

COMPLIANCE MONITORING PLAN FOR GROUNDWATER MONITORED NATURAL ATTENUATION

Pulp/Tissue Mill RAU, Georgia-Pacific West
Site

Prepared for: Port of Bellingham

Project No. 140298-001-04 • July 7, 2015 Final



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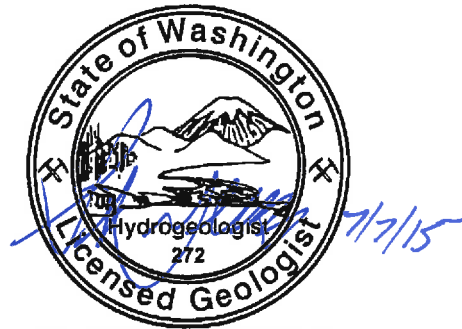
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PULP/TISSUE MILL RAU, GEORGIA-PACIFIC
WEST SITE

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Aspect Consulting, LLC

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Contents

1	Introduction and Background	1
2	Sampling and Analysis Plan.....	2
2.1	Groundwater Monitoring Locations and Analytes	2
2.2	Sampling Frequency.....	3
2.3	Termination of Monitoring at a Well	3
2.4	Amendment of this Compliance Monitoring Plan	3
2.5	Groundwater Sampling Procedures.....	4
2.6	Investigation-Derived Waste.....	5
2.7	Sampling Documentation Procedures	5
2.7.1	Field Documentation.....	5
2.7.2	Sample Labeling and Nomenclature	5
2.7.3	Sample Handling	5
2.7.4	Sample Custody	6
2.8	Replacement Monitoring Well Installation and Development.....	6
2.9	Monitoring Well Decommissioning.....	7
3	Data Evaluation and Reporting	7
4	Quality Assurance Project Plan	8
4.1	Analytical Procedures and Target Reporting Limits	8
4.2	Sample Preparation for Metals Analysis of Brackish Groundwater Samples	9
4.3	Data Quality Objective and Indicators.....	9
4.3.1	Precision.....	9
4.3.2	Accuracy.....	10
4.3.3	Representativeness	10
4.3.4	Comparability.....	10
4.3.5	Completeness.....	10
4.4	Quality Control Procedures.....	10
4.4.1	Field Quality Control	10
4.4.2	Laboratory Quality Control.....	11
4.5	Corrective Actions	11
4.6	Data Quality Review and Reporting.....	11
4.6.1	Minimum Data Reporting Requirements	11
4.6.2	Data Quality Review	12
4.7	Preventative Maintenance Procedures and Schedules.....	13
4.8	Performance and Systems Audits	13

5 References14
Limitations14

List of Figures

- 1 Monitoring Wells to be Monitored

List of Appendices

- A Pre-Design (February 2015) Groundwater Quality Monitoring Memo

1 Introduction and Background

This Compliance Monitoring Plan describes procedures for implementation of the groundwater monitored natural attenuation (MNA) cleanup action selected by the Washington State Department of Ecology (Ecology) for the Pulp/Tissue Mill Remedial Action Unit (RAU) portion of the Georgia-Pacific West Site (Site). The Pulp/Tissue RAU is being cleaned up under the terms of Consent Decree No. 14207008 (Decree) between the Port of Bellingham (Port) and Washington State Department of Ecology (Ecology).

In August 2013, a Site-wide remedial investigation (RI) was completed (Aspect, 2013). Based on the RI data, the contaminants that exceed cleanup levels in Pulp/Tissue RAU groundwater include pH and selected metals in the Acid Plant subarea, tetrachloroethene (PCE) and vinyl chloride (VC) in the LP-MW01 subarea, and selected metals in the Miscellaneous Dissolved Metals Exceedances area. The contaminants in groundwater are expected to continue to naturally attenuate through a combination of sorption, bioattenuation, volatilization, dispersion, and/or tidal mixing. The RI data indicate that natural attenuation is effectively reducing concentrations of groundwater contaminants in each of these areas. Based on the evaluation of RAU remedial alternatives relative to Model Toxics Control Act (MTCA) criteria in the Feasibility Study (FS; Aspect, 2014b), Ecology's Cleanup Action Plan (CAP; Ecology, 2014) for the Pulp/Tissue RAU selected MNA to address residual contamination in groundwater that exceeds applicable groundwater cleanup levels.

The objective of this Compliance Monitoring Plan is to describe the process that will document achievement of groundwater cleanup levels defined in the CAP. Compliance with cleanup levels for each constituent at each well will be determined based on four consecutive samples with concentrations below the respective cleanup level. It is anticipated that the results of the February 2015 groundwater monitoring completed as part of the pre-design characterization outlined in Aspect (2015) and described in Appendix A, can be used as the first set of results for the compliance determination.

As defined in the CAP, contingent actions will be considered for implementation if MNA fails to restore groundwater at a reasonable rate and is determined not to be protective of human health and the environment. Contingent actions could include enhanced source control or downgradient groundwater treatment and/or control. Design of a contingent action would be conducted if potential failure of MNA is indicated based on groundwater compliance monitoring results, at which time substantial additional information would be available to determine the causes of failure and, therefore, the most effective and practicable means to remedy it.

Following this introductory section, the remaining sections of this Plan are as follows:

- *Section 2* is the Sampling and Analysis Plan, which includes monitoring locations and analytes, sampling frequency, procedures, and documentation,

as well as investigation-derived waste removal, and potential monitoring well installation and decommissioning.

- *Section 3* outlines the reporting of monitoring results, which will be submitted to Ecology annually.
- *Section 4* is the Quality Assurance Project Plan (QAPP), which defines the quality assurance (QA) and quality control (QC) objectives for the monitoring program.
- *Appendix A* is a memorandum presenting results from the Pre-design Groundwater Quality Monitoring, which was completed to provide a snapshot view of current conditions and inform this MNA Compliance Monitoring Plan.

2 Sampling and Analysis Plan

2.1 Groundwater Monitoring Locations and Analytes

In February 2015, Aspect Consulting (Aspect) sampled groundwater from eight existing wells in the three groundwater MNA areas (see Figure 1). The monitoring was conducted in accordance with the Pre-Design Characterization Plan (Aspect, 2015), which was approved by Ecology prior to start of the monitoring. Results from the pre-design sampling, and prior monitoring, can be found in the Pre-Design Groundwater Quality Monitoring Memo included as Appendix A.

Based on the collective information to date, the wells to be sampled and their chemical analyses are as follows:

- **Acid Plant Subarea.** Groundwater samples from wells AA-MW04 and FH-MW01 within the acidic metals plume, will be analyzed for dissolved metals that exceeded cleanup levels during the 2009-2010 groundwater sampling: arsenic, cadmium, copper, nickel, and zinc at AA-MW04, and nickel and zinc at FH-MW01 (by EPA Method 6020). Although exceedances have never been detected at shoreline well AA-MW01, it will be sampled for analysis of dissolved arsenic, cadmium, copper, nickel, and zinc until wells AA-MW04 and FH-M01 are determined to meet cleanup levels, to ensure protection of the Whatcom Waterway. Groundwater field parameters, including pH, will also be measured for each sample. Outside of the acidic metals plume, groundwater pH will be measured at wells AA-MW02, AA-MW03, GF-MW01, and BC-MW05 until wells AA-MW04 and FH-M01 are determined to meet cleanup levels. If groundwater pH declines to below pH 6.2 at one of those wells, a groundwater sample will be collected from it for analysis of dissolved metals (arsenic, cadmium, copper, nickel, and zinc). If an exceedance of dissolved metal(s) is detected in the sample, Ecology will be notified immediately to evaluate the data and develop appropriate actions/modifications to this Compliance Monitoring Plan.

- **LP-MW01 Subarea.** Because PCE and VC exceeded groundwater cleanup levels during the 2009-2010 groundwater sampling, the groundwater sample from well LP-MW01 will be analyzed for the chlorinated volatile organic compounds PCE, trichloroethene (TCE), cis-1,2-dichloroethene (cis-DCE), and VC (EPA Method 8260C).
- **Miscellaneous Dissolved Metals Exceedances.** Within the identified Miscellaneous Dissolved Metals Exceedance area, groundwater samples from wells LP-MW01 and SC-MW02 will be analyzed for dissolved metals that exceeded cleanup levels during the 2009-2010 groundwater sampling: copper at LP-MW01, and copper and nickel at SC-MW02 (by EPA Method 6020). Downgradient of that area, wells LB-MW01 and AA-MW02 will be sampled for dissolved copper and nickel until wells LP-MW01 and SC-MW02 are determined to meet cleanup levels.

If a well becomes damaged or requires relocation during the course of the monitoring program, a new well will be installed to replace it (see Section 2.7), and monitoring would resume at the replacement well.

2.2 Sampling Frequency

The groundwater MNA compliance monitoring program will start within 30 days of completing RAU-wide cap construction, in accordance with Exhibit C to the Decree. Groundwater samples will be collected from the above-listed wells quarterly for a minimum of one year, and then annually provided the first year of quarterly monitoring confirms contaminants are attenuating. Annual monitoring will continue until the MNA performance monitoring program is complete (cleanup standards met). The time of year in which to conduct annual monitoring will be determined based on the collective data at that time (including the existing RI/FS data).

Decisions regarding sampling frequency and when to sample will be proposed in the annual monitoring reports submitted by the Port for Ecology approval (reporting described in Section 3).

2.3 Termination of Monitoring at a Well

After the first year of quarterly monitoring has been completed, sampling will be discontinued, pending Ecology approval, for any monitoring well that meets cleanup levels, which will be defined as having four consecutive rounds of samples with concentrations below cleanup levels for the contaminants being monitored. At any point during the annual monitoring, more frequent sampling could be conducted to expedite determination for four consecutive “clean” samples. However, samples can be collected no more frequently than quarterly for this purpose.

2.4 Amendment of this Compliance Monitoring Plan

In accordance with the provisions of the Decree, future redevelopment-related activity within the Pulp/Tissue Mill RAU must not create or facilitate migration of contaminated groundwater within or from the areas designated for cleanup by MNA. Section 3.1 of the Contaminated Materials Management Plan (CMMP, Exhibit E to the Decree; Aspect,

2014a) requires that an entity planning redevelopment within the RAU (“Proponent”) notify Ecology and the Port within 45 days before the beginning of any activity that will disturb the RAU-wide cap or underlying materials within the RAU, or potentially create pathways for the migration of contaminated groundwater. Section 3.4 of the CMMP identifies the following redevelopment-related activities that would require additional design considerations if planned within areas of contaminated groundwater:

- Construction of subsurface utilities extending beneath the water table. Any such utility corridors would need to be backfilled in a manner so as to not serve as a preferred pathway for groundwater migration (e.g., backfill with low-permeability material such as controlled density fill); and
- Construction of stormwater infiltration facilities that create focused groundwater recharge and thus change the local groundwater flow directions or velocity. Diffuse infiltration that would not substantively change groundwater flow directions or velocity in those areas is acceptable and would not require specialized design measures.

The Proponent’s required notification to the Port and Ecology will describe any such redevelopment-related features or activities considered within the defined areas of groundwater contamination, along with the design measures to be implemented to prevent migration of contaminated groundwater.

At that time, the Port and Ecology will discuss the need for amendment of this Compliance Monitoring Plan to respond to the potentially changed conditions created by the redevelopment-related activity. If Ecology deems that the groundwater MNA program needs revision in response to the redevelopment-related activity, the Port will prepare for Ecology approval an amendment to this Compliance Monitoring Plan, which will then be implemented assuming the redevelopment activity in question is implemented.

2.5 Groundwater Sampling Procedures

Groundwater samples will be collected with a peristaltic pump and dedicated downhole polyethylene tubing, following low-flow sampling techniques to minimize suspended solids in the samples, consistent with sampling procedures conducted during the RI and pre-design characterization. Prior to sample collection, the static water level in the well will be measured using an electric well sounder, graduated to 0.01 foot. In addition, an inspection of the condition of each in-service monitoring well will be completed when groundwater levels are measured. Field personnel will record the condition of the monument and well casing and identify any required maintenance activities.

The well will then be purged at flow rates less than 0.5 liter per minute, and the field parameters temperature, pH, electrical conductance, dissolved oxygen, and oxidation-reduction potential (ORP), will be monitored using a YSI meter or equivalent with a flow-through cell to prevent contact of the water with the atmosphere. These field parameters will be recorded at 3 to 5 minute intervals throughout well purging until they stabilize. Stabilization is defined as three successive readings where the parameter values vary by less than 10% (or 0.5 mg/L dissolved oxygen if the readings are below 1 mg/L). However, no more than three well casing volumes will be purged prior to groundwater

sample collection. Once purging is complete, the groundwater samples will be collected using the same low flow rate. Field measurements and observations will be recorded on groundwater sampling field forms.

Due to proximity to the shoreline, monitoring wells AA-MW01, GF-MW01, and BC-MW05 will be monitored during an outgoing tide, no less than two hours following a high tide. This will reduce the potential for dilution of upland groundwater by seawater.

Samples with a field-measured specific electrical conductance greater than 1,000 $\mu\text{S}/\text{cm}$ will be denoted as such on the chain-of-custody form, so that the laboratory can employ appropriate sample preparation techniques as appropriate to avoid analytical interferences for metals analyses (see Section 4.2).

2.6 Investigation-Derived Waste

The purge water from the monitoring wells will be discharged to the ASB or, if the ASB is no longer available for use, placed in labeled DOT-approved drums for profiling and proper off-site disposition.

If replacement wells must be installed (Section 2.7), the direct push probe rods will be decontaminated prior to the first boring and between each monitoring well boring using a steam cleaner. Rinsate from decontamination of equipment, and water produced during well development for replacement wells, will be managed as described above for purge water. Soil cuttings from replacement wells will be placed in labeled DOT-approved drums for sampling and profiling for appropriate off-site disposal.

2.7 Sampling Documentation Procedures

2.7.1 Field Documentation

While conducting field work, the field representative will document pertinent observations and events on field forms specific to each activity (e.g., groundwater sampling form, etc.) and/or in a field notebook, and, when warranted, provide photographic documentation of specific sampling efforts including inspection of well condition. Field notes will include a description of each field activity, sample descriptions, and associated details such as the date, time, and field conditions.

2.7.2 Sample Labeling and Nomenclature

Sample labels will clearly indicate the groundwater sample identification (which will include the well number and date), sampler's initials, parameters to be analyzed, preservative added, if any, and any pertinent comments.

2.7.3 Sample Handling

Upon collection, groundwater samples will be placed upright in a cooler. Ice or Blue Ice will be placed in each cooler to meet sample preservation requirements. Inert cushioning material will be placed in the remaining space of the cooler as needed to limit movement of the sample containers. If the sample coolers are being shipped, not hand carried by consultant personnel, the chain-of-custody form will be placed in waterproof bag taped to the inside lid of the cooler for shipment.

Upon sample receipt, the laboratory will fill out a cooler receipt form to document sample delivery conditions. A designated sample custodian will accept custody of the shipped samples and will verify that the chain-of-custody form matches the samples received. The laboratory will notify the consultant project manager of any issues noted with the sample shipment or custody as soon as possible. The laboratory will follow proper chain-of-custody protocol if transferring samples to other labs for specific analyses.

2.7.4 Sample Custody

After collection, samples will be maintained in the consultant's custody until formally transferred to the analytical laboratory. For purposes of this work, custody of the samples will be defined as follows:

- In plain view of the field representatives;
- Inside a cooler that is in plain view of the field representative; or
- Inside any locked space such as a cooler, locker, car, or truck to which the field representative has the only immediately available key(s).

A chain-of-custody record provided by the laboratory will be initiated at the time of sampling for all samples collected. The record will be signed by the field representative and others who subsequently take custody of the sample. Couriers or other professional shipping representatives are not required to sign the chain of custody form; however, shipping receipts will be collected and maintained as a part of custody documentation in project files. A copy of the chain of custody form with appropriate signatures will be kept by the consultant's project manager.

2.8 Replacement Monitoring Well Installation and Development

In the event that the wells being monitored are damaged or must otherwise be replaced during the monitoring program, new monitoring wells will be installed by a state-licensed resource protection well driller using a direct-push probe rig, and constructed in accordance with Chapter 173-160 WAC. The replacement wells will be installed as close as practicable to the original well, and will be constructed of 3/4-inch or 1-inch-diameter PVC well casing with 10-foot-long, 10-slot or 20-slot well screens. The well screen for each replacement well will be placed at an elevation interval equivalent to that of the well being replaced. Screens will be filter-packed with 10/20 silica sand, and an annular seal consisting of bentonite chips will be placed above the filter pack. A concrete surface seal will be set at grade. The finished monitoring wells will be protected with flush-mount steel monuments.

Each newly installed monitoring well will be developed to remove fine-grained material from inside the well casing and filter pack, and to improve hydraulic communication between the well screen and the surrounding water-bearing formation. Well development will be performed using a peristaltic pump with a surge block, gently surging the entire length of the well screen. Each well will be developed until visual turbidity is reduced to minimal levels, or until 10 casing volumes of water plus a volume equal to any water

added during drilling has been removed. Groundwater produced during well development will be managed as described for investigation-derived waste in Section 2.5.

2.9 Monitoring Well Decommissioning

All monitoring wells within the RAU that are not being monitored under this Compliance Monitoring Plan will be properly decommissioned in accordance with the requirements of Chapter 173-160 WAC. This includes RAU wells not included in the monitoring program, and wells in the monitoring program that, in the future, are determined by Ecology to comply with cleanup levels and thus are removed from the monitoring program.

3 Data Evaluation and Reporting

At the conclusion of each year of the compliance monitoring program, the collective monitoring data will be summarized in an Annual Groundwater Monitoring Report submitted to Ecology. The annual report will include:

- *Description of field activities.* A brief summary of the activities completed during the preceding year's monitoring event(s). Justification will be given for any procedures that deviate from this Plan.
- *A site map.* The site map will illustrate relevant features and sampling locations.
- *Data quality review.* The reported results and the associated quality assurance results will be reviewed with respect to data usability, as described in the QAPP (Section 4).
- *Analytical results.* The analytical results will be tabulated and compared relative to respective groundwater cleanup levels. Wells with four consecutive samples having concentrations at or below cleanup levels—determined to comply with cleanup levels—will be highlighted in the narrative.
- *Recommendations.* Based on the results above, recommendations for the next year of monitoring will be outlined. Recommendations could include a change to monitoring frequency and/or removing a monitoring well(s) from the Plan because it complies with cleanup levels. If needed, recommendations to implement a contingency action will also be documented in the Annual Report, although this information would be communicated to Ecology earlier as appropriate.

Each annual groundwater monitoring report will be prepared and submitted to Ecology within 60 days of receiving the laboratory certificates of analysis from the final monitoring event that year, in accordance with Exhibit C to the Decree. Follow-up communications with Ecology will be conducted regarding the monitoring status, and recommendations for the program, as appropriate. All analytical data collected in the

groundwater performance monitoring program will also be submitted in electronic format to Ecology’s EIM database in accordance with the Decree and Ecology Policy 840.

4 Quality Assurance Project Plan

The purpose of the Quality Assurance Project Plan (QAPP) is to define, in specific terms, the quality assurance (QA) and quality control (QC) objectives, organization, and functional activities associated with the sampling and analysis of groundwater samples collected to assess performance of the MNA remedy.

OnSite Environmental of Redmond, Washington, is the Ecology-accredited analytical laboratory that will conduct the analyses of groundwater samples under this MNA compliance monitoring program. The Port can propose for Ecology approval a change to analytical laboratory, assuming the new laboratory can meet the QC requirements of this QAPP. No change in laboratory will occur without Ecology approval.

4.1 Analytical Procedures and Target Reporting Limits

Laboratory analytical methods and target reporting limits for groundwater analyses to be performed during this monitoring program are as follow:

Constituent	Analytical Method	Target Reporting Limit (µg/L)
Dissolved As	EPA Method 6020	3.0
Dissolved Cd	EPA Method 6020	4.0
Dissolved Cu	EPA Method 6020	1.0
Dissolved Ni	EPA Method 6020	4.0
Dissolved Zn	EPA Method 6020	25
Tetrachloroethylene (PCE)	EPA Method 8260C	0.2
Trichloroethylene (TCE)	EPA Method 8260C	0.2
cis-1,2-Dichloroethylene (cis-DCE)	EPA Method 8260C	0.2
Vinyl Chloride (VC)	EPA Method 8260C	0.2

µg/L = micrograms per liter

The above-listed reporting limits (RLs) for the methods defined are at or below respective groundwater cleanup levels defined in the CAP, and the laboratory must therefore achieve them. The RL is equivalent to the practical quantitation limit (PQL) and is defined as the lowest concentration at which a chemical can be accurately and reproducibly quantified, within specified limits of precision and accuracy, for a given environmental sample. The RL can vary from sample to sample depending on sample

size, sample dilution, matrix interferences, and other sample-specific conditions. The RLs usually correspond to the lowest calibration standard. The method detection limit (MDL) is the minimum concentration of a compound that can be measured and reported with a 99% confidence that the analyte concentration is greater than zero. MDLs are established by the laboratory using prepared samples, not samples of environmental media.

4.2 Sample Preparation for Metals Analysis of Brackish Groundwater Samples

Saline water samples may create analytical interferences for trace metals analyses due to the high levels of dissolved solids in the samples. For saline water sample, OnSite Environmental applies a KED (Kinetic Energy Discrimination) during their ICP-MS analyses (EPA Method 6020) to address salinity matrix interferences. In this process, a non-reactive gas (helium) is introduced into the system to collide with larger interfering ions (e.g., chloride). This results in the interfering ions losing kinetic energy so they can be distinguished through KED, thus eliminating most of the interference problem when quantifying trace metal concentrations. If this approach does not adequately address matrix interferences, other sample preparation/analysis techniques may be performed, including reductive precipitation (EPA Method 1640), hydrided atomic absorption spectrometry (SW846 Method 7742A), and/or direct dilution—whether conducted by OnSite Environmental or other specialty laboratories.

Saline groundwater samples are indicated by elevated specific electrical conductance of the samples. To assist the laboratory in identifying saline groundwater samples, the field-measured specific conductance for each groundwater sample with conductance greater than 1,000 $\mu\text{S}/\text{cm}$ will be recorded on the corresponding chain of custody document.

4.3 Data Quality Objective and Indicators

The data quality objective for this project is to reliably document the attenuation of contaminants of concern concentrations in groundwater over time and achievement of groundwater cleanup levels.

Data quality indicators (DQIs), including precision, accuracy, representativeness, comparability, and completeness (PARCC parameters), and data RLs are dictated by the data quality objectives, project requirements, and intended uses of the data. An assessment of data quality is based upon quantitative (precision, accuracy, and completeness) and qualitative (representativeness and comparability) indicators. Definitions of these parameters and the applicable QC procedures are presented below.

4.3.1 Precision

Precision measures the reproducibility of measurements under a given set of conditions. Specifically, it is a quantitative measure of the variability of a group of measurements compared with their average values. Analytical precision is measured through matrix spike/matrix spike duplicate (MS/MSD) samples and laboratory control samples/laboratory control sample duplicate (LCS/LCSD) for organic analysis and through laboratory duplicate samples for inorganic analyses. Analytical precision is quantitatively expressed as the relative percent difference (RPD) between the LCS/LCSD, MS/MSD, or lab duplicate pairs. Analytical precision measurements will be

carried out at a minimum frequency of 1 per 20 samples or one per laboratory analysis group. Laboratory precision will be evaluated against laboratory quantitative RPD performance criteria provided with the lab's analytical data report.

4.3.2 Accuracy

Accuracy measures the closeness of the measured value to the true value. The accuracy of chemical test results is assessed by "spiking" samples with known standards (surrogates, blank spikes, or matrix spikes) and establishing the average recovery. Accuracy measurements on MS samples will be carried out at a minimum frequency of one in twenty samples per matrix analyzed. Blank spikes will also be analyzed at a minimum frequency of one in twenty samples per matrix analyzed. Surrogate recoveries will be determined for each sample analyzed for organics. Laboratory accuracy will be evaluated against the lab's quantitative matrix spike and surrogate spike recovery performance criteria as provided with the lab's analytical data report.

4.3.3 Representativeness

Representativeness measures how closely the measured results reflect the actual concentration or distribution of the chemical compounds in the matrix sampled. The sampling plan design, sampling techniques, and sample handling protocols (e.g., homogenizing, storage, and preservation) have been developed to ensure representative samples.

4.3.4 Comparability

Comparability is a qualitative parameter expressing the confidence with which one data set can be compared with another. The use of standard techniques for both sample collection and laboratory analysis should make data collected comparable to internal data generated for this project as well as pre-existing analytical data that may exist.

4.3.5 Completeness

Completeness is defined as the percentage of measurements made that are judged to be valid measurements. Results will be considered valid if all the precision, accuracy, and representativeness objectives are met and if RLs are sufficient for the intended uses of the data. The target completeness goal for this project is 95 percent.

Laboratory internal QC checks, preventive maintenance, and corrective action, as described in other sections of this document, will be implemented to help meet the QA objectives established for these analyses.

4.4 Quality Control Procedures

Field and laboratory QC procedures are outlined below.

4.4.1 Field Quality Control

Beyond use of standardized sampling protocols defined in the Sampling and Analysis Plan, field QC procedures for this project will consist of the following:

- Field instrumentation (YSI or equivalent meter for measuring field parameters during groundwater sampling) are maintained regularly and calibrated in accordance with manufacturer recommendations prior to use.

4.4.2 Laboratory Quality Control

The laboratory's QA officers are responsible for ensuring that the laboratory implements all routine internal QC and QA procedures.

The laboratory QC procedures used for this project will consist of the following at a minimum:

- Instrument calibration and standards as defined in the laboratory standard operating procedures (SOPs);
- Laboratory blank measurements at a minimum frequency of 5 percent or one per twenty samples; and
- Accuracy and precision measurements as defined above, at a minimum frequency of 5 percent or one per twenty samples per matrix.

4.5 Corrective Actions

If routine QC audits by the laboratory result in detection of unacceptable conditions or data, actions specified in the laboratory SOPs will be taken. Specific corrective actions are outlined in each SOP used and can include the following:

- Identifying the source of the violation;
- Reanalyzing samples if holding time criteria permit;
- Resampling and analyzing;
- Evaluating and amending sampling and analytical procedures; and/or
- Accepting but qualifying data to indicate the level of uncertainty.

If unacceptable conditions occur, the laboratory will contact the consultant's project manager to discuss the issues and determine the appropriate corrective action. All corrective actions taken by the laboratory during analysis of samples for this project will be documented by the laboratory in the case narrative associated with the affected samples.

4.6 Data Quality Review and Reporting

All data will undergo two levels of QA/QC evaluation: one at the laboratory and one by a validator independent of the laboratory (Section 4.6.2). Initial data QC evaluation and reporting at the laboratory will be carried out as described in the appropriate analytical protocols. Quality control data resulting from methods and procedures described in this document will also be reported.

4.6.1 Minimum Data Reporting Requirements

The following sections describe the minimum data reporting requirements necessary to allow proper QA/QC reporting.

Sample Receipt. Cooler receipt forms will be filled out for all sample shipments to document problems in sample packaging, chain of custody, and sample preservation.

Reporting. For each analytical method run, analytes for each sample will be reported as a detected concentration or as less than the specific RL. The laboratory will report dilution factors for each sample as well as date of extraction (if applicable), date of analysis, extraction method, any additional sample preparation methods performed, and confirmation results where required.

Internal Quality Control Reporting. Internal quality control samples will be analyzed at the rates specified in the applicable analytical method.

- *Laboratory Method Blanks.* Analytes will be reported for each laboratory blank. Nonblank sample results shall be designated as corresponding to a particular laboratory blank in terms of analytical batch processing.
- *Surrogate Spike Samples.* Surrogate spike recoveries will be reported with organic reports where appropriate. The report shall also specify the control limits for surrogate spike results as well as the spiking concentration. Spike recoveries outside of specified control limits (as defined in the laboratory SOP) will result in the sample being rerun.
- *Matrix Spike Samples.* Matrix spike recoveries will be reported for organic and inorganic analyses, when sufficient sample volume is provided to the lab. General sample results will be designated as corresponding to a particular matrix spike sample. The report will indicate which sample was spiked and the spike concentration. The report will also specify the control limits for matrix spike results for each method and matrix. Spike recoveries outside of specified control limits (as defined in the laboratory SOP) will result in the sample being rerun.
- *Laboratory Duplicate and/or Matrix Spike Duplicate Pairs.* Relative percent differences will be reported for duplicate pairs relative to analyte/matrix-specific control limits defined in the laboratory SOP.
- *Laboratory Control Samples (LCS).* LCS recoveries will be reported for organic analyses. LCS results and control limits will be reported with the corresponding sample data.

4.6.2 Data Quality Review

Reported analytical results will be qualified by the laboratory to identify QC concerns in accordance with the specifications of the analytical methods and the laboratory's SOPs. Additional laboratory data qualifiers may be defined and reported by the laboratory to more completely explain QC concerns regarding a particular sample result. All additional data qualifiers will be defined in the laboratory's narrative reports associated with each case.

The consultant will prepare an independent Stage 2A data quality review for all analytical data generated for this project. The data quality review will be performed in accordance with EPA National Functional Guidelines for organic and inorganic analyses (EPA, 2004 and 1999, respectively), and laboratory-defined QC limits, with regard to the following, as appropriate to the particular analysis:

- Sample documentation/custody;

- Holding times;
- Method and trip blanks (representativeness);
- Reporting limits;
- Blank spike, matrix spike, and surrogate percent recoveries (accuracy);
- Matrix spike/matrix spike duplicate, laboratory control samples/laboratory control sample duplicate, and laboratory duplicate pair RPDs (precision);
- Comparability; and
- Completeness.

4.7 Preventative Maintenance Procedures and Schedules

Preventative maintenance in the laboratory will be the responsibility of the laboratory personnel and analysts. This maintenance includes routine care and cleaning of instruments, and inspection and monitoring of carrier gases, solvents, and glassware used in analyses. Details of the maintenance procedures are addressed in the respective laboratory SOPs.

Precision and accuracy data are examined for trends and excursions beyond control limits to determine evidence of instrument malfunction. Maintenance will be performed when an instrument begins to change as indicated by the degradation of peak resolution, shift in calibration curves, decrease in sensitivity, or failure to meet one or another of the method-specific QC criteria.

4.8 Performance and Systems Audits

The consultant's project manager has responsibility for performance of the laboratory QA program. This will be achieved through regular contact with the analytical laboratory's project manager. To ensure comparable data, all samples of a given matrix to be analyzed by each specified analytical method will be processed consistently by the same analytical laboratory.

5 References

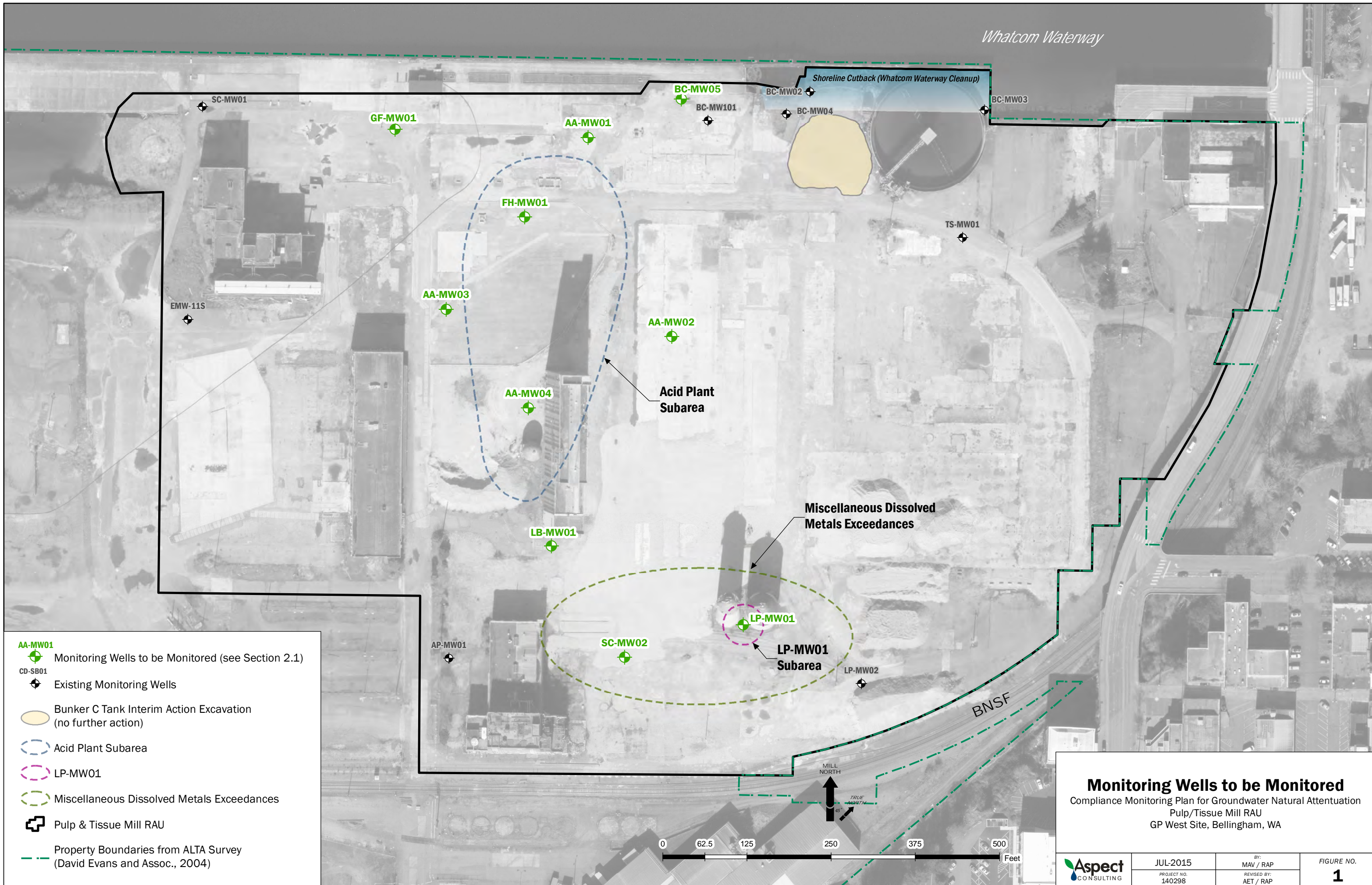
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- Aspect Consulting (Aspect), 2014a, Contaminated Materials Management Plan, Pulp/Tissue Mill Remedial Action Unit, G-P West Site, June 19, 2014.
- Aspect Consulting (Aspect), 2014b, Feasibility Study, Pulp/Tissue Mill Remedial Action Unit, Vol. 2a of RI/FS, Georgia-Pacific West Site, Bellingham, Washington, October 27, 2014.
- Aspect Consulting (Aspect), 2015, Pre-Design Characterization Plan, Pulp and Tissue Mill Remedial Action Unit, Georgia-Pacific West Site, Bellingham, Washington, February 6, 2015.
- U.S. Environmental Protection Agency (USEPA), 1999, Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, Office of Emergency and Remedial Response, USEPA Publication No. 540/R-99/008, October.
- U.S. Environmental Protection Agency (USEPA), 2004, Contract Laboratory Program National Functional Guidelines for Organic Methods Data Review, Office of Superfund Remediation and Technology Innovation (OSRTI), USEPA Publication No. 540-R-04-004, October.
- Washington State Department of Ecology (Ecology), 2014, Cleanup Action Plan, Pulp/Tissue Mill Remedial Action Unit, Georgia-Pacific West Site, Bellingham, Washington, Exhibit B to Consent Decree No. 14207008, October 30, 2014.

Limitations

Work for this project was performed for the Port of Bellingham (Client), and this report was 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. This report does not represent a legal opinion. No other warranty, expressed or implied, is made.

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FIGURES



- + **AA-MW01**
Monitoring Wells to be Monitored (see Section 2.1)
- + **CD-SB01**
Existing Monitoring Wells
- Bunker C Tank Interim Action Excavation
(no further action)
- Acid Plant Subarea
- LP-MW01
- Miscellaneous Dissolved Metals Exceedances
- + Pulp & Tissue Mill RAU
- Property Boundaries from ALTA Survey
(David Evans and Assoc., 2004)

Monitoring Wells to be Monitored

Compliance Monitoring Plan for Groundwater Natural Attenuation
Pulp/Tissue Mill RAU
GP West Site, Bellingham, WA

	JUL-2015 PROJECT NO. 140298	BY: MAV / RAP REVISED BY: AET / RAP
		FIGURE NO. 1

Path: T:\projects_8\Port_of_Bellingham\Delivered\MonitoringPlan\GNatural\Attenuation\1-MWIs to be Monitored.mxd

APPENDIX A

Pre-Design (February 2015) Groundwater Quality Monitoring Memo

MEMORANDUM

Project No.: 140298-001-04

May 5, 2015

To: Mr. Brian Sato, P.E., Washington State Department of Ecology

cc: Brian Gouran, LG, Port of Bellingham

From: Amy Tice, LG, and Steve Germiot, LHG, Aspect Consulting, LLC

Re: **Results from Pre-Design Groundwater Quality Monitoring (February 2015)
Pulp/Tissue Mill Remedial Action Unit, GP West Site**

The Washington State Department of Ecology's (Ecology) Cleanup Action Plan (CAP; Ecology, 2014) for the Pulp/Tissue Mill Remedial Action Unit (RAU) portion of the Georgia-Pacific West Site (Site) selected monitored natural attenuation (MNA) to address residual contamination in RAU groundwater that exceeds applicable groundwater cleanup levels. Based on data collected during the Site Remedial Investigation (RI; Aspect, 2013), the contaminants that exceed cleanup levels in RAU groundwater include pH and selected metals in the Acid Plant subarea, tetrachloroethene and vinyl chloride in the LP-MW01 subarea, and selected metals in the Miscellaneous Dissolved Metals Exceedances area. The RAU is being cleaned up under the terms of Consent Decree No. 14207008 (Decree) between the Port of Bellingham (Port) and Ecology.

Because it had been five years since the last groundwater monitoring, Aspect Consulting (Aspect) sampled groundwater from eight existing wells in the three groundwater MNA areas (see Figure 1) in February 2015. The groundwater monitoring was completed in accordance with the Ecology-approved Pre-Design Characterization Plan (Aspect, 2015).

The pre-design groundwater monitoring provides an up-to-date view of groundwater quality that will inform preparation of the RAU's Groundwater MNA Compliance Monitoring Plan (Compliance Monitoring Plan), which is a forthcoming deliverable under the Decree. This memorandum will be included as an appendix to that Compliance Monitoring Plan.

Analytical results from the February 2015 monitoring, along with the wells' prior data for reference, are presented by area in Tables 1, 2, and 3, respectively, and are discussed below.

Acid Plant Subarea

Wells within the defined acidic metals plume (AA-MW04 and FH-MW01), and immediately around the perimeter of the defined plume (AA-MW01, AA-MW02, AA-MW03, and LB-MW01), were sampled for pH and dissolved arsenic, cadmium, copper, nickel, and zinc by EPA Method 6020.

Within the defined plume, measured pH levels remained low (acidic), but were higher than all previous sampling events (Table 1). The pH increase was less notable in the source area well AA-MW04 than in downgradient well FH-MW01, where a pH increase of nearly 15-fold has occurred

May 5, 2015

since the 2004 measurement. Figure 2 is a plot showing the pH increase within the acidic source area and at downgradient well FH-MW01 since 2004¹. Dissolved nickel and dissolved zinc were detected above cleanup levels in both wells, but at lower concentrations than previously detected (Figure 3 depicts dissolved metals concentration trends over time). Dissolved arsenic was detected only in well AA-MW04, at a concentration (5.3 micrograms per liter [ug/L]) marginally above the 5 ug/L cleanup level. Dissolved cadmium and dissolved copper did not exceed cleanup levels in either well, which, for source area well AA-MW04, is an improvement from prior data.

Immediately around the perimeter of the defined plume, measured pH remained low in well AA-MW03, but was higher than all previous sampling events, and there were no metals exceedances detected. Dissolved copper exceeded its cleanup level in upgradient well LB-MW01, which is anomalous relative to prior data (its measured pH remained steady at pH 6.7; Table 1). The other perimeter wells AA-MW01 and AA-MW02 have a measured pH meeting the cleanup level, and no detected metals exceedances (Table 1). The continued lack of exceedances in shoreline well AA-MW01 confirms that the plume is not migrating to the Whatcom Waterway, which was a prime reason the CAP determined MNA to be an acceptable remedy for groundwater in this subarea.

Based on the 2015 data, the detected dissolved metals concentrations and pH inside the defined acidic metals plume continue a declining trend toward compliance with cleanup levels.

LP-MW01 Subarea

Historically, groundwater at well LP-MW01 had detections or exceedances of tetrachloroethene (PCE) and its biological degradation byproducts trichloroethene (TCE), cis-1,2-dichloroethene (DCE), and vinyl chloride (VC). Sampling conducted between 2004 and 2010 indicated steadily declining concentrations of these contaminants of concern (Figure 4 depicts the VOC concentration trends over time). During the February 2015 sampling event, well LP-MW01 was therefore sampled for halogenated volatile organic compounds (VOCs) by EPA Method 8260C.

During the February 2015 sampling event, PCE and DCE were detected, but were below groundwater cleanup levels. No other VOCs, including TCE and VC, were detected (Table 2). Based on the current data, well LP-MW01 meets cleanup levels for VOCs for the first time since its start of monitoring in 2004 (Figure 4).

The 2015 data confirm that natural attenuation is effectively remediating VOCs in subarea groundwater to meet cleanup levels.

Miscellaneous Dissolved Metals Exceedances Area

Due to historical detections or exceedances of dissolved copper and nickel, wells LP-MW01 and SC-MW02 were sampled for these metals by EPA Method 6020.

During the February 2015 sampling, dissolved copper was detected at a concentration (3.5 ug/L) marginally above the 3.1 ug/L cleanup level in well LP-MW01, but the concentration was lower than the previous sampling event and the overall data suggest a gradually declining trend since

¹ The 2004 data from the acidic source area is from well GF-MW02 which was destroyed after 2004 and replaced during the RI by well AA-MW04.

MEMORANDUM

Project No.: 140298-001-04

May 5, 2015

2004. The dissolved nickel concentration remains below the cleanup level in this well consistent with prior data.

During the February 2015 sampling, dissolved nickel was detected above its cleanup level in well SC-MW02 (13 ug/L); the detected dissolved nickel concentrations in this well have been variable over time. The dissolved copper concentration remains below the cleanup level in this well consistent with prior data (Table 3). Figure 5 depicts the dissolved copper and nickel concentrations over time in these wells.

The 2015 data indicate continued gradual attenuation of groundwater dissolved metals concentrations in this area.

References

Aspect Consulting (Aspect), 2013, Remedial Investigation, Georgia-Pacific West Site, Bellingham, Washington, August 5, 2013, Volume 1 of RI/FS.

Aspect Consulting (Aspect), 2015, Pre-Design Characterization Plan, Pulp and Tissue Mill Remedial Action Unit, Georgia-Pacific West Site, Bellingham, Washington, February 6, 2015.

United States Environmental Protection Agency (USEPA), 1999, Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, Office of Emergency and Remedial Response, USEPA Publication No. 540/R-99/008, October.

United States Environmental Protection Agency (USEPA), 2004, Contract Laboratory Program National Functional Guidelines for Organic Methods Data Review, Office of Superfund Remediation and Technology Innovation (OSRTI), USEPA Publication No. 540-R-04-004, October.

Washington State Department of Ecology (Ecology), 2014, Cleanup Action Plan, Pulp/Tissue Mill Remedial Action Unit, Georgia-Pacific West Site, Bellingham, Washington, Exhibit B to Consent Decree No. 14207008, October 30, 2014.

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MEMORANDUM

Project No.: 140298-001-04

May 5, 2015

Attachments

Table 1 — Groundwater Chemistry Data for Acid Plant Subarea

Table 2 — Groundwater Chemistry Data for LP-MW01 Subarea

Table 3 — Groundwater Chemistry Data for Miscellaneous Metals Exceedances Area

Figure 1 — Monitoring Wells Sampled

Figure 2 — Acid Plant Subarea Groundwater pH Over Time

Figure 3 — Acid Plant Subarea Dissolved Metals Concentrations Over Time

Figure 4 — LP-MW01 Subarea Groundwater VOC Concentrations Over Time

Figure 5 — Miscellaneous Dissolved Metals Concentrations Over Time

Attachment A — Data Validation Report and Laboratory Certificates of Analysis for February 2015 Monitoring Event

V:\140298 POB GP West Pulp & Tissue RAU Cleanup\Deliverables\Results from Pre-Design GW Quality Monitoring (February 2015) Memo\Pre-design results memo_4-22-15.docx

Table 1 - Groundwater Chemistry Data for Acid Plant Subarea

Project No. 140298, Pulp/Tissue Mill RAU Groundwater MNA Plan
Bellingham, WA

		Wells Within Defined Acidic Metals Plume							
Chemical Name	Groundwater Cleanup Level	AA-MW04 9/29/09	AA-MW04 3/30/10	AA-MW04 2/25/15	FH-MW01 7/25/04	FH-MW01 9/29/09	FH-MW01 3/30/10	FH-MW01 2/25/15	
Dissolved Metals									
Dissolved Arsenic in ug/L	5	4.73	48	5.3	2	2.72	0.5 U	3 U	
Dissolved Cadmium in ug/L	8.8	1,650	74.3	7.8	0.2 U	0.039 U	0.443	4 U	
Dissolved Copper in ug/L	3.1	2.78	179	1.4	0.8	1.55	1.55	1 U	
Dissolved Nickel in ug/L	8.2	1,560	108	19	405	209	459	190	
Dissolved Zinc in ug/L	81	7,420	836	82	760	616	1,130	530	
Field Parameters									
Dissolved Oxygen in mg/L		1.23	0.38	0.51	0.73	0.82	0.45	0.80	
ORP in mVolts		-164	277.9	74.7	261.3	-158.6	71.6	121.7	
pH in pH Units	6.2 to 8.5	4.18	4.49	4.50	4.11	4.36	4.64	5.27	
Specific Conductance in us/cm		2,345	1,716	538.7	2,305	2,132	1,613	1,877	
Temperature in deg C		15.35	11.12	11.0	20.39	16.53	11.22	11.9	
Turbidity in NTU		10	20	2.20	3.22	10	10	300	

		Wells Around Perimeter of Defined Acidic Metals Plume													
Chemical Name	Groundwater Cleanup Level	AA-MW01 9/29/09	AA-MW01 3/30/10	AA-MW01 2/25/15	AA-MW02 10/1/09	AA-MW02 4/1/10	AA-MW02 2/25/15	AA-MW03 9/29/09	AA-MW03 3/30/10	AA-MW03 2/25/15	LB-MW01 7/27/04	LB-MW01 10/1/09	LB-MW01 4/1/10	LB-MW01 2/26/15	
Dissolved Metals															
Dissolved Arsenic in ug/L	5	0.11 J	0.3 U	3 U	0.1 J	0.2 U	3 U	0.87	0.4 U	3 U	0.5 U	0.45 U	0.4 U	3 U	
Dissolved Cadmium in ug/L	8.8	0.02 U	0.02 U	4 U	0.02 U	0.02 U	4 U	0.02 U	0.09	4 U	0.5 U	0.013 U	0.02 U	4 U	
Dissolved Copper in ug/L	3.1	0.3	0.58	1 U	0.67	0.68	1 U	0.99	1.09	1 U	1 U	1.4	0.79	8.7	
Dissolved Nickel in ug/L	8.2	0.84	1.62	4 U	2.18	2.3	4 U	3.01	7.37	8	1 U	0.86	2	4 U	
Dissolved Zinc in ug/L	81	0.5 U	0.5 U	25 U	0.4 J	0.6 J	25 U	32.3	23.6	25 U	10 U	0.72	0.6 J	25 U	
Field Parameters															
Dissolved Oxygen in mg/L		1.2	0.47	0.55	0.58	0.72	0.54	0.86	0.92	0.99	0.86	0.61	0.95	0.53	
ORP in mVolts		-353.7	-112.7	9.0	-335.1	-239.1	0.3	-268	69.9	119.3	-294.8	-379.1	-250.6	57.0	
pH in pH Units	6.2 to 8.5	7.56	6.92	6.99	7.23	7.24	7.32	5.06	4.87	5.52	6.60	6.79	6.84	6.70	
Specific Conductance in us/cm		746	848	1,526	1,337	984	1,110	1,581	1,661	1,960	858	1,001	702	607	
Temperature in deg C		18.45	12.8	11.9	15.13	12.39	12.4	15.94	11.26	12.2	20.00	18.3	11.38	11.3	
Turbidity in NTU		10	10	1.39	10	10	16.3	10	10	2.55	6.44	10	10	4.45	

Notes

Concentrations in shaded cells indicate value exceeds Groundwater Screening Level for Unrestricted Land Use.

J - Analyte was positively identified. The reported result is an estimate.

U - Analyte was not detected at or above the reported result.

Table 2 - Groundwater Chemistry Data for LP-MW01 Subarea

Project No. 140298, Pulp/Tissue Mill RAU Groundwater MNA Plan
Bellingham, WA

Chemical Name	Groundwater Cleanup Level	LP-MW01 7/27/04	LP-MW01 9/1/09	LP-MW01 3/29/10	LP-MW01 3/29/10 FD	LP-MW01 2/26/15
Halogenated Volatile Organic Compounds (VOC)						
Subarea Contaminants of Concern						
Tetrachloroethene (PCE) in ug/L	3.3	25	1.9	6.5	6.2	1.8
Trichloroethene (TCE) in ug/L	1.6	5.4	1.2	0.33	0.28	0.2
cis-1,2-Dichloroethene (DCE) in ug/L	160	12	5.7	0.27	0.17	0.3
Vinyl chloride (VC) in ug/L	0.5	13	10	0.11	0.5	0.2
Other Halogenated VOCs						
1,1,1,2-Tetrachloroethane in ug/L	7.4	5.0	0.5	0.5	0.5	0.2
1,1,1-Trichloroethane in ug/L	11,000	5.0	0.5	0.5	0.5	0.2
1,1,2,2-Tetrachloroethane in ug/L	4	5.0	0.5	0.5	0.5	0.2
1,1,2-Trichloroethane in ug/L	7.9	5.0	0.5	0.5	0.5	0.2
1,1-Dichloroethane in ug/L	2,300	5.0	6	0.34	0.24	0.2
1,1-Dichloroethene in ug/L	3.2	5.0	0.29	0.5	0.5	0.2
1,1-Dichloropropene in ug/L		5.0	0.5	0.5	0.5	0.2
1,2,3-Trichlorobenzene in ug/L		25	2	2	2	0.2
1,2,3-Trichloropropane in ug/L		15	0.5	0.5	0.5	0.2
1,2,4-Trichlorobenzene in ug/L	0.48	25	2	2	2	0.2
1,2-Dibromo-3-chloropropane in ug/L		25	2	2	2	1
1,2-Dibromoethane (EDB) in ug/L	2	5.0	2	2	2	0.2
1,2-Dichlorobenzene in ug/L	6.1	5.0	0.5	0.5	0.5	0.2
1,2-Dichloroethane (EDC) in ug/L	4.2	5.0	0.5	0.5	0.5	0.2
1,2-Dichloropropane in ug/L	15	5.0	0.5	0.5	0.5	0.2
1,3-Dichlorobenzene in ug/L	960	5.0	0.5	0.5	0.5	0.2
1,3-Dichloropropane in ug/L		5.0	0.5	0.5	0.5	0.2
1,4-Dichlorobenzene in ug/L	5	5.0	0.5	0.5	0.5	0.2
2,2-Dichloropropane in ug/L		5.0	0.5	0.5	0.5	0.2
2-Chlorotoluene in ug/L		5.0	2	2	2	0.2
4-Chlorotoluene in ug/L		5.0	2	2	2	0.2
Bromobenzene in ug/L		5.0	2	2	2	0.2
Bromochloromethane in ug/L		5.0	0.5	0.5	0.5	0.2
Bromodichloromethane in ug/L	0.5	5.0	0.5	0.5	0.5	0.2
Bromoform in ug/L	140	5.0	0.5	0.5	0.5	1
Bromomethane in ug/L	13	5.0	0.5	0.5	0.5	0.2
Carbon tetrachloride in ug/L	0.5	5.0	0.5	0.5	0.5	0.2
Chlorobenzene in ug/L	100	5.0	0.5	0.5	0.5	0.2
Chloroethane in ug/L	12	5.0	0.5	0.5	0.5	1
Chloroform in ug/L	1.2	5.0	0.5	0.2	0.2	0.2
Chloromethane in ug/L	5.2	5.0	0.11	0.08	0.07	1
cis-1,3-Dichloropropene in ug/L		5.0	0.5	0.5	0.5	0.2
Dibromochloromethane in ug/L	0.5	5.0	0.5	0.5	0.5	0.2
Dibromomethane in ug/L		5.0	0.5	0.5	0.5	0.2
Dichlorodifluoromethane in ug/L	9.9		0.5	0.5	0.5	0.2
Hexachlorobutadiene in ug/L	0.2	25	2	2	2	0.2
Methylene chloride in ug/L	94	10	2	2	2	1
trans-1,2-Dichloroethene in ug/L	130	5.0	0.52	0.5	0.5	0.2
trans-1,3-Dichloropropene in ug/L		5.0	0.5	0.5	0.5	0.2
Trichlorofluoromethane in ug/L	120	5.0	0.5	0.5	0.5	0.2
Field Parameters						
Dissolved Oxygen in mg/L		0.73	0.99	3.14		0.60
ORP in mVolts		-27.4	-289.2	97.6		-178.6
pH in pH Units	6.2 to 8.5	7.20	7.09	7.79		6.94
Specific Conductance in us/cm		863	712	222		193.3
Temperature in deg C		19.14	19.1	11.39		10.8
Turbidity in NTU		17.4	10	10		3.59

Notes

Concentrations in shaded cells indicate value exceeds Groundwater Screening Level for Unrestricted Land Use.

J - Analyte was positively identified. The reported result is an estimate.

U - Analyte was not detected at or above the reported result.

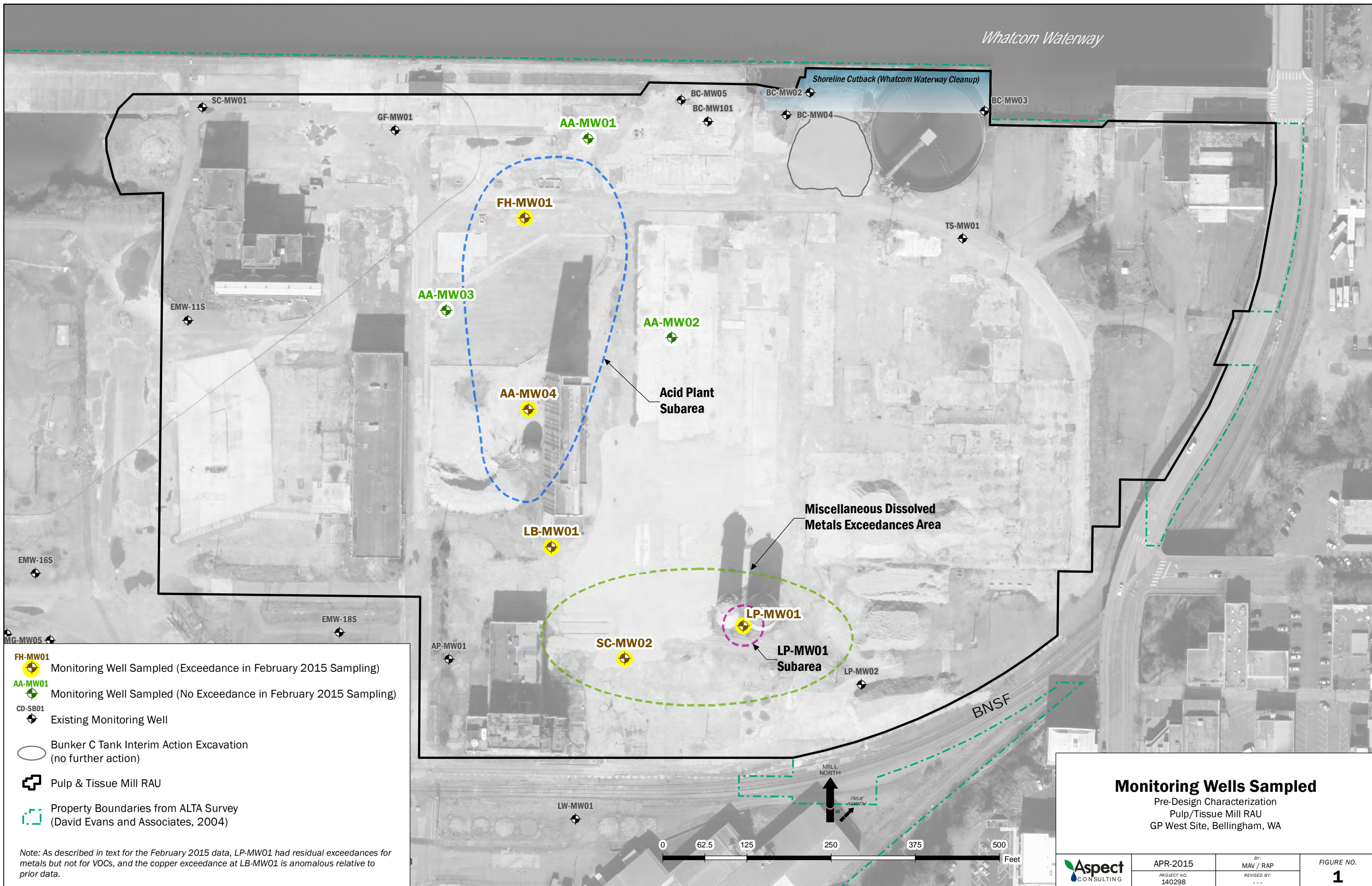
Table 3 - Groundwater Chemistry Data for Miscellaneous Metals Exceedance Area

Project No. 140298, Pulp/Tissue Mill RAU Groundwater MNA Plan
 Bellingham, WA

Chemical Name	Groundwater Screening Level for Unrestricted Land Use	LP-MW01 7/27/04	LP-MW01 9/30/09	LP-MW01 3/30/10	LP-MW01 2/26/15	SC-MW02 7/27/04	SC-MW02 7/27/04 FD	SC-MW02 9/30/09	SC-MW02 4/1/10	SC-MW02 2/26/15
Dissolved Metals										
Dissolved Copper in ug/L	3.1	45	3.1	4.41	3.5	17	17	4.78	0.412	2 U
Dissolved Nickel in ug/L	8.2	7	1.61	1.2	4 U	29	29	8.42	1.67 U	13
Field Parameters										
Dissolved Oxygen in mg/L		0.73	0.99	3.14	0.60	0.68		0.65	4.58	0.58
ORP in mVolts		-27.4	-289.2	97.6	-178.6	-385.2		-496.6	-272	-193.7
pH in pH Units	8.5	7.20	7.09	7.79	6.94	6.05		6.41	6.56	6.78
Specific Conductance in us/cm		863	712	222	193.3	6,685		4,137	2,920	3,325
Temperature in deg C		19.14	19.1	11.39	10.8	15.28		16.58	10.89	11.3
Turbidity in NTU		17.4	10	10	3.59	55.8		10	15	9.14

Notes

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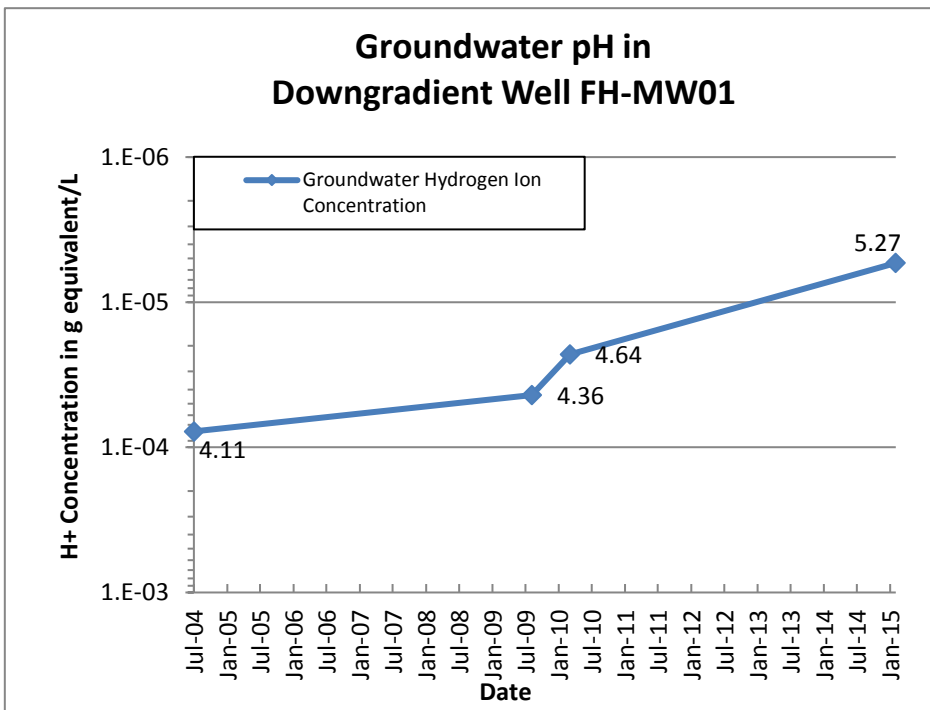
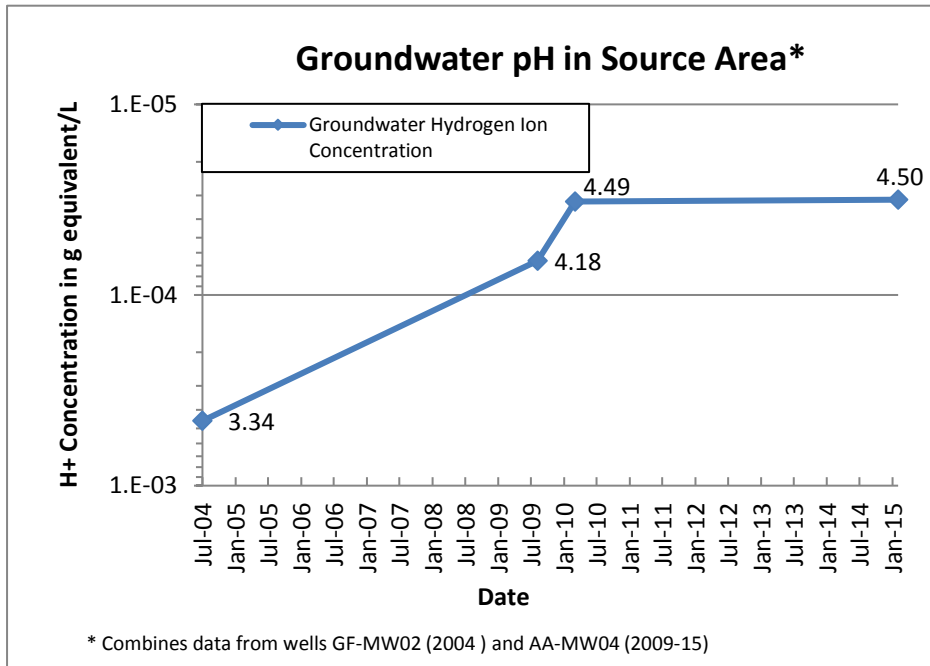
- **FH-MW01**
Monitoring Well Sampled (Exceedance in February 2015 Sampling)
- **AA-MW01**
Monitoring Well Sampled (No Exceedance in February 2015 Sampling)
- ⊕ **CD-SB01**
Existing Monitoring Well
- Bunker C Tank Interim Action Excavation (no further action)
- + Pulp & Tissue Mill RAU
- Property Boundaries from ALTA Survey (David Evans and Associates, 2004)

Note: As described in text for the February 2015 data, LP-MW01 had residual exceedances for metals but not for VOCs, and the copper exceedance at LB-MW01 is anomalous relative to prior data.

Monitoring Wells Sampled

Pre-Design Characterization
Pulp/Tissue Mill RAU
GP West Site, Bellingham, WA

	APR-2015 PROJECT NO. 140298	BY: MAV / RAP REVISED BY: ...	FIGURE NO. 1
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Notes:

(a): pH (-log [H+ concentration]) is plotted as the H+ concentration for better illustration, since pH is a logarithmic scale. The y-axis (H+ concentration) is plotted in reverse so that a higher pH is up (lower H+). The pH is the negative exponent value of the hydrogen ion concentration.

(b): labels on data points show pH value

Figure 2
Acid Plant Subarea Groundwater pH Over Time
 Pulp/Tissue Mill RAU Pre-Design Characterization

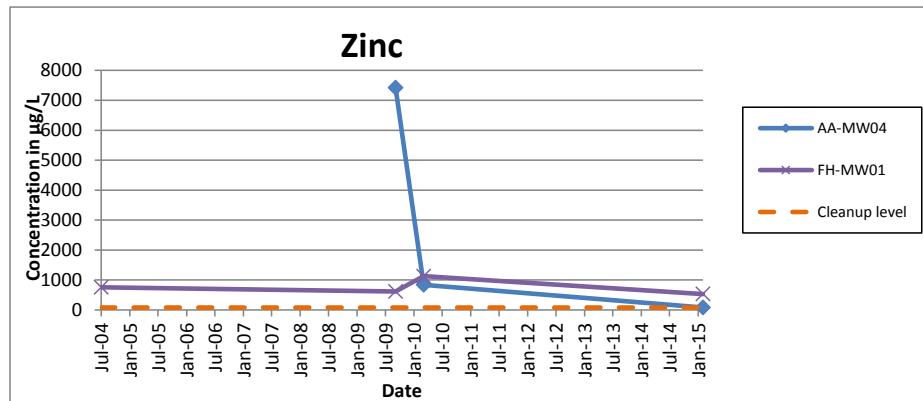
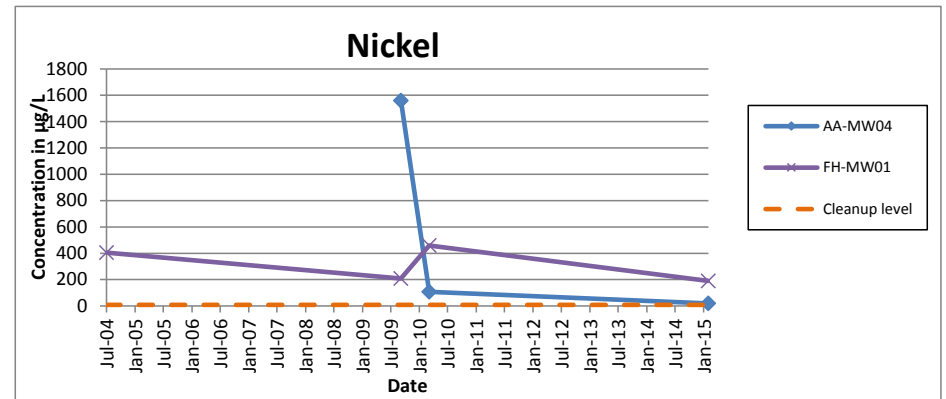
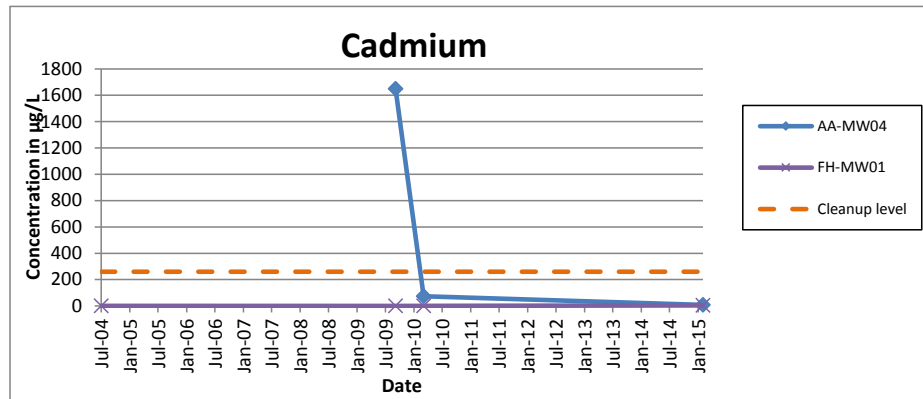
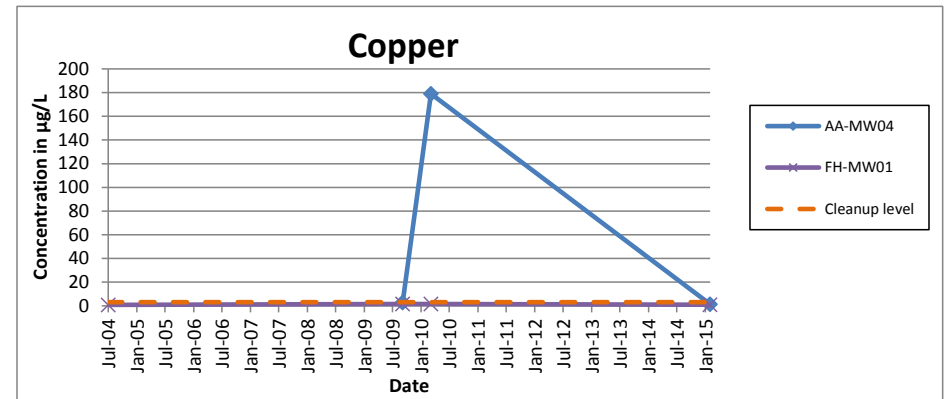
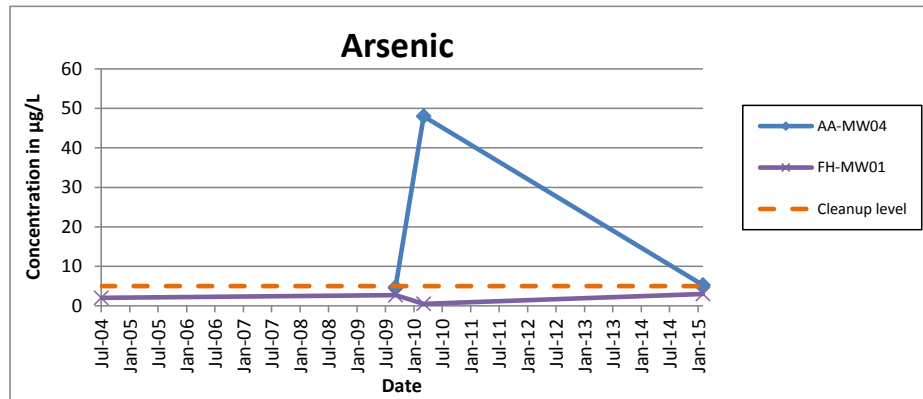


Figure 3

Acid Plant Subarea Dissolved Metals Concentrations Over Time

Pulp/Tissue Mill RAU Pre-Design Characterization

GP West Site

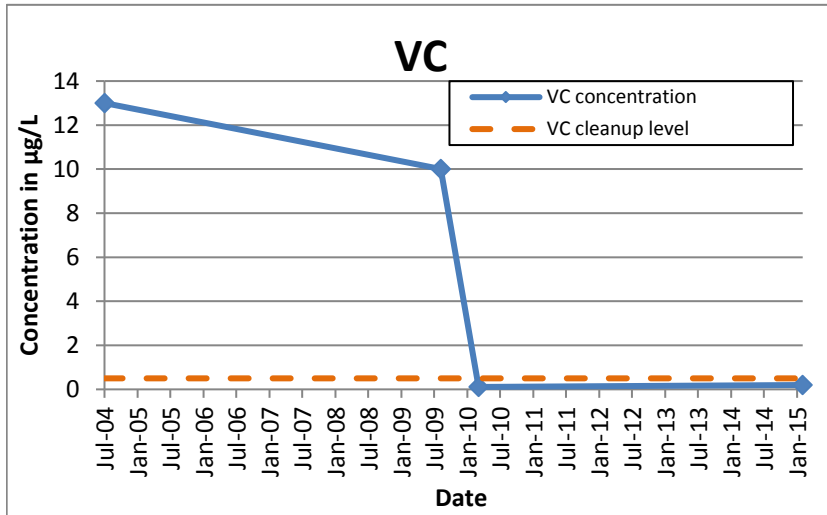
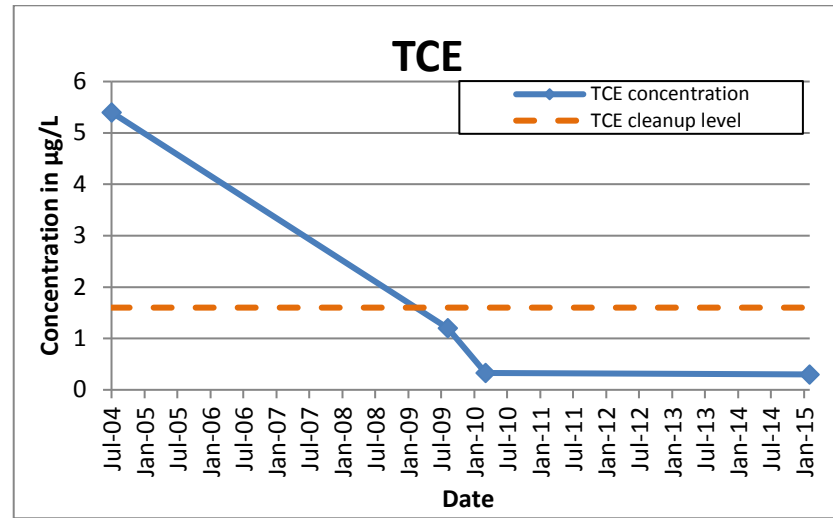
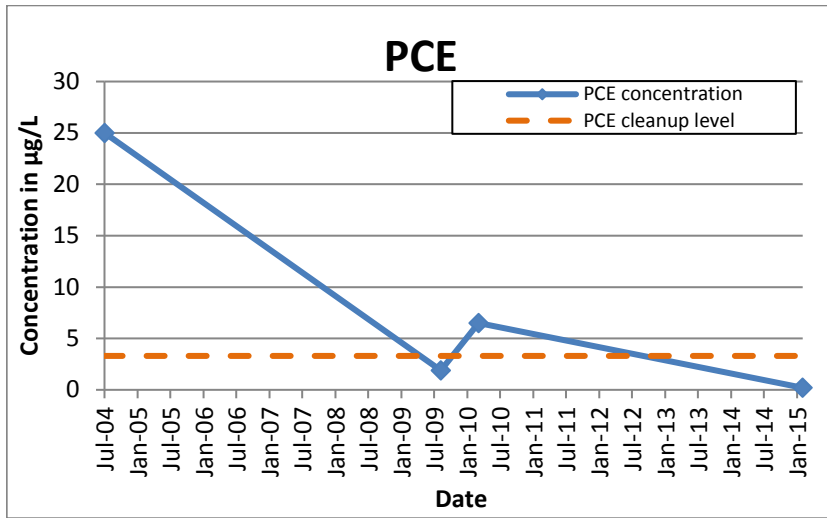


Figure 4

LP-MW01 Subarea Groundwater VOC Concentrations Over Time

Pulp/Tissue Mill RAU Pre-Design Characterization

GP West Site

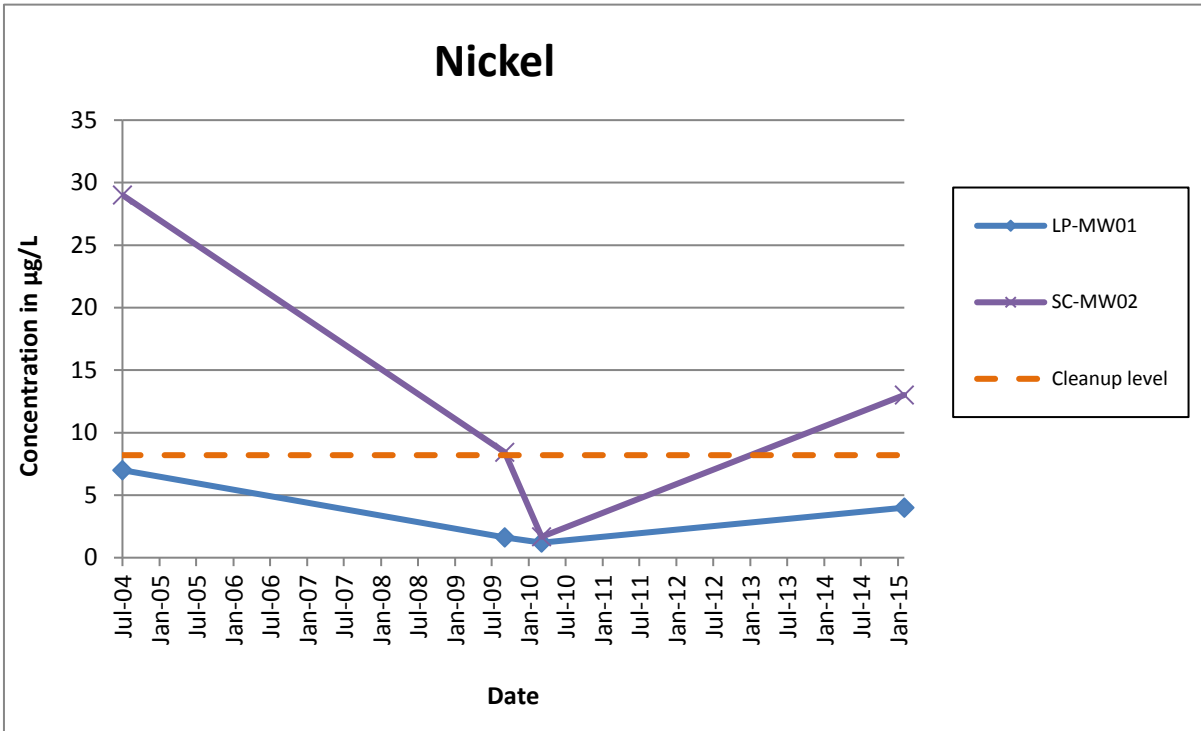
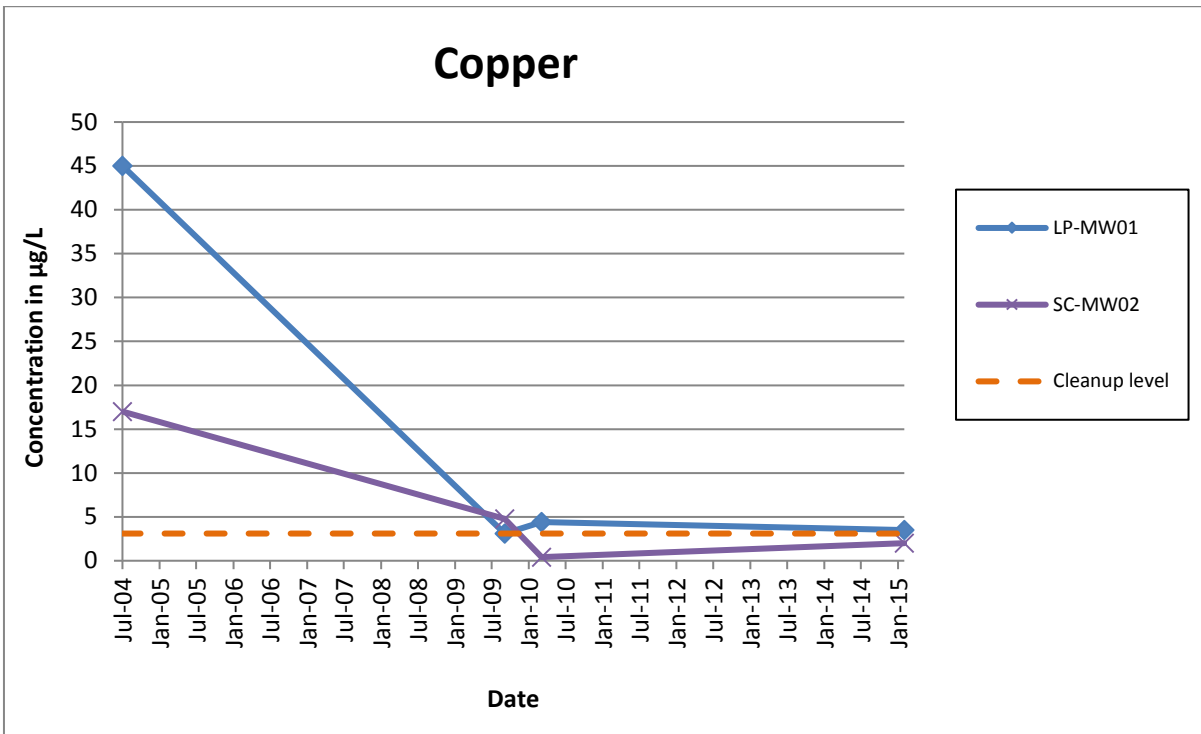


Figure 5

Miscellaneous Dissolved Metals Concentrations Over Time

Pulp/Tissue Mill RAU Pre-Design Characterization

GP West Site

ATTACHMENT A

Data Validation Report and Laboratory Certificates of Analysis for February 2015 Monitoring Event

DATA VALIDATION REPORT
Port of Bellingham GP West Site
Pre-Design Characterization Groundwater Monitoring for
Cleanup of Pulp/Tissue Mill Remedial Action Unit
February 2015
SDG 1502-246

Prepared by:
Aspect Consulting, LLC
401 Second Ave South, Suite 201
Seattle, WA 98104

Project No. 140298 • April 13, 2015

V:\140298 POB GP West Pulp & Tissue RAU Cleanup\Deliverables\Results from Pre-Design GW Quality
Monitoring (February 2015) Memo\Attach A - GP West Feb 2015 GW Data Validation_4-13.docx

1 Introduction

This report summarizes the findings of the United States Environmental Protection Agency (USEPA) Stage 2A data validation performed on analytical data for groundwater samples collected on February 25 and 26, 2015 for GP West Remedial Action Unit Pre-Design Characterization. This data quality review is divided into sections by sample delivery group (SDG). A complete list of samples and analyses for each SDG is provided in the Sample Index at the beginning of Section 2.

Samples were analyzed by OnSite Environmental (OSE) in Seattle, Washington, a Washington State Department of Ecology-accredited laboratory. The analytical methods for the groundwater samples are summarized below:

Analysis	Method	Laboratory
Volatile Organic Carbons (VOCs)	EPA 8260C	OSE
Dissolved Metals	EPA 6020A	OSE

The validation followed the procedures documented in the analytical methods, the work plan (Aspect, 2015), *National Functional Guidelines for Organic Data Review* (USEPA, 1999), and *National Functional Guidelines for Inorganic Data Review* (USEPA, 2004).

Data assigned a J qualifier (estimated) may be used for site evaluation purposes, but the reasons for qualification should be taken into account when interpreting sample concentrations. Data marked as do not report (DNR) should not be used under any circumstances. Values without qualification meet all data measurement quality objectives and are suitable for use.

Data qualifier definitions and a summary table of the qualified data are included in the Qualified Data Summary at the end of this report. Data qualifiers have been incorporated into the project chemistry database to reflect the validation in this report.

2 Data Validation Findings for SDG 1502-246

Groundwater samples in this SDG, and the chemical analyses performed on them, are tabulated below. The sections below describe the results of the data quality review for this SDG by analyte group (analysis).

Sample Index

Sample ID	Sample Date	Sample Matrix	Analyte					
			VOCs	Arsenic	Cadmium	Copper	Nickel	Zinc
AA-MW04-022515	2/25/2015	GrWtr		x	x	x	x	x
AA-MW03-022515	2/25/2015	GrWtr		x	x	x	x	x
FH-MW01-022515	2/25/2015	GrWtr		x	x	x	x	x
AA-MW01-022515	2/25/2015	GrWtr		x	x	x	x	x
AA-MW02-022515	2/25/2015	GrWtr		x	x	x	x	x
LB-MW01-022615	2/26/2015	GrWtr		x	x	x	x	x
SC-MW02-022615	2/26/2015	GrWtr		x			x	
LP-MW01-022615	2/26/2015	GrWtr	x	x			x	

2.1 Halogenated VOCs (EPA 8260C)

2.1.1 Sample Receipt, Preservation, and Holding Times

Preserved water samples should be analyzed within 14 days of collection. Unpreserved water samples should be analyzed within 7 days of collection.

Sample receipt, preservation (2–6 degrees Celsius [C]), and holding times were acceptable.

2.1.2 Method Blanks

Target analytes were not detected at or above the reporting levels in the method blanks.

2.1.3 Surrogates

All surrogate spike recoveries were within control. No data qualification was necessary.

2.1.4 Matrix Spike/Matrix Spike Duplicates (MS/MSD)

MS and MSD, %R and RPD were within the project control limits.

2.1.5 Reported Results and Reporting Limits (RL)

The target RLs met the project requirements.

2.1.6 Overall Assessment

Accuracy was acceptable based on the surrogate and MS recoveries and precision was acceptable based on the MS/MSD RPD values. The data are of known quality and are acceptable for use as qualified.

2.2 Dissolved Metals (EPA 6020A)

2.2.1 Sample Receipt, Preservation, and Holding Times

Water samples should be analyzed within 180 days of extraction.

Sample receipt, preservation (2–6 degrees C), and holding times were acceptable.

2.2.2 Method Blanks

Target analytes were not detected at or above the reporting levels in the method blanks.

2.2.3 Matrix Spike/Matrix Spike Duplicates (MS/MSD)

MS and MSD, %R and RPD were within the project control limits.

2.2.4 Laboratory Duplicates

For laboratory duplicate results that are greater than the reporting limit, the RPD control limit is 20 percent. For laboratory duplicate results less than five times the reporting limit, the difference between the sample and duplicate must be less than the reporting limit.

All RPD were within the control limits specified above.

2.2.5 Reported Results and Reporting Limits (RL)

The target RLs met the project requirements.

2.2.6 Overall Assessment

Accuracy was acceptable based on the MS recoveries, and precision was acceptable based on the MS/MSD and laboratory duplicates RPD values. The data are of known quality and are acceptable for use as qualified.

3 Qualified Data Summary

Qualified Data Summary Table

No qualification of the data was required.

Data Qualifier Definitions

Data Qualifier	Definition
DNR	Do not report; the result should be reported from an alternative analysis.
J	The analyte was detected above the reported quantitation limit, and the reported concentration was an estimated value.
R	The sample results are unusable due to the quality of the data generated because certain criteria were not met. The analyte may or may not be present in the sample.
U	The analyte was analyzed for, but was considered not detected at the reporting limit or reported value.
UJ	The analyte was analyzed for, and the associated quantitation limit was an estimated value.
X	The sample chromatographic pattern does not resemble the fuel standard used for quantitation.

4 References

Aspect, 2015, Pre-Design Characterization Plan, Remedial Action Unit, GP West Site, Bellingham, Washington, February 6, 2015.

United States Environmental Protection Agency (USEPA), 1994, Method 200.8 Determination of Trace Elements in Waters and Wastes by Inductively Coupled Plasma – Mass Spectrometry, Revision 5.4, Environmental Monitoring Systems Laboratory Office of Research and Development.

United States Environmental Protection Agency (USEPA), 1997, Method 1640 Determination of Trace Elements in Waters by Preconcentration and Inductively Coupled Plasma – Mass Spectrometry, Office of Water & Office of Science and Technology Engineering and Analysis Division (4303), April.

United States Environmental Protection Agency (USEPA), 1999, Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, Office of Emergency and Remedial Response, USEPA Publication No. 540/R-99/008, October.

United States Environmental Protection Agency (USEPA), 2004, Contract Laboratory Program National Functional Guidelines for Organic Methods Data Review, Office of Superfund Remediation and Technology Innovation (OSRTI), USEPA Publication No. 540-R-04-004, October.



14648 NE 95th Street, Redmond, WA 98052 • (425) 883-3881

March 6, 2015

Steve Germiot
Aspect Consulting
401 2nd Avenue South, Suite 201
Seattle, WA 98104

Re: Analytical Data for Project 140298-003-01
Laboratory Reference No. 1502-246

Dear Steve:

Enclosed are the analytical results and associated quality control data for samples submitted on February 27, 2015.

The standard policy of OnSite Environmental, Inc. is to store your samples for 30 days from the date of receipt. If you require longer storage, please contact the laboratory.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning the data, or need additional information, please feel free to call me.

Sincerely,

A handwritten signature in black ink, appearing to read "DB", with a long horizontal stroke extending to the right.

David Baumeister
Project Manager

Enclosures

Date of Report: March 6, 2015
Samples Submitted: February 27, 2015
Laboratory Reference: 1502-246
Project: 140298-003-01

Case Narrative

Samples were collected on February 25 and 26, 2015 and received by the laboratory on February 27, 2015. They were maintained at the laboratory at a temperature of 2°C to 6°C.

General QA/QC issues associated with the analytical data enclosed in this laboratory report will be indicated with a reference to a comment or explanation on the Data Qualifier page. More complex and involved QA/QC issues will be discussed in detail below.

Date of Report: March 6, 2015
 Samples Submitted: February 27, 2015
 Laboratory Reference: 1502-246
 Project: 140298-003-01

**DISSOLVED METALS
 EPA 6020A**

Matrix: Water
 Units: ug/L (ppb)

Analyte	Result	PQL	EPA Method	Date Prepared	Date Analyzed	Flags
Lab ID: 02-246-01						
Client ID: AA-MW04-022515						
Arsenic	5.3	3.0	6020A		3-6-15	
Cadmium	7.8	4.0	6020A		3-6-15	
Copper	1.4	1.0	6020A		3-6-15	
Nickel	19	4.0	6020A		3-6-15	
Zinc	82	25	6020A		3-6-15	
Lab ID: 02-246-02						
Client ID: AA-MW03-022515						
Arsenic	ND	3.0	6020A		3-6-15	
Cadmium	ND	4.0	6020A		3-6-15	
Copper	ND	1.0	6020A		3-6-15	
Nickel	8.0	4.0	6020A		3-6-15	
Zinc	ND	25	6020A		3-6-15	
Lab ID: 02-246-03						
Client ID: FH-MW01-022515						
Arsenic	ND	3.0	6020A		3-6-15	
Cadmium	ND	4.0	6020A		3-6-15	
Copper	ND	1.0	6020A		3-6-15	
Nickel	190	20	6020A		3-6-15	
Zinc	530	130	6020A		3-6-15	

Date of Report: March 6, 2015
 Samples Submitted: February 27, 2015
 Laboratory Reference: 1502-246
 Project: 140298-003-01

**DISSOLVED METALS
 EPA 6020A**

Matrix: Water
 Units: ug/L (ppb)

Analyte	Result	PQL	EPA Method	Date Prepared	Date Analyzed	Flags
Lab ID:	02-246-04					
Client ID:	AA-MW01-022515					
Arsenic	ND	3.0	6020A		3-6-15	
Cadmium	ND	4.0	6020A		3-6-15	
Copper	ND	1.0	6020A		3-6-15	
Nickel	ND	4.0	6020A		3-6-15	
Zinc	ND	25	6020A		3-6-15	

Lab ID:	02-246-05					
Client ID:	AA-MW02-022515					
Arsenic	ND	3.0	6020A		3-6-15	
Cadmium	ND	4.0	6020A		3-6-15	
Copper	ND	1.0	6020A		3-6-15	
Nickel	ND	4.0	6020A		3-6-15	
Zinc	ND	25	6020A		3-6-15	

Lab ID:	02-246-06					
Client ID:	LB-MW01-022615					
Arsenic	ND	3.0	6020A		3-6-15	
Cadmium	ND	4.0	6020A		3-6-15	
Copper	8.7	1.0	6020A		3-6-15	
Nickel	ND	4.0	6020A		3-6-15	
Zinc	ND	25	6020A		3-6-15	

Date of Report: March 6, 2015
 Samples Submitted: February 27, 2015
 Laboratory Reference: 1502-246
 Project: 140298-003-01

**DISSOLVED METALS
 EPA 6020A**

Matrix: Water
 Units: ug/L (ppb)

Analyte	Result	PQL	EPA Method	Date Prepared	Date Analyzed	Flags
Lab ID:	02-246-07					
Client ID:	SC-MW02-022615					
Copper	ND	2.0	6020A		3-6-15	
Nickel	13	4.0	6020A		3-6-15	

Lab ID:	02-246-08					
Client ID:	LP-MW01-022615					
Copper	3.5	1.0	6020A		3-6-15	
Nickel	ND	4.0	6020A		3-6-15	

Date of Report: March 6, 2015
Samples Submitted: February 27, 2015
Laboratory Reference: 1502-246
Project: 140298-003-01

**DISSOLVED METALS
EPA 6020A
METHOD BLANK QUALITY CONTROL**

Date Analyzed: 3-6-15
Matrix: Water
Units: ug/L (ppb)
Lab ID: MB0306D1

Analyte	Method	Result	PQL
Arsenic	6020A	ND	3.0
Cadmium	6020A	ND	4.0
Copper	6020A	ND	1.0
Nickel	6020A	ND	4.0
Zinc	6020A	ND	25

Date of Report: March 6, 2015
Samples Submitted: February 27, 2015
Laboratory Reference: 1502-246
Project: 140298-003-01

**DISSOLVED METALS
EPA 6020A
DUPLICATE QUALITY CONTROL**

Date Analyzed: 3-6-15

Matrix: Water
Units: ug/L (ppb)

Lab ID: 02-246-08

Analyte	Sample Result	Duplicate Result	RPD	PQL	Flags
Arsenic	ND	ND	NA	3.0	
Cadmium	ND	ND	NA	4.0	
Copper	3.50	3.38	4	1.0	
Nickel	ND	ND	NA	4.0	
Zinc	ND	ND	NA	25	

Date of Report: March 6, 2015
 Samples Submitted: February 27, 2015
 Laboratory Reference: 1502-246
 Project: 140298-003-01

**DISSOLVED METALS
 EPA 6020A
 MS/MSD QUALITY CONTROL**

Date Analyzed: 3-6-15

Matrix: Water
 Units: ug/L (ppb)

Lab ID: 02-246-08

Analyte	Spike Level	MS	Percent Recovery	MSD	Percent Recovery	RPD	Flags
Arsenic	80.0	82.7	103	84.6	106	2	
Cadmium	80.0	81.9	102	81.7	102	0	
Copper	80.0	74.6	89	79.0	94	6	
Nickel	80.0	79.3	99	79.4	99	0	
Zinc	80.0	83.6	105	86.8	109	4	

Date of Report: March 6, 2015
 Samples Submitted: February 27, 2015
 Laboratory Reference: 1502-246
 Project: 140298-003-01

HALOGENATED VOLATILES EPA 8260C

page 1 of 2

Matrix: Water
 Units: ug/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	LP-MW01-022615					
Laboratory ID:	02-246-08					
Dichlorodifluoromethane	ND	0.20	EPA 8260C	3-5-15	3-5-15	
Chloromethane	ND	1.0	EPA 8260C	3-5-15	3-5-15	
Vinyl Chloride	ND	0.20	EPA 8260C	3-5-15	3-5-15	
Bromomethane	ND	0.20	EPA 8260C	3-5-15	3-5-15	
Chloroethane	ND	1.0	EPA 8260C	3-5-15	3-5-15	
Trichlorofluoromethane	ND	0.20	EPA 8260C	3-5-15	3-5-15	
1,1-Dichloroethene	ND	0.20	EPA 8260C	3-5-15	3-5-15	
Iodomethane	ND	1.0	EPA 8260C	3-5-15	3-5-15	
Methylene Chloride	ND	1.0	EPA 8260C	3-5-15	3-5-15	
(trans) 1,2-Dichloroethene	ND	0.20	EPA 8260C	3-5-15	3-5-15	
1,1-Dichloroethane	ND	0.20	EPA 8260C	3-5-15	3-5-15	
2,2-Dichloropropane	ND	0.20	EPA 8260C	3-5-15	3-5-15	
(cis) 1,2-Dichloroethene	0.30	0.20	EPA 8260C	3-5-15	3-5-15	
Bromochloromethane	ND	0.20	EPA 8260C	3-5-15	3-5-15	
Chloroform	ND	0.20	EPA 8260C	3-5-15	3-5-15	
1,1,1-Trichloroethane	ND	0.20	EPA 8260C	3-5-15	3-5-15	
Carbon Tetrachloride	ND	0.20	EPA 8260C	3-5-15	3-5-15	
1,1-Dichloropropene	ND	0.20	EPA 8260C	3-5-15	3-5-15	
1,2-Dichloroethane	ND	0.20	EPA 8260C	3-5-15	3-5-15	
Trichloroethene	ND	0.20	EPA 8260C	3-5-15	3-5-15	
1,2-Dichloropropane	ND	0.20	EPA 8260C	3-5-15	3-5-15	
Dibromomethane	ND	0.20	EPA 8260C	3-5-15	3-5-15	
Bromodichloromethane	ND	0.20	EPA 8260C	3-5-15	3-5-15	
2-Chloroethyl Vinyl Ether	ND	1.0	EPA 8260C	3-5-15	3-5-15	
(cis) 1,3-Dichloropropene	ND	0.20	EPA 8260C	3-5-15	3-5-15	
(trans) 1,3-Dichloropropene	ND	0.20	EPA 8260C	3-5-15	3-5-15	

Date of Report: March 6, 2015
 Samples Submitted: February 27, 2015
 Laboratory Reference: 1502-246
 Project: 140298-003-01

HALOGENATED VOLATILES EPA 8260C
 page 2 of 2

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	LP-MW01-022615					
Laboratory ID:	02-246-08					
1,1,2-Trichloroethane	ND	0.20	EPA 8260C	3-5-15	3-5-15	
Tetrachloroethene	1.8	0.20	EPA 8260C	3-5-15	3-5-15	
1,3-Dichloropropane	ND	0.20	EPA 8260C	3-5-15	3-5-15	
Dibromochloromethane	ND	0.20	EPA 8260C	3-5-15	3-5-15	
1,2-Dibromoethane	ND	0.20	EPA 8260C	3-5-15	3-5-15	
Chlorobenzene	ND	0.20	EPA 8260C	3-5-15	3-5-15	
1,1,1,2-Tetrachloroethane	ND	0.20	EPA 8260C	3-5-15	3-5-15	
Bromoform	ND	1.0	EPA 8260C	3-5-15	3-5-15	
Bromobenzene	ND	0.20	EPA 8260C	3-5-15	3-5-15	
1,1,2,2-Tetrachloroethane	ND	0.20	EPA 8260C	3-5-15	3-5-15	
1,2,3-Trichloropropane	ND	0.20	EPA 8260C	3-5-15	3-5-15	
2-Chlorotoluene	ND	0.20	EPA 8260C	3-5-15	3-5-15	
4-Chlorotoluene	ND	0.20	EPA 8260C	3-5-15	3-5-15	
1,3-Dichlorobenzene	ND	0.20	EPA 8260C	3-5-15	3-5-15	
1,4-Dichlorobenzene	ND	0.20	EPA 8260C	3-5-15	3-5-15	
1,2-Dichlorobenzene	ND	0.20	EPA 8260C	3-5-15	3-5-15	
1,2-Dibromo-3-chloropropane	ND	1.0	EPA 8260C	3-5-15	3-5-15	
1,2,4-Trichlorobenzene	ND	0.20	EPA 8260C	3-5-15	3-5-15	
Hexachlorobutadiene	ND	0.20	EPA 8260C	3-5-15	3-5-15	
1,2,3-Trichlorobenzene	ND	0.20	EPA 8260C	3-5-15	3-5-15	
<i>Surrogate:</i>	<i>Percent Recovery</i>	<i>Control Limits</i>				
<i>Dibromofluoromethane</i>	<i>122</i>	<i>79-122</i>				
<i>Toluene-d8</i>	<i>103</i>	<i>80-120</i>				
<i>4-Bromofluorobenzene</i>	<i>99</i>	<i>80-120</i>				

Date of Report: March 6, 2015
 Samples Submitted: February 27, 2015
 Laboratory Reference: 1502-246
 Project: 140298-003-01

HALOGENATED VOLATILES EPA 8260C
METHOD BLANK QUALITY CONTROL
 page 1 of 2

Matrix: Water
 Units: ug/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Laboratory ID: MB0305W1						
Dichlorodifluoromethane	ND	0.20	EPA 8260C	3-5-15	3-5-15	
Chloromethane	ND	1.0	EPA 8260C	3-5-15	3-5-15	
Vinyl Chloride	ND	0.20	EPA 8260C	3-5-15	3-5-15	
Bromomethane	ND	0.20	EPA 8260C	3-5-15	3-5-15	
Chloroethane	ND	1.0	EPA 8260C	3-5-15	3-5-15	
Trichlorofluoromethane	ND	0.20	EPA 8260C	3-5-15	3-5-15	
1,1-Dichloroethene	ND	0.20	EPA 8260C	3-5-15	3-5-15	
Iodomethane	ND	1.0	EPA 8260C	3-5-15	3-5-15	
Methylene Chloride	ND	1.0	EPA 8260C	3-5-15	3-5-15	
(trans) 1,2-Dichloroethene	ND	0.20	EPA 8260C	3-5-15	3-5-15	
1,1-Dichloroethane	ND	0.20	EPA 8260C	3-5-15	3-5-15	
2,2-Dichloropropane	ND	0.20	EPA 8260C	3-5-15	3-5-15	
(cis) 1,2-Dichloroethene	ND	0.20	EPA 8260C	3-5-15	3-5-15	
Bromochloromethane	ND	0.20	EPA 8260C	3-5-15	3-5-15	
Chloroform	ND	0.20	EPA 8260C	3-5-15	3-5-15	
1,1,1-Trichloroethane	ND	0.20	EPA 8260C	3-5-15	3-5-15	
Carbon Tetrachloride	ND	0.20	EPA 8260C	3-5-15	3-5-15	
1,1-Dichloropropene	ND	0.20	EPA 8260C	3-5-15	3-5-15	
1,2-Dichloroethane	ND	0.20	EPA 8260C	3-5-15	3-5-15	
Trichloroethene	ND	0.20	EPA 8260C	3-5-15	3-5-15	
1,2-Dichloropropane	ND	0.20	EPA 8260C	3-5-15	3-5-15	
Dibromomethane	ND	0.20	EPA 8260C	3-5-15	3-5-15	
Bromodichloromethane	ND	0.20	EPA 8260C	3-5-15	3-5-15	
2-Chloroethyl Vinyl Ether	ND	1.0	EPA 8260C	3-5-15	3-5-15	
(cis) 1,3-Dichloropropene	ND	0.20	EPA 8260C	3-5-15	3-5-15	
(trans) 1,3-Dichloropropene	ND	0.20	EPA 8260C	3-5-15	3-5-15	

Date of Report: March 6, 2015
 Samples Submitted: February 27, 2015
 Laboratory Reference: 1502-246
 Project: 140298-003-01

**HALOGENATED VOLATILES EPA 8260C
 METHOD BLANK QUALITY CONTROL**
 page 2 of 2

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Laboratory ID:		MB0305W1				
1,1,2-Trichloroethane	ND	0.20	EPA 8260C	3-5-15	3-5-15	
Tetrachloroethene	ND	0.20	EPA 8260C	3-5-15	3-5-15	
1,3-Dichloropropane	ND	0.20	EPA 8260C	3-5-15	3-5-15	
Dibromochloromethane	ND	0.20	EPA 8260C	3-5-15	3-5-15	
1,2-Dibromoethane	ND	0.20	EPA 8260C	3-5-15	3-5-15	
Chlorobenzene	ND	0.20	EPA 8260C	3-5-15	3-5-15	
1,1,1,2-Tetrachloroethane	ND	0.20	EPA 8260C	3-5-15	3-5-15	
Bromoform	ND	1.0	EPA 8260C	3-5-15	3-5-15	
Bromobenzene	ND	0.20	EPA 8260C	3-5-15	3-5-15	
1,1,2,2-Tetrachloroethane	ND	0.20	EPA 8260C	3-5-15	3-5-15	
1,2,3-Trichloropropane	ND	0.20	EPA 8260C	3-5-15	3-5-15	
2-Chlorotoluene	ND	0.20	EPA 8260C	3-5-15	3-5-15	
4-Chlorotoluene	ND	0.20	EPA 8260C	3-5-15	3-5-15	
1,3-Dichlorobenzene	ND	0.20	EPA 8260C	3-5-15	3-5-15	
1,4-Dichlorobenzene	ND	0.20	EPA 8260C	3-5-15	3-5-15	
1,2-Dichlorobenzene	ND	0.20	EPA 8260C	3-5-15	3-5-15	
1,2-Dibromo-3-chloropropane	ND	1.0	EPA 8260C	3-5-15	3-5-15	
1,2,4-Trichlorobenzene	ND	0.20	EPA 8260C	3-5-15	3-5-15	
Hexachlorobutadiene	ND	0.20	EPA 8260C	3-5-15	3-5-15	
1,2,3-Trichlorobenzene	ND	0.20	EPA 8260C	3-5-15	3-5-15	
<i>Surrogate:</i>	<i>Percent Recovery</i>	<i>Control Limits</i>				
<i>Dibromofluoromethane</i>	<i>105</i>	<i>79-122</i>				
<i>Toluene-d8</i>	<i>100</i>	<i>80-120</i>				
<i>4-Bromofluorobenzene</i>	<i>99</i>	<i>80-120</i>				

Date of Report: March 6, 2015
 Samples Submitted: February 27, 2015
 Laboratory Reference: 1502-246
 Project: 140298-003-01

**HALOGENATED VOLATILES EPA 8260C
 SB/SBD QUALITY CONTROL**

Matrix: Water
 Units: ug/L

Analyte	Result		Spike Level		Percent Recovery		Recovery	RPD		Flags
					Recovery	Limits	RPD	Limit		
SPIKE BLANKS										
Laboratory ID:	SB0305W1									
	SB	SBD	SB	SBD	SB	SBD				
1,1-Dichloroethene	10.2	10.4	10.0	10.0	102	104	64-138	2	16	
Benzene	10.2	10.6	10.0	10.0	102	106	76-125	4	14	
Trichloroethene	8.86	9.07	10.0	10.0	89	91	70-125	2	16	
Toluene	9.57	9.77	10.0	10.0	96	98	75-125	2	15	
Chlorobenzene	9.14	9.26	10.0	10.0	91	93	80-140	1	15	
<i>Surrogate:</i>										
Dibromofluoromethane					111	114	79-122			
Toluene-d8					100	100	80-120			
4-Bromofluorobenzene					101	100	80-120			



Data Qualifiers and Abbreviations

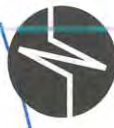
- A - Due to a high sample concentration, the amount spiked is insufficient for meaningful MS/MSD recovery data.
 - B - The analyte indicated was also found in the blank sample.
 - C - The duplicate RPD is outside control limits due to high result variability when analyte concentrations are within five times the quantitation limit.
 - E - The value reported exceeds the quantitation range and is an estimate.
 - F - Surrogate recovery data is not available due to the high concentration of coeluting target compounds.
 - H - The analyte indicated is a common laboratory solvent and may have been introduced during sample preparation, and be impacting the sample result.
 - I - Compound recovery is outside of the control limits.
 - J - The value reported was below the practical quantitation limit. The value is an estimate.
 - K - Sample duplicate RPD is outside control limits due to sample inhomogeneity. The sample was re-extracted and re-analyzed with similar results.
 - L - The RPD is outside of the control limits.
 - M - Hydrocarbons in the gasoline range are impacting the diesel range result.
 - M1 - Hydrocarbons in the gasoline range (toluene-naphthalene) are present in the sample.
 - N - Hydrocarbons in the lube oil range are impacting the diesel range result.
 - N1 - Hydrocarbons in diesel range are impacting lube oil range results.
 - O - Hydrocarbons indicative of heavier fuels are present in the sample and are impacting the gasoline result.
 - P - The RPD of the detected concentrations between the two columns is greater than 40.
 - Q - Surrogate recovery is outside of the control limits.
 - S - Surrogate recovery data is not available due to the necessary dilution of the sample.
 - T - The sample chromatogram is not similar to a typical _____.
 - U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
 - U1 - The practical quantitation limit is elevated due to interferences present in the sample.
 - V - Matrix Spike/Matrix Spike Duplicate recoveries are outside control limits due to matrix effects.
 - W - Matrix Spike/Matrix Spike Duplicate RPD are outside control limits due to matrix effects.
 - X - Sample extract treated with a mercury cleanup procedure.
 - X1 - Sample extract treated with a Sulfuric acid/Silica gel cleanup procedure.
 - Y - The calibration verification for this analyte exceeded the 20% drift specified in method 8260C, and therefore the reported result should be considered an estimate. The overall performance of the calibration verification standard met the acceptance criteria of the method.
 - Z -
- ND - Not Detected at PQL
 PQL - Practical Quantitation Limit
 RPD - Relative Percent Difference

Chain of Custody Record & Laboratory Analysis Request

02-246

on site

Page: 1 of 1
 Date: 2/26/15
 No. of Coolers: 2
 Cooler Present?
 Cooler Temps: 8260 C HVOes



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 Analytical Chemists and Consultants
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ARI Assigned Number:	Turn-around Requested:	Page:	of	of	Analysis Requested	Notes/Comments
ARI Client Company: Aspect	Phone: 206-833-5830	Date: 2/26/15	Ice Present?			
Client Contact: Steve Germiat			Cooler Temps:			
Client Project Name: 1402 98-003-01						
Client Project #: 1402 98-003-01	Samplers: GP					
Sample ID	Date	Time	Matrix	No. Containers		
AA-MW04-022515	2/25/15	1155	water	2	X	538.7 uS
AA-MW03-022515		1300		2	X	1960 uS
FH-MW01-022515		1405		2	X	1877 uS
AA-MW01-022515		1500		2	X	1526 uS
AA-MW02-022515		1555		2	X	1110 uS
LB-MW01-022515	2/26/15	0845		2	X	807 uS
SC-MW02-022515		1646		2	X	3325 uS
LP-MW01-022515		1140		5	X	193.3 uS
Comments/Special Instructions	Relinquished by: (Signature)	Received by: (Signature)	Relinquished by: (Signature)	Received by: (Signature)		
2 different 6020 - (AS, Cd, Cu, Ni, Zn) - (Cu, Ni)	Steve Butler	Jacob Hays	Steve Butler	Jacob Hays		
	Date & Time: 2/26/15 1630	Date & Time: 2/27/15 921	Date & Time: 2/27/15 1031	Date & Time: 2/27/15 1031		

Limits of Liability: ARI will perform all requested services in accordance with appropriate methodology following ARI Standard Operating Procedures and the ARI Quality Assurance Program. This program meets standards for the industry. The total liability of ARI, its officers, agents, employees, or successors, arising out of or in connection with the requested services, shall not exceed the invoiced amount for said services. The acceptance by the client of a proposal for services by ARI release ARI from any liability in excess thereof, not withstanding any provision to the contrary in any contract, purchase order or co-signed agreement between ARI and the Client.

Sample Retention Policy: All samples submitted to ARI will be appropriately discarded no sooner than 90 days after receipt or 60 days after submission of hardcopy data, whichever is longer, unless alternate retention schedules have been established by work-order or contract.