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July 10, 2015

Julie Wroble
EPA Site Manager Region 10
EPA Region 10
1200 6th Ave, Suite 900
Seattle, WA 98101

Document ID #: 3015-07102015-7

Dear Ms. Wroble:

EPA CONTRACT NUMBER EP-W-10-033
TASK ORDER NUMBER 3015
ASBESTOS QA SUPPORT

Enclosed please find the Release of Validated Data Report for the validation of Transmission Electron Microscopy (TEM) soil sample data, Laboratory Job Number 150099. The forty-five (45) soil samples associated with these data were analyzed by Lab/Cor, Inc., Seattle, Washington for the Sumas Mountain Asbestos Soil Project. This report and accompanying appendices are deliverables under Task 10 of the subject Task Order.

If you have any questions, please feel free to contact me.

Sincerely,

Lyndsay Gensler
Task Leader, QATS Program
CB&I Federal Services LLC
Phone: 702.895.8730
E-Mail Address: lyndsay.gensler@cbifederalservices.com

cc: Shari Myer, EPA-ASB, QATS Task Order Project Officer
Administrative Contracting Officer (letter only)



*The Quality Assurance Technical Support (QATS) contract is operated by CB&I Federal Services LLC.
The QATS Program's Quality Management System is certified to the ISO 9001:2008 International Standard.*

**RELEASE OF VALIDATED DATA**

DATE: July 10, 2015

SUBJECT: Review of Data for Laboratory Job Number: 150099

LABORATORY: Lab/Cor, Inc., Seattle, Washington

FROM: Quality Assurance Technical Support (QATS) Program, Las Vegas, NV
CB&I Federal Services LLC

TO: Julie Wroble, Environmental Protection Agency

QATS reviewed the data for the following case:

Applicable SAP: NA

Chain-of-Custody Number: FBAS - 150209001

Method: Transmission Electron Microscopy (TEM) ISO 10312

Applicable Laboratory
Modification(s): NA

Number and Type
of Samples: 45 Soil Samples

EPA Sample Numbers: 14394100, 14394101, 14394102, 14394103, 14394104, 14394105,
14394106, 14394107, 14394108, 14394109, 14394110, 14394111,
14394112, 14394113, 14394114, 14394115, 14394116, 14394117,
14394118, 14394119, 14394120, 14394121, 14394122, 14394123,
14394124, 14394125, 14394126, 14394127, 14394128, 14394129,
14394130, 14394131, 14394132, 14394133, 14394134, 14394135,
14394136, 14394137, 14394138, 14394139, 14394140, 14394141,
14394142, 14394143, 14394144.

VALIDATION SUMMARY

Forty-five (45) soil samples from Laboratory Job Number 150099, were hand-delivered to Lab/Cor, Inc. in Seattle, WA for preparation by the Fluidized Bed Asbestos Segregator (FBAS) technique and analysis for asbestos by the TEM-ISO 10312 Method. The samples were received at the laboratory intact on 02/09/2015, and were analyzed between 02/17/2015 and 03/30/2015.

Listed below are the Data Qualification Summary Table, EDD/Bench Sheet Discrepancy Table, Data Qualifier Table, and Reason Code Table.

DATA QUALIFICATION SUMMARY TABLE

Criteria Exceeded	EPA Sample ID	Validation Qualifier	Reason Code
Daily Cu AI Alignment was not recorded for analysis date 02/26/2015 on the Hitachi H7000 Instrument.	14394126 14394127	UJ J	MC
Daily Cu AI Alignment was not recorded for analysis date 03/15/2015 on the Hitachi H7000 Instrument.	14394123 14394124 14394125	J	MC
Daily Cu AI Alignment failed the Cu Peak Alignment with a value below the Lower Acceptance Value for analysis date 03/18/2015 on the Hitachi H7000 Instrument.	14394192 (Prep Lab Blank)	UJ	MC
Daily Cu AI Alignment was not recorded for analysis date 02/17/2015 on the JOEL Instrument.	14394100	J	MC
Daily Cu AI Alignment was not recorded for analysis date 03/15/2015 on the JOEL Instrument.	14394119	J	MC
Daily Cu AI Alignment was not recorded for analysis date 03/30/2015 on the JOEL Instrument.	Q150099g-B1 (Lab Blank) Q150099h-B2 (Lab Blank) Q150099I-B3 (Lab Blank)	UJ	MC
Daily Cu AI Alignment was not recorded for analysis date 02/27/2015 on the Hitachi H7000FA Instrument.	14394104	J	MC
Daily Cu AI Alignment was not recorded for analysis date 03/03/2015 on the Hitachi H7000FA Instrument.	14394109	J	MC
Daily Cu AI Alignment was not recorded for analysis date 03/08/2015 on the Hitachi H7000FA Instrument.	14394115 14394116	J	MC
Daily Cu AI Alignment was not recorded for analysis date 03/18/2015 on the Hitachi H7000FA Instrument.	14394122	J	MC
Daily Cu AI Alignment was not recorded for analysis date 03/22/2015 on the Hitachi H7000FA Instrument.	14394104 (Recount Different)	J	MC
k-Factors not performed at the required frequency (last performed on 01/24/2014 for instrument H-7000.)	14394127	J	IC
k-Factors not performed at the required frequency (last performed on 07/25/2014 for instrument JOEL 1200.)	14394100 14394106 14394107 14394111 14394119	J	IC
k-Factors not performed at the required frequency (last performed on 01/08/2014 for instrument H-7000FA.)	14394101 14394104 14394109 14394112 14394113 14394114 14394115 14394116 14394117 14394118 14394120 14394121 14394122 14394104 (Recount Different)	J	IC

EDD/BENCH SHEET DISCREPANCY TABLE

EPA Sample ID	C# *	Method/Matrix	Lab. Job No.	Analysis Date	Discrepancy
14394100	C0	TEM/Soil	150099	02/17/2015	The image ID for total structure #2 was incorrectly entered into the NADES file as J38721 (BF, DF, SP). The correct image ID is J38722 (BF, DF, SP).
14394100	C0	TEM/Soil	150099	02/17/2015	The structure type entered into the NADES file for primary structure #4 should be MC10. Only MC was entered.
14394101	C0	TEM/Soil	150099	02/21/2015	The structure type entered into the NADES file for primary structure #22 is incorrect. The MD11 should be MD10 because the length of total structure #22 is less than 5 µm.
14394106	C0	TEM/Soil	150099	02/27/2015	The image ID for total structure #21 was incorrectly entered into the NADES file as J38869 (BF, DF, SP). The correct image ID is J38880 (BF, DF, SP).
14394110	C0	TEM/Soil	150099	03/03/2015	The two-digit number assigned to the MR structure type was not recorded in the structure type column or the comments column for the MR in this sample.
14394115	C0	TEM/Soil	150099	03/07/2015	The image ID for total structure #2 was incorrectly entered into the NADES file as F39259 (BF, DF). The correct image ID is F39260 (BF, SP). Also there was no DF file as the diffraction pattern was too faint.
14394115	C0	TEM/Soil	150099	03/07/2015	The image ID for total structure #3 was omitted from the NADES file. The correct image ID for total structure #3 is F39261 (BF, DF).
14394116	C0	TEM/Soil	150099	03/08/2015	The structure type entered into the NADES file for primary structure #4 should be MD10. Only MD was entered. The structure type entered into the NADES file for primary structures #41 and #50 should be MC10. Only MC was entered for each. The brightfield file F39265BF was not provided with the 150099 images. The file is listed on the Direct Raw Data sheet, in the NADES file, and on the SEA150099 Final Image Log.
14394119	C0	TEM/Soil	150099	03/13/2015	The structure type entered into the NADES file for total structure #22 should be MR10. Only MR was entered.
14394123	C0	TEM/Soil	150099	03/14/2015	The structure type for primary structure #93 entered into NADES is MD1, the structure type on the ISO 10312 Direct Raw Data sheet is MD10; because the length of following total structure is less than 5 µm, a 0 should be entered after the 1. The MF for total structure #94 does not meet recording criteria. The aspect ratio for length 15 and width 12.5 is less than 3:1. A "74-0" was entered into the comments field on the ISO 10312 Direct Raw Data sheet for this structure indicating that the MF maybe should have been reported as a MR+0 which would change the structure type of primary structure #59 to MD+1.
14394124	C0	TEM/Soil	150099	03/15/2015	The structure type for total structure #14 entered into NADES is MR with 13-0 in the comments field. The structure type should have been reported as a MR+0 which would change the structure type of primary structure #10 to MD+1.
14394125	C0	TEM/Soil	150099	03/16/2015	The structure types entered into the NADES file for primary structured #1 and #6 should be MD10. Only MD was entered. The structure type entered into the NADES file for primary structure #7 should be MD20. Only MD was entered.
14394128	C0	TEM/Soil	150099	03/02/2015	The structure type entered into the NADES file for primary structure #25 should be MD20. MD10 was incorrectly entered. The structure type entered into the NADES file for primary structure #29 should be MD10. Only 10 is entered. The structure type entered into the NADES file for primary structure #41 is MD20; however, it is followed by five MFs not two. In addition, the structure type entered into the NADES file for total structure #151 should be CR+0. Only CR was entered. The two-digit number assigned to each of the MR structure types were not recorded in the structure type column for the 22 MR's in this sample.
14394129	C0	TEM/Soil	150099	03/03/2015	Image file, H39135BF provided is not a "Brightfield" file. It is actually a DF file. The structure type entered into the NADES file for primary structure #61 should be MD30. Only MD was entered. The F for total structure #110 does not meet recording criteria. The aspect ratio for length 1.06 and width 0.86 is less than 3:1. The structure type entered into the NADES file for primary structure #90 is MD30; however, it is followed by four MFs not three.
14394130	C0	TEM/Soil	150099	03/03/2015	The 15-0 entered into the comments section for total structure #70 should be 28-0 according to the ISO 10312 Direct Raw Data sheet. The 15-0 is for total structure #71. The MF for total structure #17 does not meet recording criteria. The aspect ratio for length 1.8 and width 0.8 is less than 3:1. The structure type entered into the NADES file for primary structure #95 should be MD10. Only MD was entered.
14394131	C0	TEM/Soil	150099	03/04/2015	The image ID for total structure #7 was incorrectly entered into the NADES file

EPA Sample ID	C# *	Method/Matrix	Lab. Job No.	Analysis Date	Discrepancy
					as H39136 (BF, DF, SP). The correct image ID is H39139 (BF, DF, SP). The structure type entered into the NADES file for primary structure #2 should be MD10. MD20 was entered. The structure type entered into the NADES file for primary structure #3 should be MD50. MD60 was entered.
14394132	C0	TEM/Soil	150099	03/04/2015	The structure type entered into the NADES file for total structure #46 should be MC+0. Only 0 was entered. The structure type entered into the NADES file for total structure #96 is MR50. The number of component fibers in the comments section of the ISO 10312 Direct Raw Data Sheet is 32-0, therefore, the MR50 should have been reported as MR+0 which would make the structure type for primary structure #59 MD+0.
14394133	C0	TEM/Soil	150099	03/04/2015	The structure type entered into the NADES file for primary structure #92 should be MD10. 10MD was entered.
14394134	C0	TEM/Soil	150099	03/05/2015	The structure type entered into the NADES file for primary structure #48 should be MD+1. MD+D142 was entered.
14394135	C0	TEM/Soil	150099	03/17/2015	The brightfield and diffraction files H39368BF and DF were not provided with the 150099 images. It is listed on the Direct Raw Data sheet and on the SEA150099 Final Image Log. Note that the file names were not entered into the NADES file. Only the Spectra (SP) was provided. The structure type entered into the NADES file for primary structure #15 should be MD10. Only 10 is entered. The number of component fibers for the MR reported for total structure #123 is not recorded in the NADES file nor is it reported on the ISO 10312 Direct Raw Data sheet. The structure type entered into the NADES file for primary structure #74 should be MD10. Only MD was entered. The MF for total structure #124 is incorrectly reported as MF10. 149-0 was incorrectly entered into the comments column for total structure #131, 149-0 should have been entered for total structure #130. 10MD was entered as the structure type for primary structure #94. MD10 should have been entered. The structure type entered into the NADES file for total structure #173 is MR. The number of components is not recorded in the comments column nor is it recorded on the ISO 10312 Direct Raw Data sheet.
14394136	C0	TEM/Soil	150099	03/06/2015	The structure type entered into the NADES file for primary structure #83 is MD+1. The structure type that should have been entered is MD43. The reason for the incorrect structure type is that the MR+0 that was entered for total structure #120 should be reported as MR32.
14394137	C0	TEM/Soil	150099	03/06/2015	The structure type entered into the NADES file for primary structure #19 should be MD+0. MD+1 was entered; however, there were no structures > 5 um for the following MF and MR. The ISO 10312 Direct Raw Data file incorrectly lists that structure as MD2-1 when primary structure #19 was only followed by 1 MF that was < 5 um in length. The structure type entered into the NADES file for primary structure #68 is MD41; however, it is followed by five MFs not four.
14394138	C0	TEM/Soil	150099	03/06/2015	The brightfield and diffraction files H39369BF and DF were not provided with the 150099 images. It is listed on the Direct Raw Data sheet and on the SEA150099 Final Image Log. Note that the file names were not entered into the NADES file. Only the Spectra (SP) was provided. The length and width entered into the NADES file for primary structure #1 (3.87/2.25) do not match those on the ISO 10312 Direct Raw Data sheet (3.99/2.42). The lengths entered into the NADES file for total structure #1 and #2 (3.34 and 1.36, respectively) do not match those on the Direct Raw Data sheet (3.56 and 1.32). The structure type entered into the NADES file for primary structure #89 should be MD40. MD50 was entered.
14394139	C0	TEM/Soil	150099	03/07/2015	The structure type entered into the NADES file for primary structure #6 is MD20; however, it is followed by three MFs not two.
14394140	C0	TEM/Soil	150099	03/08/2015	The brightfield and diffraction files H39272BF and DF were not provided with the 150099 images. It is listed on the Direct Raw Data sheet and on the SEA150099 Final Image Log. Note that the file names were not entered into the NADES file. Only the Spectra (SP) was provided. The structure type entered into the NADES file for primary structure #61 should be MD+0. MD+D2050 was entered. The structure type entered for total structure #118 is MR+0; however, the number of components is not recorded in the comments column nor is it recorded on the ISO 10312 Direct Raw Data sheet. The brightfield file H39273BF was not provided with the 150099 images. It is listed on the Direct Raw Data sheet, NADES file, and on the SEA150099 Final

EPA Sample ID	C# *	Method/Matrix	Lab. Job No.	Analysis Date	Discrepancy
					Image Log.
14394141	C0	TEM/Soil	150099	03/09/2015	The structure type entered into the NADES file for total structure #95 should be MR+0. MR+0+D195 was entered. The structure type entered into the NADES file for primary structure #85 should be MD60. MD+0 was entered.
14394142	C0	TEM/Soil	150099	03/10/2015	The structure type entered into the NADES file for primary structure #17 is MD+2. The structure type that should have been entered is MD+1. The reason for the incorrect structure type is that the MR+1 that was entered for total structure #26 should be reported as MR+0 according to the ISO 10312 Direct Raw Data sheet. The structure type entered into the NADES file for primary structure #55 is MC20. The structure type for primary structure #55 reported on the ISO 10312 Direct Raw Data is MC50. The MF for total structure #59 does not meet recording criteria. The aspect ratio for length 4 and width 2.35 is less than 3:1.
14394143	C0	TEM/Soil	150099	03/10/2015	The brightfield file H39297BF was not provided with the 150099 images. It is listed on the Direct Raw Data sheet, NADES file, and on the SEA150099 Final Image Log. Only the DF and SP files were provided. The structure type entered into the NADES file for primary structure #81 is MD10 which is followed by 2 MF's; therefore, the structure type should be MD20. The structure type entered into the NADES file for primary structure #92 is MD21 which is followed by 5 MF's; therefore, the structure type should be MD51.
14394143 Dup	C0	TEM/Soil	150099	03/11/2015	The structure type entered into the NADES file for primary structure #21 is MD50 which is followed by 1 MF and MR50; therefore, the structure type should be MD60. The structure type entered into the NADES file for primary structure #29 is MD20 which is followed by 1 MF; therefore, the structure type should be MD10. The structure type entered for total structure #48 is MR+0; however, the number of components is not recorded in the comments column nor is it recorded on the ISO 10312 Direct Raw Data sheet. The structure type entered into the NADES file for primary structure #78 is MD51. The structure type that should have been entered is MD+1. The reason for the incorrect structure type is that the MR40 that was entered for total structure #114 should be reported as MR+0 according to the ISO 10312 Direct Raw Data sheet.
14394144	C0	TEM/Soil	150099	03/11/2015	The brightfield and diffraction files H39310BF and DF were not provided with the 150099 images. It is listed on the Direct Raw Data sheet and on the SEA150099 Final Image Log. Only the Spectra (SP) was provided. The structure type entered into the NADES file for primary structure #10 is MD20 which is followed by 4 MF; therefore, the structure type should be MD40. The structure type entered into the NADES file for primary structure #22 should be MD20. Only 20 was entered. The MF for total structure #84 does not meet recording criteria. The aspect ratio for length 0.9 and width 2 is less than 3:1.
Q150099I-B3	C0	TEM/Soil	150099	03/30/2015	The NADES file lists S. Golden as the QA reviewer; however, a QA date is not provided.
14394104 RD	C0	TEM/Soil	150099	03/21/2015	The ISO 10312 Direct Raw Data sheets were not provided for the Recount Different and Repreparation QC samples; however, In the Data Entry 2 tab, the Grid was reported in the Grid Opening column, the Grid Opening was reported in the Low Mag? Column, and the Grid column was populated with S5 (which appears to be from the lab sample ID of 150099-S5)
13494129 RP	C0	TEM/Soil	150099	03/18/2015	The structure type entered into the NADES file for primary structure #8 should be MD20. Only MD was entered. The MF for total structure #94 does not meet recording criteria. The aspect ratio for length 0.1 and width 0.1 is less than 3:1.
NA	NA	TEM/Soil	150099	NA	The Upper Acceptance Value for the AI Peak Alignment changes from 1.496 to 1.495 on 02/20/2015 on the Daily Cu AI Calibration sheets provided for the Hitachi H7000 instrument. The values of 1.496 found after that date are not highlighted as being out of criteria indicating that the change in criteria from 1.496 to 1.495 was not intentional.

*** The EDD correction number in column 2. (i.e., C0, C1, C2, etc..)

DATA QUALIFIER TABLE

Qualifier	Definition
J	The result is estimated. The associated numerical value is an approximation.
UJ	The non-detect result may be inaccurate or imprecise due to the quality of the data generated because certain QC criteria were not met.
R	The sample results are rejected due to serious deficiencies.
X	Validator defined.

TEM REASON CODE TABLE

Reason Code	Definition
MC	Structure/fiber counts and recorded structure dimensions may be inaccurate due to improper or infrequent scope alignment and/or magnification calibrations.
IC	Identification by elemental composition or diffraction pattern may be inaccurate due to improper or infrequent EDXA or camera constant calibration.
PA	Structure/fiber counts and reported concentrations may be inaccurate due to improper or infrequent calibration of the plasma asher.
SC	The reported concentration may be inaccurate due to the condition of samples upon receipt at the laboratory.
DL	The area analyzed, structures counted, or AS do not meet the requirements specified in the applicable SAP Analytical Summary.
ID	The asbestos identification and concentrations may be inaccurate because the recorded structure types are not consistent with those described in the applicable TEM Method and/or laboratory modification(s).

VALIDATION PROCESS

The samples for Laboratory Job Number 150099 were received at the laboratory on 02/09/2015. The soil samples were prepared using the FBAS technique and analyzed in accordance with the TEM-ISO 10312 Method. CB&I's Quality Assurance Technical Support (QATS) Program performed validation in accordance with method-specific data validation SOPs. QATS preparation of this report and appendices was performed under Technical Direction 03, Task 10, of Task Order 3015.

The sample results on bench sheets and other supporting documents provided in the hardcopy deliverables were compared to the entries in the associated laboratory method-specific EDDs (where applicable) to ensure that the reported results are complete, compliant with the specified methodology, and accurate. Additional support information provided in this data validation report include the QATS Data Review Checklist used to document the data validation process (see Appendix A); and the sample results as reported by the laboratory, with qualifiers as applicable (see Appendix B).

TEM VALIDATION SUMMARY

1. **DATA PACKAGE INVENTORY AND SAMPLE RECEIPT:** The data package included a narrative, Chain-of-Custody (COC) record, EDD files, and QC samples. The samples were properly packaged, sealed, undamaged, and labeled upon receipt at the laboratory. The COC record was reviewed and found to be acceptable.
2. **SAMPLE PREPARATION:** The appropriate preparation documents were provided.
3. **EQUIPMENT CALIBRATION AND PERFORMANCE CHECKS (i.e., daily microscope alignment, screen magnification, EDS calibration, and sensitivity checks):** The Daily Cu Al alignment calibrations for 16 samples and blanks were not documented on the EDS Calibration (Al,Cu) sheets provided by the laboratory, and the Cu peak alignment failed for one preparation blank. The dates, instruments, and samples affected are listed in the Data Qualification Summary Table. Additionally, the k-factors provided by the laboratory were performed more than six months prior to the analyses of the samples in this SDG. These k-factors were performed on 01/24/2014 for instrument (scope) H-7000; on 07/25/2014 for instrument (scope) JOEL 1200; and on 01/08/2014 for instrument (scope) H7000FA. The laboratory's QAPP states for k-factors, "Calibration is performed on a biyearly basis, the first week of January and the first week of July." QATS requested the January 2015 k-factors from the laboratory; however, k-factors calculated on 03/30/2015 for Scope H-7000 and 05/21/2015 for Scopes JOEL 1200 and H7000FA were received. As a result of the described calibration deficiencies, twenty samples with TEM amphibole results reported in this SDG are qualified "J" due to the k-factor calibration. The equipment alignment and calibration for the remaining samples were performed at the correct frequency, indicating that the instruments were in proper working order during the time of sample analyses.
4. **ANALYTICAL SENSITIVITY:** A sufficient number of grid openings have been analyzed to achieve the required analytical sensitivity and/or the appropriate stopping rule was invoked.
5. **STRUCTURE RECORDING AND ASBESTOS IDENTIFICATION:** The structure recording and asbestos identification were found to be acceptable.
6. **BLANK ANALYSIS:** Five preparation laboratory blanks and two sand blanks were analyzed and reported with this sample set. There were no structures observed.
7. **ANALYTICAL VARIABILITY:** The laboratory performed one duplicate analysis on EPA Sample No. 14394143, five recount different (RD) analyses on EPA Sample Nos. 14394104, 14394125, 14394126, 14394131, and 14394192 (which is a lab prep blank) and one repreparation (RP)

analysis on EPA Sample No. 14394129. According to the laboratory's QC Summary Sheet, all QC samples passed the established QC criteria. Note that with the exception of the duplicate analysis performed on EPA Sample No. 14394143, the ISO 10312 Direct Raw Data sheets were not provided for the QC samples.

8. LABORATORY MODIFICATIONS: NA

- 9. OVERALL ASSESSMENT OF DATA:** With the exception of the discrepancies described in the EDD/Bench Sheet Discrepancy Table and the qualifiers assigned to samples with undocumented daily Cu Al calibrations and the k-factor issues listed in the Data Qualification Summary Table, the deliverable was found to be complete. Note that the stopping rules were only entered into one of the NADES sample files (14394101) and the high magnification counting rules were not entered into NADES for samples 14394106 and 14394111.

The validator also observed that when the number of component fibers or bundles in either the original matrix or matrix residual is outside of the range 1 – 9, the additional information of the number of component fibers and bundles was not always noted in the comments column of the NADES file. While this information was not consistently entered into the NADES files, it was consistently reported in the ISO 10312 Direct Raw Data.

The ISO Analysis Narrative lists two samples where the total structure counts entered into the Data Entry 2 tab of the NADES file do not match the total structure count on the ISO Report tab. The QATS validator noted three additional samples where the total count reported does not match the total number entered:

EPA Sample ID 14394100 reports 30 total structures when there were 29 entered.
EPA Sample ID 14394101 reports 45 total structures when there were 38 entered.
EPA Sample ID 14394115 reports 25 total structures when there were 23 entered.

Samples reported in the narrative:

EPA Sample ID 14394116 reports 68 total structures when there were 56 entered.
EPA Sample ID 14394120 reports 93 total structures when there were 81 entered.

REVIEWED BY: Shellee McGrath **DATE:** 07/08/2015

Appendix A

Data Review Checklist

Appendix B

Qualified Result Forms

Data Review Checklist for the Verification and Validation of Transmission Electron Microscopy (TEM) Data Deliverables

Project Name: Sumas Mtn Asbestos Soil Project	Case or Sample Set ID: 150099
Number of Samples/Matrix: 45 Soil Samples	COC Number: FBAS - 150209001
TEM Analytical Method: FBAS – TEM ISO 10312	Level of Validation (Circle one): 1 2 <u>3</u> Other

1.0 Data Package Inventory	Yes	No	Comments
1.1 Were the project-specific requirements (i.e. acceptance criteria & analytical sensitivities) provided by the client prior to the initiation of validation activities?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	A request was made to the laboratory for the laboratory's QAPP and/or SOPs documenting the frequency of the different TEM calibrations. The k-factor calibration was also requested. Five preparation laboratory blanks and two sand blanks were reported. One duplicate on EPA Sample No. 14394143, five recount different (RD) analyses on EPA Sample Nos. 14394104, 14394125, 14394126, 14394131, and 14394192 (which is a lab prep blank) and one re-preparation (RP) analysis on EPA Sample No. 14394129 were performed.
1.2 Did the received hard copy deliverables contain all the necessary components:			
1.2.1 Case Narrative (Level 1, 2 & 3)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
1.2.2 Chain-of-Custody (Level 1, 2 & 3)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
1.2.3 Form I or equivalent (Level 1, 2 & 3)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
1.2.4 Raw Data - Count Sheets (Level 1, 2 & 3)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
1.2.5 QC Sample Data (Level 2 & 3):	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
1.2.5.1 Blank(s)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
1.2.5.2 Replicate(s)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
1.2.5.3 Duplicate(s)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
1.2.5.4 Verified Analysis?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
1.2.6 Calibration Data (Level 3)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
1.2.7 Communication Records (Level 1, 2 & 3)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
1.2.8 Miscellaneous?	<input type="checkbox"/>	<input type="checkbox"/>	
1.3 Were the necessary components received to perform the requested level of validation?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
2.0 Chain-of-Custody Information Verification (Level 1, 2 & 3)			
2.1 Were the following information recorded in the hard copy electronic deliverables (if applicable) consistent with the information recorded on the COC:			
2.1.1 COC Number?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
2.1.2 Case or Sample Set Number?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
2.1.3 EPA Sample ID?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
2.1.4 Date/Time Collected?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
2.1.5 Sample Volume?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
2.1.6 Sample Matrix?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
2.1.7 Analyses (Method)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
2.1.8 Date/Time Received?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
2.1.9 Other (describe)?	<input type="checkbox"/>	<input type="checkbox"/>	
2.2 Were the COC records signed and dated upon receipt?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Additional Comments:			

Data Review Checklist for the Verification and Validation of Transmission Electron Microscopy (TEM) Data Deliverables

3.0 Sample Result Verification & Validation (Level 1, 2 & 3)	Yes	No	Comments
3.1 Is the sample preparation method documented and final sample volume recorded?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Several discrepancies were observed and are listed in the EDD/Bench Sheet Discrepancy Table of the Asbestos Validation Narrative.
3.2 Is the correct number of grid openings used to achieve the specified analytical sensitivity?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
3.3 Verify that the following information from the laboratory's bench sheets have been transcribed correctly:			
3.3.1.1 Grid identification?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
3.3.1.2 Grid opening?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
3.3.1.3 Structure type?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
3.3.1.4 Number of primary and secondary structures?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
3.3.1.5 Length and width dimensions?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
3.3.1.6 Structure identification?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
3.3.1.7 Mineral type?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
3.4 Are overloaded samples correctly reported to the specified percent obscuration (i.e. 10%, 25%)?	<input type="checkbox"/>	<input type="checkbox"/>	Not Recorded by Laboratory.
3.5 If overloading occurs, are samples prepared by an alternate method (i.e. indirect preparation)?	<input type="checkbox"/>	<input type="checkbox"/>	NA
3.6 Verify that the following information is documented correctly:			
3.6.1 Magnification?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
3.6.2 Field or QC sample type?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
3.6.3 Number of grids prepared?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
3.6.4 Filter area in (mm ²)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
3.6.5 Analysis date?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
3.7 Verify the totals reported on the count sheets for the various types of structures. These may include:			A few discrepancies between the total structures reported and the number entered into NADES. See Asbestos Validation Narrative.
3.7.1 Total EPA Structures	<input type="checkbox"/>	<input checked="" type="checkbox"/>	NA
3.7.2 PCMe Structures	<input checked="" type="checkbox"/>	<input type="checkbox"/>	NA
3.7.3 AHERA Structures	<input type="checkbox"/>	<input type="checkbox"/>	NA
3.7.4 Berman Crump Structures	<input type="checkbox"/>	<input type="checkbox"/>	
3.8 Are the required spectra included for all hits reported (i.e. ED, EDXA, SAED)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Not all of the files listed were included in the deliverable. See EDD/Bench Sheet Discrepancy Table in the Asbestos Validation Narrative.
3.9 Recalculate the reported concentration on at least 10% of the results reported.			
3.9.1 Are the recalculated concentrations consistent with those reported?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Additional Comments:			

Data Review Checklist for the Verification and Validation of Transmission Electron Microscopy (TEM) Data Deliverables

4.0 Quality Control Verification & Validation (Level 2 and 3)	Yes	No	Comments
4.1 <u>Blanks</u> 4.1.1 Are laboratory blanks (direct, indirect) prepared and analyzed at the required frequency? 4.1.2 Are laboratory blank results within the specified criteria? 4.1.2.1 If "no" then qualify the associated results in accordance with the Blank Result table in SOP QATS-70-091.	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Five preparation laboratory blanks and two sand blanks were reported.
4.2 <u>Replicate Analyses</u> 4.2.1 Are replicate (second analyst on the same grids but different grid openings) sample analyses performed at the required frequency? 4.2.2 Are replicate sample results within the specified acceptance limits? 4.2.2.1 If "no" then qualify the associated results in accordance with the Analytical Variability Results table in SOP QATS-70-091.	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	The laboratory performed one duplicate on EPA Sample No. 14394143, five recount different (RD) analyses on EPA Sample Nos. 14394104, 14394125, 14394126, 14394131, and 14394192 (which is a lab prep blank) and one reparation (RP) analysis on EPA Sample No. 14394129.
4.3 <u>Duplicate Analyses</u> 4.3.1 Are duplicates (analysis of a second sample preparation obtained from the final filter) prepared and analyzed at the required frequency? 4.3.2 Are duplicate sample results within the specified acceptance limits? 4.3.2.1 If "no" then qualify the associated results in accordance with the Analytical Variability Results table in SOP QATS-70-091.	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
4.4 <u>Verified Analyses</u> 4.4.1 Are verified analyses (second analysis on same grids and grid openings) at the required frequency? 4.4.2 Are sample verification results within the specified acceptance limits? 4.4.2.1 If "no" then qualify the associated results in accordance with the Analytical Variability Results table in SOP QATS-70-091.	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
Additional Comments: 			

Data Review Checklist for the Verification and Validation of Transmission Electron Microscopy (TEM) Data Deliverables

5.0 Calibration & Microscope Alignment Validation (Level 3)	Yes	No	Comments
5.1 Is evidence of the calibration of TEM Screen Magnification provided for all sample analyses?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Daily calibration was not recorded for 10 days between the three instruments affecting a total of 16 field samples and QC. One daily calibration failed the Cu Peak Alignment on instrument H7000 affecting one prep lab blank. All affected samples are qualified "J" or "UJ" with a reason code of MC. The k-Factors provided by the laboratory were performed on 01/24/2014) for instrument H-7000 and 07/25/2014 for instrument JOEL 1200, and 01/08/2014 for instrument H7000FA, more than six months prior to the analyses of the samples in this SDG. The laboratory's QAPP states for k-factors "Calibration is performed on a biyearly basis, the first week of January and the first week of July." Amphibole results for 20 samples were affected and qualified "J" with a reason code of "IC".
5.1.1 Camera Constant Calibration?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
5.1.2 Calibration of the EDXA System?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
5.1.3 k-Factors?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
5.2 Are the calibration checks listed above performed at the required frequencies?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
5.3 Are the calibration checks within the specified criteria?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
5.4 Are all calibration checks traceable to the associated samples analyses?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
5.5 If required, are the following additional system checks provided:			
5.5.1 Beam Dose Check?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
5.5.2 Spot Size Check?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
5.5.3 Detector Resolution Check?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
5.5.4 Resolvable Na, Mg, and Si Peaks?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
5.5.5 If "no" then qualify the associated results in accordance with the Calibration Results table in SOP QATS-70-091.			
6.0 Case Narrative Validation (Levels 2 & 3)			
6.1 Does the data package narrative include descriptions of the following:			
6.1.1 Samples received (matrix/method)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
6.1.2 Method/project requirement deviations?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
6.1.3 Example sample calculation?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
6.1.4 Laboratory blank contamination?	<input type="checkbox"/>	<input type="checkbox"/>	NA
6.1.5 Quality control analyses outside specified criteria?	<input type="checkbox"/>	<input type="checkbox"/>	NA
6.1.6 Any problems encountered and subsequent corrective action?	<input type="checkbox"/>	<input type="checkbox"/>	NA
Additional Comments:			

 Validator's Signature Shellee McGrath

 Date 07/08/2015

 QA Review Lyndsay Gensler

 Date 07/09/2015

Sumas Mtn Asbestos Methods - FBAS_Labcor Inc_14394100_SO_02-17-15_150099_TEM-EPAISO_D.xlsm
FluidizedBedEDD_v1

**TEM Asbestos Structure Count for Fluidized Bed Material -- ISO
ANALYTICAL REPORT**

FILE NAME: Sumas Mtn Asbestos Methods - FBAS_Labcor Inc_14394100_SO_02-17-15_150099_TEM-EPAISO_D.xlsm

SAMPLE INFORMATION		ANALYSIS PARAMETERS							
Field Sample Number 14394100		EFA (mm ²)	385						
Matrix Soil		GO area (mm ²) [Ago]	0.0104						
Field QC Type Not QC		# GOs counted - high mag	100						
Sample Mass (g dry wt) [M] 0.56		# GOs counted - low mag only	0						
Fluidized Bed Flow Ratio[Q _R] 0.0122		F-factor [f]	1.00E+00						
Filter Status ANALYZED		Sensitivity - High mag	5.5E+04 1/g						
		Sensitivity - PCME (high+low mag)	5.5E+04 1/g						
ANALYSIS INFORMATION									
Lab Name Labcor Inc		Recording							
Lab Sample Number 150099-S1		Rules:							
Lab QC Type NOT QC		Initial (high mag)							
TEM Prep Method Direct		<table border="1"> <tr> <th>Min. AR</th> <th>Min length (um)</th> <th>Min width (um)</th> </tr> <tr> <td>3:1</td> <td>0</td> <td>0</td> </tr> </table>		Min. AR	Min length (um)	Min width (um)	3:1	0	0
Min. AR	Min length (um)	Min width (um)							
3:1	0	0							
Est. particulate loading on filter NA		PCME Supplemental (low mag)							
		<table border="1"> <tr> <th>Min. AR</th> <th>Min length (um)</th> <th>Min width (um)</th> </tr> <tr> <td>3:1</td> <td>0</td> <td>0</td> </tr> </table>		Min. AR	Min length (um)	Min width (um)	3:1	0	0
Min. AR	Min length (um)	Min width (um)							
3:1	0	0							
		Stopping							
		Rules:							
		<table border="1"> <tr> <th>Target S (1/g)</th> <th>Max Area (mm²)</th> <th>Max N</th> </tr> <tr> <td></td> <td></td> <td></td> </tr> </table>		Target S (1/g)	Max Area (mm ²)	Max N			
Target S (1/g)	Max Area (mm ²)	Max N							

RESULTS SUMMARY

Structure Metric	Observed Structure Count (s)	Structure Filter Loading (s/mm ²)	Soil Conc. Structures per gram (s/g)
High mag only			
Total Asbestos	30	2.9E+01	1.6E+06
Total Chrysotile (CH)	17	1.6E+01	9.3E+05
Total Amphibole	13	1.3E+01	7.1E+05
actinolite (AC)	8	7.7E+00	4.4E+05
amosite (AM)	0	0.0E+00	0.0E+00
anthophyllite (AN)	0	0.0E+00	0.0E+00
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	3	2.9E+00	1.6E+05
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	2	1.9E+00	1.1E+05
other mineral class (OM)	0	0.0E+00	0.0E+00
PCME (high+low mag)			
Total Asbestos	0	0.0E+00	0.0E+00
Total Chrysotile (CH)	0	0.0E+00	0.0E+00
Total Amphibole	0	0.0E+00	0.0E+00
actinolite (AC)	0	0.0E+00	0.0E+00
amosite (AM)	0	0.0E+00	0.0E+00
anthophyllite (AN)	0	0.0E+00	0.0E+00
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	0	0.0E+00	0.0E+00
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	0	0.0E+00	0.0E+00
other mineral class (OM)	0	0.0E+00	0.0E+00

Σ Asbestos Structure Mass (g)	Mass fraction (as %)
Total TEM	
WRTA	0.00E+00 0.0000%
OA	2.98E-09 1.6349%
CH	2.76E-09 1.5150%
AC	5.07E-10 0.2783%
AM	0.00E+00 0.0000%
AN	0.00E+00 0.0000%
CR	0.00E+00 0.0000%
TR	2.50E-09 1.3723%
PCME	
WRTA	0.00E+00 0.0000%
OA	0.00E+00 0.0000%
CH	0.00E+00 0.0000%
AC	#N/A #N/A
AM	0.00E+00 0.0000%
AN	0.00E+00 0.0000%
CR	0.00E+00 0.0000%
TR	0.00E+00 0.0000%

Asbestos structure mass = Length • Width² • Density • 1E-12

LA Density = 3.1 g/cm³
OA Density = 3.0 g/cm³
CH Density = 2.6 g/cm³
AC Density = 3.1 g/cm³
AM Density = 3.5 g/cm³
AN Density = 3.0 g/cm³
CR Density = 3.3 g/cm³
TR Density = 3.0 g/cm³

Csoil (mass fraction, as %) = Σ Asbestos structure mass • Sensitivity • 100

Equations:

Filter Loading (s/mm²) = N / (GOx • Ago)
Sensitivity (1/g) = EFA / (GOx • Ago • M • f • Q_R)
Csoil (s/g) = N • Sensitivity

Asbestos Types:

AC - actinolite
AM - amosite
AN - anthophyllite
CH - chrysotile
CR - crocidolite
TR - tremolite
LA - Libby amphibole
OA - other amphibole
NAM - non-asbestos material
OM - other mineral type (specify in "other mineral description" field)

Structure Types:

High mag: Length ≥ 0.5 um, Aspect Ratio ≥ 3:1
PCME: Length > 5 um, Width ≥ 0.25 um, Aspect Ratio ≥ 3:1

Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394101_SO_02-21-15_150099_TEM-EPAISO_D.xlsm
FluidizedBedEDD_v1

TEM Asbestos Structure Count for Fluidized Bed Material -- ISO
ANALYTICAL REPORT

FILE NAME: Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394101_SO_02-21-15_150099_TEM-EPAISO_D.xlsm

SAMPLE INFORMATION		ANALYSIS PARAMETERS	
Field Sample Number 14394101		EFA (mm ²)	385
Matrix Soil		GO area (mm ²) [Ago]	0.0104
Field QC Type Not QC		# GOs counted - high mag	100
Sample Mass (g dry wt) [M] 0.50		# GOs counted - low mag only	0
Fluidized Bed Flow Ratio[Q _R] 0.0122		F-factor [f]	1.00E+00
Filter Status ANALYZED		Sensitivity - High mag	6.1E+04 1/g
		Sensitivity - PCME (high+low mag)	6.1E+04 1/g

117000FA

ANALYSIS INFORMATION							
Lab Name LabCor Inc	Recording						
Lab Sample Number 150099-S2	Rules:						
Lab QC Type NOT QC	Initial (high mag)						
TEM Prep Method Direct	<table border="1"> <tr> <th>Min. AR</th> <th>Min length (um)</th> <th>Min width (um)</th> </tr> <tr> <td>3:1</td> <td>0</td> <td>0</td> </tr> </table>	Min. AR	Min length (um)	Min width (um)	3:1	0	0
Min. AR	Min length (um)	Min width (um)					
3:1	0	0					
Est. particulate loading on filter NA	PCME Supplemental (low mag)						
	<table border="1"> <tr> <th>Min. AR</th> <th>Min length (um)</th> <th>Min width (um)</th> </tr> <tr> <td>3:1</td> <td>0</td> <td>0</td> </tr> </table>	Min. AR	Min length (um)	Min width (um)	3:1	0	0
Min. AR	Min length (um)	Min width (um)					
3:1	0	0					
	Stopping						
	Rules:						
	<table border="1"> <tr> <th>Target S (1/g)</th> <th>Max Area (mm²)</th> <th>Max N</th> </tr> <tr> <td></td> <td>1.035</td> <td>100</td> </tr> </table>	Target S (1/g)	Max Area (mm ²)	Max N		1.035	100
Target S (1/g)	Max Area (mm ²)	Max N					
	1.035	100					

RESULTS SUMMARY

Structure Metric	Observed Structure Count (s)	Structure Filter Loading (s/mm ²)	Soil Conc. Structures per gram (s/g)
High mag only			
Total Asbestos	45	4.3E+01	2.7E+06
Total Chrysotile (CH)	17	1.6E+01	1.0E+06
Total Amphibole	28	2.7E+01	1.7E+06
actinolite (AC)	5	4.8E+00	3.0E+05
amosite (AM)	5	4.8E+00	3.0E+05
anthophyllite (AN)	3	2.9E+00	1.8E+05
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	10	9.7E+00	6.1E+05
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	5	4.8E+00	3.0E+05
other mineral class (OM)	0	0.0E+00	0.0E+00
PCME (high+low mag)			
Total Asbestos	6.000000132	5.8E+00	3.7E+05
Total Chrysotile (CH)	4	3.9E+00	2.4E+05
Total Amphibole	2.000000132	1.9E+00	1.2E+05
actinolite (AC)	1	9.7E-01	6.1E+04
amosite (AM)	1.31739E-07	1.3E-07	8.0E-03
anthophyllite (AN)	1	9.7E-01	6.1E+04
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	0	0.0E+00	0.0E+00
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	3.5293E-13	3.4E-13	2.1E-08
other mineral class (OM)	0	0.0E+00	0.0E+00

Equations:

Filter Loading (s/mm²) = N / (GOx • Ago)
Sensitivity (1/g) = EFA / (GOx • Ago • M • f • Q_R)
Csoil (s/g) = N • Sensitivity

Asbestos Types:

AC - actinolite
AM - amosite
AN - anthophyllite
CH - chrysotile
CR - crocidolite
TR - tremolite
LA - Libby amphibole
OA - other amphibole
NAM - non-asbestos material
OM - other mineral type (specify in "other mineral description" field)

Structure Types:

High mag: Length ≥ 0.5 um, Aspect Ratio ≥ 3:1
PCME: Length > 5 um, Width ≥ 0.25 um, Aspect Ratio ≥ 3:1

Σ Asbestos Structure Mass (g)	Mass fraction (as %)
Total TEM	
WRTA	0.00E+00 0.0000%
OA	5.90E-10 0.3591%
CH	2.28E-08 13.8835%
AC	8.86E-11 0.0539%
AM	0.00E+00 0.0000%
AN	1.40E-08 8.5478%
CR	0.00E+00 0.0000%
TR	3.99E-07 #####
PCME	
WRTA	0.00E+00 0.0000%
OA	5.89E-10 0.3583%
CH	4.17E-10 0.2538%
AC	#N/A #N/A
AM	0.00E+00 0.0000%
AN	#N/A #N/A
CR	0.00E+00 0.0000%
TR	#N/A #N/A

Asbestos structure mass = Length • Width² • Density • 1E-12

LA Density = 3.1 g/cm³
OA Density = 3.0 g/cm³
CH Density = 2.6 g/cm³
AC Density = 3.1 g/cm³
AM Density = 3.5 g/cm³
AN Density = 3.0 g/cm³
CR Density = 3.3 g/cm³
TR Density = 3.0 g/cm³

Csoil (mass fraction, as %) = Σ Asbestos structure mass • Sensitivity • 100

Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394102_SO_02-21-15_150099_TEM-EPAISO_D.xlsm
FluidizedBedEDD_v1

**TEM Asbestos Structure Count for Fluidized Bed Material -- ISO
ANALYTICAL REPORT**

FILE NAME: Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394102_SO_02-21-15_150099_TEM-EPAISO_D.xlsm

SAMPLE INFORMATION		ANALYSIS PARAMETERS	
Field Sample Number	14394102	EFA (mm ²)	385
Matrix	Soil	GO area (mm ²) [Ago]	0.0104
Field QC Type	Not QC	# GOs counted - high mag	100
Sample Mass (g dry wt) [M]	0.50	# GOs counted - low mag only	0
Fluidized Bed Flow Ratio[Q _R]	0.0122	F-factor [f]	1.00E+00
Filter Status	ANALYZED	Sensitivity - High mag	6.1E+04 1/g
		Sensitivity - PCME (high+low mag)	6.1E+04 1/g
ANALYSIS INFORMATION			
Lab Name	LabCor Inc	Recording	
Lab Sample Number	150099-S3	Rules:	
Lab QC Type	NOT QC	Initial (high mag)	
TEM Prep Method	Direct	Min. AR	Min length (um)
Est. particulate loading on filter	NA	3:1	0
		Min width (um)	0
		PCME Supplemental (low mag)	
		Min. AR	Min length (um)
		3:1	0
		Min width (um)	0
		Stopping	
		Rules:	
		Target S (1/g)	Max Area (mm ²)
			Max N

RESULTS SUMMARY

Structure Metric	Observed Structure Count (s)	Structure Filter Loading (s/mm ²)	Soil Conc. Structures per gram (s/g)
High mag only			
Total Asbestos	2	1.9E+00	1.2E+05
Total Chrysotile (CH)	2	1.9E+00	1.2E+05
Total Amphibole	0	0.0E+00	0.0E+00
actinolite (AC)	0	0.0E+00	0.0E+00
amosite (AM)	0	0.0E+00	0.0E+00
anthophyllite (AN)	0	0.0E+00	0.0E+00
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	0	0.0E+00	0.0E+00
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	0	0.0E+00	0.0E+00
other mineral class (OM)	0	0.0E+00	0.0E+00
PCME (high+low mag)			
Total Asbestos	0	0.0E+00	0.0E+00
Total Chrysotile (CH)	0	0.0E+00	0.0E+00
Total Amphibole	0	0.0E+00	0.0E+00
actinolite (AC)	0	0.0E+00	0.0E+00
amosite (AM)	0	0.0E+00	0.0E+00
anthophyllite (AN)	0	0.0E+00	0.0E+00
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	0	0.0E+00	0.0E+00
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	0	0.0E+00	0.0E+00
other mineral class (OM)	0	0.0E+00	0.0E+00

Σ Asbestos Structure Mass (g)	Mass fraction (as %)
Total TEM	
WRTA	0.00E+00 0.0000%
OA	0.00E+00 0.0000%
CH	6.25E-11 0.0381%
AC	0.00E+00 0.0000%
AM	0.00E+00 0.0000%
AN	0.00E+00 0.0000%
CR	0.00E+00 0.0000%
TR	0.00E+00 0.0000%
PCME	
WRTA	0.00E+00 0.0000%
OA	0.00E+00 0.0000%
CH	8.95E-12 0.0055%
AC	0.00E+00 0.0000%
AM	0.00E+00 0.0000%
AN	0.00E+00 0.0000%
CR	0.00E+00 0.0000%
TR	0.00E+00 0.0000%

Asbestos structure mass = Length • Width² • Density • 1E-12

LA Density = 3.1 g/cm³
OA Density = 3.0 g/cm³
CH Density = 2.6 g/cm³
AC Density = 3.1 g/cm³
AM Density = 3.5 g/cm³
AN Density = 3.0 g/cm³
CR Density = 3.3 g/cm³
TR Density = 3.0 g/cm³

Csoil (mass fraction, as %) = Σ Asbestos structure mass • Sensitivity • 100

Equations:

Filter Loading (s/mm²) = N / (GOx • Ago)
Sensitivity (1/g) = EFA / (GOx • Ago • M • f • Q_R)
Csoil (s/g) = N • Sensitivity

Asbestos Types:

AC - actinolite
AM - amosite
AN - anthophyllite
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TR - tremolite
LA - Libby amphibole
OA - other amphibole
NAM - non-asbestos material
OM - other mineral type (specify in "other mineral description" field)

Structure Types:

High mag: Length ≥ 0.5 um, Aspect Ratio ≥ 3:1
PCME: Length > 5 um, Width ≥ 0.25 um, Aspect Ratio ≥ 3:1

Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394103_SO_02-22-15_150099_TEM-EPAISO_D.xlsm
FluidizedBedEDD_v1

**TEM Asbestos Structure Count for Fluidized Bed Material -- ISO
ANALYTICAL REPORT**

FILE NAME:Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394103_SO_02-22-15_150099_TEM-EPAISO_D.xlsm

SAMPLE INFORMATION		ANALYSIS PARAMETERS	
Field Sample Number	14394103	EFA (mm ²)	385
Matrix	Soil	GO area (mm ²) [Ago]	0.0104
Field QC Type	Not QC	# GOs counted - high mag	100
Sample Mass (g dry wt) [M]	0.51	# GOs counted - low mag only	0
Fluidized Bed Flow Ratio[Q _R]	0.0122	F-factor [f]	1.00E+00
Filter Status	ANALYZED	Sensitivity - High mag	6.0E+04 1/g
		Sensitivity - PCME (high+low mag)	6.0E+04 1/g
ANALYSIS INFORMATION			
Lab Name	LabCor Inc	Recording	
Lab Sample Number	150099-S4	Rules:	
Lab QC Type	NOT QC	Initial (high mag)	
TEM Prep Method	Direct	Min. AR	Min length (um)
Est. particulate loading on filter	NA	3:1	0
		Min width (um)	0
		PCME Supplemental (low mag)	
		Min. AR	Min length (um)
		3:1	0
		Min width (um)	0
		Stopping	
		Rules:	
		Target S (1/g)	Max Area (mm ²)
			Max N

RESULTS SUMMARY

Structure Metric	Observed Structure Count (s)	Structure Filter Loading (s/mm ²)	Soil Conc. Structures per gram (s/g)
High mag only			
Total Asbestos	2	1.9E+00	1.2E+05
Total Chrysotile (CH)	2	1.9E+00	1.2E+05
Total Amphibole	0	0.0E+00	0.0E+00
actinolite (AC)	0	0.0E+00	0.0E+00
amosite (AM)	0	0.0E+00	0.0E+00
anthophyllite (AN)	0	0.0E+00	0.0E+00
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	0	0.0E+00	0.0E+00
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	0	0.0E+00	0.0E+00
other mineral class (OM)	0	0.0E+00	0.0E+00
PCME (high+low mag)			
Total Asbestos	0	0.0E+00	0.0E+00
Total Chrysotile (CH)	0	0.0E+00	0.0E+00
Total Amphibole	0	0.0E+00	0.0E+00
actinolite (AC)	0	0.0E+00	0.0E+00
amosite (AM)	0	0.0E+00	0.0E+00
anthophyllite (AN)	0	0.0E+00	0.0E+00
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	0	0.0E+00	0.0E+00
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	0	0.0E+00	0.0E+00
other mineral class (OM)	0	0.0E+00	0.0E+00

Σ Asbestos Structure Mass (g)	Mass fraction (as %)
Total TEM	
WRTA	0.00E+00 0.0000%
OA	0.00E+00 0.0000%
CH	1.67E-12 0.0010%
AC	0.00E+00 0.0000%
AM	0.00E+00 0.0000%
AN	0.00E+00 0.0000%
CR	0.00E+00 0.0000%
TR	0.00E+00 0.0000%
PCME	
WRTA	0.00E+00 0.0000%
OA	0.00E+00 0.0000%
CH	0.00E+00 0.0000%
AC	0.00E+00 0.0000%
AM	0.00E+00 0.0000%
AN	0.00E+00 0.0000%
CR	0.00E+00 0.0000%
TR	0.00E+00 0.0000%

Asbestos structure mass = Length • Width² • Density • 1E-12

LA Density = 3.1 g/cm³
OA Density = 3.0 g/cm³
CH Density = 2.6 g/cm³
AC Density = 3.1 g/cm³
AM Density = 3.5 g/cm³
AN Density = 3.0 g/cm³
CR Density = 3.3 g/cm³
TR Density = 3.0 g/cm³

Csoil (mass fraction, as %) = Σ Asbestos structure mass • Sensitivity • 100

Equations:

Filter Loading (s/mm²) = N / (GOx • Ago)
Sensitivity (1/g) = EFA / (GOx • Ago • M • f • Q_R)
Csoil (s/g) = N • Sensitivity

Asbestos Types:

AC - actinolite
AM - amosite
AN - anthophyllite
CH - chrysotile
CR - crocidolite
TR - tremolite
LA - Libby amphibole
OA - other amphibole
NAM - non-asbestos material
OM - other mineral type (specify in "other mineral description" field)

Structure Types:

High mag: Length ≥ 0.5 um, Aspect Ratio ≥ 3:1
PCME: Length > 5 um, Width ≥ 0.25 um, Aspect Ratio ≥ 3:1

Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394104_SO_02-25-15_150099_TEM-EPAISO_D.xlsm
FluidizedBedEDD_v1

**TEM Asbestos Structure Count for Fluidized Bed Material -- ISO
ANALYTICAL REPORT**

FILE NAME: Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394104_SO_02-25-15_150099_TEM-EPAISO_D.xlsm

SAMPLE INFORMATION		ANALYSIS PARAMETERS	
Field Sample Number 14394104		EFA (mm ²)	385
Matrix Soil		GO area (mm ²) [Ago]	0.0104
Field QC Type Not QC		# GOs counted - high mag	100
Sample Mass (g dry wt) [M] 0.51		# GOs counted - low mag only	0
Fluidized Bed Flow Ratio[Q _R] 0.0122		F-factor [f]	1.00E+00
Filter Status ANALYZED		Sensitivity - High mag	6.0E+04 1/g
		Sensitivity - PCME (high+low mag)	6.0E+04 1/g
ANALYSIS INFORMATION			
Lab Name LabCor Inc		Recording	
Lab Sample Number 150099-S5		Rules:	
Lab QC Type NOT QC		Initial (high mag)	
TEM Prep Method Direct		Min. AR	Min length (um) Min width (um)
Est. particulate loading on filter NA		3:1	0 0
		PCME Supplemental (low mag)	
		Min. AR	Min length (um) Min width (um)
		3:1	0 0
		Stopping	
		Rules:	
		Target S (1/g)	Max Area (mm ²) Max N

RESULTS SUMMARY

Structure Metric	Observed Structure Count (s)	Structure Filter Loading (s/mm ²)	Soil Conc. Structures per gram (s/g)
High mag only			
Total Asbestos	4	3.9E+00	2.4E+05
Total Chrysotile (CH)	3	2.9E+00	1.8E+05
Total Amphibole	1	9.7E-01	6.0E+04
actinolite (AC)	0	0.0E+00	0.0E+00
amosite (AM)	0	0.0E+00	0.0E+00
anthophyllite (AN)	0	0.0E+00	0.0E+00
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	1	9.7E-01	6.0E+04
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	0	0.0E+00	0.0E+00
other mineral class (OM)	0	0.0E+00	0.0E+00
PCME (high+low mag)			
Total Asbestos	0	0.0E+00	0.0E+00
Total Chrysotile (CH)	0	0.0E+00	0.0E+00
Total Amphibole	0	0.0E+00	0.0E+00
actinolite (AC)	0	0.0E+00	0.0E+00
amosite (AM)	0	0.0E+00	0.0E+00
anthophyllite (AN)	0	0.0E+00	0.0E+00
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	0	0.0E+00	0.0E+00
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	0	0.0E+00	0.0E+00
other mineral class (OM)	0	0.0E+00	0.0E+00

Equations:

Filter Loading (s/mm²) = N / (GOx • Ago)
Sensitivity (1/g) = EFA / (GOx • Ago • M • f • Q_R)
Csoil (s/g) = N • Sensitivity

Asbestos Types:

AC - actinolite
AM - amosite
AN - anthophyllite
CH - chrysotile
CR - crocidolite
TR - tremolite
LA - Libby amphibole
OA - other amphibole
NAM - non-asbestos material
OM - other mineral type (specify in "other mineral description" field)

Structure Types:

High mag: Length ≥ 0.5 um, Aspect Ratio ≥ 3:1
PCME: Length > 5 um, Width ≥ 0.25 um, Aspect Ratio ≥ 3:1

Σ Asbestos Structure Mass (g)	Mass fraction (as %)
Total TEM	
WRTA	0.00E+00 0.0000%
OA	0.00E+00 0.0000%
CH	2.84E-10 0.1697%
AC	0.00E+00 0.0000%
AM	0.00E+00 0.0000%
AN	0.00E+00 0.0000%
CR	0.00E+00 0.0000%
TR	4.36E-14 0.0000%
PCME	
WRTA	0.00E+00 0.0000%
OA	0.00E+00 0.0000%
CH	0.00E+00 0.0000%
AC	0.00E+00 0.0000%
AM	0.00E+00 0.0000%
AN	0.00E+00 0.0000%
CR	0.00E+00 0.0000%
TR	0.00E+00 0.0000%

Asbestos structure mass = Length • Width² • Density • 1E-12

LA Density = 3.1 g/cm³
OA Density = 3.0 g/cm³
CH Density = 2.6 g/cm³
AC Density = 3.1 g/cm³
AM Density = 3.5 g/cm³
AN Density = 3.0 g/cm³
CR Density = 3.3 g/cm³
TR Density = 3.0 g/cm³

Csoil (mass fraction, as %) = Σ Asbestos structure mass • Sensitivity • 100

Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394105_SO_02-25-15_150099_TEM-EPAISO_D.xlsm
FluidizedBedEDD_v1

**TEM Asbestos Structure Count for Fluidized Bed Material -- ISO
ANALYTICAL REPORT**

FILE NAME: Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394105_SO_02-25-15_150099_TEM-EPAISO_D.xlsm

SAMPLE INFORMATION		ANALYSIS PARAMETERS	
Field Sample Number 14394105		EFA (mm ²)	385
Matrix Soil		GO area (mm ²) [Ago]	0.0104
Field QC Type Not QC		# GOs counted - high mag	100
Sample Mass (g dry wt) [M] 0.50		# GOs counted - low mag only	0
Fluidized Bed Flow Ratio[Q _R] 0.0122		F-factor [f]	1.00E+00
Filter Status ANALYZED		Sensitivity - High mag	6.2E+04 1/g
		Sensitivity - PCME (high+low mag)	6.2E+04 1/g
ANALYSIS INFORMATION			
Lab Name LabCor Inc		Recording	
Lab Sample Number 150099-S6		Rules:	
Lab QC Type NOT QC		Initial (high mag)	
TEM Prep Method Direct		Min. AR	Min length (um)
Est. particulate loading on filter NA		3:1	0
		Min width (um)	0
		PCME Supplemental (low mag)	
		Min. AR	Min length (um)
		3:1	0
		Min width (um)	0
		Stopping	
		Rules:	
		Target S (1/g)	Max Area (mm ²)
			Max N

RESULTS SUMMARY

Structure Metric	Observed Structure Count (s)	Structure Filter Loading (s/mm ²)	Soil Conc. Structures per gram (s/g)
High mag only			
Total Asbestos	2	1.9E+00	1.2E+05
Total Chrysotile (CH)	2	1.9E+00	1.2E+05
Total Amphibole	0	0.0E+00	0.0E+00
actinolite (AC)	0	0.0E+00	0.0E+00
amosite (AM)	0	0.0E+00	0.0E+00
anthophyllite (AN)	0	0.0E+00	0.0E+00
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	0	0.0E+00	0.0E+00
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	0	0.0E+00	0.0E+00
other mineral class (OM)	0	0.0E+00	0.0E+00
PCME (high+low mag)			
Total Asbestos	0	0.0E+00	0.0E+00
Total Chrysotile (CH)	0	0.0E+00	0.0E+00
Total Amphibole	0	0.0E+00	0.0E+00
actinolite (AC)	0	0.0E+00	0.0E+00
amosite (AM)	0	0.0E+00	0.0E+00
anthophyllite (AN)	0	0.0E+00	0.0E+00
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	0	0.0E+00	0.0E+00
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	0	0.0E+00	0.0E+00
other mineral class (OM)	0	0.0E+00	0.0E+00

Equations:

Filter Loading (s/mm²) = N / (GOx • Ago)
Sensitivity (1/g) = EFA / (GOx • Ago • M • f • Q_R)
Csoil (s/g) = N • Sensitivity

Asbestos Types:

AC - actinolite
AM - amosite
AN - anthophyllite
CH - chrysotile
CR - crocidolite
TR - tremolite
LA - Libby amphibole
OA - other amphibole
NAM - non-asbestos material
OM - other mineral type (specify in "other mineral description" field)

Structure Types:

High mag: Length ≥ 0.5 um, Aspect Ratio ≥ 3:1
PCME: Length > 5 um, Width ≥ 0.25 um, Aspect Ratio ≥ 3:1

Σ Asbestos Structure Mass (g)	Mass fraction (as %)
Total TEM	
WRTA	0.00E+00 0.0000%
OA	0.00E+00 0.0000%
CH	2.21E-14 0.0000%
AC	0.00E+00 0.0000%
AM	0.00E+00 0.0000%
AN	0.00E+00 0.0000%
CR	0.00E+00 0.0000%
TR	0.00E+00 0.0000%
PCME	
WRTA	0.00E+00 0.0000%
OA	0.00E+00 0.0000%
CH	0.00E+00 0.0000%
AC	0.00E+00 0.0000%
AM	0.00E+00 0.0000%
AN	0.00E+00 0.0000%
CR	0.00E+00 0.0000%
TR	0.00E+00 0.0000%

Asbestos structure mass = Length • Width² • Density • 1E-12

LA Density = 3.1 g/cm³
OA Density = 3.0 g/cm³
CH Density = 2.6 g/cm³
AC Density = 3.1 g/cm³
AM Density = 3.5 g/cm³
AN Density = 3.0 g/cm³
CR Density = 3.3 g/cm³
TR Density = 3.0 g/cm³

Csoil (mass fraction, as %) = Σ Asbestos structure mass • Sensitivity • 100

Sumas Mtn Asbestos Methods - FBAS_Labcor Inc_14394106_SO_02-25-15_150099_TEM-EPAISO_D.xlsm
FluidizedBedEDD_v1

**TEM Asbestos Structure Count for Fluidized Bed Material -- ISO
ANALYTICAL REPORT**

FILE NAME: Sumas Mtn Asbestos Methods - FBAS_Labcor Inc_14394106_SO_02-25-15_150099_TEM-EPAISO_D.xlsm

SAMPLE INFORMATION		ANALYSIS PARAMETERS	
Field Sample Number 14394106		EFA (mm ²)	385
Matrix Soil		GO area (mm ²) [Ago]	0.0104
Field QC Type Not QC		# GOs counted - high mag	100
Sample Mass (g dry wt) [M] 0.50		# GOs counted - low mag only	0
Fluidized Bed Flow Ratio[Q _R] 0.0122		F-factor [f]	1.00E+00
Filter Status ANALYZED		Sensitivity - High mag	6.1E+04 1/g
		Sensitivity - PCME (high+low mag)	6.1E+04 1/g
ANALYSIS INFORMATION			
Lab Name Labcor Inc		Recording	
Lab Sample Number 150099-S7		Rules:	
Lab QC Type NOT QC		Initial (high mag)	
TEM Prep Method Direct		Min. AR	Min length (um) Min width (um)
Est. particulate loading on filter NA		none	
		PCME Supplemental (low mag)	
		Min. AR	Min length (um) Min width (um)
		none	
		Stopping	
		Rules:	
		Target S (1/g)	Max Area (mm ²) Max N

RESULTS SUMMARY

Structure Metric	Observed Structure Count (s)	Structure Filter Loading (s/mm ²)	Soil Conc. Structures per gram (s/g)
High mag only			
Total Asbestos	22	2.1E+01	1.3E+06
Total Chrysotile (CH)	20	1.9E+01	1.2E+06
Total Amphibole	2	1.9E+00	1.2E+05
actinolite (AC)	0	0.0E+00	0.0E+00
amosite (AM)	0	0.0E+00	0.0E+00
anthophyllite (AN)	1	9.7E-01	6.1E+04
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	1	9.7E-01	6.1E+04
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	0	0.0E+00	0.0E+00
other mineral class (OM)	0	0.0E+00	0.0E+00
PCME (high+low mag)			
Total Asbestos	0	0.0E+00	0.0E+00
Total Chrysotile (CH)	0	0.0E+00	0.0E+00
Total Amphibole	0	0.0E+00	0.0E+00
actinolite (AC)	0	0.0E+00	0.0E+00
amosite (AM)	0	0.0E+00	0.0E+00
anthophyllite (AN)	0	0.0E+00	0.0E+00
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	0	0.0E+00	0.0E+00
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	0	0.0E+00	0.0E+00
other mineral class (OM)	0	0.0E+00	0.0E+00

Σ Asbestos Structure Mass (g)	Mass fraction (as %)
Total TEM	
WRTA	0.00E+00 0.0000%
OA	0.00E+00 0.0000%
CH	3.67E-09 2.2404%
AC	0.00E+00 0.0000%
AM	0.00E+00 0.0000%
AN	1.05E-11 0.0064%
CR	0.00E+00 0.0000%
TR	2.68E-09 1.6326%
PCME	
WRTA	0.00E+00 0.0000%
OA	0.00E+00 0.0000%
CH	6.63E-10 0.4041%
AC	0.00E+00 0.0000%
AM	0.00E+00 0.0000%
AN	#N/A #N/A
CR	0.00E+00 0.0000%
TR	0.00E+00 0.0000%

Asbestos structure mass = Length • Width² • Density • 1E-12

LA Density = 3.1 g/cm³
OA Density = 3.0 g/cm³
CH Density = 2.6 g/cm³
AC Density = 3.1 g/cm³
AM Density = 3.5 g/cm³
AN Density = 3.0 g/cm³
CR Density = 3.3 g/cm³
TR Density = 3.0 g/cm³

Csoil (mass fraction, as %) = Σ Asbestos structure mass • Sensitivity • 100

Equations:

Filter Loading (s/mm²) = N / (GOx • Ago)
Sensitivity (1/g) = EFA / (GOx • Ago • M • f • Q_R)
Csoil (s/g) = N • Sensitivity

Asbestos Types:

AC - actinolite
AM - amosite
AN - anthophyllite
CH - chrysotile
CR - crocidolite
TR - tremolite
LA - Libby amphibole
OA - other amphibole
NAM - non-asbestos material
OM - other mineral type (specify in "other mineral description" field)

Structure Types:

High mag: Length ≥ 0.5 um, Aspect Ratio ≥ 3:1
PCME: Length > 5 um, Width ≥ 0.25 um, Aspect Ratio ≥ 3:1

Sumas Mtn Asbestos Methods - FBAS_Labcor Inc_14394107_SO_02-27-15_150099_TEM-EPAISO_D.xlsm
FluidizedBedEDD_v1

**TEM Asbestos Structure Count for Fluidized Bed Material -- ISO
ANALYTICAL REPORT**

FILE NAME:Sumas Mtn Asbestos Methods - FBAS_Labcor Inc_14394107_SO_02-27-15_150099_TEM-EPAISO_D.xlsm

SAMPLE INFORMATION		ANALYSIS PARAMETERS	
Field Sample Number 14394107		EFA (mm ²)	385
Matrix Soil		GO area (mm ²) [Ago]	0.0104
Field QC Type Not QC		# GOs counted - high mag	100
Sample Mass (g dry wt) [M] 0.51		# GOs counted - low mag only	0
Fluidized Bed Flow Ratio[Q _R] 0.0122		F-factor [f]	1.00E+00
Filter Status ANALYZED		Sensitivity - High mag	6.0E+04 1/g
		Sensitivity - PCME (high+low mag)	6.0E+04 1/g
ANALYSIS INFORMATION			
Lab Name Labcor Inc		Recording	
Lab Sample Number 150099-S8		Rules:	
Lab QC Type NOT QC		Initial (high mag)	
TEM Prep Method Direct		Min. AR	Min length (um) Min width (um)
Est. particulate loading on filter NA		3:1	0 0
		PCME Supplemental (low mag)	
		Min. AR	Min length (um) Min width (um)
		3:1	0 0
		Stopping	
		Rules:	
		Target S (1/g)	Max Area (mm ²) Max N

RESULTS SUMMARY

Structure Metric	Observed Structure Count (s)	Structure Filter Loading (s/mm ²)	Soil Conc. Structures per gram (s/g)
High mag only			
Total Asbestos	24	2.3E+01	1.4E+06
Total Chrysotile (CH)	18	1.7E+01	1.1E+06
Total Amphibole	6	5.8E+00	3.6E+05
actinolite (AC)	5	4.8E+00	3.0E+05
amosite (AM)	1	9.7E-01	6.0E+04
anthophyllite (AN)	0	0.0E+00	0.0E+00
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	0	0.0E+00	0.0E+00
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	0	0.0E+00	0.0E+00
other mineral class (OM)	0	0.0E+00	0.0E+00
PCME (high+low mag)			
Total Asbestos	1	9.7E-01	6.0E+04
Total Chrysotile (CH)	1	9.7E-01	6.0E+04
Total Amphibole	0	0.0E+00	0.0E+00
actinolite (AC)	0	0.0E+00	0.0E+00
amosite (AM)	0	0.0E+00	0.0E+00
anthophyllite (AN)	0	0.0E+00	0.0E+00
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	0	0.0E+00	0.0E+00
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	0	0.0E+00	0.0E+00
other mineral class (OM)	0	0.0E+00	0.0E+00

Σ Asbestos Structure Mass (g)	Mass fraction (as %)
Total TEM	
WRTA	0.00E+00 0.0000%
OA	0.00E+00 0.0000%
CH	1.38E-09 0.8301%
AC	1.60E-08 9.5978%
AM	1.94E-11 0.0116%
AN	0.00E+00 0.0000%
CR	0.00E+00 0.0000%
TR	0.00E+00 0.0000%
PCME	
WRTA	0.00E+00 0.0000%
OA	0.00E+00 0.0000%
CH	1.10E-11 0.0066%
AC	#N/A #N/A
AM	0.00E+00 0.0000%
AN	0.00E+00 0.0000%
CR	0.00E+00 0.0000%
TR	0.00E+00 0.0000%

Asbestos structure mass = Length • Width² • Density • 1E-12

LA Density = 3.1 g/cm³
OA Density = 3.0 g/cm³
CH Density = 2.6 g/cm³
AC Density = 3.1 g/cm³
AM Density = 3.5 g/cm³
AN Density = 3.0 g/cm³
CR Density = 3.3 g/cm³
TR Density = 3.0 g/cm³

Csoil (mass fraction, as %) = Σ Asbestos structure mass • Sensitivity • 100

Equations:

Filter Loading (s/mm²) = N / (GOx • Ago)
Sensitivity (1/g) = EFA / (GOx • Ago • M • f • Q_R)
Csoil (s/g) = N • Sensitivity

Asbestos Types:

AC - actinolite
AM - amosite
AN - anthophyllite
CH - chrysotile
CR - crocidolite
TR - tremolite
LA - Libby amphibole
OA - other amphibole
NAM - non-asbestos material
OM - other mineral type (specify in "other mineral description" field)

Structure Types:

High mag: Length ≥ 0.5 um, Aspect Ratio ≥ 3:1
PCME: Length > 5 um, Width ≥ 0.25 um, Aspect Ratio ≥ 3:1

Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394108_SO_02-28-15_150099_TEM-EPAISO_D.xlsm
FluidizedBedEDD_v1

**TEM Asbestos Structure Count for Fluidized Bed Material -- ISO
ANALYTICAL REPORT**

FILE NAME:Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394108_SO_02-28-15_150099_TEM-EPAISO_D.xlsm

SAMPLE INFORMATION		ANALYSIS PARAMETERS	
Field Sample Number	14394108	EFA (mm ²)	385
Matrix	Soil	GO area (mm ²) [Ago]	0.0104
Field QC Type	Not QC	# GOs counted - high mag	100
Sample Mass (g dry wt) [M]	0.50	# GOs counted - low mag only	0
Fluidized Bed Flow Ratio[Q _R]	0.0122	F-factor [f]	1.00E+00
Filter Status	ANALYZED	Sensitivity - High mag	6.1E+04 1/g
		Sensitivity - PCME (high+low mag)	6.1E+04 1/g
ANALYSIS INFORMATION			
Lab Name	LabCor Inc	Recording	
Lab Sample Number	150099-S9	Rules:	
Lab QC Type	NOT QC	Initial (high mag)	
TEM Prep Method	Direct	Min. AR	Min length (um)
Est. particulate loading on filter	NA	3:1	0
		Min width (um)	0
		PCME Supplemental (low mag)	
		Min. AR	Min length (um)
		3:1	0
		Min width (um)	0
		Stopping	
		Rules:	
		Target S (1/g)	Max Area (mm ²)
			Max N

RESULTS SUMMARY

Structure Metric	Observed Structure Count (s)	Structure Filter Loading (s/mm ²)	Soil Conc. Structures per gram (s/g)
High mag only			
Total Asbestos	0	0.0E+00	0.0E+00
Total Chrysotile (CH)	0	0.0E+00	0.0E+00
Total Amphibole	0	0.0E+00	0.0E+00
actinolite (AC)	0	0.0E+00	0.0E+00
amosite (AM)	0	0.0E+00	0.0E+00
anthophyllite (AN)	0	0.0E+00	0.0E+00
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	0	0.0E+00	0.0E+00
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	0	0.0E+00	0.0E+00
other mineral class (OM)	0	0.0E+00	0.0E+00
PCME (high+low mag)			
Total Asbestos	0	0.0E+00	0.0E+00
Total Chrysotile (CH)	0	0.0E+00	0.0E+00
Total Amphibole	0	0.0E+00	0.0E+00
actinolite (AC)	0	0.0E+00	0.0E+00
amosite (AM)	0	0.0E+00	0.0E+00
anthophyllite (AN)	0	0.0E+00	0.0E+00
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	0	0.0E+00	0.0E+00
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	0	0.0E+00	0.0E+00
other mineral class (OM)	0	0.0E+00	0.0E+00

Equations:

Filter Loading (s/mm²) = N / (GOx • Ago)
Sensitivity (1/g) = EFA / (GOx • Ago • M • f • Q_R)
Csoil (s/g) = N • Sensitivity

Asbestos Types:

AC - actinolite
AM - amosite
AN - anthophyllite
CH - chrysotile
CR - crocidolite
TR - tremolite
LA - Libby amphibole
OA - other amphibole
NAM - non-asbestos material
OM - other mineral type (specify in "other mineral description" field)

Structure Types:

High mag: Length ≥ 0.5 um, Aspect Ratio ≥ 3:1
PCME: Length > 5 um, Width ≥ 0.25 um, Aspect Ratio ≥ 3:1

Σ Asbestos Structure Mass (g)	Mass fraction (as %)
Total TEM	
WRTA	0.00E+00 0.0000%
OA	0.00E+00 0.0000%
CH	0.00E+00 0.0000%
AC	0.00E+00 0.0000%
AM	0.00E+00 0.0000%
AN	0.00E+00 0.0000%
CR	0.00E+00 0.0000%
TR	0.00E+00 0.0000%
WRTA	0.00E+00 0.0000%
OA	0.00E+00 0.0000%
CH	0.00E+00 0.0000%
AC	0.00E+00 0.0000%
AM	0.00E+00 0.0000%
AN	0.00E+00 0.0000%
CR	0.00E+00 0.0000%
TR	0.00E+00 0.0000%

Asbestos structure mass = Length • Width² • Density • 1E-12

LA Density = 3.1 g/cm³
OA Density = 3.0 g/cm³
CH Density = 2.6 g/cm³
AC Density = 3.1 g/cm³
AM Density = 3.5 g/cm³
AN Density = 3.0 g/cm³
CR Density = 3.3 g/cm³
TR Density = 3.0 g/cm³

Csoil (mass fraction, as %) = Σ Asbestos structure mass • Sensitivity • 100

Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394109_SO_03-03-15_150099_TEM-EPAISO_D.xlsm
FluidizedBedEDD_v1

**TEM Asbestos Structure Count for Fluidized Bed Material -- ISO
ANALYTICAL REPORT**

FILE NAME: Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394109_SO_03-03-15_150099_TEM-EPAISO_D.xlsm

SAMPLE INFORMATION		ANALYSIS PARAMETERS							
Field Sample Number	14394109	EFA (mm ²)	385						
Matrix	Soil	GO area (mm ²) [Ago]	0.0104						
Field QC Type	Not QC	# GOs counted - high mag	100						
Sample Mass (g dry wt) [M]	0.50	# GOs counted - low mag only	0						
Fluidized Bed Flow Ratio[Q _R]	0.0122	F-factor [f]	1.00E+00						
Filter Status	ANALYZED	Sensitivity - High mag	6.1E+04 1/g						
		Sensitivity - PCME (high+low mag)	6.1E+04 1/g						
ANALYSIS INFORMATION									
Lab Name LabCor Inc		Recording							
Lab Sample Number 150099-S10		Rules:							
Lab QC Type NOT QC		Initial (high mag)							
TEM Prep Method Direct		<table border="1"> <tr> <th>Min. AR</th> <th>Min length (um)</th> <th>Min width (um)</th> </tr> <tr> <td>3:1</td> <td>0</td> <td>0</td> </tr> </table>		Min. AR	Min length (um)	Min width (um)	3:1	0	0
Min. AR	Min length (um)	Min width (um)							
3:1	0	0							
Est. particulate loading on filter NA		PCME Supplemental (low mag)							
		<table border="1"> <tr> <th>Min. AR</th> <th>Min length (um)</th> <th>Min width (um)</th> </tr> <tr> <td>3:1</td> <td>0</td> <td>0</td> </tr> </table>		Min. AR	Min length (um)	Min width (um)	3:1	0	0
Min. AR	Min length (um)	Min width (um)							
3:1	0	0							
		Stopping							
		Rules:							
		<table border="1"> <tr> <th>Target S (1/g)</th> <th>Max Area (mm²)</th> <th>Max N</th> </tr> <tr> <td></td> <td></td> <td></td> </tr> </table>		Target S (1/g)	Max Area (mm ²)	Max N			
Target S (1/g)	Max Area (mm ²)	Max N							

RESULTS SUMMARY

Structure Metric	Observed Structure Count (s)	Structure Filter Loading (s/mm ²)	Soil Conc. Structures per gram (s/g)
High mag only			
Total Asbestos	9	8.7E+00	5.5E+05
Total Chrysotile (CH)	7	6.8E+00	4.3E+05
Total Amphibole	2	1.9E+00	1.2E+05
actinolite (AC)	1	9.7E-01	6.1E+04
amosite (AM)	0	0.0E+00	0.0E+00
anthophyllite (AN)	0	0.0E+00	0.0E+00
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	1	9.7E-01	6.1E+04
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	0	0.0E+00	0.0E+00
other mineral class (OM)	0	0.0E+00	0.0E+00
PCME (high+low mag)			
Total Asbestos	0	0.0E+00	0.0E+00
Total Chrysotile (CH)	0	0.0E+00	0.0E+00
Total Amphibole	0	0.0E+00	0.0E+00
actinolite (AC)	0	0.0E+00	0.0E+00
amosite (AM)	0	0.0E+00	0.0E+00
anthophyllite (AN)	0	0.0E+00	0.0E+00
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	0	0.0E+00	0.0E+00
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	0	0.0E+00	0.0E+00
other mineral class (OM)	0	0.0E+00	0.0E+00

Σ Asbestos Structure Mass (g)	Mass fraction (as %)
Total TEM	
WRTA	0.00E+00 0.0000%
OA	0.00E+00 0.0000%
CH	2.18E-08 13.2946%
AC	3.75E-11 0.0228%
AM	0.00E+00 0.0000%
AN	0.00E+00 0.0000%
CR	0.00E+00 0.0000%
TR	1.99E-09 1.2110%
PCME	
WRTA	0.00E+00 0.0000%
OA	0.00E+00 0.0000%
CH	0.00E+00 0.0000%
AC	#N/A #N/A
AM	0.00E+00 0.0000%
AN	0.00E+00 0.0000%
CR	0.00E+00 0.0000%
TR	0.00E+00 0.0000%

Asbestos structure mass = Length • Width² • Density • 1E-12

LA Density = 3.1 g/cm³
OA Density = 3.0 g/cm³
CH Density = 2.6 g/cm³
AC Density = 3.1 g/cm³
AM Density = 3.5 g/cm³
AN Density = 3.0 g/cm³
CR Density = 3.3 g/cm³
TR Density = 3.0 g/cm³

Csoil (mass fraction, as %) = Σ Asbestos structure mass • Sensitivity • 100

Equations:

Filter Loading (s/mm²) = N / (GOx • Ago)
Sensitivity (1/g) = EFA / (GOx • Ago • M • f • Q_R)
Csoil (s/g) = N • Sensitivity

Asbestos Types:

AC - actinolite
AM - amosite
AN - anthophyllite
CH - chrysotile
CR - crocidolite
TR - tremolite
LA - Libby amphibole
OA - other amphibole
NAM - non-asbestos material
OM - other mineral type (specify in "other mineral description" field)

Structure Types:

High mag: Length ≥ 0.5 um, Aspect Ratio ≥ 3:1
PCME: Length > 5 um, Width ≥ 0.25 um, Aspect Ratio ≥ 3:1

Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394110_SO_03-03-15_150099_TEM-EPAISO__D.xlsm
FluidizedBedEDD_v1

**TEM Asbestos Structure Count for Fluidized Bed Material -- ISO
ANALYTICAL REPORT**

FILE NAME: Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394110_SO_03-03-15_150099_TEM-EPAISO__D.xlsm

SAMPLE INFORMATION		ANALYSIS PARAMETERS	
Field Sample Number 14394110		EFA (mm ²)	385
Matrix Soil		GO area (mm ²) [Ago]	0.0104
Field QC Type Not QC		# GOs counted - high mag	100
Sample Mass (g dry wt) [M] 0.51		# GOs counted - low mag only	0
Fluidized Bed Flow Ratio[Q _R] 0.0122		F-factor [f]	1.00E+00
Filter Status ANALYZED		Sensitivity - High mag	6.0E+04 1/g
		Sensitivity - PCME (high+low mag)	6.0E+04 1/g
ANALYSIS INFORMATION			
Lab Name LabCor Inc		Recording	
Lab Sample Number 15099-S11		Rules:	
Lab QC Type NOT QC		Initial (high mag)	
TEM Prep Method Direct		Min. AR	Min length (um)
Est. particulate loading on filter NA		3:1	0
		Min width (um)	0
		PCME Supplemental (low mag)	
		Min. AR	Min length (um)
		3:1	0
		Min width (um)	0
		Stopping	
		Rules:	
		Target S (1/g)	Max Area (mm ²)
			Max N

RESULTS SUMMARY

Structure Metric	Observed Structure Count (s)	Structure Filter Loading (s/mm ²)	Soil Conc. Structures per gram (s/g)
High mag only			
Total Asbestos	3	2.9E+00	1.8E+05
Total Chrysotile (CH)	3	2.9E+00	1.8E+05
Total Amphibole	0	0.0E+00	0.0E+00
actinolite (AC)	0	0.0E+00	0.0E+00
amosite (AM)	0	0.0E+00	0.0E+00
anthophyllite (AN)	0	0.0E+00	0.0E+00
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	0	0.0E+00	0.0E+00
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	0	0.0E+00	0.0E+00
other mineral class (OM)	0	0.0E+00	0.0E+00
PCME (high+low mag)			
Total Asbestos	0	0.0E+00	0.0E+00
Total Chrysotile (CH)	0	0.0E+00	0.0E+00
Total Amphibole	0	0.0E+00	0.0E+00
actinolite (AC)	0	0.0E+00	0.0E+00
amosite (AM)	0	0.0E+00	0.0E+00
anthophyllite (AN)	0	0.0E+00	0.0E+00
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	0	0.0E+00	0.0E+00
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	0	0.0E+00	0.0E+00
other mineral class (OM)	0	0.0E+00	0.0E+00

Σ Asbestos Structure Mass (g)	Mass fraction (as %)
Total TEM	
WRTA	0.00E+00 0.0000%
OA	0.00E+00 0.0000%
CH	1.04E-12 0.0006%
AC	0.00E+00 0.0000%
AM	0.00E+00 0.0000%
AN	0.00E+00 0.0000%
CR	0.00E+00 0.0000%
TR	0.00E+00 0.0000%
PCME	
WRTA	0.00E+00 0.0000%
OA	0.00E+00 0.0000%
CH	0.00E+00 0.0000%
AC	0.00E+00 0.0000%
AM	0.00E+00 0.0000%
AN	0.00E+00 0.0000%
CR	0.00E+00 0.0000%
TR	0.00E+00 0.0000%

Asbestos structure mass = Length • Width² • Density • 1E-12

LA Density = 3.1 g/cm³
OA Density = 3.0 g/cm³
CH Density = 2.6 g/cm³
AC Density = 3.1 g/cm³
AM Density = 3.5 g/cm³
AN Density = 3.0 g/cm³
CR Density = 3.3 g/cm³
TR Density = 3.0 g/cm³

Csoil (mass fraction, as %) = Σ Asbestos structure mass • Sensitivity • 100

Equations:

Filter Loading (s/mm²) = N / (GOx • Ago)
Sensitivity (1/g) = EFA / (GOx • Ago • M • f • Q_R)
Csoil (s/g) = N • Sensitivity

Asbestos Types:

AC - actinolite
AM - amosite
AN - anthophyllite
CH - chrysotile
CR - crocidolite
TR - tremolite
LA - Libby amphibole
OA - other amphibole
NAM - non-asbestos material
OM - other mineral type (specify in "other mineral description" field)

Structure Types:

High mag: Length ≥ 0.5 um, Aspect Ratio ≥ 3:1
PCME: Length > 5 um, Width ≥ 0.25 um, Aspect Ratio ≥ 3:1

Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394111_SO_03-03-15_150099_TEM-EPAISO__D.xlsm
FluidizedBedEDD_v1

**TEM Asbestos Structure Count for Fluidized Bed Material -- ISO
ANALYTICAL REPORT**

FILE NAME: Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394111_SO_03-03-15_150099_TEM-EPAISO__D.xlsm

SAMPLE INFORMATION		ANALYSIS PARAMETERS	
Field Sample Number 14394111		EFA (mm ²)	385
Matrix Soil		GO area (mm ²) [Ago]	0.0104
Field QC Type Not QC		# GOs counted - high mag	100
Sample Mass (g dry wt) [M] 0.51		# GOs counted - low mag only	0
Fluidized Bed Flow Ratio[Q _R] 0.0122		F-factor [f]	1.00E+00
Filter Status ANALYZED		Sensitivity - High mag	5.9E+04 1/g
		Sensitivity - PCME (high+low mag)	5.9E+04 1/g
ANALYSIS INFORMATION			
Lab Name LabCor Inc		Recording	
Lab Sample Number 150099-S12		Rules:	
Lab QC Type NOT QC		Initial (high mag)	
TEM Prep Method Direct		Min. AR	Min length (um) Min width (um)
Est. particulate loading on filter NA		none	
		PCME Supplemental (low mag)	
		Min. AR	Min length (um) Min width (um)
		none	
		Stopping	
		Rules:	
		Target S (1/g)	Max Area (mm ²) Max N

RESULTS SUMMARY

Structure Metric	Observed Structure Count (s)	Structure Filter Loading (s/mm ²)	Soil Conc. Structures per gram (s/g)
High mag only			
Total Asbestos	24	2.3E+01	1.4E+06
Total Chrysotile (CH)	19	1.8E+01	1.1E+06
Total Amphibole	5	4.8E+00	3.0E+05
actinolite (AC)	2	1.9E+00	1.2E+05
amosite (AM)	0	0.0E+00	0.0E+00
anthophyllite (AN)	0	0.0E+00	0.0E+00
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	3	2.9E+00	1.8E+05
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	0	0.0E+00	0.0E+00
other mineral class (OM)	0	0.0E+00	0.0E+00
PCME (high+low mag)			
Total Asbestos	0	0.0E+00	0.0E+00
Total Chrysotile (CH)	0	0.0E+00	0.0E+00
Total Amphibole	0	0.0E+00	0.0E+00
actinolite (AC)	0	0.0E+00	0.0E+00
amosite (AM)	0	0.0E+00	0.0E+00
anthophyllite (AN)	0	0.0E+00	0.0E+00
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	0	0.0E+00	0.0E+00
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	0	0.0E+00	0.0E+00
other mineral class (OM)	0	0.0E+00	0.0E+00

Σ Asbestos Structure Mass (g)	Mass fraction (as %)
Total TEM	
WRTA	0.00E+00 0.0000%
OA	0.00E+00 0.0000%
CH	4.12E-09 2.4469%
AC	2.30E-10 0.1363%
AM	0.00E+00 0.0000%
AN	0.00E+00 0.0000%
CR	0.00E+00 0.0000%
TR	3.67E-09 2.1772%
PCME	
WRTA	0.00E+00 0.0000%
OA	0.00E+00 0.0000%
CH	8.24E-12 0.0049%
AC	0.00E+00 0.0000%
AM	0.00E+00 0.0000%
AN	0.00E+00 0.0000%
CR	0.00E+00 0.0000%
TR	0.00E+00 0.0000%

Asbestos structure mass = Length • Width² • Density • 1E-12

LA Density = 3.1 g/cm³
OA Density = 3.0 g/cm³
CH Density = 2.6 g/cm³
AC Density = 3.1 g/cm³
AM Density = 3.5 g/cm³
AN Density = 3.0 g/cm³
CR Density = 3.3 g/cm³
TR Density = 3.0 g/cm³

Csoil (mass fraction, as %) = Σ Asbestos structure mass • Sensitivity • 100

Equations:

Filter Loading (s/mm²) = N / (GOx • Ago)

Sensitivity (1/g) = EFA / (GOx • Ago • M • f • Q_R)

Csoil (s/g) = N • Sensitivity

Asbestos Types:

AC - actinolite
AM - amosite
AN - anthophyllite
CH - chrysotile
CR - crocidolite
TR - tremolite
LA - Libby amphibole
OA - other amphibole
NAM - non-asbestos material
OM - other mineral type (specify in "other mineral description" field)

Structure Types:

High mag: Length ≥ 0.5 um, Aspect Ratio ≥ 3:1

PCME: Length > 5 um, Width ≥ 0.25 um, Aspect Ratio ≥ 3:1

Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394112_SO_03-04-15_150099_TEM-EPAISO_D.xlsm
FluidizedBedEDD_v1

**TEM Asbestos Structure Count for Fluidized Bed Material -- ISO
ANALYTICAL REPORT**

FILE NAME: Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394112_SO_03-04-15_150099_TEM-EPAISO_D.xlsm

SAMPLE INFORMATION		ANALYSIS PARAMETERS																			
Field Sample Number	14394112	EFA (mm ²)	385																		
Matrix	Soil	GO area (mm ²) [Ago]	0.0104																		
Field QC Type	Not QC	# GOs counted - high mag	100																		
Sample Mass (g dry wt) [M]	0.51	# GOs counted - low mag only	0																		
Fluidized Bed Flow Ratio[Q _R]	0.0122	F-factor [f]	1.00E+00																		
Filter Status	ANALYZED	Sensitivity - High mag	6.0E+04 1/g																		
		Sensitivity - PCME (high+low mag)	6.0E+04 1/g																		
ANALYSIS INFORMATION																					
Lab Name LabCor Inc Lab Sample Number 150099-S13 Lab QC Type NOT QC TEM Prep Method Direct Est. particulate loading on filter NA		Recording Rules: Initial (high mag) <table border="1"> <tr> <td>Min. AR</td> <td>Min length (um)</td> <td>Min width (um)</td> </tr> <tr> <td>3:1</td> <td>0</td> <td>0</td> </tr> </table> PCME Supplemental (low mag) <table border="1"> <tr> <td>Min. AR</td> <td>Min length (um)</td> <td>Min width (um)</td> </tr> <tr> <td>3:1</td> <td>0</td> <td>0</td> </tr> </table> Stopping Rules: <table border="1"> <tr> <td>Target S (1/g)</td> <td>Max Area (mm²)</td> <td>Max N</td> </tr> <tr> <td></td> <td></td> <td></td> </tr> </table>		Min. AR	Min length (um)	Min width (um)	3:1	0	0	Min. AR	Min length (um)	Min width (um)	3:1	0	0	Target S (1/g)	Max Area (mm ²)	Max N			
Min. AR	Min length (um)	Min width (um)																			
3:1	0	0																			
Min. AR	Min length (um)	Min width (um)																			
3:1	0	0																			
Target S (1/g)	Max Area (mm ²)	Max N																			

RESULTS SUMMARY

Structure Metric	Observed Structure Count (s)	Structure Filter Loading (s/mm ²)	Soil Conc. Structures per gram (s/g)
High mag only			
Total Asbestos	18	1.7E+01	1.1E+06
Total Chrysotile (CH)	13	1.3E+01	7.8E+05
Total Amphibole	5	4.8E+00	3.0E+05
actinolite (AC)	2	1.9E+00	1.2E+05
amosite (AM)	0	0.0E+00	0.0E+00
anthophyllite (AN)	0	0.0E+00	0.0E+00
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	3	2.9E+00	1.8E+05
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	0	0.0E+00	0.0E+00
other mineral class (OM)	0	0.0E+00	0.0E+00
PCME (high+low mag)			
Total Asbestos	0	0.0E+00	0.0E+00
Total Chrysotile (CH)	0	0.0E+00	0.0E+00
Total Amphibole	0	0.0E+00	0.0E+00
actinolite (AC)	0	0.0E+00	0.0E+00
amosite (AM)	0	0.0E+00	0.0E+00
anthophyllite (AN)	0	0.0E+00	0.0E+00
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	0	0.0E+00	0.0E+00
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	0	0.0E+00	0.0E+00
other mineral class (OM)	0	0.0E+00	0.0E+00

Equations:

Filter Loading (s/mm²) = N / (GOx • Ago)

Sensitivity (1/g) = EFA / (GOx • Ago • M • f • Q_R)

Csoil (s/g) = N • Sensitivity

Asbestos Types:

AC - actinolite
 AM - amosite
 AN - anthophyllite
 CH - chrysotile
 CR - crocidolite
 TR - tremolite
 LA - Libby amphibole
 OA - other amphibole
 NAM - non-asbestos material
 OM - other mineral type (specify in "other mineral description" field)

Structure Types:

High mag: Length ≥ 0.5 um, Aspect Ratio ≥ 3:1

PCME: Length > 5 um, Width ≥ 0.25 um, Aspect Ratio ≥ 3:1

Σ Asbestos Structure Mass (g)	Mass fraction (as %)
Total TEM	
WRTA	0.00E+00 0.0000%
OA	0.00E+00 0.0000%
CH	1.23E-09 0.7315%
AC	1.07E-09 0.6405%
AM	0.00E+00 0.0000%
AN	0.00E+00 0.0000%
CR	0.00E+00 0.0000%
TR	1.79E-11 0.0107%
PCME	
WRTA	0.00E+00 0.0000%
OA	0.00E+00 0.0000%
CH	0.00E+00 0.0000%
AC	0.00E+00 0.0000%
AM	0.00E+00 0.0000%
AN	0.00E+00 0.0000%
CR	0.00E+00 0.0000%
TR	#N/A #N/A

Asbestos structure mass = Length • Width² • Density • 1E-12

LA Density = 3.1 g/cm³

OA Density = 3.0 g/cm³

CH Density = 2.6 g/cm³

AC Density = 3.1 g/cm³

AM Density = 3.5 g/cm³

AN Density = 3.0 g/cm³

CR Density = 3.3 g/cm³

TR Density = 3.0 g/cm³

Csoil (mass fraction, as %) = Σ Asbestos structure mass • Sensitivity • 100

Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394113_SO_03-04-15_150099_TEM-EPAISO_D.xlsm
FluidizedBedEDD_v1

**TEM Asbestos Structure Count for Fluidized Bed Material -- ISO
ANALYTICAL REPORT**

FILE NAME: Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394113_SO_03-04-15_150099_TEM-EPAISO_D.xlsm

SAMPLE INFORMATION		ANALYSIS PARAMETERS	
Field Sample Number 14394113		EFA (mm ²)	385
Matrix Soil		GO area (mm ²) [Ago]	0.0104
Field QC Type Not QC		# GOs counted - high mag	100
Sample Mass (g dry wt) [M] 0.52		# GOs counted - low mag only	0
Fluidized Bed Flow Ratio[Q _r] 0.122		F-factor [f]	1.00E+00
Filter Status ANALYZED		Sensitivity - High mag	5.9E+03 1/g
47000FA		Sensitivity - PCME (high+low mag)	5.9E+03 1/g
ANALYSIS INFORMATION			
Lab Name LabCor Inc		Recording	
Lab Sample Number 150099-S14		Rules:	
Lab QC Type NOT QC		Initial (high mag)	
TEM Prep Method Direct		Min. AR	Min length (um)
Est. particulate loading on filter NA		3:1	0
		Min width (um)	0
		PCME Supplemental (low mag)	
		Min. AR	Min length (um)
		3:1	0
		Min width (um)	0
		Stopping	
		Rules:	
		Target S (1/g)	Max Area (mm ²)
			Max N

RESULTS SUMMARY

Structure Metric	Observed Structure Count (s)	Structure Filter Loading (s/mm ²)	Soil Conc. Structures per gram (s/g)
High mag only			
Total Asbestos	16	1.5E+01	9.4E+04
Total Chrysotile (CH)	14	1.4E+01	8.2E+04
Total Amphibole	2	1.9E+00	1.2E+04
actinolite (AC)	0	0.0E+00	0.0E+00
amosite (AM)	0	0.0E+00	0.0E+00
anthophyllite (AN)	0	0.0E+00	0.0E+00
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	1	9.7E-01	5.9E+03
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	1	9.7E-01	5.9E+03
other mineral class (OM)	0	0.0E+00	0.0E+00
PCME (high+low mag)			
Total Asbestos	4.225E-14	4.1E-14	2.5E-10
Total Chrysotile (CH)	0	0.0E+00	0.0E+00
Total Amphibole	4.225E-14	4.1E-14	2.5E-10
actinolite (AC)	0	0.0E+00	0.0E+00
amosite (AM)	0	0.0E+00	0.0E+00
anthophyllite (AN)	0	0.0E+00	0.0E+00
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	0	0.0E+00	0.0E+00
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	4.225E-14	4.1E-14	2.5E-10
other mineral class (OM)	0	0.0E+00	0.0E+00

Σ Asbestos Structure Mass (g)	Mass fraction (as %)
Total TEM	
WRTA	0.00E+00
OA	8.54E-12
CH	1.23E-08
AC	0.00E+00
AM	0.00E+00
AN	0.00E+00
CR	0.00E+00
TR	3.23E-10
PCM	
WRTA	0.00E+00
OA	0.00E+00
CH	4.19E-10
AC	0.00E+00
AM	0.00E+00
AN	0.00E+00
CR	0.00E+00
TR	0.00E+00

Asbestos structure mass = Length • Width² • Density • 1E-12

LA Density = 3.1 g/cm³
OA Density = 3.0 g/cm³
CH Density = 2.6 g/cm³
AC Density = 3.1 g/cm³
AM Density = 3.5 g/cm³
AN Density = 3.0 g/cm³
CR Density = 3.3 g/cm³
TR Density = 3.0 g/cm³

Csoil (mass fraction, as %) = Σ Asbestos structure mass • Sensitivity • 100

Equations:

Filter Loading (s/mm²) = N / (GOx • Ago)

Sensitivity (1/g) = EFA / (GOx • Ago • M • f • Q_r)

Csoil (s/g) = N • Sensitivity

Asbestos Types:

AC - actinolite
AM - amosite
AN - anthophyllite
CH - chrysotile
CR - crocidolite
TR - tremolite
LA - Libby amphibole
OA - other amphibole
NAM - non-asbestos material
OM - other mineral type (specify in "other mineral description" field)

Structure Types:

High mag: Length ≥ 0.5 um, Aspect Ratio ≥ 3:1

PCME: Length > 5 um, Width ≥ 0.25 um, Aspect Ratio ≥ 3:1

Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394114_SO_03-05-15_150099_TEM-EPAISO_D.xlsm
FluidizedBedEDD_v1

**TEM Asbestos Structure Count for Fluidized Bed Material -- ISO
ANALYTICAL REPORT**

FILE NAME:Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394114_SO_03-05-15_150099_TEM-EPAISO_D.xlsm

SAMPLE INFORMATION		ANALYSIS PARAMETERS	
Field Sample Number 14394114		EFA (mm ²)	385
Matrix Soil		GO area (mm ²) [Ago]	0.0104
Field QC Type Not QC		# GOs counted - high mag	100
Sample Mass (g dry wt) [M] 0.50		# GOs counted - low mag only	0
Fluidized Bed Flow Ratio[Q _R] 0.0122		F-factor [f]	1.00E+00
Filter Status ANALYZED		Sensitivity - High mag	6.0E+04 1/g
47000EFA		Sensitivity - PCME (high+low mag)	6.0E+04 1/g
ANALYSIS INFORMATION			
Lab Name LabCor Inc		Recording	
Lab Sample Number 150099-S15		Rules:	
Lab QC Type NOT QC		Initial (high mag)	
TEM Prep Method Direct		Min. AR	Min length (um) Min width (um)
Est. particulate loading on filter NA		3:1	0 0
		PCME Supplemental (low mag)	
		Min. AR	Min length (um) Min width (um)
		3:1	0 0
		Stopping	
		Rules:	
		Target S (1/g)	Max Area (mm ²) Max N

RESULTS SUMMARY

Structure Metric	Observed Structure Count (s)	Structure Filter Loading (s/mm ²)	Soil Conc. Structures per gram (s/g)
High mag only			
Total Asbestos	58	5.6E+01	3.5E+06
Total Chrysotile (CH)	51	4.9E+01	3.1E+06
Total Amphibole	7	6.8E+00	4.2E+05
actinolite (AC)	3	2.9E+00	1.8E+05
amosite (AM)	0	0.0E+00	0.0E+00
anthophyllite (AN)	0	0.0E+00	0.0E+00
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	4	3.9E+00	2.4E+05
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	0	0.0E+00	0.0E+00
other mineral class (OM)	0	0.0E+00	0.0E+00
PCME (high+low mag)			
Total Asbestos	2	1.9E+00	1.2E+05
Total Chrysotile (CH)	2	1.9E+00	1.2E+05
Total Amphibole	0	0.0E+00	0.0E+00
actinolite (AC)	0	0.0E+00	0.0E+00
amosite (AM)	0	0.0E+00	0.0E+00
anthophyllite (AN)	0	0.0E+00	0.0E+00
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	0	0.0E+00	0.0E+00
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	0	0.0E+00	0.0E+00
other mineral class (OM)	0	0.0E+00	0.0E+00

Σ Asbestos Structure Mass (g)	Mass fraction (as %)
Total TEM	
WRTA	0.00E+00 0.0000%
OA	0.00E+00 0.0000%
CH	3.56E-08 21.5080%
AC	4.23E-10 0.2557%
AM	0.00E+00 0.0000%
AN	0.00E+00 0.0000%
CR	0.00E+00 0.0000%
TR	3.90E-09 2.3616%
PCME	
WRTA	0.00E+00 0.0000%
OA	0.00E+00 0.0000%
CH	5.05E-09 3.0579%
AC	#N/A #N/A
AM	0.00E+00 0.0000%
AN	0.00E+00 0.0000%
CR	0.00E+00 0.0000%
TR	0.00E+00 0.0000%

Asbestos structure mass = Length • Width² • Density • 1E-12

LA Density = 3.1 g/cm³
OA Density = 3.0 g/cm³
CH Density = 2.6 g/cm³
AC Density = 3.1 g/cm³
AM Density = 3.5 g/cm³
AN Density = 3.0 g/cm³
CR Density = 3.3 g/cm³
TR Density = 3.0 g/cm³

Csoil (mass fraction, as %) = Σ Asbestos structure mass • Sensitivity • 100

Equations:

Filter Loading (s/mm²) = N / (GOx • Ago)
Sensitivity (1/g) = EFA / (GOx • Ago • M • f • Q_R)
Csoil (s/g) = N • Sensitivity

Asbestos Types:

AC - actinolite
AM - amosite
AN - anthophyllite
CH - chrysotile
CR - crocidolite
TR - tremolite
LA - Libby amphibole
OA - other amphibole
NAM - non-asbestos material
OM - other mineral type (specify in "other mineral description" field)

Structure Types:

High mag: Length ≥ 0.5 um, Aspect Ratio ≥ 3:1
PCME: Length > 5 um, Width ≥ 0.25 um, Aspect Ratio ≥ 3:1

Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394115_SO_03-07-15_150099_TEM-EPAISO__D.xlsm
FluidizedBedEDD_v1

**TEM Asbestos Structure Count for Fluidized Bed Material -- ISO
ANALYTICAL REPORT**

FILE NAME: Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394115_SO_03-07-15_150099_TEM-EPAISO__D.xlsm

SAMPLE INFORMATION		ANALYSIS PARAMETERS							
Field Sample Number	14394115	EFA (mm ²)	385						
Matrix	Soil	GO area (mm ²) [Ago]	0.0104						
Field QC Type	Not QC	# GOs counted - high mag	100						
Sample Mass (g dry wt) [M]	1.00	# GOs counted - low mag only	0						
Fluidized Bed Flow Ratio[Q _R]	0.0122	F-factor [f]	1.00E+00						
Filter Status	ANALYZED	Sensitivity - High mag	3.0E+04 1/g						
		Sensitivity - PCME (high+low mag)	3.0E+04 1/g						
ANALYSIS INFORMATION									
Lab Name LabCor Inc		Recording							
Lab Sample Number 150099-S16		Rules:							
Lab QC Type NOT QC		Initial (high mag)							
TEM Prep Method Direct		<table border="1"> <tr> <th>Min. AR</th> <th>Min length (um)</th> <th>Min width (um)</th> </tr> <tr> <td>3:1</td> <td>0</td> <td>0</td> </tr> </table>		Min. AR	Min length (um)	Min width (um)	3:1	0	0
Min. AR	Min length (um)	Min width (um)							
3:1	0	0							
Est. particulate loading on filter NA		PCME Supplemental (low mag)							
		<table border="1"> <tr> <th>Min. AR</th> <th>Min length (um)</th> <th>Min width (um)</th> </tr> <tr> <td>3:1</td> <td>0</td> <td>0</td> </tr> </table>		Min. AR	Min length (um)	Min width (um)	3:1	0	0
Min. AR	Min length (um)	Min width (um)							
3:1	0	0							
		Stopping							
		Rules:							
		<table border="1"> <tr> <th>Target S (1/g)</th> <th>Max Area (mm²)</th> <th>Max N</th> </tr> <tr> <td></td> <td></td> <td></td> </tr> </table>		Target S (1/g)	Max Area (mm ²)	Max N			
Target S (1/g)	Max Area (mm ²)	Max N							

RESULTS SUMMARY

Structure Metric	Observed Structure Count (s)	Structure Filter Loading (s/mm ²)	Soil Conc. Structures per gram (s/g)
High mag only			
Total Asbestos	25	2.4E+01	7.6E+05
Total Chrysotile (CH)	17	1.6E+01	5.2E+05
Total Amphibole	8	7.7E+00	2.4E+05
actinolite (AC)	2	1.9E+00	6.1E+04
amosite (AM)	2	1.9E+00	6.1E+04
anthophyllite (AN)	1	9.7E-01	3.0E+04
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	3	2.9E+00	9.1E+04
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	0	0.0E+00	0.0E+00
other mineral class (OM)	0	0.0E+00	0.0E+00
PCME (high+low mag)			
Total Asbestos	1	9.7E-01	3.0E+04
Total Chrysotile (CH)	1	9.7E-01	3.0E+04
Total Amphibole	3.9375E-14	3.8E-14	1.2E-09
actinolite (AC)	0	0.0E+00	0.0E+00
amosite (AM)	3.9375E-14	3.8E-14	1.2E-09
anthophyllite (AN)	0	0.0E+00	0.0E+00
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	0	0.0E+00	0.0E+00
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	0	0.0E+00	0.0E+00
other mineral class (OM)	0	0.0E+00	0.0E+00

Σ Asbestos Structure Mass (g)	Mass fraction (as %)
Total TEM	
WRTA	0.00E+00 0.0000%
OA	0.00E+00 0.0000%
CH	9.85E-09 3.0016%
AC	5.81E-10 0.1768%
AM	0.00E+00 0.0000%
AN	3.00E-09 0.9138%
CR	0.00E+00 0.0000%
TR	2.82E-10 0.0858%
PCME	
WRTA	0.00E+00 0.0000%
OA	0.00E+00 0.0000%
CH	1.64E-11 0.0050%
AC	#N/A #N/A
AM	0.00E+00 0.0000%
AN	0.00E+00 0.0000%
CR	0.00E+00 0.0000%
TR	#N/A #N/A

Asbestos structure mass = Length • Width² • Density • 1E-12

LA Density = 3.1 g/cm³
OA Density = 3.0 g/cm³
CH Density = 2.6 g/cm³
AC Density = 3.1 g/cm³
AM Density = 3.5 g/cm³
AN Density = 3.0 g/cm³
CR Density = 3.3 g/cm³
TR Density = 3.0 g/cm³

Csoil (mass fraction, as %) = Σ Asbestos structure mass • Sensitivity • 100

Equations:

Filter Loading (s/mm²) = N / (GOx • Ago)
Sensitivity (1/g) = EFA / (GOx • Ago • M • f • Q_R)
Csoil (s/g) = N • Sensitivity

Asbestos Types:

AC - actinolite
AM - amosite
AN - anthophyllite
CH - chrysotile
CR - crocidolite
TR - tremolite
LA - Libby amphibole
OA - other amphibole
NAM - non-asbestos material
OM - other mineral type (specify in "other mineral description" field)

Structure Types:

High mag: Length ≥ 0.5 um, Aspect Ratio ≥ 3:1
PCME: Length > 5 um, Width ≥ 0.25 um, Aspect Ratio ≥ 3:1

Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394116_SO_03-08-15_150099_TEM-EPAISO_D.xlsm
FluidizedBedEDD_v1

**TEM Asbestos Structure Count for Fluidized Bed Material -- ISO
ANALYTICAL REPORT**

FILE NAME:Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394116_SO_03-08-15_150099_TEM-EPAISO_D.xlsm

SAMPLE INFORMATION		ANALYSIS PARAMETERS	
Field Sample Number 14394116		EFA (mm ²)	385
Matrix Soil		GO area (mm ²) [Ago]	0.0104
Field QC Type Not QC		# GOs counted - high mag	100
Sample Mass (g dry wt) [M] 1.05		# GOs counted - low mag only	0
Fluidized Bed Flow Ratio[Q _R] 0.0122		F-factor [f]	1.00E+00
Filter Status ANALYZED		Sensitivity - High mag	2.9E+04 1/g
		Sensitivity - PCME (high+low mag)	2.9E+04 1/g
ANALYSIS INFORMATION			
Lab Name LabCor Inc		Recording	
Lab Sample Number 150099-S17		Rules:	
Lab QC Type NOT QC		Initial (high mag)	
TEM Prep Method Direct		Min. AR	Min length (um)
Est. particulate loading on filter NA		3:1	0
		Min width (um)	0
		PCME Supplemental (low mag)	
		Min. AR	Min length (um)
		3:1	0
		Min width (um)	0
		Stopping	
		Rules:	
		Target S (1/g)	Max Area (mm ²)
			Max N

RESULTS SUMMARY

Structure Metric	Observed Structure Count (s)	Structure Filter Loading (s/mm ²)	Soil Conc. Structures per gram (s/g)
High mag only			
Total Asbestos	58	6.6E+01	2.0E+06
Total Chrysotile (CH)	36	3.5E+01	1.0E+06
Total Amphibole	32	3.1E+01	9.3E+05
actinolite (AC)	11	1.1E+01	3.2E+05
amosite (AM)	10	9.7E+00	2.9E+05
anthophyllite (AN)	0	0.0E+00	0.0E+00
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	5	4.8E+00	1.5E+05
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	6	5.8E+00	1.7E+05
other mineral class (OM)	0	0.0E+00	0.0E+00
PCME (high+low mag)			
Total Asbestos	4	3.9E+00	1.2E+05
Total Chrysotile (CH)	1	9.7E-01	2.9E+04
Total Amphibole	3	2.9E+00	8.7E+04
actinolite (AC)	1	9.7E-01	2.9E+04
amosite (AM)	4.30064E-10	4.2E-10	1.3E-05
anthophyllite (AN)	0	0.0E+00	0.0E+00
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	1	9.7E-01	2.9E+04
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	1	9.7E-01	2.9E+04
other mineral class (OM)	0	0.0E+00	0.0E+00

Σ Asbestos Structure Mass (g)	Mass fraction (as %)
Total TEM	
WRTA	0.00E+00 0.0000%
OA	1.51E-10 0.0440%
CH	1.92E-07 55.7749%
AC	5.36E-08 15.5870%
AM	0.00E+00 0.0000%
AN	0.00E+00 0.0000%
CR	0.00E+00 0.0000%
TR	3.40E-08 9.8757%
PCME	
WRTA	0.00E+00 0.0000%
OA	1.19E-10 0.0347%
CH	4.58E-10 0.1332%
AC	#N/A #N/A
AM	0.00E+00 0.0000%
AN	0.00E+00 0.0000%
CR	0.00E+00 0.0000%
TR	0.00E+00 0.0000%

Asbestos structure mass = Length • Width² • Density • 1E-12

LA Density = 3.1 g/cm³
OA Density = 3.0 g/cm³
CH Density = 2.6 g/cm³
AC Density = 3.1 g/cm³
AM Density = 3.5 g/cm³
AN Density = 3.0 g/cm³
CR Density = 3.3 g/cm³
TR Density = 3.0 g/cm³

Csoil (mass fraction, as %) = Σ Asbestos structure mass • Sensitivity • 100

Equations:

Filter Loading (s/mm²) = N / (GOx • Ago)
Sensitivity (1/g) = EFA / (GOx • Ago • M • f • Q_R)
Csoil (s/g) = N • Sensitivity

Asbestos Types:

AC - actinolite
AM - amosite
AN - anthophyllite
CH - chrysotile
CR - crocidolite
TR - tremolite
LA - Libby amphibole
OA - other amphibole
NAM - non-asbestos material
OM - other mineral type (specify in "other mineral description" field)

Structure Types:

High mag: Length ≥ 0.5 um, Aspect Ratio ≥ 3:1
PCME: Length > 5 um, Width ≥ 0.25 um, Aspect Ratio ≥ 3:1

Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394117_SO_03-12-15_150099_TEM-EPAISO__D.xlsm
FluidizedBedEDD_v1

**TEM Asbestos Structure Count for Fluidized Bed Material -- ISO
ANALYTICAL REPORT**

FILE NAME: Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394117_SO_03-12-15_150099_TEM-EPAISO__D.xlsm

SAMPLE INFORMATION		ANALYSIS PARAMETERS	
Field Sample Number 14394117		EFA (mm ²)	385
Matrix Soil		GO area (mm ²) [Ago]	0.0104
Field QC Type Not QC		# GOs counted - high mag	100
Sample Mass (g dry wt) [M] 1.00		# GOs counted - low mag only	0
Fluidized Bed Flow Ratio[Q _R] 0.0122		F-factor [f]	1.00E+00
Filter Status ANALYZED		Sensitivity - High mag	3.0E+04 1/g
		Sensitivity - PCME (high+low mag)	3.0E+04 1/g
ANALYSIS INFORMATION			
Lab Name LabCor Inc		Recording	
Lab Sample Number 150099-S18		Rules:	
Lab QC Type NOT QC		Initial (high mag)	
TEM Prep Method Direct		Min. AR	Min length (um)
Est. particulate loading on filter NA		3:1	0
		Min width (um)	0
		PCME Supplemental (low mag)	
		Min. AR	Min length (um)
		3:1	0
		Min width (um)	0
		Stopping	
		Rules:	
		Target S (1/g)	Max Area (mm ²)
			Max N

RESULTS SUMMARY

Structure Metric	Observed Structure Count (s)	Structure Filter Loading (s/mm ²)	Soil Conc. Structures per gram (s/g)
High mag only			
Total Asbestos	25	2.4E+01	7.6E+05
Total Chrysotile (CH)	22	2.1E+01	6.7E+05
Total Amphibole	3	2.9E+00	9.1E+04
actinolite (AC)	0	0.0E+00	0.0E+00
amosite (AM)	0	0.0E+00	0.0E+00
anthophyllite (AN)	0	0.0E+00	0.0E+00
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	3	2.9E+00	9.1E+04
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	0	0.0E+00	0.0E+00
other mineral class (OM)	0	0.0E+00	0.0E+00
PCME (high+low mag)			
Total Asbestos	0	0.0E+00	0.0E+00
Total Chrysotile (CH)	0	0.0E+00	0.0E+00
Total Amphibole	0	0.0E+00	0.0E+00
actinolite (AC)	0	0.0E+00	0.0E+00
amosite (AM)	0	0.0E+00	0.0E+00
anthophyllite (AN)	0	0.0E+00	0.0E+00
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	0	0.0E+00	0.0E+00
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	0	0.0E+00	0.0E+00
other mineral class (OM)	0	0.0E+00	0.0E+00

Σ Asbestos Structure Mass (g)	Mass fraction (as %)
Total TEM	
WRTA	0.00E+00 0.0000%
OA	0.00E+00 0.0000%
CH	3.95E-08 12.0117%
AC	0.00E+00 0.0000%
AM	0.00E+00 0.0000%
AN	0.00E+00 0.0000%
CR	0.00E+00 0.0000%
TR	9.64E-11 0.0293%
PCME	
WRTA	0.00E+00 0.0000%
OA	0.00E+00 0.0000%
CH	0.00E+00 0.0000%
AC	0.00E+00 0.0000%
AM	0.00E+00 0.0000%
AN	0.00E+00 0.0000%
CR	0.00E+00 0.0000%
TR	#N/A #N/A

Asbestos structure mass = Length • Width² • Density • 1E-12

LA Density = 3.1 g/cm³
OA Density = 3.0 g/cm³
CH Density = 2.6 g/cm³
AC Density = 3.1 g/cm³
AM Density = 3.5 g/cm³
AN Density = 3.0 g/cm³
CR Density = 3.3 g/cm³
TR Density = 3.0 g/cm³

Csoil (mass fraction, as %) = Σ Asbestos structure mass • Sensitivity • 100

Equations:

Filter Loading (s/mm²) = N / (GOx • Ago)
Sensitivity (1/g) = EFA / (GOx • Ago • M • f • Q_R)
Csoil (s/g) = N • Sensitivity

Asbestos Types:

AC - actinolite
AM - amosite
AN - anthophyllite
CH - chrysotile
CR - crocidolite
TR - tremolite
LA - Libby amphibole
OA - other amphibole
NAM - non-asbestos material
OM - other mineral type (specify in "other mineral description" field)

Structure Types:

High mag: Length ≥ 0.5 um, Aspect Ratio ≥ 3:1
PCME: Length > 5 um, Width ≥ 0.25 um, Aspect Ratio ≥ 3:1

Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394118_SO_03-13-15_150099_TEM-EPAISO__D.xlsm
FluidizedBedEDD_v1

**TEM Asbestos Structure Count for Fluidized Bed Material -- ISO
ANALYTICAL REPORT**

FILE NAME: Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394118_SO_03-13-15_150099_TEM-EPAISO__D.xlsm

SAMPLE INFORMATION		ANALYSIS PARAMETERS							
Field Sample Number	14394118	EFA (mm ²)	385						
Matrix	Soil	GO area (mm ²) [Ago]	0.0104						
Field QC Type	Not QC	# GOs counted - high mag	100						
Sample Mass (g dry wt) [M]	1.01	# GOs counted - low mag only	0						
Fluidized Bed Flow Ratio[Q _R]	0.0122	F-factor [f]	1.00E+00						
Filter Status	ANALYZED	Sensitivity - High mag	3.0E+04 1/g						
		Sensitivity - PCME (high+low mag)	3.0E+04 1/g						
ANALYSIS INFORMATION									
Lab Name LabCor Inc		Recording							
Lab Sample Number 150099-S19		Rules:							
Lab QC Type NOT QC		Initial (high mag)							
TEM Prep Method Direct		<table border="1"> <tr> <th>Min. AR</th> <th>Min length (um)</th> <th>Min width (um)</th> </tr> <tr> <td>3:1</td> <td>0</td> <td>0</td> </tr> </table>		Min. AR	Min length (um)	Min width (um)	3:1	0	0
Min. AR	Min length (um)	Min width (um)							
3:1	0	0							
Est. particulate loading on filter NA		PCME Supplemental (low mag)							
		<table border="1"> <tr> <th>Min. AR</th> <th>Min length (um)</th> <th>Min width (um)</th> </tr> <tr> <td>3:1</td> <td>0</td> <td>0</td> </tr> </table>		Min. AR	Min length (um)	Min width (um)	3:1	0	0
Min. AR	Min length (um)	Min width (um)							
3:1	0	0							
		Stopping							
		Rules:							
		<table border="1"> <tr> <th>Target S (1/g)</th> <th>Max Area (mm²)</th> <th>Max N</th> </tr> <tr> <td></td> <td></td> <td></td> </tr> </table>		Target S (1/g)	Max Area (mm ²)	Max N			
Target S (1/g)	Max Area (mm ²)	Max N							

RESULTS SUMMARY

Structure Metric	Observed Structure Count (s)	Structure Filter Loading (s/mm ²)	Soil Conc. Structures per gram (s/g)
High mag only			
Total Asbestos	15	1.4E+01	4.5E+05
Total Chrysotile (CH)	10	9.7E+00	3.0E+05
Total Amphibole	5	4.8E+00	1.5E+05
actinolite (AC)	2	1.9E+00	6.1E+04
amosite (AM)	0	0.0E+00	0.0E+00
anthophyllite (AN)	0	0.0E+00	0.0E+00
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	3	2.9E+00	9.1E+04
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	0	0.0E+00	0.0E+00
other mineral class (OM)	0	0.0E+00	0.0E+00
PCME (high+low mag)			
Total Asbestos	0	0.0E+00	0.0E+00
Total Chrysotile (CH)	0	0.0E+00	0.0E+00
Total Amphibole	0	0.0E+00	0.0E+00
actinolite (AC)	0	0.0E+00	0.0E+00
amosite (AM)	0	0.0E+00	0.0E+00
anthophyllite (AN)	0	0.0E+00	0.0E+00
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	0	0.0E+00	0.0E+00
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	0	0.0E+00	0.0E+00
other mineral class (OM)	0	0.0E+00	0.0E+00

Equations:

Filter Loading (s/mm²) = N / (GOx • Ago)

Sensitivity (1/g) = EFA / (GOx • Ago • M • f • Q_R)

Csoil (s/g) = N • Sensitivity

Asbestos Types:

AC - actinolite
AM - amosite
AN - anthophyllite
CH - chrysotile
CR - crocidolite
TR - tremolite
LA - Libby amphibole
OA - other amphibole
NAM - non-asbestos material
OM - other mineral type (specify in "other mineral description" field)

Structure Types:

High mag: Length ≥ 0.5 um, Aspect Ratio ≥ 3:1

PCME: Length > 5 um, Width ≥ 0.25 um, Aspect Ratio ≥ 3:1

Σ Asbestos Structure Mass (g)	Mass fraction (as %)
Total TEM	
WRTA	0.00E+00 0.0000%
OA	0.00E+00 0.0000%
CH	3.54E-09 1.0719%
AC	1.24E-11 0.0037%
AM	0.00E+00 0.0000%
AN	0.00E+00 0.0000%
CR	0.00E+00 0.0000%
TR	6.41E-11 0.0194%
PCME	
WRTA	0.00E+00 0.0000%
OA	0.00E+00 0.0000%
CH	0.00E+00 0.0000%
AC	#N/A #N/A
AM	0.00E+00 0.0000%
AN	0.00E+00 0.0000%
CR	0.00E+00 0.0000%
TR	0.00E+00 0.0000%

Asbestos structure mass = Length • Width² • Density • 1E-12

LA Density = 3.1 g/cm³

OA Density = 3.0 g/cm³

CH Density = 2.6 g/cm³

AC Density = 3.1 g/cm³

AM Density = 3.5 g/cm³

AN Density = 3.0 g/cm³

CR Density = 3.3 g/cm³

TR Density = 3.0 g/cm³

Csoil (mass fraction, as %) = Σ Asbestos structure mass • Sensitivity • 100

Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394119_SO_03-13-15_150099_TEM-EPAISO_D.xlsm
FluidizedBedEDD_v1

TEM Asbestos Structure Count for Fluidized Bed Material -- ISO
ANALYTICAL REPORT

FILE NAME: Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394119_SO_03-13-15_150099_TEM-EPAISO_D.xlsm

SAMPLE INFORMATION		ANALYSIS PARAMETERS	
Field Sample Number 14394119		EFA (mm ²)	385
Matrix Soil		GO area (mm ²) [Ago]	0.0104
Field QC Type Not QC		# GOs counted - high mag	100
Sample Mass (g dry wt) [M] 1.01		# GOs counted - low mag only	0
Fluidized Bed Flow Ratio[Q _R] 0.0122		F-factor [f]	1.00E+00
Filter Status ANALYZED		Sensitivity - High mag	3.0E+04 1/g
		Sensitivity - PCME (high+low mag)	3.0E+04 1/g
ANALYSIS INFORMATION			
Lab Name LabCor Inc		Recording	
Lab Sample Number 150099-S20		Rules:	
Lab QC Type NOT QC		Initial (high mag)	
TEM Prep Method Direct		Min. AR	Min length (um)
Est. particulate loading on filter NA		3:1	0
		Min width (um)	0
		PCME Supplemental (low mag)	
		Min. AR	Min length (um)
		3:1	0
		Min width (um)	0
		Stopping	
		Rules:	
		Target S (1/g)	Max Area (mm ²)
			Max N

RESULTS SUMMARY

Structure Metric	Observed Structure Count (s)	Structure Filter Loading (s/mm ²)	Soil Conc. Structures per gram (s/g)
High mag only			
Total Asbestos	68	6.6E+01	2.1E+06
Total Chrysotile (CH)	52	5.0E+01	1.6E+06
Total Amphibole	16	1.5E+01	4.9E+05
actinolite (AC)	7	6.8E+00	2.1E+05
amosite (AM)	0	0.0E+00	0.0E+00
anthophyllite (AN)	0	0.0E+00	0.0E+00
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	9	8.7E+00	2.7E+05
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	0	0.0E+00	0.0E+00
other mineral class (OM)	0	0.0E+00	0.0E+00
PCME (high+low mag)			
Total Asbestos	5	4.8E+00	1.5E+05
Total Chrysotile (CH)	4	3.9E+00	1.2E+05
Total Amphibole	1	9.7E-01	3.0E+04
actinolite (AC)	0	0.0E+00	0.0E+00
amosite (AM)	0	0.0E+00	0.0E+00
anthophyllite (AN)	0	0.0E+00	0.0E+00
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	1	9.7E-01	3.0E+04
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	0	0.0E+00	0.0E+00
other mineral class (OM)	0	0.0E+00	0.0E+00

Σ Asbestos Structure Mass (g)	Mass fraction (as %)
Total TEM	
WRTA	0.00E+00 0.0000%
OA	0.00E+00 0.0000%
CH	4.33E-09 1.3145%
AC	3.01E-11 0.0091%
AM	0.00E+00 0.0000%
AN	0.00E+00 0.0000%
CR	0.00E+00 0.0000%
TR	1.14E-08 3.4574%
PCME	
WRTA	0.00E+00 0.0000%
OA	0.00E+00 0.0000%
CH	2.04E-11 0.0062%
AC	#N/A #N/A
AM	0.00E+00 0.0000%
AN	0.00E+00 0.0000%
CR	0.00E+00 0.0000%
TR	#N/A #N/A

Asbestos structure mass = Length • Width² • Density • 1E-12

LA Density = 3.1 g/cm³
OA Density = 3.0 g/cm³
CH Density = 2.6 g/cm³
AC Density = 3.1 g/cm³
AM Density = 3.5 g/cm³
AN Density = 3.0 g/cm³
CR Density = 3.3 g/cm³
TR Density = 3.0 g/cm³

Csoil (mass fraction, as %) = Σ Asbestos structure mass • Sensitivity • 100

Equations:

Filter Loading (s/mm²) = N / (GOx • Ago)
Sensitivity (1/g) = EFA / (GOx • Ago • M • f • Q_R)
Csoil (s/g) = N • Sensitivity

Asbestos Types:

AC - actinolite
AM - amosite
AN - anthophyllite
CH - chrysotile
CR - crocidolite
TR - tremolite
LA - Libby amphibole
OA - other amphibole
NAM - non-asbestos material
OM - other mineral type (specify in "other mineral description" field)

Structure Types:

High mag: Length ≥ 0.5 um, Aspect Ratio ≥ 3:1
PCME: Length > 5 um, Width ≥ 0.25 um, Aspect Ratio ≥ 3:1

Sumas Mtn Asbestos Methods - FBAS_Labcor Inc_14394120_SO_03-13-15_150099_TEM-EPAISO__D.xlsm
FluidizedBedEDD_v1

**TEM Asbestos Structure Count for Fluidized Bed Material -- ISO
ANALYTICAL REPORT**

FILE NAME: Sumas Mtn Asbestos Methods - FBAS_Labcor Inc_14394120_SO_03-13-15_150099_TEM-EPAISO__D.xlsm

SAMPLE INFORMATION		ANALYSIS PARAMETERS							
Field Sample Number	14394120	EFA (mm ²)	385						
Matrix	Soil	GO area (mm ²) [Ago]	0.0104						
Field QC Type	Not QC	# GOs counted - high mag	100						
Sample Mass (g dry wt) [M]	1.01	# GOs counted - low mag only	0						
Fluidized Bed Flow Ratio[Q _R]	0.0122	F-factor [f]	1.00E+00						
Filter Status	ANALYZED	Sensitivity - High mag	3.0E+04 1/g						
		Sensitivity - PCME (high+low mag)	3.0E+04 1/g						
ANALYSIS INFORMATION									
Lab Name Labcor Inc		Recording							
Lab Sample Number 150099-S21		Rules:							
Lab QC Type NOT QC		Initial (high mag)							
TEM Prep Method Direct		<table border="1"> <tr> <th>Min. AR</th> <th>Min length (um)</th> <th>Min width (um)</th> </tr> <tr> <td>3:1</td> <td>0</td> <td>0</td> </tr> </table>		Min. AR	Min length (um)	Min width (um)	3:1	0	0
Min. AR	Min length (um)	Min width (um)							
3:1	0	0							
Est. particulate loading on filter NA		PCME Supplemental (low mag)							
		<table border="1"> <tr> <th>Min. AR</th> <th>Min length (um)</th> <th>Min width (um)</th> </tr> <tr> <td>3:1</td> <td>0</td> <td>0</td> </tr> </table>		Min. AR	Min length (um)	Min width (um)	3:1	0	0
Min. AR	Min length (um)	Min width (um)							
3:1	0	0							
		Stopping							
		Rules:							
		<table border="1"> <tr> <th>Target S (1/g)</th> <th>Max Area (mm²)</th> <th>Max N</th> </tr> <tr> <td></td> <td></td> <td></td> </tr> </table>		Target S (1/g)	Max Area (mm ²)	Max N			
Target S (1/g)	Max Area (mm ²)	Max N							

RESULTS SUMMARY

Structure Metric	Observed Structure Count (s)	Structure Filter Loading (s/mm ²)	Soil Conc. Structures per gram (s/g)
High mag only			
Total Asbestos	93	9.0E+01	2.8E+06
Total Chrysotile (CH)	58	5.6E+01	1.8E+06
Total Amphibole	35	3.4E+01	1.1E+06
actinolite (AC)	13	1.3E+01	3.9E+05
amosite (AM)	12	1.2E+01	3.6E+05
anthophyllite (AN)	0	0.0E+00	0.0E+00
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	8	7.7E+00	2.4E+05
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	2	1.9E+00	6.1E+04
other mineral class (OM)	0	0.0E+00	0.0E+00
PCME (high+low mag)			
Total Asbestos	5.000000001	4.8E+00	1.5E+05
Total Chrysotile (CH)	2	1.9E+00	6.1E+04
Total Amphibole	3.000000001	2.9E+00	9.1E+04
actinolite (AC)	2	1.9E+00	6.1E+04
amosite (AM)	1.45279E-09	1.4E-09	4.4E-05
anthophyllite (AN)	0	0.0E+00	0.0E+00
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	1	9.7E-01	3.0E+04
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	0	0.0E+00	0.0E+00
other mineral class (OM)	0	0.0E+00	0.0E+00

Σ Asbestos Structure Mass (g)	Mass fraction (as %)
Total TEM	
WRTA	0.00E+00 0.0000%
OA	2.27E-12 0.0007%
CH	7.50E-08 22.7629%
AC	5.58E-09 1.6921%
AM	0.00E+00 0.0000%
AN	0.00E+00 0.0000%
CR	0.00E+00 0.0000%
TR	1.08E-08 3.2849%
PCME	
WRTA	0.00E+00 0.0000%
OA	0.00E+00 0.0000%
CH	1.51E-10 0.0457%
AC	#N/A #N/A
AM	0.00E+00 0.0000%
AN	0.00E+00 0.0000%
CR	0.00E+00 0.0000%
TR	#N/A #N/A

Equations:

Filter Loading (s/mm²) = N / (GOx • Ago)

Sensitivity (1/g) = EFA / (GOx • Ago • M • f • Q_R)

Csoil (s/g) = N • Sensitivity

Asbestos Types:

AC - actinolite
AM - amosite
AN - anthophyllite
CH - chrysotile
CR - crocidolite
TR - tremolite
LA - Libby amphibole
OA - other amphibole
NAM - non-asbestos material
OM - other mineral type (specify in "other mineral description" field)

Structure Types:

High mag: Length ≥ 0.5 um, Aspect Ratio ≥ 3:1

PCME: Length > 5 um, Width ≥ 0.25 um, Aspect Ratio ≥ 3:1

Asbestos structure mass = Length • Width² • Density • 1E-12

LA Density = 3.1 g/cm³

OA Density = 3.0 g/cm³

CH Density = 2.6 g/cm³

AC Density = 3.1 g/cm³

AM Density = 3.5 g/cm³

AN Density = 3.0 g/cm³

CR Density = 3.3 g/cm³

TR Density = 3.0 g/cm³

Csoil (mass fraction, as %) = Σ Asbestos structure mass • Sensitivity • 100

Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394121_SO_03-14-15_150099_TEM-EPAISO_D.xlsm
FluidizedBedEDD_v1

**TEM Asbestos Structure Count for Fluidized Bed Material -- ISO
ANALYTICAL REPORT**

FILE NAME: Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394121_SO_03-14-15_150099_TEM-EPAISO_D.xlsm

SAMPLE INFORMATION		ANALYSIS PARAMETERS	
Field Sample Number 14394121		EFA (mm ²)	385
Matrix Soil		GO area (mm ²) [Ago]	0.0104
Field QC Type Not QC		# GOs counted - high mag	100
Sample Mass (g dry wt) [M] 1.01		# GOs counted - low mag only	0
Fluidized Bed Flow Ratio[Q _R] 0.0122		F-factor [f]	1.00E+00
Filter Status ANALYZED		Sensitivity - High mag	3.0E+04 1/g
		Sensitivity - PCME (high+low mag)	3.0E+04 1/g
ANALYSIS INFORMATION			
Lab Name LabCor Inc		Recording	
Lab Sample Number 150099-S22		Rules:	
Lab QC Type NOT QC		Initial (high mag)	
TEM Prep Method Direct		Min. AR	Min length (um) Min width (um)
Est. particulate loading on filter NA		3:1	0 0
		PCME Supplemental (low mag)	
		Min. AR	Min length (um) Min width (um)
		3:1	0 0
		Stopping	
		Rules:	
		Target S (1/g)	Max Area (mm ²) Max N

RESULTS SUMMARY

Structure Metric	Observed Structure Count (s)	Structure Filter Loading (s/mm ²)	Soil Conc. Structures per gram (s/g)
High mag only			
Total Asbestos	110	1.1E+02	3.3E+06
Total Chrysotile (CH)	104	1.0E+02	3.1E+06
Total Amphibole	6	5.8E+00	1.8E+05
actinolite (AC)	1	9.7E-01	3.0E+04
amosite (AM)	0	0.0E+00	0.0E+00
anthophyllite (AN)	0	0.0E+00	0.0E+00
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	5	4.8E+00	1.5E+05
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	0	0.0E+00	0.0E+00
other mineral class (OM)	0	0.0E+00	0.0E+00
PCME (high+low mag)			
Total Asbestos	5	4.8E+00	1.5E+05
Total Chrysotile (CH)	5	4.8E+00	1.5E+05
Total Amphibole	0	0.0E+00	0.0E+00
actinolite (AC)	0	0.0E+00	0.0E+00
amosite (AM)	0	0.0E+00	0.0E+00
anthophyllite (AN)	0	0.0E+00	0.0E+00
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	0	0.0E+00	0.0E+00
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	0	0.0E+00	0.0E+00
other mineral class (OM)	0	0.0E+00	0.0E+00

Σ Asbestos Structure Mass (g)	Mass fraction (as %)
Total TEM	
WRTA	0.00E+00 0.0000%
OA	0.00E+00 0.0000%
CH	1.71E-07 51.7061%
AC	1.55E-12 0.0005%
AM	0.00E+00 0.0000%
AN	0.00E+00 0.0000%
CR	0.00E+00 0.0000%
TR	4.24E-08 12.7975%
PCME	
WRTA	0.00E+00 0.0000%
OA	0.00E+00 0.0000%
CH	4.14E-10 0.1250%
AC	0.00E+00 0.0000%
AM	0.00E+00 0.0000%
AN	0.00E+00 0.0000%
CR	0.00E+00 0.0000%
TR	0.00E+00 0.0000%

Asbestos structure mass = Length • Width² • Density • 1E-12

LA Density = 3.1 g/cm³
OA Density = 3.0 g/cm³
CH Density = 2.6 g/cm³
AC Density = 3.1 g/cm³
AM Density = 3.5 g/cm³
AN Density = 3.0 g/cm³
CR Density = 3.3 g/cm³
TR Density = 3.0 g/cm³

Csoil (mass fraction, as %) = Σ Asbestos structure mass • Sensitivity • 100

Equations:

Filter Loading (s/mm²) = N / (GOx • Ago)
Sensitivity (1/g) = EFA / (GOx • Ago • M • f • Q_R)
Csoil (s/g) = N • Sensitivity

Asbestos Types:

AC - actinolite
AM - amosite
AN - anthophyllite
CH - chrysotile
CR - crocidolite
TR - tremolite
LA - Libby amphibole
OA - other amphibole
NAM - non-asbestos material
OM - other mineral type (specify in "other mineral description" field)

Structure Types:

High mag: Length ≥ 0.5 um, Aspect Ratio ≥ 3:1
PCME: Length > 5 um, Width ≥ 0.25 um, Aspect Ratio ≥ 3:1

Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394122_SO_03-17-15_150099_TEM-EPAISO_D.xlsm
FluidizedBedEDD_v1

**TEM Asbestos Structure Count for Fluidized Bed Material -- ISO
ANALYTICAL REPORT**

FILE NAME: Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394122_SO_03-17-15_150099_TEM-EPAISO_D.xlsm

SAMPLE INFORMATION		ANALYSIS PARAMETERS	
Field Sample Number 14394122		EFA (mm ²)	385
Matrix Soil		GO area (mm ²) [Ago]	0.0104
Field QC Type Not QC		# GOs counted - high mag	39
Sample Mass (g dry wt) [M] 1.01		# GOs counted - low mag only	0
Fluidized Bed Flow Ratio[Q _R] 0.0122		F-factor [f]	1.00E+00
Filter Status ANALYZED		Sensitivity - High mag	7.8E+04 1/g
		Sensitivity - PCME (high+low mag)	7.8E+04 1/g
ANALYSIS INFORMATION			
Lab Name LabCor Inc		Recording	
Lab Sample Number 150099-S23		Rules:	
Lab QC Type NOT QC		Initial (high mag)	
TEM Prep Method Direct		Min. AR	Min length (um) Min width (um)
Est. particulate loading on filter NA		3:1	0 0
		PCME Supplemental (low mag)	
		Min. AR	Min length (um) Min width (um)
		3:1	0 0
		Stopping	
		Rules:	
		Target S (1/g)	Max Area (mm ²) Max N

RESULTS SUMMARY

Structure Metric	Observed Structure Count (s)	Structure Filter Loading (s/mm ²)	Soil Conc. Structures per gram (s/g)
High mag only			
Total Asbestos	102	2.5E+02	7.9E+06
Total Chrysotile (CH)	100	2.5E+02	7.8E+06
Total Amphibole	2	5.0E+00	1.6E+05
actinolite (AC)	1	2.5E+00	7.8E+04
amosite (AM)	0	0.0E+00	0.0E+00
anthophyllite (AN)	0	0.0E+00	0.0E+00
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	1	2.5E+00	7.8E+04
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	0	0.0E+00	0.0E+00
other mineral class (OM)	0	0.0E+00	0.0E+00
PCME (high+low mag)			
Total Asbestos	2	5.0E+00	1.6E+05
Total Chrysotile (CH)	2	5.0E+00	1.6E+05
Total Amphibole	0	0.0E+00	0.0E+00
actinolite (AC)	0	0.0E+00	0.0E+00
amosite (AM)	0	0.0E+00	0.0E+00
anthophyllite (AN)	0	0.0E+00	0.0E+00
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	0	0.0E+00	0.0E+00
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	0	0.0E+00	0.0E+00
other mineral class (OM)	0	0.0E+00	0.0E+00

Σ Asbestos Structure Mass (g)	Mass fraction (as %)
Total TEM	
WRTA	0.00E+00 0.0000%
OA	0.00E+00 0.0000%
CH	4.53E-07 #####
AC	2.23E-12 0.0017%
AM	0.00E+00 0.0000%
AN	0.00E+00 0.0000%
CR	0.00E+00 0.0000%
TR	7.41E-08 57.4344%
PCME	
WRTA	0.00E+00 0.0000%
OA	0.00E+00 0.0000%
CH	3.16E-08 24.5011%
AC	0.00E+00 0.0000%
AM	0.00E+00 0.0000%
AN	0.00E+00 0.0000%
CR	0.00E+00 0.0000%
TR	0.00E+00 0.0000%

Equations:

Filter Loading (s/mm²) = N / (GOx • Ago)

Sensitivity (1/g) = EFA / (GOx • Ago • M • f • Q_R)

Csoil (s/g) = N • Sensitivity

Asbestos Types:

AC - actinolite
AM - amosite
AN - anthophyllite
CH - chrysotile
CR - crocidolite
TR - tremolite
LA - Libby amphibole
OA - other amphibole
NAM - non-asbestos material
OM - other mineral type (specify in "other mineral description" field)

Structure Types:

High mag: Length ≥ 0.5 um, Aspect Ratio ≥ 3:1

PCME: Length > 5 um, Width ≥ 0.25 um, Aspect Ratio ≥ 3:1

Asbestos structure mass = Length • Width² • Density • 1E-12

LA Density = 3.1 g/cm³

OA Density = 3.0 g/cm³

CH Density = 2.6 g/cm³

AC Density = 3.1 g/cm³

AM Density = 3.5 g/cm³

AN Density = 3.0 g/cm³

CR Density = 3.3 g/cm³

TR Density = 3.0 g/cm³

Csoil (mass fraction, as %) = Σ Asbestos structure mass • Sensitivity • 100

Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394123_SO_03-13-15_150099_TEM-EPAISO_D.xlsm
FluidizedBedEDD_v1

**TEM Asbestos Structure Count for Fluidized Bed Material -- ISO
ANALYTICAL REPORT**

FILE NAME: Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394123_SO_03-13-15_150099_TEM-EPAISO_D.xlsm

SAMPLE INFORMATION		ANALYSIS PARAMETERS	
Field Sample Number	14394123	EFA (mm ²)	385
Matrix	Soil	GO area (mm ²) [Ago]	0.0104
Field QC Type	Not QC	# GOs counted - high mag	37
Sample Mass (g dry wt) [M]	1.00	# GOs counted - low mag only	0
Fluidized Bed Flow Ratio[Q _R]	0.0122	F-factor [f]	1.00E+00
Filter Status	ANALYZED	Sensitivity - High mag	8.2E+04 1/g
		Sensitivity - PCME (high+low mag)	8.2E+04 1/g
ANALYSIS INFORMATION			
Lab Name	LabCor Inc	Recording	
Lab Sample Number	150099-S24	Rules:	
Lab QC Type	NOT QC	Initial (high mag)	
TEM Prep Method	Direct	Min. AR	Min length (um)
Est. particulate loading on filter	NA	3:1	0
		Min width (um)	0
		PCME Supplemental (low mag)	
		Min. AR	Min length (um)
		3:1	0
		Min width (um)	0
		Stopping	
		Rules:	
		Target S (1/g)	Max Area (mm ²)
			Max N

RESULTS SUMMARY

Structure Metric	Observed Structure Count (s)	Structure Filter Loading (s/mm ²)	Soil Conc. Structures per gram (s/g)
High mag only			
Total Asbestos	155	4.0E+02	1.3E+07
Total Chrysotile (CH)	155	4.0E+02	1.3E+07
Total Amphibole	0	0.0E+00	0.0E+00
actinolite (AC)	0	0.0E+00	0.0E+00
amosite (AM)	0	0.0E+00	0.0E+00
anthophyllite (AN)	0	0.0E+00	0.0E+00
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	0	0.0E+00	0.0E+00
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	0	0.0E+00	0.0E+00
other mineral class (OM)	0	0.0E+00	0.0E+00
PCME (high+low mag)			
Total Asbestos	7	1.8E+01	5.8E+05
Total Chrysotile (CH)	7	1.8E+01	5.8E+05
Total Amphibole	0	0.0E+00	0.0E+00
actinolite (AC)	0	0.0E+00	0.0E+00
amosite (AM)	0	0.0E+00	0.0E+00
anthophyllite (AN)	0	0.0E+00	0.0E+00
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	0	0.0E+00	0.0E+00
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	0	0.0E+00	0.0E+00
other mineral class (OM)	0	0.0E+00	0.0E+00

Σ Asbestos Structure Mass (g)	Mass fraction (as %)
Total TEM	
WRTA	0.00E+00 0.0000%
OA	0.00E+00 0.0000%
CH	4.80E-08 39.5547%
AC	0.00E+00 0.0000%
AM	0.00E+00 0.0000%
AN	0.00E+00 0.0000%
CR	0.00E+00 0.0000%
TR	0.00E+00 0.0000%
PCME	
WRTA	0.00E+00 0.0000%
OA	0.00E+00 0.0000%
CH	1.11E-09 0.9172%
AC	0.00E+00 0.0000%
AM	0.00E+00 0.0000%
AN	0.00E+00 0.0000%
CR	0.00E+00 0.0000%
TR	0.00E+00 0.0000%

Asbestos structure mass = Length • Width² • Density • 1E-12

LA Density = 3.1 g/cm³
OA Density = 3.0 g/cm³
CH Density = 2.6 g/cm³
AC Density = 3.1 g/cm³
AM Density = 3.5 g/cm³
AN Density = 3.0 g/cm³
CR Density = 3.3 g/cm³
TR Density = 3.0 g/cm³

Csoil (mass fraction, as %) = Σ Asbestos structure mass • Sensitivity • 100

Equations:

Filter Loading (s/mm²) = N / (GOx • Ago)
Sensitivity (1/g) = EFA / (GOx • Ago • M • f • Q_R)
Csoil (s/g) = N • Sensitivity

Asbestos Types:

AC - actinolite
AM - amosite
AN - anthophyllite
CH - chrysotile
CR - crocidolite
TR - tremolite
LA - Libby amphibole
OA - other amphibole
NAM - non-asbestos material
OM - other mineral type (specify in "other mineral description" field)

Structure Types:

High mag: Length ≥ 0.5 um, Aspect Ratio ≥ 3:1
PCME: Length ≥ 5 um, Width ≥ 0.25 um, Aspect Ratio ≥ 3:1

Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394124_SO_03-15-15_150099_TEM-EPAISO_D.xlsm
FluidizedBedEDD_v1

**TEM Asbestos Structure Count for Fluidized Bed Material -- ISO
ANALYTICAL REPORT**

FILE NAME: Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394124_SO_03-15-15_150099_TEM-EPAISO_D.xlsm

SAMPLE INFORMATION		ANALYSIS PARAMETERS	
Field Sample Number 14394124		EFA (mm ²)	385
Matrix Soil		GO area (mm ²) [Ago]	0.0104
Field QC Type Not QC		# GOs counted - high mag	100
Sample Mass (g dry wt) [M] 1.01		# GOs counted - low mag only	0
Fluidized Bed Flow Ratio[Q _R] 0.0122		F-factor [f]	1.00E+00
Filter Status ANALYZED		Sensitivity - High mag	3.0E+04 1/g
		Sensitivity - PCME (high+low mag)	3.0E+04 1/g
ANALYSIS INFORMATION			
Lab Name LabCor Inc		Recording	
Lab Sample Number 150099-S25		Rules:	
Lab QC Type NOT QC		Initial (high mag)	
TEM Prep Method Direct		Min. AR	Min length (um) Min width (um)
Est. particulate loading on filter NA		3:1	0 0
		PCME Supplemental (low mag)	
		Min. AR	Min length (um) Min width (um)
		3:1	0 0
		Stopping	
		Rules:	
		Target S (1/g)	Max Area (mm ²) Max N

RESULTS SUMMARY

Structure Metric	Observed Structure Count (s)	Structure Filter Loading (s/mm ²)	Soil Conc. Structures per gram (s/g)
High mag only			
Total Asbestos	57	5.5E+01	1.7E+06
Total Chrysotile (CH)	57	5.5E+01	1.7E+06
Total Amphibole	0	0.0E+00	0.0E+00
actinolite (AC)	0	0.0E+00	0.0E+00
amosite (AM)	0	0.0E+00	0.0E+00
anthophyllite (AN)	0	0.0E+00	0.0E+00
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	0	0.0E+00	0.0E+00
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	0	0.0E+00	0.0E+00
other mineral class (OM)	0	0.0E+00	0.0E+00
PCME (high+low mag)			
Total Asbestos	2	1.9E+00	6.0E+04
Total Chrysotile (CH)	2	1.9E+00	6.0E+04
Total Amphibole	0	0.0E+00	0.0E+00
actinolite (AC)	0	0.0E+00	0.0E+00
amosite (AM)	0	0.0E+00	0.0E+00
anthophyllite (AN)	0	0.0E+00	0.0E+00
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	0	0.0E+00	0.0E+00
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	0	0.0E+00	0.0E+00
other mineral class (OM)	0	0.0E+00	0.0E+00

Σ Asbestos Structure Mass (g)	Mass fraction (as %)
Total TEM	
WRTA	0.00E+00 0.0000%
OA	0.00E+00 0.0000%
CH	2.85E-09 0.8598%
AC	0.00E+00 0.0000%
AM	0.00E+00 0.0000%
AN	0.00E+00 0.0000%
CR	0.00E+00 0.0000%
TR	0.00E+00 0.0000%
PCME	
WRTA	0.00E+00 0.0000%
OA	0.00E+00 0.0000%
CH	5.30E-11 0.0160%
AC	0.00E+00 0.0000%
AM	0.00E+00 0.0000%
AN	0.00E+00 0.0000%
CR	0.00E+00 0.0000%
TR	0.00E+00 0.0000%

Asbestos structure mass = Length • Width² • Density • 1E-12

LA Density = 3.1 g/cm³
OA Density = 3.0 g/cm³
CH Density = 2.6 g/cm³
AC Density = 3.1 g/cm³
AM Density = 3.5 g/cm³
AN Density = 3.0 g/cm³
CR Density = 3.3 g/cm³
TR Density = 3.0 g/cm³

Csoil (mass fraction, as %) = Σ Asbestos structure mass • Sensitivity • 100

Equations:

Filter Loading (s/mm²) = N / (GOx • Ago)
Sensitivity (1/g) = EFA / (GOx • Ago • M • f • Q_R)
Csoil (s/g) = N • Sensitivity

Asbestos Types:

AC - actinolite
AM - amosite
AN - anthophyllite
CH - chrysotile
CR - crocidolite
TR - tremolite
LA - Libby amphibole
OA - other amphibole
NAM - non-asbestos material
OM - other mineral type (specify in "other mineral description" field)

Structure Types:

High mag: Length ≥ 0.5 um, Aspect Ratio ≥ 3:1
PCME: Length > 5 um, Width ≥ 0.25 um, Aspect Ratio ≥ 3:1

Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394125_SO_03-15-15_150099_TEM-EPAISO_D.xlsm
FluidizedBedEDD_v1

**TEM Asbestos Structure Count for Fluidized Bed Material -- ISO
ANALYTICAL REPORT**

FILE NAME: Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394125_SO_03-15-15_150099_TEM-EPAISO_D.xlsm

SAMPLE INFORMATION		ANALYSIS PARAMETERS	
Field Sample Number	14394125	EFA (mm ²)	385
Matrix	Soil	GO area (mm ²) [Ago]	0.0104
Field QC Type	Not QC	# GOs counted - high mag	100
Sample Mass (g dry wt) [M]	1.01	# GOs counted - low mag only	0
Fluidized Bed Flow Ratio[Q _R]	0.0122	F-factor [f]	1.00E+00
Filter Status	ANALYZED	Sensitivity - High mag	3.0E+04 1/g
		Sensitivity - PCME (high+low mag)	3.0E+04 1/g
ANALYSIS INFORMATION			
Lab Name	LabCor Inc	Recording	
Lab Sample Number	150099-S26	Rules:	
Lab QC Type	NOT QC	Initial (high mag)	
TEM Prep Method	Direct	Min. AR	Min length (um)
Est. particulate loading on filter	NA	3:1	0
		Min width (um)	0
		PCME Supplemental (low mag)	
		Min. AR	Min length (um)
		3:1	0
		Min width (um)	0
		Stopping	
		Rules:	
		Target S (1/g)	Max Area (mm ²)
			Max N

RESULTS SUMMARY

Structure Metric	Observed Structure Count (s)	Structure Filter Loading (s/mm ²)	Soil Conc. Structures per gram (s/g)
High mag only			
Total Asbestos	8	7.7E+00	2.4E+05
Total Chrysotile (CH)	8	7.7E+00	2.4E+05
Total Amphibole	0	0.0E+00	0.0E+00
actinolite (AC)	0	0.0E+00	0.0E+00
amosite (AM)	0	0.0E+00	0.0E+00
anthophyllite (AN)	0	0.0E+00	0.0E+00
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	0	0.0E+00	0.0E+00
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	0	0.0E+00	0.0E+00
other mineral class (OM)	0	0.0E+00	0.0E+00
PCME (high+low mag)			
Total Asbestos	0	0.0E+00	0.0E+00
Total Chrysotile (CH)	0	0.0E+00	0.0E+00
Total Amphibole	0	0.0E+00	0.0E+00
actinolite (AC)	0	0.0E+00	0.0E+00
amosite (AM)	0	0.0E+00	0.0E+00
anthophyllite (AN)	0	0.0E+00	0.0E+00
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	0	0.0E+00	0.0E+00
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	0	0.0E+00	0.0E+00
other mineral class (OM)	0	0.0E+00	0.0E+00

Equations:

Filter Loading (s/mm²) = N / (GOx • Ago)
Sensitivity (1/g) = EFA / (GOx • Ago • M • f • Q_R)
Csoil (s/g) = N • Sensitivity

Asbestos Types:

AC - actinolite
AM - amosite
AN - anthophyllite
CH - chrysotile
CR - crocidolite
TR - tremolite
LA - Libby amphibole
OA - other amphibole
NAM - non-asbestos material
OM - other mineral type (specify in "other mineral description" field)

Structure Types:

High mag: Length ≥ 0.5 um, Aspect Ratio ≥ 3:1
PCME: Length ≥ 5 um, Width ≥ 0.25 um, Aspect Ratio ≥ 3:1

Σ Asbestos Structure Mass (g)	Mass fraction (as %)
Total TEM	
WRTA	0.00E+00 0.0000%
OA	0.00E+00 0.0000%
CH	1.13E-12 0.0003%
AC	0.00E+00 0.0000%
AM	0.00E+00 0.0000%
AN	0.00E+00 0.0000%
CR	0.00E+00 0.0000%
TR	0.00E+00 0.0000%
PCME	
WRTA	0.00E+00 0.0000%
OA	0.00E+00 0.0000%
CH	0.00E+00 0.0000%
AC	0.00E+00 0.0000%
AM	0.00E+00 0.0000%
AN	0.00E+00 0.0000%
CR	0.00E+00 0.0000%
TR	0.00E+00 0.0000%

Asbestos structure mass = Length • Width² • Density • 1E-12

LA Density = 3.1 g/cm³
OA Density = 3.0 g/cm³
CH Density = 2.6 g/cm³
AC Density = 3.1 g/cm³
AM Density = 3.5 g/cm³
AN Density = 3.0 g/cm³
CR Density = 3.3 g/cm³
TR Density = 3.0 g/cm³

Csoil (mass fraction, as %) = Σ Asbestos structure mass • Sensitivity • 100

Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394126_SO_02-26-15_150099_TEM-EPAISO_D.xlsm
FluidizedBedEDD_v1

**TEM Asbestos Structure Count for Fluidized Bed Material -- ISO
ANALYTICAL REPORT**

FILE NAME: Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394126_SO_02-26-15_150099_TEM-EPAISO_D.xlsm

SAMPLE INFORMATION		ANALYSIS PARAMETERS	
Field Sample Number	14394126	EFA (mm ²)	385
Matrix	Soil	GO area (mm ²) [Ago]	0.0104
Field QC Type	Not QC	# GOs counted - high mag	100
Sample Mass (g dry wt) [M]	1.00	# GOs counted - low mag only	0
Fluidized Bed Flow Ratio[Q _R]	0.0122	F-factor [f]	1.00E+00
Filter Status	ANALYZED	Sensitivity - High mag	3.0E+04 1/g
		Sensitivity - PCME (high+low mag)	3.0E+04 1/g
ANALYSIS INFORMATION			
Lab Name	LabCor Inc	Recording	
Lab Sample Number	150099-S27	Rules:	
Lab QC Type	NOT QC	Initial (high mag)	
TEM Prep Method	Direct	Min. AR	Min length (um)
Est. particulate loading on filter	NA	3:1	0
		Min width (um)	0
		PCME Supplemental (low mag)	
		Min. AR	Min length (um)
		3:1	0
		Min width (um)	0
		Stopping	
		Rules:	
		Target S (1/g)	Max Area (mm ²)
			Max N

RESULTS SUMMARY

Structure Metric	Observed Structure Count (s)	Structure Filter Loading (s/mm ²)	Soil Conc. Structures per gram (s/g)
High mag only			
Total Asbestos	0	0.0E+00	0.0E+00
Total Chrysotile (CH)	0	0.0E+00	0.0E+00
Total Amphibole	0	0.0E+00	0.0E+00
actinolite (AC)	0	0.0E+00	0.0E+00
amosite (AM)	0	0.0E+00	0.0E+00
anthophyllite (AN)	0	0.0E+00	0.0E+00
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	0	0.0E+00	0.0E+00
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	0	0.0E+00	0.0E+00
other mineral class (OM)	0	0.0E+00	0.0E+00
PCME (high+low mag)			
Total Asbestos	0	0.0E+00	0.0E+00
Total Chrysotile (CH)	0	0.0E+00	0.0E+00
Total Amphibole	0	0.0E+00	0.0E+00
actinolite (AC)	0	0.0E+00	0.0E+00
amosite (AM)	0	0.0E+00	0.0E+00
anthophyllite (AN)	0	0.0E+00	0.0E+00
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	0	0.0E+00	0.0E+00
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	0	0.0E+00	0.0E+00
other mineral class (OM)	0	0.0E+00	0.0E+00

Σ Asbestos Structure Mass (g)	Mass fraction (as %)
Total TEM	
WRTA	0.00E+00 0.0000%
OA	0.00E+00 0.0000%
CH	0.00E+00 0.0000%
AC	0.00E+00 0.0000%
AM	0.00E+00 0.0000%
AN	0.00E+00 0.0000%
CR	0.00E+00 0.0000%
TR	0.00E+00 0.0000%
PCME	
WRTA	0.00E+00 0.0000%
OA	0.00E+00 0.0000%
CH	0.00E+00 0.0000%
AC	0.00E+00 0.0000%
AM	0.00E+00 0.0000%
AN	0.00E+00 0.0000%
CR	0.00E+00 0.0000%
TR	0.00E+00 0.0000%

Asbestos structure mass = Length • Width² • Density • 1E-12

LA Density = 3.1 g/cm³
OA Density = 3.0 g/cm³
CH Density = 2.6 g/cm³
AC Density = 3.1 g/cm³
AM Density = 3.5 g/cm³
AN Density = 3.0 g/cm³
CR Density = 3.3 g/cm³
TR Density = 3.0 g/cm³

Csoil (mass fraction, as %) = Σ Asbestos structure mass • Sensitivity • 100

Equations:

Filter Loading (s/mm²) = N / (GOx • Ago)
Sensitivity (1/g) = EFA / (GOx • Ago • M • f • Q_R)
Csoil (s/g) = N • Sensitivity

Asbestos Types:

AC - actinolite
AM - amosite
AN - anthophyllite
CH - chrysotile
CR - crocidolite
TR - tremolite
LA - Libby amphibole
OA - other amphibole
NAM - non-asbestos material
OM - other mineral type (specify in "other mineral description" field)

Structure Types:

High mag: Length ≥ 0.5 um, Aspect Ratio ≥ 3:1
PCME: Length > 5 um, Width ≥ 0.25 um, Aspect Ratio ≥ 3:1

Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394127_SO_02-26-15_150099_TEM-EPAISO_D.xlsm
FluidizedBedEDD_v1

**TEM Asbestos Structure Count for Fluidized Bed Material -- ISO
ANALYTICAL REPORT**

FILE NAME: Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394127_SO_02-26-15_150099_TEM-EPAISO_D.xlsm

SAMPLE INFORMATION		ANALYSIS PARAMETERS	
Field Sample Number 14394127		EFA (mm ²)	385
Matrix Soil		GO area (mm ²) [Ago]	0.0104
Field QC Type Not QC		# GOs counted - high mag	60
Sample Mass (g dry wt) [M] 1.00		# GOs counted - low mag only	0
Fluidized Bed Flow Ratio[Q _R] 0.0122		F-factor [f]	1.00E+00
Filter Status ANALYZED		Sensitivity - High mag	5.1E+04 1/g
		Sensitivity - PCME (high+low mag)	5.1E+04 1/g
ANALYSIS INFORMATION			
Lab Name LabCor Inc		Recording	
Lab Sample Number 150099-S28		Rules:	
Lab QC Type NOT QC		Initial (high mag)	
TEM Prep Method Direct		Min. AR	Min length (um) Min width (um)
Est. particulate loading on filter NA		3:1	0 0
		PCME Supplemental (low mag)	
		Min. AR	Min length (um) Min width (um)
		3:1	0 0
		Stopping	
		Rules:	
		Target S (1/g)	Max Area (mm ²) Max N

RESULTS SUMMARY

Structure Metric	Observed Structure Count (s)	Structure Filter Loading (s/mm ²)	Soil Conc. Structures per gram (s/g)
High mag only			
Total Asbestos	130	2.1E+02	6.6E+06
Total Chrysotile (CH)	128	2.1E+02	6.5E+06
Total Amphibole	2	3.2E+00	1.0E+05
actinolite (AC)	2	3.2E+00	1.0E+05
amosite (AM)	0	0.0E+00	0.0E+00
anthophyllite (AN)	0	0.0E+00	0.0E+00
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	0	0.0E+00	0.0E+00
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	0	0.0E+00	0.0E+00
other mineral class (OM)	0	0.0E+00	0.0E+00
PCME (high+low mag)			
Total Asbestos	5	8.1E+00	2.5E+05
Total Chrysotile (CH)	5	8.1E+00	2.5E+05
Total Amphibole	0	0.0E+00	0.0E+00
actinolite (AC)	0	0.0E+00	0.0E+00
amosite (AM)	0	0.0E+00	0.0E+00
anthophyllite (AN)	0	0.0E+00	0.0E+00
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	0	0.0E+00	0.0E+00
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	0	0.0E+00	0.0E+00
other mineral class (OM)	0	0.0E+00	0.0E+00

Σ Asbestos Structure Mass (g)	Mass fraction (as %)
Total TEM	
WRTA	0.00E+00 0.0000%
OA	0.00E+00 0.0000%
CH	7.12E-09 3.6087%
AC	1.45E-12 0.0007%
AM	0.00E+00 0.0000%
AN	0.00E+00 0.0000%
CR	0.00E+00 0.0000%
TR	0.00E+00 0.0000%
PCM	
WRTA	0.00E+00 0.0000%
OA	0.00E+00 0.0000%
CH	1.31E-09 0.6658%
AC	0.00E+00 0.0000%
AM	0.00E+00 0.0000%
AN	0.00E+00 0.0000%
CR	0.00E+00 0.0000%
TR	0.00E+00 0.0000%

Asbestos structure mass = Length • Width² • Density • 1E-12

LA Density = 3.1 g/cm³
OA Density = 3.0 g/cm³
CH Density = 2.6 g/cm³
AC Density = 3.1 g/cm³
AM Density = 3.5 g/cm³
AN Density = 3.0 g/cm³
CR Density = 3.3 g/cm³
TR Density = 3.0 g/cm³

Csoil (mass fraction, as %) = Σ Asbestos structure mass • Sensitivity • 100

Equations:

Filter Loading (s/mm²) = N / (GOx • Ago)

Sensitivity (1/g) = EFA / (GOx • Ago • M • f • Q_R)

Csoil (s/g) = N • Sensitivity

Asbestos Types:

AC - actinolite
AM - amosite
AN - anthophyllite
CH - chrysotile
CR - crocidolite
TR - tremolite
LA - Libby amphibole
OA - other amphibole
NAM - non-asbestos material
OM - other mineral type (specify in "other mineral description" field)

Structure Types:

High mag: Length ≥ 0.5 um, Aspect Ratio ≥ 3:1

PCME: Length > 5 um, Width ≥ 0.25 um, Aspect Ratio ≥ 3:1

Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394128_SO_03-02-15_150099_TEM-EPAISO_D.xlsm
FluidizedBedEDD_v1

**TEM Asbestos Structure Count for Fluidized Bed Material -- ISO
ANALYTICAL REPORT**

FILE NAME:Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394128_SO_03-02-15_150099_TEM-EPAISO_D.xlsm

SAMPLE INFORMATION		ANALYSIS PARAMETERS	
Field Sample Number 14394128		EFA (mm ²)	385
Matrix Soil		GO area (mm ²) [Ago]	0.0104
Field QC Type Not QC		# GOs counted - high mag	6
Sample Mass (g dry wt) [M] 1.00		# GOs counted - low mag only	0
Fluidized Bed Flow Ratio[Q _R] 0.0122		F-factor [f]	1.00E+00
Filter Status ANALYZED		Sensitivity - High mag	5.1E+05 1/g
		Sensitivity - PCME (high+low mag)	5.1E+05 1/g
ANALYSIS INFORMATION			
Lab Name LabCor Inc		Recording	
Lab Sample Number 150099-S29		Rules:	
Lab QC Type NOT QC		Initial (high mag)	
TEM Prep Method Direct		Min. AR	Min length (um) Min width (um)
Est. particulate loading on filter NA		3:1	0 0
		PCME Supplemental (low mag)	
		Min. AR	Min length (um) Min width (um)
		3:1	0 0
		Stopping	
		Rules:	
		Target S (1/g)	Max Area (mm ²) Max N

RESULTS SUMMARY

Structure Metric	Observed Structure Count (s)	Structure Filter Loading (s/mm ²)	Soil Conc. Structures per gram (s/g)
High mag only			
Total Asbestos	206	3.3E+03	1.0E+08
Total Chrysotile (CH)	206	3.3E+03	1.0E+08
Total Amphibole	0	0.0E+00	0.0E+00
actinolite (AC)	0	0.0E+00	0.0E+00
amosite (AM)	0	0.0E+00	0.0E+00
anthophyllite (AN)	0	0.0E+00	0.0E+00
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	0	0.0E+00	0.0E+00
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	0	0.0E+00	0.0E+00
other mineral class (OM)	0	0.0E+00	0.0E+00
PCME (high+low mag)			
Total Asbestos	4	6.4E+01	2.0E+06
Total Chrysotile (CH)	4	6.4E+01	2.0E+06
Total Amphibole	0	0.0E+00	0.0E+00
actinolite (AC)	0	0.0E+00	0.0E+00
amosite (AM)	0	0.0E+00	0.0E+00
anthophyllite (AN)	0	0.0E+00	0.0E+00
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	0	0.0E+00	0.0E+00
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	0	0.0E+00	0.0E+00
other mineral class (OM)	0	0.0E+00	0.0E+00

Equations:

Filter Loading (s/mm²) = N / (GOx • Ago)

Sensitivity (1/g) = EFA / (GOx • Ago • M • f • Q_R)

Csoil (s/g) = N • Sensitivity

Asbestos Types:

AC - actinolite
AM - amosite
AN - anthophyllite
CH - chrysotile
CR - crocidolite
TR - tremolite
LA - Libby amphibole
OA - other amphibole
NAM - non-asbestos material
OM - other mineral type (specify in "other mineral description" field)

Structure Types:

High mag: Length ≥ 0.5 um, Aspect Ratio ≥ 3:1

PCME: Length > 5 um, Width ≥ 0.25 um, Aspect Ratio ≥ 3:1

Σ Asbestos Structure Mass (g)	Mass fraction (as %)
Total TEM	
WRTA	0.00E+00 0.0000%
OA	0.00E+00 0.0000%
CH	1.57E-08 79.9573%
AC	0.00E+00 0.0000%
AM	0.00E+00 0.0000%
AN	0.00E+00 0.0000%
CR	0.00E+00 0.0000%
TR	0.00E+00 0.0000%
PCME	
WRTA	0.00E+00 0.0000%
OA	0.00E+00 0.0000%
CH	6.46E-11 0.3284%
AC	0.00E+00 0.0000%
AM	0.00E+00 0.0000%
AN	0.00E+00 0.0000%
CR	0.00E+00 0.0000%
TR	0.00E+00 0.0000%

Asbestos structure mass = Length • Width² • Density • 1E-12

LA Density = 3.1 g/cm³

OA Density = 3.0 g/cm³

CH Density = 2.6 g/cm³

AC Density = 3.1 g/cm³

AM Density = 3.5 g/cm³

AN Density = 3.0 g/cm³

CR Density = 3.3 g/cm³

TR Density = 3.0 g/cm³

Csoil (mass fraction, as %) = Σ Asbestos structure mass • Sensitivity • 100

Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394129_SO_03-02-15_150099_TEM-EPAISO__D.xlsm
FluidizedBedEDD_v1

**TEM Asbestos Structure Count for Fluidized Bed Material -- ISO
ANALYTICAL REPORT**

FILE NAME:Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394129_SO_03-02-15_150099_TEM-EPAISO__D.xlsm

SAMPLE INFORMATION		ANALYSIS PARAMETERS	
Field Sample Number 14394129		EFA (mm ²)	385
Matrix Soil		GO area (mm ²) [Ago]	0.0104
Field QC Type Not QC		# GOs counted - high mag	2
Sample Mass (g dry wt) [M] 1.00		# GOs counted - low mag only	0
Fluidized Bed Flow Ratio[Q _R] 0.0122		F-factor [f]	1.00E+00
Filter Status ANALYZED		Sensitivity - High mag	1.5E+06 1/g
		Sensitivity - PCME (high+low mag)	1.5E+06 1/g
ANALYSIS INFORMATION			
Lab Name LabCor Inc		Recording	
Lab Sample Number 150099-S30		Rules:	
Lab QC Type NOT QC		Initial (high mag)	
TEM Prep Method Direct		Min. AR	Min length (um) Min width (um)
Est. particulate loading on filter NA		3:1	0 0
		PCME Supplemental (low mag)	
		Min. AR	Min length (um) Min width (um)
		3:1	0 0
		Stopping	
		Rules:	
		Target S (1/g)	Max Area (mm ²) Max N

RESULTS SUMMARY

Structure Metric	Observed Structure Count (s)	Structure Filter Loading (s/mm ²)	Soil Conc. Structures per gram (s/g)
High mag only			
Total Asbestos	217	1.0E+04	3.3E+08
Total Chrysotile (CH)	217	1.0E+04	3.3E+08
Total Amphibole	0	0.0E+00	0.0E+00
actinolite (AC)	0	0.0E+00	0.0E+00
amosite (AM)	0	0.0E+00	0.0E+00
anthophyllite (AN)	0	0.0E+00	0.0E+00
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	0	0.0E+00	0.0E+00
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	0	0.0E+00	0.0E+00
other mineral class (OM)	0	0.0E+00	0.0E+00
PCME (high+low mag)			
Total Asbestos	2	9.7E+01	3.0E+06
Total Chrysotile (CH)	2	9.7E+01	3.0E+06
Total Amphibole	0	0.0E+00	0.0E+00
actinolite (AC)	0	0.0E+00	0.0E+00
amosite (AM)	0	0.0E+00	0.0E+00
anthophyllite (AN)	0	0.0E+00	0.0E+00
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	0	0.0E+00	0.0E+00
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	0	0.0E+00	0.0E+00
other mineral class (OM)	0	0.0E+00	0.0E+00

Equations:

Filter Loading (s/mm²) = N / (GOx • Ago)

Sensitivity (1/g) = EFA / (GOx • Ago • M • f • Q_R)

Csoil (s/g) = N • Sensitivity

Asbestos Types:

AC - actinolite
AM - amosite
AN - anthophyllite
CH - chrysotile
CR - crocidolite
TR - tremolite
LA - Libby amphibole
OA - other amphibole
NAM - non-asbestos material
OM - other mineral type (specify in "other mineral description" field)

Structure Types:

High mag: Length ≥ 0.5 um, Aspect Ratio ≥ 3:1

PCME: Length > 5 um, Width ≥ 0.25 um, Aspect Ratio ≥ 3:1

Σ Asbestos Structure Mass (g)	Mass fraction (as %)
Total TEM	
WRTA	0.00E+00 0.0000%
OA	0.00E+00 0.0000%
CH	1.41E-08 #####
AC	0.00E+00 0.0000%
AM	0.00E+00 0.0000%
AN	0.00E+00 0.0000%
CR	0.00E+00 0.0000%
TR	0.00E+00 0.0000%
PCME	
WRTA	0.00E+00 0.0000%
OA	0.00E+00 0.0000%
CH	1.85E-10 2.8168%
AC	0.00E+00 0.0000%
AM	0.00E+00 0.0000%
AN	0.00E+00 0.0000%
CR	0.00E+00 0.0000%
TR	0.00E+00 0.0000%

Asbestos structure mass = Length • Width² • Density • 1E-12

LA Density = 3.1 g/cm³

OA Density = 3.0 g/cm³

CH Density = 2.6 g/cm³

AC Density = 3.1 g/cm³

AM Density = 3.5 g/cm³

AN Density = 3.0 g/cm³

CR Density = 3.3 g/cm³

TR Density = 3.0 g/cm³

Csoil (mass fraction, as %) = Σ Asbestos structure mass • Sensitivity • 100

Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394130_SO_03-02-15_150099_TEM-EPAISO__D.xlsm
FluidizedBedEDD_v1

**TEM Asbestos Structure Count for Fluidized Bed Material -- ISO
ANALYTICAL REPORT**

FILE NAME:Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394130_SO_03-02-15_150099_TEM-EPAISO__D.xlsm

SAMPLE INFORMATION		ANALYSIS PARAMETERS	
Field Sample Number 14394130		EFA (mm ²)	385
Matrix Soil		GO area (mm ²) [Ago]	0.0104
Field QC Type Not QC		# GOs counted - high mag	4
Sample Mass (g dry wt) [M] 1.00		# GOs counted - low mag only	0
Fluidized Bed Flow Ratio[Q _R] 0.0122		F-factor [f]	1.00E+00
Filter Status ANALYZED		Sensitivity - High mag	7.6E+05 1/g
		Sensitivity - PCME (high+low mag)	7.6E+05 1/g
ANALYSIS INFORMATION			
Lab Name LabCor Inc		Recording	
Lab Sample Number 150099-S31		Rules:	
Lab QC Type NOT QC		Initial (high mag)	
TEM Prep Method Direct		Min. AR	Min length (um) Min width (um)
Est. particulate loading on filter NA		3:1	0 0
		PCME Supplemental (low mag)	
		Min. AR	Min length (um) Min width (um)
		3:1	0 0
		Stopping	
		Rules:	
		Target S (1/g)	Max Area (mm ²) Max N

RESULTS SUMMARY

Structure Metric	Observed Structure Count (s)	Structure Filter Loading (s/mm ²)	Soil Conc. Structures per gram (s/g)
High mag only			
Total Asbestos	165	4.0E+03	1.3E+08
Total Chrysotile (CH)	165	4.0E+03	1.3E+08
Total Amphibole	0	0.0E+00	0.0E+00
actinolite (AC)	0	0.0E+00	0.0E+00
amosite (AM)	0	0.0E+00	0.0E+00
anthophyllite (AN)	0	0.0E+00	0.0E+00
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	0	0.0E+00	0.0E+00
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	0	0.0E+00	0.0E+00
other mineral class (OM)	0	0.0E+00	0.0E+00
PCME (high+low mag)			
Total Asbestos	5	1.2E+02	3.8E+06
Total Chrysotile (CH)	5	1.2E+02	3.8E+06
Total Amphibole	0	0.0E+00	0.0E+00
actinolite (AC)	0	0.0E+00	0.0E+00
amosite (AM)	0	0.0E+00	0.0E+00
anthophyllite (AN)	0	0.0E+00	0.0E+00
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	0	0.0E+00	0.0E+00
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	0	0.0E+00	0.0E+00
other mineral class (OM)	0	0.0E+00	0.0E+00

Σ Asbestos Structure Mass (g)	Mass fraction (as %)
Total TEM	
WRTA	0.00E+00 0.0000%
OA	0.00E+00 0.0000%
CH	5.10E-08 #####
AC	0.00E+00 0.0000%
AM	0.00E+00 0.0000%
AN	0.00E+00 0.0000%
CR	0.00E+00 0.0000%
TR	0.00E+00 0.0000%
PCME	
WRTA	0.00E+00 0.0000%
OA	0.00E+00 0.0000%
CH	2.16E-08 #####
AC	0.00E+00 0.0000%
AM	0.00E+00 0.0000%
AN	0.00E+00 0.0000%
CR	0.00E+00 0.0000%
TR	0.00E+00 0.0000%

Asbestos structure mass = Length • Width² • Density • 1E-12

LA Density = 3.1 g/cm³
OA Density = 3.0 g/cm³
CH Density = 2.6 g/cm³
AC Density = 3.1 g/cm³
AM Density = 3.5 g/cm³
AN Density = 3.0 g/cm³
CR Density = 3.3 g/cm³
TR Density = 3.0 g/cm³

Csoil (mass fraction, as %) = Σ Asbestos structure mass • Sensitivity • 100

Equations:

Filter Loading (s/mm²) = N / (GOx • Ago)

Sensitivity (1/g) = EFA / (GOx • Ago • M • f • Q_R)

Csoil (s/g) = N • Sensitivity

Asbestos Types:

AC - actinolite
AM - amosite
AN - anthophyllite
CH - chrysotile
CR - crocidolite
TR - tremolite
LA - Libby amphibole
OA - other amphibole
NAM - non-asbestos material
OM - other mineral type (specify in "other mineral description" field)

Structure Types:

High mag: Length ≥ 0.5 um, Aspect Ratio ≥ 3:1

PCME: Length > 5 um, Width ≥ 0.25 um, Aspect Ratio ≥ 3:1

Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394131_SO_03-04-15_150099_TEM-EPAISO_D.xlsm
FluidizedBedEDD_v1

**TEM Asbestos Structure Count for Fluidized Bed Material -- ISO
ANALYTICAL REPORT**

FILE NAME:Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394131_SO_03-04-15_150099_TEM-EPAISO_D.xlsm

SAMPLE INFORMATION		ANALYSIS PARAMETERS	
Field Sample Number 14394131		EFA (mm ²)	385
Matrix Soil		GO area (mm ²) [Ago]	0 0104
Field QC Type Not QC		# GOs counted - high mag	2
Sample Mass (g dry wt) [M] 1.01		# GOs counted - low mag only	0
Fluidized Bed Flow Ratio[Q _R] 0.0122		F-factor [f]	1.00E+00
Filter Status ANALYZED		Sensitivity - High mag	1.5E+06 1/g
		Sensitivity - PCME (high+low mag)	1.5E+06 1/g
ANALYSIS INFORMATION			
Lab Name LabCor Inc		Recording	
Lab Sample Number 150099-S32		Rules:	
Lab QC Type NOT QC		Initial (high mag)	
TEM Prep Method Direct		Min. AR	Min length (um) Min width (um)
Est. particulate loading on filter NA		3:1	0 0
		PCME Supplemental (low mag)	
		Min. AR	Min length (um) Min width (um)
		3:1	0 0
		Stopping	
		Rules:	
		Target S (1/g)	Max Area (mm ²) Max N

RESULTS SUMMARY

Structure Metric	Observed Structure Count (s)	Structure Filter Loading (s/mm ²)	Soil Conc. Structures per gram (s/g)
High mag only			
Total Asbestos	157	7.6E+03	2.4E+08
Total Chrysotile (CH)	157	7.6E+03	2.4E+08
Total Amphibole	0	0.0E+00	0.0E+00
actinolite (AC)	0	0.0E+00	0.0E+00
amosite (AM)	0	0.0E+00	0.0E+00
anthophyllite (AN)	0	0.0E+00	0.0E+00
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	0	0.0E+00	0.0E+00
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	0	0.0E+00	0.0E+00
other mineral class (OM)	0	0.0E+00	0.0E+00
PCME (high+low mag)			
Total Asbestos	6	2.9E+02	9.1E+06
Total Chrysotile (CH)	6	2.9E+02	9.1E+06
Total Amphibole	0	0.0E+00	0.0E+00
actinolite (AC)	0	0.0E+00	0.0E+00
amosite (AM)	0	0.0E+00	0.0E+00
anthophyllite (AN)	0	0.0E+00	0.0E+00
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	0	0.0E+00	0.0E+00
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	0	0.0E+00	0.0E+00
other mineral class (OM)	0	0.0E+00	0.0E+00

Σ Asbestos Structure Mass (g)	Mass fraction (as %)
Total TEM	
WRTA	0.00E+00 0.0000%
OA	0.00E+00 0.0000%
CH	1.65E-07 #####
AC	0.00E+00 0.0000%
AM	0.00E+00 0.0000%
AN	0.00E+00 0.0000%
CR	0.00E+00 0.0000%
TR	0.00E+00 0.0000%
PCME	
WRTA	0.00E+00 0.0000%
OA	0.00E+00 0.0000%
CH	3.50E-11 0.5298%
AC	0.00E+00 0.0000%
AM	0.00E+00 0.0000%
AN	0.00E+00 0.0000%
CR	0.00E+00 0.0000%
TR	0.00E+00 0.0000%

Asbestos structure mass = Length • Width² • Density • 1E-12

LA Density = 3.1 g/cm³
OA Density = 3.0 g/cm³
CH Density = 2.6 g/cm³
AC Density = 3.1 g/cm³
AM Density = 3.5 g/cm³
AN Density = 3.0 g/cm³
CR Density = 3.3 g/cm³
TR Density = 3.0 g/cm³

Csoil (mass fraction, as %) = Σ Asbestos structure mass • Sensitivity • 100

Equations:

Filter Loading (s/mm²) = N / (GOx • Ago)
Sensitivity (1/g) = EFA / (GOx • Ago • M • f • Q_R)
Csoil (s/g) = N • Sensitivity

Asbestos Types:

AC - actinolite
AM - amosite
AN - anthophyllite
CH - chrysotile
CR - crocidolite
TR - tremolite
LA - Libby amphibole
OA - other amphibole
NAM - non-asbestos material
OM - other mineral type (specify in "other mineral description" field)

Structure Types:

High mag: Length ≥ 0.5 um, Aspect Ratio ≥ 3:1
PCME: Length > 5 um, Width ≥ 0.25 um, Aspect Ratio ≥ 3:1

Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394132_SO_03-04-15_150099_TEM-EPAISO_D.xlsm
FluidizedBedEDD_v1

**TEM Asbestos Structure Count for Fluidized Bed Material -- ISO
ANALYTICAL REPORT**

FILE NAME: Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394132_SO_03-04-15_150099_TEM-EPAISO_D.xlsm

SAMPLE INFORMATION		ANALYSIS PARAMETERS	
Field Sample Number	14394132	EFA (mm ²)	385
Matrix	Soil	GO area (mm ²) [Ago]	0.0104
Field QC Type	Not QC	# GOs counted - high mag	13
Sample Mass (g dry wt) [M]	1.00	# GOs counted - low mag only	0
Fluidized Bed Flow Ratio[Q _R]	0.0122	F-factor [f]	1.00E+00
Filter Status	ANALYZED	Sensitivity - High mag	2.4E+05 1/g
		Sensitivity - PCME (high+low mag)	2.4E+05 1/g
ANALYSIS INFORMATION			
Lab Name	LabCor Inc	Recording	
Lab Sample Number	150099-S33	Rules:	
Lab QC Type	NOT QC	Initial (high mag)	
TEM Prep Method	Direct	Min. AR	Min length (um)
Est. particulate loading on filter	NA	3:1	0
		Min width (um)	0
		PCME Supplemental (low mag)	
		Min. AR	Min length (um)
		3:1	0
		Min width (um)	0
		Stopping	
		Rules:	
		Target S (1/g)	Max Area (mm ²)
			Max N

RESULTS SUMMARY

Structure Metric	Observed Structure Count (s)	Structure Filter Loading (s/mm ²)	Soil Conc. Structures per gram (s/g)
High mag only			
Total Asbestos	171	1.3E+03	4.0E+07
Total Chrysotile (CH)	171	1.3E+03	4.0E+07
Total Amphibole	0	0.0E+00	0.0E+00
actinolite (AC)	0	0.0E+00	0.0E+00
amosite (AM)	0	0.0E+00	0.0E+00
anthophyllite (AN)	0	0.0E+00	0.0E+00
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	0	0.0E+00	0.0E+00
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	0	0.0E+00	0.0E+00
other mineral class (OM)	0	0.0E+00	0.0E+00
PCME (high+low mag)			
Total Asbestos	3	2.2E+01	7.1E+05
Total Chrysotile (CH)	3	2.2E+01	7.1E+05
Total Amphibole	0	0.0E+00	0.0E+00
actinolite (AC)	0	0.0E+00	0.0E+00
amosite (AM)	0	0.0E+00	0.0E+00
anthophyllite (AN)	0	0.0E+00	0.0E+00
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	0	0.0E+00	0.0E+00
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	0	0.0E+00	0.0E+00
other mineral class (OM)	0	0.0E+00	0.0E+00

Σ Asbestos Structure Mass (g)	Mass fraction (as %)
Total TEM	
WRTA	0.00E+00 0.0000%
OA	0.00E+00 0.0000%
CH	3.11E-09 7.3187%
AC	0.00E+00 0.0000%
AM	0.00E+00 0.0000%
AN	0.00E+00 0.0000%
CR	0.00E+00 0.0000%
TR	0.00E+00 0.0000%
PCME	
WRTA	0.00E+00 0.0000%
OA	0.00E+00 0.0000%
CH	4.38E-11 0.1030%
AC	0.00E+00 0.0000%
AM	0.00E+00 0.0000%
AN	0.00E+00 0.0000%
CR	0.00E+00 0.0000%
TR	0.00E+00 0.0000%

Asbestos structure mass = Length • Width² • Density • 1E-12

LA Density = 3.1 g/cm³
OA Density = 3.0 g/cm³
CH Density = 2.6 g/cm³
AC Density = 3.1 g/cm³
AM Density = 3.5 g/cm³
AN Density = 3.0 g/cm³
CR Density = 3.3 g/cm³
TR Density = 3.0 g/cm³

Csoil (mass fraction, as %) = Σ Asbestos structure mass • Sensitivity • 100

Equations:

Filter Loading (s/mm²) = N / (GOx • Ago)
Sensitivity (1/g) = EFA / (GOx • Ago • M • f • Q_R)
Csoil (s/g) = N • Sensitivity

Asbestos Types:

AC - actinolite
AM - amosite
AN - anthophyllite
CH - chrysotile
CR - crocidolite
TR - tremolite
LA - Libby amphibole
OA - other amphibole
NAM - non-asbestos material
OM - other mineral type (specify in "other mineral description" field)

Structure Types:

High mag: Length ≥ 0.5 um, Aspect Ratio ≥ 3:1
PCME: Length > 5 um, Width ≥ 0.25 um, Aspect Ratio ≥ 3:1

Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394133_SO_03-04-15_150099_TEM-EPAISO_D.xlsm
FluidizedBedEDD_v1

**TEM Asbestos Structure Count for Fluidized Bed Material -- ISO
ANALYTICAL REPORT**

FILE NAME: Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394133_SO_03-04-15_150099_TEM-EPAISO_D.xlsm

SAMPLE INFORMATION		ANALYSIS PARAMETERS	
Field Sample Number	14394133	EFA (mm ²)	385
Matrix	Soil	GO area (mm ²) [Ago]	0 0104
Field QC Type	Not QC	# GOs counted - high mag	6
Sample Mass (g dry wt) [M]	1.00	# GOs counted - low mag only	0
Fluidized Bed Flow Ratio[Q _R]	0 0122	F-factor [f]	1.00E+00
Filter Status	ANALYZED	Sensitivity - High mag	5.1E+05 1/g
		Sensitivity - PCME (high+low mag)	5.1E+05 1/g
ANALYSIS INFORMATION			
Lab Name	LabCor Inc	Recording	
Lab Sample Number	150099-S34	Rules:	
Lab QC Type	NOT QC	Initial (high mag)	
TEM Prep Method	Direct	Min. AR	Min length (um)
Est. particulate loading on filter	NA	3:1	0
		Min width (um)	0
		PCME Supplemental (low mag)	
		Min. AR	Min length (um)
		3:1	0
		Min width (um)	0
		Stopping	
		Rules:	
		Target S (1/g)	Max Area (mm ²)
			Max N

RESULTS SUMMARY

Structure Metric	Observed Structure Count (s)	Structure Filter Loading (s/mm ²)	Soil Conc. Structures per gram (s/g)
High mag only			
Total Asbestos	161	2.6E+03	8.2E+07
Total Chrysotile (CH)	161	2.6E+03	8.2E+07
Total Amphibole	0	0.0E+00	0.0E+00
actinolite (AC)	0	0.0E+00	0.0E+00
amosite (AM)	0	0.0E+00	0.0E+00
anthophyllite (AN)	0	0.0E+00	0.0E+00
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	0	0.0E+00	0.0E+00
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	0	0.0E+00	0.0E+00
other mineral class (OM)	0	0.0E+00	0.0E+00
PCME (high+low mag)			
Total Asbestos	5	8.1E+01	2.5E+06
Total Chrysotile (CH)	5	8.1E+01	2.5E+06
Total Amphibole	0	0.0E+00	0.0E+00
actinolite (AC)	0	0.0E+00	0.0E+00
amosite (AM)	0	0.0E+00	0.0E+00
anthophyllite (AN)	0	0.0E+00	0.0E+00
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	0	0.0E+00	0.0E+00
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	0	0.0E+00	0.0E+00
other mineral class (OM)	0	0.0E+00	0.0E+00

Equations:

Filter Loading (s/mm²) = N / (GOx • Ago)
Sensitivity (1/g) = EFA / (GOx • Ago • M • f • Q_R)
Csoil (s/g) = N • Sensitivity

Asbestos Types:

AC - actinolite
AM - amosite
AN - anthophyllite
CH - chrysotile
CR - crocidolite
TR - tremolite
LA - Libby amphibole
OA - other amphibole
NAM - non-asbestos material
OM - other mineral type (specify in "other mineral description" field)

Structure Types:

High mag: Length ≥ 0.5 um, Aspect Ratio ≥ 3:1
PCME: Length > 5 um, Width ≥ 0.25 um, Aspect Ratio ≥ 3:1

Σ Asbestos Structure Mass (g)	Mass fraction (as %)
Total TEM	
WRTA	0.00E+00 0.0000%
OA	0.00E+00 0.0000%
CH	7.36E-09 37.2760%
AC	0.00E+00 0.0000%
AM	0.00E+00 0.0000%
AN	0.00E+00 0.0000%
CR	0.00E+00 0.0000%
TR	0.00E+00 0.0000%
PCME	
WRTA	0.00E+00 0.0000%
OA	0.00E+00 0.0000%
CH	1.22E-09 6.1945%
AC	0.00E+00 0.0000%
AM	0.00E+00 0.0000%
AN	0.00E+00 0.0000%
CR	0.00E+00 0.0000%
TR	0.00E+00 0.0000%

Asbestos structure mass = Length • Width² • Density • 1E-12

LA Density = 3.1 g/cm³
OA Density = 3.0 g/cm³
CH Density = 2.6 g/cm³
AC Density = 3.1 g/cm³
AM Density = 3.5 g/cm³
AN Density = 3.0 g/cm³
CR Density = 3.3 g/cm³
TR Density = 3.0 g/cm³

Csoil (mass fraction, as %) = Σ Asbestos structure mass • Sensitivity • 100

Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394134_SO_03-05-15_150099_TEM-EPAISO_D.xlsm
FluidizedBedEDD_v1

**TEM Asbestos Structure Count for Fluidized Bed Material -- ISO
ANALYTICAL REPORT**

FILE NAME:Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394134_SO_03-05-15_150099_TEM-EPAISO_D.xlsm

SAMPLE INFORMATION		ANALYSIS PARAMETERS							
Field Sample Number	14394134	EFA (mm ²)	385						
Matrix	Soil	GO area (mm ²) [Ago]	0.0104						
Field QC Type	Not QC	# GOs counted - high mag	9						
Sample Mass (g dry wt) [M]	1.01	# GOs counted - low mag only	0						
Fluidized Bed Flow Ratio[Q _R]	0.0122	F-factor [f]	1.00E+00						
Filter Status	ANALYZED	Sensitivity - High mag	3.4E+05 1/g						
		Sensitivity - PCME (high+low mag)	3.4E+05 1/g						
ANALYSIS INFORMATION									
Lab Name LabCor Inc		Recording							
Lab Sample Number 150099-S35		Rules:							
Lab QC Type NOT QC		Initial (high mag)							
TEM Prep Method Direct		<table border="1"> <tr> <td>Min. AR</td> <td>Min length (um)</td> <td>Min width (um)</td> </tr> <tr> <td>3:1</td> <td>0</td> <td>0</td> </tr> </table>		Min. AR	Min length (um)	Min width (um)	3:1	0	0
Min. AR	Min length (um)	Min width (um)							
3:1	0	0							
Est. particulate loading on filter NA		PCME Supplemental (low mag)							
		<table border="1"> <tr> <td>Min. AR</td> <td>Min length (um)</td> <td>Min width (um)</td> </tr> <tr> <td>3:1</td> <td>0</td> <td>0</td> </tr> </table>		Min. AR	Min length (um)	Min width (um)	3:1	0	0
Min. AR	Min length (um)	Min width (um)							
3:1	0	0							
		Stopping Rules:							
		<table border="1"> <tr> <td>Target S (1/g)</td> <td>Max Area (mm²)</td> <td>Max N</td> </tr> <tr> <td></td> <td></td> <td></td> </tr> </table>		Target S (1/g)	Max Area (mm ²)	Max N			
Target S (1/g)	Max Area (mm ²)	Max N							

RESULTS SUMMARY

Structure Metric	Observed Structure Count (s)	Structure Filter Loading (s/mm ²)	Soil Conc. Structures per gram (s/g)
High mag only			
Total Asbestos	166	1.8E+03	5.6E+07
Total Chrysotile (CH)	166	1.8E+03	5.6E+07
Total Amphibole	0	0.0E+00	0.0E+00
actinolite (AC)	0	0.0E+00	0.0E+00
amosite (AM)	0	0.0E+00	0.0E+00
anthophyllite (AN)	0	0.0E+00	0.0E+00
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	0	0.0E+00	0.0E+00
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	0	0.0E+00	0.0E+00
other mineral class (OM)	0	0.0E+00	0.0E+00
PCME (high+low mag)			
Total Asbestos	6	6.4E+01	2.0E+06
Total Chrysotile (CH)	6	6.4E+01	2.0E+06
Total Amphibole	0	0.0E+00	0.0E+00
actinolite (AC)	0	0.0E+00	0.0E+00
amosite (AM)	0	0.0E+00	0.0E+00
anthophyllite (AN)	0	0.0E+00	0.0E+00
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	0	0.0E+00	0.0E+00
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	0	0.0E+00	0.0E+00
other mineral class (OM)	0	0.0E+00	0.0E+00

Σ Asbestos Structure Mass (g)	Mass fraction (as %)
Total TEM	
WRTA	0.00E+00 0.0000%
OA	0.00E+00 0.0000%
CH	2.52E-08 84.6076%
AC	0.00E+00 0.0000%
AM	0.00E+00 0.0000%
AN	0.00E+00 0.0000%
CR	0.00E+00 0.0000%
TR	0.00E+00 0.0000%
PCME	
WRTA	0.00E+00 0.0000%
OA	0.00E+00 0.0000%
CH	2.21E-11 0.0742%
AC	0.00E+00 0.0000%
AM	0.00E+00 0.0000%
AN	0.00E+00 0.0000%
CR	0.00E+00 0.0000%
TR	0.00E+00 0.0000%

Asbestos structure mass = Length • Width² • Density • 1E-12

LA Density = 3.1 g/cm³
OA Density = 3.0 g/cm³
CH Density = 2.6 g/cm³
AC Density = 3.1 g/cm³
AM Density = 3.5 g/cm³
AN Density = 3.0 g/cm³
CR Density = 3.3 g/cm³
TR Density = 3.0 g/cm³

Csoil (mass fraction, as %) = Σ Asbestos structure mass • Sensitivity • 100

Equations:

Filter Loading (s/mm²) = N / (GOx • Ago)
Sensitivity (1/g) = EFA / (GOx • Ago • M • f • Q_R)
Csoil (s/g) = N • Sensitivity

Asbestos Types:

AC - actinolite
AM - amosite
AN - anthophyllite
CH - chrysotile
CR - crocidolite
TR - tremolite
LA - Libby amphibole
OA - other amphibole
NAM - non-asbestos material
OM - other mineral type (specify in "other mineral description" field)

Structure Types:

High mag: Length ≥ 0.5 um, Aspect Ratio ≥ 3:1
PCME: Length > 5 um, Width ≥ 0.25 um, Aspect Ratio ≥ 3:1

Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394135_SO_03-05-15_150099_TEM-EPAISO_D.xlsm
FluidizedBedEDD_v1

**TEM Asbestos Structure Count for Fluidized Bed Material -- ISO
ANALYTICAL REPORT**

FILE NAME: Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394135_SO_03-05-15_150099_TEM-EPAISO_D.xlsm

SAMPLE INFORMATION		ANALYSIS PARAMETERS	
Field Sample Number	14394135	EFA (mm ²)	385
Matrix	Soil	GO area (mm ²) [Ago]	0.0104
Field QC Type	Not QC	# GOs counted - high mag	4
Sample Mass (g dry wt) [M]	1.00	# GOs counted - low mag only	0
Fluidized Bed Flow Ratio[Q _R]	0.0122	F-factor [f]	1.00E+00
Filter Status	ANALYZED	Sensitivity - High mag	7.6E+05 1/g
		Sensitivity - PCME (high+low mag)	7.6E+05 1/g
ANALYSIS INFORMATION			
Lab Name	LabCor Inc	Recording	
Lab Sample Number	150099-S36	Rules:	
Lab QC Type	NOT QC	Initial (high mag)	
TEM Prep Method	Direct	Min. AR	Min length (um)
Est. particulate loading on filter	NA	3:1	0
		Min width (um)	0
		PCME Supplemental (low mag)	
		Min. AR	Min length (um)
		3:1	0
		Min width (um)	0
		Stopping	
		Rules:	
		Target S (1/g)	Max Area (mm ²)
			Max N

RESULTS SUMMARY

Structure Metric	Observed Structure Count (s)	Structure Filter Loading (s/mm ²)	Soil Conc. Structures per gram (s/g)
High mag only			
Total Asbestos	235	5.7E+03	1.8E+08
Total Chrysotile (CH)	235	5.7E+03	1.8E+08
Total Amphibole	0	0.0E+00	0.0E+00
actinolite (AC)	0	0.0E+00	0.0E+00
amosite (AM)	0	0.0E+00	0.0E+00
anthophyllite (AN)	0	0.0E+00	0.0E+00
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	0	0.0E+00	0.0E+00
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	0	0.0E+00	0.0E+00
other mineral class (OM)	0	0.0E+00	0.0E+00
PCME (high+low mag)			
Total Asbestos	7	1.7E+02	5.3E+06
Total Chrysotile (CH)	7	1.7E+02	5.3E+06
Total Amphibole	0	0.0E+00	0.0E+00
actinolite (AC)	0	0.0E+00	0.0E+00
amosite (AM)	0	0.0E+00	0.0E+00
anthophyllite (AN)	0	0.0E+00	0.0E+00
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	0	0.0E+00	0.0E+00
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	0	0.0E+00	0.0E+00
other mineral class (OM)	0	0.0E+00	0.0E+00

Σ Asbestos Structure Mass (g)	Mass fraction (as %)
Total TEM	
WRTA	0.00E+00 0.0000%
OA	0.00E+00 0.0000%
CH	2.49E-08 #####
AC	0.00E+00 0.0000%
AM	0.00E+00 0.0000%
AN	0.00E+00 0.0000%
CR	0.00E+00 0.0000%
TR	0.00E+00 0.0000%
PCME	
WRTA	0.00E+00 0.0000%
OA	0.00E+00 0.0000%
CH	2.19E-09 16.6680%
AC	0.00E+00 0.0000%
AM	0.00E+00 0.0000%
AN	0.00E+00 0.0000%
CR	0.00E+00 0.0000%
TR	0.00E+00 0.0000%

Asbestos structure mass = Length • Width² • Density • 1E-12

LA Density = 3.1 g/cm³
OA Density = 3.0 g/cm³
CH Density = 2.6 g/cm³
AC Density = 3.1 g/cm³
AM Density = 3.5 g/cm³
AN Density = 3.0 g/cm³
CR Density = 3.3 g/cm³
TR Density = 3.0 g/cm³

Csoil (mass fraction, as %) = Σ Asbestos structure mass • Sensitivity • 100

Equations:

Filter Loading (s/mm²) = N / (GOx • Ago)
Sensitivity (1/g) = EFA / (GOx • Ago • M • f • Q_R)
Csoil (s/g) = N • Sensitivity

Asbestos Types:

AC - actinolite
AM - amosite
AN - anthophyllite
CH - chrysotile
CR - crocidolite
TR - tremolite
LA - Libby amphibole
OA - other amphibole
NAM - non-asbestos material
OM - other mineral type (specify in "other mineral description" field)

Structure Types:

High mag: Length ≥ 0.5 um, Aspect Ratio ≥ 3:1
PCME: Length > 5 um, Width ≥ 0.25 um, Aspect Ratio ≥ 3:1

Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394136_SO_03-06-15_150099_TEM-EPAISO_D.xlsm
FluidizedBedEDD_v1

**TEM Asbestos Structure Count for Fluidized Bed Material -- ISO
ANALYTICAL REPORT**

FILE NAME: Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394136_SO_03-06-15_150099_TEM-EPAISO_D.xlsm

SAMPLE INFORMATION		ANALYSIS PARAMETERS	
Field Sample Number 14394136		EFA (mm ²)	385
Matrix Soil		GO area (mm ²) [Ago]	0.0104
Field QC Type Not QC		# GOs counted - high mag	11
Sample Mass (g dry wt) [M] 1.00		# GOs counted - low mag only	0
Fluidized Bed Flow Ratio[Q _R] 0.0122		F-factor [f]	1.00E+00
Filter Status ANALYZED		Sensitivity - High mag	2.8E+05 1/g
		Sensitivity - PCME (high+low mag)	2.8E+05 1/g
ANALYSIS INFORMATION			
Lab Name LabCor Inc		Recording	
Lab Sample Number 150099-S37		Rules:	
Lab QC Type NOT QC		Initial (high mag)	
TEM Prep Method Direct		Min. AR	Min length (um)
Est. particulate loading on filter NA		3:1	0
		Min width (um)	0
		PCME Supplemental (low mag)	
		Min. AR	Min length (um)
		3:1	0
		Min width (um)	0
		Stopping	
		Rules:	
		Target S (1/g)	Max Area (mm ²)
			Max N

RESULTS SUMMARY

Structure Metric	Observed Structure Count (s)	Structure Filter Loading (s/mm ²)	Soil Conc. Structures per gram (s/g)
High mag only			
Total Asbestos	144	1.3E+03	4.0E+07
Total Chrysotile (CH)	144	1.3E+03	4.0E+07
Total Amphibole	0	0.0E+00	0.0E+00
actinolite (AC)	0	0.0E+00	0.0E+00
amosite (AM)	0	0.0E+00	0.0E+00
anthophyllite (AN)	0	0.0E+00	0.0E+00
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	0	0.0E+00	0.0E+00
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	0	0.0E+00	0.0E+00
other mineral class (OM)	0	0.0E+00	0.0E+00
PCME (high+low mag)			
Total Asbestos	5	4.4E+01	1.4E+06
Total Chrysotile (CH)	5	4.4E+01	1.4E+06
Total Amphibole	0	0.0E+00	0.0E+00
actinolite (AC)	0	0.0E+00	0.0E+00
amosite (AM)	0	0.0E+00	0.0E+00
anthophyllite (AN)	0	0.0E+00	0.0E+00
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	0	0.0E+00	0.0E+00
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	0	0.0E+00	0.0E+00
other mineral class (OM)	0	0.0E+00	0.0E+00

Σ Asbestos Structure Mass (g)	Mass fraction (as %)
Total TEM	
WRTA	0.00E+00 0.0000%
OA	0.00E+00 0.0000%
CH	2.09E-08 57.8938%
AC	0.00E+00 0.0000%
AM	0.00E+00 0.0000%
AN	0.00E+00 0.0000%
CR	0.00E+00 0.0000%
TR	0.00E+00 0.0000%
PCME	
WRTA	0.00E+00 0.0000%
OA	0.00E+00 0.0000%
CH	2.19E-10 0.6087%
AC	0.00E+00 0.0000%
AM	0.00E+00 0.0000%
AN	0.00E+00 0.0000%
CR	0.00E+00 0.0000%
TR	0.00E+00 0.0000%

Asbestos structure mass = Length • Width² • Density • 1E-12

LA Density = 3.1 g/cm³
OA Density = 3.0 g/cm³
CH Density = 2.6 g/cm³
AC Density = 3.1 g/cm³
AM Density = 3.5 g/cm³
AN Density = 3.0 g/cm³
CR Density = 3.3 g/cm³
TR Density = 3.0 g/cm³

Csoil (mass fraction, as %) = Σ Asbestos structure mass • Sensitivity • 100

Equations:

Filter Loading (s/mm²) = N / (GOx • Ago)
Sensitivity (1/g) = EFA / (GOx • Ago • M • f • Q_R)
Csoil (s/g) = N • Sensitivity

Asbestos Types:

AC - actinolite
AM - amosite
AN - anthophyllite
CH - chrysotile
CR - crocidolite
TR - tremolite
LA - Libby amphibole
OA - other amphibole
NAM - non-asbestos material
OM - other mineral type (specify in "other mineral description" field)

Structure Types:

High mag: Length ≥ 0.5 um, Aspect Ratio ≥ 3:1
PCME: Length > 5 um, Width ≥ 0.25 um, Aspect Ratio ≥ 3:1

Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394137_SO_03-06-15_150099_TEM-EPAISO_D.xlsm
FluidizedBedEDD_v1

**TEM Asbestos Structure Count for Fluidized Bed Material -- ISO
ANALYTICAL REPORT**

FILE NAME:Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394137_SO_03-06-15_150099_TEM-EPAISO_D.xlsm

SAMPLE INFORMATION		ANALYSIS PARAMETERS	
Field Sample Number 14394137		EFA (mm ²)	385
Matrix Soil		GO area (mm ²) [Ago]	0.0104
Field QC Type Not QC		# GOs counted - high mag	5
Sample Mass (g dry wt) [M] 1.00		# GOs counted - low mag only	0
Fluidized Bed Flow Ratio[Q _R] 0.0122		F-factor [f]	1.00E+00
Filter Status ANALYZED		Sensitivity - High mag	6.1E+05 1/g
		Sensitivity - PCME (high+low mag)	6.1E+05 1/g
ANALYSIS INFORMATION			
Lab Name LabCor Inc		Recording	
Lab Sample Number 150099-S38		Rules:	
Lab QC Type NOT QC		Initial (high mag)	
TEM Prep Method Direct		Min. AR	Min length (um)
Est. particulate loading on filter NA		3:1	0
		Min width (um)	0
		PCME Supplemental (low mag)	
		Min. AR	Min length (um)
		3:1	0
		Min width (um)	0
		Stopping	
		Rules:	
		Target S (1/g)	Max Area (mm ²)
			Max N

RESULTS SUMMARY

Structure Metric	Observed Structure Count (s)	Structure Filter Loading (s/mm ²)	Soil Conc. Structures per gram (s/g)
High mag only			
Total Asbestos	148	2.9E+03	9.0E+07
Total Chrysotile (CH)	148	2.9E+03	9.0E+07
Total Amphibole	0	0.0E+00	0.0E+00
actinolite (AC)	0	0.0E+00	0.0E+00
amosite (AM)	0	0.0E+00	0.0E+00
anthophyllite (AN)	0	0.0E+00	0.0E+00
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	0	0.0E+00	0.0E+00
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	0	0.0E+00	0.0E+00
other mineral class (OM)	0	0.0E+00	0.0E+00
PCME (high+low mag)			
Total Asbestos	2	3.9E+01	1.2E+06
Total Chrysotile (CH)	2	3.9E+01	1.2E+06
Total Amphibole	0	0.0E+00	0.0E+00
actinolite (AC)	0	0.0E+00	0.0E+00
amosite (AM)	0	0.0E+00	0.0E+00
anthophyllite (AN)	0	0.0E+00	0.0E+00
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	0	0.0E+00	0.0E+00
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	0	0.0E+00	0.0E+00
other mineral class (OM)	0	0.0E+00	0.0E+00

Equations:

Filter Loading (s/mm²) = N / (GOx • Ago)

Sensitivity (1/g) = EFA / (GOx • Ago • M • f • Q_R)

Csoil (s/g) = N • Sensitivity

Asbestos Types:

AC - actinolite

AM - amosite

AN - anthophyllite

CH - chrysotile

CR - crocidolite

TR - tremolite

LA - Libby amphibole

OA - other amphibole

NAM - non-asbestos material

OM - other mineral type (specify in "other mineral description" field)

Structure Types:

High mag: Length ≥ 0.5 um, Aspect Ratio ≥ 3:1

PCME: Length > 5 um, Width ≥ 0.25 um, Aspect Ratio ≥ 3:1

Σ Asbestos Structure Mass (g)	Mass fraction (as %)
Total TEM	
WRTA	0.00E+00 0.0000%
OA	0.00E+00 0.0000%
CH	4.70E-09 28.5381%
AC	0.00E+00 0.0000%
AM	0.00E+00 0.0000%
AN	0.00E+00 0.0000%
CR	0.00E+00 0.0000%
TR	0.00E+00 0.0000%
PCME	
WRTA	0.00E+00 0.0000%
OA	0.00E+00 0.0000%
CH	1.11E-11 0.0673%
AC	0.00E+00 0.0000%
AM	0.00E+00 0.0000%
AN	0.00E+00 0.0000%
CR	0.00E+00 0.0000%
TR	0.00E+00 0.0000%

Asbestos structure mass = Length • Width² • Density • 1E-12

LA Density = 3.1 g/cm³

OA Density = 3.0 g/cm³

CH Density = 2.6 g/cm³

AC Density = 3.1 g/cm³

AM Density = 3.5 g/cm³

AN Density = 3.0 g/cm³

CR Density = 3.3 g/cm³

TR Density = 3.0 g/cm³

Csoil (mass fraction, as %) = Σ Asbestos structure mass • Sensitivity • 100

Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394138_SO_03-06-15_150099_TEM-EPAISO_D.xlsm
FluidizedBedEDD_v1

**TEM Asbestos Structure Count for Fluidized Bed Material -- ISO
ANALYTICAL REPORT**

FILE NAME: Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394138_SO_03-06-15_150099_TEM-EPAISO_D.xlsm

SAMPLE INFORMATION		ANALYSIS PARAMETERS	
Field Sample Number 14394138		EFA (mm ²)	385
Matrix Soil		GO area (mm ²) [Ago]	0.0104
Field QC Type Not QC		# GOs counted - high mag	8
Sample Mass (g dry wt) [M] 1.00		# GOs counted - low mag only	0
Fluidized Bed Flow Ratio[Q _R] 0.0122		F-factor [f]	1.00E+00
Filter Status ANALYZED		Sensitivity - High mag	3.8E+05 1/g
		Sensitivity - PCME (high+low mag)	3.8E+05 1/g
ANALYSIS INFORMATION			
Lab Name LabCor Inc		Recording	
Lab Sample Number 150099-S39		Rules:	
Lab QC Type NOT QC		Initial (high mag)	
TEM Prep Method Direct		Min. AR	Min length (um)
Est. particulate loading on filter NA		3:1	0
		Min width (um)	0
		PCME Supplemental (low mag)	
		Min. AR	Min length (um)
		3:1	0
		Min width (um)	0
		Stopping	
		Rules:	
		Target S (1/g)	Max Area (mm ²)
			Max N

RESULTS SUMMARY

Structure Metric	Observed Structure Count (s)	Structure Filter Loading (s/mm ²)	Soil Conc. Structures per gram (s/g)
High mag only			
Total Asbestos	154	1.9E+03	5.9E+07
Total Chrysotile (CH)	154	1.9E+03	5.9E+07
Total Amphibole	0	0.0E+00	0.0E+00
actinolite (AC)	0	0.0E+00	0.0E+00
amosite (AM)	0	0.0E+00	0.0E+00
anthophyllite (AN)	0	0.0E+00	0.0E+00
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	0	0.0E+00	0.0E+00
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	0	0.0E+00	0.0E+00
other mineral class (OM)	0	0.0E+00	0.0E+00
PCME (high+low mag)			
Total Asbestos	4	4.8E+01	1.5E+06
Total Chrysotile (CH)	4	4.8E+01	1.5E+06
Total Amphibole	0	0.0E+00	0.0E+00
actinolite (AC)	0	0.0E+00	0.0E+00
amosite (AM)	0	0.0E+00	0.0E+00
anthophyllite (AN)	0	0.0E+00	0.0E+00
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	0	0.0E+00	0.0E+00
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	0	0.0E+00	0.0E+00
other mineral class (OM)	0	0.0E+00	0.0E+00

Σ Asbestos Structure Mass (g)	Mass fraction (as %)
Total TEM	
WRTA	0.00E+00 0.0000%
OA	0.00E+00 0.0000%
CH	3.71E-08 #####
AC	0.00E+00 0.0000%
AM	0.00E+00 0.0000%
AN	0.00E+00 0.0000%
CR	0.00E+00 0.0000%
TR	0.00E+00 0.0000%
PCME	
WRTA	0.00E+00 0.0000%
OA	0.00E+00 0.0000%
CH	1.45E-10 0.5525%
AC	0.00E+00 0.0000%
AM	0.00E+00 0.0000%
AN	0.00E+00 0.0000%
CR	0.00E+00 0.0000%
TR	0.00E+00 0.0000%

Asbestos structure mass = Length • Width² • Density • 1E-12

LA Density = 3.1 g/cm³
OA Density = 3.0 g/cm³
CH Density = 2.6 g/cm³
AC Density = 3.1 g/cm³
AM Density = 3.5 g/cm³
AN Density = 3.0 g/cm³
CR Density = 3.3 g/cm³
TR Density = 3.0 g/cm³

Csoil (mass fraction, as %) = Σ Asbestos structure mass • Sensitivity • 100

Equations:

Filter Loading (s/mm²) = N / (GOx • Ago)
Sensitivity (1/g) = EFA / (GOx • Ago • M • f • Q_R)
Csoil (s/g) = N • Sensitivity

Asbestos Types:

AC - actinolite
AM - amosite
AN - anthophyllite
CH - chrysotile
CR - crocidolite
TR - tremolite
LA - Libby amphibole
OA - other amphibole
NAM - non-asbestos material
OM - other mineral type (specify in "other mineral description" field)

Structure Types:

High mag: Length ≥ 0.5 um, Aspect Ratio ≥ 3:1
PCME: Length > 5 um, Width ≥ 0.25 um, Aspect Ratio ≥ 3:1

Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394139_SO_03-07-15_150099_TEM-EPAISO__D.xlsm
FluidizedBedEDD_v1

**TEM Asbestos Structure Count for Fluidized Bed Material -- ISO
ANALYTICAL REPORT**

FILE NAME: Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394139_SO_03-07-15_150099_TEM-EPAISO__D.xlsm

SAMPLE INFORMATION		ANALYSIS PARAMETERS	
Field Sample Number 14394139		EFA (mm ²)	385
Matrix Soil		GO area (mm ²) [Ago]	0.0104
Field QC Type Not QC		# GOs counted - high mag	19
Sample Mass (g dry wt) [M] 1.00		# GOs counted - low mag only	0
Fluidized Bed Flow Ratio[Q _R] 0.0122		F-factor [f]	1.00E+00
Filter Status ANALYZED		Sensitivity - High mag	1.6E+05 1/g
		Sensitivity - PCME (high+low mag)	1.6E+05 1/g
ANALYSIS INFORMATION			
Lab Name LabCor Inc		Recording	
Lab Sample Number 150099-S40		Rules:	
Lab QC Type NOT QC		Initial (high mag)	
TEM Prep Method Direct		Min. AR	Min length (um)
Est. particulate loading on filter NA		3:1	0
		Min width (um)	0
		PCME Supplemental (low mag)	
		Min. AR	Min length (um)
		3:1	0
		Min width (um)	0
		Stopping	
		Rules:	
		Target S (1/g)	Max Area (mm ²)
			Max N

RESULTS SUMMARY

Structure Metric	Observed Structure Count (s)	Structure Filter Loading (s/mm ²)	Soil Conc. Structures per gram (s/g)
High mag only			
Total Asbestos	134	6.8E+02	2.1E+07
Total Chrysotile (CH)	134	6.8E+02	2.1E+07
Total Amphibole	0	0.0E+00	0.0E+00
actinolite (AC)	0	0.0E+00	0.0E+00
amosite (AM)	0	0.0E+00	0.0E+00
anthophyllite (AN)	0	0.0E+00	0.0E+00
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	0	0.0E+00	0.0E+00
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	0	0.0E+00	0.0E+00
other mineral class (OM)	0	0.0E+00	0.0E+00
PCME (high+low mag)			
Total Asbestos	4	2.0E+01	6.4E+05
Total Chrysotile (CH)	4	2.0E+01	6.4E+05
Total Amphibole	0	0.0E+00	0.0E+00
actinolite (AC)	0	0.0E+00	0.0E+00
amosite (AM)	0	0.0E+00	0.0E+00
anthophyllite (AN)	0	0.0E+00	0.0E+00
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	0	0.0E+00	0.0E+00
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	0	0.0E+00	0.0E+00
other mineral class (OM)	0	0.0E+00	0.0E+00

Σ Asbestos Structure Mass (g)	Mass fraction (as %)
Total TEM	
WRTA	0.00E+00 0.0000%
OA	0.00E+00 0.0000%
CH	5.08E-09 8.1226%
AC	0.00E+00 0.0000%
AM	0.00E+00 0.0000%
AN	0.00E+00 0.0000%
CR	0.00E+00 0.0000%
TR	0.00E+00 0.0000%
PCME	
WRTA	0.00E+00 0.0000%
OA	0.00E+00 0.0000%
CH	8.60E-11 0.1375%
AC	0.00E+00 0.0000%
AM	0.00E+00 0.0000%
AN	0.00E+00 0.0000%
CR	0.00E+00 0.0000%
TR	0.00E+00 0.0000%

Asbestos structure mass = Length • Width² • Density • 1E-12

LA Density = 3.1 g/cm³
OA Density = 3.0 g/cm³
CH Density = 2.6 g/cm³
AC Density = 3.1 g/cm³
AM Density = 3.5 g/cm³
AN Density = 3.0 g/cm³
CR Density = 3.3 g/cm³
TR Density = 3.0 g/cm³

Csoil (mass fraction, as %) = Σ Asbestos structure mass • Sensitivity • 100

Equations:

Filter Loading (s/mm²) = N / (GOx • Ago)
Sensitivity (1/g) = EFA / (GOx • Ago • M • f • Q_R)
Csoil (s/g) = N • Sensitivity

Asbestos Types:

AC - actinolite
AM - amosite
AN - anthophyllite
CH - chrysotile
CR - crocidolite
TR - tremolite
LA - Libby amphibole
OA - other amphibole
NAM - non-asbestos material
OM - other mineral type (specify in "other mineral description" field)

Structure Types:

High mag: Length ≥ 0.5 um, Aspect Ratio ≥ 3:1
PCME: Length > 5 um, Width ≥ 0.25 um, Aspect Ratio ≥ 3:1

Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394140_SO_03-08-15_150099_TEM-EPAISO_D.xlsm
FluidizedBedEDD_v1

**TEM Asbestos Structure Count for Fluidized Bed Material -- ISO
ANALYTICAL REPORT**

FILE NAME: Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394140_SO_03-08-15_150099_TEM-EPAISO_D.xlsm

SAMPLE INFORMATION		ANALYSIS PARAMETERS	
Field Sample Number 14394140		EFA (mm ²)	385
Matrix Soil		GO area (mm ²) [Ago]	0.0104
Field QC Type Not QC		# GOs counted - high mag	61
Sample Mass (g dry wt) [M] 1.00		# GOs counted - low mag only	0
Fluidized Bed Flow Ratio[Q _R] 0.0122		F-factor [f]	1.00E+00
Filter Status ANALYZED		Sensitivity - High mag	5.0E+04 1/g
		Sensitivity - PCME (high+low mag)	5.0E+04 1/g
ANALYSIS INFORMATION			
Lab Name LabCor Inc		Recording	
Lab Sample Number 150099-S41		Rules:	
Lab QC Type NOT QC		Initial (high mag)	
TEM Prep Method Direct		Min. AR	Min length (um) Min width (um)
Est. particulate loading on filter NA		3:1	0 0
		PCME Supplemental (low mag)	
		Min. AR	Min length (um) Min width (um)
		3:1	0 0
		Stopping	
		Rules:	
		Target S (1/g)	Max Area (mm ²) Max N

RESULTS SUMMARY

Structure Metric	Observed Structure Count (s)	Structure Filter Loading (s/mm ²)	Soil Conc. Structures per gram (s/g)
High mag only			
Total Asbestos	163	2.6E+02	8.1E+06
Total Chrysotile (CH)	163	2.6E+02	8.1E+06
Total Amphibole	0	0.0E+00	0.0E+00
actinolite (AC)	0	0.0E+00	0.0E+00
amosite (AM)	0	0.0E+00	0.0E+00
anthophyllite (AN)	0	0.0E+00	0.0E+00
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	0	0.0E+00	0.0E+00
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	0	0.0E+00	0.0E+00
other mineral class (OM)	0	0.0E+00	0.0E+00
PCME (high+low mag)			
Total Asbestos	9	1.4E+01	4.5E+05
Total Chrysotile (CH)	9	1.4E+01	4.5E+05
Total Amphibole	0	0.0E+00	0.0E+00
actinolite (AC)	0	0.0E+00	0.0E+00
amosite (AM)	0	0.0E+00	0.0E+00
anthophyllite (AN)	0	0.0E+00	0.0E+00
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	0	0.0E+00	0.0E+00
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	0	0.0E+00	0.0E+00
other mineral class (OM)	0	0.0E+00	0.0E+00

Σ Asbestos Structure Mass (g)	Mass fraction (as %)
Total TEM	
WRTA	0.00E+00 0.0000%
OA	0.00E+00 0.0000%
CH	3.05E-08 15.2242%
AC	0.00E+00 0.0000%
AM	0.00E+00 0.0000%
AN	0.00E+00 0.0000%
CR	0.00E+00 0.0000%
TR	0.00E+00 0.0000%
PCME	
WRTA	0.00E+00 0.0000%
OA	0.00E+00 0.0000%
CH	1.18E-08 5.8797%
AC	0.00E+00 0.0000%
AM	0.00E+00 0.0000%
AN	0.00E+00 0.0000%
CR	0.00E+00 0.0000%
TR	0.00E+00 0.0000%

Asbestos structure mass = Length • Width² • Density • 1E-12

LA Density = 3.1 g/cm³
OA Density = 3.0 g/cm³
CH Density = 2.6 g/cm³
AC Density = 3.1 g/cm³
AM Density = 3.5 g/cm³
AN Density = 3.0 g/cm³
CR Density = 3.3 g/cm³
TR Density = 3.0 g/cm³

Csoil (mass fraction, as %) = Σ Asbestos structure mass • Sensitivity • 100

Equations:

Filter Loading (s/mm²) = N / (GOx • Ago)
Sensitivity (1/g) = EFA / (GOx • Ago • M • f • Q_R)
Csoil (s/g) = N • Sensitivity

Asbestos Types:

AC - actinolite
AM - amosite
AN - anthophyllite
CH - chrysotile
CR - crocidolite
TR - tremolite
LA - Libby amphibole
OA - other amphibole
NAM - non-asbestos material
OM - other mineral type (specify in "other mineral description" field)

Structure Types:

High mag: Length ≥ 0.5 um, Aspect Ratio ≥ 3:1
PCME: Length > 5 um, Width ≥ 0.25 um, Aspect Ratio ≥ 3:1

Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394141_SO_03-09-15_150099_TEM-EPAISO_D.xlsm
FluidizedBedEDD_v1

**TEM Asbestos Structure Count for Fluidized Bed Material -- ISO
ANALYTICAL REPORT**

FILE NAME: Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394141_SO_03-09-15_150099_TEM-EPAISO_D.xlsm

SAMPLE INFORMATION		ANALYSIS PARAMETERS							
Field Sample Number 14394141		EFA (mm ²)	385						
Matrix Soil		GO area (mm ²) [Ago]	0.0104						
Field QC Type Not QC		# GOs counted - high mag	12						
Sample Mass (g dry wt) [M] 1.01		# GOs counted - low mag only	0						
Fluidized Bed Flow Ratio[Q _R] 0.0122		F-factor [f]	1.00E+00						
Filter Status ANALYZED		Sensitivity - High mag	2.5E+05 1/g						
		Sensitivity - PCME (high+low mag)	2.5E+05 1/g						
ANALYSIS INFORMATION									
Lab Name LabCor Inc		Recording							
Lab Sample Number 150099-S42		Rules:							
Lab QC Type NOT QC		Initial (high mag)							
TEM Prep Method Direct		<table border="1"> <tr> <th>Min. AR</th> <th>Min length (um)</th> <th>Min width (um)</th> </tr> <tr> <td>3:1</td> <td>0</td> <td>0</td> </tr> </table>		Min. AR	Min length (um)	Min width (um)	3:1	0	0
Min. AR	Min length (um)	Min width (um)							
3:1	0	0							
Est. particulate loading on filter NA		PCME Supplemental (low mag)							
		<table border="1"> <tr> <th>Min. AR</th> <th>Min length (um)</th> <th>Min width (um)</th> </tr> <tr> <td>3:1</td> <td>0</td> <td>0</td> </tr> </table>		Min. AR	Min length (um)	Min width (um)	3:1	0	0
Min. AR	Min length (um)	Min width (um)							
3:1	0	0							
		Stopping							
		Rules:							
		<table border="1"> <tr> <th>Target S (1/g)</th> <th>Max Area (mm²)</th> <th>Max N</th> </tr> <tr> <td></td> <td></td> <td></td> </tr> </table>		Target S (1/g)	Max Area (mm ²)	Max N			
Target S (1/g)	Max Area (mm ²)	Max N							

RESULTS SUMMARY

Structure Metric	Observed Structure Count (s)	Structure Filter Loading (s/mm ²)	Soil Conc. Structures per gram (s/g)
High mag only			
Total Asbestos	149	1.2E+03	3.8E+07
Total Chrysotile (CH)	149	1.2E+03	3.8E+07
Total Amphibole	0	0.0E+00	0.0E+00
actinolite (AC)	0	0.0E+00	0.0E+00
amosite (AM)	0	0.0E+00	0.0E+00
anthophyllite (AN)	0	0.0E+00	0.0E+00
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	0	0.0E+00	0.0E+00
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	0	0.0E+00	0.0E+00
other mineral class (OM)	0	0.0E+00	0.0E+00
PCME (high+low mag)			
Total Asbestos	6	4.8E+01	1.5E+06
Total Chrysotile (CH)	6	4.8E+01	1.5E+06
Total Amphibole	0	0.0E+00	0.0E+00
actinolite (AC)	0	0.0E+00	0.0E+00
amosite (AM)	0	0.0E+00	0.0E+00
anthophyllite (AN)	0	0.0E+00	0.0E+00
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	0	0.0E+00	0.0E+00
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	0	0.0E+00	0.0E+00
other mineral class (OM)	0	0.0E+00	0.0E+00

Σ Asbestos Structure Mass (g)	Mass fraction (as %)
Total TEM	
WRTA	0.00E+00 0.0000%
OA	0.00E+00 0.0000%
CH	3.01E-09 7.6192%
AC	0.00E+00 0.0000%
AM	0.00E+00 0.0000%
AN	0.00E+00 0.0000%
CR	0.00E+00 0.0000%
TR	0.00E+00 0.0000%
PCME	
WRTA	0.00E+00 0.0000%
OA	0.00E+00 0.0000%
CH	2.87E-10 0.7251%
AC	0.00E+00 0.0000%
AM	0.00E+00 0.0000%
AN	0.00E+00 0.0000%
CR	0.00E+00 0.0000%
TR	0.00E+00 0.0000%

Asbestos structure mass = Length • Width² • Density • 1E-12

LA Density = 3.1 g/cm³
OA Density = 3.0 g/cm³
CH Density = 2.6 g/cm³
AC Density = 3.1 g/cm³
AM Density = 3.5 g/cm³
AN Density = 3.0 g/cm³
CR Density = 3.3 g/cm³
TR Density = 3.0 g/cm³

Csoil (mass fraction, as %) = Σ Asbestos structure mass • Sensitivity • 100

Equations:

Filter Loading (s/mm²) = N / (GOx • Ago)
Sensitivity (1/g) = EFA / (GOx • Ago • M • f • Q_R)
Csoil (s/g) = N • Sensitivity

Asbestos Types:

AC - actinolite
AM - amosite
AN - anthophyllite
CH - chrysotile
CR - crocidolite
TR - tremolite
LA - Libby amphibole
OA - other amphibole
NAM - non-asbestos material
OM - other mineral type (specify in "other mineral description" field)

Structure Types:

High mag: Length ≥ 0.5 um, Aspect Ratio ≥ 3:1
PCME: Length > 5 um, Width ≥ 0.25 um, Aspect Ratio ≥ 3:1

Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394142_SO_03-10-15_150099_TEM-EPAISO__D.xlsm
FluidizedBedEDD_v1

**TEM Asbestos Structure Count for Fluidized Bed Material -- ISO
ANALYTICAL REPORT**

FILE NAME:Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394142_SO_03-10-15_150099_TEM-EPAISO__D.xlsm

SAMPLE INFORMATION	ANALYSIS PARAMETERS
Field Sample Number 14394142	EFA (mm ²) 385
Matrix Soil	GO area (mm ²) [Ago] 0.0104
Field QC Type Not QC	# GOs counted - high mag 38
Sample Mass (g dry wt) [M] 1.00	# GOs counted - low mag only 0
Fluidized Bed Flow Ratio[Q _R] 0.0122	F-factor [f] 1.00E+00
Filter Status ANALYZED	Sensitivity - High mag 8.0E+04 1/g
	Sensitivity - PCME (high+low mag) 8.0E+04 1/g
ANALYSIS INFORMATION	
Lab Name LabCor Inc	Recording
Lab Sample Number 150099-S43	Rules:
Lab QC Type NOT QC	Initial (high mag)
TEM Prep Method Direct	Min. AR Min length (um) Min width (um)
Est. particulate loading on filter NA	3:1 0 0
	PCME Supplemental (low mag)
	Min. AR Min length (um) Min width (um)
	3:1 0 0
	Stopping
	Rules:
	Target S (1/g) Max Area (mm ²) Max N

RESULTS SUMMARY

Structure Metric	Observed Structure Count (s)	Structure Filter Loading (s/mm ²)	Soil Conc Structures per gram (s/g)
High mag only			
Total Asbestos	185	4.7E+02	1.5E+07
Total Chrysotile (CH)	185	4.7E+02	1.5E+07
Total Amphibole	0	0.0E+00	0.0E+00
actinolite (AC)	0	0.0E+00	0.0E+00
amosite (AM)	0	0.0E+00	0.0E+00
anthophyllite (AN)	0	0.0E+00	0.0E+00
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	0	0.0E+00	0.0E+00
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	0	0.0E+00	0.0E+00
other mineral class (OM)	0	0.0E+00	0.0E+00
PCME (high+low mag)			
Total Asbestos	11	2.8E+01	8.8E+05
Total Chrysotile (CH)	11	2.8E+01	8.8E+05
Total Amphibole	0	0.0E+00	0.0E+00
actinolite (AC)	0	0.0E+00	0.0E+00
amosite (AM)	0	0.0E+00	0.0E+00
anthophyllite (AN)	0	0.0E+00	0.0E+00
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	0	0.0E+00	0.0E+00
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	0	0.0E+00	0.0E+00
other mineral class (OM)	0	0.0E+00	0.0E+00

Equations:

Filter Loading (s/mm²) = N / (GOx • Ago)

Sensitivity (1/g) = EFA / (GOx • Ago • M • f • Q_R)

Csoil (s/g) = N • Sensitivity

Asbestos Types:

AC - actinolite
AM - amosite
AN - anthophyllite
CH - chrysotile
CR - crocidolite
TR - tremolite
LA - Libby amphibole
OA - other amphibole
NAM - non-asbestos material
OM - other mineral type (specify in "other mineral description" field)

Structure Types:

High mag: Length ≥ 0.5 um, Aspect Ratio ≥ 3:1

PCME: Length > 5 um, Width ≥ 0.25 um, Aspect Ratio ≥ 3:1

Σ Asbestos Structure Mass (g)	Mass fraction (as %)
Total TEM	
WRTA	0.00E+00 0.0000%
OA	0.00E+00 0.0000%
CH	1.06E-08 8.4901%
AC	0.00E+00 0.0000%
AM	0.00E+00 0.0000%
AN	0.00E+00 0.0000%
CR	0.00E+00 0.0000%
TR	0.00E+00 0.0000%
PCME	
WRTA	0.00E+00 0.0000%
OA	0.00E+00 0.0000%
CH	2.61E-09 2.0910%
AC	0.00E+00 0.0000%
AM	0.00E+00 0.0000%
AN	0.00E+00 0.0000%
CR	0.00E+00 0.0000%
TR	0.00E+00 0.0000%

Asbestos structure mass = Length • Width² • Density • 1E-12

LA Density = 3.1 g/cm³

OA Density = 3.0 g/cm³

CH Density = 2.6 g/cm³

AC Density = 3.1 g/cm³

AM Density = 3.5 g/cm³

AN Density = 3.0 g/cm³

CR Density = 3.3 g/cm³

TR Density = 3.0 g/cm³

Csoil (mass fraction, as %) = Σ Asbestos structure mass • Sensitivity • 100

Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394143_SO_03-10-15_150099_TEM-EPAISO_D.xlsm
FluidizedBedEDD_v1

**TEM Asbestos Structure Count for Fluidized Bed Material -- ISO
ANALYTICAL REPORT**

FILE NAME:Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394143_SO_03-10-15_150099_TEM-EPAISO_D.xlsm

SAMPLE INFORMATION		ANALYSIS PARAMETERS							
Field Sample Number	14394143	EFA (mm ²)	385						
Matrix	Soil	GO area (mm ²) [Ago]	0.0104						
Field QC Type	Not QC	# GOs counted - high mag	16						
Sample Mass (g dry wt) [M]	1.00	# GOs counted - low mag only	0						
Fluidized Bed Flow Ratio[Q _R]	0.0122	F-factor [f]	1.00E+00						
Filter Status	ANALYZED	Sensitivity - High mag	1.9E+05 1/g						
		Sensitivity - PCME (high+low mag)	1.9E+05 1/g						
ANALYSIS INFORMATION									
Lab Name LabCor Inc		Recording							
Lab Sample Number 150099-S44		Rules:							
Lab QC Type NOT QC		Initial (high mag)							
TEM Prep Method Direct		<table border="1"> <tr> <td>Min. AR</td> <td>Min length (um)</td> <td>Min width (um)</td> </tr> <tr> <td>3:1</td> <td>0</td> <td>0</td> </tr> </table>		Min. AR	Min length (um)	Min width (um)	3:1	0	0
Min. AR	Min length (um)	Min width (um)							
3:1	0	0							
Est. particulate loading on filter NA		PCME Supplemental (low mag)							
		<table border="1"> <tr> <td>Min. AR</td> <td>Min length (um)</td> <td>Min width (um)</td> </tr> <tr> <td>3:1</td> <td>0</td> <td>0</td> </tr> </table>		Min. AR	Min length (um)	Min width (um)	3:1	0	0
Min. AR	Min length (um)	Min width (um)							
3:1	0	0							
		Stopping Rules:							
		<table border="1"> <tr> <td>Target S (1/g)</td> <td>Max Area (mm²)</td> <td>Max N</td> </tr> <tr> <td></td> <td></td> <td></td> </tr> </table>		Target S (1/g)	Max Area (mm ²)	Max N			
Target S (1/g)	Max Area (mm ²)	Max N							

RESULTS SUMMARY

Structure Metric	Observed Structure Count (s)	Structure Filter Loading (s/mm ²)	Soil Conc. Structures per gram (s/g)
High mag only			
Total Asbestos	160	9.7E+02	3.1E+07
Total Chrysotile (CH)	160	9.7E+02	3.1E+07
Total Amphibole	0	0.0E+00	0.0E+00
actinolite (AC)	0	0.0E+00	0.0E+00
amosite (AM)	0	0.0E+00	0.0E+00
anthophyllite (AN)	0	0.0E+00	0.0E+00
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	0	0.0E+00	0.0E+00
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	0	0.0E+00	0.0E+00
other mineral class (OM)	0	0.0E+00	0.0E+00
PCME (high+low mag)			
Total Asbestos	6	3.6E+01	1.1E+06
Total Chrysotile (CH)	6	3.6E+01	1.1E+06
Total Amphibole	0	0.0E+00	0.0E+00
actinolite (AC)	0	0.0E+00	0.0E+00
amosite (AM)	0	0.0E+00	0.0E+00
anthophyllite (AN)	0	0.0E+00	0.0E+00
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	0	0.0E+00	0.0E+00
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	0	0.0E+00	0.0E+00
other mineral class (OM)	0	0.0E+00	0.0E+00

Σ Asbestos Structure Mass (g)	Mass fraction (as %)
Total TEM	
WRTA	0.00E+00 0.0000%
OA	0.00E+00 0.0000%
CH	8.80E-09 16.7788%
AC	0.00E+00 0.0000%
AM	0.00E+00 0.0000%
AN	0.00E+00 0.0000%
CR	0.00E+00 0.0000%
TR	0.00E+00 0.0000%
PCME	
WRTA	0.00E+00 0.0000%
OA	0.00E+00 0.0000%
CH	2.80E-09 5.3432%
AC	0.00E+00 0.0000%
AM	0.00E+00 0.0000%
AN	0.00E+00 0.0000%
CR	0.00E+00 0.0000%
TR	0.00E+00 0.0000%

Asbestos structure mass = Length • Width² • Density • 1E-12

LA Density = 3.1 g/cm³
OA Density = 3.0 g/cm³
CH Density = 2.6 g/cm³
AC Density = 3.1 g/cm³
AM Density = 3.5 g/cm³
AN Density = 3.0 g/cm³
CR Density = 3.3 g/cm³
TR Density = 3.0 g/cm³

Csoil (mass fraction, as %) = Σ Asbestos structure mass • Sensitivity • 100

Equations:

Filter Loading (s/mm²) = N / (GOx • Ago)
Sensitivity (1/g) = EFA / (GOx • Ago • M • f • Q_R)
Csoil (s/g) = N • Sensitivity

Asbestos Types:

AC - actinolite
AM - amosite
AN - anthophyllite
CH - chrysotile
CR - crocidolite
TR - tremolite
LA - Libby amphibole
OA - other amphibole
NAM - non-asbestos material
OM - other mineral type (specify in "other mineral description" field)

Structure Types:

High mag: Length ≥ 0.5 um, Aspect Ratio ≥ 3:1
PCME: Length > 5 um, Width ≥ 0.25 um, Aspect Ratio ≥ 3:1

Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394143-DUP_SO_03-11-15_150099_TEM-EPAISO_D.xlsm
FluidizedBedEDD_v1

**TEM Asbestos Structure Count for Fluidized Bed Material -- ISO
ANALYTICAL REPORT**

FILE NAME:Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394143-DUP_SO_03-11-15_150099_TEM-EPAISO_D.xls

SAMPLE INFORMATION		ANALYSIS PARAMETERS	
Field Sample Number 14394143-DUP		EFA (mm ²)	385
Matrix Soil		GO area (mm ²) [Ago]	0.0104
Field QC Type Not QC		# GOs counted - high mag	7
Sample Mass (g dry wt) [M] 1.00		# GOs counted - low mag only	0
Fluidized Bed Flow Ratio[Q _R] 0.0122		F-factor [f]	1.00E+00
Filter Status ANALYZED		Sensitivity - High mag	4.4E+05 1/g
		Sensitivity - PCME (high+low mag)	4.4E+05 1/g
ANALYSIS INFORMATION			
Lab Name LabCor Inc		Recording	
Lab Sample Number 150099-S45		Rules:	
Lab QC Type NOT QC		Initial (high mag)	
TEM Prep Method Direct		Min. AR	Min length (um) Min width (um)
Est. particulate loading on filter NA		3:1	0 0
		PCME Supplemental (low mag)	
		Min. AR	Min length (um) Min width (um)
		3:1	0 0
		Stopping	
		Rules:	
		Target S (1/g)	Max Area (mm ²) Max N

RESULTS SUMMARY

Structure Metric	Observed Structure Count (s)	Structure Filter Loading (s/mm ²)	Soil Conc. Structures per gram (s/g)
High mag only			
Total Asbestos	153	2.1E+03	6.7E+07
Total Chrysotile (CH)	153	2.1E+03	6.7E+07
Total Amphibole	0	0.0E+00	0.0E+00
actinolite (AC)	0	0.0E+00	0.0E+00
amosite (AM)	0	0.0E+00	0.0E+00
anthophyllite (AN)	0	0.0E+00	0.0E+00
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	0	0.0E+00	0.0E+00
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	0	0.0E+00	0.0E+00
other mineral class (OM)	0	0.0E+00	0.0E+00
PCME (high+low mag)			
Total Asbestos	7	9.7E+01	3.0E+06
Total Chrysotile (CH)	7	9.7E+01	3.0E+06
Total Amphibole	0	0.0E+00	0.0E+00
actinolite (AC)	0	0.0E+00	0.0E+00
amosite (AM)	0	0.0E+00	0.0E+00
anthophyllite (AN)	0	0.0E+00	0.0E+00
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	0	0.0E+00	0.0E+00
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	0	0.0E+00	0.0E+00
other mineral class (OM)	0	0.0E+00	0.0E+00

Equations:

Filter Loading (s/mm²) = N / (GOx • Ago)
Sensitivity (1/g) = EFA / (GOx • Ago • M • f • Q_R)
Csoil (s/g) = N • Sensitivity

Asbestos Types:

AC - actinolite
AM - amosite
AN - anthophyllite
CH - chrysotile
CR - crocidolite
TR - tremolite
LA - Libby amphibole
OA - other amphibole
NAM - non-asbestos material
OM - other mineral type (specify in "other mineral description" field)

Structure Types:

High mag: Length ≥ 0.5 um, Aspect Ratio ≥ 3:1
PCME: Length > 5 um, Width ≥ 0.25 um, Aspect Ratio ≥ 3:1

Σ Asbestos Structure Mass (g)	Mass fraction (as %)
Total TEM	
WRTA	0.00E+00 0.0000%
OA	0.00E+00 0.0000%
CH	4.48E-08 #####
AC	0.00E+00 0.0000%
AM	0.00E+00 0.0000%
AN	0.00E+00 0.0000%
CR	0.00E+00 0.0000%
TR	0.00E+00 0.0000%
PCME	
WRTA	0.00E+00 0.0000%
OA	0.00E+00 0.0000%
CH	3.84E-10 1.6716%
AC	0.00E+00 0.0000%
AM	0.00E+00 0.0000%
AN	0.00E+00 0.0000%
CR	0.00E+00 0.0000%
TR	0.00E+00 0.0000%

Asbestos structure mass = Length • Width² • Density • 1E-12

LA Density = 3.1 g/cm³
OA Density = 3.0 g/cm³
CH Density = 2.6 g/cm³
AC Density = 3.1 g/cm³
AM Density = 3.5 g/cm³
AN Density = 3.0 g/cm³
CR Density = 3.3 g/cm³
TR Density = 3.0 g/cm³

Csoil (mass fraction, as %) = Σ Asbestos structure mass • Sensitivity • 100

Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394144_SO_03-11-15_150099_TEM-EPAISO_D.xlsm
FluidizedBedEDD_v1

**TEM Asbestos Structure Count for Fluidized Bed Material -- ISO
ANALYTICAL REPORT**

FILE NAME: Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394144_SO_03-11-15_150099_TEM-EPAISO_D.xlsm

SAMPLE INFORMATION		ANALYSIS PARAMETERS	
Field Sample Number 14394144		EFA (mm ²)	385
Matrix Soil		GO area (mm ²) [Ago]	0.0104
Field QC Type Not QC		# GOs counted - high mag	4
Sample Mass (g dry wt) [M] 1.00		# GOs counted - low mag only	0
Fluidized Bed Flow Ratio[Q _R] 0.0122		F-factor [f]	1.00E+00
Filter Status ANALYZED		Sensitivity - High mag	7.6E+05 1/g
		Sensitivity - PCME (high+low mag)	7.6E+05 1/g
ANALYSIS INFORMATION			
Lab Name LabCor Inc		Recording	
Lab Sample Number 150099-S46		Rules:	
Lab QC Type NOT QC		Initial (high mag)	
TEM Prep Method Direct		Min. AR	Min length (um)
Est. particulate loading on filter NA		3:1	0
		Min width (um)	0
		PCME Supplemental (low mag)	
		Min. AR	Min length (um)
		3:1	0
		Min width (um)	0
		Stopping	
		Rules:	
		Target S (1/g)	Max Area (mm ²)
			Max N

RESULTS SUMMARY

Structure Metric	Observed Structure Count (s)	Structure Filter Loading (s/mm ²)	Soil Conc. Structures per gram (s/g)
High mag only			
Total Asbestos	153	3.7E+03	1.2E+08
Total Chrysotile (CH)	153	3.7E+03	1.2E+08
Total Amphibole	0	0.0E+00	0.0E+00
actinolite (AC)	0	0.0E+00	0.0E+00
amosite (AM)	0	0.0E+00	0.0E+00
anthophyllite (AN)	0	0.0E+00	0.0E+00
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	0	0.0E+00	0.0E+00
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	0	0.0E+00	0.0E+00
other mineral class (OM)	0	0.0E+00	0.0E+00
PCME (high+low mag)			
Total Asbestos	7	1.7E+02	5.3E+06
Total Chrysotile (CH)	7	1.7E+02	5.3E+06
Total Amphibole	0	0.0E+00	0.0E+00
actinolite (AC)	0	0.0E+00	0.0E+00
amosite (AM)	0	0.0E+00	0.0E+00
anthophyllite (AN)	0	0.0E+00	0.0E+00
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	0	0.0E+00	0.0E+00
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	0	0.0E+00	0.0E+00
other mineral class (OM)	0	0.0E+00	0.0E+00

Σ Asbestos Structure Mass (g)	Mass fraction (as %)
Total TEM	
WRTA	0.00E+00 0.0000%
OA	0.00E+00 0.0000%
CH	3.67E-08 #####
AC	0.00E+00 0.0000%
AM	0.00E+00 0.0000%
AN	0.00E+00 0.0000%
CR	0.00E+00 0.0000%
TR	0.00E+00 0.0000%
PCME	
WRTA	0.00E+00 0.0000%
OA	0.00E+00 0.0000%
CH	3.06E-09 23.2377%
AC	0.00E+00 0.0000%
AM	0.00E+00 0.0000%
AN	0.00E+00 0.0000%
CR	0.00E+00 0.0000%
TR	0.00E+00 0.0000%

Asbestos structure mass = Length • Width² • Density • 1E-12

LA Density = 3.1 g/cm³
OA Density = 3.0 g/cm³
CH Density = 2.6 g/cm³
AC Density = 3.1 g/cm³
AM Density = 3.5 g/cm³
AN Density = 3.0 g/cm³
CR Density = 3.3 g/cm³
TR Density = 3.0 g/cm³

Csoil (mass fraction, as %) = Σ Asbestos structure mass • Sensitivity • 100

Equations:

Filter Loading (s/mm²) = N / (GOx • Ago)
Sensitivity (1/g) = EFA / (GOx • Ago • M • f • Q_R)
Csoil (s/g) = N • Sensitivity

Asbestos Types:

AC - actinolite
AM - amosite
AN - anthophyllite
CH - chrysotile
CR - crocidolite
TR - tremolite
LA - Libby amphibole
OA - other amphibole
NAM - non-asbestos material
OM - other mineral type (specify in "other mineral description" field)

Structure Types:

High mag: Length ≥ 0.5 um, Aspect Ratio ≥ 3:1
PCME: Length ≥ 5 um, Width ≥ 0.25 um, Aspect Ratio ≥ 3:1

Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394192_SO_03-12-15_150099_TEM-EPAISO_D.xlsm
FluidizedBedEDD_v1

TEM Asbestos Structure Count for Fluidized Bed Material -- ISO
ANALYTICAL REPORT

FILE NAME: Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394192_SO_03-12-15_150099_TEM-EPAISO_D.xlsm

SAMPLE INFORMATION		ANALYSIS PARAMETERS	
Field Sample Number	14394192	EFA (mm ²)	385
Matrix	Soil	GO area (mm ²) [Ago]	0.0104
Field QC Type	PB	# GOs counted - high mag	100
Sample Mass (g dry wt) [M]	0.00	# GOs counted - low mag only	0
Fluidized Bed Flow Ratio[Q _R]	0	F-factor [f]	1.00E+00
Filter Status	ANALYZED	Sensitivity - High mag	1/g
		Sensitivity - PCME (high+low mag)	1/g
ANALYSIS INFORMATION			
Lab Name	LabCor Inc	Recording	
Lab Sample Number	150099-S47	Rules:	
Lab QC Type	NOT QC	Initial (high mag)	
TEM Prep Method	Direct	Min. AR	Min length (um)
Est. particulate loading on filter	NA	3:1	0
		Min width (um)	0
		PCME Supplemental (low mag)	
		Min. AR	Min length (um)
		3:1	0
		Min width (um)	0
		Stopping	
		Rules:	
		Target S (1/g)	Max Area (mm ²)
			Max N

RESULTS SUMMARY

Structure Metric	Observed Structure Count (s)	Structure Filter Loading (s/mm ²)	Soil Conc. Structures per gram (s/g)
High mag only			
Total Asbestos	0	0.0E+00	---
Total Chrysotile (CH)	0	0.0E+00	---
Total Amphibole	0	0.0E+00	---
actinolite (AC)	0	0.0E+00	---
amosite (AM)	0	0.0E+00	---
anthophyllite (AN)	0	0.0E+00	---
crocidolite (CR)	0	0.0E+00	---
tremolite (TR)	0	0.0E+00	---
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	---
other amphibole (OA)	0	0.0E+00	---
other mineral class (OM)	0	0.0E+00	---
PCME (high+low mag)			
Total Asbestos	0	0.0E+00	---
Total Chrysotile (CH)	0	0.0E+00	---
Total Amphibole	0	0.0E+00	---
actinolite (AC)	0	0.0E+00	---
amosite (AM)	0	0.0E+00	---
anthophyllite (AN)	0	0.0E+00	---
crocidolite (CR)	0	0.0E+00	---
tremolite (TR)	0	0.0E+00	---
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	---
other amphibole (OA)	0	0.0E+00	---
other mineral class (OM)	0	0.0E+00	---

Σ Asbestos Structure Mass (g)	Mass fraction (as %)
Total TEM	
WRTA	0.00E+00
OA	0.00E+00
CH	0.00E+00
AC	0.00E+00
AM	0.00E+00
AN	0.00E+00
CR	0.00E+00
TR	0.00E+00
PCME	
WRTA	0.00E+00
OA	0.00E+00
CH	0.00E+00
AC	0.00E+00
AM	0.00E+00
AN	0.00E+00
CR	0.00E+00
TR	0.00E+00

Asbestos structure mass = Length • Width² • Density • 1E-12

LA Density = 3.1 g/cm³
OA Density = 3.0 g/cm³
CH Density = 2.6 g/cm³
AC Density = 3.1 g/cm³
AM Density = 3.5 g/cm³
AN Density = 3.0 g/cm³
CR Density = 3.3 g/cm³
TR Density = 3.0 g/cm³

Csoil (mass fraction, as %) = Σ Asbestos structure mass • Sensitivity • 100

Equations:

Filter Loading (s/mm²) = N / (GOx • Ago)
Sensitivity (1/g) = EFA / (GOx • Ago • M • f • Q_R)
Csoil (s/g) = N • Sensitivity

Asbestos Types:

AC - actinolite
AM - amosite
AN - anthophyllite
CH - chrysotile
CR - crocidolite
TR - tremolite
LA - Libby amphibole
OA - other amphibole
NAM - non-asbestos material
OM - other mineral type (specify in "other mineral description" field)

Structure Types:

High mag: Length ≥ 0.5 um, Aspect Ratio ≥ 3:1
PCME: Length > 5 um, Width ≥ 0.25 um, Aspect Ratio ≥ 3:1

Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394193_SO_03-12-15_150099_TEM-EPAISO_D.xlsm
FluidizedBedEDD_v1

TEM Asbestos Structure Count for Fluidized Bed Material -- ISO
ANALYTICAL REPORT

FILE NAME: Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394193_SO_03-12-15_150099_TEM-EPAISO_D.xlsm

SAMPLE INFORMATION		ANALYSIS PARAMETERS	
Field Sample Number 14394193		EFA (mm ²)	385
Matrix Soil		GO area (mm ²) [Ago]	0.0104
Field QC Type SB		# GOs counted - high mag	100
Sample Mass (g dry wt) [M] 0.00		# GOs counted - low mag only	0
Fluidized Bed Flow Ratio[Q _R] 0.0122		F-factor [f]	1.00E+00
Filter Status ANALYZED		Sensitivity - High mag	1/g
		Sensitivity - PCME (high+low mag)	1/g
ANALYSIS INFORMATION			
Lab Name LabCor Inc		Recording	
Lab Sample Number 150099-S48		Rules:	
Lab QC Type NOT QC		Initial (high mag)	
TEM Prep Method Direct		Min. AR	Min length (um)
Est. particulate loading on filter NA		3:1	0
		Min width (um)	0
		PCME Supplemental (low mag)	
		Min. AR	Min length (um)
		3:1	0
		Min width (um)	0
		Stopping	
		Rules:	
		Target S (1/g)	Max Area (mm ²)
			Max N

RESULTS SUMMARY

Structure Metric	Observed Structure Count (s)	Structure Filter Loading (s/mm ²)	Soil Conc. Structures per gram (s/g)
High mag only			
Total Asbestos	0	0.0E+00	---
Total Chrysotile (CH)	0	0.0E+00	---
Total Amphibole	0	0.0E+00	---
actinolite (AC)	0	0.0E+00	---
amosite (AM)	0	0.0E+00	---
anthophyllite (AN)	0	0.0E+00	---
crocidolite (CR)	0	0.0E+00	---
tremolite (TR)	0	0.0E+00	---
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	---
other amphibole (OA)	0	0.0E+00	---
other mineral class (OM)	0	0.0E+00	---
PCME (high+low mag)			
Total Asbestos	0	0.0E+00	---
Total Chrysotile (CH)	0	0.0E+00	---
Total Amphibole	0	0.0E+00	---
actinolite (AC)	0	0.0E+00	---
amosite (AM)	0	0.0E+00	---
anthophyllite (AN)	0	0.0E+00	---
crocidolite (CR)	0	0.0E+00	---
tremolite (TR)	0	0.0E+00	---
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	---
other amphibole (OA)	0	0.0E+00	---
other mineral class (OM)	0	0.0E+00	---

Σ Asbestos Structure Mass (g)	Mass fraction (as %)
Total TEM	
WRTA	0.00E+00
OA	0.00E+00
CH	0.00E+00
AC	0.00E+00
AM	0.00E+00
AN	0.00E+00
CR	0.00E+00
TR	0.00E+00
PCME	
WRTA	0.00E+00
OA	0.00E+00
CH	0.00E+00
AC	0.00E+00
AM	0.00E+00
AN	0.00E+00
CR	0.00E+00
TR	0.00E+00

Asbestos structure mass = Length • Width² • Density • 1E-12

LA Density = 3.1 g/cm³
OA Density = 3.0 g/cm³
CH Density = 2.6 g/cm³
AC Density = 3.1 g/cm³
AM Density = 3.5 g/cm³
AN Density = 3.0 g/cm³
CR Density = 3.3 g/cm³
TR Density = 3.0 g/cm³

Csoil (mass fraction, as %) = Σ Asbestos structure mass • Sensitivity • 100

Equations:

Filter Loading (s/mm²) = N / (GOx • Ago)
Sensitivity (1/g) = EFA / (GOx • Ago • M • f • Q_R)
Csoil (s/g) = N • Sensitivity

Asbestos Types:

AC - actinolite
AM - amosite
AN - anthophyllite
CH - chrysotile
CR - crocidolite
TR - tremolite
LA - Libby amphibole
OA - other amphibole
NAM - non-asbestos material
OM - other mineral type (specify in "other mineral description" field)

Structure Types:

High mag: Length ≥ 0.5 um, Aspect Ratio ≥ 3:1
PCME: Length > 5 um, Width ≥ 0.25 um, Aspect Ratio ≥ 3:1

Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394194_SO_03-13-15_150099_TEM-EPAISO_D.xlsm
FluidizedBedEDD_v1

**TEM Asbestos Structure Count for Fluidized Bed Material -- ISO
ANALYTICAL REPORT**

FILE NAME:Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394194_SO_03-13-15_150099_TEM-EPAISO_D.xlsm

SAMPLE INFORMATION		ANALYSIS PARAMETERS							
Field Sample Number 14394194		EFA (mm ²)	385						
Matrix Soil		GO area (mm ²) [Ago]	0.0104						
Field QC Type PB		# GOs counted - high mag	100						
Sample Mass (g dry wt) [M] 0.00		# GOs counted - low mag only	0						
Fluidized Bed Flow Ratio[Q _R] 0		F-factor [f]	1.00E+00						
Filter Status ANALYZED		Sensitivity - High mag	---						
		Sensitivity - PCME (high+low mag)	---						
ANALYSIS INFORMATION									
Lab Name LabCor Inc		Recording							
Lab Sample Number 150099-S49		Rules:							
Lab QC Type NOT QC		Initial (high mag)							
TEM Prep Method Direct		<table border="1"> <tr> <th>Min. AR</th> <th>Min length (um)</th> <th>Min width (um)</th> </tr> <tr> <td>3:1</td> <td>0</td> <td>0</td> </tr> </table>		Min. AR	Min length (um)	Min width (um)	3:1	0	0
Min. AR	Min length (um)	Min width (um)							
3:1	0	0							
Est. particulate loading on filter NA		PCME Supplemental (low mag)							
		<table border="1"> <tr> <th>Min. AR</th> <th>Min length (um)</th> <th>Min width (um)</th> </tr> <tr> <td>3:1</td> <td>0</td> <td>0</td> </tr> </table>		Min. AR	Min length (um)	Min width (um)	3:1	0	0
Min. AR	Min length (um)	Min width (um)							
3:1	0	0							
		Stopping Rules:							
		<table border="1"> <tr> <th>Target S (1/g)</th> <th>Max Area (mm²)</th> <th>Max N</th> </tr> <tr> <td></td> <td></td> <td></td> </tr> </table>		Target S (1/g)	Max Area (mm ²)	Max N			
Target S (1/g)	Max Area (mm ²)	Max N							

RESULTS SUMMARY

Structure Metric	Observed Structure Count (s)	Structure Filter Loading (s/mm ²)	Soil Conc. Structures per gram (s/g)
High mag only			
Total Asbestos	0	0.0E+00	---
Total Chrysotile (CH)	0	0.0E+00	---
Total Amphibole	0	0.0E+00	---
actinolite (AC)	0	0.0E+00	---
amosite (AM)	0	0.0E+00	---
anthophyllite (AN)	0	0.0E+00	---
crocidolite (CR)	0	0.0E+00	---
tremolite (TR)	0	0.0E+00	---
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	---
other amphibole (OA)	0	0.0E+00	---
other mineral class (OM)	0	0.0E+00	---
PCME (high+low mag)			
Total Asbestos	0	0.0E+00	---
Total Chrysotile (CH)	0	0.0E+00	---
Total Amphibole	0	0.0E+00	---
actinolite (AC)	0	0.0E+00	---
amosite (AM)	0	0.0E+00	---
anthophyllite (AN)	0	0.0E+00	---
crocidolite (CR)	0	0.0E+00	---
tremolite (TR)	0	0.0E+00	---
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	---
other amphibole (OA)	0	0.0E+00	---
other mineral class (OM)	0	0.0E+00	---

Σ Asbestos Structure Mass (g)	Mass fraction (as %)
Total TEM	
WRTA	0.00E+00
OA	0.00E+00
CH	0.00E+00
AC	0.00E+00
AM	0.00E+00
AN	0.00E+00
CR	0.00E+00
TR	0.00E+00
PCME	
WRTA	0.00E+00
OA	0.00E+00
CH	0.00E+00
AC	0.00E+00
AM	0.00E+00
AN	0.00E+00
CR	0.00E+00
TR	0.00E+00

Asbestos structure mass = Length • Width² • Density • 1E-12

LA Density = 3.1 g/cm³
OA Density = 3.0 g/cm³
CH Density = 2.6 g/cm³
AC Density = 3.1 g/cm³
AM Density = 3.5 g/cm³
AN Density = 3.0 g/cm³
CR Density = 3.3 g/cm³
TR Density = 3.0 g/cm³

Csoil (mass fraction, as %) = Σ Asbestos structure mass • Sensitivity • 100

Equations:

Filter Loading (s/mm²) = N / (GOx • Ago)
Sensitivity (1/g) = EFA / (GOx • Ago • M • f • Q_R)
Csoil (s/g) = N • Sensitivity

Asbestos Types:

AC - actinolite
AM - amosite
AN - anthophyllite
CH - chrysotile
CR - crocidolite
TR - tremolite
LA - Libby amphibole
OA - other amphibole
NAM - non-asbestos material
OM - other mineral type (specify in "other mineral description" field)

Structure Types:

High mag: Length ≥ 0.5 um, Aspect Ratio ≥ 3:1
PCME: Length > 5 um, Width ≥ 0.25 um, Aspect Ratio ≥ 3:1

Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394195_SO_03-13-15_150099_TEM-EPAISO_D.xlsm
FluidizedBedEDD_v1

**TEM Asbestos Structure Count for Fluidized Bed Material -- ISO
ANALYTICAL REPORT**

FILE NAME: Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394195_SO_03-13-15_150099_TEM-EPAISO_D.xlsm

SAMPLE INFORMATION		ANALYSIS PARAMETERS	
Field Sample Number	14394195	EFA (mm ²)	385
Matrix	Soil	GO area (mm ²) [Ago]	0.0104
Field QC Type	SB	# GOs counted - high mag	100
Sample Mass (g dry wt) [M]	0.00	# GOs counted - low mag only	0
Fluidized Bed Flow Ratio[Q _R]	0.0122	F-factor [f]	1.00E+00
Filter Status	ANALYZED	Sensitivity - High mag	---
		Sensitivity - PCME (high+low mag)	---
			1/g
			1/g
ANALYSIS INFORMATION			
Lab Name	LabCor Inc	Recording	
Lab Sample Number	150099-S50	Rules:	
Lab QC Type	NOT QC	Initial (high mag)	
TEM Prep Method	Direct		
Est. particulate loading on filter	NA		
		Min. AR	Min length (um)
		3:1	0
		Min width (um)	0
		PCME Supplemental (low mag)	
		Min. AR	Min length (um)
		3:1	0
		Min width (um)	0
		Stopping	
		Rules:	
		Target S (1/g)	Max Area (mm ²)
			Max N

RESULTS SUMMARY

Structure Metric	Observed Structure Count (s)	Structure Filter Loading (s/mm ²)	Soil Conc. Structures per gram (s/g)
High mag only			
Total Asbestos	0	0.0E+00	---
Total Chrysotile (CH)	0	0.0E+00	---
Total Amphibole	0	0.0E+00	---
actinolite (AC)	0	0.0E+00	---
amosite (AM)	0	0.0E+00	---
anthophyllite (AN)	0	0.0E+00	---
crocidolite (CR)	0	0.0E+00	---
tremolite (TR)	0	0.0E+00	---
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	---
other amphibole (OA)	0	0.0E+00	---
other mineral class (OM)	0	0.0E+00	---
PCME (high+low mag)			
Total Asbestos	0	0.0E+00	---
Total Chrysotile (CH)	0	0.0E+00	---
Total Amphibole	0	0.0E+00	---
actinolite (AC)	0	0.0E+00	---
amosite (AM)	0	0.0E+00	---
anthophyllite (AN)	0	0.0E+00	---
crocidolite (CR)	0	0.0E+00	---
tremolite (TR)	0	0.0E+00	---
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	---
other amphibole (OA)	0	0.0E+00	---
other mineral class (OM)	0	0.0E+00	---

Σ Asbestos Structure Mass (g)	Mass fraction (as %)
Total TEM	
WRTA	0.00E+00
OA	0.00E+00
CH	0.00E+00
AC	0.00E+00
AM	0.00E+00
AN	0.00E+00
CR	0.00E+00
TR	0.00E+00
PCME	
WRTA	0.00E+00
OA	0.00E+00
CH	0.00E+00
AC	0.00E+00
AM	0.00E+00
AN	0.00E+00
CR	0.00E+00
TR	0.00E+00

Asbestos structure mass = Length • Width² • Density • 1E-12

LA Density = 3.1 g/cm³
OA Density = 3.0 g/cm³
CH Density = 2.6 g/cm³
AC Density = 3.1 g/cm³
AM Density = 3.5 g/cm³
AN Density = 3.0 g/cm³
CR Density = 3.3 g/cm³
TR Density = 3.0 g/cm³

Csoil (mass fraction, as %) = Σ Asbestos structure mass • Sensitivity • 100

Equations:

Filter Loading (s/mm²) = N / (GOx • Ago)
Sensitivity (1/g) = EFA / (GOx • Ago • M • f • Q_R)
Csoil (s/g) = N • Sensitivity

Asbestos Types:

AC - actinolite
AM - amosite
AN - anthophyllite
CH - chrysotile
CR - crocidolite
TR - tremolite
LA - Libby amphibole
OA - other amphibole
NAM - non-asbestos material
OM - other mineral type (specify in "other mineral description" field)

Structure Types:

High mag: Length ≥ 0.5 um, Aspect Ratio ≥ 3:1
PCME: Length > 5 um, Width ≥ 0.25 um, Aspect Ratio ≥ 3:1

Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394104_SO_03-21-15_150099_TEM-EPAISO_D_Recount Different.xlsm
FluidizedBedEDD_v1

**TEM Asbestos Structure Count for Fluidized Bed Material -- ISO
ANALYTICAL REPORT**

FILE NAME: Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394104_SO_03-21-15_150099_TEM-EPAISO_D_Recount

SAMPLE INFORMATION		ANALYSIS PARAMETERS	
Field Sample Number 14394104		EFA (mm ²)	385
Matrix Soil		GO area (mm ²) [Ago]	0.0104
Field QC Type Not QC		# GOs counted - high mag	2
Sample Mass (g dry wt) [M] 0.51		# GOs counted - low mag only	0
Fluidized Bed Flow Ratio[Q _R] 0.0122		F-factor [f]	1.00E+00
Filter Status ANALYZED		Sensitivity - High mag	3.0E+06 1/g
		Sensitivity - PCME (high+low mag)	3.0E+06 1/g
ANALYSIS INFORMATION			
Lab Name LabCor Inc		Recording	
Lab Sample Number 150099-S5		Rules:	
Lab QC Type Recount Different		Initial (high mag)	
TEM Prep Method Direct		Min. AR	Min length (um)
Est. particulate loading on filter NA		3:1	0
		Min width (um)	0
		PCME Supplemental (low mag)	
		Min. AR	Min length (um)
		3:1	0
		Min width (um)	0
		Stopping	
		Rules:	
		Target S (1/g)	Max Area (mm ²)
			Max N

RESULTS SUMMARY

Structure Metric	Observed Structure Count (s)	Structure Filter Loading (s/mm ²)	Soil Conc. Structures per gram (s/g)
High mag only			
Total Asbestos	5	2.4E+02	1.5E+07
Total Chrysotile (CH)	4	1.9E+02	1.2E+07
Total Amphibole	1	4.8E+01	3.0E+06
actinolite (AC)	0	0.0E+00	0.0E+00
amosite (AM)	0	0.0E+00	0.0E+00
anthophyllite (AN)	0	0.0E+00	0.0E+00
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	1	4.8E+01	3.0E+06
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	0	0.0E+00	0.0E+00
other mineral class (OM)	0	0.0E+00	0.0E+00
PCME (high+low mag)			
Total Asbestos	0	0.0E+00	0.0E+00
Total Chrysotile (CH)	0	0.0E+00	0.0E+00
Total Amphibole	0	0.0E+00	0.0E+00
actinolite (AC)	0	0.0E+00	0.0E+00
amosite (AM)	0	0.0E+00	0.0E+00
anthophyllite (AN)	0	0.0E+00	0.0E+00
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	0	0.0E+00	0.0E+00
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	0	0.0E+00	0.0E+00
other mineral class (OM)	0	0.0E+00	0.0E+00

Σ Asbestos Structure Mass (g)	Mass fraction (as %)
Total TEM	
WRTA	0.00E+00 0.0000%
OA	0.00E+00 0.0000%
CH	1.05E-09 31.2617%
AC	0.00E+00 0.0000%
AM	0.00E+00 0.0000%
AN	0.00E+00 0.0000%
CR	0.00E+00 0.0000%
TR	5.74E-14 0.0017%
PCME	
WRTA	0.00E+00 0.0000%
OA	0.00E+00 0.0000%
CH	0.00E+00 0.0000%
AC	0.00E+00 0.0000%
AM	0.00E+00 0.0000%
AN	0.00E+00 0.0000%
CR	0.00E+00 0.0000%
TR	0.00E+00 0.0000%

Asbestos structure mass = Length • Width² • Density • 1E-12

LA Density = 3.1 g/cm³
OA Density = 3.0 g/cm³
CH Density = 2.6 g/cm³
AC Density = 3.1 g/cm³
AM Density = 3.5 g/cm³
AN Density = 3.0 g/cm³
CR Density = 3.3 g/cm³
TR Density = 3.0 g/cm³

Csoil (mass fraction, as %) = Σ Asbestos structure mass • Sensitivity • 100

Equations:

Filter Loading (s/mm²) = N / (GOx • Ago)
Sensitivity (1/g) = EFA / (GOx • Ago • M • f • Q_R)
Csoil (s/g) = N • Sensitivity

Asbestos Types:

AC - actinolite
AM - amosite
AN - anthophyllite
CH - chrysotile
CR - crocidolite
TR - tremolite
LA - Libby amphibole
OA - other amphibole
NAM - non-asbestos material
OM - other mineral type (specify in "other mineral description" field)

Structure Types:

High mag: Length ≥ 0.5 um, Aspect Ratio ≥ 3:1
PCME: Length > 5 um, Width ≥ 0.25 um, Aspect Ratio ≥ 3:1

Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394125_SO_03-20-15_150099_TEM-EPAISO_D_Recount Different.xlsm
FluidizedBedEDD_v1

TEM Asbestos Structure Count for Fluidized Bed Material -- ISO
ANALYTICAL REPORT

FILE NAME: Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394125_SO_03-20-15_150099_TEM-EPAISO_D_Recount

SAMPLE INFORMATION		ANALYSIS PARAMETERS	
Field Sample Number 14394125		EFA (mm ²)	385
Matrix Soil		GO area (mm ²) [Ago]	0.0104
Field QC Type Not QC		# GOs counted - high mag	100
Sample Mass (g dry wt) [M] 1.01		# GOs counted - low mag only	0
Fluidized Bed Flow Ratio[Q _R] 0.0122		F-factor [f]	1.00E+00
Filter Status ANALYZED		Sensitivity - High mag	3.0E+04 1/g
		Sensitivity - PCME (high+low mag)	3.0E+04 1/g
ANALYSIS INFORMATION			
Lab Name LabCor Inc		Recording	
Lab Sample Number 150099-S26		Rules:	
Lab QC Type Recount Different		Initial (high mag)	
TEM Prep Method Direct		Min. AR	Min length (um)
Est. particulate loading on filter NA		3:1	0
		Min width (um)	0
		PCME Supplemental (low mag)	
		Min. AR	Min length (um)
		3:1	0
		Min width (um)	0
		Stopping	
		Rules:	
		Target S (1/g)	Max Area (mm ²)
			Max N

RESULTS SUMMARY

Structure Metric	Observed Structure Count (s)	Structure Filter Loading (s/mm ²)	Soil Conc. Structures per gram (s/g)
High mag only			
Total Asbestos	16	1.5E+01	4.8E+05
Total Chrysotile (CH)	16	1.5E+01	4.8E+05
Total Amphibole	0	0.0E+00	0.0E+00
actinolite (AC)	0	0.0E+00	0.0E+00
amosite (AM)	0	0.0E+00	0.0E+00
anthophyllite (AN)	0	0.0E+00	0.0E+00
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	0	0.0E+00	0.0E+00
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	0	0.0E+00	0.0E+00
other mineral class (OM)	0	0.0E+00	0.0E+00
PCME (high+low mag)			
Total Asbestos	0	0.0E+00	0.0E+00
Total Chrysotile (CH)	0	0.0E+00	0.0E+00
Total Amphibole	0	0.0E+00	0.0E+00
actinolite (AC)	0	0.0E+00	0.0E+00
amosite (AM)	0	0.0E+00	0.0E+00
anthophyllite (AN)	0	0.0E+00	0.0E+00
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	0	0.0E+00	0.0E+00
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	0	0.0E+00	0.0E+00
other mineral class (OM)	0	0.0E+00	0.0E+00

Σ Asbestos Structure Mass (g)	Mass fraction (as %)
Total TEM	
WRTA	0.00E+00 0.0000%
OA	0.00E+00 0.0000%
CH	1.90E-11 0.0058%
AC	0.00E+00 0.0000%
AM	0.00E+00 0.0000%
AN	0.00E+00 0.0000%
CR	0.00E+00 0.0000%
TR	0.00E+00 0.0000%
PCME	
WRTA	0.00E+00 0.0000%
OA	0.00E+00 0.0000%
CH	0.00E+00 0.0000%
AC	0.00E+00 0.0000%
AM	0.00E+00 0.0000%
AN	0.00E+00 0.0000%
CR	0.00E+00 0.0000%
TR	0.00E+00 0.0000%

Asbestos structure mass = Length • Width² • Density • 1E-12

LA Density = 3.1 g/cm³
OA Density = 3.0 g/cm³
CH Density = 2.6 g/cm³
AC Density = 3.1 g/cm³
AM Density = 3.5 g/cm³
AN Density = 3.0 g/cm³
CR Density = 3.3 g/cm³
TR Density = 3.0 g/cm³

Csoil (mass fraction, as %) = Σ Asbestos structure mass • Sensitivity • 100

Equations:

Filter Loading (s/mm²) = N / (GOx • Ago)
Sensitivity (1/g) = EFA / (GOx • Ago • M • f • Q_R)
Csoil (s/g) = N • Sensitivity

Asbestos Types:

AC - actinolite
AM - amosite
AN - anthophyllite
CH - chrysotile
CR - crocidolite
TR - tremolite
LA - Libby amphibole
OA - other amphibole
NAM - non-asbestos material
OM - other mineral type (specify in "other mineral description" field)

Structure Types:

High mag: Length ≥ 0.5 um, Aspect Ratio ≥ 3:1
PCME: Length > 5 um, Width ≥ 0.25 um, Aspect Ratio ≥ 3:1

Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394126_SO_03-19-15_150099_TEM-EPAISO_D_Recount Different xism
FluidizedBedEDD_v1

TEM Asbestos Structure Count for Fluidized Bed Material -- ISO
ANALYTICAL REPORT

FILE NAME:Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394126_SO_03-19-15_150099_TEM-EPAISO_D_Recount

SAMPLE INFORMATION		ANALYSIS PARAMETERS	
Field Sample Number 14394126		EFA (mm ²)	385
Matrix Soil		GO area (mm ²) [Ago]	0.0104
Field QC Type Not QC		# GOs counted - high mag	100
Sample Mass (g dry wt) [M] 1.00		# GOs counted - low mag only	0
Fluidized Bed Flow Ratio[Q _R] 0.0122		F-factor [f]	1.00E+00
Filter Status ANALYZED		Sensitivity - High mag	3.0E+04 1/g
		Sensitivity - PCME (high+low mag)	3.0E+04 1/g
ANALYSIS INFORMATION			
Lab Name LabCor Inc		Recording	
Lab Sample Number 150099-S27		Rules:	
Lab QC Type Recount Different		Initial (high mag)	
TEM Prep Method Direct		Min. AR	Min length (um)
Est. particulate loading on filter NA		3:1	0
		Min width (um)	0
		PCME Supplemental (low mag)	
		Min. AR	Min length (um)
		3:1	0
		Min width (um)	0
		Stopping	
		Rules:	
		Target S (1/g)	Max Area (mm ²)
			Max N

RESULTS SUMMARY

Structure Metric	Observed Structure Count (s)	Structure Filter Loading (s/mm ²)	Soil Conc. Structures per gram (s/g)
High mag only			
Total Asbestos	0	0.0E+00	0.0E+00
Total Chrysotile (CH)	0	0.0E+00	0.0E+00
Total Amphibole	0	0.0E+00	0.0E+00
actinolite (AC)	0	0.0E+00	0.0E+00
amosite (AM)	0	0.0E+00	0.0E+00
anthophyllite (AN)	0	0.0E+00	0.0E+00
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	0	0.0E+00	0.0E+00
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	0	0.0E+00	0.0E+00
other mineral class (OM)	0	0.0E+00	0.0E+00
PCME (high+low mag)			
Total Asbestos	0	0.0E+00	0.0E+00
Total Chrysotile (CH)	0	0.0E+00	0.0E+00
Total Amphibole	0	0.0E+00	0.0E+00
actinolite (AC)	0	0.0E+00	0.0E+00
amosite (AM)	0	0.0E+00	0.0E+00
anthophyllite (AN)	0	0.0E+00	0.0E+00
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	0	0.0E+00	0.0E+00
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	0	0.0E+00	0.0E+00
other mineral class (OM)	0	0.0E+00	0.0E+00

Σ Asbestos Structure Mass (g)	Mass fraction (as %)
Total TEM	
WRTA	0.00E+00 0.0000%
OA	0.00E+00 0.0000%
CH	0.00E+00 0.0000%
AC	0.00E+00 0.0000%
AM	0.00E+00 0.0000%
AN	0.00E+00 0.0000%
CR	0.00E+00 0.0000%
TR	0.00E+00 0.0000%
PCME	
WRTA	0.00E+00 0.0000%
OA	0.00E+00 0.0000%
CH	0.00E+00 0.0000%
AC	0.00E+00 0.0000%
AM	0.00E+00 0.0000%
AN	0.00E+00 0.0000%
CR	0.00E+00 0.0000%
TR	0.00E+00 0.0000%

Asbestos structure mass = Length • Width² • Density • 1E-12

LA Density = 3.1 g/cm³
OA Density = 3.0 g/cm³
CH Density = 2.6 g/cm³
AC Density = 3.1 g/cm³
AM Density = 3.5 g/cm³
AN Density = 3.0 g/cm³
CR Density = 3.3 g/cm³
TR Density = 3.0 g/cm³

Csoil (mass fraction, as %) = Σ Asbestos structure mass • Sensitivity • 100

Equations:

Filter Loading (s/mm²) = N / (GOx • Ago)
Sensitivity (1/g) = EFA / (GOx • Ago • M • f • Q_R)
Csoil (s/g) = N • Sensitivity

Asbestos Types:

AC - actinolite
AM - amosite
AN - anthophyllite
CH - chrysotile
CR - crocidolite
TR - tremolite
LA - Libby amphibole
OA - other amphibole
NAM - non-asbestos material
OM - other mineral type (specify in "other mineral description" field)

Structure Types:

High mag: Length ≥ 0.5 um, Aspect Ratio ≥ 3:1
PCME: Length > 5 um, Width ≥ 0.25 um, Aspect Ratio ≥ 3:1

Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394129_SO_03-18-15_150099_TEM-EPAISO__D_Repreparation.xlsm
FluidizedBedEDD_v1

TEM Asbestos Structure Count for Fluidized Bed Material -- ISO

ANALYTICAL REPORT

FILE NAME: Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394129_SO_03-18-15_150099_TEM-EPAISO__D_Reprep

SAMPLE INFORMATION		ANALYSIS PARAMETERS	
Field Sample Number 14394129		EFA (mm ²)	385
Matrix Soil		GO area (mm ²) [Ago]	0.0104
Field QC Type Not QC		# GOs counted - high mag	2
Sample Mass (g dry wt) [M] 1.00		# GOs counted - low mag only	0
Fluidized Bed Flow Ratio[Q _R] 0.0122		F-factor [f]	1.00E+00
Filter Status ANALYZED		Sensitivity - High mag	1.5E+06 1/g
		Sensitivity - PCME (high+low mag)	1.5E+06 1/g
ANALYSIS INFORMATION			
Lab Name LabCor Inc		Recording	
Lab Sample Number 150099-S30		Rules:	
Lab QC Type Repreparation		Initial (high mag)	
TEM Prep Method Direct		Min. AR	Min length (um)
Est. particulate loading on filter NA		3:1	0
		Min width (um)	0
		PCME Supplemental (low mag)	
		Min. AR	Min length (um)
		3:1	0
		Min width (um)	0
		Stopping	
		Rules:	
		Target S (1/g)	Max Area (mm ²)
			Max N

RESULTS SUMMARY

Structure Metric	Observed Structure Count (s)	Structure Filter Loading (s/mm ²)	Soil Conc. Structures per gram (s/g)
High mag only			
Total Asbestos	175	8.5E+03	2.7E+08
Total Chrysotile (CH)	175	8.5E+03	2.7E+08
Total Amphibole	0	0.0E+00	0.0E+00
actinolite (AC)	0	0.0E+00	0.0E+00
amosite (AM)	0	0.0E+00	0.0E+00
anthophyllite (AN)	0	0.0E+00	0.0E+00
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	0	0.0E+00	0.0E+00
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	0	0.0E+00	0.0E+00
other mineral class (OM)	0	0.0E+00	0.0E+00
PCME (high+low mag)			
Total Asbestos	3	1.4E+02	4.6E+06
Total Chrysotile (CH)	3	1.4E+02	4.6E+06
Total Amphibole	0	0.0E+00	0.0E+00
actinolite (AC)	0	0.0E+00	0.0E+00
amosite (AM)	0	0.0E+00	0.0E+00
anthophyllite (AN)	0	0.0E+00	0.0E+00
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	0	0.0E+00	0.0E+00
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	0	0.0E+00	0.0E+00
other mineral class (OM)	0	0.0E+00	0.0E+00

Σ Asbestos Structure Mass (g)	Mass fraction (as %)
Total TEM	
WRTA	0.00E+00 0.0000%
OA	0.00E+00 0.0000%
CH	5.90E-08 #####
AC	0.00E+00 0.0000%
AM	0.00E+00 0.0000%
AN	0.00E+00 0.0000%
CR	0.00E+00 0.0000%
TR	0.00E+00 0.0000%
PCME	
WRTA	0.00E+00 0.0000%
OA	0.00E+00 0.0000%
CH	6.19E-11 0.9434%
AC	0.00E+00 0.0000%
AM	0.00E+00 0.0000%
AN	0.00E+00 0.0000%
CR	0.00E+00 0.0000%
TR	0.00E+00 0.0000%

Asbestos structure mass = Length • Width² • Density • 1E-12

LA Density = 3.1 g/cm³
OA Density = 3.0 g/cm³
CH Density = 2.6 g/cm³
AC Density = 3.1 g/cm³
AM Density = 3.5 g/cm³
AN Density = 3.0 g/cm³
CR Density = 3.3 g/cm³
TR Density = 3.0 g/cm³

Csoil (mass fraction, as %) = Σ Asbestos structure mass • Sensitivity • 100

Equations:

Filter Loading (s/mm²) = N / (GOx • Ago)
Sensitivity (1/g) = EFA / (GOx • Ago • M • f • Q_R)
Csoil (s/g) = N • Sensitivity

Asbestos Types:

AC - actinolite
AM - amosite
AN - anthophyllite
CH - chrysotile
CR - crocidolite
TR - tremolite
LA - Libby amphibole
OA - other amphibole
NAM - non-asbestos material
OM - other mineral type (specify in "other mineral description" field)

Structure Types:

High mag: Length ≥ 0.5 um, Aspect Ratio ≥ 3:1
PCME: Length > 5 um, Width ≥ 0.25 um, Aspect Ratio ≥ 3:1

Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394131_SO_03-17-15_150099_TEM-EPAISO_D_Recount Different.xlsm
FluidizedBedEDD_v1

TEM Asbestos Structure Count for Fluidized Bed Material -- ISO

ANALYTICAL REPORT

FILE NAME: Sumas Mtn Asbestos Methods - FBAS_LabCor Inc_14394131_SO_03-17-15_150099_TEM-EPAISO_D_Recount

SAMPLE INFORMATION		ANALYSIS PARAMETERS							
Field Sample Number 14394131		EFA (mm ²)	385						
Matrix Soil		GO area (mm ²) [Ago]	0.0104						
Field QC Type Not QC		# GOs counted - high mag	2						
Sample Mass (g dry wt) [M] 1.01		# GOs counted - low mag only	0						
Fluidized Bed Flow Ratio[Q _{FL}] 0.0122		F-factor [f]	1.00E+00						
Filter Status ANALYZED		Sensitivity - High mag	1.5E+06 1/g						
		Sensitivity - PCME (high+low mag)	1.5E+06 1/g						
ANALYSIS INFORMATION									
Lab Name LabCor Inc		Recording							
Lab Sample Number 150099-S32		Rules:							
Lab QC Type Recount Different		Initial (high mag)							
TEM Prep Method Direct		<table border="1"> <tr> <th>Min. AR</th> <th>Min length (um)</th> <th>Min width (um)</th> </tr> <tr> <td>3:1</td> <td>0</td> <td>0</td> </tr> </table>		Min. AR	Min length (um)	Min width (um)	3:1	0	0
Min. AR	Min length (um)	Min width (um)							
3:1	0	0							
Est. particulate loading on filter NA		PCME Supplemental (low mag)							
		<table border="1"> <tr> <th>Min. AR</th> <th>Min length (um)</th> <th>Min width (um)</th> </tr> <tr> <td>3:1</td> <td>0</td> <td>0</td> </tr> </table>		Min. AR	Min length (um)	Min width (um)	3:1	0	0
Min. AR	Min length (um)	Min width (um)							
3:1	0	0							
		Stopping							
		Rules:							
		<table border="1"> <tr> <th>Target S (1/g)</th> <th>Max Area (mm²)</th> <th>Max N</th> </tr> <tr> <td></td> <td></td> <td></td> </tr> </table>		Target S (1/g)	Max Area (mm ²)	Max N			
Target S (1/g)	Max Area (mm ²)	Max N							

RESULTS SUMMARY

Structure Metric	Observed Structure Count (s)	Structure Filter Loading (s/mm ²)	Soil Conc. Structures per gram (s/g)
High mag only			
Total Asbestos	161	7.8E+03	2.4E+08
Total Chrysotile (CH)	161	7.8E+03	2.4E+08
Total Amphibole	0	0.0E+00	0.0E+00
actinolite (AC)	0	0.0E+00	0.0E+00
amosite (AM)	0	0.0E+00	0.0E+00
anthophyllite (AN)	0	0.0E+00	0.0E+00
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	0	0.0E+00	0.0E+00
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	0	0.0E+00	0.0E+00
other mineral class (OM)	0	0.0E+00	0.0E+00
PCME (high+low mag)			
Total Asbestos	2	9.7E+01	3.0E+06
Total Chrysotile (CH)	2	9.7E+01	3.0E+06
Total Amphibole	0	0.0E+00	0.0E+00
actinolite (AC)	0	0.0E+00	0.0E+00
amosite (AM)	0	0.0E+00	0.0E+00
anthophyllite (AN)	0	0.0E+00	0.0E+00
crocidolite (CR)	0	0.0E+00	0.0E+00
tremolite (TR)	0	0.0E+00	0.0E+00
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	0.0E+00
other amphibole (OA)	0	0.0E+00	0.0E+00
other mineral class (OM)	0	0.0E+00	0.0E+00

Σ Asbestos Structure Mass (g)		Mass fraction (as %)
Total TEM		
WRTA	0.00E+00	0.0000%
OA	0.00E+00	0.0000%
CH	2.36E-07	#####
AC	0.00E+00	0.0000%
AM	0.00E+00	0.0000%
AN	0.00E+00	0.0000%
CR	0.00E+00	0.0000%
TR	0.00E+00	0.0000%
PCME		
WRTA	0.00E+00	0.0000%
OA	0.00E+00	0.0000%
CH	1.46E-10	2.2041%
AC	0.00E+00	0.0000%
AM	0.00E+00	0.0000%
AN	0.00E+00	0.0000%
CR	0.00E+00	0.0000%
TR	0.00E+00	0.0000%

Asbestos structure mass = Length • Width² • Density • 1E-12

LA Density = 3.1 g/cm³
OA Density = 3.0 g/cm³
CH Density = 2.6 g/cm³
AC Density = 3.1 g/cm³
AM Density = 3.5 g/cm³
AN Density = 3.0 g/cm³
CR Density = 3.3 g/cm³
TR Density = 3.0 g/cm³

Csoil (mass fraction, as %) = Σ Asbestos structure mass • Sensitivity • 100

Equations:

Filter Loading (s/mm²) = N / (GOx • Ago)
Sensitivity (1/g) = EFA / (GOx • Ago • M • f • Q_{FL})
Csoil (s/g) = N • Sensitivity

Asbestos Types:

AC - actinolite
AM - amosite
AN - anthophyllite
CH - chrysotile
CR - crocidolite
TR - tremolite
LA - Libby amphibole
OA - other amphibole
NAM - non-asbestos material
OM - other mineral type (specify in "other mineral description" field)

Structure Types:

High mag: Length ≥ 0.5 um, Aspect Ratio ≥ 3:1
PCME: Length > 5 um, Width ≥ 0.25 um, Aspect Ratio ≥ 3:1

Sumas Mtn Asbestos Methods - FBAS_Labcor Inc_NA_SO_03-30-15_Q150099g_TEM-EPAISO__D_Lab Blank.xlsm
FluidizedBedEDD_v1

**TEM Asbestos Structure Count for Fluidized Bed Material -- ISO
ANALYTICAL REPORT**

FILE NAME: Sumas Mtn Asbestos Methods - FBAS_Labcor Inc_NA_SO_03-30-15_Q150099g_TEM-EPAISO__D_Lab Blank.x

SAMPLE INFORMATION		ANALYSIS PARAMETERS							
Field Sample Number	NA	EFA (mm ²)	385						
Matrix	Soil	GO area (mm ²) [Ago]	0.0104						
Field QC Type	PB	# GOs counted - high mag	10						
Sample Mass (g dry wt) [M]	0.00	# GOs counted - low mag only	0						
Fluidized Bed Flow Ratio[Q _{FL}]	0	F-factor [f]	1.00E+00						
Filter Status	ANALYZED	Sensitivity - High mag	1/g						
		Sensitivity - PCME (high+low mag)	1/g						
ANALYSIS INFORMATION									
Lab Name Labcor Inc		Recording							
Lab Sample Number Q150099g-B1		Rules:							
Lab QC Type Lab Blank		Initial (high mag)							
TEM Prep Method Direct		<table border="1"> <tr> <th>Min. AR</th> <th>Min length (um)</th> <th>Min width (um)</th> </tr> <tr> <td>3:1</td> <td>0</td> <td>0</td> </tr> </table>		Min. AR	Min length (um)	Min width (um)	3:1	0	0
Min. AR	Min length (um)	Min width (um)							
3:1	0	0							
Est. particulate loading on filter NA		PCME Supplemental (low mag)							
		<table border="1"> <tr> <th>Min. AR</th> <th>Min length (um)</th> <th>Min width (um)</th> </tr> <tr> <td>3:1</td> <td>0</td> <td>0</td> </tr> </table>		Min. AR	Min length (um)	Min width (um)	3:1	0	0
Min. AR	Min length (um)	Min width (um)							
3:1	0	0							
		Stopping Rules:							
		<table border="1"> <tr> <th>Target S (1/g)</th> <th>Max Area (mm²)</th> <th>Max N</th> </tr> <tr> <td></td> <td></td> <td></td> </tr> </table>		Target S (1/g)	Max Area (mm ²)	Max N			
Target S (1/g)	Max Area (mm ²)	Max N							

RESULTS SUMMARY

Structure Metric	Observed Structure Count (s)	Structure Filter Loading (s/mm ²)	Soil Conc. Structures per gram (s/g)
High mag only			
Total Asbestos	0	0.0E+00	---
Total Chrysotile (CH)	0	0.0E+00	---
Total Amphibole	0	0.0E+00	---
actinolite (AC)	0	0.0E+00	---
amosite (AM)	0	0.0E+00	---
anthophyllite (AN)	0	0.0E+00	---
crocidolite (CR)	0	0.0E+00	---
tremolite (TR)	0	0.0E+00	---
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	---
other amphibole (OA)	0	0.0E+00	---
other mineral class (OM)	0	0.0E+00	---
PCME (high+low mag)			
Total Asbestos	0	0.0E+00	---
Total Chrysotile (CH)	0	0.0E+00	---
Total Amphibole	0	0.0E+00	---
actinolite (AC)	0	0.0E+00	---
amosite (AM)	0	0.0E+00	---
anthophyllite (AN)	0	0.0E+00	---
crocidolite (CR)	0	0.0E+00	---
tremolite (TR)	0	0.0E+00	---
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	---
other amphibole (OA)	0	0.0E+00	---
other mineral class (OM)	0	0.0E+00	---

Σ Asbestos Structure Mass (g)	Mass fraction (as %)
Total TEM	
WRTA	0.00E+00
OA	0.00E+00
CH	0.00E+00
AC	0.00E+00
AM	0.00E+00
AN	0.00E+00
CR	0.00E+00
TR	0.00E+00
PCME	
WRTA	0.00E+00
OA	0.00E+00
CH	0.00E+00
AC	0.00E+00
AM	0.00E+00
AN	0.00E+00
CR	0.00E+00
TR	0.00E+00

Asbestos structure mass = Length • Width² • Density • 1E-12

LA Density = 3.1 g/cm³
OA Density = 3.0 g/cm³
CH Density = 2.6 g/cm³
AC Density = 3.1 g/cm³
AM Density = 3.5 g/cm³
AN Density = 3.0 g/cm³
CR Density = 3.3 g/cm³
TR Density = 3.0 g/cm³

Csoil (mass fraction, as %) = Σ Asbestos structure mass • Sensitivity • 100

Equations:

Filter Loading (s/mm²) = N / (GOx • Ago)
Sensitivity (1/g) = EFA / (GOx • Ago • M • f • Q_{FL})
Csoil (s/g) = N • Sensitivity

Asbestos Types:

AC - actinolite
AM - amosite
AN - anthophyllite
CH - chrysotile
CR - crocidolite
TR - tremolite
LA - Libby amphibole
OA - other amphibole
NAM - non-asbestos material
OM - other mineral type (specify in "other mineral description" field)

Structure Types:

High mag: Length ≥ 0.5 um, Aspect Ratio ≥ 3:1
PCME: Length > 5 um, Width ≥ 0.25 um, Aspect Ratio ≥ 3:1

Sumas Mtn Asbestos Methods - FBAS Labcor Inc_NA_SO_03-30-15_Q150099h_TEM-EPAISO_D_Lab Blank.xlsm
FluidizedBedEDD_v1

**TEM Asbestos Structure Count for Fluidized Bed Material -- ISO
ANALYTICAL REPORT**

FILE NAME: Sumas Mtn Asbestos Methods - FBAS Labcor Inc_NA_SO_03-30-15_Q150099h_TEM-EPAISO_D_Lab Blank.x

SAMPLE INFORMATION		ANALYSIS PARAMETERS	
Field Sample Number NA		EFA (mm ²)	385
Matrix Soil		GO area (mm ²) [Ago]	0.0104
Field QC Type PB		# GOs counted - high mag	10
Sample Mass (g dry wt) [M] 0.00		# GOs counted - low mag only	0
Fluidized Bed Flow Ratio[Q _R] 0		F-factor [f]	1.00E+00
Filter Status ANALYZED		Sensitivity - High mag	1/g
		Sensitivity - PCME (high+low mag)	1/g
ANALYSIS INFORMATION			
Lab Name Labcor Inc		Recording	
Lab Sample Number Q150099H-B2		Rules:	
Lab QC Type Lab Blank		Initial (high mag)	
TEM Prep Method Direct		Min. AR	Min length (um)
Est. particulate loading on filter NA		3:1	0
		Min width (um)	0
		PCME Supplemental (low mag)	
		Min. AR	Min length (um)
		3:1	0
		Min width (um)	0
		Stopping	
		Rules:	
		Target S (1/g)	Max Area (mm ²)
			Max N

RESULTS SUMMARY

Structure Metric	Observed Structure Count (s)	Structure Filter Loading (s/mm ²)	Soil Conc. Structures per gram (s/g)
High mag only			
Total Asbestos	0	0.0E+00	---
Total Chrysotile (CH)	0	0.0E+00	---
Total Amphibole	0	0.0E+00	---
actinolite (AC)	0	0.0E+00	---
amosite (AM)	0	0.0E+00	---
anthophyllite (AN)	0	0.0E+00	---
crocidolite (CR)	0	0.0E+00	---
tremolite (TR)	0	0.0E+00	---
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	---
other amphibole (OA)	0	0.0E+00	---
other mineral class (OM)	0	0.0E+00	---
PCME (high+low mag)			
Total Asbestos	0	0.0E+00	---
Total Chrysotile (CH)	0	0.0E+00	---
Total Amphibole	0	0.0E+00	---
actinolite (AC)	0	0.0E+00	---
amosite (AM)	0	0.0E+00	---
anthophyllite (AN)	0	0.0E+00	---
crocidolite (CR)	0	0.0E+00	---
tremolite (TR)	0	0.0E+00	---
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	---
other amphibole (OA)	0	0.0E+00	---
other mineral class (OM)	0	0.0E+00	---

Σ Asbestos Structure Mass (g)	Mass fraction (as %)
Total TEM	
WRTA	0.00E+00
OA	0.00E+00
CH	0.00E+00
AC	0.00E+00
AM	0.00E+00
AN	0.00E+00
CR	0.00E+00
TR	0.00E+00
PCME	
WRTA	0.00E+00
OA	0.00E+00
CH	0.00E+00
AC	0.00E+00
AM	0.00E+00
AN	0.00E+00
CR	0.00E+00
TR	0.00E+00

Asbestos structure mass = Length • Width² • Density • 1E-12

LA Density = 3.1 g/cm³
OA Density = 3.0 g/cm³
CH Density = 2.6 g/cm³
AC Density = 3.1 g/cm³
AM Density = 3.5 g/cm³
AN Density = 3.0 g/cm³
CR Density = 3.3 g/cm³
TR Density = 3.0 g/cm³

Csoil (mass fraction, as %) = Σ Asbestos structure mass • Sensitivity • 100

Equations:

Filter Loading (s/mm²) = N / (GOx • Ago)
Sensitivity (1/g) = EFA / (GOx • Ago • M • f • Q_R)
Csoil (s/g) = N • Sensitivity

Asbestos Types:

AC - actinolite
AM - amosite
AN - anthophyllite
CH - chrysotile
CR - crocidolite
TR - tremolite
LA - Libby amphibole
OA - other amphibole
NAM - non-asbestos material
OM - other mineral type (specify in "other mineral description" field)

Structure Types:

High mag: Length ≥ 0.5 um, Aspect Ratio ≥ 3:1
PCME: Length > 5 um, Width ≥ 0.25 um, Aspect Ratio ≥ 3:1

Sumas Mtn Asbestos Methods - FBAS_Labcor Inc_NA_SO_03-30-15_Q150099I_TEM-EPAISO_D_Lab Blank.xlsm
FluidizedBedEDD_v1

**TEM Asbestos Structure Count for Fluidized Bed Material -- ISO
ANALYTICAL REPORT**

FILE NAME: Sumas Mtn Asbestos Methods - FBAS_Labcor Inc_NA_SO_03-30-15_Q150099I_TEM-EPAISO_D_Lab Blank.xl

SAMPLE INFORMATION		ANALYSIS PARAMETERS	
Field Sample Number	NA	EFA (mm ²)	385
Matrix	Soil	GO area (mm ²) [Ago]	0.0104
Field QC Type	PB	# GOs counted - high mag	10
Sample Mass (g dry wt) [M]	0.00	# GOs counted - low mag only	0
Fluidized Bed Flow Ratio[Q _{FL}]	0	F-factor [f]	1.00E+00
Filter Status	ANALYZED	Sensitivity - High mag	1/g
		Sensitivity - PCME (high+low mag)	1/g
ANALYSIS INFORMATION			
Lab Name	Labcor Inc	Recording	
Lab Sample Number	Q150099I-B3	Rules:	
Lab QC Type	Lab Blank	Initial (high mag)	
TEM Prep Method	Direct	Min. AR	Min length (um)
Est. particulate loading on filter	NA	3:1	0
		Min width (um)	0
		PCME Supplemental (low mag)	
		Min. AR	Min length (um)
		3:1	0
		Min width (um)	0
		Stopping	
		Rules:	
		Target S (1/g)	Max Area (mm ²)
			Max N

RESULTS SUMMARY

Structure Metric	Observed Structure Count (s)	Structure Filter Loading (s/mm ²)	Soil Conc. Structures per gram (s/g)
High mag only			
Total Asbestos	0	0.0E+00	---
Total Chrysotile (CH)	0	0.0E+00	---
Total Amphibole	0	0.0E+00	---
actinolite (AC)	0	0.0E+00	---
amosite (AM)	0	0.0E+00	---
anthophyllite (AN)	0	0.0E+00	---
crocidolite (CR)	0	0.0E+00	---
tremolite (TR)	0	0.0E+00	---
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	---
other amphibole (OA)	0	0.0E+00	---
other mineral class (OM)	0	0.0E+00	---
PCME (high+low mag)			
Total Asbestos	0	0.0E+00	---
Total Chrysotile (CH)	0	0.0E+00	---
Total Amphibole	0	0.0E+00	---
actinolite (AC)	0	0.0E+00	---
amosite (AM)	0	0.0E+00	---
anthophyllite (AN)	0	0.0E+00	---
crocidolite (CR)	0	0.0E+00	---
tremolite (TR)	0	0.0E+00	---
winchite/richterite/tremolite/actinolite (WRTA)	0	0.0E+00	---
other amphibole (OA)	0	0.0E+00	---
other mineral class (OM)	0	0.0E+00	---

Σ Asbestos Structure Mass (g)	Mass fraction (as %)
Total TEM	
WRTA	0.00E+00
OA	0.00E+00
CH	0.00E+00
AC	0.00E+00
AM	0.00E+00
AN	0.00E+00
CR	0.00E+00
TR	0.00E+00
PCME	
WRTA	0.00E+00
OA	0.00E+00
CH	0.00E+00
AC	0.00E+00
AM	0.00E+00
AN	0.00E+00
CR	0.00E+00
TR	0.00E+00

Asbestos structure mass = Length • Width² • Density • 1E-12

LA Density = 3.1 g/cm³
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CH Density = 2.6 g/cm³
AC Density = 3.1 g/cm³
AM Density = 3.5 g/cm³
AN Density = 3.0 g/cm³
CR Density = 3.3 g/cm³
TR Density = 3.0 g/cm³

Csoil (mass fraction, as %) = Σ Asbestos structure mass • Sensitivity • 100

Equations:

Filter Loading (s/mm²) = N / (GOx • Ago)
Sensitivity (1/g) = EFA / (GOx • Ago • M • f • Q_{FL})
Csoil (s/g) = N • Sensitivity

Asbestos Types:

AC - actinolite
AM - amosite
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CH - chrysotile
CR - crocidolite
TR - tremolite
LA - Libby amphibole
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Structure Types:

High mag: Length ≥ 0.5 um, Aspect Ratio ≥ 3:1
PCME: Length > 5 um, Width ≥ 0.25 um, Aspect Ratio ≥ 3:1