

Erskine Environmental Consulting

Geologic Investigations Hazardous Materials Naturally Occurring Asbestos

TECHNICAL MEMORANDUM

September 23, 2019

Subject: Comments:

-DEP Comment Regarding Heavy Equipment Loadout

-Review of DEP Reanalysis OF Asbestos Test Results by TEM Methodology

Rockhill Quarry

East Rockhill Township

Bucks County, PA

This memorandum provides comments and recommendations regarding two documents that have been issued since EEC's review of RJ Lee's asbestos test results dated September 1, 2019:

1. Message from Mr. Stefanko of the Pennsylvania Department of Environmental Protection (DEP) regarding the off loading of heavy equipment on the Rockhill Quarry site (received by the Rockhill Environmental Protection Alliance (REPA) on September 18, 2019),
2. Reanalysis of selected soil and rock samples by EMSL Laboratories for DEP dated August 21, 2019.

These comments are supplementary to and augment comments provided in two previous memoranda:

1. Review of Qualitative Geologic Survey Sampling Plan, Rockhill Quarry, East Rockhill Township, Bucks County, PA: Erskine Environmental Consulting (EEC) dated June 6, 2019.
2. Review of Asbestos Test Results, Rockhill Quarry, East Rockhill Township, Bucks County, PA: Erskine Environmental Consulting (EEC) dated September 1, 2019.

These comments are intended to be a brief summary of findings. The basis for many of the findings and opinions have been discussed in detail within the two previous memoranda submitted by EEC, and the recipients of this memo are referred to those documents where additional explanation is needed.

1. Document Number 1: Follow up message submitted to REPA by Mr. Stefanko of the DEP on September 18, 2019.

The following is the comment by Mr. Stenfanko according to the email that was forwarded to EEC:

On September 12, 2019, DEP was informed that an oversized delivery had been made to the Rock Hill Quarry. Upon investigation, DEP learned that the equipment delivery to the site was

an excavator that is not currently needed for the turnpike project and is being stored at the quarry.

DEP understands there are ongoing community concerns regarding the site and any activity that occurs. Due to the nature of the delivery and low speed of travel, it is unlikely there was any significant disturbance of asbestos. Moving or unloading this type of heavy equipment is common and done in a meticulous manner.

In order to alleviate concerns, moving forward, Hanson and/or RE Pierson will be required to notify and receive approval from DEP prior to moving equipment, either onto or from the site.

Comment No. 1-1: *“Due to the nature of the delivery and low speed of travel, it is unlikely there was any significant disturbance of asbestos”.*

Reducing speeds on unpaved surfaces is a standard practice to reduce asbestos emissions, and speed limits are a standard best management practice to control dust. However, speed is not the only factor that contributes to uncontrolled dust. Larger vehicles produce a higher dust plume than smaller vehicles. Larger vehicles are heavier, and the depth of disturbance is greater, which impacts a higher volume of soil. There are a greater number of tires, and semi-trailer trucks that haul heavy equipment such as large excavators are often 18-wheelers, which produce more dust than standard vehicles with four tires. Due to the larger tire size, the surface area of each wheel that contacts the ground is greater, generating more dust than smaller wheels on standard vehicles. The area under the semi-trailer is greater, and the turbulence created under the semi-trailer is greater. Large trucks therefore produce significantly more dust than small vehicles at the same speed.

It should be recognized that asbestos is one of the few Federally-listed carcinogens, and it needs to be respected as such. The well-established connection between mesothelioma, asbestosis and lung cancer to asbestos, combined with significant public concern, has led to numerous laws, regulations and standards of practice related to asbestos disturbance. The OSHA asbestos standard in the construction industry is an excellent example where reliance on perception and visible observation is not allowed. On a site where asbestos in any concentration is disturbed, the employer must conduct an Initial Exposure Assessment (IEA) of each activity that disturbs asbestos. An IEA, which includes personal air monitoring, must be conducted before any determination regarding respiratory protection is made. Wet methods must be employed (in this case, the wetting of roads). Workers, including truck drivers, require documented awareness training. Also, OSHA requires that all feasible engineering controls be in place before a decision is made that respirators are not required, and this determination must be based on air monitoring data only.

Comment 1-2: *“Moving or unloading this type of heavy equipment is common and done in a meticulous manner”.*

It is true that loading and unloading of heavy equipment is done in a meticulous manner. Heavy equipment is remarkably expensive, and even minor damage can bring high costs. However, minimizing dust generation is perhaps one of the least concerns to contractors. It should also be noted that in construction, time is money. There is a great financial incentive to drive to and on the site as fast as possible, and drive off as fast as possible. An asbestos dust mitigation plan (ADMP) that includes the wetting of roads and speed limits, asbestos awareness training and instruction regarding the elements of the ADMP, and oversight and enforcement is a fundamental requirement at asbestos sites. Training and decontamination procedures is paramount to prevent

contractors from inadvertently bringing dust home and exposing family members to asbestos. It should be pointed out that Union organizations, who are very concerned with health and safety of workers, fully support adherence to asbestos regulations and standards.

Recommendations

An ADMP that specifies dust control measures, training and oversight should be prepared and implemented before any activity that disturbs soil in any amount occurs. All workers that enter the site should conduct work in accordance to regulations and standards for construction on asbestos sites. Please refer to discussions provided in the previous EEC documents for details.

2. Document Number 2: EMSL's Re-Analysis of Selected Samples by both Polarizing Light Microscopy (PLM) and Transmission Electron Microscopy (TEM)

The attached table summarizes the asbestos test results of the initial investigation and the recent reanalysis of selected samples.

On the left of the table are the test results of the initial RJ Lee report. On the right are the test results of the reanalysis by EMSL, with the PLM results highlighted in gray and the TEM results highlighted in yellow. In both cases, the results for asbestos, "non-asbestos", and total are broken out. Details regarding the methodology, limitations and advantages of each method, as well as a discussion regarding what each are measuring, is provided in detail within EEC's previous test review that is cited above. The following are some observations regarding the sample results. Again, details that support the observations may be found in the previous document that reviewed the RJ Lee results.

Comment 2-1: The PLM results of the RJ Lee and EMSL analyses do not appear to be consistent.

This inconsistency is not unexpected. As discussed in the previous review of the RJ Lee test results, the PLM method cannot detect fine particles, and the point counting protocol carries a high error. It was originally designed to quantify asbestos in building materials where large amounts of asbestos were applied. Naturally Occurring Asbestos (NOA) is much more complex and its properties are not equivalent to commercially exploitable asbestos. As was done at EMSL, it should be used as a first order analysis, followed by TEM.

Comment 2-2: The EMSL TEM results do not appear to be consistent with either the EMSL or RJ Lee PLM results.

This inconsistency is expected. The two methods measure two very different things. The PLM concentration is related to surface area percent where the TEM analysis is a measurement of concentration by weight. Both of the measurements provide information, but the TEM method is the only one that measures a true concentration. Please see comment 2-3 that suggests one additional reason for the inconsistency (inaccuracy). Details regarding this subject are provided in the review of the RJ Lee test results.

Comment 2-3: The target analytical sensitivity (0.1% by weight) is too low to provide accurate and reproducible data, and the scanning method likely contributed to this error.

The Analytical Sensitivity (AS) is not a limit of detection. It is defined as the concentration of a unit fiber that is detected within the area scanned during the analysis. For air samples, where fibers of different sizes are counted with equivalence, the AS should be one-tenth of the target concentration. For soil samples, where the weight of each fiber is dependent on size, the AS

needs to be at least 1/100th of the target concentration, and in many cases, 1/1000th of the target concentration. Thus, the AS should have been 0.001% to 0.0001% by weight. The target AS of 0.1%, usually targeted because of analytical cost considerations, produces data with a high error and a result that is not reproducible. In samples where short fibers are predominant, as is likely the case with the Rockhill samples, the result tends to under estimate the asbestos concentration. There are methods, such as the phased magnification method, that can be employed to produce more accurate data with low cost impacts.

Comment 2-4: The Analytical Sensitivity of 0.1% was incorrectly specified as a reporting limit, which under reported the concentration of asbestos in many samples.

The Analytical Sensitivity is not a reporting limit, as used by EMSL. Traditionally, a report of “less than” (<) a value, in this case, <0.1%, is reported when no asbestos was detected. Where fibers were counted, and the concentration was less than 0.1%, EMSL reported “<0.1%” instead of the concentration that was calculated.

An example can be found in the first lab report by EMSL (attached) for the sample no. RH#33. Note that two asbestos fibers of tremolite and 17 asbestos fibers of actinolite were observed, however, the concentration of these fibers was reported as “<0.1%”. Apparently, the concentration was below 0.1%, and rather than reporting the measured concentration, <0.1% was reported. This would normally mean that no asbestos was present, but it certainly is not the case. All concentrations are valid, even when below the AS. The result is an inappropriate and arbitrary under reporting of asbestos in several samples. These samples are identified by the comment regarding unreported fibers in the notes column of the attached table.

Comment 2-5: Like RJ Lee, EMSL used a differential counting method that is not allowed by the test method and under-estimates the concentration of asbestos.

As discussed in the EEC review of the sampling work plan and RJ Lee results, differential counting practices under report the concentration of asbestos are not allowed by the EPA test methods that were selected, not published for peer review, and accepted by neither EPA nor NIOSH (concentrations within the two categories are found on the attached table as “asbestos” and “non-asbestos” columns). There is no approved test method to differentiate fibers that were created by the parting of amphiboles that crystallized in the asbestiform habit from those produced by cleaving along planes of weakness (generally referred to as cleavage fragments). Thus, the methodology is proprietary, and likely not consistent between the laboratories that employ them. TEM analysis, in particular, cannot distinguish the two morphologies, so it is unclear how EMSL could possibly separate reported amphiboles into the two categories. Review of the laboratory bench sheets suggest that the average aspect ratio of fibers (length divided by width) was used as a differentiator, which has no utility in asbestos determinations, particularly when the test method dictates that all fibers with an aspect ratio of greater than 3:1 be counted.

The intent of the very few laboratories who employ these methods, and of clients that request them, is uncertain. In any case, the result is the under reporting of regulated asbestos as would be normally reported by the EPA test methods that were employed by both laboratories. The actual asbestos concentration, assuming that the data is reliable, is the sum of the asbestos and “non-asbestos” columns, labeled in the attached table as Total Asbestos. These concentrations should be regarded as the lower estimate of asbestos concentrations in the rocks and soil that were analyzed.

Conclusions and Recommendations

Review of the EMSL test results indicate that the test methodologies, particularly the TEM results, are likely not reliable nor reproducible. In particular, the use of an in-house and unpublished method that attempts to differentiate fibers by morphology severely under reported the true asbestos concentrations, as would normally be reported by the test methods that were employed.

Regardless, one fact emerges from both the EMSL and RJ Lee analyses: Regulated actinolite and subordinate tremolite asbestos is present in the rocks underlying the Rockhill quarry site, and the concentrations are sufficiently high to produce a potential adverse health impact to workers at the site, residents near the site, and particularly children attending schools near the site. The site is considered an NOA site, and all relevant asbestos regulations and standards of practice apply when disturbing these materials.

The results support the recommendations that were documented in EEC's review of the asbestos testing work plan and review of the RJ Lee analyses. These include, but are not limited to the following (see the referenced documents for details):

- A work plan for the geologic investigation of the site needs to be prepared, reviewed and implemented to characterize the asbestos concentrations in each rock unit. The testing should be conducted by an experienced laboratory that follows strict protocols as required by EPA test methods, and not deviate by using differential counting methods.
- Following the asbestos investigation, soil or rock disturbance should not occur until an ADMP is prepared, reviewed, and approved by the DEP.
- Consider Activity-Based Sampling (ABS) prior to construction to measure asbestos emissions that may be anticipated during construction.
- Worker protection procedures should be implemented in compliance with the appropriate lead agencies regulations, presumably the Mine Safety and Health Administration (MSHA) or the Occupational Safety and Health Administration (OSHA).
- An air monitoring program that includes perimeter monitoring and monitoring of roads that are used by haul trucks through the Rockhill Township should be developed and implemented. Consider predictive air modeling that may assist in the design of the air monitoring program, and set risk-based thresholds to document exposures to residents and children at nearby schools.
- Consider using an alternative quarry located near the project site. This would eliminate the potential health risk caused by activities at the Rockhill Quarry.



Bradley G. Erskine, Ph.D., CEG
Erskine Environmental Consulting

Summary of Asbestos Testing
Original PLM Testing by R.J. Lee.

Sample ID	Asbestos	"Non-Asbestos" Fibers	Total Asbestos (EPA Criteria)
June 26 2019 lab sample May 30 2019			
#1 - CB-1 #1	0.2	0.1	0.3
#2 - CB-1 #3	ND	0.2	0.2
#3 - CB-2#4	ND	0.2	0.2
#4 - CB-2#5	ND	0.1	0.1
#5 - CB-2 #6	0.1	0.3	0.4
#6 - CB-3 #7	ND	0.3	0.3
#7 - CB-3 #8	ND	0.2	0.2
#8 - CB-3 #9	ND	<0.1	0.05
#9 - CB-4 #10	ND	<0.1	0.05
June 26 2019 lab sample June 3 2019			
1 - RH #1	ND	<0.1	0.05
2 - RH#2	<0.1	0.5	0.505
3 - RH#3	ND	<0.1	0.05
4 - RH#4	ND	<0.1	0.05
5 - RH#5	ND	<0.1	0.05
6 - RH#6	ND	<0.1	0.05
7 - RH#7	<0.1	<0.1	0.1
8 - RH#8	ND	<0.1	0.05
9 - RH#10	ND	<0.1	0.05
10 - RH#11	<0.1	<0.1	0.1
11 - RH #12	<0.1	0.3	0.305
12 - RH #14	<0.1	0.5	0.505
13 - RH#18	ND	<0.1	0.05
June 27 2019 lab sample May 30 2019			
#1 - DB-1	0.1	0.2	0.3
#2 - DB-2	ND	ND	0
#3 - DB-3	ND	ND	0
#4 - DB-4	ND	ND	0
#1 - Hand Sample #1	ND	0.1	0.1
#2 - Hand Sample #2	ND	ND	0
#3 - Vein 7	0.1	0.4	0.5
June 27 2019 lab sample June 3 2019			
14 - RH #22	ND	<0.1	0.05
15 - RH #23	ND	<0.1	0.05
16 - RH #24	ND	ND	0
17 - RH #25	ND	<0.1	0.05
18 - RH #26	<0.1	ND	0.05
19 - RH #27	ND	ND	0
20 - RH #28	ND	ND	0
21 - RH #29	<0.1	0.2	0.205
22 - RH #30	ND	0.2	0.2
23 - RH #31	ND	0.2	0.2
24 - RH #32	ND	0.3	0.3
25 - RH #33	ND	0.8	0.8

Notes:
Asbestos= Concentrations reported as "asbestos" by the laboratory
Non-Asbestos Fibers= Concentrations reported as "non-asbestos fibers" by the laboratory
Total Asbestos= Concentrations calculated using EPA criteria.
 ND= No fibers detected.
 <0.1= Fibers detected but none fell on one of the 1,000 counting points.
Average Concentrations: The average concentrations were calculated using a value of 1/2 the limit of quantitation for trace concentrations (<0.1%) and zero for samples where no asbestos was detected.

Summary of Asbestos Testing
PLM and TEM Analyses by EMSL

Re-Analysis by PLM			Re-Analysis by TEM			NOTES
EMSL Reanalysis (PLM- Asbestos)	EMSL Reanalysis (PLM- "Non-Asbestos")	Total Asbestos (PLM- EPA Criteria)	EMSL Reanalysis (TEM-Asbestos)	EMSL Reanalysis (TEM-Non-Asbestos)	Total Asbestos (TEM- EPA Criteria)	
Reanalyses of Selected Samples by EMSL						
0.0	3.0	3.0	3.3	0.8	4.1	
0.0	5.0	5.0	0.5	<0.1	0.5	19 "non-asbestos" fibers were counted but not reported.
0.0	4.0	4.0	0.6	<0.1	0.6	11 "non-asbestos" fibers were counted but not reported.
0.0	5.0	5.0	0.2	<0.1	0.2	12 "non-asbestos" fibers were counted but not reported.
0.0	5.0	5.0	<0.1	0.2	0.2	
0.0	3.0	3.0	<0.1	<0.1	<0.1	one asbestos and one "non-asbestos" fibers were counted but not reported.
0.0	0.0	0.0	0.7	0.1	0.8	
0.0	3.0	3.0	0.6	0.2	0.8	
18.0	10.0	28.0	19.1	5.4	24.5	
0.0	3.0	3.0	<0.1	<0.1	<0.1	19 asbestos and 18 "non-asbestos" fibers were counted but not reported.
Notes: Asbestos: Concentrations reported as "asbestos" by the laboratory Non-Asbestos Fibers: Concentrations reported as "non-asbestos fibers" by the laboratory Total Asbestos: Concentrations calculated using EPA criteria. ND= No fibers detected. <0.1= Fibers detected but none fell on one of the 1,000 counting points (PLM) or not detected within the scan area (TEM). Total Asbestos Concentration: The average concentrations were calculated using a value of 0.5 where <0.1% asbestos was reported.						

Notes:
Asbestos= Concentrations reported as "asbestos" by the laboratory
Non-Asbestos Fibers= Concentrations reported as "non-asbestos fibers" by the laboratory
Total Asbestos= Concentrations calculated using EPA criteria.
 ND= No fibers detected.
 <0.1= Fibers detected but none fell on one of the 1,000 counting points (PLM) or not detected within the scan area (TEM).
Total Asbestos Concentration: The average concentrations were calculated using a value of 0.5 where <0.1% asbestos was reported.

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Asbestos Chain of Custody

EMSL Order Number (Lab Use Only):

041922026

EMSL ANALYTICAL, INC.
5221 MILITIA HILL ROAD
PLYMOUTH MEETING, PA 19462
PHONE: (610) 828-3102
FAX: (610) 828-3122

Company Name: PA Dept. of Environmental Protection		EMSL Customer ID: PADP42	
Street: SW Laurel Blvd		City: Pottsville	State/Province: PA
Zip/Postal Code: 17901	Country: US	Telephone #: 570-621-3118	Fax #: 570-621-3110
Report To (Name): Gary Latscha		Please Provide Results: ☐ Fax ☒ Email	
Email Address: g.latscha@pa.gov		Purchase Order:	
Project Name/Number: Rockhill Quarry		EMSL Project ID (Internal Use Only):	
U.S. State Samples Taken: PA		CT Samples: ☐ Commercial/Taxable ☐ Residential/Tax Exempt	
EMSL-Bill to: ☒ Same ☐ Different - If Bill to is Different note instructions in Comments** Third Party Billing requires written authorization from third party			
Turnaround Time (TAT) Options* - Please Check			
☐ 3 Hour ☐ 6 Hour ☐ 24 Hour ☐ 48 Hour ☐ 72 Hour ☐ 96 Hour ☐ 1 Week ☒ 2 Week			
*For TEM Air 3 hr through 6 hr, please call ahead to schedule *There is a premium charge for 3 Hour TEM AHERA or EPA Level II TAT. You will be asked to sign an authorization form for this service. Analysis completed in accordance with EMSL's Terms and Conditions located in the Analytical Process Guide.			
PCM - Air ☐ Check if samples are from NY ☐ NIOSH 7400 ☐ w/ OSHA 8hr. TWA PLM - Bulk (reporting limit) ☐ PLM EPA 600/R-93/116 (<1%) ☐ PLM EPA NOB (<1%) Point Count ☐ 400 (<0.25%) ☐ 1000 (<0.1%) Point Count w/Gravimetric ☐ 400 (<0.25%) ☐ 1000 (<0.1%) ☐ NYS 198.1 (friable in NY) ☐ NYS 198.6 NOB (non-friable-NY) ☐ NYS 198.8 SOF-V ☐ NIOSH 9002 (<1%)		TEM - Air ☐ 4-4.5hr TAT (AHERA only) ☐ AHERA 40 CFR, Part 763 ☐ NIOSH 7402 ☐ EPA Level II ☐ ISO 10312 TEM - Bulk ☐ TEM EPA NOB ☐ NYS NOB 198.4 (non-friable-NY) ☐ Chatfield SOP ☐ TEM Mass Analysis-EPA 600 sec. 2.5 TEM - Water: EPA 100.2 Fibers >10µm ☐ Waste ☐ Drinking All Fiber Sizes ☐ Waste ☐ Drinking	
TEM - Dust ☐ Microvac - ASTM D 5755 ☐ Wipe - ASTM D6480 ☐ Carpet Sonication (EPA 600/J-93/167) Soil/Rock/Vermiculite ☐ PLM EPA 600/R-93/116 with milling prep (<1%) ☒ PLM EPA 600/R-93/116 with milling prep (<0.25%) ☒ TEM EPA 600/R-93/116 with milling prep (<0.1%) ☐ TEM Qualitative via Filtration Prep ☐ TEM Qualitative via Drop Mount Prep ☐ Cincinnati Method EPA 600/R-04/004 - PLM/TEM (BC only) Other: ☐		RECEIVED EMSL ANALYTICAL, INC. JUL 30 2019	
☐ Check For Positive Stop - Clearly Identify Homogenous Group		Filter Pore Size (Air Samples): ☐ 0.8µm ☐ 0.45µm	
Samplers Name:		Samplers Signature:	
Sample #	Sample Description	Volume/Area (Air) HA # (Bulk)	Date/Time Sampled
PH # 33	rock		5/13/19 0830
DB -4	69.0' - core sample - rock		5/23/19 1248
HS # 2	bench zero trench - rock		5/15/19 1050
CB-3 # 8	core sample - rock		5/23/19 1203
CB-1 # 1	core sample - rock		5/23/19 1123
Client Sample # (s):		Total # of Samples: 10	
Relinquished (Client): Amiee Bollinger		Date: 7/30/19	Time: 0938
Received (Lab): Meredith H. H. H.		Date: 7/30/19	Time: 9:38 AM
Comments/Special Instructions: Disk milling on all samples - See attached quote sheet for methods			

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Asbestos Chain of Custody

EMSL Order Number (*Lab Use Only*):

041922026

EMSL ANALYTICAL, INC.
521 PLYMOUTH ROAD
SUITE 107
PLY MTG, PA 19462
PHONE: (610) 828-3102
FAX: (610) 828-3122

Additional Pages of the Chain of Custody are only necessary if needed for additional sample information

[illegible]



EMSL ANALYTICAL, INC.

<http://www.emsl.com>

800-220-3675

EMSL ANALYTICAL, INC.
Confidential Pricing
PA Dept of Environmental Protection
Customer ID: PADP42
July 30, 2019



Locally Focused...
 ...Nationally Recognized

041922026

Attention:
Gary Latsha
 PA Dept of Environmental Protection
 5 Laurel Blvd.
 Pottsville, PA 17901
 570-274-2464
 glatsha@pa.gov

Contact:
Gary Perlmutter, Regional Account Manager
 EMSL Analytical, Inc.
 200 Route 130 North
 Cinnaminson, NJ 08077
 (856) 303-2530

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 CINNAMINSON, N.J.
 2019 JUL 30 P

Asbestos Laboratory Services¹

SOIL / ROCK / VERMICULITE METHODS	3 Hr	6 Hr	24 Hr	48 Hr	72 Hr	96 Hr	1 Wk	2 Wk
PLM by EPA/600/R-93/116 with Milling Prep Level A (400 Point Count, reporting limit to <0.25%)	\$449.00	\$321.00	\$238.00	\$197.00	\$168.00	\$138.00	\$107.00	\$77.50
PLM by EPA/600/R-93/116 with Milling Prep Level B (1000 Point Count, reporting limit to <0.1%)	\$544.00	\$416.00	\$290.00	\$247.00	\$215.00	\$186.00	\$155.00	\$125.00
PLM by EPA/600/R-93/116 with Milling and Gravimetric Prep Level A (400 Point Count, reporting limit to <0.25%)	\$461.00	\$333.00	\$250.00	\$209.00	\$179.00	\$149.00	\$119.00	\$88.00
PLM by EPA/600/R-93/116 with Milling Prep and Gravimetric Prep Level B (1000 Point Count, reporting limit to <0.1%)	\$557.00	\$427.00	\$301.00	\$258.00	\$227.00	\$197.00	\$167.00	\$137.00
TEM by EPA/600/R-93/116 with Milling Prep Level B (reporting limit to 0.1%)	N/A	N/A	\$406.00	\$351.00	\$316.00	\$281.00	\$247.00	\$212.00
TEM by EPA/600/R-93/116 with Milling and Gravimetric Prep Level B (reporting limit to 0.1%)	N/A	N/A	\$418.00	\$361.00	\$328.00	\$292.00	\$258.00	\$223.00
TEM by EPA/600/R-93/116 with Milling Prep Level C (reporting limit to 0.01%)	N/A	N/A	\$455.00	\$392.00	\$351.00	\$322.00	\$287.00	\$252.00
TEM by EPA/600/R-93/116 with Milling and Gravimetric Prep Level C (reporting limit to 0.01%)	N/A	N/A	\$466.00	\$402.00	\$361.00	\$333.00	\$298.00	\$264.00
PLM CARB 435 Level A (reporting limit to 0.25%)	\$449.00	\$321.00	\$238.00	\$197.00	\$168.00	\$138.00	\$107.00	\$77.50
PLM CARB 435 Level B (reporting limit to 0.1%)	\$544.00	\$415.00	\$289.00	\$246.00	\$215.00	\$185.00	\$155.00	\$125.00
TEM CARB 435 Level B (reporting limit to 0.1%)	N/A	N/A	\$423.00	\$365.00	\$329.00	\$292.00	\$257.00	\$219.00
TEM CARB 435 Level C (reporting limit to 0.01%) ²	N/A	N/A	\$474.00	\$406.00	\$365.00	\$335.00	\$298.00	\$263.00
ASTM D7521 Asbestos in Soil PLM Quantitative with TEM Qualitative check	N/A	N/A	\$284.00	\$235.00	\$205.00	\$187.00	\$145.00	\$127.00
ASTM D7521 Asbestos in Soil TEM Quantitative ³	N/A	N/A	\$307.00	\$268.00	\$247.00	\$239.00	\$233.00	\$225.00
PLM Qualitative (Asbestos Detect/Non Detect only)	\$102.00	\$68.50	\$43.00	\$35.00	\$31.25	\$28.90	\$27.65	\$26.45
TEM Qualitative via Filtration Prep Technique	N/A	Call	\$142.00	\$112.00	\$90.50	\$83.00	\$75.50	\$70.50
TEM Qualitative via Drop Mount Prep Technique	Call	Call	\$107.00	\$84.00	\$67.00	\$63.00	\$58.50	\$51.50
Fluidized Bed Asbestos Segregator (FBAS)-Level A	N/A	N/A	N/A	N/A	N/A	N/A	\$566.00	\$507.00
Fluidized Bed Asbestos Segregator (FBAS)-Level B	N/A	N/A	N/A	N/A	N/A	N/A	\$624.00	\$565.00
Fluidized Bed Asbestos Segregator (FBAS)-Level C	N/A	N/A	N/A	N/A	N/A	N/A	\$739.00	\$680.00
Fluidized Bed Asbestos Segregator (FBAS)-Level D	N/A	N/A	N/A	N/A	N/A	N/A	\$1,213.00	\$1,150.00
Superfund EPA 540-R-97-026 (Elutriator Method)	N/A	N/A	N/A	N/A	N/A	Call	\$1,539.00	\$1,358.00
Cincinnati Method EPA 600/R-04/004 PLM Only	N/A	N/A	N/A	N/A	\$254.00	\$232.00	\$216.00	\$181.00
Cincinnati Method EPA 600/R-04/004 TEM ³	N/A	N/A	N/A	N/A	\$181.00	\$174.00	\$169.00	\$156.00
Jaw Crushing Prep	\$368.00	\$263.00	\$184.00	\$147.00	\$105.00	\$89.50	\$79.00	\$79.00
Milling Prep	\$368.00	\$263.00	\$184.00	\$147.00	\$105.00	\$89.50	\$79.00	\$79.00
Sample Homogenization (Turbula Mixer/Riffle Splitter)	\$263.00	\$158.00	\$105.00	\$79.00	\$68.50	\$61.00	\$52.50	\$36.75

¹All Test pricing is "Per Sample Unit Rates" which will apply to each item, discrete Sample and/or sub-component submitted for analysis. This unit price quote includes Customer Specific pricing which takes into account types of samples typically and/or routinely submitted, volume of workload expected, and client payment history and/or credit rating. Any/all work performed will be in accordance with EMSL Analytical, Inc. Terms and Conditions included herein. EMSL reserves the right to adjust pricing at our sole discretion based on (but not limited to) the customer's non-compliance with net 30 day payment terms, change in scope of work including but not limited to an amount/volume of work less than described at the time of the quote, and/or non-compliance with the EMSL terms and conditions included herein.



EMSL Analytical, Inc.
 200 Route 130 North, Cinnaminson, NJ 08077
 Phone: (800) 220-3675
 Fax: (856) 858-1292
 Email: CinnAsblab@emsl.com

EMSL Order: 041922026
 Customer ID: PADP42
 Customer PO:
 Project ID:

Attn: Gary Latsha
 PA Dept of Environmental Protection
 5 Laurel Blvd.
 Pottsville, PA, 17901

Phone: (570) 274-2464
 Fax: N/A
 Collected: 05/13/2019
 Received: 07/30/19 17:50

Project: Rockhill Quarry

Analyzed: 8/15/2019 - 8/21/2019

SUMMARY REPORT : TEM EPA 600/R-93/116

Analysis of Bulk Material Utilizing Analytical Electron Microscopy (Section 2.5.5.2) with Milling Prep

Sample ID	Minerals Present	Results	Structures	Reporting Limit	Asbestos Weight	Comments
RH#33 041922026-0001 Rock	Tremolite, Non-asbestiform Tremolite, Actinolite, Non-asbestiform Actinolite, Pyroxene, Non-asbestiform Pyroxene	Regulated Asbestos	19	0.1%	< 0.1%	Pyx = Diopside
		Other Minerals	20		< 0.1%	
		Total	39		< 0.1%	
		Undetermined	0			
DB-4 041922026-0002 69.0'-Core Sample-Rock	Actinolite, Non-asbestiform Actinolite	Regulated Asbestos	1	0.1%	< 0.1%	
		Other Minerals	1		< 0.1%	
		Total	2		< 0.1%	
		Undetermined	0			
HS#2 041922026-0003 Bench Zero Trench-Rock	Non-asbestiform Actinolite, Actinolite	Regulated Asbestos	52	0.1%	0.6%	
		Other Minerals	7		0.2%	
		Total	59		0.8%	
		Undetermined	0			
CB-3#8 041922026-0004 Core Sample-Rock	Actinolite, Non-asbestiform Actinolite	Regulated Asbestos	41	0.1%	0.2%	
		Other Minerals	12		< 0.1%	
		Total	53		0.3%	
		Undetermined	0			
CB-1#1 041922026-0005 Core Sample-Rock	Non-asbestiform Actinolite, Actinolite, Non-asbestiform Pyroxene	Regulated Asbestos	54	0.1%	3.3%	Pyx = Diopside
		Other Minerals	27		0.9%	
		Total	81		4.2%	
		Undetermined	0			
CB-2#5 041922026-0006 Core Sample-Rock	Actinolite, Non-asbestiform Actinolite	Regulated Asbestos	41	0.1%	0.6%	
		Other Minerals	11		< 0.1%	
		Total	52		0.6%	
		Undetermined	0			
CB-4#10 041922026-0007 Core Sample-Rock	Actinolite, Non-asbestiform Actinolite	Regulated Asbestos	23	0.1%	< 0.1%	
		Other Minerals	18		0.2%	
		Total	41		0.2%	
		Undetermined	0			
CB-2#4 041922026-0008 Core Sample-Rock	Actinolite, Non-asbestiform Actinolite	Regulated Asbestos	31	0.1%	0.5%	
		Other Minerals	19		< 0.1%	
		Total	50		0.5%	
		Undetermined	0			

F Craig
 Analyst

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EMSL Analytical, Inc.
200 Route 130 North, Cinnaminson, NJ 08077
Phone: (800) 220-3675
Fax: (856) 858-1292
Email: CinnAsblab@emsl.com

EMSL Order: 041922026
Customer ID: PADP42
Customer PO:
Project ID:

Attn: Gary Latsha
PA Dept of Environmental Protection
5 Laurel Blvd.
Pottsville, PA, 17901

Phone: (570) 274-2464
Fax: N/A
Collected: 05/13/2019
Received: 07/30/19 17:50

Project: Rockhill Quarry

Analyzed: 8/15/2019 - 8/21/2019

SUMMARY REPORT : TEM EPA 600/R-93/116

Analysis of Bulk Material Utilizing Analytical Electron Microscopy (Section 2.5.5.2) with Milling Prep

Sample ID	Minerals Present	Results	Structures	Reporting Limit	Asbestos Weight	Comments
RH HS-1	Non-asbestiform Actinolite, Actinolite	Regulated Asbestos	21	0.1%	0.7%	
041922026-0009		Other Minerals	14		0.1%	
Hand Sample#1 Rock		Total	35		0.8%	
		Undetermined	0			
RH Vein#7	Non-asbestiform Actinolite, Actinolite	Regulated Asbestos	76	0.1%	19.1%	
041922026-0010		Other Minerals	27		5.4%	
Rock Sample		Total	103		24.5%	
		Undetermined	0			

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200 Route 130 North, Cinnaminson, NJ 08077
Phone: (800) 220-3675
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Email: CinnAsblab@emsl.com

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Customer ID: PADP42
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Attn: Gary Latsha
PA Dept of Environmental Protection
5 Laurel Blvd.
Pottsville, PA, 17901

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TEM EPA 600/R-93/116

Analysis of Bulk Material Utilizing Analytical Electron Microscopy (Section 2.5.5.2) with Milling Prep

Detailed Sample Report

Customer Sample Number: RH#33		Reporting Limit : 0.1%	
Sample Description: Rock			
EMSL Sample Number: 041922026-0001		Sample Matrix: Bulk	
Aspect ratio for fiber definition: 3:1		Area of collection filter (mm ²): 1360	
Minimum Length (µm): 0.5		Grid Opening Area (mm ²): 0.0062	
Gravimetric Reduction Ratio: 1.00		Grid Openings Analyzed: 10	
Mass contributed by Largest fiber: 45%		Analyst: F Craig	
Mineral Type	Structures	Weight %	Average Aspect Ratio
Total Regulated Asbestos	19	< 0.1%	10.7
Chrysotile	None Detected	<0.1%	
Amosite	None Detected	<0.1%	
Crocidolite	None Detected	<0.1%	
Tremolite	2	< 0.1%	8.8
Actinolite	17	< 0.1%	10.9
Anthophyllite	None Detected	<0.1%	
Total Other Elongate Mineral Types	20	< 0.1%	6.5
Non-asbestiform Actinolite	16	< 0.1%	6.7
Non-asbestiform Pyroxene	1	< 0.1%	3.1
Non-asbestiform Tremolite	2	< 0.1%	7.6
Pyroxene	1	< 0.1%	4.3
Undetermined Elongate Mineral	None Detected	-	

Pyx = Diopside

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EMSL Analytical, Inc.
200 Route 130 North, Cinnaminson, NJ 08077
Phone: (800) 220-3675
Fax: (856) 858-1292
Email: CinnAsblab@emsl.com

EMSL Order: 041922026
Customer ID: PADP42
Customer PO:
Project ID:

Attn: Gary Latsha
PA Dept of Environmental Protection
5 Laurel Blvd.
Pottsville, PA, 17901

Phone: (570) 274-2464
Fax: N/A
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Project: Rockhill Quarry

Analyzed: 08/15/2019

TEM EPA 600/R-93/116

Analysis of Bulk Material Utilizing Analytical Electron Microscopy (Section 2.5.5.2) with Milling Prep
Detailed Sample Report

Customer Sample Number: DB-4		Reporting Limit : 0.1%	
Sample Description: 69.0'-Core Sample-Rock			
EMSL Sample Number: 041922026-0002		Sample Matrix: Bulk	
Aspect ratio for fiber definition: 3:1		Area of collection filter (mm ²): 1360	
Minimum Length (µm): 0.5		Grid Opening Area (mm ²): 0.0062	
Gravimetric Reduction Ratio: 1.00		Grid Openings Analyzed: 10	
Mass contributed by Largest fiber: 75%		Analyst: F Craig	
Mineral Type	Structures	Weight %	Average Aspect Ratio
Total Regulated Asbestos	1	< 0.1%	6
Chrysotile	None Detected	<0.1%	
Amosite	None Detected	<0.1%	
Crocidolite	None Detected	<0.1%	
Tremolite	None Detected	<0.1%	
Actinolite	1	< 0.1%	6
Anthophyllite	None Detected	<0.1%	
Total Other Elongate Mineral Types	1	< 0.1%	6
Non-asbestiform Actinolite	1	< 0.1%	6
Unknown Elongate Mineral	None Detected	-	

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EMSL Analytical, Inc.
200 Route 130 North, Cinnaminson, NJ 08077
Phone: (800) 220-3675
Fax: (856) 858-1292
Email: CinnAsblab@emsl.com

EMSL Order: 041922026
Customer ID: PADP42
Customer PO:
Project ID:

Attn: Gary Latsha
PA Dept of Environmental Protection
5 Laurel Blvd.
Pottsville, PA, 17901

Phone: (570) 274-2464
Fax: N/A
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TEM EPA 600/R-93/116

Analysis of Bulk Material Utilizing Analytical Electron Microscopy (Section 2.5.5.2) with Milling Prep
Detailed Sample Report

Customer Sample Number: HS#2		Reporting Limit : 0.1%	
Sample Description: Bench Zero Trench-Rock			
EMSL Sample Number: 041922026-0003		Sample Matrix: Bulk	
Aspect ratio for fiber definition: 3:1		Area of collection filter (mm ²): 1360	
Minimum Length (µm): 0.5		Grid Opening Area (mm ²): 0.0062	
Gravimetric Reduction Ratio: 1.00		Grid Openings Analyzed: 4	
Mass contributed by Largest fiber: 56%		Analyst: F Craig	
Mineral Type	Structures	Weight %	Average Aspect Ratio
Total Regulated Asbestos	52	0.6%	20
Chrysotile	None Detected	<0.1%	
Amosite	None Detected	<0.1%	
Crocidolite	None Detected	<0.1%	
Tremolite	None Detected	<0.1%	
Actinolite	52	0.6%	20
Anthophyllite	None Detected	<0.1%	
Total Other Elongate Mineral Types	7	0.2%	14
Non-asbestiform Actinolite	7	0.2%	14
Unknown Elongate Mineral	None Detected	-	

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EMSL Analytical, Inc.
200 Route 130 North, Cinnaminson, NJ 08077
Phone: (800) 220-3675
Fax: (856) 858-1292
Email: CinnAsblab@emsl.com

EMSL Order: 041922026
Customer ID: PADP42
Customer PO:
Project ID:

Attn: Gary Latsha
PA Dept of Environmental Protection
5 Laurel Blvd.
Pottsville, PA, 17901

Phone: (570) 274-2464
Fax: N/A
Collected: 05/13/2019
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TEM EPA 600/R-93/116

Analysis of Bulk Material Utilizing Analytical Electron Microscopy (Section 2.5.5.2) with Milling Prep
Detailed Sample Report

Customer Sample Number: CB-3#8		Reporting Limit : 0.1%	
Sample Description: Core Sample-Rock			
EMSL Sample Number: 041922026-0004		Sample Matrix: Bulk	
Aspect ratio for fiber definition: 3:1		Area of collection filter (mm²): 1360	
Minimum Length (µm): 0.5		Grid Opening Area (mm²): 0.0062	
Gravimetric Reduction Ratio: 1.00		Grid Openings Analyzed: 5	
Mass contributed by Largest fiber: 49%		Analyst: F Craig	
Mineral Type	Stuctures	Weight %	Average Aspect Ratio
Total Regulated Asbestos	41	0.2%	15
Chrysotile	None Detected	<0.1%	
Amosite	None Detected	<0.1%	
Crocidolite	None Detected	<0.1%	
Tremolite	None Detected	<0.1%	
Actinolite	41	0.2%	15
Anthophyllite	None Detected	<0.1%	
Total Other Elongate Mineral Types	12	< 0.1%	11
Non-asbestiform Actinolite	12	< 0.1%	11
Unknown Elongate Mineral	None Detected	-	

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EMSL Analytical, Inc.
200 Route 130 North, Cinnaminson, NJ 08077
Phone: (800) 220-3675
Fax: (856) 858-1292
Email: CinnAsblab@emsl.com

EMSL Order: 041922026
Customer ID: PADP42
Customer PO:
Project ID:

Attn: Gary Latsha
PA Dept of Environmental Protection
5 Laurel Blvd.
Pottsville, PA, 17901

Phone: (570) 274-2464
Fax: N/A
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Project: Rockhill Quarry

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TEM EPA 600/R-93/116

Analysis of Bulk Material Utilizing Analytical Electron Microscopy (Section 2.5.5.2) with Milling Prep
Detailed Sample Report

Customer Sample Number: CB-1#1		Reporting Limit : 0.1%	
Sample Description: Core Sample-Rock			
EMSL Sample Number: 041922026-0005		Sample Matrix: Bulk	
Aspect ratio for fiber definition: 3:1		Area of collection filter (mm²): 1360	
Minimum Length (µm): 0.5		Grid Opening Area (mm²): 0.0062	
Gravimetric Reduction Ratio: 1.00		Grid Openings Analyzed: 4	
Mass contributed by Largest fiber: 42%		Analyst: F Craig	
Mineral Type	Stuctures	Weight %	Average Aspect Ratio
Total Regulated Asbestos	54	3.3%	27
Chrysotile	None Detected	<0.1%	
Amosite	None Detected	<0.1%	
Crocidolite	None Detected	<0.1%	
Tremolite	None Detected	<0.1%	
Actinolite	54	3.3%	27
Anthophyllite	None Detected	<0.1%	
Total Other Elongate Mineral Types	27	0.9%	11
Non-asbestiform Actinolite	26	0.8%	11
Non-asbestiform Pyroxene	1	< 0.1%	7
Unknown Elongate Mineral	None Detected	-	

Pyx = Diopside

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EMSL Analytical, Inc.
200 Route 130 North, Cinnaminson, NJ 08077
Phone: (800) 220-3675
Fax: (856) 858-1292
Email: CinnAsblab@emsl.com

EMSL Order: 041922026
Customer ID: PADP42
Customer PO:
Project ID:

Attn: Gary Latsha
PA Dept of Environmental Protection
5 Laurel Blvd.
Pottsville, PA, 17901

Phone: (570) 274-2464
Fax: N/A
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Project: Rockhill Quarry

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TEM EPA 600/R-93/116

Analysis of Bulk Material Utilizing Analytical Electron Microscopy (Section 2.5.5.2) with Milling Prep
Detailed Sample Report

Customer Sample Number: CB-2#5		Reporting Limit : 0.1%	
Sample Description: Core Sample-Rock			
EMSL Sample Number: 041922026-0006		Sample Matrix: Bulk	
Aspect ratio for fiber definition: 3:1		Area of collection filter (mm ²): 1360	
Minimum Length (µm): 0.5		Grid Opening Area (mm ²): 0.0062	
Gravimetric Reduction Ratio: 1.00		Grid Openings Analyzed: 9	
Mass contributed by Largest fiber: 71%		Analyst: F Craig	
Mineral Type	Structures	Weight %	Average Aspect Ratio
Total Regulated Asbestos	41	0.6%	14
Chrysotile	None Detected	<0.1%	
Amosite	None Detected	<0.1%	
Crocidolite	None Detected	<0.1%	
Tremolite	None Detected	<0.1%	
Actinolite	41	0.6%	14
Anthophyllite	None Detected	<0.1%	
Total Other Elongate Mineral Types	11	< 0.1%	17
Non-asbestiform Actinolite	11	< 0.1%	17
Unknown Elongate Mineral	None Detected	-	

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EMSL Analytical, Inc.
200 Route 130 North, Cinnaminson, NJ 08077
Phone: (800) 220-3675
Fax: (856) 858-1292
Email: CinnAsblab@emsl.com

EMSL Order: 041922026
Customer ID: PADP42
Customer PO:
Project ID:

Attn: Gary Latsha
PA Dept of Environmental Protection
5 Laurel Blvd.
Pottsville, PA, 17901

Phone: (570) 274-2464
Fax: N/A
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Analysis of Bulk Material Utilizing Analytical Electron Microscopy (Section 2.5.5.2) with Milling Prep
Detailed Sample Report

Customer Sample Number: CB-4#10		Reporting Limit : 0.1%	
Sample Description: Core Sample-Rock			
EMSL Sample Number: 041922026-0007		Sample Matrix: Bulk	
Aspect ratio for fiber definition: 3:1		Area of collection filter (mm ²): 1360	
Minimum Length (µm): 0.5		Grid Opening Area (mm ²): 0.0062	
Gravimetric Reduction Ratio: 1.00		Grid Openings Analyzed: 10	
Mass contributed by Largest fiber: 23%		Analyst: F Craig	
Mineral Type	Structures	Weight %	Average Aspect Ratio
Total Regulated Asbestos	23	< 0.1%	12
Chrysotile	None Detected	<0.1%	
Amosite	None Detected	<0.1%	
Crocidolite	None Detected	<0.1%	
Tremolite	None Detected	<0.1%	
Actinolite	23	< 0.1%	12
Anthophyllite	None Detected	<0.1%	
Total Other Elongate Mineral Types	18	0.2%	8
Non-asbestiform Actinolite	18	0.2%	8
Unknown Elongate Mineral	None Detected	-	

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EMSL Analytical, Inc.
200 Route 130 North, Cinnaminson, NJ 08077
Phone: (800) 220-3675
Fax: (856) 858-1292
Email: CinnAsblab@emsl.com

EMSL Order: 041922026
Customer ID: PADP42
Customer PO:
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Attn: Gary Latsha
PA Dept of Environmental Protection
5 Laurel Blvd.
Pottsville, PA, 17901

Phone: (570) 274-2464
Fax: N/A
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Analysis of Bulk Material Utilizing Analytical Electron Microscopy (Section 2.5.5.2) with Milling Prep
Detailed Sample Report

Customer Sample Number: CB-2#4		Reporting Limit : 0.1%	
Sample Description: Core Sample-Rock			
EMSL Sample Number: 041922026-0008		Sample Matrix: Bulk	
Aspect ratio for fiber definition: 3:1		Area of collection filter (mm ²): 1360	
Minimum Length (µm): 0.5		Grid Opening Area (mm ²): 0.0062	
Gravimetric Reduction Ratio: 1.00		Grid Openings Analyzed: 8	
Mass contributed by Largest fiber: 73%		Analyst: F Craig	
Mineral Type	Structures	Weight %	Average Aspect Ratio
Total Regulated Asbestos	31	0.5%	15
Chrysotile	None Detected	<0.1%	
Amosite	None Detected	<0.1%	
Crocidolite	None Detected	<0.1%	
Tremolite	None Detected	<0.1%	
Actinolite	31	0.5%	15
Anthophyllite	None Detected	<0.1%	
Total Other Elongate Mineral Types	19	< 0.1%	8
Non-asbestiform Actinolite	19	< 0.1%	8
Unknown Elongate Mineral	None Detected	-	

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200 Route 130 North, Cinnaminson, NJ 08077
Phone: (800) 220-3675
Fax: (856) 858-1292
Email: CinnAsblab@emsl.com

EMSL Order: 041922026
Customer ID: PADP42
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Attn: Gary Latsha
PA Dept of Environmental Protection
5 Laurel Blvd.
Pottsville, PA, 17901

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Project: Rockhill Quarry

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TEM EPA 600/R-93/116

Analysis of Bulk Material Utilizing Analytical Electron Microscopy (Section 2.5.5.2) with Milling Prep Detailed Sample Report

Customer Sample Number: RH HS-1		Reporting Limit : 0.1%	
Sample Description: Hand Sample#1 Rock			
EMSL Sample Number: 041922026-0009		Sample Matrix: Bulk	
Aspect ratio for fiber definition: 3:1		Area of collection filter (mm ²): 1360	
Minimum Length (µm): 0.5		Grid Opening Area (mm ²): 0.0062	
Gravimetric Reduction Ratio: 1.00		Grid Openings Analyzed: 10	
Mass contributed by Largest fiber: 39%		Analyst: F Craig	
Mineral Type	Structures	Weight %	Average Aspect Ratio
Total Regulated Asbestos	21	0.7%	10
Chrysotile	None Detected	<0.1%	
Amosite	None Detected	<0.1%	
Crocidolite	None Detected	<0.1%	
Tremolite	None Detected	<0.1%	
Actinolite	21	0.7%	10
Anthophyllite	None Detected	<0.1%	
Total Other Elongate Mineral Types	14	0.1%	12
Non-asbestiform Actinolite	14	0.1%	12
Unknown Elongate Mineral	None Detected	-	

Laboratory Manager or Other Approved Signatory

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EMSL Analytical, Inc.
200 Route 130 North, Cinnaminson, NJ 08077
Phone: (800) 220-3675
Fax: (856) 858-1292
Email: CinnAsblab@emsl.com

EMSL Order: 041922026
Customer ID: PADP42
Customer PO:
Project ID:

Attn: Gary Latsha
PA Dept of Environmental Protection
5 Laurel Blvd.
Pottsville, PA, 17901

Phone: (570) 274-2464
Fax: N/A
Collected: 05/13/2019
Received: 07/30/19 17:50

Project: Rockhill Quarry

Analyzed: 08/15/2019

TEM EPA 600/R-93/116

Analysis of Bulk Material Utilizing Analytical Electron Microscopy (Section 2.5.5.2) with Milling Prep
Detailed Sample Report

Customer Sample Number: RH Vein#7		Reporting Limit : 0.1%	
Sample Description: Rock Sample			
EMSL Sample Number: 041922026-0010		Sample Matrix: Bulk	
Aspect ratio for fiber definition: 3:1		Area of collection filter (mm ²): 1360	
Minimum Length (µm): 0.5		Grid Opening Area (mm ²): 0.0062	
Gravimetric Reduction Ratio: 1.00		Grid Openings Analyzed: 3	
Mass contributed by Largest fiber: 69%		Analyst: F Craig	
Mineral Type	Structures	Weight %	Average Aspect Ratio
Total Regulated Asbestos	76	19.1%	28
Chrysotile	None Detected	<0.1%	
Amosite	None Detected	<0.1%	
Crocidolite	None Detected	<0.1%	
Tremolite	None Detected	<0.1%	
Actinolite	76	19.1%	28
Anthophyllite	None Detected	<0.1%	
Total Other Elongate Mineral Types	27	5.4%	19
Non-asbestiform Actinolite	27	5.4%	19
Unknown Elongate Mineral	None Detected	-	

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8/26/2019

Asbestos Analysis Of Bulk Materials using Polarized Light Microscopy With Point Counting

Special Instructions:

Due Date 08/13/2019

Sample Number	041922026-0001				Analyst	wnguyen			
Customer Sample No.	RH #33				Analysis Date	08/13/2019 09:34 AM			
Matrix	Bulk				Status	None Detected			
Sample Colors	Gray		Homogeneity		Homogeneous		% Asbestos		0.0
Treatment	Teased		Stereo Asb. Est.				% Non-Asb. Fibrous		3.0
Texture	Non-Fibrous		Temperature (C)		21.8		% Non-fibrous		97.0
Comments:									
Material	Pct	R.I. Perpend.	R.I. Parallel	Morphology	Elongation	Pleochroism	Birefringence	Fiber Color	Extinction
Fibrous (other)	3	Straight				Medium: 0.011-0.01			
Point counts:	SlideID	Non-asbestos	Chrysotile	Amosite	Crocidolite	Anthophyllite	Tremolite	Actinolite	
	01	100	0	0	0	0	0	0	
	02	100	0	0	0	0	0	0	
	03	100	0	0	0	0	0	0	
	04	100	0	0	0	0	0	0	
	05	100	0	0	0	0	0	0	
	06	100	0	0	0	0	0	0	
	07	100	0	0	0	0	0	0	
	08	100	0	0	0	0	0	0	
	09	100	0	0	0	0	0	0	
	10	100	0	0	0	0	0	0	

Sample Number		041922026-0002				Analyst		wnguyen	
Customer Sample No.		DB-4				Analysis Date		08/13/2019 09:57 AM	
Matrix		Bulk				Status		None Detected	
Sample Colors	Gray	Homogeneity		Homogeneous		% Asbestos		0.0	
Treatment	Teased	Stereo Asb. Est.				% Non-Asb. Fibrous		3.0	
Texture	Non-Fibrous	Temperature (C)		21.8		% Non-fibrous		97.0	
Comments:									
Material	Pct	R.I. Perpend.	R.I. Parallel	Morphology	Elongation	Pleochroism	Birefringence	Fiber Color	Extinction
Fibrous (other)	3	Straight				Medium: 0.011-0.01			
Point counts:	SlideID	Non-asbestos	Chrysotile	Amosite	Crocidolite	Anthophyllite	Tremolite	Actinolite	
	01	100	0	0	0	0	0	0	
	02	100	0	0	0	0	0	0	
	03	100	0	0	0	0	0	0	
	04	100	0	0	0	0	0	0	
	05	100	0	0	0	0	0	0	
	06	100	0	0	0	0	0	0	
	07	100	0	0	0	0	0	0	
	08	100	0	0	0	0	0	0	
	09	100	0	0	0	0	0	0	
	10	100	0	0	0	0	0	0	

Sample Number		041922026-0003			Analyst		wnguyen		
Customer Sample No.		HS #2			Analysis Date		08/13/2019 10:16 AM		
Matrix		Bulk			Status		None Detected		
Sample Colors	Gray	Homogeneity		Homogeneous		% Asbestos		0.0	
Treatment	Teased/Crushed	Stereo Asb. Est.				% Non-Asb. Fibrous		3.0	
Texture	Non-Fibrous	Temperature (C)		21.8		% Non-fibrous		97.0	
Comments:									
Material	Pct	R.I. Perpend.	R.I. Parallel	Morphology	Elongation	Pleochroism	Birefringence	Fiber Color	Extinction
Fibrous (other)	3	Straight				Medium: 0.011-0.01			

Asbestos Analysis Of Bulk Materials using Polarized Light Microscopy With Point Counting

Special Instructions:

Due Date 08/13/2019

Point counts:	SlideID	Non-asbestos	Chrysotile	Amosite	Crocidolite	Anthophyllite	Tremolite	Actinolite
	01	100	0	0	0	0	0	0
	02	100	0	0	0	0	0	0
	03	100	0	0	0	0	0	0
	04	100	0	0	0	0	0	0
	05	100	0	0	0	0	0	0
	06	100	0	0	0	0	0	0
	07	100	0	0	0	0	0	0
	08	100	0	0	0	0	0	0
	09	100	0	0	0	0	0	0
	10	100	0	0	0	0	0	0

Sample Number		041922026-0004				Analyst		wnguyen	
Customer Sample No.		CB-3 #8				Analysis Date		08/13/2019 10:35 AM	
Matrix		Bulk				Status		None Detected	
Sample Colors	Gray	Homogeneity		Homogeneous		% Asbestos		0.0	
Treatment	Teased	Stereo Asb. Est.				% Non-Asb. Fibrous		5.0	
Texture	Non-Fibrous	Temperature (C)		21.8		% Non-fibrous		95.0	
Comments:									
Material	Pct	R.I. Perpend.	R.I. Parallel	Morphology	Elongation	Pleochroism	Birefringence	Fiber Color	Extinction
Fibrous (other)	5			Straight			Medium: 0.011-0.04		

Point counts:	SlideID	Non-asbestos	Chrysotile	Amosite	Crocidolite	Anthophyllite	Tremolite	Actinolite
	01	100	0	0	0	0	0	0
	02	100	0	0	0	0	0	0
	03	100	0	0	0	0	0	0
	04	100	0	0	0	0	0	0
	05	100	0	0	0	0	0	0
	06	100	0	0	0	0	0	0
	07	100	0	0	0	0	0	0
	08	100	0	0	0	0	0	0
	09	100	0	0	0	0	0	0
	10	100	0	0	0	0	0	0

Sample Number		041922026-0005				Analyst		wnguyen	
Customer Sample No.		CB-1 #1				Analysis Date		08/13/2019 11:23 AM	
Matrix		Bulk				Status		None Detected	
Sample Colors	Gray	Homogeneity		Homogeneous		% Asbestos		0.0	
Treatment	Teased	Stereo Asb. Est.				% Non-Asb. Fibrous		3.0	
Texture	Non-Fibrous	Temperature (C)		21.8		% Non-fibrous		97.0	
Comments:									
Material	Pct	R.I. Perpend.	R.I. Parallel	Morphology	Elongation	Pleochroism	Birefringence	Fiber Color	Extinction
Fibrous (other)	3			Straight			Medium: 0.011-0.04		

Point counts:	SlideID	Non-asbestos	Chrysotile	Amosite	Crocidolite	Anthophyllite	Tremolite	Actinolite
	01	100	0	0	0	0	0	0
	02	100	0	0	0	0	0	0
	03	100	0	0	0	0	0	0
	04	100	0	0	0	0	0	0
	05	100	0	0	0	0	0	0
	06	100	0	0	0	0	0	0
	07	100	0	0	0	0	0	0
	08	100	0	0	0	0	0	0
	09	100	0	0	0	0	0	0
	10	100	0	0	0	0	0	0

Asbestos Analysis Of Bulk Materials using Polarized Light Microscopy With Point Counting

Special Instructions:

Due Date 08/13/2019

Sample Number	041922026-0006				Analyst	wnguyen			
Customer Sample No.	CB-2 #5				Analysis Date	08/13/2019 11:42 AM			
Matrix	Bulk				Status	None Detected			
Sample Colors	Gray		Homogeneity	Homogeneous		% Asbestos	0.0		
Treatment	Teased		Stereo Asb. Est.			% Non-Asb. Fibrous	4.0		
Texture	Non-Fibrous		Temperature (C)	21.8		% Non-fibrous	96.0		
Comments:									
Material	Pct	R.I. Perpend.	R.I. Parallel	Morphology	Elongation	Pleochroism	Birefringence	Fiber Color	Extinction
Fibrous (other)	4	Straight				Medium: 0.011-0.01			
Point counts:	SlideID	Non-asbestos	Chrysotile	Amosite	Crocidolite	Anthophyllite	Tremolite	Actinolite	
	01	100	0	0	0	0	0	0	
	02	100	0	0	0	0	0	0	
	03	100	0	0	0	0	0	0	
	04	100	0	0	0	0	0	0	
	05	100	0	0	0	0	0	0	
	06	100	0	0	0	0	0	0	
	07	100	0	0	0	0	0	0	
	08	100	0	0	0	0	0	0	
	09	100	0	0	0	0	0	0	
	10	100	0	0	0	0	0	0	

Sample Number		041922026-0007				Analyst		wnguyen	
Customer Sample No.		CB-4 #10				Analysis Date		08/13/2019 12:00 PM	
Matrix		Bulk				Status		None Detected	
Sample Colors	Gray	Homogeneity		Homogeneous		% Asbestos		0.0	
Treatment	Teased/Crushed	Stereo Asb. Est.				% Non-Asb. Fibrous		5.0	
Texture	Non-Fibrous	Temperature (C)		21.8		% Non-fibrous		95.0	
Comments:									
Material	Pct	R.I. Perpend.	R.I. Parallel	Morphology	Elongation	Pleochroism	Birefringence	Fiber Color	Extinction
Fibrous (other)	5	Straight				Medium: 0.011-0.01			
Point counts:	SlideID	Non-asbestos	Chrysotile	Amosite	Crocidolite	Anthophyllite	Tremolite	Actinolite	
	01	100	0	0	0	0	0	0	
	02	100	0	0	0	0	0	0	
	03	100	0	0	0	0	0	0	
	04	100	0	0	0	0	0	0	
	05	100	0	0	0	0	0	0	
	06	100	0	0	0	0	0	0	
	07	100	0	0	0	0	0	0	
	08	100	0	0	0	0	0	0	
	09	100	0	0	0	0	0	0	
	10	100	0	0	0	0	0	0	

Sample Number		041922026-0008			Analyst		wnguyen		
Customer Sample No.		CB-2 #4			Analysis Date		08/13/2019 12:12 PM		
Matrix		Bulk			Status		None Detected		
Sample Colors	Gray	Homogeneity	Homogeneous		% Asbestos	0.0			
Treatment	Teased	Stereo Asb. Est.			% Non-Asb. Fibrous	5.0			
Texture	Non-Fibrous	Temperature (C)	21.8		% Non-fibrous	95.0			
Comments:									
Material	Pct	R.I. Perpend.	R.I. Parallel	Morphology	Elongation	Pleochroism	Birefringence	Fiber Color	Extinction
Fibrous (other)	5			Straight			Medium: 0.011-0.01		

Asbestos Analysis Of Bulk Materials using Polarized Light Microscopy With Point Counting

Special Instructions:

Due Date 08/13/2019

Point counts:	SlideID	Non-asbestos	Chrysotile	Amosite	Crocidolite	Anthophyllite	Tremolite	Actinolite
	01	100	0	0	0	0	0	0
	02	100	0	0	0	0	0	0
	03	100	0	0	0	0	0	0
	04	100	0	0	0	0	0	0
	05	100	0	0	0	0	0	0
	06	100	0	0	0	0	0	0
	07	100	0	0	0	0	0	0
	08	100	0	0	0	0	0	0
	09	100	0	0	0	0	0	0
	10	100	0	0	0	0	0	0

Sample Number		041922026-0009				Analyst		wnguyen	
Customer Sample No.		RH HS-1				Analysis Date		08/13/2019 01:37 PM	
Matrix		Bulk				Status		None Detected	
Sample Colors	Gray	Homogeneity		Homogeneous		% Asbestos		0.0	
Treatment	Teased/Crushed/Dissolved	Stereo Asb. Est.				% Non-Asb. Fibrous		0.0	
Texture	Non-Fibrous	Temperature (C)		21.8		% Non-fibrous		100.0	
Comments:									
Material	Pct	R.I. Perpend.	R.I. Parallel	Morphology	Elongation	Pleochroism	Birefringence	Fiber Color	Extinction
Comment:									

Point counts:	SlideID	Non-asbestos	Chrysotile	Amosite	Crocidolite	Anthophyllite	Tremolite	Actinolite
	01	100	0	0	0	0	0	0
	02	100	0	0	0	0	0	0
	03	100	0	0	0	0	0	0
	04	100	0	0	0	0	0	0
	05	100	0	0	0	0	0	0
	06	100	0	0	0	0	0	0
	07	100	0	0	0	0	0	0
	08	100	0	0	0	0	0	0
	09	100	0	0	0	0	0	0
	10	100	0	0	0	0	0	0

Sample Number		041922026-0010				Analyst		wnguyen	
Customer Sample No.		RH Vein #7				Analysis Date		08/13/2019 01:47 PM	
Matrix		Bulk				Status		Positive Result	
Sample Colors	Gray	Homogeneity		Homogeneous		% Asbestos		18.0	
Treatment	Teased	Stereo Asb. Est.				% Non-Asb. Fibrous		10.0	
Texture	Fibrous	Temperature (C)		21.8		% Non-fibrous		72.0	
Comments:									
Material	Pct	R.I. Perpend.	R.I. Parallel	Morphology	Elongation	Pleochroism	Birefringence	Fiber Color	Extinction
Actinolite	18.0	1.621	1.638	Straight	+	No	Medium: 0.011-0.03	Colorless	Oblique
Fibrous (other)	10			Straight			Medium: 0.011-0.03		

Point counts:	SlideID	Non-asbestos	Chrysotile	Amosite	Crocidolite	Anthophyllite	Tremolite	Actinolite
	01	79	0	0	0	0	0	21
	02	89	0	0	0	0	0	11
	03	85	0	0	0	0	0	15
	04	80	0	0	0	0	0	20
	05	75	0	0	0	0	0	25
	06	81	0	0	0	0	0	19
	07	84	0	0	0	0	0	16
	08	78	0	0	0	0	0	22
	09	91	0	0	0	0	0	9
	10	76	0	0	0	0	0	24



EMSL Analytical, Inc.
200 Route 130 North, Cinnaminson,
NJ 08077
Phone: (800) 220-3675

EMSL Order: 041922026

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TEM EPA 600/R-93/116

Analysis of Bulk Material Utilizing Analytical Electron Microscopy (Section 2.5.5.2) with Milling Prep

Analytical Worksheet Report

Customer Sample Number: RH#33

Laboratory Sample ID: 041922026-0001

Sample Description: Rock

Grid ID	Mineral Type	Length	Structure Width	Type	Photo ID Number	Mass (%)	Aspect Ratio	Mineral Class
B1 : N5	Tremolite	5.4	0.49	F	1106	4.27E-03	11.0	Regulated
B1 : N5	Non-asbestiform Tremolite	2.4	0.25	F		4.94E-04	9.6	Other
B1 : N5	Actinolite	4.7	0.49	F		3.84E-03	9.6	Regulated
B1 : K3	Actinolite	4.9	0.25	F		1.04E-03	19.6	Regulated
B1 : K3	Actinolite	2.9	0.25	f	1108	6.16E-04	11.6	Regulated
B1 : K3	Non-asbestiform Actinolite	1.6	0.25	f		3.40E-04	6.4	Other
B1 : K3	Pyroxene	1.6	0.37	F		8.12E-04	4.3	Other
B1 : K3	Non-asbestiform Actinolite	1.6	0.12	F		7.83E-05	13.3	Other
B1 : K3	Non-asbestiform Actinolite	1.5	0.49	F		1.22E-03	3.1	Other
B1 : K3	Non-asbestiform Actinolite	2.4	0.25	F		5.10E-04	9.6	Other
B1 : K3	Actinolite	1.9	0.12	F		9.30E-05	15.8	Regulated
B1 : I5	Non-asbestiform Actinolite	1.2	0.12	F		5.88E-05	10.0	Other
B1 : I5	Non-asbestiform Tremolite	6.9	1.23	F		3.43E-02	5.6	Other
B1 : I5	Actinolite	1.5	0.25	F		3.19E-04	6.0	Regulated
B1 : I5	Non-asbestiform Actinolite	3.4	0.98	F		1.11E-02	3.5	Other
B1 : I5	Actinolite	2.9	0.25	F		6.16E-04	11.6	Regulated
B1 : F4	Actinolite	1.2	0.12	F		5.88E-05	10.0	Regulated
B1 : F4	Actinolite	1.6	0.25	F		3.40E-04	6.4	Regulated
B1 : F4	Non-asbestiform Actinolite	1.6	0.12	F		7.83E-05	13.3	Other
B1 : F4	Non-asbestiform Actinolite	2.8	0.37	F		1.30E-03	7.6	Other
B1 : C7	Actinolite	1.2	0.12	F		5.88E-05	10.0	Regulated
B1 : C7	Actinolite	1.5	0.12	F		7.34E-05	12.5	Regulated
B1 : C7	Non-asbestiform Actinolite	1.2	0.12	F		5.88E-05	10.0	Other
B2 : B6	Non-asbestiform Actinolite	2.2	0.49	F		1.80E-03	4.5	Other
B2 : B6	Actinolite	1.2	0.48	F		0.00E+00	2.5	Regulated
B2 : B6	Non-asbestiform Pyroxene	1.5	0.49	F		1.34E-03	3.1	Other



EMSL Analytical, Inc.
200 Route 130 North, Cinnaminson,
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TEM EPA 600/R-93/116

Analysis of Bulk Material Utilizing Analytical Electron Microscopy (Section 2.5.5.2) with Milling Prep

Analytical Worksheet Report

Customer Sample Number: RH#33

Laboratory Sample ID: 041922026-0001

Sample Description: Rock

Grid ID	Mineral Type	Length	Structure Width	Type	Photo ID Number	Mass (%)	Aspect Ratio	Mineral Class
B2 : E2	Actinolite	2.4	0.12	F		1.18E-04	20.0	Regulated
B2 : E2	Tremolite	2.4	0.37	F		1.08E-03	6.5	Regulated
B2 : E2	Non-asbestiform Actinolite	2.6	0.49	F		2.12E-03	5.3	Other
B2 : E2	Non-asbestiform Actinolite	2.4	0.49	F		1.96E-03	4.9	Other
B2 : H4	Actinolite	1.2	0.25	F		2.55E-04	4.8	Regulated
B2 : H4	Actinolite	1.5	0.37	F		6.98E-04	4.1	Regulated
B2 : L6	Actinolite	3.1	0.12	F		1.52E-04	25.8	Regulated
B2 : L6	Actinolite	1.5	0.25	F		3.19E-04	6.0	Regulated
B2 : L6	Actinolite	2.3	0.25	F		4.89E-04	9.2	Regulated
B2 : N5	Non-asbestiform Actinolite	1.9	0.49	F		1.55E-03	3.9	Other
B2 : N5	Non-asbestiform Actinolite	1.6	0.37	F		7.45E-04	4.3	Other
B2 : N5	Non-asbestiform Actinolite	1.5	0.49	F		1.22E-03	3.1	Other
B2 : N5	Non-asbestiform Actinolite	1.2	0.25	F		2.55E-04	4.8	Other



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Analysis of Bulk Material Utilizing Analytical Electron Microscopy (Section 2.5.5.2) with Milling Prep

Analytical Worksheet Report

Customer Sample Number: DB-4

Laboratory Sample ID: 041922026-0002

Sample Description: 69.0'-Core Sample-Rock

Grid ID	Mineral Type	Length	Structure Width	Type	Photo ID Number	Mass (%)	Aspect Ratio	Mineral Class
C1 : N6	Actinolite	1.6	0.25	F		3.40E-04	6.4	Regulated
C1 : K4	No Structures Detected							
C1 : I2	No Structures Detected							
C1 : F7	No Structures Detected							
C1 : C5	No Structures Detected							
C2 : B6	No Structures Detected							
C2 : E3	No Structures Detected							
C2 : H5	No Structures Detected							
C2 : J2	Non-asbestiform Actinolite	2.2	0.37	F	1115	1.02E-03	5.9	Other
C2 : M4	No Structures Detected							



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Analysis of Bulk Material Utilizing Analytical Electron Microscopy (Section 2.5.5.2) with Milling Prep

Analytical Worksheet Report

Customer Sample Number: HS#2

Laboratory Sample ID: 041922026-0003

Sample Description: Bench Zero Trench-Rock

Grid ID	Mineral Type	Length	Structure Width	Type	Photo ID Number	Mass (%)	Aspect Ratio	Mineral Class
D4 : M4	Non-asbestiform Actinolite	8.1	0.49	F	1117	3.31E-02	16.5	Other
D4 : M4	Actinolite	1.5	0.12	F		3.68E-04	12.5	Regulated
D4 : M4	Actinolite	4.9	0.37	B		1.14E-02	13.2	Regulated
D4 : M4	Actinolite	2.7	0.12	F		6.62E-04	22.5	Regulated
D4 : M4	Actinolite	3.4	0.12	F		8.34E-04	28.3	Regulated
D4 : M4	Actinolite	1.5	0.12	F		3.68E-04	12.5	Regulated
D4 : M4	Actinolite	7.1	0.12	F		1.74E-03	59.2	Regulated
D4 : M4	Actinolite	1.2	0.12	F		2.94E-04	10.0	Regulated
D4 : M4	Non-asbestiform Actinolite	2.9	0.74	F		2.71E-02	3.9	Other
D4 : M4	Actinolite	5.4	0.12	F		1.32E-03	45.0	Regulated
D4 : M4	Actinolite	8.5	0.12	F		2.08E-03	70.8	Regulated
D4 : M4	Actinolite	3.2	0.25	F		3.41E-03	12.8	Regulated
D4 : M4	Actinolite	2.2	0.1	F		3.75E-04	22.0	Regulated
D4 : I6	Actinolite	5.1	0.49	F	1119	2.09E-02	10.4	Regulated
D4 : I6	Actinolite	2.6	0.12				21.7	Regulated
D4 : I6	Actinolite	2.9	0.12	F		7.11E-04	24.2	Regulated
D4 : I6	Actinolite	1.5	0.12	F		3.68E-04	12.5	Regulated
D4 : I6	Actinolite	0.8	0.12	F		1.96E-04	6.7	Regulated
D4 : I6	Non-asbestiform Actinolite	4.9	0.12	F		1.20E-03	40.8	Other
D4 : I6	Actinolite	1.2	0.37	F		2.80E-03	3.2	Regulated
D4 : I6	Actinolite	1.2	0.12	F		2.94E-04	10.0	Regulated
D4 : I6	Actinolite	1.5	0.12	F		3.68E-04	12.5	Regulated
D4 : I6	Actinolite	2.1	0.1	F		3.58E-04	21.0	Regulated
D4 : I6	Actinolite	5.4	0.12	F		1.32E-03	45.0	Regulated
D4 : I6	Actinolite	1.2	0.12	F		2.94E-04	10.0	Regulated
D4 : I6	Non-asbestiform Actinolite	5.9	0.74	F		5.50E-02	8.0	Other



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Analysis of Bulk Material Utilizing Analytical Electron Microscopy (Section 2.5.5.2) with Milling Prep

Analytical Worksheet Report

Customer Sample Number: HS#2

Laboratory Sample ID: 041922026-0003

Sample Description: Bench Zero Trench-Rock

Grid ID	Mineral Type	Length	Structure Width	Type	Photo ID Number	Mass (%)	Aspect Ratio	Mineral Class
D4 : I6	Actinolite	1.5	0.37	F		3.50E-03	4.1	Regulated
D4 : I6	Actinolite	1.2	0.12	F		2.94E-04	10.0	Regulated
D5 : F7	Actinolite	1.6	0.1	F		2.73E-04	16.0	Regulated
D5 : F7	Actinolite	1.2	0.1	F		2.04E-04	12.0	Regulated
D5 : F7	Actinolite	7.1	0.25	F		7.56E-03	28.4	Regulated
D5 : F7	Actinolite	3.6	0.25	F		3.83E-03	14.4	Regulated
D5 : F7	Actinolite	1.2	0.12	F		2.94E-04	10.0	Regulated
D5 : F7	Non-asbestiform Actinolite	5.1	0.37	F		1.19E-02	13.8	Other
DE5 : F7	Actinolite	1	0.12	F		2.45E-04	8.3	Regulated
D5 : F7	Actinolite	1.2	0.12	F		2.94E-04	10.0	Regulated
D5 : F7	Actinolite	4.3	0.74	F		4.01E-02	5.8	Regulated
D5 : F7	Actinolite	2.2	0.12	F		5.40E-04	18.3	Regulated
D5 : J8	Actinolite	2.2	0.12	F		5.40E-04	18.3	Regulated
D5 : J8	Non-asbestiform Actinolite	5.1	0.49	F		2.09E-02	10.4	Other
D5 : J8	Actinolite	1.2	0.12	F		2.94E-04	10.0	Regulated
D5 : J8	Actinolite	1	0.25	F		1.06E-03	4.0	Regulated
D5 : J8	Actinolite	9.1	1.72	B		4.59E-01	5.3	Regulated
D5 : J8	Actinolite	1.7	0.12	F		4.17E-04	14.2	Regulated
D5 : J8	Actinolite	5.1	0.12	F		1.25E-03	42.5	Regulated
D5 : J8	Actinolite	3.1	0.49	F		1.27E-02	6.3	Regulated
D5 : J8	Actinolite	4.3	0.25	F		4.58E-03	17.2	Regulated
D5 : J8	Actinolite	1.5	0.37	F		3.50E-03	4.1	Regulated
D5 : J8	Actinolite	6.1	0.12	F		1.50E-03	50.8	Regulated
D5 : J8	Actinolite	2.8	0.25	F		2.98E-03	11.2	Regulated
D5 : J8	Actinolite	7.3	0.25	F		7.77E-03	29.2	Regulated
D5 : J8	Actinolite	6.1	0.12	F		1.50E-03	50.8	Regulated



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Analysis of Bulk Material Utilizing Analytical Electron Microscopy (Section 2.5.5.2) with Milling Prep

Analytical Worksheet Report

Customer Sample Number: HS#2

Laboratory Sample ID: 041922026-0003

Sample Description: Bench Zero Trench-Rock

Grid ID	Mineral Type	Length	Structure Width	Type	Photo ID Number	Mass (%)	Aspect Ratio	Mineral Class
D5 : J8	Actinolite	4.9	0.12	F		1.20E-03	40.8	Regulated
D5 : J8	Actinolite	6.4	0.12	F		1.57E-03	53.3	Regulated
D5 : J8	Non-asbestiform Actinolite	5.4	0.74	F		5.04E-02	7.3	Other
D5 : J8	Actinolite	3.1	0.12	F		7.60E-04	25.8	Regulated
D5 : J8	Actinolite	2.9	0.49	F	1121	1.19E-02	5.9	Regulated
D5 : J8	Actinolite	2.9	0.12	F		7.11E-04	24.2	Regulated
D5 : J8	Actinolite	3.1	0.25	F		3.30E-03	12.4	Regulated



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Analysis of Bulk Material Utilizing Analytical Electron Microscopy (Section 2.5.5.2) with Milling Prep

Analytical Worksheet Report

Customer Sample Number: CB-3#8

Laboratory Sample ID: 041922026-0004

Sample Description: Core Sample-Rock

Grid ID	Mineral Type	Length	Structure Width	Type	Photo ID Number	Mass (%)	Aspect Ratio	Mineral Class
E1 : M6	Actinolite	2.4	0.49	F	1123	3.91E-03	4.9	Regulated
E1 : K4	Actinolite	2.2	0.25	F		9.34E-04	8.8	Regulated
E1 : K4	Non-asbestiform Actinolite	6.8	0.61	M		1.72E-02	11.1	Other
E1 : K4	Actinolite	1.2	0.12	F		1.17E-04	10.0	Regulated
E1 : K4	Actinolite	1.5	0.25	F		6.37E-04	6.0	Regulated
E1 : K4	Actinolite	1.2	0.25	F	1125	5.09E-04	4.8	Regulated
E1 : K4	Actinolite	7.5	0.12	F		7.34E-04	62.5	Regulated
E1 : K4	Actinolite	4.9	0.12	F		4.79E-04	40.8	Regulated
E1 : K4	Non-asbestiform Actinolite	1.5	0.25	F		6.37E-04	6.0	Other
E1 : K4	Actinolite	1.7	0.25	M		7.22E-04	6.8	Regulated
E1 : K4	Actinolite	4.6	0.12	F		4.50E-04	38.3	Regulated
E1 : K4	Actinolite	1.2	0.12	F		1.17E-04	10.0	Regulated
E1 : K4	Actinolite	1.2	0.12	F		1.17E-04	10.0	Regulated
E1 : K4	Actinolite	5.4	0.49	M		8.81E-03	11.0	Regulated
E1 : K4	Actinolite	5.4	0.12	F		5.28E-04	45.0	Regulated
E1 : I5	Non-asbestiform Actinolite	3.4	0.25	F		1.44E-03	13.6	Other
E1 : I5	Actinolite	0.8	0.12	F		7.83E-05	6.7	Regulated
E1 : I5	Actinolite	6.4	0.37	F		5.95E-03	17.3	Regulated
E1 : I5	Non-asbestiform Actinolite	4.1	0.49	F		6.69E-03	8.4	Other
E1 : I5	Actinolite	2.9	0.25	F		1.23E-03	11.6	Regulated
E1 : I5	Non-asbestiform Actinolite	7.8	0.49	F	1127	1.27E-02	15.9	Other
E1 : I5	Actinolite	1.5	0.12	M		1.47E-04	12.5	Regulated
E1 : I5	Non-asbestiform Actinolite	2.4	0.25	F		1.02E-03	9.6	Other
E1 : I5	Actinolite	2.9	0.49	F		4.73E-03	5.9	Regulated
E1 : I5	Actinolite	1.7	0.12	M		1.66E-04	14.2	Regulated
E1 : I5	Actinolite	2.2	0.25	F		9.34E-04	8.8	Regulated



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Analysis of Bulk Material Utilizing Analytical Electron Microscopy (Section 2.5.5.2) with Milling Prep

Analytical Worksheet Report

Customer Sample Number: CB-3#8

Laboratory Sample ID: 041922026-0004

Sample Description: Core Sample-Rock

Grid ID	Mineral Type	Length	Structure Width	Type	Photo ID Number	Mass (%)	Aspect Ratio	Mineral Class
E1 : I5	Actinolite	3.1	0.12	F		3.03E-04	25.8	Regulated
E1 : F7	Actinolite	2.6	0.25	F		1.10E-03	10.4	Regulated
E1 : F7	Actinolite	3.1	0.25	F		1.32E-03	12.4	Regulated
E1 : F7	Actinolite	2.8	0.12	F		2.74E-04	23.3	Regulated
E1 : F7	Actinolite	7.8	0.25	M		3.31E-03	31.2	Regulated
E1 : F7	Actinolite	2.6	0.49	F		4.24E-03	5.3	Regulated
E1 : F7	Non-asbestiform Actinolite	2.6	0.25	F		1.10E-03	10.4	Other
E1 : F7	Actinolite	6.2	1.72	B		1.25E-01	3.6	Regulated
E2 : G4	Actinolite	2.6	0.49	F		4.24E-03	5.3	Regulated
E2 : G4	Actinolite	1.5	0.12	F		1.47E-04	12.5	Regulated
E2 : G4	Actinolite	1.7	0.12	F		1.66E-04	14.2	Regulated
E2 : G4	Non-asbestiform Actinolite	9.3	0.49	F		1.52E-02	19.0	Other
E2 : G4	Non-asbestiform Actinolite	2.4	0.25	F		1.02E-03	9.6	Other
E2 : G4	Actinolite	3.2	0.74	F		1.19E-02	4.3	Regulated
E2 : G4	Actinolite	5.1	0.12	F		4.99E-04	42.5	Regulated
E2 : G4	Actinolite	2.2	0.25	F		9.34E-04	8.8	Regulated
E2 : G4	Non-asbestiform Actinolite	1.2	0.25	F		5.09E-04	4.8	Other
E2 : G4	Actinolite	1.2	0.12	F		1.17E-04	10.0	Regulated
E2 : G4	Non-asbestiform Actinolite	3.6	0.37	F		3.35E-03	9.7	Other
E2 : G4	Actinolite	4.3	0.12	F		4.21E-04	35.8	Regulated
E2 : G4	Actinolite	1.2	0.24	F		4.70E-04	5.0	Regulated
E2 : G4	Actinolite	2.5	0.25	F		1.06E-03	10.0	Regulated
E2 : G4	Non-asbestiform Actinolite	3.9	0.25	F		1.66E-03	15.6	Other
E2 : G4	Actinolite	2.4	0.25	F		1.02E-03	9.6	Regulated
E2 : G4	Actinolite	1.2	0.25	F		5.09E-04	4.8	Regulated
E2 : G4	Actinolite	3.4	0.25	F		1.44E-03	13.6	Regulated



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Analysis of Bulk Material Utilizing Analytical Electron Microscopy (Section 2.5.5.2) with Milling Prep

Analytical Worksheet Report

Customer Sample Number: CB-3#8

Laboratory Sample ID: 041922026-0004

Sample Description: Core Sample-Rock

Grid ID	Mineral Type	Length	Structure Width	Type	Photo ID Number	Mass (%)	Aspect Ratio	Mineral Class
E2 : G4	Actinolite	1.9	0.25	F		8.07E-04	7.6	Regulated



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Analysis of Bulk Material Utilizing Analytical Electron Microscopy (Section 2.5.5.2) with Milling Prep

Analytical Worksheet Report

Customer Sample Number: CB-1#1
Laboratory Sample ID: 041922026-0005
Sample Description: Core Sample-Rock

Grid ID	Mineral Type	Length	Structure Width	Type	Photo ID Number	Mass (%)	Aspect Ratio	Mineral Class
F4 : M6	Non-asbestiform Actinolite	5.9	0.49	F	1132	2.41E-02	12.0	Other
F4 : M6	Actinolite	2.2	0.12	F		5.39E-04	18.3	Regulated
F4 : M6	Non-asbestiform Actinolite	2.3	0.49	F		9.39E-03	4.7	Other
F4 : M6	Actinolite	2.2	0.25	F		2.34E-03	8.8	Regulated
F4 : M6	Non-asbestiform Actinolite	3.6	0.49	F		1.47E-02	7.3	Other
F4 : M6	Actinolite	1.2	0.12	F		2.94E-04	10.0	Regulated
F4 : M6	Actinolite	3.4	0.25	F		3.61E-03	13.6	Regulated
F4 : M6	Non-asbestiform Actinolite	4.9	0.25	F		5.21E-03	19.6	Other
F4 : M6	Actinolite	5.9	0.12	F		1.44E-03	49.2	Regulated
F4 : M6	Actinolite	0.8	0.12	F		1.96E-04	6.7	Regulated
F4 : M6	Actinolite	1.9	0.12	F		4.65E-04	15.8	Regulated
F4 : M6	Actinolite	4.9	0.12	F		1.20E-03	40.8	Regulated
F4 : M6	Actinolite	1.7	0.12	F		4.16E-04	14.2	Regulated
F4 : M6	Actinolite	14.1	0.12	F		3.45E-03	117.5	Regulated
F4 : M6	Non-asbestiform Actinolite	3.4	0.25	F		3.61E-03	13.6	Other
F4 : M6	Non-asbestiform Actinolite	1.5	0.37	F		3.49E-03	4.1	Other
F4 : M6	Non-asbestiform Actinolite	12.2	0.49	F		4.98E-02	24.9	Other
F4 : F4	Actinolite	7.7	0.37	F	1134	1.79E-02	20.8	Regulated
F4 : F4	Actinolite	1.2	0.12	F		2.94E-04	10.0	Regulated
F4 : F4	Actinolite	1.2	0.12	F		2.94E-04	10.0	Regulated
F4 : F4	Actinolite	8.1	0.25	F		8.61E-03	32.4	Regulated
F4 : F4	Non-asbestiform Actinolite	1.5	0.25	F		1.59E-03	6.0	Other
F4 : F4	Non-asbestiform Actinolite	3.6	0.49	F		1.47E-02	7.3	Other
F4 : F4	Actinolite	1.2	0.12	F		2.94E-04	10.0	Regulated
F4 : F4	Actinolite	2.6	0.25	F		2.76E-03	10.4	Regulated
F4 : F4	Actinolite	1	0.25	F		1.06E-03	4.0	Regulated



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Analysis of Bulk Material Utilizing Analytical Electron Microscopy (Section 2.5.5.2) with Milling Prep

Analytical Worksheet Report

Customer Sample Number: CB-1#1
Laboratory Sample ID: 041922026-0005
Sample Description: Core Sample-Rock

Grid ID	Mineral Type	Length	Structure Width	Type	Photo ID Number	Mass (%)	Aspect Ratio	Mineral Class
F4 : F4	Actinolite	14.1	0.86	B		1.77E-01	16.4	Regulated
F4 : F4	Non-asbestiform Actinolite	5.1	0.25	F		5.42E-03	20.4	Other
F4 : F4	Non-asbestiform Actinolite	12.6	0.74	F		1.17E-01	17.0	Other
F4 : F4	Non-asbestiform Actinolite	3.4	0.25	F		3.61E-03	13.6	Other
F4 : F4	Actinolite	9.2	0.37	F		2.14E-02	24.9	Regulated
F4 : F4	Actinolite	4.3	0.25	F		4.57E-03	17.2	Regulated
F4 : F4	Non-asbestiform Actinolite	2.9	0.25	F		3.08E-03	11.6	Other
F4 : F4	Actinolite	7.9	0.12	F		1.93E-03	65.8	Regulated
F4 : F4	Actinolite	1.2	0.25	F		1.28E-03	4.8	Regulated
F5 : E5	Actinolite	1.7	0.25	F		1.81E-03	6.8	Regulated
F5 : E5	Non-asbestiform Actinolite	1.5	0.25	F		1.59E-03	6.0	Other
F5 : E5	Actinolite	7.1	1.23	B		1.83E-01	5.8	Regulated
F5 : E5	Non-asbestiform Actinolite	1.2	0.25	F		1.28E-03	4.8	Other
F5 : E5	Actinolite	3.4	0.61	F		2.15E-02	5.6	Regulated
F5 : E5	Actinolite	7.8	0.86	F		9.81E-02	9.1	Regulated
F5 : E5	Non-asbestiform Actinolite	3.4	0.74	F		3.17E-02	4.6	Other
F5 : E5	Actinolite	1.5	0.12	F		3.67E-04	12.5	Regulated
F5 : E5	Actinolite	3.6	0.12	F		8.81E-04	30.0	Regulated
F5 : E5	Actinolite	6.6	0.12	F		1.62E-03	55.0	Regulated
F5 : E5	Actinolite	4.6	0.25	F		4.89E-03	18.4	Regulated
F5 : E5	Actinolite	11.2	0.49	F		4.57E-02	22.9	Regulated
F5 : E5	Actinolite	3.4	0.1	F		5.78E-04	34.0	Regulated
F5 : E5	Actinolite	1.2	0.25	F		1.28E-03	4.8	Regulated
F5 : E5	Actinolite	1.5	0.49	F		6.12E-03	3.1	Regulated
F5 : E5	Actinolite	12.2	0.12	F		2.99E-03	101.7	Regulated
F5 : E5	Actinolite	7.5	0.12	F		1.84E-03	62.5	Regulated



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Analysis of Bulk Material Utilizing Analytical Electron Microscopy (Section 2.5.5.2) with Milling Prep

Analytical Worksheet Report

Customer Sample Number: CB-1#1

Laboratory Sample ID: 041922026-0005

Sample Description: Core Sample-Rock

Grid ID	Mineral Type	Length	Structure Width	Type	Photo ID Number	Mass (%)	Aspect Ratio	Mineral Class
F5 : E5	Non-asbestiform Actinolite	3.6	0.37	F		8.38E-03	9.7	Other
F5 : E5	Actinolite	1.7	0.12	F		4.16E-04	14.2	Regulated
F5 : E5	Non-asbestiform Actinolite	9.2	0.49	F		3.76E-02	18.8	Other
F5 : E5	Actinolite	6.1	0.98	F		9.96E-02	6.2	Regulated
F5 : K7	Non-asbestiform Actinolite	4.6	0.49	F		1.88E-02	9.4	Other
F5 : K7	Actinolite	2.6	0.49	F		1.06E-02	5.3	Regulated
F5 : K7	Actinolite	17.1	0.12	F		4.19E-03	142.5	Regulated
F5 : K7	Actinolite	12.2	0.12	F		2.99E-03	101.7	Regulated
F5 : K7	Actinolite	5.4	0.37	F		1.26E-02	14.6	Regulated
F5 : K7	Non-asbestiform Actinolite	2.4	0.37	F		5.59E-03	6.5	Other
F5 : K7	Non-asbestiform Actinolite	3.1	0.25	F		3.29E-03	12.4	Other
F5 : K7	Actinolite	13.4	0.1	F		2.28E-03	134.0	Regulated
F5 : K7	Actinolite	6.8	0.98	B		1.11E-01	6.9	Regulated
F5 : K7	Actinolite	3.1	0.49	F		1.27E-02	6.3	Regulated
F5 : K7	Actinolite	1.9	0.12	F		4.65E-04	15.8	Regulated
F5 : K7	Non-asbestiform Pyroxene	5.9	0.86	F	1138	8.09E-02	6.9	Other
F5 : K7	Actinolite	3.4	0.49	F		1.39E-02	6.9	Regulated
F5 : K7	Non-asbestiform Actinolite	7.9	1.23	F		2.03E-01	6.4	Other
F5 : K7	Actinolite	14.8	0.49	F		6.04E-02	30.2	Regulated
F5 : K7	Non-asbestiform Actinolite	17.1	0.74	F		1.59E-01	23.1	Other
F5 : K7	Non-asbestiform Actinolite	2.4	0.25	F		2.55E-03	9.6	Other
F5 : K7	Actinolite	8.5	1.72	F		4.27E-01	4.9	Regulated
F5 : K7	Non-asbestiform Actinolite	2.9	0.74	F		2.70E-02	3.9	Other
F5 : K7	Actinolite	3.6	0.25	F		3.83E-03	14.4	Regulated
F5 : K7	Actinolite	21.9	2.18	B		1.77E+00	10.0	Regulated
F5 : K7	Actinolite	8.3	0.98	B		1.36E-01	8.5	Regulated



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Analysis of Bulk Material Utilizing Analytical Electron Microscopy (Section 2.5.5.2) with Milling Prep

Analytical Worksheet Report

Customer Sample Number: CB-1#1

Laboratory Sample ID: 041922026-0005

Sample Description: Core Sample-Rock

Grid ID	Mineral Type	Length	Structure Width	Type	Photo ID Number	Mass (%)	Aspect Ratio	Mineral Class
F5 : K7	Actinolite	4.9	0.12	F		1.20E-03	40.8	Regulated
F5 : K7	Non-asbestiform Actinolite	5.4	0.61	F		3.42E-02	8.9	Other
F5 : K7	Actinolite	1.7	0.25	F		1.81E-03	6.8	Regulated



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Analysis of Bulk Material Utilizing Analytical Electron Microscopy (Section 2.5.5.2) with Milling Prep

Analytical Worksheet Report

Customer Sample Number: CB-2#5
Laboratory Sample ID: 041922026-0006
Sample Description: Core Sample-Rock

Grid ID	Mineral Type	Length	Structure Width	Type	Photo ID Number	Mass (%)	Aspect Ratio	Mineral Class
G1 : N6	Actinolite	7.3	0.49	F	1142	6.61E-03	14.9	Regulated
G1 : N6	Actinolite	6.4	0.49	F		5.79E-03	13.1	Regulated
G1 : N6	Actinolite	1.2	0.12	F		6.51E-05	10.0	Regulated
G1 : N6	Non-asbestiform Actinolite	2.5	0.49	F		2.26E-03	5.1	Other
G1 : N6	Actinolite	3.6	0.37	F		1.86E-03	9.7	Regulated
G1 : N6	Actinolite	7.1	0.25	M		1.67E-03	28.4	Regulated
G1 : N6	Actinolite	5.4	0.25	M		1.27E-03	21.6	Regulated
G1 : N6	Actinolite	4.9	0.98	B		1.77E-02	5.0	Regulated
G1 : K4	Non-asbestiform Actinolite	2.1	0.49	F		1.90E-03	4.3	Other
G1 : K4	Actinolite	3.6	0.49	F		3.26E-03	7.3	Regulated
G1 : K4	Actinolite	2.3	0.25	F		5.42E-04	9.2	Regulated
G1 : K4	Actinolite	1.2	0.25	F		2.83E-04	4.8	Regulated
G1 : K4	Actinolite	4.6	0.98	F		1.67E-02	4.7	Regulated
G1 : I5	Actinolite	7.5	1.23	F		4.28E-02	6.1	Regulated
G1 : I5	Actinolite	4.6	0.12	F		2.50E-04	38.3	Regulated
G1 : I5	Actinolite	2.1	0.25	F		4.95E-04	8.4	Regulated
G1 : I5	Actinolite	1.7	0.25	F		4.01E-04	6.8	Regulated
G1 : G7	Non-asbestiform Actinolite	1.7	0.61	F		0.00E+00	2.8	Other
G1 : G7	Actinolite	4.3	0.12	F		2.33E-04	35.8	Regulated
G1 : G7	Non-asbestiform Actinolite	12.5	0.25	F		2.95E-03	50.0	Other
G1 : D4	Actinolite	2.6	0.25	F		6.13E-04	10.4	Regulated
GF1 : D4	Actinolite	1.5	0.12	F		8.14E-05	12.5	Regulated
G1 : D4	Non-asbestiform Actinolite	2.7	0.74	F		5.57E-03	3.6	Other
G1 : D4	Actinolite	2.9	0.25	F		6.83E-04	11.6	Regulated
G3 : C6	Non-asbestiform Actinolite	2.6	0.49	F		2.35E-03	5.3	Other
G3 : C6	Actinolite	3.1	0.12	F		1.68E-04	25.8	Regulated



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Analysis of Bulk Material Utilizing Analytical Electron Microscopy (Section 2.5.5.2) with Milling Prep

Analytical Worksheet Report

Customer Sample Number: CB-2#5
Laboratory Sample ID: 041922026-0006
Sample Description: Core Sample-Rock

Grid ID	Mineral Type	Length	Structure Width	Type	Photo ID Number	Mass (%)	Aspect Ratio	Mineral Class
G3 : C6	Actinolite	2.6	0.25	F		6.13E-04	10.4	Regulated
G3 : C6	Actinolite	1.2	0.25	F		2.83E-04	4.8	Regulated
G3 : E5	Non-asbestiform Actinolite	17.2	0.25	F		4.05E-03	68.8	Other
G3 : E5	Actinolite	6.8	0.98	F		2.46E-02	6.9	Regulated
G3 : E5	Actinolite	2.6	0.12	F		1.41E-04	21.7	Regulated
G3 : E5	Actinolite	3.4	0.25	F		8.01E-04	13.6	Regulated
G3 : E5	Actinolite	1.7	0.25	F		4.01E-04	6.8	Regulated
G3 : E5	Non-asbestiform Actinolite	3.6	0.49	F		3.26E-03	7.3	Other
G3 : E5	Actinolite	5.1	0.25	F		1.20E-03	20.4	Regulated
G3 : E5	Actinolite	3.1	0.25	F		7.30E-04	12.4	Regulated
G3 : E5	Actinolite	6.6	0.25	F		1.56E-03	26.4	Regulated
G3 : H4	Non-asbestiform Actinolite	8.3	0.49	f	1144	7.51E-03	16.9	Other
G3 : H4	Actinolite	1.5	0.12	F		8.14E-05	12.5	Regulated
G3 : H4	Actinolite	4.9	0.49	F		4.44E-03	10.0	Regulated
G3 : H4	Actinolite	17.5	2.52	B		4.19E-01	6.9	Regulated
G3 : H4	Non-asbestiform Actinolite	2.6	0.25	F		6.13E-04	10.4	Other
G3 : H4	Actinolite	1.2	0.25	F		2.83E-04	4.8	Regulated
G3 : H4	Actinolite	3.9	0.12	F		2.12E-04	32.5	Regulated
G3 : H4	Non-asbestiform Actinolite	3.4	0.49	F		3.08E-03	6.9	Other
G3 : H4	Actinolite	1.2	0.12	F		6.51E-05	10.0	Regulated
G3 : H4	Actinolite	1.5	0.12	F		8.14E-05	12.5	Regulated
G3 : H4	Actinolite	3.1	0.25	F		7.30E-04	12.4	Regulated
G3 : L5	Actinolite	2.4	0.1	F		9.05E-05	24.0	Regulated
G3 : L5	Actinolite	1.2	0.12	F		6.51E-05	10.0	Regulated
G3 : L5	Actinolite	3.1	0.25	F		7.30E-04	12.4	Regulated
G3 : L5	Actinolite	1.7	0.25	M		4.01E-04	6.8	Regulated



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Analytical Worksheet Report

Customer Sample Number: CB-2#5
Laboratory Sample ID: 041922026-0006
Sample Description: Core Sample-Rock

Grid ID	Mineral Type	Length	Structure Width	Type	Photo ID Number	Mass (%)	Aspect Ratio	Mineral Class
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Analysis of Bulk Material Utilizing Analytical Electron Microscopy (Section 2.5.5.2) with Milling Prep

Analytical Worksheet Report

Customer Sample Number: CB-4#10

Laboratory Sample ID: 041922026-0007

Sample Description: Core Sample-Rock

Grid ID	Mineral Type	Length	Structure Width	Type	Photo ID Number	Mass (%)	Aspect Ratio	Mineral Class
H2 : N6								
H2 : N6								
H2 : N6	Actinolite	8.3	0.49	F	1146	6.78E-03	16.9	Regulated
H2 : N6	Actinolite	1.2	0.25	F		2.55E-04	4.8	Regulated
H2 : N6	Actinolite	2.6	0.61	F		3.29E-03	4.3	Regulated
H2 : N6	Non-asbestiform Actinolite	4.5	0.98	F		1.47E-02	4.6	Other
H2 : N6	Actinolite	7.5	0.98	F		2.45E-02	7.7	Regulated
H2 : L4	Non-asbestiform Actinolite	1.7	0.25	F		3.61E-04	6.8	Other
H2 : L4	Non-asbestiform Actinolite	3.6	0.74	F		6.70E-03	4.9	Other
H2 : L4	Non-asbestiform Actinolite	5.5	0.86	F		1.38E-02	6.4	Other
H2 : L4	Actinolite	1.2	0.25	F		2.55E-04	4.8	Regulated
H2 : L4	Non-asbestiform Actinolite	7.1	1.47	F		5.22E-02	4.8	Other
H2 : J7	Non-asbestiform Actinolite	10.2	0.74	F	1148	1.90E-02	13.8	Other
H2 : J7	Actinolite	2.4	0.12	F		1.18E-04	20.0	Regulated
H2 : J7	Actinolite	1.7	0.49	F		1.39E-03	3.5	Regulated
H2 : G4	Actinolite	2.2	0.25	F		4.68E-04	8.8	Regulated
H2 : G4	Non-asbestiform Actinolite	1.5	0.12	F		7.34E-05	12.5	Other
H2 : D5	Non-asbestiform Actinolite	1.7	0.49	F		1.39E-03	3.5	Other
H2 : D5	Actinolite	1.7	0.49	F		1.39E-03	3.5	Regulated
H2 : D5	Non-asbestiform Actinolite	3.6	0.49	F		2.94E-03	7.3	Other
H3 : C7	Actinolite	2.9	0.61	F		3.67E-03	4.8	Regulated
H3 : C7	Actinolite	4.9	0.12	M		2.40E-04	40.8	Regulated
H3 : C7	Non-asbestiform Actinolite	12.2	0.74	F		2.27E-02	16.5	Other
H3 : F8	Actinolite	3.1	0.25	F		6.59E-04	12.4	Regulated
H3 : F8	Non-asbestiform Actinolite	1.5	0.37	F		6.98E-04	4.1	Other
H3 : F8	Non-asbestiform Actinolite	2.5	0.49	F		2.04E-03	5.1	Other



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Analytical Worksheet Report

Customer Sample Number: CB-4#10

Laboratory Sample ID: 041922026-0007

Sample Description: Core Sample-Rock

Grid ID	Mineral Type	Length	Structure Width	Type	Photo ID Number	Mass (%)	Aspect Ratio	Mineral Class
H3 : I6	Non-asbestiform Actinolite	3.9	0.74	F		7.26E-03	5.3	Other
H3 : I6	Actinolite	1.5	0.25	F		3.19E-04	6.0	Regulated
H3 : L10	Non-asbestiform Actinolite	7.5	0.49	F		6.12E-03	15.3	Other
H3 : L10	Actinolite	5.1	0.49	F		4.16E-03	10.4	Regulated
H3 : L10	Actinolite	2.4	0.49	F		1.96E-03	4.9	Regulated
H3 : L10	Actinolite	2.6	0.12	F		1.27E-04	21.7	Regulated
H3 : L10	Actinolite	2.9	0.49	F		2.37E-03	5.9	Regulated
H3 : L10	Non-asbestiform Actinolite	1.5	0.25	F		3.19E-04	6.0	Other
H3 : L10	Actinolite	5.4	0.1	F		1.84E-04	54.0	Regulated
H3 : L10	Actinolite	1.2	0.25	F		2.55E-04	4.8	Regulated
H3 : L10	Non-asbestiform Actinolite	2.9	0.61	F		3.67E-03	4.8	Other
H3 : L10	Actinolite	2.4	0.25	M		5.10E-04	9.6	Regulated
H3 : N8	Actinolite	1.7	0.25	F		3.61E-04	6.8	Regulated
H3 : N8	Actinolite	7.1	0.98	F		2.32E-02	7.2	Regulated
H3 : N8	Non-asbestiform Actinolite	1.5	0.12	F		7.34E-05	12.5	Other
H3 : N8	Non-asbestiform Actinolite	2.7	0.25	F		5.74E-04	10.8	Other
H3 : N8	Actinolite	1.2	0.12	F		5.88E-05	10.0	Regulated



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Analysis of Bulk Material Utilizing Analytical Electron Microscopy (Section 2.5.5.2) with Milling Prep

Analytical Worksheet Report

Customer Sample Number: CB-2#4
Laboratory Sample ID: 041922026-0008
Sample Description: Core Sample-Rock

Grid ID	Mineral Type	Length	Structure Width	Type	Photo ID Number	Mass (%)	Aspect Ratio	Mineral Class
I4 : N5	Actinolite	4.7	0.49	F	1150	9.61E-03	9.6	Regulated
I4 : N5	Actinolite	3.4	0.61	F		1.08E-02	5.6	Regulated
I4 : N5	Non-asbestiform Actinolite	1.7	0.37	F		1.98E-03	4.6	Other
I4 : N5	Non-asbestiform Actinolite	2.9	0.25	F		1.54E-03	11.6	Other
I4 : N5	Non-asbestiform Actinolite	2.4	0.49	F		4.91E-03	4.9	Other
I4 : N5	Actinolite	10.2	0.25	F		5.43E-03	40.8	Regulated
I4 : N5	Actinolite	1.9	0.12	F		2.33E-04	15.8	Regulated
I4 : N5	Actinolite	2.2	0.49	F		4.50E-03	4.5	Regulated
I4 : J3	Actinolite	1.5	0.12	F		1.84E-04	12.5	Regulated
I4 : J3	Actinolite	7.8	2.43	B		3.92E-01	3.2	Regulated
I4 : J3	Non-asbestiform Actinolite	3.6	0.25	F		1.92E-03	14.4	Other
I4 : J3	Actinolite	1.2	0.1	F		1.02E-04	12.0	Regulated
I4 : J3	Actinolite	3.9	0.37	F		4.55E-03	10.5	Regulated
I4 : J3	Non-asbestiform Actinolite	1.7	0.49	F		3.48E-03	3.5	Other
I4 : J3	Actinolite	5.4	0.49	F		1.10E-02	11.0	Regulated
I4 : J3	Non-asbestiform Actinolite	3.2	0.74	F		1.49E-02	4.3	Other
I4 : J3	Non-asbestiform Actinolite	1.7	0.37	F		1.98E-03	4.6	Other
I4 : J3	Actinolite	1.2	0.12	F		1.47E-04	10.0	Regulated
I4 : G5	Actinolite	2.6	0.25	F		1.38E-03	10.4	Regulated
I4 : G5	Actinolite	1.7	0.12	F		2.08E-04	14.2	Regulated
I4 : G5	Non-asbestiform Actinolite	1.5	0.25	F		7.98E-04	6.0	Other
I4 : G5	Non-asbestiform Actinolite	4.9	0.49	F	1152	1.00E-02	10.0	Other
I4 : G5	Actinolite	2.6	0.12	F		3.19E-04	21.7	Regulated
I4 : G5	Non-asbestiform Actinolite	2.4	0.25	F		1.28E-03	9.6	Other
I4 : G5	Actinolite	2.6	0.1	F		2.21E-04	26.0	Regulated
I4 : G5	Non-asbestiform Actinolite	1.5	0.25	F		7.98E-04	6.0	Other



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Analytical Worksheet Report

Customer Sample Number: CB-2#4
Laboratory Sample ID: 041922026-0008
Sample Description: Core Sample-Rock

Grid ID	Mineral Type	Length	Structure Width	Type	Photo ID Number	Mass (%)	Aspect Ratio	Mineral Class
I5 : C6	Non-asbestiform Actinolite	1.7	0.49	F		3.48E-03	3.5	Other
I5 : C6	Non-asbestiform Actinolite	1.2	0.25	F		6.39E-04	4.8	Other
I5 : F5	Actinolite	1.2	0.25	F		6.39E-04	4.8	Regulated
I5 : F5	Actinolite	6.9	0.12	F		8.46E-04	57.5	Regulated
I5 : F5	Actinolite	4.1	0.25	F		2.18E-03	16.4	Regulated
I5 : F5	Actinolite	1.5	0.12	F		1.84E-04	12.5	Regulated
I5 : F5	Non-asbestiform Actinolite	3.1	0.25	F		1.65E-03	12.4	Other
I5 : F5	Non-asbestiform Actinolite	1.5	0.25	F		7.98E-04	6.0	Other
I5 : H12	Actinolite	1.2	0.25	F		6.39E-04	4.8	Regulated
I5 : H12	Actinolite	2.4	0.12	F		2.94E-04	20.0	Regulated
I5 : H12	Non-asbestiform Actinolite	2.7	0.25	F		1.44E-03	10.8	Other
I6 : M4	Non-asbestiform Actinolite	2.6	0.12	F		3.19E-04	21.7	Other
I6 : M4	Actinolite	1.5	0.12	F		1.84E-04	12.5	Regulated
I6 : M4	Actinolite	5.5	0.49	B		1.12E-02	11.2	Regulated
I6 : M4	Actinolite	3.4	0.25	F		1.81E-03	13.6	Regulated
I6 : M4	Actinolite	2.9	0.25	F		1.54E-03	11.6	Regulated
I6 : H2	Actinolite	2.2	0.12	F		2.70E-04	18.3	Regulated
I6 : H2	Actinolite	1.2	0.12	F		1.47E-04	10.0	Regulated
I6 : H2	Non-asbestiform Actinolite	3.1	0.49	F		6.34E-03	6.3	Other
I6 : H2	Actinolite	4.6	0.12	F		5.64E-04	38.3	Regulated
I6 : H2	Actinolite	1.2	0.12	F		1.47E-04	10.0	Regulated
I6 : H2	Actinolite	2.1	0.12	F		2.58E-04	17.5	Regulated
I6 : H2	Non-asbestiform Actinolite	7.1	0.49	F		1.45E-02	14.5	Other
I6 : H2	Actinolite	0.9	0.12	F		1.10E-04	7.5	Regulated



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Analytical Worksheet Report

Customer Sample Number: RH HS-1

Laboratory Sample ID: 041922026-0009

Sample Description: Hand Sample#1 Rock

Grid ID	Mineral Type	Length	Structure Width	Type	Photo ID Number	Mass (%)	Aspect Ratio	Mineral Class
J2 : L4	Non-asbestiform Actinolite	3.2	0.61	F	1158	4.05E-03	5.2	Other
J2 : L4	Actinolite	2.6	0.49	F		2.12E-03	5.3	Regulated
J2 : L4	Actinolite	8.5	1.76	F		8.95E-02	4.8	Regulated
J2 : I6	Non-asbestiform Actinolite	5.6	0.25	F		1.19E-03	22.4	Other
J2 : I6	Non-asbestiform Actinolite	1.2	0.25	F		2.55E-04	4.8	Other
J2 : I6	Non-asbestiform Actinolite	4.5	0.49	F		3.67E-03	9.2	Other
J2 : I6	Actinolite	2.9	0.12	F		1.42E-04	24.2	Regulated
J2 : G4	Actinolite	7.5	0.49	F	1160	6.12E-03	15.3	Regulated
J2 : G4	Non-asbestiform Actinolite	1.7	0.49	F		1.39E-03	3.5	Other
J2 : G4	Non-asbestiform Actinolite	14.3	1.23	F		7.36E-02	11.6	Other
J2 : G4	Actinolite	15.1	2.43	F		3.03E-01	6.2	Regulated
J2 : E5	Actinolite	2.2	0.12	F		1.08E-04	18.3	Regulated
J2 : E5	Non-asbestiform Actinolite	1.2	0.12	F		5.88E-05	10.0	Other
J2 : E5	Actinolite	1.5	0.25	F		3.19E-04	6.0	Regulated
J2 : E5	Actinolite	1.5	0.25	F		3.19E-04	6.0	Regulated
J2 : B6	Non-asbestiform Actinolite	11.9	0.25	F		2.53E-03	47.6	Other
J2 : B6	Non-asbestiform Actinolite	3.6	0.74	F	1162	6.70E-03	4.9	Other
J2 : B6	Actinolite	2.4	0.25	F		5.10E-04	9.6	Regulated
J3 : C5	Actinolite	1.2	0.12	F		5.88E-05	10.0	Regulated
J3 : C5	Actinolite	1.7	0.25	F		3.61E-04	6.8	Regulated
J3 : C5	Non-asbestiform Actinolite	5.3	0.86	F		1.33E-02	6.2	Other
J3 : C5	Actinolite	1.5	0.37	F		6.98E-04	4.1	Regulated
J3 : C5	Actinolite	1.2	0.12	F		5.88E-05	10.0	Regulated
J3 : F4	Non-asbestiform Actinolite	1.2	0.25	F		2.55E-04	4.8	Other
J3 : F4	Actinolite	1.7	0.25	F		3.61E-04	6.8	Regulated
J3 : F4	Actinolite	1.2	0.12	F		5.88E-05	10.0	Regulated



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Analysis of Bulk Material Utilizing Analytical Electron Microscopy (Section 2.5.5.2) with Milling Prep

Analytical Worksheet Report

Customer Sample Number: RH HS-1

Laboratory Sample ID: 041922026-0009

Sample Description: Hand Sample#1 Rock

Grid ID	Mineral Type	Length	Structure Width	Type	Photo ID Number	Mass (%)	Aspect Ratio	Mineral Class
J3 : F4	Actinolite	10.7	2.68	F		2.61E-01	4.0	Regulated
J3 : H6	Non-asbestiform Actinolite	2.2	0.37	F		1.02E-03	5.9	Other
J3 : H6	Actinolite	1.5	0.12	F		7.34E-05	12.5	Regulated
J3 : K3	Non-asbestiform Actinolite	8.7	0.49	F		7.10E-03	17.8	Other
J3 : K3	Actinolite	4.9	0.12	F		2.40E-04	40.8	Regulated
J3 : K3	Non-asbestiform Actinolite	1.2	0.12	F		5.88E-05	10.0	Other
J3 : M7	Actinolite	2.4	0.49	F		1.96E-03	4.9	Regulated
J3 : M7	Actinolite	1.5	0.25	F		3.19E-04	6.0	Regulated
J3 : M7	Actinolite	1.5	0.25	F		3.19E-04	6.0	Regulated



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Analysis of Bulk Material Utilizing Analytical Electron Microscopy (Section 2.5.5.2) with Milling Prep

Analytical Worksheet Report

Customer Sample Number: RH Vein#7

Laboratory Sample ID: 041922026-0010

Sample Description: Rock Sample

Grid ID	Mineral Type	Length	Structure Width	Type	Photo ID Number	Mass (%)	Aspect Ratio	Mineral Class
J4 : M2	Non-asbestiform Actinolite	4.7	0.74	F	1165	2.92E-01	6.4	Other
J4 : M2	Actinolite	2.4	0.12	F		3.92E-03	20.0	Regulated
J4 : M2	Actinolite	1.5	0.12	F		2.45E-03	12.5	Regulated
J4 : M2	Non-asbestiform Actinolite	1.2	0.12	F		1.96E-03	10.0	Other
J4 : M2	Actinolite	1.2	0.12	F		1.96E-03	10.0	Regulated
J4 : M2	Actinolite	7.1	0.25	F		5.03E-02	28.4	Regulated
J4 : M2	Non-asbestiform Actinolite	1.7	0.12	F		2.77E-03	14.2	Other
J4 : M2	Actinolite	10.4	0.12	F		1.70E-02	86.7	Regulated
J4 : M2	Actinolite	9.5	0.12	F		1.55E-02	79.2	Regulated
J4 : M2	Actinolite	3.4	0.12	F		5.55E-03	28.3	Regulated
J4 : M2	Actinolite	0.8	0.12	F		1.31E-03	6.7	Regulated
J4 : M2	Non-asbestiform Actinolite	3.6	0.49	F	1167	9.80E-02	7.3	Other
J4 : M2	Actinolite	3.2	0.25	F		2.27E-02	12.8	Regulated
J4 : M2	Actinolite	3.6	0.1	F		4.08E-03	36.0	Regulated
J4 : M2	Actinolite	1.2	0.1	F		1.36E-03	12.0	Regulated
J4 : M2	Actinolite	1.2	0.25	F		8.50E-03	4.8	Regulated
J4 : M2	Actinolite	5.6	0.25	F		3.97E-02	22.4	Regulated
J4 : M2	Non-asbestiform Actinolite	10.2	0.74	F		6.33E-01	13.8	Other
J4 : M2	Non-asbestiform Actinolite	1.5	0.49	F		4.08E-02	3.1	Other
J4 : M2	Actinolite	3.1	0.1	F		3.51E-03	31.0	Regulated
J4 : M2	Actinolite	10.2	0.1	F		1.16E-02	102.0	Regulated
J4 : M2	Actinolite	2.9	0.12	F		4.73E-03	24.2	Regulated
J4 : M2	Actinolite	2.3	0.12	F		3.75E-03	19.2	Regulated
J4 : M2	Actinolite	1.2	0.37	F		1.86E-02	3.2	Regulated
J4 : M2	Actinolite	4.7	0.25	F		3.33E-02	18.8	Regulated
J4 : M2	Actinolite	7.6	0.25	F		5.38E-02	30.4	Regulated



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Analysis of Bulk Material Utilizing Analytical Electron Microscopy (Section 2.5.5.2) with Milling Prep

Analytical Worksheet Report

Customer Sample Number: RH Vein#7

Laboratory Sample ID: 041922026-0010

Sample Description: Rock Sample

Grid ID	Mineral Type	Length	Structure Width	Type	Photo ID Number	Mass (%)	Aspect Ratio	Mineral Class
J4 : M2	Actinolite	6.4	0.12	F		1.04E-02	53.3	Regulated
J4 : M2	Non-asbestiform Actinolite	3.4	0.49	F		9.25E-02	6.9	Other
J4 : M2	Actinolite	3.2	0.25	F		2.27E-02	12.8	Regulated
J4 : M2	Actinolite	1.2	0.12	F		1.96E-03	10.0	Regulated
J4 :	Actinolite	1.5	0.12	F		2.45E-03	12.5	Regulated
J4 : M2	Actinolite	4.9	0.98	F		5.33E-01	5.0	Regulated
J4 : M2	Actinolite	2.9	0.49	F		7.89E-02	5.9	Regulated
J4 : M2	Actinolite	4.7	0.49	F	1169	1.28E-01	9.6	Regulated
J4 : M2	Actinolite	2.7	0.12	F		4.41E-03	22.5	Regulated
J4 : M2	Actinolite	1.2	0.12	F		1.96E-03	10.0	Regulated
J4 : M2	Actinolite	3.6	0.37	F		5.59E-02	9.7	Regulated
J4 : M2	Actinolite	5.5	0.25	F		3.90E-02	22.0	Regulated
J4 : M2	Actinolite	4.9	0.1	F		5.55E-03	49.0	Regulated
J4 : M2	Actinolite	3.4	0.1	F		3.85E-03	34.0	Regulated
J4 : M2	Actinolite	9.9	0.25	F		7.01E-02	39.6	Regulated
J4 : M2	Non-asbestiform Actinolite	3.6	0.25	F		2.55E-02	14.4	Other
J4 : M2	Actinolite	17.4	2.92	B		1.68E+01	6.0	Regulated
J4 : M2	Actinolite	10.4	0.25	F		7.37E-02	41.6	Regulated
J4 : M2	Actinolite	24.7	0.25	F		1.75E-01	98.8	Regulated
J4 : M2	Actinolite	1.2	0.12	F		1.96E-03	10.0	Regulated
J4 : M2	Actinolite	14.8	0.37	F		2.30E-01	40.0	Regulated
J4 : M2	Actinolite	10.5	0.12	F		1.71E-02	87.5	Regulated
J4 : M2	Actinolite	3.6	0.25	F		2.55E-02	14.4	Regulated
J4 : M2	Actinolite	3.4	0.12	F		5.55E-03	28.3	Regulated
J4 : M2	Non-asbestiform Actinolite	4.1	0.25	F		2.90E-02	16.4	Other
J4 : M2	Actinolite	2.9	0.12	F		4.73E-03	24.2	Regulated



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Analytical Worksheet Report

Customer Sample Number: RH Vein#7

Laboratory Sample ID: 041922026-0010

Sample Description: Rock Sample

Grid ID	Mineral Type	Length	Structure Width	Type	Photo ID Number	Mass (%)	Aspect Ratio	Mineral Class
J4 : M2	Actinolite	2.2	0.12	F		3.59E-03	18.3	Regulated
J6 : I3	Actinolite	7.6	0.25	F		5.38E-02	30.4	Regulated
J6 : I3	Actinolite	1.2	0.1	F		1.36E-03	12.0	Regulated
J6 : I3	Non-asbestiform Actinolite	1.2	0.25	F		8.50E-03	4.8	Other
J6 : I3	Actinolite	1.2	0.1	F		1.36E-03	12.0	Regulated
J6 : I3	Actinolite	8.3	0.12	F		1.35E-02	69.2	Regulated
J6 : I3	Actinolite	1.7	0.25	F		1.20E-02	6.8	Regulated
J6 : I3	Non-asbestiform Actinolite	3.7	0.49	F		1.01E-01	7.6	Other
J6 : I3	Actinolite	1.9	0.12	F		3.10E-03	15.8	Regulated
J6 : I3	Non-asbestiform Actinolite	1.2	0.12	F		1.96E-03	10.0	Other
J6 : I3	Non-asbestiform Actinolite	1.5	0.25	F		1.06E-02	6.0	Other
J6 : I3	Actinolite	1.2	0.1	F		1.36E-03	12.0	Regulated
J6 : I3	Non-asbestiform Actinolite	7.3	0.37	F		1.13E-01	19.7	Other
J6 : I3	Actinolite	1.2	0.12	F		1.96E-03	10.0	Regulated
J6 : I3	Non-asbestiform Actinolite	7.8	0.49	F		2.12E-01	15.9	Other
J6 : I3	Actinolite	1.7	0.49	F		4.63E-02	3.5	Regulated
J6 : I3	Actinolite	6.4	0.12	F		1.04E-02	53.3	Regulated
J6 : I3	Actinolite	2.5	0.12	F		4.08E-03	20.8	Regulated
J6 : I3	Actinolite	6.4	0.25	F		4.53E-02	25.6	Regulated
J6 : I3	Non-asbestiform Actinolite	6.6	0.25	F		4.68E-02	26.4	Other
J6 : I3	Non-asbestiform Actinolite	1.5	0.12	F		2.45E-03	12.5	Other
J6 : I3	Non-asbestiform Actinolite	2.2	0.49	F		5.99E-02	4.5	Other
J6 : I3	Non-asbestiform Actinolite	13.1	0.12	F		2.14E-02	109.2	Other
J6 : I3	Actinolite	5.4	0.12	F		8.81E-03	45.0	Regulated
J6 : I3	Non-asbestiform Actinolite	19.9	0.25	F		1.41E-01	79.6	Other
J6 : I3	Actinolite	2.9	0.12	F		4.73E-03	24.2	Regulated



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Analytical Worksheet Report

Customer Sample Number: RH Vein#7

Laboratory Sample ID: 041922026-0010

Sample Description: Rock Sample

Grid ID	Mineral Type	Length	Structure Width	Type	Photo ID Number	Mass (%)	Aspect Ratio	Mineral Class
J6 : I3	Actinolite	1.5	0.25	F		1.06E-02	6.0	Regulated
J6 : I3	Actinolite	2.2	0.1	F		2.49E-03	22.0	Regulated
J6 : I3	Actinolite	8.8	0.12	F		1.44E-02	73.3	Regulated
J6J : I3	Non-asbestiform Actinolite	8.1	0.25	F		5.74E-02	32.4	Other
J6 : I3	Non-asbestiform Actinolite	16.1	0.25	F		1.14E-01	64.4	Other
J6 : I3	Actinolite	12.6	0.12	F		2.06E-02	105.0	Regulated
J6 : I3	Actinolite	9.2	0.25	F		6.52E-02	36.8	Regulated
J6 : I3	Actinolite	2.6	0.25	F		1.84E-02	10.4	Regulated
J6 : I3	Non-asbestiform Actinolite	2.9	0.74	F	1172	1.80E-01	3.9	Other
J6 : I3	Non-asbestiform Actinolite	1.5	0.25	F		1.06E-02	6.0	Other
J6 : I3	Actinolite	4.7	0.12	F		7.67E-03	39.2	Regulated
J6 : I3	Actinolite	2.9	0.12	F		4.73E-03	24.2	Regulated
J6 : I3	Non-asbestiform Actinolite	9.3	1.72	F		3.12E+00	5.4	Other
J6 : I3	Actinolite	1.9	0.37	F		2.95E-02	5.1	Regulated
J6 : I3	Actinolite	1.7	0.12	F		2.77E-03	14.2	Regulated
J6 : I3	Actinolite	2.9	0.25	F		2.05E-02	11.6	Regulated
J6 : I3	Actinolite	2.9	0.1	F		3.29E-03	29.0	Regulated
J6 : I3	Actinolite	8.3	0.1	F		9.41E-03	83.0	Regulated
J6 : I3	Actinolite	1.5	0.12	F		2.45E-03	12.5	Regulated
J6 : I3	Actinolite	1.2	0.12	F		1.96E-03	10.0	Regulated
J6 : I3	Actinolite	8.5	0.25	F		6.02E-02	34.0	Regulated
J6 : I3	Non-asbestiform Actinolite	0.8	0.12	F		1.31E-03	6.7	Other
J6 : I3	Non-asbestiform Actinolite	1.2	0.25	F		8.50E-03	4.8	Other
J6 : I3	Actinolite	1.2	0.1	F		1.36E-03	12.0	Regulated
J6 : I3	Actinolite	0.6	0.12	F		9.79E-04	5.0	Regulated