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Fugitive Dust Assessment at Rock and Sand Facilities in the South Coast Air Basin

November 1979

Prepared for

Southern California Rock Products Association
and
Southern California Ready-Mix Concrete Association

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Executive Summary and Conclusions

In order to further the aim of reducing emissions of total suspended particulate matter (TSP) from the local sand and gravel processing industry, the South Coast Air Quality Management District (SCAQMD) proposed a regulation based on opacity, designed to restrict emissions from all continuous material handling and storage operations. The Southern California Rock Products Association (SCRPA) and the Southern California Ready Mix Concrete Association (SCRMCA) were asked to comment on the impact of such a regulation on their activities. SCRPA/SCRMCA questioned the economic feasibility as well as the actual need for such a regulation, given the efficiency of control techniques already in place and the physical characteristics of their emissions.

PES was selected to conduct a study on fugitive dust emissions in the industry which would estimate their magnitude, their relationship to opacity, the effectiveness of wet dust suppression techniques, and the impact on ambient TSP levels.

The conclusions from this study are summarized below.

1. Emission factors for five types of point sources(Table 3-1) and for three haul roads (Table 3-2) were derived.

2. Dust control by wet suppression was 90-98 percent effective for point sources, and 89-96 percent effective for haul roads.

3. Six downwind samples, out of twelve for which particle sizes were determined microscopically, contained only 0.3 to 11 percent by weight of particles less than ten microns in diameter (Table 2-1).

4. With opacity observations made by an SCAQMD representative during emission tests, no general quantitative relationship between average opacity and maximum dust concentration could be supported, although there may be such a relationship for each individual

source.

5. The EPA dispersion model "PAL" gave estimates of downwind receptor concentrations in excess of the air quality standard (Table 4-3).

These estimates are believed conservative (high) because of various simplifying assumptions. The most serious deficiency in applying such models to dust emissions is the lack of adequate allowance for fallout.

6. Total emissions for SCRPA membership were estimated to be 36,600 MT/yr (40,300 T/yr) without use of controls. This is reduced by wet suppression to 1830 MT/yr (2020 T/yr), much below the value of 13,990 MT/yr (15,409 T/yr) previously estimated for the industry by the SCAQMD on the basis of literature values.

1.0 INTRODUCTION

As a step towards its objective of further progress towards reduction in total suspended particulate matter (TSP), the South Coast Air Quality Management District (SCAQMD) proposed rules 403.1 and 403.2 to regulate fugitive dust emissions and requested that the industry respond to the proposed rules (1). The rules limit visible opacities and spillage or carry-out by transportation. When informed of this proposal, the Southern California Rock Products Association (SCRPA) and the Southern California Ready-Mix Concrete Association (SCRMCA) requested Pacific Environmental Services (PES) to provide a literature search. The search showed that the currently used emission factors were not soundly based. SCRPA and SCRMCA then engaged PES to conduct a further study in coordination with SCQMD. The objectives of the study were as follows:

- To determine emission factors for various unit processing operations by source testing, with simultaneous opacity observations to be made by SCAQMD.
- To estimate the emissions for all member facilities in the South Coastal Basin and project their impact on ambient air quality.
- To investigate the relationship between particulate dust emissions and visual opacity.
- To use appropriate dispersion modeling techniques to project the impact of dust emissions from representative facilities on downwind receptor sites.
- To examine particle size distributions in selected samples taken upwind and downwind of dust emission sources.

The methodology adopted by PES in consultation with SCRPA, SCRMCA, and SCAQMD involved several states. Emission factors were determined by use of a profile sampler rack with filtration collection of TSP on glass fiber filters (2). Since to date the particulate air quality standards are based on TSP, no differentiation of particle sizes during sampling was made, but a separate arrangement was made by SCRPA and SCRMCA with Dyer Laboratories to determine by microscopic count the particle size distributions on twelve of the airborne dust samples collected by PES. The profile sampler has been used extensively in various EPA studies to define essentially the entire mass of the dust plumes emitted from sources (3,4,5). It is impractical to make temporary enclosures to collect all emissions from most rock-processing units. The alternative approach of "upwind-downwind" sampling does not allow isolation of single sources in the vicinity of other emission points. For these reasons the profiler method was adopted for all but one type of source, the surge pile.

During sampling SCAQMD representatives recorded opacity using standard SCAQMD methodology. SCRPA provided source inventory data obtained by questionnaire from its members, and more detailed layouts and operational data from several selected operators. The latter were for use as cases in the dispersion modeling phase of the project.

The types of sources to be tested, and the particular units, were selected in consultation with SCRPA and SCAQMD with the object of including examples of elements potentially contributing to fugitive dust emissions if uncontrolled. These included haul roads (three examples), transfer point, screen, crusher, surge pile, and bulk loading. The process elements tested were all "dry side" or unwashed material, since the washed material is saturated with water and emits no significant amount of dust at any stage. Except for bulk loading all tests were run both uncontrolled and with water spray control. Haul roads were also tested in an intermediate state of control. The sampling was carried out in the period of July to September, 1979, the hottest season of the year. There was no rain during this period, nor for at least two months previous.

2.0 METHODOLOGY

2.1 PROFILE SAMPLER

This device was developed along the lines reported by Cowherd (2-5). The PES apparatus took two forms, one for point sources and one for line sources'. Nozzles were made of sheet metal in three sizes and selected according to wind velocity to approximate isokinetic sampling. (Isokinetic sampling matches air velocity into the sampler nozzle to the velocity of air moving past the nozzle, in order to avoid biased sampling of the mixture of particle sizes found in the dust plume.) The nozzle selection was made from a tabulation of air volume flow rates against nozzle diameter and air velocity/wind speed (Table A-1 in Appendix A). The nozzles were clamped to a rack at one meter intervals, five on the horizontal cross-bar, two meters high, and two more on the center vertical at one and three meter heights. The nozzles were each connected by twelve foot lengths of flexible hose and sheet metal adapters to standard 8" x 10" HiVol filter holders. The hose was lined with woven glass, which was chosen for its lack of tendency for sand or dust to adhere to the interior of it. For sampling, the profiler was centered downwind two to eight meters from the source.

For haul roads (considered to be line sources), the profiler was reduced to three nozzles in a vertical line at one, two and three meter heights. It was set up within five meters of the edge of the road.

Before the run the HiVol samplers were loaded with numbered glass fiber filters which had been desiccated overnight and tared. After sampling the hoses were tapped and manipulated to send any settled dust to the HiVol. Then, filters were unloaded (behind a wind shield, if necessary), folded once lengthwise, placed in a plastic envelope and stored in a manila envelope oriented to prevent dust spillage. Later the filters were again desiccated overnight and reweighed. During sampling HiVol air flows were determined by taking manometer readings on a tap in the blower output, previously calibrated by a set of calibrated orifices. These procedures are adapted from standard EPA methods (6).

2.2 SAMPLING PROCEDURES

2.2.1 SAMPLING OF POINT OR LINE SOURCES

The sampler deployment is shown in Figures 2-1 and 2-2. The upwind and downwind HiVols were run conventionally (6), and simultaneously with the profiler. Wind speed and direction were recorded with a Bendix-Friez Aerovane oriented by compass, with allowance for magnetic deviation from true north. Before sampling with the profiler, some preliminary runs were made with a Raeder portable particulates sampler, in order to determine approximately the duration of sampling time necessary to collect an adequate weight of sample. After the first profiler test series, it was possible to select a suitable test duration by visual assessment of the plume. Sampling times were varied from ten minutes for uncontrolled (dry), high emission sources, to one hour for sources with a high degree of water spray control.

For haul roads (line sources), a measured interval of distance of about 100 feet was marked off along the road. During the sampling period, each vehicle was timed between the marks for velocity determination. The type of vehicle, and its load, were recorded.

Test run data are given in the Appendix.

2.2.2 SURGE PILE SAMPLING

In order to sample a surge pile, a larger area source, an array of HiVols was deployed as shown in Figure 2-3. The degree of control was varied by changing the spray on the crusher-screen combination

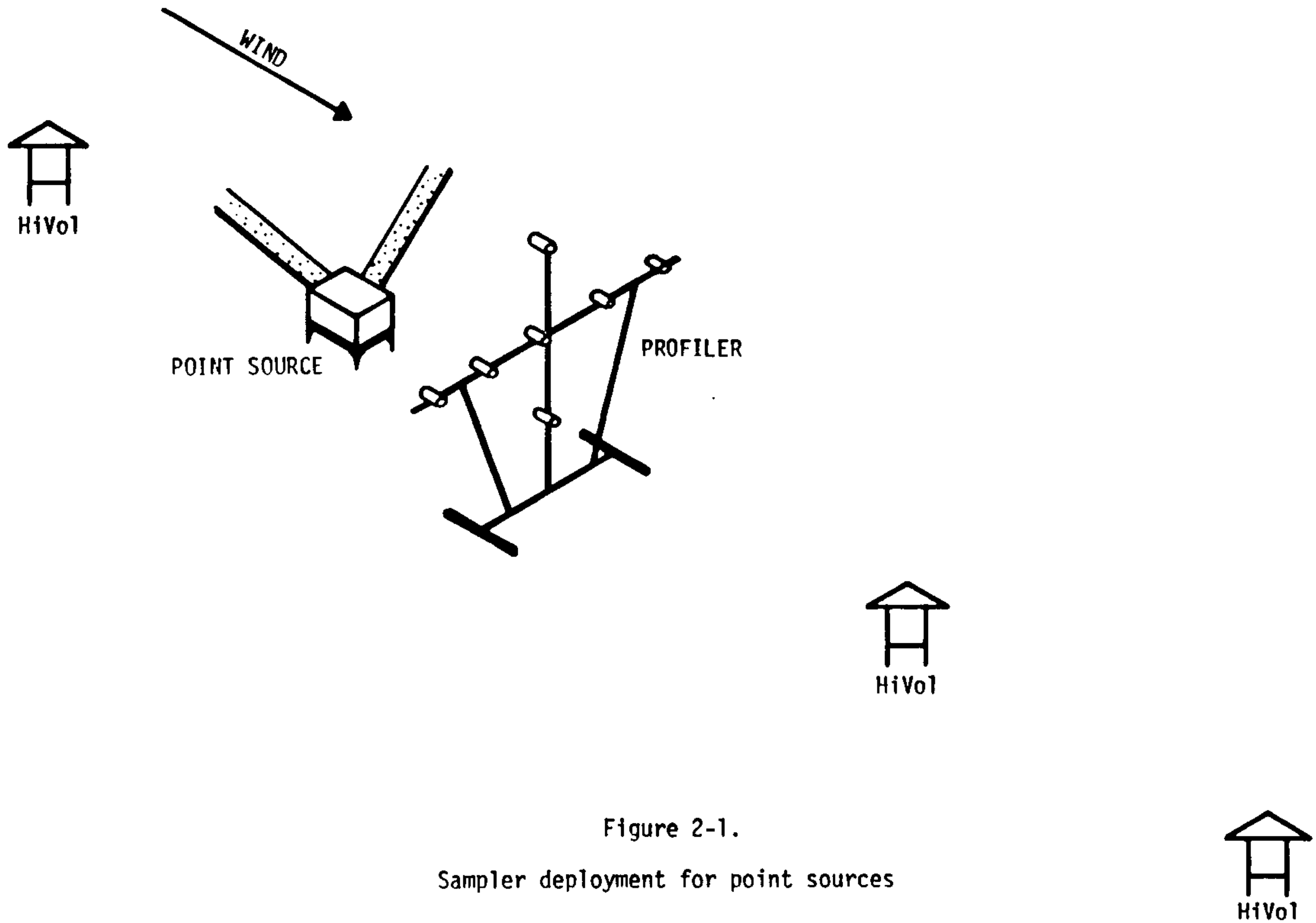


Figure 2-1.

Sampler deployment for point sources

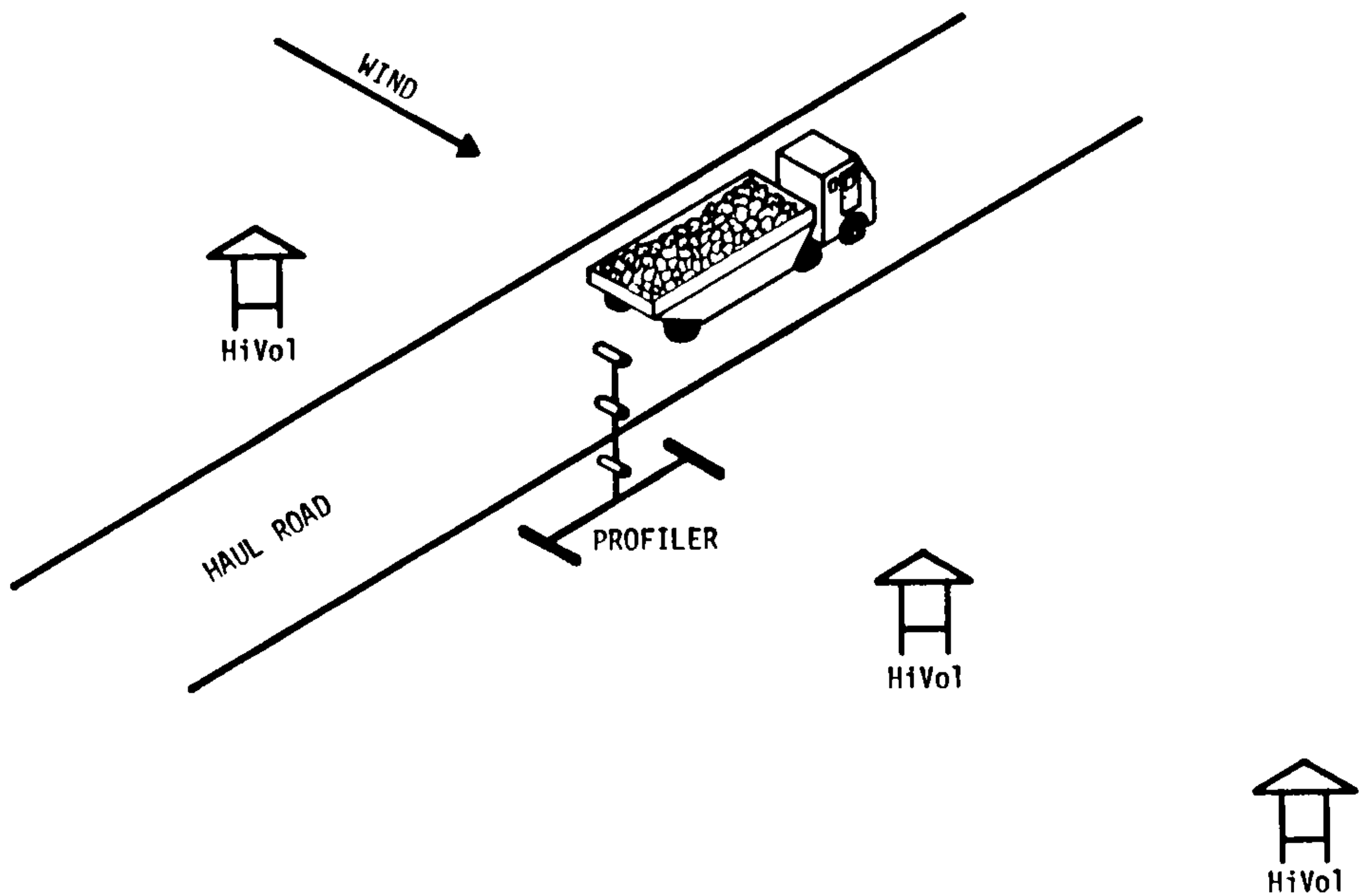


Figure 2-2.

Sampler deployment for haul roads

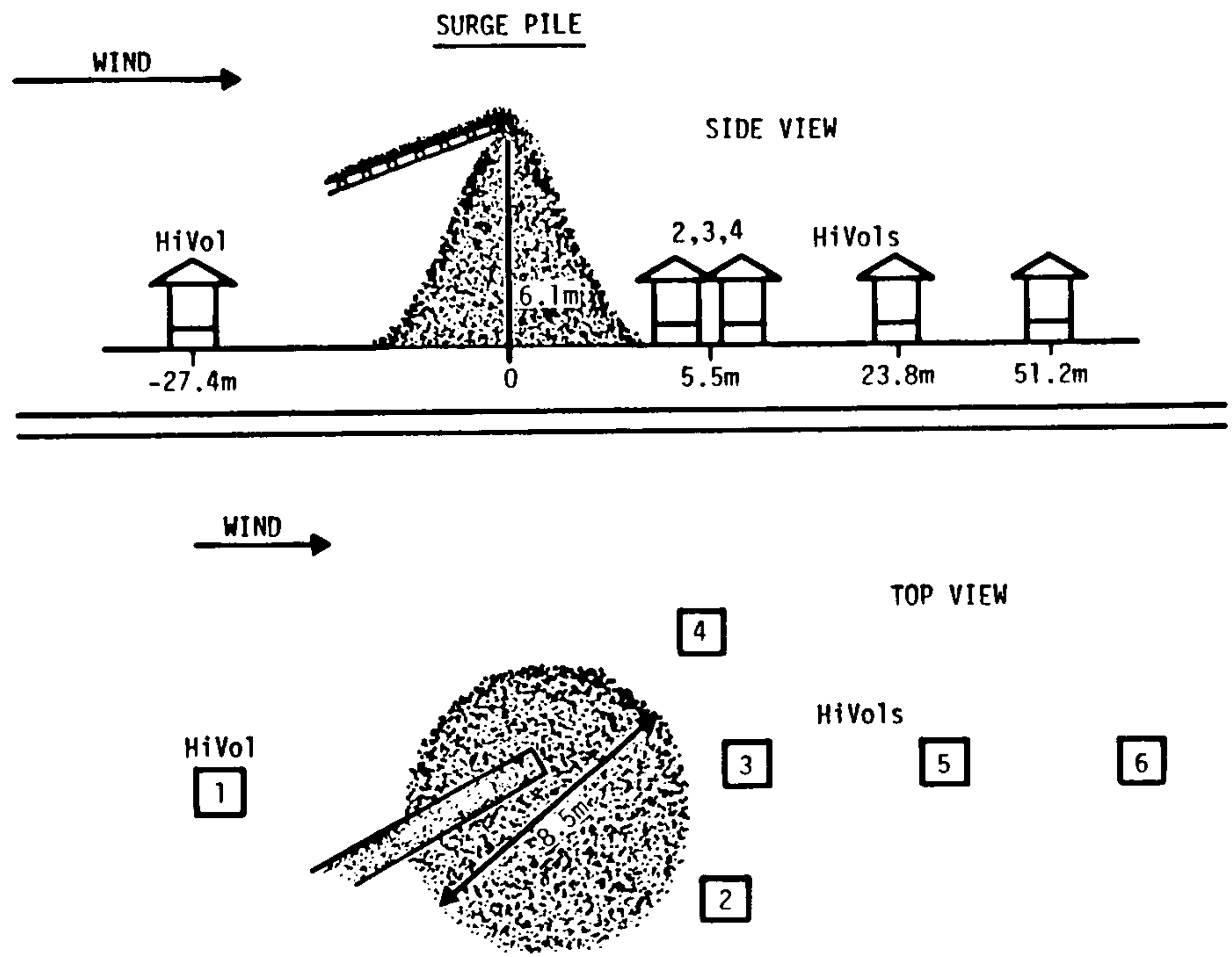


Figure 2-3.

HiVol Deployment for Surge Pile Sampling whose output was conveyed to the surge pile. This sampling arrangement did not define the vertical extent of the plume.

2.2.3 PLUME SAMPLE INTEGRATION PROCEDURE

2.2.3.1 POINT SOURCES

Horizontal and vertical profiler concentration data were separately fitted by statistical regression to the expression:

$$\ell n\ y = a_0 + a_1 x + a_2 x^2$$

where

y = TSP concentration, mg/m^3

x = profiler nozzle position, m

The fitted curves for one example are shown in Figure 2-4. The plume density at the profiler is sketched three-dimensionally in Figure 2-5. To integrate this, it was assumed that any cross-section of the solid is an ellipse with axes equal to the width and height of the solid at that density (i.e. the horizontal widths of the curves in Figure 2-4). The area of the ellipse is equal to πab, where a and b are semi-axes (See Figure 2-6). The solid volume, representing the total plume dust mass passing the profiler, can be obtained by graphical integration: elliptical slices of thickness Δy, as shown in Figures 2-5 and 2-6, are summed. The result is in grams per second, or pounds per hour.

2.2.3.2 LINE SOURCES

The vertical profiler data for haul roads were fitted by statistical regression to the equation:

$$y = a + b\ \ell n x$$

where

y = vertical distance, m

x = TSP concentration, mg/m^3

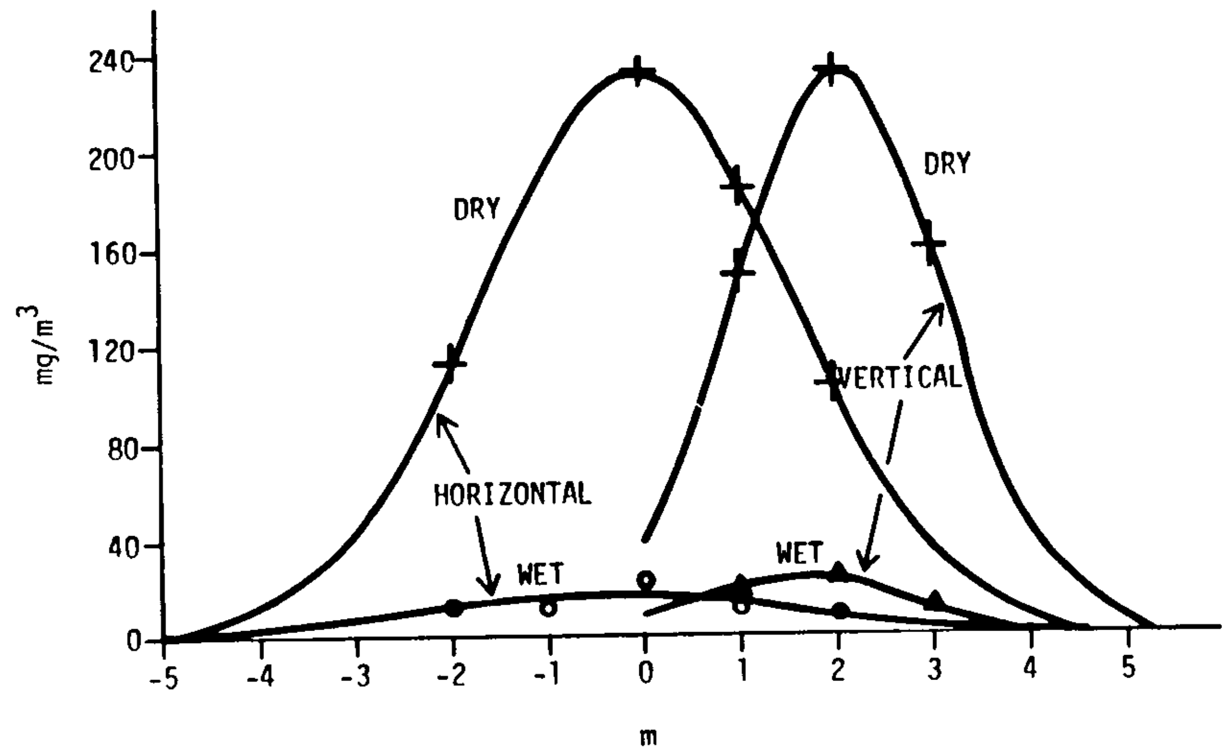


Figure 2-4.

Example of profiler data fitted to Gaussian curves

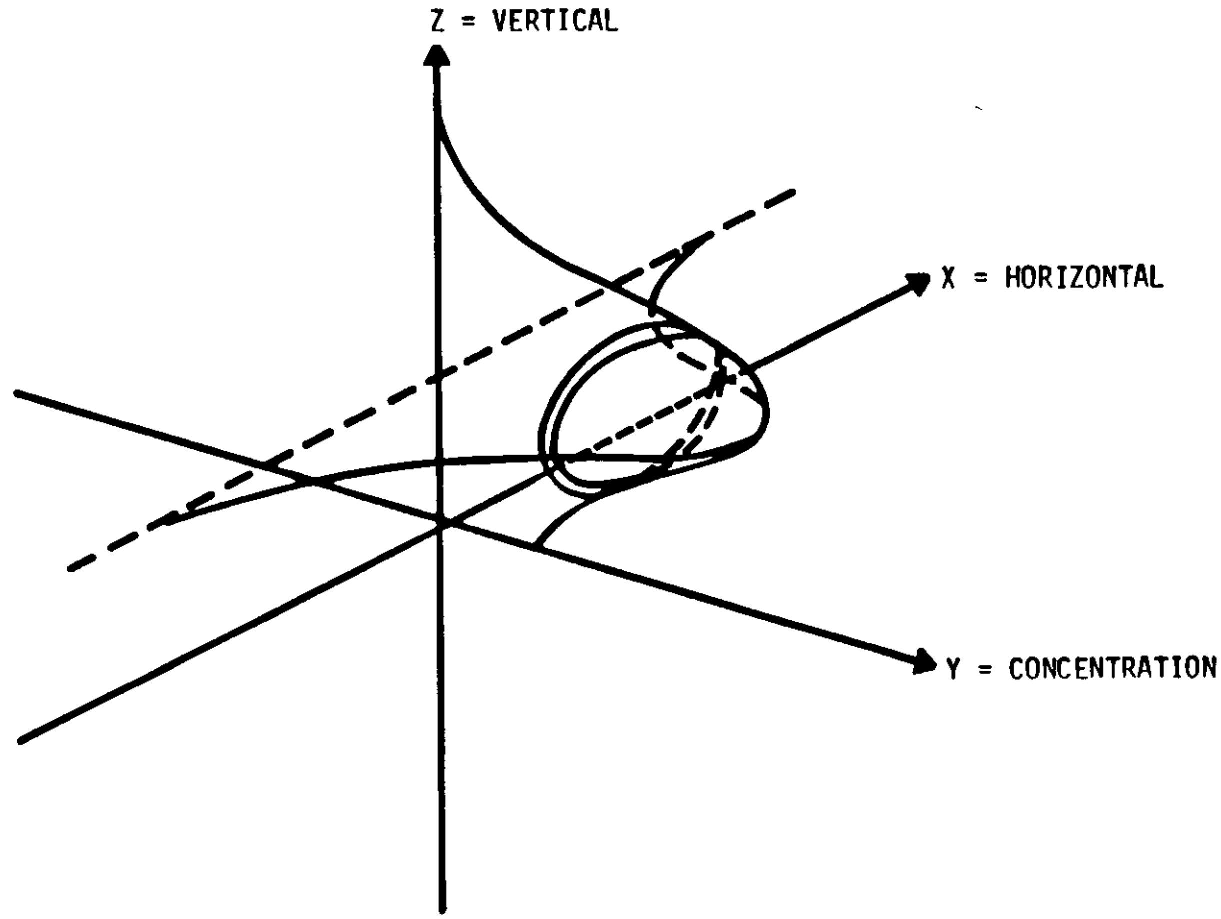
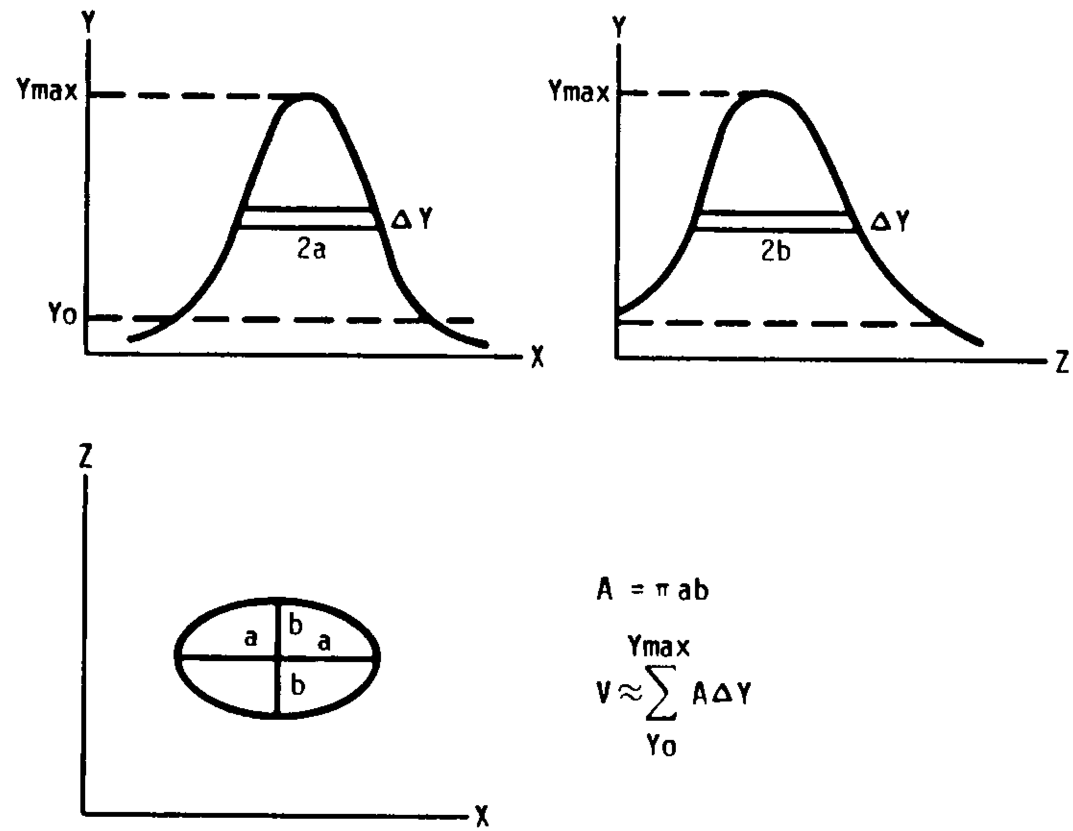


Figure 2-5.

Plume concentration cross-section at the profiler



$$A = \pi ab$$

$$V \approx \sum_{Yo}^{Ymax} A \Delta Y$$

Figure 2-6.

Graphical integration procedure for point source profiler data

The curves were integrated graphically from ground concentration (y = zero) to the concentration equal to that at the upwind sampler. Multiplying the integrated total by the wind velocity and dividing by the number of vehicles gave the emission factor in terms of grams per vehicle meter traveled (or pounds per vehicle mile). An example of the curve fit is given in Figure 2-7.

In all cases the dry road tests were made with no water spray for at least one hour previous. At haul roads A and C, there had been no spraying since the previous day before the dry condition run. At haul road B, the last spraying was one hour before the run. The wet and intermediate tests were started at various intervals up to 50 minutes after spraying, based on subjective estimates of dust levels.

2.3 OPACITY OBSERVATIONS

The SCAQMD provided qualified opacity observers. For point sources, the observations were made from a suitable position by estimating at uniform time intervals the percent opacity at the densest part of the dust plume being emitted. For haul roads, the readings were made, in all but one test day, each time a vehicle passed, again at the densest part of the plume. One one day, the readings were made at equal time intervals, as for a point source.

The SCAQMD procedure for opacity observation is basically that of EPA method 9 (7), with one exception. Instead of observations made at equal timed intervals, the SCAQMD procedure calls for noting the times when the opacity changes from one level to another.

2.4 SIZE DISTRIBUTIONS

In consultation with SCRPA one haul road, a screen, and a bulk loading operation were selected for determination of size distribution. The filters from the upwind and two downwind HiVols

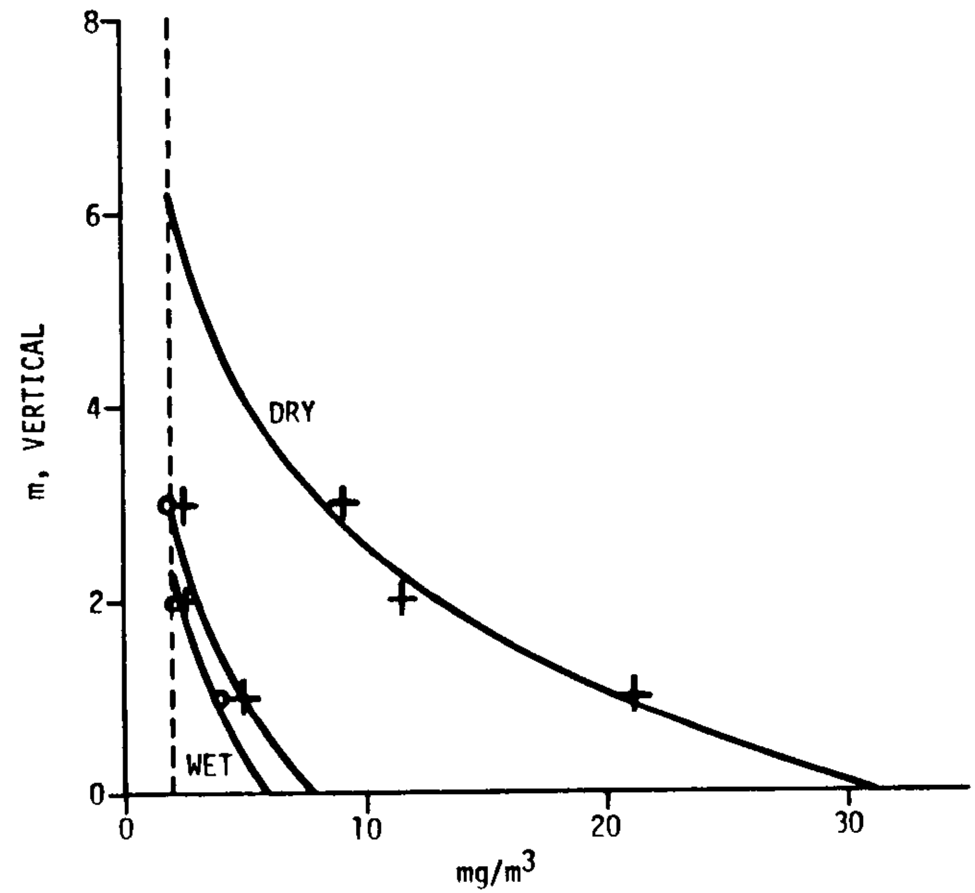


Figure 2-7.

Example of verticle profiler data fitted to logarithmic curves

HiVols and from the center of the profiler were conveyed to Dyer Laboratories, who were engaged separately to make microscopic particle counts in three diameter ranges: 2.5-10μ, 10-30μ, and above 30μ. The report from Dyer Laboratories is included in the Appendix. The results were converted to percent by weight, using geometric mean diameters for the two smaller ranges and the estimate (given by Dr. Dyer) of 40μ for the median large particle, and assuming equal densities in all size ranges. The results are shown in Table 2-1. The precision of the size distribution increases with the number of particles counted in each size range, along with an increase in time and effort. The number of particles counted for this study were sufficient for distribution counts which are accurate to about 20 percent. The one value of zero (for particles larger than 30μ in bulk loading) thus signifies a very low value such that no particles that large appeared in the preselected counting grids.

2.5 SOURCE INVENTORY

An inventory of operational components in member plants was obtained by SCRPA through the survey questionnaire shown as Table 2-2. Only plants within the SCAQMD boundaries and currently in operation were tabulated. It is estimated that over 95 percent of the industry capacity in this area is included in SCRPA membership.

2.6 DIFFUSION MODELING

The model used was PAL, one of the set of UNAMAP diffusion models accepted by EPA (9). This model is a multiple source, multiple receptor version. Up to 30 each of six types of sources, and 30 receptor sites can be included. Input data was: grid locations, size, and elevations of sources and receptor sites,

Table 2-1: PARTICLE SIZE DISTRIBUTIONS, WEIGHT BASIS

Range of Particle Diameters, μ:			Percent by weight		
			2 1/2-10	10-30	>30 (~40)
Source Type	Sample Point	Filter No.			
Screen	Upwind	T99	2.5	42	56
	Profiler Center	T94	0.3	10	89
	Near downwind	T97	0.5	6	93
	Far downwind	T98	1.3	19	79
Haul road	Upwind	T26	13	17	70
	Profiler Center	T20	6	57	37
	Near downwind	T21	6	57	37
	Far downwind	T22	6	54	39
Bulk loading	Upwind	A21	2.1	35	63
	Profiler Center	A52	1.0	22	77
	Near downwind	A24	3,1.6	52,34	45,65
	Far downwind	A23	11	89	0

Table 2-2. FUGITIVE DUST QUESTIONNAIRE

Company Name ____________

Plant Name ____________

Plant Address ____________

____

Name of Preparer ____________

Fugitive Dust Sources

Pit Area ________ Acres
Native Soil Type ________
Haul Road Length ________ Miles
Haul Road Treatment
________ Paved ________ Watered ________ Chemical Treatment

Plant Production

	Ave. TPH Wet	Ave. TPH Dry
Sand		
Gravel		
Crushed		
Base		

Average Total Throughput ________ TPH

THE FOLLOWING QUESTIONS APPLY TO DRY PROCESSING ONLY

Crushers

Type (cone, jaw, etc.)	Size	Method of Dust Suppression

Screens

Size	Method of Dust Suppression

Transfer Points

Number	Method of Dust Suppression

Bulk Loading Points		Average TPH
How Loaded		
Plant Bunker	____________	________
Field Bunker	____________	________
Conveyor Belt	____________	________
Front End Loader	____________	________

CITATIONS (AQMD) RECEIVED RELATED TO AGGREGATE PRODUCTION

Date	Rule Cited
________	____________
________	____________
________	____________

Please attach a line diagram of the plant layout.

Comments: ____

source strengths (point, area, and line), averaging time, area and line source dimensions, wind speed and direction, atmospheric stability, temperature, mixing height, and fallout rate. The source strengths were those derived in this study, adjusted for tonnages of material handled and for truck traffic frequencies. Only "dry side" processing components were considered. Receptor sites were selected directly downwind and at various other locations (including upwind) depending on terrain.

2.6.1 DESCRIPTION OF THE MODEL

PAL and other models in the UNAMAP group (8,9,10) are based on the assumption of Gaussian distribution, vertically and horizontally, at any cross-section of the plume. The spreading rate of the plume used in the model is based on experimental data with gases, and is not realistic for particles large enough to settle appreciably within the downwind distances of interest. Therefore, it is common to introduce a fallout rate, which in effect tilts the central axis of the plume downward (11). The fallout rate, or angle of tilt, is determined from settling velocity tables according to the known or assumed particle diameter and density. Densities were considered to be uniform in this study. Airborne particles rarely fail to show a broad range of particle diameters, which would correspond to a variety of fallout rates. Since the standard models do not provide for this, some inaccuracy results. Nearby receptor concentrations tend to be overestimated because particles larger than the mean fall out faster than predicted. (This effect is noticeable at greater distances when the source has a higher elevation.) The theoretical terminal settling rate by Stokes law is proportional to the square of the diameter, for spherical particles. Moderate non-spherical shape does not cause large changes in the settling velocity. The use of linear fallout rates may underestimate the concentrations of particles smaller than the mean at large receptor distances. The importance of this is reduced for the type of dust studied here, where the weight percent of particles below 10 is small near the source. Wind velocity in the model expression is reciprocally related to receptor concentrations. At very low wind speeds the model becomes unrealistic; at zero wind speed the concentration at receptors is calculated to be very high, possibly infinite, whereas in reality initially it would be zero, except at the source, and would increase only by diffusion thereafter at non-source sites. The averaging time may be varied. In the current study one hour was used, since with steady state source output and windspeeds of at least one m/sec any receptor distance of interest would be reached well within this period. In relating model receptor concentrations to the air quality standard, it must be remembered that normal plant operations are for eight daytime hours, while the standard is averaged over 24 hours. Therefore, the model values should be divided by three, unless off-hour activity is known to occur. Wind direction, although fairly stable during the day, does vary, so that emissions are distributed to different receptors, at times, than those downwind according to the selected modeling conditions. This causes overestimates by roughly a factor of two. The model takes no account of air turbulence introduced by irregularities in terrain, which have the effect of increasing the dispersion, i.e. diluting the pollutant.

The United States Environmental Protection Agency has designated methods for maintaining air quality in a series of guidelines (e.g., 12). Where simple projections are not definitive, or indicate failure to maintain air quality standards, the methods call for use of computerized dispersion models. There is a large variety of models (8), from which the user selects the most appropriate for his problem. In general, the models are thought to give projections accurate to about 50% when carefully selected and applied. The bulk of previous experience, however, has concerned gaseous stack emissions. The problem of settling by large-diameter particles has not been well accommodated in existing models.

2.6.2 WIND CONDITIONS(13)

The average daytime wind conditions in the South Coast Air Basin are remarkably similar throughout the year, interrupted only by infrequent storms or "Santa Ana" conditions. Ordinarily during late night or early morning, the wind is offshore. As the temperature rises during the morning the flow reverses and becomes onshore. The reversal occurs early during the summer and later in the winter, but normally before noon. During the entire year in most of the basin the predominant wind flow during the latter half of the working day (which starts at six or seven o'clock) is from the southwest quadrant from morning until late afternoon.Local topography causes variations in the direction and velocity, but at any given location it is consistent. Santa Ana conditions refer to reversed flow patterns caused by a high pressure air mass over the central plateau of the western states. This occurs only a few times a year, mostly in the fall, and often results in gusty, high-speed downslope winds, particularly in the canyons. Nearly all conventional storms come in off the Pacific. They are infrequent and mostly confined to the winter months, typically lasting two or three days. Many storms brush by to the north without precipitation, but may alter the usual offshore-onshore diurnal wind cycle pattern. Once the onshore breeze is established in the morning, it strengthens until late afternoon cooling occurs. Velocities in the range of three to twelve knots are usual. For modeling input the mean value of six knots (3.1 m/sec) was used.

2.6.3 AMBIENT AIR QUALITY STANDARDS

California air quality standards for TSP are 100 $\mu g/m^3$ averaged over 24 hours and 60 $\mu g/m^3$ annual average, both based on high volume filtration sampling. These standards are more stringent than the Federal standards of 250 and 75 $\mu g/m^3$, respectively. Also, the California standard is not to be exceeded, while the Federal 24 hour standard of 250 $\mu g/m^3$ may be exceeded once a year (at most). For modeling projections in this study the 24 hour California standard of 100 $\mu g/m^3$ (= 0.100 mg/m^3 = 1×10^{-4} g/m^3) is the relevant one for comparisons.

3.0 TEST RESULTS

3.1 EMISSION FACTORS

3.1.1 POINT SOURCE EMISSION FACTORS

Table 3-1 summarizes emission factors for point sources derived from profiler sampling, except for the surge pile, for which no vertical definition was possible. Approximate emission factors for the surge pile were deduced by integrating horizontally and assuming an effective dust plume height of six meters (the height of the surge pile). Spray control on the various sources reduces dust emissions by 90-98 percent. Two early tests are not reported in Table 3-1. In one case(J) the wind alternated most of the day between two directions 90° apart, which did not permit obtaining samples of material consistently originating from the source with any profiler location. In the other case (I, a large crusher) the concentrations were still increasing towards one end and the top of the profiler. This indicated that a major part of the plume was passing above and to one side of the profile sampler rack, and the integration described in Section 2.2.3.1 was impossible. This was caused by placing the rack too far away from the source and not high enough above the ground.

3.1.2 HAUL ROAD EMISSION FACTORS

Emission factors for three different haul roads are summarized in Table 3-2. Dry road emissions varied by about a factor of two; full spray control reduced emissions 89-96 percent to levels agreeing closely; 0.88, 1.00, 1.11 g/veh-m (grams per vehicle per meter).

Table 3-1. EMISSION FACTORS FOR POINT SOURCES

Source Location	Through-put T/hr	Control	Emission Rate g/s	Emission Rate lb/hr	Percent Control	Emission Factor kg/MT	Emission Factor lb/T
D - Transfer Point	350	Wet	0.027	0.21	98	0.0003	0.0006
		Dry	1.28[a]	10.2	0	0.0146	0.0291
E - Crusher	50	Wet	0.16	1.27	90	0.0127	0.0254
		Dry	1.62	12.9	0	0.129	0.258
F - Screens	200	Wet[b]	0.42	3.3	95	0.0082	0.0165
		Dry	9.1	72.	0	0.180	0.360
G - Open Loading	312	Dry	9.6	76.	0	0.122	0.244
H - Surge Pile	350	Wet	0.24	1.9	96	0.0027	0.0054
		Dry	5.7	45.	0	0.064	0.129

[a]See text discussion
[b]Water spray failed the last 10 minutes of 60 minute run

Table 3-2. EMISSION FACTORS FOR HAUL ROADS

Source Location	Degree of Moisture	Emission Factor g/veh - m	Emission Factor lb/veh - mi	Percent Control
A	Wet	0.88	3.1	96
	Intermediate	2.1	7.5	90
	Dry	21.	75.	0
B	Wet	1.00	3.6	92
	Intermediate	1.7	6.0	86
	Dry	12.3	44.	0
C	Wet	1.11	3.9	89
	Intermediate	2.3	8.2	78
	Dry	10.4	37.	0
Averages	Wet	1.0	3.5	93
	Dry	14.6	52.	0

3.2 DOWNWIND DECAY OF DUST CONCENTRATIONS

For an approximation of fallout rates downwind, the two downwind sample TSP concentrations were used to derive the equations for an assumed logarithmic decay of the form:

$$y = a + b \ln x$$

where

y = TSP concentration, mg/m^3

x = downwind distance, m

Then these expressions were used to estimate the distance at which TSP concentrations dropped to 1) the value observed upwind, or 2) the air quality standard of 0.100 mg/m^3. As shown in Table 3-3, except for some spray-controlled cases where upwind-downwind values were very similar (or even reversed), the decay distances calculated were in the range of 12-61 meters to drop to upwind levels, and 10-221 meters to drop to the standard.

3.3 OPACITY-EMISSION RESULTS

The available SCAQMD opacity reports are given in Appendix C. Results for haul roads are summarized in Table 3-4. The emission rates at various levels of control do not lead to a similar correspondence in opacities. In one example, the opacities associated with individual trucks were plotted against time from start of the test in two groups, empty and loaded, as shown in Figure 3-1. The empty trucks averaged 32 mph speed, the loaded trucks 17 mph. Nevertheless the loaded trucks gave dust plumes of higher opacity which increased with duration of the test more rapidly than those of empty trucks.

Point source opacity observations are given in Table 3-5, where opacities are compared with maximum concentrations collected at the profile rack. Except source G, these are plotted in Figure 3-2

Table 3-3. DOWNWIND DECAY

(Two downwind TSP concentrations used to derive curve: $Y = a + b \ln X$; Y = conc., mg/m^3; X = distances, m)

Source	Type	Control	Measured Y upwind	Profile Center Y, 1 m high	measured downwind		calculated	
					Y (x)	Y (x)	X(Y=Yuw)	X(Y=0.100)
Haul Road - A	Line	Wet	1.97	3.79	1.12 (14.4)	1.14 (27.5)	*	*
		Inter.	2.11	4.94	2.77 (14.4)	2.04 (27.5)	26	154
		Dry	1.67	21.0	10.1 (14.4)	5.1 (27.5)	43	53
Haul Road - B	Line	Wet	0.80	1.71	0.67 (13.7)	0.62 (27.5)	2.2	4×10^4
		Inter.	1.99	4.34	0.61 (13.7)	1.86 (27.5)	30	10
		Dry	5.32	19.1	7.72 (13.7)	5.81 (27.5)	33	221
Haul Road - C	Line	Wet	0.59	1.29	0.80 (8.1)	0.73 (14.9)	59	4×10^3
		Inter.	0.57	1.60	1.30 (8.1)	0.54 (14.9)	17	24
		Dry	0.42	7.41	3.50 (8.1)	2.06 (14.9)	34	40
Transfer Point - D	Point	Wet	0.76	3.26	0.86 (12.2)	0.84 (24.4)	390	*
		Dry	2.08	51.4	2.08 (12.2)	1.44 (24.4)	12	104
Crusher - E	Point	Wet	0.64	8.56	2.28 (13.4)	1.35 (22.3)	33	44
		Dry	0.97	88.8	5.80 (13.4)	3.06 (22.3)	33	39
Screens - F	Point	Wet	0.97	17.9	4.65 (23)	1.41 (38)	41	47
		Dry	1.55	146.	59. (23)	11.5 (38)	42	43
Open Loading - G	Point	Dry	1.29	89.	13.4 (23.0)	6.43 (40.4)	61	67
Surge Pile - H**	Point	Wet	0.55	2.58	0.79 (23.8)	0.43 (51.2) 2.58 (5.5)	39	61
		Dry	2.33	23.0	3.69 (23.8)	4.91 (51.2) 23.0 (5.5)	48	62

* Curve could not be fitted.
** Three downwind concentrations used.

Table 3-4. OPACITY-EMISSION RELATIONS
HAUL ROADS

Source Location	Control	Emission Rate g/veh - m	Opacity, Percent	
			Average	Maximun
A	Wet	0.88	25	70
	Inter	2.1	34	50
	Dry	21.	18,20,28*	60,80,70*
B	Inter	1.7	19	60
C	Wet	1.11	3	10
	Inter	2.3	26	80
	Dry	10.4	58	80

*Intervals of interrupted test observed separately

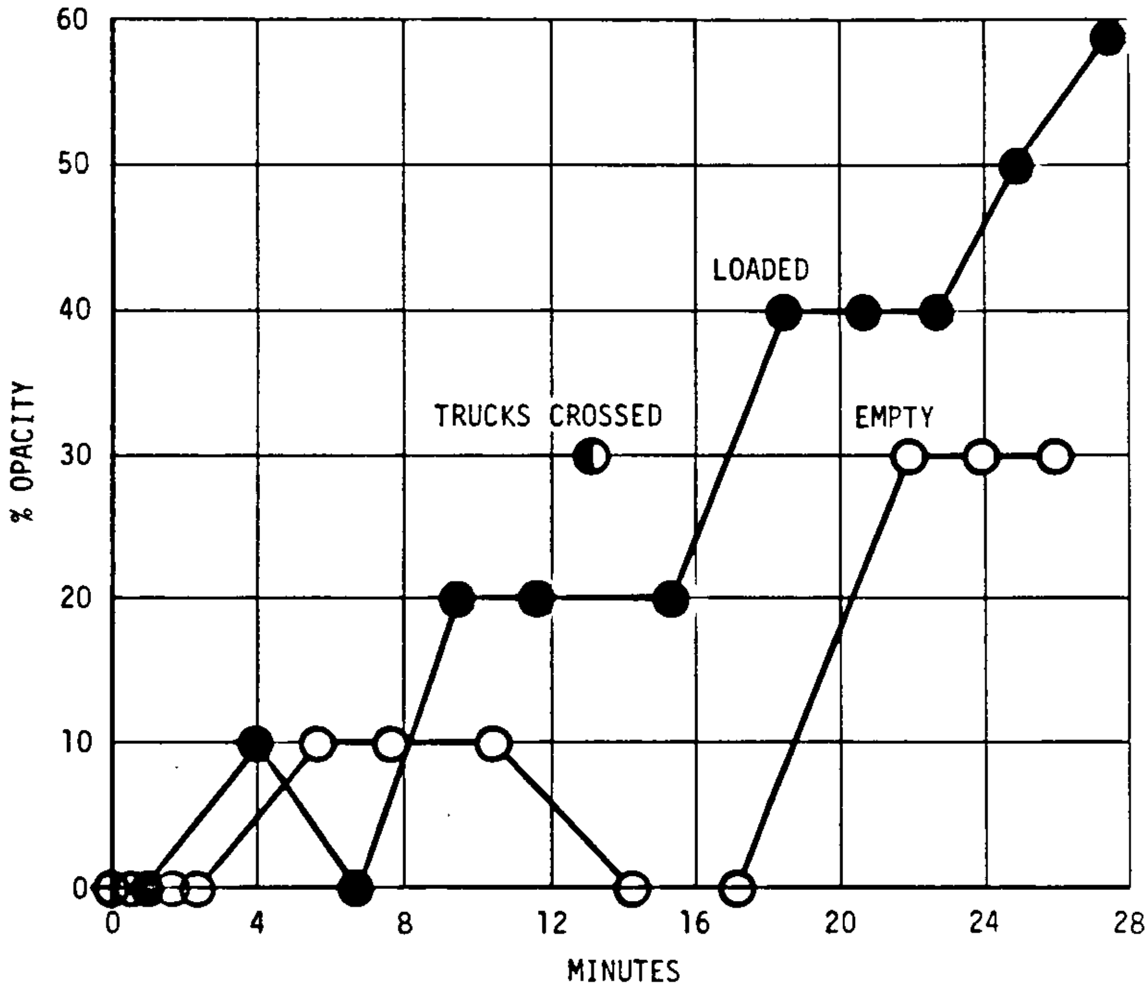


Figure 3-1. Opacities at Haul Road B

Table 3-5. OPACITY-EMISSION RELATIONS

Point Sources

Source	Control	Maximum Concentration, mg/m^3	Opacity, Percent	
			Average	Maximum
Crusher, I	Wet	45	4	10
		44	8	20
	Dry	335	47	60
Screen, J	Wet	74	7	15
	Dry	359	27	40
Open Loading, G*	Dry	178	70	100

* Qualified observer, but not SCAQMD

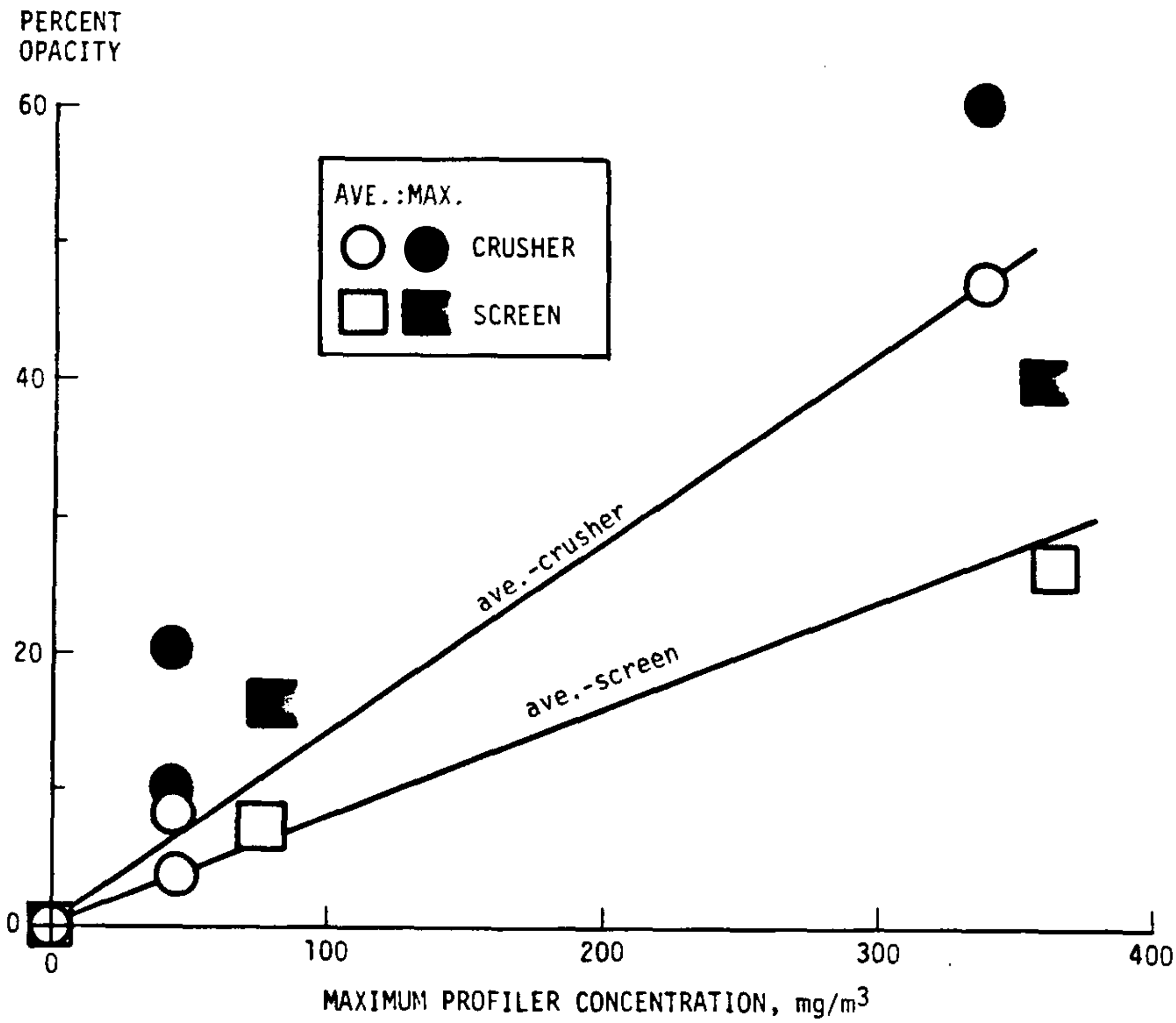


Figure 3-2. Point Source Opacities

(assuming zero opacity at zero emissions). The average opacities may be linearly related to maximum concentration for each source individually. There are few data points, however, and other curves might fit just as well, since the concentrations are either high or low, without intermediate values.

3.4 PARTICLE SIZE DISTRIBUTION

The size distributions (shown in Table 2-1) for screen and bulk loading samples are high in large particles over 30μ diameter, while the haul road samples show more in the 10-30μ range. The highest downwind value for particles under 10μ was eleven percent; upwind values reached 13 percent in one case. These findings reflect the fact that relatively few large particles dominate the weight distribution downwind from the point sources. Evidently there is less of this large material made airborne by vehicle movement on haul roads, and more of the medium and smaller particles. Upwind samples not affected by the source may have small particles coming from long distances.

3.5 DIFFUSION MODELING PROJECTIONS

3.5.1 EFFECTS OF VARIATION IN MODEL INPUT

The initial runs were made with no alterations in the PAL model except adding a fallout rate of 0.01 m/s for the plume (This simple version allows the plume to reflect off the ground, as if it bounced). The windspeed was set at 3.1 m/sec (6 knots), wind direction at 270°, and the atmospheric stability constant equal to four. All these are very typical conditions, as discussed in Section 2.6.2.

PAL is a conservative model which tends to overestimate downwind concentrations, and on all case examples some projected fense line TSP concentrations exceeded the California standard of

100 $\mu g/m^3$, even with spray control on the sources. For greater realism the model was altered to eliminate reflection of the plume; i.e. where it strikes the ground it remains (mathematically, it penetrates the furface), and is not found further downwind, at the receptor heights. The effect of varying windspeed and fallout rate were also examined. Higher windspeeds reduced receptor concentrations; lower windspeeds become unrealistic because the assumed function in the model relates concentration to the reciprocol of windspeed. A nearby receptor will show approximately this reciprocol relationship in simple cases. Changing the fallout rate from 0.01 to 0.05 m/s gave both increases and decreases at downwind receptors, apparently depending on the elevation of major sources. No extreme changes would be expected within the receptor distances examined, which were not over 3000 m.

3.5.2 MODELING RESULTS

Five plants were modeled. They varied in location, size, and process layout. Four had haul roads. Appendix D contains each plant layout with sources and receptor sites, lists of sources with their emissions (controlled and uncontrolled), and copies of the computer printouts for the two cases. (For plant no. 5 the model was also rerun for a second wind direction). Sources are listed with spatial coordinates and emissions, then meteorological factors. Finally concentrations at each numbered receptor are listed from point, area, and line sources, and in total. Units are g/m^3 in exponential notation.

4.0 DISCUSSION AND CONCLUSIONS

4.1 EMISSION FACTORS

After the first two runs, the remaining 18 tests were successful and yielded data capable of quantitative interpretation. The first of three haul road series was interrupted by electrical power failures, but nevertheless resulted in data in good accord with the other tests. The haul roads were tested three times each with varying degrees of water spray control. The program was limited to one example each of five point sources, with and without spray control in four cases. The emission data could be fitted by statistical regression, using a gaussian-type expression for point sources, and a semilogarithmic form for the haul roads (line sources). The emission factors are shown in Table 3-1 and 3-2 and indicate that water spray control is capable of at least 90 percent control. The degree to which the data can be generalized from the single source tests is not certain, but the nine haul road tests agree among the three series to at worst a factor of two; most are within about 20 percent.

4.2 PLANT EMISSIONS IN THE SOUTH COASTAL DISTRICT

From the SCRPA-SCRMCA questionnaire the major source types for each SCRPA member were tabulated. This data is summarized for SCRPA as a whole in Table 4-1. The data relate to unwashed material only. Although jaw crushers are included in the count, no emission test was made on any of them. They do not produce much fines and are often below ground level, which reduces emissions. There is usually one jaw crusher in the average plant. The reported count is 36 jaw crushers and 82 other crushers, totalling 118, and averaging 3.4 crushers per plant. The total number of screens reported was 159, an average of 4.5 per plant. Haul roads were present in 18 plants. The total length was 25.8 km, averaging 1.43 km in plants where they were present, and 0.74 km for all plants.

Table 4-1. DRY SIDE PRODUCTION DATA

Plant No.	Throughput, T/hr	No. Crushers	No. Screens	Haul Road, km
1	509	7	9	0.8
2	100	3	5	0
3	250	8	7	3.2
4	25	4	1	0.8
5	400	4	2	0.8
6	0	4	0	1.4
7	0	0	0	0
8	210	1	1	0
9	450	5	2	0
10	225	3	1	0
11	200	3	7	0
12	150	2	1	0.4
13	40	2	2	2.0
14	0	2	3	1.6
15	286	3	8	1.6
16	300	6	4	0.4
17	300	4	4	0.8
18	340	4	4	2.0
19	250	2	6	1.2
20	200	2	4	3.2
21	89	3	3	1.2
22	105	4	6	0
23	301	3	7	1.2
24	200	3	5	1.6
25	195	3	2	2.0
26	850	7	8	0
27	0	0	0	0
28	360	7	15	0
29	425	2	5	0
30	161	3	10	0
31	672	4	19	0
32	80	3	1	0
33	0	2	0	0
34	50	2	4	0
35	4	3	3	0

Throughput rates for individual operating units were obtained for the five plants used in modeling projections, and used to scale emissions with the factors listed in Tables 3-1 and 3-2. The results for each of the five plants are in Appendix D. A summary of the unit emissions is shown in Table 4-2, along with projections to the entire South Coastal Basin industry. Transfer points were reported inconsistently and showed relatively small contributions, especially when controlled. They are not included. Table 4-2 shows the averages per process unit for the five plants, and the estimated industry totals for all process units, using those averages. For uncontrolled emissions, the contributions of screens are largest (51%), followed by haul roads (31%). With control, screens (40%) and haul roads (42%) are about equal contributors at a much lower emission level.

4.3 OPACITY-EMISSION RELATIONS

The results of the SCAQMD opacity observations reported in Appendix C and discussed in Section 3.3 are limited in range, including very little data for intermediate emission levels. (It would be difficult to fine-tune the water spray emission controls so as to reduce dry emissions by just half, for example.) The data therefore are essentially for two emission points, high and low, to which many algebraic relations could be fitted. The data are also not in agreement between different sources. Since the opacity is not dependent on the size of a plume, whereas the emissions are, a consistent opacity-emission relationship for plumes of different sizes could hardly be expected.

4.4 DISPERSION MODEL RESULTS

The results of modeling on five individual plants are given in Appendix D and summarized in Table 4-3. In every case there are downwind receptors projected to exceed the air quality standard

Table 4-2. EMISSIONS BY PROCESS UNIT

Plant No:	1	2	3	4	5	Total	Average Per Unit	Estimated for Industry Total
Process Unit:								
Crusher (except Jaw)								
Number of units	2	6	3	3	3	17		82
Emissions uncontrolled, MT/yr	270	43	151	86	39	589	34.6	2,837
Emissions controlled, MT/yr	27	4	15	9	4	59	3.47	285
Screen								
Number of units	5	9	5	2	2	23		159
Emissions uncontrolled, MT/yr	1,680	287	359	215	155	2,696	117.	18,600
Emissions controlled, MT/yr	77	13	16	10	7	123	4.6	731
Surge Pile								
Number of units	7	1	2	1	1	12		84 (est.)
Emissions uncontrolled, MT/yr	350	58	35	72	41	556	46.3	3,889
Emissions controlled, MT/yr	15	2	2	3	2	24	0.50	42
Haul Road								
Length, km	0.8	0	3.2	0.8	0.8	5.6		25.8
Emissions uncontrolled, MT/yr	440	0	241	601	308	1,592	437*	11,275
Emissions controlled, MT/hr	30	0	16	41	21	108	29.9*	771
						Total Uncontrolled		36,600
						Total Controlled		1,830

* per km

Table 4-3. SUMMARY OF HIGH RECEPTOR CONCENTRATIONS FROM DISPERSION MODELING

Plant No.	Total Downwind Receptors	Maximum Receptor Concentration $\mu g/m^3$		Number of Receptors over 100 $\mu g/m^3$		Number of Receptors over 300 $\mu g/m^3$	
		Dry	Controlled	Dry	Controlled	Dry	Controlled
1	28	40,400	2,060	24	23	24	11
2	24	5,070	1,260	17	10	15	7
3	23	3,590	216	22	9	16	0
4	29	13,100	709	28	26	28	6
5(225°wind)	28	4,960	331	15	8	13	6
5(270°wind)	28	9,580	614	13	13	13	1

of 100 $\mu g/m^3$. Plant 3, where the downwind receptors are about 2000 m from most of the sources, is the only plant where the value of 300 $\mu g/m^3$ is not exceeded at some receptor site. (This is the eight hour value equivalent to 100 $\mu g/m^3$ averaged over 24 hours, with no emissions the other 16 hours.)

Closer inspection of the individual receptor values and their locations shows examples where far receptors have higher values than nearer ones in the same direction from the main sources. This is a consequence of the linear fallout rate incorporated in the model. The central axis of the plume from an elevated source can pass above a near receptor and come close to another receptor further away. The plume from a source closer to the ground would reach nearer receptors with more strength.

The limitations of dispersion models are discussed in Section 3.5. The projected values are apt to be higher than the actual, for several reasons: the unsteadiness of wind direction, the turbulence due to local roughness in terrain (including structures), and the use of a single linear fallout rate in place of the spectrum of non-linear rates of the real, polydisperse mixture of dust particle sizes. The last reason may be the most significant source of error. These factors, combined with some uncertainty as to how far the measured emission factors can be generalized, suggest that model projections could be in error by several-fold, if all errors were in the same direction.

As shown in Table 4-3, the maximum receptor concentrations for the five plants studied range from 331 to 2060 $\mu g/m^3$. The lower end of this range is borderline, and might not indicate an excessive addition to the ambient TSP levels, but the upper values for exceed this, and indicate a significant contribution to them. Based on Section 4.2, the major sources of emission are screens and haul roads, which may put out around 80% of the total.

A more accurate projection of the impact of fugitive dust emissions from the industry would depend on more data in three areas: improved emission factors (more examples); downwind TSP sampling at property lines; and size-fractionated profile plume cross-sections further downwind, to establish fallout rates for different particle sizes. A good set of actual fallout rates for a spectrum of size ranges would add considerable accuracy to TSP modeling.

4.5 DOWNWIND FALLOUT RATES

The downwind fallout rates calculated in Section 3.2 are derived from the two observed downwind TSP sample weights by fitting a simple logarithmic expression:

$$y = a + b \ln x$$

where y is TSP concentration and x is the downwind distance. Two observations are the minimum needed to derive the values of a and b; consequently there is no way of estimating how good the fit is, except for the last two entries in Table 3-3, where three downwind samples were available. In those cases the correlation coefficients could be calculated. They were 0.92 for the wet (control) case and 0.70 for the dry (uncontrolled) case, both adjusted for the small number of data points (three). Only two cases in Table 3-3 predicted downwind decay distances of TSP to the air quality standard that were greater than 221m, and two other cases could not be fitted. All four of these were wet (control) cases where there was little variation among the low TSP values at the upwind and two downwind samples. The remaining cases in Table 3-3 are in fairly good accord in predicting to the level of the standard for decay distances of roughly 40 to 60m.

The dispersion model results project much longer distances to get down to the standard in most examples. The deficiencies of the model were discussed in Section 4.4.

The simple logarithmic decay equations project distances short enough that the standard would rarely be exceeded outside plant boundaries. The dispersion model projections suggest that nearly all cases examined exceed the standard outside the plant. The model very probably projects TSP concentrations too high, while the accuracy of the logarithmic decay equations is not known, although the results seem consistent among different sources.

5.0 REFERENCES

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APPENDIX A - SOURCE TEST DATA SUMMARIES

Isokinetic Sampling Rates and Wind Speed
Sampler, Filter, and Wind Data
Source Test Layouts with TSP Concentrations and Best Fit Equations

APPENDIX B - MICROSCOPIC SIZE DISTRIBUTIONS

(Dyer Laboratories Reports)

APPENDIX C - OPACITY REPORTS (SCAQMD)

APPENDIX D - MODELING DATA

Description of Computer Readout Format
Plants No. 1 to 5: Source Descriptions and Emissions
Plot of Source and Receptor Sites
Computer Readout

APPENDIX A

Source Test Data Summaries

Isokinetic Sampling Rates and Wind Speed

Sampler, Filter and Wind Data

Source Test Layouts with TSP Concentrations and Best Fit Equations

Table A-1. ISOKINETIC SAMPLING RATES

Nozzle i.d., in.	Sampling Rate, ft^3/min				
	2.0	2.5	3.0	3.5	4.0
Wind Speed, knots					
2					17.7
4				27.1	35.4
6		20.7	29.9	40.6	53.1
8		27.7	39.8	54.2	70.8
10	22.1	34.5	49.7	67.7	
12	26.5	41.5	59.7		
14	30.9	48.4	69.6		
16	35.3	55.3			
18	39.8	62.2			
20	44.0	68.8			

HAUL ROAD A

Test Description	Sampler Position	Filter No.	Net Sample Weight, g.	Sampling Rate, m^3/min	Sample Conc., mg/m^3
8/14/79 - No. 1	T	Q43	0.0788	1.10	1.59
45 min. test	C	Q44	0.0942	1.08	2.04
42 trucks	B	Q45	0.0870	0.51	3.79
50 min. after spray	D1	Q52	0.0783	1.56	1.12
wind average 245° / 7 knots	D2	Q50	0.0538	1.05	1.14
	U	Q49	0.0630	0.71	1.97
8/15/79 - No. 1	T	Q47	0.1382	1.02	9.03
15 min. test, interrupted twice	C	Q48	0.1885	1.10	11.42
9 trucks	B	Q51	0.2137	0.68	20.95
dried overnight	D1	Q53	0.1669	1.10	10.12
wind average 240°/8 knots	D2	Q54	0.1364	1.78	5.11
	U	Q58	0.0228	0.91	1.67
8/15/79 - No. 2	T	T2	0.0768	0.99	2.10
37 min. test	C	T3	0.0854	0.91	2.54
35 trucks	B	T4	0.1169	0.64	4.94
45 min. after spray, sprinkled during test	D1	T5	0.1126	1.10	2.77
wind average 230°/10 knots	D2	T1	0.1386	1.84	2.04
	U	T6	0.1240	1.59	2.11

HAUL ROAD B

Test Description	Sampler Position	Filter No.	Net Sample Weight, g.	Sampling Rate, m^3/min	Sample Conc, mg/m^3
8/17/79 - No.1 15 min. test 12 trucks 60 min. after spray wind average 235°/9 knots	T	T 11	0.1478	1.16	8.49
	C	T12	0.1500	1.18	8.47
	B	T13	0.2031	0.71	19.07
	D1	T8	0.1702	1.47	7.72
	D2	T9	0.1254	1.44	5.81
	U	T10	0.0766	0.96	5.32
8/17/79 - No. 2 60 min. test 45 trucks right after spray; sprayed during run wind average 230°/11 Knots	T	T16	0.0712	1.05	1.13
	C	T15	0.0630	1.10	0.95
	B	T14	0.0678	0.66	1.71
	D1	T7	0.0475	1.19	0.67
	D2	T6	0.0502	1.36	0.62
	U	T17	0.0355	0.74	0.80
8/20/79 - No.1 30 min. test 26 trucks 20 min. after spray wind average 240°/9 Knots	T	T23	0.0721	1.08	2.23
	C	T24	0.0688	1.10	2.08
	B	T25	0.0873	0.67	4.34
	D1	T28	0.0252	1.37	0.61
	D2	T29	0.0776	1.39	1.86
	U	T30	0.0442	0.74	1.99

HAUL ROAD C

Test Description	Sampler Position	Filter No.	Net Sample Weight, g.	Sampling Rate, m³/min	Sample Conc., mg/m³
8/22/79 - No. 1 30 min. test 12 trucks dried overnight wind average 300°/7 Knots	T	0.0855	T18	1.10	2.59
	C	0.1034	T19	1.19	2.90
	B	0.1490	T20	0.67	7.41
	D1	0.1386	T21	1.32	3.50
	D2	0.0840	T22	1.36	2.06
	U	0.0096	T26	0.76	0.42
8/22/79 - No. 2 30 min test 6 trucks 3 min. after spray Wind average 275°/7 Knots	T	0.0187	T32	1.10	0.57
	C	0.0221	T33	1.08	0.68
	B	0.0322	T34	0.67	1.60
	D1	0.0516	T35	1.32	1.30
	D2	0.0227	T36	1.39	0.54
	U	0.0131	T37	0.76	0.57
8/22/79 - No. 3 60 min test 15 trucks 2 min. after spray, sprinkled 22 and 28 min into test Wind average 295°/7 Knots	T	0.0360	T38	1.10	0.55
	C	0.0438	T39	1.19	0.61
	B	0.0517	T40	0.67	1.29
	D1	0.0637	T41	1.32	0.80
	D2	0.0611	T42	1.39	0.73
	U	0.0263	T43	0.74	0.59

POINT SOURCE D - Transfer Point

Test Description	Sampler Position	Filter No.	Net Sample Weight, g.	Sampling Rate, m^3/min	Sample Conc, mg/m^3
8/28/79 - No. 1	T	T54	0.0560	0.89	1.05
60 min. test	B	T55	0.2053	1.05	3.26
spray control	FL	T56	0.0426	1.08	0.66
wind average 275°/6 knots	NL	T57	0.0620	1.02	1.01
	C	T58	0.0908	0.61	2.48
	NR	T59	0.0854	0.74	1.92
	FR	T60	0.2750	0.91	5.04
	D1	T61	0.0710	1.37	0.86
	D2	T62	0.0971	1.45	0.84
	U	T63	0.0386	1.10	0.76
8/28/79 - No. 2	T	T64	0.5364	0.93	19.2
30 min. test	B	T65	1.6191	1.05	57.4
no control	FL	T66	0.4437	1.05	14.1
wind average 265°/6 knots	NL	T67	1.0218	1.07	31.8
	C	T69	1.8083	0.67	90.0
	NR	T70	1.4510	0.75	64.5
	FR	T71	0.9699	0.91	35.5
	D1	T72	0.0782	1.39	2.08
	D2	T31	0.0627	1.45	1.44
	U	T27	0.0686	1.10	2.08

POINT SOURCE E - Crusher

Test Description	Sampler Position	Filter No.	Net Sample Weight, g.	Sampling Rate, m^3/min	Sample Conc., mg/m^3
9/6/79 - No. 1 15 min. test no control wind average 180°/7 Knots	T	T 74	0.5065	0.93	36.3
	B	T 75	1.4649	1.10	89.8
	FL	T 76	0.3648	1.14	21.3
	NL	T 77	0.6499	1.14	39.0
	C	T 78	1.3258	0.71	124.5
	NR	T 79	0.8477	0.74	76.4
	FR	T 80	0.5596	0.98	38.1
	D1	T 81	0.1113	1.28	5.80
	D2	T 82	0.0533	1.16	3.06
	U	T 83	0.0177	1.22	0.97
9/6/79 - No. 2 60 min. test spray control wind average 175°/6 Knots	T	T 84	0.3030	0.77	6.66
	B	T 85	0.5239	1.02	8.56
	FL	T 86	0.2360	1.03	3.82
	NL	T 87	0.3094	0.99	5.21
	C	T 88	0.4320	0.62	11.61
	NR	T 89	0.4145	0.70	9.87
	FR	T 90	0.3983	0.88	7.54
	D1	T 91	0.1508	1.10	2.28
	D2	T 92	0.1031	1.27	1.35
	U	T 93	0.0368	0.96	0.64

POINT SOURCE F – Screens

Test Description	Sampler Position	Filter No.	Net Sample Weight, g.	Sampling Rate, m^3/min	Sample Conc., mg/m^3
9/7/79 – No. 1	T	A25	0.6869	1.16	10.8
Test time nominal 60 min., except as follows:	B	A26	1.5046	1.40	17.9
D2, U ran 67 min.	FL	A27	0.7557	1.26	13.3
FL, NL, C ran 45 min.	NL	A28	0.7002	1.30	12.0
T ran 55 min	C	A29	0.7689	0.76	22.5
other positions ran 60 min.	NR	A30	0.7150	1.05	11.3
(electrical power interruptions)	FR	A31	0.6535	1.19	9.15
Spray control for 50 min.	D1	A32	0.3540	1.27	4.65
Wind average 220°/5 Knots	D2	A33	0.1285	1.36	1.41
	U	A34	0.0533	0.82	0.97
9/7/79 – No. 2	T	A1	2.0136	0.85	158
10 min. test	B	A2	2.1717	0.99	146
no control	FL	A3	1.6655	0.99	112
Wind average 225°/8 Knots	NL	A4	2.0334	(0.94)*	(144)*
	C	T94	2.0411	0.59	231
	NR	T95	1.8429	0.67	183
	FR	T96	1.2591	0.85	99
	D1	T97	0.8446	0.95	59
* missing data, estimated	D2	T98	0.2281	1.32	11.5
	U	T99	0.0282	1.21	1.55

Point Source G - Open Loading

Test Description	Sampler Position	Filter No.	Net Sample Weight, g.	Sampling Rate, m³/min	Sample Conc. mg/m³
9/14/79	T	A48	4.1779	0.81	123
42 min. test	B	A49	3.9158	1.05	89
no control	FL	A50	2.5437	1.16	52
wind average 170°/6 knots	NL	A51	2.6304	1.14	55
	C	A52	4.1915	0.59	169
	NR	A53	4.5551	0.61	178
	FR	A54	4.0560	0.76	127
	D1	A24	0.7207	1.28	13.4
	D2	A23	0.3591	1.33	6.43
	U	A21	0.0592	1.09	1.29

POINT SOURCE H - SURGE PILE

Test Description	Sampler Position	Filter No.	Net Sample Weight, g.	Sampling Rate, m^3/min	Sample Conc., mg/m^3
8/29/79 - No. 1 60 min. test spray control (on crusher/screen feeding pile) Wind average 265°/6 knots	L	T44	0.0562	1.05	0.89
	C	T45	0.1051	0.68	2.58
	R	T46	0.0809	0.88	1.53
	D1	T47	0.0278	0.59	0.79
	D2	T48	0.0266	1.03	0.43
	U	T49	0.0224	0.68	0.55
8/29/79 - No. 2 15 min. test no control wind average 265°/5 knots	L	T51	0.1029	0.99	6.93
	C	T52	0.2416	0.70	23.0
	R	T53	0.4640	0.86	36.0
	D1	T73	0.0437	0.78	3.69
	D2	T50	0.0758	1.03	4.91
	U	T68	0.0098	0.29	2.33

POINT SOURCE I - CRUSHER

Test Description	Sampler Position	Filter No.	Net Sample Weight, g.	Sampling Rate, m^3/min	Sample Conc, mg/m^3
7/31/79 - No.1 10 min. test Spray control wind average 255°/3 knots	T	Q 31	0.2627	0.58	45.
	B	Q 23	0.3492	0.86	41.
	FL	Q 22	0.2168	0.91	24.
	NL	Q 17	0.2092	0.56	37.
	C	Q 30	0.2690	0.86	31.
	NR	Q 29	0.2978	0.68	44
	FR	Q 28	0.2910	0.76	38
	D1	Q 14	0.1356	1.04	13.0
	D2	Q 15	0.1466	0.51	29.
	U	Q 27	0.0752	0.74	10.2
7/31/79 - No. 2 4 min. test no control wind average 245°/4 knots	T	Q 25	0.5206	0.45	289
	B	Q 26	0.4637	0.82	141
	FL	Q 63	0.2338	0.76	77
	NL	Q 64	0.3752	0.28	335
	C	Q 62	0.4945	0.67	185
	NR	Q 61	0.4784	0.61	196
	FR	Q 60	0.6427	0.69	233
	D1	Q 59	0.1559	0.88	44
	D2	Q 58	0.1677	0.79	53
	U	Q 57	0.0473	not read	—

continued next page

POINT SOURCE I - CRUSHER (CONTINUED)

Test Description	Sampler Position	Filter No.	Net Sample Weight, g.	Sampling Rate, m^3/min	Sample Conc., mg/m^3
7/31/79 - No. 3	T	Q 42	0.2249	0.51	44
10 min. test	B	Q 41	0.0489	0.82	6.0
spray control	FL	Q 40	0.2571	0.82	31.
wind average 240° / 3 knots	NL	Q 39	0.1797	0.47	38
	C	Q 38	0.1446	0.67	22
	NR	Q 37	0.1247	0.68	18.3
	FR	Q 36	0.2131	0.71	30
	D1	Q 34	0.0728	0.91	8.0
	D2	Q 33	0.0781	0.57	15.3
	U	Q 35	0.0301	0.96	3.1

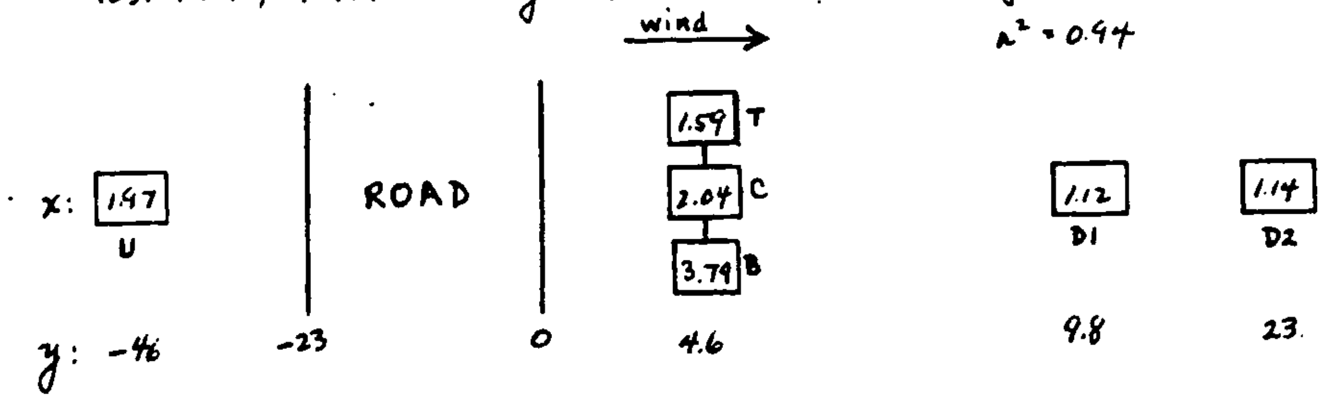
POINT SOURCE J - SCREEN

Test Description	Sampler Position	Filter No.	Net Sample Weight, g.	Sampling Rate, m^3/min	Sample Conc., mg/m^3
7/26/79 - No. 1 20 min. test spray control wind approx. 60% at 175° 40% at 270° average 3 knots	T	Q 4	0.7525	1.39	27
	B	Q 3	0.8442	1.27	33
	FL	Q 1	1.2256	1.36	45
	NL	Q 2	1.2411	0.82	74
	C	Q 5	1.0308	1.20	43
	NR	Q 7	0.2812	1.02	13.8
	FR	Q 6	0.7480	1.05	36
	D1	Q 10	0.2274	1.23	9.24
	D2	Q 8	0.2328	1.10	10.6
	U	Q 9	0.3283	1.16	14.2
7/26/79 - No. 2 10 min. test no control wind approx. 50% at 180° 50% at 265° average 3 knots	T	Q 20	1.4012	0.79	177
	B	Q 18	1.5881	1.16	137
	FL	Q 13	1.8185	1.18	154
	NL	Q 19	1.7949	0.85	359
	C	Q 21	1.5293	1.10	139
	NR	Q 16	1.6701	0.99	169
	FR	Q 24	2.0065	0.98	205
	D1	Q 32	0.3348	0.84	40
	D2	Q 11	0.2106	1.39	15.2
	U	Q 12	0.7102	1.50	47.

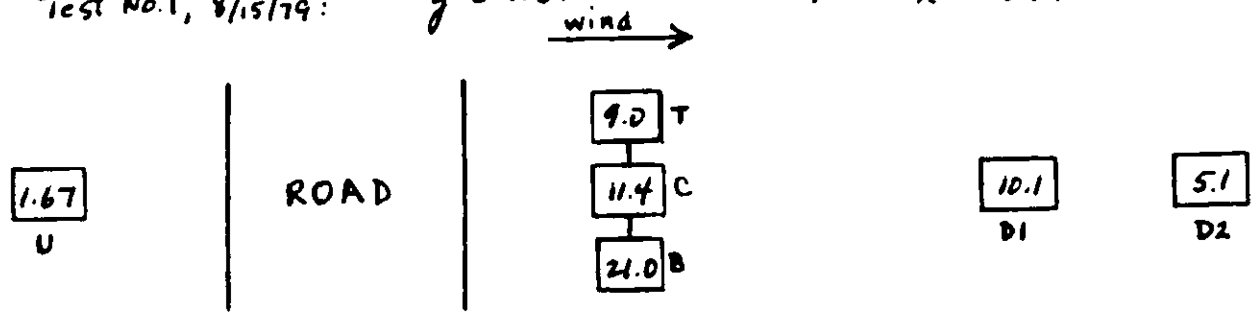
HAUL ROAD A

Test No. 1, 8/14/79: $y = 3.816 - 2.171 \ln x$ (y = meters, x = mg/m^3)

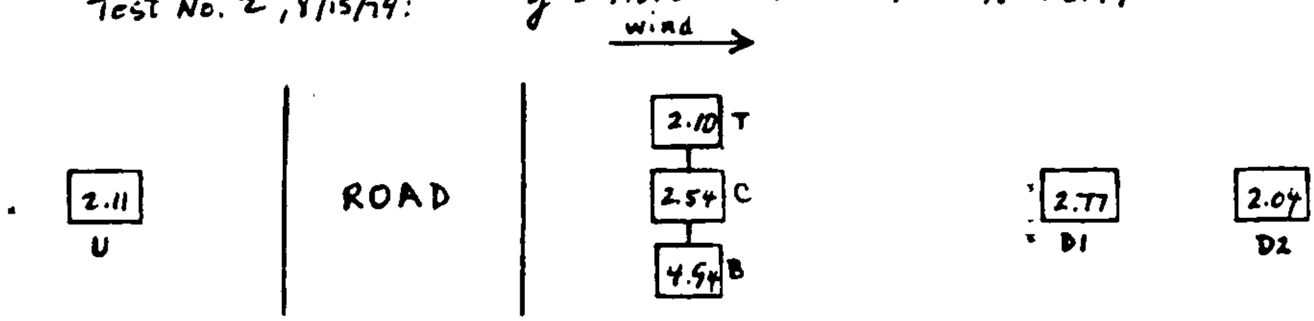
$r^2 = 0.94$



Test No. 1, 8/15/79: $y = 7.670 - 2.216 \ln x$ $r^2 = 0.94$



Test No. 2, 8/15/79: $y = 4.312 - 2.120 \ln x$ $r^2 = 0.91$



HAUL ROAD B

Test No. 1, 8/17/79: $y = 6.4426 - 1.845 \ln x$ $\quad r^2 = 0.75$

wind →

	U	ROAD			T	C	B	D1	D2
x:	5.32				8.49	8.47	19.1	7.72	5.81
y:	−17.3	−13.7	ROAD	0	4.6			13.7	27.5

Test No. 2, 8/17/79: $y = 2.460 - 2.271 \ln x$ $\quad r^2 = 0.47$

wind →

	U	ROAD	T	C	B	D1	D2
x:	0.80		1.13	0.95	1.71	0.67	0.62

Test No. 1, 8/20/79: $y = 4.021 - 2.019 \ln x$ $\quad r^2 = 0.67$

wind →

	U	ROAD	T	C	B	D1	D2
x:	1.99		2.23	2.08	4.34	0.61	1.86

HAUL ROAD C

Test No. 1, 8/22/79: $y = 4.115 - 1.578 \ln x$ $r^2 = 0.83$

wind →

	U		ROAD		T / C / B	D1	D2
x:	0.42		ROAD		T: 2.59, C: 2.90, B: 7.41	3.50	2.06
y:	−17.1	−10.1		0	2.13	9.1	17.0

Test No. 2, 8/22/79 $y = 1.730 - 1.693 \ln x$ $r^2 = 0.87$

wind →

U	ROAD	T / C / B	D1	D2
0.57	ROAD	T: 0.57, C: 0.68, B: 1.60	1.30	0.54

Test No. 3, 8/22/79 $y = 1.450 - 1.970 \ln x$ $r^2 = 0.84$

wind →

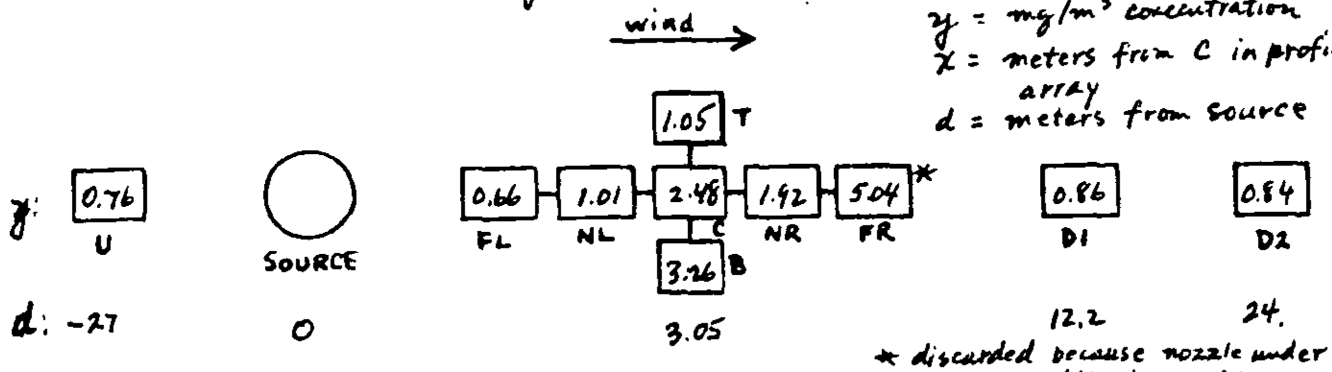
U	ROAD	T / C / B	D1	D2
0.59	ROAD	T: 0.55, C: 0.61, B: 1.29	0.80	0.73

POINT SOURCE D - TRANSFER POINT

Test No. 1, 8/28/79:

$$\ln y_H = 0.664 + 0.240x - 0.170x^2$$
$$\ln y_V = 0.869 + 0.606x - 0.293x^2$$

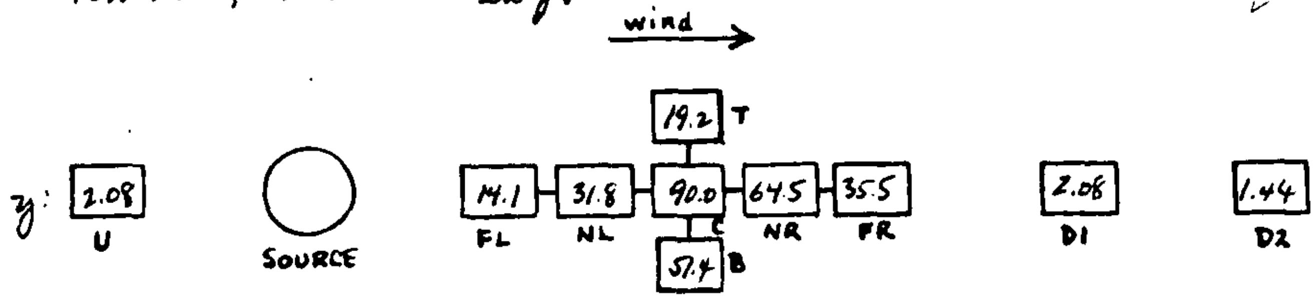
y = mg/m³ concentration
x = meters from C in profile array
d = meters from source

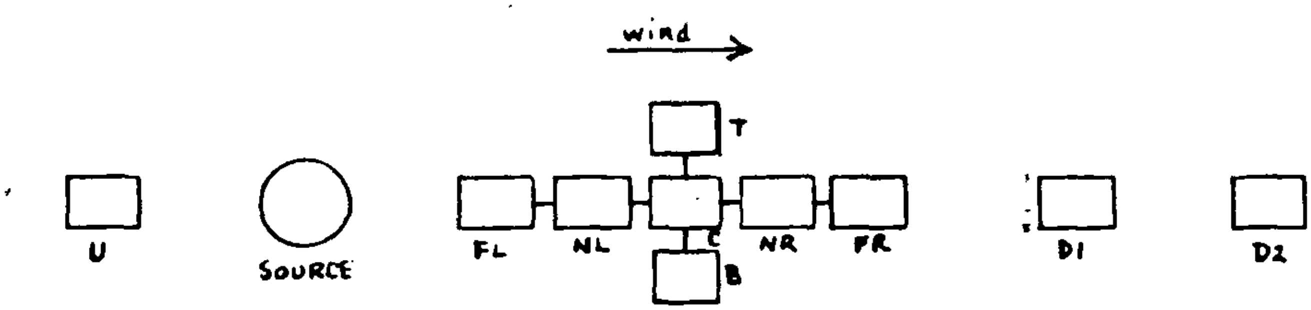


* discarded because nozzle under conveyer without shielding

Test No. 2, 8/28/79:

$$\ln y_H = 4.268 + 0.255x - 0.300x^2$$
$$\ln y_V = 1.274 + 3.718x - 1.052x^2$$

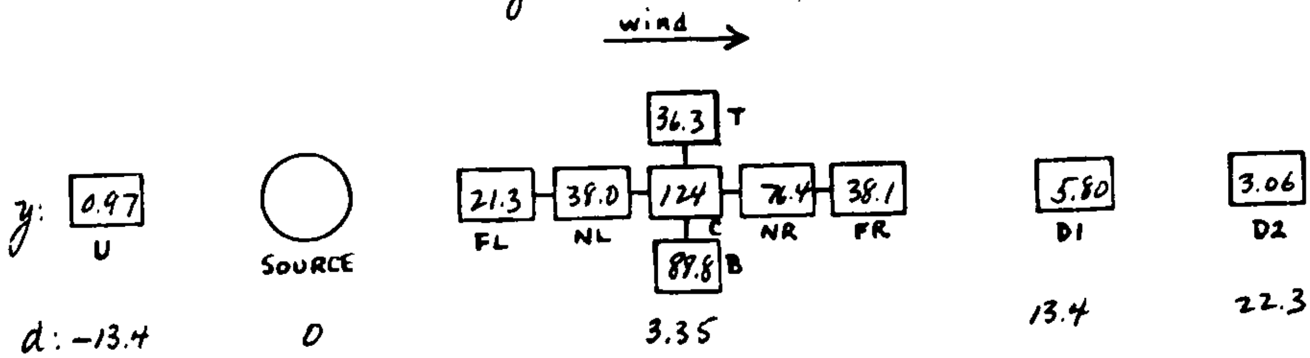




POINT SOURCE E - CRUSHER

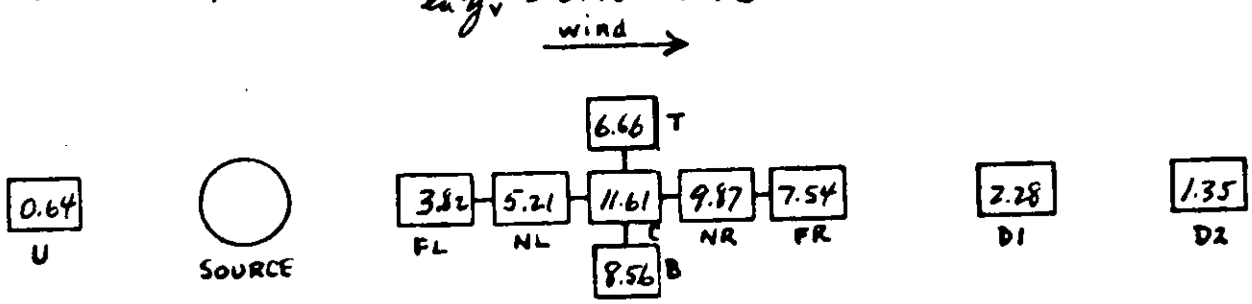
Test No. 1, 9/6/79:

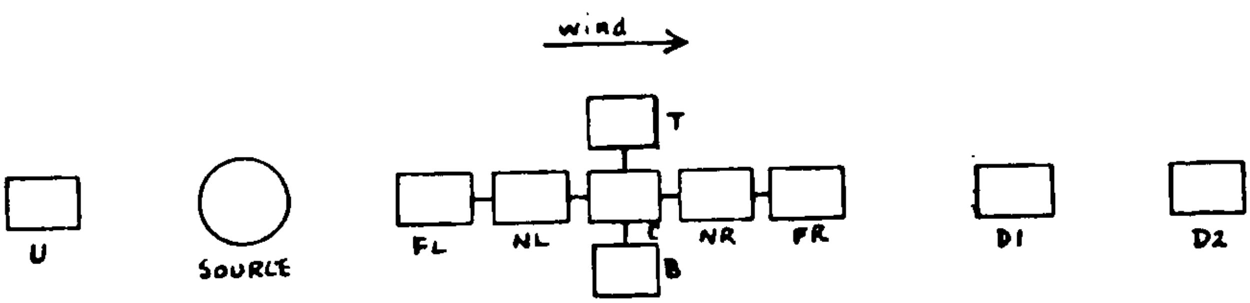
$$\ln y_H = 4.503 - 0.186x - 0.302x^2$$
$$\ln y_V = 2.578 + 2.694x - 0.785x^2$$



Test No. 2, 9/6/79:

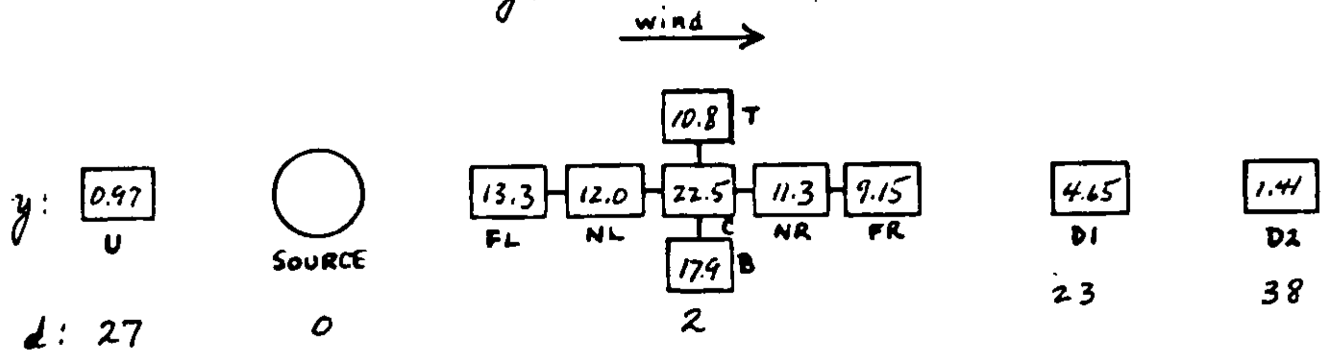
$$\ln y_H = 2.254 - 0.200x - 0.152x^2$$
$$\ln y_V = 0.982 + 1.596x - 0.430x^2$$



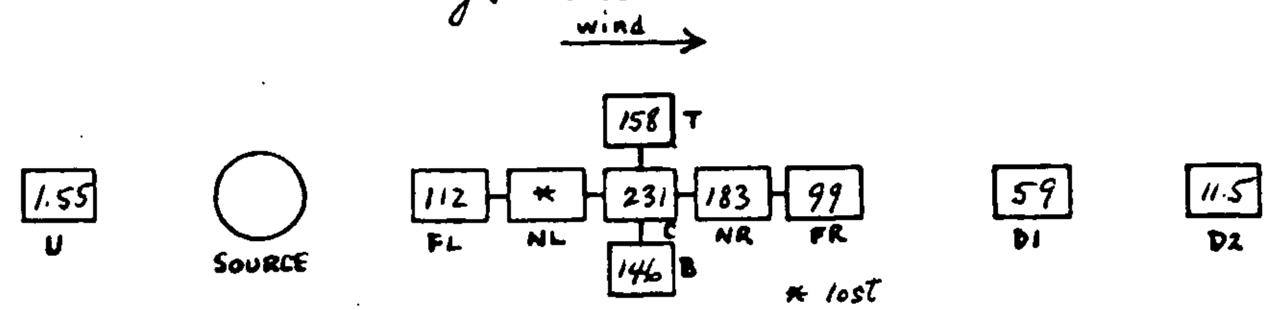


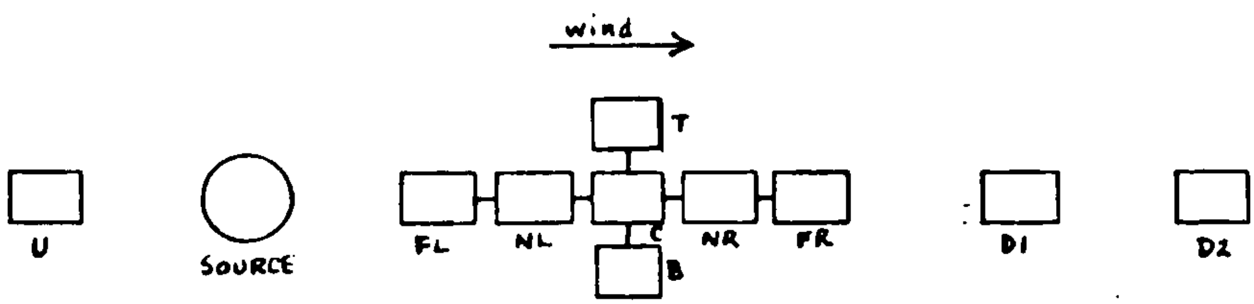
POINT SOURCE F-SCREENS

Test No. 1, 9/7/79: $\ln y_H = 2.784 - 0.0808x - 0.1096x^2$
$\ln y_V = 1.694 + 1.673x - 0.4813x^2$



Test No. 2, 9/7/79: $\ln y_H = 5.440 - 0.03126x - 0.1959x^2$
$\ln y_V = 3.686 + 1.717x - 0.419x^2$

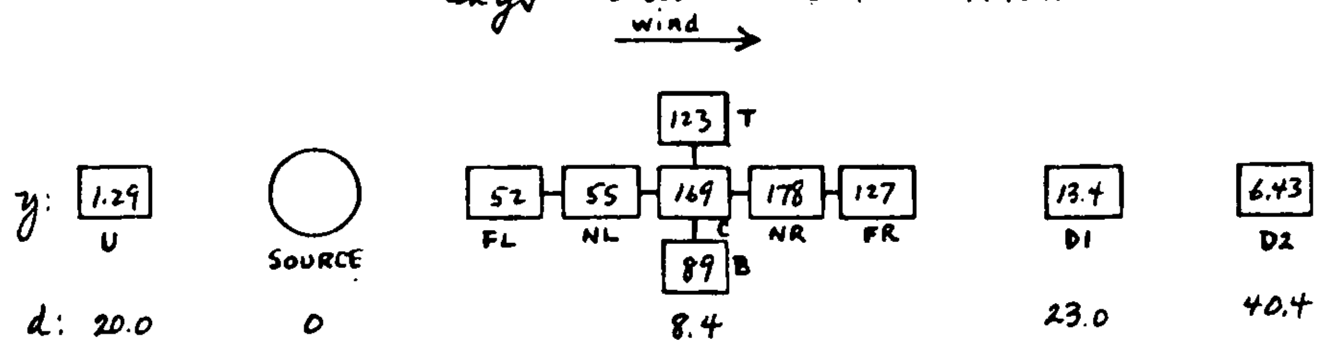


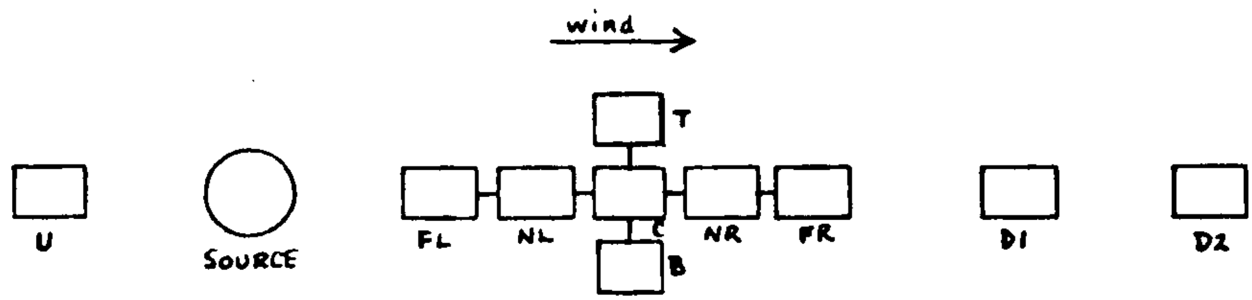


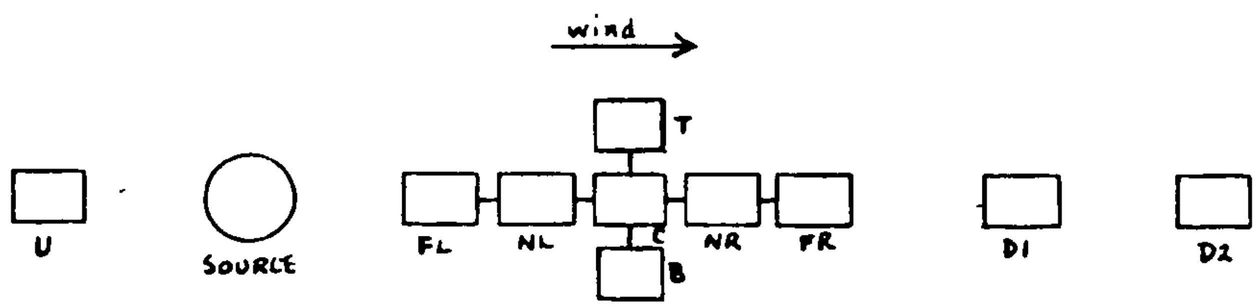
POINT SOURCE G - OPEN LOADING

Test 9/14/79:

$$\ln y_H = 4.888 + 0.2960x - 0.1327x^2$$
$$\ln y_V = 2.888 + 2.080x - 0.4795x^2$$







POINT SOURCE H - SURGE PILE

Test No. 1, 8/29/79 : $\ln y_H = 0.948 + 0.2709\,x - 0.793\,x^2$

wind →

x: −3.88 +3.88

	U	SOURCE	L	C	R	D1	D2
y:	0.55		0.89	2.58	1.53	0.79	0.43
d:	27	0	5.5	5.5	5.5	24	51

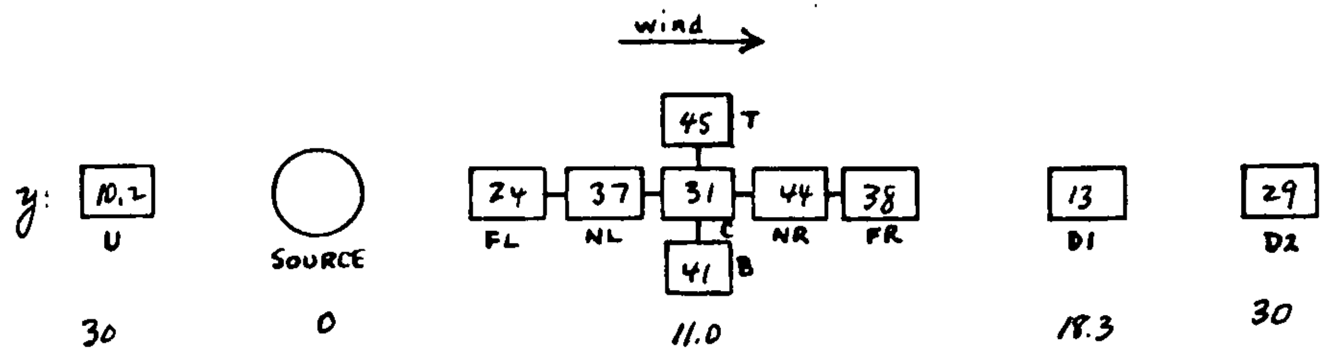
wind →

Test No. 2, 8/29/79 $\ln y_H = 3.136 + 0.824\,x - 0.376\,x^2$

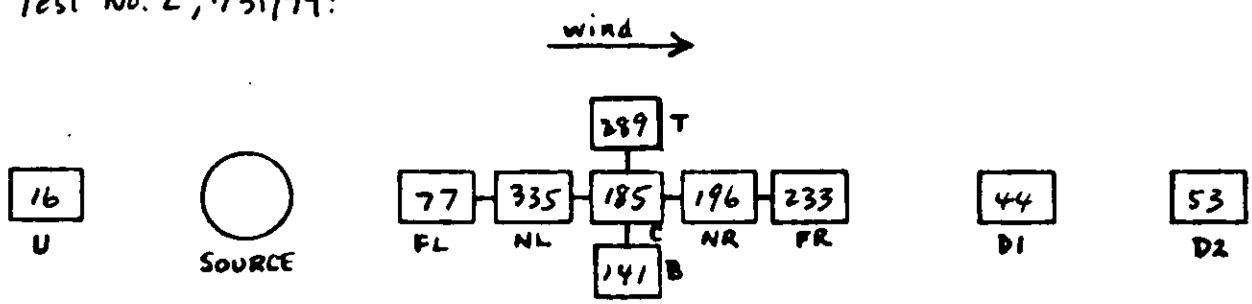
	U	SOURCE	L	C	R	D1	D2
y:	2.33		6.93	23.0	36.0	3.69	4.91
d:							

POINT SOURCE I - CRUSHER

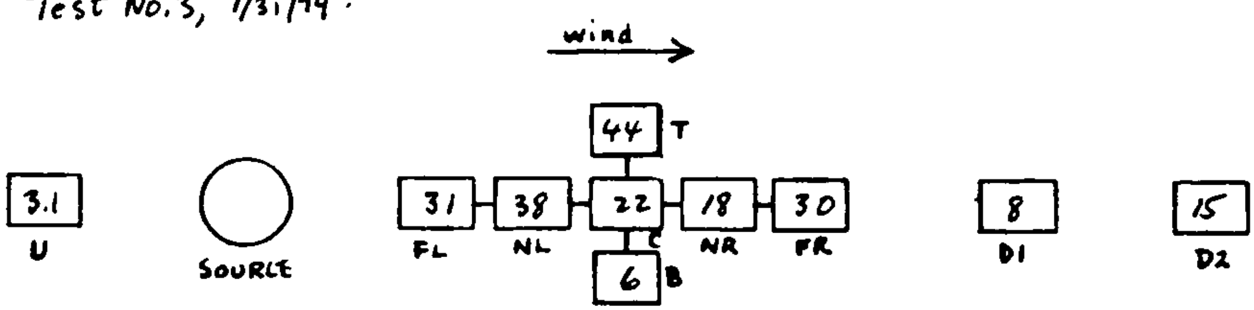
Test No.1, 7/31/79:



Test No.2, 7/31/79:

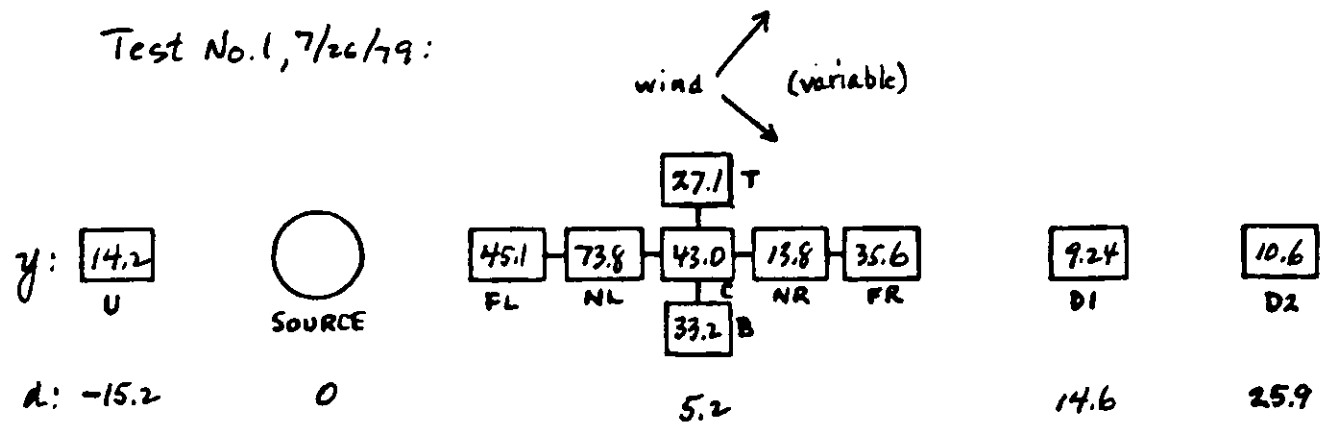


Test No.3, 7/31/79:

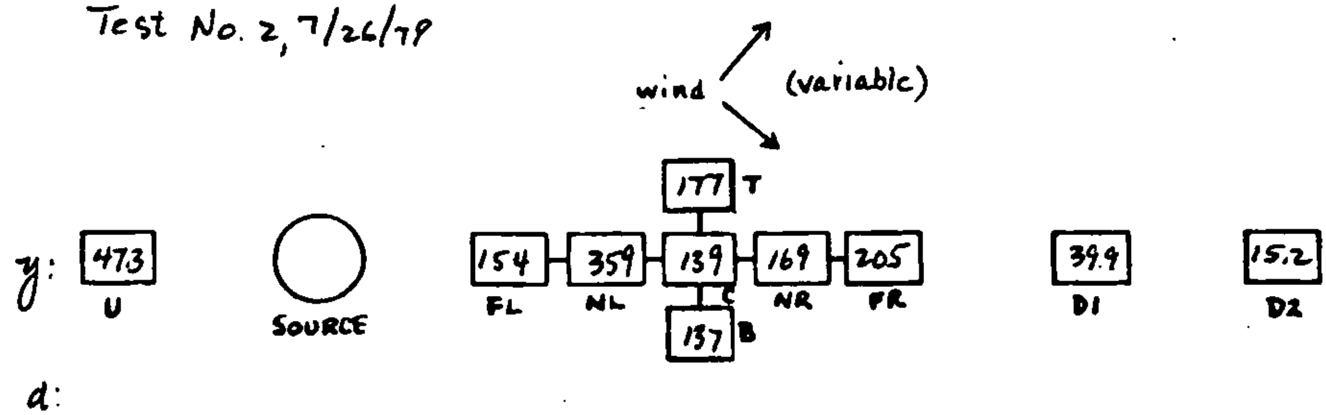


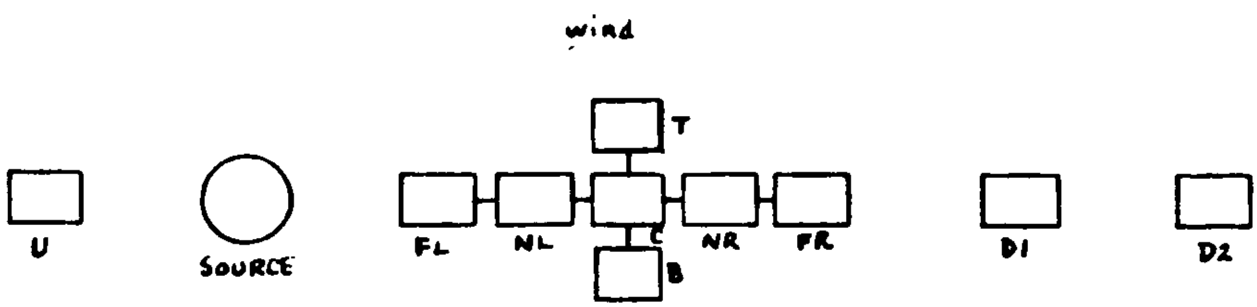
POINT SOURCE J - SCREEN

Test No. 1, 7/26/79:



Test No. 2, 7/26/79





APPENDIX B

Microscopic Size Distributions

(Dyer Laboratories Reports)

RECEIVED OCT 25 1979

DYER LABORATORIES
CONSULTING CHEMISTS

3675 SKYPARK DRIVE, #311
TORRANCE, CALIFORNIA 90505
(213) 530-3322

23 October 1979

REPORT

TO: Southern California Rock Products Association
1811 Fair Oaks Avenue
South Pasadena, California 91030

Attn.: Don Reining, Executive Director

Copy to Pacific Environmental Service

SUBJECT: Particle sizing from air filters LAB. REF. NO. 0743 to 0754

Laboratory Reference number	Filter Identification	Particle size distribution in percent by number		
		2½ - 10 μm	10 - 30 μm	>30 μm
0743	T99	71%	29%	omitted
0744	T97	61%	18%	22%
0745	T98	74%	26%	omitted
0746	T94	42%	34%	24%
0747	T21	80%	19%	1%
0748	T20	80%	19%	1%
0749	T26	96%	3%	1%
0750	T22	82%	17%	1%
0751	A52	59%	32%	9%
0752	A24	69%	29%	2%
0752A	A24	63%	32%	5%
0753	A23	72%	28%	omitted
0754	A21	84%	16%	omitted

Notes:
1. Because relatively low numbers were counted, the low percentages are not precise.
2. Very lightly loaded filters were counted directly on segments of the filter. Heavily loaded filters were counted by removing a small amount of loose dust. #0752 was counted both ways, 0752A being the result for loose dust, with 0752 the count on the filter.

DYER LABORATORIES
CONSULTING CHEMISTS

2673 SKYPARK DRIVE, #311
TORRANCE, CALIFORNIA 90505
(213) 530-5322

28 November 1979

REPORT

TO: Southern California Rock Products Ass'n.
1811 Fair Oaks Avenue
South Pasadena, CA 91030

Attn.: Don Reining, Executive Director
Copy to Bob Gordon, Pacific Environmental Services.

SUBJECT: Subject: Further particle size data from air filters

LAB. REF. NO. ~~0743, 45, 53,~~ 54

Laboratory Reference Number	Filter Identification	Particle size distribution in percent by number		
		$2\frac{1}{2}$-10 μm	10-30 μm	> 30 μm
0743	T99	69%	28%	3%
0745	T98	68%	24%	8%
0753	A23	69%	27%	4%
0754	A21	84%	16%	0% (< 0.3%)

Denzel D. Dyer

APPENDIX C

Opacity Reports

AIR PROGRAMS DIVISION
ENGINEERING DIVISION

OBSERVATIONS DURING SOURCE TEST NO. ________

NAME OF FIRM: Owl Rock - Azusa DATE OF TEST: 7-26-79

EQUIPMENT TESTED: Screen PERMIT APPL. NO.: ________

HOURS OF OBSERVATION: FROM [X] A.M. [ ] P.M. 11:00 TO [ ] A.M. [X] P.M. 4:30 WEATHER: 90° WIND: 5-10 mph.

NAMES & TITLES OF PERSONS CONTACTED: Mr. Robert Gordon, Pacific Environmental Services

REPORT BY: Deanna Dean, Air Quality Engineer I

OBSERVATIONS MADE AND DATA RECORDED DURING TEST:

Source testing was begun on fugitive emissions from a screen. Seven high-volume samplers were mounted on a framework with four high-volume samplers spaced about one meter apart horizontally, approximately one meter above the ground. Two high-volume samplers were placed approximately one and two meters above the center line of the four horizontally-spaced samplers, and one sampler was mounted about one-half meter off the ground on the center line. The ~~rock~~ rack was located about five meters from the screen. A continuous recording indicator of wind speed and direction was installed adjacent to the rock. Two more Hi-Vols were placed approximately ten and twenty meters from the ~~rock~~ rack in what was hoped to be the downwind direction. One more Hi-Vol was located about ten meters upwind from the ~~rock~~ rack. The objective of the tests is to obtain a horizontal and vertical profile of the dust plume.

In order to obtain meaningful results, the ~~rock~~ rack should be normal to the wind direction. On this day of testing, the wind speed was fairly steady, but the wind direction varied between south and west approximately half the time each. The tests were delayed while waiting for the wind direction to stabilize.

The wind direction never did stabilize, but it was decided to begin testing because the test apparatus was already assembled. Testing began with the water spray on for one run and off for one run. Opacity readings were less than five percent with the water spray on. With the water spray off, a maximum opacity of 60 percent was read.

It is expected that all experimental results obtained on this day of testing would not be included in the final analysis due to the sporadic behavior of the wind direction.

DD:pmj

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

ENGINEERING DIVISION----FIELD REPORT

NAME OF APPLICANT: Owl Rock - Azusa

DATE OF INSPECTION: 7-26-79

EQUIPMENT LOCATION (ADDRESS):

PERMIT APPL. NO.:

SOURCE OF AIR CONTAMINANTS: Screen - Water Spray Off

TYPES OF AIR CONTAMINANTS:

POINT(S) OF OBSERVATION:

POINT OF DISCHARGE:

WEATHER: 80-90°

WIND: 5-10 mph.

HOURS OF OBSERVATION: FROM 2:05 TO 2:09

OBSERVATIONS OF VISIBLE AIR CONTAMINANTS

TIME Min	TIME Sec	Opac. Obs. %	TIME MINUTES	TIME SECONDS	Opac. Obs.	TIME		Opac. Obs.	TIME		Opac Obs.	TIME		Opac. Obs.
05	00	25												
	15	25												
	30	35												
	45	40												
06	00	30												
	15	35												
	30	35												
	45	30												
07	00	35												
	15	40												
	30	35												
	45	25												
08	00	5												
	15	LT 5												
	30	LT 5												
	45	35												
09	00	25												

← TOTAL TIME OF DISCHARGE OF AIR CONTAMINANTS OF DENSITY (OR OPACITY) OF ______ OR GREATER

*COLOR CODE:
"B" MEANS BLACK
"W" MEANS WHITE
"__" MEANS ______
"__" MEANS ______

SIGNATURE ______

PAGE ____ OF ____ PAGES

16-500108 R1-55-5

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

ENGINEERING DIVISION----FIELD REPORT

NAME OF APPLICANT: Owl Rock - Azusa

DATE OF INSPECTION: 7-26-79

EQUIPMENT LOCATION (ADDRESS): Screen - Water Spray On

PERMIT APPL. NO.:

SOURCE OF AIR CONTAMINANTS:

TYPES OF AIR CONTAMINANTS: Dust

POINT(S) OF OBSERVATION:

POINT OF DISCHARGE:

WEATHER: 80-90°

WIND: 5-10 mph.

HOURS OF OBSERVATION: FROM 2:43 TO 2:53

OBSERVATIONS OF VISIBLE AIR CONTAMINANTS

TIME Min	TIME Sec	Opac. Obs. %	TIME MINUTES	TIME SECONDS	Opac Obs %	TIME Min	TIME Sec	Opac. Obs.	TIME	TIME	Opac Obs.	TIME	TIME	Opac. Obs.
43	00	5		45	10		30	5						
	15	5	48	00	5		45	5						
	30	10		15	5	53	00	5						
	45	5		30	5									
44	00	5		45	LT 5									
	15	5	49	00	LT 5									
	30	5		15	5									
	45	5		30	5									
45	00	LT 5		45	5									
	15	LT 5	50	00	10									
	30	5		15	10									
	45	5		30	10									
46	00	10		45	15									
	15	5	51	00	10									
	30	10		15	5									
	45	5		30	10									
47	00	LT 5		45	5									
	15	10	52	00	10									
	30	10		15	10									

← TOTAL TIME OF DISCHARGE OF AIR CONTAMINANTS OF DENSITY (OR OPACITY) OF ________ OR GREATER

*COLOR CODE:
"B" MEANS BLACK
"W" MEANS WHITE
____ MEANS ________
____ MEANS ________

SIGNATURE ____________________

PAGE ______ OF ______ PAGES

16-50D108 R1-55-5

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

AIR PROGRAMS DIVISION
ENGINEERING DIVISION

OBSERVATIONS DURING SOURCE TEST NO. ______

NAME OF FIRM: Owl Rock - Azusa   DATE OF TEST: 7-31-79

EQUIPMENT TESTED: Crusher   PERMIT APPL. NO.: ______

HOURS OF OBSERVATION: FROM ☐ A.M. ☒ P.M. 1:00 TO ☐ A.M. ☒ P.M. 4:30   WEATHER: 80-90°   WIND: 5-10 mph.

NAMES & TITLES OF PERSONS CONTACTED: Mr. Robert Gordon, Pacific Environmental Services

REPORT BY: Deanna Dean, Air Quality Engineer I

OBSERVATIONS MADE AND DATA RECORDED DURING TEST:

Testing for fugitive emissions from a crusher was performed with the same test apparatus as described in the field report for July 25, 1979, set up downwind from a crusher. The opacity observations are attached.

DD:pmj

Attachment

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

ENGINEERING DIVISION····FIELD REPORT

NAME OF APPLICANT: Owl Rock - Azusa

DATE OF INSPECTION: 7-31-79

EQUIPMENT LOCATION (ADDRESS): Crusher - Water Spray On

PERMIT APPL. NO.:

SOURCE OF AIR CONTAMINANTS:

TYPES OF AIR CONTAMINANTS: Dust

POINT(S) OF OBSERVATION:

POINT OF DISCHARGE:

WEATHER: 80-90°

WIND: 5-10 mph.

HOURS OF OBSERVATION: FROM 1:23 TO 1:28

OBSERVATIONS OF VISIBLE AIR CONTAMINANTS

TIME Min.	TIME Sec	Opac. Obs. %	TIME MINUTES	TIME SECONDS	Opac. Obs%	TIME	TIME	Opac. Obs.	TIME	TIME	Opac Obs.	TIME	TIME	Opac. Obs.
23	00	LT 5		45	LT 5									
	15	LT 5	28	00	LT 5									
	30	LT 5												
	45	LT 5												
24	00	LT 5												
	15	LT 5												
	30	LT 5												
	45	LT 5												
25	00	LT 5												
	15	LT 5												
	30	LT 5												
	45	LT 5												
26	00	5-10												
	15	5-10												
	30	10												
	45	5-10												
27	00	5-10												
	15	LT 5												
	30	LT 5												

← TOTAL TIME OF DISCHARGE OF AIR CONTAMINANTS OF DENSITY (OR OPACITY) OF ____________ OR GREATER

*COLOR CODE:
"B" MEANS BLACK
"W" MEANS WHITE
"____" MEANS ____________
"____" MEANS ____________

SIGNATURE ____________

PAGE ______ OF ______ PAGES

16-50D108 R1-55-5

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

ENGINEERING DIVISION----FIELD REPORT

NAME OF APPLICANT: Owl Rock - Azusa

DATE OF INSPECTION: 7-31-79

EQUIPMENT LOCATION (ADDRESS): Crusher - Water Spray Off

PERMIT APPL. NO.:

SOURCE OF AIR CONTAMINANTS:

TYPES OF AIR CONTAMINANTS: Dust

POINT(S) OF OBSERVATION:

POINT OF DISCHARGE:

WEATHER: 80-90°

WIND: 5-10 mph.

HOURS OF OBSERVATION: FROM 3:57 TO 4:02

OBSERVATIONS OF VISIBLE AIR CONTAMINANTS

TIME Min	TIME Sec	Opac. Obs. %	TIME MINUTES	TIME SECONDS	Opac. Obs.	TIME	TIME	Opac. Obs.	TIME	TIME	Opac. Obs.	TIME	TIME	Opac. Obs.
57	00	30		45	50									
	15	30	02	00	50									
	30	30												
	45	40												
58	00	40												
	15	40												
	30	40												
	45	50												
59	00	50												
	15	60												
	30	60												
	45	60												
00	00	50												
	15	60												
	30	50												
	45	50												
01	00	40												
	15	50												
	30	50												

← TOTAL TIME OF DISCHARGE OF AIR CONTAMINANTS OF DENSITY (OR OPACITY) OF ______ OR GREATER

*COLOR CODE:
"B" MEANS BLACK
"W" MEANS WHITE
"__" MEANS ______
"__" MEANS ______

SIGNATURE ______

PAGE ______ OF ______ PAGES

16-50D108 R1-55-5

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

ENGINEERING DIVISION----FIELD REPORT

NAME OF APPLICANT: Owl Rock - Azusa

DATE OF INSPECTION: 7-31-79

EQUIPMENT LOCATION (ADDRESS): Crusher - Water Spray On

PERMIT APPL. NO.:

SOURCE OF AIR CONTAMINANTS:

TYPES OF AIR CONTAMINANTS: Dust

POINT(S) OF OBSERVATION:

POINT OF DISCHARGE:

WEATHER: 80-90°

WIND: 5-10 mph.

HOURS OF OBSERVATION: FROM 2:54 TO 3:02

OBSERVATIONS OF VISIBLE AIR CONTAMINANTS

TIME Min.	TIME Sec.	Opac. Obs.%	TIME Minutes	TIME Seconds	Opac. Obs.	TIME	TIME	Opac. Obs.	TIME	TIME	Opac. Obs.	TIME	TIME	Opac. Obs.
54	00	LT 5		45	5-10									
	15	LT 5	59	00	5-10									
	30	LT 5		15	5									
	45	LT 5		30	10-15									
55	00	LT 5		45	5									
	15	5-10	00	00	10									
	30	LT 5		15	5									
	45	LT 5		30	15									
56	00	LT 5		45	20									
	15	LT 5	01	00	20									
	30	LT 5		15	20									
	45	LT 5		30	20									
57	00	5-10		45	20									
	15	LT 5	02	00	20									
	30	0												
	45	LT 5												
58	00	LT 5												
	15	5												
	30	5-10												

← TOTAL TIME OF DISCHARGE OF AIR CONTAMINANTS OF DENSITY (OR OPACITY) OF ________ OR GREATER

*COLOR CODE:
"B" MEANS BLACK
"W" MEANS WHITE
____ MEANS ________
____ MEANS ________

SIGNATURE ________

PAGE ____ OF ____ PAGES

16-SOD108 R1-55-5

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

AIR PROGRAMS DIVISION
ENGINEERING DIVISION

OBSERVATIONS DURING SOURCE TEST NO. ____

NAME OF FIRM: Owl Rock - Azusa

DATE OF TEST: 8-14-79

EQUIPMENT TESTED: Haul Roads

PERMIT APPL. NO.: ____

HOURS OF OBSERVATION: FROM [X] A.M. [ ] P.M. 11:00 TO [ ] A.M. [X] P.M. 4:30

WEATHER: 80-90°

WIND: 5-10 mph.

NAMES & TITLES OF PERSONS CONTACTED: Mr. John Bennett, Southern Calif. Rock Products Assoc.
Mr. Robert Gordon, Pacific Environmental Services

REPORT BY: Deanna Dean, Air Quality Engineer I

OBSERVATIONS MADE AND DATA RECORDED DURING TEST:

Tests were conducted for fugitive emissions from vehicles driving on haul roads. Six high-volume samplers were set up. One high-volume was upwind of the road. The wind speed and wind direction indicator was next to the upwind hi-vol. The remaining five hi-vols were downwind of the road. Three hi-vols were connected to flexible tubing at different elevations, approximately one, two, and three meters off the ground in order to get a vertical profile of the dust plume. An effort was made to get the vertical profile isokinetically. The remaining two hi-vols were approximately five and ten meters from the three vertical hi-vols.

The road condition on this test day was supposed to be in an intermediate stage between wet and dry. The water truck sprinkled approximately 30 minutes before testing began. The wind speed and direction were steady and in the right direction.

There were problems with the portable generators. At one point, one generator ran out of gas and the test was terminated until a trip to the gas station was made. The tests resumed and two tests were made on the road in the intermediate stage. It should be pointed out that the three vertical intake nozzles were positioned downwind from the wettest spot in the road.

Don Hopps and Ayjay Wilson were present during the tests. Opacity observations taken during the one completed test run are attached.

DD:pmj

Attachment

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

ENGINEERING DIVISION----FIELD REPORT

NAME OF APPLICANT: Owl Rock - Azusa

DATE OF INSPECTION: 8-14-79

EQUIPMENT LOCATION (ADDRESS): Haul Road - Intermediate Condition

PERMIT APPL. NO.:

SOURCE OF AIR CONTAMINANTS: Trucks on Haul Road

TYPES OF AIR CONTAMINANTS: Dust

POINT(S) OF OBSERVATION:

POINT OF DISCHARGE:

WEATHER: 80-90° WIND: 5-10 mph. HOURS OF OBSERVATION: FROM 2:25 TO 2:51

OBSERVATIONS OF VISIBLE AIR CONTAMINANTS

TIME		Opac. Obs.	TIME MIN-UTES	TIME SEC-ONDS	Opac. Obs.	TIME		Opac. Obs.	TIME		Opac Obs.	TIME		Opac. Obs.
25	00	50	50	10	15									
26	00	20	51	00	LT 5									
27	00	15												
29		70												
31		20												
31	30	35												
34		5												
35	45	10												
36	00	LT 5												
36	30	60												
37	00	30												
38	40	30												
40	00	20												
41	25	15												
43	45	60												
44	15	20												
47	10	15												
47	20	10												
49	55	15												

← TOTAL TIME OF DISCHARGE OF AIR CONTAMINANTS OF DENSITY (OR OPACITY) OF ________ OR GREATER

*COLOR CODE:
"B" MEANS BLACK
"W" MEANS WHITE
..... MEANS ________
..... MEANS ________

SIGNATURE ________

PAGE ______ OF ______ PAGES

36-500108 R1-55-5

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT
AIR PROGRAMS DIVISION
ENGINEERING DIVISION

OBSERVATIONS DURING SOURCE TEST NO. ________

NAME OF FIRM: Owl Rock - Azusa DATE OF TEST: 8-15-79

EQUIPMENT TESTED: Haul Roads PERMIT APPL. NO. ________

HOURS OF OBSERVATION: FROM [X] A.M. [ ] P.M. 11:00 TO [ ] A.M. [X] P.M. 4:30 WEATHER 80-90° WIND 5-10 mph.

NAMES & TITLES OF PERSONS CONTACTED: Mr. Robert Gordon, Pacific Environmental Services

REPORT BY: Deanna Dean, Air Quality Engineer I

OBSERVATIONS MADE AND DATA RECORDED DURING TEST:

Source tests on emissions from haul roads continued. Maurice Ballas of the Source Testing Section was present during the tests, and his report is attached. The opacity observations taken during the four test runs are attached.

DD:pmj

Attachments

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

MEMORANDUM

DATE: August 21, 1979

TO: Robert N. Milner

FROM: Maurice A. Ballas MAB

SUBJECT: Source test observations at the Owl Rock Co., 1201 North Todd Ave., Azusa, CA, on August 15, 1979

Pacific Environmental Services, Inc. (PES) is running a series of tests for a rock crushing association to determine fugitive emissions caused by trucks driving on gravel roads, as well as dust reduction by water spraying the roads.

PES used high-volume samplers, one upwind of the road and five downwind of the road. Three high-volume samplers were connected to flexible tubing at different elevations, approximately 3, 6, and 9 feet off the ground, in order to get a vertical profile of the dust while the trucks were going by. An effort was made to get the vertical profile isokinetically. The other high-volume samplers were used with and without covers. The wind was steady and in the right direction throughout the tests. A dry road test was conducted for ten minutes during which time sampling by some of the high-volume samplers was interrupted because of a generator breakdown.

PES had much difficulty with the generators, and also with the high-volume samplers while testing when the road was wet. Finally they had to give up testing upwind of the road altogether and simply took samples downwind with interruptions.

During the test District Air Quality Engineer Deanna Dean was present to record opacity and other pertinent data.

Due to the difficulties with the high-volume samplers and generators, it is my opinion that the samples obtained on this date were of questionable value.

dm

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

ENGINEERING DIVISION----FIELD REPORT

NAME OF APPLICANT: Owl Rock - Azusa

DATE OF INSPECTION: 8-15-79

EQUIPMENT LOCATION (ADDRESS): Haul Road - Dry

PERMIT APPL. NO.:

SOURCE OF AIR CONTAMINANTS: Trucks on Haul Road

TYPES OF AIR CONTAMINANTS: Dust

POINT(S) OF OBSERVATION:

POINT OF DISCHARGE:

WEATHER: 80-90°

WIND: 5-10 mph.

HOURS OF OBSERVATION: FROM 11:00 TO 11:04

OBSERVATIONS OF VISIBLE AIR CONTAMINANTS

TIME Min	TIME Sec	Opac. Obs. %	TIME Minutes	TIME Seconds	Opac. Obs.	TIME	TIME	Opac. Obs.	TIME	TIME	Opac Obs.	TIME	TIME	Opac. Obs.
0	00	5												
	15	5												
	30	5												
	45	5-10												
01	00	5-10												
	15	5-10												
	30	30												
	45	20												
02	00	10												
	15	50												
	30	15												
	45	10												
03	00	60												
	15	10												
	30	Test Terminated												
	45													
04	00													

← TOTAL TIME OF DISCHARGE OF AIR CONTAMINANTS OF DENSITY (OR OPACITY) OF ________ OR GREATER

*COLOR CODE:

"B" MEANS BLACK

"W" MEANS WHITE

"__" MEANS ________

"__" MEANS ________

SIGNATURE ________

PAGE ____ OF ____ PAGES

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

ENGINEERING DIVISION----FIELD REPORT

NAME OF APPLICANT: Owl Rock - Azusa	DATE OF INSPECTION: 8-15-79
EQUIPMENT LOCATION (ADDRESS): Haul Road - Dry	PERMIT APPL. NO.
SOURCE OF AIR CONTAMINANTS: Trucks on Haul Road	TYPES OF AIR CONTAMINANTS: Dust
POINT(S) OF OBSERVATION	POINT OF DISCHARGE
WEATHER: 80-90° WIND: 5-10 mph.	HOURS OF OBSERVATION: FROM 11:07 TO 11:10:30

OBSERVATIONS OF VISIBLE AIR CONTAMINANTS

TIME Min	TIME Sec.	Opac. Obs. %	TIME MINUTES	TIME SECONDS	Opac. Obs.	TIME		Opac. Obs.	TIME		Opac Obs.	TIME		Opac. Obs.
07	00	10												
	15	60												
	30	40												
	45	15												
08	00	10												
	15	5												
	30	5												
	45	5												
09	00	10												
	15	80												
	30	10												
	45	5												
10	00	5												
Test Terminated														

← TOTAL TIME OF DISCHARGE OF AIR CONTAMINANTS OF DENSITY (OR OPACITY) OF ________ OR GREATER

*COLOR CODE:
"B" MEANS BLACK
"W" MEANS WHITE
____ MEANS ________
____ MEANS ________

SIGNATURE ________

PAGE ____ OF ____ PAGES

36-500109 R1-55-5

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

ENGINEERING DIVISION----FIELD REPORT

NAME OF APPLICANT: Owl Rock - Azusa	DATE OF INSPECTION: 8-15-79
EQUIPMENT LOCATION (ADDRESS): Haul Road - Dry	PERMIT APPL. NO.:
SOURCE OF AIR CONTAMINANTS: Trucks on Haul Roads	TYPES OF AIR CONTAMINANTS: Dust
POINT(S) OF OBSERVATION:	POINT OF DISCHARGE:
WEATHER: 80-90° / WIND: 5-10 mph.	HOURS OF OBSERVATION: FROM 11:13 TO 11:19

OBSERVATIONS OF VISIBLE AIR CONTAMINANTS

TIME Min	TIME Sec	Opac. Obs. %	TIME MINUTES	TIME SECONDS	Opac. Obs.	TIME		Opac. Obs.	TIME		Opac. Obs.	TIME		Opac. Obs.
13	00	10		45	40									
	15	10	18	00	40									
	30	10		15	30									
	45	10		30	10									
14	00	30		45	10									
	15	40	19	00	10									
	30	40												
	45	30												
15	00	20												
	15	20												
	30	30												
	45	60												
16	00	30												
	15	20												
	30	30												
	45	20												
17	00	20												
	15	60												
	30	70												

← TOTAL TIME OF DISCHARGE OF AIR CONTAMINANTS OF DENSITY (OR OPACITY) OF ____________ OR GREATER

*COLOR CODE:
"B" MEANS BLACK
"W" MEANS WHITE
"..." MEANS ____________
"..." MEANS ____________

SIGNATURE ____________

PAGE ______ OF ______ PAGES

16-500100 R1.55-5

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

ENGINEERING DIVISION----FIELD REPORT

NAME OF APPLICANT: Owl Rock - Azusa	DATE OF INSPECTION: 8-15-79
EQUIPMENT LOCATION (ADDRESS): Haul Road - Wet	PERMIT APPL. NO.
SOURCE OF AIR CONTAMINANTS: Trucks on Haul Roads	TYPES OF AIR CONTAMINANTS: Dust
POINT(S) OF OBSERVATION	POINT OF DISCHARGE
WEATHER / WIND / HOURS OF OBSERVATION: FROM 2:40 TO 3:10	

OBSERVATIONS OF VISIBLE AIR CONTAMINANTS

Water spray at 1:45 resulting in roads almost in mud conditions.

Spray truck sprayed again at 2:45.

TIME Min	TIME Sec	Opac. Obs. %	TIME MINUTES	TIME SECONDS	Opac. Obs.	TIME		Opac. Obs.	TIME		Opac. Obs.	TIME		Opac. Obs.
46	20	30												
54	50	50												
56	10	10												
59	50	40												
05	15	40												

← TOTAL TIME OF DISCHARGE OF AIR CONTAMINANTS OF DENSITY (OR OPACITY) OF ________ OR GREATER

*COLOR CODE:
"B" MEANS BLACK
"W" MEANS WHITE
"__" MEANS ________
"__" MEANS ________

SIGNATURE ________

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SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

AIR PROGRAMS DIVISION
ENGINEERING DIVISION

OBSERVATIONS DURING SOURCE TEST NO. ________

NAME OF FIRM: Owl Rock - Lytle Creek — DATE OF TEST: 8-20-79

EQUIPMENT TESTED: Haul Road to North Pit — PERMIT APPL. NO.: ________

HOURS OF OBSERVATION: FROM ☐ A.M. ☒ P.M. 1:00 TO ☐ A.M. ☒ P.M. 4:30 — WEATHER: ________ WIND: ________

NAMES & TITLES OF PERSONS CONTACTED: Mr. Robert Gordon, Pacific Environmental Services

REPORT BY: Deanna Dean, Air Quality Engineer I

OBSERVATIONS MADE AND DATA RECORDED DURING TEST:

Air Quality Engineer Donald Hopps was present to record opacity observations on this day of testing haul roads. The record of his readings is attached.

DD:pmj
Attachment

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

ENGINEERING DIVISION----FIELD REPORT

NAME OF APPLICANT: Owl Rock - Lytle Creek	DATE OF INSPECTION: 8/20/79
EQUIPMENT LOCATION (ADDRESS): Haul Road to North Pit	PERMIT APPL. NO.
SOURCE OF AIR CONTAMINANTS: Trucks on Haul Road	TYPES OF AIR CONTAMINANTS: Dust
POINT(S) OF OBSERVATION: Road Heavily Watered at 2:00	POINT OF DISCHARGE
WEATHER / WIND	HOURS OF OBSERVATION: FROM TO

OBSERVATIONS OF VISIBLE AIR CONTAMINANTS

TIME	Truck #	Opac. Obs.	TIME To	TIME From		Time	#	Opac. Obs.	To	From	
2:08	1	0		X	Small mud spray	2:30	20	30	X		8'
	2	0	X				21	40		X	6' wind up
	3	0		X			22	30	X		
	4	0	X				23	50		X	
2:10	5	0	X			2:34	24	30	X		
2:12	6	10		X	About 4' high	2:35	25	60		X	
	7	10	X		Brisk breeze						
	8	0		X	Part of road app. to dry out						
2:16	9	10	X								
	10	20		X	1' high						
	11	10	X		4' high						
	12	20		X	4' high						
2:21	13	30	X	X	Trucks crossed						
	14	0	X		Calm						
	15	20		X	4'						
	16	0	X								
	17	40		X	6'						
2:28	18	20	X		6'						
	19	40		X	6' half of road looks dry						

← TOTAL TIME OF DISCHARGE OF AIR CONTAMINANTS OF DENSITY (OR OPACITY) OF ________ OR GREATER

*COLOR CODE:
"B" MEANS BLACK
"W" MEANS WHITE
---- MEANS ----------
---- MEANS ----------

SIGNATURE ____________________

PAGE ______ OF ______ PAGES

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

AIR PROGRAMS DIVISION
ENGINEERING DIVISION

OBSERVATIONS DURING SOURCE TEST NO. ________

NAME OF FIRM: Transit Mix DATE OF TEST: 8-22-79

EQUIPMENT TESTED: Haul Road PERMIT APPL. NO. ________

HOURS OF OBSERVATION: FROM [ ] A.M. [X] P.M. 1:00 TO [ ] A.M. [X] P.M. 4:30 WEATHER 85° WIND 5-10 mph.

NAMES & TITLES OF PERSONS CONTACTED: Mr. Gary Quinn, Pacific Environmental Services

REPORT BY: Deanna Dean, Air Quality Engineer I

OBSERVATIONS MADE AND DATA RECORDED DURING TEST:

Tests on emissions from haul roads continued with the same test apparatus and the same basic configuration of test equipment. Tests were conducted for a haul road in a dry condition, an intermediate (between wet and dry) condition, and a wet condition. Opacity observations for these three tests are attached.

DD:pmj

Attachments

ENGINEERING DIVISION----FIELD REPORT

NAME OF APPLICANT: Transit Mix - Santiago Creek

DATE OF INSPECTION: 8-22-79

EQUIPMENT LOCATION (ADDRESS): Haul Road - Dry Condition

PERMIT APPL. NO.:

SOURCE OF AIR CONTAMINANTS: Trucks on Haul Roads

TYPES OF AIR CONTAMINANTS: Dust

POINT(S) OF OBSERVATION:

POINT OF DISCHARGE:

WEATHER: 85°

WIND: 5-10 mph.

HOURS OF OBSERVATION: FROM 1:25 TO 1:55

OBSERVATIONS OF VISIBLE AIR CONTAMINANTS

TIME Min.	TIME Sec.	Opac. Obs. %	TIME Minutes	TIME Seconds	Opac. Obs.	TIME		Opac. Obs.	TIME		Opac Obs.	TIME		Opac. Obs.
26	18	50	✓											
26	28	60	✓											
35	23	70	✓											
36	28	70		✓										
38	33	60		✓										
39	18	20	W	✓										
42	13	80		✓										
43	38	60	✓											
44	48	20	W	✓										
46	03	70		✓										
49	48	50	✓											
54	28	80	✓											
			72	70										

← TOTAL TIME OF DISCHARGE OF AIR CONTAMINANTS OF DENSITY (OR OPACITY) OF ________ OR GREATER

*COLOR CODE:
"B" MEANS BLACK
"W" MEANS WHITE
.... MEANS ....
.... MEANS ....

SIGNATURE ________

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

ENGINEERING DIVISION----FIELD REPORT

NAME OF APPLICANT: Transit Mix - Santiago Creek	DATE OF INSPECTION: 8-22-79
EQUIPMENT LOCATION (ADDRESS): Haul Road - Intermediate Condition	PERMIT APPL. NO.
SOURCE OF AIR CONTAMINANTS: Trucks on Haul Road	TYPES OF AIR CONTAMINANTS: Dust
POINT(S) OF OBSERVATION: Wetted-One pass at 2:24	POINT OF DISCHARGE
WEATHER: 85° WIND: 5-10 mph.	HOURS OF OBSERVATION: FROM 2:25 TO 2:55

OBSERVATIONS OF VISIBLE AIR CONTAMINANTS

TIME Min	TIME Sec	Opac. Obs.	TIME MINUTES	TIME SECONDS	Opac Obs.	TIME		Opac. Obs.	TIME		Opac Obs.	TIME		Opac. Obs.
26	30	10												
29	04	20												
37	42	80												
47	35													
49	40													
52	24	--												
55	25	20												

← TOTAL TIME OF DISCHARGE OF AIR CONTAMINANTS OF DENSITY (OR OPACITY) OF ______ OR GREATER

*COLOR CODE:
"B" MEANS BLACK
"W" MEANS WHITE
____ MEANS ________
____ MEANS ________

SIGNATURE ____________________

PAGE ____ OF ____ PAGES

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

ENGINEERING DIVISION----FIELD REPORT

NAME OF APPLICANT: Transit Mix - Santiago Creek	DATE OF INSPECTION: 8-22-79
EQUIPMENT LOCATION (ADDRESS): Haul Road - Wet Condition	PERMIT APPL. NO.
SOURCE OF AIR CONTAMINANTS: Trucks on Haul Road	TYPES OF AIR CONTAMINANTS
POINT(S) OF OBSERVATION: Road wetted at 3:14	POINT OF DISCHARGE
WEATHER: 85° WIND: 5-10 mph.	HOURS OF OBSERVATION: FROM 3:15 TO 4:15

OBSERVATIONS OF VISIBLE AIR CONTAMINANTS

TIME Min	TIME Sec	Opac. Obs.	TIME Minutes	TIME Seconds	Opac. Obs.	TIME		Opac. Obs.	TIME		Opac. Obs.	TIME		Opac. Obs.
17	04	--												
20	45	--												
26	12	--												
26	35	--												
35	10	10												
36	30	Water Spray Truck												
39	05	--												
42	53	--												
44	22	--												
44	35	--												
53	25	5												
54	40	Bulldozer maneuvering downwind												
55	40													
55	40	10												
56	32	5-10												
59	30													
00	00													
01	25	5												
02	00	--												

03 55

COLOR CODE:
"B" MEANS BLACK
"W" MEANS WHITE
___ MEANS ___
___ MEANS ___

← TOTAL TIME OF DISCHARGE OF AIR CONTAMINANTS OF DENSITY (OR OPACITY) OF ________ OR GREATER

SIGNATURE ________________

APPENDIX D

Modeling Data

Description of Computer Format

Plant Nos. 1 to 5: Source descriptions and Emissions
Plot of Source and Receptor Sites
Computer Readout

COMPUTER READOUT FORMAT

Sources

Point, area, and line sources are each numbered consecutively and separately, but for clarity in the plant plots they are numbered serially, not separately. For point sources the initial Y and Z sigmas are the assumed initial horizontal and vertical dimensions of the plumes at the sources. Area sources (used for surge piles) are approximated as rectangles. Line sources (haul roads) are approximated with a series of linear segments from point A to point B. The sigmas have the same significance as for point sources.

Meteorology

Theta is wind direction in degrees, U is wind velocity in m/sec, KST is the atmospheric stability constant, HL is the mixing height in m, and T the absolute temperature. All the values are assumed as typical. The main effect of KST is on rate of dispersion of the plume. The mixing height probably has no effect on the cases studies because of the low elevations of sources and lack of plume rise.

Receptor Concentrations

Projected concentrations at receptors with the coordinates listed are modeled after one hour steady conditions. The concentrations are listed separately from point, area, and line sources, as groups, and totaled in the last column. Results are in exponential notation; the initial three digit number is to be multiplied by the power of ten given after E. In these terms, the air quality standard of 100 $\mu g/m^3$ (= 1×10^{-4} g/m^3) is expressed as 1.00E-04.

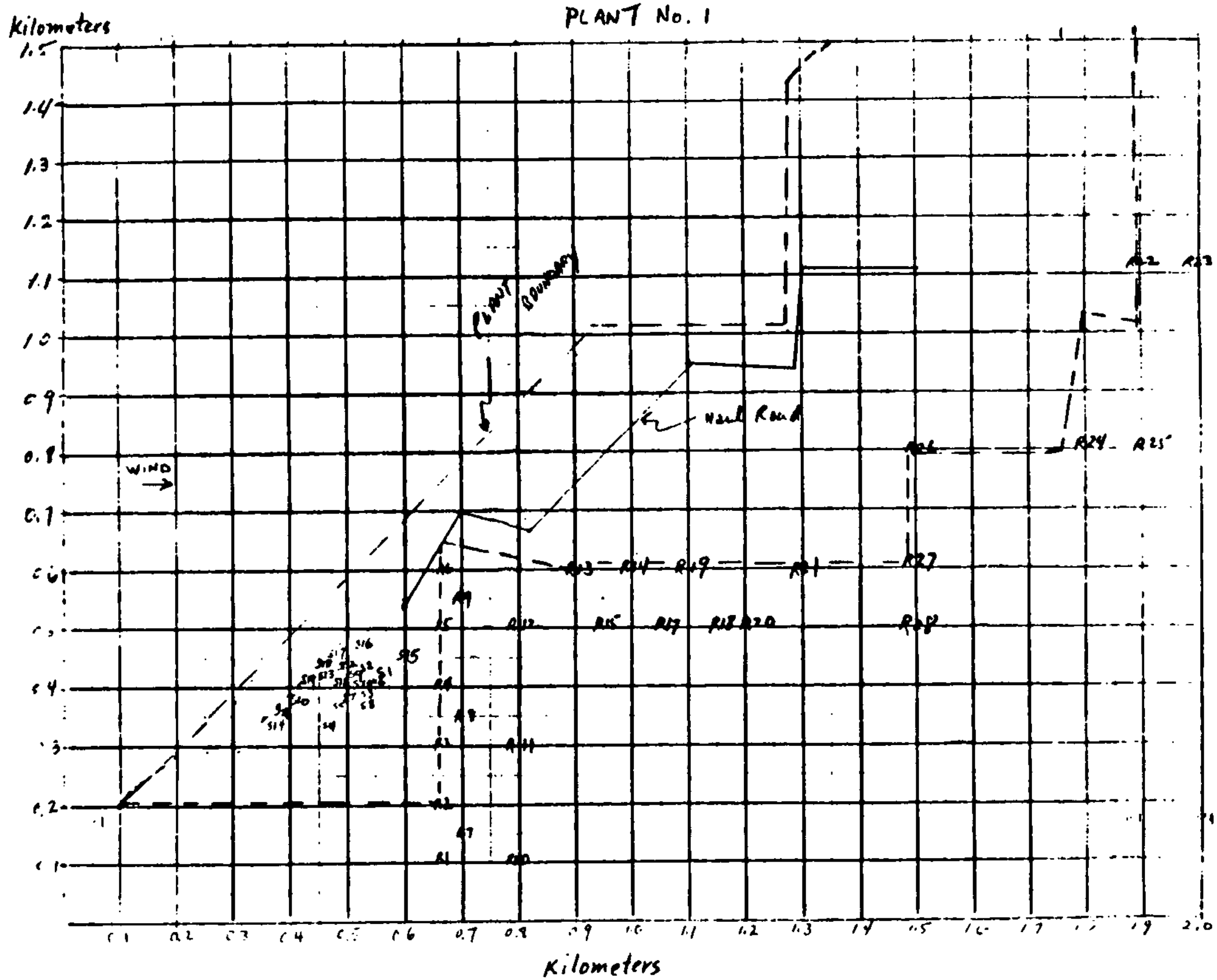
Plant No. 1

Days/yr 250 Hr/da 10

Source No.	Source Type	Throughput, T/hr	Emission Factor, Kg/MT Dry	Emission Factor, Kg/MT Wet	Dry Emission Rate MT/yr	Dry Emission Rate T/yr	Wet Emission Rate MT/yr	Wet Emission Rate T/yr
1	Screen	1320	0.180	0.0082	540	590		
2		876			360	390		
3		1036			420	470		
4		713			290	320		
5		180			70	80		
				Total	1680	1850	77	85
6	Crusher	760	0.129	0.0127	220	250		
7		180			50	60		
				Total	270	310	27	30
8	Transfer point	758	0.0146	0.00030	20	30		
9		194			10	10		
10		160			10	10		
11		180			10	10		
12		180			10	10		
13		100			–	–		
14		1200			40	40		
				Total	100	110	2	2
15	Surge Pile	838	0.064	0.0027	110	120		
16		876			110	130		
17		170			20	30		
18		173			20	30		
19		318			40	50		
20		292			40	40		
21		103			10	10		
				Total	350	410	15	20
22	Haul Road (800m)	15 trucks/hr	146*	1.00*	440	480		
				Total	440	480	30	32
			Plant Total		2840	1850	151	169

* g/veh-m

PLANT No. 1



Kilometers
WIND
Plant Boundary
Haul Road
R13 R14 R19 R21 R27
R12 R15 R17 R18 R20 R28
R24 R25
R22 R23
Kilometers

Plant No. 1

Uncontrolled

HEIGHT AT WIND SPEED 5.0 METERS DEPOSITION VELOCITY 0.01000 M/S

*** P O I N T S O U R C E S ***

NO.	POINT SOURCE STRENGTH (G/SEC)	PHYSICAL HEIGHT (METERS)	STACK TEMP (DEG-K)	STACK GAS VELOCITY (M/SEC)	STACK DIAMETER (METERS)	VOLUME FLOW (CU M/SEC)	COORDINATES EAST (KM)	COORDINATES NORTH (KM)	INITIAL SIGMAS Y (M)	INITIAL SIGMAS Z (M)
1	66.00	10.0	297.0	0.0	0.0	0.0	0.570	0.420	1.0	0.7
2	43.80	10.0	297.0	0.0	0.0	0.0	0.530	0.430	1.0	0.7
3	51.60	10.0	297.0	0.0	0.0	0.0	0.520	0.390	1.0	0.7
4	35.60	9.0	297.0	0.0	0.0	0.0	0.460	0.340	1.0	0.7
5	9.00	4.0	297.0	0.0	0.0	0.0	0.480	0.370	1.0	0.7
6	42.10	10.0	297.0	0.0	0.0	0.0	0.550	0.410	1.0	2.0
7	10.00	8.0	297.0	0.0	0.0	0.0	0.500	0.380	1.0	2.0
8	2.90	1.0	297.0	0.0	0.0	0.0	0.540	0.390	0.5	0.5
9	0.75	1.0	297.0	0.0	0.0	0.0	0.510	0.430	0.5	0.5
10	0.62	2.0	297.0	0.0	0.0	0.0	0.520	0.420	0.5	0.5
11	0.70	9.0	297.0	0.0	0.0	0.0	0.500	0.410	0.5	0.5
12	0.70	3.0	297.0	0.0	0.0	0.0	0.500	0.430	0.5	0.5
13	0.40	1.0	297.0	0.0	0.0	0.0	0.480	0.410	0.5	0.5
14	4.70	1.0	297.0	0.0	0.0	0.0	0.370	0.340	0.5	0.5

*** A R E A S O U R C E S ***

NO.	AREA SOURCE STRENGTH (G/SEC-M**2)	AREA SOURCE HEIGHT (METERS)	COORDINATES SW-CORNER EAST (KM)	COORDINATES SW-CORNER NORTH (KM)	AREA SIZE EAST-WEST (KM)	AREA SIZE NORTH-SOUTH (KM)
1	0.00500000	6.0	0.600	0.460	0.054	0.054
2	0.00530000	6.0	0.520	0.470	0.054	0.054
3	0.00400000	6.0	0.480	0.450	0.027	0.027
4	0.00430000	6.0	0.460	0.430	0.027	0.027
5	0.00730000	6.0	0.440	0.400	0.027	0.027
6	0.00730000	6.0	0.420	0.380	0.027	0.027
7	0.00230000	6.0	0.390	0.360	0.027	0.027

*** H O R I Z O N T A L L I N E S O U R C E S ***

NO.	LINE SOURCE STRENGTH (G/SEC-M)	LINE SOURCE HEIGHT (METERS)	COORDINATES POINT A EAST (KM)	COORDINATES POINT A NORTH (KM)	COORDINATES POINT B EAST (KM)	COORDINATES POINT B NORTH (KM)	INITIAL SIGMAS Y (M)	INITIAL SIGMAS Z (M)
1	0.06000000	0.0	0.598	0.541	0.698	0.691	6.00	2.00
2	0.06000000	0.0	0.632	0.539	0.702	0.689	6.00	2.00
3	0.06000000	0.0	0.730	0.692	0.810	0.672	6.00	2.00
4	0.06000000	0.0	0.733	0.688	0.810	0.668	6.00	2.00

Plant No. 1 (cont.)

Uncontrolled

5	0.36000000	0.0	0.808	0.672	1.098	0.952	6.00	2.00
6	0.36000000	0.0	0.812	0.648	1.102	0.948	6.00	2.00
7	0.36000000	0.0	1.130	0.952	1.290	0.942	6.00	2.00
8	0.36000000	0.0	1.190	0.948	1.290	0.938	6.00	2.00
9	0.36000000	0.0	1.288	0.940	1.298	1.120	6.00	2.00
10	0.36000000	0.0	1.292	0.940	1.302	1.120	6.00	2.00
11	0.06000000	0.0	1.300	1.122	1.500	1.122	6.00	2.00
12	0.06000000	0.0	1.300	1.117	1.500	1.117	6.00	2.00

** M E T E O R O L O G Y ***

NO.	THETA(DEG)	U (M/SEC)	KST	HL (M)	T (DEG-K)
1.	270.	3.1	4	300.	297.

** C O N C E N T R A T I O N S A T R E C E P T O R S ***

CONCENTRATIONS IN GRAMS PER CUBIC METER

HOUR	RECEPTOR NO.	RECEPTOR COORDINATES EAST	NORTH	HEIGHT	FROM POINTS	FROM AREAS	FROM HORIZONTAL LINES	FROM CURVED PATHS	FROM SPECIAL LINES	FROM SPECIAL PATHS	TOTAL
1	1	0.660	0.100	1.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	2	0.660	0.200	1.50	4.68E-12	0.0	0.0	0.0	0.0	0.0	4.68E-12
1	3	0.660	0.300	1.50	1.16E-03	0.0	0.0	0.0	0.0	0.0	1.16E-03
1	4	0.660	0.400	1.50	4.04E-02	0.0	0.0	0.0	0.0	0.0	4.04E-02
1	5	0.660	0.500	1.50	5.50E-10	8.70E-03	6.43E-07	0.0	0.0	0.0	8.70E-03
1	6	0.660	0.600	1.50	0.0	0.0	1.12E-02	0.0	0.0	0.0	1.17E-02
1	7	0.700	0.150	1.50	4.43E-16	0.0	0.0	0.0	0.0	0.0	4.43E-16
1	8	0.700	0.350	1.50	1.72E-02	0.0	0.0	0.0	0.0	0.0	1.72E-02
1	9	0.700	0.550	1.50	2.56E-16	1.23E-04	4.69E-03	0.0	0.0	0.0	4.82E-03
1	10	0.800	0.100	1.50	4.06E-16	0.0	0.0	0.0	0.0	0.0	4.06E-16
1	11	0.800	0.300	1.50	3.14E-03	0.0	0.0	0.0	0.0	0.0	3.14E-03
1	12	0.800	0.500	1.50	6.72E-05	1.07E-02	9.36E-05	0.0	0.0	0.0	1.09E-02
1	13	0.900	0.600	1.50	1.30E-10	9.32E-06	3.02E-03	0.0	0.0	0.0	3.03E-03
1	14	1.000	0.600	1.50	5.13E-08	4.62E-05	2.35E-03	0.0	0.0	0.0	2.40E-03
1	15	0.950	0.500	1.50	1.08E-03	6.00E-03	2.34E-04	0.0	0.0	0.0	7.32E-03
1	16	1.000	0.600	1.50	5.13E-08	4.62E-05	2.35E-03	0.0	0.0	0.0	2.40E-03
1	17	1.050	0.500	1.50	2.27E-03	4.32E-03	2.86E-04	0.0	0.0	0.0	6.88E-03
1	18	1.150	0.500	1.50	3.33E-03	3.24E-03	3.13E-04	0.0	0.0	0.0	6.88E-03
1	19	1.100	0.600	1.50	1.43E-06	1.15E-04	1.99E-03	0.0	0.0	0.0	2.11E-03
1	20	1.200	0.500	1.50	3.73E-03	2.85E-03	3.21E-04	0.0	0.0	0.0	6.90E-03
1	21	1.300	0.600	1.50	4.39E-05	2.77E-04	1.67E-03	0.0	0.0	0.0	2.00E-03
1	22	1.900	1.120	1.50	7.31E-16	0.0	3.87E-03	0.0	0.0	0.0	3.87E-03
1	23	2.000	1.120	1.50	2.14E-14	0.0	3.01E-03	0.0	0.0	0.0	3.01E-03
1	24	1.800	0.800	1.50	2.38E-07	1.23E-06	1.72E-03	0.0	0.0	0.0	1.73E-03
1	25	1.900	0.800	1.50	7.82E-07	2.32E-06	1.63E-03	0.0	0.0	0.0	1.63E-03
1	26	1.500	0.800	1.50	6.88E-10	0.0	2.24E-03	0.0	0.0	0.0	2.24E-03
1	27	1.500	0.600	1.50	2.13E-04	3.77E-04	1.44E-03	0.0	0.0	0.0	2.03E-03
1	28	1.500	0.400	1.50	1.17E-02	5.59E-04	1.98E-05	0.0	0.0	0.0	1.23E-02

Plant No. 1

Controlled

HEIGHT AT WIND SPEED 5.0 METERS DEPOSITION VELOCITY 0.01000 M/S

*** POINT SOURCES ***

NO.	POINT SOURCE STRENGTH (G/SEC)	PHYSICAL HEIGHT (METERS)	STACK TEMP (DEG-K)	STACK GAS VELOCITY (M/SEC)	STACK DIAMETER (METERS)	VOLUME FLOW (CU M/SEC)	COORDINATES EAST (KM)	COORDINATES NORTH (KM)	INITIAL SIGMAS Y (M)	INITIAL SIGMAS Z (M)
1	3.70	10.0	297.0	0.0	0.0	0.0	0.570	0.420	1.0	0.7
2	2.40	10.0	297.0	0.0	0.0	0.0	0.530	0.430	1.0	0.7
3	2.90	10.0	297.0	0.0	0.0	0.0	0.520	0.390	1.0	0.7
4	2.00	9.0	297.0	0.0	0.0	0.0	0.460	0.340	1.0	0.7
5	0.50	4.0	297.0	0.0	0.0	0.0	0.480	0.370	1.0	0.7
6	2.10	10.0	297.0	0.0	0.0	0.0	0.550	0.410	1.0	2.0
7	0.50	8.0	297.0	0.0	0.0	0.0	0.500	0.380	1.0	2.0
8	0.06	1.0	297.0	0.0	0.0	0.0	0.540	0.390	0.5	0.5
9	0.02	1.0	297.0	0.0	0.0	0.0	0.510	0.430	0.5	0.5
10	0.13	2.0	297.0	0.0	0.0	0.0	0.520	0.420	0.5	0.5
11	0.02	9.0	297.0	0.0	0.0	0.0	0.500	0.410	0.5	0.5
12	0.02	3.0	297.0	0.0	0.0	0.0	0.500	0.430	0.5	0.5
13	0.01	1.0	297.0	0.0	0.0	0.0	0.480	0.410	0.5	0.5
14	0.10	1.0	297.0	0.0	0.0	0.0	0.370	0.340	0.5	0.5

*** AREA SOURCES ***

NO.	AREA SOURCE STRENGTH (G/SEC-M**2)	AREA SOURCE HEIGHT (METERS)	COORDINATES SW-CORNER EAST (KM)	COORDINATES SW-CORNER NORTH (KM)	AREA SIZE EAST-WEST (KM)	AREA SIZE NORTH-SOUTH (KM)
1	0.00020000	6.0	0.600	0.460	0.054	0.054
2	0.00020000	6.0	0.520	0.470	0.054	0.054
3	0.00020000	6.0	0.480	0.450	0.027	0.027
4	0.00020000	6.0	0.460	0.410	0.027	0.027
5	0.00030000	6.0	0.440	0.400	0.027	0.027
6	0.00010000	6.0	0.420	0.390	0.027	0.027
7	0.00010000	6.0	0.390	0.360	0.027	0.027

*** HORIZONTAL LINE SOURCES ***

NO.	LINE SOURCE STRENGTH (G/SEC-M)	LINE SOURCE HEIGHT (METERS)	POINT A EAST (KM)	POINT A NORTH (KM)	POINT B EAST (KM)	POINT B NORTH (KM)	INITIAL SIGMAS Y (M)	INITIAL SIGMAS Z (M)
1	0.00400000	0.0	0.599	0.541	0.690	0.691	6.00	2.00
2	0.00400000	0.0	0.602	0.539	0.702	0.689	6.00	2.00
3	0.00400000	0.0	0.700	0.692	0.810	0.672	6.00	2.00
4	0.00400000	0.0	0.700	0.680	0.810	0.668	6.00	2.00

Plant No. 1 (cont.)

Controlled

5	0.C0400CC0	0.0	0.808	C.672	1.C98	0.952	6.00	2.00
6	0.C0400CC0	0.0	0.812	0.668	1.102	0.948	6.00	2.00
7	0.C0400CC0	0.0	1.100	C.952	1.290	0.942	6.00	2.00
8	0.C0400000	0.0	1.100	C.948	1.290	0.938	6.00	2.00
9	0.C0400000	0.0	1.288	C.940	1.298	1.120	6.00	2.00
1C	0.C0400CC0	0.0	1.292	C.940	1.302	1.120	6.00	2.00
11	0.C0400CC0	0.0	1.300	1.122	1.500	1.122	6.00	2.00
12	0.C0400000	0.0	1.300	1.117	1.500	1.117	6.00	2.00

* * M E T E O R O L O G Y * * *

NO.	THETA (DEG)	U (M/SEC)	KST	HI (M)	T (DEG-K)
1.	270.	3.1	4	300.	297.

* * C O N C E N T R A T I O N S   A T   R E C E P T O R S * * *

CONCENTRATIONS IN GRAMS PER CUBIC METER

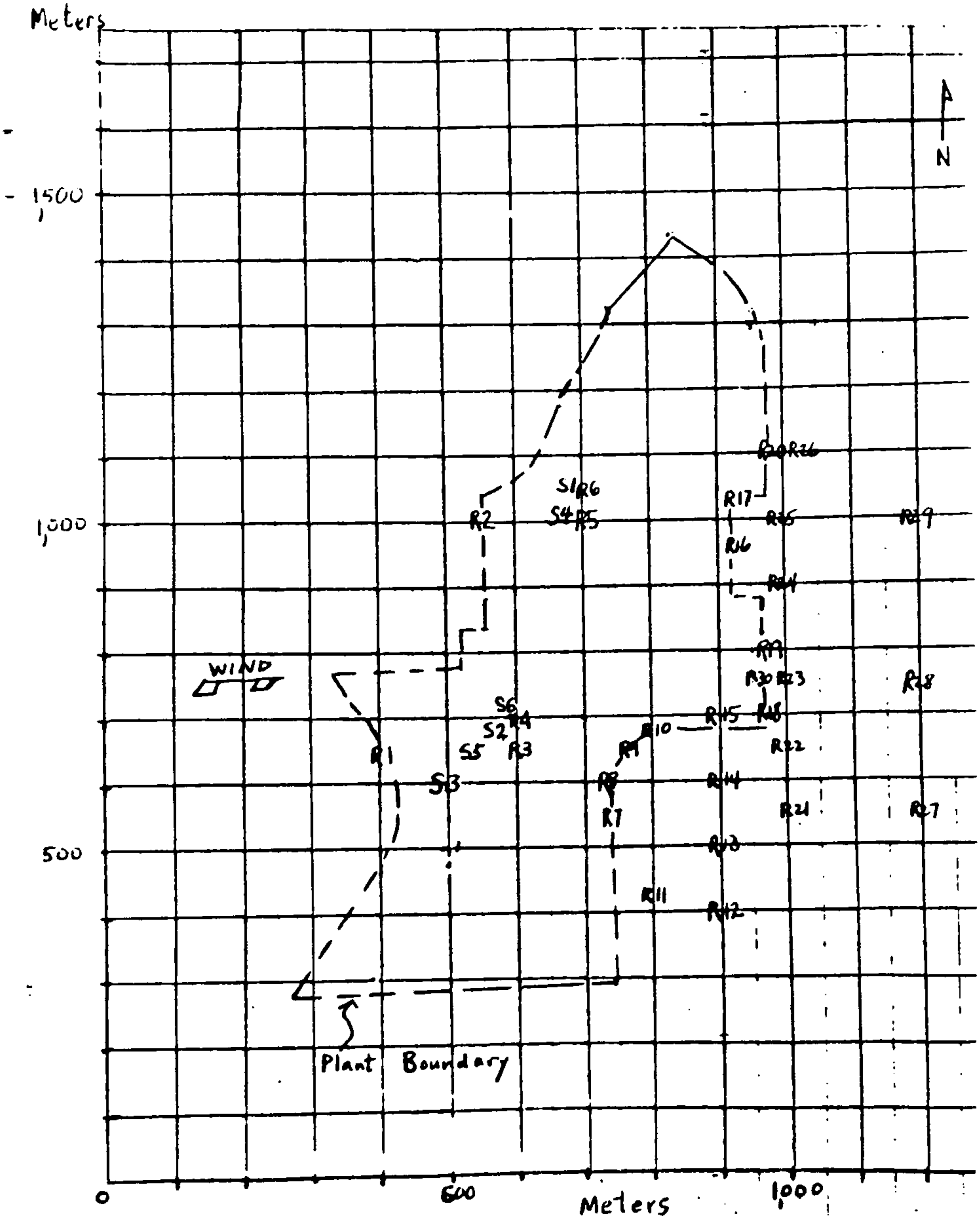
HOUR	RECEPTOR NO.	RECEPTOR COORDINATES EAST	NORTH	HEIGHT	FROM POINTS	FROM AREAS	FROM HORIZONTAL LINES	FROM CURVED PATHS	FROM SPECIAL LINES	FROM SPECIAL PATHS	TOTAL
1	1	0.660	0.100	1.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	2	0.660	0.200	1.50	9.96E-18	0.0	0.0	C.0	0.0	0.0	9.96E-18
1	3	0.660	0.300	1.50	5.29E-C5	0.0	0.0	0.0	0.0	0.0	5.29E-05
1	4	0.660	C.400	1.50	2.06E-C3	0.0	0.0	C.0	0.0	0.0	2.06E-03
1	5	0.660	0.500	1.50	1.45E-11	3.48E-04	4.29E-C8	0.0	0.0	0.0	3.48E-04
1	6	0.660	0.600	1.50	C.C	0.0	7.48E-C4	C.0	0.0	0.0	7.48E-04
1	7	0.7C0	C.150	1.50	9.43E-18	0.0	C.0	0.0	0.0	0.0	9.43E-18
1	8	0.700	0.350	1.50	9.14E-04	0.0	0.0	0.0	0.0	0.0	9.14E-04
1	9	0.700	0.550	1.50	5.67E-18	4.94E-06	3.13E-04	C.0	0.0	0.0	3.18E-04
1	10	0.8C0	0.100	1.50	8.63E-18	0.0	0.0	0.0	0.0	0.0	8.63E-18
1	11	0.800	0.300	1.50	1.62E-04	0.0	C.0	0.0	0.0	0.0	1.62E-04
1	12	0.8C0	0.500	1.50	3.56E-06	4.28E-04	6.24E-06	C.C	0.0	0.0	4.38E-04
1	13	0.900	0.600	1.50	8.48E-12	3.73E-C7	2.01E-04	0.0	0.0	0.0	2.02E-04
1	14	1.000	C.600	1.50	2.71E-09	1.85E-06	1.57E-04	C.0	0.0	0.0	1.58E-04
1	15	0.950	C.500	1.50	9.90E-05	2.40E-04	1.56E-C5	C.C	0.0	0.0	3.15E-04
1	16	1.CC0	0.600	1.50	2.71E-09	1.85E-06	1.57E-04	0.0	0.C	0.0	1.58E-04
1	17	1.050	C.50C	1.50	1.24E-04	1.73E-C4	1.91E-05	0.0	0.0	0.0	3.16E-04
1	18	1.150	C.500	1.50	1.81E-C4	1.30E-04	2.09E-C5	C.0	0.0	0.0	3.31E-04
1	19	1.100	0.600	1.50	7.68E-C8	4.61E-06	1.33E-C4	C.0	0.0	0.0	1.38E-04
1	20	1.2C0	C.5C0	1.50	2.03E-04	1.14E-04	2.14E-05	C.0	0.C	0.0	3.38E-04
1	21	1.300	0.600	1.50	2.38E-C6	1.11E-05	1.12E-04	C.0	0.0	0.0	1.25E-04
1	22	1.9C0	1.120	1.50	3.87E-17	0.0	2.58E-04	C.C	0.C	0.0	2.58E-04
1	23	2.CC0	1.120	1.50	1.14E-15	C.0	2.01E-04	0.0	0.0	0.0	2.01E-04
1	24	1.800	C.800	1.50	1.29E-08	4.93E-08	1.15E-04	0.0	0.C	0.0	1.15E-04
1	25	1.9C0	0.800	1.50	4.23E-C8	9.28E-08	1.09E-C4	0.0	0.0	0.0	1.09E-04
1	26	1.500	C.800	1.50	3.70E-11	C.0	1.50E-C4	C.0	0.0	0.0	1.50E-04
1	27	1.500	C.6C0	1.50	1.16E-05	1.51E-05	9.63E-C5	C.0	0.C	0.0	1.23E-04
1	28	1.500	0.400	1.50	6.31E-C4	2.23E-05	1.32E-C6	C.0	0.0	0.0	6.55E-04

Plant No. 2

Days/yr 220 Hr/da 8

Source No.	Source Type	Throughput, T/hr	Emission Factor, Kg/MT Dry	Emission Factor, Kg/MT Wet	Dry Emission Rate MT/yr	Dry Emission Rate T/yr	Wet Emission Rate MT/yr	Wet Emission Rate T/yr
1	Screens	86	0.180	0.0082	25	28	1.1	1.3
2		150			43	47	2.0	2.1
3	(4ea)	564						
		47			219	241	10.0	11.0
		100						
		49		Total	287	316	13.1	14.4
4	Crushers (2)	58	0.129	0.0127	12	13	1.2	1.3
5	(4)	150			31	34	3.1	3.3
				Total	43	47	4.3	4.6
6	Surge Pile	564	0.064	0.0027	58	64	2.4	2.7
					58	64	2.4	2.7
			Plant	Total	388	427	19.8	21.7

Plant No. 2



S: source
R: Receptor

Plant No. 2 (cont.)

Uncontrolled

HEIGHT AT WIND SPEED 5.0 METERS DEPOSITION VEOCITY 0.01000 M/S

* * * P O I N T S O U R C E S * * *

NO.	POINT SOURCE STRENGTH (G/SEC)	PHYSICAL HEIGHT (METERS)	STACK TEMP (DEG-K)	STACK GAS VELOCITY (M/SEC)	STACK DIAMETER (METERS)	VOLUME FLOW (CU M/SEC)	COORDINATES EAST (KM)	COORDINATES NORTH (KM)	INITIAL SIGMAS Y (M)	INITIAL SIGMAS Z (M)
1	4.30	9.0	297.0	0.0	0.0	0.0	0.680	1.040	1.0	0.7
2	7.50	8.0	297.0	0.0	0.0	0.0	0.560	0.680	1.0	0.7
3	38.10	25.0	297.0	0.0	0.0	0.0	0.490	0.600	2.0	1.4
4	3.20	3.0	297.0	0.0	0.0	0.0	0.660	1.000	2.0	2.0
5	11.20	3.0	297.0	0.0	0.0	0.0	0.530	0.650	4.0	2.0

* * A R E A S O U R C E S * * *

NO.	AREA SOURCE STRENGTH (G/SEC-M**2)	AREA SOURCE HEIGHT (METERS)	COORDINATES SW-CORNER EAST (KM)	COORDINATES SW-CORNER NORTH (KM)	AREA SIZE EAST-WEST (KM)	AREA SIZE NORTH-SOUTH (KM)
1	0.02300000	6.0	0.580	0.700	0.020	0.020

* * M E T E O R O L O G Y * * *

NO.	THETA(DEG)	U (M/SEC)	KST	HL (M)	T (DEG-K)
1.	270.	3.1	4	300.	297.

Plant No. 2 (cont.)

Uncontrolled

C O N C E N T R A T I O N S   A T   R E C E P T O R S*

CONCENTRATIONS IN GRAMS PER CUBIC METER

HOUR	RECEPTOR NO.	RECEPTOR COORDINATES EAST	NORTH	HEIGHT	FROM POINTS	FROM AREAS	FROM HORIZONTAL LINES	FROM CURVED PATHS	FROM SPECIAL LINES	FROM SPECIAL PATHS	TOTAL
1	1	0.400	0.650	1.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	2	0.550	1.000	1.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	3	0.600	0.650	1.50	2.04E-02	0.0	0.0	0.0	0.0	0.0	2.04E-02
1	4	0.600	0.700	1.50	7.07E-08	9.70E-07	0.0	0.0	0.0	0.0	1.04E-06
1	5	0.700	1.000	1.50	1.22E-02	0.0	0.0	0.0	0.0	0.0	1.22E-02
1	6	0.700	1.050	1.50	8.04E-06	0.0	0.0	0.0	0.0	0.0	8.04E-06
1	7	0.740	0.550	1.50	9.33E-05	0.0	0.0	0.0	0.0	0.0	9.33E-05
1	8	0.740	0.600	1.50	1.94E-03	0.0	0.0	0.0	0.0	0.0	1.94E-03
1	9	0.760	0.650	1.50	5.70E-03	1.14E-06	0.0	0.0	0.0	0.0	5.70E-03
1	10	0.800	0.680	1.50	4.78E-03	1.12E-03	0.0	0.0	0.0	0.0	5.89E-03
1	11	0.800	0.420	1.50	9.61E-15	0.0	0.0	0.0	0.0	0.0	9.61E-15
1	12	0.900	0.400	1.50	5.68E-12	0.0	0.0	0.0	0.0	0.0	5.68E-12
1	13	0.900	0.500	1.50	1.82E-05	0.0	0.0	0.0	0.0	0.0	1.82E-05
1	14	0.900	0.600	1.50	3.33E-03	0.0	0.0	0.0	0.0	0.0	3.33E-03
1	15	0.900	0.700	1.50	2.06E-03	2.63E-03	0.0	0.0	0.0	0.0	4.68E-03
1	16	0.920	0.960	1.50	2.18E-04	0.0	0.0	0.0	0.0	0.0	2.18E-04
1	17	0.920	1.030	1.50	2.24E-03	0.0	0.0	0.0	0.0	0.0	2.24E-03
1	18	0.960	0.700	1.50	1.92E-03	2.05E-03	0.0	0.0	0.0	0.0	3.96E-03
1	19	0.960	0.800	1.50	7.09E-07	1.26E-05	0.0	0.0	0.0	0.0	1.33E-05
1	20	0.960	1.100	1.50	3.84E-05	0.0	0.0	0.0	0.0	0.0	3.84E-05
1	21	1.000	0.550	1.50	1.14E-03	0.0	0.0	0.0	0.0	0.0	1.14E-03
1	22	1.000	0.650	1.50	3.59E-03	2.74E-04	0.0	0.0	0.0	0.0	3.87E-03
1	23	1.000	0.750	1.50	1.80E-04	7.94E-04	0.0	0.0	0.0	0.0	9.74E-04
1	24	1.000	0.900	1.50	8.29E-07	0.0	0.0	0.0	0.0	0.0	8.29E-07
1	25	1.000	1.000	1.50	1.18E-03	0.0	0.0	0.0	0.0	0.0	1.18E-03
1	26	1.000	1.100	1.50	6.90E-05	0.0	0.0	0.0	0.0	0.0	6.90E-05
1	27	1.200	0.550	1.50	1.40E-03	1.29E-06	0.0	0.0	0.0	0.0	1.40E-03
1	28	1.200	0.750	1.50	3.82E-04	6.39E-04	0.0	0.0	0.0	0.0	1.02E-03
1	29	1.200	1.000	1.50	7.36E-04	0.0	0.0	0.0	0.0	0.0	7.36E-04
1	30	0.960	0.750	1.50	1.31E-04	7.90E-04	0.0	0.0	0.0	0.0	9.20E-04

Plant No. 2

Controlled

HEIGHT AT WIND SPEED 5.0 METERS DEPOSITION VEOCITY 0.01000 M/S

* * * P O I N T S O U R C E S * * *

NO.	POINT SOURCE STRENGTH (G/SEC)	PHYSICAL HEIGHT (METERS)	STACK TEMP (DEG-K)	STACK GAS VELOCITY (M/SEC)	STACK DIAMETER (METERS)	VOLUME FLOW (CU M/SEC)	COORDINATES EAST (KM)	COORDINATES NORTH (KM)	INITIAL SIGMAS Y (M)	INITIAL SIGMAS Z (M)
1	0.24	5.0	297.0	0.0	0.0	0.0	0.680	1.040	1.0	0.7
2	0.42	8.0	297.0	0.0	0.0	0.0	0.560	0.680	1.0	0.7
3	2.10	25.0	297.0	0.0	0.0	0.0	0.490	0.600	2.0	1.4
4	0.16	3.0	297.0	0.0	0.0	0.0	0.660	1.000	2.0	2.0
5	0.94	3.0	297.0	0.0	0.0	0.0	0.530	0.650	4.0	2.0

* * A R E A S O U R C E S * * *

NO.	AREA SOURCE STRENGTH (G/SEC-M**2)	AREA SOURCE HEIGHT (METERS)	COORDINATES SW-CORNER EAST (KM)	COORDINATES SW-CORNER NORTH (KM)	AREA SIZE EAST-WEST (KM)	AREA SIZE NORTH-SOUTH (KM)
1	0.00100J00	6.0	0.980	0.700	0.020	0.020

* * M E T E O R O L O G Y * * *

NO.	THETA(DEG)	U (M/SEC)	KST	HL (M)	T (DEG-K)
1.	270.	3.1	4	300.	297.

Plant No. 2 (cont.)

Controlled

C O N C E N T R A T I O N S   A T   R E C E P T O R S*

CONCENTRATIONS IN GRAMS PER CUBIC METER

HOUR	RECEPTOR NO.	RECEPTOR COORDINATES EAST	NORTH	HEIGHT	FROM POINTS	FROM AREAS	FROM HORIZONTAL LINES	FROM CURVED PATHS	FROM SPECIAL LINES	FROM SPECIAL PATHS	TOTAL
1	1	0.400	0.650	1.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	2	0.550	1.000	1.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	3	0.600	0.650	1.50	1.02E-03	0.0	0.0	0.0	0.0	0.0	1.02E-03
1	4	0.600	0.700	1.50	3.83E-09	4.22E-08	0.0	0.0	0.0	0.0	4.60E-08
1	5	0.700	1.000	1.50	6.09E-04	0.0	0.0	0.0	0.0	0.0	6.09E-04
1	6	0.700	1.050	1.50	4.49E-07	0.0	0.0	0.0	0.0	0.0	4.49E-07
1	7	0.740	0.550	1.50	5.14E-06	0.0	0.0	0.0	0.0	0.0	5.14E-06
1	8	0.740	0.600	1.50	1.06E-04	0.0	0.0	0.0	0.0	0.0	1.06E-04
1	9	0.760	0.650	1.50	2.90E-04	4.97E-08	0.0	0.0	0.0	0.0	2.90E-04
1	10	0.800	0.680	1.50	2.57E-04	4.85E-05	0.0	0.0	0.0	0.0	3.06E-04
1	11	0.800	0.420	1.50	5.30E-16	0.0	0.0	0.0	0.0	0.0	5.30E-16
1	12	0.900	0.400	1.50	3.13E-13	0.0	0.0	0.0	0.0	0.0	3.13E-13
1	13	0.900	0.500	1.50	1.00E-06	0.0	0.0	0.0	0.0	0.0	1.00E-06
1	14	0.900	0.600	1.50	1.80E-04	0.0	0.0	0.0	0.0	0.0	1.80E-04
1	15	0.900	0.700	1.50	1.11E-04	1.14E-04	0.0	0.0	0.0	0.0	2.26E-04
1	16	0.920	0.960	1.50	1.09E-05	0.0	0.0	0.0	0.0	0.0	1.09E-05
1	17	0.920	1.030	1.50	1.22E-04	0.0	0.0	0.0	0.0	0.0	1.22E-04
1	18	0.960	0.700	1.50	1.03E-04	8.90E-05	0.0	0.0	0.0	0.0	1.92E-04
1	19	0.960	0.800	1.50	3.88E-08	5.46E-07	0.0	0.0	0.0	0.0	5.85E-07
1	20	0.960	1.100	1.50	2.14E-06	0.0	0.0	0.0	0.0	0.0	2.14E-06
1	21	1.000	0.550	1.50	6.26E-05	0.0	0.0	0.0	0.0	0.0	6.26E-05
1	22	1.000	0.650	1.50	1.90E-04	1.19E-05	0.0	0.0	0.0	0.0	2.02E-04
1	23	1.000	0.750	1.50	9.79E-06	3.45E-05	0.0	0.0	0.0	0.0	4.43E-05
1	24	1.000	0.900	1.50	4.14E-08	0.0	0.0	0.0	0.0	0.0	4.14E-08
1	25	1.000	1.000	1.50	6.09E-05	0.0	0.0	0.0	0.0	0.0	6.09E-05
1	26	1.000	1.100	1.50	3.85E-06	0.0	0.0	0.0	0.0	0.0	3.85E-06
1	27	1.200	0.550	1.50	7.66E-05	5.61E-08	0.0	0.0	0.0	0.0	7.67E-05
1	28	1.200	0.750	1.50	2.06E-05	2.78E-05	0.0	0.0	0.0	0.0	4.84E-05
1	29	1.200	1.000	1.50	3.88E-05	0.0	0.0	0.0	0.0	0.0	3.88E-05
1	30	0.960	0.750	1.50	7.14E-06	3.43E-05	0.0	0.0	0.0	0.0	4.15E-05

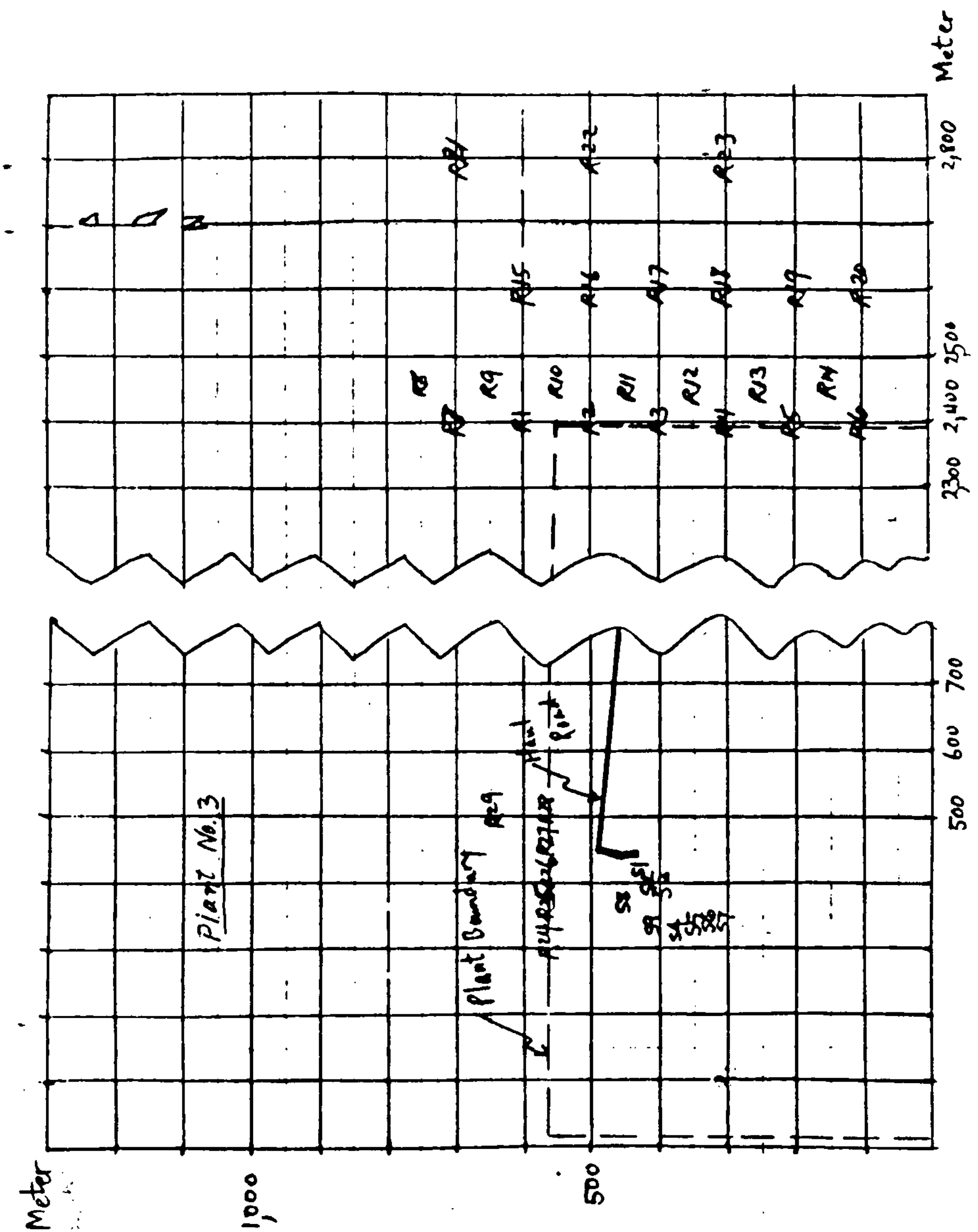
Plant No. 3

Days/yr 220 Hr/da 8

Source	Source	Throughput	Emission Factor, Kg/MT		Dry Emission Rate		Wet Emission Rate	
No.	Type	T/hr	Dry	Wet	MT/yr	T/yr	MT/yr	T/yr
1	Screens (2)	450	0.180	0.0082	129	143	5.9	6.5
2		450			129	143	5.9	6.5
4		250			72	79	3.3	3.6
6		100			29	32	1.3	1.4
				Total	359	397	16.4	18.0
3	Crusher	450	0.129	0.0127	93	102	9.1	10.0
5		250			52	57	5.1	5.6
7		30			6.2	6.8	0.6	0.7
				Total	151	166	14.8	16.3
8	Surge Pile	150	0.064	0.0027	15.3	16.9	0.65	0.71
9		200			20.0	22.5	0.86	0.95
				Total	35.3	39.4	1.51	1.66
10	Haul Road (1.25 km)	7.5 *	14.6 **	1.00 **	241	265	16.5	18.2
					241	265	16.5	18.2
			Plant	Total	786	867	49.2	54.2

* Trucks/hr

** g/veh-m


Plant No. 3
Plant Boundary
Meter
1,000
500
Meter
2,800
2,500
2,400
2300
700
600
500
R9
R10
R11
R12
R13
R14

Plant No. 3

Uncontrolled

HEIGHT AT WIND SPEED 5.0 METERS DEPOSITION VELOCITY 0.01000 M/S

*** P O I N T S O U R C E S ***

NO.	POINT SOURCE STRENGTH (G/SEC)	PHYSICAL HEIGHT (METERS)	STACK TEMP (DEG-K)	STACK GAS VELOCITY (M/SEC)	STACK DIAMETER (METERS)	VOLUME FLOW (CU M/SEC)	COORDINATES EAST (KM)	COORDINATES NORTH (KM)	INITIAL SIGMAS Y (M)	INITIAL SIGMAS Z (M)
1	22.50	3.0	297.0	0.0	0.0	0.0	0.420	0.430	2.0	0.7
2	22.50	2.0	297.0	0.0	0.0	0.0	0.400	0.420	2.0	0.7
3	25.00	2.0	297.0	0.0	0.0	0.0	0.400	0.420	1.0	2.0
4	12.50	2.0	297.0	0.0	0.0	0.0	0.320	0.380	1.0	0.7
5	13.90	2.0	297.0	0.0	0.0	0.0	0.330	0.370	1.0	2.0
6	5.00	25.0	297.0	0.0	0.0	0.0	0.330	0.365	1.0	0.7
7	1.70	2.0	297.0	0.0	0.0	0.0	0.340	0.335	2.0	2.0

*** A R E A S O U R C E S ***

NO.	AREA SOURCE STRENGTH (G/SEC-M**2)	AREA SOURCE HEIGHT (METERS)	COORDINATES SW-CORNER EAST (KM)	COORDINATES SW-CORNER NORTH (KM)	AREA SIZE EAST-WEST (KM)	AREA SIZE NORTH-SOUTH (KM)
1	0.00150000	6.0	0.380	0.460	0.040	0.040
2	0.00700000	6.0	0.340	0.410	0.020	0.025

*** H O R I Z O N T A L L I N E S O U R C E S ***

NO.	LINE SOURCE STRENGTH (G/SEC-M)	LINE SOURCE HEIGHT (METERS)	COORDINATES POINT A EAST (KM)	COORDINATES POINT A NORTH (KM)	COORDINATES POINT B EAST (KM)	COORDINATES POINT B NORTH (KM)	INITIAL SIGMAS Y (M)	INITIAL SIGMAS Z (M)
1	0.03000000	0.0	0.447	0.430	0.447	0.460	6.00	2.00
2	0.03000000	0.0	0.452	0.430	0.452	0.460	6.00	2.00
3	0.03000000	0.0	0.448	0.462	0.478	0.492	6.00	2.00
4	0.03000000	0.0	0.452	0.458	0.482	0.488	6.00	2.00
5	0.03000000	0.0	0.480	0.492	1.500	0.492	6.00	2.00
6	0.03000000	0.0	0.480	0.488	1.500	0.398	6.00	2.00

Plant No. 3 (cont.)

Uncontrolled

** M E T E O R O L O G Y * * *

NO.	THETA(DEG)	U (M/SEC)	KST	HL (M)	T (DEG-K)
1.	270.	3.1	4	300.	297.

** C O N C E N T R A T I O N S A T R E C E P T O R S * * *

CONCENTRATIONS IN GRAMS PER CUBIC METER

HOUR	RECEPTOR NO.	RECEPTOR COORDINATES EAST	NORTH	HEIGHT	FROM POINTS	FROM AREAS	FROM HORIZONAL LINES	FROM CURVED PATHS	FROM SPECIAL LINES	FROM SPECIAL PATHS	TOTAL
1	1	2.400	0.600	1.50	5.44E-04	4.57E-05	4.50E-04	0.0	0.0	0.0	1.04E-03
1	2	2.400	0.500	1.50	1.23E-03	8.18E-05	1.31E-03	0.0	0.0	0.0	2.62E-03
1	3	2.400	0.400	1.50	1.57E-03	8.34E-05	1.65E-03	0.0	0.0	0.0	3.30E-03
1	4	2.400	0.300	1.50	1.12E-03	4.85E-05	6.01E-04	0.0	0.0	0.0	1.77E-03
1	5	2.400	0.200	1.50	4.60E-04	1.60E-05	7.22E-05	0.0	0.0	0.0	5.48E-04
1	6	2.400	0.100	1.50	1.09E-04	3.53E-06	5.07E-06	0.0	0.0	0.0	1.17E-04
1	7	2.400	0.700	1.50	1.33E-04	1.45E-05	9.48E-05	0.0	0.0	0.0	2.42E-04
1	8	2.300	0.750	1.50	4.13E-05	5.53E-06	2.94E-05	0.0	0.0	0.0	7.62E-05
1	9	2.300	0.650	1.50	2.67E-04	2.67E-05	2.01E-04	0.0	0.0	0.0	4.94E-04
1	10	2.300	0.550	1.50	9.02E-04	6.89E-05	8.39E-04	0.0	0.0	0.0	1.81E-03
1	11	2.300	0.450	1.50	1.61E-03	9.56E-05	1.89E-03	0.0	0.0	0.0	3.59E-03
1	12	2.300	0.350	1.50	1.52E-03	7.17E-05	1.25E-03	0.0	0.0	0.0	2.85E-03
1	13	2.300	0.250	1.50	7.79E-04	2.93E-05	1.94E-04	0.0	0.0	0.0	1.00E-03
1	14	2.300	0.150	1.50	2.18E-04	6.54E-06	1.35E-05	0.0	0.0	0.0	2.38E-04
1	15	2.600	0.600	1.50	5.54E-04	4.38E-05	4.69E-04	0.0	0.0	0.0	1.07E-03
1	16	2.600	0.500	1.50	1.11E-03	7.19E-05	1.14E-03	0.0	0.0	0.0	2.32E-03
1	17	2.600	0.400	1.50	1.36E-03	7.31E-05	1.35E-03	0.0	0.0	0.0	2.78E-03
1	18	2.600	0.300	1.50	1.03E-03	4.60E-05	6.16E-04	0.0	0.0	0.0	1.69E-03
1	19	2.600	0.200	1.50	4.80E-04	1.80E-05	1.13E-04	0.0	0.0	0.0	6.12E-04
1	20	2.600	0.100	1.50	1.40E-04	4.04E-06	1.13E-05	0.0	0.0	0.0	1.56E-04
1	21	2.800	0.600	1.50	5.52E-04	4.16E-05	4.75E-04	0.0	0.0	0.0	1.07E-03
1	22	2.800	0.400	1.50	1.19E-03	6.46E-05	1.13E-03	0.0	0.0	0.0	2.39E-03
1	23	2.800	0.200	1.50	4.88E-04	1.94E-05	1.53E-04	0.0	0.0	0.0	6.60E-04
1	24	0.300	0.550	1.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	25	0.350	0.550	1.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	26	0.400	0.550	1.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	27	0.450	0.550	1.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	28	0.500	0.550	1.50	0.0	0.0	5.16E-16	0.0	0.0	0.0	5.16E-16
1	29	0.500	0.650	1.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Plant No. 3

Controlled

HEIGHT AT WIND SPEED 5.0 METERS DEPOSITION VEOCITY 0.01000 M/S

*** P O I N T S O U R C E S ***

NO.	POINT SOURCE STRENGTH (G/SEC)	PHYSICAL HEIGHT (METERS)	STACK TEMP (DEG-K)	STACK GAS VELOCITY (M/SEC)	STACK DIAMETER (METERS)	VOLUME FLOW (CU M/SEC)	COORDINATES EAST (KM)	COORDINATES NORTH (KM)	INITIAL SIGMAS Y (M)	INITIAL SIGMAS Z (M)
1	1.25	3.0	297.0	0.0	0.0	0.0	0.420	0.430	2.0	0.7
2	1.25	2.0	297.0	0.0	0.0	0.0	0.400	0.420	2.0	0.7
3	1.25	2.0	297.0	0.0	0.0	0.0	0.400	0.420	1.0	2.0
4	0.70	2.0	297.0	0.0	0.0	0.0	0.320	0.380	1.0	0.7
5	0.70	2.0	297.0	0.0	0.0	0.0	0.330	0.370	1.0	2.0
6	0.28	25.0	297.0	0.0	0.0	0.0	0.330	0.365	1.0	0.7
7	0.09	2.0	297.0	0.0	0.0	0.0	0.340	0.335	2.0	2.0

*** A R E A S O U R C E S ***

NO.	AREA SOURCE STRENGTH (G/SEC-M**2)	AREA SOURCE HEIGHT (METERS)	COORDINATES SW-CORNER EAST (KM)	COORDINATES SW-CORNER NORTH (KM)	AREA SIZE EAST-WEST (KM)	AREA SIZE NORTH-SOUTH (KM)
1	0.00006000	6.0	0.380	0.460	0.040	0.040
2	0.00030000	6.0	0.340	0.410	0.020	0.025

*** H O R I Z O N T A L L I N E S O U R C E S ***

NO.	LINE SOURCE STRENGTH (G/SEC-M)	LINE SOURCE HEIGHT (METERS)	COORDINATES POINT A EAST (KM)	COORDINATES POINT A NORTH (KM)	COORDINATES POINT B EAST (KM)	COORDINATES POINT B NORTH (KM)	INITIAL SIGMAS Y (M)	INITIAL SIGMAS Z (M)
1	0.02000000	0.0	0.447	0.430	0.447	0.460	6.00	2.00
2	0.02000000	0.0	0.452	0.430	0.452	0.460	6.00	2.00
3	0.02000000	0.0	0.448	0.462	0.478	0.492	6.00	2.00
4	0.02000000	0.0	0.452	0.458	0.482	0.488	6.00	2.00
5	0.02000000	0.0	0.480	0.492	1.500	0.402	6.00	2.00
6	0.02000000	0.0	0.480	0.488	1.500	0.398	6.00	2.00

Plant No. 3 (cont.)

Controlled

* * M E T E O R O L O G Y * * *

NO.	THETA (DEG)	U (M/SEC)	KST	HL (M)	T (DEG-K)
1.	270.	3.1	4	300.	297.

* * C O N C E N T R A T I O N S   A T   R E C E P T O R S * * *

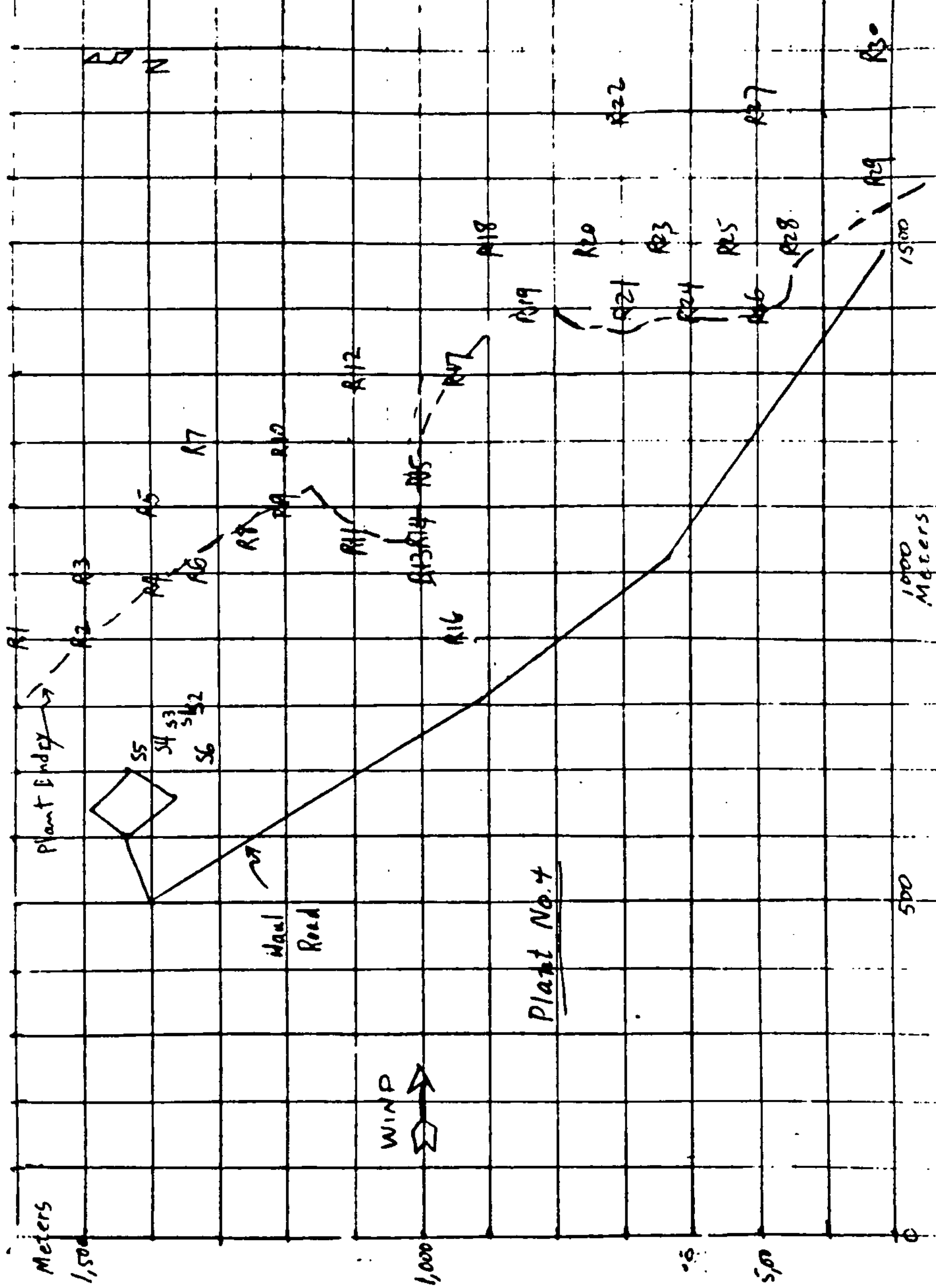
CONCENTRATIONS IN GRAMS PER CUBIC METER

HOUR	RECEPTOR NO.	RECEPTOR COORDINATES EAST	NORTH	HEIGHT	FROM POINTS	FROM AREAS	FROM HORIZONTAL LINES	FROM CURVED PATHS	FROM SPECIAL LINES	FROM SPECIAL PATHS	TOTAL
1	1	2.400	0.600	1.50	2.92E-05	1.89E-06	3.00E-05	0.0	0.0	0.0	6.11E-05
1	2	2.400	0.500	1.50	6.61E-05	3.40E-06	8.72E-05	0.0	0.0	0.0	1.57E-04
1	3	2.400	0.400	1.50	8.39E-05	3.48E-06	1.10E-04	0.0	0.0	0.0	1.97E-04
1	4	2.400	0.300	1.50	6.01E-05	2.04E-06	4.00E-05	0.0	0.0	0.0	1.02E-04
1	5	2.400	0.200	1.50	2.46E-05	6.76E-07	4.81E-06	0.0	0.0	0.0	3.01E-05
1	6	2.400	0.100	1.50	5.81E-06	1.50E-07	3.38E-07	0.0	0.0	0.0	6.30E-06
1	7	2.400	0.700	1.50	7.14E-06	5.95E-07	6.32E-06	0.0	0.0	0.0	1.41E-05
1	8	2.300	0.750	1.50	2.22E-06	2.26E-07	1.96E-06	0.0	0.0	0.0	4.40E-06
1	9	2.300	0.650	1.50	1.43E-05	1.10E-06	1.34E-05	0.0	0.0	0.0	2.88E-05
1	10	2.300	0.550	1.50	4.83E-05	2.85E-06	5.59E-05	0.0	0.0	0.0	1.07E-04
1	11	2.300	0.450	1.50	8.60E-05	3.99E-06	1.26E-04	0.0	0.0	0.0	2.16E-04
1	12	2.300	0.350	1.50	8.15E-05	3.01E-06	8.34E-05	0.0	0.0	0.0	1.68E-04
1	13	2.300	0.250	1.50	4.16E-05	1.24E-06	1.29E-05	0.0	0.0	0.0	5.58E-05
1	14	2.300	0.150	1.50	1.16E-05	2.77E-07	8.99E-07	0.0	0.0	0.0	1.28E-05
1	15	2.600	0.600	1.50	2.97E-05	1.81E-06	3.13E-05	0.0	0.0	0.0	6.28E-05
1	16	2.600	0.500	1.50	5.95E-05	2.99E-06	7.61E-05	0.0	0.0	0.0	1.39E-04
1	17	2.600	0.400	1.50	7.28E-05	3.05E-06	8.99E-05	0.0	0.0	0.0	1.66E-04
1	18	2.600	0.300	1.50	5.49E-05	1.93E-06	4.11E-05	0.0	0.0	0.0	9.79E-05
1	19	2.600	0.200	1.50	2.57E-05	7.58E-07	7.55E-06	0.0	0.0	0.0	3.40E-05
1	20	2.600	0.100	1.50	7.51E-06	1.71E-07	7.55E-07	0.0	0.0	0.0	8.43E-06
1	21	2.800	0.600	1.50	2.96E-05	1.72E-06	3.16E-05	0.0	0.0	0.0	6.30E-05
1	22	2.800	0.400	1.50	6.40E-05	2.70E-06	7.53E-05	0.0	0.0	0.0	1.42E-04
1	23	2.800	0.200	1.50	2.61E-05	8.17E-07	1.02E-05	0.0	0.0	0.0	3.71E-05
1	24	0.300	0.550	1.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	25	0.350	0.550	1.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	26	0.400	0.550	1.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	27	0.450	0.550	1.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	28	0.500	0.550	1.50	0.0	0.0	3.44E-17	0.0	0.0	0.0	3.44E-17
1	29	0.500	0.650	1.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Plant No. 4
Days/yr 220 Hr/da 16

Source No.	Source Type	Throughput T/hr	Emission Factor Kg/MT Dry	Emission Factor Kg/MT Wet	Dry Emission Rate MT/yr	Dry Emission Rate T/yr	Wet Emission Rate MT/yr	Wet Emission Rate T/yr
1	Screen	300	0.180	0.0082	172	190	7.86	8.66
4		75			43	48	1.97	2.16
				Total	215	238	9.83	10.82
2	Crusher	100	0.129	0.0127	41.2	45.4	4.06	4.47
3		35			14.4	15.9	1.42	1.56
5		75			30.9	34.1	3.04	3.35
				Total	86.5	95.4	8.52	9.38
6	Surge Pile	350	0.064	0.0027	71.6	78.8	3.02	3.33
7	Haul Road (780m)	15 trucks/hr	14.6*	1.00*	601	662	41.2	45.4
			Plant Total		974	1074	62.6	68.9

* g/veh-m


N
WIND
Plant Entry
Haul Road
Plant No. 4
Meters
1,500
1,000
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500
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R1
R2
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R22
R23
R24
R25
R26
R27
R28
R29
R30
S2
S3
S4
S5
S6

Plant No. 4

Uncontrolled

HEIGHT AT WIND SPEED 5.0 METERS DEPOSITION VELOCITY 0.01000 M/S

*** POINT SOURCES ***

NO.	POINT SOURCE STRENGTH (G/SEC)	PHYSICAL HEIGHT (METERS)	STACK TEMP (DEG-K)	STACK GAS VELOCITY (M/SEC)	STACK DIAMETER (METERS)	VOLUME FLOW (CU M/SEC)	COORDINATES EAST (KM)	COORDINATES NORTH (KM)	INITIAL SIGMAS Y (M)	INITIAL SIGMAS Z (M)
1	15.00	8.0	297.0	0.0	0.0	0.0	0.780	1.330	1.0	0.7
2	5.60	4.0	297.0	0.0	0.0	0.0	0.790	1.330	1.0	2.0
3	2.00	3.0	297.0	0.0	0.0	0.0	0.780	1.340	1.0	2.0
4	3.75	3.0	297.0	0.0	0.0	0.0	0.740	1.380	1.0	0.7
5	4.20	3.5	297.0	0.0	0.0	0.0	0.730	1.410	1.0	2.0

*** AREA SOURCES ***

NO.	AREA SOURCE STRENGTH (G/SEC-M**2)	AREA SOURCE HEIGHT (METERS)	COORDINATES SW-CORNER EAST (KM)	COORDINATES SW-CORNER NORTH (KM)	AREA SIZE EAST-WEST (KM)	AREA SIZE NORTH-SOUTH (KM)
1	0.01150000	6.0	0.720	1.320	0.020	0.025

*** HORIZONTAL LINE SOURCES ***

NO.	LINE SOURCE STRENGTH (G/SEC-M)	LINE SOURCE HEIGHT (METERS)	COORDINATES POINT A EAST (KM)	COORDINATES POINT A NORTH (KM)	COORDINATES POINT B EAST (KM)	COORDINATES POINT B NORTH (KM)	INITIAL SIGMAS Y (M)	INITIAL SIGMAS Z (M)
1	0.06000000	0.0	0.700	1.430	0.660	1.360	6.00	2.00
2	0.06000000	0.0	0.660	1.360	0.600	1.430	6.00	2.00
3	0.06000000	0.0	0.600	1.430	0.640	1.490	6.00	2.00
4	0.06000000	0.0	0.601	1.428	0.511	1.408	6.00	2.00
5	0.06000000	0.0	0.599	1.432	0.509	1.412	6.00	2.00
6	0.06000000	0.0	0.512	1.411	0.812	0.911	6.00	2.00
7	0.06000000	0.0	0.508	1.409	0.808	0.909	6.00	2.00
8	0.06000000	0.0	0.812	0.912	1.142	0.632	6.00	2.00
9	0.06000000	0.0	0.808	0.908	1.138	0.628	6.00	2.00
10	0.06000000	0.0	1.142	0.632	1.482	0.322	6.00	2.00
11	0.06000000	0.0	1.138	0.628	1.478	0.318	6.00	2.00

Plant No. 4 (cont.)

Uncontrolled

M E T E O R O L O G Y*

NO.	THETA(DEG)	U (M/SEC)	KST	HL (M)	T (DEG-K)
1.	270.	3.1	4	303.	297.

C O N C E N T R A T I O N S   A T   R E C E P T O R S*

CONCENTRATIONS IN GRAMS PER CUBIC METER

HOUR	RECEPTOR NO.	RECEPTOR COORDINATES EAST	NORTH	HEIGHT	FROM POINTS	FROM AREAS	FROM HORIZONAL LINES	FROM CURVED PATHS	FROM SPECIAL LINES	FROM SPECIAL PATHS	TOTAL
1	1	0.900	1.600	1.50	0.0	0.0	9.87E-09	0.0	0.0	0.0	9.87E-09
1	2	0.900	1.500	1.50	5.65E-12	0.0	6.33E-04	0.0	0.0	0.0	6.33E-04
1	3	1.000	1.500	1.50	2.06E-07	0.0	6.71E-04	0.0	0.0	0.0	6.71E-04
1	4	0.970	1.400	1.50	2.80E-03	7.24E-06	5.09E-03	0.0	0.0	0.0	7.90E-03
1	5	1.100	1.400	1.50	1.78E-03	7.98E-05	3.65E-03	0.0	0.0	0.0	5.52E-03
1	6	1.000	1.320	1.50	8.95E-03	1.83E-03	2.33E-03	0.0	0.0	0.0	1.31E-02
1	7	1.200	1.320	1.50	4.14E-03	8.67E-04	1.94E-03	0.0	0.0	0.0	6.94E-03
1	8	1.050	1.250	1.50	5.66E-06	7.57E-06	2.02E-03	0.0	0.0	0.0	2.04E-03
1	9	1.100	1.200	1.50	4.93E-09	0.0	1.96E-03	0.0	0.0	0.0	1.96E-03
1	10	1.200	1.200	1.50	7.33E-07	6.83E-07	1.69E-03	0.0	0.0	0.0	1.69E-03
1	11	1.050	1.100	1.50	0.0	0.0	2.39E-03	0.0	0.0	0.0	2.39E-03
1	12	1.300	1.100	1.50	3.20E-11	0.0	1.60E-03	0.0	0.0	0.0	1.60E-03
1	13	1.000	1.000	1.50	0.0	0.0	3.12E-03	0.0	0.0	0.0	3.12E-03
1	14	1.050	1.000	1.50	0.0	0.0	2.73E-03	0.0	0.0	0.0	2.73E-03
1	15	1.150	1.000	1.50	0.0	0.0	2.21E-03	0.0	0.0	0.0	2.21E-03
1	16	0.900	0.950	1.50	0.0	0.0	5.27E-03	0.0	0.0	0.0	5.27E-03
1	17	1.300	0.950	1.50	6.04E-25	0.0	1.90E-03	0.0	0.0	0.0	1.90E-03
1	18	1.500	0.900	1.50	6.32E-19	0.0	1.74E-03	0.0	0.0	0.0	1.74E-03
1	19	1.400	0.850	1.50	0.0	0.0	2.32E-03	0.0	0.0	0.0	2.32E-03
1	20	1.500	0.750	1.50	0.0	0.0	2.45E-03	0.0	0.0	0.0	2.45E-03
1	21	1.400	0.700	1.50	0.0	0.0	3.24E-03	0.0	0.0	0.0	3.24E-03
1	22	1.700	0.700	1.50	6.08E-25	0.0	2.02E-03	0.0	0.0	0.0	2.02E-03
1	23	1.500	0.650	1.50	0.0	0.0	2.96E-03	0.0	0.0	0.0	2.96E-03
1	24	1.400	0.600	1.50	0.0	0.0	4.21E-03	0.0	0.0	0.0	4.21E-03
1	25	1.500	0.550	1.50	0.0	0.0	3.67E-03	0.0	0.0	0.0	3.67E-03
1	26	1.400	0.500	1.50	0.0	0.0	6.57E-03	0.0	0.0	0.0	6.57E-03
1	27	1.700	0.500	1.50	0.0	0.0	2.69E-03	0.0	0.0	0.0	2.69E-03
1	28	1.500	0.450	1.50	0.0	0.0	5.31E-03	0.0	0.0	0.0	5.31E-03
1	29	1.600	0.320	1.50	0.0	0.0	3.22E-03	0.0	0.0	0.0	3.22E-03
1	30	1.700	0.320	1.50	0.0	0.0	2.15E-03	0.0	0.0	0.0	2.15E-03

Plant No. 4

Controlled

HEIGHT AT WIND SPEED 5.0 METERS DEPOSITION VELOCITY 0.01000 M/S

POINT SOURCES

NO.	POINT SOURCE STRENGTH (G/SEC)	PHYSICAL HEIGHT (METERS)	STACK TEMP (DEG-K)	STACK GAS VELOCITY (M/SEC)	STACK DIAMETER (METERS)	VOLUME FLOW (CU M/SEC)	COORDINATES EAST (KM)	COORDINATES NORTH (KM)	INITIAL SIGMAS Y (M)	INITIAL SIGMAS Z (M)
1	0.82	8.0	297.0	0.0	0.0	0.0	0.780	1.330	1.0	0.7
2	0.28	4.0	297.0	0.0	0.0	0.0	0.790	1.330	1.0	2.0
3	0.10	3.0	297.0	0.0	0.0	0.0	0.780	1.340	1.0	2.0
4	0.20	3.0	297.0	0.0	0.0	0.0	0.740	1.380	1.0	0.7
5	0.21	3.5	297.0	0.0	0.0	0.0	0.730	1.410	1.0	2.0

AREA SOURCES*

NO.	AREA SOURCE STRENGTH (G/SEC-M**2)	AREA SOURCE HEIGHT (METERS)	COORDINATES SW-CORNER EAST (KM)	COORDINATES SW-CORNER NORTH (KM)	AREA SIZE EAST-WEST (KM)	AREA SIZE NORTH-SOUTH (KM)
1	0.00050000	6.0	0.720	1.320	0.020	0.025

HORIZONTAL LINE SOURCES*

NO.	LINE SOURCE STRENGTH (G/SEC-M)	LINE SOURCE HEIGHT (METERS)	COORDINATES POINT A EAST (KM)	COORDINATES POINT A NORTH (KM)	COORDINATES POINT B EAST (KM)	COORDINATES POINT B NORTH (KM)	INITIAL SIGMAS Y (M)	INITIAL SIGMAS Z (M)
1	0.00400000	0.0	0.700	1.430	0.660	1.360	6.00	2.00
2	0.00400000	0.0	0.660	1.360	0.600	1.430	6.00	2.00
3	0.00400000	0.0	0.600	1.430	0.640	1.490	6.00	2.00
4	0.00400000	0.0	0.601	1.428	0.511	1.408	6.00	2.00
5	0.00400000	0.0	0.599	1.432	0.509	1.412	6.00	2.00
6	0.00400000	0.0	0.512	1.411	0.812	0.911	6.00	2.00
7	0.00400000	0.0	0.508	1.409	0.808	0.909	6.00	2.00
8	0.00400000	0.0	0.812	0.912	1.142	0.632	6.00	2.00
9	0.00400000	0.0	0.808	0.908	1.138	0.628	6.00	2.00
10	0.00400000	0.0	1.142	0.632	1.482	0.322	6.00	2.00
11	0.00400000	0.0	1.138	0.628	1.478	0.318	6.00	2.00

Controlled

* * M E T E O R O L O G Y * * *

NO.	THETA(DEG)	U (M/SEC)	KST	HL (M)	T (DEG-K)
1.	270.	3.1	4	330.	297.

* * C O N C E N T R A T I O N S A T R E C E P T O R S * * *

CONCENTRATIONS IN GRAMS PER CUBIC METER

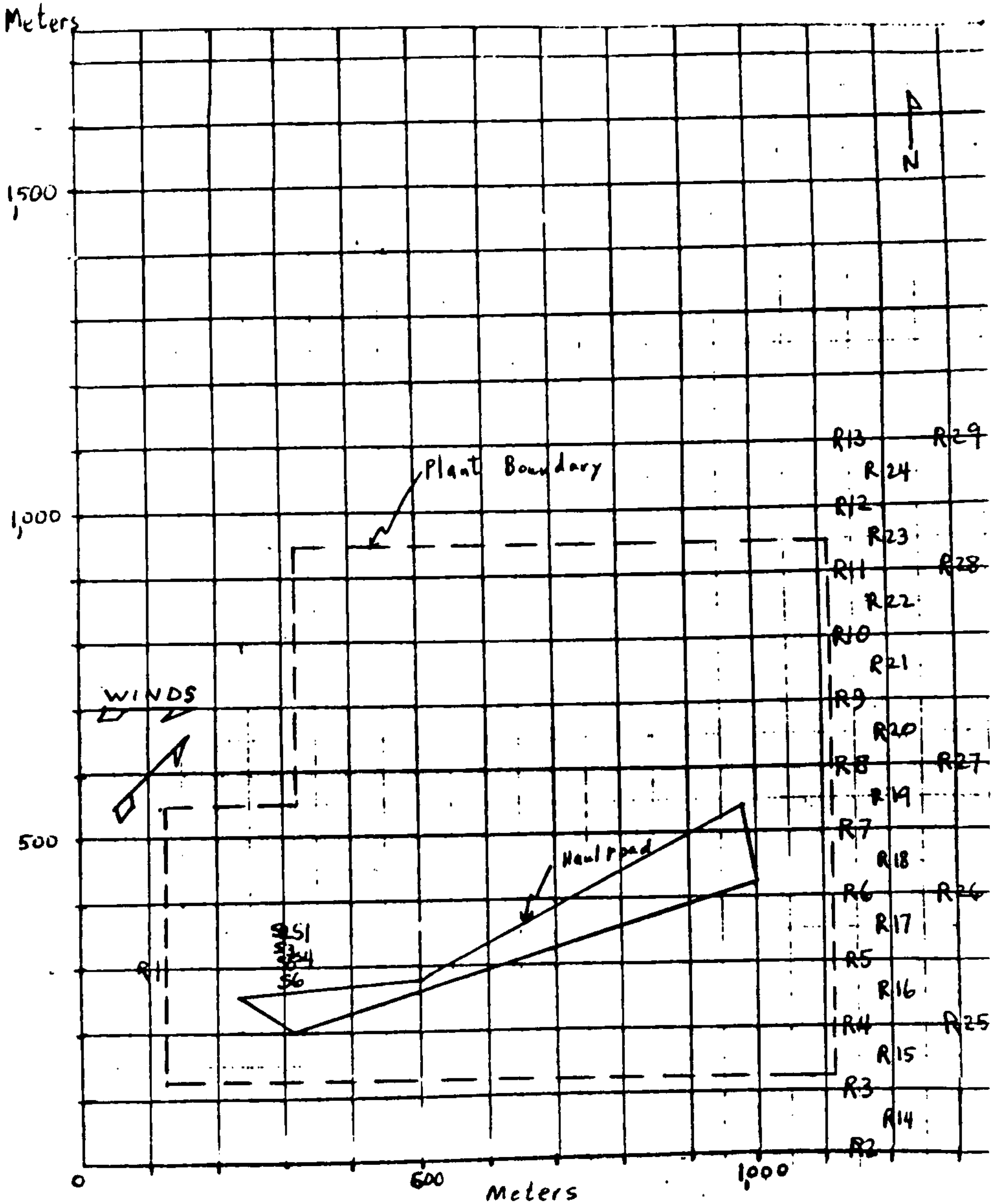
HOUR	RECEPTOR NO.	RECEPTOR COORDINATES EAST	NORTH	HEIGHT	FROM POINTS	FROM AREAS	FROM HORIZONAL LINES	FROM CURVED PATHS	FROM SPECIAL LINES	FROM SPECIAL PATHS	TOTAL
1	1	0.900	1.600	1.50	0.0	0.0	6.58E-10	0.0	0.0	0.0	6.58E-10
1	2	0.900	1.500	1.50	2.83E-13	0.0	4.22E-05	0.0	0.0	0.0	4.22E-05
1	3	1.000	1.500	1.50	1.03E-08	0.0	4.47E-05	0.0	0.0	0.0	4.47E-05
1	4	0.970	1.400	1.50	1.44E-04	3.15E-07	3.40E-04	0.0	0.0	0.0	4.83E-04
1	5	1.100	1.400	1.50	9.19E-05	3.47E-06	2.44E-04	0.0	0.0	0.0	3.39E-04
1	6	1.000	1.320	1.50	4.75E-04	7.97E-05	1.55E-04	0.0	0.0	0.0	7.09E-04
1	7	1.200	1.320	1.50	2.20E-04	3.77E-05	1.29E-04	0.0	0.0	0.0	3.86E-04
1	8	1.050	1.250	1.50	3.03E-07	3.29E-07	1.35E-04	0.0	0.0	0.0	1.35E-04
1	9	1.100	1.200	1.50	2.66E-10	0.0	1.30E-04	0.0	0.0	0.0	1.30E-04
1	10	1.200	1.200	1.50	3.92E-08	2.97E-08	1.13E-04	0.0	0.0	0.0	1.13E-04
1	11	1.050	1.100	1.50	0.0	0.0	1.59E-04	0.0	0.0	0.0	1.59E-04
1	12	1.300	1.100	1.50	1.72E-12	0.0	1.07E-04	0.0	0.0	0.0	1.07E-04
1	13	1.300	1.000	1.50	0.0	0.0	2.08E-04	0.0	0.0	0.0	2.08E-04
1	14	1.050	1.000	1.50	0.0	0.0	1.82E-04	0.0	0.0	0.0	1.82E-04
1	15	1.150	1.000	1.50	0.0	0.0	1.47E-04	0.0	0.0	0.0	1.47E-04
1	16	0.900	0.950	1.50	0.0	0.0	3.51E-04	0.0	0.0	0.0	3.51E-04
1	17	1.300	0.950	1.50	3.30E-26	0.0	1.27E-04	0.0	0.0	0.0	1.27E-04
1	18	1.500	0.900	1.50	3.41E-20	0.0	1.16E-04	0.0	0.0	0.0	1.16E-04
1	19	1.400	0.850	1.50	0.0	0.0	1.54E-04	0.0	0.0	0.0	1.54E-04
1	20	1.500	0.750	1.50	0.0	0.0	1.63E-04	0.0	0.0	0.0	1.63E-04
1	21	1.400	0.700	1.50	0.0	0.0	2.16E-04	0.0	0.0	0.0	2.16E-04
1	22	1.700	0.700	1.50	3.29E-26	0.0	1.35E-04	0.0	0.0	0.0	1.35E-04
1	23	1.500	0.650	1.50	0.0	0.0	1.97E-04	0.0	0.0	0.0	1.97E-04
1	24	1.400	0.600	1.50	0.0	0.0	2.81E-04	0.0	0.0	0.0	2.81E-04
1	25	1.500	0.550	1.50	0.0	0.0	2.45E-04	0.0	0.0	0.0	2.45E-04
1	26	1.400	0.500	1.50	0.0	0.0	4.38E-04	0.0	0.0	0.0	4.38E-04
1	27	1.700	0.500	1.50	0.0	0.0	1.80E-04	0.0	0.0	0.0	1.80E-04
1	28	1.500	0.450	1.50	0.0	0.0	3.54E-04	0.0	0.0	0.0	3.54E-04
1	29	1.600	0.320	1.50	0.0	0.0	2.15E-04	0.0	0.0	0.0	2.15E-04
1	30	1.700	0.320	1.50	0.0	0.0	1.43E-04	0.0	0.0	0.0	1.43E-04

Plant No. 5

Days/yr 220 Hr/da 8

Source No.	Source Type	Throughput, T/hr	Emission Factor, Kg/MT Dry	Wet	Dry Emission Rate MT/yr	T/yr	Wet Emission Rate MT/yr	T/yr
1	Screen	400	0.180	0.0082	115	127	5.24	5.77
4		140			40	44	1.83	2.02
				Total	155	171	7.07	7.79
2	Crusher	70	0.129	0.0127	14.4	15.9	1.42	1.57
3		70			14.4	15.9	1.42	1.57
5		50			10.3	11.4	1.01	1.12
				Total	39.1	43.2	3.85	4.26
6	Surge Pile	400	0.064	0.0027	40.9	45.1	1.73	1.90
7	Haul Road (800m)	15 trucks/hr	14.6*	1.00*	308	340	21.1	23.3
			Plant Total		543	599	33.8	37.2

PLANT No. 5


Meters
1500
1,000
500
0
1,000
Meters
N
Plant Boundary
Haul Road
WINDS
R1
R2
R3
R4
R5
R6
R7
R8
R9
R10
R11
R12
R13
R14
R15
R16
R17
R18
R19
R20
R21
R22
R23
R24
R25
R26
R27
R28
R29
S1
S6

Plant No. 5

Uncontrolled

HEIGHT AT WIND SPEED 5.0 METERS DEPOSITION VELOCITY 0.01000 M/S

*** P O I N T   S O U R C E S ***

NO.	POINT SOURCE STRENGTH (G/SEC)	PHYSICAL HEIGHT (METERS)	STACK TEMP (DEG-K)	STACK GAS VELOCITY (M/SEC)	STACK DIAMETER (METERS)	VOLUME FLOW (CU M/SEC)	COORDINATES EAST (KM)	COORDINATES NORTH (KM)	INITIAL SIGMAS Y (M)	INITIAL SIGMAS Z (M)
1	20.00	10.0	297.0	0.0	0.0	0.0	0.320	0.365	1.0	0.7
2	3.90	3.0	297.0	0.0	0.0	0.0	0.310	0.365	1.0	2.0
3	3.90	3.0	297.0	0.0	0.0	0.0	0.310	0.360	1.0	2.0
4	7.00	11.0	297.0	0.0	0.0	0.0	0.320	0.340	1.0	0.7
5	2.80	3.0	297.0	0.0	0.0	0.0	0.310	0.340	1.0	2.0

** A R E A   S O U R C E S ***

NO.	AREA SOURCE STRENGTH (G/SEC-M**2)	AREA SOURCE HEIGHT (METERS)	COORDINATES SW-CORNER EAST (KM)	COORDINATES SW-CORNER NORTH (KM)	AREA SIZE EAST-WEST (KM)	AREA SIZE NORTH-SOUTH (KM)
1	0.00700000	6.0	0.300	0.300	0.030	0.030

** H O R I Z O N T A L   L I N E   S O U R C E S ***

NO.	LINE SOURCE STRENGTH (G/SEC-M)	LINE SOURCE HEIGHT (METERS)	COORDINATES POINT A EAST (KM)	COORDINATES POINT A NORTH (KM)	COORDINATES POINT B EAST (KM)	COORDINATES POINT B NORTH (KM)	INITIAL SIGMAS Y (M)	INITIAL SIGMAS Z (M)
1	0.06000000	0.0	0.240	0.600	0.310	0.200	6.00	2.00
2	0.06000000	0.0	0.310	0.200	1.000	0.420	6.00	2.00
3	0.06000000	0.0	1.000	0.420	0.980	0.530	6.00	2.00
4	0.06000000	0.0	0.980	0.530	0.500	0.270	6.00	2.00
5	0.06000000	0.0	0.500	0.270	0.240	0.600	6.00	2.00

Plant No. 5 (cont.)

Uncontrolled

* * M E T E O R O L O G Y * * *

NO.	THETA(DEG)	U (M/SEC)	KST	HL (M)	T (DEG-K)
1.	270.	3.1	4	300.	297.

* * C O N C E N T R A T I O N S A T R E C E P T O R S * * *

CONCENTRATIONS IN GRAMS PER CUBIC METER

HOUR	RECEPTOR NO.	RECEPTOR COORDINATES EAST	NORTH	HEIGHT	FROM POINTS	FROM AREAS	FROM HORIZONTAL LINES	FROM CURVED PATHS	FROM SPECIAL LINES	FROM SPECIAL PATHS	TOTAL
1	1	0.100	0.300	1.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	2	1.150	0.0	1.50	3.12E-11	0.0	1.18E-06	0.0	0.0	0.0	1.18E-06
1	3	1.150	0.100	1.50	1.85E-07	4.59E-07	1.06E-04	0.0	0.0	0.0	1.07E-04
1	4	1.150	0.200	1.50	6.54E-05	5.66E-05	1.31E-03	0.0	0.0	0.0	1.43E-03
1	5	1.150	0.300	1.50	1.39E-03	3.78E-04	4.51E-03	0.0	0.0	0.0	6.28E-03
1	6	1.150	0.400	1.50	1.75E-03	1.36E-04	7.70E-03	0.0	0.0	0.0	9.58E-03
1	7	1.150	0.530	1.50	1.27E-04	2.69E-06	5.65E-03	0.0	0.0	0.0	5.77E-03
1	8	1.150	0.600	1.50	5.12E-07	0.0	5.74E-04	0.0	0.0	0.0	5.74E-04
1	9	1.150	0.700	1.50	1.13E-10	0.0	7.49E-05	0.0	0.0	0.0	7.49E-05
1	10	1.150	0.800	1.50	1.34E-15	0.0	1.52E-06	0.0	0.0	0.0	1.52E-06
1	11	1.150	0.900	1.50	8.69E-22	0.0	3.95E-09	0.0	0.0	0.0	3.95E-09
1	12	1.150	1.000	1.50	0.0	0.0	1.22E-12	0.0	0.0	0.0	1.22E-12
1	13	1.150	1.100	1.50	0.0	0.0	4.33E-17	0.0	0.0	0.0	4.33E-17
1	14	1.200	0.050	1.50	1.13E-08	0.0	1.94E-05	0.0	0.0	0.0	1.94E-05
1	15	1.200	0.150	1.50	8.11E-06	1.05E-05	4.68E-04	0.0	0.0	0.0	4.87E-04
1	16	1.200	0.250	1.50	4.58E-04	2.03E-04	2.63E-03	0.0	0.0	0.0	3.29E-03
1	17	1.200	0.350	1.50	2.03E-03	3.01E-04	5.56E-03	0.0	0.0	0.0	7.89E-03
1	18	1.200	0.450	1.50	6.91E-04	3.22E-05	5.22E-03	0.0	0.0	0.0	5.95E-03
1	19	1.200	0.550	1.50	1.77E-05	3.27E-07	1.75E-03	0.0	0.0	0.0	1.77E-03
1	20	1.200	0.650	1.50	3.32E-38	0.0	2.57E-04	0.0	0.0	0.0	2.58E-04
1	21	1.200	0.750	1.50	4.53E-12	0.0	1.70E-05	0.0	0.0	0.0	1.70E-05
1	22	1.200	0.850	1.50	4.47E-17	0.0	1.84E-07	0.0	0.0	0.0	1.84E-07
1	23	1.200	0.950	1.50	3.20E-23	0.0	2.97E-10	0.0	0.0	0.0	2.97E-10
1	24	1.200	1.050	1.50	0.0	0.0	6.75E-14	0.0	0.0	0.0	6.75E-14
1	25	1.300	0.200	1.50	1.22E-04	7.00E-05	1.22E-03	0.0	0.0	0.0	1.42E-03
1	26	1.300	0.400	1.50	1.43E-03	1.35E-04	5.42E-03	0.0	0.0	0.0	6.98E-03
1	27	1.300	0.600	1.50	3.32E-06	0.0	5.49E-04	0.0	0.0	0.0	5.53E-04
1	28	1.300	0.900	1.50	3.48E-17	0.0	3.97E-08	0.0	0.0	0.0	3.97E-08
1	29	1.300	1.100	1.50	0.0	0.0	2.55E-14	0.0	0.0	0.0	2.55E-14

Plant No. 5 (cont.)

Uncontrolled

* * M E T E O R O L O G Y * * *

NO.	THETA(DEG)	U (M/SEC)	KST	HL (M)	T (DEG-K)
1.	225.	3.1	4	300.	297.

* * C O N C E N T R A T I O N S   A T   R E C E P T O R S * * *

CONCENTRATIONS IN GRAMS PER CUBIC METER

HOUR	RECEPTOR NO.	RECEPTOR COORDINATES EAST	NORTH	HEIGHT	FROM POINTS	FROM AREAS	FROM HORIZONTAL LINES	FROM CURVED PATHS	FROM SPECIAL LINES	FROM SPECIAL PATHS	TOTAL
1	1	0.100	0.300	1.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	2	1.150	0.0	1.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	3	1.150	0.100	1.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	4	1.150	0.200	1.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	5	1.150	0.300	1.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	6	1.150	0.400	1.50	0.0	0.0	2.49E-17	0.0	0.0	0.0	2.49E-17
1	7	1.150	0.500	1.50	1.76E-23	0.0	2.57E-05	0.0	0.0	0.0	2.57E-05
1	8	1.150	0.600	1.50	7.63E-16	0.0	3.66E-03	0.0	0.0	0.0	3.66E-03
1	9	1.150	0.700	1.50	8.01E-11	0.0	4.96E-03	0.0	0.0	0.0	4.96E-03
1	10	1.150	0.800	1.50	1.51E-07	2.89E-07	3.75E-03	0.0	0.0	0.0	3.75E-03
1	11	1.150	0.900	1.50	1.74E-05	1.16E-05	2.32E-03	0.0	0.0	0.0	2.35E-03
1	12	1.150	1.000	1.50	2.72E-04	9.19E-05	1.47E-03	0.0	0.0	0.0	1.83E-03
1	13	1.200	1.100	1.50	1.01E-03	2.14E-04	1.11E-03	0.0	0.0	0.0	2.33E-03
1	14	1.200	0.050	1.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	15	1.200	0.150	1.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	16	1.200	0.250	1.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	17	1.200	0.350	1.50	0.0	0.0	5.09E-23	0.0	0.0	0.0	5.09E-23
1	18	1.200	0.450	1.50	0.0	0.0	6.21E-13	0.0	0.0	0.0	6.21E-13
1	19	1.200	0.550	1.50	2.06E-20	0.0	9.22E-05	0.0	0.0	0.0	9.22E-05
1	20	1.200	0.650	1.50	3.95E-14	0.0	2.90E-03	0.0	0.0	0.0	2.90E-03
1	21	1.200	0.750	1.50	6.72E-10	0.0	4.24E-03	0.0	0.0	0.0	4.24E-03
1	22	1.200	0.850	1.50	4.33E-07	4.79E-07	3.40E-03	0.0	0.0	0.0	3.40E-03
1	23	1.200	0.950	1.50	2.68E-05	1.45E-05	2.18E-03	0.0	0.0	0.0	2.27E-03
1	24	1.200	1.350	1.50	3.00E-04	9.33E-05	1.42E-03	0.0	0.0	0.0	1.81E-03
1	25	1.300	0.200	1.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	26	1.300	0.400	1.50	0.0	0.0	3.93E-21	0.0	0.0	0.0	3.93E-21
1	27	1.300	0.600	1.50	4.36E-19	0.0	1.23E-05	0.0	0.0	0.0	1.23E-05
1	28	1.300	0.900	1.50	2.27E-07	3.09E-07	3.25E-03	0.0	0.0	0.0	3.25E-03
1	29	1.300	1.100	1.50	1.50E-04	5.04E-05	1.60E-03	0.0	0.0	0.0	1.80E-03

Plant No. 5

Controlled

HEIGHT AT WIND SPEED 5.0 METERS   DEPOSITION VELOCITY 0.01000 M/S

*** POINT SOURCES ***

NO.	POINT SOURCE STRENGTH (G/SEC)	PHYSICAL HEIGHT (METERS)	STACK TEMP (DEG-K)	STACK GAS VELOCITY (M/SEC)	STACK DIAMETER (METERS)	VOLUME FLOW (CU M/SEC)	COORDINATES EAST (KM)	COORDINATES NORTH (KM)	INITIAL SIGMAS Y (M)	INITIAL SIGMAS Z (M)
1	1.11	10.0	297.0	0.0	0.0	0.0	0.320	0.365	1.0	0.7
2	0.20	3.0	297.0	0.0	0.0	0.0	0.310	0.365	1.0	2.0
3	0.20	3.0	297.0	0.0	0.0	0.0	0.310	0.360	1.0	2.0
4	0.39	11.0	297.0	0.0	0.0	0.0	0.320	0.340	1.0	0.7
5	0.14	3.0	297.0	0.0	0.0	0.0	0.310	0.340	1.0	2.0

*** AREA SOURCES ***

NO.	AREA SOURCE STRENGTH (G/SEC-M**2)	AREA SOURCE HEIGHT (METERS)	COORDINATES SW-CORNER EAST (KM)	COORDINATES SW-CORNER NORTH (KM)	AREA SIZE EAST-WEST (KM)	AREA SIZE NORTH-SOUTH (KM)
1	0.00030000	6.0	0.300	0.300	0.030	0.030

*** HORIZONTAL LINE SOURCES ***

NO.	LINE SOURCE STRENGTH (G/SEC-M)	LINE SOURCE HEIGHT (METERS)	COORDINATES POINT A EAST (KM)	COORDINATES POINT A NORTH (KM)	COORDINATES POINT B EAST (KM)	COORDINATES POINT B NORTH (KM)	INITIAL SIGMAS Y (M)	INITIAL SIGMAS Z (M)
1	0.00400000	0.0	0.240	0.600	0.310	0.200	6.00	2.00
2	0.00400000	0.0	0.310	0.200	1.000	0.420	6.00	2.00
3	0.00400000	0.0	1.000	0.420	0.980	0.530	6.00	2.00
4	0.00400000	0.0	0.980	0.530	0.500	0.270	6.00	2.00
5	0.00400000	0.0	0.500	0.270	0.240	0.600	6.00	2.00

Controlled

* * M E T E O R O L O G Y * * *

NO.	THETA(DEG)	U (M/SEC)	KST	HL (M)	T (DEG-K)
1.	270.	3.1	4	300.	297.

* * C O N C E N T R A T I O N S A T R E C E P T O R S * * *

CONCENTRATIONS IN GRAMS PER CUBIC METER

HOUR	RECEPTOR NO.	RECEPTOR COORDINATES EAST	NORTH	HEIGHT	FROM POINTS	FROM AREAS	FROM HORIZONTAL LINES	FROM CURVED PATHS	FROM SPECIAL LINES	FROM SPECIAL PATHS	TOTAL
1	1	0.100	0.300	1.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	2	1.150	0.0	1.50	1.68E-12	0.0	7.87E-08	0.0	0.0	0.0	7.87E-08
1	3	1.150	0.100	1.50	9.99E-09	1.97E-08	7.06E-06	0.0	0.0	0.0	7.09E-06
1	4	1.150	0.200	1.50	3.54E-06	2.42E-06	8.75E-05	0.0	0.0	0.0	9.35E-05
1	5	1.150	0.300	1.50	7.54E-05	1.62E-05	3.01E-04	0.0	0.0	0.0	3.92E-04
1	6	1.150	0.400	1.50	9.52E-05	5.82E-06	5.13E-04	0.0	0.0	0.0	6.14E-04
1	7	1.150	0.500	1.50	6.90E-06	1.15E-07	3.76E-04	0.0	0.0	0.0	3.83E-04
1	8	1.150	0.600	1.50	2.78E-08	0.0	3.82E-05	0.0	0.0	0.0	3.83E-05
1	9	1.150	0.700	1.50	6.11E-12	0.0	4.99E-06	0.0	0.0	0.0	4.99E-06
1	10	1.150	0.800	1.50	7.26E-17	0.0	1.01E-07	0.0	0.0	0.0	1.01E-07
1	11	1.150	0.900	1.50	4.67E-23	0.0	2.64E-10	0.0	0.0	0.0	2.64E-10
1	12	1.150	1.000	1.50	0.0	0.0	8.16E-14	0.0	0.0	0.0	8.16E-14
1	13	1.150	1.100	1.50	0.0	0.0	2.89E-18	0.0	0.0	0.0	2.89E-18
1	14	1.200	0.050	1.50	6.09E-10	0.0	1.29E-06	0.0	0.0	0.0	1.29E-06
1	15	1.200	0.150	1.50	4.38E-07	4.52E-07	3.12E-05	0.0	0.0	0.0	3.21E-05
1	16	1.200	0.250	1.50	2.48E-05	8.71E-06	1.75E-04	0.0	0.0	0.0	2.09E-04
1	17	1.200	0.350	1.50	1.10E-04	1.29E-05	3.71E-04	0.0	0.0	0.0	4.94E-04
1	18	1.200	0.450	1.50	3.75E-05	1.38E-06	3.48E-04	0.0	0.0	0.0	3.87E-04
1	19	1.200	0.550	1.50	9.60E-07	1.40E-08	1.17E-04	0.0	0.0	0.0	1.18E-04
1	20	1.200	0.650	1.50	1.80E-09	0.0	1.72E-05	0.0	0.0	0.0	1.72E-05
1	21	1.200	0.750	1.50	2.45E-13	0.0	1.13E-06	0.0	0.0	0.0	1.13E-06
1	22	1.200	0.850	1.50	2.41E-18	0.0	1.23E-08	0.0	0.0	0.0	1.23E-08
1	23	1.200	0.950	1.50	1.72E-24	0.0	1.98E-11	0.0	0.0	0.0	1.98E-11
1	24	1.200	1.050	1.50	0.0	0.0	4.50E-15	0.0	0.0	0.0	4.50E-15
1	25	1.300	0.200	1.50	6.58E-06	3.00E-06	8.16E-05	0.0	0.0	0.0	9.11E-05
1	26	1.300	0.400	1.50	7.76E-05	5.79E-06	3.61E-04	0.0	0.0	0.0	4.44E-04
1	27	1.300	0.600	1.50	1.80E-07	0.0	3.66E-05	0.0	0.0	0.0	3.68E-05
1	28	1.300	0.900	1.50	1.88E-18	0.0	2.65E-09	0.0	0.0	0.0	2.65E-09
1	29	1.300	1.100	1.50	0.0	0.0	1.70E-15	0.0	0.0	0.0	1.70E-15

Controlled

* * M E T E O R O L O G Y * * *

NO.	THETA (DEG)	U (M/SEC)	KST	HL (M)	T (DEG-K)
1.	225.	3.1	4	300.	297.

* * C O N C E N T R A T I O N S   A T   R E C E P T O R S * * *

CONCENTRATIONS IN GRAMS PER CUBIC METER

HOUR	RECEPTOR NO.	RECEPTOR COORDINATES EAST	NORTH	HEIGHT	FROM POINTS	FROM AREAS	FROM HORIZONTAL LINES	FROM CURVED PATHS	FROM SPECIAL LINES	FROM SPECIAL PATHS	TOTAL
1	1	0.100	0.300	1.50	C.C	0.0	0.0	0.0	0.0	0.0	0.0
1	2	1.150	0.0	1.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	3	1.150	0.100	1.50	C.C	C.0	0.0	0.0	0.0	0.0	0.0
1	4	1.150	0.200	1.50	0.0	0.0	0.0	C.0	0.0	0.0	0.0
1	5	1.150	0.300	1.50	C.C	0.0	0.0	0.0	0.0	0.0	0.0
1	6	1.150	0.400	1.50	C.0	C.0	1.66E-18	0.0	0.0	0.0	1.66E-18
1	7	1.150	C.500	1.50	9.62E-25	0.0	1.71E-C6	0.0	0.0	0.0	1.71E-06
1	8	1.150	0.600	1.50	4.17E-17	0.0	2.44E-C4	C.0	0.0	0.0	2.44E-04
1	9	1.150	0.700	1.50	4.37E-12	0.0	3.31E-04	0.0	0.0	0.0	3.31E-04
1	10	1.150	0.800	1.50	8.24E-09	1.24E-08	2.50E-04	0.0	0.0	0.0	2.50E-04
1	11	1.150	0.900	1.50	9.46E-07	4.96E-07	1.55E-04	0.0	0.0	0.0	1.56E-04
1	12	1.150	1.000	1.50	1.48E-C5	3.94E-06	9.79E-05	0.0	0.0	0.0	1.17E-04
1	13	1.150	1.100	1.50	5.46E-05	9.16E-06	7.30E-C5	C.0	0.0	0.0	1.38E-04
1	14	1.200	0.050	1.50	C.0	0.0	0.0	0.0	0.0	0.0	0.0
1	15	1.200	0.150	1.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	16	1.200	C.250	1.50	C.0	0.0	0.0	0.0	0.0	0.0	0.0
1	17	1.200	0.350	1.50	C.C	0.0	3.40E-24	0.0	0.0	0.0	3.40E-24
1	18	1.200	0.450	1.50	C.0	0.0	4.14E-14	0.0	0.0	0.0	4.14E-14
1	19	1.200	C.550	1.50	1.13E-21	0.0	6.15E-C6	0.0	0.0	0.0	6.15E-06
1	20	1.200	C.650	1.50	2.15E-15	0.0	1.94E-04	0.0	0.0	0.0	1.94E-04
1	21	1.200	0.750	1.50	3.66E-11	0.0	2.83E-C4	C.0	0.C	0.0	2.83E-04
1	22	1.200	C.850	1.50	2.36E-08	2.05E-08	2.27E-04	0.0	0.0	0.0	2.27E-04
1	23	1.200	0.950	1.50	1.46E-06	6.23E-C7	1.45E-C4	C.0	0.0	0.0	1.47E-04
1	24	1.200	1.050	1.50	1.63E-05	4.00E-C6	9.46E-05	0.0	0.0	0.0	1.15E-04
1	25	1.300	0.200	1.50	C.C	0.0	0.0	C.C	0.0	0.0	0.0
1	26	1.300	C.400	1.50	C.0	0.0	2.62E-22	0.0	0.C	0.0	2.62E-22
1	27	1.300	C.600	1.50	2.38E-20	0.0	8.17E-C7	0.0	0.0	0.0	8.17E-07
1	28	1.300	0.900	1.50	1.23E-C8	1.33E-08	2.17E-04	0.0	0.C	0.0	2.17E-04
1	29	1.300	1.100	1.50	E.18E-C6	2.16E-06	1.07E-04	0.0	0.0	0.0	1.17E-04