



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
 REGION 10 LABORATORY
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April 27, 2006

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 Environmental Cleanup Office

MEMORANDUM

TO: Denise Baker, Site Assessment Manager
 Office of Environmental Clean-up

FROM: Jed Januch, Investigator
 Office of Environmental Assessment

QA REVIEWER: Susan Davis, Washington State Department of Ecology *SD 5-1-06*

SUBJECT: Case narrative for asbestos analysis by stereomicroscope and polarized light microscopy for samples from Swift Creek

Project Code: ESD-122A
Account Code: 06T10P302DD2C10EGLA00

The following pertains to the quality assurance (QA) documentation associated with the asbestos analysis by stereomicroscope and polarized light microscopy (PLM) for eight samples collected by the Office of Environmental Assessment (OEA) on April 6, 2006 from Swift Creek. I conducted the analyses using the EPA Region 10 standard operating procedure for asbestos analysis ASB_001 and EPA method 600/R-93/116. The data quality objectives for this project were developed from the quality assurance project plan (QAPP) approved by Roy Araki, the EPA Region 10 Quality Assurance Manager.

OEA collected twenty-four samples at the Swift Creek site on April 6, 2006. A sub-set of eight of the twenty-four samples was submitted for analysis by stereomicroscopy and polarized light microscopy (PLM). Additional samples from the original group of twenty-four may be analyzed at a later date. The following comments refer to the quality control specifications for analysis of the following samples:

<u>Sample No.</u>	<u>Location</u>	<u>Description</u>
06144001	landslide toe	ambient water and suspended sediments
06144005	landslide toe	soft Green vein rocks
06144006	landslide toe	hard green rocks with coating
06144010	Swift Creek channel	dry sediment
06144018	dredge pile top (mid reach)	dry laminated crust
06144019	dredge pile interior (mid reach)	brown silt
06144021	dredge pile top upper (lower reach)	large laminated clast, soft silty clay
06144022	dredge pile interior	well sorted medium sand with clay

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 April 7, 2006 and the analysis was completed on April 21, 2006. The

Manchester Environmental Laboratory is a secure facility and the asbestos analysis area requires a key card for access.

2.0 Results of Analysis

Chrysotile asbestos was detected in all of the samples ranging in estimated concentration of <1% (trace) to approximately 30%. The results of analysis are displayed in Table 1. Photomicrographs of suspect or confirmed chrysotile asbestos fiber bundles are shown in Figures 1-5.

The morphology of the asbestos fiber bundles ranged from wavy to straight with splayed ends. The chrysotile asbestos detected in these samples exhibited parallel extinction and a positive sign of elongation. The dispersion staining colors observed with fiber bundles immersed in high-density (HD) Cargille 1.550 refractive index liquid ranged from orange (480 nanometers-nm) to magenta (520 nm) in the parallel orientation and from magenta (520 nm) to blue (580 nm) in the perpendicular orientation.

Table 1. Results of analysis

Sample Number	Asbestos Result (visual estimate)	Comments
06144001	chrysotile 20-30 %	Suspended sediments only
06144005	chrysotile 10-20 %	Vein material only
06144006	chrysotile 20-30 %	34 % acid soluble, rock coating only
06144010	chrysotile 5-10 %	
06144018	chrysotile 3-5 %	
06144019	chrysotile <1 % (T)	
06144021	chrysotile 1-3 %	
06144022	chrysotile <1 % (T)	Quartz
SRM 1866	chrysotile 95 %	

The colors exhibited for dispersion staining during analysis of chrysotile can vary due to replacement of elements such as iron for magnesium in the lattice.⁽¹⁾ The average difference between the wavelength observed for the parallel orientation and that of the perpendicular orientation is normally under 100 nm.

In addition to chrysotile asbestos, I observed abundant black colored opaque grits and brown to copper colored flakes in the sediments. The black colored grits were magnetic. The brown to copper colored flakes were partly acid soluble in dilute HCl. I also observed abundant quartz in sample 06144022.

3.0 Sample Preparation

The sample preparation techniques used for this project are as follows:

3.1 Liquid Sample (number 06144001) - Water with suspended sediment was taken from the sample containers with a dropper and placed on a glass slide and allowed to air dry. The dried sediment was treated with a dilute HCl solution for 10 minutes. The acid solution was diluted again with de-ionized water and filtered through a 0.4 micrometer (μm) polycarbonate filter using a vacuum filtration apparatus. The residue material remaining (non acid-soluble portion) was air dried on the polycarbonate filter and weighed.

3.2 Solid Sample (number 06144005) - A subsample was scraped off assorted soft green vein rocks using a tungsten needle. Portions of the subsample were immersed in three different refractive index liquids.

3.3 Solid Samples (numbers 06144006, 06144010, 06144018, and 06144021) – Subsamples were lightly crushed with mortar and pestle and treated with dilute HCl for 10 minutes. The acid solution was diluted with de-ionized water and was filtered through a 0.4µm polycarbonate filter with a vacuum filtration apparatus. The material remaining was air dried on the polycarbonate filter and weighed.

3.4 Solid Samples (numbers 06144019 and 06144022) - Subsamples were ashed in a muffle furnace for 6 hours at 475° centigrade (C) followed by treatment with a dilute HCl solution for 10 minutes. The acid solution was further diluted with de-ionized water and filtered through a 0.4 µm polycarbonate filter using a vacuum filtration apparatus. The material remaining was air dried on the polycarbonate filter and weighed.

Treatment with HCl was intended to remove interference from acid-soluble components including carbonates. Two samples were ashed in a muffle furnace to remove interference from the potential organic matter present.

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 in October 2005 using an Abbe refractometer.

5.0 Analytical Procedures

The analysis of samples for this project was done according to the EPA Region 10 standard operating procedure for analysis of bulk asbestos samples by stereo and polarized light microscopy and method EPA/600/R-93/116 Method for the Determination of Asbestos in Bulk Building Materials. The analysis was performed using a Wild M-5 stereomicroscope with a magnification range of 6x to 50x and a Carl Zeiss Axioskop 40 PLM with a magnification range of 100x to 400x and 100x for dispersion staining.

The percent concentration of asbestos is based on a visual estimate of the amount of suspect asbestos fiber bundles observed under the stereomicroscope. Suspect asbestos fiber bundles are hand-picked from samples and mounted in appropriate refractive index liquid for analysis by PLM to confirm the asbestos type by evaluation of the optical properties. The raw data prepared for this project documents the properties of the samples observed including gross sample description, stereomicroscopic observations, and optical properties including extinction angle, sign of elongation, and central-stop dispersion staining characteristics in appropriate refractive index liquids.

6.0 Quality Assurance and Quality Control

The data quality objectives were met by conducting re-analysis by the same analyst demonstrating intra-analyst precision and re-analysis of samples by another analyst to demonstrate inter-analyst precision. A standard reference material (SRM) 1866, chrysotile asbestos from the former National Bureau of Standards (NBS) was analyzed for this project as a QA/QC sample. In addition, a set of commercially prepared slides were reviewed as references.

Prior to analyzing samples for this project a method blank was analyzed to determine that supplies and tools used for this project were asbestos-free.

7.0 Reporting Limits / Data Qualifiers

The detection limit for asbestos minerals by PLM is approximately 1%. The sample results for this project were reported as the average percentage based on visual estimate and the qualifier for present (P) is used. 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 1%, the qualifier used is trace (T).

8.0 References

(1) McCrone, Walter. Asbestos Identification. McCrone Research Institute, 1987.

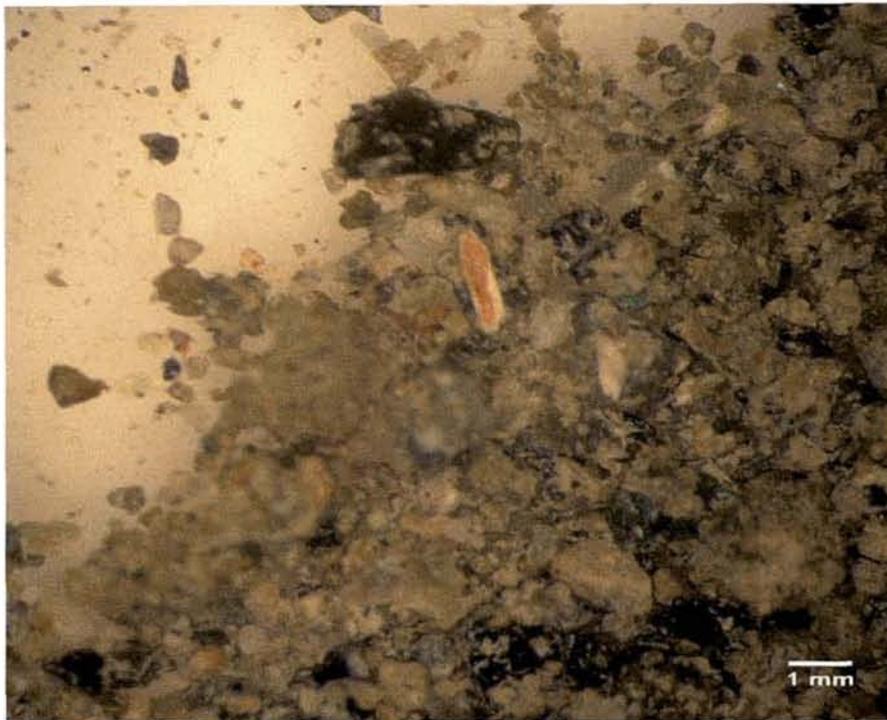


Figure 1 White colored fiber bundle with copper colored coating. Sample 06144022. Image taken at 12x magnification.

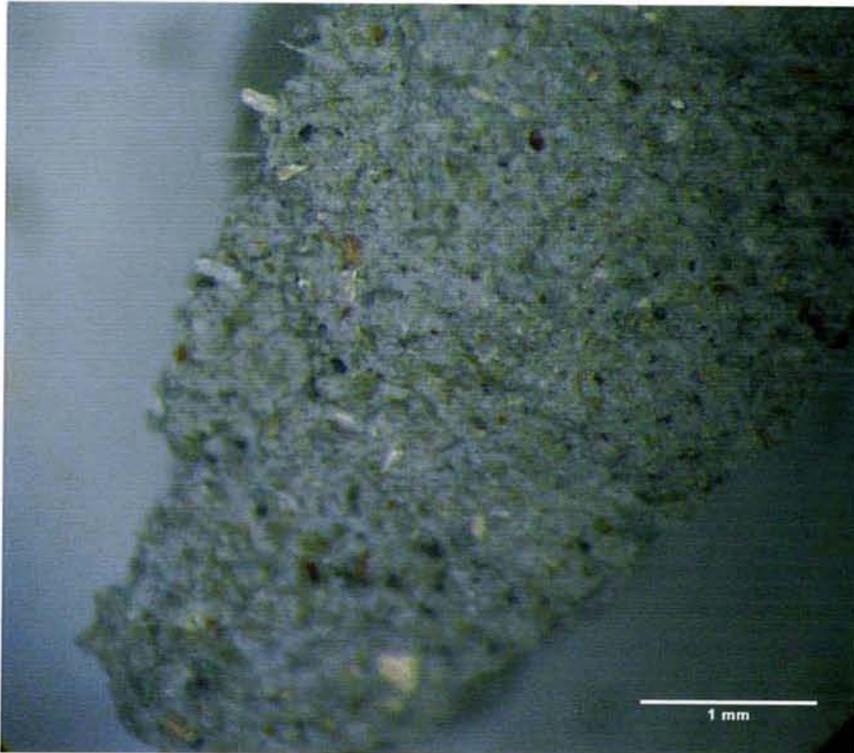


Figure 2 White colored fiber bundles protruding from a layered section of sediment in. Sample 06144018 from the top of a pile of dredge material from Swift Creek. This image view is at 24x magnification.



Figure 3 Chrysotile asbestos fiber bundle isolated from sample 06144022 immersed in 1.550 high-dispersion refractive index liquid. Sample was from well sorted clayey sand from the interior of the dredge pile. This image view is at 400x magnification.

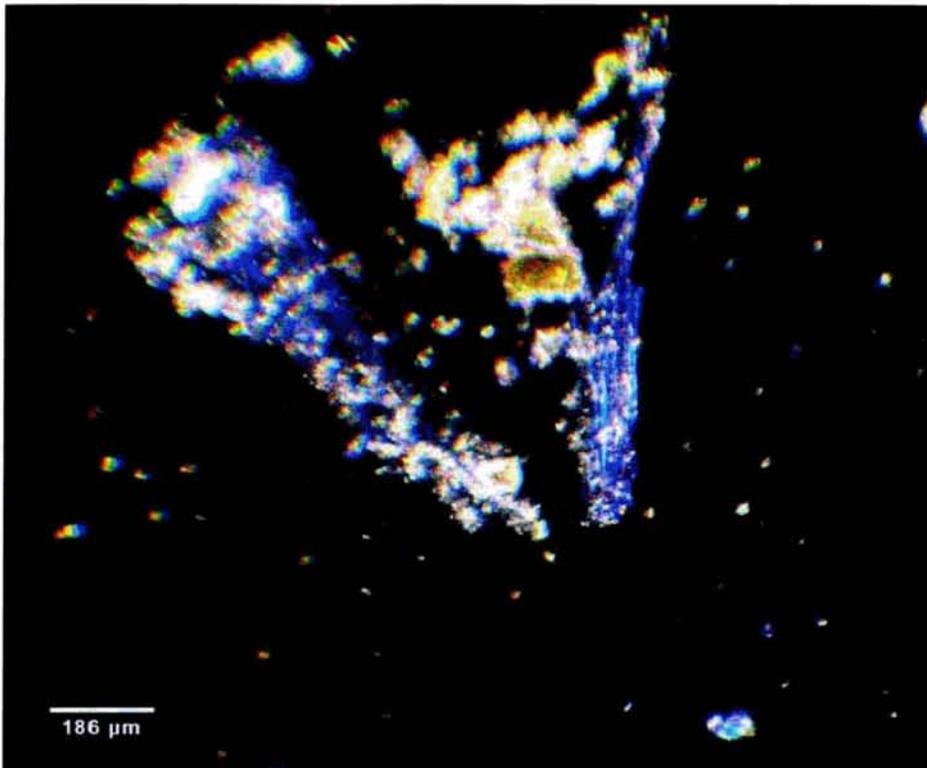


Figure 4 Chrysotile fiber bundles isolated from Sample 06144021 mounted in 1.550 high-dispersion refractive index liquid. Image view is at 100x magnification dispersion staining with fibers oriented perpendicular to the E-W position.

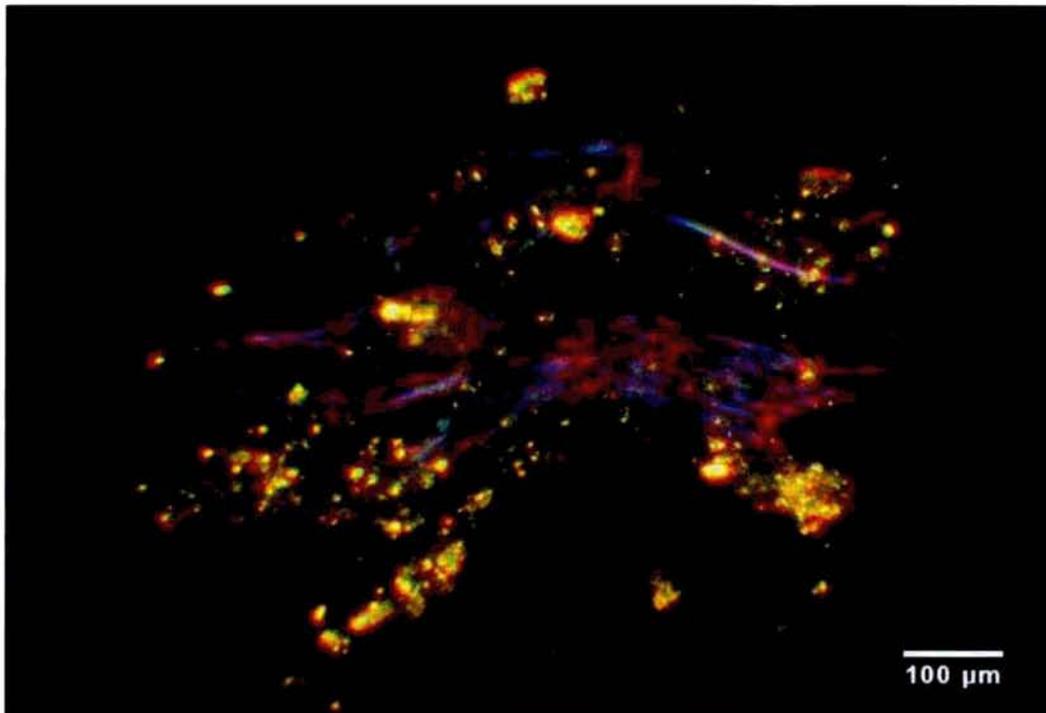


Figure 5 Chrysotile fiber bundles isolated from Sample 06144010 mounted in 1.550 high-dispersion refractive index liquid. Image view is at 100x magnification dispersion staining with fibers oriented parallel to the E-W position.

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

Project Code: ESD-122A
Project Name: SWIFT CREEK
Project Officer: DENISE BAKER
Account Code: 06T10P302DD2C10EGLA00
Station Description: SLIDE AREA

Collected: 4/6/06
Matrix: Liquid
Sample Number: 06144001
Type: Reg sample

		Result	Units	Qlfr
GEN				
Parameter	: Bulk Asbestos Analysis			Container ID :
Method	: 600R-93116			Analysis Date : 4/19/2006
Prep Method	:			Prep Date :
Analytes(s):	*200009 Actinolite			A
	*200006 Amosite			A
	*200007 Anthophyllite			A
	*200005 Chrysotile	20-30	%	P
	*200010 Crocidolite			A
	*200124 Non-Asbestos	80-70	%	P
	*200125 Other Fibrous Amphibole			A
	*200008 Tremolite			A

Manchester Environmental Laboratory

Report by Parameter for Project ESD-122A

Project Code: ESD-122A
Project Name: SWIFT CREEK
Project Officer: DENISE BAKER
Account Code: 06T10P302DD2C10EGLA00
Station Description: SLIDE AREA

Collected: 4/6/06
Matrix: Solid (Dry Weight)
Sample Number: 06144005
Type: Reg sample

		Result	Units	Qlfr
GEN				
Parameter	: Bulk Asbestos Analysis			Container ID :
Method	: 600R-93116			Analysis Date : 4/17/2006
Prep Method	:			Prep Date :
Analytes(s):	*200009 Actinolite			A
	*200006 Amosite			A
	*200007 Anthophyllite			A
	*200005 Chrysotile	10-20	%	P
	*200010 Crocidolite			A
	*200124 Non-Asbestos	90-80	%	P
	*200125 Other Fibrous Amphibole			A
	*200008 Tremolite			A

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

Project Code: ESD-122A
Project Name: SWIFT CREEK
Project Officer: DENISE BAKER
Account Code: 06T10P302DD2C10EGLA00
Station Description: SLIDE AREA

Collected: 4/6/06
Matrix: Solid (Dry Weight)
Sample Number: 06144006
Type: Reg sample

	Result	Units	Qlfr
GEN			
Parameter : Bulk Asbestos Analysis			Container ID :
Method : 600R-93116			Analysis Date : 4/19/2006
Prep Method :			Prep Date :
Analytes(s): *200009 Actinolite			A
*200006 Amosite			A
*200007 Anthophyllite			A
*200005 Chrysotile	20-30	%	P
*200010 Crocidolite			A
*200124 Non-Asbestos	80-70	%	P
*200125 Other Fibrous Amphibole			A
*200008 Tremolite			A

Manchester Environmental Laboratory

Report by Parameter for Project ESD-122A

Project Code:	ESD-122A	Collected:	4/6/06
Project Name:	SWIFT CREEK	Matrix:	Solid (Dry Weight)
Project Officer:	DENISE BAKER	Sample Number:	06144010
Account Code:	06T10P302DD2C10EGLA00	Type:	Reg sample
Station Description:	SWIFT CREEK @ GIMMAKA		

	Result	Units	Qlfr
GEN			
Parameter : Bulk Asbestos Analysis			Container ID :
Method : 600R-93116			Analysis Date : 4/7/2006
Prep Method :			Prep Date :
Analytes(s): *200009 Actinolite			A
*200006 Amosite			A
*200007 Anthophyllite			A
*200005 Chrysotile	5-10	%	P
*200010 Crocidolite			A
*200124 Non-Asbestos	95-90	%	P
*200125 Other Fibrous Amphibole			A
*200008 Tremolite			A

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

Project Code:	ESD-122A	Collected:	4/6/06
Project Name:	SWIFT CREEK	Matrix:	Solid (Dry Weight)
Project Officer:	DENISE BAKER	Sample Number:	06144018
Account Code:	06T10P302DD2C10EGLA00	Type:	Reg sample
Station Description:	SWIFT CREEK @ GIMMAKA (BERM)		

	Result	Units	Qlfr
GEN			
Parameter :	Bulk Asbestos Analysis		Container ID :
Method :	600R-93116		Analysis Date : 4/10/2006
Prep Method :			Prep Date :
Analytes(s):	*200009	Actinolite	A
	*200006	Amosite	A
	*200007	Anthophyllite	A
	*200005	Chrysotile	3-5
	*200010	Crocidolite	%
	*200124	Non-Asbestos	97-95
	*200125	Other Fibrous Amphibole	%
	*200008	Tremolite	A

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

Project Code:	ESD-122A	Collected:	4/6/06
Project Name:	SWIFT CREEK	Matrix:	Solid (Dry Weight)
Project Officer:	DENISE BAKER	Sample Number:	06144019
Account Code:	06T10P302DD2C10EGLA00	Type:	Reg sample
Station Description:	SWIFT CREEK @ GIMMAKA (BERM INTERIOR)		

	Result	Units	Qlfr
GEN			
Parameter :	Bulk Asbestos Analysis		Container ID :
Method :	600R-93116		Analysis Date : 4/12/2006
Prep Method :			Prep Date :
Analytes(s):	*200009	Actinolite	A
	*200006	Amosite	A
	*200007	Anthophyllite	A
	*200005	Chrysotile	T
	*200010	Crocidolite	A
	*200124	Non-Asbestos	P
	*200125	Other Fibrous Amphibole	A
	*200008	Tremolite	A
	<1	%	
	>99	%	

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

Project Code:	ESD-122A	Collected:	4/6/06
Project Name:	SWIFT CREEK	Matrix:	Solid (Dry Weight)
Project Officer:	DENISE BAKER	Sample Number:	06144021
Account Code:	06T10P302DD2C10EGLA00	Type:	Reg sample
Station Description:	SWIFT CREEK @ PARKER (BERM)		

	Result	Units	Qlfr
GEN			
Parameter :	Bulk Asbestos Analysis		Container ID :
Method :	600R-93116		Analysis Date : 4/12/2006
Prep Method :			Prep Date :
Analytes(s):	*200009	Actinolite	A
	*200006	Amosite	A
	*200007	Anthophyllite	A
	*200005	Chrysotile	P
	*200010	Crocidolite	A
	*200124	Non-Asbestos	P
	*200125	Other Fibrous Amphibole	A
	*200008	Tremolite	A
	1-3	%	
	99-97	%	

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

Project Code:	ESD-122A	Collected:	4/6/06
Project Name:	SWIFT CREEK	Matrix:	Solid (Dry Weight)
Project Officer:	DENISE BAKER	Sample Number:	06144022
Account Code:	06T10P302DD2C10EGLA00	Type:	Reg sample
Station Description:	SWIFT CREEK @ PARKER (BERM INTERIOR)		

		<u>Result</u>	<u>Units</u>	<u>Qlfr</u>
GEN				
Parameter :	Bulk Asbestos Analysis			Container ID :
Method :	600R-93116			Analysis Date : 4/11/2006
Prep Method :				Prep Date :
Analytes(s):	*200009 Actinolite			A
	*200006 Amosite			A
	*200007 Anthophyllite			A
	*200005 Chrysotile	<1	%	T
	*200010 Crocidolite			A
	*200124 Non-Asbestos	>99	%	P
	*200125 Other Fibrous Amphibole			A
	*200008 Tremolite			A

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

Project Code:	ESD-122A	Collected:	4/6/06
Project Name:	SWIFT CREEK	Matrix:	Solid (Dry Weight)
Project Officer:	DENISE BAKER	Sample Number:	SRM1866
Account Code:	06T10P302DD2C10EGLA00	Type:	Quality Control
Station Description:	STANDARD REFERENCE MATERIAL		

	Result	Units	Qlfr
GEN			
Parameter : Bulk Asbestos Analysis			Container ID :
Method : 600R-93116			Analysis Date : 4/17/2006
Prep Method :			Prep Date :
Analytes(s): *200009 Actinolite			A
*200006 Amosite			A
*200007 Anthophyllite			A
*200005 Chrysotile	95	%	P
*200010 Crocidolite			A
*200124 Non-Asbestos	5	%	P
*200125 Other Fibrous Amphibole			A
*200008 Tremolite			A

