

State of California
California Environmental Protection Agency
Air Resources Board
Stationary Source Division

**PILOT MONITORING STUDY OF CRYSTALLINE SILICA
IN AMBIENT AIR IN LOMPOC, CALIFORNIA**

Report prepared for the Lompoc Interagency Work Group

April 2003

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PILOT MONITORING STUDY OF CRYSTALLINE SILICA
IN AMBIENT AIR IN LOMPOC, CALIFORNIA

Report prepared for the Lompoc Interagency Work Group

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State of California
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A draft of this report was reviewed by members of the Other Environmental Issues Subcommittee of the Lompoc Interagency Work Group. Attempts were made to respond to all comments on the draft report.

Pilot Monitoring Study of Crystalline Silica in Ambient Air in Lompoc, California

SUMMARY

In 1997, the Department of Pesticide Regulation (DPR) formed the Lompoc Interagency Work Group (LIWG) to investigate respiratory illnesses in Lompoc. The primary focus of the investigation has been whether potential exposure to airborne pesticides is associated with the respiratory illnesses. The Other Environmental Issues Subcommittee of the LIWG evaluated other possible environmental causes of the respiratory illnesses. In 1998, the LIWG endorsed recommendations that included having the Air Resources Board (ARB) conduct ambient air monitoring in Lompoc for crystalline silica. The diatomaceous earth mining and processing industry near Lompoc has reported emissions of crystalline silica.

To investigate ambient air concentrations of crystalline silica in Lompoc, a pilot study of ambient monitoring was conducted on selected days from January-March 2001 (see Appendix A). A subset of the LIWG, including a representative of the Celite diatomaceous earth mining and processing industry, approved the study design. Particulate (PM-10) samples were collected at three locations in Lompoc and at a background site in Santa Maria, with subsequent analysis for the cristobalite and quartz forms of crystalline silica.

The analytical report is presented in Appendix B. No significant amounts of cristobalite or quartz were detected in the analysis of the Lompoc air sampling filters. The analytical report notes that because the air concentrations were quite low, it was quite difficult to distinguish between crystalline material such as cristobalite, poorly crystalline material such as opaline silica, and amorphous (noncrystalline) silica. [Note: Concentrations in the analytical report are reported as mass per sample in units of micrograms (μg) per sample. To convert a mass to an air concentration in units of micrograms per cubic meter of air ($\mu\text{g}/\text{m}^3$), the mass of a sample should be divided by the air sampling volume of 24 cubic meters of air, based on: (air sampling flow rate of 16.7 liters per minute)(60 minutes per hour)(24 hours)(1 cubic meter per 1000 liters).]

All concentrations of cristobalite were below the estimated quantitation limit of 0.57 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$). For quartz, only three samples were above the estimated quantitation limit of 0.65 $\mu\text{g}/\text{m}^3$ (all three collected at the background site in Santa Maria), the highest being $2.6 \pm 2.4 \mu\text{g}/\text{m}^3$. (This concentration reflects the uncertainty of the analytical method, stated in Appendix B as being plus or minus one standard deviation.) This compares with a concentration of 3.45 $\mu\text{g}/\text{m}^3$ crystalline silica, measured previously in Santa Maria (North Santa Barbara County Crystalline Silica Study, Santa Barbara County Air Pollution Control District, June 1993). This prior study concluded that the measurement of crystalline silica in downtown Santa Maria was probably due to "higher than average 're-suspended paved road dust' impact," rather than industrial sources.

As stated in the sampling protocol (Appendix A), PVC filters were used for collecting the air samples. The PVC filters, 47 millimeters in diameter, were commercially available in two pore sizes: 0.8 and 5.0 microns. In preparation for this study, attempts were made to use filters with a pore size of 0.8 microns. Unfortunately, particulate matter collected on these filters resulted in a flow restriction and the pumps shut off automatically after less than two hours. Because of this, filters with a 5.0 micron pore size were used for this study. According to a representative of Millipore Corporation, the manufacturer of the filters, during initial stages of air sampling, until a filter is coated with particulate matter, particles much smaller than the pore size (e.g., particles of less than one micron in diameter) may pass through the filter. It is unknown what percent of particles in Lompoc air would have been small enough to pass through the filters during this pilot study.

On the three sampling days targeted for the wind to be from the south (from the direction of the Colito mine towards Lompoc), Colito staff verified that the distemperous

February 7. Prior to and following the launch, the wind was from the northwest, from the launch site toward Lompoc. No cristobalite or quartz was quantified at any of the three Lompoc sampling sites on this sampling day. The PVC air sampling filters used for collecting the cristobalite and quartz air samples were not appropriate for analysis of possible emissions (e.g., gases or metals) from the missile launch. As shown in Appendix D, the PM-10 air concentrations were slightly higher at all three Lompoc sampling sites during this 24-hour sampling period than any of the other sampling days in Lompoc. Due to the limited number of samples, we cannot speculate as to whether or not this was a coincidence.

As stated in the sampling protocol, air monitoring was conducted based upon forecast wind directions. Three sampling days were targeted for prevailing winds from the west and three sampling days were targeted for winds from the south (from Celite toward Lompoc). Rain fell during one of these southerly wind sampling days (February 17), causing two of the sampling pumps to stop operating. Those two samples were invalidated. The remaining three sampling days had collocated sampling conducted in Lompoc for quality assurance with simultaneous sampling in Santa Maria as a background site. The meteorological data for Lompoc (wind speed and direction, temperature, standard deviation of the wind direction, and rainfall) for the sampling days are presented in Appendix E. Attempts were made to obtain meteorological data for Santa Maria to coincide with the samples collected at the background site in

Appendix A

ARB Sampling Protocol

ARB Sampling Protocol
Pilot Study of Crystalline Silica in Ambient Air in Lompoc, CA
January-February 2001

I. Objective

The objective of this pilot study is to evaluate potential ambient air concentrations of crystalline silica in Lompoc. A limited number of particulate (PM-10) air samples will be collected for subsequent analysis for the quartz and cristobalite forms of crystalline silica. Results may be used to decide if there is a need for more detailed crystalline silica monitoring in the Lompoc area. Other background information, including the analysis method and procedures for data reporting and interpretation, are contained in Attachment 1.

II. Sampling

PM-10 sampling will be conducted by a LIWG contractor at the three sites listed in Attachment 2. These sites are located in the southwest, central, and east portions of Lompoc. Six 24-hour samples will be collected at each of the three sites during January and February 2001. Of these sampling periods, three will be conducted during typical meteorological conditions with prevailing winds from the west and northwest. The remaining three sampling periods will be based on weather forecasts on days when the wind direction is predicted to be from the south prior to the passage of a cold front. A southerly wind would have the greatest potential to bring crystalline silica down into Lompoc from the diatomaceous earth processing plant located in the hills south of Lompoc. The choice of these days will be based on consultation between the contractor collecting the samples and staff of the Air Resources Board (ARB). Meteorological data for this sampling will be obtained from the Santa Barbara County Air Pollution Control District (SBCAPCD) monitoring site in central Lompoc.

Background samples will be collected in Santa Maria, outside of the Lompoc Valley. On three days, samples will be collected at the background site. On these same days, duplicate filters will be collected at the SBCAPCD site in Lompoc using collocated PM-10 samplers for comparison with the background and to assess sampling precision.

PM-10 samplers (BGI model PQ100 samplers, a U.S. EPA reference method for PM-10) will be used for this study. Although the PQ100 samplers are equipped with batteries, the samplers will be connected to AC. Sampling will consist of pulling air at a rate of about 16.7 liters per minute through a PVC filter (47 mm in diameter, 5 μ m pore size) over a period of 24 hours. Filters will be pre-weighed and placed in individually numbered petri dish containers. After sample collection, filters will be stored in the same numbered container and placed in a cool, secure location until the completion of sampling, at which time the filters will be transported to ARB's laboratory for gravimetric determination, followed by delivery to UC Davis for crystalline silica analysis. Flows will

be verified prior to and following the study with a referenced flow-measuring device. A

Attachment 1

PILOT STUDY OF CRYSTALLINE SILICA IN AMBIENT AIR IN LOMPOC, CA

Principal Investigator: Britt A. Holmén, University of California, Davis

I. Introduction

In 1997, the Lompoc Interagency Work Group (LIWG) was formed to investigate respiratory illnesses in Lompoc. The primary focus of the LIWG has been to determine whether potential exposure to pesticides is associated with the respiratory illnesses. In 1998, the LIWG endorsed recommendations to conduct ambient air monitoring in Lompoc for pesticides, metals, and crystalline silica.

The Other Environmental Issues Subgroup of the LIWG has been evaluating environmental conditions in Lompoc that may be related to the respiratory illnesses. Of primary interest is crystalline silica that may be emitted by the diatomaceous earth processing industry near Lompoc. To evaluate potential ambient air concentrations of crystalline silica, a limited number of particulate (PM₁₀) samples will be collected from sites near the diatomaceous earth processing facility.

chloride (PVC) membrane filters are recommended by filter manufacturers and laboratories for trapping and subsequent analysis of crystalline silica. A detailed sampling protocol listing sampling procedures will be provided to the sampling technician. The expected sampling duration should allow for collecting ~ 1-2 mg of particulates per filter. Filters will be pre-weighed, numbered and stored in individual petri dish containers prior to sampling. After

Attachment 2

Lompoc Crystalline Silica Sampling Sites

1. Miguelito School (southwest corner of Lompoc)
1600 W. Olive St. at V St.
Sampler location: roof of restroom building
Contact: Duane Schuyler or Shirley Edwards (805) 736-2371
Permission granted by: Earl Wammack (805) 736-2371
2. Santa Barbara County APCD monitoring trailer (downtown Lompoc)
Between G and H Streets, 1/2 block south of Ocean Ave.
Sampler location: roof of trailer
Contact: Joel Cordes (805) 961-8816
3. Santa Barbara County Maintenance Yard (eastern Lompoc)
Sweeney Rd. at Highway 246

Attachment 3

CHAIN OF CUSTODY FORM
CALIFORNIA AIR RESOURCES BOARD
MONITORING AND LABORATORY DIVISION
P.O. Box 2815, Sacramento CA 95812

CHAIN OF CUSTODY

SAMPLE RECORD

Job #: _____ Date: _____
 Sample/Run #: _____ Time: _____
 Job Name: _____
 Sample Location: _____
 Type of Sample: _____
 Log #'s: _____

ACTION	DATE	TIME	INITIALS		METHOD OF STORAGE
Sample Collected					freezer, ice or dry ice
			GIVEN BY	TAKEN BY	
Transfer					
Transfer					
Transfer					
Transfer					
Transfer					
Transfer					

LOG #	ID #	

RETURN THIS FORM TO: _____

Attachment 4

Field Log Sheet

Project: Pilot Study of Crystalline Silica in Ambient Air in Lompoc, CA

[illegible]

Appendix B

Lompoc Project Final Report, UC Davis

Lompoc Project Final Report

Pilot Study of Crystalline Silica in Ambient Air in Lompoc, California

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Crocker Nuclear Laboratory
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June 30, 2001

INTRODUCTION

The concentration of crystalline silica (CS; as both the cristobalite and quartz forms) in twenty-seven airborne PM₁₀ samples collected by the California Air Resources Board at sites in the city of Lompoc, CA was determined by X-ray diffractometry at the Crocker Nuclear Laboratory, University of California, Davis. The concentration of CS was also determined for 10 grab samples of bulk materials that are considered to be potential sources of airborne dust in the city. This report summarizes the X-ray diffraction sample preparation and analysis methods and sample results. The analytical method is based on NIOSH Method 7500, "Crystalline Silica by XRD" and OSHA Method ID-142, "Quartz and Cristobalite in Workplace Atmospheres".

The samples that were analyzed are listed in Tables 1 and 2.

Table 1. Reference Materials Description

Sample type	UC Davis Lab No.	ARB: Lab ID	ARB: LIMS ID	ARB: Sampling Date	Form
Reference materials					
	LR01	Celite mine, Lompoc	Dark crude	9/27/00	sand

Table 2. Filter Samples Description

Sample type	UC Davis Lab No.	ARB: Lab ID	ARB: LIMS ID	ARB: Sampling Date	ARB: Sample Mass (μ g)
Filter samples					
	LF02	PF007602	85217	1/25/01	258
	LF03	PF007603	85218	1/25/01	292
	LF04	PF007604	85219	1/25/01	178
	LF05	PF007605	85220	1/30/01	407
	LF06	PF007606	85221	1/30/01	388
	LF07	PF007607	85222	1/30/01	404
	LF08	PF007608	85223	1/31/01	-3
	LF09	PF007609	85224	2/01/01	322
	LF10	PF007610	85225	2/01/01	478
	LF11	PF007611	85226	2/01/01	423
	LF12	PF007612	85227	2/06/01	522
	LF13	PF007613	85228	2/06/01	570
	LF14	PF007614	85229	2/06/01	504
	LF15	PF007615	85230	2/09/01	332
	LF16	PF007616	85231	2/09/01	227
	LF17	PF007617	85232	2/09/01	356
	LF20	PF007620	85233	2/17/01	360
	LF23	PF007623	85234	3/01/01	39
	LF24	PF007624	85235	3/01/01	559
	LF25	PF007625	85236	3/01/01	618
	LF26	PF007626	85237	3/07/01	388
	LF27	PF007627	85238	3/07/01	420
	LF28	PF007628	85239	3/07/01	658
	LF29	PF007629	85240	3/12/01	523
	LF30	PF007630	85241	3/12/01	539
	LF31	PF007631	85242	3/12/01	810
	LF32	PF007632	85243	3/14/01	-12

ANALYTICAL METHOD

Overview

The California Air Resources Board collected 24-hour PM₁₀ samples on PVC filters (47 mm, 5 micron pore size) at a flow rate of 16.7 liters per minute. At UC Davis, the PVC filter containing the PM₁₀ sample was placed in tetrahydrofuran (THF) to dissolve the filter and suspend the particulate matter. Using a filtration apparatus, the particulate matter was deposited onto a pre-weighed silver membrane filter. After drying, the silver filter was scanned by X-ray diffraction and the diffraction peaks for quartz and cristobalite were quantified by comparison to calibration standards.

Materials used

- Respirable cristobalite standard (Standard reference material for quantitative XRD prepared by the National Institute of Standards and Technology, 1879a). The range of particle size was between 1 and 10 μ m.
- Respirable quartz standard (Standard reference material for quantitative XRD prepared

by the National Institute of Occupational Safety and Health, Q-1). The particle size was smaller than 16 μm (99.1% was < 10 μm).

- 2-propanol (ACS certified grade, Fisher Scientific)
- Tetrahydrofuran (Optima grade, Fisher Scientific)
- Silver (Ag) membrane filter (0.45 μm , Osmonics)

Preparation of samples for XRD

A. Calibration standards

The series of quartz and cristobalite standards were prepared from liquid suspensions in 2-propanol. The method proceeded in the following steps:

1. 10 or 50 mg of standard material (NIST cristobalite and NIOSH quartz) was weighed on a microbalance.
2. The standard material was transferred to a 500ml volumetric flask and the volume adjusted to 500 ml with 2-propanol.
3. The suspension was sonicated for 20 minutes.
4. The suspension was stirred magnetically while aliquots of the suspension (0.5 to 20 ml) were removed using a glass volumetric pipet.
5. The aliquots were deposited onto pre-weighed Ag membrane filters mounted in a vacuum filtration apparatus. Different standard masses were prepared by adding different volumes of the suspension to the Ag membrane filter.
6. During the filtration step, about 5 ml of 2-propanol was placed in the filtration apparatus funnel (16 mm I.D., ~ 15 ml in volume) prior to adding the suspension. After the suspension volume was added, the inside of the transfer pipet was washed down two times with 2-propanol.
7. Finally, the suspension was filtered until the Ag filter was visually dry.
8. The Ag membrane filter was air dried overnight in a loosely covered petri dish.
9. The dry Ag membrane filter was re-weighed to determine the mass of standard material.
10. A total of 6 and 8 concentrations were prepared for cristobalite and quartz, respectively and each concentration was prepared and analyzed in triplicate.
11. Three blanks were prepared by filtering ~ 15 ml of 2-propanol through a pre-weighed Ag membrane filter. These blanks were used for both cristobalite and quartz quantification.

B. Filter samples

All PVC filters were dissolved in tetrahydrofuran (THF) using the following procedure:

1. Prior to dissolution, THF was filtered using Ag membrane filters
2. Each filter sample was placed into a clean 250 ml glass beaker containing 20 ml filtered THF and covered with a watch glass.
3. After standing 5 min, the beaker was agitated by hand and then the supernatant was transferred directly into the filtration funnel of the vacuum filtration apparatus described above in Steps A5 and A6.
4. The walls of the 250 ml beaker were rinsed three times each with 10 ml of filtered THF and this solution was added to the filtration funnel.
5. The suspension was filtered until the Ag filter was visually dry.
6. The Ag membrane filter was air dried overnight in a loosely covered petri dish.
7. The dry Ag membrane filter was re-weighed to determine the mass of the sample.

NOTE: Initial experiments examined the dissolution of the PVC filters into tetrahydrofuran (THF) by dissolving four blank PVC filters in untreated THF. The difference in the Ag membrane filter weight before and after dissolution of the four filters was $120 (\pm 26) \mu\text{g}$, suggesting some residue remained on the Ag membrane filters. The source of this residue could be the PVC filters, the THF, or THF oxidation products formed during sonication. Prior to the dissolution of field filter samples, we further investigated the possible sources of the residue by dissolving a series of blank PVC filters treated under a range of conditions. The conditions included filtering different volumes of THF, changing the duration of sonication (0 to 20 min), and using untreated and pre-filtered THF. There was no systematic relationship between experimental conditions and Ag membrane weight gain. The mean weight increase over all “dissolution” blanks was $116 (\pm 28) \mu\text{g}$ ($n = 13$), quite similar to that obtained from the initial four blank PVC filters. Because sonication was not necessary to dissolve these filters and it was considered a potential source of residue formation, the filter sample preparation procedures did not include sonication. Further, all results reported as “Mass used for XRD” (see Table 4) are the measured difference in the weight of the Ag membrane filter before and after the PVC filter dissolution and are not corrected for residue. In other words, the average dissolution blank residue mass was not subtracted from the measured mass difference. The mass fraction values in Table 4 were computed using this laboratory mass value rather than the “Sample Mass” reported by ARB.

C. Reference materials

Two block samples (Celite mine, Lompoc, Dark and light crude, block; UC Davis Lab No. LR02 and LR03) were crushed in their sample bags using a hammer and were then gently crushed using a ceramic pestle in a mortar. Then these samples and five other reference materials (LR01, LR04, LR08 to LR10) were dried at 110°C in an oven over night. Particles smaller than 75 μm were collected by dry sieving these samples. Finally, these powders were ground finely in an agate mortar for about 10 min until a smooth texture was achieved that indicated grain sizes smaller than 10 μm . No treatment was performed for reference materials LR05, LR06, and LR07 prior to filtration onto Ag membrane filters.

Each sample was weighed ($\sim 500 \mu\text{g}$) and transferred to a 50 ml glass beaker to which approximately 10 ml 2-propanol was added. After placing a watch glass on a beaker, the sample

because often only the primary peak is detectable. All references to "cristobalite" in this report are based on comparison to the NIST α -cristobalite standard; no opal standards were analyzed. The cristobalite standards showed sharp diffraction peaks whereas the majority of the filter and reference material samples had small, broad peaks in the cristobalite peak position. The broadening of the peaks in XRD generally indicates contributions from more amorphous/ poorly

distinguish crystalline (ID= "C") from poorly crystalline (ID= "PC"). In other words, if the measured peak width (FWHM) exceeded 0.36 degrees, the Type 2 sample was assigned a cristobalite ID of "poorly crystalline" in Table 4. Note that small peaks near the baseline have profiles that are very difficult to assign a meaningful peak width. Therefore, when the quantified cristobalite concentrations are near the limit of detection, the ID assignment should be viewed skeptically.

Improved identification of the cristobalite peak mineralogy in the Lompoc samples can be achieved by (a) obtaining additional ancillary data such as sampling location, wind direction (for filter samples) and sample history (i.e., Celite product samples) and (b) conducting more

DIANO diffraction peaks

Table 3 summarizes the 2θ values ($^{\circ}$) for the primary peaks of minerals identified in the standards and Lompoc samples.

Table 3. DIANO 2θ values ($^{\circ}$)

Mineral	Primary Peak
Cristobalite (standard only)	22.07
Quartz	26.73
Albite	28.00
Biotite	8.88

(but LF06 and LF10 were < LOD). Sample LF08, an agricultural soil, had the highest quartz content (15.0 wt%).

Other Minerals. Wide-range diffraction measurements showed that reference materials from the Celite mine, LR01 to LR05, contained quartz and albite as main constituents (Peaks at $2\theta = \sim 32.2^\circ$ and 36.2° are for the silver membrane substrate). Materials LR06 and LR07 showed distinct cristobalite primary peaks, suggesting those samples contain cristobalite with high crystallinity. The agricultural soil diffraction patterns of LR08 and LR09 showed that the soil contained quartz, albite, and mica (probably biotite). The main constituent of LR10 was celestine.

Table 4. X-Ray Diffraction Results for Cristobalite and Quartz in Lompoc Samples

UC Davis Lab No.	ARB: Lab ID	ARB: LIMS ID	Sampling Date	ARB	UCD	"Cristobalite"						Quartz			Water Content (%)
				Sample	Mass	C Mass	1σ	C Mass	C Peak			Q Mass	1σ	Q Mass	
				Mass (μg)	for XRD (μg)	(μg)	(μg)	Fraction (%)	Type (see text)	FWHM (°)	ID	(μg)	(μg)	Fraction (%)	
Filter samples															
PVC-B17	(Blank of PVC filter dissolution by tetrahydrofuran)					109	< LOD						< LOD		
LF02	PF007602	85217	1/25/01	258	280	4.1	3.9	1.5	3	-	PC	< LOD			
LF03	PF007603	85218	1/25/01	292	305	7.0	3.8	2.3	2	0.44	PC	< LOD			
LF04	PF007604	85219	1/25/01	178	170	4.5	3.8	2.6	3	-	PC	< LOD			
LF05	PF007605	85220	1/30/01	407	422	4.8	3.8	1.1	3	-	PC	< LOD			

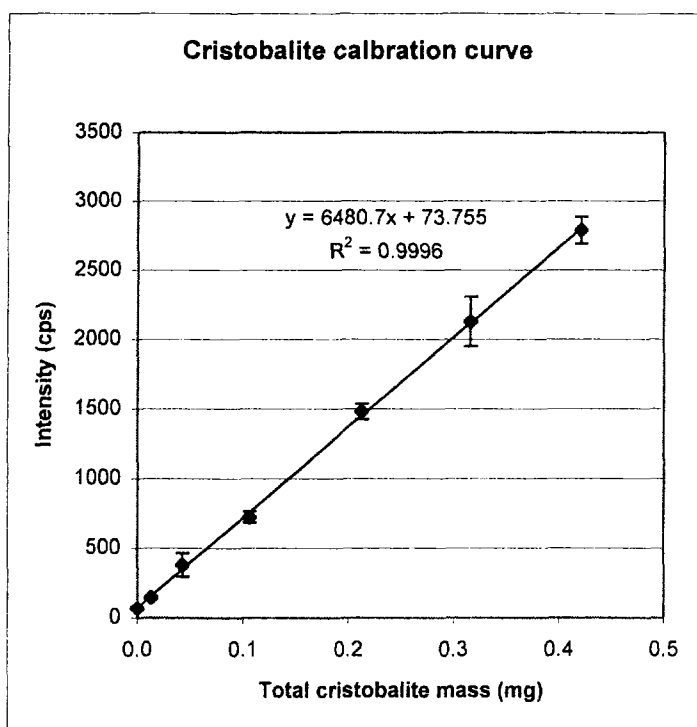
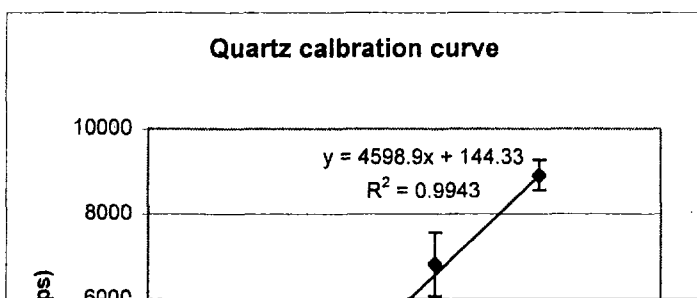
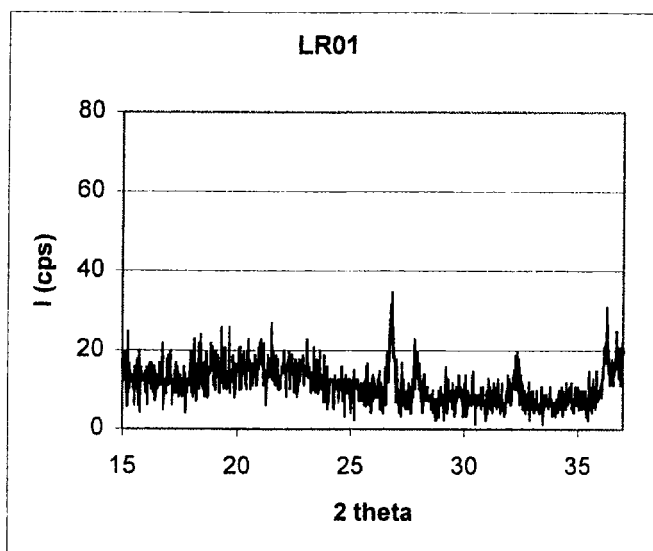


Figure 1. Cristobalite Calibration Curve

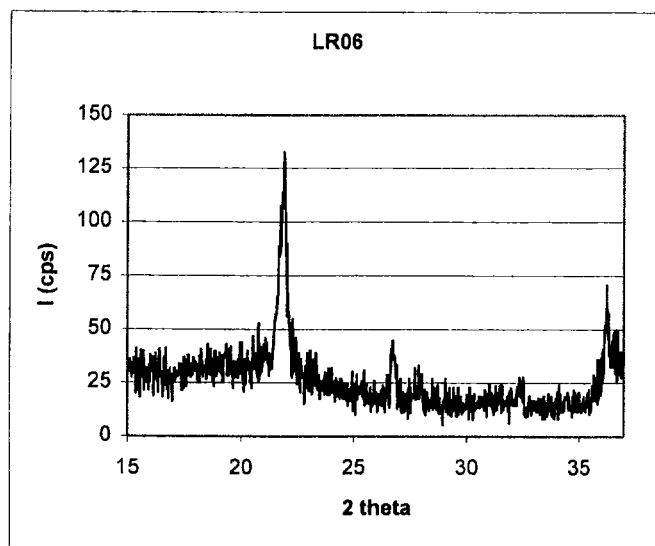


APPENDIX

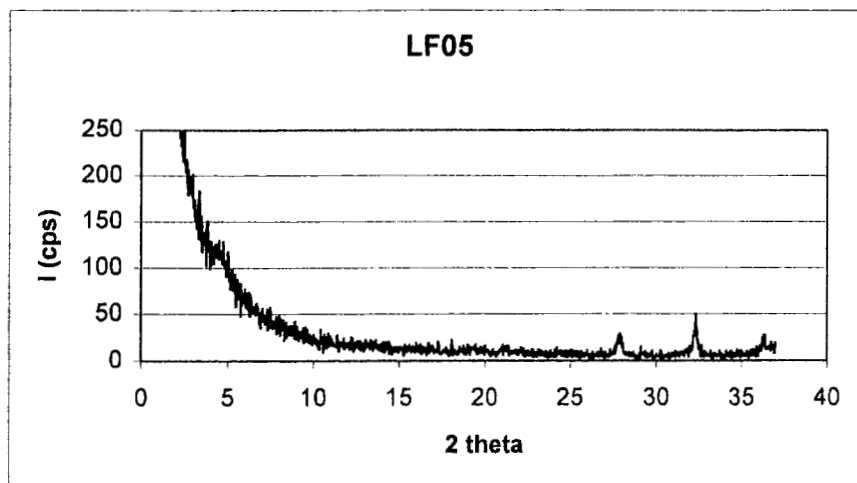
X-ray diffraction patterns (wide scans) of several reference materials and filter samples.



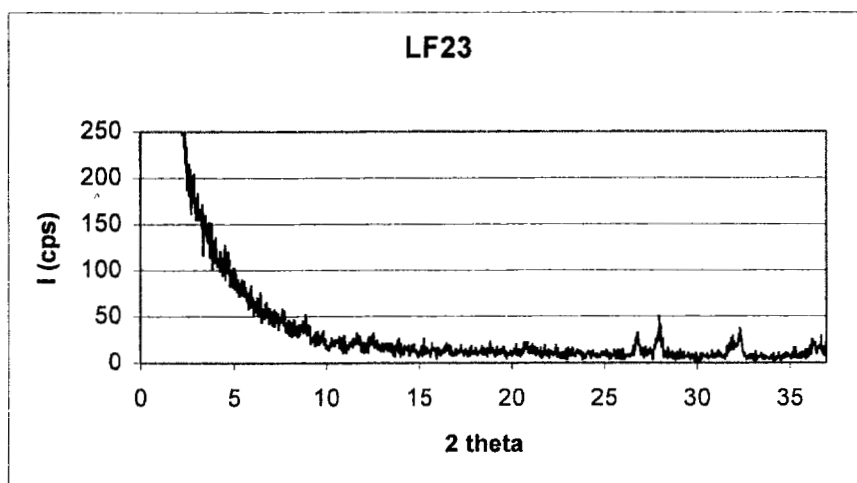
Celite Mine, Lompoc, Dark Crude



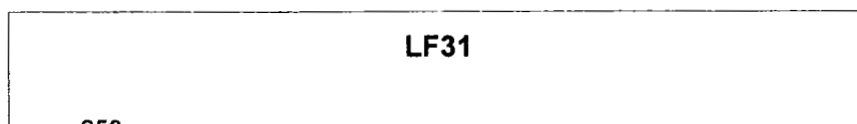
Celite, Lompoc, Celite 512



Filter Sample PF007605



Filter Sample PF007623



Appendix C

Protocol for Soil/Materials Sampling at Agricultural
Fields and Celite Mine in Lompoc – September 2000

9/25/00

PROTOCOL FOR SOIL/MATERIALS SAMPLING AT AGRICULTURAL FIELDS AND CELITE MINE IN LOMPOC - SEPTEMBER 2000

Introduction

In support of the Lompoc Interagency Work Group investigation of respiratory illnesses in Lompoc, the Air Resources Board (ARB) plans to conduct ambient air monitoring for crystalline silica in Lompoc during the fall of 2000. In preparation for this ambient air monitoring, soil/materials samples will be collected at agricultural fields west of Lompoc and at the Celite mine in the hills south of Lompoc. The objective of this soil/materials sampling is to determine the presence or absence of the quartz or cristobalite forms of crystalline silica, which will be analyzed for during the ambient air monitoring. This soil/materials sampling has been coordinated with staff of Celite and the Santa Barbara County Office of the Agricultural Commissioner.

Sampling Procedures

Composite soil samples will be collected by ARB staff from two fields west of Lompoc. Composite soil/materials samples will also be collected from three locations at Celite: 1) from the tailings piles, 2) of mined material prior to processing in the kiln, and 3) of

Appendix D

PM-10 Concentrations on Sampling Days

PM-10 Concentrations on Sampling Days – January – March 2001
($\mu\text{g}/\text{m}^3$)

<u>Sampling Day</u>	<u>Sampling Sites</u>		<u>Maintenance Yard</u>	<u>Miguelito School</u>	<u>Santa Maria</u>
	<u>H Street Primary</u>	<u>Duplicate</u>			
1/25-26 ^a	11		7	12	
1/31-2/1 ^b	16		17	17	
2/1-2 ^b	20		13	18	
2/6-7 ^{b,d}	24		22	21	
2/9-10 ^a	14		13	15	
2/17-18 ^a	void		void	15	
3/1-2 ^c	23	26			2
3/7-8 ^c	16	18			35
3/12-13 ^c	22	22			34

^a = southerly wind sampling event (wind predicted to be from the south, from the Celite mine and processing plant towards Lompoc)

^b = westerly wind sampling event (wind predicted to be from the west, the prevailing direction for the Lompoc Valley)

^c = collocated sampling conducted at H Street site and background sampling conducted at Santa Maria site

^d = Minuteman III missile launch at Vandenberg AFB during this sampling period

Void samples

Blank filters

Two PVC filters were weighed following the Lompoc sampling as trip blanks. These two filters were weighed along with all of the study filters prior to sampling, accompanied all study filters in storage in Lompoc and were transported back to Sacramento with the study filters. Both blank filters lost mass (3 and 12 micrograms, or a loss of 0.01 and 0.05 percent). This is not surprising as PVC filters lose mass due to volatilization of the filter media. This loss does not affect the PM-10 sampling results.

Mass Summary of Lompoc Silica Study

Lab Id	Sampling Date	Pre-Wt Date	Pre-Weight	Post-Wt Date	Post-Weight	Net-Weight	Units
PF007602	01/25/01	12/11/00	23.176	03/19/01	23.434	0.258	milligrams
PF007603	01/25/01	12/11/00	24.275	03/19/01	24.567	0.292	milligrams
PF007604	01/25/01	12/11/00	24.920	03/19/01	25.098	0.178	milligrams
PF007605	01/30/01	12/11/00	27.172	03/19/01	27.579	0.407	milligrams
PF007606	01/30/01	12/11/00	24.942	03/19/01	25.330	0.388	milligrams
PF007607	01/30/01	12/11/00	22.053	03/19/01	22.457	0.404	milligrams
PF007608	01/31/01	12/11/00	28.306	03/19/01	28.303	-0.003	milligrams
PF007609	02/01/01	12/11/00	20.485	03/19/01	20.807	0.322	milligrams
PF007610	02/01/01	12/11/00	22.437	03/19/01	22.915	0.478	milligrams
PF007611	02/01/01	12/11/00	23.079	03/19/01	23.502	0.423	milligrams
PF007612	02/06/01	12/11/00	21.533	03/19/01	22.055	0.522	milligrams
PF007613	02/06/01	12/11/00	22.428	03/19/01	22.998	0.570	milligrams
PF007614	02/06/01	12/11/00	22.682	03/19/01	23.186	0.504	milligrams
PF007615	02/09/01	12/11/00	21.792	03/19/01	22.124	0.332	milligrams
PF007616	02/09/01	12/11/00	22.383	03/19/01	22.610	0.227	milligrams
PF007617	02/09/01	12/11/00	22.356	03/19/01	22.712	0.356	milligrams
PF007620	02/17/01	12/11/00	23.098	03/19/01	23.458	0.360	milligrams
PF007623	03/01/01	12/11/00	22.646	03/19/01	22.685	0.039	milligrams
PF007624	03/01/01	12/11/00	23.956	03/19/01	24.515	0.559	milligrams
PF007625	03/01/01	12/11/00	28.970	03/19/01	29.588	0.618	milligrams
PF007626	03/07/01	12/11/00	32.315	03/19/01	32.703	0.388	milligrams
PF007627	03/07/01	12/11/00	29.677	03/19/01	30.097	0.420	milligrams
PF007628	03/07/01	12/11/00	26.015	03/19/01	26.673	0.658	milligrams
PF007629	03/12/01	12/11/00	26.145	03/19/01	26.668	0.523	milligrams
PF007630	03/12/01	12/11/00	22.842	03/19/01	23.381	0.539	milligrams
PF007631	03/12/01	12/11/00	22.140	03/19/01	22.950	0.810	milligrams
PF007632	03/14/01	12/11/00	22.366	03/19/01	22.354	-0.012	milligrams

Appendix E

Lompoc Meteorological Data for Sampling Days

Lompoc Meteorological Data for Sampling Days

Hourly meteorological data (wind speed and direction, temperature, and standard deviation of the wind direction) for the nine sampling days are presented on the next several pages. The hourly data were provided by the Santa Barbara County Air Pollution Control District from their air monitoring station located between G and H Streets, one half block south of Ocean Avenue in Lompoc. In addition, rainfall data for the sampling days are presented on the next page. The rainfall data were provided by the Lompoc Record from their rain gauge located at the corner of H Street and Ocean Avenue. During the sampling, weather forecasts and real-time meteorological data from the Lompoc Airport were used in making the decision of which days represented desired meteorological conditions for sampling. Following is a summary of the predominant wind directions (the direction the wind was from) from the H Street station for the sampling days:

<u>Sampling Period</u>	<u>Predominant Wind Direction</u>
1	SE, NW
2	W, E
3	W, NE
4	NW
5	SE
6	SE
7	NW, W, NE
8	NW, N
9	NW, S

The attached meteorological data (times are local time, PST) are summarized under the following headings:

WSR = wind speed, resultant, in meters per second

WDR = wind direction, resultant, in degrees

WSA = wind speed, arithmetic average, in meters per second

Lompoc Rainfall

<u>Date</u>	<u>Rainfall (inches)</u>
1/25/01	0.00
1/26/01	0.00
1/31/01	0.00
2/1/01	0.00
2/2/01	0.00
2/6/01	0.00
2/7/01	0.00
2/9/01	0.00
2/10/01	0.00
2/17/01	0.30
2/18/01	0.00
3/1/01	0.00
3/2/01	0.00
3/7/01	0.20
3/8/01	0.05
3/12/01	0.00
3/13/01	0.00

METEOROLOGICAL REPORT

Report Date: 24-OCT-2001 13:49

For Data From: 25-JAN-2001 00:00

To: 26-JAN-2001 23:00

STATION: LOMPOC-H

DATE/TIME	WSR M/S	WDR DEG	WSA M/S	WDA DEG	ATM DEG/C	SIGT DEG	SIGV M/S
25-JAN-2001 00:00	0.1	155.	0.6	88.	5.2	102.7	-999.
25-JAN-2001 01:00	0.3	169.	0.7	165.	4.5	85.1	-999.
25-JAN-2001 02:00	0.4	122.	0.7	116.	3.7	92.6	-999.
25-JAN-2001 03:00	0.1	71.	0.6	67.	3.4	101.3	-999.

26-JAN-2001 10:00 0.1 294. 0.9 307. 10.3 102.3 -999.

26-JAN-2001 11:00 2.5 275. 2.8 277. 11.7 29.1 -999.

26-JAN-2001 12:00 2.7 288. 3.1 289. 12.0 31.0 -999.

26-JAN-2001 13:00 3.6 279. 3.9 279. 12.2 24.3 -999.

26-JAN-2001 14:00 3.2 278. 3.5 279. 11.1 24.4 -999.

26-JAN-2001 15:00 2.8 303. 3.1 301. 11.3 26.5 -999.

METEOROLOGICAL REPORT

Report Date: 24-OCT-2001 13:50
For Data From: 31-JAN-2001 00:00

To: 01-FEB-2001 23:00

STATION: LOMPOC-H

DATE/TIME	WSR M/S	WDR DEG	WSA M/S	WDA DEG	ATM DEG/C	SIGT DEG	SIGV M/S
31-JAN-2001 00:00	0.4	215.	0.9	217.	4.5	79.9	-999.
31-JAN-2001 01:00	0.1	86.	0.7	111.	3.9	102.8	-999.
31-JAN-2001 02:00	0.3	355.	0.4	357.	3.5	46.5	-999.
31-JAN-2001 03:00	0.7	143.	1.0	151.	4.0	75.8	-999.
31-JAN-2001 04:00	0.2	224.	0.9	141.	3.7	103.5	-999.
31-JAN-2001 05:00	1.5	145.	1.8	138.	4.6	38.4	-999.



01-FEB-2001 10:00	1.4	251.	1.5	253.	11.5	24.0	-999.
01-FEB-2001 11:00	1.3	285.	1.6	286.	15.8	37.6	-999.
01-FEB-2001 12:00	2.8	287.	3.0	286.	17.6	24.6	-999.
01-FEB-2001 13:00	3.3	267.	3.6	267.	17.5	21.8	-999.
01-FEB-2001 14:00	2.8	259.	3.0	261.	18.4	22.3	-999.
01-FEB-2001 15:00	2.7	269.	2.9	268.	19.2	22.0	-999.
01-FEB-2001 16:00	3.5	272.	3.7	271.	16.7	21.1	-999.
01-FEB-2001 17:00	2.6	265.	2.8	265.	13.3	19.0	-999.
01-FEB-2001 18:00	2.1	261.	2.2	261.	12.6	17.3	-999.
01-FEB-2001 19:00	1.5	267.	1.6	267.	11.9	18.8	-999.
01-FEB-2001 20:00	0.6	32.	1.0	40.	9.6	56.6	-999.
01-FEB-2001 21:00	0.6	92.	0.8	93.	7.6	55.6	-999.
01-FEB-2001 22:00	0.6	315.	0.6	315.	6.5	55.6	-999.

METEOROLOGICAL REPORT

Report Date: 24-OCT-2001 13:50

For Data From: 01-FEB-2001 00:00

To: 02-FEB-2001 23:00

STATION: LOMPOC-H

DATE/TIME	WSR M/S	WDR DEG	WSA M/S	WDA DEG	ATM DEG/C	SIGT DEG	SIGV M/S
01-FEB-2001 00:00	1.2	131.	1.7	118.	6.4	79.4	-999.
01-FEB-2001 01:00	1.1	82.	1.3	83.	5.0	38.8	-999.
01-FEB-2001 02:00	0.7	79.	1.1	71.	5.5	60.4	-999.
01-FEB-2001 03:00	0.6	95.	1.5	54.	4.4	79.1	-999.
01-FEB-2001 04:00	1.1	130.	1.5	125.	6.9	69.2	-999.
01-FEB-2001 05:00	0.6	94.	1.7	75.	5.8	86.8	-999.
01-FEB-2001 06:00	1.3	159.	2.2	169.	5.6	57.6	-999.
01-FEB-2001 07:00	0.7	252.	0.9	264.	3.4	51.2	-999.
01-FEB-2001 08:00	0.6	276.	0.7	277.	5.7	41.2	-999.
01-FEB-2001 09:00	1.0	260.	1.1	267.	8.2	36.9	-999.
01-FEB-2001 10:00	1.4	251.	1.5	253.	11.5	24.0	-999.
01-FEB-2001 11:00	1.3	285.	1.6	286.	15.8	37.6	-999.
01-FEB-2001 12:00	2.8	287.	3.0	286.	17.6	24.6	-999.
01-FEB-2001 13:00	3.3	267.	3.6	267.	17.5	21.8	-999.
01-FEB-2001 14:00	2.8	259.	3.0	261.	18.4	22.3	-999.
01-FEB-2001 15:00	2.7	269.	2.9	268.	19.2	22.0	-999.
01-FEB-2001 16:00	3.5	272.	3.7	271.	16.7	21.1	-999.
01-FEB-2001 17:00	2.6	265.	2.8	265.	13.3	19.0	-999.
01-FEB-2001 18:00	2.1	261.	2.2	261.	12.6	17.3	-999.
01-FEB-2001 19:00	1.5	267.	1.6	267.	11.9	18.8	-999.
01-FEB-2001 20:00	0.6	32.	1.0	40.	9.6	56.6	-999.
01-FEB-2001 21:00	0.6	92.	0.8	93.	7.6	55.6	-999.
01-FEB-2001 22:00	0.2	347.	0.6	343.	6.7	73.9	-999.
01-FEB-2001 23:00	0.4	184.	0.7	184.	5.3	62.6	-999.
02-FEB-2001 00:00	0.4	242.	0.6	245.	4.9	80.6	-999.
02-FEB-2001 01:00	0.8	105.	1.0	108.	3.9	38.2	-999.
02-FEB-2001 02:00	0.3	47.	0.8	39.	4.2	81.4	-999.
02-FEB-2001 03:00	0.5	274.	0.8	277.	3.9	51.4	-999.
02-FEB-2001 04:00	0.6	273.	0.8	272.	3.3	49.9	-999.
02-FEB-2001 05:00	0.8	245.	1.0	251.	2.7	49.1	-999.
02-FEB-2001 06:00	0.3	199.	0.7	194.	2.4	87.1	-999.
02-FEB-2001 07:00	0.7	232.	0.8	231.	2.7	30.9	-999.

METEOROLOGICAL REPORT

Report Date: 24-OCT-2001 13:50

For Data From: 01-FEB-2001 00:00

To: 02-FEB-2001 23:00

STATION: LOMPOC-H

DATE/TIME	WSR M/S	WDR DEG	WSA M/S	WDA DEG	ATM DEG/C	SIGT DEG	SIGV M/S
02-FEB-2001 08:00	0.0	81.	0.7	41.	4.5	97.2	-999.
02-FEB-2001 09:00	0.2	69.	0.7	85.	8.6	96.8	-999.



02-FEB-2001 10:00	0.1	45.	0.7	57.	13.6	95.2	-999.
02-FEB-2001 11:00	1.3	289.	1.6	289.	16.8	43.7	-999.
02-FEB-2001 12:00	3.1	274.	3.3	276.	18.0	24.5	-999.
02-FEB-2001 13:00	4.1	271.	4.4	272.	17.9	21.4	-999.
02-FEB-2001 14:00	4.6	263.	4.9	263.	16.0	18.8	-999.
02-FEB-2001 15:00	4.3	263.	4.5	264.	15.7	20.0	-999.
02-FEB-2001 16:00	4.2	268.	4.4	267.	14.7	20.1	-999.
02-FEB-2001 17:00	3.7	258.	3.9	258.	12.9	17.3	-999.
02-FEB-2001 18:00	1.4	265.	1.8	263.	12.6	57.8	-999.
02-FEB-2001 19:00	0.5	166.	0.7	159.	10.6	85.2	-999.
02-FEB-2001 20:00	0.2	70.	0.6	52.	9.7	92.2	-999.
02-FEB-2001 21:00	0.2	160.	0.5	175.	9.1	89.9	-999.
02-FEB-2001 22:00	0.3	57.	0.5	54.	8.6	49.2	-999.
02-FEB-2001 23:00	0.2	332.	0.8	26.	8.2	86.3	-999.

METEOROLOGICAL REPORT

Report Date: 24-OCT-2001 13:51

For Data From: 06-FEB-2001 00:00

To: 07-FEB-2001 23:00

STATION: LOMPOC-H

DATE/TIME	WSR M/S	WDR DEG	WSA M/S	WDA DEG	ATM DEG/C	SIGT DEG	SIGV M/S
06-FEB-2001 00:00	3.1	275.	3.3	276.	12.2	20.8	-999.
06-FEB-2001 01:00	2.4	279.	2.6	280.	11.9	22.8	-999.
06-FEB-2001 02:00	2.1	271.	2.2	272.	12.1	23.4	-999.
06-FEB-2001 03:00	2.1	287.	2.3	289.	11.6	25.3	-999.
06-FEB-2001 04:00	2.7	275.	2.9	276.	11.3	23.8	-999.
06-FEB-2001 05:00	2.5	287.	2.7	287.	11.4	22.7	-999.
06-FEB-2001 06:00	2.3	295.	2.5	294.	11.1	22.9	-999.
06-FEB-2001 07:00	2.3	300.	2.5	299.	11.1	23.0	-999.
06-FEB-2001 08:00	3.3	287.	3.5	287.	11.5	23.6	-999.
06-FEB-2001 09:00	4.2	298.	4.5	297.	12.4	20.9	-999.
06-FEB-2001 10:00	4.5	300.	4.8	299.	12.9	21.5	-999.
06-FEB-2001 11:00	5.7	299.	6.1	298.	13.1	20.6	-999.
06-FEB-2001 12:00	5.3	296.	5.8	295.	13.1	23.6	-999.
06-FEB-2001 13:00	6.0	302.	6.3	301.	12.5	20.9	-999.
06-FEB-2001 14:00	5.9	304.	6.3	304.	12.1	21.0	-999.
06-FEB-2001 15:00	6.2	307.	6.6	307.	11.9	19.2	-999.
06-FEB-2001 16:00	6.4	305.	6.8	304.	11.0	20.4	-999.
06-FEB-2001 17:00	5.4	299.	5.7	299.	10.3	21.5	-999.
06-FEB-2001 18:00	5.5	302.	5.8	301.	9.8	19.8	-999.
06-FEB-2001 19:00	5.6	304.	5.9	304.	9.7	20.2	-999.
06-FEB-2001 20:00	5.3	312.	5.6	311.	9.9	20.0	-999.
06-FEB-2001 21:00	4.7	316.	5.0	315.	9.3	19.3	-999.
06-FEB-2001 22:00	2.9	321.	3.1	323.	8.9	22.4	-999.
06-FEB-2001 23:00	2.1	328.	2.2	328.	8.0	19.6	-999.
07-FEB-2001 00:00	1.9	338.	2.1	337.	7.5	19.2	-999.
07-FEB-2001 01:00	3.2	327.	3.4	326.	8.4	20.9	-999.
07-FEB-2001 02:00	3.8	315.	4.1	314.	8.8	20.5	-999.
07-FEB-2001 03:00	2.9	323.	3.2	326.	8.3	22.9	-999.
07-FEB-2001 04:00	1.7	316.	1.9	313.	6.4	26.3	-999.
07-FEB-2001 05:00	1.2	263.	1.2	262.	5.1	20.9	-999.
07-FEB-2001 06:00	1.0	213.	1.1	213.	3.7	35.0	-999.
07-FEB-2001 07:00	0.7	177.	0.9	167.	4.0	50.0	-999.

METEOROLOGICAL REPORT

Report Date: 24-OCT-2001 13:51

For Data From: 06-FEB-2001 00:00

To: 07-FEB-2001 23:00

STATION: LOMPOC-H

DATE/TIME	WSR M/S	WDR DEG	WSA M/S	WDA DEG	ATM DEG/C	SIGT DEG	SIGV M/S
07-FEB-2001 08:00	0.7	189.	0.8	181.	6.2	64.3	-999.
07-FEB-2001 09:00	1.1	345.	1.3	346.	8.2	42.5	-999.

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07-FEB-2001 10:00	3.2	334.	3.5	332.	10.6	26.6	-999.
07-FEB-2001 11:00	3.6	316.	4.1	314.	11.3	29.8	-999.
07-FEB-2001 12:00	4.5	312.	4.8	312.	11.1	23.5	-999.
07-FEB-2001 13:00	4.6	299.	5.0	298.	11.1	22.6	-999.

METEOROLOGICAL REPORT

Report Date: 24-OCT-2001 13:51
For Data From: 09-FEB-2001 00:00

To: 10-FEB-2001 23:00

STATION: LOMPOC-H

↑
Sampling Period 5
↓

DATE/TIME	WSR M/S	WDR DEG	WSA M/S	WDA DEG	ATM DEG/C	SIGT DEG	SIGV M/S
09-FEB-2001 00:00	0.0	304.	1.0	151.	3.5	100.5	-999.
09-FEB-2001 01:00	0.4	201.	1.0	193.	2.5	66.0	-999.
09-FEB-2001 02:00	0.9	76.	1.2	82.	3.3	72.5	-999.
09-FEB-2001 03:00	0.9	273.	1.0	281.	2.6	34.7	-999.
09-FEB-2001 04:00	0.5	109.	0.9	109.	1.8	55.6	-999.
09-FEB-2001 05:00	0.5	90.	0.8	91.	2.4	79.3	-999.
09-FEB-2001 06:00	0.5	38.	0.8	32.	3.5	52.7	-999.
09-FEB-2001 07:00	0.9	284.	1.0	287.	3.8	30.0	-999.
09-FEB-2001 08:00	0.6	102.	1.5	55.	6.3	81.4	-999.
09-FEB-2001 09:00	4.4	145.	4.6	146.	10.5	17.9	-999.
09-FEB-2001 10:00	4.0	140.	4.2	141.	11.4	21.8	-999.
09-FEB-2001 11:00	3.2	135.	3.5	135.	11.0	26.1	-999.
09-FEB-2001 12:00	5.2	139.	5.5	141.	12.4	21.0	-999.
09-FEB-2001 13:00	5.4	142.	5.8	144.	12.7	22.3	-999.
09-FEB-2001 14:00	6.3	138.	6.5	138.	11.3	16.0	-999.
09-FEB-2001 15:00	4.6	140.	4.8	142.	10.3	18.7	-999.
09-FEB-2001 16:00	4.4	144.	4.6	145.	10.2	18.0	-999.
09-FEB-2001 17:00	3.8	136.	3.9	136.	9.6	15.8	-999.
09-FEB-2001 18:00	2.6	145.	2.7	146.	9.8	21.8	-999.
09-FEB-2001 19:00	0.6	114.	1.9	97.	9.7	94.5	-999.
09-FEB-2001 20:00	0.5	105.	1.0	93.	9.6	87.0	-999.
09-FEB-2001 21:00	1.3	163.	1.8	174.	9.8	55.8	-999.
09-FEB-2001 22:00	0.7	132.	1.1	133.	9.7	79.3	-999.
09-FEB-2001 23:00	0.7	142.	0.9	137.	9.3	46.9	-999.
10-FEB-2001 00:00	0.9	161.	1.1	162.	9.1	55.1	-999.
10-FEB-2001 01:00	0.3	115.	0.8	130.	8.9	96.8	-999.
10-FEB-2001 02:00	1.0	157.	1.1	159.	8.0	27.8	-999.
10-FEB-2001 03:00	1.1	121.	1.2	112.	7.3	31.6	-999.
10-FEB-2001 04:00	1.1	92.	1.2	92.	7.1	32.0	-999.
10-FEB-2001 05:00	0.1	211.	1.0	221.	7.1	97.9	-999.
10-FEB-2001 06:00	0.9	115.	1.0	113.	6.9	21.8	-999.
10-FEB-2001 07:00	1.2	139.	1.3	136.	7.4	24.4	-999.

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METEOROLOGICAL REPORT

Report Date: 24-OCT-2001 13:51
For Data From: 09-FEB-2001 00:00
To: 10-FEB-2001 23:00

STATION: LOMPOC-H

DATE/TIME	WSR M/S	WDR DEG	WSA M/S	WDA DEG	ATM DEG/C	SIGT DEG	SIGV M/S
10-FEB-2001 08:00	0.4	225.	1.0	243.	8.2	78.9	-999.
10-FEB-2001 09:00	0.4	20.	0.7	15.	10.0	67.7	-999.

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METEOROLOGICAL REPORT

Report Date: 24-OCT-2001 13:51
For Data From: 17-FEB-2001 00:00

To: 18-FEB-2001 23:00

STATION: LOMPOC-H

Sampling Period

DATE/TIME	WSR M/S	WDR DEG	WSA M/S	WDA DEG	ATM DEG/C	SIGT DEG	SIGV M/S
17-FEB-2001 00:00	1.2	173.	1.3	174.	7.8	26.7	-999.
17-FEB-2001 01:00	0.1	100.	0.7	41.	7.3	96.7	-999.
17-FEB-2001 02:00	1.9	117.	2.0	115.	9.0	16.1	-999.
17-FEB-2001 03:00	1.4	127.	2.1	141.	9.3	73.4	-999.
17-FEB-2001 04:00	0.8	229.	1.0	230.	8.3	60.9	-999.
17-FEB-2001 05:00	0.6	57.	0.9	59.	7.9	70.5	-999.
17-FEB-2001 06:00	1.6	110.	1.7	110.	9.3	12.5	-999.
17-FEB-2001 07:00	1.3	102.	1.7	108.	9.8	59.5	-999.
17-FEB-2001 08:00	1.7	102.	2.0	98.	11.4	38.3	-999.
17-FEB-2001 09:00	3.5	124.	3.6	124.	13.1	16.7	-999.
17-FEB-2001 10:00	4.3	123.	4.6	121.	15.4	29.9	-999.
17-FEB-2001 11:00	5.2	134.	5.5	136.	16.4	20.5	-999.
17-FEB-2001 12:00	4.3	145.	4.7	148.	15.9	25.2	-999.
17-FEB-2001 13:00	3.9	157.	4.3	157.	15.4	24.4	-999.
17-FEB-2001 14:00	4.7	143.	5.1	144.	15.7	22.2	-999.
17-FEB-2001 15:00	4.4	154.	4.7	154.	14.5	22.2	-999.
17-FEB-2001 16:00	3.8	145.	4.0	147.	13.3	19.3	-999.
17-FEB-2001 17:00	3.3	143.	3.5	144.	12.9	19.0	-999.
17-FEB-2001 18:00	4.1	137.	4.2	138.	13.0	15.6	-999.
17-FEB-2001 19:00	4.3	130.	4.5	131.	12.8	19.1	-999.
17-FEB-2001 20:00	3.2	141.	3.4	142.	12.7	19.5	-999.
17-FEB-2001 21:00	5.6	133.	5.8	133.	12.8	14.2	-999.
17-FEB-2001 22:00	5.9	138.	6.1	139.	12.7	15.8	-999.
17-FEB-2001 23:00	5.9	138.	6.1	138.	10.8	15.4	-999.
18-FEB-2001 00:00	4.7	144.	4.9	145.	10.2	17.7	-999.
18-FEB-2001 01:00	4.6	137.	4.8	137.	10.4	15.5	-999.
18-FEB-2001 02:00	3.9	143.	4.1	145.	10.9	18.9	-999.
18-FEB-2001 03:00	3.1	126.	3.2	126.	11.0	15.6	-999.
18-FEB-2001 04:00	3.3	126.	3.5	128.	10.4	20.6	-999.
18-FEB-2001 05:00	1.1	146.	1.5	154.	10.4	78.2	-999.
18-FEB-2001 06:00	1.2	127.	1.4	122.	10.5	51.1	-999.
18-FEB-2001 07:00	0.5	115.	1.0	110.	10.7	99.7	-999.

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METEOROLOGICAL REPORT

Report Date: 24-OCT-2001 13:51
For Data From: 17-FEB-2001 00:00
To: 18-FEB-2001 23:00

STATION: LOMPOC-H

DATE/TIME	WSR M/S	WDR DEG	WSA M/S	WDA DEG	ATM DEG/C	SIGT DEG	SIGV M/S
18-FEB-2001 08:00	3.0	125.	3.2	127.	11.4	45.4	-999.
18-FEB-2001 09:00	2.7	138.	2.9	140.	12.3	20.5	-999.

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METEOROLOGICAL REPORT

Report Date: 24-OCT-2001 13:52

For Data From: 01-MAR-2001 00:00

To: 02-MAR-2001 23:00

STATION: LOMPOC-H

WSR	WDR	WSA	WDA	ATM	SIGT	SIGV
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02-MAR-2001 10:00	3.1	281.	3.4	281.	13.7	26.6	-999.
02-MAR-2001 11:00	3.5	278.	3.8	278.	13.6	25.5	-999.
02-MAR-2001 12:00	3.2	272.	3.5	272.	13.7	25.0	-999.
02-MAR-2001 13:00	3.3	266.	3.6	265.	12.9	23.9	-999.
02-MAR-2001 14:00	2.7	265.	2.9	267.	12.6	24.8	-999.
02-MAR-2001 15:00	2.9	268.	3.1	268.	12.4	22.9	-999.
02-MAR-2001 16:00	2.5	270.	2.7	271.	12.2	24.5	-999.
02-MAR-2001 17:00	2.7	283.	2.9	282.	11.7	24.2	-999.
02-MAR-2001 18:00	2.6	299.	2.8	298.	11.3	22.1	-999.
02-MAR-2001 19:00	2.5	298.	2.7	297.	11.6	23.0	-999.
02-MAR-2001 20:00	2.0	302.	2.1	301.	11.5	21.1	-999.
02-MAR-2001 21:00	1.7	299.	1.8	297.	11.3	23.0	-999.
02-MAR-2001 22:00	2.0	294.	2.2	294.	11.2	22.2	-999.
02-MAR-2001 23:00	2.1	284.	2.3	284.	11.2	23.5	-999.

METEOROLOGICAL REPORT

Report Date: 24-OCT-2001 13:52
For Data From: 07-MAR-2001 00:00

To: 08-MAR-2001 23:00

STATION: LOMPOC-H

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Sampling Period 8

DATE/TIME	WSR M/S	WDR DEG	WSA M/S	WDA DEG	ATM DEG/C	SIGT DEG	SIGV M/S
07-MAR-2001 00:00	0.2	162.	0.8	171.	10.4	99.3	-999.
07-MAR-2001 01:00	0.5	247.	0.7	248.	10.7	54.1	-999.
07-MAR-2001 02:00	0.5	93.	0.7	97.	10.7	54.5	-999.
07-MAR-2001 03:00	0.2	113.	0.6	71.	10.8	96.5	-999.
07-MAR-2001 04:00	0.5	80.	0.7	71.	11.0	47.5	-999.
07-MAR-2001 05:00	0.3	184.	0.6	201.	10.9	85.2	-999.
07-MAR-2001 06:00	0.2	181.	0.5	178.	10.1	79.0	-999.
07-MAR-2001 07:00	0.5	34.	0.6	43.	10.8	48.2	-999.
07-MAR-2001 08:00	2.2	270.	2.4	272.	13.6	24.6	-999.
07-MAR-2001 09:00	2.9	267.	3.1	268.	14.2	22.4	-999.
07-MAR-2001 10:00	3.4	259.	3.6	259.	15.0	19.5	-999.
07-MAR-2001 11:00	3.4	273.	3.6	274.	16.1	23.6	-999.
07-MAR-2001 12:00	4.3	277.	4.7	277.	15.9	23.8	-999.
07-MAR-2001 13:00	4.7	275.	5.0	275.	15.5	22.1	-999.
07-MAR-2001 14:00	4.0	271.	4.3	271.	15.7	23.0	-999.
07-MAR-2001 15:00	4.2	265.	4.5	265.	15.0	20.6	-999.
07-MAR-2001 16:00	3.9	268.	4.1	268.	14.0	21.9	-999.
07-MAR-2001 17:00	2.9	282.	3.1	283.	13.3	25.4	-999.
07-MAR-2001 18:00	2.3	291.	2.4	289.	12.9	23.8	-999.
07-MAR-2001 19:00	2.1	290.	2.2	290.	12.8	23.6	-999.
07-MAR-2001 20:00	1.9	284.	2.1	284.	12.8	24.2	-999.
07-MAR-2001 21:00	1.8	281.	2.0	281.	12.9	22.4	-999.
07-MAR-2001 22:00	1.6	276.	1.7	277.	12.9	27.2	-999.
07-MAR-2001 23:00	1.5	277.	1.6	278.	12.8	25.8	-999.
08-MAR-2001 00:00	1.0	304.	1.4	306.	12.6	46.0	-999.
08-MAR-2001 01:00	1.0	17.	1.2	16.	12.3	29.3	-999.
08-MAR-2001 02:00	1.1	343.	1.2	341.	12.1	25.7	-999.
08-MAR-2001 03:00	1.1	3.	1.2	3.	11.9	21.0	-999.
08-MAR-2001 04:00	1.0	43.	1.1	43.	11.8	23.6	-999.
08-MAR-2001 05:00	0.9	8.	1.0	9.	11.6	23.9	-999.
08-MAR-2001 06:00	1.3	324.	1.4	322.	11.6	23.4	-999.
08-MAR-2001 07:00	0.6	356.	1.1	13.	11.6	64.7	-999.

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METEOROLOGICAL REPORT

Report Date: 24-OCT-2001 13:52
For Data From: 07-MAR-2001 00:00
To: 08-MAR-2001 23:00

STATION: LOMPOC-H

DATE/TIME	WSR M/S	WDR DEG	WSA M/S	WDA DEG	ATM DEG/C	SIGT DEG	SIGV M/S
08-MAR-2001 08:00	0.4	212.	0.7	208.	12.0	61.0	-999.
08-MAR-2001 09:00	1.1	287.	1.3	286.	12.3	27.8	-999.

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08-MAR-2001 10:00	2.0	275.	2.2	275.	12.8	24.0	-999.
08-MAR-2001 11:00	1.8	278.	2.0	279.	13.1	26.1	-999.
08-MAR-2001 12:00	2.2	271.	2.4	271.	13.5	24.3	-999.
08-MAR-2001 13:00	3.2	275.	3.4	276.	13.4	23.3	-999.
08-MAR-2001 14:00	3.0	278.	3.2	279.	13.0	22.9	-999.
08-MAR-2001 15:00	2.9	279.	3.1	279.	12.8	23.3	-999.
08-MAR-2001 16:00	2.8	288.	3.0	288.	12.5	25.3	-999.
08-MAR-2001 17:00	2.7	299.	2.8	299.	12.2	20.8	-999.
08-MAR-2001 18:00	2.3	295.	2.4	294.	11.9	22.7	-999.
08-MAR-2001 19:00	2.4	302.	2.6	301.	11.8	20.6	-999.
08-MAR-2001 20:00	2.2	299.	2.4	299.	11.7	21.1	-999.
08-MAR-2001 21:00	2.4	299.	2.6	298.	11.5	21.8	-999.
08-MAR-2001 22:00	2.4	307.	2.6	307.	11.4	21.1	-999.
08-MAR-2001 23:00	2.2	300.	2.4	300.	11.1	21.7	-999.

METEOROLOGICAL REPORT

Report Date: 24-OCT-2001 13:52
For Data From: 12-MAR-2001 00:00

To: 13-MAR-2001 23:00

STATION: LOMPOC-H

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Sampling Period 5
K

DATE/TIME	WSR M/S	WDR DEG	WSA M/S	WDA DEG	ATM DEG/C	SIGT DEG	SIGV M/S
12-MAR-2001 00:00	0.7	185.	0.7	180.	9.8	31.8	-999.
12-MAR-2001 01:00	0.3	116.	0.6	116.	9.2	69.6	-999.
12-MAR-2001 02:00	0.4	169.	0.8	163.	8.6	74.7	-999.
12-MAR-2001 03:00	0.8	161.	1.1	159.	8.2	65.6	-999.
12-MAR-2001 04:00	0.4	197.	1.2	181.	8.5	81.0	-999.
12-MAR-2001 05:00	0.4	94.	1.1	100.	8.2	103.7	-999.
12-MAR-2001 06:00	0.5	94.	0.8	99.	7.8	77.6	-999.
12-MAR-2001 07:00	0.3	264.	0.8	293.	8.7	75.7	-999.
12-MAR-2001 08:00	1.1	69.	1.3	66.	10.8	37.9	-999.
12-MAR-2001 09:00	0.9	42.	1.2	36.	13.1	56.4	-999.
12-MAR-2001 10:00	0.3	339.	1.2	360.	15.4	87.8	-999.
12-MAR-2001 11:00	0.9	244.	1.7	226.	17.6	69.0	-999.
12-MAR-2001 12:00	3.7	295.	4.0	294.	17.0	23.9	-999.
12-MAR-2001 13:00	3.8	301.	4.1	300.	17.1	23.3	-999.
12-MAR-2001 14:00	4.0	298.	4.3	297.	16.6	24.0	-999.
12-MAR-2001 15:00	3.2	294.	3.5	293.	16.4	24.7	-999.
12-MAR-2001 16:00	2.8	291.	3.1	291.	14.9	24.8	-999.
12-MAR-2001 17:00	2.3	277.	2.6	276.	13.6	25.3	-999.
12-MAR-2001 18:00	1.4	263.	1.5	263.	12.8	19.6	-999.
12-MAR-2001 19:00	1.2	197.	1.3	197.	11.3	20.0	-999.
12-MAR-2001 20:00	0.6	154.	0.7	153.	10.6	47.4	-999.
12-MAR-2001 21:00	0.7	210.	0.8	218.	9.4	36.0	-999.
12-MAR-2001 22:00	0.4	84.	1.1	86.	9.2	100.2	-999.
12-MAR-2001 23:00	0.5	223.	1.1	212.	8.4	82.0	-999.
13-MAR-2001 00:00	0.4	151.	0.9	147.	7.8	82.9	-999.
13-MAR-2001 01:00	0.3	43.	0.8	57.	7.8	96.0	-999.
13-MAR-2001 02:00	0.4	212.	0.9	210.	6.7	69.6	-999.
13-MAR-2001 03:00	0.2	126.	0.6	120.	6.5	93.3	-999.
13-MAR-2001 04:00	0.0	279.	0.6	279.	6.3	87.5	-999.
13-MAR-2001 05:00	0.1	180.	0.5	211.	5.9	96.0	-999.
13-MAR-2001 06:00	0.2	96.	0.4	99.	5.7	67.8	-999.
13-MAR-2001 07:00	0.1	222.	0.8	90.	7.4	97.3	-999.

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METEOROLOGICAL REPORT

Report Date: 24-OCT-2001 13:52
For Data From: 12-MAR-2001 00:00
To: 13-MAR-2001 23:00

STATION: LOMPOC-H

DATE/TIME	WSR M/S	WDR DEG	WSA M/S	WDA DEG	ATM DEG/C	SIGT DEG	SIGV M/S
13-MAR-2001 08:00	0.5	353.	0.8	358.	10.4	53.7	-999.
13-MAR-2001 09:00	1.5	276.	1.8	279.	14.7	45.5	-999.

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Appendix F

Quality Assurance Audit Report

Lynn Baker
June 19, 2001
Page 2

4. Although it is preferred that a second method of analysis be used to confirm analytical results, the laboratory indicated no alternate method of analysis is available.

Due to the uncertainty of accurate quantitation and lack of any method to confirm results, the QA team feels any results obtained from this analysis should be considered "order of magnitude" accuracy and used only as an indicator of possible health risks.

If you have any questions regarding the laboratory audit results, please contact Don Fitzell of my staff at (916) 322-3892 or e-mail at dfitzell@arb.ca.gov.

cc: Britt Holmen, Ph.D., UC Davis
Mathew Plate, U.S. EPA Region IX
Randy Segawa, DPR
Kathy Orr, DPR
Don Fitzell

Appendix G

Log Sheets and Chain of Custody Forms

Field Log Sheet

Project: Pilot Study of Crystalline Silica in Ambient Air in Lompoc, CA

Field Log Sheet

Project: Pilot Study of Crystalline Silica in Ambient Air in Lompoc, CA

Log	Sample	Date	Time	Start	End	Start	End	Comments	Weather o=overcast pc=partly	Techn. Initial
-----	--------	------	------	-------	-----	-------	-----	----------	------------------------------------	-------------------

CHAIN OF CUSTODY FORM
CALIFORNIA AIR RESOURCES BOARD
MONITORING AND LABORATORY DIVISION
P.O. Box 2815, Sacramento CA 95812

CHAIN OF CUSTODY

SAMPLE RECORD

Job #: _____ Date: _____
 Sample/Run #: _____ Time: _____
 Job Name: _____
 Sample Location: Lompoc
 Type of Sample: PVC filters
 Log #'s: _____

ACTION	DATE	TIME	INITIALS		METHOD OF STORAGE
Sample Collected					freezer, ice or dry ice
			GIVEN BY	TAKEN BY	
Transfer	3-14-01	1000	DB Vener	L. Baker	
Transfer	3/15/01	0900	L. Baker	M. Pearce	
Transfer	3/15/01	1230	W. Vener	P. Samra	
Transfer	3/22/01	8:45	P. Samra	L. Baker	
Transfer	3/30/01	12:24	L. Baker	B. Hill	
Transfer					

LOG #	ID #	
1-382		PVC FILTERS FROM Lompoc & S.M. study
		- filters stored in cool garage until
		3-14 when transported to Sacramento
		(total of 27 filters)
		- filters weighed between 3/15 & 3/21

CHAIN OF CUSTODY FORM
CALIFORNIA AIR RESOURCES BOARD
MONITORING AND LABORATORY DIVISION
P.O. Box 2815, Sacramento CA 95812

~~PESTICIDE~~
CHAIN OF CUSTODY

SAMPLE RECORD

Job #: _____ Date: _____
 Sample/Run #: _____ Time: _____
 Job Name: _____
 Sample Location: Lompac
 Type of Sample: Soil / mine material
 Log #'s: _____

ACTION	DATE	TIME	INITIALS		METHOD OF STORAGE
Sample Collected	9-27-00		ZA		freezer, ice or dry ice
			GIVEN BY	TAKEN BY	
Transfer					
Transfer					
Transfer					
Transfer					
Transfer					
Transfer					

LOG #	ID #	
1		Celite mine - dark crude
2		" "
3		" - light crude
4		" - overburden
5		" - Celite 500 product (filter aid)
6		" - Celite 512 " "
7		" - Hyflo Super-Cel product "
8		Ag. soil from Olive & V St., Lompac
9		Ag. soil from Olive & Bodger Rd., Lompac

RETURN THIS FORM TO: _____

