SOIL, SEDIMENT AND SURFACE WATER SAMPLING
SUMAS MOUNTAIN NATURALLY-OCCURRING ASBESTOS SITE
WHATCOM COUNTY, WASHINGTON

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INTRODUCTION

On May 12 and 13, 2009, the EPA Region 10 Office of Environmental Assessment (OEA) conducted surface water, upland soil, and sediment sampling at locations along Swift Creek and the Sumas River, downstream from a landslide on Sumas Mountain, in Whatcom County, Washington. This report documents the field sampling and presents the analytical results of the sampling.

The purpose of the sampling was to determine whether flood deposits along Swift Creek and the Sumas River contained asbestos, and if so, to determine the type of asbestos and the concentration. In addition to upland flood deposits, bank sediments and surface water were collected and analyzed to determine whether asbestos is present in these media and if concentrations change with distance from the source. Samples were also analyzed for selected metals in an attempt to better understand the mineral composition of flood deposits and determine if metals analyses can be used to indicate the presence or relative concentrations of asbestos (Schreier 2009). The tasks required to achieve these objectives were to:

- Collect soil samples at locations where flooding deposited sediments onto upland areas.
- Collect bank sediment samples from along Swift Creek and the Sumas River in the same areas where upland soil samples were collected.
- Collect surface water samples from Swift Creek and the Sumas River in the same areas where upland soil samples were collected.
- Collect bank sediment and surface water from a location in the Sumas River that is upstream of Swift Creek to determine upgradient levels of asbestos and selected metals.
- Analyze soil and sediment samples for asbestos using polarized light microscopy (PLM).
- Analyze soil samples for selected metals (Ca, Cr, Co, Mg, Ni).
- Analyze surface water samples for asbestos using transmission electron microscopy (TEM).
- Analyze surface water samples for selected metals (Ca, Cr, Co, Mg, Ni).
- Document the field event using a global positioning system device, photographs, and record observations in a logbook.

BACKGROUND

An earth flow type of landslide on the west side of the Sumas Mountain initiated around 1940 resulted in a significant deposition of sediments into Swift Creek during periods of rain and snow melt. Sampling and analysis conducted by EPA in April –May 2006, confirmed that sediment and the dredged material at this site are contaminated with chrysotile asbestos and a very small amount of actinolite asbestos. The concentration of asbestos in the dredged materials, measured by PLM, ranged from 0.1% to 4.4%, with an average concentration of 1.6%. Workers collecting the samples wore personal monitors which revealed airborne concentrations of asbestos ranging from 0.0044 phase contrast

microscopy equivalent (PCME) fibers per cubic centimeter of air (f/cc) to 0.055 PCME f/cc (E & E 2006). A PCME fiber is defined as a fiber with an aspect ratio (length: width) greater than 3:1, and is longer than 5 micrometers (µm) in length, and has a diameter between 0.2 and 3.0 µm. The OSHA permissible exposure limit (PEL) for asbestos is 0.1 f/cc eight-hour time weighted average (Title 29 of the CFR Part 1926.1101(c)(1)).

To further investigate the potential health risks for visitors to the Sumas Mountain site, EPA performed activity-based sampling on piles of dredged material deposited along Swift Creek in August 2006. EPA evaluated three scenarios that are typically performed at the site, including loading/hauling dredged material, raking/spreading dredged material, and recreation (walking, biking, and jogging). The results indicated that there were elevated levels of exposure to asbestos fibers for all three activities evaluated. Concentrations of PCME fibers ranged from not detected to 0.21 f/cc. The average concentrations of PCME fibers were 0.078 f/cc for loading/hauling, 0.018 f/cc for raking/spreading dredged material, and 0.029 f/cc for walking/biking on the piles. A risk evaluation using these data indicated that typical activities conducted on site may lead to an increased level of long-term risk of asbestos-related cancers resulting from regular exposures to dredged materials from the site.

In July 2008, EPA collected additional samples to determine the levels of asbestos in residential soils on Swift Creek properties where dredged materials may have been used for fill. Concentrations ranged from 0.25% to 6.5% at the 4 sampled properties adjacent to Swift Creek; asbestos was not detected at a background location. Soil samples also were analyzed for metals to determine whether the calcium to magnesium ratio in soils near the site can be used as a marker for asbestos contamination. While calcium to magnesium (Ca:Mg) ratios were altered as compared with the Ca:Mg ratios at the background location, a clear correlation could not be discerned from this data. Earlier work by Whatcom County and Dr. Hans Schreier at University of British Columbia has indicated that metals or metals ratios may be useful as indicators of asbestos contamination.

In early 2009, heavy rains caused flooding in much of western Washington, including the Sumas River. EPA was concerned that flood events deposited sediments containing asbestos along the banks. In February 2009, EPA staff visited the site with county and state officials to identify locations where January floods had deposited material onto uplands. At that time, preliminary sampling locations were identified based on observed flood deposits and access (e.g., rights of way). Locations on two private parcels were selected for sampling based on observations of large quantities of sediment having been deposited onto upland portions of the parcels. Once EPA identified these parcels, access letters were sent to property owners. Copies of these access letters are on file in EPA's Regional Office.

In May 2009, EPA staff visited sampling locations beginning with the farthest downstream location. At each location, surface water samples were collected first, followed by upland soil and then bank sediment. This ordering was done to prevent

contamination of one medium by another during sampling. Surface water samples were grab samples collected from as near to the middle of the river/creek as possible using an extendable sampling device from either the bank or a bridge. Upland soils and bank sediments were collected as composite samples from a roughly 3 foot by 3 foot area. Surface water samples were analyzed for asbestos by transmission electron microscopy (TEM) and selected metals by Inductively Coupled Plasma – Atomic Emission Spectroscopy (ICP-AES). Upland soil and bank sediment samples were analyzed for asbestos by PLM and selected metals by ICP-AES. Sampling results were made available to homeowners in July 2009 once data were compiled and validated.

METHODS AND MATERIALS

I. Experimental Design

This project consisted of soil sampling at locations along Swift Creek and the Sumas River where recent flooding deposited material potentially containing naturally occurring asbestos onto uplands. The intent was to determine how asbestos concentrations in bank sediment and upland soils are impacted by flood events and to determine if concentrations decrease with increasing distance from the Sumas Mountain landslide. Surface water samples also were collected to determine asbestos concentrations. All samples also were analyzed for selected metals to see if they are elevated in samples that contained asbestos. Sample locations are shown on Figure 1. At each location, surface water, upland soil, and sediment samples were collected, with the exception of Location 1 (upstream location on Sumas River). At Location 1 only bank sediment and surface water was collected, because no flooding appeared to have occurred recently at this location. A site-specific sampling and analysis plan (SAP) and quality assurance project plan (QAPP) were developed by OEA and implemented for this project (EPA 2009). The QAPP received approval by the EPA Region 10 Quality Assurance officer prior to conducting field work.

II. Field Team

The field team consisted of EPA staff from Region 10 Office of Environmental Assessment (OEA): two staff to perform the sampling and take GPS readings and one staff to log samples in the field log book, take photographs, and perform other field support tasks. The field sampling personnel wore PPE (including respirators) during sample collection.

III. Measurements and Sampling

The time of sampling was generally very short, on the order of about 15-20 minutes per location. Digital photographs were taken while sampling activities were conducted (see Appendix A). In addition, global positioning system (GPS) readings were taken at sampling locations using a Garmin GPSMAP 60CSx device (see Figure 1).

A. Field Sample Data Recording

The field sample data collected during the soil sampling event were recorded in a log book (see Appendix B). Photos of many of the sampling locations are included in Appendix A. Meteorological data were not gathered directly; however, sampling conditions on the day of sampling were mostly dry, with chilly to mild temperatures and some clouds.

B1. Surface Water Sampling

Surface water samples were collected by submerging the sampling container into the river or creek with the mouth pointed upstream. Field personnel attempted to collect the sample from as near the midstream as possible using an extendable sampling device. At location 12, the field crew elected to collect an additional surface water sample near the bank where bank sediments appeared to be mixing with near bank waters.

B2. Upland Soil and Bank Sediment Sampling

Upland soil and bank sediment samples were composite samples generally collected from the top 0-2 inches at each sampling location. Sample collection involved scraping away surface vegetation if present and scraping or scooping surface material from up to 5 sublocations, placing into a plastic mixing bowl, thoroughly homogenizing by hand, and placing in a clean glass or plastic sample containers. At location 2, the field crew elected to collect the upland soil sample from the very top surface of the soil as a layer of fine, whitish, grey material was apparent.

C. Health and Safety

The individuals participating in the sampling activities wore level C personal protective equipment (PPE) consisting of a Tyvek® suit, latex gloves, rubber safety boots, and full face air purifying respirator (APR) with type P-100 high efficiency particulate arrestance (HEPA) filters. After sampling at each location was completed, the individuals doing the sampling were decontaminated first with soapy water and then rinse water before they removed their PPE. Used PPE was disposed of in plastic asbestos debris bags and transported to the Manchester Environmental Laboratory for disposal.

IV. Analytical Methods

Sample Preparation

Surface water samples for asbestos were initially going to be analyzed using EPA Method 100.2; however, the samples contained concentrations of asbestos high enough to require the lab to use EPA Method 100.1 instead. Preparation of the samples was conducted in accordance with EPA Method 100.1. Each sample was shaken and then sonicated briefly in a Branson 2200 sonicator to distribute particulate evenly. Several aliquots were filtered onto 0.22 um, 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.

Surface water samples for metals were prepared in accordance with ILM05.4, ICP-AES requirements (See Appendix B of the Soil Sampling and Analysis Plan, EPA 2009).

Upland soil and bank sediment samples for asbestos were dried in a lab oven at a sufficient temperature so that optical properties of chrysotile asbestos were not altered (< 500° C). The composite samples were then crushed to produce material with a nominal size less than 8 centimeters (cm) in diameter. ASTM method C-702-80 was used to reduce the size of the crushed grab sample to a one-pint aliquot. The one-pint aliquot was further crushed using a BICO mill or equivalent to produce a material less than 200 Tyler mesh (< 0.074 millimeters). Following crushing, 4 split samples were sent to EPA's Manchester Environmental Laboratory for analysis.

Upland soil and bank sediment samples for metals were prepared in accordance with ILM05.4, ICP-AES requirements (See Appendix B of the Soil Sampling and Analysis Plan, EPA 2009).

Analytical Requirements

The surface water samples were analyzed for asbestos by transmission electron microscopy (TEM) using EPA Method 100.1. Surface water samples also were analyzed for metals by ILM05.4 ICP-AES.

The upland soil and sediment samples were analyzed for asbestos by a stereomicroscope and polarized light microscopy (PLM) using the California Air Resources Board (CARB) Method 435. Samples were analyzed for asbestos by PLM using 400 point counts. This results in an analytical sensitivity of 0.25%.

The upland soil and sediment samples also were analyzed for metals by EPA Method 6010. Detection limits for non-detected inorganic compounds are indicated in Table 2 where the qualifier is a "U."

V. Quality Assurance and Quality Control

Quality Assurance (QA) and quality control (QC) were defined in Section C1 of the QAPP and were based on the analytical methods used. The QA/QC samples consisted of duplicate and replicate analyses in the laboratory, and analysis of field duplicates. A field duplicate was sent to the primary lab for PLM analysis. Four split samples were sent from the primary lab to Manchester Environmental Laboratory for analysis. These results are discussed further in the next section.

Copies of the chain of custody documentation for the project are provided in Appendix C.

RESULTS OF ANALYSIS

The sampling results for this project are presented in Table 1 for upland soil and bank sediment and Table 2 for surface water. The complete data are presented in Appendix D. Samples were collected at 2 locations along Swift Creek, 10 locations along the Sumas River, and 1 upstream location.

Asbestos concentrations in upland soil and bank sediment samples are shown in Figure 2. Along Swift Creek, concentrations ranged from 1.75% to 21.75% in the bank sediments and from 2.75% to 26.75% in the upland soils. At location 2, where an attempt was made to collect more concentrated material in the upland, the concentration was 32.75% (2.75% or which was actinolite asbestos). Along the Sumas River, concentrations ranged from 7.25% to 22.75% in the bank sediments and from 0.25% to 26.75% in the upland soils. The concentration in the upstream, upland soil sample from the Sumas River was 0.5%. The majority of fibers detected by PLM were chrysotile fibers; however, a few actinolite fibers also were detected in some samples.

Concentrations of the five selected metals in soil and sediment samples from Swift Creek and Sumas River were elevated relative to the upstream location for all inorganic compounds except for calcium. See Table 1 for details. One reason for collecting metals data was to determine whether calcium-to-magnesium (Ca:Mg) ratios could be used as an indicator of asbestos containing soils. The Ca:Mg ratios ranged from 0.0041 to 0.027 in the upland soil and bank sediment samples (excluding the upstream location); the average of the ratios was 0.012. At the background location, the Ca:Mg ratio was 0.415. These data suggest that Ca:Mg ratios could be used as an indicator of materials that may contain asbestos; however, a broader study may be needed to confirm this finding. Further, the Ca:Mg ratios wouldn't necessarily indicate that asbestos fibers are present, but rather may only indicate where a higher proportion of serpentine material is present.

The asbestos concentrations in downstream locations were elevated relative to the upstream sample. Clearly, flood events, such as the one in January 2009, result in transport and deposition of fine, asbestos fibers onto upland areas and along river banks as flood waters recede. Processes that may contribute to increased asbestos concentrations downstream from the slide area include the following:

- Higher concentrations of fine materials moving in surface water during flood events;
- Fines being deposited in areas with reduced velocity; and
- Increased asbestos concentrations in the portion of the slide that is currently sloughing.

Two field duplicate and four laboratory split samples were collected and analyzed for quality assurance and quality control purposes. The field duplicate sample was sent to the primary laboratory for analysis by PLM with the other samples. These samples were from locations 3/4 and 12 as shown in Table 1. As you can see, there is reasonably good agreement between each primary sample and the duplicate. The split samples were crushed in the primary laboratory and a part of these samples was sent to Manchester

Environmental Lab (MEL) for analysis using the same PLM method. Table 3 presents the comparison of results for the laboratory splits. These results show that the inter-laboratory agreement is not as good as the intra-laboratory agreement. This may be attributable to non-homogeneity of the samples, especially for soils. However, in general, both the split and duplicate results are considered to be within a reasonable range of uncertainty for asbestos analysis by PLM.

Table 2 presents the surface water sampling results; the complete data are presented in Appendix D. Asbestos concentrations in surface water samples are shown in Figure 3. Along Swift Creek, concentrations ranged from 363 million fibers per liter (MFL, fibers longer than 10 microns) to 1,483 MFL. Along the Sumas River, concentrations ranged from 63 MFL to 879 MFL. At a single location (Location 12) the field team elected to collect a near bank sample from an area where sediments were observed to be mixing with water; the concentration at this location was 2,324 MFL. Asbestos was not detected in the upstream, surface water sample from the Sumas River. Note that all fibers detected in surface water by TEM were chrysotile fibers.

Metals concentrations for surface water samples from Swift Creek and Sumas River were elevated relative to the upstream location for three of the five selected metals: chromium, magnesium, and nickel. Calcium concentrations were generally higher in the upstream location compared to the other locations (except Location 15), and cobalt was detected in all locations except the upstream location. See Table 2 for details.

CONCLUSIONS

Chrysotile asbestos (and some actinolite asbestos) was detected in upland soil, bank sediment, and surface water samples collected from Swift Creek and Sumas River downstream from Swift Creek. The concentrations detected were much higher than observed in earlier sampling events conducted by EPA.[1] (However, earlier sampling events were focused on dredged materials which may have been diluted through mixing during dredging compared with these samples) Concentrations ranged up to 27% in upland soil samples and up to 22.75% in bank sediment samples collected along the Sumas River downstream from Swift Creek. Surface water samples ranged up to 879 MFL in the Sumas River downstream from Swift Creek. These sample results indicate that asbestos is present in the Sumas River and flooding has contributed to distribution of asbestos-containing materials beyond the river banks.

Exposures to asbestos could occur through incidental or routine contact with bank materials along Swift Creek and the Sumas River (downstream of the confluence with Swift Creek). Direct contact with asbestos-containing soils/sediments could result in releases of asbestos fibers to air, where they can be breathed into the lungs. Chronic inhalation exposures to asbestos are the main types of exposures that can have an adverse effect on health. Asbestos in Swift Creek and Sumas River surface water makes it

[1] Note that in 2005, the Whatcom County Health Department reported levels up to 46% asbestos in the fine fraction of a biased sample of “cake” material collected in sediment (as reported by U.S. Department of Health and Human Services, 2006).

unsuitable for drinking. Also, uses of this water for agricultural purposes could spread the asbestos farther from the creek and river.

Given the potential health risks associated with disturbing asbestos-containing materials, property owners, including residents, business owners, and farmers, along the Sumas River should take the following precautions:

- Remove shoes before entering homes or other buildings to prevent tracking-in dirt.
- Use doormats to lower the amount of soil that is tracked into the home.
- Keep windows and doors closed on windy days and during nearby construction.
- Use a wet rag instead of a dry rag or duster to dust.
- Use a wet mop on non-carpeted floors.
- Use washable area rugs on floors and wash them regularly.
- Vacuum carpets often using a vacuum with a high efficiency HEPA filter.
- Install a HEPA quality filter in forced air furnace systems.
- Try to keep pets from carrying dust or dirt on their fur or feet into the home by keeping them out of areas where asbestos may be present. If they do get dirty, bathe the pet (brushing can release fibers into the air).
- Pave or cover unpaved walkways, driveways, or roadways. The cover should be thick enough to prevent disturbance of asbestos-contaminated soil during routine uses or activities.
- Cover known Swift Creek sediments in gardens and yards with asbestos-free soil or landscape covering. The cover should be thick enough to prevent disturbance of asbestos-contaminated soil during routine uses or activities.
- Pre-wet garden (or agricultural) areas before digging, shoveling, or disturbing soil.
- Consider wearing coveralls or other work clothes while gardening and wash up outside so that any asbestos is not brought indoors.
- Neither Swift Creek nor Sumas River surface water (downstream from the confluence with Swift Creek) should be used for domestic purposes because it contains asbestos and some metals that exceed drinking water standards.
- Water from the Sumas River, if used for irrigation, could deposit asbestos on plants and soil.

Selected metals data were collected to determine whether any trends related to Ca:Mg ratios were present and if so, whether these could be used as an indicator of asbestos-contaminated soils. Upland soils and bank sediments collected along Swift Creek and the Sumas River show elevated ratios of Ca:Mg as compared with a background location; however, no clear correlations between asbestos concentration and individual metals concentrations or Ca:Mg are apparent.

Future sampling that better characterizes the distribution of asbestos at greater distances from Swift Creek and the downstream portions of the Sumas River may be useful in understanding the extent of naturally occurring asbestos in the affected areas. Additional activity-based sampling could be used to better understand potential exposures and risks

associated with conducting routine activities in areas with naturally occurring asbestos. EPA is working cooperatively with other state, local, and Federal agencies to further investigate the Sumas Mountain Naturally Occurring Asbestos site.

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United States Department of Health and Human Services, March 31, 2006, Health Consultation, Swift Creek Sediment Asbestos, Whatcom County, Washington.

United States Environmental Protection Agency (EPA), May 11, 2009, Sampling and Analysis Plan, Soil, Sediment, and Surface Water, Swift Creek Asbestos Site, Whatcom County, Washington, Revision 1.4.

Table 1
Sediment and Soil Sample Results
Swift Creek and Sumas River

		Units: mg/kg dry weight										Units: %
Sample No.	**Location**	**Calcium**		**Chromium**		**Cobalt**		**Magnesium**		**Nickel**		**Asbestos**
MJB624	Loc. 1 bank sed.	5810		39		12.5		14000		112		0.5
MJB627	Loc. 2 bank sed.	1070		372		83.7		262000	D	2090	D	1.75
MJB629	Loc. 2 upland soil	1380		330		81.6	J	213000	DJ	1810	D	32.75
MJB630	Loc. 3/4 bank sed.	1630		318		74.5		341000	D	1690		13.75
MJB633	Loc. 3/4 bank sed. (duplicate)	1730		309		75.3		342000		1740		21.75
MJB632	Loc. 3/4 upland soil	3600		263		72.2		276000	D	1530		2.75
MJB635	Loc. 3/4 upland soil (duplicate)	3600		262		73.3		276000	D	1530		3
MJB636	Loc. 5 bank sed.	2010		319		73.7		192000	D	1740	D	7.25
MJB638	Loc. 5 upland soil	2650		280		69.5		173000	D	1620	D	0.25
MJB639	Loc. 6 bank sed.	1830		316		74.4		195000	D	1700		8.5
MJB640	Loc. 6 upland soil	4160		272		80.1		167000	D	1590		16.5
MJB642	Loc. 7 bank sed.	3490		289		81.4		195000	D	1730	D	22.75
MJB644	Loc. 7 upland soil	3020		272		69.7		167000	D	1530	D	6.25
MJB648	Loc. 9 bank sed.	2120		315		77.7		190000	D	1750	D	11
MJB650	Loc. 9 upland soil	4300		258		77.1		158000	D	1490		3.5
MJB651	Loc. 10 bank sed.	2360		302		76.6		180000	D	1710	D	11
MJB653	Loc. 10 upland soil	2580		288		75.8		180000	D	1660	D	19.25
MJB654	Loc. 11 bank sed.	1770		306		74.7		195000	D	1710	D	15.75
MJB656	Loc. 11 upland soil	1990		305		74		190000	D	1720	D	15
MJB657	Loc. 12 bank sed.	1890		291		73.6		196000	D	1690	D	14.25
MJB670	Loc. 12 bank sed. (duplicate)	2030		316		76.7	J	198000	DJ	1630	D	14.5
MJB659	Loc. 12 upland soil	2170		260		71.3		179000	D	1650	D	10.25
MJB671	Loc. 12 upland soil (duplicate)	2100		273		74.6	J	175000	DJ	1640	D	3.75
MJB660	Loc. 13 bank sed.	2170		328		79.2	J	248000	DJ	1620	D	10.25
MJB662	Loc. 13 upland soil	2580		317		77.4	J	229000	DJ	1480	D	10.25
MJB663	Loc. 14 bank sed.	2230		314		74.8	J	192000	DJ	1660		15.5
MJB665	Loc. 14 upland soil	2260		323		76.3	J	199000	DJ	1710		16.5
MJB666	Loc. 15 bank sed.	2500		315		77.4	J	197000	DJ	1670		21.25
MJB668	Loc. 15 upland soil	2830		297		76.2	J	193000	DJ	1600		26.75

Key:
mg/kg = milligrams per kilogram
% = percent
D = data qualifier
J = data qualifer, estimated value

Table 2
Surface Water Sample Results
Swift Creek and Sumas River

		Units: ug/L										Units: MFL>10 um	
Sample No.	**Location**	**Calcium**		**Chromium**		**Cobalt**		**Magnesium**		**Nickel**		**Asbestos**	
MJB625	Loc. 1 surface water	15900		0.34	J	50	U	15900		3.9	J	0.19	U
MJB628	Loc. 2 surface water	5280		113		25.7	J	81400		673		1241	
MJB631	Loc. 3/4 surface water	5410		180		41.5	J	132000		1070		1483	
MJB634	Loc. 3/4 surface water (dupe)	5410		197		45.5	J	143000		1160		363	
MJB637	Loc. 5 surface water	11200		62.1		14.1	J	60000		369		63	
MJB641	Loc. 6 surface water	11000		65.3		15.2	J	61700		385		293	
MJB643	Loc. 7 surface water	8900		76.8		18.2	J	67900		467		879	
MJB649	Loc. 9 surface water	9310		76.8		18.2	J	68100		466		488	
MJB652	Loc. 10 surface water	9190		75.3		17.9	J	68000		454		544	
MJB655	Loc. 11 surface water	9730		122		29.8	J	101000		736		530	
MJB658	Loc. 12 surface water	10400		150		35	J	122000		880		321	
MJB661	Loc. 13 surface water	11200		86.1		20.2	J	79000		488		265	
MJB664	Loc. 14 surface water	11900		31.9		8.1	J	43300		193		213	
MJB667	Loc. 15 surface water	17600		19.9		4.9	J	32500		117		168	
MJB672	Loc. 9 surface water (dupe)	9040		79.9		18.5	J	70100		465		112	
MJB673	Trip Blank	12.9	J	10	U	50	U	30.9	U	40	U		
	Location 12 (near bank)											2324	

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

Table 3
Summary of Laboratory Split Samples
Sumas Mountain Asbestos Site

		Units: %	
Sample No.	**Location**	**Original**	**Split**
MJB633	Loc. 3/4 bank sed. (duplicate)	21.75	15
MJB638	Loc. 5 upland soil	0.25	9.25
MJB650	Loc. 9 upland soil	3.5	9.25
MJB670	Loc. 12 bank sed. (duplicate)	14.5	19.5

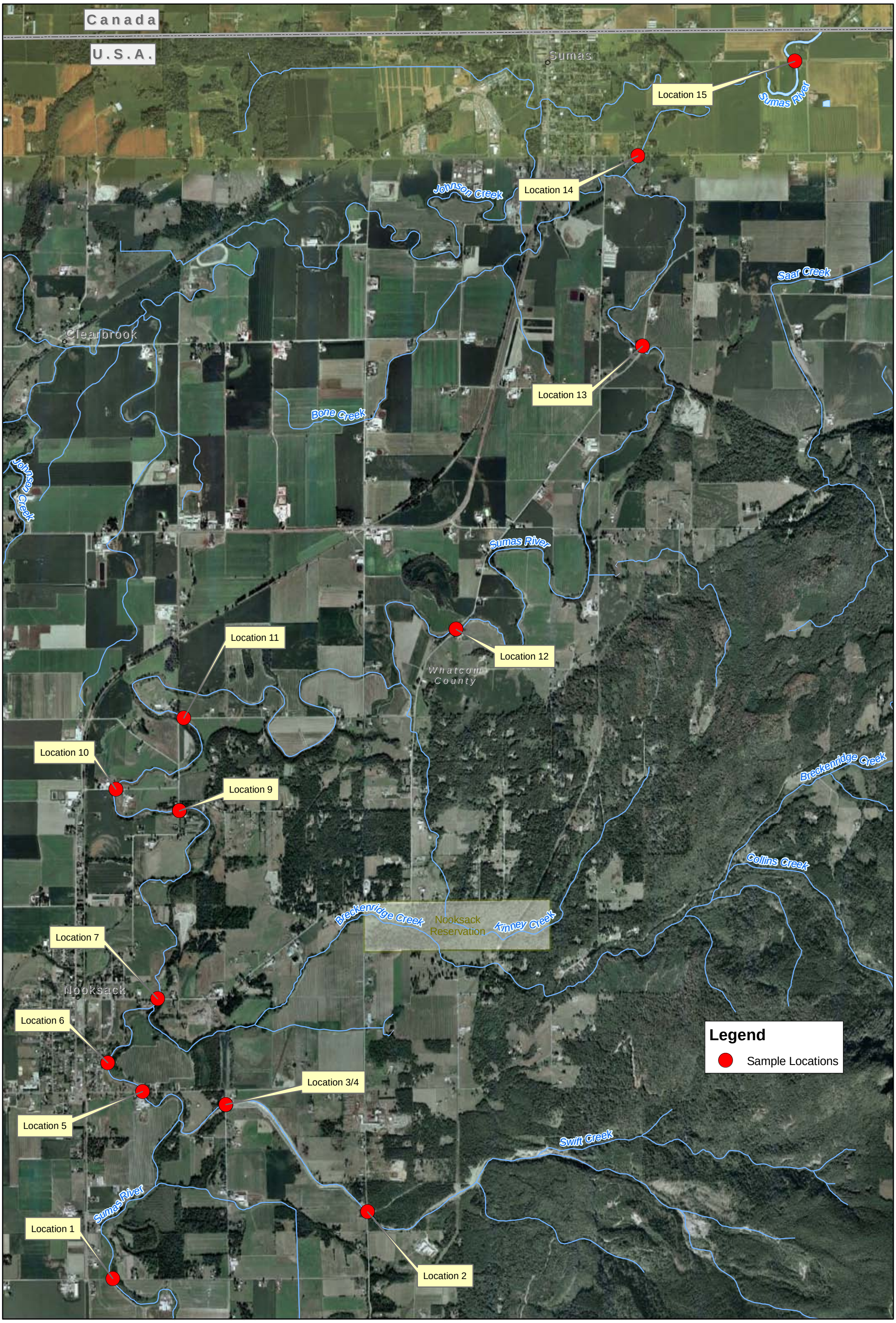

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Figure 1:
Sampling Locations
Swift Creek/Sumas River

Sampling Dates: May 12-13, 2009

Map Created 07/23/2009 EPA Region 10

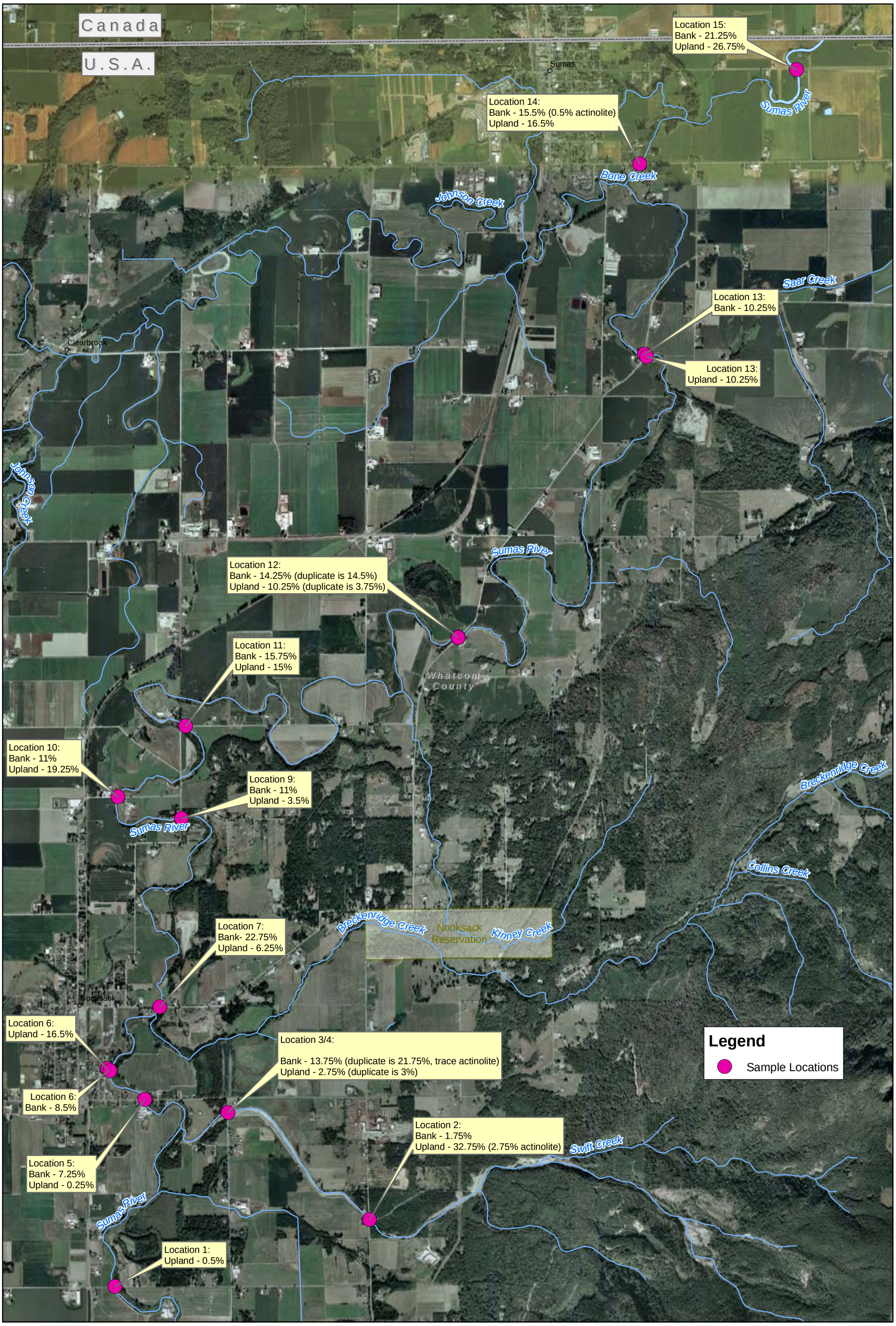

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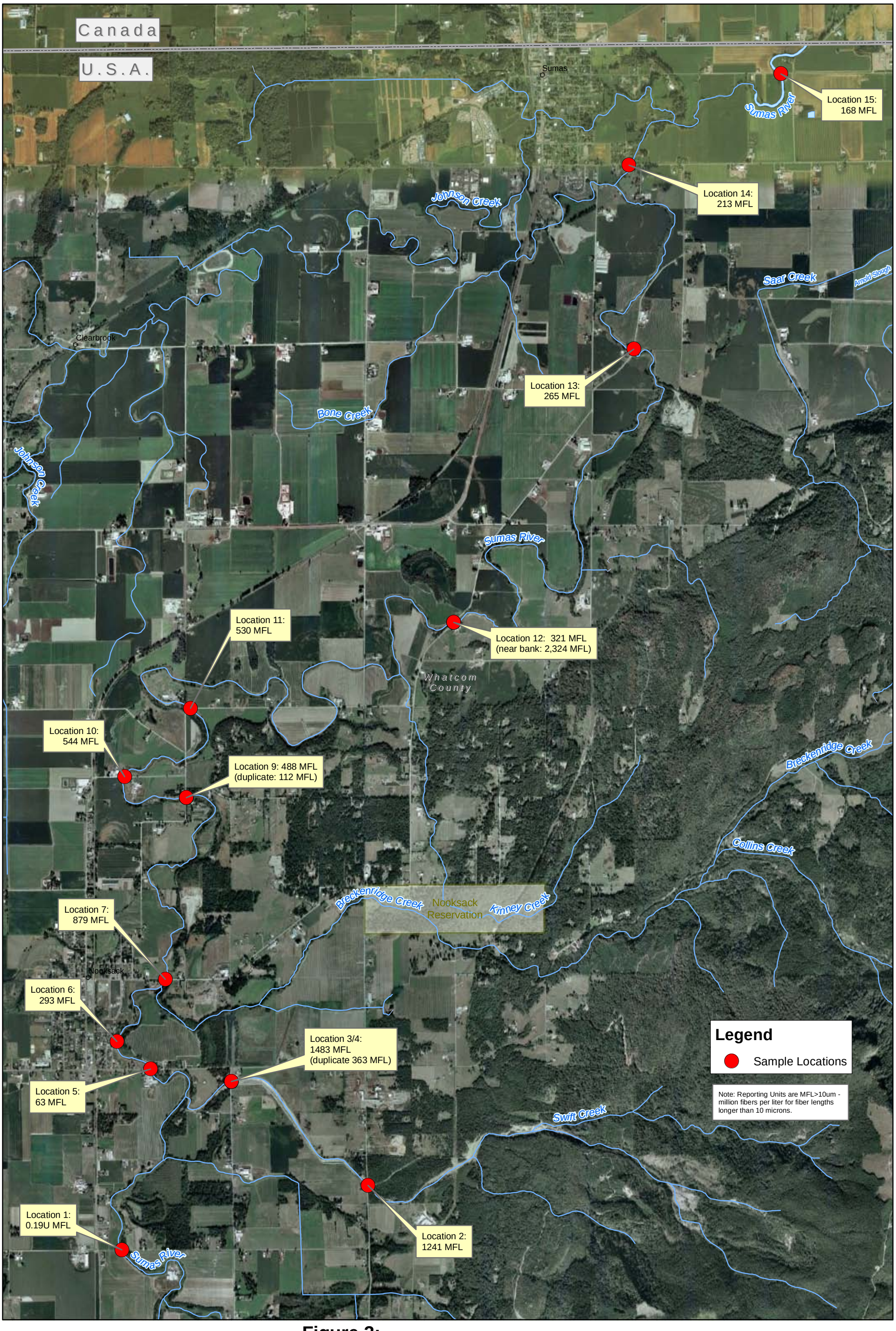
Figure 2:
Chrysotile Asbestos Concentrations by PLM
Swift Creek/Sumas River
Sampling Dates: May 12-13, 2009

0 250 500 1,000 1,500 Meters

DRAFT Map Created 06/23/2009 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.

Figure 3:
Asbestos Concentrations In Surface Water
Swift Creek/Sumas River

Sampling Dates: May 12-13, 2009

0 250 500 1,000 1,500 Meters

N W E S

DRAFT Map Created 07/10/2009 EPA Region 10

APPENDIX A

Photo Log

Sample Location 1

Sample Location 1

Sample Location 2

Sample Location 2

Photo Log

Sample Location 2

Sample Location 3/4

Sample Location 3/4

Sample Location 3/4

Photo Log

Sample Location 3/4

Sample Location 5

Sample Location 5

Sample Location 6

Photo Log

Sample Location 6

Sample Location 7

Sample Location 7

Sample Location 7

Photo Log

Sample Location 7

Sample Location 9

Sample Location 9

Sample Location 10

Photo Log

Sample Location 10

Sample Location 10

Sample Location 11

Sample Location 12

Photo Log

Sample Location 12

Sample Location 12

Sample Location 12

Sample Location 13

Photo Log

Sample Location 13

Sample Location 14

Sample Location 14

Sample Location 14

Photo Log

Sample Location 15

Sample Location 15

Sample Location 15

APPENDIX B

5/12/09

Janusch, Crawford Wroble
arrive at Location 15 @ 8:15am.

Location #15 #38511 MJB 667

0841 Metals Sample Photo #1
GPS Way pt. # 011, Pres <2 pH HNO_3

0843 Asbestos water 09194019

0900 Upland Sediment under Bridge
Photo #2 MJB 668

0904 Bank Sediment N. of Bridge
photo #3 MJB 666

09194018 - Fluid Bed

Location 14 #38511

0933 Asbestos - 09194016 way pt 012
photo #4
Metals

0945 upland sediment under Bridge
photo #5

0947 Bank sediment south of Bridge
photo #6

Location 13 #38511
GPS Way pt. # 013 09194013

1026 Asbestos Water Sample photo #7

1027 Metals water Sample

1034 ~~Bank~~ upland Sediment New GPS
GPS way pt #14

1038 Bank sediment photo #8

Location 12 GPS way pt. # 15
Photo #9 #16

1104 Asbestos water Sample 09194010
1145 Asbestos #2 @ SW 09194049
1106 Metals water sample MJB 658

1135 upland Sediment East of Bridge
Photo # 10 - taking soil metal MJB 671
11 - compositing metal dup
MJB 659 MJB 670
0919 ~~[illegible]~~ 4011 Asbestos
1141 Bank Sediment metals MJB 657
Photo # 12
09194009 - FBA
09194048 - FBA Dup

Location 11 GPS way pt. #017

1210 metals - MJB655
pH < 2 HNO_3
1211 Asbestos - 09194001
~~1215 Asbestos - [illegible] #09194009~~
1218 Upland ~~Bank~~ Sediment Photo #13
metals MJB656
asbestos 09194008

1222 Bank sediment
metals MJB654
asbestos 09194007
FBA 09194007

Location 10 GPS way pt. #018

1327 metals - MJB652
pH < 2 HNO_3
Photo 14 & 15
1328 Asbestos - 09194005

1338 upland Sediment Photo #16
Asbestos 09194006
metals MJB653
1341 Bank Sediment
Asbestos 09194004
metals MJB651
FBA 09194004

Location 9 GPS way pt # 019

1400 metals — Sample MJB 649 PH<2 HNO_3
Photo #17 — Duplicate MJB 672

1402 Asbestos — sample 09194043
— Duplicate 09194050

1409 upland Sediment Photo #18
metals - MJB 650
Asbestos - 09194044
FSA - 09194044

1413 Bank Sediment
metals - MJB 648
Asbestos - 09194042

Location 7 GPS way pt. #020

photo 19 - mixing w/ Brackenridge Creek

20 - Sampling

1440 metals - MJB643

1441 asbestos - 09194037

1448 Upland Sediment photo 21
asbestos - 09194038
metals - MJB644

1450 Bank Sediment photo 22
asbestos - 09194036
metals MJB 642
FBA - 09194036

5/13/09

Location 1 GPS way pt. #021

0809 Metals - MJB625 pres pH<2
Photo's 23 & 24 sampling H2O3

0810 Asbestos - 09194002

0808 Bank Sediment
asbestos - 09194000
Metals - MJB 624
FBA 09194

Location # 6 GPS way pt # 022
Photo # 25
0901 - metals MJB641

0902 - asbestos 09194035

0905 - upland sediment - GPS way pt 023
Photo # 26
metals - MJB640
asbestos - 09194034
FBA - 09194034
0908 Bank Sediment
metals - MJB 639
asbestos - 09194033
FB upland

GPS 24?

Location # 5 GPS way pt # 25

0933 - metals - MJB 637
Photo 27
0934 - asbestos - 09194031

0940 upland Sed -
asbestos - 09194032
metals - MJB 638
FBA - 09194032
Photo # 28
0944 Bank Sed -
metals - MJB 636
asbestos - 09194030

Location 3/4 GPS any pt # 26

1034 metals — Sample MJB 634
— Duplicate MJB 631

Photo # 29

1036 Asbestos — Sample 09194028
— Duplicate 09194025

1046 upland Sed.

Photo # 30

metals — Sample MJB 635
— Duplicate MJB 632

asbestos — Sample 09194029
— Duplicate 09194026

Photo 31 FW mixing

1053 Bank Sediment

Photo # 31

metals — Sample MJB 633
— duplicate MJB 630

asbestos — Sample 09194027
— Duplicate 09194024

FBA — Sample 09194027
— Duplicate 09194024

GPS way pt #27

Location #2

1122 Asbestos - 09194022
Photo 33 & 34
1123 Metals - MJD628

1130 Upland Sed.
metals MJB 629
asbestos 09194023

1133 Bank Sed.
metals MJD 627
Asbestos 09194021
FBA 09194021

1 Gallon Sample for
USGS
Photo 35

APPENDIX C

EPA Region 10, 1200 Sixth Avenue, Seattle, WA 98101

Sample Custody & Analysis Required Form

EPA Manchester Laboratory, 7411 Beach Drive East, Port Orchard, WA 98366, 360-871-8700

Form Effective Date: July 2005

Revision 1

Project Name	Project Code	Method of Shipment/carrier	Airbill Number (if known prior to sealing):
Swift Creek	ESD-122D	Fed Ex	8673 3240 4208
Account Code	**EPA Project Manager/phone number**	**Check all that apply**	
	Elly Hale 206 553 1215	☐ Enforce/Custody ☐ Possible Toxic/Hazardous ☐ Data Confidential	

Sampler Names (Print & Sign). *Mark* (R) *after name of principal recorder.*
Julie Wroble (R)
Fed Janvch
Jennifer Crawford Lafferty

If applicable, circle the set of selected metals:

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

(see reverse for more to add/circle)

① Matrix Codes:
10 Water/Liquid (Total)
20 Water/Liquid (Filtered)
40 Sediment/Soil/Solid/Bulk
70 Tissue
80 Oil/Solvent
44 Air filter
42 Wipe/Swab[1]
00 _____

[1] PCB wipe is to be 10cm x 10cm (100 cm²)

#C ② enter the number of containers for each preservative type followed by the appropriate preservation code P ③:

A - HCl
B - HNO_3
C - NaOH
D - H_2SO_4
E - $Na_2S_2O_3$
F - ascorbic acid[2], then HCl
G - $Na_2S_2O_3$+EDTA
H - EDTA
N - No chemical preservation
~~P - Bottles pre-preserved at lab~~
T - To be preserved at the lab

[2] $Na_2S_2O_3$ *if required by plan.*

W - _____

☐ Check here if the cooler is iced

④ Enter the letter or range of letters on each container for each group of containers with the same preservative type. Each container for each unique sample number must have a unique letter on it.

Laboratory: *see the applicable QAPP, SOW and/or Analytical Support Request for specific methods and detection, reporting, and/or quantitation limits*

EPA Method 100.2

Sampler's comments for the laboratory:

EPA Sample number Yr	Wk	Sequence	Sampling Date & Time Yr	Mo	Day	Time	Matrix ①	#C ②	P ③	#C ②	P ③	#C ②	P ③	#C ②	P ③	Sampler Initials	Sample/Station Description/Field Measurements	Organics (see reverse) VOA	BNA	Pest	PCB	PAH	Metals (see reverse) CLP	Selected	Mercury	Micro (see reverse) E. Coli	F. Coliform	T. Coliform	General Chemistry (see reverse) TSS	TDS	BOD 5	NO2+NO3	Oil & Grease	Asbestos	Additional Write in Analyses (see reverse)		
09	19	40 19	09	05	12	0843	10	1	N							JW	Location 15																	X			
09	19	40 16	09	05	12	0933	10	1	N							JW	Location 14																	X			
09	19	40 13	09	05	12	1026	10	1	N							JW	Location 13																	X			
09	19	40 10	09	05	12	1104	10	1	N							JW	Location 12																	X			
09	19	40 49	09	05	12	1145	10	1	N							JW	Location 12 (near bank)																	X			
09	19	40 01	09	05	12	1211	10	1	N							JW	Location 11																	X			
09	19	40 05	09	05	12	1328	10	1	N							JW	Location 10																	X			
09	19	40 43	09	05	12	1402	10	1	N							JW	Location 9																	X			
09	19	40 37	09	05	12	1441	10	1	N							JW	Location 7																	X			
09	19	40 50	09	05	12	1402	10	1	N							JW	Location 9																	X			

Chain of Custody Record

Relinquished by (Signature)	Date	Time	Received by (Signature)	Date	Time
Jennifer Lafferty	5/12/09	5:25pm			
Relinquished by (Signature)	Date	Time	Received by (Signature)	Date	Time
Relinquished by (Signature)	Date	Time	Received by **Mobile Lab** for Field Analysis (Signature)	Date	Time
Shipped by (Signature)	Date	Time	Received for **lab** by (Signature)	Date	Time
Jennifer Lafferty	5/12/09	5:25pm			

Receiving Laboratory Information Condition of Samples upon Receipt at Lab:

Custody Seals Intact: ☐ yes ☐ no ☐ none

Distribution: White - Laboratory Copy; Yellow - Regional Sample Control Center (RSCC) Copy; Pink - Field or Office Copy

EPA Region 10, 1200 Sixth Avenue, Seattle, WA 98101

Sample Custody & Analysis Required Form

EPA Manchester Laboratory, 7411 Beach Drive East, Port Orchard, WA 98366, 360-871-8700

Form Effective Date: July 2005

Revision 1

Project Name	Project Code	Method of Shipment/carrier	Airbill Number (if known prior to sealing):
Swift Creek	ESD-122D	Hand Delivery	N/A
Account Code	**EPA Project Manager/phone number**	**Check all that apply**	
09T1OP302DD7C10EG1A00	Elly Hale 206 553.1215	☐ Enforce/Custody ☐ Possible Toxic/Hazardous ☐ Data Confidential	

Sampler Names (Print & Sign). *Mark* (R) *after name of principal recorder.*

Julie Wroble (R)
Jennifer Crawford

If applicable, circle the set of selected metals:

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

(see reverse for more to add/circle)

① Matrix Codes:
10 Water/Liquid (Total)
20 Water/Liquid (Filtered)
40 Sediment/Soil/Solid/Bulk
70 Tissue
80 Oil/Solvent
44 Air filter
42 Wipe/Swab[1]
00 _____

[1] PCB wipe is to be 10cm x 10cm (100 cm²)

#C ② enter the number of containers for each preservative type followed by the appropriate preservation code P ③:

A - HCl
B - HNO_3
C - NaOH
D - H_2SO_4
E - $Na_2S_2O_3$
F - ascorbic acid[2], then HCl
G - $Na_2S_2O_3$+EDTA
H - EDTA
N - No chemical preservation
P - Bottles pre-preserved at lab
T - To be preserved at the lab

[2] $Na_2S_2O_3$ *if required by plan.*

W - _____

☐ Check here if the cooler is iced

④ Enter the letter or range of letters on each container for each group of containers with the same preservative type. Each container for each unique sample number must have a unique letter on it.

Laboratory: *see the applicable QAPP, SOW and/or Analytical Support Request for specific methods and detection, reporting, and/or quantitation limits.*

Asbestos: CARB 435 (PLM) Solids

Sampler's comments for the laboratory:

EPA Sample number Yr	Wk	Sequence	Sampling Date & Time Yr	Mo	Day	Time	Matrix ①	#C ②	P ③	#C ②	P ③	#C ②	P ③	#C ②	P ③	Sampler Initials	Sample/Station Description/Field Measurements	Organics (see reverse) VOA	BNA	Pest	PCB	PAH	Metals (see reverse) CLP	Selected	Mercury	Micro (see reverse) E. Coli	F. Coliform	T. Coliform	General Chemistry (see reverse) TSS	TDS	BOD 5	NO2+NO3	Oil & Grease	Asbestos	Additional Write in Analyses (see reverse)			
09	19	400	09	05	13	0808	40	1	N							JWJC	Location 1																		X			
09	19	402	09	05	13	1130	40	1	N							JWJC	Location 2 - Upland																		X			
09	19	402	09	05	13	1133	40	1	N							JWJC	Location 2 - Bank																		X			
09	19	402	09	05	13	1053	40	1	N							JWJC	Location 3/4 - Bank																		X			
09	19	402	09	05	13	1053	40	1	N							JWJC	Location 3/4 - Bank (dup.)																		X			
09	19	402	09	05	13	1046	40	1	N							JWJC	Location 3/4 - Upland																		X			
09	19	402	09	05	13	1046	40	1	N							JWJC	Location 3/4 - Upland (dup.)																		X			
09	19	403	09	05	13	0940	40	1	N							JWJC	Location 5 - Upland																		X			
09	19	403	09	05	13	0944	40	1	N							JWJC	Location 5 - Bank																		X			
09	19	403	09	05	13	0905	40	1	N							JWJC	Location 6 - Upland																		X			
09	19	403	09	05	13	0908	40	1	N							JWJC	Location 6 - Bank																		X			
09	19	403	09	05	13	1448	40	1	N							JWJC	Location 7 - Upland																		X			
09	19	403	09	05	12	1450	40	1	N							JWJC	Location 7 - Bank																		X			
09	19	404	09	05	12	1409	40	1	N							JWJC	Location 9 - Upland																		X			
09	19	404	09	05	12	1413	40	1	N							JWJC	Location 9 - Bank																		X			
09	19	400	09	05	12	1338	40	1	N							JWJC	Location 10 - Upland																		X			

Chain of Custody Record

Relinquished by (Signature)	Date	Time	Received by (Signature)	Date	Time
[signature]	5/13/09	16:05	[signature]	5/13/09	16:05
Relinquished by (Signature)	Date	Time	Received by (Signature)	Date	Time
Relinquished by (Signature)	Date	Time	Received by **Mobile Lab** for Field Analysis (Signature)	Date	Time
Shipped by (Signature)	Date	Time	Received for **lab** by (Signature)	Date	Time

Receiving Laboratory Information Condition of Samples upon Receipt at Lab:

Custody Seals Intact: ☐ yes ☐ no ☐ none

Distribution: White - Laboratory Copy; Yellow - Regional Sample Control Center (RSCC) Copy; Pink - Field or Office Copy

EPA Region 10, 1200 Sixth Avenue, Seattle, WA 98101

Sample Custody & Analysis Required Form

EPA Manchester Laboratory, 7411 Beach Drive East, Port Orchard, WA 98366, 360-871-8700

Form Effective Date: July 2005

Revision 1

ct Name: Swift Creek Asbestos	Project Code: ESD-122D	Method of Shipment/carrier: Hand Deliver	Airbill Number (if known prior to sealing): N/A
unt Code: 9T10P302DD2C1DEGLA00	EPA Project Manager/phone number: Elly Hale (206) 553-1215	Check all that apply: ☐ Enforce/Custody ☒ Possible Toxic/Hazardous ☐ Data Confidential	

ler Names (Print & Sign). Mark (R) after name of ipal recorder.
Jennifer Crawford (R)
[illegible]
[illegible]
[illegible]

If applicable, circle the set of selected metals:

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

(see reverse for more to add/circle)

① Matrix Codes:
10 Water/Liquid (Total)
20 Water/Liquid (Filtered)
40 Sediment/Soil/Solid/Bulk
70 Tissue
80 Oil/Solvent
44 Air filter
42 Wipe/Swab[1]
00 _____

[1] PCB wipe is to be 10cm x 10cm (100 cm²)

#C ② enter the number of containers for each preservative type followed by the appropriate preservation code P ③:

A - HCl
B - HNO_3
C - NaOH
D - H_2SO_4
E - $Na_2S_2O_3$
F - ascorbic acid[2], then HCl
G - $Na_2S_2O_3$+EDTA
H - EDTA
N - No chemical preservation
P - Bottles pre-preserved at lab
T - To be preserved at the lab

[2] $Na_2S_2O_3$ if required by plan.

W - _____

☐ Check here if the cooler is iced

④ Enter the letter or range of letters on each container for each group of containers with the same preservative type. Each container for each unique sample number must have a unique letter on it.

Laboratory: see the applicable QAPP, SOW and/or Analytical Support Request for specific methods and detection, reporting, and/or quantitation limits CARB 435/1.0
Fluidized Bed / SEM [illegible]

ler's comments for the laboratory:
N (likely) to contain asbestos. CID "IN" went to a different lab.
2009 * Locations 14 + 15 are on next pg *

Sample number: Wk	Sequence	Sampling Date & Time: Yr	Mo	Day	Time	Matrix ①	#C ②	P ③	#C ②	P ③	#C ②	P ③	#C ②	P ③	Sampler Initials	Sample/Station Description/Field Measurements	Organics (see reverse): VOCs	BNA	Pest	PCB	PAH	Metals (see reverse): TCLP	Selenium	Mercury	Micro (see reverse): E. Coli	F. Coliform	General Chemistry (see reverse): T. Coliform	TSS	TDS	BOD 5	NO2+NO3	Oil & Grease	Asbestos	Additional Write in Analyses (see reverse)		
19	H00	09	05	13	0808	40	2N								JW/JC	Location 1																	X			
19	H02	09	05	13	1133	40	2N								JW/JC	Location 2																	X			
19	402	09	05	13	1053	40	2N								JW/JC	Location 3																	X			
19	402	09	05	13	1055	40	2N								JW/JC	Location 4																	X			
19	403	09	05	13	0940	40	2N								JW/JC	Location 5																	X			
19	403	09	05	13	1050	40	2N								JW/JC	Location 6																	X			
19	401	09	05	12	1034	40	1N								JW/JC	Location 13 - Island																	X	CARB	435	
19	401	09	05	12	0938	40	1N								JW/JC	Location 13 - Island																	X	CARB	435	
19	401	09	05	12	1135	40	1N								JW/JC	Location 17 - Island																	X	CARB	435	
19	402	09	05	12	1150	40	2N								JW/JC	Location 7																	X			
19	403	09	05	12	1141	40	2N								JW/JC	" 12																	X			
19	404	09	05	12	1048	40	2N								JW/JC	" 9																	X			
19	406	09	05	12	1241	40	2N								JW/JC	" 10																	X			
19	406	09	05	12	1222	40	2N								JW/JC	" 11																	X			
19	405	09	05	12	1141	40	2N								JW/JC	" 12																	X			
19	401	09	05	12	1035	40	2N								JW/JC	" 13																	X			

ain of Custody Record

Relinquished by (Signature)	Date	Time	Received by (Signature)	Date	Time
[illegible]	5/13/09	16:05	Ann Knaack	5/13/09	16:05
Relinquished by (Signature)	Date	Time	Received by (Signature)	Date	Time
	Date	Time	Received by Mobile Lab for Field Analysis (Signature)	Date	Time
	Date	Time	Received for lab by (Signature)	Date	Time

Receiving Laboratory Information Condition of Samples upon Receipt at Lab:

Custody Seals Intact: ☐ yes ☐ no ☐ none

Distribution: White - Laboratory Copy; Yellow - Regional Sample Control Center (RSCC) Copy; Pink - Field or Office Copy

EPA Region 10, 1200 Sixth Avenue, Seattle, WA 98101

Sample Custody & Analysis Required Form

EPA Manchester Laboratory, 7411 Beach Drive East, Port Orchard, WA 98366, 360-871-8700

Form Effective Date: July 2005

Revision 1

Project Name	Project Code	Method of Shipment/carrier	Airbill Number (if known prior to sealing):
Swift Creek Asbestos	ESD-122D	Hand deliver	N/A
Account Code	**EPA Project Manager/phone number**	**Check all that apply**	
09TOP302DD2CIDEG1A00	Elly Hale (206) 553-1215	☐ Enforce/Custody ☒ Possible Toxic/Hazardous ☐ Data Confidential	

Sampler Names (Print & Sign). *Mark* (R) *after name of principal recorder.*

Jennifer Crawford (R)
[illegible]
Julie Wolle
[illegible]

If applicable, circle the set of selected metals:

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

(see reverse for more to add/circle)

① Matrix Codes:
10 Water/Liquid (Total)
20 ~~Water/Liquid (Filtered)~~
40 Sediment/Soil/Solid/Bulk
70 Tissue
80 Oil/Solvent
44 Air filter
42 Wipe/Swab[1]
00 _____

[1] PCB wipe is to be 10cm x 10cm (100 cm²)

#C ② enter the number of containers for each preservative type followed by the appropriate preservation code P ③:

A - HCl
B - HNO_3
C - NaOH
D - H_2SO_4
E - $Na_2S_2O_3$
F - ascorbic acid[2], then HCl
G - $Na_2S_2O_3$+EDTA
H - EDTA
N - No chemical preservation
P - Bottles pre-preserved at lab
T - To be preserved at the lab

[2] $Na_2S_2O_3$ if required by plan.

W - _____

☐ Check here if the cooler is iced

④ Enter the letter or range of letters on each container for each group of containers with the same preservative type. Each container for each unique sample number must have a unique letter on it.

Laboratory: *see the applicable QAPP, SOW and/or Analytical Support Request for specific methods and detection, reporting, and/or quantitation limits*

EPA 100.2 (TEM)/CARB 435 (PLM) Solids

Sampler's comments for the laboratory:

May contain asbestos (some likely).

EPA Sample number Yr	Wk	Sequence	Sampling Date & Time Yr	Mo	Day	Time	Matrix ①	#C ②	P ③	#C ②	P ③	#C ②	P ③	#C ②	P ③	Sampler Initials	Sample/Station Description/Field Measurements	Organics (see reverse) VOA	BNA	Pest	PCB	PAH	Metals (see reverse) CLP	Selected	Mercury	Micro (see reverse) E. Coli	F. Coliform	T. Coliform	General Chemistry (see reverse) TSS	TDS	BOD 5	NO2+NO3	Oil & Grease	Asbestos	Additional Write In Analyses (see reverse)			
09	19	40002	09	05	13	0810	10	1	N							JC/JW	Location 1 SW																	X				
09	19	40022	09	05	13	1122	10	1	N							JC/JW	Location 2 SW																	X				
09	19	40025	09	05	13	1036	10	1	N							JC/JW	Location 3 SW																	X				
09	19	40028	09	05	13	1030	10	1	N							JC/JW	Location 4 SW																	X				
09	19	40031	09	05	13	0934	10	1	N							JW/JC	Location 5 SW																	X				
09	19	40035	09	05	13	0902	10	1	N							JW/JC	Location 6 SW																	X				
09	19	40040	09	05	12	1341	40	1	N							JW/JC	Location 10 - bank																	X	CARB 435			
09	19	40048	09	05	12	1218	40	1	N							JW/JC	Location 11 - upland																	X	CARB 435			
09	19	40047	09	05	12	1222	40	1	N							JW/JC	Location 11 - bank																	X	CARB 435			
09	19	40052	09	05	12	1141	40	1	N							JW/JC	Location 12 - bank																	X	CARB 435			
09	19	40048	09	05	12	1135	40	1	N							JW/JC	Location 12 - upland																	X	CARB 435			
09	19	40059	09	05	12	1141	40	1	N							JW/JC	Location 12 - bank																	X	CARB 435			
09	19	40018	09	05	12	0904	40	1	N							JW/JC	Location 15 - bank																	X	CARB 435			
09	19	40020	09	05	12	0900	40	1	N							JW/JC	Location 15 - upland																	X	CARB 435			
09	19	40017	09	05	12	0945	40	1	N							JW/JC	Location 14 - upland																	X	CARB 435			
09	19	40015	09	05	12	0947	40	1	N							JW/JC	Location 14 - bank																	X	CARB 435			

Chain of Custody Record

Relinquished by (Signature)	Date	Time	Received by (Signature)	Date	Time
[illegible]	5/13/09	16:05	[illegible]	5/13/09	16:05
Relinquished by (Signature)	Date	Time	Received by (Signature)	Date	Time
Relinquished by (Signature)	Date	Time	Received by **Mobile Lab** for Field Analysis (Signature)	Date	Time
Shipped by (Signature)	Date	Time	Received for **lab** by (Signature)	Date	Time

Receiving Laboratory Information Condition of Samples upon Receipt at Lab:

Custody Seals Intact: ☐ yes ☐ no ☐ none

Distribution: White - Laboratory Copy; Yellow - Regional Sample Control Center (RSCC) Copy; Pink - Field or Office Copy