

Environmental Monitoring for Asbestos: Sumas Mountain Asbestos Site Selected Residential Properties

Bulk Sampling and Analysis
Activity Based Sampling
Surface Water Sampling

Whatcom County, Washington

August 23 – 26, 2010

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INTRODUCTION

On August 23 – 26, 2010, the EPA Region 10 Office of Environmental Assessment (OEA) conducted bulk soil and activity-based sampling at the Sumas Mountain Asbestos (formerly Swift Creek) Site in Whatcom County, Washington. The objective of this sampling was to provide data to determine the degree of potential risks to individuals who are exposed to airborne asbestos as a result of working or living in areas with flood deposits contaminated with asbestos.

Beginning in 2006, EPA Region 10 conducted sampling at the Sumas Mountain Asbestos Site. Analysis of bulk samples of dredged materials stockpiled along the banks of Swift Creek revealed chrysotile (up to 4.4%) and small quantities of actinolite asbestos. Activity-based sampling conducted in this area showed that chrysotile asbestos could get into the breathing zone when materials were disturbed and potential excess lifetime cancer risks exceeded 1 in 10,000 for some exposure scenarios. In 2008, the EPA Region 10 OEA conducted further study to characterize areas where dredged materials from Swift Creek had been placed at off-site properties. Concentrations of asbestos up to 6% were found. In 2009, EPA's OEA conducted sampling in areas downstream along the Sumas River where flooding in January 2009 deposited sediments in large quantities on upland properties adjacent to the river. In May 2009, EPA found concentrations of chrysotile asbestos up to about 25% in bank sediment and upland soil samples at locations along the Sumas River all the way to the Canadian border. Surface water samples collected at the same time revealed asbestos concentrations from about 63 to 879 million fibers per liter (MFL) along downstream stretches of the Sumas River; concentrations within Swift Creek were between 1200 and 1500 MFL. These results showed that asbestos from the slide has the potential to concentrate during flood events. The August 2010 work was focused on conducting activity-based sampling in proximity to areas with flood deposits to determine the potential risks to individuals who live near or work in these areas or have regular access to flood deposits.

Regulations under the Clean Air Act (CAA) and the Toxic Substances Control Act (TSCA) define asbestos as the asbestiform varieties of chrysotile, crocidolite, amosite, anthophyllite, actinolite, and tremolite.¹ The EPA Integrated Risk Information System (IRIS) classifies asbestos as a Group A human carcinogen based on epidemiologic studies showing an increased incidence of deaths due primarily to lung cancer and mesothelioma associated with the inhalation route of exposure.²

Study Design

EPA decided to conduct activity-based sampling (ABS), soil sampling, and surface water sampling in 2010 to better understand asbestos levels and associated risks posed in areas impacted by flooding. As identified during 2009 sampling, downstream areas where flooding occurred had much higher levels of asbestos than the area where ABS was conducted in 2006 along Swift Creek. The current study provides additional information about exposures that occur in the affected area. This study had two objectives. The first was to confirm concentrations of asbestos in flood deposits, sediment, and soil at properties selected for this field event. The second objective was to determine if asbestos fibers present in flood deposits and/or soil would become airborne if the soil was disturbed. The tasks required to achieve these objectives included the following:

- Collect soil samples for analysis by polarized light microscopy (PLM).

¹ Title 40 Code of Federal Regulations, Part 763

² U.S. EPA Integrated Risk Information System (IRIS) <http://www.epa.gov/ncea/iris/subst/0371.htm>

- For soil samples, collect metals data to look for trends with calcium:magnesium ratios.
- Conduct additional testing using the fluidized bed asbestos segregator. This device is currently being assessed by EPA as a more sensitive means of detecting asbestos in soil samples.
- Collect personal air monitoring samples during activity-based sampling (digging/moving/spreading, mowing/raking, and walking).
- Collect stationary air monitoring samples around the perimeter of each activity location.
- Collect surface water samples to determine the concentration of asbestos and metals in the Sumas River, at lower, slower flows near the end of the dry season (e.g., late summer) as compared to May 2009 sampling.
- Collect meteorological data during activity-based sampling.
- Collect samples for analysis of moisture content to assess field conditions during activity-based sampling.

Location

The Sumas Mountain Asbestos Site is located in Whatcom County, Washington, near the towns of Everson and Nooksack. Figure 1 shows the slide area, Swift Creek, and the Sumas River and the towns of Nooksack and Sumas, Washington. The current study area was focused on residential and agricultural properties located along the Sumas River north of Nooksack and south of Sumas.

The locations where sampling was focused during this study include the following:

Location 1: A Farm on Telegraph Road

This location was selected because flooding deposited material on this property in 2009 (asbestos concentrations between 10 and 15%) and the Farmer uses sediment from the Sumas River as bed material in his loafing shed. An additional drainage backs up and contributes to flooding along the south side of the property.

Location 2: A Residence and Adjacent Corn Field on Gillies Road

This location was selected because the property and residence were flooded in 2009. The property owner removed sediments from areas near the house, mixed in topsoil and reseeded the lawn. The corn field on this property showed impacts of the flood deposits as plants closer to the river did not grow as high as plants farther back from the river, where flooding did not deposit sediments.

Location 3: A Residence and Business on Gillies Road

This location was selected because the property was flooded in 2009 and the homeowner has since vacated the property. A large amount of sediment was deposited in 2009 on the portion of the property nearest the Sumas River.

BULK MATERIALS SAMPLING

I. Bulk Soil Sampling and PLM and Metals Analysis

On August 24 to 26, 2010, OEA collected bulk soil samples from three residential/agricultural properties. The bulk soil samples were collected either as composite samples or using a multi-increment sampling technique intended to provide representative samples for analysis by PLM using the California Air Resources Board (CARB) Method 435 with added field of view counts. Composite samples consisted of about 5 subsamples collected from the area of interest. Composite samples were collected from the top few inches of surface soil in areas where the soil was more difficult to sample (e.g., turf cover, hard packed soil) or when the area was smaller geographically. Multi-increment soil samples consisted of about 30 increments (scoops) collected between a 1"-3" depth. Multi-increment samples were collected when the soil was bare, soft, and easy to sample. Table 1 provides sample information including location, type of sample (composite, multi-increment, or grab), and sampling results. Note that a few sample locations were determined in the field based on areas of interest identified either by property owners or by the field team. The scoops of soil were combined in a stainless steel mixing bowl and homogenized by mixing with a stainless steel spoon. One liter of soil was submitted to a commercial laboratory for analysis by CARB 435. To demonstrate inter-laboratory precision, two split samples were submitted to the EPA Region 10 Laboratory for analysis by CARB 435. For a subset of samples, a 250 milliliter (ml) container of soil was submitted to the EPA Region 10 Laboratory for testing in an experimental fluidized bed asbestos segregator (see below).

Bulk samples also were submitted for analysis for metals using ISM01.2. The soil moisture content was determined as part of the metals analysis by the contract laboratory. A 5-10 gram aliquot of the soil sample for metals analysis was placed in a weigh boat, weighed to the nearest 0.01 gram, then dried at 105°C for 12-24 hours. The sample was then cooled in a desiccator with the weigh boat lid on, re-weighed, and then a percent solid was calculated.

Complete soil analytical results are discussed in Results Section III and provided in Appendix B.

II. Fluidized Bed Asbestos Segregator Testing

The fluidized bed asbestos segregator is currently experimental. The fluidized bed asbestos segregator has been evaluated as a qualitative device to determine presence or absence of asbestos in soil.

Seven bulk soil samples, split in the field with the bulk samples analyzed by PLM described above, were tested in an experimental fluidized bed asbestos segregator (FBAS). Each of the samples was dried, sieved, and mixed with laboratory grade sand in preparation for testing in the fluidized bed asbestos segregator. The sample/sand mixture (bed) was placed inside a clean glass vessel and air was drawn through it so the solid material begins to circulate and act as a fluid. Small particles elutriate from the bed and are drawn with the air flow through the top of the glass vessel where a portion of the air/particulate mixture is split off and drawn through a mixed cellulose ester (MCE) filter. The particulates captured on the filter were analyzed by TEM.

WATER SAMPLING

On August 24 and 25, 2010, EPA collected surface water samples from eight locations along the Sumas River. All but one of these locations had been sampled previously, in May 2009. Surface water samples were collected by dipping a one-liter polyethylene jar into the center of the river,

with the mouth pointed upstream. Water samples were submitted for asbestos analysis by EPA Method 100.1, Asbestos in Water by TEM. Water samples also were analyzed for metals by ISM01.2.

Surface water sampling locations are shown in Figure 1. Analytical results are included in Appendix C.

ACTIVITY-BASED SAMPLING

It has been demonstrated that disturbance of a matrix, such as soil, contaminated with relatively low concentrations of asbestos (<1% by weight) can potentially result in significant airborne concentrations. Recent studies suggest that analysis of air monitoring filters collected during stationary air sampling, conducted downwind from soil disturbance, will typically yield less particulate than filters from personal air monitoring samples. The turbulence and wake effects that occur as air moves around a person's body, as well as the fact that people move around during activity-based sampling events, results in data that are more representative of actual exposures than stationary monitoring data.

I. ABS Experimental Design

The intent of activity-based sampling is to determine if asbestos fibers present in soil at selected locations could become airborne if the soil is disturbed. Data on the meteorological conditions and soil moisture content were collected to document the conditions at the site during the activity-based sampling events. The study locations are indicated on the aerial photographs in Figures 2, 3, and 4. A site-specific sampling and analysis plan³ (SAP) and a quality assurance project plan⁴ (QAPP) were developed by OEA and implemented for this project. The QAPP for this project was approved by Ginna Grepogrove, EPA Region 10 quality assurance manager, in August 2010. The study locations were chosen based on prior evidence of flooding and/or presence of flood deposits on the property. For 2 of the locations, the presence of asbestos was confirmed at the study locations during earlier bulk sampling and analysis. However, bulk sampling was repeated at these locations in 2010 to confirm the presence of asbestos in areas where ABS was actually conducted.

II. Field Team

The sampling team and individuals performing activities were from the EPA Region 10's OEA, Region 10's Office of Compliance and Enforcement, EPA's Environmental Response Team – West, and an EPA Scientific Engineering Response and Analytical Services Contractor.

III. Measurements, Sampling, and Activities

1. Meteorological Measurements

The meteorological data for this project was collected with a Coastal Environmental Systems WeatherPak[®] 2000 weather station. The weather station tower was erected in close proximity to each of the ABS study areas. The station was equipped with a Gill ultrasonic sensor for

³ U.S. Environmental Protection Agency, Region 10, *Activity-Based Sampling Plan, Sumas Mountain Asbestos Site, Whatcom County, Washington, Revision 5, August 16, 2010.*

⁴ U.S. Environmental Protection Agency, Region 10, *Quality Assurance Project Plan (QAPP) for Activity-Based Sampling and Analysis, Sumas Mountain Asbestos Site, Whatcom County, Washington, Revision 4.0, August 2010.*

measuring wind direction and velocity. The resolution for measuring wind direction was 1° and the accuracy was +/- 3°. The resolution for measuring wind velocity was 0.01 meters per second (m/s) and the accuracy was +/- 2%. The temperature sensor was accurate to +/- 0.6° centigrade (C) and the relative humidity sensor was accurate to +/- 3% at 20° C. A digital image showing the weather station used for this project is included in Appendix A.

The Coastal Environmental Systems WeatherPak® 2000 weather station was serviced and evaluated for accuracy by the manufacturer in May 2010. The readings from the weather station were periodically checked with hand-held instruments including a compass and VWR digital thermometer/hygrometer.

2. Field Sample Data Recording

The field sample data collected during the air monitoring associated with the ABS activities at the selected study locations was recorded in a log book during the field event. Copies of the logbook pages for this sampling event are included in Appendix D.

3. Activity-Based Sampling

A summary of the sampling information is included in Table 2. Images of individuals participating in the various activities (e.g., excavating and moving flood deposits, spreading material in the loafing pens, and mowing/raking) are included in Appendix A. These various activities and walking around the properties represent a range of activities performed by landowners on their properties. For example, the mowing/raking activity results could be used to assess exposure for someone who engages in gardening on a regular basis. Similarly, the excavating/moving and spreading material activity results could be used to assess exposure for someone who handles flood deposits more directly, such as a farmer who uses the material in his loafing shed.

At Location 1, the first activity consisted of digging up flood deposits and placing them in a wheelbarrow and spreading these materials in a loafing shed. Three individuals participated in these activities. One person worked near the river digging up flood deposits and the other two worked in the loafing shed spreading flood deposits provided by the property owner. The second activity at Location 1 consisted of walking around the fields. During this activity, the field team collected the various soil samples for this property.

At Location 2, the first activity consisted of mowing and raking in a lawn area near the house. A second activity consisted of mowing and raking another area of lawn between the property owners shop and Gillies Road. The third activity at Location 2 consisted of walking along the edge within about 40 feet of the bank of the Sumas River (see Figure 4).

At Location 3, only 1 activity was conducted because meteorological conditions were not favorable for sampling. It was raining lightly to moderately and the field team made the call to focus ABS work on the area suspected of having the highest asbestos levels. As a result, a raking activity was done along the Sumas River along the south side of this property (see Figure 5).

The various activities were done by one or two people working at a time at each study location. Each activity ran for between 2 and 3 hours (120-180 minutes). Due to the duration of the activity, the daytime temperatures, and the personal protective equipment required for this project, additional workers would rotate in approximately every 45 minutes to one hour to provide rest breaks. When one worker rotated into the activity to replace another worker, the personal air monitoring equipment was transferred from one worker to the next. This transfer of

equipment took approximately 60 seconds. The personal monitoring pump used to collect air samples were fastened to a belt with a shoulder harness worn by the workers. The filter cassettes were fastened with a clip to the shoulder harness and were situated within the workers' breathing zone, oriented in a downward position.

Stationary air monitoring samples were collected around the perimeter of each of the study locations. Four perimeter samples were collected per location. We intended to note which monitor was placed downwind, but the sample numbers were not always logged by location, so this was not possible at each location. At the loafing shed, one stationary monitor was placed inside the loafing shed and two were placed just outside the loafing shed as the building was open on just one side. No stationary monitors were used for the walking activity at location 1 since the area was very large (i.e., several acres).

At least two personal air monitoring samples were collected for TEM analysis per activity. During some of the sampling sessions a second personal monitoring sample was collected as a co-located sample for quality assurance purposes. These duplicate samples are indicated on Table 2 (above).

A. Health and Safety

The fieldwork performed during this project was done according to health and safety guidelines approved by Grady Maxwell, the EPA Region 10 Industrial Hygienist. Prior to conducting the activity-based sampling, workers participated in daily safety briefings to review potential hazards. The workers participating in the activities wore level C personal protective equipment (PPE) consisting of a Tyvek[®] suit, nitrile or latex gloves, leather safety boots, and full-face air purifying respirator (APR) with P-100 cartridges or full-face power air purifying respirator (PAPR) with H-1 cartridges. After workers completed their portion of the field activity, they were decontaminated with rinse water amended with soap before they removed their PPE. Wet PPE was disposed in asbestos debris bags and transported to the EPA Region 10 Laboratory for disposal.

B. Personal Air Monitoring

The personal air monitoring samples were collected with Gilian[®] Hi volume personal sampling pumps attached with 6.4 millimeter (mm) inside diameter Tygon[®] R3603 tubing to a filter cassette. The pumps were calibrated in the field immediately before and after sampling using a Gilian[®] Challenger Air Flow Calibrator, serial number 132. The Challenger Air Flow Calibrator was calibrated daily in a mobile laboratory on site with a Gillian soap film meter (primary standard). The flow cell on the meter was serviced and verified accurate (within 0.15% maximum difference) by Sensidyne, Inc., on July 23, 2010. The before and after flow rates were used to determine an average flow rate for the personal samples. The average flow rate was recorded on the filter cassette and in the field sample data documentation. The filter cassettes used for this project were Zefon[®] 0.8 µm mixed cellulose ester (MCE) type, Lot # 20199.

The personal air monitoring samples were collected at an average flow rate between 2.4 and 2.7 liters per minute, except for samples collected on the last day, when it was raining lightly and flow rates were adjusted to between 3.0 and 4.0 liters per minute. The target analytical sensitivity for personal monitoring samples was 0.001 asbestos structures per cubic centimeter (s/cc) and the target detection limit was 0.003 s/cc, typical for personal monitoring samples.

C. Stationary Air Monitoring

Stationary air monitoring was conducted around the perimeter of the study locations. The stationary air monitoring pumps were calibrated in the field before and after sampling using the same Gilian[®] Challenger Air Flow Calibrator used to calibrate the personal monitoring samples. The before and after flow rates were used to determine an average flow rate. The average flow rate was recorded on the filter cassette and in the field sample data documentation. The filter cassettes used for this project were Zefon[®] 0.8 µm mixed cellulose ester (MCE) type, Lot # 20199.

The stationary air monitoring samples were collected at an average flow rate between 5.3 and 5.7 liters per minute. The target analytical sensitivity for stationary monitoring samples was 0.0001 s/cc and the target detection limit was 0.0003 s/cc, typical for stationary monitoring samples. The stationary pumps were positioned around the perimeter of the study. The stationary samples were collected with Airmetrics[®] stationary monitors that run on 12 volt DC batteries. Pump number 3184 failed on August 24, 2010 during sample collection at Location 1. However, 3 other stationary monitors were deployed and had valid results for that location.

The calibration certificate for the Low-flow cell used for personal air monitoring and stationary air monitoring is included in Appendix E.

IV. Analytical Methods

The personal and stationary air monitoring samples were analyzed by TEM using an analytical method developed by the International Organization for Standardization (ISO) titled ISO 10312 Ambient Air – Determination of Asbestos Fibres – Direct-Transfer Transmission Electron Microscopy Method. In some cases, the sample filters submitted for analysis were determined to be overloaded with particulate and unsuitable for direct-transfer analysis. Therefore, analysis of three personal monitoring samples was conducted using the ISO 13794 Ambient Air – Determination of Asbestos Fibres-Indirect-Transfer Transmission Electron Microscopy Method. Asbestos content of soil samples was determined using CARB 435 with field of view. Method ISM01.2 was used to determine metals content for bulk materials samples; moisture content was measured as part of this analysis. EPA Method 100.1 was used to determine asbestos concentrations in surface water samples. Method ISM01.2 was used to determine metals contact of surface water samples.

V. Quality Assurance and Quality Control

Quality assurance (QA) and quality control (QC) were defined in Section D-1 of the QAPP for this project and based on the sampling and analysis plan and the analytical methods used. The QA/QC samples consisted of duplicate and replicate analysis in the laboratory, analysis of co-located field samples, analysis of air monitoring cassette lot blanks, and analysis of surface water blanks. Duplicate samples are indicated in tables that report data. There is good agreement between the duplicate (or triplicate) sample and the primary sample for asbestos content in soil (Table 1), metals analysis in soil (Table 3), and asbestos and metals analyses in water (Table 8). Table 5 presents the activity-based sampling data for the project and the duplicate results match the primary results more closely for the Low Magnification as compared with the High Magnification results. This finding is discussed in greater detail in Results Section IV. Overall, the results of duplicate analysis and laboratory QA do not limit the intended use of the data.

RESULTS OF ANALYSIS

I. Meteorological Data

The weather during the activity-based sampling was favorable for the first two days of the project; on the third day, light rain and high humidity created less than ideal conditions for activity-based sampling. As a result, on the third day, only 1 activity was conducted, and flow rates were adjusted upwards in attempt to increase the likelihood of finding asbestos in the personal samples as overloading would be less of a concern given the damp conditions. The wind velocity was relatively light and did not hamper efforts to collect stationary and personal monitoring samples on the first two days. The average wind speed on these days during sampling activities ranged from 0.38 m/s to 3.8 m/s (0.85 to 8.5 mph). The average temperature on these two days ranged from 20.4°C to 30.7°C (about 69°F to 87°F), and relative humidity ranged from 30% to 72%. On the third day, the average wind speed ranged from 0 m/s to 0.8 m/s (0 to 1.8 mph), the average air temperature had dropped to a range of 14.6 to 17.8°C (about 58°F to 64°F), and the relative humidity ranged from 65% to 91%. A digital image showing the weather station tower deployed in a field at sampling location 1 is displayed in Appendix A. A summary of the weather conditions measured during each repetition of each activity is included in Appendix F.

II. Soil Moisture Content

The analysis of moisture content was performed at the CLP Laboratory, Test/America Laboratories, Inc., located in South Burlington, Vermont. The average moisture content of the soil samples was about 3.5% and ranged from 2.2% to 4.6% for most samples collected from Locations 1 and 2. Moisture content from samples collected from drainages at Locations 1 and 2 were 10.1% and 53.1%, respectively. The drainage at Location 2 was saturated and the soil had the consistency of quicksand. At both of these locations, material from Sumas River backs up into the drainages during flood events; this exacerbates flood conditions. Moisture content from samples collected from Location 3 on the day that it was raining averaged about 9% and ranged from 2.9% to 15.1%. A copy of the data package for the moisture content analysis is included with the metals data in Appendix B.

III. Soil Results

PLM analysis of the bulk samples revealed concentrations from nondetect (<0.25%) to 17% chrysotile asbestos. In the three samples with no asbestos detected by point counting, a few fibers were observed using field of view; that is, the number of fibers in each field of view were reported, even though they were not touching a point used for quantification in the CARB 435 Method. Field of view measurements may give a better indication of true nondetects, because additional information is captured in this analysis. A summary of the PLM sample information and analytical results is included in Table 1. Note that duplicate samples are listed together to aid comparisons; there's generally good agreement (i.e., within about 25%) between the primary sample and the duplicate or triplicate samples. This is good agreement for PLM results. Two samples were analyzed by both the primary lab and the EPA Region 10 Laboratory to check interlaboratory agreement. The results were within a factor of about 2 for one sample (7.75% vs. 13.5% and within about 40% for the second sample (14.25% versus 10.75%). This agreement is reasonable for asbestos samples by PLM and would not change the findings (i.e., asbestos levels are elevated) at either location. The analytical results from the laboratory and quality assurance (QA) evaluation are included in Appendix B.

The PLM results for soils from 2010 are comparable, though somewhat lower, than PLM results from 2009. However, when samples were collected in the same location (Locations 1 and 3 riverbanks), results were generally similar.

Soil samples also were analyzed for metals. Although metals have not been the primary focus of EPA's work in this area, results are provided in Table 3. Again, duplicate samples are listed together to aid comparisons; there is very good agreement between the primary sample and duplicate sample for metals. Samples that exceed risk-based screening levels for human health are indicated with yellow shading. Also, the Calcium-to-Magnesium ratio is given in the last column; this ratio has been shown to be associated with asbestos-containing soils (Schreier 1987).

In addition to PLM, EPA conducted fluidized bed analysis to determine the amount of asbestos in the fine fraction of soils (see Table 4). Five very short and thin chrysotile fibers (i.e., no PCME) were detected in the sand blank used for this phase of the project. The corresponding concentration for the blank was 2-3 orders of magnitude (100-1000 times) lower than the field sample results. Of the seven soil samples tested in the fluidized bed asbestos segregator, 4 exhibited quantifiable levels of chrysotile asbestos by PLM. The remaining 3 had detectable asbestos by PLM, field of view. Only one sample appeared to contain a significant concentration of actinolite asbestos. This sample was collected from a planting bed on the north side of the house at Location 3. The sample contained 103 total asbestos structures; the only PCME fiber in this sample was a single actinolite structure. The finding of actinolite is not surprising given that this type of asbestos has been observed in other samples collected closer to Swift Creek and the Sumas River. The quantitative fluidized bed results should be viewed with caution as this method is still under development within EPA and has not yet been fully validated.

IV. Air Monitoring

The analysis of air monitoring samples collected during the activity-based sampling was conducted by TEM at LabCor, Inc., in Seattle, Washington. LabCor, Inc. is accredited through the National Voluntary Laboratory Accreditation Program (NVLAP) administered by the Department of Commerce under the National Institute of Standards and Technology (NIST). NVLAP accreditation certifies that the laboratory has demonstrated an established level of competence. This does not guarantee the accuracy of analytical results. The final data package for the asbestos analysis by TEM is included in Appendix G.

Asbestos levels were reported as total asbestos concentration and PCME asbestos. This is because PCME concentrations (representing fibers/structures between 0.25 and 3 microns in width, longer than 5 microns, with an aspect ratio of at least 3:1) are used to quantitatively evaluate potential health risks associated with asbestos (see companion risk memo). The analysis of the air samples collected during this project revealed that asbestos was detected in 15 out of 19 personal samples and in 11 out of 19 stationary air samples. Measured asbestos concentrations at Location 1 were generally more than an order of magnitude higher than at the other locations for both personal and stationary samples. At some locations, concentrations were greater than the permissible exposure limit (PEL) set by the Occupational Safety and Health Administration (OSHA) which is 0.1 f/cc of air based on an eight hour time-weighted average.

1. Personal Air Monitoring Samples

Most of the personal monitoring samples collected were analyzed by ISO 10312 direct transfer TEM analysis. Four overloaded samples were encountered during analysis of ABS samples requiring indirect transfer TEM analysis by ISO 13794. Overall, the mineral types detected in the personal monitoring samples include mostly chrysotile asbestos and small amounts of actinolite asbestos. The analytical data package included in Appendix G reports additional asbestos fiber and structure data based on different size categories and mineral type. The results of analysis of the personal air monitoring samples collected for this project are displayed in Table 5. Note that

for every sample, a high magnification (High Mag) and low magnification (Low Mag) result is reported. After EPA received the initial High Mag data, an additional Low Mag analysis was requested to improve analytical sensitivity and increase the confidence in the data. High Mag analysis includes a larger sized variety of fibers but results in low counts of PCME fibers. Low Mag analysis is focused only on PCME fibers so analytical sensitivities are improved. Duplicate results are listed next to primary results for ease of comparison. The Low Mag results seem to provide a better estimate of concentrations and better reproducibility as evidenced by the findings listed below:

- Overall, the concentrations, means, and pooled means matched up well between High Mag and Low Mag results.
- 14 of 19 samples had fewer than than 4 PCME fibers for High Mag results; there were only 3 of 19 samples with less than 4 PMCE fibers for Low Mag results. This means the Low Mag results have less uncertainty than the High Mag results.
- There were 4 non-detects in the High Mag dataset as compared with only 1 non-detect in the Low Mag data set.
- There was better agreement between straight mean and pooled mean for Low Mag results as compared with High Mag results.
- Lower analytical sensitivities were achieved with Low Mag as compared with High Mag. There was better agreement between the duplicate and primary samples for Low Mag results as compared with High Mag.

2. Stationary Air Monitoring Samples

Most of the stationary samples were analyzed by ISO 10312 direct transfer TEM analysis. Two overloaded samples required analysis using the Indirect Transfer method, ISO 13794. The most common mineral type detected was chrysotile asbestos followed by a minor amount of actinolite asbestos. The results of analysis for the stationary air monitoring samples collected for this project are displayed in Table 6. These concentrations are generally very low, and lower than the corresponding ABS concentrations. At Location 1 near the loafing shed, PCME concentrations are elevated relative to the other sample locations, which is not surprising given how high given the high concentrations in the corresponding ABS results. Note that Low Mag analysis was not performed on this dataset as these data were not used in the risk evaluation.

Table 6 – Summary of stationary air monitoring results

Sample Number	Date	Description	No. PCME Fibers	Analytical Sensitivity (s/cc)	Hi Mag PCME conc
10344222	8/24/2010	Loc. 1	1	0.0001	0.0001
10344223	8/24/2010	Loc. 1	2	0.003	0.006
10344224	8/24/2010	Loc. 1	1	0.00263	0.00263
10344225	8/24/2010	Loc. 1	4	0.01376	0.05504
10344227	8/24/2010	Loc. 1 - near/in loafing shed	0	0.9105	0
10344228	8/24/2010	Loc. 1 - near/in loafing shed	3	0.02064	0.06192
10344229	8/24/2010	Loc. 1 - near/in loafing shed	1	0.7987	0.7987
10344230	8/25/2010	Loc. 2, stationary near house	0	0.00076	0
10344231	8/25/2010	Loc. 2, stationary near house	2	0.00135	0.0027
10344232	8/25/2010	Loc. 2, stationary near house	0	0.00016	0
10344233	8/25/2010	Loc. 2, stationary near house	3	0.00032	0.00096
10344234	8/25/2010	Loc. 2, stationary near shed	2	0.00121	0.00242
10344235	8/25/2010	Loc. 2, stationary near shed	0	0.00028	0

10344236	8/25/2010	Loc. 2, stationary near shed	2	0.00035	0.0007
10344237	8/25/2010	Loc. 2, stationary near shed	0	0.00117	0
10344238	8/26/2010	Loc. 3, stationary along river	0	0.00099	0
10344239	8/26/2010	Loc. 3, stationary along river	1	0.00099	0.00099
10344240	8/26/2010	Loc. 3, stationary along river	0	0.00099	0
10344241	8/26/2010	Loc. 3, stationary along river	0	0.00099	0

V. Surface Water Samples

Surface water samples were collected from 8 locations along the Sumas River. At two planned locations along Swift Creek, surface water could not be collected because the creek bed had filled in and surface water was not present at the time of sampling. The Sumas River water was not obviously cloudy like it had been during the May 2009 field event. However, asbestos was detected in all samples except for the background sample and the field blank. These results show much lower levels (about 10 to 100 times lower) of asbestos fibers in water during the August 2010 field event as compared with the May 2009 field event. This difference could be due to lower water levels, slower flow rates, or other factors related to the time of year and/or meteorological conditions at the time of sampling. The notes in this table provide comments on the types of fibers found or whether additional fibers were observed that did not meet the counting criteria (i.e., for water samples, only fibers longer than 10 microns are counted).

Table 7 – Summary of surface water sample results

Sample No.	Date	Location	Asbestos (MFL) 2010	Asbestos (MFL) 2009	Notes 2010
10344275	8/24/2010	Loc. 15 (2009)	1.7	168	1 actinolite fiber, 4 chrysotile
10344276	8/24/2010	Loc. 13 (2009)	4.1	265	Some smaller chrysotile structures are present
10344277	8/24/2010	Loc. 1 (2010)	4.4	321	
10344278	8/24/2010	Loc. 3 (2010)	3.4	488	
10344284	8/24/2010	Loc. 3 (2010) dupe	1.4	112	
10344279	8/25/2010	Loc. 2 (2010)	6.1	NA	
10344280	8/25/2010	Loc. 7 (2009)	8.5	879	1 actinolite fiber, 24 chrysotile
10344281	8/25/2010	Loc. 5 (2009)	3.1	63	Some smaller chrysotile fibers are present
10344282	8/25/2010	Loc. 1 (2009)	<1.0	<0.19	A few small chrysotile fibers are present
10344283	8/26/2010	Blank	<0.13	NA	
Key: MFL = million fibers per liter (fibers longer than 10 microns) NA = Not Analyzed					

Surface water results for metals are provided in Table 8. Note that concentrations exceeding Regional Screening Levels (<http://www.epa.gov/reg3hwmd/risk/human/rb-concentration-table/index.htm>) or maximum contaminant levels are highlighted in this table. Metals are not the primary focus of this work, but were collected to better understand the mineral content and potential markers for asbestos contamination.

CONCLUSIONS

- Analysis of bulk samples analyzed by method CARB 435 revealed between 10 and 15% in most areas where flood deposits were found. At Location 2, concentrations from the two yard areas were much lower (i.e., 0.5% and 1.5%). At Location 3, a few locations were nondetect by PLM, but field of view and fluidized bed measurements indicated the presence of a small amount of asbestos.
- Analysis of bulk samples tested in the fluidized bed asbestos segregator revealed asbestos in all seven of the locations that were tested. PCME fibers were detected at 6 out of 7 sample locations.
- Results of analysis of personal and stationary monitoring samples collected during ABS indicate elevated levels asbestos in the breathing zone at Location 1. Concentrations at other locations were lower and these results will be evaluated in greater detail in the companion risk memorandum. Stationary samples generally showed lower levels (nondetect to about 0.003 f/cc) except at Location 1.
- ABS samples collected on the third day, August 26, 2010, exhibited lower concentrations than samples collected earlier. This likely is due to relatively wet and humid weather conditions. Note that PLM results for the area where ABS samples were collected were comparable to PLM results for the corn field at Location 2 and soil and sediment from Location 1.
- Surface water samples were about 2 orders of magnitude (100 times) lower than concentrations detected in May 2009. This likely represents seasonal fluctuations in flow rate or meteorological parameters.
- Metals results for soil and surface water have been provided and discussed briefly in the text. As the current focus is asbestos, additional details have not been provided in this report.

REFERENCES

Schreier, H., J.A. Omuetti and L.M. Lavkulich. **1987**. Weathering processes of asbestos rich serpentinitic sediments. *Soil Sci. Soc. Am. J.* 51: 993-999.

**Table 1
Polarized Light Microscopy and Moisture Content Results
Sumas Mountain Asbestos Site**

Sample No.	Location	Description	Type	Units: %		Field of View Results	Moisture Content
				Asbestos	Type		
10344246	1	Along River, composite from wheelbarrow	M	12	Chrysotile	112/6 fields	4.60%
10344268	1	Along River, composite from wheelbarrow (duplicate)	M	15.5	Chrysotile	108 fibers over 6 fields	2.80%
10344247	1	Loafing Shed	M	13.25	Chrysotile	115 over 7 fields	4.20%
10344248	1	Along Drainage	M	11.25	Chrysotile	103 over 6 fields	10.10%
10344250	2	Lawn Near House	C	0.5	Chrysotile	8 over 400 fields	2.20%
10344252	2	Lawn Near Shop	C	1.5	Chrysotile	102 fibers over 32 fields	3.70%
10344255	2	Corn Field	M	10.5	Chrysotile	111 over 7 fields	3.20%
10344256	2	Corn Field (duplicate)	M	7.75	Chrysotile	102 fibers over 9 fields	3.40%
10344257	2	Drainage Along Gillies Road	C	14.5	Chrysotile	107 fibers over 5 fields	53.10%
10344259	3	Riverside	M	13	Chrysotile	106 fibers over 7 fields	7.90%
10344260	3	Riverside (duplicate)	M	10.5	Chrysotile	105 fibers over 4 fields	2.90%
10344261	3	Riverside (triplicate, asbestos only)	M	14.25	Chrysotile	105 fibers over 4 fields	NA
10344262	3	Front Yard	C	0		1 fiber in 400 fields	9.90%
10344264	3	North Side of House	C	0		1 fiber in 400 fields	15.10%
10344266	3	Drip Line Along Greenhouse	C	0		2 fibers in 400 fields	8.90%
10344272	3	Riverside	G	14.25	Chrysotile	104 fibers over 4 fields	
10344270	2	Corn Field	G	17	Chrysotile	105 fibers over 8 fields	4.30%

Key:

mg/kg = milligrams per kilogram

% = percent

C = composite sample

D = data qualifier, sample was diluted

G = grab sample

J = data qualifier, estimated value

M = multi-increment sample

average 1 and 2

average 3 (raining)

3.41%

8.94%

Table 2
Summary of Air Samples Collected for this Project
Sumas Mountain Asbestos Site

Sample Number	Date	Pump No.	Sample Type	Description	Repetition	Time On	Time Off	Duration (min)	Flow Rate (lpm)	Air Volume
10324050	8/11/2010	NA	Lot Blank	N/A	N/A				N/A	N/A
10324051	8/11/2010	NA	Lot Blank	N/A	N/A				N/A	N/A
10324052	8/9/2010	NA	Lot Blank	N/A	N/A				N/A	N/A
10324053	8/9/2010	NA	Lot Blank	N/A	N/A				N/A	N/A
10344200	8/24/2010	1121	Personal	Loc. 1, Walking in field, collecting samples	1	3:07 PM	6:00 PM	173	2.5	433
10344201	8/24/2010	1123	Personal	Loc. 1, Walking in field, collecting samples	2	3:07 PM	6:00 PM	173	2.5	433
10344202	8/24/2010	1120	Personal	Loc. 1, Loading, raking spreading	1	9:50 AM	12:55 PM	185	2.7	500
10344203	8/24/2010	1121	Personal	Loc. 1, Loading, raking spreading	2	9:52 AM	12:30 PM	158	2.6	411
10344204	8/24/2010	1122	Personal	Loc. 1, Loading, raking spreading	3	9:51 AM	12:30 PM	159	2.5	397.5
10344205	8/24/2010	1123	Personal	Loc. 1, Loading, raking spreading	4	9:54 AM	12:30 PM	156	2.6	405.6
10344222	8/24/2010	3180	Stationary	Loc. 1		9:30 AM	12:30 PM	180	5.3	954
10344223	8/24/2010	3175	Stationary	Loc. 1		9:30 AM	12:30 PM	180	5.3	954
10344224	8/24/2010	3194	Stationary	Loc. 1		9:30 AM	12:30 PM	180	5.3	954
10344225	8/24/2010	3186	Stationary	Loc. 1		9:30 AM	12:30 PM	180	5.4	972
10344227	8/24/2010	3192	Stationary	Loc. 1 - near/in loafing shed	1	10:30 AM	1:30 PM	180	5	900
10344228	8/24/2010	3173	Stationary	Loc. 1 - near/in loafing shed	2	10:30 AM	1:30 PM	180	5.5	990
10344229	8/24/2010	3182	Stationary	Loc. 1 - near/in loafing shed	3	10:30 AM	1:30 PM	180	5.7	1026
10344210	8/25/2010	1120	Personal	Loc. 2, raking/mowing lawn near house	1	9:25 AM	12:24 PM	179	2.6	465.4
10344211	8/25/2010	1121	Personal	Loc. 2, raking/mowing lawn near house	2	9:25 AM	12:24 PM	179	2.5	447.5
10344212	8/25/2010	1122	Personal	Loc. 2, raking/mowing lawn near house	3	9:25 AM	12:24 PM	179	2.4	429.6
10344230	8/25/2010	3184	Stationary	Loc. 2, stationary near house		9:00 AM	12:00 PM	180	5.3	954
10344231	8/25/2010	3186	Stationary	Loc. 2, stationary near house		9:00 AM	12:00 PM	180	5.6	1008
10344232	8/25/2010	3175	Stationary	Loc. 2, stationary near house		9:00 AM	12:00 PM	180	5.6	1008
10344233	8/25/2010	3192	Stationary	Loc. 2, stationary near house		9:00 AM	12:00 PM	180	5	900
10344206	8/25/2010	1123	Personal	Loc. 2, raking/mowing lawn near shed	1	10:00 AM	12:00 PM	120	2.5	300
10344207	8/25/2010	1118	Personal	Loc. 2, raking/mowing lawn near shed	2	10:00 AM	12:00 PM	120	2.5	300
10344209	8/25/2010	1119	Personal	Loc. 2, raking/mowing lawn near shed	3	10:00 AM	12:00 PM	120	2.7	324
10344234	8/25/2010	3182	Stationary	Loc. 2, stationary near shed		9:30 AM	12:30 PM	180	5.7	1026
10344235	8/25/2010	3173	Stationary	Loc. 2, stationary near shed		9:30 AM	12:30 PM	180	5.5	990
10344236	8/25/2010	3180	Stationary	Loc. 2, stationary near shed		9:30 AM	12:30 PM	180	5.3	954
10344237	8/25/2010	3194	Stationary	Loc. 2, stationary near shed		9:45 AM	12:45 PM	180	5.4	972
10344213	8/25/2010	1120	Personal	Loc. 2, walking in corn field	1	2:10 PM	5:00 PM	170	2.7	459
10344208	8/25/2010	1122	Personal	Loc. 2, duplicate of 10344213	D	2:10 PM	5:00 PM	170	2.5	425
10344214	8/25/2010	1121	Personal	Loc. 2, walking in corn field	2	2:05 PM	5:00 PM	170	2.5	425
10344215	8/26/2010	1120	Personal	Loc. 3, raking along river	1	10:30 AM	1:00 PM	150	3.1	465
10344216	8/26/2010	1121	Personal	Loc. 3, raking along river	2	10:30 AM	1:00 PM	150	3.2	480
10344217	8/26/2010	1118	Personal	Loc. 3, raking along river	3	10:30 AM	1:00 PM	150	4	600
10344218	8/26/2010	1119	Personal	Loc. 3, duplicate of 10344217	D	10:30 AM	1:00 PM	150	4	600
10344238	8/26/2010	3186	Stationary	Loc. 3, stationary along river		10:30 AM	1:00 PM	150	5.5	825
10344239	8/26/2010	3194	Stationary	Loc. 3, stationary along river		10:30 AM	1:00 PM	150	5.4	810
10344240	8/26/2010	3184	Stationary	Loc. 3, stationary along river		10:30 AM	1:00 PM	150	5.4	810
10344241	8/26/2010	3180	Stationary	Loc. 3, stationary along river		10:30 AM	1:00 PM	150	5.3	795

**Table 3
Soil/Sediment Metals
Sumas Mountain Asbestos Site**

Sample No.	Location	Soil Moisture (%)	Units: mg/kg dry weight																		Ca:Mg				
			Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt	Copper	Iron	Lead	Magnesium	Manganese	Nickel	Potassium	Selenium	Silver		Sodium	Thallium	Vanadium	Zinc
MJCS01	Loc. 1, Along River, composite from wheelbarrow	4.60%	4930	1.1 J	0.92 UJ	38	0.12 J	0.086 J	2470	276	75.7	9	45800	1.4	179000	874	1560	785	3.2 U	0.92 U	93.7 J	0.24 J	20.7	30.1	0.013799
MJCSE2	Loc. 1, Along River, composite from wheelbarrow (duplicate)	2.80%	5590	1.5 J	0.91 UJ	42.2	0.12 J	0.088 J	3170	273	78.3	11.2	46200	1.9	176000	898	1520	1070	3.2 U	0.91 U	125 J	0.12 J	23.1	35.9	0.018011
MJCS02	Loc. 1, Loading Shed, composite	4.20%	5240	1.3 J	0.98 UJ	36.8	0.12 J	0.12 J	2500	284	79.4	9.3	47000	0.92 J	182000	889	1620	2330	3.4 U	0.98 U	188 J	0.13 J	22.2	29.8	0.013736
MJCS03	Loc. 1, Along Drainage composite	10.10%	11600	6.1 UJ	4.7 J	76.6	0.18 J	0.2 J	4230	199	62.7	21.6	44400	4	114000	742	1080	696	3.5 U	1 U	220 J	2.5 UJ	41.5	48.8	0.037105
MJCS04	Loc. 2, Lawn Near House, composite	2.20%	14500	5.1 UJ	3.9 J	91.8	0.18 J	0.28 J	3740	49.2	15.3	21.2	25500	16.3	15300	480	146	867	3 U	0.84 U	127 J	2.1 UJ	52.3	65.3	0.244444
MJCS05	Loc. 2, Lawn Near Shop, composite	3.70%	12600	4.4 UJ	4.5 J	80.2	0.15 J	0.22 J	6510	47.4	15.9	31	23700	9.1	21700	484	183 J	1200	2.6 U	0.74 U	222 J	1.8 UJ	40.4	118	0.3
MJCS06	Loc. 2, Corn Field, composite	3.20%	7930	0.95 J	0.9 UJ	60.4	0.16 J	0.11 J	3590	247	75.6	15.1	47300	2	156000	836	1480	513	3.1 U	0.9 U	101 J	2.2 UJ	30.1	41.3	0.023013
MJCS03	Loc. 2, Corn Field, composite (duplicate)	3.40%	8610	0.84 J	0.87 UJ	65.4	0.17 J	0.16 J	4030	249	79.8	16.1	48200	2	155000	855	1480	589	3 U	0.87 U	109 J	2.2 UJ	32.7	43.1	0.026
MJCS07	Loc. 2, Drainage along Gillies Rd.	53.10%	6220	3.1 J	2 UJ	42.6	0.13 J	0.25 J	2280	288	87.1	10.9	45100	2.5	189000	785	1730	550 J	1.9 J	2 U	167 J	5.1 UJ	24.1	39.2	0.012063
MJCS08	Loc. 3, Riverside	7.90%	7330	2.3 J	0.96 UJ	58.9	0.12 J	0.12 J	2600	271	78	11.7	45800	1.3	170000	826	1590	460 J	0.76 J	0.96 U	72.6 J	2.4 UJ	27.1	38.1	0.015294
MJCS06	Loc. 3, Riverside (duplicate)	2.90%	10600	2.8 J	0.99 UJ	75.9	0.19 J	0.16 J	3460	272	88.1	18.9	49900	2.6	169000	882	1540	731	1.4 J	0.99 U	132 J	2.5 UJ	37.4	52.4	0.020473
MJCS09	Loc. 3, Yard composite	9.90%	15200	6 UJ	7.2 J	103	0.19 J	0.25 J	4370	44.8	16.6	21.4	27600	29.6	12200	454	112	635	3.5 U	1 U	281 J	2.5 UJ	53.6	75.5	0.358197
MJCS00	Loc. 3, north side of house	15.10%	13500	6.5 UJ	6.9 J	172	0.15 J	1.8	6070	42.9	16.1	26.1	26000	388	13000	453	115	1220	3.8 U	1.1 U	305 J	2.7 UJ	59.8	476	0.466923
MJCSE1	Loc. 3, drip line along greenhouse	8.90%	8870	4.6 UJ	4.7 J	62.4	0.12 J	0.17 J	3450	32.3	10.7	25	20100	10.5	8500	311	70.8	1200	2.7 U	0.76 U	147 J	1.9 UJ	37.4	81.2	0.405882
MJCS04	Loc. 2, Corn Field grab	4.30%	3500	4 J	0.99 UJ	20.9	0.096 J	0.055 J	1470	310	85.6	6.1	47500	0.61 J	197000	788	1700	195 J	1.1 J	0.99 U	45.8 J	0.42 J	17.9	33.8	0.007462
Regional Screening Level			7800 n	3.1 n	0.39 c	1500 n	16 n	7 n		0.29 c*	2.3 n	310 n	5500 n	400 n	NA	180 n	150 n	NA	195 J	39	39	NA	NA	39 n	2300 n

* assumes hexavalent chromium

Key:
Ca:Mg - Calcium to Magnesium Ratio
mg/kg - Milligrams per kilogram

**Table 4
Fluidized Bed Asbestos Segregator Data Summary
Sumas Mountain Asbestos Site**

FBAS No.	Parent No.	Location	Asbestos % by PLM	Type	FOV	FBAS Rep.	Sample wt. g	Sand wt. g	ISO Method	Area mm ²	Tot. Str. s/mm ²	PCME EPA- defined s/mm ²	Total Asbestos Count	Total Asbestos Concentration (f/g)	PCME Asbestos Concentration (f/g)
10394550	10344249	Loc. 1, Along Drainage composite	11.25	Chrysotile	103 over 6 fields	1	2.01	18	10312	0.02826	3892	70.8	110	5.81E+07	1.06E+06
10394551	10344251	Loc. 2, Lawn Near House, composite	0.5	Chrysotile	8 over 400 fields	1	2.08	18.04	13794	0.13189	5202	50.5	103	7.50E+07	7.28E+05
10394552	10344253	Loc. 2, Lawn Near Shop, composite	1.5	Chrysotile	102 fibers over 32 fields	1	2.03	18.02	10312	0.09421	1072.1	63.7	101	1.58E+07	9.41E+05
10394553	10344258	Loc. 2, Drainage along Gillies Rd.	14.5	Chrysotile	107 fibers over 5 fields	1	1.01	19.02	10312	0.01884	11729.1	265.4	221	3.48E+08	7.88E+06
10394554	10344258	Loc. 2, Drainage along Gillies Rd. (duplicate)	14.5	Chrysotile	107 fibers over 5 fields	2	1.04	19	10312	0.01884	6368.8	53.1	120	1.84E+08	1.53E+06
10394555	10344263	Loc. 3, drip line along greenhouse	0	NA	2 fibers in 400 fields	1	2.05	18.01	10312	0.26379	382.9	19	101	5.60E+06	2.78E+05
10394556	10344265	Loc. 3, north side of house	0	NA	1 fiber in 400 fields	1	2.03	18.02	10312	0.69715	147.7	1.4	103	2.18E+06	2.07E+04
10394557	10344267	Loc. 3, Yard composite	0	NA	1 fiber in 400 fields	1	2.01	18.01	13794	0.9421	587	0	83	8.76E+06	0.00E+00
10394558	Sand Blank	QA Sample	0	NA	NA	1	0	20	10312	0.96094	5.2	0	5	7.80E+03	0.00E+00

**Table 5
Activity-Based Sampling Results
Sumas Mountin Asbestos Site
Whatcom County, Washington**

Sample Number	Date	Description	High Magnification Results			Low Magnification Results			Notes
			No. PCME Fibers	Anal. Sens. (s/cc)	PCME conc (s/cc)	No. PCME Fibers	Anal. Sens. (s/cc)	PCME conc (s/cc)	
10344200	8/24/2010	Loc. 1, Walking in field, collecting samples	2	0.02362	0.04724	79	0.00094	0.07426	
10344201	8/24/2010	Loc. 1, Walking in field, collecting samples	8	0.02362	0.18896	88	0.00117	0.10296	
10344202	8/24/2010	Loc. 1, Loading, raking spreading	6	0.03058	0.18348	87	0.0023	0.2001	
10344203	8/24/2010	Loc. 1, Loading, raking spreading	0	1.9576	0	54	0.0196	1.0584	analyzed indirectly
10344204	8/24/2010	Loc. 1, Loading, raking spreading	1	2.0615	2.0615	54	0.0248	1.3392	analyzed indirectly
10344205	8/24/2010	Loc. 1, Loading, raking spreading	0	2.0203	0	86	0.0266	2.2876	analyzed indirectly
10344210	8/25/2010	Loc. 2, raking/mowing lawn near house	4	0.0012	0.0048	4	0.00088	0.00352	
10344211	8/25/2010	Loc. 2, raking/mowing lawn near house	1	0.0083	0.0083	8	0.00091	0.00728	
10344212	8/25/2010	Loc. 2, raking/mowing lawn near house	1	0.00202	0.00202	2	0.00095	0.0019	
10344206	8/25/2010	Loc. 2, raking/mowing lawn near shed	4	0.01514	0.06056	18	0.00136	0.02448	
10344207	8/25/2010	Loc. 2, raking/mowing lawn near shed	3	0.00099	0.00297	2	0.00136	0.00272	
10344209	8/25/2010	Loc. 2, raking/mowing lawn near shed	0	0.0649	0	0	0.0506	0	analyzed indirectly
10344213	8/25/2010	Loc. 2, walking in corn field	1	0.01781	0.01781	36	0.00088	0.03168	
10344208	8/25/2010	Loc. 2, duplicate of 10344213	1	0.03205	0.03205	45	0.00096	0.0432	
10344214	8/25/2010	Loc. 2, walking in corn field	3	0.01168	0.03504	11	0.00093	0.01023	
10344215	8/26/2010	Loc. 3, raking along river	1	0.01465	0.01465	19	0.00088	0.01672	
10344216	8/26/2010	Loc. 3, raking along river	1	0.00946	0.00946	8	0.00085	0.0068	
10344217	8/26/2010	Loc. 3, raking along river	0	0.00524	0	6	0.00068	0.00408	
10344218	8/26/2010	Loc. 3, duplicate of 10344217	1	0.00568	0.00568	6	0.00068	0.00408	

Key:

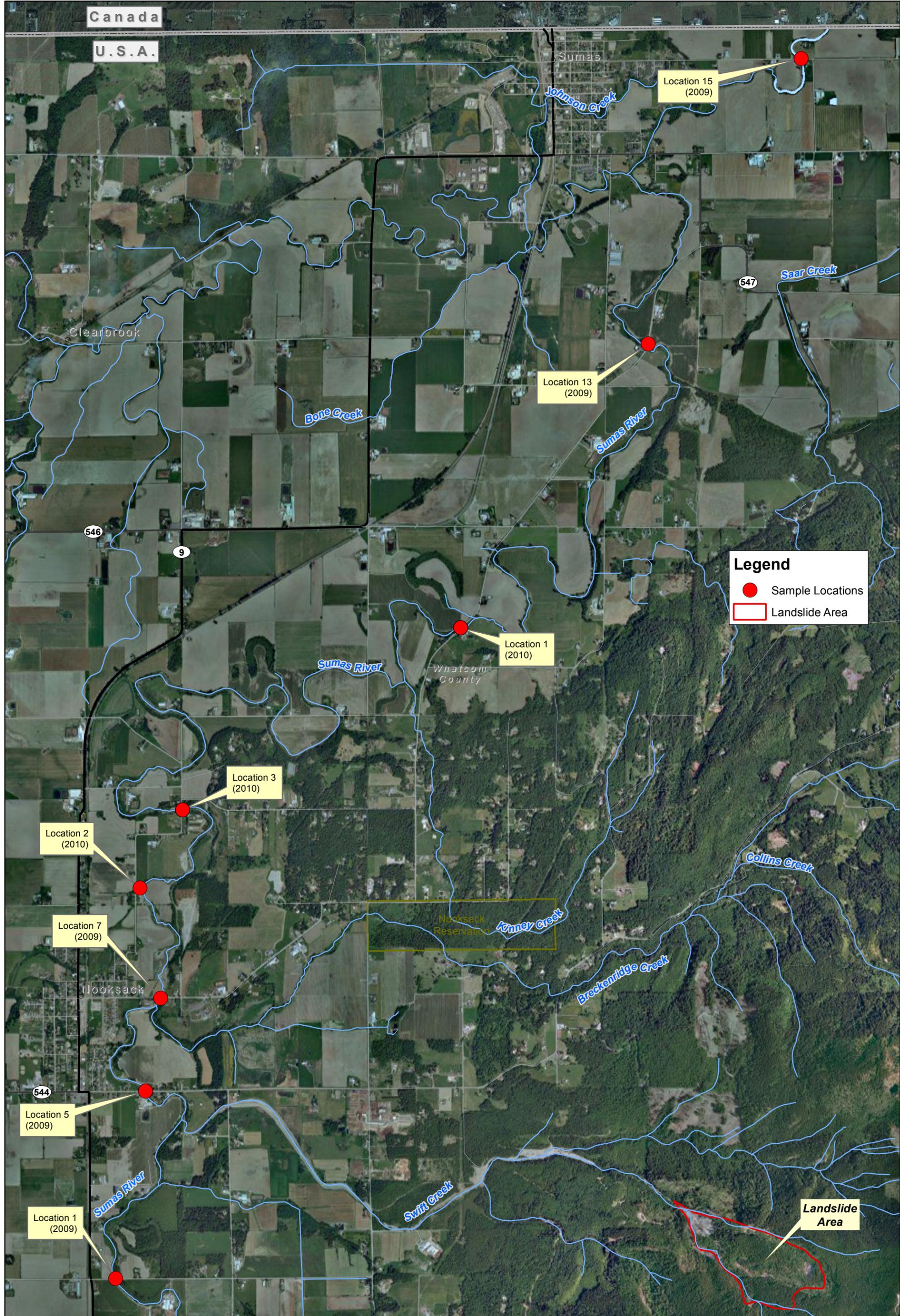
PCME = Phase contrast microscopy equivalent

s/cc = structures per cuib centimeter

Table 8
Surface Water Sample Results
Swift Creek and Sumas River

Sample No.	Location	Units: ug/L																					
		Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt	Copper	Iron	Lead	Magnesium	Manganese	Nickel	Potassium	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc
MJCSE9	Loc. 15 (2009)	200 U	60 U	10 U	43.8 J	5 U	5 U	27200	10 U	50 U	25 U	901	10 U	20900	72.3	14.8 J	2450 J	35 U	10 U	12500	25 U	50 U	60 U
MJCSE9	Loc. 13 (2009)	200 U	60 U	10 U	35.4 J	5 U	5 U	20200	1.2 J	50 U	25 U	655	10 U	31900	43.1	24.7 J	2010 J	35 U	10 U	17200	25 U	50 U	60 U
MJCSE1	Loc. 1 (2010)	59.3 J	60 U	10 U	34.5 J	5 U	5 U	19300	1.8 J	50 U	25 U	546	10 U	32800	27.1	22.4 J	1660 J	35 U	10 U	10000	25 U	50 U	60 U
MJCSE2	Loc. 3 (2010)	44.8 J	60 U	10 U	31.1 J	5 U	5 U	17600	0.92 J	50 U	25 U	494	10 U	33000	27.8	15.5 J	1410 J	35 U	10 U	9900	25 U	50 U	60 U
MJCSE3	Loc. 2 (2010)	42.3 J	60 U	10 U	34.2 J	5 U	5 U	17100	1.4 J	50 U	25 U	772	10 U	32600	57.6	18.6 J	1290 J	35 U	10 U	9700	25 U	50 U	60 U
MJCSE4	Loc. 7 (2009)	73.8 J	60 U	10 U	32.7 J	5 U	5 U	16200	2 J	50 U	25 U	914	10 U	31500	99.5	19.3 J	1230 J	35 U	10 U	9520	25 U	50 U	1.6 J
MJCSE5	Loc. 5 (2009)	69.8 J	60 U	10 U	39.1 J	5 U	5 U	16500	1.3 J	50 U	25 U	854	10 U	30900	212	11.6 J	1230 J	35 U	10 U	9830	25 U	50 U	60 U
MJCSE6	Loc. 1 (2009)	58.8 J	60 U	10 U	58.7 J	5 U	5 U	18900	10 U	1.7 J	25 U	2290	10 U	17400	2210	3.4 J	1160 J	35 U	10 U	9080	25 U	50 U	60 U
MJCSE7	Blank	200 U	60 U	10 U	200 U	5 U	5 U	5000 U	10 U	50 U	25 U	100 U	10 U	5000 U	15 U	40 U	5000 U	35 U	10 U	5000 U	25 U	50 U	60 U
MJCSE8	Loc. 3 (2010) dupe	42 J	60 U	10 U	34.1 J	5 U	5 U	17400	1.1 J	50 U	25 U	505	2.7 J	33200	25.4	15.1 J	1510 J	35 U	10 U	9920	25 U	50 U	60 U
RBC/MCL		3700 n	6 M	10 M	2000 M	4 M	5 M		0.043 c	1.1 n	1300 M	2600 n	15 M	NA	88 n	73 n	NA	50 M	18 n	NA	2 M	18 n	1100 n

Key:
 ug/L = micrograms per liter
 MFL = millions of fibers per liter (for fibers longer than 10 microns)
 J = Data qualifier, estimated value
 U = data qualifier, analyte not detected



The U.S. Environmental Protection Agency (EPA) has compiled this computer representation from data or information sources that may not have been verified by the EPA. This data is offered here as a general representation only, and is not to be re-used without verification by an independent professional qualified to verify such data or information. The EPA does not guarantee the accuracy, completeness, or timeliness of the information shown, and shall not be liable for any loss or injury resulting from reliance upon the information shown.

Figure 1:
Sampling Locations
Swift Creek/Sumas River

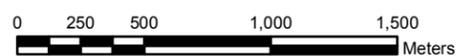




Figure 2:
Location 1 Asbestos Results

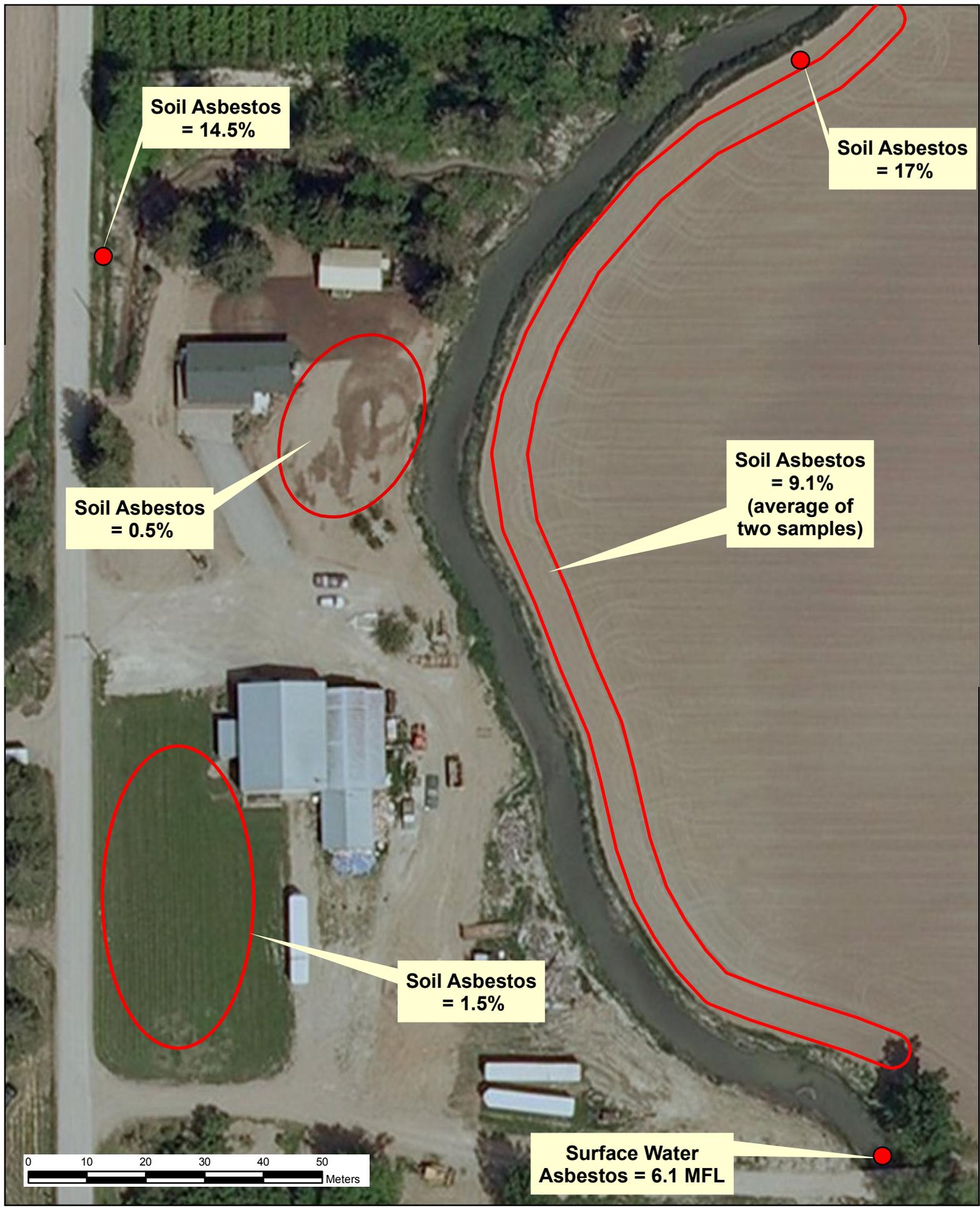


Figure 3:
Location 2 Asbestos Results





Figure 4:
Location 3 Asbestos Results

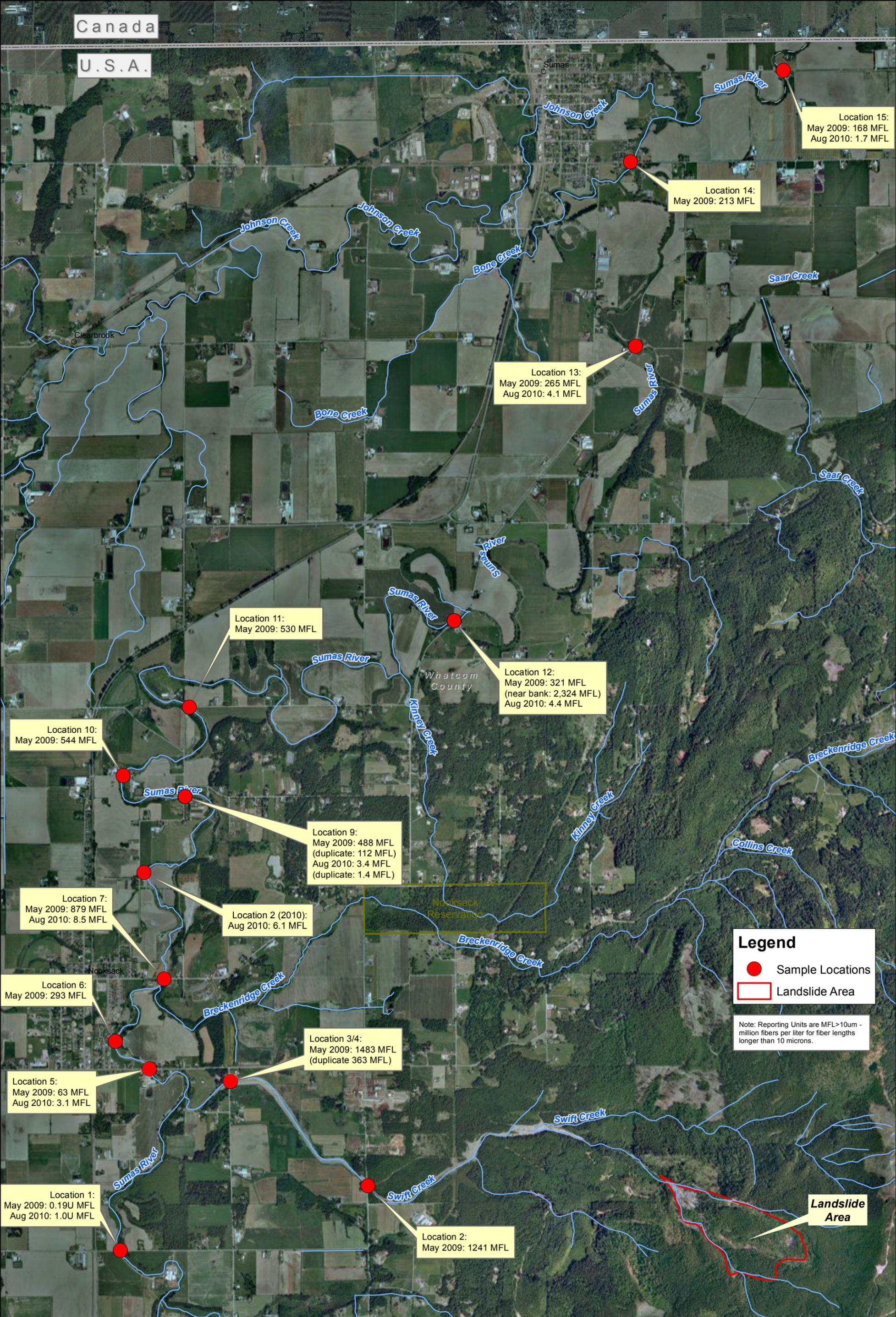
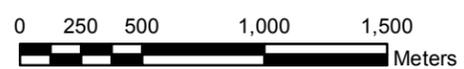


Figure 5:
Asbestos Concentrations In Surface Water
Swift Creek/Sumas River

Sampling Dates: May 12-13, 2009; August 24-25, 2010



Map Created 01/31/2011 EPA Region 10

The U.S. Environmental Protection Agency (EPA) has compiled this computer representation from data or information sources that may not have been verified by the EPA. This data is offered here as a general representation only, and is not to be re-used without verification by an independent professional qualified to verify such data or information. The EPA does not guarantee the accuracy, completeness, or timeliness of the information shown, and shall not be liable for any loss or injury resulting from reliance upon the information shown.

APPENDIX A
FIELD PHOTOGRAPHS

Photo Log

Sample Location 1
Excavating and Moving Sediments



Sample Location 1
Spreading Sediments in Loafing Pens



Sample Location 1
Working in Loafing Shed

A-1

Sample Location 1
Spreading Sediments in Loafing Pens

Photo Log

Sample Location 1
Tractor Load of Bank Sediment



Sample Location 1
Changing Field Crew



Sample Location 1
Changing Field Crew

A-1



Sample Location 1
Weather Station

Photo Log

Sample Location 2
Mowing Lawn Near House



Sample Location 2
Raking Lawn Near House



Sample Location 2
Mowing Lawn Near Road

A-2



Sample Location 2
Raking Lawn Near Road

Photo Log

Goodwin Road at Swift Creek
Dried Creek Bed



Oat Coles Road at Swift Creek
Dried Creek Bed



Weather Station at Location 1

APPENDIX B
SOIL SAMPLE INFORMATION AND DATA

Asbestos and Environmental Analysis

Client: Lab/Cor, Inc.
7619 6th Ave NW
Seattle, WA 98117

Report Number: 101853R01
Report Date: 09/30/2010

Job Number: 101853

P.O. No: n/a

Project Name: Sumas Mountain Asbestos

Project Number: Case 40437 ESD-122E

Project Notes:

Client Sample ID: 10344246 **Sample ID:** S1 **Date Analyzed:** 09/25/2010
Client Sample Description: Along River Layer **Analyst:** Stephanie Golden
Asbestos Mineral Fibers Percent: Chrysotile Amosite Crocidolite **Percent Asbestos:**

Homogeneous						Point Count: 48	Point Count Fields: 400	
fine powder, brown	100 %	12 %	-	-				12 %
Other Fibers	Fibrous	Mineral						
	Glass	Cellulose	Wool	Synthetic	Other			Matrix
	-	-	-	-	-			88 %

Comments: Field of view count: 112 fibers over 6 fields.

Client Sample ID: 10344247 **Sample ID:** S2 **Date Analyzed:** 09/25/2010
Client Sample Description: Loc: Shed Layer **Analyst:** Stephanie Golden
Asbestos Mineral Fibers Percent: Chrysotile Amosite Crocidolite **Percent Asbestos:**

Homogeneous						Point Count: 53	Point Count Fields: 400	
fine powder, brown	100 %	13.25 %	-	-				13.25 %
Other Fibers	Fibrous	Mineral						
	Glass	Cellulose	Wool	Synthetic	Other			Matrix
	-	-	-	-	-			86.75 %

Comments: Field of view count: 115 fibers over 7 fields.

Client Sample ID: 10344248 **Sample ID:** S3 **Date Analyzed:** 09/25/2010
Client Sample Description: Along Drainage Layer **Analyst:** Stephanie Golden
Asbestos Mineral Fibers Percent: Chrysotile Amosite Crocidolite **Percent Asbestos:**

Homogeneous						Point Count: 45	Point Count Fields: 400	
fine powder, brown	100 %	11.25 %	-	-				11.25 %
Other Fibers	Fibrous	Mineral						
	Glass	Cellulose	Wool	Synthetic	Other			Matrix
	-	-	-	-	-			88.75 %

Comments: Field of view count: 103 fibers over 6 fields.

Client Sample ID: 10344250 **Sample ID:** S4 **Date Analyzed:** 09/25/2010
Client Sample Description: Lawn Near House Layer **Analyst:** Stephanie Golden
Asbestos Mineral Fibers Percent: Chrysotile Amosite Crocidolite **Percent Asbestos:**

Homogeneous						Point Count: 2	Point Count Fields: 400	
fine powder, brown	100 %	0.5 %	-	-				0.5 %
Other Fibers	Fibrous	Mineral						
	Glass	Cellulose	Wool	Synthetic	Other			Matrix
	-	-	-	-	-			99.5 %

Comments: Field of view count: 8 fibers over 400 fields.

Job Number: 101853

Report Number: 101853R01

Report Date: 09/30/2010

Client Sample ID: 10344252 **Sample ID:** S5 **Date Analyzed:** 09/25/2010
Client Sample Description: Lawn Near Shed Layer **Analyst:** Stephanie Golden
Asbestos Mineral Fibers Percent: Chrysotile Amosite Crocidolite **Percent Asbestos:**
Homogeneous Point Count: 6 Point Count Fields: 400
 fine powder, brown 100 % 1.5 % - - **1.5 %**
Other Fibers Fibrous Mineral Other Matrix
 Glass Cellulose Wool Synthetic - - - 98.5 %
 - - - - - - - -

Comments: Field of view count: 102 fibers over 32 fields.

Client Sample ID: 10344254 **Sample ID:** S6 **Date Analyzed:** 09/25/2010
Client Sample Description: Cornfield Layer **Analyst:** Stephanie Golden
Asbestos Mineral Fibers Percent: Chrysotile Amosite Crocidolite **Percent Asbestos:**
Homogeneous Point Count: 32 Point Count Fields: 400
 fine powder, brown 100 % 8 % - - **8 %**
Other Fibers Fibrous Mineral Other Matrix
 Glass Cellulose Wool Synthetic - - - 92 %
 - - - - - - - -

Comments: Field of view count: 108 fibers over 6 fields.

Client Sample ID: 10344255 **Sample ID:** S7 **Date Analyzed:** 09/25/2010
Client Sample Description: Cornfield Layer **Analyst:** Stephanie Golden
Asbestos Mineral Fibers Percent: Chrysotile Amosite Crocidolite **Percent Asbestos:**
Homogeneous Point Count: 42 Point Count Fields: 400
 fine powder, brown 100 % 10.5 % - - **10.5 %**
Other Fibers Fibrous Mineral Other Matrix
 Glass Cellulose Wool Synthetic - - - 89.5 %
 - - - - - - - -

Comments: Field of view count: 111 fibers over 7 fields.

Client Sample ID: 10344256 **Sample ID:** S8 **Date Analyzed:** 09/25/2010
Client Sample Description: Cornfield (process for manchester lab) Layer **Analyst:** Stephanie Golden
Asbestos Mineral Fibers Percent: Chrysotile Amosite Crocidolite **Percent Asbestos:**
Homogeneous Point Count: 31 Point Count Fields: 400
 fine powder, brown 100 % 7.75 % - - **7.75 %**
Other Fibers Fibrous Mineral Other Matrix
 Glass Cellulose Wool Synthetic - - - 92.25 %
 - - - - - - - -

Comments: Field of view count: 102 fibers over 9 fields.

Client Sample ID: 10344257 **Sample ID:** S9 **Date Analyzed:** 09/25/2010
Client Sample Description: Along Drainage by Gilles Road Layer **Analyst:** Stephanie Golden
Asbestos Mineral Fibers Percent: Chrysotile Amosite Crocidolite **Percent Asbestos:**
Homogeneous Point Count: 58 Point Count Fields: 400
 fine powder, brown 100 % 14.5 % - - **14.5 %**
Other Fibers Fibrous Mineral Other Matrix
 Glass Cellulose Wool Synthetic - - - 85.5 %
 - - - - - - - -

Comments: Field of view count: 107 fibers over 5 fields.

Asbestos and Environmental Analysis

Job Number: 101853

Report Number: 101853R01

Report Date: 09/30/2010

Client Sample ID: 10344259 **Sample ID:** S10 **Date Analyzed:** 09/25/2010
Client Sample Description: Riverbank Layer **Analyst:** Stephanie Golden
Asbestos Mineral Fibers
 Percent: Chrysotile Amosite Crocidolite **Percent Asbestos:**
Homogeneous **Point Count: 52 Point Count Fields: 400**
 fine powder, brown 100 % 13 % - - **13 %**
Other Fibers Fibrous Mineral
 Glass Cellulose Wool Synthetic Other Matrix
 - - - - - - 87 %

Comments: Field of view count: 106 fibers over 7 fields.

Client Sample ID: 10344260 **Sample ID:** S11 **Date Analyzed:** 09/25/2010
Client Sample Description: Riverbank Layer **Analyst:** Stephanie Golden
Asbestos Mineral Fibers
 Percent: Chrysotile Amosite Crocidolite **Percent Asbestos:**
Homogeneous **Point Count: 42 Point Count Fields: 400**
 fine powder, brown 100 % 10.5 % - - **10.5 %**
Other Fibers Fibrous Mineral
 Glass Cellulose Wool Synthetic Other Matrix
 - - - - - - 89.5 %

Comments: Field of view count: 105 fibers over 4 fields.

Client Sample ID: 10344261 **Sample ID:** S12 **Date Analyzed:** 09/25/2010
Client Sample Description: Riverbank (process for manchester bank) Layer **Analyst:** Stephanie Golden
Asbestos Mineral Fibers
 Percent: Chrysotile Amosite Crocidolite **Percent Asbestos:**
Homogeneous **Point Count: 57 Point Count Fields: 400**
 fine powder, brown 100 % 14.25 % - - **14.25 %**
Other Fibers Fibrous Mineral
 Glass Cellulose Wool Synthetic Other Matrix
 - - - - - - 85.75 %

Comments: Field of view count: 105 fibers over 4 fields.

Client Sample ID: 10344262 **Sample ID:** S13 **Date Analyzed:** 09/25/2010
Client Sample Description: In Yard Layer **Analyst:** Stephanie Golden
Asbestos Mineral Fibers
 Percent: Chrysotile Amosite Crocidolite **Percent Asbestos:**
Homogeneous **Point Count: 0 Point Count Fields: 400**
 fine powder, brown 100 % 0 % - - **NAD**
Other Fibers Fibrous Mineral
 Glass Cellulose Wool Synthetic Other Matrix
 - - - - - - 100 %

Comments: Field of view count: 1 fiber over 400 fields.

Client Sample ID: 10344264 **Sample ID:** S14 **Date Analyzed:** 09/25/2010
Client Sample Description: North Side of House Layer **Analyst:** Stephanie Golden
Asbestos Mineral Fibers
 Percent: Chrysotile Amosite Crocidolite **Percent Asbestos:**
Homogeneous **Point Count: 0 Point Count Fields: 400**
 fine powder, brown 100 % - - - **NAD**
Other Fibers Fibrous Mineral
 Glass Cellulose Wool Synthetic Other Matrix
 - - - - - - 100 %

Comments: Field of view count: 1 fiber over 400 fields.



Job Number: 101853

Report Number: 101853R01

Report Date: 09/30/2010

This laboratory participates in the National Voluntary Laboratory Accreditation Program (NVLAP).
Testing method is per 40 CFR 763 Subpart F, Appendix A, PLM.

Layered samples are considered non-homogeneous. "Misc" is miscellaneous. "NAD" is No Asbestos Detected.
Asbestos consists of the following minerals: chrysotile, amosite, crocidolite, tremolite, actinolite, anthophyllite.
Small diameter fibers such as those found in vinyl floor tiles, may not be detected by PLM.
Asbestos detection interferences may result from material binders.

Qualitative and quantitative TEM analysis may be recommended for difficult samples.

Quantitative analysis by PLM point count or TEM is recommended for samples testing at < or = to 1% asbestos.

The following estimate of error for this method by visual estimation of asbestos percent are as follows:

1% asbestos: 0-3% error, 5% asbestos: 1-9% error, 10% asbestos: 5-15% error, 20% asbestos: 10-30% error.

This report pertains only to the samples listed on the report. Report considered valid only when signed by analyst.

Reviewed by:

STEPHANIE GOLDEN

Stephanie Golden
Analyst



Sample Summary Report

Case No: 40437	Contract: EPW09044	SDG No: MJCSD1	Lab Code: STLV
Sample Number: LCS	Method: ICP_AES	Matrix: Soil	MA Number: DEFAULT
Sample Location:	pH:	Sample Date:	Sample Time:
% Moisture :		% Solids : 100	

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable	Validation Level
Aluminum	39.3	mg/kg	1.0			Yes	S2BVE
Antimony	11.7	mg/kg	1.0			Yes	S2BVE
Arsenic	1.7	mg/kg	1.0			Yes	S2BVE
Barium	37.4	mg/kg	1.0			Yes	S2BVE
Beryllium	0.87	mg/kg	1.0			Yes	S2BVE
Cadmium	0.90	mg/kg	1.0			Yes	S2BVE
Calcium	962	mg/kg	1.0			Yes	S2BVE
Chromium	2.0	mg/kg	1.0			Yes	S2BVE
Cobalt	10.3	mg/kg	1.0			Yes	S2BVE
Copper	5.0	mg/kg	1.0			Yes	S2BVE
Iron	19.8	mg/kg	1.0			Yes	S2BVE
Lead	1.9	mg/kg	1.0			Yes	S2BVE
Magnesium	970	mg/kg	1.0			Yes	S2BVE
Manganese	2.9	mg/kg	1.0			Yes	S2BVE
Nickel	8.4	mg/kg	1.0			Yes	S2BVE
Potassium	1030	mg/kg	1.0			Yes	S2BVE
Selenium	7.1	mg/kg	1.0			Yes	S2BVE
Silver	1.9	mg/kg	1.0			Yes	S2BVE
Sodium	992	mg/kg	1.0			Yes	S2BVE
Thallium	4.2	mg/kg	1.0			Yes	S2BVE
Vanadium	9.4	mg/kg	1.0			Yes	S2BVE
Zinc	11.5	mg/kg	1.0			Yes	S2BVE

Case No:	40437	Contract:	EPW09044	SDG No:	MJCSD1	Lab Code:	STLV
Sample Number:	MJCSD1	Method:	ICP_AES	Matrix:	Soil	MA Number:	DEFAULT
Sample Location:	Along River A (composite)	pH:		Sample Date:	08242010	Sample Time:	15:20:00
% Moisture :		% Solids :	95.4				

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable	Validation Level
Aluminum	4930	mg/kg	1.0			Yes	S2BVE
Antimony	1.1	mg/kg	1.0	J N	J	Yes	S2BVE
Arsenic	0.92	mg/kg	1.0	U N	UJ	Yes	S2BVE
Barium	38.0	mg/kg	1.0			Yes	S2BVE
Beryllium	0.12	mg/kg	1.0	J	J	Yes	S2BVE
Cadmium	0.086	mg/kg	1.0	J	J	Yes	S2BVE
Calcium	2470	mg/kg	1.0			Yes	S2BVE
Chromium	276	mg/kg	20.0	D		Yes	S2BVE
Cobalt	75.7	mg/kg	1.0			Yes	S2BVE
Copper	9.0	mg/kg	1.0			Yes	S2BVE
Iron	45800	mg/kg	20.0	D		Yes	S2BVE
Lead	1.4	mg/kg	1.0			Yes	S2BVE
Magnesium	179000	mg/kg	100.0	D		Yes	S2BVE
Manganese	874	mg/kg	100.0	D		Yes	S2BVE
Nickel	1560	mg/kg	100.0	D		Yes	S2BVE
Potassium	785	mg/kg	1.0			Yes	S2BVE
Selenium	3.2	mg/kg	1.0	U	U	Yes	S2BVE
Silver	0.92	mg/kg	1.0	U	U	Yes	S2BVE
Sodium	93.7	mg/kg	1.0	J	J	Yes	S2BVE
Thallium	0.24	mg/kg	1.0	J N	J	Yes	S2BVE
Vanadium	20.7	mg/kg	1.0			Yes	S2BVE
Zinc	30.1	mg/kg	1.0			Yes	S2BVE

Case No:	40437	Contract:	EPW09044	SDG No:	MJCSD1	Lab Code:	STLV
Sample Number:	MJCSD2	Method:	ICP_AES	Matrix:	Soil	MA Number:	DEFAULT
Sample Location:	Loaf Shed B (composite)	pH:		Sample Date:	08242010	Sample Time:	15:15:00
% Moisture :		% Solids :	95.8				

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable	Validation Level
Aluminum	5240	mg/kg	1.0			Yes	S2BVE
Antimony	1.3	mg/kg	1.0	J N	J	Yes	S2BVE
Arsenic	0.98	mg/kg	1.0	U N	UJ	Yes	S2BVE
Barium	36.8	mg/kg	1.0			Yes	S2BVE
Beryllium	0.12	mg/kg	1.0	J	J	Yes	S2BVE
Cadmium	0.12	mg/kg	1.0	J	J	Yes	S2BVE
Calcium	2500	mg/kg	1.0			Yes	S2BVE
Chromium	284	mg/kg	20.0	D		Yes	S2BVE
Cobalt	79.4	mg/kg	1.0			Yes	S2BVE
Copper	9.3	mg/kg	1.0			Yes	S2BVE
Iron	47000	mg/kg	20.0	D		Yes	S2BVE
Lead	0.92	mg/kg	1.0	J	J	Yes	S2BVE
Magnesium	182000	mg/kg	100.0	D		Yes	S2BVE
Manganese	889	mg/kg	100.0	D		Yes	S2BVE
Nickel	1620	mg/kg	100.0	D		Yes	S2BVE
Potassium	2330	mg/kg	1.0			Yes	S2BVE
Selenium	3.4	mg/kg	1.0	U	U	Yes	S2BVE
Silver	0.98	mg/kg	1.0	U	U	Yes	S2BVE
Sodium	188	mg/kg	1.0	J	J	Yes	S2BVE
Thallium	0.13	mg/kg	1.0	J N	J	Yes	S2BVE
Vanadium	22.2	mg/kg	1.0			Yes	S2BVE
Zinc	29.8	mg/kg	1.0			Yes	S2BVE

Case No:	40437	Contract:	EPW09044	SDG No:	MJCSD1	Lab Code:	STLV
Sample Number:	MJCSD3	Method:	ICP_AES	Matrix:	Soil	MA Number:	DEFAULT
Sample Location:	Along Drainage(composite 2)	pH:		Sample Date:	08242010	Sample Time:	15:50:00
% Moisture :		% Solids :	89.9				

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable	Validation Level
Aluminum	11600	mg/kg	1.0			Yes	S2BVE
Antimony	6.1	mg/kg	1.0	U N	UJ	Yes	S2BVE
Arsenic	4.7	mg/kg	1.0	N	J-	Yes	S2BVE
Barium	76.6	mg/kg	1.0			Yes	S2BVE
Beryllium	0.18	mg/kg	1.0	J	J	Yes	S2BVE
Cadmium	0.20	mg/kg	1.0	J	J	Yes	S2BVE
Calcium	4230	mg/kg	1.0			Yes	S2BVE
Chromium	199	mg/kg	10.0	D		Yes	S2BVE
Cobalt	62.7	mg/kg	1.0			Yes	S2BVE
Copper	21.6	mg/kg	1.0			Yes	S2BVE
Iron	44400	mg/kg	10.0	D		Yes	S2BVE
Lead	4.0	mg/kg	1.0			Yes	S2BVE
Magnesium	114000	mg/kg	100.0	D		Yes	S2BVE
Manganese	742	mg/kg	100.0	D		Yes	S2BVE
Nickel	1080	mg/kg	100.0	D		Yes	S2BVE
Potassium	696	mg/kg	1.0			Yes	S2BVE
Selenium	3.5	mg/kg	1.0	U	U	Yes	S2BVE
Silver	1.0	mg/kg	1.0	U	U	Yes	S2BVE
Sodium	220	mg/kg	1.0	J	J	Yes	S2BVE
Thallium	2.5	mg/kg	1.0	U N	UJ	Yes	S2BVE
Vanadium	41.5	mg/kg	1.0			Yes	S2BVE
Zinc	48.8	mg/kg	1.0			Yes	S2BVE

Case No:	40437	Contract:	EPW09044	SDG No:	MJCSD1	Lab Code:	STLV
Sample Number:	MJCSD4	Method:	ICP_AES	Matrix:	Soil	MA Number:	DEFAULT
Sample Location:	Lawn Near house A (composite)	pH:		Sample Date:	08252010	Sample Time:	10:44:00
% Moisture :				% Solids :	97.8		

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable	Validation Level
Aluminum	14500	mg/kg	1.0			Yes	S2BVE
Antimony	5.1	mg/kg	1.0	U N	UJ	Yes	S2BVE
Arsenic	3.9	mg/kg	1.0	N	J-	Yes	S2BVE
Barium	91.8	mg/kg	1.0			Yes	S2BVE
Beryllium	0.18	mg/kg	1.0	J	J	Yes	S2BVE
Cadmium	0.28	mg/kg	1.0	J	J	Yes	S2BVE
Calcium	3740	mg/kg	1.0			Yes	S2BVE
Chromium	48.2	mg/kg	10.0	D		Yes	S2BVE
Cobalt	15.3	mg/kg	1.0			Yes	S2BVE
Copper	21.2	mg/kg	1.0			Yes	S2BVE
Iron	25500	mg/kg	10.0	D		Yes	S2BVE
Lead	16.3	mg/kg	1.0			Yes	S2BVE
Magnesium	15300	mg/kg	1.0			Yes	S2BVE
Manganese	460	mg/kg	1.0			Yes	S2BVE
Nickel	146	mg/kg	10.0	D		Yes	S2BVE
Potassium	867	mg/kg	1.0			Yes	S2BVE
Selenium	3.0	mg/kg	1.0	U	U	Yes	S2BVE
Silver	0.84	mg/kg	1.0	U	U	Yes	S2BVE
Sodium	127	mg/kg	1.0	J	J	Yes	S2BVE
Thallium	2.1	mg/kg	1.0	U N	UJ	Yes	S2BVE
Vanadium	52.3	mg/kg	1.0			Yes	S2BVE
Zinc	65.3	mg/kg	1.0			Yes	S2BVE

Case No:	40437	Contract:	EPW09044	SDG No:	MJCSD1	Lab Code:	STLV
Sample Number:	MJCSD5	Method:	ICP_AES	Matrix:	Soil	MA Number:	DEFAULT
Sample Location:	Lawn Near Shed B(composite)	pH:		Sample Date:	08252010	Sample Time:	12:27:00
% Moisture :				% Solids :	96.3		

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable	Validation Level
Aluminum	12800	mg/kg	1.0			Yes	S2BVE
Antimony	4.4	mg/kg	1.0	U N	UJ	Yes	S2BVE
Arsenic	4.5	mg/kg	1.0	N	J-	Yes	S2BVE
Barium	80.2	mg/kg	1.0			Yes	S2BVE
Beryllium	0.15	mg/kg	1.0	J	J	Yes	S2BVE
Cadmium	0.22	mg/kg	1.0	J	J	Yes	S2BVE
Calcium	6510	mg/kg	1.0			Yes	S2BVE
Chromium	47.4	mg/kg	10.0	D		Yes	S2BVE
Cobalt	15.9	mg/kg	1.0			Yes	S2BVE
Copper	31.0	mg/kg	1.0			Yes	S2BVE
Iron	23700	mg/kg	10.0	D		Yes	S2BVE
Lead	9.1	mg/kg	1.0			Yes	S2BVE
Magnesium	21700	mg/kg	10.0	D		Yes	S2BVE
Manganese	484	mg/kg	100.0	D		Yes	S2BVE
Nickel	183	mg/kg	100.0	J D	J	Yes	S2BVE
Potassium	1200	mg/kg	1.0			Yes	S2BVE
Selenium	2.6	mg/kg	1.0	U	U	Yes	S2BVE
Silver	0.74	mg/kg	1.0	U	U	Yes	S2BVE
Sodium	222	mg/kg	1.0	J	J	Yes	S2BVE
Thallium	1.8	mg/kg	1.0	U N	UJ	Yes	S2BVE
Vanadium	40.4	mg/kg	1.0			Yes	S2BVE
Zinc	118	mg/kg	1.0			Yes	S2BVE

Case No:	40437	Contract:	EPW09044	SDG No:	MJCSD1	Lab Code:	STLV
Sample Number:	MJCSD6	Method:	ICP_AES	Matrix:	Soil	MA Number:	DEFAULT
Sample Location:	Corn Field 1(Composite)	pH:		Sample Date:	08252010	Sample Time:	14:26:00
% Moisture :		% Solids :	96.8				

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable	Validation Level
Aluminum	7930	mg/kg	1.0			Yes	S2BVE
Antimony	0.95	mg/kg	1.0	J N	J	Yes	S2BVE
Arsenic	0.90	mg/kg	1.0	U N	UJ	Yes	S2BVE
Barium	60.4	mg/kg	1.0			Yes	S2BVE
Beryllium	0.16	mg/kg	1.0	J	J	Yes	S2BVE
Cadmium	0.11	mg/kg	1.0	J	J	Yes	S2BVE
Calcium	3590	mg/kg	1.0			Yes	S2BVE
Chromium	247	mg/kg	20.0	D		Yes	S2BVE
Cobalt	75.6	mg/kg	1.0			Yes	S2BVE
Copper	15.1	mg/kg	1.0			Yes	S2BVE
Iron	47300	mg/kg	20.0	D		Yes	S2BVE
Lead	2.0	mg/kg	1.0			Yes	S2BVE
Magnesium	156000	mg/kg	100.0	D		Yes	S2BVE
Manganese	836	mg/kg	100.0	D		Yes	S2BVE
Nickel	1480	mg/kg	100.0	D		Yes	S2BVE
Potassium	513	mg/kg	1.0			Yes	S2BVE
Selenium	3.1	mg/kg	1.0	U	U	Yes	S2BVE
Silver	0.90	mg/kg	1.0	U	U	Yes	S2BVE
Sodium	101	mg/kg	1.0	J	J	Yes	S2BVE
Thallium	2.2	mg/kg	1.0	U N	UJ	Yes	S2BVE
Vanadium	30.1	mg/kg	1.0			Yes	S2BVE
Zinc	41.3	mg/kg	1.0			Yes	S2BVE

Case No:	40437	Contract:	EPW09044	SDG No:	MJCSD1	Lab Code:	STLV
Sample Number:	MJCSD7	Method:	ICP_AES	Matrix:	Soil	MA Number:	DEFAULT
Sample Location:	Along Drainage by Gillies Rd(composite)	pH:		Sample Date:	08252010	Sample Time:	15:51:00
% Moisture :		% Solids :	46.9				

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable	Validation Level
Aluminum	6220	mg/kg	1.0			Yes	S2BVE
Antimony	3.1	mg/kg	1.0	J N	J	Yes	S2BVE
Arsenic	2.0	mg/kg	1.0	U N	UJ	Yes	S2BVE
Barium	42.6	mg/kg	1.0			Yes	S2BVE
Beryllium	0.13	mg/kg	1.0	J	J	Yes	S2BVE
Cadmium	0.25	mg/kg	1.0	J	J	Yes	S2BVE
Calcium	2280	mg/kg	1.0			Yes	S2BVE
Chromium	288	mg/kg	10.0	D		Yes	S2BVE
Cobalt	87.1	mg/kg	1.0			Yes	S2BVE
Copper	10.9	mg/kg	1.0			Yes	S2BVE
Iron	45100	mg/kg	10.0	D		Yes	S2BVE
Lead	2.5	mg/kg	1.0			Yes	S2BVE
Magnesium	189000	mg/kg	100.0	D		Yes	S2BVE
Manganese	785	mg/kg	100.0	D		Yes	S2BVE
Nickel	1730	mg/kg	10.0	D		Yes	S2BVE
Potassium	550	mg/kg	1.0	J	J	Yes	S2BVE
Selenium	1.9	mg/kg	1.0	J	J	Yes	S2BVE
Silver	2.0	mg/kg	1.0	U	U	Yes	S2BVE
Sodium	167	mg/kg	1.0	J	J	Yes	S2BVE
Thallium	5.1	mg/kg	1.0	U N	UJ	Yes	S2BVE
Vanadium	24.1	mg/kg	1.0			Yes	S2BVE
Zinc	39.2	mg/kg	1.0			Yes	S2BVE

Case No:	40437	Contract:	EPW09044	SDG No:	MJCSD1	Lab Code:	STLV
Sample Number:	MJCSD8	Method:	ICP_AES	Matrix:	Soil	MA Number:	DEFAULT
Sample Location:	River Bank A (composite)	pH:		Sample Date:	08262010	Sample Time:	12:00:00
% Moisture :		% Solids :	92.1				

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable	Validation Level
Aluminum	7330	mg/kg	1.0			Yes	S2BVE
Antimony	2.3	mg/kg	1.0	J N	J	Yes	S2BVE
Arsenic	0.96	mg/kg	1.0	U N	UJ	Yes	S2BVE
Barium	58.9	mg/kg	1.0			Yes	S2BVE
Beryllium	0.12	mg/kg	1.0	J	J	Yes	S2BVE
Cadmium	0.12	mg/kg	1.0	J	J	Yes	S2BVE
Calcium	2600	mg/kg	1.0			Yes	S2BVE
Chromium	271	mg/kg	20.0	D		Yes	S2BVE
Cobalt	78.0	mg/kg	1.0			Yes	S2BVE
Copper	11.7	mg/kg	1.0			Yes	S2BVE
Iron	45800	mg/kg	20.0	D		Yes	S2BVE
Lead	1.3	mg/kg	1.0			Yes	S2BVE
Magnesium	170000	mg/kg	100.0	D		Yes	S2BVE
Manganese	826	mg/kg	100.0	D		Yes	S2BVE
Nickel	1590	mg/kg	20.0	D		Yes	S2BVE
Potassium	460	mg/kg	1.0	J	J	Yes	S2BVE
Selenium	0.76	mg/kg	1.0	J	J	Yes	S2BVE
Silver	0.96	mg/kg	1.0	U	U	Yes	S2BVE
Sodium	72.6	mg/kg	1.0	J	J	Yes	S2BVE
Thallium	2.4	mg/kg	1.0	U N	UJ	Yes	S2BVE
Vanadium	27.1	mg/kg	1.0			Yes	S2BVE
Zinc	38.1	mg/kg	1.0			Yes	S2BVE

Case No:	40437	Contract:	EPW09044	SDG No:	MJCSD1	Lab Code:	STLV
Sample Number:	MJCSD9	Method:	ICP_AES	Matrix:	Soil	MA Number:	DEFAULT
Sample Location:	In Yard B (composite)	pH:		Sample Date:	08262010	Sample Time:	14:06:00
% Moisture :				% Solids :	90.1		

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable	Validation Level
Aluminum	15200	mg/kg	1.0			Yes	S2BVE
Antimony	6.0	mg/kg	1.0	U N	UJ	Yes	S2BVE
Arsenic	7.2	mg/kg	1.0	N	J-	Yes	S2BVE
Barium	103	mg/kg	1.0			Yes	S2BVE
Beryllium	0.19	mg/kg	1.0	J	J	Yes	S2BVE
Cadmium	0.25	mg/kg	1.0	J	J	Yes	S2BVE
Calcium	4370	mg/kg	1.0			Yes	S2BVE
Chromium	44.8	mg/kg	10.0	D		Yes	S2BVE
Cobalt	16.6	mg/kg	1.0			Yes	S2BVE
Copper	21.4	mg/kg	1.0			Yes	S2BVE
Iron	27600	mg/kg	10.0	D		Yes	S2BVE
Lead	29.6	mg/kg	1.0			Yes	S2BVE
Magnesium	12200	mg/kg	1.0			Yes	S2BVE
Manganese	454	mg/kg	100.0	D		Yes	S2BVE
Nickel	112	mg/kg	10.0	D		Yes	S2BVE
Potassium	635	mg/kg	1.0			Yes	S2BVE
Selenium	3.5	mg/kg	1.0	U	U	Yes	S2BVE
Silver	1.0	mg/kg	1.0	U	U	Yes	S2BVE
Sodium	281	mg/kg	1.0	J	J	Yes	S2BVE
Thallium	2.5	mg/kg	1.0	U N	UJ	Yes	S2BVE
Vanadium	53.6	mg/kg	1.0			Yes	S2BVE
Zinc	75.5	mg/kg	1.0			Yes	S2BVE

Case No:	40437	Contract:	EPW09044	SDG No:	MJCSD1	Lab Code:	STLV
Sample Number:	MJCSE0	Method:	ICP_AES	Matrix:	Soil	MA Number:	DEFAULT
Sample Location:	N.Side of House (composite)	pH:		Sample Date:	08262010	Sample Time:	13:37:00
% Moisture :				% Solids :	84.9		

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable	Validation Level
Aluminum	13500	mg/kg	1.0			Yes	S2BVE
Antimony	6.5	mg/kg	1.0	U N	UJ	Yes	S2BVE
Arsenic	6.9	mg/kg	1.0	N	J-	Yes	S2BVE
Barium	172	mg/kg	1.0			Yes	S2BVE
Beryllium	0.15	mg/kg	1.0	J	J	Yes	S2BVE
Cadmium	1.8	mg/kg	1.0			Yes	S2BVE
Calcium	6070	mg/kg	1.0			Yes	S2BVE
Chromium	42.9	mg/kg	10.0	D		Yes	S2BVE
Cobalt	16.1	mg/kg	1.0			Yes	S2BVE
Copper	26.1	mg/kg	1.0			Yes	S2BVE
Iron	26000	mg/kg	10.0	D		Yes	S2BVE
Lead	386	mg/kg	100.0	D		Yes	S2BVE
Magnesium	13000	mg/kg	1.0			Yes	S2BVE
Manganese	453	mg/kg	10.0	D		Yes	S2BVE
Nickel	115	mg/kg	1.0			Yes	S2BVE
Potassium	1220	mg/kg	1.0			Yes	S2BVE
Selenium	3.8	mg/kg	1.0	U	U	Yes	S2BVE
Silver	1.1	mg/kg	1.0	U	U	Yes	S2BVE
Sodium	305	mg/kg	1.0	J	J	Yes	S2BVE
Thallium	2.7	mg/kg	1.0	U N	UJ	Yes	S2BVE
Vanadium	50.8	mg/kg	1.0			Yes	S2BVE
Zinc	476	mg/kg	10.0	D		Yes	S2BVE

Case No:	40437	Contract:	EPW09044	SDG No:	MJCSD1	Lab Code:	STLV
Sample Number:	MJCSE1	Method:	ICP_AES	Matrix:	Soil	MA Number:	DEFAULT
Sample Location:	Drip Line along greenhouse (composite)	pH:		Sample Date:	08262010	Sample Time:	13:55:00
% Moisture :				% Solids :	91.1		

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable	Validation Level
Aluminum	8870	mg/kg	1.0			Yes	S2BVE
Antimony	4.6	mg/kg	1.0	U N	UJ	Yes	S2BVE
Arsenic	4.7	mg/kg	1.0	N	J-	Yes	S2BVE
Barium	62.4	mg/kg	1.0			Yes	S2BVE
Beryllium	0.12	mg/kg	1.0	J	J	Yes	S2BVE
Cadmium	0.17	mg/kg	1.0	J	J	Yes	S2BVE
Calcium	3450	mg/kg	1.0			Yes	S2BVE
Chromium	32.3	mg/kg	10.0	D		Yes	S2BVE
Cobalt	10.7	mg/kg	1.0			Yes	S2BVE
Copper	25.0	mg/kg	1.0			Yes	S2BVE
Iron	20100	mg/kg	10.0	D		Yes	S2BVE
Lead	10.5	mg/kg	1.0			Yes	S2BVE
Magnesium	8500	mg/kg	1.0			Yes	S2BVE
Manganese	311	mg/kg	100.0	D		Yes	S2BVE
Nickel	70.8	mg/kg	1.0			Yes	S2BVE
Potassium	1200	mg/kg	1.0			Yes	S2BVE
Selenium	2.7	mg/kg	1.0	U	U	Yes	S2BVE
Silver	0.76	mg/kg	1.0	U	U	Yes	S2BVE
Sodium	147	mg/kg	1.0	J	J	Yes	S2BVE
Thallium	1.9	mg/kg	1.0	U N	UJ	Yes	S2BVE
Vanadium	37.4	mg/kg	1.0			Yes	S2BVE
Zinc	81.2	mg/kg	1.0			Yes	S2BVE

Case No:	40437	Contract:	EPW09044	SDG No:	MJCSD1	Lab Code:	STLV
Sample Number:	MJCSE2	Method:	ICP_AES	Matrix:	Soil	MA Number:	DEFAULT
Sample Location:	Along river -A	pH:		Sample Date:	08242010	Sample Time:	15:20:00
% Moisture :				% Solids :	97.2		

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable	Validation Level
Aluminum	5590	mg/kg	1.0			Yes	S2BVE
Antimony	1.5	mg/kg	1.0	J N	J	Yes	S2BVE
Arsenic	0.91	mg/kg	1.0	U N	UJ	Yes	S2BVE
Barium	42.2	mg/kg	1.0			Yes	S2BVE
Beryllium	0.12	mg/kg	1.0	J	J	Yes	S2BVE
Cadmium	0.088	mg/kg	1.0	J	J	Yes	S2BVE
Calcium	3170	mg/kg	1.0			Yes	S2BVE
Chromium	273	mg/kg	20.0	D		Yes	S2BVE
Cobalt	78.3	mg/kg	1.0			Yes	S2BVE
Copper	11.2	mg/kg	1.0			Yes	S2BVE
Iron	46200	mg/kg	20.0	D		Yes	S2BVE
Lead	1.9	mg/kg	1.0			Yes	S2BVE
Magnesium	176000	mg/kg	100.0	D		Yes	S2BVE
Manganese	898	mg/kg	100.0	D		Yes	S2BVE
Nickel	1520	mg/kg	100.0	D		Yes	S2BVE
Potassium	1070	mg/kg	1.0			Yes	S2BVE
Selenium	3.2	mg/kg	1.0	U	U	Yes	S2BVE
Silver	0.91	mg/kg	1.0	U	U	Yes	S2BVE
Sodium	125	mg/kg	1.0	J	J	Yes	S2BVE
Thallium	0.12	mg/kg	1.0	J N	J	Yes	S2BVE
Vanadium	23.1	mg/kg	1.0			Yes	S2BVE
Zinc	35.9	mg/kg	1.0			Yes	S2BVE

Case No:	40437	Contract:	EPW09044	SDG No:	MJCSD1	Lab Code:	STLV
Sample Number:	MJCSE2A	Method:	ICP_AES	Matrix:	Soil	MA Number:	DEFAULT
Sample Location:		pH:		Sample Date:	08242010	Sample Time:	15:20:00
% Moisture :				% Solids :	97.2		

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable	Validation Level
Antimony	13.6	mg/kg	1.0			Yes	
Arsenic	0.91	mg/kg	1.0	U N	U	Yes	
Thallium	4.3	mg/kg	1.0			Yes	

Case No:	40437	Contract:	EPW09044	SDG No:	MJCSD1	Lab Code:	STLV
Sample Number:	MJCSE2D	Method:	ICP_AES	Matrix:	Soil	MA Number:	DEFAULT
Sample Location:		pH:		Sample Date:	08242010	Sample Time:	15:20:00
% Moisture :				% Solids :	97.3		

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable	Validation Level
Aluminum	5460	mg/kg	1.0			Yes	S2BVE
Antimony	1.5	mg/kg	1.0	J	J	Yes	S2BVE
Arsenic	0.91	mg/kg	1.0	U	U	Yes	S2BVE
Barium	41.0	mg/kg	1.0			Yes	S2BVE
Beryllium	0.12	mg/kg	1.0	J	J	Yes	S2BVE
Cadmium	0.10	mg/kg	1.0	J	J	Yes	S2BVE
Calcium	2620	mg/kg	1.0			Yes	S2BVE
Chromium	289	mg/kg	20.0			Yes	S2BVE
Cobalt	81.8	mg/kg	1.0			Yes	S2BVE
Copper	9.6	mg/kg	1.0			Yes	S2BVE
Iron	47700	mg/kg	20.0			Yes	S2BVE
Lead	1.4	mg/kg	1.0			Yes	S2BVE
Magnesium	186000	mg/kg	100.0			Yes	S2BVE
Manganese	907	mg/kg	100.0			Yes	S2BVE
Nickel	1610	mg/kg	100.0			Yes	S2BVE
Potassium	901	mg/kg	1.0			Yes	S2BVE
Selenium	3.2	mg/kg	1.0	U	U	Yes	S2BVE
Silver	0.91	mg/kg	1.0	U	U	Yes	S2BVE
Sodium	111	mg/kg	1.0	J	J	Yes	S2BVE
Thallium	0.13	mg/kg	1.0	J	J	Yes	S2BVE
Vanadium	22.9	mg/kg	1.0			Yes	S2BVE
Zinc	32.1	mg/kg	1.0			Yes	S2BVE

Case No:	40437	Contract:	EPW09044	SDG No:	MJCSD1	Lab Code:	STLV
Sample Number:	MJCSE2L	Method:	ICP_AES	Matrix:	Soil	MA Number:	DEFAULT
Sample Location:		pH:		Sample Date:	08242010	Sample Time:	15:20:00
% Moisture :				% Solids :	97.2		

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable	Validation Level
Aluminum	5710	mg/kg	5.0			Yes	
Antimony	27.3	mg/kg	5.0	U	U	Yes	
Arsenic	4.6	mg/kg	5.0	U	U	Yes	
Barium	44.2	mg/kg	5.0	J	J	Yes	
Beryllium	0.20	mg/kg	5.0	J	J	Yes	
Cadmium	0.57	mg/kg	5.0	J	J	Yes	
Calcium	3280	mg/kg	5.0			Yes	
Chromium	258	mg/kg	100.0			Yes	
Cobalt	80.8	mg/kg	5.0			Yes	
Copper	11.1	mg/kg	5.0	J	J	Yes	
Iron	44100	mg/kg	100.0			Yes	
Lead	4.6	mg/kg	5.0	U	U	Yes	
Magnesium	176000	mg/kg	500.0	J	J	Yes	
Manganese	906	mg/kg	500.0			Yes	
Nickel	1580	mg/kg	500.0	J	J	Yes	
Potassium	1080	mg/kg	5.0	J	J	Yes	
Selenium	15.9	mg/kg	5.0	U	U	Yes	
Silver	4.6	mg/kg	5.0	U	U	Yes	
Sodium	116	mg/kg	5.0	J	J	Yes	
Thallium	11.4	mg/kg	5.0	U	U	Yes	
Vanadium	21.7	mg/kg	5.0	J	J	Yes	
Zinc	35.6	mg/kg	5.0			Yes	

Case No:	40437	Contract:	EPW09044	SDG No:	MJCSD1	Lab Code:	STLV
Sample Number:	MJCSE2S	Method:	ICP_AES	Matrix:	Soil	MA Number:	DEFAULT
Sample Location:		pH:		Sample Date:	08242010	Sample Time:	15:20:00
% Moisture :				% Solids :	97.2		

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable	Validation Level
Antimony	5.5	mg/kg	1.0	N		Yes	S2BVE
Arsenic	3.9	mg/kg	1.0	N		Yes	S2BVE
Barium	341	mg/kg	1.0			Yes	S2BVE
Beryllium	7.6	mg/kg	1.0			Yes	S2BVE
Cadmium	8.6	mg/kg	1.0			Yes	S2BVE
Calcium	2510	mg/kg	1.0			Yes	S2BVE
Chromium	311	mg/kg	20.0			Yes	S2BVE
Cobalt	162	mg/kg	1.0			Yes	S2BVE
Copper	49.9	mg/kg	1.0			Yes	S2BVE
Lead	5.1	mg/kg	1.0			Yes	S2BVE
Magnesium	178000	mg/kg	100.0			Yes	S2BVE
Manganese	942	mg/kg	100.0			Yes	S2BVE
Nickel	1620	mg/kg	100.0			Yes	S2BVE
Potassium	833	mg/kg	1.0			Yes	S2BVE
Selenium	9.7	mg/kg	1.0			Yes	S2BVE
Silver	7.0	mg/kg	1.0			Yes	S2BVE
Sodium	110	mg/kg	1.0	J	J	Yes	S2BVE
Thallium	4.4	mg/kg	1.0	N		Yes	S2BVE
Vanadium	102	mg/kg	1.0			Yes	S2BVE
Zinc	128	mg/kg	1.0			Yes	S2BVE

Case No:	40437	Contract:	EPW09044	SDG No:	MJCSD1	Lab Code:	STLV
Sample Number:	MJCSE3	Method:	ICP_AES	Matrix:	Soil	MA Number:	DEFAULT
Sample Location:	Corn	pH:		Sample Date:	08252010	Sample Time:	14:26:00
% Moisture :				% Solids :	96.6		

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable	Validation Level
Aluminum	8610	mg/kg	1.0			Yes	S2BVE
Antimony	0.84	mg/kg	1.0	J N	J	Yes	S2BVE
Arsenic	0.87	mg/kg	1.0	U N	UJ	Yes	S2BVE
Barium	65.4	mg/kg	1.0			Yes	S2BVE
Beryllium	0.17	mg/kg	1.0	J	J	Yes	S2BVE
Cadmium	0.16	mg/kg	1.0	J	J	Yes	S2BVE
Calcium	4030	mg/kg	1.0			Yes	S2BVE
Chromium	249	mg/kg	20.0	D		Yes	S2BVE
Cobalt	79.8	mg/kg	1.0			Yes	S2BVE
Copper	16.1	mg/kg	1.0			Yes	S2BVE
Iron	48200	mg/kg	20.0	D		Yes	S2BVE
Lead	2.0	mg/kg	1.0			Yes	S2BVE
Magnesium	155000	mg/kg	100.0	D		Yes	S2BVE
Manganese	855	mg/kg	100.0	D		Yes	S2BVE
Nickel	1480	mg/kg	100.0	D		Yes	S2BVE
Potassium	589	mg/kg	1.0			Yes	S2BVE
Selenium	3.0	mg/kg	1.0	U	U	Yes	S2BVE
Silver	0.87	mg/kg	1.0	U	U	Yes	S2BVE
Sodium	109	mg/kg	1.0	J	J	Yes	S2BVE
Thallium	2.2	mg/kg	1.0	U N	UJ	Yes	S2BVE
Vanadium	32.7	mg/kg	1.0			Yes	S2BVE
Zinc	43.1	mg/kg	1.0			Yes	S2BVE

Case No:	40437	Contract:	EPW09044	SDG No:	MJCSD1	Lab Code:	STLV
Sample Number:	MJCSE4	Method:	ICP_AES	Matrix:	Soil	MA Number:	DEFAULT
Sample Location:	Corn Field Blank	pH:		Sample Date:	08252010	Sample Time:	15:25:00
% Moisture :		% Solids :	95.7				

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable	Validation Level
Aluminum	3500	mg/kg	1.0			Yes	S2BVE
Antimony	4.0	mg/kg	1.0	J N	J	Yes	S2BVE
Arsenic	0.99	mg/kg	1.0	U N	UJ	Yes	S2BVE
Barium	20.9	mg/kg	1.0			Yes	S2BVE
Beryllium	0.096	mg/kg	1.0	J	J	Yes	S2BVE
Cadmium	0.055	mg/kg	1.0	J	J	Yes	S2BVE
Calcium	1470	mg/kg	1.0			Yes	S2BVE
Chromium	310	mg/kg	20.0	D		Yes	S2BVE
Cobalt	85.6	mg/kg	1.0			Yes	S2BVE
Copper	6.1	mg/kg	1.0			Yes	S2BVE
Iron	47500	mg/kg	20.0	D		Yes	S2BVE
Lead	0.61	mg/kg	1.0	J	J	Yes	S2BVE
Magnesium	197000	mg/kg	100.0	D		Yes	S2BVE
Manganese	768	mg/kg	100.0	D		Yes	S2BVE
Nickel	1700	mg/kg	100.0	D		Yes	S2BVE
Potassium	195	mg/kg	1.0	J	J	Yes	S2BVE
Selenium	1.1	mg/kg	1.0	J	J	Yes	S2BVE
Silver	0.99	mg/kg	1.0	U	U	Yes	S2BVE
Sodium	45.8	mg/kg	1.0	J	J	Yes	S2BVE
Thallium	0.42	mg/kg	1.0	J N	J	Yes	S2BVE
Vanadium	17.9	mg/kg	1.0			Yes	S2BVE
Zinc	33.8	mg/kg	1.0			Yes	S2BVE

Case No:	40437	Contract:	EPW09044	SDG No:	MJCSD1	Lab Code:	STLV
Sample Number:	MJCSE6	Method:	ICP_AES	Matrix:	Soil	MA Number:	DEFAULT
Sample Location:	Riverbank A	pH:		Sample Date:	08262010	Sample Time:	12:00:00
% Moisture :				% Solids :	97.1		

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable	Validation Level
Aluminum	10600	mg/kg	1.0			Yes	S2BVE
Antimony	2.8	mg/kg	1.0	J N	J	Yes	S2BVE
Arsenic	0.99	mg/kg	1.0	U N	UJ	Yes	S2BVE
Barium	75.9	mg/kg	1.0			Yes	S2BVE
Beryllium	0.19	mg/kg	1.0	J	J	Yes	S2BVE
Cadmium	0.16	mg/kg	1.0	J	J	Yes	S2BVE
Calcium	3460	mg/kg	1.0			Yes	S2BVE
Chromium	272	mg/kg	20.0	D		Yes	S2BVE
Cobalt	88.1	mg/kg	1.0			Yes	S2BVE
Copper	18.9	mg/kg	1.0			Yes	S2BVE
Iron	49900	mg/kg	20.0	D		Yes	S2BVE
Lead	2.6	mg/kg	1.0			Yes	S2BVE
Magnesium	169000	mg/kg	100.0	D		Yes	S2BVE
Manganese	882	mg/kg	100.0	D		Yes	S2BVE
Nickel	1540	mg/kg	100.0	D		Yes	S2BVE
Potassium	731	mg/kg	1.0			Yes	S2BVE
Selenium	1.4	mg/kg	1.0	J	J	Yes	S2BVE
Silver	0.99	mg/kg	1.0	U	U	Yes	S2BVE
Sodium	132	mg/kg	1.0	J	J	Yes	S2BVE
Thallium	2.5	mg/kg	1.0	U N	UJ	Yes	S2BVE
Vanadium	37.4	mg/kg	1.0			Yes	S2BVE
Zinc	52.4	mg/kg	1.0			Yes	S2BVE

Case No:	40437	Contract:	EPW09044	SDG No:	MJCSD1	Lab Code:	STLV
Sample Number:	PBS	Method:	ICP_AES	Matrix:	Soil	MA Number:	DEFAULT
Sample Location:		pH:		Sample Date:		Sample Time:	
% Moisture :				% Solids :			

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable	Validation Level
Aluminum	20.0	mg/kg	1.0	U	U	Yes	S2BVE
Antimony	6.0	mg/kg	1.0	U	U	Yes	S2BVE
Arsenic	1.0	mg/kg	1.0	U	U	Yes	S2BVE
Barium	20.0	mg/kg	1.0	U	U	Yes	S2BVE
Beryllium	0.50	mg/kg	1.0	U	U	Yes	S2BVE
Cadmium	0.50	mg/kg	1.0	U	U	Yes	S2BVE
Calcium	500	mg/kg	1.0	U	U	Yes	S2BVE
Chromium	0.053	mg/kg	1.0	J	J	Yes	S2BVE
Cobalt	5.0	mg/kg	1.0	U	U	Yes	S2BVE
Copper	0.20	mg/kg	1.0	J	J	Yes	S2BVE
Iron	10.0	mg/kg	1.0	U	U	Yes	S2BVE
Lead	1.0	mg/kg	1.0	U	U	Yes	S2BVE
Magnesium	500	mg/kg	1.0	U	U	Yes	S2BVE
Manganese	0.059	mg/kg	1.0	J	J	Yes	S2BVE
Nickel	4.0	mg/kg	1.0	U	U	Yes	S2BVE
Potassium	500	mg/kg	1.0	U	U	Yes	S2BVE
Selenium	3.5	mg/kg	1.0	U	U	Yes	S2BVE
Silver	1.0	mg/kg	1.0	U	U	Yes	S2BVE
Sodium	500	mg/kg	1.0	U	U	Yes	S2BVE
Thallium	-0.31	mg/kg	1.0	J	J	Yes	S2BVE
Vanadium	5.0	mg/kg	1.0	U	U	Yes	S2BVE
Zinc	6.0	mg/kg	1.0	U	U	Yes	S2BVE



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10 LABORATORY
7411 Beach Dr. East
Port Orchard, Washington 98366**

MEMORANDUM

SUBJECT: Data Release for Asbestos Results from the USEPA Region 10 Laboratory.

PROJECT NAME: Sumas Mountain/ Swift Creek Project

PROJECT CODE: ESD-122E

FROM: Gerald Dodo, Chemistry Supervisor
Office of Environmental Assessment
USEPA Region 10 Laboratory

TO: Ellie Hale, Remedial Project Manager
Office of Environmental Cleanup
Site Cleanup Unit 4
USEPA Region 10

Julie Wroble, Toxicologist
Office of Environmental Assessment
Risk Evaluation Unit
USEPA Region 10

I have authorized release of this data package. Attached you will find the asbestos results for the Sumas Mt/ Swift Creek project for the samples received on 10/01/2010. For further information regarding the attached data, contact Jed Januch at 360-871-8731.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10 LABORATORY
7411 Beach Dr. East
PortOrchard, Washington 98366

MEMORANDUM

TO: Ellie Hale, Remedial Project Manager
Office of Environmental Cleanup
Site Cleanup Unit 4

Julie Wroble, Toxicologist
Office of Environmental Assessment
Risk Evaluation Unit

FROM: Jed Januch, Environmental Protection Specialist
Office of Environmental Assessment
Environmental Services Unit

QA

REVIEWER: Susan Carrell, Washington State Department of Ecology _____

SUBJECT: Case narrative for asbestos analysis of split samples from the Sumas Mountain/Swift Creek site

Project Code: ESD-122E
Account Code: 11T10P302DD2C10EGLA00

The following pertains to the quality assurance (QA) documentation associated with asbestos analysis of two sediment samples collected near the Sumas River in Whatcom County, Washington. The samples are splits of samples analyzed by Lab/Cor, Inc. (Lab/Cor) using the California Air Resources Board (CARB) method 435. I conducted my analysis of these samples using the EPA Region 10 standard operating procedure for asbestos analysis in soil ASB_003 and CARB method 435. For those tests for which the U.S. EPA Region 10 Laboratory has been accredited by the National Environmental Laboratory Accreditation Conference (NELAC), all requirements of the current NELAC Standard have been met.

The following comments refer to the quality control specifications for analysis of the following samples:

EPA Region 10	Lab/Cor
<u>Sample Number</u>	<u>Sample Number</u>
10344256	101853-S8-1
10344261	101853-S12-1

1.0 Holding time and Chain of Custody

There is no recommended holding time for asbestos samples. The samples were received in the laboratory on October 1, 2010, and the analysis was completed on November 30, 2010. The EPA Region 10 Laboratory is a secure facility and the asbestos analysis area requires a key card for access.

2.0 Results of Analysis

Both samples contained chrysotile asbestos as well as various other minerals including but not limited to quartz, calcite, coalingite (brown to reddish colored material), and magnetite (black colored opaque grains). The chrysotile occurs in fibrous, massive, or splintery habits. I did not detect fibrous structures with optical properties consistent with amphiboles. Table 1 shows the estimated concentration of chrysotile asbestos found in each sample.

Table 1 - Results of analysis

Sample Number	Asbestos Analysis Result
10344256	13.5% chrysotile
10344261	10.8% chrysotile

I also analyzed two specimens from each sample using a JEOL JSM6510LV scanning electron microscope (SEM) as an alternate technique. I did this to better show the morphology of the chrysotile asbestos structures (smaller asbestos fibers and bundles) present in the samples that may be too small to be resolved by PLM. Attached to this report are digital photomicrographs showing examples of chrysotile asbestos detected by PLM and SEM.

3.0 Sample Preparation

The samples were ground by Lab/Cor in preparation for analysis. In some cases, I observed that the grain size was too large to get even dispersion under the glass cover slip. To correct this, I suspended a representative aliquot of each sample in isopropanol grinding medium and lightly crushed it with a corundum mortar and pestle. I deposited the re-ground material on large glass slides and allowed the isopropanol to evaporate. I mounted several pinches of the sample in appropriate refractive index liquids on glass slides. I prepared eight slides per sample in the 1.550 refractive index liquid. I also prepared several slides using the 1.605 refractive index liquid to check for amphiboles.

4.0 Asbestos Measurement System Calibration

The calibration for the PLM and the refractive index liquids were performed as required using appropriate methods and procedures. Prior to analysis the PLM was checked for Köhler illumination. A stage micrometer slide was used to calibrate the measurement ocular at 100x, 200x and 400x magnifications. Refractive index liquids used for this project were verified accurate on June 24, 2010, using an Abbe refractometer.

5.0 Analytical Procedures

I analyzed the samples in accordance with the EPA Region 10 SOP and the CARB method 435. The analysis was performed using a Carl Zeiss Axioskop 40 PLM at 100 x magnification. The microscope is equipped with a cross-hair reticle and I used slightly crossed polars while scanning slides.

Fifty occupied points were counted for each of the eight slides that were prepared for each sample. The percentage of asbestos in each sample is based on point counting asbestos fibers and bundles using the following formula:

$$\% \text{ asbestos} = (a/n) (100\%)$$

The letter “a” represents the number of points occupied by an asbestos fiber or fiber bundle, and the letter “n” represents the number of non-empty points counted.

The raw data prepared recorded for this project includes the number of points counted plus the optical properties observed by PLM including extinction angle (using crossed polars), sign of elongation (crossed polars with a first order red 530 nanometer compensator plate), and central stop dispersion staining characteristics.

6.0 Quality Assurance and Quality Control

For reference, I analyzed a specimen of chrysotile asbestos from standard reference material (SRM) 1866b. In addition, I reviewed a set of commercially prepared slides containing chrysotile and actinolite asbestos. Prior to analyzing samples for this project, I prepared a method blank in the 1.550 refractive index liquid that I analyzed to determine that supplies and tools used for this project were free of asbestos fibers.

7.0 Reporting Limits / Data Qualifiers

The detection limit for asbestos by CARB method 435 is approximately 0.25%. The sample results for this project were reported as a percentage based on point counting. If the component is present but no percentage is reported, the qualifier for present but not quantified (PNQ) is used. If the component is not present, the qualifier for absent (A) is used. If the component is positively identified but is estimated to be less than 0.25%, the qualifier for trace (T) is used.

Manchester Environmental Laboratory
Report by Parameter for Project ESD-122E

Project Code:	ESD-122E	Collected:	8/25/10	14:26:00
Project Name:	SUMAS MT/ SWIFT CREEK ASBESTOS	Matrix:	Solid	
Project Officer:	ELLIE HALE	Sample Number:	10344256	
Account Code:	11T10P302DD2C10EGLA00	Type:	Reg sample	
Station Description:	CORNFIELD			

	Result	Units	Qlfr
GEN			
Parameter : Bulk Asbestos Analysis			Container ID : N1
Method : CARB 435 California Resources Board method 435			Analysis Date : 11/30/2010
Prep Method :			Prep Date :
Analytes(s): *200009 Actinolite			A
*200006 Amosite			A
*200007 Anthophyllite			A
*200005 Chrysotile	13.5	%	
*200010 Crocidolite			A
*200124 Non-Asbestos			A
*200125 Other Fibrous Amphibole			A
*200008 Tremolite			A

Manchester Environmental Laboratory
Report by Parameter for Project ESD-122E

Project Code:	ESD-122E	Collected:	8/26/10	12:00:00
Project Name:	SUMAS MT/ SWIFT CREEK ASBESTOS	Matrix:	Solid	
Project Officer:	ELLIE HALE	Sample Number:	10344261	
Account Code:	11T10P302DD2C10EGLA00	Type:	Reg sample	
Station Description:	RIVERBANK			

	Result	Units	Qlfr
GEN			
Parameter : Bulk Asbestos Analysis			Container ID : N1
Method : CARB 435 California Resources Board method 435			Analysis Date : 11/30/2010
Prep Method :			Prep Date :
Analytes(s): *200009 Actinolite			A
*200006 Amosite			A
*200007 Anthophyllite			A
*200005 Chrysotile	10.8	%	
*200010 Crocidolite			A
*200124 Non-Asbestos			A
*200125 Other Fibrous Amphibole			A
*200008 Tremolite			A

Manchester Environmental Laboratory
Report by Parameter for Project ESD-122E

Project Code:	ESD-122E	Collected:	0:00:00
Project Name:	SUMAS MT/ SWIFT CREEK ASBESTOS	Matrix:	Solid
Project Officer:	ELLIE HALE	Sample Number:	FMB111710
Account Code:	11T10P302DD2C10EGLA00	Type:	Quailty Control
Station Description:			

	Result	Units	Qlfr
GEN			
Parameter : Bulk Asbestos Analysis			Container ID : N1
Method : CARB 435 California Resources Board method 435			Analysis Date : 11/30/2010
Prep Method :			Prep Date :
Analytes(s): *200009 Actinolite			A
*200006 Amosite			A
*200007 Anthophyllite			A
*200005 Chrysotile			A
*200010 Crocidolite			A
*200124 Non-Asbestos			PNQ
*200125 Other Fibrous Amphibole			A
*200008 Tremolite			A

APPENDIX C
SURFACE WATER SAMPLE DATA



Lab/Cor, Inc.

7619 6th Ave NW
Seattle, WA 98117

Analysis Report Cover
Final Report

A Professional Service Corporation in the Northwest

Phone: (206) 781-0155
Fax: (206) 789-8424
<http://www.labcor.net>

Job Number: 101090 SEA

Report Number: 101090R05

Client: EPA - Region 10

Report Date: 10/25/2010

**Address: 1200 Sixth Avenue
Suite 900, OWW-136
Seattle, WA 98101**

Project Name: Swift Creek / Sumas Mtn

Project No.: ESD - 122E

PO Number:

PWS ID:

Reference No.:

Report Note:

REVISED REPORT: This report is revised to show the modification made to the EPA 100.2 method. Sonication was not performed. Sonication has the potential to break up the complex structures composed mainly of chrysotile and creates a bias of higher fiber counts.

All the water samples in this set had many non-countable structures that were <10µm in length.

Enclosed please find results for samples submitted to our laboratory. A list of samples and analyses follows:

Lab/Cor Sample #	Client Sample # and Description	Analysis	Analysis Notes	Date Received:
101090 - S59	10344275 - Loc: 15 ('09)	EPA 100.1 - Non-Potable Water - WA		8/27/2010
101090 - S60	10344276 - Loc: 13 ('09)	EPA 100.1 - Non-Potable Water - WA	Some smaller Chrysotile structures present. Image 101090-S60-G13-Cluster-J7101BF, shows a cluster type structure. No individual structure can be determined to be >10µm.	8/27/2010
101090 - S61	10344277 - Loc: 1 ('10)	EPA 100.1 - Non-Potable Water - WA		8/27/2010
101090 - S62	10344278 - Loc: 3 ('10)	EPA 100.1 - Non-Potable Water - WA		8/27/2010
101090 - S63	10344284 - Loc: 3 ('10)	EPA 100.1 - Non-Potable Water - WA		8/27/2010
101090 - S64	10344279 - Loc: 2 ('10)	EPA 100.1 - Non-Potable Water - WA		8/27/2010
101090 - S65	10344280 - Loc: 7 ('09)	EPA 100.1 - Non-Potable Water - WA		8/27/2010
101090 - S66	10344281 - Loc: 5 ('09)	EPA 100.1 - Non-Potable Water - WA		8/27/2010
101090 - S67	10344283 - Grab Along River	EPA 100.1 - Non-Potable Water - WA		8/27/2010
101090 - S68	10344282 - Loc: 1 ('09)	EPA 100.1 - Non-Potable Water - WA		8/27/2010

Job Number: 101090 SEA

Client: EPA - Region 10

Report Number: 101090R05

Report Date: 10/25/2010

Project Name: Swift Creek / Sumas Mtn

EPA 100.1 - Non-Potable Water - WA
Preparation and analysis of the above samples was conducted in accordance with the EPA method #100.2. In this method, samples are taken from an affected water supply to measure the amount of asbestos contamination in the system. Samples received 48 hours after collection, or with a sample received temperature greater than 10°C, are subjected to ozone/UV treatment.

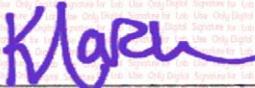
Each sample was shaken, and several aliquots were filtered onto 0.22 µm, 25 mm diameter mixed cellulose ester filters. Filters were etched lightly, air-dried, and carbon-coated at high vacuum with a thin layer of carbon, placed on 200 mesh copper TEM grids and allowed to dissolve in acetone until cleared of filter debris.

Each aliquot was examined at low magnification to determine the best particulate loading for analysis. Analysis was performed using a transmission electron microscope equipped with an EDS X ray analyzer. The samples were analyzed at an approximate screen magnification of 10,000x, with an accelerating voltage of 100 KV. Grid opening measurements were performed at a magnification of approximately 550X.

Disclaimer The results reported relate only to the samples tested or analyzed. Interpretation of these results is the sole responsibility of the client.

If further clarification of these results is needed, please call us. Thank you for allowing the staff at Lab/Cor, Inc. the opportunity to provide you with the analytical services.

Sincerely,



Kate March
Analyst

EPA 100.1 - Non-Potable Water - WA Summary Data

Job Number: 101090 SEA

Report Number: 101090R05

Client: EPA - Region 10

Date Received: 8/27/2010

Project Name: Swift Creek / Sumas Mtn

Lab/Cor Sample No.: S59
Client Sample No.: 10344275
Description: Loc: 15 ('09)
Filter Fraction: 1
Volume Taken: 3

Aliquot Dilution: 1
Final Dilution: 1

Sample Area/Mass/Volume (ml) : 800
Lab Filter Area (mm2) : 193
Grid Openings Analyzed : 20
Average Grid Opening Area : 0.009421
Area Analyzed (mm2) : 0.18842
Analytical Sens. (struc/MFL>10-um) : 0.341
Dectection Limit. (struc/MFL>10-um) : 1.021

Analyst(s) Analysis Date Microscope Magnification
KM 9/7/2010 JEOL 1200 EX 10000

Structure Type	Concentration MFL>10-um	95% Confidence Interval MFL>10-um	Structure Count ¹ Prim/Total
TEM Water Amphibole	0.341	0.009 - 1.902 - Poisson	1
TEM Water Chrysotile	1.366	0.372 - 3.497 - Poisson	4
TEM Water Total	1.707	0.554 - 3.984 - Poisson	5

Lab/Cor Sample No.: S60
Client Sample No.: 10344276
Description: Loc: 13 ('09)
Filter Fraction: 1
Volume Taken: 3

Aliquot Dilution: 1
Final Dilution: 1

Sample Area/Mass/Volume (ml) : 800
Lab Filter Area (mm2) : 193
Grid Openings Analyzed : 20
Average Grid Opening Area : 0.009421
Area Analyzed (mm2) : 0.18842
Analytical Sens. (struc/MFL>10-um) : 0.341
Dectection Limit. (struc/MFL>10-um) : 1.021

Analyst(s) Analysis Date Microscope Magnification
KM 9/7/2010 JEOL 1200 EX 10000

Structure Type	Concentration MFL>10-um	95% Confidence Interval MFL>10-um	Structure Count ¹ Prim/Total
TEM Water Amphibole	< 0.341	0 - 1.26 - Poisson	0
TEM Water Chrysotile	4.097	2.117 - 7.157 - Poisson	12
TEM Water Total	4.097	2.117 - 7.157 - Poisson	12

Lab/Cor Sample No.: S61
Client Sample No.: 10344277
Description: Loc: 1 ('10)
Filter Fraction: 1
Volume Taken: 3

Aliquot Dilution: 1
Final Dilution: 1

Sample Area/Mass/Volume (ml) : 800
Lab Filter Area (mm2) : 193
Grid Openings Analyzed : 20
Average Grid Opening Area : 0.009421
Area Analyzed (mm2) : 0.18842
Analytical Sens. (struc/MFL>10-um) : 0.341
Dectection Limit. (struc/MFL>10-um) : 1.021

Analyst(s) Analysis Date Microscope Magnification
KM 9/7/2010 JEOL 1200 EX 10000

Structure Type	Concentration MFL>10-um	95% Confidence Interval MFL>10-um	Structure Count ¹ Prim/Total
TEM Water Amphibole	< 0.341	0 - 1.26 - Poisson	0
TEM Water Chrysotile	4.439	2.363 - 7.59 - Poisson	13
TEM Water Total	4.439	2.363 - 7.59 - Poisson	13

* One-sided upper 95% Poisson confidence limits may be used to calculate sample concentrations ([Struc count] * [Analytical Sensitivity]) when the structure count is below 4. The limits are: 0 str - 0, 1 str - 1, 2 str - 2, 3 str - 3

EPA 100.1 - Non-Potable Water - WA Summary Data

Job Number: 101090 SEA

Report Number: 101090R05

Client: EPA - Region 10

Date Received: 8/27/2010

Project Name: Swift Creek / Sumas Mtn

Lab/Cor Sample No.: S62
Client Sample No.: 10344278
Description: Loc: 3 ('10)
Filter Fraction: 1
Volume Taken: 3

Aliquot Dilution: 1
Final Dilution: 1

Sample Area/Mass/Volume (ml) : 800
Lab Filter Area (mm2) : 193
Grid Openings Analyzed : 20
Average Grid Opening Area : 0.009421
Area Analyzed (mm2) : 0.18842
Analytical Sens. (struc/MFL>10-um) : 0.341
Dectection Limit. (struc/MFL>10-um) : 1.021

Analyst(s) Analysis Date Microscope Magnification
KM 9/7/2010 JEOL 1200 EX 10000

Structure Type	Concentration MFL>10-um	95% Confidence Interval MFL>10-um	Structure Count ¹ Prim/Total
TEM Water Amphibole	< 0.341	0 - 1.26 - Poisson	0
TEM Water Chrysotile	3.414	1.637 - 6.279 - Poisson	10
TEM Water Total	3.414	1.637 - 6.279 - Poisson	10

Lab/Cor Sample No.: S63
Client Sample No.: 10344284
Description: Loc: 3 ('10)
Filter Fraction: 1
Volume Taken: 3

Aliquot Dilution: 1
Final Dilution: 1

Sample Area/Mass/Volume (ml) : 800
Lab Filter Area (mm2) : 193
Grid Openings Analyzed : 20
Average Grid Opening Area : 0.009421
Area Analyzed (mm2) : 0.18842
Analytical Sens. (struc/MFL>10-um) : 0.341
Dectection Limit. (struc/MFL>10-um) : 1.021

Analyst(s) Analysis Date Microscope Magnification
KM 9/28/2010 JEOL 1200 EX 10000

Structure Type	Concentration MFL>10-um	95% Confidence Interval MFL>10-um	Structure Count ¹ Prim/Total
TEM Water Amphibole	< 0.341	0 - 1.26 - Poisson	0
TEM Water Chrysotile	1.366	0.372 - 3.497 - Poisson	4
TEM Water Total	1.366	0.372 - 3.497 - Poisson	4

Lab/Cor Sample No.: S64
Client Sample No.: 10344279
Description: Loc: 2 ('10)
Filter Fraction: 1
Volume Taken: 3

Aliquot Dilution: 1
Final Dilution: 1

Sample Area/Mass/Volume (ml) : 800
Lab Filter Area (mm2) : 193
Grid Openings Analyzed : 20
Average Grid Opening Area : 0.009421
Area Analyzed (mm2) : 0.18842
Analytical Sens. (struc/MFL>10-um) : 0.341
Dectection Limit. (struc/MFL>10-um) : 1.021

Analyst(s) Analysis Date Microscope Magnification
KM 9/28/2010 JEOL 1200 EX 10000

Structure Type	Concentration MFL>10-um	95% Confidence Interval MFL>10-um	Structure Count ¹ Prim/Total
TEM Water Amphibole	< 0.341	0 - 1.26 - Poisson	0
TEM Water Chrysotile	6.146	3.642 - 9.713 - Poisson	18
TEM Water Total	6.146	3.642 - 9.713 - Poisson	18

* One-sided upper 95% Poisson confidence limits may be used to calculate sample concentrations ([Struc count] * [Analytical Sensitivity]) when the structure count is below 4. The limits are: 0 str - 0, 1 str - 1, 2 str - 2, 3 str - 3

EPA 100.1 - Non-Potable Water - WA Summary Data

Job Number: 101090 SEA

Report Number: 101090R05

Client: EPA - Region 10

Date Received: 8/27/2010

Project Name: Swift Creek / Sumas Mtn

Lab/Cor Sample No.: S65
 Client Sample No.: 10344280
 Description: Loc: 7 ('09)
 Filter Fraction: 1
 Volume Taken: 3

Aliquot Dilution: 1
 Final Dilution: 1

Sample Area/Mass/Volume (ml) : 800
 Lab Filter Area (mm2) : 193
 Grid Openings Analyzed : 20
 Average Grid Opening Area : 0.009421
 Area Analyzed (mm2) : 0.18842
 Analytical Sens. (struc/MFL>10-um) : 0.341
 Detection Limit. (struc/MFL>10-um) : 1.021

Analyst(s) Analysis Date Microscope Magnification
 KM 9/28/2010 JEOL 1200 EX 10000

Structure Type	Concentration MFL>10-um	95% Confidence Interval MFL>10-um	Structure Count ¹ Prim/Total
TEM Water Amphibole	0.341	0.009 - 1.902 - Poisson	1
TEM Water Chrysotile	8.194	5.251 - 12.193 - Poisson	24
TEM Water Total	8.536	5.524 - 12.601 - Poisson	25

Lab/Cor Sample No.: S66
 Client Sample No.: 10344281
 Description: Loc: 5 ('09)
 Filter Fraction: 1
 Volume Taken: 1

Aliquot Dilution: 1
 Final Dilution: 1

Sample Area/Mass/Volume (ml) : 800
 Lab Filter Area (mm2) : 193
 Grid Openings Analyzed : 20
 Average Grid Opening Area : 0.009421
 Area Analyzed (mm2) : 0.18842
 Analytical Sens. (struc/MFL>10-um) : 1.024
 Detection Limit. (struc/MFL>10-um) : 3.063

Analyst(s) Analysis Date Microscope Magnification
 KM 8/30/2010 JEOL 1200 EX 10000
 KM 8/31/2010

Structure Type	Concentration MFL>10-um	95% Confidence Interval MFL>10-um	Structure Count ¹ Prim/Total
TEM Water Amphibole	< 1.024	0 - 3.779 - Poisson	0
TEM Water Chrysotile	3.073	0.634 - 8.98 - Poisson	3
TEM Water Total	3.073	0.634 - 8.98 - Poisson	3

* One-sided upper 95% Poisson confidence limits may be used to calculate sample concentrations ([Struc count] * [Analytical Sensitivity]) when the structure count is below 4. The limits are: 0 str - 0, 1 str - 1, 2 str - 2, 3 str - 3

EPA 100.1 - Non-Potable Water - WA Summary Data

Job Number: 101090 SEA Report Number: 101090R05
Client: EPA - Region 10 Date Received: 8/27/2010
Project Name: Swift Creek / Sumas Mtn

Lab/Cor Sample No.: S67 Sample Area/Mass/Volume (ml) : 800
Client Sample No.: 10344283 Lab Filter Area (mm2) : 193
Description: Grab Along River Grid Openings Analyzed : 4
Filter Fraction: 1 Aliquot Dilution: 1 Average Grid Opening Area : 0.009421
Volume Taken: 40 Final Dilution: 1 Area Analyzed (mm2) : 0.037684
Analytical Sens. (struc/MFL>10-um) : 0.128
Dectection Limit. (struc/MFL>10-um) : 0.383

Analyst(s) Analysis Date Microscope Magnification
KM 8/30/2010 JEOL 1200 EX 10000

Structure Type	Concentration MFL>10-um	95% Confidence Interval MFL>10-um	Structure Count' Prim/Total
TEM Water Amphibole	< 0.128	0 - 0.472 - Poisson	0
TEM Water Chrysotile	< 0.128	0 - 0.472 - Poisson	0
TEM Water Total	< 0.128	0 - 0.472 - Poisson	0

Lab/Cor Sample No.: S68 Sample Area/Mass/Volume (ml) : 800
Client Sample No.: 10344282 Lab Filter Area (mm2) : 193
Description: Loc: 1 ('09) Grid Openings Analyzed : 20
Filter Fraction: 1 Aliquot Dilution: 1 Average Grid Opening Area : 0.009421
Volume Taken: 1 Final Dilution: 1 Area Analyzed (mm2) : 0.18842
Analytical Sens. (struc/MFL>10-um) : 1.024
Dectection Limit. (struc/MFL>10-um) : 3.063

Analyst(s) Analysis Date Microscope Magnification
KM 8/31/2010 JEOL 1200 EX 10000

Structure Type	Concentration MFL>10-um	95% Confidence Interval MFL>10-um	Structure Count' Prim/Total
TEM Water Amphibole	< 1.024	0 - 3.779 - Poisson	0
TEM Water Chrysotile	< 1.024	0 - 3.779 - Poisson	0
TEM Water Total	< 1.024	0 - 3.779 - Poisson	0

Reviewed by:

Kate March
X **Kate March**
Analyst

* One-sided upper 95% Poisson confidence limits may be used to calculate sample concentrations ([Struc count] * [Analytical Sensitivity]) when the structure count is below 4. The limits are: 0 str - 0, 1 str - 1, 2 str - 2, 3 str - 3

EPA 100.1 - Non-Potable Water - WA Raw Data

Job Number: 101090 **SEA**
Client: EPA - Region 10
Project Name: Swift Creek / Sumas Mtn
Project No.: ESD - 122E

Report Number: 101090R05
Date Received: 8/27/2010

Lab/Cor Sample No: S59
Client Sample No: 10344275
Description: Loc: 15 ('09)

Analyst(s) **Analysis Date** **Microscope** **Magnification**
KM 9/7/2010 JEOL 1200 EX 10000

Gr	No.	Loc.	ID	Prim	Tot	Class	Length	Width	Aspect	Analyte	Elements	Comment	Count Categories
G13	1	C34				NSD							
G13	2	E33				NSD							
G13	3	E42				NSD							
G13	4	F41				NSD							
G13	5	C44				NSD							
G13	6	E43				NSD							
G13	7	E52				NSD							
G13	8	F51				NSD							
G14	9	C34				NSD							
G14	10	E33				NSD							
G14	11	E42				NSD							
G14	12	F41	CDQ	1		Fiber	14.8	0.12	123.3	Chrysotile	Mg, Si		WATER_Total, WATER_Chrys
						ItemType	ItemNum		Confirmed		Comment		
						Brightfield	J7113BF						
						Diffraction	J7113DF		KM 9/7/2010		0.53nm ROW SPACING		
						Spectra	J7113SP		KM 9/7/2010				
G14	13	C44				NSD							
G14	14	E43				NSD							
G15	15	C34	CD	2		Fiber	12.2	0.11	110.9	Chrysotile			WATER_Total, WATER_Chrys
						ItemType	ItemNum		Confirmed		Comment		
						Brightfield	J7114BF				Matrix		
G15	16	E33				NSD							
G15	17	E42	CD	3		Fiber	11.5	0.45	25.6	Chrysotile			WATER_Total, WATER_Chrys
						ItemType	ItemNum		Confirmed		Comment		
						Brightfield	J7115BF				Bundle		
G15	18	F41				NSD							
G15	19	C44	CD	4		Fiber	12.2	0.1	122	Chrysotile			WATER_Total, WATER_Chrys
						ItemType	ItemNum		Confirmed		Comment		
						Brightfield	J7116BF						
G15	20	E43	AZQ	5		Fiber	12.6	1.9	6.6	Actinolite	Mg, Si, Ca, Fe		WATER_Total, Water_Amph
						ItemType	ItemNum		Confirmed		Comment		
						Brightfield	J7117BF						
						Diffraction	J7117DF		KM 9/7/2010		ZONE AXIS [1 0 0]		
						Spectra	J7117SP		KM 9/7/2010				

EPA 100.1 - Non-Potable Water - WA Raw Data

Job Number: 101090 **SEA**
Client: EPA - Region 10
Project Name: Swift Creek / Sumas Mtn
Project No.: ESD - 122E

Report Number: 101090R05
Date Received: 8/27/2010

Lab/Cor Sample No: S60
Client Sample No: 10344276
Description: Loc: 13 ('09)

Analyst(s) **Analysis Date** **Microscope** **Magnification**
KM 9/7/2010 JEOL 1200 EX 10000

Gr	No.	Loc.	ID	Prim	Tot	Class	Length	Width	Aspect	Analyte	Elements	Comment	Count Categories
G13	1	C34				NSD							
G13	2	E33	CDQ	1		Fiber	10.7	0.1	107	Chrysotile	Mg, Si		WATER_Total, WATER_Chrys
						ItemType						Confirmed	Comment
						Brightfield							
						Diffraction						KM 9/7/2010	0.53nm ROW SPACING
						Spectra						KM 9/7/2010	
G13	3	E42				NSD							
G13	4	F41				NSD							
G13	5	C52	CD	2		Fiber	11.4	0.22	51.8	Chrysotile			WATER_Total, WATER_Chrys
						ItemType						Confirmed	Comment
						Brightfield							
G13	6	E51				NSD							
G13	7	E52	CD	3		Fiber	11.5	0.18	63.9	Chrysotile			WATER_Total, WATER_Chrys
						ItemType						Confirmed	Comment
						Brightfield							
G13	7	E52	CD	4		Fiber	11	0.11	100	Chrysotile			WATER_Total, WATER_Chrys
						ItemType						Confirmed	Comment
						Brightfield							
G14	8	C34	CD	5		Fiber	11.2	0.15	74.7	Chrysotile			WATER_Total, WATER_Chrys
						ItemType						Confirmed	Comment
						Brightfield							
G14	9	E33	CD	6		Fiber	11.6	0.11	105.5	Chrysotile			WATER_Total, WATER_Chrys
G14	10	E42	CD	7		Fiber	11.3	0.8	14.1	Chrysotile			WATER_Total, WATER_Chrys
						ItemType						Confirmed	Comment
						Brightfield							Bundle
G14	11	F41	CD	8		Fiber	10.1	0.15	67.3	Chrysotile			WATER_Total, WATER_Chrys
						ItemType						Confirmed	Comment
						Brightfield							
G14	12	C44	CD	9		Fiber	23.5	0.12	195.8	Chrysotile			WATER_Total, WATER_Chrys
						ItemType						Confirmed	Comment
						Brightfield							
G14	13	E43				NSD							
G14	14	E52				NSD							

EPA 100.1 - Non-Potable Water - WA Raw Data

Job Number: 101090 **SEA**
Client: EPA - Region 10
Project Name: Swift Creek / Sumas Mtn
Project No.: ESD - 122E

Report Number: 101090R05
Date Received: 8/27/2010

Lab/Cor Sample No: S60

Client Sample No: 10344276

Description: Loc: 13 ('09)

Analyst(s) **Analysis Date** **Microscope** **Magnification**
 KM 9/7/2010 JEOL 1200 EX 10000

Gr	No.	Loc.	ID	Prim	Tot	Class	Length	Width	Aspect	Analyte	Elements	Comment	Count Categories
G15	15	C44				NSD							
G15	16	E43				NSD							
G15	17	E52	CD	10		Fiber	20.8	0.35	59.4	Chrysotile			WATER_Total, WATER_Chrys
						ItemType	ItemNum				Confirmed	Comment	
						Brightfield	J7110BF					Bundle	
G15	18	F51	CD	11		Fiber	14	0.11	127.3	Chrysotile			WATER_Total, WATER_Chrys
						ItemType	ItemNum				Confirmed	Comment	
						Brightfield	J7111BF						
G15	19	G51	CD	12		Fiber	10.1	0.11	91.8	Chrysotile			WATER_Total, WATER_Chrys
						ItemType	ItemNum				Confirmed	Comment	
						Brightfield	J7112BF					Matrix	
G15	20	G44				NSD							

EPA 100.1 - Non-Potable Water - WA Raw Data

Job Number: 101090 **SEA**
Client: EPA - Region 10
Project Name: Swift Creek / Sumas Mtn
Project No.: ESD - 122E

Report Number: 101090R05
Date Received: 8/27/2010

Lab/Cor Sample No: S61
Client Sample No: 10344277
Description: Loc: 1 ('10)

Analyst(s) **Analysis Date** **Microscope** **Magnification**
 KM 9/7/2010 JEOL 1200 EX 10000

Gr	No.	Loc.	ID	Prim	Tot	Class	Length	Width	Aspect	Analyte	Elements	Comment	Count Categories
G13	1	C34				NSD							
G13	2	E33				NSD							
G13	3	E42	CDQ	1		Fiber	14.2	0.12	118.3	Chrysotile	Mg, Si		WATER_Total, WATER_Chrys
						ItemType	ItemNum				Confirmed	Comment	
						Brightfield	J7118BF						
						Diffraction	J7118DF				KM 9/7/2010	0.53nm ROW SPACING	
						Spectra	J7118SP				KM 9/7/2010		
G13	4	C44				NSD							
G13	5	E43	CD	2		Fiber	10.8	0.3	36	Chrysotile			WATER_Total, WATER_Chrys
						ItemType	ItemNum				Confirmed	Comment	
						Brightfield	J7119BF					Bundle	
G13	6	E52	CD	3		Fiber	20.8	0.55	37.8	Chrysotile			WATER_Total, WATER_Chrys
						ItemType	ItemNum				Confirmed	Comment	
						Brightfield	J7120BF					Bundle	
G13	6	E52	CD	4		Fiber	11.8	0.11	107.3	Chrysotile			WATER_Total, WATER_Chrys
						ItemType	ItemNum				Confirmed	Comment	
						Brightfield	J7121BF						
G13	7	F51	CD	5		Fiber	16.5	0.11	150	Chrysotile			WATER_Total, WATER_Chrys
						ItemType	ItemNum				Confirmed	Comment	
						Brightfield	J7122BF						
G14	8	E41				NSD							
G14	9	E42	CD	6		Fiber	11.2	0.68	16.5	Chrysotile			WATER_Total, WATER_Chrys
						ItemType	ItemNum				Confirmed	Comment	
						Brightfield	J7123BF					Bundle	
G14	10	C43				NSD							
G14	11	E43	CD	7		Fiber	10.7	0.12	89.2	Chrysotile			WATER_Total, WATER_Chrys
						ItemType	ItemNum				Confirmed	Comment	
						Brightfield	J7124BF						
G14	12	E52				NSD							
G14	13	F51	CD	8		Fiber	11	0.15	73.3	Chrysotile			WATER_Total, WATER_Chrys
						ItemType	ItemNum				Confirmed	Comment	
						Brightfield	J7125BF						

EPA 100.1 - Non-Potable Water - WA Raw Data

Job Number: 101090 **SEA**
Client: EPA - Region 10
Project Name: Swift Creek / Sumas Mtn
Project No.: ESD - 122E

Report Number: 101090R05
Date Received: 8/27/2010

Lab/Cor Sample No: S61
Client Sample No: 10344277
Description: Loc: 1 ('10)

Analyst(s) **Analysis Date** **Microscope** **Magnification**
 KM 9/7/2010 JEOL 1200 EX 10000

Gr	No.	Loc.	ID	Prim	Tot	Class	Length	Width	Aspect	Analyte	Elements	Comment	Count Categories
G14	14	F52	CD	9		Fiber	10.3	0.1	103	Chrysotile			WATER_Total, WATER_Chrys
						ItemType						Confirmed	Comment
						Brightfield							
G15	15	C34	CD	10		Fiber	10.6	0.1	106	Chrysotile			WATER_Total, WATER_Chrys
						ItemType						Confirmed	Comment
						Brightfield							
G15	16	E33	CD	11		Fiber	11.5	0.1	115	Chrysotile			WATER_Total, WATER_Chrys
						ItemType						Confirmed	Comment
						Brightfield							
G15	16	E33	CD	12		Fiber	18	0.1	180	Chrysotile			WATER_Total, WATER_Chrys
						ItemType						Confirmed	Comment
						Brightfield							
G15	17	E42				NSD							
G15	18	F41	CD	13		Fiber	15.8	0.11	143.6	Chrysotile			WATER_Total, WATER_Chrys
						ItemType						Confirmed	Comment
						Brightfield							
G15	19	E43				NSD							
G15	20	F43				NSD							

EPA 100.1 - Non-Potable Water - WA Raw Data

Job Number: 101090 **SEA**
Client: EPA - Region 10
Project Name: Swift Creek / Sumas Mtn
Project No.: ESD - 122E

Report Number: 101090R05
Date Received: 8/27/2010

Lab/Cor Sample No: S62
Client Sample No: 10344278
Description: Loc: 3 ('10)

Analyst(s) **Analysis Date** **Microscope** **Magnification**
KM 9/7/2010 JEOL 1200 EX 10000

Gr	No.	Loc.	ID	Prim	Tot	Class	Length	Width	Aspect	Analyte	Elements	Comment	Count Categories
G13	1	C34				NSD							
G13	2	E33				NSD							
G13	3	E42				NSD							
G13	4	F41				NSD							
G13	5	C44				NSD							
G13	6	E43				NSD							
G13	7	E52				NSD							
G14	8	C34	CDQ	1		Fiber	12	0.15	80	Chrysotile		No EDS, fiber tilts into grid bar	WATER_Total, WATER_Chrys
						ItemType						Confirmed	Comment
						Brightfield							J7131BF
						Diffraction						KM 9/7/2010	0.53nm ROW SPACING
G14	9	E33				NSD							
G14	10	E42	CD	2		Fiber	11.1	0.1	111	Chrysotile			WATER_Total, WATER_Chrys
						ItemType						Confirmed	Comment
						Brightfield							J7132BF
G14	11	F41				NSD							
G14	12	C43	CD	3		Fiber	10.2	0.11	92.7	Chrysotile			WATER_Total, WATER_Chrys
						ItemType						Confirmed	Comment
						Brightfield							J7133BF
G14	13	E44				NSD							
G14	14	F43				NSD							
G15	15	C34				NSD							
G15	16	E33	CD	4		Fiber	10.2	0.11	92.7	Chrysotile			WATER_Total, WATER_Chrys
						ItemType						Confirmed	Comment
						Brightfield							J7134BF
G15	16	E33	CD	5		Fiber	13.5	0.1	135	Chrysotile			WATER_Total, WATER_Chrys
						ItemType						Confirmed	Comment
						Brightfield							J7135BF
G15	16	E33	CD	6		Fiber	18	0.1	180	Chrysotile			WATER_Total, WATER_Chrys
						ItemType						Confirmed	Comment
						Brightfield							J7136BF Matrix
G15	17	E42	CD	7		Fiber	11	0.08	137.5	Chrysotile			WATER_Total, WATER_Chrys

EPA 100.1 - Non-Potable Water - WA Raw Data

Job Number: 101090 **SEA**
Client: EPA - Region 10
Project Name: Swift Creek / Sumas Mtn
Project No.: ESD - 122E

Report Number: 101090R05
Date Received: 8/27/2010

Lab/Cor Sample No: S62

Client Sample No: 10344278

Description: Loc: 3 ('10)

Analyst(s) **Analysis Date** **Microscope** **Magnification**
 KM 9/7/2010 JEOL 1200 EX 10000

Gr	No.	Loc.	ID	Prim	Tot	Class	Length	Width	Aspect	Analyte	Elements	Comment	Count Categories
G15	17	E42	CD	8		Fiber	12.5	0.1	125	Chrysotile			WATER_Total, WATER_Chrys
						ItemType						Confirmed	Comment
						Brightfield							Matrix
G15	18	F41				NSD							
G15	19	C44	CD	9		Fiber	11.6	0.1	116	Chrysotile			WATER_Total, WATER_Chrys
						ItemType						Confirmed	Comment
						Brightfield							
G15	20	E44	CD	10		Fiber	10.3	0.11	93.6	Chrysotile			WATER_Total, WATER_Chrys
						ItemType						Confirmed	Comment
						Brightfield							

EPA 100.1 - Non-Potable Water - WA Raw Data

Job Number: 101090 **SEA**
Client: EPA - Region 10
Project Name: Swift Creek / Sumas Mtn
Project No.: ESD - 122E

Report Number: 101090R05
Date Received: 8/27/2010

Lab/Cor Sample No: S63
Client Sample No: 10344284
Description: Loc: 3 ('10)

Analyst(s) **Analysis Date** **Microscope** **Magnification**
 KM 9/28/2010 JEOL 1200 EX 10000

Gr	No.	Loc.	ID	Prim	Tot	Class	Length	Width	Aspect	Analyte	Elements	Comment	Count Categories
G9	1	F43	CDQ	1		Fiber	10.55	0.7	15.1	Chrysotile	Mg, Si		WATER_Total, WATER_Chrys
						ItemType	ItemNum		Confirmed		Comment		
						Brightfield	J8191BF		KM		10/25/2010		
						Diffraction	J8191DF		KM		10/15/2010 0.53nm ROW SPACING		
						Spectra	J8191SP		KM		10/15/2010		
G9	2	G43	CD	2		Fiber	26.2	1.2	21.8	Chrysotile			WATER_Total, WATER_Chrys
						ItemType	ItemNum		Confirmed		Comment		
						Brightfield	J8192BF						
G9	3	H43				NSD							
G9	4	C51				NSD							
G9	5	E51				NSD							
G9	6	G51				NSD							
G9	7	H51				NSD							
G10	8	C42	CD	3		Fiber	10.7	0.1	107	Chrysotile			WATER_Total, WATER_Chrys
						ItemType	ItemNum		Confirmed		Comment		
						Brightfield	J8193BF						
G10	9	E42				NSD							
G10	10	G42				NSD							
G10	11	H42				NSD							
G10	12	E52				NSD							
G10	13	F52				NSD							
G10	14	G53				NSD							
G11	15	C42				NSD							
G11	16	E42				NSD							
G11	17	G41	CD	4		Fiber	16	0.08	200	Chrysotile			WATER_Total, WATER_Chrys
						ItemType	ItemNum		Confirmed		Comment		
						Brightfield	J8194BF						
G11	18	H42				NSD							
G11	19	E43				NSD							
G11	20	F44				NSD							

EPA 100.1 - Non-Potable Water - WA Raw Data

Job Number: 101090 **SEA**
Client: EPA - Region 10
Project Name: Swift Creek / Sumas Mtn
Project No.: ESD - 122E

Report Number: 101090R05
Date Received: 8/27/2010

Lab/Cor Sample No: S64
Client Sample No: 10344279
Description: Loc: 2 ('10)

Analyst(s) **Analysis Date** **Microscope** **Magnification**
KM 9/28/2010 JEOL 1200 EX 10000

Gr	No.	Loc.	ID	Prim	Tot	Class	Length	Width	Aspect	Analyte	Elements	Comment	Count Categories
G13	1	E32	CD	1		Fiber	10.35	0.1	103.5	Chrysotile			WATER_Total, WATER_Chrys
						ItemType						Confirmed	Comment
						Brightfield							Matrix
G13	2	G31	CD	2		Fiber	11.2	0.1	112	Chrysotile			WATER_Total, WATER_Chrys
						ItemType						Confirmed	Comment
						Brightfield							J8197BF
G13	2	G31	CDQ	3		Fiber	12.5	0.9	13.9	Chrysotile			WATER_Total, WATER_Chrys
						ItemType						Confirmed	Comment
						Brightfield							Bundle
						Diffraction					KM	10/15/2010	0.53nm ROW SPACING
						Spectra					KM	10/15/2010	
G13	3	E34	CD	4		Fiber	10.2	0.1	102	Chrysotile			WATER_Total, WATER_Chrys
						ItemType						Confirmed	Comment
						Brightfield							J8199BF
G13	4	F34				NSD							
G13	5	F52				NSD							
G13	6	G52	CD	5		Fiber	19.5	0.1	195	Chrysotile			WATER_Total, WATER_Chrys
						ItemType						Confirmed	Comment
						Brightfield							J8200BF
G13	6	G52	CD	6		Fiber	11.2	0.1	112	Chrysotile			WATER_Total, WATER_Chrys
						ItemType						Confirmed	Comment
						Brightfield							J8202BF
G13	6	G52	CD	7		Fiber	10.7	1	10.7	Chrysotile			WATER_Total, WATER_Chrys
						ItemType						Confirmed	Comment
						Brightfield							J8203BF
G13	7	H52	CD	8		Fiber	16	0.1	160	Chrysotile			WATER_Total, WATER_Chrys
						ItemType						Confirmed	Comment
						Brightfield							J8205BF
G14	8	C41				NSD							
G14	9	E41	CD	9		Fiber	24.2	0.11	220	Chrysotile			WATER_Total, WATER_Chrys
						ItemType						Confirmed	Comment
						Brightfield							J8206BF
													Matrix

EPA 100.1 - Non-Potable Water - WA Raw Data

Job Number: 101090 **SEA**
Client: EPA - Region 10
Project Name: Swift Creek / Sumas Mtn
Project No.: ESD - 122E

Report Number: 101090R05
Date Received: 8/27/2010

Lab/Cor Sample No: S64
Client Sample No: 10344279
Description: Loc: 2 ('10)

Analyst(s) **Analysis Date** **Microscope** **Magnification**
 KM 9/28/2010 JEOL 1200 EX 10000

Gr	No.	Loc.	ID	Prim	Tot	Class	Length	Width	Aspect	Analyte	Elements	Comment	Count Categories
G14	9	E41	CD		10	Fiber	12.5	0.1	125	Chrysotile			WATER_Total, WATER_Chrys
						ItemType						Confirmed	Comment
						Brightfield							J8207BF
G14	10	F41				NSD							
G14	11	G41				NSD							
G14	12	C51	CD		11	Fiber	10.7	0.12	89.2	Chrysotile			WATER_Total, WATER_Chrys
						ItemType						Confirmed	Comment
						Brightfield							J8208BF Matrix
G14	12	C51	CD		12	Fiber	22.6	0.45	50.2	Chrysotile			WATER_Total, WATER_Chrys
						ItemType						Confirmed	Comment
						Brightfield							J8209BF Matrix
G14	13	E52				NSD							
G14	14	F52	CD		13	Fiber	15.4	0.11	140	Chrysotile			WATER_Total, WATER_Chrys
						ItemType						Confirmed	Comment
						Brightfield							J8210BF
G15	15	C42				NSD							
G15	16	E42				NSD							
G15	17	F42	CD		14	Fiber	10.1	0.1	101	Chrysotile			WATER_Total, WATER_Chrys
						ItemType						Confirmed	Comment
						Brightfield							J8211BF
G15	18	G42	CD		15	Fiber	11	0.1	110	Chrysotile			WATER_Total, WATER_Chrys
						ItemType						Confirmed	Comment
						Brightfield							J8213BF
G15	19	C51	CD		16	Fiber	11	0.4	27.5	Chrysotile			WATER_Total, WATER_Chrys
						ItemType						Confirmed	Comment
						Brightfield							J8214BF Bundle
G15	20	E51	CD		17	Fiber	19	0.12	158.3	Chrysotile			WATER_Total, WATER_Chrys
						ItemType						Confirmed	Comment
						Brightfield							J8215BF
G15	20	E51	CD		18	Fiber	11.25	0.11	102.3	Chrysotile			WATER_Total, WATER_Chrys
						ItemType						Confirmed	Comment
						Brightfield							J8216BF

EPA 100.1 - Non-Potable Water - WA Raw Data

Job Number: 101090 **SEA**
Client: EPA - Region 10
Project Name: Swift Creek / Sumas Mtn
Project No.: ESD - 122E

Report Number: 101090R05
Date Received: 8/27/2010

Lab/Cor Sample No: S65
Client Sample No: 10344280
Description: Loc: 7 ('09)

Analyst(s) **Analysis Date** **Microscope** **Magnification**
KM 9/28/2010 JEOL 1200 EX 10000

Gr	No.	Loc.	ID	Prim	Tot	Class	Length	Width	Aspect	Analyte	Elements	Comment	Count Categories
G13	1	E33	CDQ	1		Fiber	10.3	0.1	103	Chrysotile	Mg, Si		WATER_Total, WATER_Chrys
						ItemType	ItemNum		Confirmed		Comment		
						Brightfield	J8217BF						
						Diffraction	J8217DF		KM 9/28/2010		0.53nm ROW SPACING		
						Spectra	J8217SP		KM 9/28/2010				
G13	2	F33	CM	2		Fiber	12	0.11	109.1	Chrysotile			WATER_Total, WATER_Chrys
						ItemType	ItemNum		Confirmed		Comment		
						Brightfield	J8218BF						
G13	2	F33	CD	3		Fiber	17	0.4	42.5	Chrysotile		The following structures are part of this matrix.	WATER_Total, WATER_Chrys
						ItemType	ItemNum		Confirmed		Comment		
						Brightfield	J8219BF				Bundle		
G13	2	F33	CD	4		Fiber	16.5	0.12	137.5	Chrysotile		See previous image	WATER_Total, WATER_Chrys
G13	2	F33	CD	5		Fiber	16	0.11	145.5	Chrysotile		See previous image	WATER_Total, WATER_Chrys
G13	2	F33	CD	6		Fiber	40	0.65	61.5	Chrysotile	Bundle	See previous image	WATER_Chrys, WATER_Total
G13	2	F33	CM	7		Fiber	12.7	0.11	115.5	Chrysotile		See previous image	WATER_Total, WATER_Chrys
G13	2	F33	CM	8		Fiber	36	0.12	300	Chrysotile		See previous image	WATER_Total, WATER_Chrys
G13	3	C41	CD	9		Fiber	11.5	0.1	115	Chrysotile			WATER_Chrys, WATER_Total
						ItemType	ItemNum		Confirmed		Comment		
						Brightfield	J8220BF				Matrix		
G13	4	E41				NSD							
G13	5	G42				NSD							
G13	6	H42	CD	10		Fiber	32	0.1	320	Chrysotile			WATER_Total, WATER_Chrys
						ItemType	ItemNum		Confirmed		Comment		
						Brightfield	J8221BF						
G13	7	F43				NSD							
G14	8	C52	AZQ	11		Fiber	10.3	0.85	12.1	Actinolite	Mg, Al, Si, Ca, Fe		WATER_Total, Water_Amph
						ItemType	ItemNum		Confirmed		Comment		
						Brightfield	J8222BF						
						Diffraction	J8222DF		KM 9/28/2010		ZONE AXIS [3 1 4]		
						Spectra	J8222SP		KM 9/28/2010				

EPA 100.1 - Non-Potable Water - WA Raw Data

Job Number: 101090 **SEA**
Client: EPA - Region 10
Project Name: Swift Creek / Sumas Mtn
Project No.: ESD - 122E

Report Number: 101090R05
Date Received: 8/27/2010

Lab/Cor Sample No: S65
Client Sample No: 10344280
Description: Loc: 7 ('09)

Analyst(s) **Analysis Date** **Microscope** **Magnification**
KM 9/28/2010 JEOL 1200 EX 10000

Gr	No.	Loc.	ID	Prim	Tot	Class	Length	Width	Aspect	Analyte	Elements	Comment	Count Categories
G14	8	C52	CD	12		Fiber	11.3	0.1	113	Chrysotile			WATER_Chrys, WATER_Total
						ItemType						Confirmed	Comment
						Brightfield							Matrix
G14	9	F51	CD	13		Fiber	23.3	1.2	19.4	Chrysotile			WATER_Total, WATER_Chrys
						ItemType						Confirmed	Comment
						Brightfield							Bundle
G14	10	G51				NSD							
G14	11	H51	CM	14		Fiber	12.8	0.1	128	Chrysotile			WATER_Total, WATER_Chrys
						ItemType						Confirmed	Comment
						Brightfield							
G14	11	H51	CD	15		Fiber	13.5	0.11	122.7	Chrysotile			WATER_Total, WATER_Chrys
						ItemType						Confirmed	Comment
						Brightfield							
G14	12	G43				NSD							
G14	13	C42	CD	16		Fiber	12.1	0.13	93.1	Chrysotile			WATER_Total, WATER_Chrys
						ItemType						Confirmed	Comment
						Brightfield							Matrix
G14	14	E42	CD	17		Fiber	14.5	0.1	145	Chrysotile		Matrix	WATER_Total, WATER_Chrys
G15	15	E42				NSD							
G15	16	F42	CD	18		Fiber	10.8	0.13	83.1	Chrysotile			WATER_Total, WATER_Chrys
						ItemType						Confirmed	Comment
						Brightfield							Matrix
G15	16	F42	CD	19		Fiber	10.7	0.14	76.4	Chrysotile			WATER_Total, WATER_Chrys
						ItemType						Confirmed	Comment
						Brightfield							Matrix
G15	17	G42	CD	20		Fiber	11.5	0.11	104.5	Chrysotile			WATER_Total, WATER_Chrys
						ItemType						Confirmed	Comment
						Brightfield							
G15	18	H42				NSD							
G15	19	G33	CD	21		Fiber	16.2	0.4	40.5	Chrysotile			WATER_Total, WATER_Chrys
						ItemType						Confirmed	Comment
						Brightfield							Bundle

EPA 100.1 - Non-Potable Water - WA Raw Data

Job Number: 101090 **SEA**
Client: EPA - Region 10
Project Name: Swift Creek / Sumas Mtn
Project No.: ESD - 122E

Report Number: 101090R05
Date Received: 8/27/2010

Lab/Cor Sample No: S65
Client Sample No: 10344280
Description: Loc: 7 ('09)

Analyst(s) **Analysis Date** **Microscope** **Magnification**
 KM 9/28/2010 JEOL 1200 EX 10000

Gr	No.	Loc.	ID	Prim	Tot	Class	Length	Width	Aspect	Analyte	Elements	Comment	Count Categories
G15	19	G33	CD	22		Fiber	28	0.1	280	Chrysotile			WATER_Total, WATER_Chrys
						ItemType	ItemNum				Confirmed	Comment	
						Brightfield	J8233BF						
G15	19	G33	CD	23		Fiber	16.2	0.2	81	Chrysotile		Bundle	WATER_Total, WATER_Chrys
G15	19	G33	CM	24		Fiber	13	3.3	3.9	Chrysotile			WATER_Total, WATER_Chrys
						ItemType	ItemNum				Confirmed	Comment	
						Brightfield	J8234BF					Bundle	
G15	20	H33	CD	25		Fiber	33	0.1	330	Chrysotile			WATER_Total, WATER_Chrys
						ItemType	ItemNum				Confirmed	Comment	
						Brightfield	J8235BF					Matrix	

EPA 100.1 - Non-Potable Water - WA Raw Data

Job Number: 101090 **SEA**
Client: EPA - Region 10
Project Name: Swift Creek / Sumas Mtn
Project No.: ESD - 122E

Report Number: 101090R05
Date Received: 8/27/2010

Lab/Cor Sample No: S66
Client Sample No: 10344281
Description: Loc: 5 ('09)

Analyst(s)	Analysis Date	Microscope	Magnification
KM	8/30/2010	JEOL 1200 EX	10000
KM	8/31/2010		

Gr	No.	Loc.	ID	Prim	Tot	Class	Length	Width	Aspect	Analyte	Elements	Comment	Count Categories
G5	1	E33				NSD							
G5	2	E42	CDQ	1		Fiber	16.25	0.11	147.7	Chrysotile	Mg, Si		WATER_Total, WATER_Chrys
						ItemType	ItemNum		Confirmed	Comment			
						Brightfield	J7020BF						
						Diffraction Spectra	J7020DF J7020SP			KM	8/30/2010	0.53nm ROW SPACING	
										KM	8/30/2010		
G5	3	F41				NSD							
G5	4	G41				NSD							
G5	5	C44				NSD							
G5	6	E43				NSD							
G5	7	G51	CD	2		Fiber	19.2	0.3	64	Chrysotile			WATER_Total, WATER_Chrys
						ItemType	ItemNum		Confirmed	Comment			
						Brightfield	J7021BF						
G5	8	G44				NSD							
G6	9	C34				NSD							
G6	10	E33				NSD							
G6	11	E42				NSD							
G6	12	F41				NSD							
G6	13	E44				NSD							
G6	14	F43				NSD							
G7	15	E34				NSD							
G7	16	F33	CM	3		Fiber	10.9	0.11	99.1	Chrysotile			WATER_Total, WATER_Chrys
						ItemType	ItemNum		Confirmed	Comment			
						Brightfield	J7023BF						
G7	17	F42				NSD							
G7	18	E43				NSD							
G7	19	F43				NSD							
G7	20	G51				NSD							

EPA 100.1 - Non-Potable Water - WA Raw Data

Job Number: 101090 **SEA**

Report Number: 101090R05

Client: EPA - Region 10

Date Received: 8/27/2010

Project Name: Swift Creek / Sumas Mtn

Project No.: ESD - 122E

Lab/Cor Sample No: S67

Client Sample No: 10344283

Analyst(s) **Analysis Date** **Microscope** **Magnification**

Description: Grab Along River

KM 8/30/2010 JEOL 1200 EX 10000

Gr	No.	Loc.	ID	Prim	Tot	Class	Length	Width	Aspect	Analyte	Elements	Comment	Count Categories
G9	1	E41				NSD							
G9	2	F41				NSD							
G10	3	E44				NSD							
G11	4	F43				NSD							

EPA 100.1 - Non-Potable Water - WA Raw Data

Job Number: 101090 **SEA**
Client: EPA - Region 10
Project Name: Swift Creek / Sumas Mtn
Project No.: ESD - 122E

Report Number: 101090R05
Date Received: 8/27/2010

Lab/Cor Sample No: S68

Client Sample No: 10344282

Description: Loc: 1 ('09)

Analyst(s) **Analysis Date** **Microscope** **Magnification**
 KM 8/31/2010 JEOL 1200 EX 10000

Gr	No.	Loc.	ID	Prim	Tot	Class	Length	Width	Aspect	Analyte	Elements	Comment	Count Categories
G13	1	C34				NSD							
G13	2	E33				NSD							
G13	3	E42				NSD							
G13	4	F41				NSD							
G13	5	C44				NSD							
G13	6	E43				NSD							
G13	7	E51				NSD							
G14	8	C33				NSD							
G14	9	E33				NSD							
G14	10	E42				NSD							
G14	11	F41				NSD							
G14	12	E44				NSD							
G14	13	F43				NSD							
G14	14	F52				NSD							
G15	15	C34				NSD							
G15	16	E33				NSD							
G15	17	E42				NSD							
G15	18	F41				NSD							
G15	19	E44				NSD							
G15	20	F44				NSD							

Sample Summary Report

Case No: 40437	Contract: EPW09044	SDG No: MJCSE9	Lab Code: STLV
Sample Number: LCS	Method: ICP_AES	Matrix: Water	MA Number: DEFAULT
Sample Location:	pH:	Sample Date:	Sample Time:
% Moisture :		% Solids :	

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable	Validation Level
Aluminum	432	ug/L	1.0			Yes	S2BVE
Antimony	126	ug/L	1.0			Yes	S2BVE
Arsenic	19.9	ug/L	1.0			Yes	S2BVE
Barium	405	ug/L	1.0			Yes	S2BVE
Beryllium	9.3	ug/L	1.0			Yes	S2BVE
Cadmium	9.9	ug/L	1.0			Yes	S2BVE
Calcium	10700	ug/L	1.0			Yes	S2BVE
Chromium	20.8	ug/L	1.0			Yes	S2BVE
Cobalt	108	ug/L	1.0			Yes	S2BVE
Copper	53.3	ug/L	1.0			Yes	S2BVE
Iron	238	ug/L	1.0			Yes	S2BVE
Lead	20.0	ug/L	1.0			Yes	S2BVE
Magnesium	10700	ug/L	1.0			Yes	S2BVE
Manganese	31.8	ug/L	1.0			Yes	S2BVE
Nickel	86.7	ug/L	1.0			Yes	S2BVE
Potassium	10900	ug/L	1.0			Yes	S2BVE
Selenium	72.4	ug/L	1.0			Yes	S2BVE
Silver	23.4	ug/L	1.0			Yes	S2BVE
Sodium	10900	ug/L	1.0			Yes	S2BVE
Thallium	49.3	ug/L	1.0			Yes	S2BVE
Vanadium	105	ug/L	1.0			Yes	S2BVE
Zinc	129	ug/L	1.0			Yes	S2BVE

Case No:	40437	Contract:	EPW09044	SDG No:	MJCSE9	Lab Code:	STLV
Sample Number:	MJCSE9	Method:	ICP_AES	Matrix:	Water	MA Number:	DEFAULT
Sample Location:	Grab 1	pH:	2.0	Sample Date:	08242010	Sample Time:	17:10:00
% Moisture :				% Solids :			

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable	Validation Level
Aluminum	200	ug/L	1.0	U	U	Yes	S2BVE
Antimony	60.0	ug/L	1.0	U	U	Yes	S2BVE
Arsenic	10.0	ug/L	1.0	J	U	Yes	S2BVE
Barium	43.8	ug/L	1.0	J	J	Yes	S2BVE
Beryllium	5.0	ug/L	1.0	U	U	Yes	S2BVE
Cadmium	5.0	ug/L	1.0	U	U	Yes	S2BVE
Calcium	27200	ug/L	1.0			Yes	S2BVE
Chromium	10.0	ug/L	1.0	U	U	Yes	S2BVE
Cobalt	50.0	ug/L	1.0	U	U	Yes	S2BVE
Copper	25.0	ug/L	1.0	U	U	Yes	S2BVE
Iron	901	ug/L	1.0			Yes	S2BVE
Lead	10.0	ug/L	1.0	U	U	Yes	S2BVE
Magnesium	20900	ug/L	1.0			Yes	S2BVE
Manganese	72.3	ug/L	1.0			Yes	S2BVE
Nickel	14.8	ug/L	1.0	J	J	Yes	S2BVE
Potassium	2450	ug/L	1.0	J	J	Yes	S2BVE
Selenium	35.0	ug/L	1.0	U	U	Yes	S2BVE
Silver	10.0	ug/L	1.0	J	U	Yes	S2BVE
Sodium	12500	ug/L	1.0			Yes	S2BVE
Thallium	25.0	ug/L	1.0	U	U	Yes	S2BVE
Vanadium	50.0	ug/L	1.0	U	U	Yes	S2BVE
Zinc	60.0	ug/L	1.0	U	U	Yes	S2BVE

Case No:	40437	Contract:	EPW09044	SDG No:	MJCSE9	Lab Code:	STLV
Sample Number:	MJCSF0	Method:	ICP_AES	Matrix:	Water	MA Number:	DEFAULT
Sample Location:	Grab 1	pH:	2.0	Sample Date:	08242010	Sample Time:	17:28:00
% Moisture :				% Solids :			

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable	Validation Level
Aluminum	200	ug/L	1.0	U	U	Yes	S2BVE
Antimony	60.0	ug/L	1.0	U	U	Yes	S2BVE
Arsenic	10.0	ug/L	1.0	U	U	Yes	S2BVE
Barium	35.4	ug/L	1.0	J	J	Yes	S2BVE
Beryllium	5.0	ug/L	1.0	U	U	Yes	S2BVE
Cadmium	5.0	ug/L	1.0	U	U	Yes	S2BVE
Calcium	20200	ug/L	1.0			Yes	S2BVE
Chromium	1.2	ug/L	1.0	J	J	Yes	S2BVE
Cobalt	50.0	ug/L	1.0	U	U	Yes	S2BVE
Copper	25.0	ug/L	1.0	U	U	Yes	S2BVE
Iron	655	ug/L	1.0			Yes	S2BVE
Lead	10.0	ug/L	1.0	U	U	Yes	S2BVE
Magnesium	31900	ug/L	1.0			Yes	S2BVE
Manganese	43.1	ug/L	1.0			Yes	S2BVE
Nickel	24.7	ug/L	1.0	J	J	Yes	S2BVE
Potassium	2010	ug/L	1.0	J	J	Yes	S2BVE
Selenium	35.0	ug/L	1.0	U	U	Yes	S2BVE
Silver	10.0	ug/L	1.0	J	U	Yes	S2BVE
Sodium	17200	ug/L	1.0			Yes	S2BVE
Thallium	25.0	ug/L	1.0	U	U	Yes	S2BVE
Vanadium	50.0	ug/L	1.0	U	U	Yes	S2BVE
Zinc	60.0	ug/L	1.0	U	U	Yes	S2BVE

Case No:	40437	Contract:	EPW09044	SDG No:	MJCSE9	Lab Code:	STLV
Sample Number:	MJCSF1	Method:	ICP_AES	Matrix:	Water	MA Number:	DEFAULT
Sample Location:	Grab	pH:	2.0	Sample Date:	08242010	Sample Time:	17:43:00
% Moisture :				% Solids :			

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable	Validation Level
Aluminum	59.3	ug/L	1.0	J	J	Yes	S2BVE
Antimony	60.0	ug/L	1.0	U	U	Yes	S2BVE
Arsenic	10.0	ug/L	1.0	U	U	Yes	S2BVE
Barium	34.5	ug/L	1.0	J	J	Yes	S2BVE
Beryllium	5.0	ug/L	1.0	U	U	Yes	S2BVE
Cadmium	5.0	ug/L	1.0	U	U	Yes	S2BVE
Calcium	19300	ug/L	1.0			Yes	S2BVE
Chromium	1.8	ug/L	1.0	J	J	Yes	S2BVE
Cobalt	50.0	ug/L	1.0	U	U	Yes	S2BVE
Copper	25.0	ug/L	1.0	U	U	Yes	S2BVE
Iron	546	ug/L	1.0			Yes	S2BVE
Lead	10.0	ug/L	1.0	U	U	Yes	S2BVE
Magnesium	32800	ug/L	1.0			Yes	S2BVE
Manganese	27.1	ug/L	1.0			Yes	S2BVE
Nickel	22.4	ug/L	1.0	J	J	Yes	S2BVE
Potassium	1660	ug/L	1.0	J	J	Yes	S2BVE
Selenium	35.0	ug/L	1.0	U	U	Yes	S2BVE
Silver	10.0	ug/L	1.0	U	U	Yes	S2BVE
Sodium	10000	ug/L	1.0			Yes	S2BVE
Thallium	25.0	ug/L	1.0	U	U	Yes	S2BVE
Vanadium	50.0	ug/L	1.0	U	U	Yes	S2BVE
Zinc	60.0	ug/L	1.0	U	U	Yes	S2BVE

Case No:	40437	Contract:	EPW09044	SDG No:	MJCSE9	Lab Code:	STLV
Sample Number:	MJCSF2	Method:	ICP_AES	Matrix:	Water	MA Number:	DEFAULT
Sample Location:	Grab 1	pH:	2.0	Sample Date:	08242010	Sample Time:	18:03:00
% Moisture :				% Solids :			

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable	Validation Level
Aluminum	44.8	ug/L	1.0	J	J	Yes	S2BVE
Antimony	60.0	ug/L	1.0	U	U	Yes	S2BVE
Arsenic	10.0	ug/L	1.0	U	U	Yes	S2BVE
Barium	31.1	ug/L	1.0	J	J	Yes	S2BVE
Beryllium	5.0	ug/L	1.0	U	U	Yes	S2BVE
Cadmium	5.0	ug/L	1.0	U	U	Yes	S2BVE
Calcium	17600	ug/L	1.0			Yes	S2BVE
Chromium	0.92	ug/L	1.0	J	J	Yes	S2BVE
Cobalt	50.0	ug/L	1.0	U	U	Yes	S2BVE
Copper	25.0	ug/L	1.0	U	U	Yes	S2BVE
Iron	494	ug/L	1.0			Yes	S2BVE
Lead	10.0	ug/L	1.0	U	U	Yes	S2BVE
Magnesium	33000	ug/L	1.0			Yes	S2BVE
Manganese	27.8	ug/L	1.0			Yes	S2BVE
Nickel	15.5	ug/L	1.0	J	J	Yes	S2BVE
Potassium	1410	ug/L	1.0	J	J	Yes	S2BVE
Selenium	35.0	ug/L	1.0	U	U	Yes	S2BVE
Silver	10.0	ug/L	1.0	J	U	Yes	S2BVE
Sodium	9900	ug/L	1.0			Yes	S2BVE
Thallium	25.0	ug/L	1.0	U	U	Yes	S2BVE
Vanadium	50.0	ug/L	1.0	U	U	Yes	S2BVE
Zinc	60.0	ug/L	1.0	U	U	Yes	S2BVE

Case No:	40437	Contract:	EPW09044	SDG No:	MJCSE9	Lab Code:	STLV
Sample Number:	MJCSF3	Method:	ICP_AES	Matrix:	Water	MA Number:	DEFAULT
Sample Location:	Grab 1	pH:	2.0	Sample Date:	08252010	Sample Time:	16:07:00
% Moisture :				% Solids :			

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable	Validation Level
Aluminum	42.3	ug/L	1.0	J	J	Yes	S2BVE
Antimony	60.0	ug/L	1.0	U	U	Yes	S2BVE
Arsenic	10.0	ug/L	1.0	U	U	Yes	S2BVE
Barium	34.2	ug/L	1.0	J	J	Yes	S2BVE
Beryllium	5.0	ug/L	1.0	U	U	Yes	S2BVE
Cadmium	5.0	ug/L	1.0	U	U	Yes	S2BVE
Calcium	17100	ug/L	1.0			Yes	S2BVE
Chromium	1.4	ug/L	1.0	J	J	Yes	S2BVE
Cobalt	50.0	ug/L	1.0	U	U	Yes	S2BVE
Copper	25.0	ug/L	1.0	U	U	Yes	S2BVE
Iron	772	ug/L	1.0			Yes	S2BVE
Lead	10.0	ug/L	1.0	U	U	Yes	S2BVE
Magnesium	32600	ug/L	1.0			Yes	S2BVE
Manganese	57.6	ug/L	1.0			Yes	S2BVE
Nickel	18.6	ug/L	1.0	J	J	Yes	S2BVE
Potassium	1290	ug/L	1.0	J	J	Yes	S2BVE
Selenium	35.0	ug/L	1.0	U	U	Yes	S2BVE
Silver	10.0	ug/L	1.0	J	U	Yes	S2BVE
Sodium	9700	ug/L	1.0			Yes	S2BVE
Thallium	25.0	ug/L	1.0	U	U	Yes	S2BVE
Vanadium	50.0	ug/L	1.0	U	U	Yes	S2BVE
Zinc	60.0	ug/L	1.0	U	U	Yes	S2BVE

Case No:	40437	Contract:	EPW09044	SDG No:	MJCSE9	Lab Code:	STLV
Sample Number:	MJCSF3D	Method:	ICP_AES	Matrix:	Water	MA Number:	DEFAULT
Sample Location:		pH:	2.0	Sample Date:	08252010	Sample Time:	16:07:00
% Moisture :				% Solids :			

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable	Validation Level
Aluminum	80.6	ug/L	1.0	J	J	Yes	S2BVE
Antimony	60.0	ug/L	1.0	U	U	Yes	S2BVE
Arsenic	10.0	ug/L	1.0	U	U	Yes	S2BVE
Barium	31.0	ug/L	1.0	J	J	Yes	S2BVE
Beryllium	5.0	ug/L	1.0	U	U	Yes	S2BVE
Cadmium	5.0	ug/L	1.0	U	U	Yes	S2BVE
Calcium	18100	ug/L	1.0			Yes	S2BVE
Chromium	1.6	ug/L	1.0	J	J	Yes	S2BVE
Cobalt	50.0	ug/L	1.0	U	U	Yes	S2BVE
Copper	25.0	ug/L	1.0	U	U	Yes	S2BVE
Iron	826	ug/L	1.0			Yes	S2BVE
Lead	10.0	ug/L	1.0	U	U	Yes	S2BVE
Magnesium	34500	ug/L	1.0			Yes	S2BVE
Manganese	61.1	ug/L	1.0			Yes	S2BVE
Nickel	20.1	ug/L	1.0	J	J	Yes	S2BVE
Potassium	1490	ug/L	1.0	J	J	Yes	S2BVE
Selenium	35.0	ug/L	1.0	U	U	Yes	S2BVE
Silver	10.0	ug/L	1.0	J	U	Yes	S2BVE
Sodium	10300	ug/L	1.0			Yes	S2BVE
Thallium	25.0	ug/L	1.0	U	U	Yes	S2BVE
Vanadium	50.0	ug/L	1.0	U	U	Yes	S2BVE
Zinc	60.0	ug/L	1.0	U	U	Yes	S2BVE

Case No:	40437	Contract:	EPW09044	SDG No:	MJCSE9	Lab Code:	STLV
Sample Number:	MJCSF3L	Method:	ICP_AES	Matrix:	Water	MA Number:	DEFAULT
Sample Location:		pH:	2.0	Sample Date:	08252010	Sample Time:	16:07:00
% Moisture :				% Solids :			

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable	Validation Level
Aluminum	1000	ug/L	5.0	U	U	Yes	
Antimony	300	ug/L	5.0	U	U	Yes	
Arsenic	50.0	ug/L	5.0	U	U	Yes	
Barium	1000	ug/L	5.0	U	U	Yes	
Beryllium	25.0	ug/L	5.0	U	U	Yes	
Cadmium	25.0	ug/L	5.0	U	U	Yes	
Calcium	17200	ug/L	5.0	J	J	Yes	
Chromium	50.0	ug/L	5.0	U	U	Yes	
Cobalt	250	ug/L	5.0	U	U	Yes	
Copper	125	ug/L	5.0	U	U	Yes	
Iron	746	ug/L	5.0			Yes	
Lead	50.0	ug/L	5.0	U	U	Yes	
Magnesium	33200	ug/L	5.0			Yes	
Manganese	58.7	ug/L	5.0	J	J	Yes	
Nickel	18.7	ug/L	5.0	J	J	Yes	
Potassium	1100	ug/L	5.0	J	J	Yes	
Selenium	175	ug/L	5.0	U	U	Yes	
Silver	13.0	ug/L	5.0	J	J	Yes	
Sodium	9950	ug/L	5.0	J	J	Yes	
Thallium	125	ug/L	5.0	U	U	Yes	
Vanadium	250	ug/L	5.0	U	U	Yes	
Zinc	300	ug/L	5.0	U	U	Yes	

Case No:	40437	Contract:	EPW09044	SDG No:	MJCSE9	Lab Code:	STLV
Sample Number:	MJCSF3S	Method:	ICP_AES	Matrix:	Water	MA Number:	DEFAULT
Sample Location:		pH:	2.0	Sample Date:	08252010	Sample Time:	16:07:00
% Moisture :				% Solids :			

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable	Validation Level
Aluminum	2190	ug/L	1.0			Yes	S2BVE
Antimony	103	ug/L	1.0			Yes	S2BVE
Arsenic	41.4	ug/L	1.0			Yes	S2BVE
Barium	2080	ug/L	1.0			Yes	S2BVE
Beryllium	50.1	ug/L	1.0			Yes	S2BVE
Cadmium	52.3	ug/L	1.0			Yes	S2BVE
Calcium	17300	ug/L	1.0			Yes	S2BVE
Chromium	211	ug/L	1.0			Yes	S2BVE
Cobalt	535	ug/L	1.0			Yes	S2BVE
Copper	259	ug/L	1.0			Yes	S2BVE
Iron	1900	ug/L	1.0			Yes	S2BVE
Lead	19.9	ug/L	1.0			Yes	S2BVE
Magnesium	33100	ug/L	1.0			Yes	S2BVE
Manganese	602	ug/L	10.0			Yes	S2BVE
Nickel	545	ug/L	1.0			Yes	S2BVE
Potassium	1320	ug/L	1.0	J	J	Yes	S2BVE
Selenium	52.7	ug/L	1.0			Yes	S2BVE
Silver	45.3	ug/L	1.0			Yes	S2BVE
Sodium	9800	ug/L	1.0			Yes	S2BVE
Thallium	51.4	ug/L	1.0			Yes	S2BVE
Vanadium	503	ug/L	1.0			Yes	S2BVE
Zinc	524	ug/L	1.0			Yes	S2BVE

Case No:	40437	Contract:	EPW09044	SDG No:	MJCSE9	Lab Code:	STLV
Sample Number:	MJCSF4	Method:	ICP_AES	Matrix:	Water	MA Number:	DEFAULT
Sample Location:	Grab 1	pH:	2.0	Sample Date:	08252010	Sample Time:	16:40:00
% Moisture :				% Solids :			

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable	Validation Level
Aluminum	73.8	ug/L	1.0	J	J	Yes	S2BVE
Antimony	60.0	ug/L	1.0	U	U	Yes	S2BVE
Arsenic	10.0	ug/L	1.0	J	U	Yes	S2BVE
Barium	32.7	ug/L	1.0	J	J	Yes	S2BVE
Beryllium	5.0	ug/L	1.0	U	U	Yes	S2BVE
Cadmium	5.0	ug/L	1.0	U	U	Yes	S2BVE
Calcium	16200	ug/L	1.0			Yes	S2BVE
Chromium	2.0	ug/L	1.0	J	J	Yes	S2BVE
Cobalt	50.0	ug/L	1.0	U	U	Yes	S2BVE
Copper	25.0	ug/L	1.0	U	U	Yes	S2BVE
Iron	914	ug/L	1.0			Yes	S2BVE
Lead	10.0	ug/L	1.0	U	U	Yes	S2BVE
Magnesium	31500	ug/L	1.0			Yes	S2BVE
Manganese	99.5	ug/L	1.0			Yes	S2BVE
Nickel	19.3	ug/L	1.0	J	J	Yes	S2BVE
Potassium	1230	ug/L	1.0	J	J	Yes	S2BVE
Selenium	35.0	ug/L	1.0	U	U	Yes	S2BVE
Silver	10.0	ug/L	1.0	J	U	Yes	S2BVE
Sodium	9520	ug/L	1.0			Yes	S2BVE
Thallium	25.0	ug/L	1.0	U	U	Yes	S2BVE
Vanadium	50.0	ug/L	1.0	U	U	Yes	S2BVE
Zinc	1.6	ug/L	1.0	J	J	Yes	S2BVE

Case No:	40437	Contract:	EPW09044	SDG No:	MJCSE9	Lab Code:	STLV
Sample Number:	MJCSF5	Method:	ICP_AES	Matrix:	Water	MA Number:	DEFAULT
Sample Location:	Grab 1	pH:	2.0	Sample Date:	08252010	Sample Time:	16:56:00
% Moisture :				% Solids :			

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable	Validation Level
Aluminum	69.8	ug/L	1.0	J	J	Yes	S2BVE
Antimony	60.0	ug/L	1.0	U	U	Yes	S2BVE
Arsenic	10.0	ug/L	1.0	J	U	Yes	S2BVE
Barium	39.1	ug/L	1.0	J	J	Yes	S2BVE
Beryllium	5.0	ug/L	1.0	U	U	Yes	S2BVE
Cadmium	5.0	ug/L	1.0	U	U	Yes	S2BVE
Calcium	16500	ug/L	1.0			Yes	S2BVE
Chromium	1.3	ug/L	1.0	J	J	Yes	S2BVE
Cobalt	50.0	ug/L	1.0	U	U	Yes	S2BVE
Copper	25.0	ug/L	1.0	U	U	Yes	S2BVE
Iron	854	ug/L	1.0			Yes	S2BVE
Lead	10.0	ug/L	1.0	U	U	Yes	S2BVE
Magnesium	30900	ug/L	1.0			Yes	S2BVE
Manganese	212	ug/L	1.0			Yes	S2BVE
Nickel	11.6	ug/L	1.0	J	J	Yes	S2BVE
Potassium	1230	ug/L	1.0	J	J	Yes	S2BVE
Selenium	35.0	ug/L	1.0	U	U	Yes	S2BVE
Silver	10.0	ug/L	1.0	U	U	Yes	S2BVE
Sodium	9830	ug/L	1.0			Yes	S2BVE
Thallium	25.0	ug/L	1.0	U	U	Yes	S2BVE
Vanadium	50.0	ug/L	1.0	U	U	Yes	S2BVE
Zinc	60.0	ug/L	1.0	U	U	Yes	S2BVE

Case No:	40437	Contract:	EPW09044	SDG No:	MJCSE9	Lab Code:	STLV
Sample Number:	MJCSF6	Method:	ICP_AES	Matrix:	Water	MA Number:	DEFAULT
Sample Location:	Grab 1	pH:	2.0	Sample Date:	08252010	Sample Time:	17:16:00
% Moisture :				% Solids :			

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable	Validation Level
Aluminum	58.8	ug/L	1.0	J	J	Yes	S2BVE
Antimony	60.0	ug/L	1.0	U	U	Yes	S2BVE
Arsenic	10.0	ug/L	1.0	J	U	Yes	S2BVE
Barium	58.7	ug/L	1.0	J	J	Yes	S2BVE
Beryllium	5.0	ug/L	1.0	U	U	Yes	S2BVE
Cadmium	5.0	ug/L	1.0	U	U	Yes	S2BVE
Calcium	18900	ug/L	1.0			Yes	S2BVE
Chromium	10.0	ug/L	1.0	U	U	Yes	S2BVE
Cobalt	1.7	ug/L	1.0	J	J	Yes	S2BVE
Copper	25.0	ug/L	1.0	U	U	Yes	S2BVE
Iron	2290	ug/L	1.0			Yes	S2BVE
Lead	10.0	ug/L	1.0	U	U	Yes	S2BVE
Magnesium	17400	ug/L	1.0			Yes	S2BVE
Manganese	2210	ug/L	10.0	D		Yes	S2BVE
Nickel	3.4	ug/L	1.0	J	J	Yes	S2BVE
Potassium	1160	ug/L	1.0	J	J	Yes	S2BVE
Selenium	35.0	ug/L	1.0	U	U	Yes	S2BVE
Silver	10.0	ug/L	1.0	U	U	Yes	S2BVE
Sodium	9080	ug/L	1.0			Yes	S2BVE
Thallium	25.0	ug/L	1.0	U	U	Yes	S2BVE
Vanadium	50.0	ug/L	1.0	U	U	Yes	S2BVE
Zinc	1.5	ug/L	1.0	J	J	Yes	S2BVE

Case No:	40437	Contract:	EPW09044	SDG No:	MJCSE9	Lab Code:	STLV
Sample Number:	MJCSF7	Method:	ICP_AES	Matrix:	Water	MA Number:	DEFAULT
Sample Location:	Grab 1	pH:	2.0	Sample Date:	08262010	Sample Time:	15:02:00
% Moisture :				% Solids :			

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable	Validation Level
Aluminum	200	ug/L	1.0	U	U	Yes	S2BVE
Antimony	60.0	ug/L	1.0	U	U	Yes	S2BVE
Arsenic	10.0	ug/L	1.0	U	U	Yes	S2BVE
Barium	200	ug/L	1.0	U	U	Yes	S2BVE
Beryllium	5.0	ug/L	1.0	U	U	Yes	S2BVE
Cadmium	5.0	ug/L	1.0	U	U	Yes	S2BVE
Calcium	5000	ug/L	1.0	U	U	Yes	S2BVE
Chromium	10.0	ug/L	1.0	U	U	Yes	S2BVE
Cobalt	50.0	ug/L	1.0	U	U	Yes	S2BVE
Copper	25.0	ug/L	1.0	U	U	Yes	S2BVE
Iron	100	ug/L	1.0	U	U	Yes	S2BVE
Lead	10.0	ug/L	1.0	U	U	Yes	S2BVE
Magnesium	5000	ug/L	1.0	U	U	Yes	S2BVE
Manganese	15.0	ug/L	1.0	J	U	Yes	S2BVE
Nickel	40.0	ug/L	1.0	U	U	Yes	S2BVE
Potassium	5000	ug/L	1.0	U	U	Yes	S2BVE
Selenium	35.0	ug/L	1.0	U	U	Yes	S2BVE
Silver	10.0	ug/L	1.0	U	U	Yes	S2BVE
Sodium	5000	ug/L	1.0	U	U	Yes	S2BVE
Thallium	25.0	ug/L	1.0	U	U	Yes	S2BVE
Vanadium	50.0	ug/L	1.0	U	U	Yes	S2BVE
Zinc	60.0	ug/L	1.0	U	U	Yes	S2BVE

Case No:	40437	Contract:	EPW09044	SDG No:	MJCSE9	Lab Code:	STLV
Sample Number:	MJCSF8	Method:	ICP_AES	Matrix:	Water	MA Number:	DEFAULT
Sample Location:	Grab 1 DUP	pH:	2.0	Sample Date:	08242010	Sample Time:	18:07:00
% Moisture :				% Solids :			

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable	Validation Level
Aluminum	42.0	ug/L	1.0	J	J	Yes	S2BVE
Antimony	60.0	ug/L	1.0	U	U	Yes	S2BVE
Arsenic	10.0	ug/L	1.0	U	U	Yes	S2BVE
Barium	34.1	ug/L	1.0	J	J	Yes	S2BVE
Beryllium	5.0	ug/L	1.0	U	U	Yes	S2BVE
Cadmium	5.0	ug/L	1.0	U	U	Yes	S2BVE
Calcium	17400	ug/L	1.0			Yes	S2BVE
Chromium	1.1	ug/L	1.0	J	J	Yes	S2BVE
Cobalt	50.0	ug/L	1.0	U	U	Yes	S2BVE
Copper	25.0	ug/L	1.0	U	U	Yes	S2BVE
Iron	505	ug/L	1.0			Yes	S2BVE
Lead	2.7	ug/L	1.0	J	J	Yes	S2BVE
Magnesium	33200	ug/L	1.0			Yes	S2BVE
Manganese	25.4	ug/L	1.0			Yes	S2BVE
Nickel	15.1	ug/L	1.0	J	J	Yes	S2BVE
Potassium	1510	ug/L	1.0	J	J	Yes	S2BVE
Selenium	35.0	ug/L	1.0	U	U	Yes	S2BVE
Silver	10.0	ug/L	1.0	J	U	Yes	S2BVE
Sodium	9920	ug/L	1.0			Yes	S2BVE
Thallium	25.0	ug/L	1.0	U	U	Yes	S2BVE
Vanadium	50.0	ug/L	1.0	U	U	Yes	S2BVE
Zinc	60.0	ug/L	1.0	U	U	Yes	S2BVE

Case No:	40437	Contract:	EPW09044	SDG No:	MJCSE9	Lab Code:	STLV
Sample Number:	PBW	Method:	ICP_AES	Matrix:	Water	MA Number:	DEFAULT
Sample Location:		pH:		Sample Date:		Sample Time:	
% Moisture :				% Solids :			

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable	Validation Level
Aluminum	200	ug/L	1.0	U	U	Yes	S2BVE
Antimony	60.0	ug/L	1.0	U	U	Yes	S2BVE
Arsenic	10.0	ug/L	1.0	U	U	Yes	S2BVE
Barium	200	ug/L	1.0	U	U	Yes	S2BVE
Beryllium	5.0	ug/L	1.0	U	U	Yes	S2BVE
Cadmium	5.0	ug/L	1.0	U	U	Yes	S2BVE
Calcium	5000	ug/L	1.0	U	U	Yes	S2BVE
Chromium	10.0	ug/L	1.0	U	U	Yes	S2BVE
Cobalt	50.0	ug/L	1.0	U	U	Yes	S2BVE
Copper	3.7	ug/L	1.0	J	J	Yes	S2BVE
Iron	33.3	ug/L	1.0	J	J	Yes	S2BVE
Lead	10.0	ug/L	1.0	U	U	Yes	S2BVE
Magnesium	5000	ug/L	1.0	U	U	Yes	S2BVE
Manganese	1.1	ug/L	1.0	J	J	Yes	S2BVE
Nickel	40.0	ug/L	1.0	U	U	Yes	S2BVE
Potassium	5000	ug/L	1.0	U	U	Yes	S2BVE
Selenium	35.0	ug/L	1.0	U	U	Yes	S2BVE
Silver	3.0	ug/L	1.0	J	J	Yes	S2BVE
Sodium	5000	ug/L	1.0	U	U	Yes	S2BVE
Thallium	25.0	ug/L	1.0	U	U	Yes	S2BVE
Vanadium	50.0	ug/L	1.0	U	U	Yes	S2BVE
Zinc	60.0	ug/L	1.0	U	U	Yes	S2BVE

APPENDIX D

LOGBOOKS

Swift Creek
Senas River



"Rite in the Rain"
ALL-WEATHER
LEVEL
No. 311

Activity Based Sampling

Air Samples

Front Cover

Pg 2

8/19/10

Lot blanked out and 1044 per...
10324050, 10324053 -
Lot # 20199, Zedfran milk
25mm 0.8 pin MCE filters

Pg 3

8/24/10 Dairy Farm

Activity 1 - Loading Raking Simulaten

Personal	Start Flow	Time	Time off	End Flow
1120	2.7	09:50	12:55	2.6
1121	2.6	09:52	12:53	2.5
1122	2.6	09:51	12:50	2.4
1123	2.6	09:54	12:50	2.5

8/11/10
Lot blanked out and 1044 per...
offivered to lot/cor in stable.
10324050, 10324053, 1034204, 10344205, 10344205, 10344205

of laboratory

Sample #	Pump #	Start Flow	Time on	Time off	End Flow
10344222	3180	5.37	09:30	12:30	5.3
10344223	3175	5.5	"	"	5.3
10344224	3174	5.4	"	"	5.3
10344225	3184	5.6	"	1:30	5.4

Sample #	Pump #	Start Flow	Time on	Time off	End Flow
10344227	3192	5.0	10:30	13:30	4.9
10344228	3173	5.6	"	13:30	5.4
10344229	3182	5.7	"	13:30	5.7

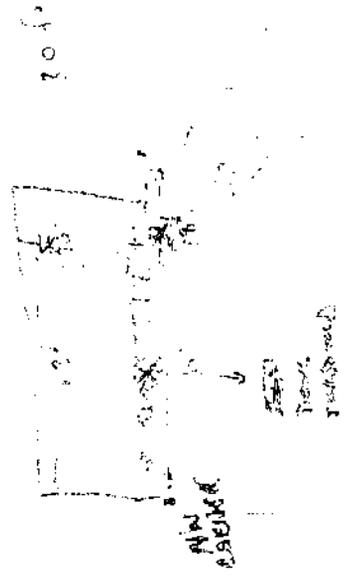
[Signature]

8/24/10 - Cont - Dairy Farm

Personal Pump Sample #	Start Floor	Time ON	Time OFF	End Floor
10344200	121	2.5	1507	121
10344201	123	2.4	1507	123

John Doe

Sample time: 10:30 AM
Location: C-100
Operator: [unclear]



Crit 2

Challenges

8/25/10 Location 2

Activity 1 - Lagoon near house

Personal Sample #	Pump #	Start Flow	Time	Time off	End Flow
10344210	1120	2.6	0925	1224	2.6
10344211	1121	2.5	0925	1224	2.5
10344212	1122	2.4	0925	1224	2.4

~~10344213~~

Stationary - Lawn

Sample #	Pump #	Start Flow	Time	Time off	End Flow
10344230	3184	5.35	0900	1200	5.32
10344231	3186	5.6	0900	"	5.5
10344232	3175	5.6	"	"	5.8
10344233	3192	5.0	"	"	5.0

8/25/10 Location 2 Activity 2

Activity 2 - Lower Farm Shrub

Personal Pump Sample #	Start Flow	Time on	Time off	End Flow
10344206	2.5	1000	1200	2.4
10344207	2.5	"	"	2.5
10344209	2.7	"	"	2.6

Stakeholder Pump - Farm

Sample #	Start Flow	Time on	Time off	End Flow
10344234	5.7	0930	1230	5.6
10344235	5.5	0930	"	5.4
10344236	5.3	0930	"	5.3
10344237	5.4	0945	1245	5.3

[Signature]

8/25/10 Location 2 cont

Activity 3 - Corn Field

Personal Pumps

Sample #	Pump #	Start Flow	Time on	Time off	End Flow
10344213	1120	2.7	1420	1700	2.6
10344208	1122	2.5	1430	1700	2.4
10344214	1124	2.5	1405	1700	2.5

[Signature]

Criticism 2 2.4
 Reel 1
 Challenge 2.4

2.5 Reel 2
 2.5

2.4 Reel 3
 2.4

8/26/10 Location 3

Activity 1 Cummings Property
 Personal pumps

Sample #	Pump #	Start Flow Time on	Time off	End Flow
1034 4215	1120	10:30	13:00	3.0
1034 4216	1181	"	"	3.1
1034 4217	1118	"	"	4.0
1034 4218	1119	"	"	4.0

Flow DP
 1034 4218

Stationary pumps

Sample #	Pump #	Start Flow Time on	Time off	End Flow
1034 4238	3186	10:30	13:00	5.5
1034 4239	3194	"	"	5.4
1034 4240	3184	"	"	5.3
1034 4241	3180	"	"	5.3

[Signature]

2 Soil Samples on 8/24/10

Sample Date:	Time	Location
8/24/10	3:15 pm	Leaking Snd
"	3:15 pm	Leaking Snd
"	3:20 pm	along river
8/24/10	3:26 pm	along river
8/24/10	3:20	along river
8/24/10	5:50	Along Drainage
8/24/10	15:50	Along Drainage
8/24/10	15:45	Along Drainage

Sample Number

Sample Number	Sample Location
10344247	"
MJCS0022	KW & SW
MJC SD1	KW & SW
MJCSFF6 / MJCSFF6	KW & SW
10344246	KW & SW
10344242	KW & SW
MJCS03	KW & SW
10344248	KW & SW
10344249 (F3)	KW & SW

waters Samples on 8/24/10

<u>Sample Date</u>	<u>Time</u>	<u>Location</u>
8/24/10	5:10PM	loc. 15 '09
8/24/10	17:28	loc. 13 '09
8/24/10	1743	loc. 1 '10
8/24/10	1803	loc. 3 '10
8/24/10	1807	loc. 3 '10 dipe

<u>Sample Number</u>	<u>Sampler Initials</u>
10344225 MJCSE9 ✓	JW/RW GPS hang point 013
10344276 MJCSEFB ✓	JW/RW GPS hang point 014
10344277 MJCSE1 ✓	RW/RW GPS hang point 015
10344278 MJCSE2 ✓	RW/JW
10344284 MJCSE8	GPS hang point

8/25/0

GPS waypoint 017
Stationing near house (SW)
outlet # 1078

GPS waypoint 018
Stationing adjacent to front door
sample # 10344232

GPS waypoint 020
Stationing at back corner of
front yard
sample # 10344233

GPS waypoint 021
Stationing next to river opposite
house
sample # 10344231

Weather station location 022

7

Fixed station on yard w/ fill material

GPS waypoint 023
NW corner
sample # 10344234

GPS waypoint 024
SW corner
sample 10344237

GPS waypoint 025
SE corner
sample 10344235

GPS waypoint 026
NE corner (behind shed)
sample 10344236

8/25/10

Soil sample at Location 2,
near house. 1034425D,
10344251⁽¹⁶⁾ MJCSD4,
collected at 10:44 by RC
(Debra Lennell)

Soil sample at Location 2
near shed. 10344252,
10344253⁽¹⁶⁾ MJCSD5,
collected at 12:27 by RC

Soil sample near house & well and path
to pt compost.

14.4 lbs for the corn field &
soil sample collection time

Sample #s: 10344255
10344256
10344254
MJCSD6,
MJCSE3

8/25/10

Soil sample - Grab on
North side of corn
field. Opportunistic
sample location where
vegetation is very
stressed and soil is
very white on the bank.
10344270 + MJCSE4
Collected at 15:25
by RC + BR
GPS waypoint 026

Soil sample - Grab Along
Drainage by Gillies Road.
10344257 + 10344258⁽¹⁶⁾
MJCSD7. Collected
at 15:51 by SB & SW
GPS waypoint #029

8/25/10
 Surface Water Sample at
 Location 2 '10' MJCSEF3'
 10344279 at 16:07
 by JW + SB. GPS Waypoint
 #028.

Surface Water Sample at
 Loc. 7 (09) 16:40 10344280
 MJCSEF4 by JW + SB
 GPS Waypoint #30

Surface Water Sample at
 Loc. 5 16:54 10344281
 MJCSEF5 by JW + SB
 GPS Waypoint #31

Surface Water Sample at
 Loc. 1 '09 17:16 10344282
 + MJCSEF6 by JW + SB
 GPS Waypoint #32

8/26/10
 10:00 time for 1st
 samples taken along riverbank =

10344261
 10344260 (Composite)
 10344259
 MJCSEF8 ✓ samples
 MJCSEF7 ✓
 10344272

Samples: JW
 13:37 Sample time for
 samples: GPS #33 waypt.
 - for composite samples.
 2 hrs windows on North side
 of house.

10344265
 10344264
 MJCSEF9

Samples: JW
 additional samples: GPS
 excursions.

1st and 2nd windows
 North samples # 34 window
 # 35 window

~~North~~ East Sampler # 210 weight.
South sampler closest to the
river # 87 weight.
West sampler # 88 weight.

sample time for composite
samples taken @ 3:55.
down side of garden bed.

10344 2105
10344 2107
MCSF 29
GPS down pt # 87

sample time is 14:00
for sun yard samples compare
GPS down pt. # 47

10344 2103
10344 2107
MCSF 29

MTC SF=7 Trip Blank
15:02 8/26/2010
10344 283 Trip Blank

APPENDIX E
INSTRUMENT CALIBRATION CERTIFICATES

Test Tech:	Date	Part Number	S/N
KM	12 MAY 2010	2930-000-299	041845

Applies to p/ns:
2930000292, 2930000299,
2930000321

Test Equipment Required

Device	S/N	Cal Due Date	Remarks	Pass/Fail
Power Supply w/ current limit	N/A	N/A		
Terminal	N/A	N/A		
Host system (Zeno or Weatherpak)	N/A	N/A		

Procedure

1 Bench test. Couple the WindSonic to the host system and power supply, using a known working test cable. Use the terminal and record the configuration by going into Configuration mode and using the D3 command. See Manual Section 10.3 *Checking the configuration* for more information. A typical configuration looks like:

D3
M2,U2,O2,L1,P2,B3,F1,H1,NQ,E3,T1,S3,C1,

1a. Configuration **M2,U1,O1,L1,P2,B3,F1,H1,NQ,E3,T1,S3,C1,**

1b. Check for normal output data, and that the Status Code is OK – 00 (or A for NMEA format). If the status code is other than 00, refer to Manual Section 12.5 *Status (error) codes* for more information.

Item	Value	Limit	Remarks	Pass/Fail
1b. Status Code	00	OK		PASS

1c. Use an office fan or similar to check that the unit is sensing wind, turning the unit to simulate changing wind direction and to check that both axes are functioning. Note that this a quick functional test. There are no calibration adjustments; the unit is designed NOT to require re-calibration within its lifetime.

Item	Observation	Limit	Remarks	Pass/Fail
1c. Changing wind direction	YES	Direction must change		PASS

2 Self-Test (Still Air). This test checks Alignment, Gain and Checksums. **Alignment tests :** The unit performs a transducer geometry check and compares the result with its factory setting. **Gain tests :** The unit performs a check of its operating gain against its factory setting. **Checksum tests :** The unit performs a check of its program and data memory. *Important This test is a stringent laboratory test which will only be passed if carried out under still air conditions at room temperature (17-23°C).*

Use the original packing box (inner and outer) to enclose the unit. (The packaging was designed as a zero wind enclosure). Go into Configuration Mode * ENTER . Carry out the Self-test by entering D 6 ENTER. A message similar to that shown below in the table will be generated. For each of the Alignment and Gain tests a Pass or Refer to Manual message is generated. For each of the Checksum tests a Pass or Fail message is generated (except the first message "Alignment Limit:")

Item	Value	Limit	Remarks	Pass/Fail
2a. ALIGNMENT LIMITS:0D59,0CF5	N/A	PASS		PASS
2b. ALIGNMENT U:0D15 *PASS*		PASS		PASS
2c. ALIGNMENT V:0D16 *PASS*		PASS		PASS
2d. GAIN 0:0001 *PASS*		PASS		PASS
2e. GAIN 1:0001 *PASS*		PASS		PASS
2f. GAIN 2:0001 *PASS*		PASS		PASS
2g. GAIN 3:0001 *PASS*		PASS		PASS
2h. CHECKSUM ROM:AB7D AB7D *PASS*		PASS		PASS
2i. CHECKSUM FAC:04F4 04F4 *PASS*		PASS		PASS
2j. CHECKSUM ENG:082A 082A *PASS*		PASS		PASS
2k. CHECKSUM CAL:A9C1 A9C1 *PASS*		PASS		PASS

If any of the tests fail, contact your supplier. If a "refer to manual" message appears please see *Section 12.3 Fault Finding*. *Note that it will only pass if the specified temperature and zero wind conditions are met.* Check that there are no visible obstructions or damage to the unit before contacting Gill or your authorized distributor for further advice.

Evaluation

All steps must be completed and all tests must be passed.

QA:	Pass /Fail	Date:	Remarks
P. GARNER	PASS	5/12/10	

Rev	Date	By	Description
0	5/12/05	SJN	New Test

Test Tech:	Date:	Sales Order	WP Model #	WP Serial #
KM	12 MAY 2010	SO-8637	WP2000	1822

Test Equipment Required

Device	S/N	Cal Due Date	Remarks	Pass/Fail
Fluke DVM	US 36138891	4 JAN 2011		PASS
AT RH ref sensor	W2120019	25 FEB 2011		PASS
Barometric pressure ref	7C3976	6-30-10		PASS
Wind speed calibrator	NA	NA		NA
Wind direction table	NA	NA		NA
Compass table	NA	NA		NA
RF wattmeter w/10W 400-1000 MHz element	NA	NA		NA
Configuration file: 18224178.txt.TXT	ZENOS3200 (ZENOSOFT) Software version, date and C.S. V2.02 Sep 10 2002 11:29:41 CS B97B			

1. HIGH CURRENT DRAIN TEST (ALL SENSORS AND RADIO CONNECTED, NO TERMINAL)

Current W/Radio	Limit	Current No Radio	Limit	Pass/Fail	Remarks
N/A	750ma to 1000ma	140 mA	<240 mA Average	PASS	

2. WIND SPEED TEST For 2a or 2b attach wind test to back of test form.

2c. Speed in measured in units of: m/s mph kts

Calibrator RPM	Wind Speed	Limit RMY 05103 RMY 05203	Limit RMY 05305	Pass/fail	Remarks
200	N/A	0.0 - 1.2 m/s 0.0 - 2.6 mph 0.0 - 2.3 kts	0.8 - 1.2 m/s 1.8 - 2.8 mph 1.5 - 2.3 kts	N/A	GILL
6400		30.7 - 32.0 m/s 68.8 - 71.6 mph 59.7 - 62.2 kts	32.0 - 33.3 m/s 71.6 - 74.5 mph 62.2 - 64.7 kts		

Wind Speed Threshold

Wind Monitor	Torque	Limit gm-cm	Pass/Fail	Remarks
5103	N/A	<2.4	N/A	GILL
5305 (AQ)		<0.3		
5701 (RE)		<0.3		

3. VANE TESTS

Table CW	Measured	Table CCW	Measured	Limit	Pass/Fail	Remarks
0	N/A	0	N/A	357-3	N/A	GILL
45		45		42-48		
90		90		87-93		
135		135		132-138		
180		180		177-183		
225		225		222-228		
270		270		267-273		
315		315		312-318		
355		355		352-1		

Wind Direction Threshold

Wind Monitor	Torque measured	Limit Torque gm-cm	Pass/Fail	Remarks
5103	N/A	30	N/A	GILL
5305(AQ)		9		
5701(RE)		7		

4. COMPASS TEST

TABLE	CLOCKWISE	Counter CW	LIMIT	Pass/Fail	Remarks
0	1	0	357 - 3	PASS	
60	61	SKIP THIS	57 - 63	PASS	
120	122	121	117 - 123	PASS	
180	181	SKIP THIS	177 - 183	PASS	
240	241	241	237 - 243	PASS	
300	300	SKIP THIS	297 - 303	PASS	
360	2	1	357 - 3	PASS	

5. Air Temperature

	LAB	WP	LIMIT	Pass/Fail	Remarks
WP400			$\pm 0.2^{\circ}\text{C}$		
WP2000	22.8	22.8	$\pm 0.2^{\circ}\text{C}$	PASS	

6. RELATIVE HUMIDITY

Lab	Wpak	Delta	Limit	Pass/Fail	Remarks
36	36	0%	S1057: 2% (Vaisala HMM22D) S1112: 2% (Vaisala HMP45D) S1276: 3% (Vaisala Humitter) S1113: 4% (Humirel HTM2500) S1276: 3% (Vaisala HMP50)	PASS	

7. BAROMETER

LAB	WP	DELTA	Type of pressure sensor	Limit mB	Pass/Fail	Remarks
			S1233 Honeywell PPT (serial i/f)	± 0.3		
			S1233 Honeywell PPT (analog i/f)	± 0.6		
			S1079 Setra 270 w' option 623 (12V)	± 0.3		
			S1080 Setra 270 w' options 623, 703	± 0.3		
			S1394 Setra 270 w' options 623, 707	± 0.2		
1024	1024	0	S1081 3C 1220A-015A-3L	± 4.0	PASS	
			(N/A) Vaisala PTB 200	± 0.2		
			S1082 Paroscientific 6016-B	± 0.1		

8. RADIO TEST

Forward Power	Limit	Reflected Power	Limit	Pass/Fail	Remarks
N/A	1.0 - 2.0 W	N/A	< 0.1W	N/A	

9. RECIEVER AND TOWER TESTS

	Value	Limit	Pass/Fail	Remarks
9.a Rcvr software Ver.			NA	
9.b Display operation	NA	Data Present on Display	NA	
9.c Tower Battery Voltage	NA	13.0 - 13.9Vdc	NA	
9.d Buzzer operation	NA	Buzzer sounds	NA	
9.e Diode check	NA	14.5 - 15.0Vdc	NA	
9.f Up-light Test On	NA	Light on w/ wpak connected	NA	
9.g Up-light Test Off	NA	Light off w/ wpak removed	NA	

PARAMETERS AS SHIPPED

System OK?	Decals OK?	Clean?	BP Offset	Compass Offset	Unit ID
YES	YES	YES	547.9	0	2

FINAL QUALIFICATION

QA by:	Date:	Pass/Fail	Remarks
P. GARNER	5/12/10	PASS	

SENSIDYNE, INC.

CALIBRATION CERTIFICATE

CELL S/N: 002598-S

DATE: 07 - 23 - 2010

This is to certify that the above referenced Gilibrator Flow Cell was calibrated using film flowmeter MCS-102-A, which has been calibrated by instruments directly traceable to the National Institute of Standards and Technology. NIST Report 8361604.

Results:

REFERENCE	S/N	RELATIVE	PERCENT
MCS-102-A	002598-S	DIFF.	DIFF.
cc/min	cc/min	cc/min	
2021	2021	0	0.0
2020	2022	2	0.1
2020	2022	2	0.1
2022	2021	-1	-0.05
2020	2024	4	0.2
2022	2021	-1	-0.05
2022	2024	2	0.1
2024	2021	-3	-0.15
2024	2022	-2	-0.1
2024	2022	-2	-0.1

MAX 4 0.2

MEAN 2021.9 2022

CALIBRATED BY Agnes Banfield DATE: 07 - 23 - 2010
CODE 000

SENSIDYNE, INC.

CALIBRATION CERTIFICATE

CELL S/N: 0208000-H

DATE: 07 - 23 - 2010

This is to certify that the above referenced Gilibrator Flow Cell was calibrated using film flowmeter MCH-101-A, which has been calibrated by instruments directly traceable to the National Institute of Standards and Technology. NIST Report 8361604.

Results:

REFERENCE	S/N	RELATIVE	PERCENT
MCH-101-A	0208000-H	DIFF.	DIFF.
LPM	LPM	LPM	
5.03	5.03	0	0.0
5.018	5.011	-0.007	-0.14
5.032	5.033	.001	0.02
5.029	5.03	.001	0.02
5.03	5.034	.004	0.08
5.039	5.038	-.001	-0.02
5.032	5.039	.007	0.14
5.027	5.027	0	0.0
5.026	5.032	.006	0.12
5.032	5.034	.002	0.04

MAX -0.007 -0.14

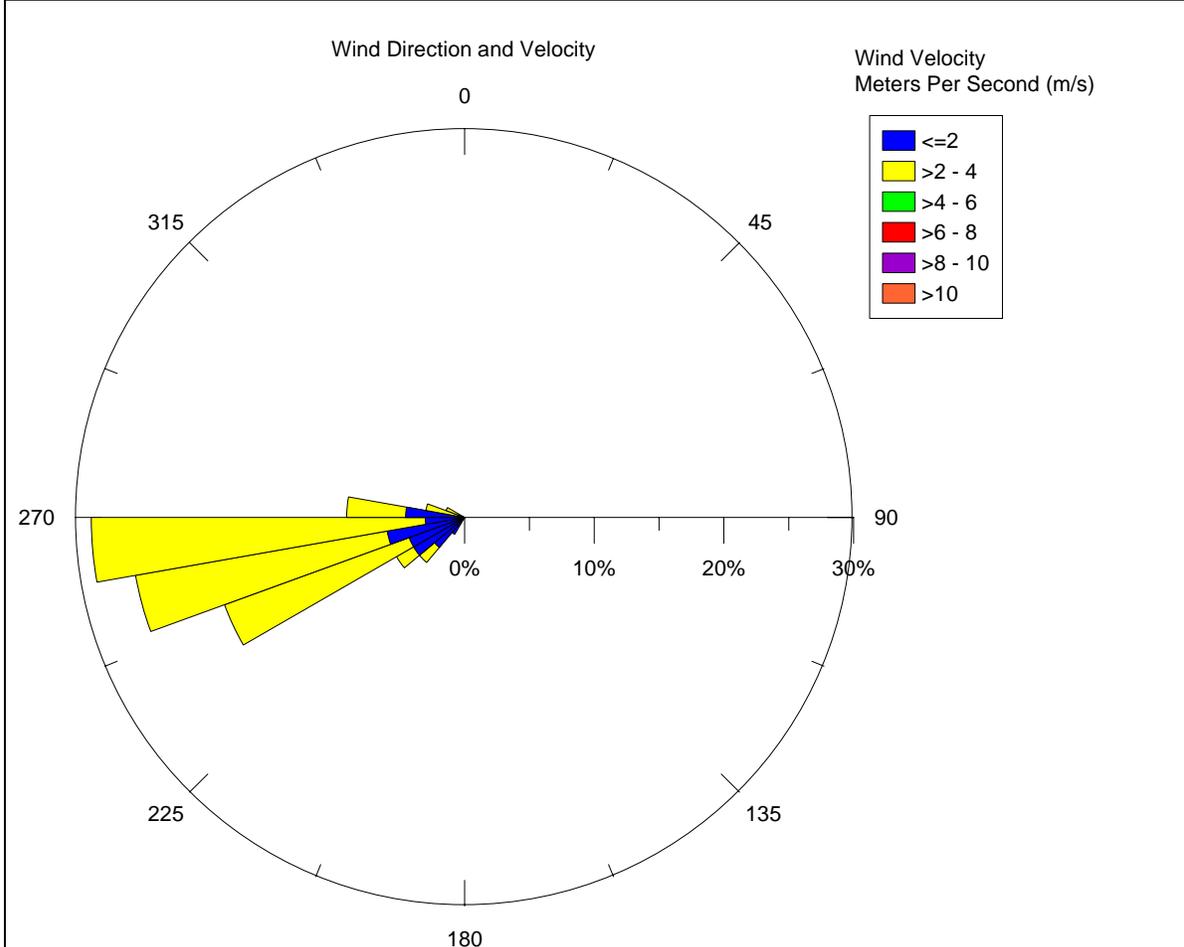
MEAN 5.03 5.031

CALIBRATED BY Agnes Banfield DATE: 07 - 23 - 2010
CODE 100

APPENDIX F
METEOROLOGICAL DATA

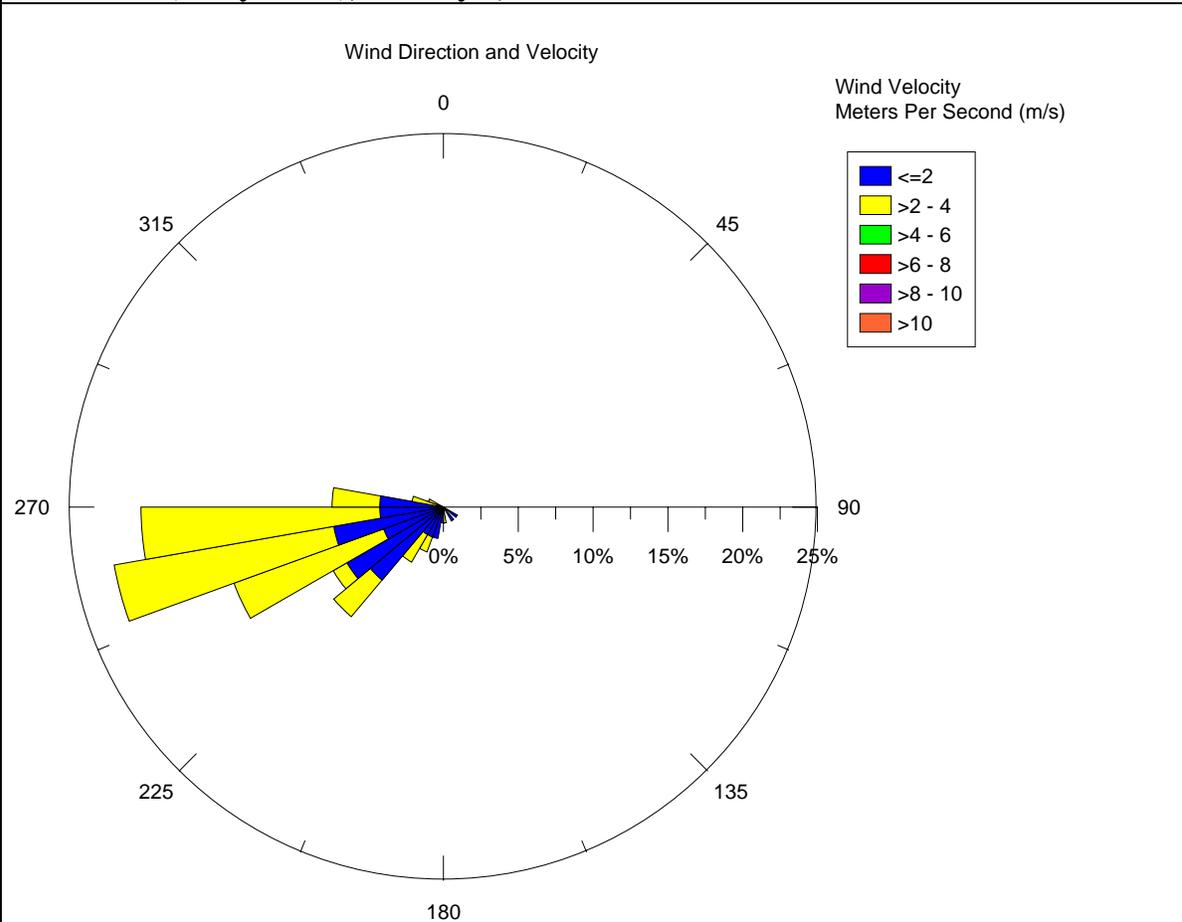
In a wind chart, each bin represents the number of times wind flows from a given direction. The direction is divided into bins, and each bin contains separation of the data into wind speeds. Therefore, the number of times wind comes from a given direction and the speed of the wind is given in each bin.

Sumas River Activity-Based Sampling
Location 1 (Dairy Farm), Activity 1, Weather Data



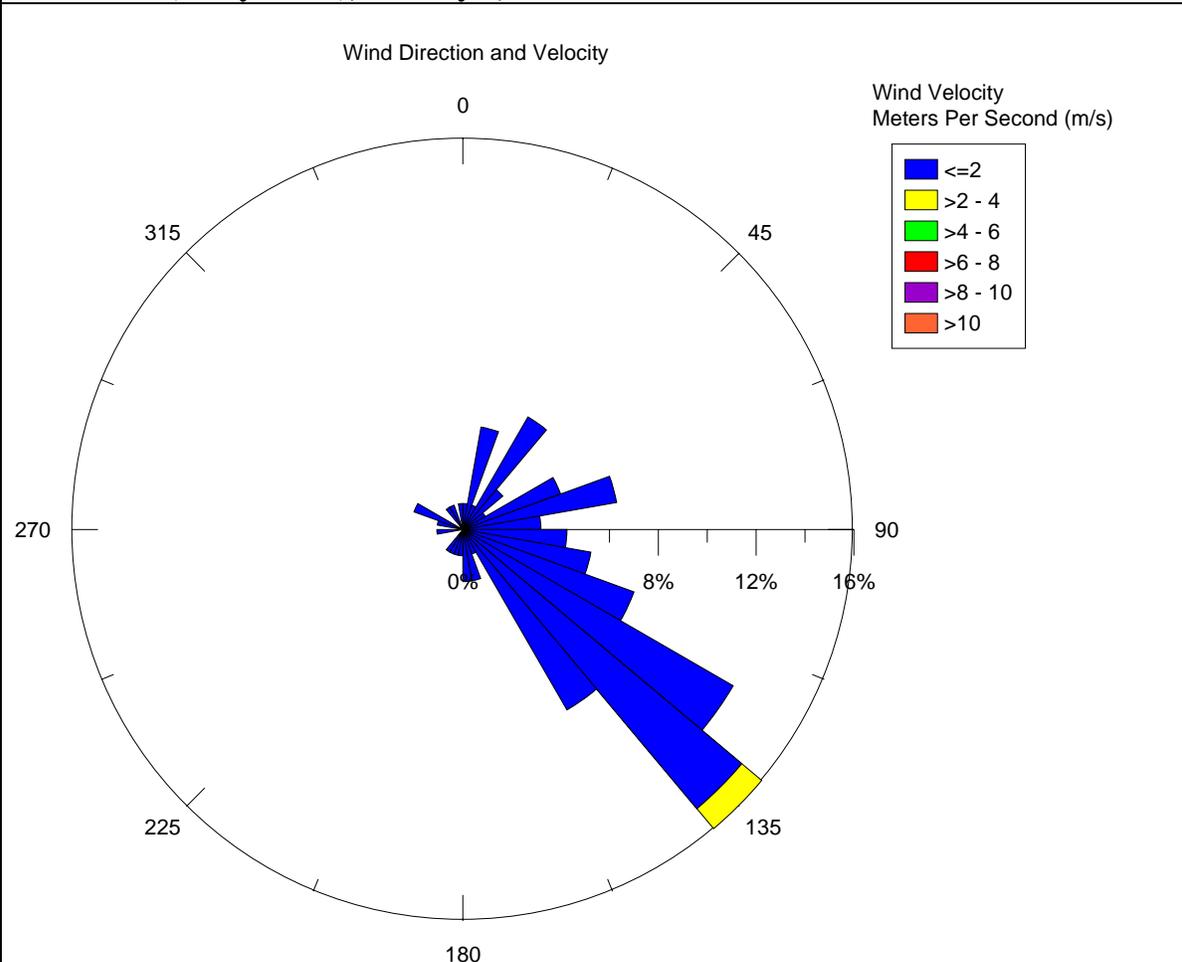
Date: 8/24/2010 Location 1 (Dairy Farm), Activity 1	Time:	Start: 1017	Average Wind Speed: 2.45 m/s Range: 1 m/s to 3.8 m/s
		Stop: 1227	
Average Air Temperature: 23.03 °C Range: 20.4 °C to 25.1 °C	Average Humidity: 47.07% Range: 38% to 56%	Data collected by: Jed Januch U.S. EPA Region 10 OEA	

Sumas River Activity-Based Sampling
Location 1 (Dairy Farm), Activity 2, Weather Data



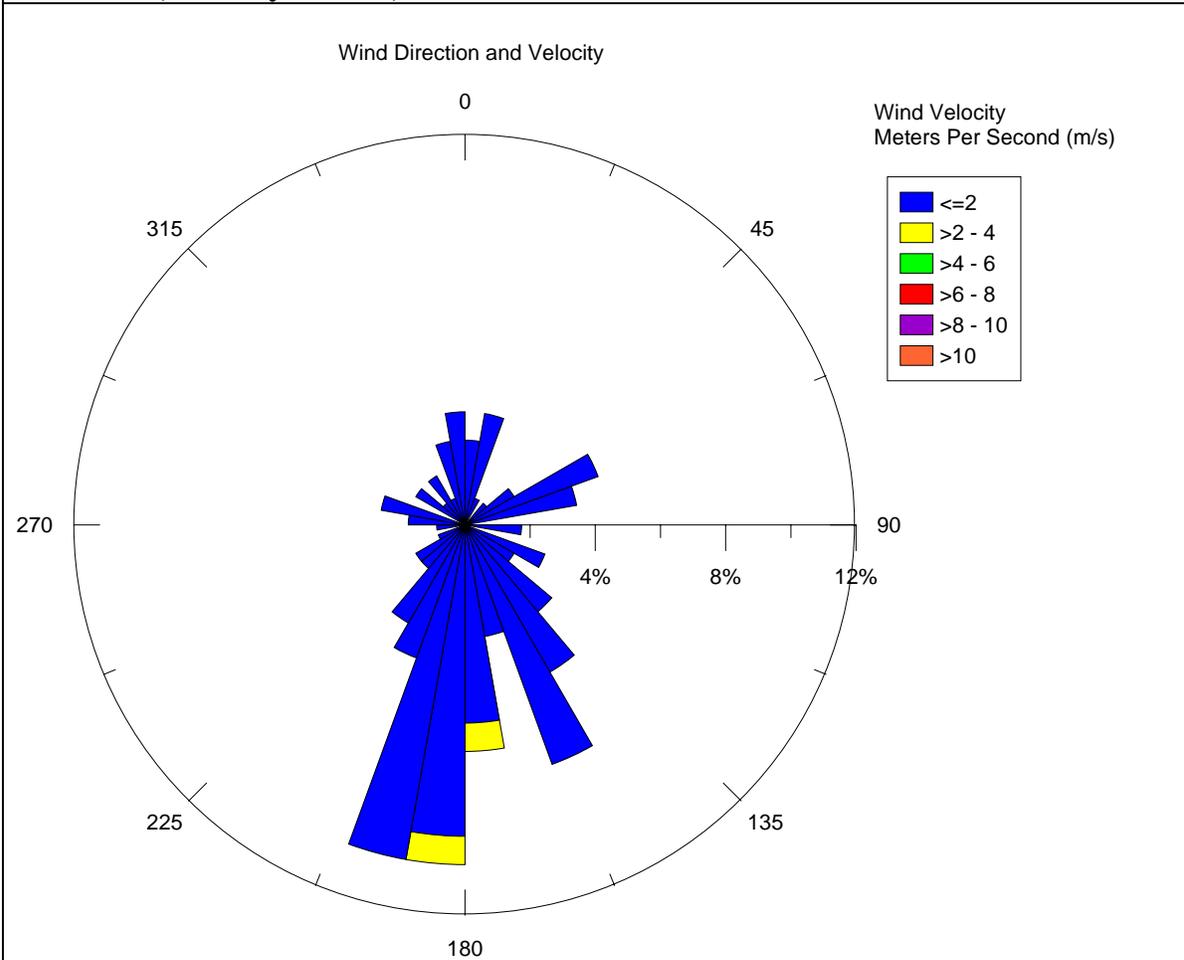
Date: 8/24/2010 Location 1(Dairy Farm), Activity 2	Time:	Start: 1025	Average Wind Speed: 2.19 m/s Range: 0.8 m/s to 3.4 m/s
		Stop: 1331	
Average Air Temperature: 24.10 °C Range: 20.8° C to 26.9° C	Average Humidity: 43.54% Range: 34% to 54%	Data collected by: Jed Januch U.S. EPA Region 10 OEA	

Sumas River Activity-Based Sampling
Location 1 (Dairy Farm), Activity 3, Weather Data



Date: 8/24/2010 Location 1 (Dairy Farm), Activity 3	Time:	Start: 1455	Average Wind Speed: 1.07 m/s Range: 0.3 m/s to 2.4 m/s
		Stop: 1801	
Average Air Temperature: 29.02 °C Range: 28.3° C to 30.4° C	Average Humidity: 34.27% Range: 30% to 40%	Data collected by: Jed Januch U.S. EPA Region 10 OEA	

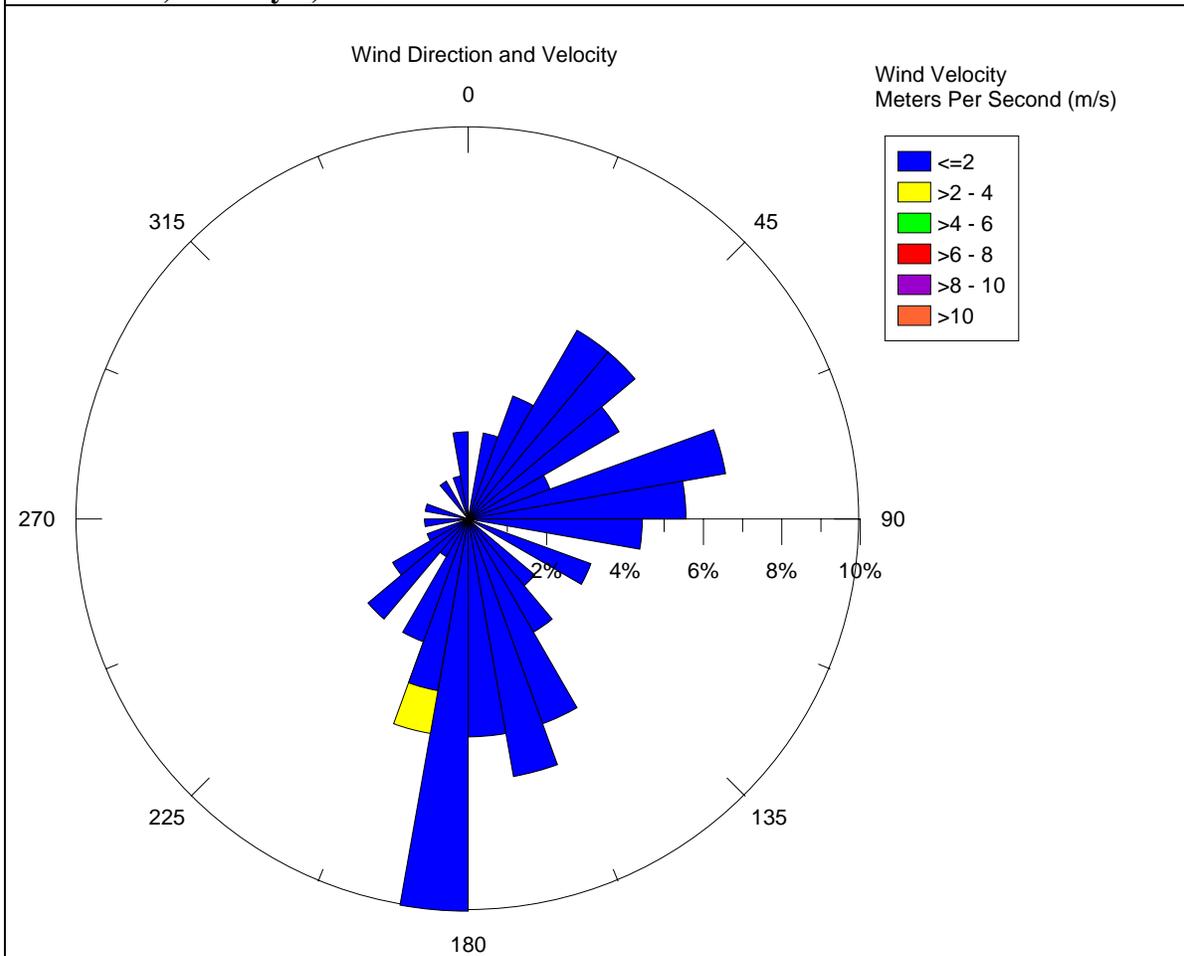
Sumas River Activity-Based Sampling
Location 2, Activity 1 and 2, Weather Data



Date: 8/25/2010 Location 2, Activity 1 and 2	Time:	Start: 0914	Average Wind Speed: 0.81 m/s Range: 0.1 m/s to 2.5 m/s
		Stop: 1302	
Average Air Temperature: 23.75°C Range: 18.5°C to 27.5°C	Average Humidity: 54.15% Range: 43% to 72%	Data collected by: Jed Januch U.S. EPA Region 10 OEA	

Sumas River Activity-Based Sampling

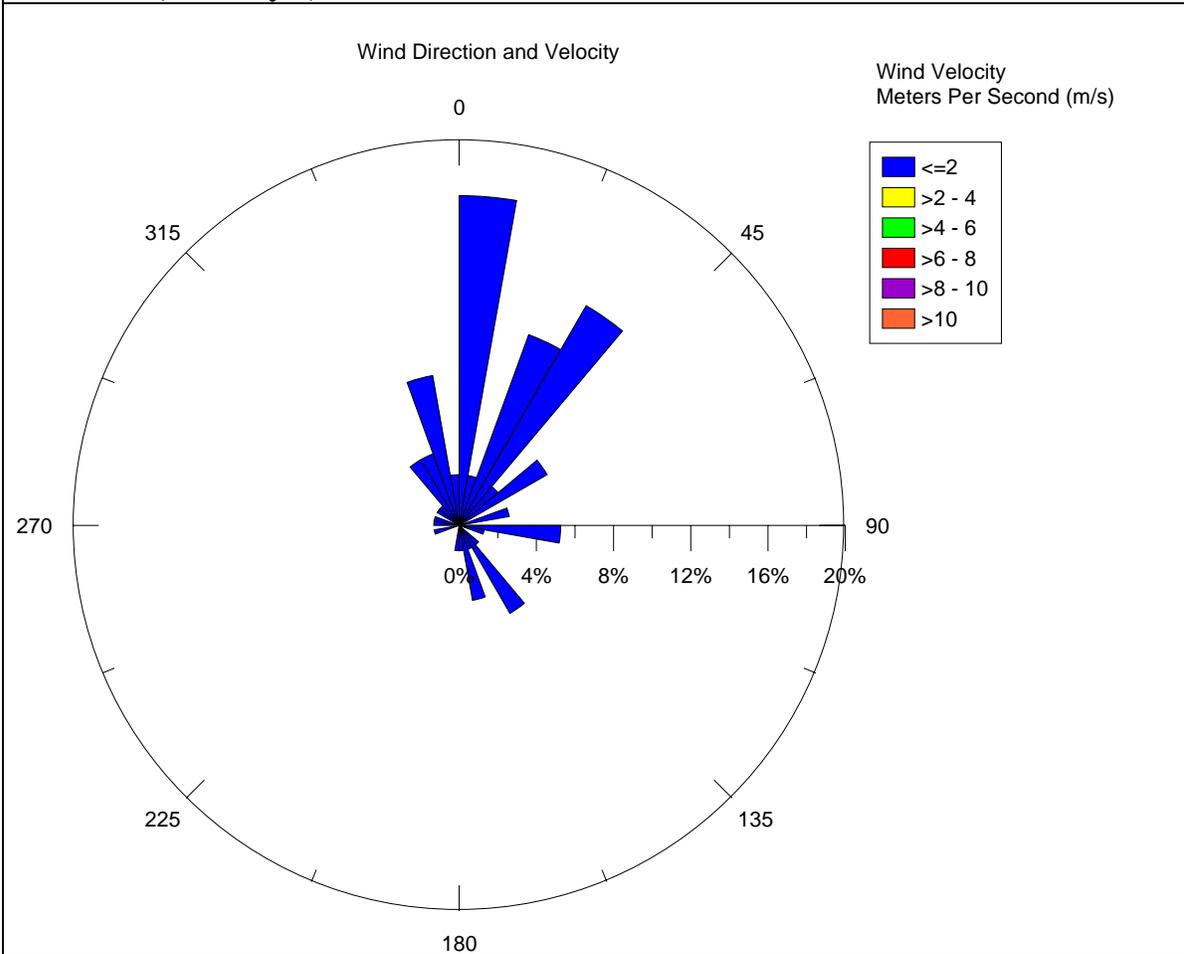
Location 2, Activity 3, Weather Data



Date: 8/25/2010 Location 2, Activity 3	Time:	Start: 1400	Average Wind Speed: 0.84 m/s Range: 0.1 m/s to 2.1 m/s
		Stop: 1702	
Average Air Temperature: 29.71 °C Range: 28.9° C to 30.7° C	Average Humidity: 34.92% Range: 31% to 40%	Data collected by: Jed Januch U.S. EPA Region 10 OEA	

Sumas River Activity-Based Sampling

Location 3, Activity 1, Weather Data



Date: 8/26/2010 Location 3, Activity 1	Time:	Start: 1030	Average Wind Speed: 0.31 m/s Range: 0 m/s to 0.8 m/s
		Stop: 1300	
Average Air Temperature: 15.87° C Range: 14.6° C to 17.8° C	Average Humidity: 80.56% Range: 65% to 91%	Data collected by: Jed Januch U.S. EPA Region 10 OEA	

APPENDIX G
AIR SAMPLE INFORMATION AND DATA
(to be provided upon request)