Custody Numbers:				

7. Were custody papers properly filled out (ink, signed, etc.)? NA (Y) N
8. Packing material used. *Inserts* *Baggies* *Bubble Wrap* (Gel Packs) *Wet Ice* *Sleeves* *Other* _____
9. **Did all bottles arrive in good condition (unbroken)?** *Indicate in the table below.* NA (Y) N
10. Were all sample labels complete (i.e analysis, preservation, etc.)? (Y) N
11. Did all sample labels and tags agree with custody papers? *Indicate in the table below* (Y) N
12. **Were appropriate bottles/containers and volumes received for the tests indicated?** NA (Y) N
13. Were the pH-preserved bottles tested* received at the appropriate pH? *Indicate in the table below* NA (Y) N
14. Were VOA vials and 1631 Mercury bottles received without headspace? *Indicate in the table below.* (NA) Y N
15. **Are CWA Microbiology samples received with >1/2 the 24hr. hold time remaining from collection?** (NA) Y N
16. Was C12/Res negative? (NA) Y N

Sample ID on Bottle	Sample ID on COC	Sample ID on Bottle	Sample ID on COC

Sample ID	Bottle Count	Bottle Type	Out of Temp	Head-space	Broken	pH	Reagent	Volume added	Reagent Lot Number	Initials

*Does not include all pH preserved sample aliquots received. See sample receiving SOP (SMO-GEN).

Additional Notes, Discrepancies, & Resolutions:

label on metal bottle says Field Filtered.

Columbia Analytical Services, Inc.
Cooler Receipt and Preservation Form

PC Shey

Client / Project: Aspect Consulting Service Request K08 05184

Received: 6/12/08 Opened: 6/12/08 By: KSmith

1. Samples were received via? *US Mail* (Fed Ex) *UPS* *DHL* *GH* *GS* *PDX* *Courier* *Hand Delivered*
2. Samples were received in: (circle) (Cooler) *Box* *Envelope* *Other* _____ *NA*
3. Were custody seals on coolers? NA Y (N) If yes, how many and where? _____
   If present, were custody seals intact? Y (N) If present, were they signed and dated? Y (N)
4. Is shipper's air-bill filed? If not, record air-bill number: _____ NA (Y) N

RUSH

5. Temperature of cooler(s) upon receipt (°C): 4.7C
   Temperature Blank (°C): 4.8C
6. If applicable, list Chain of Custody Numbers:
7. Were custody papers properly filled out (ink, signed, etc.)? NA (Y) N
8. Packing material used. *Inserts* *Baggies* (Bubble Wrap) (Gel Packs) *Wet Ice* *Sleeves* *Other* _____
9. **Did all bottles arrive in good condition (unbroken)?** *Indicate in the table below.* NA (Y) N
10. Were all sample labels complete (i.e analysis, preservation, etc.)? (Y) N

SHORT HOLD TIME

11. Did all sample labels and tags agree with custody papers? *Indicate in the table below* (Y) N
12. **Were appropriate bottles/containers and volumes received for the tests indicated?** NA (Y) N
13. Were the pH-preserved bottles tested* received at the appropriate pH? *Indicate in the table below* NA (Y) N
14. Were VOA vials and 1631 Mercury bottles received without headspace? *Indicate in the table below.* NA Y N
15. **Are CWA Microbiology samples received with >1/2 the 24hr. hold time remaining from collection?** NA Y N
16. Was C12/Res negative? NA Y N

Sample ID on Bottle	Sample ID on COC	Sample ID on Bottle	Sample ID on COC

Sample ID	Bottle Count	Bottle Type	Out of Temp	Head-space	Broken	pH	Reagent	Volume added	Reagent Lot Number	Initials

*Does not include all pH preserved sample aliquots received. See sample receiving SOP (SMO-GEN).

Additional Notes, Discrepancies, & Resolutions: _____

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client : Aspect Consulting
Project Name : Webb Hill Biosolids Facility
Project Number : 070041
Sample Matrix : WATER

Service Request : K0805184
Date Collected : 06/10-12/08
Date Received : 06/12,13/08

Ammonia as Nitrogen

Analysis Method : SM 4500 NH3 E
Test Notes :

Units : mg/L
Basis : NA

Sample Name	Lab Code	MRL	MDL	Dilution Factor	Date Analyzed	Result	Result Notes
MW-5	K0805184-001	0.05	0.02	1	06/19/08	0.08	
MW-7	K0805184-002	0.05	0.02	1	06/19/08	0.02	J
MW-6	K0805184-003	0.05	0.02	1	06/19/08	0.12	
Method Blank	K0805184-MB	0.05	0.02	1	06/19/08	ND	

SM Standard Methods for the Examination of Water and Wastewater, 20th Ed., 1998.

Report By: CSKILLERN

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client :	Aspect Consulting	**Service Request :**	K0805184
Project Name :	Webb Hill Biosolids Facility	**Date Collected :**	06/10-12/08
Project Number :	070041	**Date Received :**	06/12,13/08
Sample Matrix :	WATER		

Bicarbonate as CaCO3

Analysis Method :	SM 2320 B	Units :	mg/L
Test Notes :		Basis :	NA

Sample Name	Lab Code	MRL	MDL	Dilution Factor	Date Analyzed	Result	Result Notes
MW-5	K0805184-001	2	1	1	06/13/08	48	
MW-7	K0805184-002	2	1	1	06/13/08	29	
MW-6	K0805184-003	2	1	1	06/14/08	50	
Method Blank	K0805184-MB	2	1	1	06/13/08	ND	
Method Blank	K0805184-MB	2	1	1	06/14/08	ND	

SM Standard Methods for the Examination of Water and Wastewater, 20th Ed., 1998.

Report By:CSKILLERN

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client : Aspect Consulting
Project Name : Webb Hill Biosolids Facility
Project Number : 070041
Sample Matrix : WATER

Service Request : K0805184
Date Collected : 06/10-12/08
Date Received : 06/12,13/08

Carbonate as CaCO3

Analysis Method : SM 2320 B
Test Notes :

Units : mg/L
Basis : NA

Sample Name	Lab Code	MRL	MDL	Dilution Factor	Date Analyzed	Result	Result Notes
MW-5	K0805184-001	2	1	1	06/13/08	ND	
MW-7	K0805184-002	2	1	1	06/13/08	ND	
MW-6	K0805184-003	2	1	1	06/14/08	ND	
Method Blank	K0805184-MB	2	1	1	06/13/08	ND	
Method Blank	K0805184-MB	2	1	1	06/14/08	ND	

SM Standard Methods for the Examination of Water and Wastewater, 20th Ed., 1998.

Report By: CSKILLERN

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Analytical Report

Client : Aspect Consulting
Project Name : Webb Hill Biosolids Facility
Project Number : 070041
Sample Matrix : WATER

Service Request : K0805184
Date Collected : 06/10-12/08
Date Received : 06/12,13/08

Bromide

Analysis Method : 300.0
Test Notes :

Units : mg/L
Basis : NA

Sample Name	Lab Code	MRL	MDL	Dilution Factor	Date Analyzed	Result	Result Notes
MW-5	K0805184-001	0.1	0.012	2	06/12/08	0.012	J
MW-7	K0805184-002	0.1	0.012	2	06/12/08	ND	
MW-6	K0805184-003	0.1	0.012	2	06/13/08	0.012	J
Method Blank	K0805184-MB	0.1	0.006	1	06/13/08	ND	
Method Blank	K0805184-MB	0.1	0.006	1	06/12/08	ND	

Report By: CSKILLERN

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client : Aspect Consulting
Project Name : Webb Hill Biosolids Facility
Project Number : 070041
Sample Matrix : WATER

Service Request : K0805184
Date Collected : 06/10-12/08
Date Received : 06/12,13/08

Chloride

Analysis Method : 300.0
Test Notes :

Units : mg/L
Basis : NA

Sample Name	Lab Code	MRL	MDL	Dilution Factor	Date Analyzed	Result	Result Notes
MW-5	K0805184-001	0.2	0.016	2	06/12/08	6.9	
MW-7	K0805184-002	0.2	0.016	2	06/12/08	3.8	
MW-6	K0805184-003	0.2	0.016	2	06/13/08	15.7	
Method Blank	K0805184-MB	0.2	0.008	1	06/13/08	ND	
Method Blank	K0805184-MB	0.2	0.008	1	06/12/08	ND	

Report By: CSKILLERN

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client : Aspect Consulting
Project Name : Webb Hill Biosolids Facility
Project Number : 070041
Sample Matrix : WATER

Service Request : K0805184
Date Collected : 06/10-12/08
Date Received : 06/12,13/08

Fluoride

Analysis Method : 300.0
Test Notes :

Units : mg/L
Basis : NA

Sample Name	Lab Code	MRL	MDL	Dilution Factor	Date Analyzed	Result	Result Notes
MW-5	K0805184-001	0.2	0.010	2	06/12/08	0.011	J
MW-7	K0805184-002	0.2	0.010	2	06/12/08	0.021	J
MW-6	K0805184-003	0.2	0.010	2	06/13/08	ND	
Method Blank	K0805184-MB	0.2	0.005	1	06/13/08	ND	
Method Blank	K0805184-MB	0.2	0.005	1	06/12/08	ND	

Report By: CSKILLERN

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client : Aspect Consulting
Project Name : Webb Hill Biosolids Facility
Project Number : 070041
Sample Matrix : WATER

Service Request : K0805184
Date Collected : 06/10-12/08
Date Received : 06/12,13/08

Nitrate as Nitrogen

Analysis Method : 300.0
Test Notes :

Units : mg/L
Basis : NA

Sample Name	Lab Code	MRL	MDL	Dilution Factor	Date/Time Analyzed	Result	Result Notes
MW-5	K0805184-001	0.1	0.008	2	06/12/08 14:13	4.0	
MW-7	K0805184-002	0.1	0.008	2	06/12/08 14:24	0.7	
MW-6	K0805184-003	0.5	0.020	5	06/13/08 15:40	11.9	
Method Blank	K0805184-MB	0.1	0.004	1	06/12/08 09:27	ND	
Method Blank	K0805184-MB	0.1	0.004	1	06/13/08 09:38	ND	

Report By: CSKILLERN

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client : Aspect Consulting
Project Name : Webb Hill Biosolids Facility
Project Number : 070041
Sample Matrix : WATER

Service Request : K0805184
Date Collected : 06/10-12/08
Date Received : 06/12,13/08

Sulfate

Analysis Method : 300.0
Test Notes :

Units : mg/L
Basis : NA

Sample Name	Lab Code	MRL	MDL	Dilution Factor	Date Analyzed	Result	Result Notes
MW-5	K0805184-001	0.2	0.012	2	06/12/08	2.0	
MW-7	K0805184-002	0.2	0.012	2	06/12/08	0.9	
MW-6	K0805184-003	0.2	0.012	2	06/13/08	6.7	
Method Blank	K0805184-MB	0.2	0.006	1	06/13/08	ND	
Method Blank	K0805184-MB	0.2	0.006	1	06/12/08	ND	

Report By: CSKILLERN

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client : Aspect Consulting
Project Name : Webb Hill Biosolids Facility
Project Number : 070041
Sample Matrix : WATER

Service Request : K0805184
Date Collected : 06/10-12/08
Date Received : 06/12,13/08

Nitrate+Nitrite as Nitrogen

Analysis Method : 353.2
Test Notes :

Units : mg/L
Basis : NA

Sample Name	Lab Code	MRL	MDL	Dilution Factor	Date Analyzed	Result	Result Notes
MW-5	K0805184-001	0.05	0.005	1	06/13/08	4.09	
MW-7	K0805184-002	0.05	0.005	1	06/13/08	0.83	
MW-6	K0805184-003	0.50	0.050	10	06/19/08	12.0	
Method Blank	K0805184-MB	0.05	0.005	1	06/13/08	0.007	J
Method Blank	K0805184-MB	0.05	0.005	1	06/19/08	ND	

Report By: CSKILLERN

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client : Aspect Consulting
Project Name : Webb Hill Biosolids Facility
Project Number : 070041
Sample Matrix : WATER

Service Request : K0805184
Date Collected : 06/10-12/08
Date Received : 06/12,13/08

Phosphorus, Total

Prep Method : Method
Analysis Method : 365.3
Test Notes :

Units : mg/L
Basis : NA

Sample Name	Lab Code	MRL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Result	Result Notes
MW-5	K0805184-001	0.01	0.004	1	6/13/2008	06/13/08	0.01	
MW-7	K0805184-002	0.01	0.004	1	6/13/2008	06/13/08	0.02	
MW-6	K0805184-003	0.01	0.004	1	6/13/2008	06/17/08	0.01	
Method Blank	K0805184-MB	0.01	0.004	1	6/13/2008	06/17/08	ND	
Method Blank	K0805184-MB	0.01	0.004	1	6/13/2008	06/13/08	ND	

Report By: CSKILLERN

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client : Aspect Consulting
Project Name : Webb Hill Biosolids Facility
Project Number : 070041
Sample Matrix : WATER

Service Request : K0805184
Date Collected : 06/10-12/08
Date Received : 06/12,13/08

Nitrogen, Total Kjeldahl (TKN)

Prep Method : ASTM D 3590-89B-21.1
Analysis Method : ASTM D 1426-93B
Test Notes :

Units : mg/L
Basis : NA

Sample Name	Lab Code	MRL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Result	Result Notes
MW-5	K0805184-001	0.2	0.07	1	6/17/2008	06/18/08	0.8	
MW-7	K0805184-002	0.2	0.07	1	6/17/2008	06/18/08	1.0	
MW-6	K0805184-003	0.2	0.07	1	6/17/2008	06/18/08	2.0	
Method Blank	K0805184-MB	0.2	0.07	1	6/17/2008	06/18/08	0.14	J

Report By: CSKILLERN

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client : Aspect Consulting
Project Name : Webb Hill Biosolids Facility
Project Number : 070041
Sample Matrix : WATER

Service Request : K0805184
Date Collected : 06/10-12/08
Date Received : 06/12,13/08

Carbon, Total Organic

Analysis Method : 415.1
Test Notes :

Units : mg/L
Basis : NA

Sample Name	Lab Code	MRL	MDL	Dilution Factor	Date Analyzed	Result	Result Notes
MW-5	K0805184-001	0.5	0.05	1	06/16/08	1.0	
MW-7	K0805184-002	0.5	0.05	1	06/16/08	0.7	
MW-6	K0805184-003	0.5	0.05	1	06/16/08	1.0	
Method Blank	K0805184-MB	0.5	0.05	1	06/16/08	ND	

Report By: CSKILLERN

Columbia Analytical Services

- Cover Page -
INORGANIC ANALYSIS DATA PACKAGE

Client: Aspect Consulting
Project Name: Webb Hill Biosolids Facility
Project No.: 070041

Service Request: K0805184

Sample Name:	Lab Code:
MW-5	K0805184-001 DISS
MW-5D	K0805184-001D DISS
MW-5S	K0805184-001S DISS
MW-7	K0805184-002 DISS
MW-6	K0805184-003 DISS
MW-6D	K0805184-003D DISS
MW-6S	K0805184-003S DISS
Method Blank	K0805184-MB
Method Blank	K0805184-MB2

Comments:

Approved By: 3C **Date:** 6/20/08

Metals

- 1 -

INORGANIC ANALYSIS DATA PACKAGE

Client: Aspect Consulting
Project No.: 070041
Project Name: Webb Hill Biosolids Facility
Matrix: WATER

Service Request: K0805184
Date Collected: 6/10/08
Date Received: 6/12/08
Units: ug/L
Basis: N/A

Sample Name: MW-5
Lab Code: K0805184-001 DISS

Analyte	Analysis Method	MRL	MDL	Dil. Factor	Date Extracted	Date Analyzed	Result	C	Q
Calcium	200.7	50	10	1.0	06/17/08	06/18/08	15500		
Iron	200.7	20.0	10.0	1.0	06/17/08	06/18/08	10.0	U	
Magnesium	200.7	20	1.5	1.0	06/17/08	06/18/08	7450		
Manganese	200.7	5.0	1.0	1.0	06/17/08	06/18/08	1.1	B	
Potassium	200.7	2000	1000	1.0	06/17/08	06/18/08	1000	U	
Sodium	200.7	100	35	1.0	06/17/08	06/18/08	3860		

% Solids: 0.0

Comments:

Metals

- 1 -
INORGANIC ANALYSIS DATA PACKAGE

Client: Aspect Consulting
Project No.: 070041
Project Name: Webb Hill Biosolids Facility
Matrix: WATER

Service Request: K0805184
Date Collected: 6/11/08
Date Received: 6/12/08
Units: ug/L
Basis: N/A

Sample Name: MW-7
Lab Code: K0805184-002 DISS

Analyte	Analysis Method	MRL	MDL	Dil. Factor	Date Extracted	Date Analyzed	Result	C	Q
Calcium	200.7	50	10	1.0	06/17/08	06/18/08	10100		
Iron	200.7	20.0	10.0	1.0	06/17/08	06/18/08	10.0	U	
Magnesium	200.7	20	1.5	1.0	06/17/08	06/18/08	4950		
Manganese	200.7	5.0	1.0	1.0	06/17/08	06/18/08	13.8		
Potassium	200.7	2000	1000	1.0	06/17/08	06/18/08	1000	U	
Sodium	200.7	100	35	1.0	06/17/08	06/18/08	3110		

% Solids: 0.0

Comments:

Metals

- 1 -

INORGANIC ANALYSIS DATA PACKAGE

Client: Aspect Consulting
Service Request: K0805184
Project No.: 070041
Date Collected: 6/12/08
Project Name: Webb Hill Biosolids Facility
Date Received: 6/13/08
Matrix: WATER
Units: ug/L
Basis: N/A

Sample Name: MW-6
Lab Code: K0805184-003 DISS

Analyte	Analysis Method	MRL	MDL	Dil. Factor	Date Extracted	Date Analyzed	Result	C	Q
Calcium	200.7	50	9	1.0	06/19/08	06/19/08	24400		
Iron	200.7	20.0	2.0	1.0	06/19/08	06/19/08	4.8	B	
Magnesium	200.7	20	4.0	1.0	06/19/08	06/19/08	11700		
Manganese	200.7	5.0	0.3	1.0	06/19/08	06/19/08	5.6		
Potassium	200.7	2000	30	1.0	06/19/08	06/19/08	405	B	
Sodium	200.7	100	20	1.0	06/19/08	06/19/08	4630		

% Solids: 0.0

Comments:

APPENDIX D

USGS Groundwater Dating and Water Quality Report

United States Department of the Interior
U.S. Geological Survey
USGS Washington Water Science Center
934 Broadway, Suite 300
Tacoma, Washington 98402
(253) 552-1600 . FAX (253) 552-1581
http://wa.water.usgs.gov/

June 26, 2008

Ms. Pam Bennett-Cumming
Mason County Department of Community Development
Senior Planner - Water Resource Planning
411 North 5th
P.O. Box 279
Shelton, Washington 98584

Dear Ms. Bennett-Cumming:

Attached are results of the laboratory analyses of archived water-quality samples collected by the U.S. Geological Survey (USGS) from four Webb Hill monitoring wells (MW-1, MW-2, MW-3 and MW-4) in July 2007. The USGS unique site identification numbers for these wells are 4718281223063501, 471831123070001, 471845123063701, and 471815123061801, respectively. Sample results are stored in and can be retrieved from our National Water Quality Database (http://waterdata.usgs.gov/nwis) using these site identification numbers. For future reference, please refer to these numbers.

The samples were analyzed for selected constituents that have been identified by the USGS National Research Program as useful tracers of recently recharged ground water. These types of data, in particular the sulfur hexafluoride data, may provide information useful to Mason County in its ongoing hydrologic investigation of the Webb Hill Biosolids disposal facility and nutrient issues in Hood Canal. General discussions of the use of environmental tracers for dating recently recharged ground water are summarized by Plummer and others, 1993.

Samples were collected to analyze for three suites of environmental tracers, including sulfur-hexafluoride, tritium-helium, and waste-water treatment compounds. Sulfur-hexafluoride (SF_6) is present in the atmosphere primarily as a result of anthropogenic origin. The atmospheric concentration of SF_6 has increased from a steady-state value of about 0.05 parts per trillion to more than 4 parts per trillion during the past 40 years. The date of ground-water recharge can be estimated from SF_6 concentrations if it is in equilibrium with atmospheric SF_6 at the time of recharge. Methods describing the sulfur hexafluoride technique and its limitations can be found in E. Busenberg and L.N. Plummer, 2000.

Results from three of the four sulfur hexafluoride (SF_6) samples provided good estimates of the year of ground-water recharge. The SF_6 measurements results are reported using a NOAA scale as mass concentrations (FMoles/kg) but have been converted to equivalent concentrations as partial volume (pptv) for comparison to regularly monitored atmospheric SF_6 concentrations. On the attached figure, the results of the analysis of MW1, MW2, and MW4 are plotted on the curve of SF_6 concentrations in air. Their location on the curve indicates that these samples contained SF_6 concentrations equivalent to atmospheric concentrations present in late 1990's to early 2000's. Refinements to the estimates of recharge date could be made if additional information was available on the temperature of ground water at the point of recharge and measurements to determine if excess air was incorporated during the recharge process. The very large concentrations of SF_6 in the sample from MW-3 indicate that the sample was contaminated, which will result in inaccurate estimates of the recharge.

Large tritium (^{3}H) inputs to ground water occurred in a series of spikes resulting from atmospheric testing of nuclear devices occurring from 1952 to 1963. Concentrations of ^{3}H in precipitation have decreased since the mid-1960's bomb peak and provide limited information on recharge related to the period of nuclear testing. Measurements of tritium (^{3}H) and its decay product, tritiogenic helium (^{3}He), provide a ^{3}H/^{3}He ratio which can be used to calculate the ^{3}H/^{3}He apparent age of ground water from a single water sample (Schlosser and others, 1988, 1989; Poreda and others, 1988; Solomon and others, 1992, 1993).

The process for the analysis of ^{3}H/^{3}He ratios is lengthy, because the accumulation of daughter products requires several months to generate measureable quantities when the initial concentrations of ^{3}H are small. The analytical laboratory at Lamont-Doherty Earth Observatory has been experiencing difficulties with the specialized mass-spectrophotometer that is used for this analysis and thus has delayed the analysis of the ^{3}H/^{3}He data. Once these data are released from the laboratory, they will be provided to you.

The analysis of waste-water compounds in samples from three wells (MW1, MW3, and MW4) resulted in few detections and thus did not provide substantial useful data when applied to ground-water samples from this site. The waste-water analytical suite focuses on compounds typically found in domestic and industrial wastewater. The suite analyzes for 61 compounds that include the alkylphenol ethoxylate nonionic surfactants and their degradates, food additives, fragrances, antioxidants, flame retardants, plasticizers, industrial solvents, disinfectants, fecal sterols, polycyclicaromatic hydrocarbons, and high-use domestic pesticides. Data from these samples are in the attached table.

If you have any questions, please don't hesitate to call Steve Cox of this office at 253-552-1623.

Sincerely yours,

//s//

Cynthia Barton, Ph.D., L.G., L.H.G.
Director

References

E. Busenberg and L. N. Plummer. Dating young ground water with sulfur hexafluoride: Natural and anthropogenic sources of sulfur hexafluoride. Water Resources Research, v. 36, p. 3011-3030, October, 2000.

Plummer, L.N., Michel, R.L., Thurman, E.M., and Glynn, P.D., 1993, Environmental tracers for age-dating young ground water: in Alley, W.M., ed., Regional Ground-water Quality, Chap. 11, Van Nostrand Reinhold, New York, p. 255-294.

Poreda, R.J., Cerling, T.E., and Solomon, D.K., 1988, Tritium and helium isotopes as hydrologic tracers in a shallow unconfined aquifer: Journal of Hydrology, v. 103, p. 1-9.

Schlosser P., Stute, M., Dorr, H., Sonntag, C., and Munnich, K.O., 1988, Tritium/^{3}He dating of shallow groundwater: Earth and Planetary Science Letters, v. 89, p. 353-362.

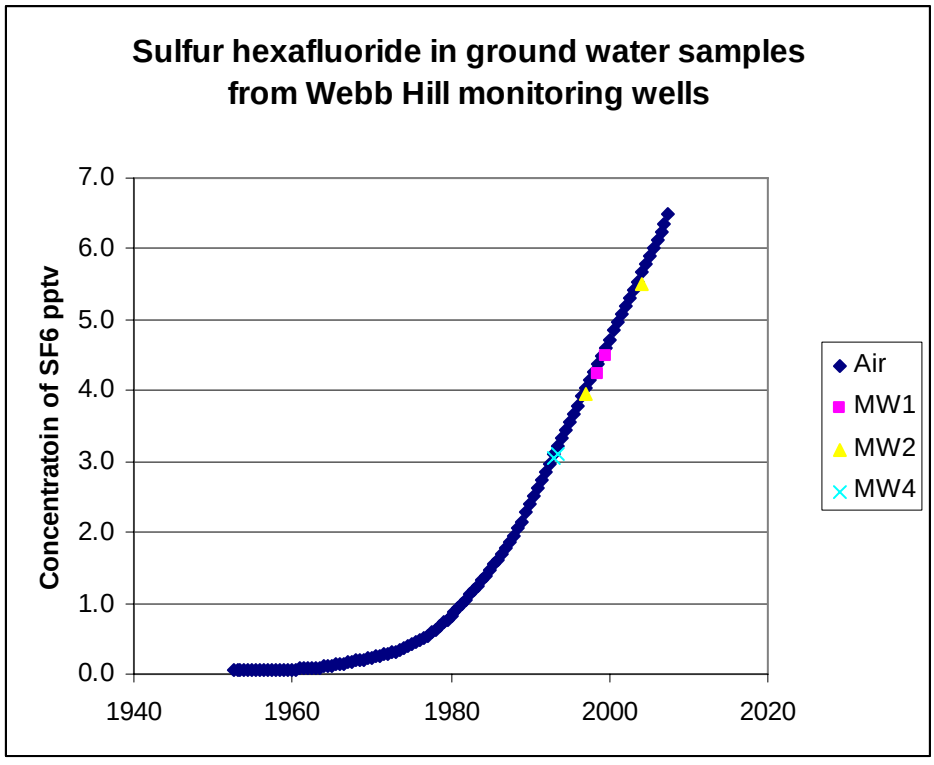
Schlosser P., Stute, M., Sonntag, C., and Munnich, K.O., 1989, Tritiogenic ^{3}He in shallow groundwater: Earth and Planetary Science Letters, v. 94, p. 245-256.

Solomon, D.K., Poreda, R.J., Schiff, S.L., and Cherry, J.A., 1992, Tritium and Helium 3 as groundwater age tracers in the Borden Aquifer: Water Resources Research, v. 28, no. 3, p. 741-755.

Solomon, D.K., and Sudicky, E.A., 1992, Correction to "Tritium and helium 3 isotope ratios for direct estimation of spatial variations in groundwater recharge": Water Resources Research, v. 28, no. 4, p. 1197.

Results of SF6 analyses in ground-water samples from monitoring wells collected by the USGS in July 2007, at Webb Hill Biosolids Facility, Mason County, WA

Sample Name	Sampling Date (Mo/day/year)	Time	NOAA Scale fMol/L	Calculated SF6 (pptv)
MW-1	07/09/07	1410	1.8040	4.4779
MW-1	07/09/07	1410	1.7104	4.2456
MW-2	07/11/07	1200	1.5844	3.9388
MW-2	07/11/07	1200	2.2187	5.5156
MW-3	07/11/07	1300	10.4911	26.1021
MW-3	07/11/07	1300	4.6028	11.4518
MW-4	07/11/07	930	1.2576	3.1185
MW-4	07/11/07	930	1.2270	3.0427
Tap water	01/28/08		4.7782	15.0989
Tap water	01/28/08		4.7652	15.0579



Concentrations of waste water treatment compounds in ground-water samples from monitoring wells collected by the USGS in July 2007, at Webb Hill Biosolids Facility, Mason County, WA

[Abbreviations: ug/L, micrograms per liter; E, estimated value, concentration is less than the detection limit; M, presence verified but not quanitifed; <, actual value is less than value shown]

	USGS Site ID, Well number, and date sampled		
	471828123063501	471845123063701	471815123061801
	MW-1	MW-3	MW-4
	7/10/07 2:10 PM	7/11/07 1:00 PM	7/11/07 9:30 AM
Analyte	(ug/L)	(ug/L)	(ug/L)
1,4-Dichlorobenzene	<.1	<.5	<.1
1-Methylnaphthalene	<.1	<.6	<.1
2,6-Dimethylnaphthalene	<.2	<1.2	<.2
2-Methylnaphthalene	<.1	<.5	<.1
3-beta-Coprostanol	<2	<10	<2
3-Methyl-1H-indole	<.08	<.48	<.08
3-tert-Butyl-4-hydroxyanisole	<.6	<4	<.6
4-Cumylphenol	<.14	<.84	<.14
4-Nonylphenol	<2	<11	<2
4-Octylphenol	<.16	<.96	<.16
4-tert-Octylphenol	<.10	<.6	<.10
5-Methyl-1H-benzotriazole	<2	<11	<2
9,10-Anthraquinone	<.2	<1.0	<.2
Acetophenone	<.1	<.6	<.1
Acetyl hexamethyl tetrahydro naphthalene	<.5	<3.0	<.5
Anthracene	<.1	<.5	<.1
Benzo[a]pyrene	<.1	<.7	<.1
Benzophenone	<.2	<1.1	<.2
beta-Sitosterol	<2	<12	<2
beta-Stigmastanol	<2	<12	<2
Bromacil	<.4	<2.4	<.4
Caffeine	<.2	<1.2	<.2
Camphor	<.1	<.6	<.1
Carbaryl	<1	<6	<1
Carbazole	<.1	<.5	<.1
Chlorpyrifos	<.2	<1.2	<.2
Cholesterol	<1	<8	<1
Cotinine	<.400	<2.40	<.400
p-Cresol	<.18	**M**	<.18
DEET	**M**	<1.2	<.2
Diazinon	<.2	<1.0	<.2
Diethoxynonylphenol	<5	<30	<5
Diethoxyoctylphenol	<1	<6	<1
D-Limonener	<.1	<.8	<.1
Fluoranthene	<.1	<.5	<.1
Hexahydrohexamethyl cyclopentabenzopyran	<.5	<3.0	<.5

Indole	<.1	<.8	<.1
Isoborneol	<.1	<.4	<.1
Isophorone	<.1	<.8	<.1
Isopropylbenzene	<.1	<.6	<.1
Isoquinoline	<.4	<2.4	<.4
Menthol	<.2	<1.2	<.2
Metalaxyl	<.2	<1.2	<.2
Methyl salicylate	<.2	<1.1	<.2
Metolachlor	<.2	<1.0	<.2
Monoethoxyoctylphenol	<1	<6	<1
Naphthalene	<.1	<.6	<.1
Phenanthrene	<.1	<.5	<.1
Phenol	<.4	**E.3**	**7.2**
Prometon	<.4	<2.4	<.4
Pyrene	<.1	<.5	<.1
Tetrachloroethene	<.2	<1.1	<.2
Tribromomethane	<.1	<.5	<.1
Tributyl phosphate	<.2	<1.2	**E1.8**
Triclosan	<.2	<1	<.2
Triethyl citrate	<.4	<2.4	<.4
Triphenyl phosphate	<.2	<1.0	**0.4**
Tris(2-butoxyethyl) phosphate	<.5	<3.0	<.5
Tris(2-chloroethyl) phosphate	**M**	<1.1	<.2
Tris(dichloroisopropyl) phosphate	<.2	<1.1	<.2