TABLE OF CONTENTS

COMPANY : GOLDEN STATE METALS
UNIT : AUTO SHREDDER
DATE : 1-28-93
REPORT : 042-329

Metals, Asbestos, PCB
LBS/HR

AS FOUND, UNCORRECTED

POLLUTANT	TEST #	Vm(std)	DSCFM	TOTAL ug	ug/DSCF	LBS/HR
Cd *	1	46.73	12037	13.385	4.41E-06	4.56E-04
	2	46.44	11836	13.405	4.45E-06	4.51E-04
				AVERAGE	4.43E-06	4.53E-04
Cr **	1	46.73	12037	15.651	5.16E-06	5.33E-04
	2	46.44	11836	15.877	5.26E-06	5.35E-04
				AVERAGE	5.21E-06	5.34E-04
Pb **	1	46.73	12037	17.695	5.83E-06	6.02E-04
	2	46.44	11836	25.465	8.44E-06	8.58E-04
				AVERAGE	7.14E-06	7.30E-04
Ni **	1	46.73	12037	15.239	5.02E-06	5.19E-04
	2	46.44	11836	15.671	5.20E-06	5.28E-04
				AVERAGE	5.11E-06	5.23E-04
Zn	1	46.73	12037	146.42	4.83E-05	4.98E-03
	2	46.44	11836	243.78	8.08E-05	8.21E-03
				AVERAGE	6.45E-05	6.60E-03
Asbestos	1	46.73	12037	3.405	1.12E-06	1.16E-04
	2	46.44	11836	0.383	1.27E-07	1.29E-05
				AVERAGE	6.25E-07	6.44E-05
PCB *	1	46.73	12037	2.3	7.58E-07	7.83E-05
	2	46.44	11836	2.3	7.63E-07	7.75E-05
				AVERAGE	7.60E-07	7.79E-05

* All results listed on analytical data as 'ND' for 2 runs, used ½ detection limit
** Partially detected, used ½ detection limit on the ND fractions.

COMPANY : GOLDEN STATE METALS
UNIT : AUTO SHREDDER
DATE : 1-28-93
REPORT : 042-329

SUMMARY OF RESULTS

METHOD 5 – PARTICULATE	RUN 1		RUN 2		AVERAGE	PERMIT LIMITS
gr/DSCF	0.00254		0.00282		0.00268	NA
gr/SCF	0.00249		0.00278		0.00264	NA
LBS/HR	0.262		0.286		0.274	4.5

METALS, ASBESTOS, & PCB, AS FOUND, UNCORRECTED

ANALYSIS OF PARTICULATE CATCH (AVERAGE OF 2 RUNS)

	Cd *	Cr **	Pb **	Ni **	Zn	Asbestos	PCB *	PERMIT LIMITS
Total ug	13.395	15.764	21.580	15.455	195.1	1.894	2.3	NA
ug/DSCF	4.43E-06	5.21E-06	7.14E-06	5.11E-06	6.45E-05	6.25E-07	7.60E-07	
ug/DSCM	1.25E-07	1.48E-07	2.02E-07	1.45E-07	1.83E-06	1.77E-08	2.15E-08	
LBS/HR	4.53E-04	5.34E-04	7.30E-04	5.23E-04	6.60E-03	6.44E-05	7.79E-05	

METALS, ASBESTOS, & PCB, BLANK CORRECTED

ANALYSIS OF PARTICULATE CATCH (AVERAGE OF 2 RUNS)

	Cd *	Cr **	Pb **	Ni **	Zn	Asbestos	PCB *	PERMIT LIMITS
Total ug	13.395	10.064	12.24	15.455	54.9	1.894	2.3	NA
ug/DSCF	4.43E-06	3.33E-06	4.05E-06	5.11E-06	1.82E-05	6.25E-07	7.60E-07	
ug/DSCM	1.25E-07	9.43E-08	1.15E-07	1.45E-07	5.15E-07	1.77E-08	2.15E-08	
LBS/HR	4.53E-04	3.41E-04	4.14E-04	5.23E-04	1.85E-03	6.44E-05	7.79E-05	

* Not detected, used 1/2 detection limit
** Partially detected, used 1/2 detection limit on the ND fraction.

INTRODUCTION

On January 27 & 28, 1993, Petro Chem Environmental Services, Inc. (PCES) performed a series of emission source tests for Golden State Metals, Inc. located in Bakersfield, California. The unit tested was the Auto Shredder Residue Separator. Concentrations and emissions of particulate, heavy metals (Cd, Cr, Pb, Ni, & Zn), PCB, and asbestos were determined using the following procedures:

Parameters	Method	# Test Runs
Particulate	EPA Method 5; Gravimetric	2 - 60 min
% H_2O	EPA Method 4; Condensation	2 - 60 min
% O_2, CO_2, and N_2	EPA Method 3; Orsat Analysis	2
Volume Flow Rate	EPA Method 2; Pitot Tube Traverse	2 - 60 min
Metals (Cd, Cr, Pb, Ni, Zn)	ICP Analysis of particulate catch, BC Laboratories	2
PCB	GC/FID Analysis of particulate catch, BC Laboratories	2
Asbestos	TEM Analysis of particulate catch, EMS Laboratories	2

When pollutants (metals, PCB, asbestos) were not detected in a sample run, the results were asterisked and one-half the detection limit was used for emission calculations. When pollutants were partially detected (one or more of the fractions of a run were not detected) the results were double asterisked and one-half the detection limit was used for those non-detected fractions.

All sampling was performed by John Hinkle and Doug Towne of Petro Chem Environmental Services, Inc. The particulate analysis were performed by Terry Rowles of PCES. The metals and PCB analysis was performed by BC Laboratories of Bakersfield, California. The asbestos analysis was performed by EMS Laboratories of Pasadena, California.

COMPANY : GOLDEN STATE METALS, INC.
UNIT : AUTO SHREDDER - CYCLONE OUTLET
DATE : 1-28-93
REPORT : 042-329

METHOD 1-5
FIELD DATA @ 60° F

	RUN #:	1	2
	TIME :	1032	1214
Vm (dry gas sampled)		46.35	46.87
Y (meter calib. factor)		0.982977	0.982977
P bar (Barometric pressure)		30.17	30.17
P static (stack pressure, " H2O)		-0.37	-0.37
Delta H (differential meter press, " H2O)		1.45	1.46
Tm (meter temperature, R°)		513	522
Vol H2O mls		18.9	12.6
Vm(std),dscf		46.73	46.44
Bws-H2O vapor		0.0184	0.0124
MF-moisture factor		0.9816	0.9876
% CO2		0	0
% O2		20.9	20.9
% N2		79.1	79.1
Md-MW stk gas,dry		28.84	28.84
Ms-MW stk gas,wet		28.64	28.70
Cp-pitot tube		0.84	0.84
Avg sq rt ^p		0.83	0.83
T stack, R°		508	526
Stack area,ft2		4.34	4.34
Vs-fps		45.66	46.21
Qstd-dscfm		12037	11836
Area noz,ft2		2.89E-04	2.94E-04
Sample time		60	60
% Isokinetic		97.3	96.7

COMPANY : GOLDEN STATE METALS, INC.
UNIT : AUTO SHREDDER - OUTLET
DATE : 1-28-93
PROJECT : 042-329

EPA METHOD 5 DATA
@ 60°F

RUN #1

PARTICULATE RESULTS:	net mg	gr/dscf	gr/scf	lbs/hr
Probe & Nozzle:	4.60	0.00152	0.00149	0.157
Filter:	0.10	0.00003	0.00003	0.003
Condensables:	3.00	0.00099	0.00097	0.102
Total:	7.70	0.00254	0.00249	0.262

ADDITIONAL DATA:

TIME

start	finish	%O2	%CO2	%H2O	Vm(std)	DSCFM
1032	1132	20.9	0	1.84	46.73	12037

RUN #2

PARTICULATE RESULTS:	net mg	gr/dscf	gr/scf	lbs/hr
Probe & Nozzle:	8.30	0.00275	0.00272	0.280
Filter:	0.20	0.00007	0.00007	0.007
Condensables:	0.00	0.00000	0.00000	0.000
Total:	8.50	0.00282	0.00278	0.286

ADDITIONAL DATA:

TIME

start	finish	%O2	%CO2	%H2O	Vm(std)	DSCFM
1214	1314	20.9	0	1.24	46.44	11836

COMPANY : GOLDEN STATE METALS
UNIT : AUTO SHREDDER
DATE : 1-28-93
REPORT : 042-329

Metals, Asbestos, PCB
LBS/HR

BLANK CORRECTED

POLLUTANT	TEST #	Vm(std)	DSCFM	TOTAL ug	ug/DSCF	LBS/HR
Cd *	1	46.73	12037	13.385	4.41E-06	4.56E-04
	2	46.44	11836	13.405	4.45E-06	4.51E-04
				AVERAGE	4.43E-06	4.53E-04
Cr **	1	46.73	12037	9.951	3.28E-06	3.39E-04
	2	46.44	11836	10.177	3.37E-06	3.43E-04
				AVERAGE	3.33E-06	3.41E-04
Pb **	1	46.73	12037	8.355	2.75E-06	2.84E-04
	2	46.44	11836	16.125	5.35E-06	5.43E-04
				AVERAGE	4.05E-06	4.14E-04
Ni **	1	46.73	12037	15.239	5.02E-06	5.19E-04
	2	46.44	11836	15.671	5.20E-06	5.28E-04
				AVERAGE	5.11E-06	5.23E-04
Zn	1	46.73	12037	6.22	2.05E-06	2.12E-04
	2	46.44	11836	103.58	3.43E-05	3.49E-03
				AVERAGE	1.82E-05	1.85E-03
Asbestos	1	46.73	12037	3.405	1.12E-06	1.16E-04
	2	46.44	11836	0.383	1.27E-07	1.29E-05
				AVERAGE	6.25E-07	6.44E-05
PCB *	1	46.73	12037	2.3	7.58E-07	7.83E-05
	2	46.44	11836	2.3	7.63E-07	7.75E-05
				AVERAGE	7.60E-07	7.79E-05

* All results listed on analytical data as 'ND' for 2 runs, used ½ detection limit
** Partially detected, used ½ detection limit on the ND fractions.

COMPANY : GOLDEN STATE METALS
UNIT : AUTO SHREDDER
DATE : 1-28-93
REPORT : 042-329

TOTAL MICROGRAMS
AS FOUND, BLANK, & BLANK CORRECTED

POLLUTANT	RUN	AS FOUND TOTAL µg	BLANK µg			BLANK CORRECTED µg
			H2O blank	FILTER	TOTAL	
Cd *	1	13.385	ND	ND	N/A	13.385
	2	13.405	ND	ND	N/A	13.405
					AVERAGE	13.395
Cr **	1	15.651	ND	5.70	5.70	9.951
	2	15.877	ND	5.70	5.70	10.177
					AVERAGE	10.064
Pb **	1	17.695	ND	9.34	9.34	8.355
	2	25.465	ND	9.34	9.34	16.125
					AVERAGE	12.24
Ni **	1	15.239	ND	ND	N/A	15.239
	2	15.671	ND	ND	N/A	15.671
					AVERAGE	15.455
Zn	1	146.42	82.5	57.7	140.2	6.22
	2	243.78	82.5	57.7	140.2	103.58
					AVERAGE	54.9
Asbestos	1	3.405	3.18E-04	ND	3.18E-04	3.405
	2	0.383	3.18E-04	ND	3.18E-04	0.383
					AVERAGE	1.894
PCB *	1	2.3	ND	ND	N/A	2.3
	2	2.3	ND	ND	N/A	2.3
					AVERAGE	2.3

* All results listed on analytical data as 'ND' for 2 runs, used ½ detection limit.
** Partially detected, used ½ detection limit on the ND fractions.

COMPANY : GOLDEN STATE METALS
UNIT : AUTO SHREDDER
DATE : 1-28-93
REPORT : 042-329

TOTAL MICROGRAMS
AS FOUND

POLLUTANT	RUN	PROBE WASH, µg	FILTER, µg	IMPINGATE, µg	TOTAL µg
Cd *	1	2.98 *	1.03 *	9.375 *	13.385
	2	3.00 *	1.03 *	9.375 *	13.405
				AVERAGE	13.395
Cr *	1	2.98 *	3.296	9.375 *	15.651
	2	3.00 *	3.502	9.375 *	15.877
				AVERAGE	15.764
Pb	1	1.49 *	11.33	4.875 *	17.695
	2	7.20	13.39	4.875 *	25.465
				AVERAGE	21.580
Ni	1	2.98 *	2.884	9.375 *	15.239
	2	3.00 *	3.296	9.375 *	15.671
				AVERAGE	15.455
Zn	1	38.1	45.32	63	146.42
	2	45.6	160.68	37.5	243.78
				AVERAGE	195.1
Asbestos	1	0.48	1.75E-07	2.925 *	3.405
	2	0.36	1.90E-08	0.0225 *	0.383
				AVERAGE	1.894
PCB *	1	0.595 *	0.2 *	1.5 *	2.3
	2	0.600 *	0.2 *	1.5 *	2.3
				AVERAGE	2.3

* All results listed on analytical data as 'ND' used ½ detection limit.

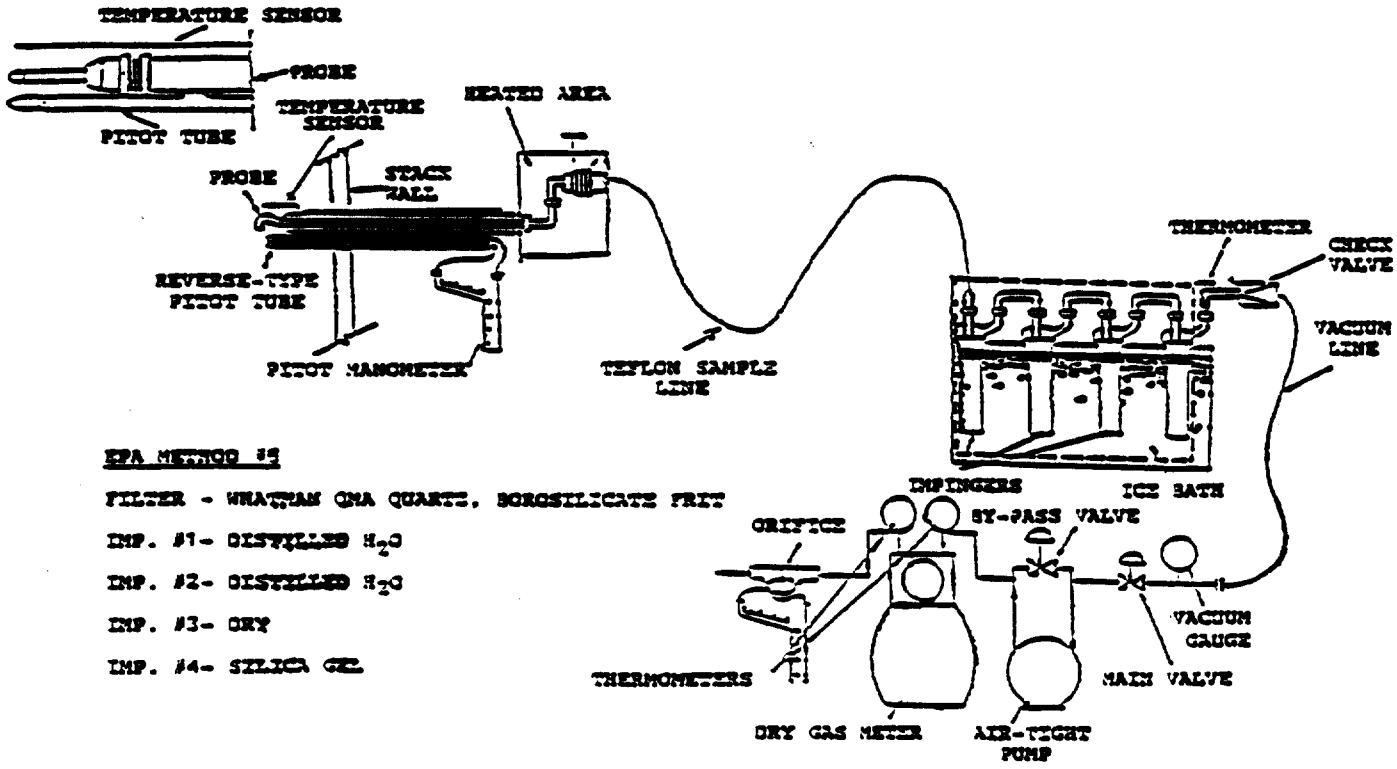
SAMPLING AND ANALYTIC PROCEDURES

REF: EPA Code of Federal Regulations, Title 40, Part 60, Appendix A.
Method 1, 2, 3, 4, and 5

Sampling Apparatus

The sampling apparatus consisted of a nozzle, a heater wrapped probe, and a heated filter holder (see data sheets for type of nozzle, probe, and filter). The filter was connected to a heated teflon filter-to-impinger line. A series of impingers (see data sheet for type and contents) was connected in tandem and immersed in an ice bath. Following the absorption train was a gas pump, dry test meter, and a calibrated restriction orifice fitted with a magnehelic differential pressure gauge. A type 'S' pitot tube and temperature probe was then positioned alongside the probe terminating at the sample nozzle for the purpose of monitoring duct conditions throughout the test.

Sampling Diagram



EPA Method 1: Sampling and Velocity Traverses for Stationary Sources

Prior to the source test a site assessment was performed in order to locate sample points for obtaining the best representative measurements of pollution concentrations and volumetric flow rates. EPA Method 1 takes into account duct area, straight run and cyclonic or stratified flow patterns.

EPA Method 2: Velocity and Volumetric Flow Rates

A computer was used in selection of suitable sample/traverse points. The calibrated pitot tube was connected to a magnehelic gauge and leak checked. A temperature and Δ-P was then recorded at each traverse point and a duct static pressure was also measured and recorded. A volume flow rate was calculated from the measured required traverse points.

EPA Method 3: % CO_2, % O_2, Dry Molecular Weight

Concurrent with each particulate sampling, an integrated gas sample was withdrawn from the summation of the traverse points through the train and collected at the outlet of the meter into a sample bag. Then the contents of the sample bladder were analyzed by Orsat for fixed gas composition.

EPA Method 4: Percent Water

Tare weights of the charged individual impingers was recorded. After sampling, the final weights was then recorded. Percent water was calculated from the weight of water collected and the dry gas volume sampled.

EPA Method 5: Particulate Emissions

A series of preliminary measurements was made prior to conducting the particulate test. EPA Methods 1, 2, and 3 was performed to determine location and number of traverse points, average gas velocity, and pressure and gas molecular weight. Percent water was determined by a psychrometric chart or from combustion analysis of the fixed gases. The results of these measurements were entered into the field computer for the purpose of determining an appropriate nozzle size for isokinetic sampling.

The method 5 apparatus was then prepared on-site in the mobile laboratory. The absorption train was charged with freshly prepared chemicals, weighted on a calibrated digital balance to the nearest 0.1 grams, and assembled. The probe was brushed out and rinsed with distilled water and acetone, then the filter holder was charged. The sampling apparatus was sealed and transported to the sampling site were it was assembled and leak tested at 15 inches mercury vacuum.

The probe, filter and impinger line heaters were set at 250 °F and the probe was then positioned into the duct at the first traverse point with the nozzle out of the flow.

The nozzle was positioned into the gas flow and the vacuum pump was started immediately and adjusted to obtain an isokinetic sample rate. A complete traverse was performed while sampling at a minimum of two minutes per sample point. Upon completion of the traverse the vacuum pump was turned off and the probe was transferred into the next sample EPA port where an identical sample-traverse was then performed. Duct conditions (temperature, Δ-P)

Method 5: Continued

and sampling conditions (meter temperature, volume and pressure, probe, filter, sample line, impinger temperatures, and absorption train vacuum) was monitored and recorded regularly for each sample point.

Upon completion of sampling, the apparatus was leak tested at a vacuum greater than the highest observed vacuum. The leak was recorded and the apparatus was then sealed and transported to the mobile laboratory. The heated filter-to-impinger line was rinsed with a known amount of distilled water into the first impinger.

The filter and any loose particulate was carefully removed from the filter holder with tweezers. It was then placed in a labeled petri dish and transported to the P.C.E.S. laboratory. The nozzle, probe, and filter top housing was rinsed and brushed three times with distilled water and acetone. The sample fractions were combined, bottled, labeled, and fluid level marked for transportation to the P.C.E.S. laboratory. Aliquots of distilled water and acetone were similarly treated for blank analysis.

The absorption train was inspected for abnormalities and disassembled. The impingers were weighed on a digital balance for a percent moisture determination. The contents of the impingers were quantitatively transferred into separate bottles, sealed, labeled, and fluid level marked for transportation to the P.C.E.S. laboratory for analysis, if required. Aliquots of the reagent grade impinger contents were saved for blank analysis.

The filter was transferred to an oven and heated at 105 °F for 2-3 hours and then placed in a desiccator for 24 hours. The filter was then weighed on a Mettler digital balance to the nearest 0.01 mg. Additional six hour desiccations and weighings were then performed until the difference between consecutive weighings were less than 0.5 mg or one percent of the total filtrate weight (weighed to a constant weight).

The nozzle/probe/filter top wash was then examined for any leakage during transportation and transferred to a tared evaporation dish. The wash was then evaporated at an elevated temperature, below the boiling point of the wash, with occasional swirling. The dish and wash residue was then desiccated and weighed to a constant weight.

If required by the regulatory agency, the contents of the first impinger were recovered and diluted volumetrically to a known volume. An aliquot of this sample was then evaporated, desiccated, and then weighed to a constant weight.

The net weight of particulate was calculated from the two fractions (three fractions including the impinger contents, if required). Concentrations (gr/DSCF) and emissions (lbs/hr) or other applicable units were then calculated and reported.

EPA METHOD 2
STACK GAS VELOCITY AND VOLUMETRIC FLOWRATE

Average Stack Gas Velocity
Eq. 2-6 & Eq. 2-9

$$P_g = \frac{\text{Static Pressure, } H_2O}{13.6}$$

$$P_s = P_{bar} + P_g$$

$$V_s = K_p \, C_p \, (\sqrt{\Delta P})avg \sqrt{\frac{T_{s\,(avg)}}{P_s \, M_s}}$$

Average Stack Gas Dry Volumetric Flow Rate
Eq. 2-10

$$Q_{std} = 60 \left(1 - B_{ws}\right) V_s \, A \left(\frac{T_{std}}{T_{s\,(avg)}}\right) \left(\frac{P_s}{P_{std}}\right)$$

$$\frac{Q_{std}}{MF} = SCFM$$

EPA METHOD 3
DRY MOLECULAR WEIGHT OF STACK GAS
Eq. 3-2

$$M_d = 0.44\ (\%\ CO_2) + 0.320\ (\%\ O_2) + 0.280\ (\%\ N_2 + \%\ CO)$$

Wet Molecular Weight of Stack Gas

$$M_s = M_d \left(1 - B_{ws}\right) + 18 \left(B_{ws}\right)$$

EPA METHOD 4
DETERMINATION OF MOISTURE CONTENT IN STACK GASES

Volume of Water Vapor Condensed
Eq. 4-1

$$V_{vc\,(std)} = \frac{(V_f - V_i)\rho_w\ RT_{std}}{P_{std}\ M_w} = K_1 (V_f - V_i)$$

Where: $K_1 = 0.04646\ \frac{ft^3}{ml}$ @ $520^\circ R$

Volume of Water Vapor Collected in Silica Gel
Eq. 4-2

$$V_{vsg\,(std)} = \frac{(W_f - W_i)\ RT_{std}}{P_{std}\ M_w\ (453.6\ g/lb)}$$

$$= K_2 (W_f - W_i)$$

Where: $K_2 = 0.04651\ \frac{ft^3}{g}$ @ $520^\circ R$

Sample Gas Volume
Eq. 4-3

$$V_{m\,(std)} = V_m\ Y \left(\frac{(P_m)(T_{std})}{(P_{std})(T_m)} \right)$$

$$= K_3\ Y\ \frac{V_m\ P_m}{T_m}$$

Where: $K_3 = 17.38\ \frac{^\circ R}{in.\ Hg}$ @ $520^\circ R$

Moisture Content
Eq. 4-4

$$B_{ws} = \frac{V_{vc\ (std)} + V_{vsg\ (std)}}{V_{vc\ (std)} + V_{vsg\ (std)} + V_{m\ (std)}}$$

$B_{ws} \times 100 = \%\ H_2O$ in gas stream

$$MF = 1 - B_{ws}$$

EPA METHOD 5
DETERMINATION OF PARTICULATE EMISSIONS FROM STATIONARY SOURCES
Use in Method 5 and 8 combinations runs

Dry Gas Volume
Eq. 5-1

$$V_m(std) = V_m Y \left(\frac{T_{std}}{T_m}\right)\left[P_{bar} + \frac{\Delta H}{13.6}\right]$$

$$= K_1 V_m Y \left[\frac{P_{bar} + \frac{\Delta H}{13.6}}{T_m}\right]$$

$$= K_1 = 17.38 \frac{^\circ R}{in.Hg} @ 520^\circ R$$

*In case of leak rate beyond allowable limits, correct Eq. 5-1 as follows:
Case 1 - No component changes made during run.

$$V_m = V_m - (L_p - L_a)\theta$$

Case 2 - One or more component changes made during run.

$$V_m = \left[V_m - (L_1 - L_a)\theta_1 - \sum_{i=2}^{n} (L_i - L_a)\theta_i - (L_p - L_a)\theta_p\right]$$

Volume of Water Vapor
Eq. 5-2

$$V_{wc}(std) = V_1 c \left(\frac{\rho_w}{M_w}\right)\left(\frac{RT_{std}}{P_{std}}\right)$$

$$= K_2 V_1 c$$

Where: $K_2 = 0.04646 \frac{ft^3}{ml} @ 60^\circ F$

Moisture Contnet
Eq. 5-3

$$B_{ws} = \frac{V_{wc}(std)}{V_m(std) + V_{wc}(std)}$$

EPA METHOD 5
(con't)

Acetone Blank Concentration
Eq. 5-4

$$C_a = \frac{M_a}{V_a \rho_a}$$

Acetone Wash Blank
Eq. 5-5

$$W_a = C_a V_{aw} \rho_a$$

Particulate Concentration
Eq. 5-6

$$C_s = \frac{gr}{dscf} = \left(0.001 \frac{g}{mg}\right)\left(\frac{M_n}{V_{m(std)}}\right)(15.432)$$

$$gr/dscf\,(MF) = \frac{gr}{scf}$$

Corrected to 12 % CO_2

$$\frac{gr}{dscf} @ 12\%\ CO_2 = \frac{\frac{gr}{dscf} \times 12\ \%\ CO_2}{\%\ CO_2\ (dry)}$$

Isokinetic Variation
Eq. 5-7 and 5-8

$$\%\ I = 100 \times \frac{T_s \left[V_{lc} K_3 + \frac{V_m}{T_m}\left(P_b + \frac{\Delta H}{13.6}\right)\right]}{60\ \theta\ A_n\ V_s\ P_s}$$

Where: $K_3 = 0.002669$

Mass Emission Rate

$$\frac{lbs}{hr} = \frac{gr}{dscf} \times dscfm \times 60 \frac{m}{hr} \times \frac{1\ lb}{7000\ gr}$$

NOMENCLATURE

(1 of 3)

A = Cross-sectional area of stack (ft^2)

A_n = Cross-sectional area of nozzle, (ft^2)

B_{ws} = Proportion of water vapor, by volume, in the gas stream

C_a = Acetone blank residue concentration, (mg/g)

C_p = Pitot tube coefficient, dimensionless

C_s = Concentration of particulate matter in stack gas, dry basis corrected to standard conditions, (gr/dscf)

C_{SO2} = Concentration of sulfur dioxide dry basis corrected to standard conditions, (lb/dscf)

C_{H2SO4} = Sulfuric acid (including SO3) concentration, corrected to standard conditions, (lb/dscf)

ΔH = Average pressure differential across the orifice meter, (in H_2O)

K_p = Pitot tube constant, $85.49 \frac{ft\,[(lb/lb\text{-}mole)(in\ Hg)]^{\frac{1}{2}}}{sec[\ (^\circ R)\ (in\ H_2O)\ ]}$

L_p = Leakage rate observed during the post-test leak check, (cfm)

L_a = Maximum acceptable leakage rate, (0.02 cfm or 4% of average sampling rate, whichever is less)

L_i = Individual leakage rate observed during the leak check conducted prior to the "i^{th}" component change, (cfm)

M_a = Mass of residue of acetone after evaporation, mg

M_d = Molecular weight of stack gas, dry basis, (lb/lb-mole)

M_n = Total weight of particulate matter collected, mg

M_s = Molecular weight of stack gas, wet basis, (lb/lb-mole)

M_w = Molecular weight of water, 18 lb/lb-mole

N = Normality of barium perchlorate titrant, (milliequivalents/ml)

ΔP = Velocity head of stack gas, (in H_2O)

P_{bar} = Barometric pressure at measurement site (in Hg)

P_g = Stack static pressure, (in Hg)

P_m = Absolute pressure at the dry gas meter, ($P_{bar} + \Delta H/13.6$)

NOMENCLATURE

(2 of 3)

P_s = Absolute stack gas pressure, (inches Hg)

$P_{(std)}$ = Standard absolute pressure, 29.92 in Hg

$Q_{(std)}$ = Dry volumetric stack gas flow rate, standard conditions, (dscfm)

R = Ideal gas constant, 21.85 (in Hg) $(ft^3)/(lb\text{-}mole)(^\circ R)$

t_s = Stack temperature, (°F)

T_m = Absolute temperature at meter, (°R)

$T_{(std)}$ = Standard absolute temperature, (520°R)

T_s = Absolute stack temperature, (460°+ t_s)

V_a = Volume of sample aliquot titrated, (ml)

V_{ab} = Volume of acetone blank, ml

V_m = Dry gas volume measured by dry gas meter, (dcf)

$V_{m(std)}$ = Dry gas volume measured by dry gas meter, corrected to standard conditions, (dscf)

$V_{wc(std)}$ = Volume of water vapor condensed corrected to standard conditions,(scf)

$V_{wsg(std)}$ = Volume of water vapor collected in silica gel corrected to standard conditions (scf)

V_{ic} = Volume of water vapor condensed in impingers and silica gel, (ml)

V_f = Final volume of condensed water, ml

V_i = Initial volume of condensed water, ml

v_s = Average stack gas velocity, (ft/sec)

V_{soln} = Total volume of solution in which the sulfur dioxide sample is contained (ml)

V_t = Volume of barium perchlorate titrant used for the sample, (ml)

V_{tb} = Volume of barium perchlorate titrant used for the blank, (ml)

W_f = Final weight of silica gel or silica gel plus impinger, (g)

W_i = Initial weight of silica gel or silica gel plus impinger, (g)

Y = Dry gas meter calibration factor

ρ_w = Density of water, (0.002202 lb/ml @ 60°F)

NOMENCLATURE

(3 of 3)

ρa	= Density of acetone, (g/ml)(see bottle label)
MF	= Moisture factor
$\%CO_2$	= Percent CO_2 by volume (dry basis)
$\%O_2$	= Percent O_2 by volume (dry basis)
%CO	= Percent CO by volume (dry basis)
$\%N_2$	= Percent N_2 by volume (dry basis)
0.264	= Ratio of O_2 to N_2 in air v/v
0.280	= Molecular weight of N_2 or CO, divided by 100
0.320	= Molecular weight of O_2, divided by 100
0.440	= Molecular weight of CO_2, divided by 100
60	= Conversion factor, (sec/min)
18.0	= Molecular weight of water, (lb/lb-mole)
32.03	= Equivalent weight of sulfur dioxide
θ	= Total sampling time (min)
θ_1	= Sampling time interval, between two successive component changes, beginning with the interval between the first and second changes, (min)
θ_1	= Sampling time interval, from the run beginning until first component change, (min)
θ_p	= Sampling time interval, from the final (n^{th}) component change until the end of the sampling run, (min)

COMPANY : GOLDEN STATE METALS
UNIT : Cyclone OUTLET
DATE : 1/28/93
REPORT : 042-329

ON-SITE DATA

ESTIMATED PBAR : N
FIELD. ACTUAL P. BAR IS 30.17

		RUN	#1	#2	#3
		TIME	10:32	12:14	
Vm	Dry sampled gas volume, dcf		46.35	46.87	
Y	Meter calibration factor (met#_____)		.982977	.982977	
Pbar	Barometric Pressure, "Hg		30.17	30.17	
Pstatic	Stack static pressure, "Hg		-.37	-.37	
ΔH	Differential meter pressure, "H2O		1.45	1.46	
Tm	Meter temperature, °F		53	62	

	RUN 1			RUN 2			RUN 3		
CONTENTS	FINAL	TARE	NET	FINAL	TARE	NET	FINAL	TARE	NET
H2O	689.4	620.0	69.4	657.9	591.1	66.8			
H2O	600.7	599.8	1.9	601.9	601.0	.9			
KO	511.4	514.0	.4	489.2	489.0	.2			
Silica Gel	797.2	790.0	7.2	873.1	864.2	7.9			
Line Wash			(60)			(63.2)			
V lc volume of H2O, gms			18.9			12.6			

		RUN	#1	#2	#3
CO2	% Dry Volume		0	0	
O2	% Dry Volume		20.9	20.9	
N2	% Dry Volume		79.1	79.1	
Cp	Pitot tube coefficient (Pit#_____)		.84	.84	
ΔP	Avg P, "H2O		.687	.681	
Ts	Stack temperature, °F		48	66	
As	Stack area, sq. ft.		4.34	4.34	
Ds	Stack diameter, inches		28.21	28.21	
Dn	Nozzle diameter, inches		.230	.232	
Dur	Sampling time, min		60	60	
% Iso	Mini iso		100.4	100.37	
	Filter #		438	469	
	Filter tare weights, gms		.5997	.6005	

INITIALS
CONTROL BOX#:
Hi P_____ Lo P_____ Avg P_____ Duct Temp _____
Diameters before disturb_____ After_____
# of points, total _____
Overall (inches)_____ Coupling _____

METHOD 5 RUN # 1

COMPANY: Golden State Metals
UNIT: Cyclone Exhaust
DATE: 1-28-93
REPORT: 042-329
TECH: DCR
PUMP #: GAST
METER BOX#: 1002
METER coeff: 0.982977 (ΔH:.285)
PITOT TUBE#: .84

PRE / POST TEST LEAK CHECK

LEAK RATE: .005 / .004 cfm
VACUUM: 13 / 4 "Hg

AMBIENT TEMP, °F: 50°
Pbar: 30.00
STATIC PRESSURE("Hg): +.37
ASSUMED MOISTURE,%: 3
MWW 29
AVG. CALIB. NOZZLE DIAM("): .230
PROBE LINER MATERIAL: Qtz
FILTER #:
DUCT DIAM ("):

TRAVERSE PT. NUMBER	TIME (θ) min. 5 min./Pt.	VACUUM "Hg	STACK TEMP (Ts) °F	VELOCITY HEAD (ΔPs) "H2O	PRESSURE DIFFERENTIAL ΔH rate "H2O	ΔH	GAS SAMPLE VOLUME (cu. ft)	GAS SAMPLE TEMP. AT DRY GAS METER INLET, °F	GAS SAMPLE TEMP. AT DRY GAS METER OUTLET, °F	FILTER HOLDER TEMP °F Probe	FILTER HOLDER TEMP °F Box	TEMP OF GAS EXIT CONDENSER OR LAST IMPIGN °F
							142.900	47	47	248	252	
12	10:32.0	3	49	.66	0.747	1.38	146.6	51	48	250	252	
11	37.	3	47	.77	0.812	1.61	150.7	53	48	250	253	
10	42	4	48	.73	0.792	1.53	154.7	56	48	249	255	
9	47	4	51	.76	0.808	1.58	158.7	58	50	250	255	
8	52	4	48	.72	0.791	1.52	162.7	58	51	251	255	
7	57	3	48	.73	0.798	1.54	166.6	58	51	246	254	
6	11:02.0	3	48	.72	0.792	1.52	170.6	60	52	245	255	
5	07	3	48	.66	0.761	1.41	174.4	58	52	247	256	
4	12	3	49	.65	0.753	1.38	178.2	60	52	248	258	
3	17	2	49	.68	0.771	1.44	182.0	60	53	249	258	
2	22	2	48	.60	0.726	1.29	185.7	58	54	249	256	
1	27	2	46	.58	0.715	1.26	189.250					
EOT	11:32.0						Vm: 46.35					
							Vso: 100.40					
AVERAGE			48	0.687		1.45	Vf: 45.48		53			

METHOD 5 RUN # 2

COMPANY: Golden State Metals
UNIT: Cyclone Exhaust
DATE: 1-28-93
REPORT: 012-329
TECH: DCT
PUMP #: 6AST
METER BOX#: 1002
METER coeff: 0.982977 (ΔH: 0.85)
PITOT TUBE#: .84

PRE / POST TEST LEAK CHECK

LEAK RATE: <.004 / .017 cfm
VACUUM: 14 / 4 "Hg

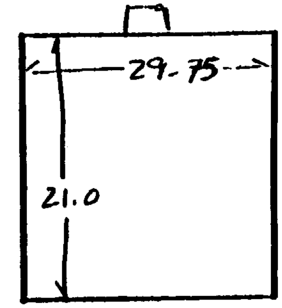
AMBIENT TEMP, °F: 55°
Pbm: 30.00
STATIC PRESSURE("Hg): -.37
ASSUMED MOISTURE,%: 3
MWW 29
AVG. CALIB. NOZZLE DIAM("): .232
PROBE LINER MATERIAL: Qtz
FILTER #:
DUCT DIAM ("):

TRAVERSE PT. NUMBER	TIME (θ) min. Sum/pt.	VACUUM "Hg	STACK TEMP (Ts) °F	VELOCITY HEAD (ΔPs) "H2O	PRESSURE DIFFERENTIAL ΔH rate "H2O	ΔH	GAS SAMPLE VOLUME (cu. ft)	GAS SAMPLE TEMP. AT DRY GAS METER INLET, °F	OUTLET, °F	FILTER HOLDER TEMP °F Probe	Box	TEMP OF GAS EXIT CONDENSER OR LAST IMPNGR °F
12	12:14.00	2	67	.64	0.748	1.37	191.500	57	55	246	244	
11	19	2	67	.79	0.835	1.66	195.2	62	54	248	249	
10	24	2	67	.73	0.805	1.55	199.4	65	55	252	250	
9	29	3	67	.72	0.801	1.53	203.4	66	56	250	251	
8	34	3	67	.72	0.803	1.53	207.5	67	57	251	251	
7	39	3	68	.71	0.798	1.51	211.5	68	58	254	252	
6	44	3	67	.70	0.792	1.50	215.5	67	58	254	249	
5	49	3	68	.66	0.772	1.42	219.4	69	60	253	249	
4	511	2	67	.66	0.773	1.42	223.3	69	61	254	250	
3	59	2	65	.65	0.769	1.41	227.1	68	62	254	251	
2	13:04.0	2	63	.61	0.715	1.33	231.0	67	62	254	251	
1	09	2	64	.59	0.729	1.29	234.7	62	62	253	252	
EOT	13:14.0						238.370					
							VM: 46.87					
							ESD: 100.37					
AVERAGE			66	0.681		1.46	VF: 46.06		62			

VELOCITY TRAVERSE

COMPANY : Golden State Metals
UNIT : Cyclone Exhaust
DATE : 1.28.93
REPORT : 042-329
RUN # : Initial
PUMP # : GAST
METER BOX# : 100
METER coeff :
PITOT TUBE# : ΔH .85

TOTAL : 38.25
COUPLING : L 8.5 in
DIAMETER : 29.75 X 21
AREA : 4.34
Cp :



TRAVERSE POINTS w/o	w/coup	no.	Ts (°F)	ΔP	Ts (°F)	ΔP
1.2	9.7	1	54	.51		
3.7	12.2	2	55	.53		
6.2	14.7	3	55	.59		
8.7	17.2	4	54	.58		
11.2	19.7	5	54	.60		
13.6	22.5	6	54	.58		
16.1	24.6	7	54	.55		
18.6	27.1	8	54	.60		
21.1	29.6	9	54	.59		
23.6	32.1	10	53	.58		
26	34.5	11	52	.55		
28.5	37.0	12	51	.53		
			Cp 23.38			

VELOCITY DATA

Rated Total MMBTU/hr

$\overline{\Delta P}$ .565
$\overline{Ts}$ 53
Static .37
Pbar 30.0 (Est.)
MW(wet) 28.8
%H2O 3%
%O2
F_{60}

Vel=
DSCFM=
MMBTU/hr=
%Thr=

Additional Data:

.230 nozzle 41.6' .694 cate

LABORATORY ANALYSIS
EPA METHOD 5 - PARTICULATE ANALYSIS

Company: Golden State Metals

Location/Unit: Cyclone Exhaust

Report: 042-329

Date Tested: 1/28/93

Analyst: DGS

RUN # 1

Probe/Nozzle/Filter Top vol- 238 ml

Dish # 24			
#1	#2	#3	Average
final (g) 74.5923	74.5925		74.5924
tare (g) 74.5878			74.5878
NET (g)			0.0046

Filter # 438

#1	#2	#3	Average
final (g) 0.5999	0.5997		0.5998
tare (g) 0.5997			0.5997
NET (g)			0.0001

Condensable (aliquot 250ml / 750ml)

Dish # 27			
#1	#2	#3	Average
final (g) 81.1255	81.1254		81.1255
tare (g) 81.1245			81.1245
NET (g)			0.0010

LABORATORY ANALYSIS
EPA METHOD 5 - PARTICULATE ANALYSIS

Company: Golden State Metals
Location/Unit: Cyclone Exhaust

Report: 042-329
Date Tested: 1/28/93
Analyst: DGS

RUN # 2

Probe/Nozzle/Filter Top vol - 240 ml

Dish # 7	#2	#3	Average
#1			
final (g) 65.0592	65.0592		65.0592
tare (g) 65.0509			65.0509
NET (g)			0.0083

Filter # 469

#1	#2	#3	Average
final (g) 0.6007	0.6004		0.6007
tare (g) 0.6005			0.6005
NET (g)			0.0002

Condensable (aliquot 250 ml / 150 ml)

Dish # 38	#2	#3	Average
#1	78.4230		
final (g) 78.4231	~~48.4230~~		78.4231
tare (g) 78.4231			78.4231
NET (g)			0

LABORATORY ANALYSIS
EPA METHOD 5 - PARTICULATE ANALYSIS

Company: Golden State Metals
Location/Unit: Cyclone Exhaust

Report: 042 - 329
Date Tested: 1/28/93
Analyst: DGS

RUN # Blanks

Probe/Nozzle/Filter Top

Dish #	#1	#2	#3	Average
final (g)				
tare (g)				
NET (g)				

Filter # 482

	#1	#2	#3	Average
final (g)	0.6270	0.6268		0.6269
tare (g)	0.6271			0.6271
NET (g)				0

H_2O Condensable (aliquot 250 ml / 750 ml)

Dish # 16	#1	#2	#3	Average
final (g)	76.9175	76.9179		76.9178
tare (g)	76.9177			76.9177
NET (g)				0.0001

PETRO CHEM ENVIRONMENTAL SERVICES LABORATORY

QUALITY CONTROL - METHOD 5 Q A BATCH #: 5-93-0006

DI H_2O FROM ANTONINO AVE VOLUME (ml): 250 ml

		AVERAGE
DISH #: 52		
FINAL WT.(g): 77.1672	FINAL WT.(g): 77.1674	FINAL WT.(g): 77.1673
TARE WT. (g): 77.1671	TARE WT. (g):	TARE WT. (g): 77.1671
NET WT. (g):	NET WT. (g):	NET WT. (g): 0.0002

DI H_2O FROM DANIELS LN. VOLUME (ml): 250 ml

		AVERAGE
DISH #: 12		
FINAL WT.(g): 76.9007	FINAL WT.(g): 76.9009	FINAL WT.(g): 76.9008
TARE WT. (g): 76.9006	TARE WT. (g):	TARE WT. (g): 76.9006
NET WT. (g):	NET WT. (g):	NET WT. (g): 0.0002

EMPTY DISH

		AVERAGE
DISH #: 5		
FINAL WT.(g): 76.5799	FINAL WT.(g): 76.5797	FINAL WT.(g): 76.5798
TARE WT. (g): 76.5796	TARE WT. (g):	TARE WT. (g): 76.5796
NET WT. (g):	NET WT. (g):	NET WT. (g): 0.0002

FILTER BLANK

		AVERAGE
FILTER #: 465		
FINAL WT.(g): 0.6047	FINAL WT.(g): 0.6047	FINAL WT.(g): 0.6047
TARE WT. (g): 0.6046	TARE WT. (g):	TARE WT. (g): 0.6046
NET WT. (g):	NET WT. (g):	NET WT. (g): 0.0001

RECOVERY SAMPLE VOLUME (ml): 100 ml

		AVERAGE
DISH #: 20	~~73.72.3970~~	
FINAL WT.(g): 72.3961	FINAL WT.(g): 72.3971	FINAL WT.(g): 72.3971
TARE WT. (g): 72.3954	TARE WT. (g):	TARE WT. (g): 72.3954
NET WT. (g):	NET WT. (g):	NET WT. (g): 0.0017

CONC (g/l): 0.01435 g/l Na_2SO_4	% RECOVERY: 118.5 %
WT (g): 0.001435 g	(0.0017/0.001435)100

BC LABORATORIES

PETRO CHEM ENVIRONMENTAL SERVICE
3207 ANTONINO AVE
BAKERSFIELD, CA 93308
Attn.: TERRY ROWLES 327-7300

Date Reported: 02/24/93 Page 1
Date Received: 02/08/93
Laboratory No.: 93-01131-3

Sample Description: GOLDEN STATE METALS AUTO SHREDDER REPORT #042-329 PROBE WASH #1 100ml, SAMPLED ON 01-28-93 BY JOHN HINKLE.

TOTAL CONTAMINANTS
(California Code of Regulations, Title 22, Section 66261)

Constituents	Sample Results	Units	Method P.Q.L.	Method	Regulatory Criteria STLC mg/L	Regulatory Criteria TTLC mg/kg
Cadmium	None Detected	µg	2.5	SW-6010	1.0	100.
Chromium	None Detected	µg	2.5	SW-6010	560.	2500.
Lead	None Detected	µg	1.25	SW-7421	5.0	1000.
Nickel	None Detected	µg	2.5	EPA-249.2	20.	2000.
Zinc	16.	µg	2.5	SW-6010	250.	5000.

Comment: All above constituents are reported on an as received (wet) sample basis. Results reported represent totals (TTLC) as sample subjected to appropriate techniques to determine total levels.

P.Q.L. = Practical Quantitation Limit (refers to the least amount of analyte detectable based on sample size used and analytical technique employed).
STLC = Soluble Threshold Limit Concentration
TTLC = Total Threshold Limit Concentration

REFERENCES:
EPA = "Methods for Chemical Analysis of Water and Wastes", EPA-600, 14-79-020.
SW = "Test Methods for Evaluating Solid Wastes Physical/Chemical Methods", EPA-SW-846, September, 1986.

Department Supervisor

BC LABORATORIES

PETRO CHEM ENVIRONMENTAL SERVICE
3207 ANTONINO AVE
BAKERSFIELD, CA 93308
Attn.: TERRY ROWLES 327-7300

Date Reported: 02/24/93 Page 1
Date Received: 02/08/93
Laboratory No.: 93-01131-4

Sample Description: GOLDEN STATE METALS AUTO SHREDDER REPORT #042-329 PROBE WASH #2 100ml, SAMPLED ON 01-28-93 BY JOHN HINKLE.

TOTAL CONTAMINANTS
(California Code of Regulations, Title 22, Section 66261)

Constituents	Sample Results	Units	Method P.Q.L.	Method	Regulatory Criteria STLC mg/L	Regulatory Criteria TTLC mg/kg
Cadmium	None Detected	µg	2.5	SW-6010	1.0	100.
Chromium	None Detected	µg	2.5	SW-6010	560.	2500.
Lead	3.0	µg	1.25	SW-7421	5.0	1000.
Nickel	None Detected	µg	2.5	EPA-249.2	20.	2000.
Zinc	19.	µg	2.5	SW-6010	250.	5000.

Comment: All above constituents are reported on an as received (wet) sample basis. Results reported represent totals (TTLC) as sample subjected to appropriate techniques to determine total levels.

P.Q.L. = Practical Quantitation Limit (refers to the least amount of analyte detectable based on sample size used and analytical technique employed).
STLC = Soluble Threshold Limit Concentration
TTLC = Total Threshold Limit Concentration

REFERENCES:
EPA = "Methods for Chemical Analysis of Water and Wastes", EPA-600, 14-79-020.
SW = "Test Methods for Evaluating Solid Wastes Physical/Chemical Methods", EPA-SW-846, September, 1986.

Department Supervisor

BC LABORATORIES

PETRO CHEM ENVIRONMENTAL SERVICE
3207 ANTONINO AVE
BAKERSFIELD, CA 93308
Attn.: TERRY ROWLES 327-7300

Date Reported: 02/24/93 Page 1
Date Received: 02/08/93
Laboratory No.: 93-01131-5

Sample Description: GOLDEN STATE METALS AUTO SHREDDER REPORT #042-329 FILTER #1 (0.2914gm), SAMPLED ON 01-28-93 BY JOHN HINKLE.

TOTAL CONTAMINANTS
(California Code of Regulations, Title 22, Section 66261)

Constituents	Sample Results	Units	Method P.Q.L.	Method	Regulatory Criteria STLC mg/L	Regulatory Criteria TTLC mg/kg
Cadmium	None Detected	µg	1.0	SW-6010	1.0	100.
Chromium	1.6	µg	1.0	SW-6010	560.	2500.
Lead	5.5	µg	0.5	SW-7421	5.0	1000.
Nickel	1.4	µg	1.0	EPA-249.2	20.	2000.
Zinc	22.	µg	1.0	SW-6010	250.	5000.

Comment: All above constituents are reported on an as received (wet) sample basis. Results reported represent totals (TTLC) as sample subjected to appropriate techniques to determine total levels.

P.Q.L. = Practical Quantitation Limit (refers to the least amount of analyte detectable based on sample size used and analytical technique employed).
STLC = Soluble Threshold Limit Concentration
TTLC = Total Threshold Limit Concentration

REFERENCES:
EPA = "Methods for Chemical Analysis of Water and Wastes", EPA-600, 14-79-020.
SW = "Test Methods for Evaluating Solid Wastes Physical/Chemical Methods", EPA-SW-846, September, 1986.

Department Supervisor

BC LABORATORIES

PETRO CHEM ENVIRONMENTAL SERVICE
3207 ANTONINO AVE
BAKERSFIELD, CA 93308
Attn.: TERRY ROWLES 327-7300

Date Reported: 02/24/93 Page 1
Date Received: 02/08/93
Laboratory No.: 93-01131-6

Sample Description: GOLDEN STATE METALS AUTO SHREDDER REPORT #042-329 FILTER #2 (0.2921gm), SAMPLED ON 01-28-93 BY JOHN HINKLE.

TOTAL CONTAMINANTS
(California Code of Regulations, Title 22, Section 66261)

Constituents	Sample Results	Units	Method P.Q.L.	Method	Regulatory Criteria STLC mg/L	Regulatory Criteria TTLC mg/kg
Cadmium	None Detected	µg	1.0	SW-6010	1.0	100.
Chromium	1.7	µg	1.0	SW-6010	560.	2500.
Lead	6.5	µg	0.5	SW-7421	5.0	1000.
Nickel	1.6	µg	1.0	EPA-249.2	20.	2000.
Zinc	78.	µg	1.0	SW-6010	250.	5000.

Comment: All above constituents are reported on an as received (wet) sample basis. Results reported represent totals (TTLC) as sample subjected to appropriate techniques to determine total levels.

P.Q.L. = Practical Quantitation Limit (refers to the least amount of analyte detectable based on sample size used and analytical technique employed).
STLC = Soluble Threshold Limit Concentration
TTLC = Total Threshold Limit Concentration

REFERENCES:
EPA = "Methods for Chemical Analysis of Water and Wastes", EPA-600, 14-79-020.
SW = "Test Methods for Evaluating Solid Wastes Physical/Chemical Methods", EPA-SW-846, September, 1986.

Department Supervisor

BC LABORATORIES

PETRO CHEM ENVIRONMENTAL SERVICE
3207 ANTONINO AVE
BAKERSFIELD, CA 93308
Attn.: TERRY ROWLES 327-7300

Date Reported: 02/24/93 Page 1
Date Received: 02/08/93
Laboratory No.: 93-01131-1

Sample Description: GOLDEN STATE METALS AUTO SHREDDER REPORT #042-329 IMPINGATE #1 250ml, SAMPLED ON 01-28-93 BY JOHN HINKLE.

TOTAL CONTAMINANTS
(California Code of Regulations, Title 22, Section 66261)

Constituents	Sample Results	Units	Method P.Q.L.	Method	Regulatory Criteria STLC mg/L	Regulatory Criteria TTLC mg/kg
Cadmium	None Detected	µg	6.25	SW-6010	1.0	100.
Chromium	None Detected	µg	6.25	SW-6010	560.	2500.
Lead	None Detected	µg	3.25	SW-7421	5.0	1000.
Nickel	None Detected	µg	6.25	EPA-249.2	20.	2000.
Zinc	21.	µg	6.25	SW-6010	250.	5000.

Comment: All above constituents are reported on an as received (wet) sample basis. Results reported represent totals (TTLC) as sample subjected to appropriate techniques to determine total levels.

P.Q.L. = Practical Quantitation Limit (refers to the least amount of analyte detectable based on sample size used and analytical technique employed).
STLC = Soluble Threshold Limit Concentration
TTLC = Total Threshold Limit Concentration

REFERENCES:
EPA = "Methods for Chemical Analysis of Water and Wastes", EPA-600, 14-79-020.
SW = "Test Methods for Evaluating Solid Wastes Physical/Chemical Methods", EPA-SW-846, September, 1986.

Department Supervisor

BC LABORATORIES

PETRO CHEM ENVIRONMENTAL SERVICE
3207 ANTONINO AVE
BAKERSFIELD, CA 93308
Attn.: TERRY ROWLES 327-7300

Date Reported: 02/24/93
Date Received: 02/08/93
Laboratory No.: 93-01131-2

Sample Description: GOLDEN STATE METALS AUTO SHREDDER REPORT #042-329 IMPINGATE #2 250ml, SAMPLED ON 01-28-93 BY JOHN HINKLE.

TOTAL CONTAMINANTS
(California Code of Regulations, Title 22, Section 66261)

Constituents	Sample Results	Units	Method P.Q.L.	Method	Regulatory Criteria STLC mg/L	Regulatory Criteria TTLC mg/kg
Cadmium	None Detected	µg	6.25	SW-6010	1.0	100.
Chromium	None Detected	µg	6.25	SW-6010	560.	2500.
Lead	None Detected	µg	3.25	SW-7421	5.0	1000.
Nickel	None Detected	µg	6.25	EPA-249.2	20.	2000.
Zinc	12.5	µg	6.25	SW-6010	250.	5000.

Comment: All above constituents are reported on an as received (wet) sample basis. Results reported represent totals (TTLC) as sample subjected to appropriate techniques to determine total levels.

P.Q.L. = Practical Quantitation Limit (refers to the least amount of analyte detectable based on sample size used and analytical technique employed).
STLC = Soluble Threshold Limit Concentration
TTLC = Total Threshold Limit Concentration

REFERENCES:
EPA = "Methods for Chemical Analysis of Water and Wastes", EPA-600, 14-79-020.
SW = "Test Methods for Evaluating Solid Wastes Physical/Chemical Methods", EPA-SW-846, September, 1986.

Department Supervisor

BC LABORATORIES

PETRO CHEM ENVIRONMENTAL SERVICE
3207 ANTONINO AVE
BAKERSFIELD, CA 93308
Attn.: TERRY ROWLES 327-7300

Date Reported: 02/24/93 Page 1
Date Received: 02/08/93
Laboratory No.: 93-01131-7-Revised

Sample Description: H2O BLANK 250ml, SAMPLED ON 01-28-93 BY JOHN HINKEL.

TOTAL CONTAMINANTS
(California Code of Regulations, Title 22, Section 66261)

Constituents	Sample Results	Units	Method P.Q.L.	Method	Regulatory Criteria STLC mg/L	Regulatory Criteria TTLC mg/kg
Cadmium	None Detected	µg/ml	0.025	SW-6010	1.0	100.
Chromium	None Detected	µg/ml	0.025	SW-6010	560.	2500.
Lead	None Detected	µg/ml	0.0125	SW-7421	5.0	1000.
Nickel	None Detected	µg/ml	0.025	EPA-249.2	20.	2000.
Zinc	0.11	µg/ml	0.025	SW-6010	250.	5000.

Comment: All above constituents are reported on an as received (wet) sample basis. Results reported represent totals (TTLC) as sample subjected to appropriate techniques to determine total levels.

P.Q.L. = Practical Quantitation Limit (refers to the least amount of analyte detectable based on sample size used and analytical technique employed).
STLC = Soluble Threshold Limit Concentration
TTLC = Total Threshold Limit Concentration

REFERENCES:
EPA = "Methods for Chemical Analysis of Water and Wastes", EPA-600, 14-79-020.
SW = "Test Methods for Evaluating Solid Wastes Physical/Chemical Methods", EPA-SW-846, September, 1986.

Department Supervisor

BC LABORATORIES

PETRO CHEM ENVIRONMENTAL SERVICE
3207 ANTONINO AVE
BAKERSFIELD, CA 93308
Attn.: TERRY ROWLES 327-7300

Date Reported: 02/24/93
Date Received: 02/08/93
Laboratory No.: 93-01131-8

Sample Description: FILTER BLANK (0.3155gm), SAMPLED ON 01-28-93 BY JOHN HINKEL.

TOTAL CONTAMINANTS
(California Code of Regulations, Title 22, Section 66261)

Constituents	Sample Results	Units	Method P.Q.L.	Method	Regulatory Criteria STLC mg/L	Regulatory Criteria TTLC mg/kg
Cadmium	None Detected	µg/g	5.	SW-6010	1.0	100.
Chromium	9.1	µg/g	5.	SW-6010	560.	2500.
Lead	14.9	µg/g	2.	SW-7421	5.0	1000.
Nickel	None Detected	µg/g	5.	EPA-249.2	20.	2000.
Zinc	92.	µg/g	5.	SW-6010	250.	5000.

Comment: All above constituents are reported on an as received (wet) sample basis. Results reported represent totals (TTLC) as sample subjected to appropriate techniques to determine total levels.

P.Q.L. = Practical Quantitation Limit (refers to the least amount of analyte detectable based on sample size used and analytical technique employed).
STLC = Soluble Threshold Limit Concentration
TTLC = Total Threshold Limit Concentration

REFERENCES:
EPA = "Methods for Chemical Analysis of Water and Wastes", EPA-600, 14-79-020.
SW = "Test Methods for Evaluating Solid Wastes Physical/Chemical Methods", EPA-SW-846, September, 1986.

Department Supervisor

BC LABORATORIES

PCB Analysis

PETRO CHEM ENVIRONMENTAL SERVICE
3207 ANTONINO AVE
BAKERSFIELD, CA 93308
Attn.: TERRY ROWLES 327-7300

Date of Report: 02/19/93
Lab #: 93-01131-3

Sample Description: GOLDEN STATE METALS AUTO SHREDDER REPORT #042-329 PROBE WASH #1 100ml, SAMPLED ON 01-28-93 BY JOHN HINKLE.

Test Method: EPA Method 8080

Sample Matrix: Water

Date Sample Collected: 01/28/93

Date Sample Received @ Lab: 02/08/93

Date Analysis Completed: 02/18/93

Constituents	Analysis Results	Reporting Units	Minimum Reporting Level
PCB-1016	None Detected	Total/µg	0.5
PCB-1221	None Detected	Total/µg	0.5
PCB-1232	None Detected	Total/µg	0.5
PCB-1242	None Detected	Total/µg	0.5
PCB-1248	None Detected	Total/µg	0.5
PCB-1254	None Detected	Total/µg	0.5
PCB-1260	None Detected	Total/µg	0.5
Total PCB's (Summation)	None Detected	Total/µg	0.5

California D.O.H.S. Cert. #1186

Stuart S. Batham
Department Supervisor

BC LABORATORIES

PCB Analysis

PETRO CHEM ENVIRONMENTAL SERVICE
3207 ANTONINO AVE
BAKERSFIELD, CA 93308
Attn.: TERRY ROWLES 327-7300

Date of Report: 02/19/93
Lab #: 93-01131-4

Sample Description: GOLDEN STATE METALS AUTO SHREDDER REPORT #042-329 PROBE WASH #2 100ml, SAMPLED ON 01-28-93 BY JOHN HINKLE.

Test Method: EPA Method 8080

Sample Matrix: Water

Date Sample Collected: 01/28/93

Date Sample Received @ Lab: 02/08/93

Date Analysis Completed: 02/18/93

Constituents	Analysis Results	Reporting Units	Minimum Reporting Level
PCB-1016	None Detected	Total/µg	0.5
PCB-1221	None Detected	Total/µg	0.5
PCB-1232	None Detected	Total/µg	0.5
PCB-1242	None Detected	Total/µg	0.5
PCB-1248	None Detected	Total/µg	0.5
PCB-1254	None Detected	Total/µg	0.5
PCB-1260	None Detected	Total/µg	0.5
Total PCB's (Summation)	None Detected	Total/µg	0.5

California D.O.H.S. Cert. #1186

Stuart S. Buttram
Department Supervisor

BC LABORATORIES

PCB Analysis

PETRO CHEM ENVIRONMENTAL SERVICE
3207 ANTONINO AVE
BAKERSFIELD, CA 93308
Attn.: TERRY ROWLES 327-7300

Date of Report: 02/19/93
Lab #: 93-01131-6

Sample Description: GOLDEN STATE METALS AUTO SHREDDER REPORT #042-329 FILTER #2 (0.2921gm), SAMPLED ON 01-28-93 BY JOHN HINKLE.

Test Method: EPA Method 8080

Sample Matrix: FILTER

Date Sample Collected: 01/28/93

Date Sample Received @ Lab: 02/08/93

Date Analysis Completed: 02/19/93

Constituents	Analysis Results	Reporting Units	Minimum Reporting Level
PCB-1016	None Detected	Total/µg	0.2
PCB-1221	None Detected	Total/µg	0.2
PCB-1232	None Detected	Total/µg	0.2
PCB-1242	None Detected	Total/µg	0.2
PCB-1248	None Detected	Total/µg	0.2
PCB-1254	None Detected	Total/µg	0.2
PCB-1260	None Detected	Total/µg	0.2
Total PCB's (Summation)	None Detected	Total/µg	0.2

California D.O.H.S. Cert. #1186

Stuart S. Rittiman
Department Supervisor

BC LABORATORIES

PCB Analysis

PETRO CHEM ENVIRONMENTAL SERVICE
3207 ANTONINO AVE
BAKERSFIELD, CA 93308
Attn.: TERRY ROWLES 327-7300

Date of Report: 02/19/93
Lab #: 93-01131-5

Sample Description: GOLDEN STATE METALS AUTO SHREDDER REPORT #042-329 FILTER #1 (0.2914gm), SAMPLED ON 01-28-93 BY JOHN HINKLE.

Test Method: EPA Method 8080

Sample Matrix: FILTER

Date Sample Collected: 01/28/93

Date Sample Received @ Lab: 02/08/93

Date Analysis Completed: 02/19/93

Constituents	Analysis Results	Reporting Units	Minimum Reporting Level
PCB-1016	None Detected	Total/µg	0.2
PCB-1221	None Detected	Total/µg	0.2
PCB-1232	None Detected	Total/µg	0.2
PCB-1242	None Detected	Total/µg	0.2
PCB-1248	None Detected	Total/µg	0.2
PCB-1254	None Detected	Total/µg	0.2
PCB-1260	None Detected	Total/µg	0.2
Total PCB's (Summation)	None Detected	Total/µg	0.2

California D.O.H.S. Cert. #1186

Stuart S. Buttram
Department Supervisor

BC LABORATORIES

PCB Analysis

PETRO CHEM ENVIRONMENTAL SERVICE
3207 ANTONINO AVE
BAKERSFIELD, CA 93308
Attn.: TERRY ROWLES 327-7300

Date of Report: 02/19/93
Lab #: 93-01131-1

Sample Description: GOLDEN STATE METALS AUTO SHREDDER REPORT #042-329 IMPINGATE #1 250ml, SAMPLED ON 01-28-93 BY JOHN HINKLE.

Test Method: EPA Method 8080

Sample Matrix: Water

Date Sample Collected: 01/28/93

Date Sample Received @ Lab: 02/08/93

Date Analysis Completed: 02/18/93

Constituents	Analysis Results	Reporting Units	Minimum Reporting Level
PCB-1016	None Detected	Total/µg	1.
PCB-1221	None Detected	Total/µg	1.
PCB-1232	None Detected	Total/µg	1.
PCB-1242	None Detected	Total/µg	1.
PCB-1248	None Detected	Total/µg	1.
PCB-1254	None Detected	Total/µg	1.
PCB-1260	None Detected	Total/µg	1.
Total PCB's (Summation)	None Detected	Total/µg	1.

California D.O.H.S. Cert. #1186

Stuart S. Battiam
Department Supervisor

BC LABORATORIES

PCB Analysis

PETRO CHEM ENVIRONMENTAL SERVICE
3207 ANTONINO AVE
BAKERSFIELD, CA 93308
Attn.: TERRY ROWLES 327-7300

Date of Report: 02/19/93
Lab #: 93-01131-2

Sample Description: GOLDEN STATE METALS AUTO SHREDDER REPORT #042-329 IMPINGATE #2 250ml, SAMPLED ON 01-28-93 BY JOHN HINKLE.

Test Method: EPA Method 8080

Sample Matrix: Water

Date Sample Collected: 01/28/93

Date Sample Received @ Lab: 02/08/93

Date Analysis Completed: 02/18/93

Constituents	Analysis Results	Reporting Units	Minimum Reporting Level
PCB-1016	None Detected	Total/µg	1.
PCB-1221	None Detected	Total/µg	1.
PCB-1232	None Detected	Total/µg	1.
PCB-1242	None Detected	Total/µg	1.
PCB-1248	None Detected	Total/µg	1.
PCB-1254	None Detected	Total/µg	1.
PCB-1260	None Detected	Total/µg	1.
Total PCB's (Summation)	None Detected	Total/µg	1.

California D.O.H.S. Cert. #1186

Stuart S. Buttram
Department Supervisor

BC LABORATORIES

PCB Analysis

PETRO CHEM ENVIRONMENTAL SERVICE
3207 ANTONINO AVE
BAKERSFIELD, CA 93308
Attn.: TERRY ROWLES 327-7300

Date of Report: 02/19/93
Lab #: 93-01131-7

Sample Description: H2O BLANK 250ml, SAMPLED ON 01-28-93 BY JOHN HINKEL.

Test Method: EPA Method 8080

Sample Matrix: Water

Date Sample Collected: 01/28/93

Date Sample Received @ Lab: 02/08/93

Date Analysis Completed: 02/18/93

Constituents	Analysis Results	Reporting Units	Minimum Reporting Level
PCB-1016	None Detected	µg/ml	0.003
PCB-1221	None Detected	µg/ml	0.003
PCB-1232	None Detected	µg/ml	0.003
PCB-1242	None Detected	µg/ml	0.003
PCB-1248	None Detected	µg/ml	0.003
PCB-1254	None Detected	µg/ml	0.003
PCB-1260	None Detected	µg/ml	0.003
Total PCB's (Summation)	None Detected	µg/ml	0.003

California D.O.H.S. Cert. #1186

Stuart S. Nittsan
Department Supervisor

BC LABORATORIES

PCB Analysis

PETRO CHEM ENVIRONMENTAL SERVICE
3207 ANTONINO AVE
BAKERSFIELD, CA 93308
Attn.: TERRY ROWLES 327-7300

Date of Report: 02/19/93
Lab #: 93-01131-8

Sample Description: FILTER BLANK (0.3155gm), SAMPLED ON 01-28-93 BY JOHN HINKEL.

Test Method: EPA Method 8080

Sample Matrix: Miscellaneous

Date Sample Collected: 01/28/93

Date Sample Received @ Lab: 02/08/93

Date Analysis Completed: 02/19/93

Constituents	Analysis Results	Reporting Units	Minimum Reporting Level
PCB-1016	None Detected	µg/ml	0.8
PCB-1221	None Detected	µg/ml	0.8
PCB-1232	None Detected	µg/ml	0.8
PCB-1242	None Detected	µg/ml	0.8
PCB-1248	None Detected	µg/ml	0.8
PCB-1254	None Detected	µg/ml	0.8
PCB-1260	None Detected	µg/ml	0.8
Total PCB's (Summation)	None Detected	µg/ml	0.8

California D.O.H.S. Cert. #1186

Stuart S. Buttram
Department Supervisor

DATE: February 13, 1993

CLIENT: PETRO CHEM ENVIRONMENTAL SERVICES, INC.
3207 Antonino Avenue
Bakersfield, CA 93308

ATTENTION: Tim Brennan/Terry Rowles

REFERENCE: P. O. No. 49138

REPORT NO: 26662

SUBJECT: ANALYSIS OF LIQUID SAMPLES BY TRANSMISSION ELECTRON MICROSCOPY

ACCREDITED: National Institute of Standards and Technology through NVLAP (Laboratory No. 1218)

California Department of Health Services for Asbestos by TEM (ELAP E1119)

Four liquid samples and one liquid blank were submitted for TEM analysis of asbestos structures. The liquid sample was analyzed according to the U.S. EPA method EPA-600/4-83-043. Additional analyses were performed for asbestos fibers >10μm in length to comply with the new water regulation.

The results are as follows:

LIQUID	Chrysotile μg/ml
Impingate #1	3.9×10^{-3}
Impingate #2	0.03×10^{-3}
Probe Wash #1	2.0×10^{-3}
Probe Wash #2	1.5×10^{-3}
Water Blank	0.000424×10^{-3}

The test reports are enclosed.

Respectfully submitted,

EMS LABORATORIES, INC.

B M Kolk

B. M. Kolk
Laboratory Director

U.S. Dept. of Commerce, Nat'l Institute of Standards and Technology
Airborne Asbestos
Asbestos Bulk Sample
Analyses
NVLAP
EMS Laboratories, Inc.
Lab Code: 1218

This report, from a NIST accredited laboratory through NVLAP, must not be used by the client to claim product endorsement by NVLAP or any agency of the Government.

ANALYSIS OF WATER BY TEM (EPA-600/4-83-043)

LAB NO: 26662
CLIENT: Petro-Chem Environmental

Laboratory I.D.	Client I.D.	FILTER MEDIA DATA			No. of G.O.	Analyzed Area, mm^2	Sample Volume (ml)
		Type	Diameter mm	Effective Area mm^2			
26662-P-1	IMP-1	MCE	47	1017	3	0.0201	20
26662-P-2	IMP-2	MCE	47	1017	21	0.1407	100
26662-N-1	P/N-1	MCE	47	1017	6	0.0402	50
26662-N-2	P/N-2	MCE	47	1017	12	0.0804	10
BLANK	BLANK	MCE	47	1017	21	0.1407	100

INDIVIDUAL ANALYTICAL RESULTS

Laboratory I.D.	Client I.D.	No. of Asbestos			Detection Limit (MFL)	CONCENTRATION (MFL)		
		Str	>5	>10		Str	Str >5um	Str >10um
26662-P-1	IMP-1	90	7	1	2.5	230	20	2.5
26662-P-2	IMP-2	43	1	1	0.07	3.1	0.07	0.07
26662-N-1	P/N-1	92	2	1	0.5	47	1	0.5
26662-N-2	P/N-2	84	3	1	1.3	110	5.1	1.3
BLANK	BLANK	2	N.D.	N.D.	0.07	0.1	N.D.	N.D.

The analysis was carried out to the approved TEM method. This laboratory is in compliance with the quality specified by the method.

B M Kalk
Authorized Signature

EMS LABORATORIES 117 West Bellevue Drive / Pasadena CA 91105-2503 / 818-568-4065

Analysis of Water by Transmission Electron Microscopy
(EPA-600/4-83-043)

EMS No. 26662 **Client** Petro-Chem Environmental

Sample No. IMP-1 **Date Analyzed** 2/15/93

Fibers (chrysotile)	230	MFL
Fibers > 5 µm in length (chrysotile)	20	MFL
Fibers > 10 µm in length (chrysotile)	2.5	MFL
Mass (chrysotile)	3.9	ug/L
More/Less than 5 Fibers in Sample (chrysotile)	MORE	
Poisson 95% Confidence Interval	180 to 280	MFL
Detection Limit	2.5	MFL

* BDL : Below Detection Limit; MFL: Million Fibers per Liter

Particle Size Distribution (Chrysotile)

Particle Length - Microns

O -0.49	0.50 - 0.99	1.00 - 1.49	1.50 - 1.99	2.00 - 2.49	2.5 - 4.99	5.00 - 9.99	10 & UP
0	19	19	6	11	27	7	1

Particle Width - Microns

O - .04	.05 - .09	.1 - .14	.15 - .19	.2 - .24	.25 - .49	.50 - .99	1 & UP
0	88	2	0	0	0	0	0

Aspect Ratio L/W

0 - 9.9	10 - 19.9	20 - 29.9	30 - 39.9	40 - 49.9	50 - 99	100 - 199	200 & UP
1	21	18	8	10	25	7	0

15-Feb-1993 08:46:09

26662-IMP-1,C,#25,SA
Vert= 200 counts Disp= 1

Preset= 100 secs
Elapsed= 41 secs

Energy	Counts	X-Ray Lines
1.23	202.	Mg K , Mg K
1.74	326.	Si K , Si K

Quantex)
0.320 Range= 10.230 keV

Integral 0 = 10.230
7242

15-Feb-1993 08:34:43

26662-IMP-1,C,#04,SA
Vert= 200 counts Disp= 1

Preset= 100 secs
Elapsed= 40 secs

Energy	Counts	X-Ray Lines
1.24	478.	Mg K , Mg K , As L , As L
1.74	787.	Si K , Si K

Quantex>
0.320 Range= 10.230 keV

10.230
Integral O = 9282

15-Feb-1993 08:45:43

26662-IMP-1,C,#15,SA
Vert= 200 counts Disp= 1

Preset= 100 secs
Elapsed= 31 secs

Energy	Counts	X-Ray Lines
1.23	115.	Mg K , Mg K
1.75	188.	Si K , Si K

Quantex>
0.320 Range= 10.230 keV

10.230
Integral O = 5416

15-Feb-1993 08:33:30

26662-IMP-1,C,#02,SA Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 47 secs

Energy	Counts	X-Ray Lines
1.25	429.	Mg K , Mg K , Mg K , As L , As L
1.74	944.	Si K , Si K

Quantex>
0.320 Range= 10.230 keV 10.230
Integral 0 = 10042

15-Feb-1993 08:34:15

26662-IMP-1,C,#03,SA Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 28 secs

Energy	Counts	X-Ray Lines
1.23	272.	Mg K , Mg K
1.73	499.	Si K , Si K

Quantex>
0.320 Range= 10.230 keV 10.230
Integral 0 = 6651

15-Feb-1993 08:32:48

26662-IMP-1,C,#01,SA
Vert= 200 counts Disp= 1

Preset= 100 secs
Elapsed= 27 secs

Energy	Counts	X-Ray Lines
1.24	292.	Mg K , Mg K , As L , As L
1.74	567.	Si K , Si K
8.04	711.	Cu K , Cu K
8.93	108.	Cu K , Cu K , Cu K

Quantex)
0.320 Range= 10.230 keV

10.230
Integral 0 = 6209

TEM ASBESTOS ANALYSIS

Client Petro Chem
Sample No. Imp-1

EMS Lab No. 26662
Page 1 of

MICROSCOPE
Serial No. 542-05-06 H600A ☐
Serial No. 542-05-13 H600B ☑

RECEIVING

ANALYSIS

Grid Address 1C
Screen Magnification 19100 X
Camera Constant 28.4
Accelerating Voltage 100 KV
Beam Current 10 µm
K-Factor 1.75
Analyst S. Ahmed Date 2/15/93

Grid Opening	Structure Number	Structure	Dimensions (mm) Width	Dimensions (mm) Length	Fiber Classification NAM	TM	CM	CD	CQ	CMQ	CDQ	UF	AD	AX	ADX	AQ	ADQ	AZQ	AZZ	EDS Analysis Na	Mg	Si	Ca	Fe	Comments
1	1	MD	1	90							✓										5	10			EDS#1
	2	F	1	140							✓										5	10			EDS#2
	3	F	1	92							✓										5	10			EDS#3
	4	F	1	18							✓										5	10			EDS#4
	5	MD	1	70				✓																	
	6	F	1	30				✓																	
	7	F	1	36				✓																	
	8	F	1	50				✓																	
	9	F	2	25				✓																	
	10	F	1	10	✓																				
	11	F	1	26				✓																	
	12	F	1	28				✓																	
	13	F	1.5	44				✓																	
	14	MD	1	70				✓																	
	15	F	1	62				✓			✓										6	10			EDS#15

OBSERVATIONS:

Clean ☐ Other _____
Debris ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐
Gypsum ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐

EMS LABORATORIES 117 West Bellevue Drive ☐ Pasadena, California 91105-2503 ☐ (818) 568-4065

TEM ASBESTOS ANALYSIS

Client Petro Chem
Sample No. Imp-1

EMS Lab No. 26662
Page 2 of

RECEIVING

ANALYSIS

MICROSCOPE
Serial No. 542-05-06 H600A ☐
Serial No. 542-05-13 H600B ☑

Grid Address 1C
Screen Magnification 19100 X
Camera Constant 28.4
Accelerating Voltage 100 KV
Beam Current 10 µm
K-Factor 1.75
Analyst S. Ahmed Date 2/15/93

Grid Opening	Structure Number	Structure	Dimensions (mm) Width	Dimensions (mm) Length	Fiber Classification NAM	TM	CM	CD	CQ	CMQ	CDQ	UF	AD	AX	ADX	AQ	ADQ	AZQ	AZZ	EDS Analysis Na	Mg	Si	Ca	Fe	Comments
1	16	F	1	96				✓																	
	17	F/MD	1	25				✓																	
	18	F	1	18				✓																	
	19	F	1	35				✓																	
	20	MD	1	22				✓																	
	21	F	1	15				✓																	
	22	F	1	80				✓																	
	23	MD	1	45				✓																	
	24	F	1	18	✓																				
	25	MD	1	92				✓													G	10			EDS #25
	26	F	1	180				✓																	
	27	F	1	75				✓																	
	28	F	1	130				✓																	
	29	F	1	15				✓																	
	30	F	1	70				✓																	

OBSERVATIONS:

Clean ☐	Other			
Debris ☑	Very Light ☐	Light ☐	Moderate ☑	Heavy ☐	Very Heavy ☐
Gypsum ☐	Very Light ☐	Light ☐	Moderate ☐	Heavy ☐	Very Heavy ☐

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TEM ASBESTOS ANALYSIS

Client Petro Chem
Sample No. IMP-1

EMS Lab No. 7662
Page 3 of

MICROSCOPE
Serial No. 542-05-06 H600A ☐
Serial No. 542-05-13 H600B ☑

RECEIVING

Vol. 20ml.

ANALYSIS

Grid Address 1C
Screen Magnification 19100 X
Camera Constant 28.64
Accelerating Voltage 100 KV
Beam Current 10 µm
K-Factor 1.75
Analyst S Ahmed Date 2/15/93

Grid Opening	Structure Number	Structure	Dimensions (mm) Width	Dimensions (mm) Length	Fiber Classification NAM	TM	CM	CD	CQ	CMQ	CDQ	UF	AD	AX	ADX	AQ	ADQ	AZQ	AZZ	EDS Analysis Na	Mg	Si	Ca	Fe	Comments
1	31	F	1	45				✓																	
	32	MD	1	40				✓																	
	33	F	1	50X				✓																	
	34	F	1	11				✓																	
	35	F	1	21				✓																	
	36	F	1	25				✓																	

OBSERVATIONS:

Clean ☐	Other			
Debris ☑	Very Light ☐	Light ☐	Moderate ☑	Heavy ☐	Very Heavy ☐
Gypsum ☐	Very Light ☐	Light ☐	Moderate ☐	Heavy ☐	Very Heavy ☐

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14-Feb-1993 10:45:29

26662,P/N-1,B,05,GA
Vert= 200 counts Disp= 1

Preset= 100 secs
Elapsed= 31 secs

Energy	Counts	X-Ray Lines
1.24	197.	Mg K , Mg K , As L , As L
1.74	343.	Si K , Si K

Quantex)
0.160 Range= 10.230 keV

10.230
Integral 8 = 58

14-Feb-1993 10:44:20

26662,P/N-1,B,04,GA
Vert= 200 counts Disp= 1

Preset= 100 secs
Elapsed= 25 secs

Energy	Counts	X-Ray Lines
1.24	138.	Mg K , Mg K , As L , As L
1.74	248.	Si K , Si K

Quantex)
0.160 Range= 10.230 keV

Integral 8 = 10.230
51

14-Feb-1993 10:43:20

26662,P/N-1,B,03,GA
Vert= 200 counts Disp= 1

Preset= 100 secs
Elapsed= 45 secs

Energy	Counts	X-Ray Lines
1.24	237.	Mg K , Mg K , As L , As L
1.74	336.	Si K , Si K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 8 = 61

14-Feb-1993 10:42:34

26662,P/N-1,B,02,GA
Vert= 200 counts Disp= 1

Preset= 100 secs
Elapsed= 32 secs

Energy	Counts	X-Ray Lines
1.23	189.	Mg K , Mg K
1.74	263.	Si K , Si K

Quantex)
0.160 Range= 10.230 keV

10.230
Integral 8 = 50

14-Feb-1993 10:41:29

26662,P/N-1,B,01,GA
Vert= 200 counts Disp= 1

Preset= 100 secs
Elapsed= 26 secs

Energy	Counts	X-Ray Lines
1.24	146.	Mg K , Mg K , As L , As L
1.73	280.	Si K , Si K

Quantex)
0.160 Range= 10.230 keV

10.230
Integral 8 = 35

TEM ASBESTOS ANALYSIS

Client: Petro-Chem
Sample No. IMP-1

EMS Lab No. 26662
Page ______ of ______

20 ml

RECEIVING

ANALYSIS

MICROSCOPE
Serial No. 542-05-06 H600A ☐
Serial No. 542-05-13 H600B ☐

Grid Address: 1-B
Screen Magnification: 19,300 X
Camera Constant: 20.1
Accelerating Voltage: 100 KV
Beam Current: 11 μm
K-Factor: ______

Analyst: [illegible] Date: 3-14-93

Grid Opening	Structure Number	Structure	Dimensions (mm) Width	Length	Fiber Classification NAM	TM	CM	CD	CQ	CMQ	CDQ	UF	AD	AX	ADX	AQ	ADQ	AZQ	AZZ	EDS Analysis Na	Mg	Si	Ca	Fe	Comments
1	01	F	1	23						/	/										5	10			EDS #1
	02	F	1	35						/	/										7	10			" 2
	03	F	1	23						/	/										7	10			" 3
	04	F	1	30						/	/										6	10			" 4
	05	F	1	25						/	/										6	10			" 5
	06	F	1	25			/	/																	
	07	F	1	120			/	/																	
	08	F	1	140			/	/																	
	09	F	1	15			/	/																	
	10	F	1	45			/	/																	
	11	F	1	20			/	/																	
	12	F	1	75			/	/																	
	13	B	1	15			/	/																	
	14	F/mD	1	75			/	/																	
	15	F	1	65			/	/																	

OBSERVATIONS:

Clean ☐ Other ______
Debris ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐
Gypsum ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐

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TEM ASBESTOS ANALYSIS

Client Petro Chem EMS Lab No. 26621

Sample No. 1 Page _____ of _____

Analyst [signature] Date 2-14-93

Grid Opening	Structure Number	Structure	Dimensions (mm) Width	Dimensions (mm) Length	NAM	TM	CM	CD	CQ	CMQ	CDQ	UF	AD	AX	ADX	AQ	ADQ	AZQ	AZZ	EDS Analysis No	Mg	Si	Ca	Fe	Comments
1	16	F	1	15			/	/																	
	17	F	1	40			/	/																	
	18	F	1.5	50			/	/																	
	19	F	1	30			/	/																	
	20	F	1	80			/	/																	
	21	F	1	15			/	/																	
	22	F	1	55			/	/																	
	23	F	1	15			/	/																	
	24	F	1	45			/	/																	
	25	F	1	18	/																				
	26	F	1	14	/																				
	27	F	1	16			/	/																	
	28	F	1	24			/	/																	
	29	F	1	41			/	/																	

OBSERVATIONS:

Clean ☐ Other _____

Debris ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐

Gypsum ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐

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13-Feb-1993 12:36:29

26662, IMP-1, A, 06, KC Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 44 secs

Energy	Counts	X-Ray Lines
1.24	261.	Mg K , Mg K , As L , As L
1.73	475.	Si K , Si K

Quantex)
0.160 Range= 10.230 keV 10.230
Integral 8 = 83

13-Feb-1993 13:17:26

26662, IMP-1, A, 14, KC Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 52 secs

Energy	Counts	X-Ray Lines
1.24	278.	Mg K , Mg K , As L , As L
1.74	613.	Si K , Si K

Quantex)
0.160 Range= 10.230 keV 10.230
Integral 8 = 86

13-Feb-1993 13:29:59

26662, IMP-1, A, 25, KC
Vert= 200 counts Disp= 1

Preset= 100 secs
Elapsed= 35 secs

Energy	Counts	X-Ray Lines
1.24	192.	Mg K , Mg K , As L , As L
1.73	359.	Si K , Si K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 8 = 63

13-Feb-1993 12:26:51

26662, IMP-1, A, 01, KC
Vert= 200 counts Disp= 1

Preset= 100 secs
Elapsed= 43 secs

Energy	Counts	X-Ray Lines
1.25	268.	Mg K , Mg K , Mg K , As L , As L
1.74	525.	Si K , Si K

Quantex>
0.160 Range= 10.230 keV

Integral 8 = 10.230 89

13-Feb-1993 12:34:34

26662, IMP-1, A, 03, KC
Vert= 200 counts Disp= 1

Preset= 100 secs
Elapsed= 31 secs

Energy	Counts	X-Ray Lines
1.25	181.	Mg K , Mg K , Mg K , As L , As L
1.72	358.	Si K , Si K

Quantex>
0.160 Range= 10.230 keV

Integral 8 = 10.230 54

TEM ASBESTOS ANALYSIS

Client: Petro-Chem
Sample No.: IMP-1

EMS Lab No.: 26662
Page 1 of 2

RECEIVING

TYPE OF SAMPLE: Air ☐ Water ☑ Soil ☐ Bulk ☐ Other ____

LENGTHS: All Sizes (EPA) ☐ (µm) ≥0.5 ☑ ≥1.0 ☐ ≥5.0 ☐ ≥10.0 ☐ PCM Range* ☐
*(≥0.25 µm width ≥5.0 µm length)

METHOD OF ANALYSIS: EPA 600/4-83-043 ☑ ISO ☐

LEVEL OF ANALYSIS:
Chrysotile: CD-CDQ
Amphibole: AD-ADQ

ASPECT RATIO: 3:1 ☑ 5:1 ☐

Approved By: B Kolk Date: 2-11-93

FILTER TYPE / AREA (mm±): MCE ☑ PC ☐ MCN ☐ Other ____ 385 ☐ 314 ☐ 1017 ☑

PORE SIZE: 0.45 µm ☐ 0.1 µm ☑ 0.8 µm ☐ 0.22 µm ☐ Other ____

G.O. Area (mm²) 0.0 067
No. of G.O. to Analyze: 20
Filter Lot No.: #2EMC6077

PREP

DIRECT PREP ☑
INDIRECT PREP ☐

Filtration date 2-10-93

Volume ____ liters
Working Volume 20 ml
Weight ____ grams
Ashed Area ____ %

Prepared By: FG
Date: 2-11-93

ANALYSIS

MICROSCOPE
Serial No. 542-05-06 H600A ☐
Serial No. 542-05-13 H600B ☑

Grid Address: 1A
Screen Magnification: 19,100 X
Camera Constant: 28.4
Accelerating Voltage: 100 KV
Beam Current: 10 µm
K-Factor: mg: 1.75
Analyst: Kyleong Date: 2/13/93

Grid Opening	Structure Number	Structure	Width	Length	NAM	TM	CM	CD	CQ	CMQ	CDQ	UF	AD	AX	ADX	AQ	ADQ	AZQ	AZZ	Na	Mg	Si	Ca	Fe	Comments
1	1	F	1.5	42							✓										5	10			EPS#1
	2	F	1	18				✓																	
	3	F	1	196x							✓										5	10			EPS#3
	4	F/MD	1	40			✓																		
	5	F	1	18	✓																				
	6	F	1.5	95							✓										5	10			EPS#6
	7	F	1	15	✓																				
	8	F	1	68				✓																	
	9	F	1	67				✓																	
	10	F	1	20				✓																	
	11	F	1	85				✓																	
	12	B	2	20				✓																	
	13	F	1	13				✓																	
	14	F	1	21							✓										5	10			EPS#14
	15	F	1.5	17				✓																	

OBSERVATIONS: Clean ☐ Debris ☒ Gypsum ☐ Other ____ Very Light ☐ Very Light ☐ Light ☐ Light ☐ Moderate ☒ Moderate ☐ Heavy ☒ Heavy ☐ Very Heavy ☐ Very Heavy ☐

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TEM ASBESTOS ANALYSIS

Client Petro-chem
Sample No. IMP-1

EMS Lab No. 26662
Page 2 of 2

Analyst Kyeong Date 2/13/93

Grid Opening	Structure Number	Structure	Dimensions (mm) Width	Dimensions (mm) Length	Fiber Classification NAM	TM	CM	CD	CQ	CMQ	CDQ	UF	AD	AX	ADX	AQ	ADQ	AZQ	AZZ	EDS Analysis Na	Mg	Si	Ca	Fe	Comments
1	16	F	1	20				✓																	
	17	F	1	50				✓																	
	18	F	1	12				✓																	
	19	F	1	20	✓																				
	20	F	1	184				✓																	
	21	F	1.5	22X				✓																	
	22	F	1	68				✓																	
	23	F	1	12				✓																	
	24	F	1.5	18				✓																	
	25	F	1.5	51							✓										5	10			EDS#25
	26	F	1.5	13				✓																	
	27	F/MD	1.5	80				✓																	
	28	F	1	40				✓																	
	29	F	1	58				✓																	
	30	F/MD	1	31				✓																	
	31	F/MD	1	18				✓																	
	32	F	1.5	74X				✓																	

OBSERVATIONS:

Clean ☐ Debris ☐ Gypsum ☐ Other _____ Very Light ☐ Very Light ☐ Light ☐ Light ☐ Moderate ☐ Moderate ☐ Heavy ☐ Heavy ☐ Very Heavy ☐ Very Heavy ☐

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Analysis of Water by Transmission Electron Microscopy
(EPA-600/4-83-043)

EMS No. 26662

Sample No. IMP-1

Client Petro-Chem Environmental

Date Analyzed 2/15/93

Fibers > 10 µm in length (chrysotile)	4	MFL
Mass (chrysotile)	0.6	ug/L
More/Less than 5 Fibers >10 um in Sample (chrysotile)	MORE	
Poisson 95% Confidence Interval	2.4 to 6.6	MFL
Detection Limit	0.3	MFL

* BDL : Below Detection Limit; MFL: Million Fibers per Liter

Particle Size Distribution (Chrysotile)

Particle Length - Microns

O -0.49	0.50 - 0.99	1.00 - 1.49	1.50 - 1.99	2.00 - 2.49	2.5 - 4.99	5.00 - 9.99	10 & UP
0	0	0	0	0	0	0	16

Particle Width - Microns

O - .04	.05 - .09	.1 - .14	.15 - .19	.2 - .24	.25 - .49	.50 - .99	1 & UP
0	15	1	0	0	0	0	0

Aspect Ratio L/W

0 - 9.9	10 - 19.9	20 - 29.9	30 - 39.9	40 - 49.9	50 - 99	100 - 199	200 & UP
0	0	0	0	0	0	1	15

TEM ASBESTOS ANALYSIS

Client Petro-Chem
Sample No. IMP-1

EMS Lab No. 26662
Page _____ of _____

RECEIVING

TYPE OF SAMPLE: Air ☐ Water ☑ Soil ☐ Bulk ☐ Other _____

METHOD OF ANALYSIS: EPA 600/4-83-043 ☑ ISO ☐

LEVEL OF ANALYSIS: Chrysotile AD-CDQ; Amphibole AD-AMDQ

ASPECT RATIO: 3:1 ☐ 5:1 ☐

Approved By BJ Kuell Date 2-11-93

LENGTHS: All Sizes (EPA) ☐; (μm) ≥0.5 ☐; ≥1.0 ☐; ≥5.0 ☐; ≥10.0 ☒; PCM Range* ☐ (*≥0.25 μm width, ≥5.0 μm length)

FILTER TYPE / AREA (mm±): MCE ☑ 385 ☐; PC ☐ 314 ☐; MCN ☐ 1017 ☑; Other _____

PORE SIZE: 0.45 μm ☐ 0.8 μm ☐; 0.1 μm ☑ 0.22 μm ☐; Other _____

G.O. Area (mm²) 0.0 067
No. of G.O. to Analyze _____
Filter Lot No. H2EM96077

PREP

DIRECT PREP ☑
INDIRECT PREP ☐

≥ 10μm analysis

Volume _____ liters
Working Volume 20 ml
Weight _____ grams
Ashed Area _____ %

Prepared By FG
Date 2-11-93

ANALYSIS

MICROSCOPE
Serial No. 542-05-06 H600A ☐
Serial No. 542-05-13 H600B ☒

Grid Address 1A
Screen Magnification 19,100 X
Camera Constant 28.4
Accelerating Voltage 100 KV
Beam Current 10 μm
K-Factor Mg 1.75

Analyst Kyeong Date 2/13/93

Grid Opening	Structure Number	Structure	Dimensions (mm) Width	Dimensions (mm) Length	Fiber Classification: NAM	TM	CM	CD	CQ	CMQ	CDQ	UF	AD	AX	ADX	AQ	ADQ	AZQ	AZZ	EDS Analysis: Na	Mg	Si	Ca	Fe	Comments
1	NSD																								
2	NSD																								
3	1	F	1	245				✓																	
	2	F	1.5	410				✓																	
4	NSD																								
5	NSD																								
6	NSD																								
7	NSD																								
8	3	F/MD	1	260				✓																	
9	NSD																								
10	4	F	2	493				✓																	

OBSERVATIONS:

Clean ☐ Debris ☒ Gypsum ☐
Other _____
Very Light ☐ Very Light ☐
Light ☐ Light ☐
Moderate ☒ Moderate ☐
Heavy ☒ Heavy ☐
Very Heavy ☐ Very Heavy ☐

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TEM ASBESTOS ANALYSIS

Client Petro - Chem
Sample No. IMP-1
EMS Lab No. 26662
Page _____ of _____

≥10µm

B

Analyst GW Date 3-14-93

Grid Opening	Structure Number	Structure	Dimensions (mm) Width	Dimensions (mm) Length	NAM	TM	CM	CD	CQ	CMQ	CDQ	UF	AD	AX	ADX	AQ	ADQ	AZQ	AZZ	EDS Analysis Na	Mg	Si	Ca	Fe	Comments
1	NAO																								
2	NAO																								
3	01	F	1	330			1																		
	02	F	1	270			1																		
4	NAO																								
5	NAO																								
6	NAO																								
7	NAO																								
8	NAO																								
9	NAO																								
10	03	F X	1	330			1																		
	04	F	1	290			1																		
	05	F	1	276			1																		

OBSERVATIONS:

Clean ☐ Other _____
Debris ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐
Gypsum ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐

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TEM ASBESTOS ANALYSIS

Client Petrochem
Sample No. Imp-1

EMS Lab No. 26662
Page 1 of

MICROSCOPE
Serial No. 542-05-06 H600A ☐
Serial No. 542-05-13 H600B ☐

RECEIVING

ANALYSIS

≥10um.

Grid Address 1C
Screen Magnification 19000 X
Camera Constant 28.4
Accelerating Voltage 100 KV
Beam Current 15 µm
K-Factor .75
Analyst S. Ahmed Date 2/5

Grid Opening	Structure Number	Structure	Dimensions (mm) Width	Length	Fiber Classification NAM	TM	CM	CD	CQ	CMQ	CDQ	UF	AD	AX	ADX	AQ	ADQ	AZQ	AZZ	EDS Analysis Na	Mg	Si	Ca	Fe	Comments
1	1	F	1.5	198							✓										6	10			EDS #1
2	2	F	1.5	360							✓										6	10			EDS #2
3	NSD																								
4	3	F	1	200				✓																	
	4	MD	1	220				✓																	
5	NSD																								
6	NSD																								
7	5	F	1	200				✓																	
8	6	F	1	315				✓																	
9	NSD																								
10	7	F	1	400				✓																	

OBSERVATIONS:

Clean ☐ Other
Debris ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐
Gypsum ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐

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15-Feb-1993 08:46:43

26662-IMP-1,C,#01,SA
Vert= 200 counts Disp= 1

Preset= 100 secs
Elapsed= 41 secs

Energy	Counts	X-Ray Lines
1.23	204.	Mg K , Mg K
1.74	334.	Si K , Si K

Quantex>
0.320 Range= 10.230 keV

Integral 0 = 10.230 7242

15-Feb-1993 08:47:54

26662-IMP-1,C,#02,SA
Vert= 200 counts Disp= 1

Preset= 100 secs
Elapsed= 20 secs

Energy	Counts	X-Ray Lines
1.25	116.	Mg K , Mg K , Mg K , As L , As L
1.74	210.	Si K , Si K

Quantex>
0.320 Range= 10.230 keV

Integral 0 = 10.230 4023

Analysis of Water by Transmission Electron Microscopy
(EPA-600/4-83-043)

EMS No. 26662

Sample No. IMP-2

Client Petro-Chem Environmental

Date Analyzed 2/15/93

Fibers (chrysotile)	3.1	MFL
Fibers > 5 µm in length (chrysotile)	0.07	MFL
Fibers > 10 µm in length (chrysotile)	0.07	MFL
Mass (chrysotile)	0.03	ug/L
More/Less than 5 Fibers in Sample (chrysotile)	MORE	
Poisson 95% Confidence Interval	2.3 to 4.2	MFL
Detection Limit	0.07	MFL

* BDL : Below Detection Limit; MFL: Million Fibers per Liter

Particle Size Distribution (Chrysotile)

Particle Length - Microns

O -0.49	0.50 - 0.99	1.00 - 1.49	1.50 - 1.99	2.00 - 2.49	2.5 - 4.99	5.00 - 9.99	10 & UP
0	25	6	4	3	4	0	1

Particle Width - Microns

O - .04	.05 - .09	.1 - .14	.15 - .19	.2 - .24	.25 - .49	.50 - .99	1 & UP
0	43	0	0	0	0	0	0

Aspect Ratio L/W

0 - 9.9	10 - 19.9	20 - 29.9	30 - 39.9	40 - 49.9	50 - 99	100 - 199	200 & UP
3	23	6	3	3	4	0	1

TEM ASBESTOS ANALYSIS

Client: Petro-Chem
Sample No.: IMP-2
EMS Lab No.: 26662
Page: 1 of 2

RECEIVING

TYPE OF SAMPLE: Air ☐ Water ☒ Soil ☐ Bulk ☐ Other ____

METHOD OF ANALYSIS: EPA 600/4-83-043 ☒ ISO ☐

LEVEL OF ANALYSIS: Chrysotile CD-CDQ; Amphibole AD-ADQ

ASPECT RATIO: 3:1 ☒ 5:1 ☐

LENGTHS: All Sizes (EPA) ☐; (μm) ≥0.5 ☒; ≥1.0 ☐; ≥5.0 ☐; ≥10.0 ☐; PCM Range* ☐ (*≥0.25 μm width, ≥5.0 μm length)

FILTER TYPE / AREA (mm±): MCE ☒ 385 ☐; PC ☐ 314 ☐; MCN ☐ 1007 ☒; Other ____

PORE SIZE: 0.45 μm ☐ 0.8 μm ☐; 0.1 μm ☒ 0.22 μm ☐; Other ____

G.O. Area (mm²) 0.0 067

No. of G.O. to Analyze 20

Filter Lot No. H2E419607J

Approved By BJK Date 2-11-93

PREP

DIRECT PREP ☒
INDIRECT PREP ☐

Filtration date 2-10-93

Volume ____ liters
Working Volume 100 ml
Weight ____ grams
Ashed Area ____ %

Prepared By FG
Date 2-11-93

ANALYSIS

MICROSCOPE: Serial No. 542-05-06 H600A ☐; Serial No. 542-05-13 H600B ☒

Grid Address 1A
Screen Magnification 19,100 X
Camera Constant 28.4
Accelerating Voltage 100 KV
Beam Current 10 μm
K-Factor mg 1.25

Analyst Kyeong Date 2/13/93

Grid Opening	Structure Number	Structure	Dimensions (mm) Width	Dimensions (mm) Length	Fiber Classification NAM	TM	CM	CD	CQ	CMQ	CDQ	UF	AD	AX	ADX	AQ	ADQ	AZQ	AZZ	EDS Analysis Na	Mg	Si	Ca	Fe	Comments
1	1	F	1	10	✓																				Si
	2	F	1.5	19	✓																				Si
	3	F	1.5	18							✓										5	10			EDS#3
	4	B	3	19	✓																				
	5	F	1.5	12				✓																	
	6	F	1	20		✓																			
	7	F	1	35	✓																				
	8	F	1	18							✓										5	10			EDS#8
	9	F	1	16	✓																				
	10	F/MD	1	260X							✓										5	10			EDS#10
2	11	F	1	33				✓																	
	12	F	1.5	10							✓										6	10			EDS#12
	13	F	1.5	21				✓																	
	14	B	10	70	✓																				Mg, Si, Al, Ca, Fe
	15	F	1	16				✓																	

OBSERVATIONS:
Clean ☐ Debris ☒ Gypsum ☐
Other ____
Very Light ☐ Very Light ☐
Light ☐ Light ☐
Moderate ☒ Moderate ☐
Heavy ☒ Heavy ☐
Very Heavy ☐ Very Heavy ☐

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TEM ASBESTOS ANALYSIS

Client Petro-Chem
Sample No. Imp-2

EMS Lab No. 26662
Page 2 of 2

Analyst Kyeong Date 2/13/93

Grid Opening	Structure Number	Structure	Dimensions (mm) Width	Dimensions (mm) Length	Fiber Classification NAM	TM	CM	CD	CQ	CMQ	CDQ	UF	AD	AX	ADX	AQ	ADQ	AZQ	AZZ	EDS Analysis Na	Mg	Si	Ca	Fe
3	16	F	1	25				✓																
	17	F	1.5	10				✓																
	18	F	1	79				✓																
	19	F	10	40	✓																			
	20	F	1.5	26		✓																		
4	21	F/MD	1	90				✓																
	22	F	1	15				✓																
5	23	F	1	17		✓																		
	24	F	1	11			✓																	
6	25	F	0.5	40		✓																		
	26	F	1	58				✓																
	27	F	1	21				✓																
	28	F	1	110		✓																		
7	29	F	1	17				✓																
	30	F	1	70			✓																	
	31	F	1	10				✓																

Comments

*After the 1st g.o nonasbestos structures are not recorded *
Si, Al, Mg, Ca, Fe

OBSERVATIONS:

Clean ☐ Debris ☐ Gypsum ☐
Other _____
Very Light ☐ Very Light ☐
Light ☐ Light ☐
Moderate ☐ Moderate ☐
Heavy ☐ Heavy ☐
Very Heavy ☐ Very Heavy ☐

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13-Feb-1993 14:44:27

26662, IMP-2, A, 08, KC Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 29 secs

Energy	Counts	X-Ray Lines
1.24	145.	Mg K , Mg K , As L , As L
1.73	300.	Si K , Si K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 8 = 52

13-Feb-1993 14:53:49

26662, IMP-2, A, 08, KC Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 32 secs

Energy	Counts	X-Ray Lines
1.23	108.	Mg K , Mg K
1.73	215.	Si K , Si K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 8 = 27

13-Feb-1993 15:02:44

26662, IMP-2, A, ϕθ, KC
Vert= 200 counts Disp= 1
Preset= 100 secs
Elapsed= 45 secs

Energy	Counts	X-Ray Lines
1.26	138.	Mg K , Mg K , Mg K , As L , As L
1.73	290.	Si K , Si K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 8 = 46

13-Feb-1993 15:04:46

26662, IMP-2, A, 12, KC
Vert= 200 counts Disp= 1
Preset= 100 secs
Elapsed= 35 secs

Energy	Counts	X-Ray Lines
1.24	299.	Mg K , Mg K , As L , As L
1.74	531.	Si K , Si K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 8 = 91

TEM ASBESTOS ANALYSIS

Client Petro-chem
Sample No. IMP-2

EMS Lab No. 26662
Page ______ of ______

RECEIVING

ANALYSIS

MICROSCOPE
Serial No. 542-05-06 H600A ☐
Serial No. 542-05-13 H600B ☐

Grid Address 1-B
Screen Magnification 19,100 X
Camera Constant 32.1
Accelerating Voltage 100 KV
Beam Current 10 μm
K-Factor ______

Analyst [illegible] Date 5-14-93

Grid Opening	Structure Number	Structure	Dimensions (mm) Width	Length	Fiber Classification NAM	TM	CM	CD	CQ	CMQ	CDQ	UF	AD	AX	ADX	AQ	ADQ	AZQ	AZZ	EDS Analysis Na	Mg	Si	Ca	Fe	Comments
1	01	F	2	110	✓																				
	02	F	1	15	✓																				
	03	F	1	32	✓																				
	04	F	1	18	✓																				
	05	F	1	20																					
	06	F	1	18			✓																		
	07	F	1	10			✓																		
	08	F	1	15			✓																		
	09	F	1	22			✓																		
	10	F	1	12	✓																				
2	11	F	1	42			✓																		
	12	F	1	22	✓																				
	13	F	1	20	✓																				
3	14	F	1	22	✓																				
	15	F	1	25	✓																				

OBSERVATIONS: Clean ☐ Other ______
Debris ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐
Gypsum ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐

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TEM ASBESTOS ANALYSIS

Client Petro-Chem
Sample No. 1

EMS Lab No. 76662
Page _____ of _____

Analyst _____ Date _____

Grid Opening	Structure Number	Structure	Dimensions (mm) Width	Dimensions (mm) Length	NAM	TM	CM	CD	CQ	CMQ	CDQ	UF	AD	AX	ADX	AQ	ADQ	AZQ	AZZ	EDS Analysis Na	Mg	Si	Ca	Fe	Comments
(1)	16	P	3	15	1																				
	17	P	1	13	1																				
	18	P	1	22	1																				
(5)	19	P	1	25	1																				
(6)	20	P	1	15	1																				
	21	P	1	90	1																				
	22	P	1	12			1	1																	
	23	P	1	15			1	1																	
	24	P	1	18	1																				
	25	P	1	21			1	1																	
	26	P	1.5	31			1	1																	
(2)	27	P	1	20	1																				
	28	P	1	42			1	1																	

OBSERVATIONS:

Clean ☐ Debris ☐ Gypsum ☐

Other _____

Very Light ☐ Very Light ☐

Light ☐ Light ☐

Moderate ☐ Moderate ☐

Heavy ☐ Heavy ☐

Very Heavy ☐ Very Heavy ☐

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TEM ASBESTOS ANALYSIS

Client Petro-chem
Sample No. Emp-2

EMS Lab No. 26662
Page 1 of 2

RECEIVING

ANALYSIS

MICROSCOPE
Serial No. 542-05-06 H600A ☐
Serial No. 542-05-13 H600B ☒

Grid Address LC
Screen Magnification 19.8 X
Camera Constant 30.5
Accelerating Voltage 100 KV
Beam Current 10 μA
K-Factor 1.6

Analyst Radha Date 2/13/93

Grid Opening	Structure Number	Structure	Dimensions (mm) Width	Dimensions (mm) Length	Fiber Classification NAM	TM	CM	CD	CQ	CMQ	CDQ	UF	AD	AX	ADX	AQ	ADQ	AZQ	AZZ	EDS Analysis Na	Mg	Si	Ca	Fe	Comments
(1)	1	R	1	3.5	✓																				
	2	F	1	12	✓																				
	3	B	2	22	✓																				
	4	MD	1	18			✓																		
	5	F	1	38				✓																	
	6	F	1	15	✓																				
	7	MD	1.5	16				✓																	
	8	MD	1	16				✓																	
	9	F	1	45				✓																	
(2)	10	R	1	2			✓																		
	11	E	1	16			✓																		
	12	F	1.5	12	✓																				
	13	F	1	11				✓																	
	14	F	1	15			✓																		
(3)	15	B/M12	2	25	✓																				

OBSERVATIONS:

Clean ☐ Other _____
Debris ☐ Very Light ☐ Light ☐ Moderate ☒ Heavy ☐ Very Heavy ☐
Gypsum ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐

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TEM ASBESTOS ANALYSIS

Client Petro-Chem.
Sample No. EMP-2

EMS Lab No. 26662
Page 2 of 2

RECEIVING

ANALYSIS

MICROSCOPE
Serial No. 542-05-06 H600A ☐
Serial No. 542-05-13 H600B ☒

Grid Address 1-C
Screen Magnification 1940 X
Camera Constant 30.5
Accelerating Voltage 100 KV
Beam Current 10 μm
K-Factor 1.6
Analyst Radha Date 2/16/93

Grid Opening	Structure Number	Structure	Dimensions (mm) Width	Dimensions (mm) Length	Fiber Classification NAM	TM	CM	CD	CQ	CMQ	CDQ	UF	AD	AX	ADX	AQ	ADQ	AZQ	AZZ	EDS Analysis Na	Mg	Si	Ca	Fe	Comments
3	16	F	1	20	✓																				
	17	F	1	11	✓																				
	18	F	1	22				✓																	
4	19	F	1	11				✓																	
	20	F	1	30				✓																	
	21	F	1	45				✓																	
	22	F	1	16			✓																		
5	23	F	1	10				✓																	
6	24	F	1	16	✓																				
	25	MD	1	22		✓																			
	26	F	1	22	✓																				
7	27	MD	1	11				✓																	
	28	MD	1	16			✓																		

OBSERVATIONS:

Clean ☐ Other _____
Debris ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐
Gypsum ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐

EMS LABORATORIES 117 West Bellevue Drive ☐ Pasadena, California 91105-2503 ☐ (818) 568-4065

Analysis of Water by Transmission Electron Microscopy
(EPA-600/4-83-043)

EMS No. 26662

Client Petro-Chem Environmental

Sample No. IMP-2

Date Analyzed 2/15/93

Fibers > 10 µm in length (chrysotile)	0.08	MFL
Mass (chrysotile)	0.01	ug/L
More/Less than 5 Fibers >10 um in Sample (chrysotile)	LESS	
Poisson 95% Confidence Interval	0.008 to 0.4	MFL
Detection Limit	0.08	MFL

* BDL : Below Detection Limit; MFL: Million Fibers per Liter

Particle Size Distribution (Chrysotile)

Particle Length - Microns

O -0.49	0.50 - 0.99	1.00 - 1.49	1.50 - 1.99	2.00 - 2.49	2.5 - 4.99	5.00 - 9.99	10 & UP
0	0	0	0	0	0	0	1

Particle Width - Microns

O - .04	.05 - .09	.1 - .14	.15 - .19	.2 - .24	.25 - .49	.50 - .99	1 & UP
0	1	0	0	0	0	0	0

Aspect Ratio L/W

0 - 9.9	10 - 19.9	20 - 29.9	30 - 39.9	40 - 49.9	50 - 99	100 - 199	200 & UP
0	0	0	0	0	0	1	0

TEM ASBESTOS ANALYSIS

Client Petro-Chem
Sample No. Imp-2

EMS Lab No. 26662
Page 1 of

RECEIVING

TYPE OF SAMPLE: Air ☐ Water ☑ Soil ☐ Bulk ☐ Other ____

METHOD OF ANALYSIS: EPA 600/4-83-043 ☑ ISO ☐

LEVEL OF ANALYSIS: Chrysotile QD-CDQ; Amphibole AD-ADQ

ASPECT RATIO: 3:1 ☑ 5:1 ☐

Approved By BKolb Date 2-12

LENGTHS: All Sizes (EPA) ☐; (μm) ≥0.5 ☐; ≥1.0 ☐; ≥5.0 ☐; ≥10.0 ☒; PCM Range* ☐ (*≥0.25 μm width, ≥5.0 μm length)

FILTER TYPE / AREA (mm±): MCE ☑ 385 ☐; PC ☐ 314 ☐; MCN ☐ 1017 ☑; Other ____

PORE SIZE: 0.45 μm ☐ 0.8 μm ☐; 0.1 μm ☑ 0.22 μm ☐; Other ____

G.O. Area (mm²) 0.0 067
No. of G.O. to Analyze
Filter Lot No. H2EM96077

PREP

DIRECT PREP ☑
INDIRECT PREP ☐

≥10μm analysis

Volume ____ liters
Working Volume 100 ml
Weight ____ grams
Ashed Area ____ %

Prepared By FG
Date

ANALYSIS

MICROSCOPE: Serial No. 542-05-06 H600A ☐; Serial No. 542-05-13 H600B ☑

Grid Address 1A
Screen Magnification 19,100 X
Camera Constant 28.4
Accelerating Voltage 100 KV
Beam Current 10 μA
K-Factor mg 1.75

Analyst Kyong Date 2/13/93

Grid Opening	Structure Number	Structure	Dimensions (mm) Width	Dimensions (mm) Length	Fiber Classification NAM	TM	CM	CD	CQ	CMQ	CDQ	UF	AD	AX	ADX	AQ	ADQ	AZQ	AZZ	EDS Analysis Na	Mg	Si	Ca	Fe	Comments
1	NSD																								
2	NSD																								
3	NSD																								
4	NSD																								
5	1	F	1.5	208							✓										6	10			EDS#1
6	NSD																								
7	NSD																								
8	NSD																								
9	NSD																								
10	NSD																								

OBSERVATIONS:

Clean ☐ Other ____
Debris ☒ Very Light ☐ Light ☐ Moderate ☒ Heavy ☒ Very Heavy ☐
Gypsum ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐

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13-Feb-1993 16:27:09

26662,IMP-2,A,)=10UM,01,KC
Vert= 100 counts Disp= 1

Preset= 100 secs
Elapsed= 30 secs

Energy	Counts	X-Ray Lines
1.24	167.	Mg K , Mg K , As L , As L
1.73	261.	Si K , Si K

Quantex)
0.160 Range= 10.230 keV

Integral 8 = 10.230
55

TEM ASBESTOS ANALYSIS

Client Petro - chem
Sample No. IMP-2

EMS Lab No. 26662
Page _____ of _____

≥10μm

B

Analyst [illegible] Date 2-14-97

Grid Opening	Structure Number	Structure	Dimensions (mm) Width	Dimensions (mm) Length	Fiber Classification NAM	TM	CM	CD	CQ	CMQ	CDQ	UF	AD	AX	ADX	AQ	ADQ	AZQ	AZZ	EDS Analysis Na	Mg	Si	Ca	Fe	Comments
1	NSB																								
2	NSD																								
3	NSD																								
4	NSD																								
5	NSD																								
6	NSD																								
7	NSD																								
8	NSD																								
9	NSD																								
10	NSD																								

OBSERVATIONS:

Clean ☐ Other _____
Debris ☐ Very Light ☐ Light ☐ Moderate ☒ Heavy ☒ Very Heavy ☐
Gypsum ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐

EMS LABORATORIES 117 West Bellevue Drive ☐ Pasadena, California 91105-2503 ☐ (818) 568-4065

Analysis of Water by Transmission Electron Microscopy
(EPA-600/4-83-043)

EMS No.	26662	**Client**	Petro-Chem Environmental
Sample No.	P / N-1	**Reference**	49138
Date	2/15/93		

Total Asbestos Fibers	47	MFL
Chrysotile Fibers	46	MFL
Amphibole Fibers	0.5	MFL
> 5 Micron length (chrysotile)	1	MFL
> 5 Micron length (amphibole)	*BDL	MFL
Mass (Chrysotile)	0.6	µg/L
Mass (amphibole)	1.4	µg/L
More/Less than 5 Chrysotile Fibers in Sample	MORE	
More/Less than 5 Amphibole Fibers in Sample	LESS	
Poisson 95% Confidence Interval	37 to 57	MFL
Detection Limit	0.5	MFL

* BDL : Below Detection Limit; MFL: Million Fibers per Liter

Size Distribution (Chrysotile and Amphibole)

Particle Length - Microns

O -0.49	0.50 - 0.99	1.00 - 1.49	1.50 - 1.99	2.00 - 2.49	2.5 & UP
0	46	25	7	3	11

Particle Width - Microns

O - .04	.05 - .09	.1 - .14	.15 - .19	.2 - .24	.25 & UP
0	85	4	2	0	1

Aspect Ratio L/W

0 - 9.9	10 - 19.9	20 - 29.9	30 - 39.9	40 - 49.9	50 & UP
4	49	23	7	2	7

Petro Chem Environmental Services, Inc.

EMS LABORATORIES 117 West Bellevue Drive / Pasadena CA 91105-2503 / 818-568-4065

TEM ASBESTOS ANALYSIS

Client Petro-Chem
Sample No. P/N-1

EMS Lab No. 26662
Page 1 of 3

RECEIVING

TYPE OF SAMPLE: Air ☐ Water ☒ Soil ☐ Bulk ☐ Other ____

METHOD OF ANALYSIS: EPA 600/4-83-043 ☒ ISO ☐

LEVEL OF ANALYSIS: Chrysotile CD-CDQ; Amphibole AD-ADQ

ASPECT RATIO: 3:1 ☒ 5:1 ☐

LENGTHS: All Sizes (EPA) ☐; (μm) ≥0.5 ☒; ≥1.0 ☐; ≥5.0 ☐; ≥10.0 ☐; PCM Range* ☐ (*≥0.25 μm width, ≥5.0 μm length)

FILTER TYPE / AREA (mm±): MCE ☒ 385 ☐; PC ☐ 314 ☐; MCN ☐ 1017 ☒; Other ____

PORE SIZE: 0.45 μm ☐ 0.8 μm ☐; 0.1 μm ☒ 0.22 μm ☐; Other ____

G.O. Area (mm²) 0.0 067
No. of G.O. to Analyze 20
Filter Lot No. H2EM9607I

Approved By BKoll Date 2.11.93

PREP

DIRECT PREP ☒
INDIRECT PREP ☐

Filtration date 2-10-93

Volume ____ liters
Working Volume 50 ml
Weight ____ grams
Ashed Area ____ %

Prepared By FG
Date 2-11-93

ANALYSIS

MICROSCOPE: Serial No. 542-05-06 H600A ☐; Serial No. 542-05-13 H600B ☒

Grid Address 1A
Screen Magnification 19,100 X
Camera Constant 28.4
Accelerating Voltage 100 KV
Beam Current 10 μm
K-Factor mg : 1.75

Analyst Kyeong Date 2/12/93

Grid Opening	Structure Number	Structure	Dimensions (mm) Width	Length	Fiber Classification NAM	TM	CM	CD	CQ	CMQ	CDQ	UF	AD	AX	ADX	AQ	ADQ	AZQ	AZZ	EDS Analysis Na	Mg	Si	Ca	Fe	Comments
1	1	F	1	100X							✓										4	10			EDS#1
	2	F	1	12							✓										6	10			EDS#2
	3	F	1	25				✓																	
	4	F/MD	1	60				✓																	
	5	F	1	35				✓																	
	6	F/MD	2.5	32	✓																				
	7	B/MD	3	40							✓										6	10			EDS#7
	8	F	1	15				✓																	
	9	F	1	24				✓																	
	10	B	2	40X				✓																	
	11	F	1.5	11							✓										5	10			EDS#11
	12	F/MD	1	26				✓																	
	13	F/MD	2	70				✓																	
	14	F	1	10				✓																	
	15	F	1	41				✓																	

OBSERVATIONS:

Clean ☐ Other ____
Debris ☒ Very Light ☐ Light ☐ Moderate ☐ Heavy ☒ Very Heavy ☐
Gypsum ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐

Petro Chem Environmental Services, Inc.

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TEM ASBESTOS ANALYSIS

Client Petro-Chem
Sample No. P/N-1

EMS Lab No. 26662
Page 2 of 3

Date Analyst 2/13/93 Analyst Kyeong

Grid Opening	Structure Number	Structure	Dimensions (mm) Width	Dimensions (mm) Length	Fiber Classification NAM	TM	CM	CD	CQ	CMQ	CDQ	UF	AD	AX	ADX	AQ	ADQ	AZQ	AZZ	EDS Analysis Na	Mg	Si	Ca	Fe	Comments
1	16	F	1	17				✓																	
	17	F	1.5	50				✓																	
2	18	F/MD	2	80				✓																	
	19	F	1	51				✓																	
	20	F/MD	1	17				✓																	
	21	F	1	19				✓																	
	22	F	1.5	20				✓																	
	23	F	1	21				✓																	
	24	B	3	34							✓										6	10			EDS #24
	25	F	1	17				✓																	
	26	F	4	35	✓																				Si, Al
	27	F	1	13				✓																	
	28	F	1	10				✓																	
	29	F	2.5	24				✓																	
	30	F	1	20				✓																	
	31	F	1.5	25				✓																	
	32	F	1.5	16				✓																	
	33	F	1	19				✓																	
	34	F	1	12				✓																	
	35	F	1	10				✓																	

OBSERVATIONS:

Clean ☐ Other _____
Debris ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐
Gypsum ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐

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TEM ASBESTOS ANALYSIS

Client Petro-Chem
Sample No. P/N-1

EMS Lab No. 26662
Page 3 of 3

Analyst Kyeong Date 2/13/93

Grid Opening	Structure Number	Structure	Dimensions (mm) Width	Dimensions (mm) Length	Fiber Classification NAM	TM	CM	CD	CQ	CMQ	CDQ	UF	AD	AX	ADX	AQ	ADQ	AZQ	AZZ	EDS Analysis Na	Mg	Si	Ca	Fe	Comments
2	36	F	1.5	10				✓																	

OBSERVATIONS:

Clean ☐ Other _____

Debris ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐

Gypsum ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐

EMS LABORATORIES 117 West Bellevue Drive ☐ Pasadena, California 91105-2503 ☐ (818) 568-4065

13-Feb-1993 16:54:01

26662,P/N-1,A,01,KC
Vert= 200 counts Disp= 1

Preset= 100 secs
Elapsed= 47 secs

Energy	Counts	X-Ray Lines
1.25	221.	Mg K , Mg K , Mg K , As L , As L
1.74	524.	Si K , Si K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 8 = 76

13-Feb-1993 16:59:56

26662,P/N-1,A,02,KC
Vert= 200 counts Disp= 1

Preset= 100 secs
Elapsed= 26 secs

Energy	Counts	X-Ray Lines
1.24	167.	Mg K , Mg K , As L , As L
1.74	254.	Si K , Si K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 8 = 34

13-Feb-1993 17:01:26

26662,P/N-1,A,07,KC Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 27 secs

Energy	Counts	X-Ray Lines
1.25	338.	Mg K , Mg K , Mg K , As L , As L
1.74	581.	Si K , Si K
6.40	64.	Fe K , Fe K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 8 = 125

13-Feb-1993 17:06:57

26662,P/N-1,A,11,KC Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 42 secs

Energy	Counts	X-Ray Lines
1.26	359.	Mg K , Mg K , Mg K , As L , As L
1.73	745.	Si K , Si K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 8 = 106

13-Feb-1993 17:21:15

26662,P/N-1,A,24,KC
Vert= 200 counts Disp= 1

Preset= 100 secs
Elapsed= 27 secs

Energy	Counts	X-Ray Lines
1.24	468.	Mg K , Mg K , As L , As L
1.73	757.	Si K , Si K
6.37	83.	Fe K , Fe K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 8 = 154

TEM ASBESTOS ANALYSIS

Client Petro - Chem
Sample No. P/N-1

EMS Lab No. 26662
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Analyst Radha Date 2-15-93

Grid Opening	Structure Number	Structure	Dimensions (mm) Width	Dimensions (mm) Length	Fiber Classification NAM	TM	CM	CD	CQ	CMQ	CDQ	UF	AD	AX	ADX	AQ	ADQ	AZQ	AZZ	EDS Analysis Na	Mg	Si	Ca	Fe	Comments
1	1	MD	1	12	✓			✓																	
	2	E	1	18				✓																	
	3	F	1	9	✓																				
	4	F	1	~~12~~				✓																	#432
	5	MD	1	14	✓																				
	6	F	1	22				✓																	
	7	MD	1	14	✓																				
	8	MD	1.5	28				✓																	
	9	MD	1	25				✓																	
	10	E	1	16	✓																				
	11	MD	4	2.5	✓																				
	12	MD	1	12				✓																	
	13	MD	1	14				✓																	
	14	MD	1	22				✓																	
	15	E	1	11	✓																				
	16	F	1	10				✓																	
	17	MD	1	18				✓																	
	18	MD	1	14			✓																		
	19	MD	1	16				✓																	
2	20	MD	1	14				✓																	#433

OBSERVATIONS: Clean ☐ Debris ☐ Gypsum ☐ Other _____ Very Light ☐ Very Light ☐ Light ☐ Light ☐ Moderate ☒ Moderate ☐ Heavy ☒ Heavy ☐ Very Heavy ☐ Very Heavy ☐

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TEM ASBESTOS ANALYSIS

Client Petro-Chem. EMS Lab No. 26662
Sample No. DIN-1 Page _____ of _____

Analyst Radley Date 5-15-93

Grid Opening	Structure Number	Structure	Dimensions (mm) Width	Length	NAM	TM	CM	CD	CQ	CMQ	CDQ	UF	AD	AX	ADX	AQ	ADQ	AZQ	AZZ	EDS Analysis Na	Mg	Si	Ca	Fe	Comments
2	21	E	1	10			✓																		
	22	MD	1	16				✓																	
	23	E	5	52	✓																				
	24	F	1	11				✓																	
	25	F	1	14				✓																	
	26	F	1	10				✓																	
	27	MD	1	10				✓																	
	28	F	1	11				✓																	
	29	MD	1	15				✓																	
	30	E	1	20				✓																	
	31	E	12	58													✓				1	P		8	# 4326 (amosite)
	32	MD	15	12								✓													
	33	E	1	14				✓																	
	34	E	1	78				✓																	
	35	E	1	22	✓																				
	36	E	1	11				✓																	
	37	E	1	12				✓																	

OBSERVATIONS:

Clean ☐ Other _____ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐
Debris ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐
Gypsum ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐

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15-Feb-1993 10:04:51

26662-P/N-1,B,#31,RS Preset= 100 secs
Vert= 500 counts Disp= 1 Elapsed= 24 secs

1.25	496.	Mg K	,	Mg K	,	Mg K	,	As L	, As L
1.73	4533.	Si K	,	Si K					
6.40	3633.	Fe K	,	Fe K					
7.04	500.	Fe K	,	Fe K					

Quantex>
Quantex>
Quantex>
0.320 Range= 10.230 keV 10.230
Integral 0 = 28020

TEM ASBESTOS ANALYSIS

Client Petro Chem
Sample No. P/N-1

EMS Lab No. 26662
Page 1 of

MICROSCOPE
Serial No. 542-05-06 H600A ☐
Serial No. 542-05-13 H600B ☑

50 ml.

RECEIVING

ANALYSIS

Grid Address 1C
Screen Magnification 19100 X
Camera Constant 28.4
Accelerating Voltage 100 KV
Beam Current 10 μm
K-Factor 0.75
Analyst S. Ahmed Date 2/15/93

Grid Opening	Structure Number	Structure	Dimensions (mm) Width	Length	Fiber Classification NAM	TM	CM	CD	CQ	CMQ	CDQ	UF	AD	AX	ADX	AQ	ADQ	AZQ	AZZ	EDS Analysis Na	Mg	Si	Ca	Fe	Comments
1	1	MD	1.5	30							✓	✓									6	10			EDS #1
	2	MD	1.5	220					✓		✓	✓									5	10			EDS #2
	3	F	1	20				✓	✓		✓										5	10			EDS #3
	4	F	1	18				✓	✓																
	5	F	1	11				✓	✓																
	6	MD	1	20				✓	✓																
	7	F	1	11				✓	✓																
	8	F	1	25				✓	✓																
	9	MD	1	20	✓				✓																
	10	F	1	10				✓	✓																
	11	F	1	12				✓	✓																
	12	MD	1	25				✓	✓																
	13	F	2	40	✓				✓																
	14	F	1	62				✓																	
2	15	F	1	15				✓																	

OBSERVATIONS:

Clean ☐	Other			
Debris ☑	Very Light ☐	Light ☐	Moderate ☐	Heavy ☐	Very Heavy ☐
Gypsum ☐	Very Light ☐	Light ☐	Moderate ☐	Heavy ☐	Very Heavy ☐

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TEM ASBESTOS ANALYSIS

Client Petro Chem EMS Lab No. 26662
Sample No. P/N-1 Page 2 of

Analyst S. Ahmad Date 2/15

Grid Opening	Structure Number	Structure	Dimensions (mm) Width	Dimensions (mm) Length	Fiber Classification NAM	TM	CM	CD	CQ	CMQ	CDQ	UF	AD	AX	ADX	AQ	ADQ	AZQ	AZZ	EDS Analysis Na	Mg	Si	Ca	Fe	Comments
2	16	F	1	26				✓																	
	17	F	1	28				✓																	
	18	F	1	22				✓																	
	19	MD	1	50				✓																	
	20	F	1	23				✓																	
	21	F	1	25				✓																	
	22	F	1	33				✓																	
	23	F	1	30				✓																	
	24	F	1	10				✓																	
	25	MD	1	25				✓																	
	26	F	1	18				✓																	
	27	F	1	28				✓																	
	28	MD	1	30				✓																	
	29	F	1	30				✓																	
	30	MD	1	15	✓																				
	31	F	1	15				✓																	
	32	MD	2	25				✓																	
	33	F	1	11				✓																	
	34	F	1	12				✓																	

OBSERVATIONS:

Clean ☐ Debris ☐ Gypsum ☐
Other _____
Very Light ☐ Very Light ☐
Light ☐ Light ☐
Moderate ☐ Moderate ☐
Heavy ☐ Heavy ☐
Very Heavy ☐ Very Heavy ☐

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15-Feb-1993 09:31:04

26662-P/N-1,C,#02,SA
Vert= 200 counts Disp= 1
Preset= 100 secs
Elapsed= 18 secs

Energy	Counts	X-Ray Lines
1.25	309.	Mg K , Mg K , Mg K , As L , As L
1.74	675.	Si K , Si K
6.40	57.	Fe K , Fe K

Quantex)
0.320 Range= 10.230 keV
Integral 0 = 10.230 6689

15-Feb-1993 09:50:06

26662-P/N-1,C,#03,SA
Vert= 200 counts Disp= 1
Preset= 100 secs
Elapsed= 32 secs

Energy	Counts	X-Ray Lines
1.22	85.	Mg K , Mg K , Ge L , Ge L , Ge L , Ge L
1.75	162.	Si K , Si K

Quantex)
0.320 Range= 10.230 keV
Integral 0 = 10.230 5402

15-Feb-1993 09:29:43

26662-P/N-1,C,#04,SA
Vert= 200 counts Disp= 1

Preset= 100 secs
Elapsed= 11 secs

Energy	Counts	X-Ray Lines
1.25	154.	Mg K , Mg K , Mg K , As L , As L
1.73	274.	Si K , Si K
2.05	14.	P K , P K
3.72	20.	Ca K , Ca K
4.13	15.	Sc K
5.87	17.	Mn K , Mn K

Quantex>
0.320 Range= 10.230 keV

Integral 0 = 10.230
4137

Analysis of Water by Transmission Electron Microscopy
(EPA-600/4-83-043)

EMS No.	26662	**Client**	Petro-Chem Environmental
Sample No.	P / N-2	**Reference**	49138
Date	2/15/93		

Total Asbestos Fibers	110	MFL
Chrysotile Fibers	110	MFL
Amphibole Fibers	*BDL	MFL
> 5 Micron length (chrysotile)	5.1	MFL
> 5 Micron length (amphibole)	*BDL	MFL
Mass (Chrysotile)	1.5	µg/L
Mass (amphibole)	*BDL	µg/L
More/Less than 5 Chrysotile Fibers in Sample	MORE	
More/Less than 5 Amphibole Fibers in Sample	LESS	
Poisson 95% Confidence Interval	85 to 130	MFL
Detection Limit	1.3	MFL

* BDL : Below Detection Limit; MFL: Million Fibers per Liter

Size Distribution (Chrysotile and Amphibole)

Particle Length - Microns

O -0.49	0.50 - 0.99	1.00 - 1.49	1.50 - 1.99	2.00 - 2.49	2.5 & UP
0	38	21	8	3	14

Particle Width - Microns

O - .04	.05 - .09	.1 - .14	.15 - .19	.2 - .24	.25 & UP
0	82	1	1	0	0

Aspect Ratio L/W

0 - 9.9	10 - 19.9	20 - 29.9	30 - 39.9	40 - 49.9	50 & UP
0	39	21	9	5	10

TEM ASBESTOS ANALYSIS

Client: Petro - Chem
Sample No.: P/N-2

EMS Lab No.: 26662
Page: 1 of

RECEIVING

TYPE OF SAMPLE: Air ☐ Water ☑ Soil ☐ Bulk ☐ Other ____

METHOD OF ANALYSIS: EPA 600/4-83-043 ☑ ISO ☐

LEVEL OF ANALYSIS: Chrysotile LD. CDQ; Amphibole AD. ADQ

ASPECT RATIO: 3:1 ☑ 5:1 ☐

LENGTHS: All Sizes (EPA) ☐; (μm) ≥0.5 ☑; ≥1.0 ☐; ≥5.0 ☐; ≥10.0 ☐; PCM Range* ☐ (*≥0.25 μm width, ≥5.0 μm length)

FILTER TYPE / AREA (mm±): MCE ☑ 385 ☐; PC ☐ 314 ☐; MCN ☐ 1017 ☑; Other ____

PORE SIZE: 0.45 μm ☐ 0.8 μm ☐; 0.1 μm ☑ 0.22 μm ☐; Other ____

G.O. Area (mm²) 0.0 067

No. of G.O. to Analyze 20

Filter Lot No. #2EM96071

Approved By ____ Date ____

PREP

DIRECT PREP ☑
INDIRECT PREP ☐

Filtation date 2-10-93

Volume ____ liters
Working Volume 10 ml
Weight ____ grams
Ashed Area ____ %

Prepared By FG
Date 2-11-93

ANALYSIS

MICROSCOPE: Serial No. 542-05-06 H600A ☐; Serial No. 542-05-13 H600B ☑

Grid Address 1A
Screen Magnification 1900 X
Camera Constant 28.4
Accelerating Voltage 100 KV
Beam Current 10 μm
K-Factor 1.75

Analyst S. Ahmed Date 2/15/93

Grid Opening	Structure Number	Structure	Dimensions (mm) Width	Dimensions (mm) Length	Fiber Classification: NAM	TM	CM	CD	CQ	CMQ	CDQ	UF	AD	AX	ADX	AQ	ADQ	AZQ	AZZ	EDS Analysis: Na	Mg	Si	Ca	Fe	Comments
1	1	MD	1	40							✓	✓									6	10			EDS #1
	2	F	1	51							✓										6	10			EDS #2
	3	F	1	16							✓	✓									5	10			EDS #3
	4	MD	1	60							✓										5	10			EDS #4
	5	MD	1.5	50				✓																	
	6	F	1	36				✓																	
	7	F	1	18				✓																	
	8	F	1	10				✓																	
	9	F	1	26				✓																	
	10	F	1	60			✓	✓																	
	11	MD	1	24	✓																				
	12	F	1	18				✓																	
	13	F	1	15	✓																				
	14	MD	1	200				✓													5	10			EDS #14
	15	F	1	12				✓																	

OBSERVATIONS:

Clean ☐ Debris ☑ Gypsum ☐ Other ____

Very Light ☐ Very Light ☐ Light ☐ Light ☐ Moderate ☑ Moderate ☐ Heavy ☑ Heavy ☐ Very Heavy ☐ Very Heavy ☐

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TEM ASBESTOS ANALYSIS

Client Petro - Chem
Sample No. P/N-2

EMS Lab No. 26662
Page 2 of ____

Analyst S Ahmed Date 2/15/93

Grid Opening	Structure Number	Structure	Dimensions (mm) Width	Dimensions (mm) Length	Fiber Classification NAM	TM	CM	CD	CQ	CMQ	CDQ	UF	AD	AX	ADX	AQ	ADQ	AZQ	AZZ	EDS Analysis Na	Mg	Si	Ca	Fe	Comments
2	16	F	1	27				✓																	
	17	MD	2	60				✓																	
	18	F	1	18				✓																	
	19	F	1	12	✓																				
	20	MD	1	18				✓																	
	21	F	1	20				✓																	
	22	MD	1	25				✓																	
	23	F	1	41				✓																	
	24	F	1	24				✓			✓		✓								7	10			EDS #24
	26	F	1	32				✓																	
3	27	B	3	130				✓																	
	28	F	1	25				✓																	
	29	F	1	25	✓																				
	30	F	1	18				✓																	
	31	F	1	27				✓																	
	32	F	1	22				✓																	
	33	F	1	110				✓				✓													
	34	F	1	27				✓			✓										5	10			EDS #34
	35	F	1	15				✓																	
	36	F	1	12				✓																	

OBSERVATIONS:

Clean ☐ Other ____
Debris ☑ Very Light ☐ Light ☐ Moderate ☑ Heavy ☐ Very Heavy ☐
Gypsum ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐

Petro Chem Environmental Services, Inc.

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TEM ASBESTOS ANALYSIS

Client PetroChem EMS Lab No. 26652
Sample No. P/N-2 Page 3 of ____

Analyst S Ahmad Date 2/15/93

Grid Opening	Structure Number	Structure	Dimensions (mm) Width	Dimensions (mm) Length	Fiber Classification NAM	TM	CM	CD	CQ	CMQ	CDQ	UF	AD	AX	ADX	AQ	ADQ	AZQ	AZZ	EDS Analysis Na	Mg	Si	Ca	Fe	Comments
3	37	F	1	96x				✓																	

OBSERVATIONS:

Clean ☐ Debris ☑ Gypsum ☐ Other ____

Very Light ☐ Very Light ☐ Light ☐ Light ☐ Moderate ☑ Moderate ☐ Heavy ☐ Heavy ☐ Very Heavy ☐ Very Heavy ☐

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15-Feb-1993 10:32:10

26662-P/N-2,A,#01,SA
Vert= 500 counts Disp= 1

Preset= 100 secs
Elapsed= 28 secs

Energy	Counts	X-Ray Lines
1.24	297.	Mg K' , Mg K , As L , As L
1.75	495.	Si K , Si K

Quantex)
0.320 Range= 10.230 keV

10.230
Integral 0 = 5878

15-Feb-1993 10:32:50

26662-P/N-2,A,#02,SA
Vert= 500 counts Disp= 1
Preset= 100 secs
Elapsed= 40 secs

Energy	Counts	X-Ray Lines
1.24	505.	Mg K , Mg K , As L , As L
1.74	846.	Si K , Si K

Quantex>
0.320 Range= 10.230 keV
Integral 0 = 10.230
8258

15-Feb-1993 10:33:22

26662-P/N-2,A,#03,SA
Vert= 500 counts Disp= 1
Preset= 100 secs
Elapsed= 20 secs

Energy	Counts	X-Ray Lines
1.25	132.	Mg K , Mg K , Mg K , As L , As L
1.74	253.	Si K , Si K

Quantex>
0.320 Range= 10.230 keV
Integral 0 = 10.230
4206

15-Feb-1993 10:34:04

LN Testng

Preset= 100 secs
Elapsed= 37 secs

26662-P/N-2,A,#04,SA
Vert= 500 counts Disp= 1

Energy	Counts	X-Ray Lines
1.26	345.	Mg K , Mg K , Mg K , As L , As L
1.74	640.	Si K , Si K

Quantex>
0.320 Range= 10.230 keV 10.230
Integral 0 = 7690

15-Feb-1993 10:54:52

26662-P/N-2,A,#14,SA
Vert= 200 counts Disp= 1

Preset= 100 secs
Elapsed= 24 secs

1.23	299.	Mg K	, Mg K
1.74	628.	Si K	, Si K
6.43	68.	Fe K	, Fe K

Quantex)
Quantex)
0.320 Range= 10.230 keV 10.230
Integral O = 5365

TEM ASBESTOS ANALYSIS

Client Petro Chem.
Sample No. P/N-2

EMS Lab No. 26662
Page 1 of 2

MICROSCOPE
Serial No. 542-05-06 H600A ☐
Serial No. 542-05-13 H600B ☐

RECEIVING

ANALYSIS

Grid Address 1-B
Screen Magnification 19400 X
Camera Constant 30.1
Accelerating Voltage 100 KV
Beam Current 16 μm
K-Factor 1.6
Analyst Rodda Date 2/15/93

Grid Opening	Structure Number	Structure	Dimensions (mm) Width	Dimensions (mm) Length	Fiber Classification NAM	TM	CM	CD	CQ	CMQ	CDQ	UF	AD	AX	ADX	AQ	ADQ	AZQ	AZZ	EDS Analysis Na	Mg	Si	Ca	Fe	Comments
1	1	F	15	15				✓																	
	2	F	1	11				✓																	
	3	F	1	12				✓																	
	4	F	1.5	14	✓																				
	5	F	1	12				✓																	
	6	MD	1	18	✓																				
	7	F	1	22				✓																	
	8	F	1	12	✓																				
	9	F	1	20				✓																	
	10	MD	1	10				✓																	
	11	F	1	22				✓																	
	12	MD	1	25				✓																	
2	13	MD	1	20	✓																				
	14	MD	1	10				✓																	
	15	MD	1	67				✓																	

OBSERVATIONS:

Clean ☐ Other _____ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐
Debris ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐
Gypsum ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐

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TEM ASBESTOS ANALYSIS

Client 26662
Sample No. PIN-2

EMS Lab No. ______
Page 2 of 2

Analyst Radha Date 2/15/93

Grid Opening	Structure Number	Structure	Dimensions (mm) Width	Length	Fiber Classification NAM	TM	CM	CD	CQ	CMQ	CDQ	UF	AD	AX	ADX	AQ	ADQ	AZQ	AZZ	EDS Analysis Na	Mg	Si	Ca	Fe	Comments
2	16	F	1	18				✓																	
	17	F	1	15				✓																	
	18	MD	1	15				✓																	
	19	F	1	14				✓																	
	20	F	1	13				✓																	
3	21	MD	1	15				✓																	
	22	F	1.5	22	✓																				
	23	F	1	11	✓																				
	24	F	1	12				✓																	
	25	F	1	12	✓																				
	26	F	1	16	✓			✓																	
4	27	F	1	11	✓																				
	28	MD	1	22				✓																	
	29	MD	1	14				✓																	
	30	F	1	12			✓																		
	31	F	3	24	✓																				
	32	F	1	19				✓																	
	33	F	1	22				✓																	
	34	MD	1	12	✓																				

OBSERVATIONS: Clean ☐ Debris ☐ Gypsum ☐ Other ______ Very Light ☐ Very Light ☐ Light ☐ Light ☐ Moderate ☐ Moderate ☐ Heavy ☐ Heavy ☐ Very Heavy ☐ Very Heavy ☐

EMS LABORATORIES 117 West Bellevue Drive ☐ Pasadena, California 91105-2503 ☐ (818) 568-4065

TEM ASBESTOS ANALYSIS

Client Petro Chem
Sample No. P/N-2

EMS Lab No. 2666 L
Page ____ of ____

MICROSCOPE
Serial No. 542-05-06 H600A ☐
Serial No. 542-05-13 H600B ☑

RECEIVING

10ml.

ANALYSIS

Grid Address 1C
Screen Magnification 19100 X
Camera Constant 28.0
Accelerating Voltage 100 KV
Beam Current 10 μm
K-Factor 98.1.75
Analyst S. Ahmed Date 2/15/93

Grid Opening	Structure Number	Structure	Dimensions (mm) Width	Length	Fiber Classification NAM	TM	CM	CD	CQ	CMQ	CDQ	UF	AD	AX	ADX	AQ	ADQ	AZQ	AZZ	EDS Analysis Na	Mg	Si	Ca	Fe	Comments
1	1	F	1	84							✓										6	10			EDS#1
	2	MD	1	25							✓										6	10			EDS#2
	3	MD	1	35	✓																				
	4	F	1	32							✓										6	10			EDS#3
	5	F	1	10							✓										6	10			EDS#4
	6	F	1	32							✓										5	10			EDS#6
	7	F	1	15							✓														
2	8	F	1	92				✓																	
	9	F	1	30				✓																	
	10	MD	1	25				✓																	
	11	F	1	18				✓																	
3	12	MD	1	20				✓																	
	13	F	1	42				✓																	
	14	F	1	14				✓																	
	15	MD	1	30				✓																	

OBSERVATIONS:
Clean ☐ Other ____
Debris ☑ Very Light ☐ Light ☐ Moderate ☑ Heavy ☑ Very Heavy ☐
Gypsum ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐

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TEM ASBESTOS ANALYSIS

Client Petro Chem EMS Lab No. 26662
Sample No. P/N-2 Page 2 of

Analyst S. Ahmad Date 2/15/93

Grid Opening	Structure Number	Structure	Dimensions (mm) Width	Dimensions (mm) Length	Fiber Classification NAM	TM	CM	CD	CQ	CMQ	CDQ	UF	AD	AX	ADX	AQ	ADQ	AZQ	AZZ	EDS Analysis Na	Mg	Si	Ca	Fe	Comments
3	16	F	1	18				✓			✓										6	10			EDS #16
	17	F	1.5	70				✓																	
	18	F	1	20				✓																	
	19	F	1	19				✓																	
	20	F	1	11				✓																	
	21	F	1	31				✓																	
	22	F	1	15				✓																	
	23	F	1	10				✓																	
4	24	MD	1	15				✓																	
	25	F	1	50		✓		✓																	
	26	F	1	15		✓																			
	27	F	2	22		✓															6	10			EDS #128
5	28	F	1	25				✓																	
	29	MD	1.5	20				✓																	
	30	MD	1	35				✓																	
	31	F	1.5	50		✓																			
	32	F	1	18		✓																			
	33	F	1	10				✓																	

OBSERVATIONS:

Clean ☐ Other
Debris ☒ Very Light ☐ Light ☐ Moderate ☒ Heavy ☒ Very Heavy ☐
Gypsum ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐

EMS LABORATORIES 117 West Bellevue Drive ☐ Pasadena, California 91105-2503 ☐ (818) 568-4065

15-Feb-1993 13:36:48

26662-P/N2,C,#01,SA
Vert= 200 counts Disp= 1
Preset= 100 secs
Elapsed= 28 secs

Energy	Counts	X-Ray Lines
1.25	378.	Mg K , Mg K , Mg K , As L , As L
1.74	601.	Si K , Si K
6.40	80.	Fe K , Fe K

Quantex)
0.320 Range= 10.230 keV
Integral 0 = 10.230
7935

15-Feb-1993 13:37:14

26662-P/N2,C,#02,SA
Vert= 200 counts Disp= 1
Preset= 100 secs
Elapsed= 40 secs

Energy	Counts	X-Ray Lines
1.24	451.	Mg K , Mg K , As L , As L
1.74	709.	Si K , Si K

Quantex)
0.320 Range= 10.230 keV
Integral 0 = 10.230
9608

15-Feb-1993 14:01:05

26662-P/N2,C,#03,SA
Vert= 200 counts Disp= 1

Preset= 100 secs
Elapsed= 18 secs

Energy	Counts	X-Ray Lines
1.29	63.	Mg K , Mg K , Mg K , As L , As L , As L
1.74	111.	Si K , Si K

Quantex)
0.320 Range= 10.230 keV

Integral 0 = 10.230 3101

15-Feb-1993 14:01:37

26662-P/N2,C,#04,SA
Vert= 200 counts Disp= 1

Preset= 100 secs
Elapsed= 36 secs

Energy	Counts	X-Ray Lines
1.26	161.	Mg K , Mg K , Mg K , As L , As L
1.74	279.	Si K , Si K

Quantex)
0.320 Range= 10.230 keV

Integral 0 = 10.230 6357

15-Feb-1993 14:04:50

26662-P/N2,C,#06,SA
Vert= 200 counts Disp= 1

Preset= 100 secs
Elapsed= 22 secs

Energy	Counts	X-Ray Lines
1.23	113.	Mg K , Mg K
1.74	207.	Si K , Si K

Quantex)
0.320 Range= 10.230 keV

10.230
Integral O = 4111

15-Feb-1993 14:40:39

26662-P/N2,C,#16,SA
Vert= 200 counts Disp= 1

Preset= 100 secs
Elapsed= 22 secs

Energy	Counts	X-Ray Lines
1.25	311.	Mg K , Mg K , Mg K , As L , As L
1.74	557.	Si K , Si K

Quantex)
0.320 Range= 10.230 keV

10.230
Integral O = 5556

15-Feb-1993 14:41:15

26662-P/N2,C,#26,SA
Vert= 200 counts Disp= L

Preset= 100 secs
Elapsed= 33 secs

Energy	Counts	X-Ray Lines
1.25	625.	Mg K , Mg K , Mg K , As L , As L
1.74	1072.	Si K , Si K

Quantex)
0.320 Range= 10.230 keV

Integral 0 = 10.230
8364

Analysis of Water by Transmission Electron Microscopy
(EPA-600/4-83-043)

EMS No. 26662

Client Petro-Chem Environmental

Sample No. BLANK

Date Analyzed 2/16/93

Fibers (chrysotile)	0.1	MFL
Fibers > 5 µm in length (chrysotile)	0	MFL
Fibers > 10 µm in length (chrysotile)	0	MFL
Mass (chrysotile)	0.000424	ug/L
More/Less than 5 Fibers in Sample (chrysotile)	LESS	
Poisson 95% Confidence Interval	0.01 to 0.5	MFL
Detection Limit	0.07	MFL

* BDL : Below Detection Limit; MFL: Million Fibers per Liter

Particle Size Distribution (Chrysotile)

Particle Length - Microns

O -0.49	0.50 - 0.99	1.00 - 1.49	1.50 - 1.99	2.00 - 2.49	2.5 - 4.99	5.00 - 9.99	10 & UP
0	2	0	0	0	0	0	0

Particle Width - Microns

O - .04	.05 - .09	.1 - .14	.15 - .19	.2 - .24	.25 - .49	.50 - .99	1 & UP
0	2	0	0	0	0	0	0

Aspect Ratio L/W

0 - 9.9	10 - 19.9	20 - 29.9	30 - 39.9	40 - 49.9	50 - 99	100 - 199	200 & UP
0	2	0	0	0	0	0	0

TEM ASBESTOS ANALYSIS

Client: Petro-Chem
Sample No.: Blank
EMS Lab No.: 26662
Page: _____ of _____

RECEIVING

TYPE OF SAMPLE: Air ☐ Water ☑ Soil ☐ Bulk ☐ Other _____

METHOD OF ANALYSIS: EPA 600/4-83-043 ☑ ISO ☐

LEVEL OF ANALYSIS: Chrysotile CD-CDQ; Amphibole AD-ADQ

ASPECT RATIO: 3:1 ☐ 5:1 ☐

LENGTHS: All Sizes (EPA) ☐; (μm) ≥0.5 ☐; ≥1.0 ☐; ≥5.0 ☐; ≥10.0 ☐; PCM Range* ☐ (*≥0.25 μm width, ≥5.0 μm length)

FILTER TYPE / AREA (mm±): MCE ☑ 385 ☐; PC ☐ 314 ☐; MCN ☐ 1017 ☑; Other _____

PORE SIZE: 0.45 μm ☐ 0.8 μm ☐; 0.1 μm ☑ 0.22 μm ☐; Other _____

G.O. Area (mm²) 0.0 Q 67
No. of G.O. to Analyze 20
Filter Lot No. H2EM96071

Approved By _____ Date _____

PREP

DIRECT PREP ☑
INDIRECT PREP ☐

Filtration date 2-10-93

Volume _____ liters
Working Volume 100 ml
Weight _____ grams
Ashed Area _____ %

Prepared By FG
Date 2-11-93

ANALYSIS

MICROSCOPE: Serial No. 542-05-06 H600A ☐; Serial No. 542-05-13 H600B ☑

Grid Address 1A
Screen Magnification 19100 X
Camera Constant 28.4
Accelerating Voltage 100 KV
Beam Current 10 μm
K-Factor 0.751

Analyst S. Ahmed Date 2/15/93

Grid Opening	Structure Number	Structure	Dimensions (mm) Width	Dimensions (mm) Length	Fiber Classification NAM	TM	CM	CD	CQ	CMQ	CDQ	UF	AD	AX	ADX	AQ	ADQ	AZQ	AZZ	EDS Analysis Na	Mg	Si	Ca	Fe	Comments
1	1	F	2	12	✓																				
2	2	F	1	12	✓																				
	3	F	1	10			✓																		
3	4	F	1	10	✓																				
4	5	F	1	12	✓																				
A	NSD																								
6	6	F	1	20	✓																				
	7	F	1	15	✓																				
	8	F	1	20	✓																				
7	9	F	1	10				✓																	

OBSERVATIONS: Clean ☐ Other _____

Debris ☑ Very Light ☐ Light ☑ Moderate ☐ Heavy ☐ Very Heavy ☐

Gypsum ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐

Petro Chem Environmental Services, Inc.

EMS LABORATORIES 117 West Bellevue Drive ☐ Pasadena, California 91105-2503 ☐ (818) 568-4065

TEM ASBESTOS ANALYSIS

Client Petro-Chem
Sample No. Blank

EMS Lab No. 26662
Page _____ of _____

1-B

Analyst Radha Date 2/14

Grid Opening	Structure Number	Structure	Dimensions (mm) Width	Dimensions (mm) Length	Fiber Classification NAM	TM	CM	CD	CQ	CMQ	CDQ	UF	AD	AX	ADX	AQ	ADQ	AZQ	AZZ	EDS Analysis Na	Mg	Si	Ca	Fe	Comments
1	1	F	1	12	✓		●																		
	2	F	1	16	✓																				
2	3	F	1	11	✓																				
3	4	F	1	10	✓		●																		
4	5	F	1.5	16		●	●																		
	6	B	2	20	✓																				
-	7	F	1	11	✓																				
5	8	F	1	12	✓																				
6	NSD																								
7		F	1	12	✓																				
		F	1	10	✓																				

OBSERVATIONS: Clean ☐ Other _____

Debris ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐

Gypsum ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐

EMS LABORATORIES 117 West Bellevue Drive ☐ Pasadena, California 91105-2503 ☐ (818) 568-4065

15-Feb-1993 15:57:03

26662-BLK.B,#01,RS
Vert= 200 counts Disp= 1

Preset= 100 secs
Elapsed= 27 secs

Energy	Counts	X-Ray Lines
1.75	191.	Si K , Si K

Quantex)
0.320 Range= 10.230 keV

10.230
Integral 0 = 3865

15-Feb-1993 16:11:34

26662-BLK.B,#04,RS
Vert= 200 counts Disp= 1

Preset= 100 secs
Elapsed= 46 secs

Energy	Counts	X-Ray Lines
1.73	184.	Si K , Si K

Quantex)
0.320 Range= 10.230 keV

10.230
Integral 0 = 10466

TEM ASBESTOS ANALYSIS

Client Petro-chem. EMS Lab No. 26662
Sample No. Blank Page _____ of _____

1-C

Analyst Radig Date 2/16/93

Grid Opening	Structure Number	Structure	Dimensions (mm) Width	Dimensions (mm) Length	Fiber Classification NAM	TM	CM	CD	CQ	CMQ	CDQ	UF	AD	AX	ADX	AQ	ADQ	AZQ	AZZ	EDS Analysis Na	Mg	Si	Ca	Fe	Comments
1	NSD																								
2	NSD																								
3	NSD.																								
4	NSD																								
5	1	F	0.5	20	✓																				
6	NSD																								
7	2	F	1	20	✓																				
8																									

OBSERVATIONS: Clean ☐ Other _____

Debris ☒	Very Light ☐	Light ☒	Moderate ☐	Heavy ☐	Very Heavy ☐
Gypsum ☐	Very Light ☐	Light ☐	Moderate ☐	Heavy ☐	Very Heavy ☐

EMS LABORATORIES 117 West Bellevue Drive ☐ Pasadena, California 91105-2503 ☐ (818) 568-4065

Analysis of Water by Transmission Electron Microscopy
(EPA-600/4-83-043)

EMS No. 26662 **Date Analyzed** 2/15/93

Client Petro-Chem Environmental

Sample No. EMS BLANK

Fibers (chrysotile)	ND	MFL
> 5 Micron length (chrysotile)	ND	MFL
Mass (chrysotile)	0	ug/L
More/Less than 5 Fibers in Sample (chrysotile)	LESS	
Sensitivity Level	0.01	MFL

Particle Size Distribution (Chrysotile)

Particle Length - Microns

O -0.49	0.50 - 0.99	1.00 - 1.49	1.50 - 1.99	2.00 - 2.49	2.5 & UP
0	0	0	0	0	0

Particle Width - Microns

O - .04	.05 - .09	.1 - .14	.15 - .19	.2 - .24	.25 & UP
0	0	0	0	0	0

Aspect Ratio L/W

0 - 9.9	10 - 19.9	20 - 29.9	30 - 39.9	40 - 49.9	50 & UP
0	0	0	0	0	0

TEM ASBESTOS ANALYSIS

EMS Lab No. 26662
Client Ems Blank
Sample No. 2-10-93

RECEIVING

METHOD OF ANALYSIS
EPA Yamate Level I ☐
Level II ☐
Level III ☐
AHERA ☐

ASPECT RATIO 3:1 ☐ 5:1 ☐

LENGTHS
All Sizes (EPA) ☐
(µm): ≥0.5 ☐
≥1.0 ☐
≥5.0 ☐
≥10.0 ☐
PCM Range* ☐
*≥0.25 µm width, ≥5.0 µm length

Approved By _____ Date _____

PREP

FILTER TYPE/AREA (mm²)
MCE/385 ☐
MCE/314 ☐
MCE/1007 ☑
Other ☐

TYPE OF SAMPLE
Air ☐ Water ☑
Soil ☐ Wipe ☐
Bulk ☐ Other ☐
Dust/Microvac ☐

PORE SIZE
0.45 µm ☐
0.8 µm ☐
.1 µm ☑
.22 µm ☐
Other ☐

G.O. Area (mm²) 0.0067
No. of G.O. to Analyze 20
Filter Lot No. H2EM96077

DIRECT PREP ☑
INDIRECT PREP ☐

Volume _____ liters
Working Volume 500 ml
Weight _____ grams
Ashed Area _____ %

Date 2-11-93
Prepared By FG

ANALYSIS

GRID
1 ☑ 3 ☐
2 ☐ 4 ☐

Grid Address 1A
Screen Magnification 10100 x
Camera Constant 28.4
Accelerating Voltage 100 KV
Beam Current 10 µa

Analyst S. Ahmed Date 2/15/93

MICROSCOPE
600A ☐
600B ☑
HU11E ☐
HU125E ☐

A

1	NSD																
2	NSD																
3	NSD																
4	NSD																
5	NSD																
6	NSD																
7	NSD																
8	NSD																
9	NSD																
10	NSD																
11	NSD																

OBSERVATIONS:

Clean ☑
Debris: ☐ Very Light ☑ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐
Gypsum: ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐
Other ☐

TEM ASBESTOS ANALYSIS

EMS Lab No. 26662
Client EMS Blank
Sample No. 2 10 93

MICROSCOPE
600A ☐
600B ☒
HU11E ☐
HU125E ☐

GRID
1 ☐ 3 ☐
2 ☒ 4 ☐

Grid Address 1-B
Screen Magnification 9140 x
Camera Constant 28.4
Accelerating Voltage 100 KV
Beam Current 10 µa

B

Analyst Radha Date 2/15/93

1	NSD																		
2	NSD																		
3	NSD																		
4	NSD																		
5	NSD																		
6	NSD																		
7	NSD																		
8	NSD																		
9	NSD																		

OBSERVATIONS:

Clean ☐
Debris: ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐
Gypsum: ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐
Other ☐

EMS LABORATORIES 117 West Bellevue Drive / Pasadena CA 91105-2503 / 818-568-4065

TEM-EPA Method for Bulk Samples

LAB NO: 26661
CLIENT: Petro-Chem Environmental

Laboratory I.D.	Client I.D.	FILTER MEDIA DATA			Weight gr.	Working Volume ml.	Volume liters
		Type	Diameter mm	Effective Area mm^2			
26661-1	1	MCE	47	1017	0.00005	2	0.1
26661-2	2	MCE	47	1017	0.0001	2	0.1
26661-BK	Blank	MCE	47	1017		10	0.1

INDIVIDUAL ANALYTICAL RESULTS

Laboratory I.D.	Client I.D.	No. of Asbestos Str	Analytical Sensitivity, S/MFL	Mass; Chrys(Asb.) / gram of sample	Weight Percent of Chrys(Asb.)
26661-1	1	2	3.6	0.0006	0.06
26661-2	2	1	3.6	0.00004	0.004
26661-BK	Blank	N.D.	0.7	-	-

The analysis was carried out to the approved TEM method. This laboratory is in compliance with the quality specified by the method.

Authorized Signature

EMS LABORATORIES 117 West Bellevue Drive / Pasadena CA 91105-2503 / 818-568-4065

Analysis of Water by Transmission Electron Microscopy
(EPA-600/4-83-043)

EMS No. 26661 **Date Analyzed** 2/16/93

Client Petro-Chem Environmental

Sample No. EMS BLANK

Fibers (chrysotile)	ND	MFL
> 5 Micron length (chrysotile)	ND	MFL
Mass (chrysotile)	0	ug/L
More/Less than 5 Fibers in Sample (chrysotile)	LESS	
Sensitivity Level	0.07	MFL

Particle Size Distribution (Chrysotile)

Particle Length - Microns

.O -0.49	0.50 - 0.99	1.00 - 1.49	1.50 - 1.99	2.00 - 2.49	2.5 & UP
0	0	0	0	0	0

Particle Width - Microns

O - .04	.05 - .09	.1 - .14	.15 - .19	.2 - .24	.25 & UP
0	0	0	0	0	0

Aspect Ratio L/W

0 - 9.9	10 - 19.9	20 - 29.9	30 - 39.9	40 - 49.9	50 & UP
0	0	0	0	0	0

EMS LABORATORIES 117 West Bellevue Drive / Pasadena CA 91105-2503 / 818-568-4065

TEM ASBESTOS ANALYSIS

EMS Lab No. 26661

Client EMS Blank

Sample No. 2-11-93

METHOD OF ANALYSIS

EPA Yamate Level I ☐
Level II ☑
Level III ☐
AHERA ☐

ASPECT RATIO 3:1 ☑ 5:1 ☐

LENGTHS

All Sizes (EPA) ☐
(µm): ≥0.5 ☑
≥1.0 ☐
≥5.0 ☐
≥10.0 ☐
PCM Range* ☐
*(≥0.25 µm width, ≥5.0 µm length)

Approved By B Kolk Date 2-12-93

FILTER TYPE/AREA (mm²)

MCE/385 ☐
MCE/314 ☐
MCE/1017 ☑
Other ☐

TYPE OF SAMPLE

Air ☐ Water ☑
Soil ☐ Wipe ☐
Bulk ☐ Other ☐
Dust/Microvac ☐

PORE SIZE

0.45 µm ☐
0.8 µm ☐
.1 µm ☐
.22 µm ☑
Other ☐

G.O. Area (mm²) 0.0067

No. of G.O. to Analyze

Filter Lot No. HWA9H3184

DIRECT PREP ☑
INDIRECT PREP ☐

Volume ______ liters
Working Volume 100 ml
Weight ______ grams
Ashed Area ______ %

Date 2-12-93

Prepared By FG

GRID 1

1 ☑ 3 ☐
2 ☐ 4 ☐

Grid Address 1-A
Screen Magnification 19,300 x
Camera Constant 2.11
Accelerating Voltage 100 KV
Beam Current 70 µa

Analyst C. J. Date 2-14-93

MICROSCOPE

600A ☐
600B ☑
HU11E ☐
HU125E ☐

A

1	NSD
2	NSD
3	NSD
4	NSD
5	NSD

OBSERVATIONS:

Clean ☐
Debris: ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐
Gypsum: ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐
Other ☐

EMS LABORATORIES 117 West Bellevue Drive / Pasadena CA 91105-2503 / 818-568-4065

TEM ASBESTOS ANALYSIS

EMS Lab No. 26661
Client Ens Blank
Sample No. 2-11-93

MICROSCOPE
600A ☐
600B ☒
HU11E ☐
HU125E ☐

GRID
1 ☐ 3 ☐
2 ☒ 4 ☐

Grid Address 1B
Screen Magnification 19000 x
Camera Constant 28.4
Accelerating Voltage 100 KV
Beam Current 10 µa

B

Analyst S. Ahmed Date 2/16/93

1	NSD																		
2	NSD																		
3	NSD																		
4	NSD																		
5	NSD																		
6	NSD																		
7	NSD																		
8	NSD																		
9	NSD																		
10	NSD																		
11	NSD																		
12	NSD																		
13	NSD																		
14	NSD																		
15	NSD																		

OBSERVATIONS:

Clean ☐					
Debris: ☒	Very Light ☐	Light ☒	Moderate ☐	Heavy ☐	Very Heavy ☐
Gypsum: ☐	Very Light ☐	Light ☐	Moderate ☐	Heavy ☐	Very Heavy ☐
Other ☐					

EMSL EMS LABORATORIES 117 West Bellevue Drive / Pasadena CA 91105-2503 / 818-568-1015

SUMMARY OF TEM CHRYSOTILE STRUCTURE ANALYSIS

EMS No. 26661 Date 2/16/93

Sample Description 1

Client Petro-Chem Environmental

Volume of Sample (L)	0.1	Filter Area (mm^2)	1017
Working Volume (ml)	2	Area Analyzed (mm^2)	0.1407
Weight of Sample (g)	0.00005	No. of Structures	2
Weight of Chrysotile Analyzed (ug)	9.00E-08	Detection Limit (MFL)	3.6

Mass = 0.0006 gram of Chrysotile/gram of Sample

Mass = 0.06 % of Chrysotile

MFL: Millions of Fibers per Liter of Sample

Petro Chem Environmental Services, Inc.
EMS LABORATORIES 117 West Bellevue Drive / Pasadena CA 91105-2503 / 818-568-4065

TEM ASBESTOS ANALYSIS

EMS Lab No. 26661
Client Petro- Chem
Sample No. #1

FILTER TYPE/AREA (mm²)
- MCE/385 ☐
- MCE/314 ☐
- MCE/1017 ☑
- Other ☐

METHOD OF ANALYSIS
- EPA Yamate Level I ☐
- Level II ☐
- Level III ☐
- AHERA ☐

ASPECT RATIO 3:1 ☑ 5:1 ☐

LENGTHS
- All Sizes (EPA) ☐
- (µm): ≥0.5 ☑
- ≥1.0 ☐
- ≥5.0 ☐
- ≥10.0 ☐
- PCM Range* ☐

*(≥0.25 µm width, ≥5.0 µm length)

TYPE OF SAMPLE
- Air ☐ Water ☐
- Soil ☐ Wipe ☐
- Bulk ☐ Other ☑
- Dust/Microvac ☐

Fiber glass filter

PORE SIZE
- 0.45 µm ☐
- 0.8 µm ☐
- .1 µm ☐
- .22 µm ☑
- Other ☐

G.O. Area (mm²) 0.0067
No. of G.O. to Analyze
Filter Lot No. H1AMG4318A

Approved By BKuh Date 2-12-93

- DIRECT PREP ☑
- INDIRECT PREP ☐

Volume 100.1 liters
Working Volume 2 ml
Weight .0141 grams
Ashed Area %
Date 2-12-93
Prepared By FG

GRID 1 ☑ 2 ☐ 3 ☐ 4 ☐
Grid Address 1-A
Screen Magnification 19,300 x
Camera Constant 20.1
Accelerating Voltage 100 KV
Beam Current 10 µa

Analyst B [signature] Date 2-14-93

MICROSCOPE
- 600A ☑
- 600B ☐
- HU11E ☐
- HU125B ☐

A

1	ND				A - Heavy fiber glass
2	ND				
3	ND				
4	ND				
5	ND				
6	ND				
7	ND				

OBSERVATIONS:
- Clean ☐
- Debris: ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐
- Gypsum: ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐
- Other ☐

EMS LABORATORIES 117 West Bellevue Drive / Pasadena CA 91105-2503 / 818-568-4065

TEM ASBESTOS ANALYSIS

EMS Lab No. 26661
Client Petro. Chem
Sample No. #1

MICROSCOPE

Serial No. 542-05-06 H600A ☐
Serial No. 542-05-13 H600B ☒

GRID
1 ☐ 3 ☐
2 ☒ 4 ☐

Grid Address 1B
Screen Magnification 19100x
Camera Constant 28.4
Accelerating Voltage 100 KV
Beam Current 10 µa

Analyst S. Ahmed Date 2/16/93

1	NSD														
2	NSD														
3	NSD														
4	NSD														
5	1	F	1	230x	✓					8	10				EDS #1
6	NSD														
7	NSD														

OBSERVATIONS:

Clean ☐
Debris: ☒ Very Light ☐ Light ☒ Moderate ☐ Heavy ☐ Very Heavy ☐
Gypsum: ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐
Other ☐

16-Feb-1993 10:03:55

26661-1,B,#01,SA Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 33 secs

Energy	Counts	X-Ray Lines
1.26	192.	Mg K , Mg K , Mg K , As L , As L
1.73	252.	Si K , Si K

Quantex)
0.320 Range= 10.230 keV 10.230
Integral B = 66

TEM ASBESTOS ANALYSIS

EMS Lab No. 26661
Client Petro-Chem
Sample No. #1

[redacted]

MICROSCOPE

Serial No. 542-05-06 H600A ☒
Serial No. 542-05-13 H600B ☐

GRID
1 ☒ 3 ☐
2 ☐ 4 ☐

Grid Address 1C
Screen Magnification 19,400 x
Camera Constant 30.5
Accelerating Voltage 100 KV
Beam Current 10 µa

C

Analyst Kyeong Date 2/16/93

1	NS	P														* This sample contains many fiberglass fibers. EDS#1
2	NS	P														
3	1	F	1	65		✓					6	10				
4	NS	P														
5	NS	P														
6	NS	P														
7	NS	P														

OBSERVATIONS:

Clean ☐
Debris: ☒ Very Light ☐ Light ☒ Moderate ☐ Heavy ☐ Very Heavy ☐
Gypsum: ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐
Other ☐

EMS LABORATORIES 117 West Bellevue Drive / Pasadena CA 91105-2503 / 818-568-4065

16-Feb-1993 13:57:00

26661-1,C,#01,KC
Vert= 200 counts Disp= 1

Preset= 100 secs
Elapsed= 47 secs

Energy	Counts	X-Ray Lines
1.25	200.	Mg K , Mg K , Mg K , As L , As L
1.73	320.	Si K , Si K

Quantex)
0.160 Range= 10.230 keV

Integral 8 = 10.230
49

SUMMARY OF TEM CHRYSOTILE STRUCTURE ANALYSIS

EMS No. 26661 **Date** 2/16/93

Sample Description 2

Client Petro-Chem Environmental

Volume of Sample (L)	0.1	Filter Area (mm^2)	1017
Working Volume (ml)	2	Area Analyzed (mm^2)	0.1407
Weight of Sample (g)	0.0001	No. of Structures	1
Weight of Chrysotile Analyzed (ug)	1.00E-08	Detection Limit (MFL)	3.6

Mass = 0.00004 gram of Chrysotile/gram of Sample

Mass = 0.004 % of Chrysotile

MFL: Millions of Fibers per Liter of Sample

EMS LABORATORIES 117 West Bellevue Drive / Pasadena CA 91105-2503 / 818-568-4065

TEM ASBESTOS ANALYSIS

EMS Lab No. 26661
Client Petro - Chem
Sample No. 2

FILTER TYPE/AREA (mm²)
MCE/385 ☐
MCE/314 ☐
MCE/1017 ☐
Other ☐

METHOD OF ANALYSIS
EPA Yamate Level I ☐
Level II ☑
Level III ☐
AHERA ☐

ASPECT RATIO 3:1 ☑ 5:1 ☐

LENGTHS
All Sizes (EPA) ☑
(μm): ≥0.5 ☑
≥1.0 ☐
≥5.0 ☐
≥10.0 ☐
PCM Range* ☐
*(≥0.25 μm width, ≥5.0 μm length)

Approved By B. K. [illegible] Date 2-12

TYPE OF SAMPLE
Air ☐ Water ☐
Soil ☐ Wipe ☐
Bulk ☐ Other ☑
Dust/Microvac ☐
Fiber glass filter

PORE SIZE
0.45 μm ☐
0.8 μm ☐
.1 μm ☐
.22 μm ☑
Other ☐

G.O. Area (mm²) 0.0067
No. of G.O. to Analyze
Filter Lot No. HWAQ4318A

DIRECT PREP ☑
INDIRECT PREP ☐

Volume .1 liters
Working Volume 2 ml
Weight .0212 grams
Ashed Area %
Date 2-12-93
Prepared By FG

GRID 1 ☑ 2 ☐ 3 ☐ 4 ☐
Grid Address 1-A
Screen Magnification 19,100 x
Camera Constant 27.1
Accelerating Voltage 100 KV
Beam Current 10 μa

MICROSCOPE
600A ☑
600B ☐
HU11E ☐
HU125E ☐

A

Analyst G. [illegible] Date 5-14-93

1	NSD																Heavy fiberglass
2	NSD																
3	NSD																
4	NSD																
5	NSD																
6	NSD																
7	NSD																

OBSERVATIONS:
Clean ☐
Debris: ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐
Gypsum: ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐
Other ☐

EMS LABORATORIES 117 West Bellevue Drive / Pasadena CA 91105-2503 / 818-568-4065

TEM ASBESTOS ANALYSIS

EMS Lab No. 26661
Client Petro - Chem
Sample No. 2

[redacted]

[redacted]

MICROSCOPE
Serial No. 542-05-06 H600A ☒
Serial No. 542-05-13 H600B ☐

GRID
1 ☑ 3 ☐
2 ☐ 4 ☐

Grid Address B
Screen Magnification 19,400 x
Camera Constant 30.5
Accelerating Voltage 100 KV
Beam Current 10 μa

B

Analyst Kyong Date 3/6/93

[redacted]		[redacted]	[redacted]	[redacted]	[redacted]
1	NSD				* This sample contains ~30-40
2	NSD				~~Asb~~ fiberglass str. per g.o
3	NSD				
4	NSD				
5	NSD				
6	NSD				
7	NSD				

OBSERVATIONS:
Clean ☐
Debris: ☒ Very Light ☐ Light ☒ Moderate ☐ Heavy ☐ Very Heavy ☐
Gypsum: ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐
Other ☐

EMS LABORATORIES 117 West Bellevue Drive / Pasadena CA 91105-2503 / 818-568-4065

TEM ASBESTOS ANALYSIS

EMS Lab No. 26661
Client Petro Chem
Sample No. 2

2ml.

MICROSCOPE
Serial No. 542-05-06 H600A ☐
Serial No. 542-05-13 H600B ☑

GRID
1 ☐ 3 ☑
2 ☐ 4 ☐
Grid Address 1C
Screen Magnification 19000x
Camera Constant 28.4
Accelerating Voltage 100 KV
Beam Current 10 µa

C

Analyst S. Ahmed Date 2/16/93

1	1	F	12	240				✓						EDS #1; fiberglass
	2	F	1	40		✓				6	10			EDS #2
	3	F	1	18				✓						EDS #3 Silicates
2	NSD													
3	NSD													
4	NSD													
5	NSD													
6	NSD													
7	NSD													

OBSERVATIONS:

Clean ☐					
Debris: ☑	Very Light ☐	Light ☑	Moderate ☐	Heavy ☐	Very Heavy ☐
Gypsum: ☐	Very Light ☐	Light ☐	Moderate ☐	Heavy ☐	Very Heavy ☐
Other ☐					

EMS LABORATORIES 117 West Bellevue Drive / Pasadena CA 91105-2503 / 818-568-4065

16-Feb-1993 10:53:55 26661-2,C,#01,SA

ENERGY	COUNTS	X-RAY LINES
1.22	128.	Mg KA1, Mg KA2, Ge LA1, Ge LA2, Ge LB1, Ge LG1
1.46	840.	Al KA1, Al KA2
1.74	8713.	Si KA1, Si KA2
3.69	3841.	Ca KA1, Ca KA2
4.04	323.	Sc KA2, Ca KB1, Ca KB3
4.51	142.	Ti KA1, Ti KA2
5.41	69.	Cr KA1, Cr KA2
5.89	107.	Mn KA1, Mn KA2
6.39	180.	Fe KA1, Fe KA2

16-Feb-1993 10:57:21

26661-2,C,#02,SA
Vert= 200 counts Disp= 1

Preset= 100 secs
Elapsed= 31 secs

Energy	Counts	X-Ray Lines
1.26	141.	Mg K , Mg K , Mg K , As L , As L
1.75	253.	Si K , Si K

Quantex)
0.320 Range= 10.230 keV

Integral 8 = 10.230 42

16-Feb-1993 11:00:35

26661-2,C,#03,SA
Vert= 200 counts Disp= 1

Preset= 100 secs
Elapsed= 31 secs

Energy	Counts	X-Ray Lines
1.73	163.	Si K , Si K

Quantex)
0.320 Range= 10.230 keV

Integral 8 = 10.230 31

Analysis of Water by Transmission Electron Microscopy
(EPA-600/4-83-043)

EMS No. 26661 **Date Analyzed** 2/16/93

Client Petro-Chem Environmental

Sample No. BLANK

Fibers (chrysotile)	ND	MFL
> 5 Micron length (chrysotile)	ND	MFL
Mass (chrysotile)	0	ug/L
More/Less than 5 Fibers in Sample (chrysotile)	LESS	
Sensitivity Level	0.7	MFL

Particle Size Distribution (Chrysotile)

Particle Length - Microns

O -0.49	0.50 - 0.99	1.00 - 1.49	1.50 - 1.99	2.00 - 2.49	2.5 & UP
0	0	0	0	0	0

Particle Width - Microns

O - .04	.05 - .09	.1 - .14	.15 - .19	.2 - .24	.25 & UP
0	0	0	0	0	0

Aspect Ratio L/W

0 - 9.9	10 - 19.9	20 - 29.9	30 - 39.9	40 - 49.9	50 & UP
0	0	0	0	0	0

EMS LABORATORIES 117 West Bellevue Drive / Pasadena CA 91105-2503 / 818-568-4065

TEM ASBESTOS ANALYSIS

EMS Lab No. 26661
Client Petro- Chem
Sample No. Blank

FILTER TYPE/AREA (mm²): MCE/385 ☐ MCE/314 ☐ MCE/1017 ☐ Other ☐

METHOD OF ANALYSIS: EPA Yamate Level I ☐ Level II ☑ Level III ☐ AHERA ☐

LENGTHS: All Sizes (EPA) ☐ (µm):≥0.5 ☑ ≥1.0 ☐ ≥5.0 ☐ ≥10.0 ☐ PCM Range* ☐
*(≥0.25 µm width, ≥5.0 µm length)

TYPE OF SAMPLE: Air ☐ Water ☐ Soil ☐ Wipe ☐ Bulk ☐ Other ☑ Dust/Microvac ☐
Fiber glass Filter

PORE SIZE: 0.45 µm ☐ 0.8 µm ☐ .1 µm ☐ .22 µm ☑ Other ☐

ASPECT RATIO 3:1 ☑ 5:1 ☐

G.O. Area (mm²) 0.0 067
No. of G.O. to Analyze
Approved By B Koch Date 2-12
Filter Lot No. HWMAU318A

DIRECT PREP ☑ INDIRECT PREP ☐
Volume .1 liters
Working Volume 10 ml
Weight ____ grams
Ashed Area ____ %
Date 2-12-93
Prepared By FG

GRID 1 ☑ 2 ☐ 3 ☐ 4 ☐
Grid Address 1-A
Screen Magnification 19,100 x
Camera Constant 28.1
Accelerating Voltage 100 KV
Beam Current 1 µa
Analyst [illegible] Date 2-14-93

MICROSCOPE 600A ☑ 600B ☐ HU11E ☐ HU125E ☐

A

1	NSD
2	NSD
3	NSD
4	NSD
5	NSD
6	NSD
7	NSD

OBSERVATIONS:
Clean ☐
Debris: ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐
Gypsum: ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐
Other ☐

EMS LABORATORIES 117 West Bellevue Drive / Pasadena CA 91105-2503 / 818-568-4065

TEM ASBESTOS ANALYSIS

EMS Lab No. 26661
Client Petro -Chem
Sample No. Blank

MICROSCOPE
Serial No. 542-05-06 H600A ☐
Serial No. 542-05-13 H600B ☑

GRID
1 ☐ 3 ☐
2 ☑ 4 ☐

Grid Address 1B
Screen Magnification 19100 x
Camera Constant 28.4
Accelerating Voltage 100 KV
Beam Current 10 μa

B

Analyst S. Ahmed Date 2/16/93

1	NSD
2	NSD
3	NSD
4	NSD
5	NSD
6	NSD
7	NSD

OBSERVATIONS:

Clean ☐
Debris: ☑ Very Light ☐ Light ☑ Moderate ☐ Heavy ☐ Very Heavy ☐
Gypsum: ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐
Other ☐

EMS LABORATORIES 117 West Bellevue Drive / Pasadena CA 91105-2503 / 818-568-4065

TEM ASBESTOS ANALYSIS

EMS Lab No. 26661
Client Petro-Chem
Sample No. blank

[redacted]

[redacted]

MICROSCOPE

Serial No. 542-05-06 H600A ☒
Serial No. 542-05-13 H600B ☐

[redacted]

GRID
1 ☐ 2 ☐ 3 ☒ 4 ☐

Grid Address 1-C
Screen Magnification 19KD x
Camera Constant 20 in
Accelerating Voltage 100 KV
Beam Current 10 μa

Analyst Radka Date 2/16

[redacted]			[redacted]			[redacted]					[redacted]						[redacted]
1	NSD																
2	NSD																
3	NSD																
4	NSD																
5	NSD																
6	NSD																
7	NSD																

OBSERVATIONS:

Clean ☐
Debris: ☐ Very Light ☐ Light ☒ Moderate ☐ Heavy ☐ Very Heavy ☐
Gypsum: ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐
Other ☐

EMS LABORATORIES 117 West Bellevue Drive / Pasadena CA 91105-2503 / 818-568-4065

PETRO CHEM ENVIRONMENTAL SERVICES, INC.
3207 Antonino Avenue, Bakersfield, CA 93308
(805) 327-7300 FAX (805) 327-3459

CHAIN OF CUSTODY RECORD

Submitted to: BC LABS

COMPANY	LOCATION/UNIT
GOLDEN STATE METALS	AUTO SHREDDER
REPORT #	**SAMPLER**
042-329	John Hinkle
METHOD	**REPORT ATTN.** / **PO#**
EPA METHOD 5	TERRY ROWLES / 49139

ANALYSIS REQUEST

SAMPLE No/ID	SAMPLE DESCRIPTION	SAMPLE DATE	Liq	Filter	Gas	TOTAL PCB µg	TOTAL Cd, Pb, Zn, Ni, Cr,	PCB µg/ml or µg/gr.	Cd, Pb, Zn, Cr, Ni µg/ml or µg/gr.	
93-001131-1	IMPINGATE #1 250ml	1/28	X			X	X			1
-2	IMPINGATE #2 250ml	1/28	X			X	X			2
-3	PROBE WASH #1 100ml	1/28	X			X	X			3
-4	PROBE WASH #2 100ml	1/28	X			X	X			4
-5	FILTER #1 (0.2914 gm)	1/28		X		X	X			5
-6	FILTER #2 (0.2921 gm)	1/28		X		X	X			6
-7	H_2O BLANK 250ml	1/28	X					X	X	7
-8	FILTER BLANK (0.3155 gm)	1/28		X				X	X	8

COMMENTS: PCB by 505/608/8080
REQUESTING FOLLOWING: PCB 1016, PCB 1221, PCB 1232, PCB 1242, PCB 1248, PCB 1254, PCB 1260

METALS BY ICP SEALED; INTACT

Need Results In 6 to 10 Working Days.

RELINQUISHED BY:	DATE	RECEIVED BY:	DATE
John Hinkle	1/28/93	D Smallwood	1/28/93
D Smallwood	2/8/93	Jean Mabbs	2/8/93 3:40pm
RELINQUISHED BY:	DATE	RECEIVED BY:	DATE

PETRO CHEM ENVIRONMENTAL SERVICES, INC.
3207 Antonino Avenue, Bakersfield, CA 93308
(805) 327-7300 FAX (805) 327-3459

CHAIN OF CUSTODY RECORD

Submitted to: EMS LABS

COMPANY	LOCATION/UNIT
GOLDEN STATE METALS	Auto Shredder
REPORT # 042-329	SAMPLER John Hinkle
METHOD EPA METHOD 5	REPORT ATTN. TERRI ROWLES
	PO# 49138

SAMPLE No/ID	SAMPLE DESCRIPTION	SAMPLE DATE	Liq	Filter	Gas	ANALYSIS REQUEST: ASBESTOS µg/ml, TEM	ASBESTOS µg/gm, TEM
	IRRIGATE #1 250ml	1/28	X			X	
	IRRIGATE #2 250ml	1/28	X			X	
	PRESSWASH #1 100ml	1/28	X			X	
	PRESSWASH #2 100ml	1/28	X			X	
	FILTER #1 (0.3082 gm)	1/28		X			X
	FILTER #2 (0.3087 gm)	1/28		X			X
	H2O BLANK 250ml	1/28	X			X	
	FILTER BLANK (0.3115 gm)	1/28		X			X

COMMENTS: ANALYSIS BY TEM

Quote $215.00/sample
ok per TWS 2/10/93

RELINQUISHED BY:	DATE	RECEIVED BY:	DATE
John Hinkle	1/28/93	D Strickland	1/28/93
D Strickland	2/8/93		

PETRO CHEM ENVIRONMENTAL SERVICES, INC.

DRY GAS METER CALIBRATION

DATE:	1-27-93	AMBIENT TEMP °F:	62
TECH:	BDM	BAROMETRIC Pbar:	29.54
METER I.D.#	1002	TEST METER ID#:	95M104564
		TEST METER Mcf:	1.023

APPROXIMATE CFM		0.75	0.50	0.30
STD TEST METER VOLUME CF	INITIAL	0.00	0.00	0.00
	FINAL	7.41	10.01	10.05
	TOTAL	7.41	10.01	10.05
FIELD GAS METER VOLUME CF	INITIAL	109.20	119.00	130.10
	FINAL	116.69	129.56	140.89
	TOTAL	7.49	10.56	10.79
STD TEST METER TEMP (°F)		62.5	60.0	60.0
FIELD GAS METER TEMP (°F)	IN	69.0	71.0	69.5
	OUT	54.0	60.0	63.0
	AVERAGE	61.5	65.5	66.3
STD TEST METER PRESSURE ("H2O)		-0.60	-0.30	-0.15
FIELD GAS METER PRESSURE ("H2O)		1.40	0.60	0.21
FIELD GAS METER, Mcf		1.006629	0.978614	0.963789

FIELD AVERAGE Mcf:	0.982977

H@:	1.4324

PETRO
CHEM
ENVIRONMENTAL
SERVICES, INC.

313 Daniels Lane
Bakersfield, California 93307
(805) 327-7300
FAX (805) 327-3459

Mr. Takehish Miyake
Golden State Metals, Inc.
January 15, 1993

Unit: Auto Shredding
Cyclone

SOURCE TEST PLAN

I. Source Information:

A. Unit: Auto Shredding Residue Separator
APCD #5013003

B. Company: Golden State Metals
2000 E. Brundage Lane
Bakersfield, California 93307

Attention: Takehish Miyake

II. Testing Firm:

Petro Chem Environmental Services, Inc.
313 Daniels Lane
Bakersfield, California 93307

Attention: Tim Brennan

III. Regulatory Agency:

San Joaquin Valley Unified APCD,
Southern Region

IV. Summary:

Determination of concentrations and emissions of PM. The particulate samples will also be analyzed for asbestos, PCB and heavy metals (Cd, Pb, Zn, total Cr, and Ni)

V. Testing Date:

January 28, 1993

Mr. Takehish Miyake
Golden State Metals, Inc.
January 15, 1993

Unit: Auto Shredding
Cyclone

PROPOSAL FOR ANNUAL COMPLIANCE TESTING

Determination of particulate, PCB, Cd, Pb, Zn, Total Cr, Ni, and asbestos concentrations emissions from the outlet of an auto shredding cyclone located in Kern County, California. The particulate collected will be analyzed for PCB heavy metals and asbestos content as per Kern County PTO #5013003. The Methods used will be those set forth by San Joaquin Valley Unified APCD.

Parameters	Method	# Test Runs	Permit Limits
Particulate	EPA Method 5; Particulate	2	4.5 lb/hr
Metals	ICP Analysis of particulate catch, BC Labs	2	N/A
PCB	ECP Analysis of particulate catch, BC Labs	2	N/A
Asbestos	TEM Analysis of particulate catch, EMS Labs	2	N/A
Volume Flow Rate	EPA Method 2; Pitot tube traverse	2	N/A
H_2O	EPA Method 4; Condensation	2	N/A
Fixed Gases O_2, CO_2 and N_2	EPA Method 3; Orsat analysis	2	N/A

KERN COUNTY AIR POLLUTION CONTROL DISTRICT

PERMIT TO OPERATE

2700 "M" STREET, SUITE 275
BAKERSFIELD, CA 93301
TELEPHONE: (805) 861-3682

Number: 5013003

PERMIT TO OPERATE IS HEREBY GRANTED TO: GOLDEN STATE METALS, INC.

FOR EQUIPMENT LOCATED AT: 2000 E. Brundage Lane

EQUIPMENT OR PROCESS DESCRIPTION: Auto Shredder Residue Separator

OPERATIONAL CONDITIONS LISTED BELOW.

THIS PERMIT BECOMES VOID UPON ANY CHANGE OF OWNERSHIP OR LOCATION, OR ANY ALTERATION.

NOTE: The permittee may be required to provide adequate sampling and testing facilities. Equipment modification requires a new permit.

REVOCABLE: This permit does not authorize the emission of air contaminants in excess of those allowed by the Rules and Regulations of the K.C.A.P.C.D.

WILLIAM J. RODDY
AIR POLLUTION CONTROL OFFICER

By:

For Period: 03-31-91 TO 09-21-93

CONDITIONAL APPROVAL:
Compliance with all conditions of approval imposed by any applicable Authority to Construct is required for life of this equipment unless modified by application.

EQUIPMENT DESCRIPTION: Auto Shredder Residue Separator, including the following equipment:

a. Infeed belt conveyor, 2 hp (from shredder).
b. "Z" box type classifier with Phelphs Model SW-643 blower and motor.
c. 90 in. cyclone for PM control and recycle.
d. "Z" box discharge conveyor, magnetic head pulley manual separator, 2 hp.
e. Trommel for heavy fines extraction, 3 hp.
f. Picking belt for manual separation, 2 hp.

OPERATIONAL CONDITIONS:

1. Conveyors, belts, and trommel shall be designed, operated and ventilated to prevent fugitive emissions. (Rule 210.1)
2. Cyclone shall be designed for a collection efficiency of no less than 99.75%. (Rule 210.1)
3. Visible emissions from cyclone shall be less than 20% opacity (Rule 401) and from any other emission point not detectable. (Rule 210.1)
4. Shredded material flow to "Z" box type classifier shall not exceed 12 tons/hr without prior District approval. (Rule 210.1)
5. Material flow to cyclone shall not exceed 7200 lbs/hr without prior District approval. (Rule 210.1)
6. Fines discharged from cyclone shall be disposed of in manner preventing entrainment in atmosphere. (Rule 210.1)

EMISSION SAMPLING LIMITS:

Particulates: 4.50 lbs/hr (Rule 210.1)

COMPLIANCE TESTING REQUIREMENTS:

Compliance with emission limits shall be demonstrated by District-witnessed sample collection by independent testing laboratory within 60 days after startup of this equipment and annually 60 days prior to permit anniversary date and official test results and field data submitted within 30 days thereafter. (Rule 108.1)

Particulate collected shall be analyzed for asbestos, PCB, and heavy metals content. (Rule 418)

SPECIAL CONDITIONS:

Operation of permit 5013002 shall be discontinued upon startup of equipment authorized by 5013003. (Rule 210.1)