



ASBESTOS TEM LABORATORIES, INC.

**EPA 600/4-83 Drinking Water
Transmission Electron Microscopy
Analytical Report**

Laboratory Job # 544-036

1409 Fifth Street
Berkeley, CA 94710
(510) 528-0108
FAX (510) 528-0109



ASBESTOS TEM LABORATORIES, INC

Accredited by
U.S. Dept. of Commerce

NVLAP
CA DOHS ELAP

Feb/20/2003

Mr. Jack Anderson
ABC Consultants
5499 West "A" Street
Burlingame, CA 94111

RE: LABORATORY JOB # 544-036
Transmission electron microscopy analytical results for 2 water sample(s).
Job Site: West District Wells
Job No.:

Enclosed please find results for the TEM analysis of one or more water samples. The analytical procedures were performed according to EPA Method 600/4-83 for the analysis of asbestos in drinking water.

Prior to analysis, samples are checked for damage, disruption of any chain-of-custody seals, and completeness of accompanying paperwork. If no problems are found, samples are then logged-in, each given a unique laboratory number, and a hard copy containing all pertinent information is generated. This, and all other relevant paper work are kept with each sample throughout the analytical procedures to assure proper analysis.

Preparation of water samples is performed within a HEPA filtered, Class 100 air, laminar flow clean bench environment. Prior to filtration, water sample containers are ultrasonicated, and the exterior surfaces cleaned. An aliquot of water is drawn from the sample container and drawn through a special filtration apparatus and collected onto a 0.1 micron pore size polycarbonate filter. The filters are removed from the apparatus and dried. A portion of each sample filter is sectioned, placed onto a glass microscope slide, and carbon coated. The filters are further sectioned and placed carbon side up onto 200-mesh copper TEM sample grids in a chloroform wick washer. Sample grids are placed into a condensation washer, or left in the wick washer, until all filter material is dissolved. The TEM grids are removed and placed into labeled grid storage boxes.

TEM analysis is performed on a Philips EM-300 transmission electron microscope operating at 100 kV. Initially, the grid is scanned at low and medium magnification to insure proper sample loading, and coherence of the carbon support film. Then TEM grid openings are analyzed at a magnification of 10,000X. All fibers >10 um in length and exhibiting an aspect ratio >3:1 are analyzed. Scanning continues until either 100 asbestiform fibers >10um in length are counted, or an analytical sensitivity of 0.2 million fibers per liter (MFL) is achieved. Analyzed fibers are subjected to detailed morphological and selected area diffraction (SAED) analysis. Fibers indicated as asbestos, or potentially asbestos, are further analyzed by energy dispersive X-ray (EDX) analysis as needed. The number of asbestos fibers detected, and other analytical parameters, are then used to calculate the concentration of asbestos in MFL. The results are entered into a standard report format and reviewed by the analyst and the laboratory manager before release to the client.

Sincerely Yours,

Laboratory Manager
ASBESTOS TEM LABORATORIES, INC.

--- These results relate only to the samples tested and must not be reproduced, except in full, with the approval of the laboratory. This report must not be used to claim product endorsement by NVLAP or any other agency of the U.S. Government. ---

TRANSMISSION ELECTRON MICROSCOPY ANALYTICAL REPORT

Contact:	Mr. Jack Anderson	Report No.:	29424
Address:	ABC Consultants 5499 West "A" Street Burlingame, CA 94111	Date:	<u>Nov-01-01</u>
Job Site / No.	West District Wells	Total Samples Analyzed:	<u>2</u>
		Sample Collector:	

CLIENT SAMPLE #	1030-S1.	SAMPLE LOCATION
Laboratory Sample #	544-036-001	Well #1

WATER SAMPLE DATA			
Date/Time Collected	Oct-30-01 / 12:00 pm	Volume Submitted (ml)	1000
Date/Time Lab Received	Oct-31-01 / 11:45 am	Volume Filtered (ml)	1
Date/Time Filtered	Oct-31-01 / 2:30 pm	Filter & Pore Size	MCE0.22um
Date/Time Analyzed	Nov-01-01 / 2:25 pm	UV/Ozone Treated:	NO

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COMMENTS	Chrysotile Asbestos (>10um) Detected. Numerous Tiny Chrysotile (<10um) Observed.																									
	Filter Loading: <u>HEAVY</u> SAED Photo ID Nos.																									

TEM / ANALYTICAL PARAMETERS			
Grid Openings Scanned at 10,000X	40	Analytical Sensitivity	0.5 MFL
Grid Opening Area (mm ²)	0.0096	95% UCL	7.5 MFL
Scan Area (mm ²)	0.3840	95% LCL	1.5 MFL
WATER SAMPLE LAB BLANK RESULTS			
Lab ID#	TLB-3196	Analytical Sensitivity	0.01 MFL
Grid Openings Scanned at 10,000X	8	Asbestos Structure Concentration	<0.01 MFL
Volume Filtered (ml)	300		

NOTATION KEY	
Chrys. - Chrysotile Asbestos	1 um = 1 micron = 0.001 mm
Amph. - Amphibole Asbestos	MFL = Millions of Fibers per Liter
NSD - No Structures Detected	UCL = Upper Confidence Level
1 mm = 1 millimeter	LCL = Lower Confidence Level
	_____ ANALYST SIGNATURE
	_____ LAB MANAGER SIGNATURE

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Job Site / No.	West District Wells	Total Samples Analyzed:	<u>2</u>
		Sample Collector:	

CLIENT SAMPLE #	1030-SB.	SAMPLE LOCATION
Laboratory Sample #	544-036-002	Well #2

WATER SAMPLE DATA			
Date/Time Collected	<u>Oct-30-01 / 11:00 am</u>	Volume Submitted (ml)	<u>1000</u>
Date/Time Lab Received	<u>Oct-31-01 / 11:45 am</u>	Volume Filtered (ml)	<u>1</u>
Date/Time Filtered	<u>Oct-31-01 / 2:35 pm</u>	Filter & Pore Size	<u>MCE0.22um</u>
Date/Time Analyzed	<u>Nov-01-01 / 12:30 pm</u>	UV/Ozone Treated:	<u>NO</u>

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TEM / ANALYTICAL PARAMETERS			
Grid Openings Scanned at 10,000X	<u>6</u>	Analytical Sensitivity	<u>3.5 MFL</u>
Grid Opening Area (mm ²)	<u>0.0096</u>	95% UCL	<u>228 MFL</u>
Scan Area (mm ²)	<u>0.0576</u>	95% LCL	<u>128 MFL</u>
WATER SAMPLE LAB BLANK RESULTS			
Lab ID#	<u>TLB-3196</u>	Analytical Sensitivity	<u>0.01 MFL</u>
Grid Openings Scanned at 10,000X	<u>8</u>	Asbestos Structure Concentration	<u><0.01 MFL</u>
Volume Filtered (ml)	<u>300</u>		

NOTATION KEY

Chrys. - Chrysotile Asbestos Amph. - Amphibole Asbestos NSD - No Structures Detected 1 mm = 1 millimeter	1 um = 1 micron = 0.001 mm MFL = Millions of Fibers per Liter UCL = Upper Confidence Level LCL = Lower Confidence Level
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ANALYST SIGNATURE

LAB MANAGER SIGNATURE