

**SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT**

**APPLIED SCIENCE AND TECHNOLOGY  
ATMOSPHERIC MEASUREMENTS**

**REPORT OF  
MICROMETEOROLOGICAL AND AMBIENT AIR  
QUALITY MONITORING CONDUCTED IN THE  
AZUSA CALIFORNIA AREA**

**February, 1993**

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## EXECUTIVE SUMMARY

Micrometeorological and ambient air quality monitoring were conducted in Azusa on July 16, July 30, and September 11, 1991. The purpose of the monitoring was to determine Azusa Rock Company's compliance with South Coast Air Quality Management District (District) Rule 403 -- Fugitive Dust.

A survey of the area indicated that multiple sources were potential emitters. Therefore, a sampling protocol was devised to simultaneously monitor six activities for compliance with District Rule 403. The survey and wind data collected on site determined that Azusa Rock Company did not contribute to the fugitive dust measured during the project. The companies that were monitored were: CALMAT, Inc., Owl Rock, San Gabriel Rock Company, Criterion Catalysts, Inc., and Fiber Fuels, Inc.. Data were collected from nine sites located in the vicinity of these facilities on glass fiber filters by high volume air samplers. The filters were handled according to established chain of custody procedures and delivered to the District laboratory for gravimetric analysis.

Samplers were operated for a minimum of five hours during each sampling episode, under steady southwesterly winds. Filters were analyzed for mass of total suspended particulates (TSP). Analysis of the results indicates that only Criterion Catalysts, Inc. was regularly operating in compliance with the Rule. San Gabriel Rock Company was found to have exceeded the 100 ug/m<sup>3</sup> limit imposed by the Rule on September 11, 1991. An upwind-downwind difference of 120 ug/m<sup>3</sup> was recorded on that date. Fiber Fuels, Inc. also recorded one exceedance of the Rule, on July 30, 1991. An equipment breakdown, reported in accordance with permit requirements resulted in an upwind-downwind difference of 444 ug/m<sup>3</sup>. CALMAT, Inc. was found to have exceeded the parameters of District Rule 403 on July 16, 1991, with a measured exceedance of 171 ug/m<sup>3</sup>.

Fugitive emissions from Owl Rock, Inc. exceeded the limits imposed by the Rule during every sampling episode. Upwind-downwind differences of 618, 471, and 218 ug/m<sup>3</sup> were discovered, respectively, in samples collected on July 16, July 30, and September 11, 1991. No effective control measures were observed at this facility during the sampling episodes.

Results of this monitoring program have been made available to the cognizant Stationary Source Compliance Manager and the Chief Prosecutor's Office for action.

**REPORT OF  
MICROMETEOROLOGICAL AND AMBIENT AIR  
QUALITY MONITORING CONDUCTED IN AZUSA  
IN THE VICINITY OF AZUSA ROCK, INC.**

**1.0 INTRODUCTION**

The Special Monitoring and Toxics Section of the Atmospheric Measurements Branch conducted micrometeorological and ambient air quality monitoring in Azusa from July 16, 1991 to September 11, 1991. The purpose of the program was to collect data sufficient to determine Azusa Rock Company's compliance with South Coast Air Quality Management District (District) Rule 403(c) -- Fugitive Dust.

The primary objectives of the monitoring program were to collect data to support the following types of analyses:

- Characterization of micrometeorological parameters.
- Quantitative analyses of total suspended particulates (TSP) from ambient air samples collected on high-volume air samplers.

A site survey of the area revealed that Azusa Rock Company is situated in the foothills of the San Gabriel Mountains, north of the areas from which complaints have been received. There are several other gravel activities and potential dust-producing

operations located along and in the San Gabriel Wash between Foothill Boulevard and Azusa Rock Company. Therefore, the ambient monitoring program was designed to include each of these potential emitters.

Field monitoring was conducted on July 16, 1991, July 30, 1991, and September 11, 1991. Nine TSP samples were collected on each occasion, over five-hour sampling intervals at nine different locations. In all, a total of 27 particulate samples were collected. All sample filters were handled according to established chain of custody procedures and delivered to the District Laboratory for analysis.

## 2.0 TOPOGRAPHY

Azusa Rock, Inc., 3901 Encanto Parkway, Azusa, CA 91702 is located in a small canyon oriented NNW to SSE at the foothills of the San Gabriel Mountains. The area is in the northeastern part of the South Coast Air Basin commonly referred to as the Foothills. It is bounded on the north by the San Gabriel Mountains, on the east by the San Bernardino Mountains, and on the southeast by the San Jose Hills. To the south the facility opens into the San Gabriel River Valley.

All other facilities mentioned as potential sources are located south of Azusa Rock, Inc. in the San Gabriel River Valley. Elevations in the Azusa area range from 560 to 700 feet above mean sea level (msl). The San Gabriel Mountains rise to elevations over

0 feet above msl on the north while the Santa Ana Mountains reach elevations over 10,000 feet above msl and the San Bernardino Mountains reach elevations over 10,000 feet above msl, essentially making the Azusa area a moderate sloping foothill in relation to its surroundings. It can also be referred to as part of the San Gabriel River Basin which is northeast of the Santa Fe Flood Control Basin. Figure 1 identifies the business area and its surroundings.

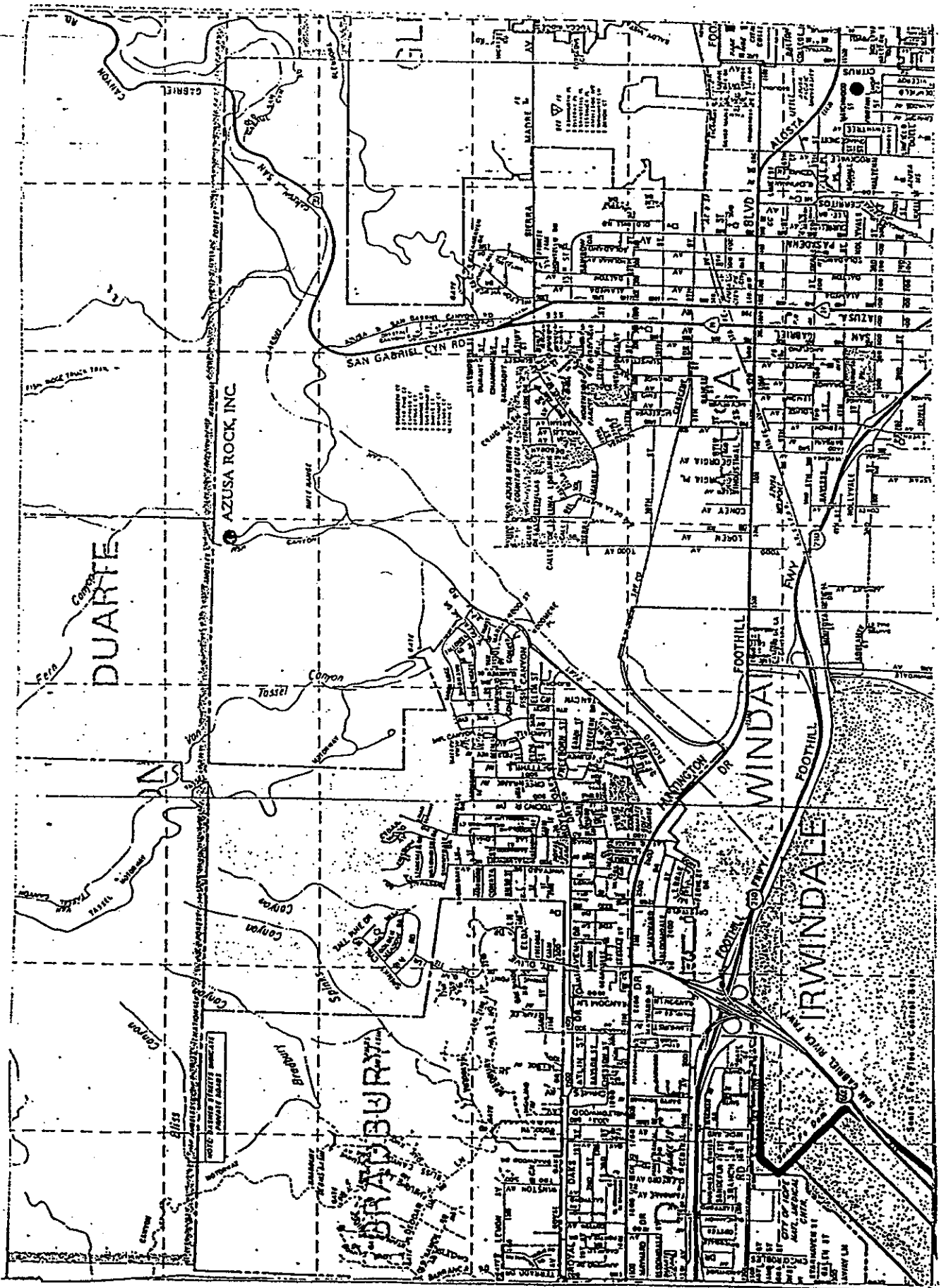


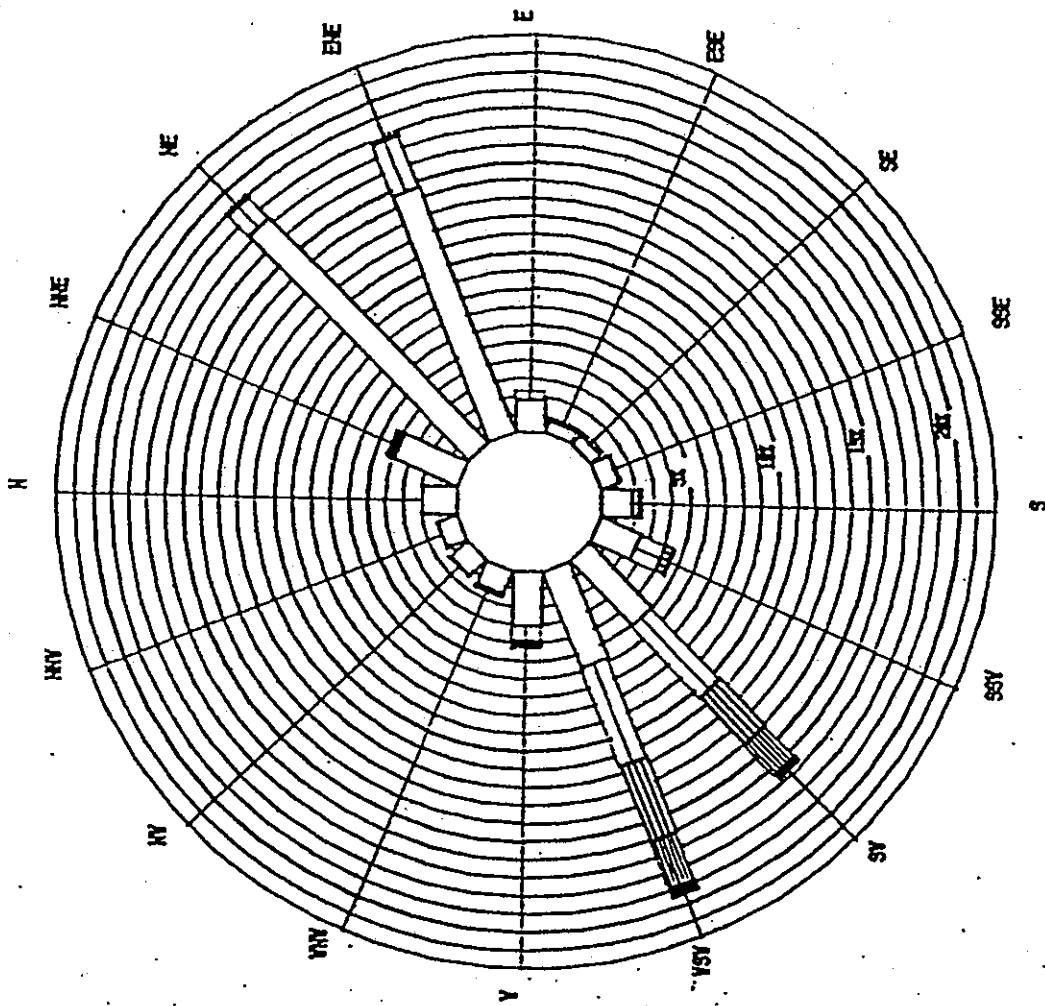
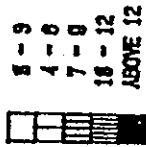
FIGURE 1

### 3.0 CLIMATOLOGY

Summer is the most meteorologically stable period in South Coast Air Basin weather. High pressure centered over the eastern Pacific Ocean envelopes the entire California coast, weakening the baroclinic gradient and inhibiting the formation and passage of short wave storm systems. Cloudiness is virtually nonexistent, with the exception of late afternoon convective development near the coast.

Winds recorded at the Azusa monitoring station (Figure 2) indicate predominant west-southwesterly and southwesterly flow anytime of the year from mid-morning hours into the evening. Statistics associated with the generated wind rose also indicate lighter, northeasterly and east-northeasterly winds that are associated with nighttime drainage flow from the San Gabriel Mountains. Topography plays a strong role in the wind flow patterns that predominate due to the close proximity of the San Gabriel Mountains and the general southwest to northeast orientation of the San Gabriel River Valley.

WIND SPEED (MPH)



WIND ROSE AT AZUSA (1956-1961)

FIGURE 2

Temperatures in the Azusa area are hot during the months of July and August, averaging from a low of 60 degrees F to a high of 91 degrees F. The area averages 0.10 inch of precipitation in July and 0.01 inch of precipitation in August.

#### **4.0 AMBIENT AIR MONITORING PROCEDURES**

Azusa Rock, Inc., is a rock crushing, sand and gravel mining facility located in a canyon at the foothills of the San Gabriel Mountains. It is situated north of the San Gabriel River and northwest of the City of Azusa. Several businesses of a similar nature are located in the adjacent riverbed and river plain areas. Among those businesses are Owl Rock, a sand and gravel mining company; San Gabriel Rock, a company hired by the Army Corps of Engineers to grade the San Gabriel River; CALMAT, an aggregate processing company and Industrial Asphalt, (a division of CALMAT), an asphalt processing facility mixing gravel, tar and sand. Other businesses in the immediate area which may also affect air quality are Fibre Fuel Products, Inc., a wood grinding company, and Criterion Catalysts, a catalyst producing company.

As shown by Figure 3, Azusa Rock, Inc., 3901 Encanto Parkway, Azusa, CA lies north of the Foothill Freeway (I-210) in a canyon. The area south of this company is mixed residential and heavy industrial activities.

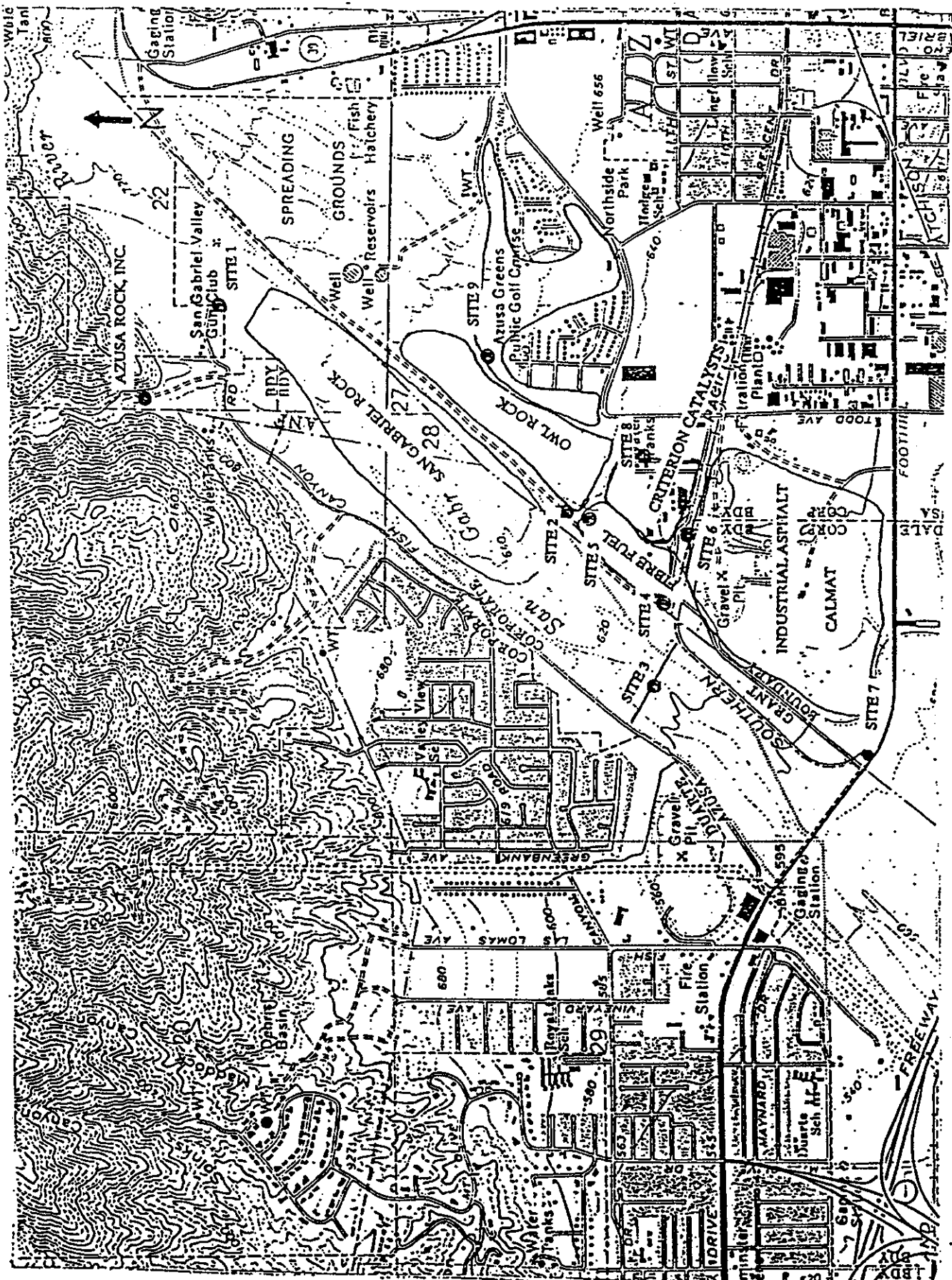


FIGURE 3

Selection of ambient air monitoring sites was based on climatological wind data, complainants' locations, and the upwind-downwind correlations required by District Rule 403. The number and proximity of potential dust emitters posed a problem. Six companies are juxtaposed in the San Gabriel River Basin. In order to accurately quantify dust emissions, and to identify their source(s), six simultaneous Rule 403 compliance tests were required. The wind monitors installed at sites # 1 and # 2 were in position and operating on July 2, 1991. Their purpose was to determine the exact, microscale wind parameters at the locations to be sampled in order to most accurately place the upwind-downwind sensors for each facility. The initial site survey and subsequent wind data indicated the following locations and instrumentation requirements:

- 1) One high volume sampler and one wind system at the Rifle Club located southeast of Azusa Rock, Inc.
- 2) One high volume sampler and one wind system located west of Owl Rock along an existing bike path.
- 3) One high volume sampler on an old Pacific Electric Railroad right-of-way (foot path) southwest of the San Gabriel Rock excavating site in the San Gabriel riverbed.
- 4) One high volume sampler located to the southwest of Fibre Fuel Products, Inc.

- 5) One high volume sampler located along the northwest fenceline at Fibre Fuel Products, Inc.
- 6) One high volume sampler located west of Criterion Catalysts, Inc., along their western perimeter.
- 7) One high volume sampler and one wind system at the southwest boundary of CALMAT.
- 8) One high volume sampler located along the eastern boundary of Criterion Catalysts, Inc., at the Colorama Nursery.
- 9) One high volume sampler located east of Owl Rock on the northwest boundary of the Azusa Greens Public Golf Course.

At least three monitoring episodes were required to characterize the effluent transport in and around the area. Per Rule 403(c), each was performed for at least five hours duration measuring particulate concentrations both upwind and downwind of the six identified facilities. Laboratory analyses were requested for Total Suspended Particulates (TSP).

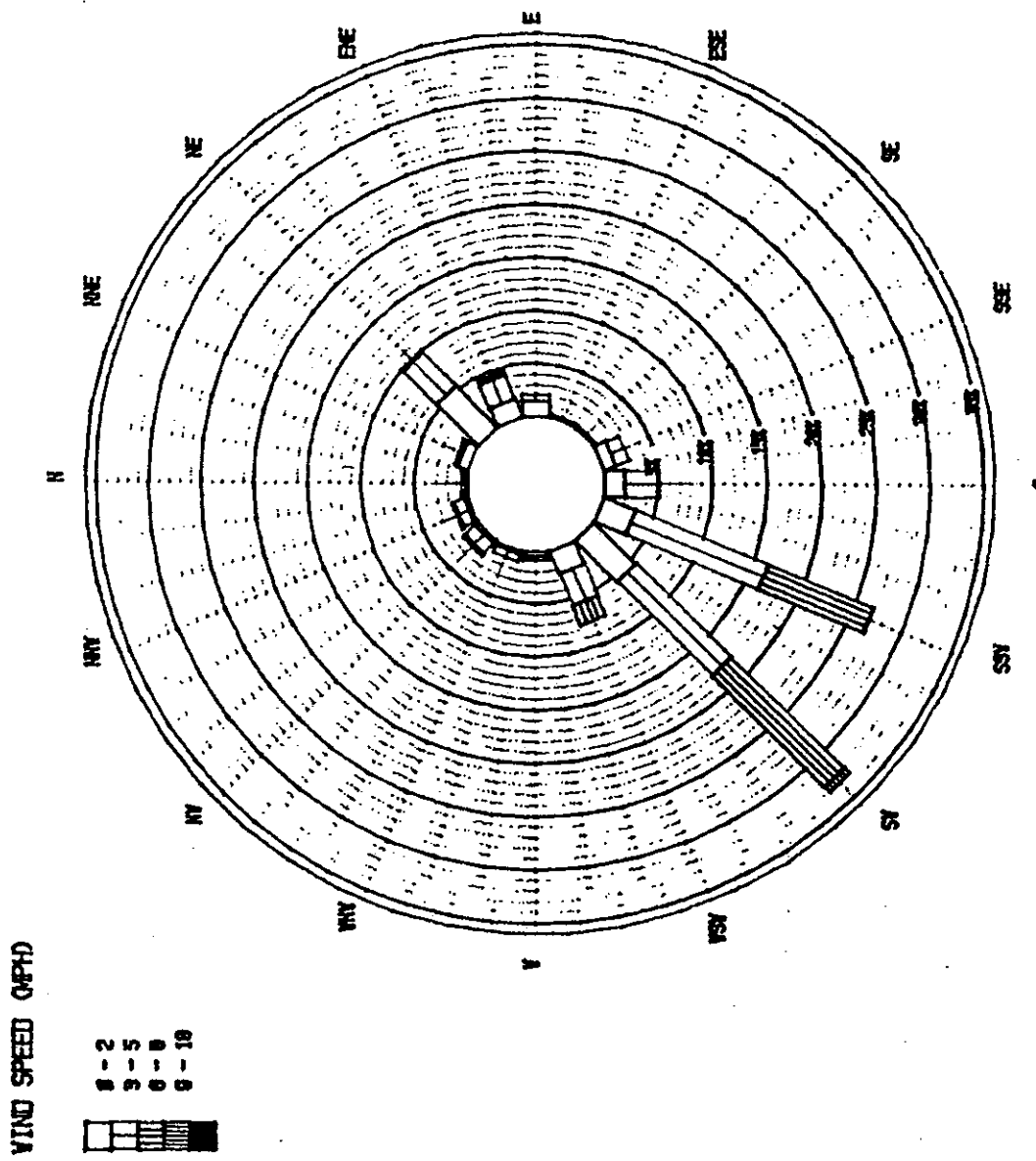
## 5.0 RESULTS OF THE AMBIENT AIR MONITORING

Rule 403(c) compliance sampling was conducted on three occasions during the ambient air monitoring program. In order to prevent confusion in analyzing the data, analysis was conducted for each of the facilities under investigation independently.

In general, winds monitored between July 2, 1991 and September 17, 1991 conformed to the expected climatology. Composite wind roses covering the entire monitoring program for sites # 1 and # 2 are shown as Figures 4 and 5. They indicate predominantly southwesterly flow between July and September of 1991. Site # 1 shows that approximately 20 percent of the winds at that location originated in the northeast quadrant. As shown in Figure 3, site # 1 was located due south of Azusa Rock, in the foothills. Topographical drainage flow from the mountains produced these light, northerly-component winds. Virtually all the remaining airflow monitored at site # 1 originated southwest of Azusa Rock, moving up-canyon into the mountains.

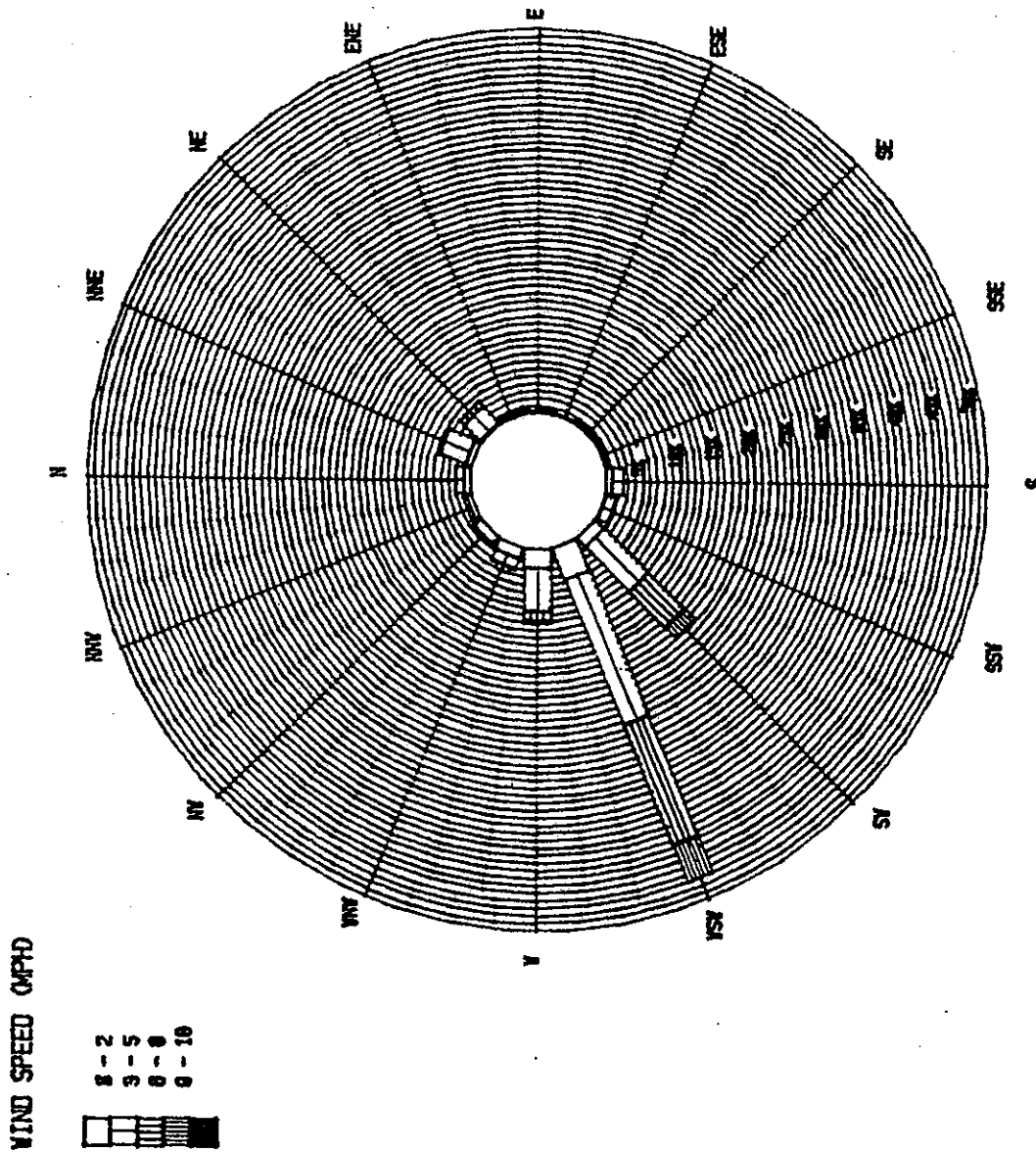
Winds at site # 2, located at the approximately midpoint of the sampling area, were almost uniformly southwesterly. Over 80 percent of all monitored winds originated southwest of the monitored area.

Figure 4



AZUSA ROCK 7/2/91 TO 9/17/91 SITE 1

Figure 5



AZUSA ROCK 7/2/91 TO 9/17/91 SITE 2

Figure 6 depicts the aggregate analyses of samples taken at each location on all three sampling days. Concentrations of TSP range from a low of 65 ug/m<sup>3</sup>, collected at site # 3 on September 11, 1991, to a maximum of 837 ug/m<sup>3</sup> at site # 9 on July 16, 1991. The average TSP concentration for this ambient monitoring program was 262 ug/m<sup>3</sup>.

Upwind-downwind couplets for each of the monitored facilities were determined by on-site wind data. They are listed below.

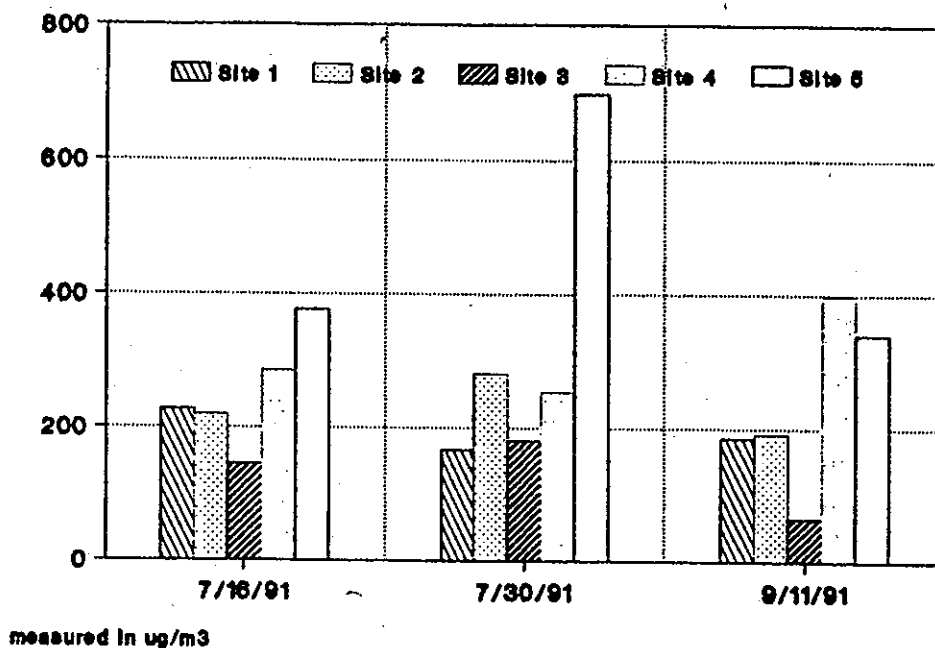
AMBIENT MONITORING LOCATIONS		
<u>FACILITY</u>	<u>UPWIND</u>	<u>DOWNWIND</u>
CALMAT	Site # 7	Site # 6
FIBER FUEL	Site # 4	Site # 5
OWL ROCK	Site # 2	Site # 9
SAN GABRIEL ROCK	Site # 3	Site # 1
CRITERION CATALYSTS	Site # 6	Site # 8

Table 1. Upwind-Downwind Site Locations.

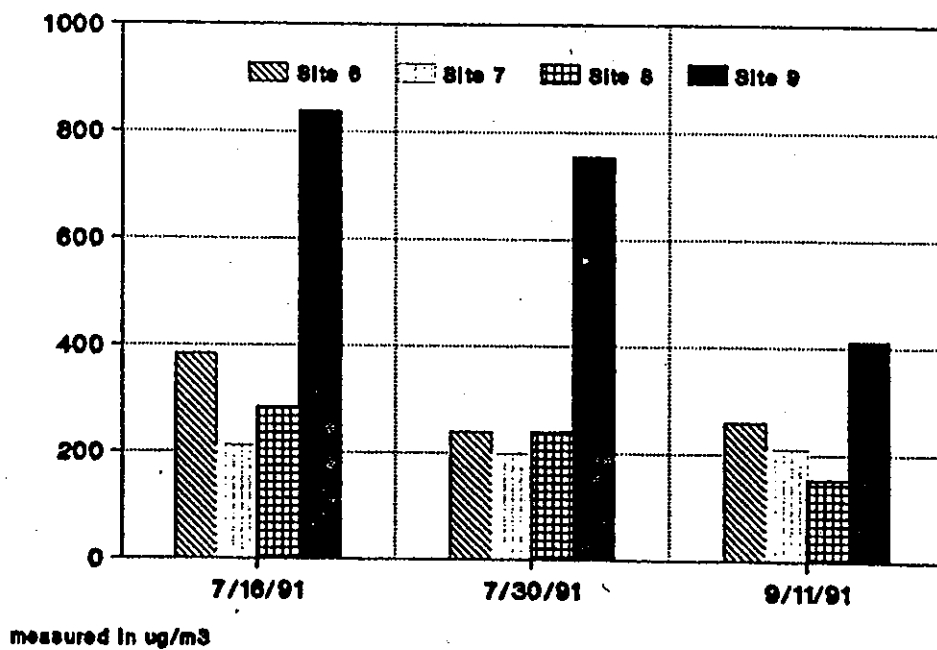
Azusa Rock Company, the primary complaint source, is not listed in Table 1. Winds monitored during each sampling interval show that all transport is from Azusa Rock into the mountains, away from the areas from which complaints were made. Further, due to the severe topographical features, placement of a sampler to the northeast of Azusa Rock was not considered possible.

Figure 6

**AZUSA ROCK COMPANY  
Total Suspended Particulates**



**AZUSA ROCK COMPANY  
Total Suspended Particulates**



Winds monitored at site # 7 on July 16, 1991 are shown in Figure 7. Monitoring was conducted between 1100 Pacific Standard Time (PST) and 1700 PST. All monitored winds during that interval originated southwest to south-southwest of site # 7. Wind speed averaged 7 - 10 miles per hour (mph) during the five-hour monitoring program.

Winds measured on July 30, 1991 were lighter and slightly more variable. As shown in Figure 8, winds monitored on that date between 0800 and 1400 PST originated predominantly southwest of site 7, with components from the south and west. Eighty-five percent of the monitored winds originated from west southwest to south-southwest of site # 7, and speeds averaging 3 - 4 mph.

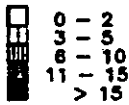
The final sampling episode occurred on September 11, 1991. Winds observed at site # 7 on that date between the sampling hours of 0800 - 1400 PST were predominantly south-southwesterly to southwesterly, averaging 4 - 7 mph (Figure 9).

#### 5.1 AZUSA ROCK COMPANY

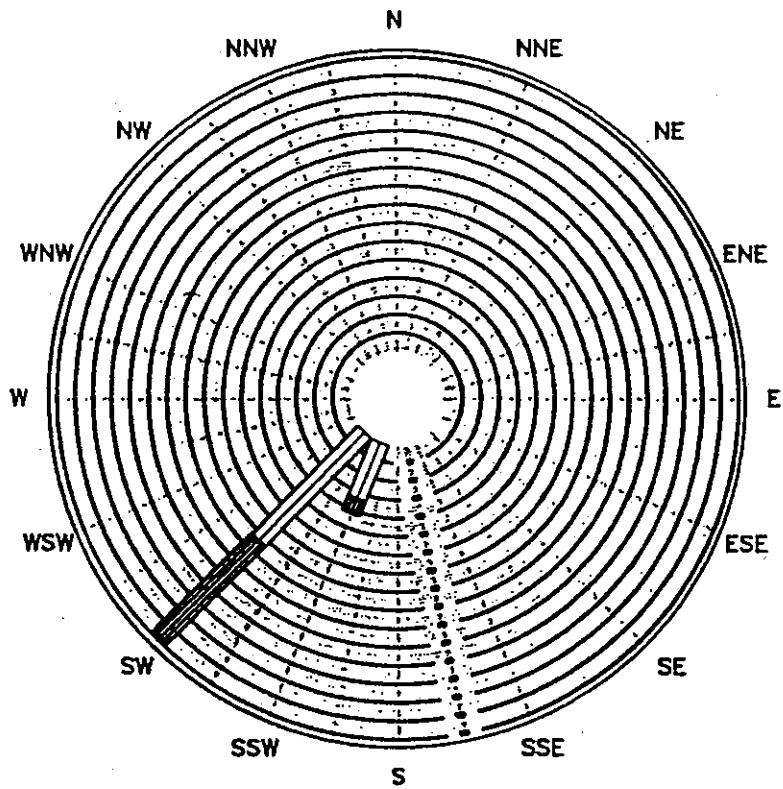
No compliance test was completed for this facility. Topography prohibited installation of a sampler to the northeast of the gravel quarry. Further, the uniformly southwesterly winds would restrict fugitive emissions from this facility from providing any impact on the residential neighborhoods.

Figure 7

WIND SPEED (MPH)



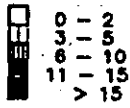
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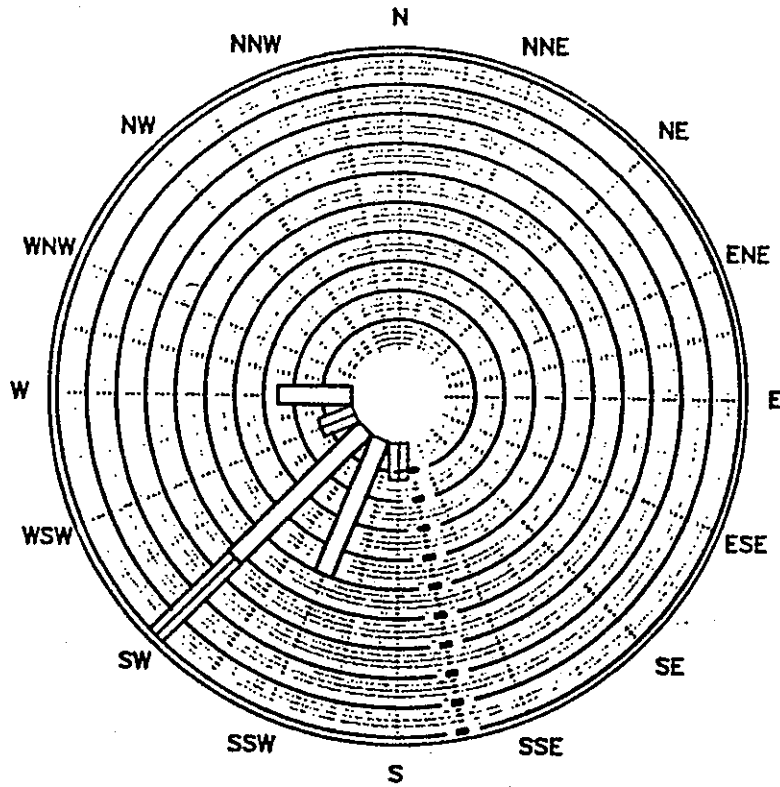
AZUSA ROCK SITE 7  
7/16/91 1100 - 1700

Figure 8

WIND SPEED (MPH)

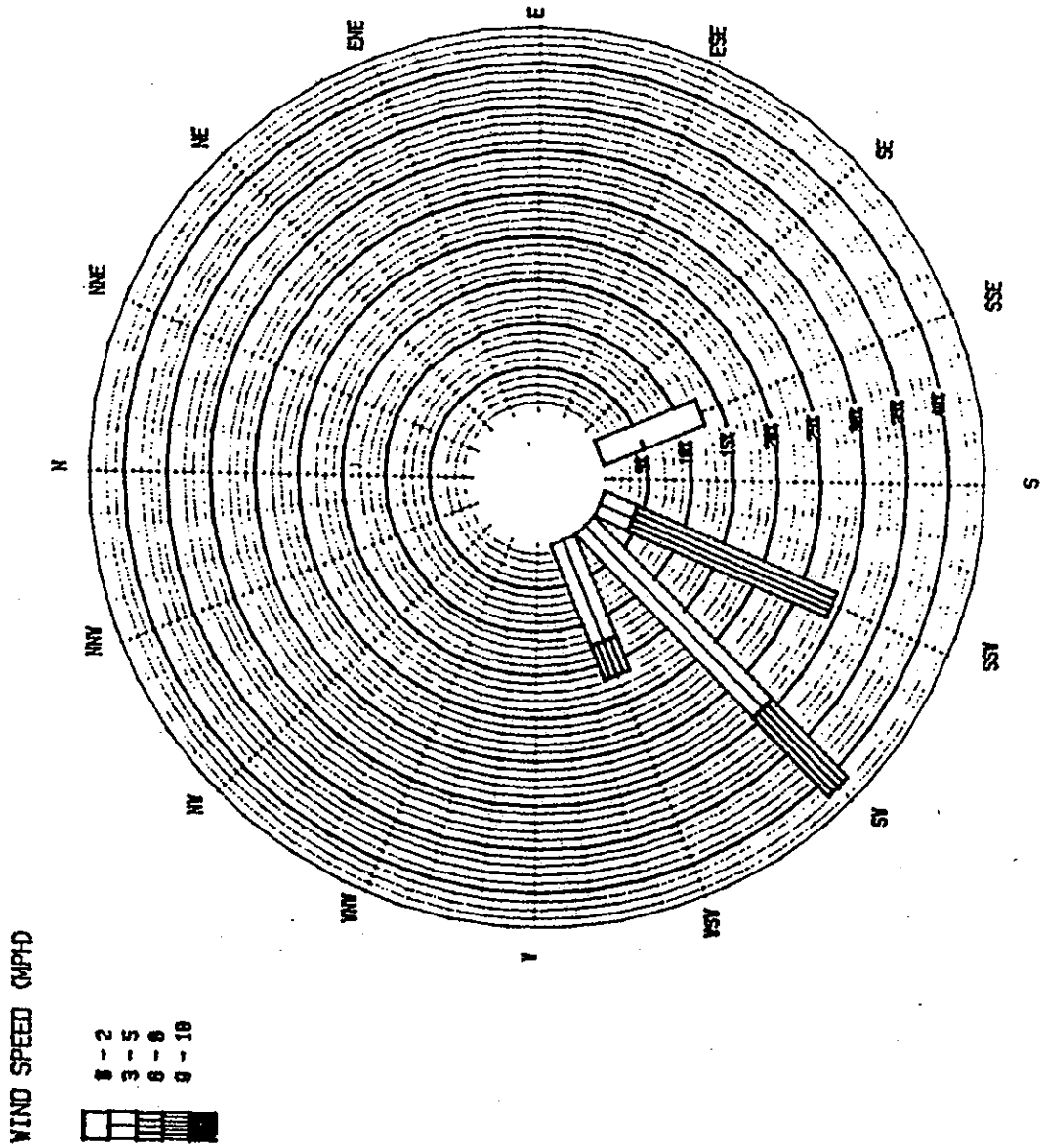


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AZUSA ROCK SITE 7  
7/30/91 0800 - 1400

Figure 9



AZUSA ROCK 9/11/91 0800 TO 1400 SITE 7

## 5.2 SAN GABRIEL ROCK COMPANY

Results of the District Rule 403 compliance tests conducted at this facility are depicted in Figure 10. Moderately strong (7 - 10 mph) wind conditions on July 16, 1991 produced a difference between upwind and downwind monitoring sites of  $82 \text{ ug/m}^3$ .

The very light winds measured on July 30, 1991 did not transport any fugitive dust beyond the perimeter of this facility. A TSP concentration of  $181 \text{ ug/m}^3$  was measured upwind, while only  $167 \text{ ug/m}^3$  were analyzed in the sample collected downwind at site # 1.

Light to moderate south-southwesterly flow (4 - 7 mph) measured on September 11, 1991 produced a difference of  $120 \text{ ug/m}^3$  between samples collected upwind at site # 3 and downwind at site # 1.

## 5.3 CRITERION CATALYSTS INC.

All samples collected at sites # 6 and # 8, upwind and downwind of Criterion Catalysts, respectively, indicate that there are no fugitive dust emissions from that facility. Figure 11 clearly indicates that samples collected downwind of the facility contained concentrations of TSP less than or equal to their upwind counterparts.

Figure 10

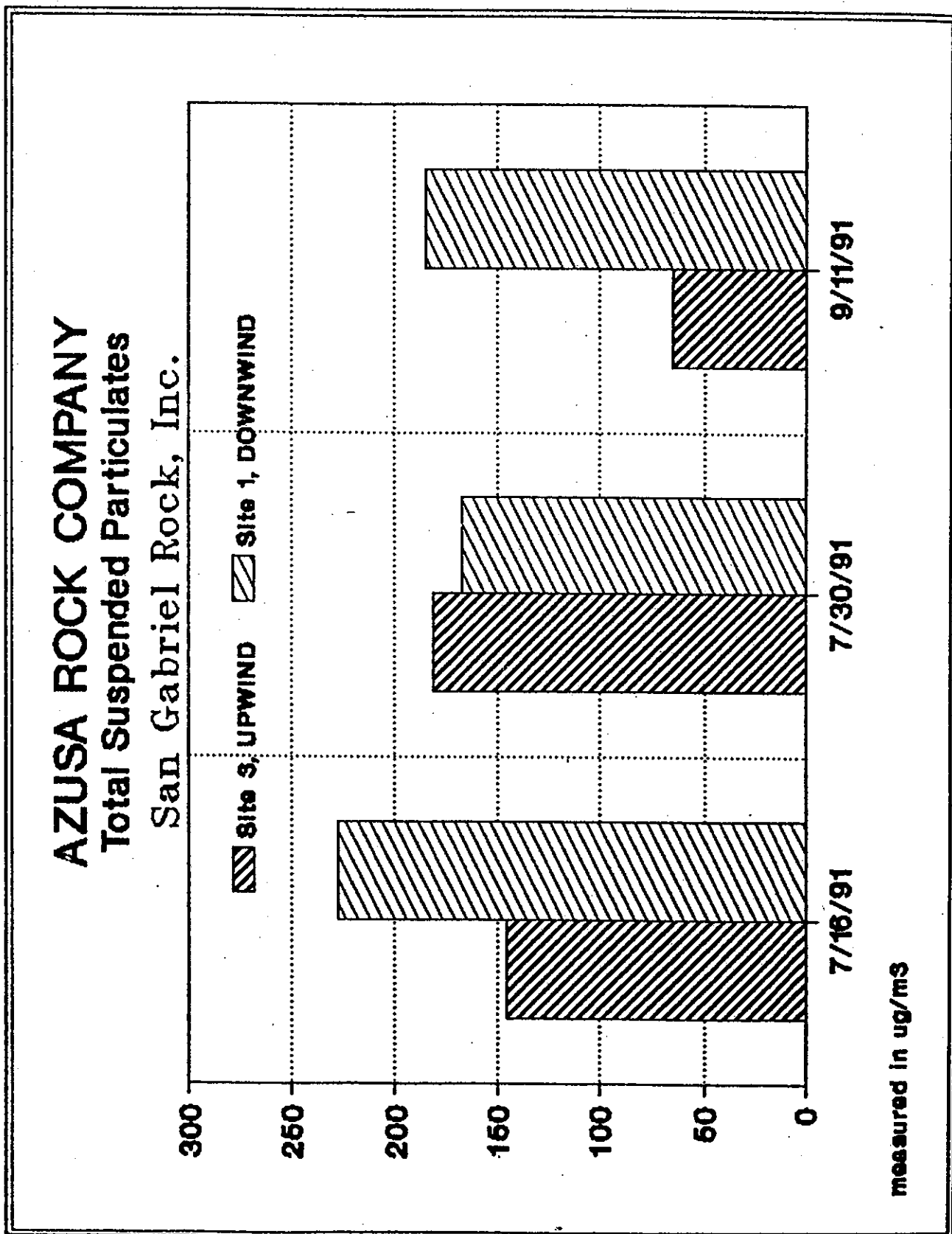
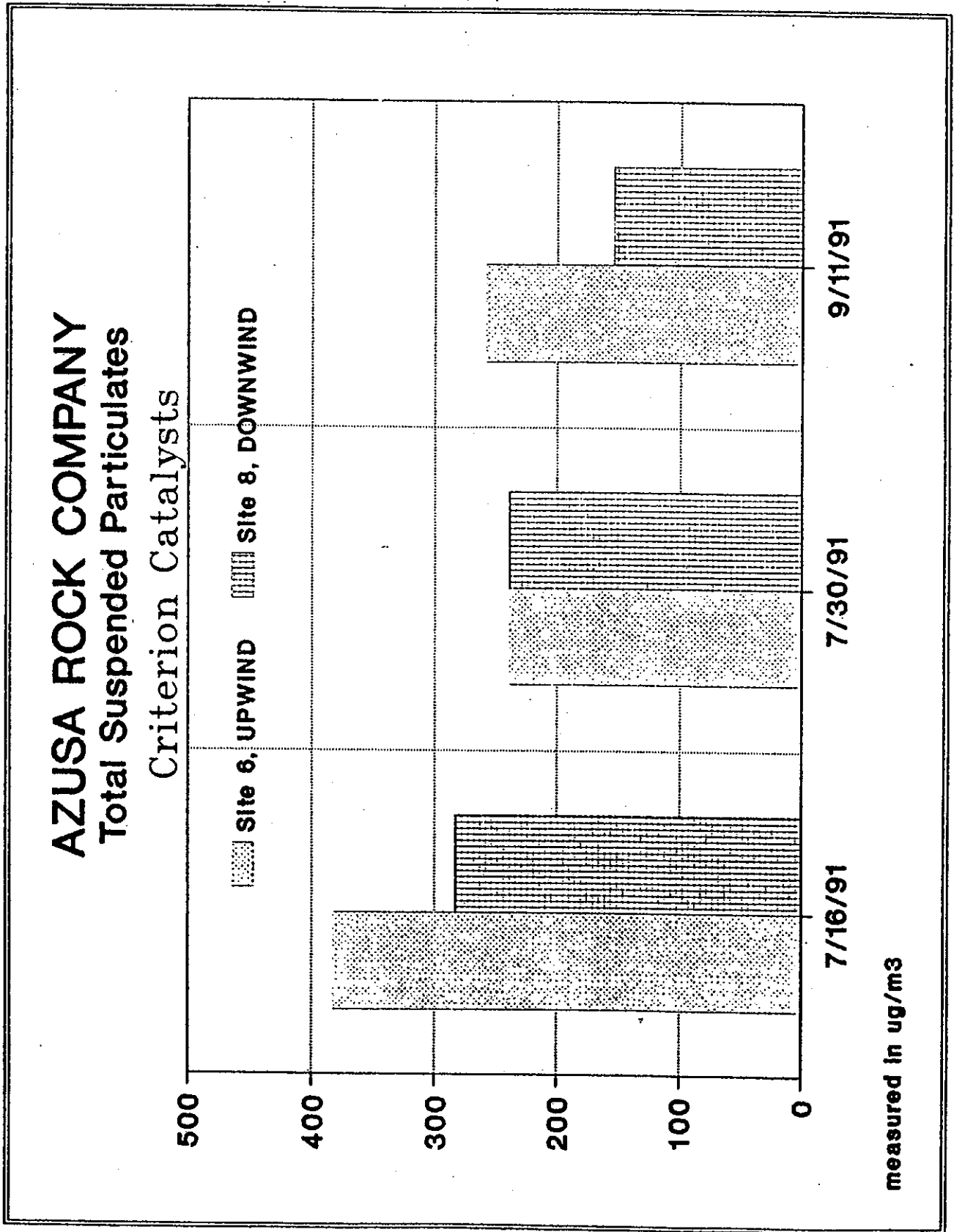


Figure 11



#### 5.4 FIBER FUELS, INC.

Fugitive Dust emissions from Fiber Fuels, Inc. were discovered on each sampling day. On only one occasion, however, were the parameters of District Rule 403(c) exceeded (Figure 12).

Sampling conducted on July 16, 1991, under moderately strong wind conditions (7 - 10 mph) resulted in TSP concentrations at sites # 4 and # 5 (upwind/downwind) of 286 and 376  $\text{ug}/\text{m}^3$ , respectively. The difference of 90  $\text{ug}/\text{m}^3$  is well within the compliance criteria.

Monitoring conducted under light to moderate (3 - 4 mph) wind conditions on July 30, 1991 resulted in TSP concentrations of 253  $\text{ug}/\text{m}^3$  at site # 4, and 697  $\text{ug}/\text{m}^3$  at site # 5. The difference between upwind and downwind sites during the five-hour sampling episode was 444  $\text{ug}/\text{m}^3$ .

#### 5.5 CALMAT, INC.

CALMAT, Inc., operates a large quarrying and gravel operation just north of Foothill Boulevard. Although covering a large area, their stockpiles are primarily situated along the western perimeter of the facility.

Figure 12

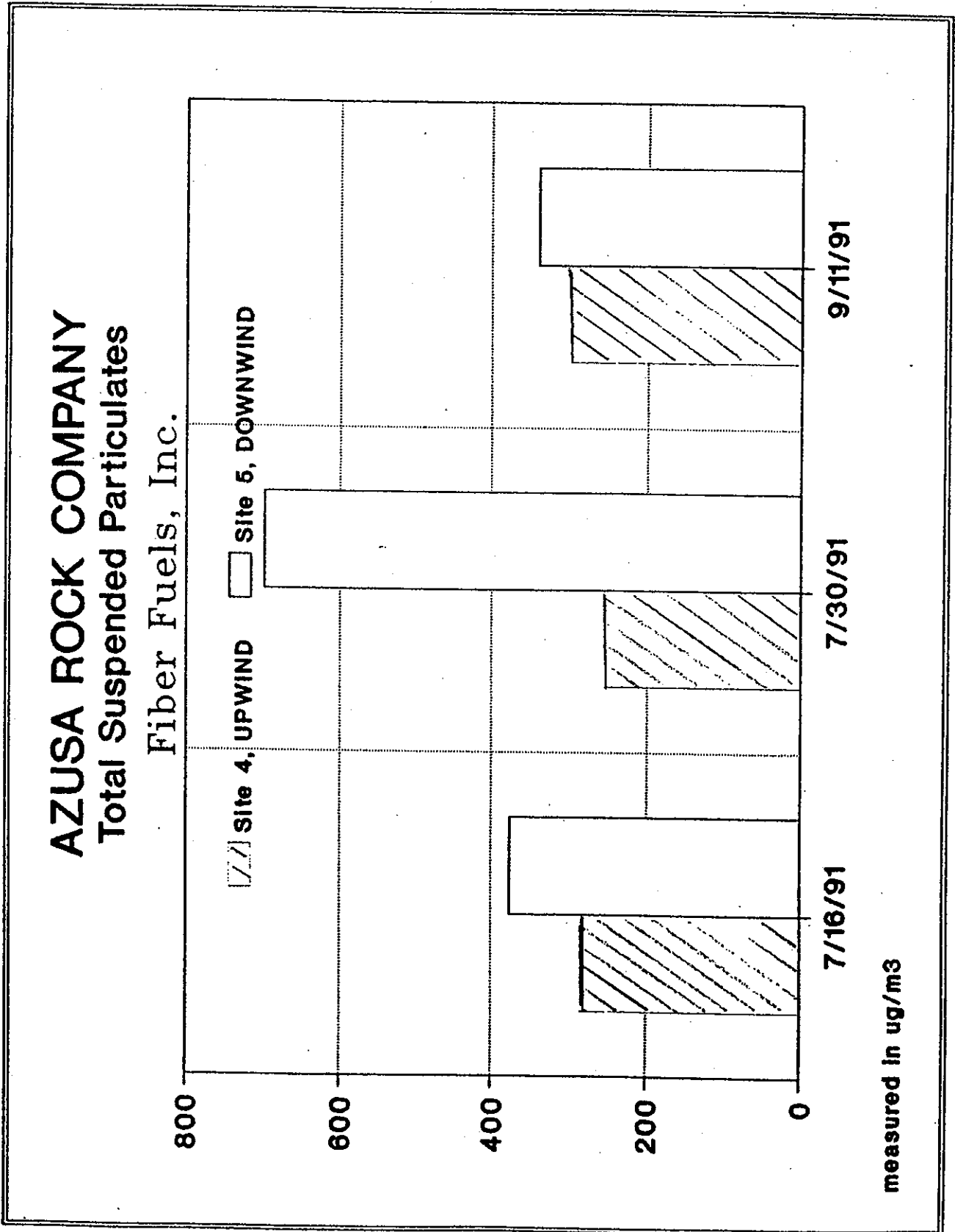


Figure 13 depicts the TSP concentrations obtained at sites # 7 and # 6 during the three monitoring episodes. Site # 7 was located at the southwest corner of CALMAT, just north of Foothill Boulevard. The southernmost sampling location, it represents the relative background concentration for the entire project. Concentrations measured at that site were distinctly uniform, ranging from a low of  $200 \text{ ug/m}^3$  on July 30, 1991, to a peak of  $212 \text{ ug/m}^3$  on July 16, 1991. These dates also represent the respective low and high wind speed days for the project.

Downwind TSP concentrations on July 16, 1991 were  $383 \text{ ug/m}^3$ . Moderate to strong (7 - 10 mph) winds out of the southwest produced a fugitive dust difference of  $171 \text{ ug/m}^3$  over a 5-hour sampling episode.

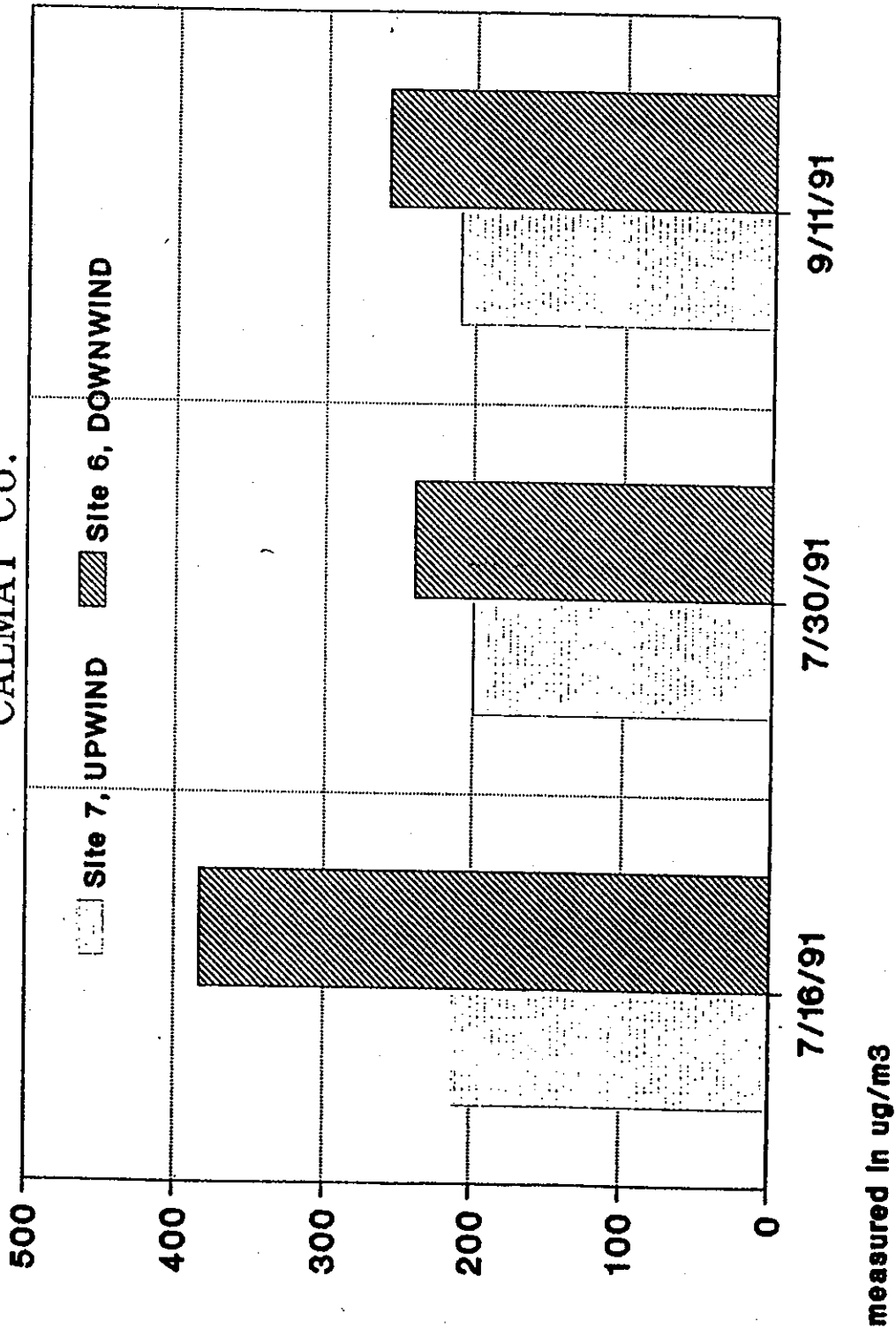
Light wind speeds (3 - 4 mph) from the southwest on July 30, 1991 produced a difference in TSP concentration between upwind and downwind monitors of  $39 \text{ ug/m}^3$ . A TSP concentration of  $200 \text{ ug/m}^3$  was obtained at site # 6, downwind of the CALMAT stockpiles, on that date.

The difference between upwind and downwind sample concentrations analyzed from samples collected at sites # 7 and # 6, respectively, on September 11, 1991, was  $48 \text{ ug/m}^3$ . Moderate (4 - 7 mph) winds from the southwest resulted in downwind concentrations of TSP of  $258 \text{ ug/m}^3$ , while upwind values were analyzed at  $210 \text{ ug/m}^3$  over the 5-hour sampling interval.

Figure 13

# AZUSA ROCK COMPANY Total Suspended Particulates

CALMAT Co.



## 5.6 OWL ROCK, INC.

The difference between upwind and downwind sample concentrations collected at sites # 2 and # 9, respectively, averaged  $436 \text{ ug/m}^3$ . The District Rule 403 compliance limit of  $100 \text{ ug/m}^3$  was exceeded during each sampling episode (Figure 14).

Concentrations of TSP discovered in the samples collected at site # 2, upwind of Owl Rock, were relatively uniform. They ranged from a low of  $192 \text{ ug/m}^3$  on September 11, 1991, to a peak of  $281 \text{ ug/m}^3$  on July 30, 1991. The average concentration of TSP, during the three 5-hour sampling episodes, was found to be  $246 \text{ ug/m}^3$ . Slightly higher overall than the concentrations obtained at site # 7, they nevertheless represent relative background concentrations.

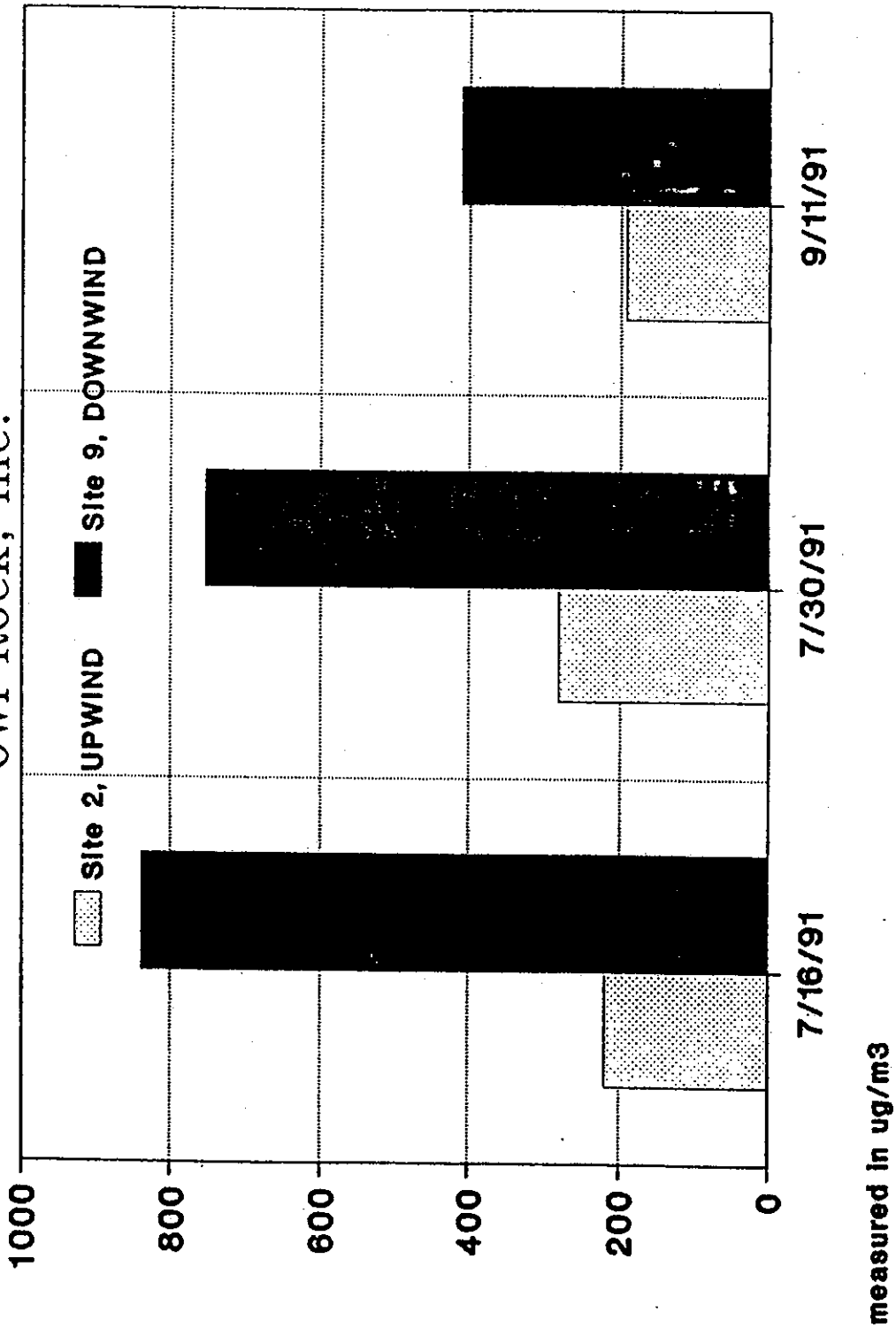
Concentrations of TSP measured at site # 9 represent emission concentrations of TSP added to the local background. Under moderate to strong (7 - 10 mph) southwesterly winds, the TSP concentration analyzed in the sample collected on July 16, 1991 was  $837 \text{ ug/m}^3$  over a 5-hour sampling interval. Subtracting the local background leaves a difference of  $618 \text{ ug/m}^3$  of fugitive dust emanating from Owl Rock property.

Light southwesterly flow (3 - 4 mph) resulted in  $752 \text{ ug/m}^3$  of TSP collected over a 5-hour period at site # 9 on July 30, 1991. The upwind/downwind difference indicates that  $471 \text{ ug/m}^3$  of fugitive dust left Owl Rock property during the 5 hours of sampling on that date.

Figure 14

# AZUSA ROCK COMPANY Total Suspended Particulates

Owl Rock, Inc.



Sampling on September 11, 1991 was conducted under moderate southwesterly winds (4 - 7 mph). Concentrations of TSP analyzed from samples collected over a 5-hour sampling interval at site # 9 on that date were found to be  $410 \text{ ug/m}^3$ . Site # 2 sample concentrations for the same period were much lower,  $192 \text{ ug/m}^3$ . The difference between upwind and downwind sample concentrations, collected over a 5-hour sampling interval, was  $218 \text{ ug/m}^3$ .

## 6.0 CONCLUSIONS

District Rule 403 -- Fugitive Dust Compliance tests were conducted in the vicinity of Azusa Rock Company on July 16, 1991, July 30, 1991, and September 11, 1991. Each was conducted under varying meteorological conditions to test facility compliance with the Rule. Six potential dust-producing facilities were tested simultaneously on each occasion. They were Azusa Rock Company; San Gabriel Rock Company; Criterion Catalysts, Inc.; Fiber Fuels, Inc.; CALMAT Company; and Owl Rock, Inc.

Winds monitored during sampling were uniformly southwesterly. Moderate to strong (7 - 10 mph) winds, with respect to the 15 mph limit imposed by the Rule, were observed on July 16, 1991. Very light winds (3 - 4 mph), persistently out of the southwest quadrant were monitored on July 30, 1991. Moderate (4 - 7 mph) southwesterly flow was measured at all monitoring locations on September 11, 1991.

Two of the six companies had no impact on fugitive dust levels in the San Gabriel Wash. Criterion Catalysts, Inc. was found to have effective control measures in place. No downwind concentration of TSP exceeded its upwind counterpart during any of the compliance tests.

Azusa Rock Company was not sampled according to the parameters of the Rule. Its position, in a canyon on the San Gabriel foothills, prohibited installation of a downwind sampler. However, persistent southwesterly winds would have transported any aerosol particulates into the mountains, away from the affected neighborhoods. Azusa Rock Company did not contribute to fugitive dust levels found in the San Gabriel Wash during this project.

San Gabriel Rock Company exceeded the parameters of District Rule 403 -- Fugitive Dust on one occasion. The upwind-downwind difference in TSP concentration measured over a 5-hour sampling interval on September 11, 1991 was  $120 \text{ ug/m}^3$ , an exceedance of the  $100 \text{ ug/m}^3$  limit imposed by the Rule.

Fiber Fuels, Inc., also exceeded the  $100 \text{ ug/m}^3$  difference between upwind and downwind samples on one occasion during the project. Under very light wind conditions, a difference between upwind and downwind sample concentrations collected over a 5-hour sampling interval of  $444 \text{ ug/m}^3$  was observed on July 30, 1993. District staff on-site during the sampling further observed a facility breakdown on that date. The breakdown, which resulted in intermittent but dense visible emissions, can account for the anomalously high TSP concentration downwind.

January 21, 1993

CALMAT Company exceeded the parameters of District Rule 403 -- Fugitive Dust on one occasion. District staff observed apparently acceptable dust control measures at CALMAT on each sample day. Stockpiles were effectively coned and watered to minimize fugitive transport. However, on July 16, 1991 moderately strong (7 - 10 mph) southwesterly winds resulted in an upwind-downwind difference in TSP concentration of  $171 \text{ ug/m}^3$  over a 5-hour sampling interval. Staff observed visible transport from CALMAT stockpiles to the vicinity of site # 6 on that date, as well as less frequent watering than was conducted during subsequent testing. Under conditions when watering was observed to be more frequent and winds were lighter, no exceedance occurred.

Owl Rock, Inc., exceeded the  $100 \text{ ug/m}^3$  difference during every sampling episode. Differences in upwind-downwind concentration of  $618 \text{ ug/m}^3$ ,  $471 \text{ ug/m}^3$ , and  $218 \text{ ug/m}^3$  were recorded during 5 hours of sampling on July 16, 1991, July 30, 1991, and September 11, 1991.

No effective control measures were observed on the three days of sampling. The only watering that was noted occurred at the entry gate to the facility. Stockpiles were not coned to limit turbulent lift of aerosol particles, and bulldozer activity was heavy on all observed stockpiles.