

# **Erskine Environmental Consulting**

*Geologic Investigations Hazardous Materials Naturally Occurring Asbestos*

September 16, 2021

Jeremy Malson, CIH, CSP, CAC, CDPH  
Millennium Consulting Associates  
4683 Chabot Drive, Suite 380  
Pleasanton CA 94588

Subject: Geologic Evaluation for Naturally Occurring Asbestos  
Child Development Center Site  
Merritt College Campus, Oakland, CA

Mr. Malson,

Erskine Environmental Consulting, Inc. (EEC) is pleased to submit to Millennium Consulting Associates (MCA) this report of findings regarding the potential for Naturally Occurring Asbestos (NOA) at the proposed Merritt College Child Development Center (CDC) construction site (Figure 1). The evaluation was conducted in accordance with the scope of work dated July 22, 2021.

The proposed CDC project includes construction involving the excavation and grading of rocks and soil that underlie the site. Several geotechnical investigations have been conducted at the site, one of which included one sample that was tested for asbestos. Although the investigations concluded that ultramafic rocks are not present beneath the area where soil disturbance will occur and the sample tested negative for asbestos, MCA requested an additional NOA-specific evaluation to conclusively document that ultramafic rocks or asbestos is not present at the site, and therefore, the proposed construction project is not subject to the California Air Resources Board (CARB) Airborne Toxic Control Measure (ATCM) for asbestos. Figure 2 shows the limits of the CDC site and the area where soil disturbance is expected during construction.

## **Compliance with the CARB ATCM**

The CARB ATCM specifies three conditions where the regulation is triggered:

1. *Any portion of the area to be disturbed is located in a geographic ultramafic rock unit, or*
2. *Any portion of the area to be disturbed has naturally-occurring asbestos, serpentine, or ultramafic rock as determined by the owner / operator, or the Air Pollution Control Officer (APCO); or*
3. *Naturally-occurring asbestos, serpentine, or ultramafic rock is discovered by the owner/operator, a registered geologist, or the APCO in the area to be disturbed after the start of any construction, grading, quarrying, or surface mining operation.*

The term "geographic ultramafic rock unit" (GURU) is defined as:

*"A geographic area that is designated as an ultramafic rock unit or ultrabasic rock unit, including the unit boundary line, on any of the maps referenced in Appendix A".*

It is understood that the identification of GURU applies to any ultramafic rock that is mapped on a readily available geologic map, particularly those published by the United States Geological Survey (USGS), California Geological Survey (CGS), and/or published on the USGS national geological map database.

## **Review of Geologic Maps**

A search of the USGS database produced two geologic maps depicting the geologic units that underlie the subject site. The most recently published map by Dibblee and Minch (2005) depicts serpentinite (an ultramafic rock unit where asbestos is ubiquitous) approximately 900 feet northeast of the CDC site (Figure 3). On this map, the site where construction will occur is underlain by rhyolite of the Coast Range Ophiolite Complex and possibly shale of the Knoxville formation. Rhyolite and shale are considered by the California Geological Survey (CGS) as having a low potential for asbestos to be present (asbestos is not likely to be present). The earlier map published by Graymer (2000) depicts the site to be underlain by quartz keratophyre, a volcanic rock of intermediate composition (Figure 4). This lithology also is considered to have a low potential to contain asbestos.

## **Previous Work**

In 2019, Terraphase Engineering Inc. conducted a Geotechnical Design and Geological Hazards Evaluation which included five borings (Terraphase, 2019). The location of the five borings advanced by Terraphase is shown in Figure 5.

The following is a summary of the findings that were presented in the Terraphase (2019) report.

*Three different geologic formations are present at the Merritt College Campus: Leona Rhyolite, Knoxville Shale, and Franciscan Serpentine. These rocks are arranged in parallel bands, elongated northwest to southeast from one end of the property to the other. The rhyolite, a bluish-gray, hard, somewhat fractured, fine-grained crystalline volcanic rock, forms the high ridge on the southwest and the chain of low knobs along the axis of the property. The site is located near the boundary between the Leona Rhyolite and the Knoxville Formation. The surficial bedrock at the site was found to be Leona Rhyolite.*

*A sample of site soil was collected and analyzed in a laboratory for asbestos by polarized light microscopy. No asbestos was detected in the sample.*

Therefore, the site is reported to be underlain by rhyolite, a rock unit that is considered by the CGS to have a low potential for asbestos (Churchill, Higgins and Hill, 2000; Higgins and Clinkenbeard, 2006a and 2006b), And ultramafic rocks (serpentinite, in this case) are not present at the site

## **Results of the NOA Evaluation at the CDC Site.**

### Field Reconnaissance

The site was clear of buildings and structures, and much of the site had been cleared of vegetation (Figure 6). Gravel sized clasts of rhyolite were present across the site and on the surrounding slopes (Figure 7). Ten potholes were advanced using a breaking bar and post hole digger to ascertain the lithology of the rock units that underlie the site. Hard rhyolite was

encountered in each of the potholes, confirming the depiction on the geologic maps and observations by Terraphase that the site is underlain by rhyolite. Serpentinite was not observed at the site.

### Sampling and Testing for Asbestos.

Three samples consisting of 20-point aliquots were collected within the area that will be disturbed during construction (Figure 8). The three samples, consisting of rhyolite, were representative of the rock that occupies the site as indicated by clasts on the surface and observed within the ten potholes.

Prior to submittal to the asbestos testing laboratory, a representative portion of each sample was hand milled using a porcelain mortar and pestle, and analyzed under a Nikon polarizing light petrographic microscope using the standard oil immersion method. A variety of refractive index oils (n= 1.510, 1.550, 1.630 and 1.640) provided refractive index data for mineral identification. The rhyolite was very hard, highly recrystallized, and very fine grained, and most grains were opaque due to their composition of many small mineral crystals. Most mineral particles that dissociated from the rock mass were too fine to be positively identified. However, abundant grains of quartz, plagioclase (likely sanidine) and biotite were observed. This assemblage is consistent with the composition of rhyolite, and confirms that the rock is a felsic volcanic rock and not ultramafic in composition.

The three samples were submitted under chain of custody protocol to Asbestos TEM Laboratories (ATEM) in Berkeley, California. ATEM is accredited under the Federal NVLAP, State ELAP, and AIHA programs for the testing of asbestos in bulk materials. The samples were prepared using a Braun mill pulverizer and point counted (400 points) following the procedures specified by the CARB 435 Method. Asbestos was not detected in each of the three samples (Table 1). The laboratory testing report is included in Appendix A, and the laboratory report of the sample collected by Terraphase is included in Appendix B.

**Table 1**  
**Results of Asbestos Testing by CARB 435**

Sample ID	Lithology	CGS Class*	Points Counted	Asbestos Counted	Asbestos Observed	Result
CDC-1	Rhyolite	Unlikely to contain asbestos	400	0	No	No Asbestos Detected
CDC-2	Rhyolite	Unlikely to contain asbestos	400	0	No	No Asbestos Detected
CDC-3	Rhyolite	Unlikely to contain asbestos	400	0	No	No Asbestos Detected
1**	Rhyolite	Unlikely to contain asbestos	400	0	No	No Asbestos Detected

\*California Geological Survey (Churchill, Higgins, and Hill, 2000; Higgins and Clinkenbeard, 2006a; Higgins and Clinkenbeard, 2006b).

\*\*Sampled previously during the geotechnical investigation (Terraphase, 2019). See Appendix B.

### **Conclusions**

Based on the data provided in Terraphase (2019) and the results of this targeted NOA evaluation, EEC concludes that ultramafic rocks that may contain chrysotile asbestos or other rock units that may contain amphibole asbestos as defined by the CARB ATCM are not present on the CDC site, and detectable concentrations of asbestos are not a constituent of the rocks at the site. It is the opinion of EEC that the asbestos ATCM is not applicable to this

construction site, and notification to BAAQMD or specialized asbestos dust control measures are not required.

Thank you for selecting EEC for this project. Please contact me if you have any questions.

Handwritten signature of Bradley G. Erskine in blue ink.

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

**References Cited**

Churchill, Ronald K., Higgins, Chris T., and Hill, Bob, 2000, Areas More Likely to Contain Natural Occurrences of Asbestos in Western El Dorado County, California. California Department of Conservation Open-File Report 2000-2002, 66p.

Dibblee, T.W. and Minch, J.A. (2005), Geologic map of the Oakland East Quadrangle, Contra Costa and Alameda Counties, California. Map Scale: 1:24,000.

Graymer, R.W. (2000) Geologic Map and Map Database of the Oakland Metropolitan Area, Alameda, Contra Costa, and San Francisco Counties, California. Map Scale: 1:50,000.

Higgins, Chris T., and Clinkenbeard, John P., 2006a, Relative Likelihood for the Presence of Naturally Occurring Asbestos in Placer County, California. California Geological Survey Special Report 190, 54p.

Higgins, Chris T, and Clinkenbeard, John P., 2006b, Relative Likelihood for the Presence of Naturally Occurring Asbestos in Eastern Sacramento County, California. Geological Survey Special Report 192, 43p.

Terraphase Engineering Inc., 2019, Geotechnical Design and Geological Hazards Evaluation Report, Child Development Center, Merritt College, Oakland, California.

**FIGURES**

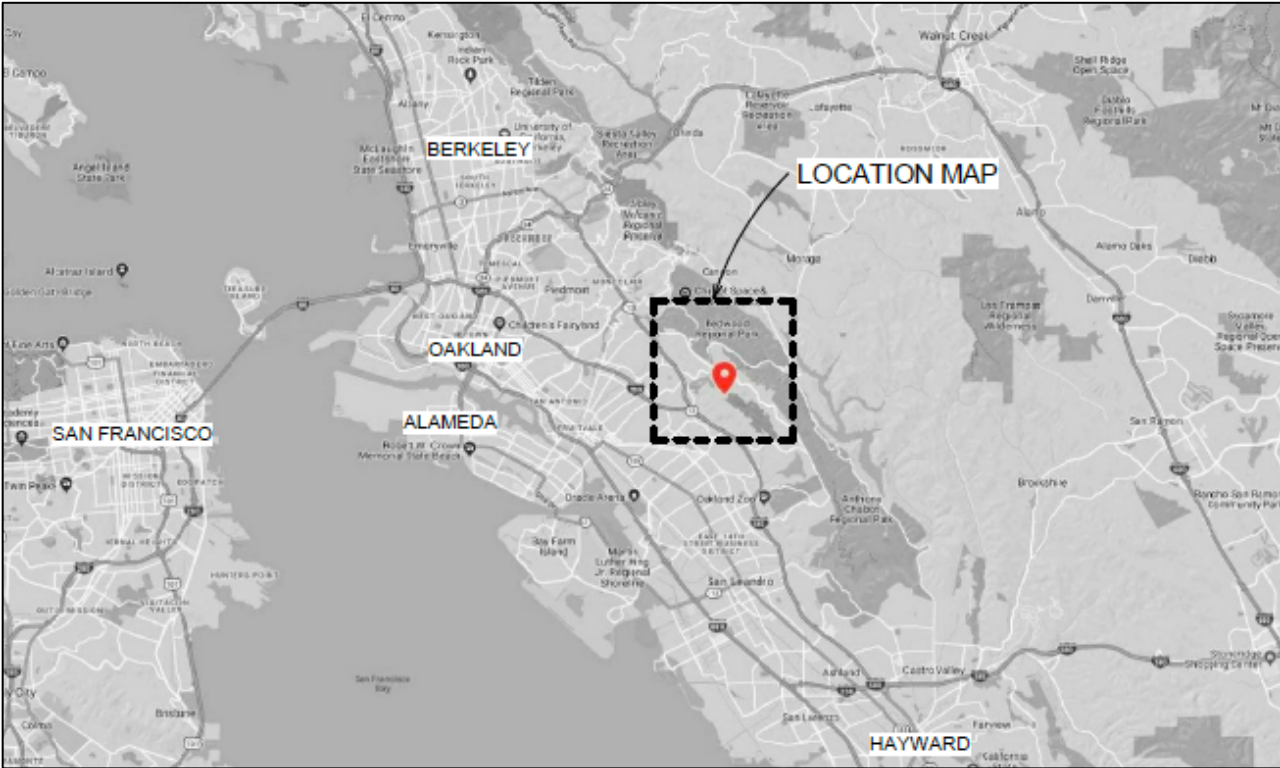


Figure 1: Site location.

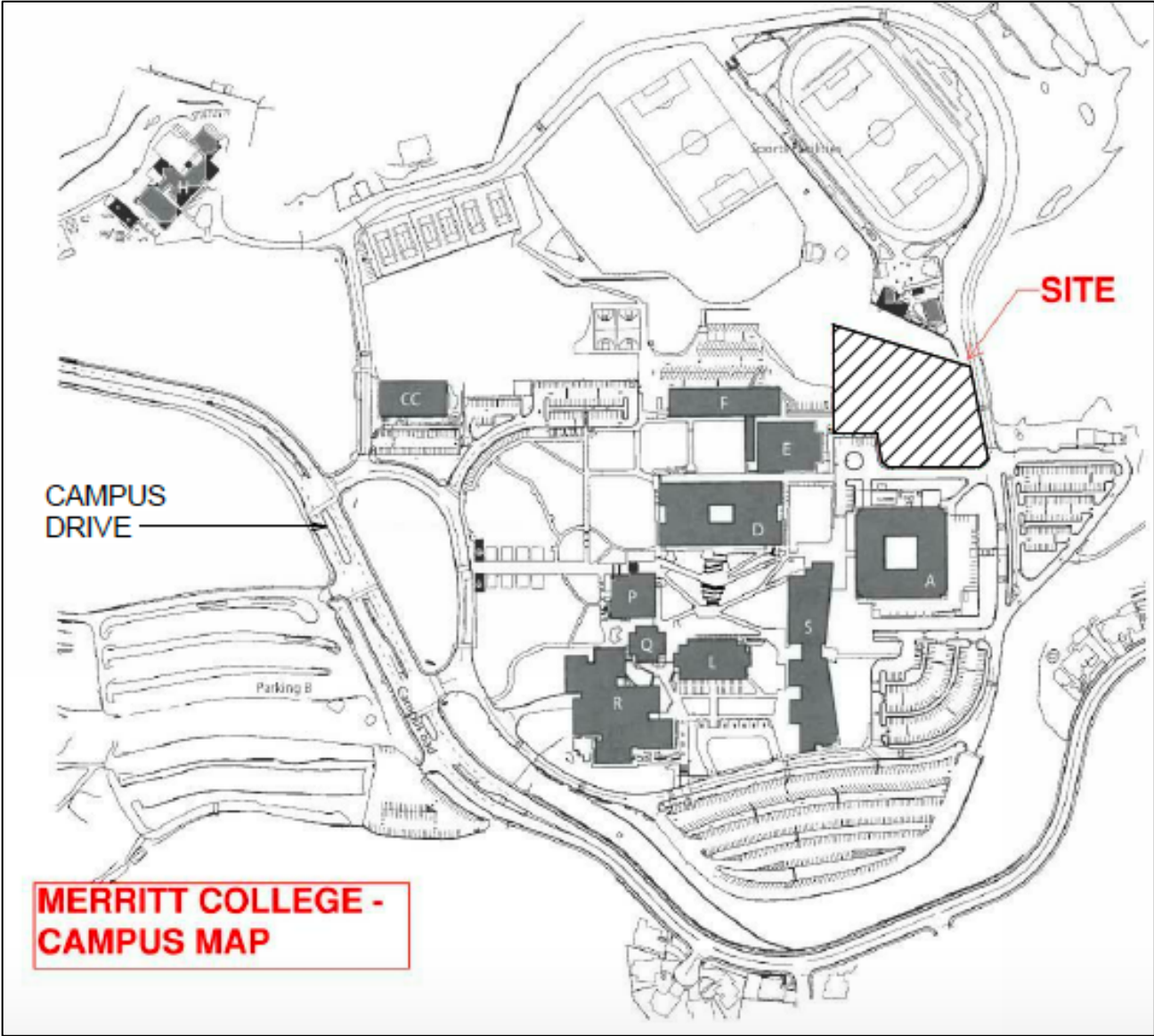


Figure 2: Site location on the Merritt College campus.



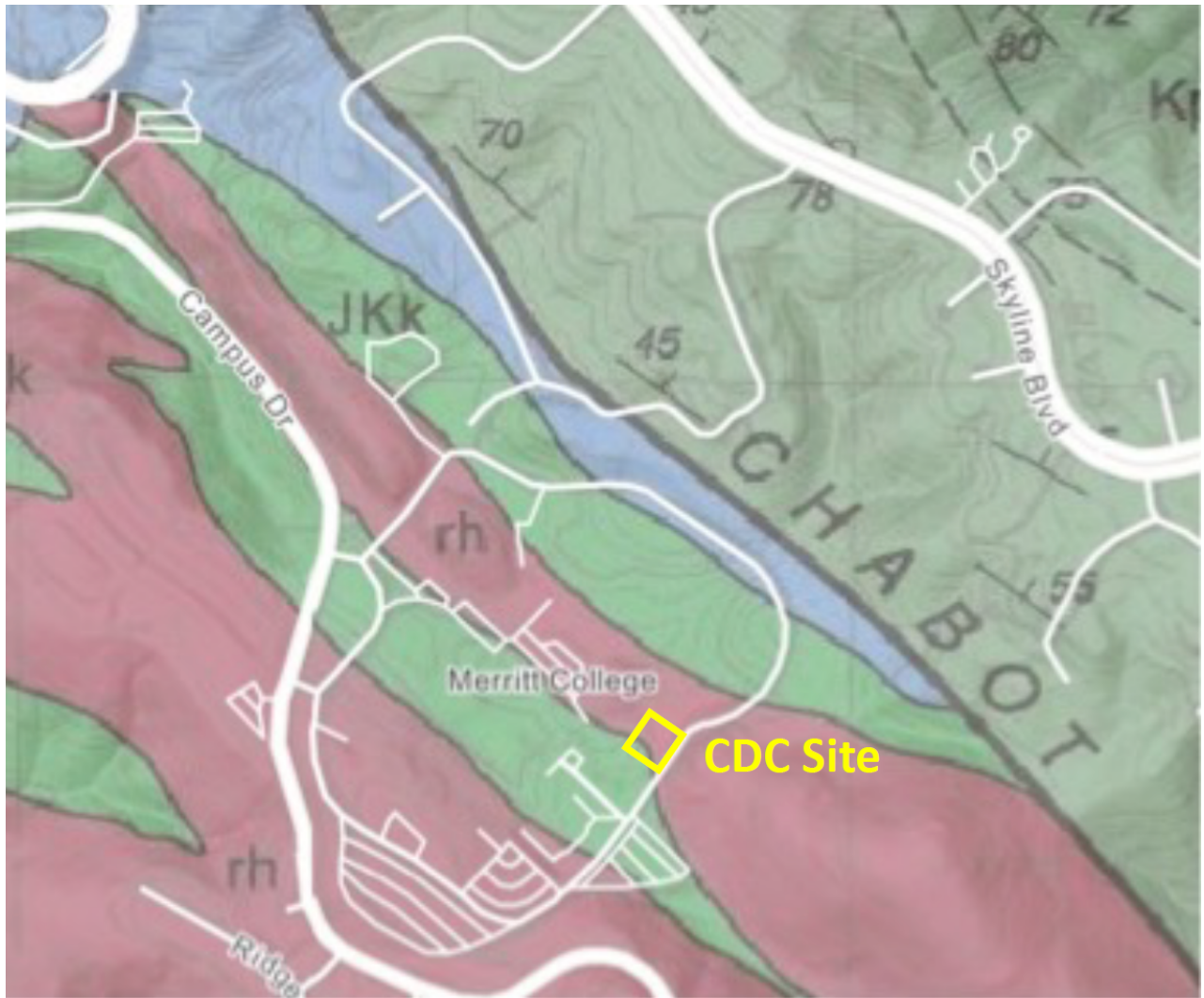


Figure 3: Geologic map showing the CDC site being underlain by rhyolite and possibly Knoxville Formation shale. From Dibblee and Minch, 2005.

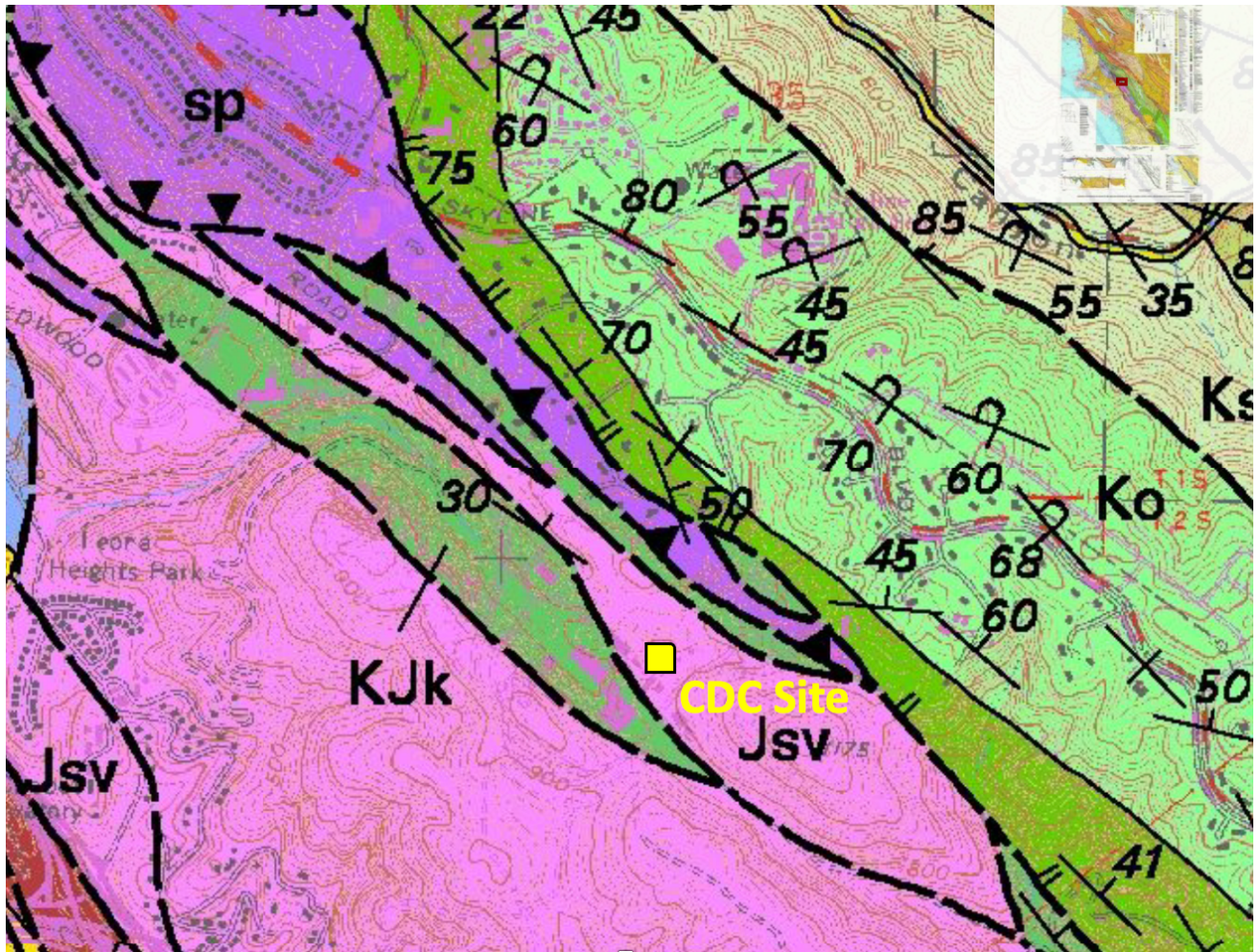


Figure 4: Geologic map showing the CDC site being underlain by volcanic rocks (unit Jsv), with Knoxville formation shale (unit KJk) located off of the site to the southeast. From Graymer, 2000.

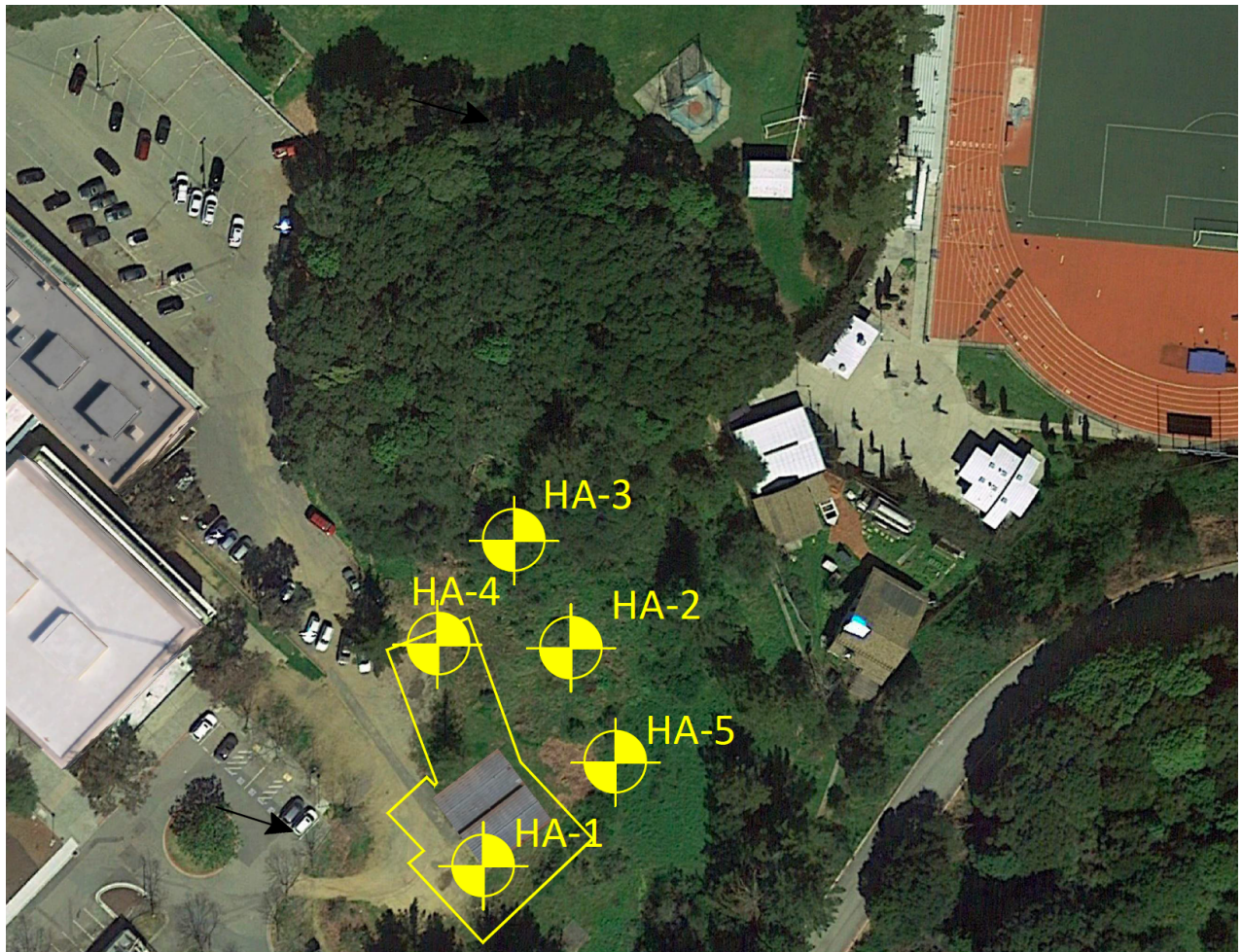


Figure 5: Location of the five borings advanced by Terraphase (2019) during the geotechnical investigation.



Figure 6: Photograph of the CDC site at the time of the geologic evaluation.



Figure 7: Detail showing clasts of rhyolite occupying the CDC site.

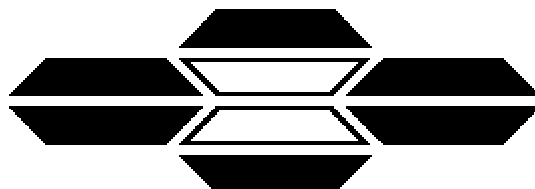


Figure 8: Location of soil borings for the sampling of soil for asbestos.

**APPENDIX A**

**LABORATORY TEST RESULTS**

**ERSKINE ENVIRONMENTAL CONSULTING**



**ASBESTOS TEM LABORATORIES, INC.**

**CARB Method 435  
Polarized Light Microscopy  
Analytical Report**

**Laboratory Job # 1553-00004**

3431 Ettie St.  
Oakland, CA 94608  
(510) 704-8930  
FAX (510) 704-8429

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ASBESTOS TEM LABORATORIES, INC

CA DPH ELAP  
Lab No. 1866



NVLAP Lab Code: 101891-0  
Oakland, CA

Sep/16/2021

Bradley Erskine  
Erskine Environmental  
401 Marina Place  
Benicia, CA 94510

RE: LABORATORY JOB # 1553-00004  
Polarized light microscopy analytical results for 3 bulk sample(s).  
Job Site:  
Job No.: Merrit Child Developmental Center

Enclosed please find the bulk material analytical results for one or more samples submitted for asbestos analysis. The analyses were performed in accordance with the California Air Resources Board (ARB) Method 435 for the determination of asbestos in serpentine aggregate samples.

Prior to analysis, samples are logged-in and all data pertinent to the sample recorded. The samples are checked for damage or disruption of any chain-of-custody seals. A unique laboratory ID number is assigned to each sample. A hard copy log-in sheet containing all pertinent information concerning the sample is generated. This and all other relevant paper work are kept with the sample throughout the analytical procedures to assure proper analysis.

Sample preparation follows a standard CARB 435 prep method. The entire sample is dried at 135-150 C and then crushed to ~3/8" gravel size using a Bico Chipmunk crusher. If the submitted sample is >1 pint, the sample was split using a 1/2" riffle splitter following ASTM Method C-702-98 to obtain a 1 pint aliquot. The entire 1 pint aliquot, or entire original sample, is then pulverized in a Bico Braun disc pulverizer calibrated to produce a nominal 200 mesh final product. If necessary, additional homogenization steps are undertaken using a 3/8" riffle splitter. Small aliquots are collected from throughout the pulverized material to create three separate microscope slide mounts containing the appropriate refractive index oil. The prepared slides are placed under a polarizing light microscope where standard mineralogical techniques are used to analyze the various materials present, including asbestos. If asbestos is identified and of less than 10% concentration by visual area estimate then an additional five sample mounts are prepared. Quantification of asbestos concentration is obtained using the standard CAL ARB Method 435 point count protocol. For samples observed to contain visible asbestos of less than 10% concentration, a point counting technique is used with 50 points counted on each of eight sample mounts for a total of 400 points. The data is then compiled into standard report format and subjected to a thorough quality assurance check before the information is released to the client.

While the CARB 435 method has much to commend it, there are a number of situations where it fails to provide sufficient accuracy to make a definitive determination of the presence/absence of asbestos and/or an accurate count of the asbestos concentration present in a given sample. These problems include, but are not limited to, 1) statistical uncertainty with samples containing <1% asbestos when too few particles are counted, 2) definitive identification and discrimination between various fibrous amphibole minerals such as tremolite/actinolite/hornblende and the "Libby amphiboles" such as tremolite/winchite/richterite/arfvedsonite, and C) small asbestiform fibers which are near or below the resolution limit of the PLM microscope such as those found in various California coast range serpentine bodies. In these cases, further analysis by transmission electron microscopy is recommended to obtain a more accurate result.

Sincerely Yours,

Lab Manager  
ASBESTOS TEM LABORATORIES, INC.

--- These results relate only to the samples tested and must not be reproduced, except in full, without the approval of the laboratory. ---

3431 Ettie St. • Oakland, CA 94608 • PH. (510) 704-8930 • FAX (510) 704-8429

With Branch Offices Located At: 1350 FREEPORT BLVD. UNIT 104, SPARKS, NV 89431

# POLARIZED LIGHT MICROSCOPY CARB 435 ANALYTICAL REPORT

Contact: Bradley Erskine	Samples Submitted: 3	Report No. <b>375229</b>
Address: Erskine Environmental 401 Marina Place Benicia, CA 94510	Samples Analyzed: 3	Date Submitted: Aug-24-21
	Job Site / No. Merrit Child Developmental Center	Date Reported: Sep-08-21

SAMPLE ID	POINTS COUNTED	ASBESTOS		LOCATION / DESCRIPTION
		%	TYPE	
CDC-1		ND	None Detected	East
Lab ID # 1553-00004-001	400 - Total Points			No Asbestos Detected - ARB Exception I
CDC-2		ND	None Detected	North
Lab ID # 1553-00004-002	400 - Total Points			No Asbestos Detected - ARB Exception I
CDC-3		ND	None Detected	South
Lab ID # 1553-00004-003	400 - Total Points			No Asbestos Detected - ARB Exception I
Lab ID #	- Total Points			
Lab ID #	- Total Points			
Lab ID #	- Total Points			
Lab ID #	- Total Points			
Lab ID #	- Total Points			
Lab ID #	- Total Points			
Lab ID #	- Total Points			

**QC Reviewer** \_\_\_\_\_  
Asbestos TEM Laboratories, Inc.

**Analys** \_\_\_\_\_  
3431 Ettie St., Oakland, CA 94608 PH. (510) 704-8930



**APPENDIX B**

**LABORATORY TEST RESULTS**

**TERRAPHASE ENGINEERING**

**MICRO ANALYTICAL LABORATORIES, INC.**  
**BULK ASBESTOS ANALYSIS - PLM ARB 435**



1225  
 Jeff Raines  
 Terraphase Engineering, Inc.  
 1404 Franklin St, Ste 600  
 Oakland, CA 94612

PROJECT:  
**PROJECT NO. 0034.005.0002**

Micro Log In **260766**  
 Total Samples 1  
 Date Sampled 08/08/2019  
 Date Received 08/12/2019  
 Date Analyzed 08/14/2019

SAMPLE INFORMATION			ASBESTOS INFORMATION	DOMINANT OTHER MATERIALS
			QUANTITY (AREA %) / TYPES / LAYERS / DISTINCT SAMPLES	
Client #:	1		ND	1 % CELLULOSE
Micro #: 260766-01	Analyst: JM			1 % FIBROUS GLASS
BULK				Matrix Type: ROCK FRAGMENTS CLAY MISCELLANEOUS PARTICLES
Asb. / Total Pts.	Matrix Removed	Sensitivity		
0 / 400	0%	0.250%		

Technical Supervisor:  8/14/2019  
 Gamini Ranatunga, Ph.D. Date Reported

Analyses use Polarized Light Microscopy (PLM), Micro Analytical SOP PLM-101, Rev. 1/4/2013 for building materials (based on EPA-600/R93-116 (1993)), and California ARB 435 (1991) for applicable soil, rock, or aggregate samples. NOTES: Weight % cannot be determined by PLM estimation or point counts. Asbestos fibers with diameter below ~1 µm may not be detected by PLM. The absence of asbestos in dust or debris (including wipe or microvacuum), and in some compact materials, including floor tiles, cannot be conclusively established by PLM, and should be confirmed by Transmission Electron Microscopy (TEM). Only dominant non-asbestos materials are indicated. This report must not be interpreted as a conclusive identification of non-asbestos (fibrous or not). Quantities of non-asbestos fibers are estimated, not point counted. Preparation (all samples): grinding, milling; teasing bundles apart; drying, if needed, by hotplate. Acid dissolution, ashing, or other matrix reduction techniques may be applied to some samples; residue asbestos % is corrected for amount of matrix removed. Various sample interferences may prevent detection of small asbestos fibers, and hinder determination of some optical properties. Notes are made if point counting is used; otherwise, asbestos is quantified by calibrated visual estimation. Detection limit is material dependent. Detection of asbestos traces (<<1%) may not be reliable or reproducible by PLM. Lower quantitation limit (reporting limit) of PLM estimation is 1%. The Cal-OSHA definition of asbestos-containing construction material is 0.1% asbestos by weight; however, reliable determination of asbestos weight percent at this level cannot be done by PLM, and TEM is recommended. Sample heterogeneity is indicated by listing more than one distinct layer or material on the report. Composite asbestos percentages on multilayered samples are applicable only to layered wall systems (wallboard, joint compound, and related materials); compositing is based on clients' descriptions of a material as "joint compound". Clients are solely responsible for identification and description of bulk materials listed on field forms. Laboratory sample descriptions may differ from descriptions given by the client. Quality Control (QC): all results have been determined to be within acceptance limits prior to reporting. Samples that were reanalyzed are denoted by two sets of analyst initials. Unless otherwise stated in this report, all samples were received in acceptable condition for analysis. This report must not be used to claim product endorsement by NIST or any U.S. Government agency. This report shall not be reproduced except in full, without the approval of Micro Analytical Laboratories, Inc., and pertains only to the samples analyzed. ND = NO ASBESTOS DETECTED.