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16. Abstract

Airborne particulate concentrations along Texas roadways were monitored at four sites in three cities. The instrumentation used for this study consisted of ten stacked filter units, eight flow controlled high volume air samplers, and four Lundgren impactors. Instruments were placed 150 ft. (45.7 m) upwind and at assorted distances up to 300 ft. (91.4 m) downwind of each roadway. The stacked filter units were spread from 5 to 90 ft. (1.5 to 27.4 m) above ground level. All other instrumentation was set at a five-foot elevation. Sampling times varied from 2 to 12 hours per sample. A total of approximately 40 hours of data were collected at each site in Dallas, San Antonio and El Paso. Traffic and meteorology data were taken by another project monitoring gaseous pollutants concurrently at the same sites. Total suspended particulates were determined by weighing all hivol filters before and after they were used. The TSP loadings on many of the stacked filter units were also determined. All filters were subjected to quantitative elemental analysis using one of two independent energy dispersive spectrometers. Many filters were examined using both systems. The results of the particulate collection project are presented herein.

This report and the experimental data on magnetic tape are available from the Texas State Department of Highways and Public Transportation and NTIS. They are also available at modest costs from Dr. Jerry A. Bullin, Chemical Engineering Department, Texas A&M University, College Station, Texas 77843, phone 713-845-3361.

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## FOREWORD

This report presents the results of a project entitled "Measurement and Analysis of Resuspended Dust from Roadways in Texas." Airborne particulate concentrations were monitored in Dallas, San Antonio and El Paso. The particulate collection equipment consisted of ten stacked filter units, eight high volume air samplers and four Lundgren impactors. Meteorological and traffic information were collected as a part of a gaseous dispersion from roadways project.

The experimental equipment and procedures are described in this report. The experimental data, including total suspended particulates and elemental analysis of the particulate filters, are also presented in this report. Comparisons are being made to gaseous pollutant data taken simultaneously with the particulate samples and to various mathematical models.

This report is being distributed to the National Technical Information Service, The Federal Highway Administration, The Texas State Department of Highways and Public Transportation and the general public upon request.

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## NOTICE

Acknowledgment

The authors would like to express their appreciation to the Texas State Department of Highways and Public Transportation for their assistance in site preparations for the project. Special thanks are extended to the Texas Air Control Board and Dr. Jim Payne who analyzed all of the particulate samples at no cost. We are particularly indebted to Dr. Tom Cahill at the University of California at Davis for his analytical help and technical advice.

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# Chapter I

## Introduction

In recent years, there has been increasing concern about the health effects of suspended particulate material in the air. The health effects are of course dependent upon the size classification of the particulates. Large particles (> 10 μm in diameter) are essentially all removed in the nasal chamber. Respiratory clearance mechanisms may remove these particles within hours. Smaller particles are deposited at varying depths in the respiratory system and may require much longer periods for removal from the respiratory system.

Vehicular traffic along roadways are one source of suspended particulates. These particulates come primarily from fuel, tire, brake and roadway wear, and exhaust train erosion. The particulates directly emitted by the vehicles become airborne immediately and then undergo a settling and dispersion process. Some of these particulates will settle on the roadway surface along with most of the materials which blow from open trucks. This deposited material is resuspended by passing vehicles until it eventually is carried from the roadway.

The process by which particulates are dispersed in the air is more complex than the gaseous dispersion process. First, some slippage occurs between the particles and the air flow, slowing the speed with which the particles are dispersed. Furthermore, coarse particles deposit on the ground by gravitational settling at rates dependent upon the particle sizes. Also, some particulates, such as bromine and sulfur, disappear because of chemical reactions in the atmosphere. However, if the particles are nonreactive and are sufficiently fine, they behave essentially as gases.

The current project entitled "The Measurement and Analysis of Resuspended Dust from Roadways in Texas" was undertaken in order to collect data on aerosols generated by vehicular traffic which contributed to the total aerosol load near roadways. At the present time only a very limited amount of data on the dispersion of particulates from roadways is available. The results from the present program represent a major addition to the particulate dispersion data base. This project was undertaken in conjunction with Project 218, "Analytical and Experimental Assessment of Highway Impact on Air Quality," at four sites in Texas, including two in Dallas, and one each in San Antonio and El Paso. Particulate samples were collected and analyzed under Project 528, while meteorological and traffic data were collected under Project 218 along with carbon monoxide, nitrogen oxides and hydrocarbon concentration data.

# Chapter II

## Site Descriptions

### Introduction

Data collection for Project 528 was carried out at four sites in Texas. The experimental sites included one "at grade" site each in Dallas, San Antonio, and El Paso. In addition, there was an "elevated" site in Dallas. Sample collection for Project 528 was carried out in conjunction with Project 218 data collection. Each of these sites was chosen under considerations for equipment constraints and experimental procedure requirements, such as highway and wind orientations, right of way widths, and others. At least 150 feet of clear space on both sides of the roadway was required in order for the equipment to be located properly. At all sites, except the Dallas elevated site, the roadway ran roughly east-west in order to take advantage of the prevailing south wind. This maximized the amount of crosswind situations for which data were collected. The Dallas elevated site ran north-south and thus did not have the advantage of the prevailing south wind; however, this was the most suitable elevated site which could be found in terms of the other site selection criteria.

The remainder of this chapter consists of the site descriptions and instrumentation layouts for both projects. The following chapter will give a more detailed description of the instruments and their operation.

### Dallas Elevated Site

The elevated site in Dallas was located just south of the downtown interchange on IH45, between Forest and Pennsylvania Avenues. Figure 1 gives an overhead view of this site. The symbols used in Figures 1 through 12 are defined in Table 1. The freeway runs northwest and southeast (compass heading

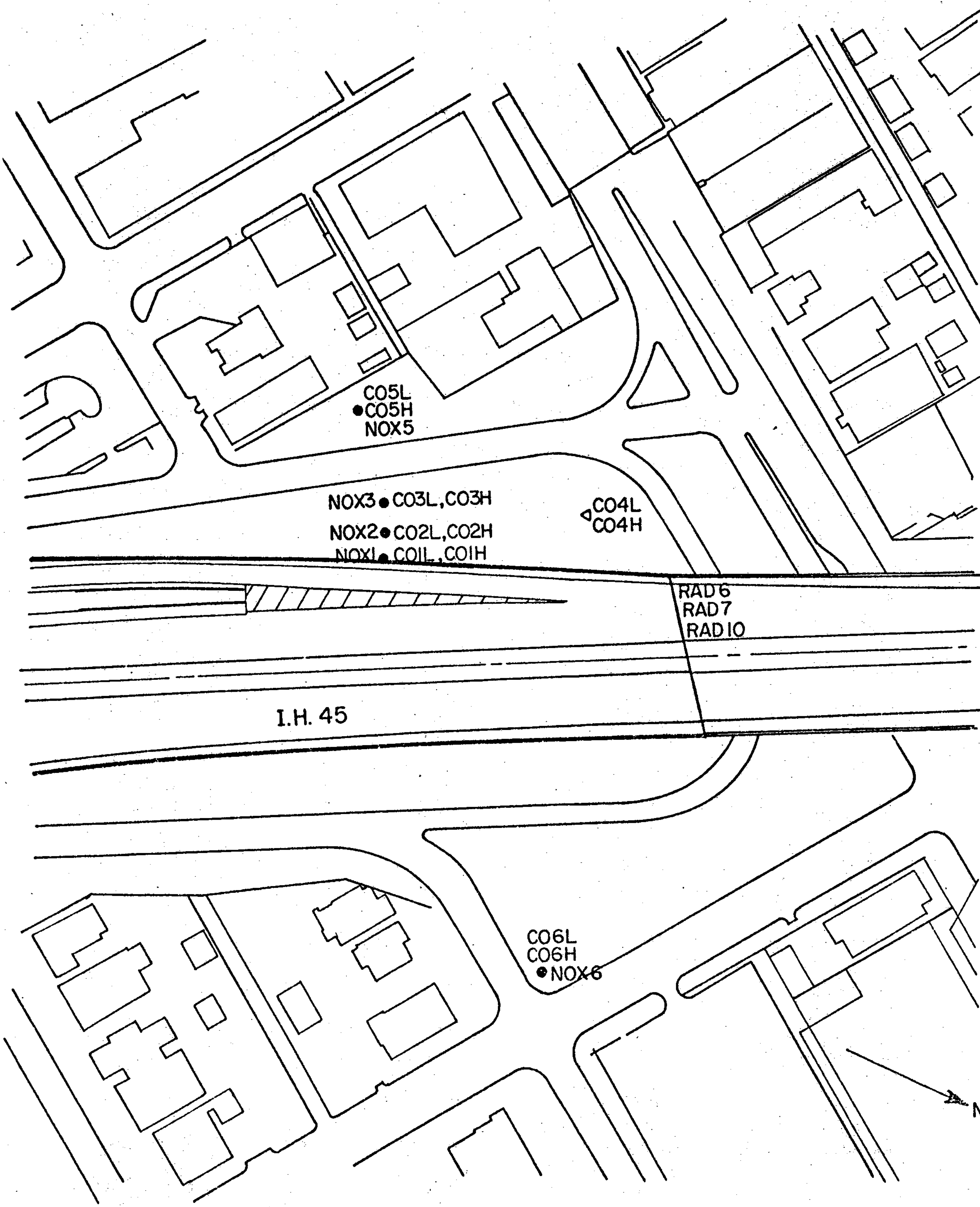



Figure 1

Overhead View

Dallas, IH45 at Forest Avenue

Table 1

Project 218 Instrument List

| Name | Channel | Instrument | Sample Interval |
|---|---|---|---|
| RAD0 | 1 | Radar | .01 sec |
| RAD1 | 2 | " | " |
| RAD2 | 3 | " | " |
| RAD3 | 4 | " | " |
| RAD4 | 5 | " | " |
| RAD5 | 6 | " | " |
| RAD6 | 7 | " | " |
| RAD7 | 8 | " | " |
| RAD10 | 9 | " | " |
| RAD11 | 10 | " | " |
| VA1.5m | 11 | 1.5 meter vertical anemometer | 2 sec |
| VA10m | 12 | 8 " | 4 sec |
| VA20m | 13 | 16 " | 5 sec |
| VA40m | 14 | 30 " | 5 sec |
| HA1.5m | 15 | 1.5 meter horizontal anemometer | 15 sec |
| HA10m | 16 | 8 " | " |
| HA20m | 17 | 16 " | " |
| HA40m | 18 | 30 " | " |
| WV1.5m | 19 | 1.5 meter wind vane | 5 sec |
| WV1.0m | 20 | 8 " | " |
| WV20m | 21 | 16 " | " |
| WV40m | 22 | 30 " | " |
| TM1.5m | 23 | 1.5 meter thermometer | 60 sec |
| TMP10m | 24 | 9 " | " |
| TMP20m | 25 | 13 " | " |
| TMP30m | 26 | 25 " | " |
| RH1.5m | 27 | 1.5 meter psychrometer | " |
| RH30m | 28 | 25 " | " |
| PYRAN | 29 | Heliopyranometer | " |
| CO1H | 30 | Ecolyzers | 10 sec |
| CO1L | 31 | " | " |
| CO2H | 32 | " | " |
| CO2L | 33 | " | " |
| CO3H | 34 | " | " |
| CO3L | 35 | " | " |
| CO4H | 36 | " | " |
| CO4L | 37 | " | " |
| CO5H | 38 | " | " |
| CO5L | 39 | " | " |
| CO6H | 40 | " | " |
| CO6L | 41 | " | " |
| NOX1 | 43 | NOX Monitor | " |
| NOX2 | 45 | " | " |
| NOX3 | 47 | " | " |
| NOX5 | 49 | " | " |
| NOX6 | 51 | " | " |

151°). There were three 12 foot wide lanes in each direction with an exit lane on the southbound side dividing from the freeway at the point where the monitoring insturments were located. There was a chain link fence at its center and a ten foot wide shoulder on each side. The entire freeway was elevated 20 feet above local ground level on an earth filled concrete wall which became a viaduct where Forest and Pennsylvania Avenues passed under the freeway. A two lane access road paralleled the freeway at ground level on each side, separated from the freeway wall by grassy boulevards with scattered eight foot oaks and crepe myrtle bushes. On the west side, the boulevard was 110 feet wide at its widest point. On the east side, the boulevard was only 40 feet wide and separated from a grass-covered island by a turn-around lane for IH45 that passed through the viaduct. Land use in the area consisted primarily of one and two story apartments and small businesses.

In addition to the equipment used for Project 218, shown in Figures 1 and 2, this was the first site at which Project 528 was set up. The particulate instrument locations are shown in Figure 3. Particulate equipment was set up in locations near the gas monitoring stations of Project 218, except for those stations nearest the roadway. One such station was set up at ground level beside the wall and beneath the sign bridge, another was set up at road level beneath the sign bridge, and one more at the top outer edge of the sign bridge.

There were two major problems with this site. The first occured because a heavily travelled roadway, Highway 75, was located less than half a mile east of the site. The gaseous polutants from this roadway occasionally affected the background monitors for Project 218 and the particulates from that roadway may also have affected the background stations for Project 528. A second major problem occured due to a lack of traffic monitors over the three northbound lanes. Since there was no sign bridge located over those

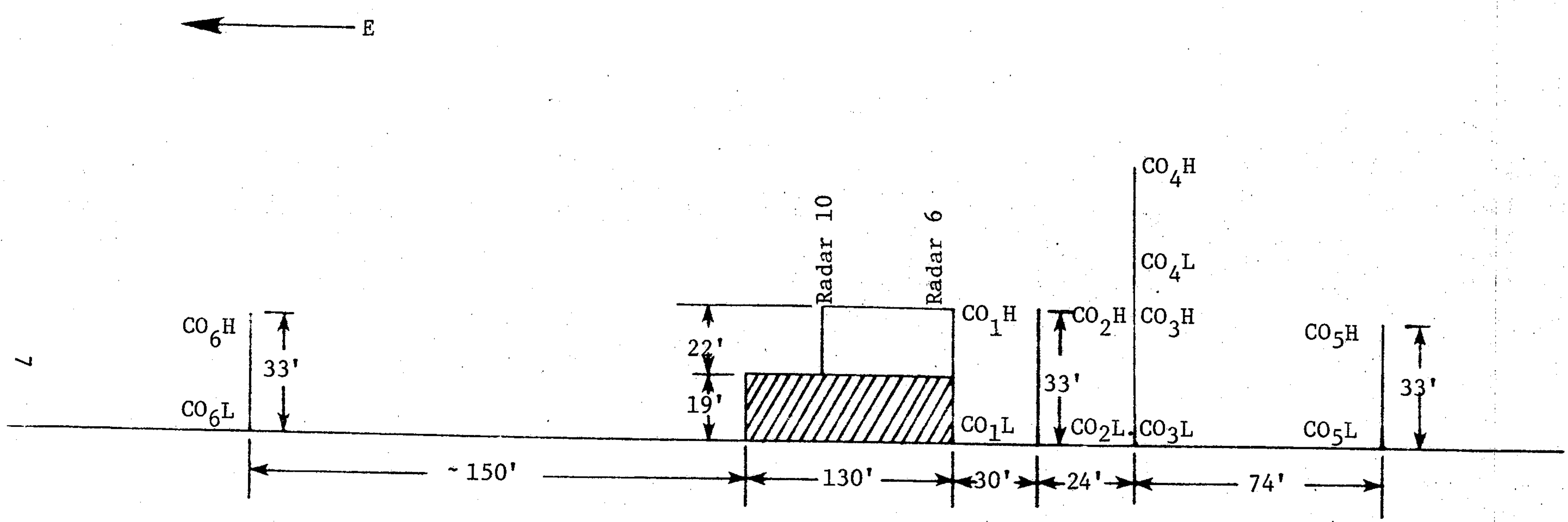
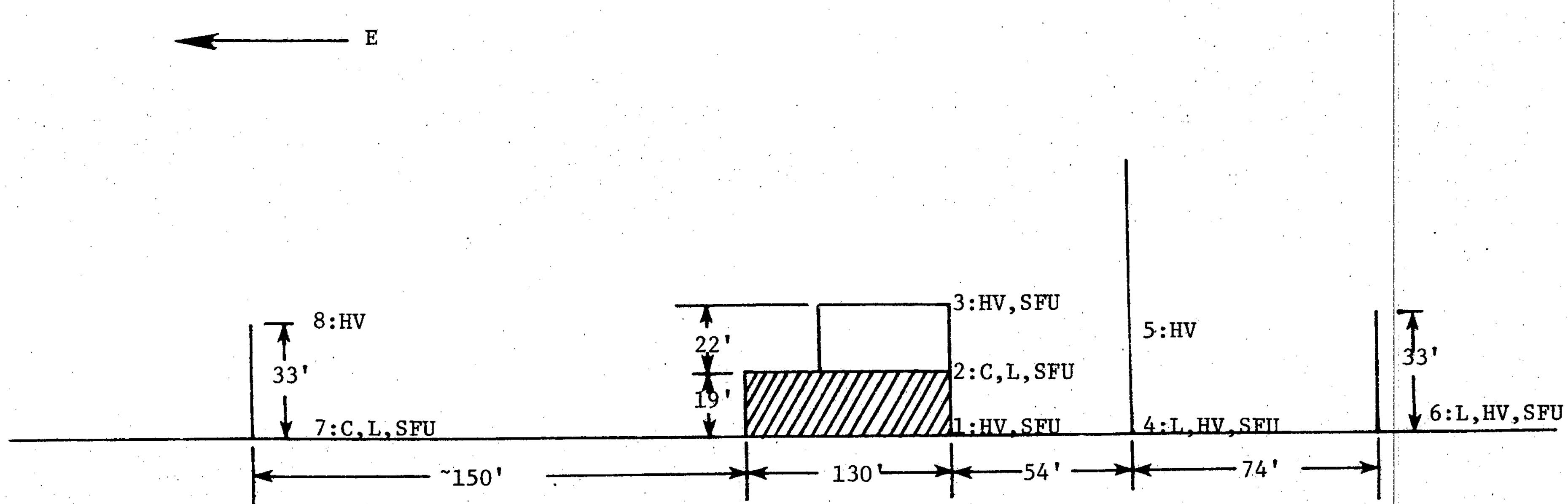



FIGURE 2

INSTRUMENT LOCATIONS: Project 218

Dallas: IH45 at Forest Avenue




| SYMBOL | INSTRUMENT |
|---|---|
| C | Cascade Impactor |
| HV | Hivol |
| L | Lundgren Impactor |
| SFU | Stacked Filter Unit |

FIGURE 3

INSTRUMENT LOCATIONS: Project 528

Dallas: IH45 at Forest Avenue

| STATION | HEIGHT (FT) |
|---|---|
| 5 | 30 |
| 8 | 33 |

lanes, the radars could not be installed over the lanes. A permanent counting station was established at the site before the projects were removed from this site. Historical data from this station can be used to estimate traffic flow on a daily basis.

Dallas At Grade Site

This site was actually east of Dallas in the suburb of Mesquite where Motley Drive passes over IH30. An overhead view of this site is shown in Figure 4. The freeway ran in a southwest and northeast direction (compass heading 56°), and consisted of two 12 foot wide lanes in each direction with a 38 foot wide grassy median separating the southwest and northeast bound lanes. Each outside lane had a ten foot shoulder. A two lane access road paralleled the freeway on each side, separated from it by grassy medians. On the eastbound side the median was 66 feet wide, while on the west bound side the median was 42 feet wide. Except for the Motley Drive overpass, two service stations, and a small creek the surrounding terrain was flat grassland. The instrument layout for Project 218 is shown in Figure 5 and the instrument locations for Project 528 are shown in Figure 6. All of the particulate sampling stations were located near Project 218 stations.

This site presented two problems. The first occurred because the access roads carried a significant fraction of the total traffic. The second occurred because the center median was wide enough to cause a separation of the mixing cells in each directional group.

San Antonio Site

This site was located at the Military Highway overpass on IH410, one mile west of the San Pedro Street overpass. An overhead view of this site is shown in Figure 7. The freeway consisted of three lanes in each direction,

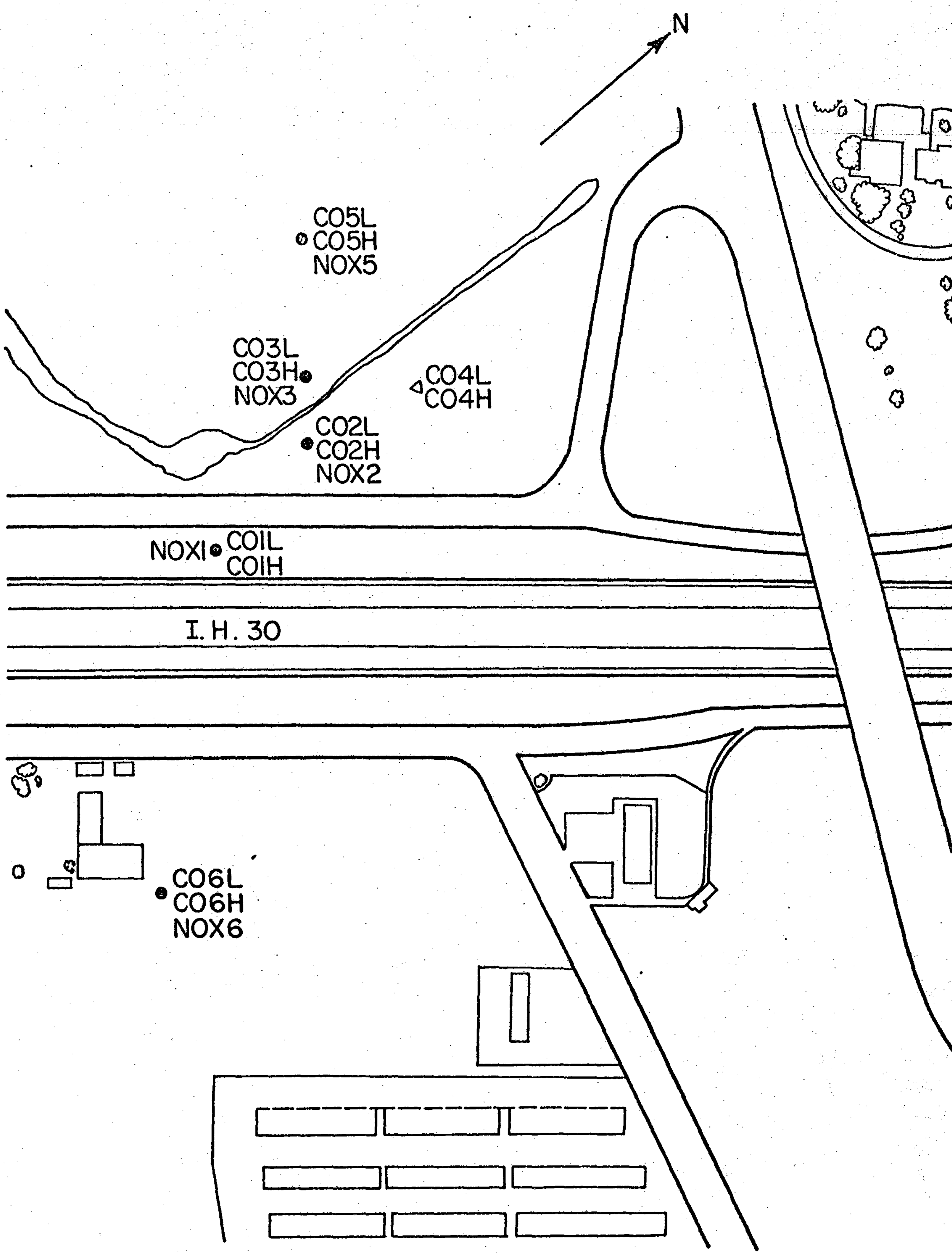



Figure 4

Overhead View

Dallas, IH30 at Motely Drive

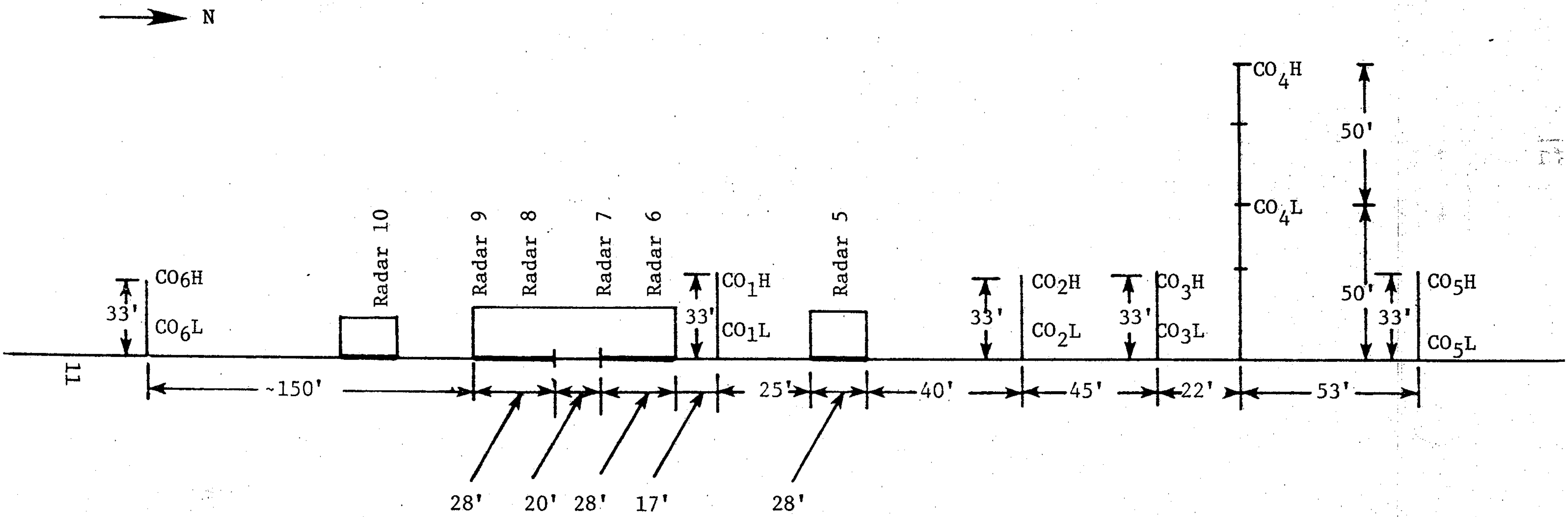
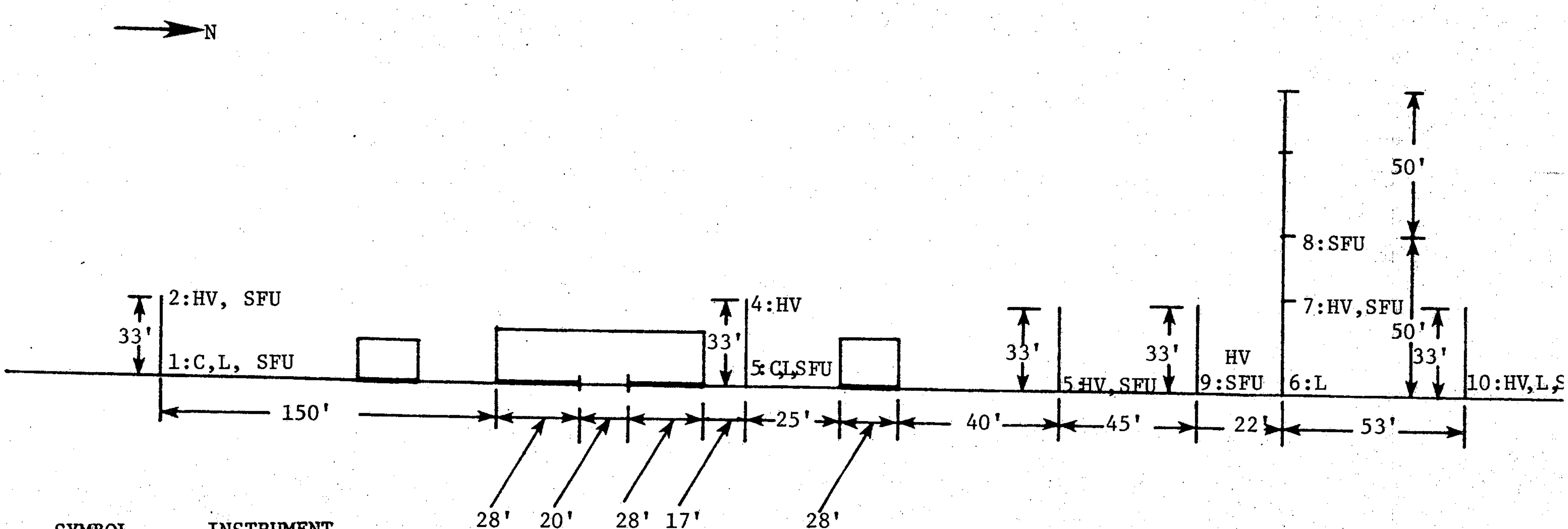





FIGURE 5

INSTRUMENT LOCATIONS: Project 218

Dallas: IH30 at Motley Drive




| SYMBOL | INSTRUMENT |
|---|---|
| C | Cascade Impactor |
| HV | Hivol |
| L | Lundgren Impactor |
| SFU | Stacked Filter Unit |

FIGURE 6

INSTRUMENT LOCATIONS: Project 528

Dallas: IH30 at Motley Drive

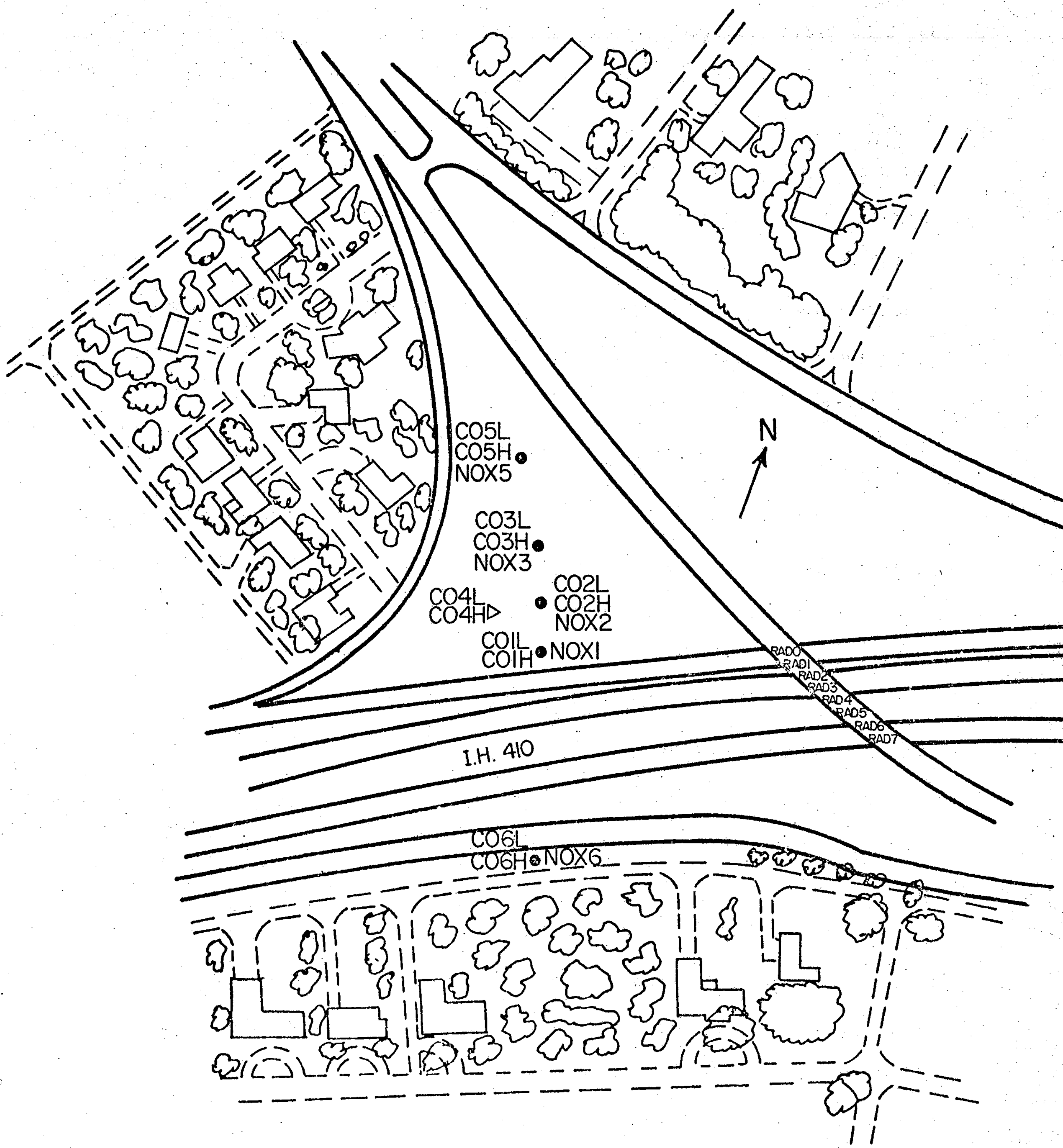



FIGURE 7

OVERHEAD VIEW
San Antonio, IH410 at Military Highway

running southwest and northeast (compass heading 68°). The main roadway had a 20 foot wide median between the lane groupings with a chain link fence down the center. There also was a ten foot wide shoulder along the north edge of the freeway. A ten foot wide grassy median on the north side of the roadway separated it from a 20 foot wide access road. The terrain surrounding the site was characterized by single story dwellings and trees up to 40 feet tall, although the triangular area on which the equipment was located was flat and grassy. Project 218 equipment locations are shown in Figure 8, while Project 528 equipment locations are shown in Figure 9. Again the Project 528 sampling stations were located near the Project 218 stations.

El Paso Site

An overhead view of this site is shown in Figure 10. The freeway consisted of six 12 foot wide lanes in each direction, and ran in a roughly east-west direction (compass heading 79°). There was a 20 foot wide median with a chain link fence along its center between the lane groupings and a ten foot wide shoulder on each outside lane. An exit lane cut through the receptor area on the north side of the roadway, with one receptor station located between the freeway and the exit lane and another station located at the edge of the exit lane. A fifty foot wide sandy boulevard separated the freeway from a 30 foot wide access road on the north side of the freeway, and a 120 foot wide sandy boulevard separated the freeway from a similar access road on the south side of the freeway. The land use in the area consisted of single story dwellings and businesses. The equipment layout for Project 218 is shown in Figure 11, while the equipment layout for Project 528 is shown in Figure 12.

Since there were only ten signal wires available for radar units, the two outside lanes on each side were monitored by a single unit. Counts in these lanes are accordingly less accurate.

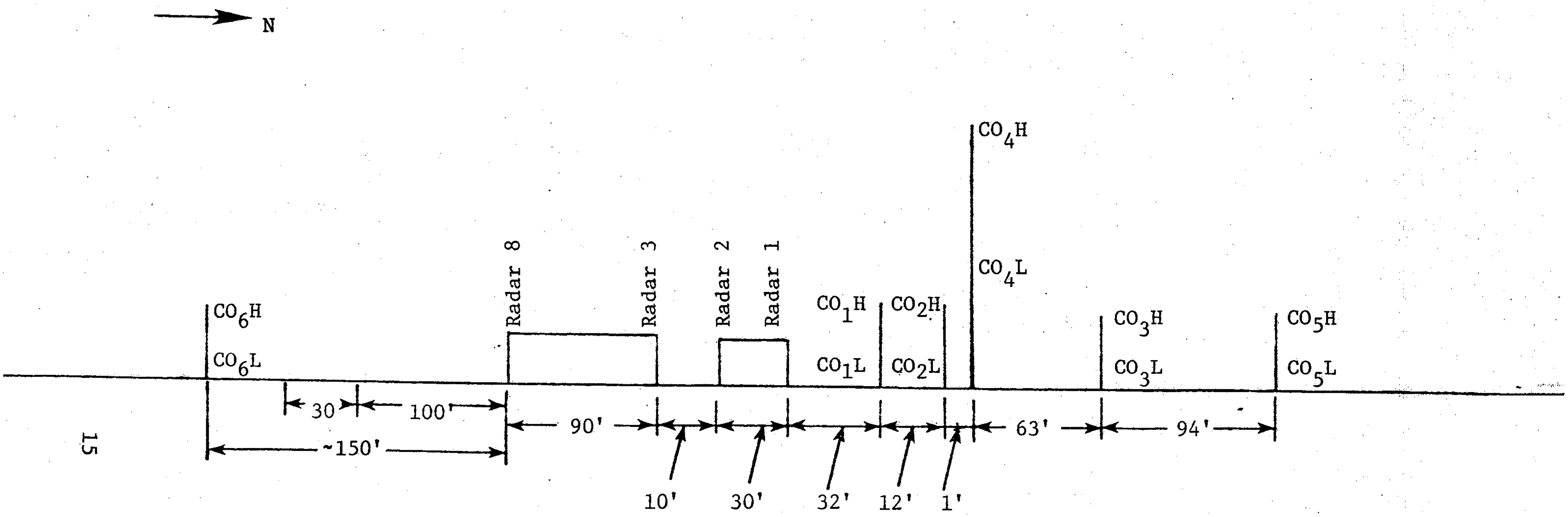
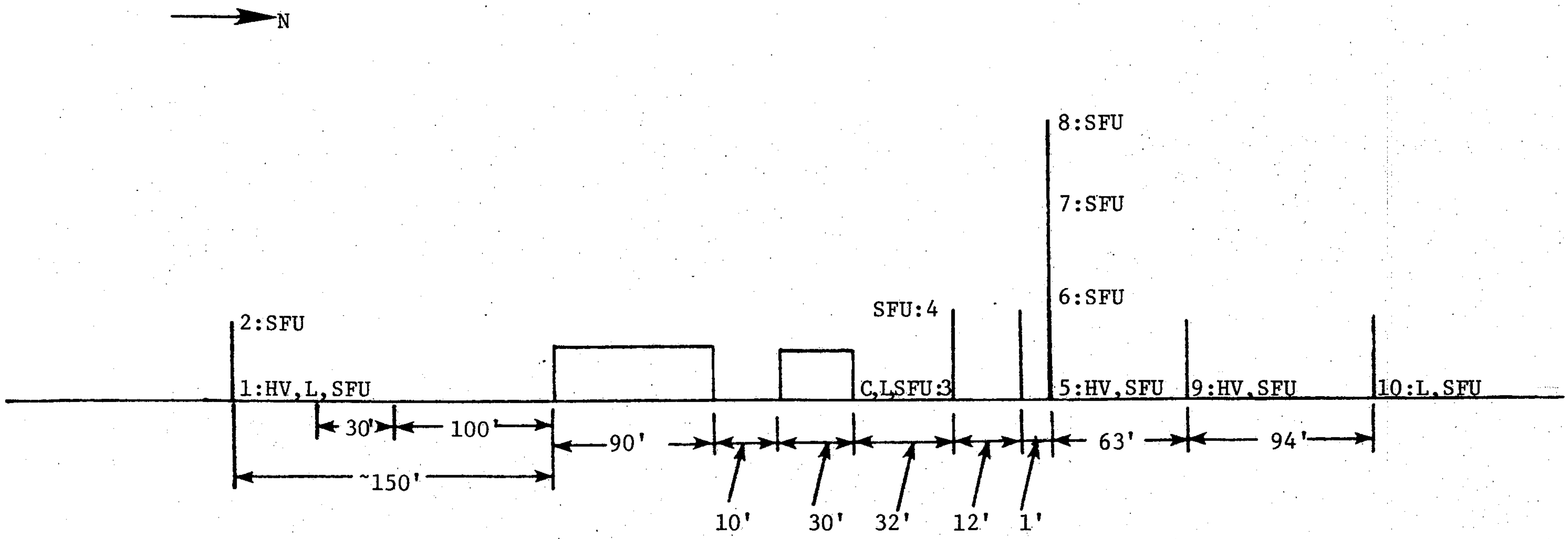



FIGURE 8

INSTRUMENT LOCATIONS: Project 218

San Antonio: IH410 at Military Highway




| SYMBOL | INSTRUMENT |
|---|---|
| C | Cascade Impactor |
| HV | Hivol |
| L | Lundgren Impactor |
| SFU | Stacked Filter Unit |

FIGURE 9

INSTRUMENT LOCATIONS: Project 528

San Antonio: IH410 at Military Highway

| STATION | HEIGHT (FT) |
|---|---|
| 2 | 33 |
| 4 | 33 |
| 6 | 30 |
| 7 | 60 * |
| 8 | 90 * |

* See data

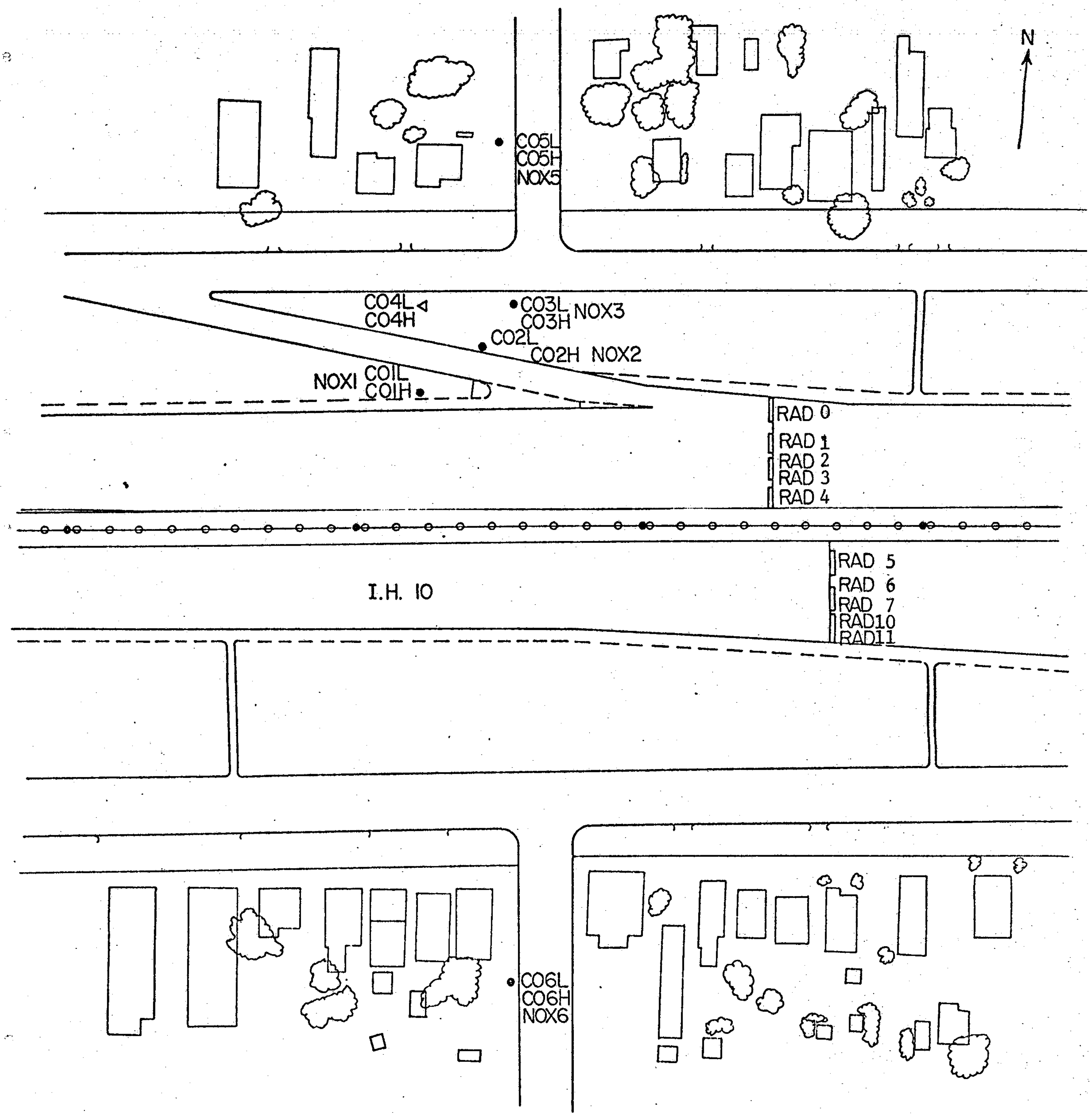



Figure 10

Overhead View

El Paso IH10 at Luna Street

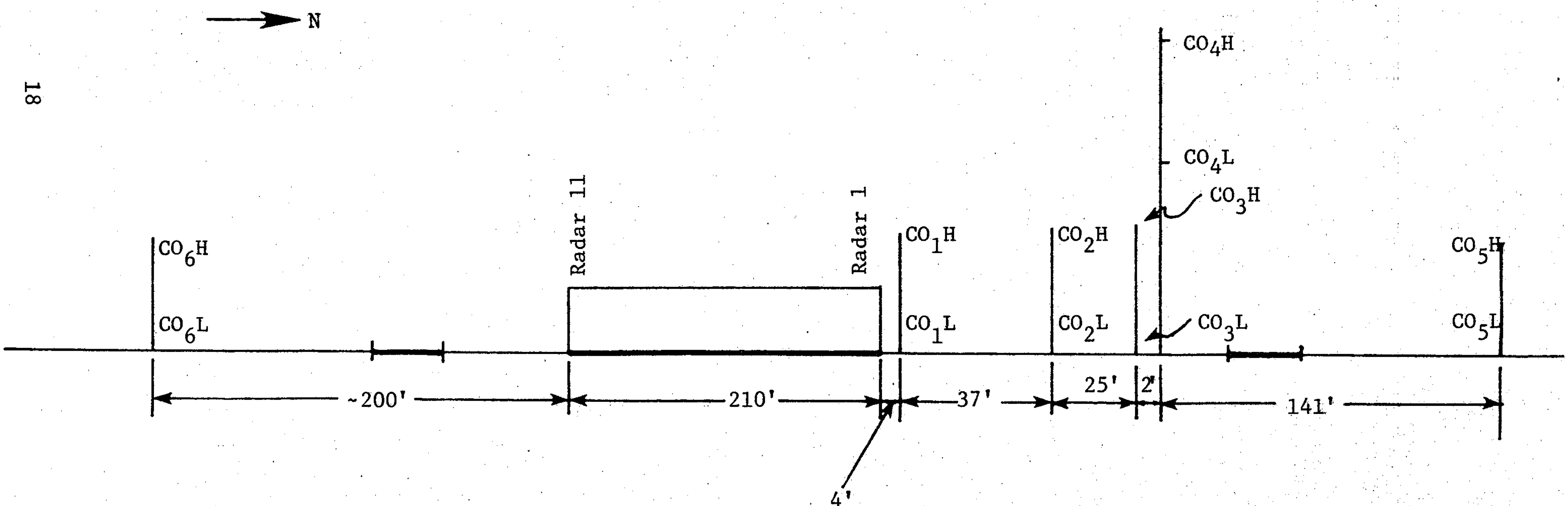
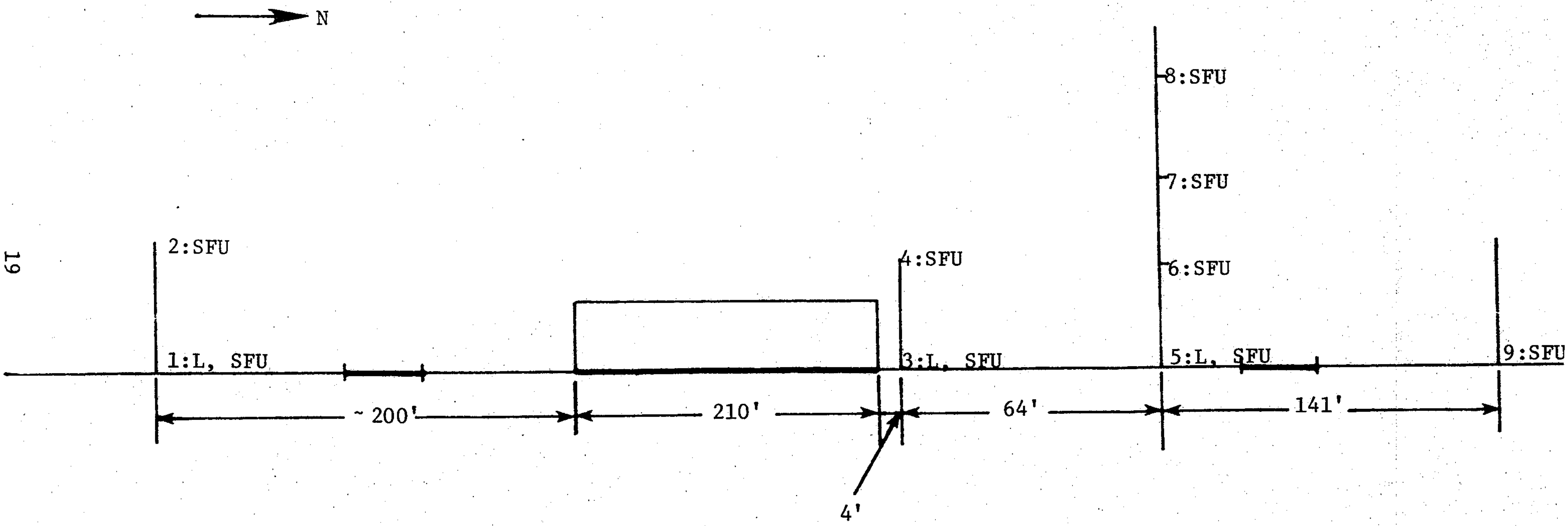



FIGURE 11

INSTRUMENT LOCATIONS: Project 218

El Paso: IH10 at Luna Steeet




| SYMBOL | INSTRUMENT |
|---|---|
| C | Cascade Impactor |
| HV | Hivol |
| L | Lundgren Impactor |
| SFU | Stacked Filter Unit |

FIGURE 12

INSTRUMENT LOCATIONS: Project 528

El Paso: IH10 at Luna St.

| STATION | HEIGHT (FT) |
|---|---|
| 2 | 35 * |
| 4 | 35 |
| 6 | 30 |
| 7 | 60 * |
| 8 | 90 * |

* See data

# Chapter III

# Experimental Methods

## Introduction

An extensive program of particulate data collection was performed under Project 528. The traffic and meteorological data were collected under Project 218 along with carbon monoxide, nitrogen oxides, and hydrocarbon data. The suspended particulates were collected using several different devices and different filter media. The particulate filters were analyzed by the Texas Air Control Board in Austin and by the Air Quality Group of the University of California at Davis. The systems used to collect the samples and the data will be discussed in this chapter. Since Projects 218 and 528 are so closely interrelated, the traffic and meteorology monitoring equipment from Project 218 will be included in this section along with the particulate sampling equipment. The data handling techniques of Project 218 will be discussed in the next chapter.

## Data Collection System

Data recording from the meteorology instruments, radar units, and from the carbon monoxide, nitrogen oxides, and hydrocarbon sensors was performed by a Data General Nova 1200 minicomputer. Readings were taken via a Radian analog to digital converter and a 64 channel multiplexor. Data were stored on cassette magnetic tapes. With this method, readings from all instruments were taken essentially simultaneously rather than sequentially. The computer read each instrument at a rate commensurate with that instrument's response time and the rate of data fluctuation. Table 1 gives each instrument's sampling rate, as well as the six-letter code used by the computer to identify it. The required software program was written by File D-19 of the State Department of Highways and Public Transportation in Austin, Texas. This software was modified in minor ways by project personnel.

## Traffic Measurement

In order to perform any highway air pollution model validation work it is necessary to know several parameters about the vehicles on the roadway. These include the vehicle count, the average vehicle speed, the heavy duty vehicle mix, and the vehicle age mix. The first three values were collected using Stevenson Mark 5 doppler-shift radar units obtained from the Texas Department of Public Safety. With these units and the minicomputer, the vehicle count, speed, and size mix were obtained on a lane by lane basis. The vehicle age mix may be approximated using figures available from local vehicle registration tables.

Since the radar units were originally designed for use inside of a vehicle, they had to be modified for use in this project. This was accomplished by mounting them on 10 inch "C" clamps and providing them with waterproof housing. A further modification involved replacing the 3/4 turn potentiometers used to adjust the range of the units with ten turn potentiometers. These provided much finer range control and worked very well.

To obtain traffic flow information, each radar unit was placed over a single traffic lane looking down at the roadway at an angle of 45°. The size of the field of view was then varied both in length and diameter by adjusting the range control on each unit. The radar units had both an indicator needle and a 0-10 v recorder output. The range control was turned down until the indicator needle barely indicated the detection of compact cars. The field of view was then restricted to an elliptical area approximately 15 ft long and 10 ft wide at the pavement. Since a car moving at 60 miles per hour spent only 1/2 of a second in the unit's field of view, the indicator needle did not have time to respond before the car was out of the field. However, due to its speed, the computer obtained full response from the unit via the recorder output.

The radar unit sent a voltage pulse to the computer for each vehicle passage. The height of the pulse was proportional to the vehicle's speed and the number of pulses was equal to the number of vehicles, resulting in an accurate vehicle count. The area under the pulse was also proportional to the length of the vehicle. This allowed the cars to be separated from trucks, giving an accurate breakdown of the heavy duty vehicle fraction. To obtain the area under the pulse the computer was required to do a numerical integration. Since most pulses coming from the radars were less than 1/2 second long, the radars were monitored at a very high rate of speed. A sampling rate of 100 samples per second was selected as the highest practical rate. At this rate, the NOVA computer was idle only 5% of the time while it spent 94% of the time processing the radar units. The remaining 1% of the time was sufficient to handle all other samples, compute averages, and to run the cassette units and the teletype. The numerical integration method used was the fastest in terms of computer time available. The readings were simply summed for the duration of the pulse and then divided by a calibration factor after the pulse was over. The result was then compared to five length categories selected by the programmer and the appropriate counter was incremented by one. The speed was also summed with the appropriate vehicle speed accumulator. At the end of each one minute interval the vehicle speed count and length information were averaged and written to the cassette tape. The five vehicle categories were chosen as category 1-cars, category 2-cars and pick-ups, category 3-light trucks, category 4-heavy trucks, and category 5-calibration and tailgates.

For a discussion of traffic measurement in highway air pollution research see Polasek and Bullin (1978).

## Meteorological Measurements

Windspeed and Direction:

Horizontal windspeed and direction were measured with six-cup anemometers and windvanes manufactured by Texas Electronics. The starting threshold for the anemometers was 0.75 mph with an accuracy of ± 1% of full scale. The windvanes had a starting threshold of 1.0 mph and an accuracy of ± 0.5%. The anemometers used the light chopper technique while the wind direction vanes used potentiometers in a one volt circuit.

Gill propeller anemometers (Model No. 27100) were used to determine the vertical wind speeds. This instrument had a starting threshold of less than 0.5 mph and an accuracy of ± 1.0% of full scale.

In order to obtain a good description of the wind profile, stations containing the horizontal windspeed and direction and vertical windspeed sensors were located at heights of 5, 26, 52, and 102 ft. This equipment was largely trouble free.

Atmospheric Temperature and Humidity:

To obtain information on atmospheric stability, temperature measurements were made with Texas Electronics Model No. 2015 thermistors at several heights. These units had an accuracy of ± 0.5% of full scale and were located at heights of 5, 29, 42, and 82 ft.

The relative humidity was measured at heights of 5 and 82 ft with Texas Electronics Model No. 2013 relative humidity systems. The psychrometers determined the relative humidity by utilizing the fact that a fiber, such as a hair, changes length in proportion to the amount of water vapor present in the air. An inductance change was induced in a coil by this change in length. The accuracy of this instrument was better than ± 3% relative humidity.

Solar Radiation

The incoming solar radiation was measured with an Eppley Model No. 8-48 pyranometer. Due to the low voltage output of this instrument, an amplifier was constructed that fed an amplified signal to the analog to digital interface. This instrument was very trouble free.

Particulate Sampling Equipment

High Volume Air Samplers:

Up to eight Sierra Instruments Model 305 high volume air samplers (hivols) were used in Project 528. Each had a Sierra Instruments Model 310R high volume constant flow controller maintaining a constant flow rate of 40 SCFM. The controller compensated for changes in ambient air temperature, air pressure, line voltage (as long as the voltage remained above 105 v), and for increased filter loading during the sampling period. If the flow controller did not compensate for these factors, large errors could be made when calculating the average particulate concentration. The controller measured the flow rate through the use of a hot wire anemometer. The flow rate was checked periodically with a rotameter attached to the pump outlet.

Hivols use particle impactation on porous filter media to effect particulate capture. Although most particles are captured by impactation, especially large particles may be captured by interception and some of the fine particles may be captured by diffusion. In this study, Whatman 41 cellulose base filter papers were used as the filter media. This media lends itself well to gravimetric analysis to determine the total suspended particulates (TSP) using the special procedure stated in the next chapter.

High Volume Cascade Impactors:

The high volume, parallel slot cascade impactors used the basic hivol and flow controller, along with the Sierra Instruments Model 235 five-stage cascade impactor and the Model 230CP cyclone preseparator. Two of the eight hivols were used as cascade impactors.

According to the manufacturers specifications, the cyclone preseparator placed above the impactor had a 50% cutpoint for particles having an aerodynamic diameter greater than approximately 12 μm. Particles of this size might bounce or roll through the impactor stages causing error in the particle size distribution. Since the cyclone was free to turn into the wind, the cascade impactor more closely approximated an isokinetic sampler than either the hivol or the Lundgren impactor. The cyclone preseparator was isokinetic at a windspeed of 10 mph for a flow rate of 40 CFM.

The cascade impactor had six plates with parallel slots. The top plate of this system had nine slots in order to minimize end effects, while the rest of the plates had ten slots each. Particles passing through the slotted jets impacted on five slotted filters. These particles were captured by the filters or passed through depending upon their aerodynamic diameters and the air velocity through the slots. The slotted filters were made of Whatman 41 paper. A standard Whatman 41 filter paper was placed beneath the last stage of the impactor in order to capture some of the particles that passed through the five stage impactor.

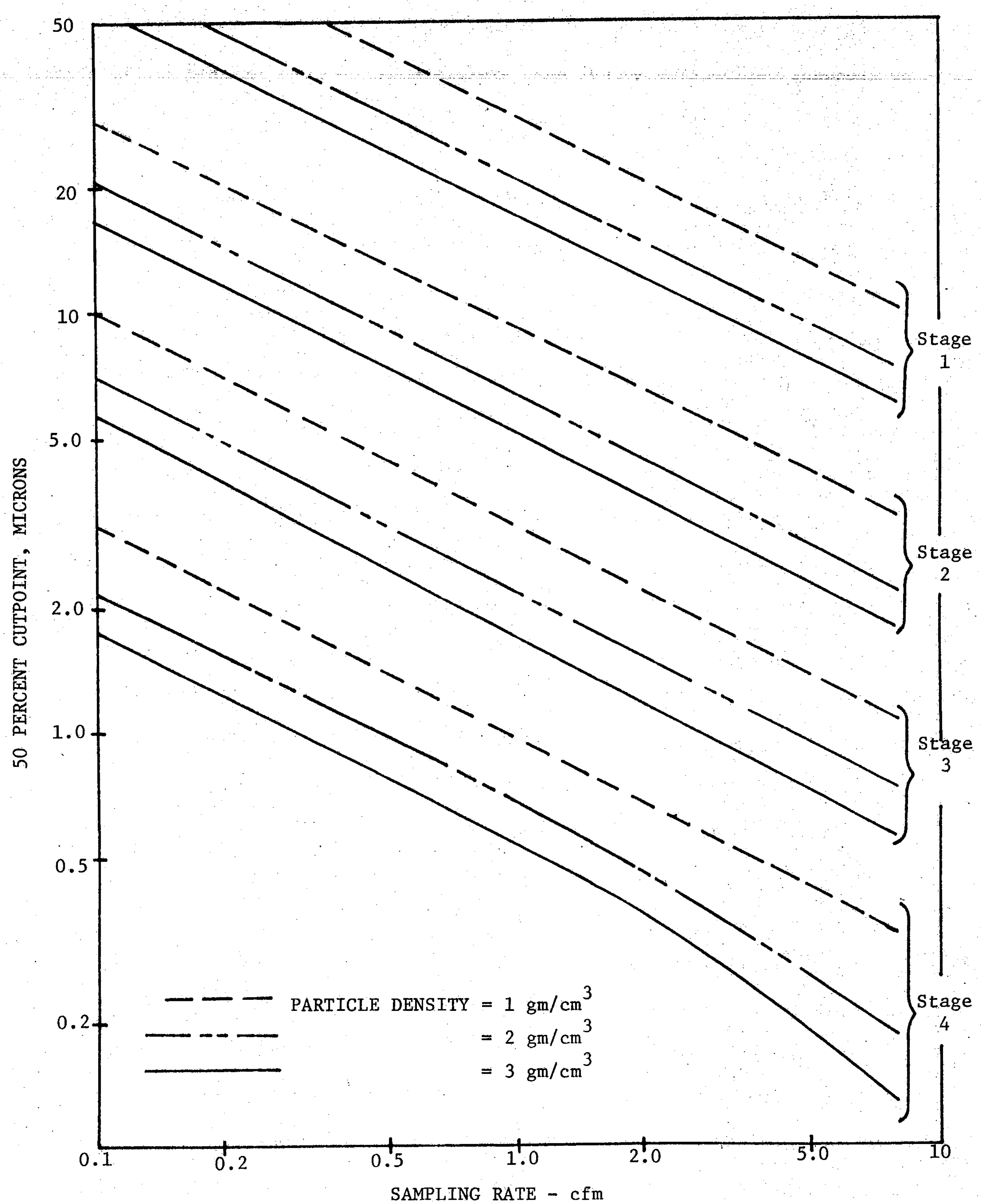
Lundgren Impactors:

The third particulate collection system used in Project 528 consisted of Environmental Research Model 4220 five stage Lundgren impactors. Particles suspended in the airstream passing through a Lundgren impactor are captured by inertial impactation on the surfaces of four cascaded rotating drums. The airstream goes through a converging nozzle before passing over each drum. The nozzle slots are successively narrower and accelerate the air to successively higher velocities before striking the drums. The particles strike the drum or continue in the airstream depending upon their inertia (i.e., aerodynamic size). The impactor parameters are given in Figure 13.

To improve collection efficiency and to allow relatively simple analysis of the particles, the drums were cleaned, wrapped in mylar strips and coated with Apiezon Type L grease. The procedure was developed by Cahill (1976). Each drum was first cleaned in toluene and then wrapped with mylar type S strips from DuPont, Inc. These strips had also been cleaned in toluene prior to being placed on the drums. After wrapping, the drums were cleaned in toluene once more to make sure no fugitive grease or dirt remained on the outer surface of the mylar strips. After drying, the drums were dipped into a saturated (5%) solution of Apiezon Type L grease for about two seconds and allowed to dry for 24 hours before use. The Apiezon Type L grease has high chemical purity and provides a very efficient collection surface closely comparable to Millipore AA filters (Cahill, 1976).

An Environmental Research Model 710 filter holder was placed after each impactor to capture those particles not captured on the last stage of the impactor. The last stage had a 50% cutpoint of about 0.4 μm. At different times both Whatman 41 and 0.4 μm Nucleopore filters, 90 mm in diameter, were used as afterfilters. The filter type used is clearly noted in the experimental data.

The impactor was calibrated using quarter-inch ports located before and after the second stage drum. A spirometer-calibrated magnehelic gauge was connected across the ports and the pump was adjusted to obtain a reading of 0.8 inches of water. This reading corresponded to a flow rate of 4.0 cfm. The magnehelic reading was linear with respect to the flow rate between two and five cfm (0.4 to 1.0 inches of water). There were difficulties in maintaining this flow rate primarily because of excessive pressure drop across the 0.4 μm Nuclepore filters that were usually used as the afterfilters.




LUNDGREN IMPACTOR
STAGE CUTPOINTS

FIGURE 13

The flow rate was maintained at a relatively constant level during each run by frequent calibration (about once every two hours). At no time did the flow rate drop below 2.2 cfm.

Stacked Filter Units:

Up to ten University of California at Davis stacked filter units (SFU) were used. This equipment is described in papers by Cahill, et al. (1977) and John, et al. (1978). Each unit consists of a PVC cap over a 60 mesh stainless steel screen and a PVC manifold. The screen provides for 50% capture of particles with an aerodynamic diameter of 20 μm. The length of the manifold is designed to provide uniform particle deposition on the upper filter. The intake was normally located 1.6 m above ground.

The manifold was inserted into a commercially available filter holder made by Nuclepore Corporation. The holder contained two Nuclepore filters 47 mm in diameter. The top filter had pores 8.0 μm in diameter, while the lower filter had pores 0.4 μm in diameter. The top filter collected the coarse size fraction corresponding to that caught by the upper respiratory tract, while the second filter caught the fine fraction corresponding to that caught by the lower respiratory tract (Cahill, et al., 1977).

The flow rate was controlled by a needle valve attached to the pump inlet. In addition to controlling the flow rate, the needle valve also acted as a high impedence to flow, thus ballasting the pump against flow rate changes due to filter loading. The flow rate was calibrated using a spirometer calibrated orifice and a magnehelic gauge. Calibration was performed periodically throughout each run in order to maintain a near constant flow rate. All pumps were operated at ground level and the SFU's were connected to the pumps via the necessary length of reinforced nylon tubing. Ground level SFU's allowed the calibration to be performed on the inlet side of the filter holders. The elevated SFU's were calibrated using a T-connector and orifice on the outlet side of the pump to check the pump's total flow rate. The new orifice was cross-calibrated with the original calibrated orifice. When care was taken to eliminate air leaks in the system, the T-connector and orifice worked quite well in checking the total air flow through the pump and therefore through the SFU's.

At the two sites in Dallas the flow rate was kept to 5 l/min. The SFU's were run for two hour periods during the morning rush period (7-9 a.m.) and the evening rush period (4-6 p.m.). The SFU's were run at the same flow rate at the second site in Dallas, but for periods of 2-11 hours. These flow conditions did not produce adequate filter loading for TACB XRF analysis, even at the 11 hour run times. The flow rate was then increased to 22.5 l/min at the San Antonio and El Paso sites with run times of 2-11 hours. The increased flow rate produced adequate filter loading. A recent report to the California Air Resources Board by Cahill (1978) has shown that there is an insignificant change in both capture efficiency and coarse/fine separation with an increase in flow rate from 5 to 22.5 l/min.

# Chapter IV

# Sample Analysis

## Introduction

The particulate filters were analyzed using two different quantitative elemental analysis systems. All SFU filters,Lundgren afterfilters, cascade afterfilters, and hivol filters were first analyzed by the Texas Air Control Board (TACB) in Austin using an x-ray fluoresence (XRF) system. The TACB also determined the total suspended particulate (TSP) weight on all hivol filters, slotted cascade filters and cascade afterfilters. They also determined the TSP weight on many of the SFU filters. The Air Quality Group at the University of California at Davis (UCD/AQG) also analyzed many of the filters. They used a particle induced x-ray emission (PIXE) system located at Crocker Nuclear Laboratory. They reanalyzed a large portion of the SFU filters, all Lundgren afterfilters, and several of the hivol filters and cascade afterfilters. In addition, they analyzed the mylar strips from the Lundgren impactors and a selection of the slotted cascade filters. Filters were reanalyzed because the TACB had been unable to obtain satisfactory analyses from certain lightly loaded filters. Also, some filters could not easily be analyzed using the XRF system because of filter shape or loading pattern. The dual analyses provided a direct comparison between the two systems. A complete list of all filters analyzed by both groups is provided in Appendix A.

## Analysis Systems

X-Ray Fluoresence System:

The Texas Air Control Board (TACB) uses an x-ray fluoresence system to analyze the particulate filters they collect at various sites in the State of

Texas. They analyzed most of the particulate filters for Project 528 with this system. This energy dispersive spectrometer used four different radioactive isotopes (iron 55, plutonium 238, cadmium 109, and gallium 153) to act as x-ray sources to check for the presence of four different bands of elements. These x-rays caused x-ray line spectra characteristic of the elements present to be emitted. The detected count rate of the characteristic x-rays was proportional to the weight fraction of the element. A lithium-drifted silicon (Si(Li)) cell was used as the solid state detector. This system was able to simultaneously analyze for elements ranging in atomic weights from magnesium to lead, with an accuracy in the 1-10 ppm range, depending upon the element, the total sample weight, and the amount of the major constituent present. A minicomputer was used to smooth the data from the detector, and unfold the spectral lines. Due to the nature of the source, the sample had to be at least 37 mm in diameter. The program assumed a relatively even particulate distribution across the sample. For more information on x-ray spectrometry, see J. R. Rhodes (1972), J. R. Rhodes, et al., (1972), or Birks and Gilfrich (1976).

Particle Induced X-Ray Emission System:

The Air Quality Group located at the University of California at Davis (UCD/AQG) also analyzed many of the particulate filters from Project 528 using the isochronous cyclotron located at Crocker Nuclear Laboratory. The particle induced x-ray emission (PIXE) system they employed used an alpha particle beam to detect all elements heavier than neon with detection limits in the one ppm range. The alpha particle beam caused the emission of a characteristic x-ray line spectra. A Si(Li) cell was used as the solid state detector. Because of simpler and more accurate data analysis techniques useable with PIXE systems, the UCD/AQG analyses were not influenced by the total loading of the filters or the amount of the major constituent present. The alpha particle beam was 2.5 cm long by 0.75 cm wide. Because of the small size of this beam, filters having a small particulate collection area, such as the slotted cascade filters, could be effectively analyzed on the PIXE system. The mylar strips from the Lundgren impactors could also be analyzed on the PIXE system by selecting a small area on each filter strip sequence (four strips) that had a fairly uniform particulate deposit. For a more complete description of the UCD/AQG PIXE system and the way it was operated as of January 1, 1975, see Cahill (1975).

Filter Analyses

Hivol Filters:

The hivol filters consisted of 8" x 10" Whatman 41 cellulose base filter papers. Cellulose filters were used because they are essentially free of contamination by the elements zinc, iron, zirconium, potassium, and calcium which contaminate standard glass fiber filters. In order to calculate the TSP weight on the filters, a special weighing procedure had to be followed, since cellulose filters are hygroscopic. The TACB first numbered the filters sequentially and then placed them in a constant humidity chamber. They were allowed to equilibrate for 24 hours in this chamber and then weighed to the nearest mg. The filter weight and number were recorded, along with the humidity in the chamber.

After a filter had been run in a hivol or as a cascade afterfilter, it was returned to the TACB. All handling was performed with forceps, at no time was the filter touched with the hands. The filter was folded lengthwise with the particulates on the inside of the fold. The filters were placed in a folder which was then sealed in an envelope. The folder and envelope were both marked with the site, date, and run time and with the station number at which the hivol was run. Since the hivols used flow controllers, no further identification was necessary.

After a week's run, the filters were returned to the TACB in Austin via project personnel or a courier. The TACB replaced the filters in the constant humidity room for another 24 hours, after which time they were re-weighed to the nearest mg. Since the initial and final filter weights were known, along with the humidity in the chamber at both weighings, the TSP weight on each filter could be calculated. A circular section was then stamped from near the center of each filter for XRF analysis. The minicomputer analyzed the data from the Si(Li) detector to arrive at units of μg/sample. This number was then extrapolated to obtain the amount of each element present on the filter in units of μg/filter. The minicomputer also calculated a standard deviation (σ) for each element, where this number represented the uncertainity in the measurement and the data smoothing operation. At the recommendation of the TACB, all reported values in the Project 528 data set are larger than 3σ.

Several of the hivol filters and cascade afterfilters were reanalyzed by the UCD/AQG for comparison purposes. The results of these analyses will be discussed in Chapter V.

SFU Filters:

The stacked filter units used two Nuclepore filters with pore diameters of 8.0 and 0.4 μm. The filters were handled with forceps at all times. They were placed in the filter holders with their shiny sides up so that the filters might later be visually examined, if desired. After a week's run they were taken to the TACB along with the other filters.

The TSP weight on the SFU filters was not determined prior to August 10, 1977. Starting at that time, however, the TACB weighed all SFU filters to the nearest 10 μg before and after use. It was not necessary to equilibrate them in the constant humidity chamber before weighing because Nuclepore filters are nonhygroscopic. Each filter was stored in a numbered petri dish. After the filters were run, great care was taken to return each filter to its proper dish and clearly identify where it was used.

At the first site in Dallas, the SFU samplers were run for two hours each at a flow rate of 5 l/min. The TACB found that these filters were not heavily enough loaded for them to perform dependable XRF analyses on the filters. Only calcium or silicon was found on some filters, while nothing at all was found on others.

In an attempt to increase the filter loadings sufficiently for XRF analysis, the run time was increased to 10 or 11 hours. The flow rate remained at 5 l/min. When these filters were analyzed, it was found that the increased run times still did not solve the loading problem. A new orifice was then calibrated for a flow rate of 22.5 l/min. The new flow rate was used at the San Antonio and El Paso sites, along with the extended run times. The increased flow rate and the longer run times proved effective in increasing the particulate loadings sufficiently for TACB analysis.

Those SFU filters which were too lightly loaded for TACB/XRF analysis were later sent to the UCD/AQG for PIXE analysis. Because of the greater sensitivity of the PIXE system, it was hoped that that system would be able to more properly analyze those filters. A number of heavily loaded SFU filters were also sent to the UCD/AQG for direct comparison purposes. All SFU filters were sent to the UCD/AQG via United Parcel Service. The SFU filters were placed in 35mm slide holders and analyzed in the standard UCD/AQG manner for Nucleopore filters.

Slotted Cascade Filters:

The cascade filters were made of slotted 4" X 5" Whatman 41 filter papers.

The TACB numbered and weighed each filter before use and then reweighed the filters after use. Before each weighing, the filters were allowed to equilibrate for 24 hours in the constant humidity room. The filters were handled with forceps at all times. Upon being removed from the cascade filter holder, each filter was folded in half, with the fold being made parallel to the slots and the particulates on the inside of the fold. The slotted filters were then separately stored in clearly identified folders and sealed envelopes.

The TACB determined the total particulate retained on each filter to the nearest mg. Most of the filters retained less than 1 mg of particulate. For this reason the TACB was unable to analyze the filters. In addition, the particulates had been deposited in narrow bands between the slots and these bands were too narrow for XRF analysis.

Because the TACB could not analyze the cascade filters, all of these filters were sent to UCD/AQG for PIXE analysis. However, only a small fraction of these filters were actually analyzed due to light particulate loading. Before the filters were analyzed, each was examined visually for signs of particulate loading. If at least two of the filters from a set of five had visible loading then the entire set was subjected to PIXE analysis.

Lundgren Impactors (Drum Strips):

The Apiezon-coated mylar strips from the Lundgren impactors were carefully removed from the drums after use and taped or tacked to flat boards which were then placed in clean metal or cardboard boxes for storage. Labeling on the carrier boards was sufficient to fully identify each strip.

The TACB was unable to analyze the Lundgren strips because the particulates were not evenly deposited on the strips. If the TACB/XRF system had been used to analyze the filters, a great deal of accuracy would have been lost due to uncertainity in the statistical analysis of the data from the detector.

The Lundgren strips were therefore sent to UCD/AQG for PIXE analysis. To analyze the strips, a section about one-half inch wide was cut from near the center of each strip and mounted in a 35mm slide. Cahill (1978) suggested that the exact location would not matter too greatly since the Lundgren is more useful in providing qualitive information on particle sizing than in providing quantitative information. He also suggested that the particle size ratio's would not change greatly from run to run over the short time period in which samples were collected at each site. The same relative position on each of the four strips from one impactor was subjected to analysis.

Lundgren Impactor Afterfilters:

The Lundgren afterfilters consisted of either Whatman 41 or 0.4 μm Nuclepore filters. The Nuclepore filters captured a greater percentage of the fine particulates than the Whatman 41 filters, but the pressure drop across the Nuclepore filters was too great for the pump to maintain a uniform 4.0 cfm flow rate.

The Lundgren afterfilters were analyzed by both the TACB and UCD/AQG. The filters were first analyzed by the TACB, but it was then decided that the UCD/AQG should also analyze the filters since they had already analyzed the Lundgren strips and needed the results from the afterfilters to provide complete elemental ratios from the impactors. In addition, some of the filters had been too lightly loaded for proper TACB analysis.

# Chapter V

# Discussion of Results

## Introduction

The discussion of results from Project 528 has been divided into several sections. These sections include (a) a discussion and evaluation of experimental data, (b) a comparison of TACB and UCD analyses, (c) a discussion of elemental profiles and a comparison of TACB and UCD analyses using these profiles, (d) the results of some correlation analyses, (e) a comparison of stacked filter unit and high volume air sampler data, and (f) a discussion of road vacuuming data. In addition, the actual fine lead concentrations have been compared to the predicted concentration profiles obtained from carbon monoxide dispersion models.

Experimental Particulate Data

The particulate data from Project 528, "Measurement and Analysis of Resuspended Roadway Dust in Texas," is contained in Appendix B of this report. Appendix B also contains the traffic and meteorology data taken by Project 218 in conjunction with Project 528. The traffic and meteorology data are presented in tabular form as one hour averages during each run. All data is available on IBM compatible nine track magnetic tape from the Texas State Department of Highways and Public Transportation and NTIS. The data and the report are also available at modest costs from Dr. Jerry A. Bullin, Chemical Engineering Department, Texas A&M University, College Station, Texas 77843, phone 713-845-3361.

Error Analysis and Validity of Data

Introduction:

Three different types of errors are associated with the calculation of airborne particulate concentrations. The sampler itself introduces error because of anomalies in the collection characteristics and the sampling techniques used. The latter includes uncertainty in the actual flow rate of the sampler during the period of operation. Another group of errors are introduced by the sample analysis system and the analysis technique used. The errors associated with each sampling system will be discussed in this section of the report. The errors associated with the meteorological and traffic measurement systems from Project 218 will also be discussed here.

High Volume Air Samplers:

There are several errors associated with the use of hivols to collect airborne particulates. Among these are wind directional, variable capture efficiency and wind velocity large particle capture anomalies. Both are due to the nonsymetrical nature of the hivol and the high air flow rate through the filter. The amount of error due to these effects cannot be estimated. However, in an effort to make the errors uniform throughout the hivol sampling network, all hivols were set up with the wide side of the sampler parallel to the roadway. Except for the elevated hivols, all were located at least ten feet from the nearest large obstruction to the air flow.

Another error can occur because of nonuniform filter loading during a run due to a changing flow rate. However, the flow controllers used on the hivols in this project maintained a constant flow rate of 40 SCFM. The flow rate could be read directly from an analog meter on the controller. The flow rate was also checked periodically with a rotameter connected to the pressure tap on the motor blower. Although the rotameter is not a highly accurate or a repeatable flow rate measuring device, it cross checked with the analog meter on the hivol and could be used to check for significant changes in flow rate. In cases where the flow controller did not function because of low line voltage, the particulate filters for those runs were not submitted to the TACB for XRF analysis.

Skogerboe, et al., (1977) state that the filter efficiency for a particular element will depend on its size distribution in the particulate size spectrum for any particular type of filter or set of collection conditions. Elements having enriched concentrations in the lower size ranges will be preferentially passed through the filters. Cahill (1978) has found that there is approximately a 25% penetration of fine lead through Whatman 41 filter papers. Together these observations imply that the hivol filter analyses are probably biased towards the larger sized particles.

Cascade Impactors:

Some of the errors associated with high volume cascade impactors are similar to those associated with the basic hivol. However, cascade impactors do not have the same wind directional variable capture efficiencies, since the cyclone preseparators used on these samplers are free to turn in the wind. The cyclones also limit the large particle wind velocity anomalies.

Cascade impactors do, however, have several major errors associated with their use. These errors are related to their collection efficiency, which is determined by their impaction and adhesion efficiencies. These efficiencies are, in turn, determined by particle bounce, reentrainment, and deagglomeration or breakup. This means that oversized particles will reach every stage beyond the first stage, including the afterfilter. The presence of oversized particles tends to bias the particle sizing towards higher than actual concentrations of fine particles and reduced concentrations of large particles. In order to limit these effects and increase the efficiency of the cascade impactors, an adhesive coating, such as an oil, may be applied to the upper surfaces of the slotted plates. Such methods are very rarely used because the coating severely limits the ability to perform elemental analyses on the collected particulates and are very difficult to use in the field. Fibrous filters, such as Whatman filter papers and Gelman glass fiber filters have been widely used as collection surfaces because they facilitate sample handling and appear to reduce particle bounce. Even so, in the majority of cases, the stage collection efficiencies usually fall between 80 and 95% (Cushing, et al., 1979).

Whatman 41 filter papers were used as the cascade impactor collection substrates in Project 528. Glass fiber filters would have been used, but these filters are usually contaminated with elements such as zinc, barium, and chlorine. Even small quantities of these elements present on the filters will affect the XRF analyses of the samples, although such contamination can be partly corrected by using an appropriate blank filter correction in the XRF analyses. The Whatman 41 filters contribute to the errors associated with the cascade impactors used in this project. Rao and Whitby (1977) have recently found that Whatman 41 filter papers do not significantly reduce particle bounce. This, in turn, may mean that the impactor collector stages were no more than 50% efficient (Cushing, et al., 1979). Also, the last stage of the impactor is designed to capture particles smaller than 0.5 μm, but the Whatman 41 filter papers used as the afterfilters in this project allowed fine particles to pass through them (Skogerboe, et al., 1977). In addition, because of the small size of the particles, the fines penetration through these filters may have been more than the 25% fines penetration suggested by Cahill (1978) for standard hivol filters.

Not only is there fines penetration of the Whatman 41 papers, it also appears that these filters have low filter efficiencies for total suspended particulates at low loading conditions. Skogerboe, et al. (1977) state "smaller particle sizes are collected quite inefficiently under conditions of low filter loading (clogging) and this may present a serious problem for sampling atmospheres with low total particulate concentrations and/or sampling at low rates." Although that study was performed using Millipore Type HA filters, they thought that similar results would have been found had they used Gelman glass fiber, Whatman 41 or other similar filter papers.

In conclusion, any size classification scheme using the cascade impactor data from Project 528 is likely to be greatly in error due to particle bounce biasing of fine particle concentrations, fine particle penetration through the afterfilters, and low filter efficiencies under conditions of low filter loadings.

Stacked Filter Units:

The stacked filter unit, because of its symetrical design, does not have any wind directional capture effects, but it does have variable wind speed capture anomalies. In an Environmental Protection Agency study by McFarland (1979), the aerodynamic particle diameter cutpoints for SFU of the design used in this study were found to be 17.0 μm at a windspeed of 2 km/hr and 8.1 μm at a windspeed of 8.0 km/hr.

Another large error may come from uncertainty of the flow rate during an extended run. The pressure drop across the particulate filter will increase with time during a run, because increased particulate loading reduces the number of pores through which air can flow. The flow rate decreases non-linearly with time because of nonuniformity of loading caused by changes in windspeed and direction and traffic flow. Simply averaging the startup and shutdown flow rates will probably produce an average flow rate different from the true average. To minimize this problem, the SFU were calibrated at startup and shutdown for the two hour runs and about every two hours for the longer runs. The flow rate did not change greatly during any one two hour period primarily because of the ballasting provided by the needle valves. Special calibrations were performed after the morning rush period (~ 9 A.M.) and before the afternoon rush period (~ 4 P.M.). The frequent calibrations maintained the average flow rate near the desired flow rate of either 5 l/min or 22.5 l/min. From the calibration curves for the two orifices used during the project and from the calibration record, it has been estimated that the error in the flow rate of 5 l/min was no more than 0.5 l/min. For the

22.5 l/min flow the estimated error was no larger than 2 l/min. This represents a 10% error.

A large error may be introduced into the analyses by the nature of the Nuclepore filters used in the SFU's. The surfaces of the filters are smooth and nonsticky, allowing large particles to fall off the filters during shipment and handling. In order to minimize these effects, the filters were always handled with the particulate covered surfaces up prior to their analysis by the TACB. However, it is not possible to testify to their handling by the United Parcel Service on the way to Davis, California for analysis there. Special 8.0 μm filters are now available from the Nuclepore Corporation that have an Apiezon L coating on their surfaces to minimize both particle bounce and falloff. These filters, however, were not available when this project was performed. The subject of particle falloff during shipment and handling will be discussed more fully in the next section.

Lundgren Impactors:

One error associated with the Lundgren impactor occurs because this impactor is very sensitive to changes in wind direction. It was attempted to reduce this error by frequently turning the impactor to face directly into the wind. However, this was not a very feasible approach to the problem since the wind direction was highly variable during some runs. In such cases it was possible to see banding on the Lundgren impactor drums because of wind direction shifts.

Another error occurred because of the uncertainty in determining the true flow rate during a run. A decreasing flow rate during a run, apparently due to particulate loading on the 0.4 μm Nuclepore afterfilter, caused the particulate fraction caught on each stage to be shifted to larger sizes. This also caused inaccuracies in determining the total flow through the afterfilters. In order to minimize these effects, the flow rate was checked periodically during each run to maintain a nearly constant flow rate. When Whatman 41 filters were used in the afterfilter, the flow rate was easily maintained at the desired 4.0 cfm, which implies that difficulties in flow control arose from excessive pressure drop across the 0.4 μm Nuclepore filters. Fines penetration through the Whatman 41 filters precluded their common use as the Lundgren afterfilters. The 0.4 μm Nuclepore filters were changed whenever the flow rate dropped more than about 30% below its starting value; the flow rate usually returned to its starting value at that time.

At a flow rate of 4.0 cfm, the first four stages of the Lundgren impactor have 50% cutpoints of approximately 15 μm, 5 μm, 2 μm, and 0.5 μm (Cahill, 1979; Environmental Research Corporation, Report 138M, April 1971). If the flow rate is allowed to drop 30% to 2.8 cfm, then the particle sizing classification increases to approximately 20 μm, 10 μm, 5 μm, and 1.0 μm. The flow rate decrease was not usually this drastic, although the Lundgren's were operated around 3.0 to 3.5 cfm.

For the above reasons then, the data from the Lundgren impactor strips have been reported in units of $\mu g/cm^2$ and should only be used to indicate general trends at each site and differences between sites. Even the latter use of the data may be somewhat misleading because of the time spread over which the samples were taken.

A/D Error:

The data collection system for this project employed a 12 bit analog to digital converter (A/D). The accuracy of this instrument is shown in Table 2, along with the accuracy of the traffic and meterological instru-

Table 2

Instrument Accuracy

| | Instrument | error |
|---|---|---|
| I. | A/D | 0.6% span drift, 0.25% zero drift |
| II. | Radar | |
| | a. overall count | 2% |
| | b. heavy duty vehicle fraction | 10% |
| | c. speed | 3 mph + 10% of reading |
| III. | Vertical Anemometer | 5% of span drift (max) * |
| IV. | Horizontal Anemometer | 1% of zero drift (max) *, ** |
| V. | Wind Vanes | 10° in Houston, 5° all other sites ** |
| VI. | Thermometers | 1.5°F |
| VII. | Psychrometer | 3% relative humidity * |
| VIII. | Pyranometer | 15 watts/square cm |

* Manufacturers Ratings, not checked by project personnel

** See text for more detailed error description ments. There are two possible errors in the A/D unit. First, the span or gain could drift, causing any input to be interpreted as some factor greater or less than its actual value. This error is expressed as a fixed fraction of any particular reading. It reaches its maximum magnitude at the maximum data value and vanishes completely at a data reading of zero. The second type of error, the zero or offset drift is one by which a zero input produces an apparent voltage. This error is constant over the entire range of input values and is usually expressed as a fraction of the full scale reading.

In this project, the gain was checked in ten channels every time the project was moved. If there was any significant span drift in those channels, the entire A/D was checked and calibrated. However, span drift never exceeded eight counts out of an input value of 1331, or 0.6%. It was felt this low error would not warrant the effort required to correct it. The zero drift was checked daily in twelve channels. It never exceeded ten counts or 0.25%. This was judged to be negligible in light of the errors found in the instruments themselves.

Traffic Parameter Errors:

The errors associated with the radar units were due primarily to the fact that this project required more than a simple global traffic count. The radar unit signals carried the traffic count, traffic speed, and heavy duty vehicle fraction on a lane by lane basis. It was decided that since this information was potentially quite valuable to a highway air pollution study, every effort should be made to record it.

There were three factors that influenced the quality of the radar data. First, the speed calibration remained quite stable and gave few problems. If the span reading was within 2 miles per hour (3%) of the desired 65-mile per hour reading, the unit was left alone. This parameter was checked weekly.

The second, and slightly more troublesome source of error was the range control which regulated the size of the unit's field of view. If the field of view was too large, the radar detected vehicles in adjacent lanes as well as misfiling the vehicles as to length. If the field of view was too small, the radar would misfile vehicles as to length and could easily miss the smaller vehicles. A rigorous check of the range required the use of an analog integrator and about fifteen minutes per radar. This type of check was accordingly made only when the project was moved to a new site or when a radar had to be replaced. A partial check could be made by observing the behavior of the indicator needle on the radar unit itself. This check was sufficient to assure the overall accuracy of the count, but not precise enough to assure 100% accurate vehicle length classification. The indicator needle check was typically made once per week. The third source of error resulted from the misalignment of the radar heads. The heads were supposed to be aligned at an angle of 45° with respect to the horizontal. Since the radar can only detect that component of the velocity which is directly toward or away from the radar head and since a change in the angle causes a change in the size of the field of view, an error of 5° in the angle results in an 8% error in the apparent speed and a 14% error in the apparent vehicle length. The heads were aligned to within 2° of the desired 45° angle at each site. However, at those sites where sign bridges were employed to support the radar units, vibrations misaligned the heads by as much as 10°. This was not corrected for unless the error became great enough to cause the unit to pick up vehicles in adjacent lanes or miss vehicles passing through the unit's field of view. Replacement units were aligned correctly.

Two methods were used to assess the accuracy of the radar units. The sampling towers at a site in Houston were placed in line with the already existing loop counters of a permanent counting station on IH610. A listing of the data from several typical one-hour counting periods during May 1976 is given in Table 3. Because the two counting systems did not agree, project personnel then used any available time to make manual counts lane by lane for five-minute periods to compare with the radar counts during the same time periods. The results of these counts were used to establish the overall accuracy of the radar units to within 2%. A typical comparison between manual and radar counts is shown in Table 4. The length categories were not as accurate since no true breakdown could be established between autos and pick-ups and vans (vehicle categories 1 and 2) or between short and long trucks (vehicle categories 3 and 4). However, the break between autos and trucks was fairly clear (within 10%). Manual counts were performed at all sites in order to maintain the high confidence levels in the radar counts.

Vertical Anemometers:

These instruments were not checked by project personnel. The values quoted here are those in the operator's manual. The primary source of error in these instruments is due to the fact that the propellers employed did not quite follow the cosine law with respect to wind angle. When the wind was within 2° of the horizontal (the vertical windspeed component was less than 3% of the horizontal component) the propeller stalled and did not turn at all. When the wind angle was at 45° with respect to the horizontal (the vertical component was as large as the horizontal component) the instrument read 5% low. In view of the instability in the vertical windspeed, these errors were regarded as negligible. The starting threshold for these instruments was quite low, 0.5 mile per hour (0.26 meter/sec.).

Horizontal Anemometers:

There were three sources of error in these instruments, only one of which was considered in the operator's manual. The starting threshold for these in-

Table 3. Comparison of Radar to Loop Counts

IH610 - Westbound

| Date | Time | Radar Count | Loop Counters | Ratio |
|---|---|---|---|---|
| May 15, 1976 | 1100 | 2284* | 3580 | 1.57 |
| | 1400 | 2077* | 3390 | 1.63 |
| May 19 | 1800 | 4448 | 5120 | 1.15 |
| May 20 | 0800 | 3924 | 4940 | 1.26 |
| | 0900 | 3487 | 4300 | 1.23 |
| | 1000 | 3000* | 3620 | 1.21 |
| | 1100 | 2971 | 3480 | 1.17 |
| | 1200 | 3032 | 3490 | 1.15 |
| | 1300 | 2816* | 3630 | 1.29 |
| May 25 | 1500 | 3441 | 3830 | 1.11 |
| | 1600 | 4230 | 4700 | 1.11 |
| | 1700 | 4772 | 5180 | 1.09 |
| | 1800 | 4868 | 5340 | 1.10 |
| May 26 | 0800 | 3311 | 3550 | 1.07 |
| | | | Mean: | 1.28 |
| | | | Std. dev.: | 0.21 |
| | | | Mean: | 1.15** |
| | | | Std. dev.: | .06** |

* One radar inactive

** Excludes times when one radar was inactive

Table 4

Comparison of Manual and Radar Traffic Counts

| Range of vehicles per 5 min. period | No. of 5 min. counts | Average % error | Std. dev. of % error |
|---|---|---|---|
| 1-20 | 49 | -5.4 | 16.9 |
| 21-40 | 33 | -1.0 | 7.1 |
| 41-60 | 7 | 2.8 | 5.7 |
| 61-80 | 6 | 2.3 | 5.3 |
| 81-100 | 7 | 2.2 | 2.2 |
| 101-120 | 1 | 3.6 | |
| 121-up | 4 | 2.2 | 1.9 |

struments was quoted as 0.75 mile per hour. This meant that in low windspeed conditions, typically found on late summer and fall mornings, the recorded windspeed was less than the actual windspeed. A second source of error was due to the mass of the anemometer cups. When a wind gust struck an instrument, it would spin at greater than the actual windspeed for some time thereafter. This meant that in gusty conditions, the recorded windspeed was higher than the actual windspeed. A third source of error had to do with the sensing of the windspeed. The instruments used a photo chopper and frequency to voltage converter to generate the requisite signal to the A/D. At windspeeds below 2 miles per hour, the output of the frequency to voltage converter began to break up into a series of spikes instead of a smooth voltage output. Since the A/D logged point values only, the wind appeared to be much more turbulent than was actually the case. Considerable care should be taken in low windspeed cases for this reason.

Wind Vanes:

The primary error in the wind vanes is due not to any error in the instrument, but instead to the alignment procedures used by project personnel. At all of the sites the vanes were pointed at landmarks and the bearings of these landmarks were used to compute correction factors. This procedure was accurate to within 5°. As the standard deviation of the wind direction was seldom below 15°, this error was considered negligible.

Thermometers:

The operator's manual stated that these instruments were accurate to within 0.5°F (0.3°C). However, when a test was made in Dallas which placed 2 instruments on the east face of the 100 ft tower and 2 instruments on the west face, all at the 35-foot level, it was observed that those on the east face read 0.75°F (0.4°C) higher than those on the west face in the mornings and the thermometers on the west face read 1.1°F (0.6°C) higher than those on the east face in the afternoons. From this it was infered that sunlight was causing a temperature rise in the instruments. The total error in the instruments was taken as the square root of the sum of the squares or 1.5°F (0.83°C).

Psychrometers:

The project personnel did not check the accuracy of the psychrometers. The operator's manual stated that the instruments were accurate to within 3% relative humidity.

Pyranometer:

The error in this data comes not from the instrument, but rather from an an amplifier used to magnify the signal to a level acceptable to the A/D. The voltage had to be boosted 41 times to be intelligible to the A/D. The amplifier used for this task had a maximum error of 1%. Since the maximum pyranometer reading expected in these latitudes is 1500 watts/sq cm, all pyranometer readings should be regarded as within 15 watts/sq cm of the correct value.

Comparison of TACB and UCD Analyses

As discussed in Chapter 4, some particulate samples were analyzed by both the Texas Air Control Board and the Air Quality Group at the University of California at Davis. Light particulate loading caused difficulties in analyzing some of the filters with the XRF system. The shape and loading characteristics of some of the filters and the size of the analysis beam caused some additional problems with the analyses by XRF. These filters were sent to the Air Quality Group for analysis on their PIXE system because of the greater sensitivity of that system (Ahlberg and Adams, 1978; Cahill, 1978) and the smaller size of the analysis beam. In addition, several samples covering all ranges of loadings were sent to UCD for reanalysis in order to achieve a direct comparison of the results from the two systems. The number of filters of all types that were analyzed by both groups are listed in Table 5 on a site by site basis.

There seem to be several major discrepencies between the analyses by the TACB and UCD. A comparison of the analyses from selected samples is shown in Table 6. As can be seen from this table, the concentration for one element might be higher for the UCD analysis of a sample than for the earlier TACB analysis of that same sample, while the reverse situation is true for other elements on that sample. Table 7 presents the results of a statistical analysis on selected samples listed in Table 5, subdivided according to filter type. Because many of the SFU filters from the two Dallas sites were too lightly loaded for adequate analysis on the TACB system these filters were not included in these statistical analyses. Thus, only the SFU filters from San Antonio (October 20, 1977) and El Paso (November 17, 1977) were included in the comparison (see Appendix A). The seven hivol filters analyzed came from the site located at IH30 and Motley Drive in Dallas; all of the Lundgren afterfilters were included in the statistical analyses, although some of them were also too lightly loaded for adequate TACB analysis. Table 7 gives the means and standard deviations of the UCD concentration/TACB concentration ratios for the selected samples. If an element was found by one group but not by the other, that null ratio was not included in these analyses. The data were widely scattered for most of the elements as indicated by the relative sizes of the means and the

Table 5. Filters Analyzed by Both the University of California at Davis and the Texas Air Control Board

| Site** | Instrument* SFU | HV | CAF | LA |
|---|---|---|---|---|
| Dallas I | 84 | -- | --- | 8 |
| Dallas II | 76 | 7 | 2 | 36 |
| San Antonio | 20 | -- | --- | 34 |
| El Paso | 18 | -- | --- | -- |
| Road Vacuuming | -- | -- | --- | -- |

* SFU: Stacked Filter Unit
HV: High Volume Air Sampler
CAF: High Volume Cascade Impactors (afterfilters)
LA: Lundgren Impactors (afterfilters)

** Site Location
Dallas I: Dallas, IH45 at Forest Avenue
Dallas II: Dallas, IH30 at Motley Drive
San Antonio: Loop 410 at Military Highway
El Paso: IH10 at Luna Street

TABLE 6. COMPARISON OF PARTICULATE SAMPLE ANALYSES
PERFORMED BY THE TEXAS AIR CONTROL BOARD AND THE UNIVERSITY OF CALIFORNIA AT DAVIS

Stacked Filter Unit - 0.4 μm Nucleopore Filter

| Sample Number | Ratio of UCD/TACB-Sample Date 10/20/77 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| Fe | 0.55 | 1.22 | 0.78 | 0.96 | 0.45 |
| Pb | 0.97 | 1.40 | 0.86 | 1.29 | 1.22 |
| Si | -- | 0.64 | 0.10 | 0.23 | 0.05 |
| K | 0.70 | -- | -- | -- | 0.48 |
| Br | 0.81 | 1.21 | 0.72 | 1.04 | 0.94 |

Stacked Filter Unit - 8.0 μm Nucleopore Filter

| Sample Number | Ratio of UCD/TACB-Sample Date 11/18/77 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| Fe | 0.11 | 0.50 | 0.85 | 0.47 | 0.29 |
| Pb | 0.64 | 1.15 | -- | 1.06 | 0.51 |
| Si | 0.11 | -- | 1.02 | -- | -- |
| K | 0.08 | 0.34 | 0.22 | 0.27 | 0.20 |
| Br | 0.89 | 0.89 | -- | -- | -- |

Lundgren Afterfilter

| Sample Number | Ratio of UCD/TACB-Sample Date 6/1-3/77,10/5/77 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| Fe | 0.65 | 1.19 | 4.95 | 1.06 | 3.70 |
| Pb | 1.71 | -- | 1.49 | 1.42 | 1.75 |
| Si | 0.02 | 0.17 | -- | 0.24 | 0.07 |
| K | 0.64 | 0.98 | -- | 1.42 | 2.62 |
| Br | 0.92 | -- | 0.82 | 1.18 | 1.34 |

Hivol Sampler

| Sample Number | Ratio of UCD/TACB-Sample Date 8/11/77 1 | 2 | 3 |
|---|---|---|---|
| Fe | 0.47 | 0 | 0.14 |
| Pb | 2.39 | 2.46 | 2.79 |
| Si | 0.05 | 0.04 | 0 |
| K | 1.92 | 1.99 | 2.16 |
| Br | 1.57 | 1.94 | 2.45 |

Table 7. Comparison of TACB and UCD Analyses

| Instrument | Filter | Element | Number of Observations | Ratio (UCD/TACB) Mean | Ratio (UCD/TACB) Standard Deviations |
|---|---|---|---|---|---|
| Stacked Filter Unit (SFU) | 8.0 μm Nuclepore | Al | 2 | 0.22 | 0.04 |
| | | Ca | 18 | 0.59 | 0.80 |
| | | Fe | 17 | 1.07 | 1.99 |
| | | K | 16 | 1.04 | 1.78 |
| | | Si | 14 | 0.75 | 1.32 |
| | | Br | 7 | 0.38 | 0.20 |
| | | Cl | 13 | 0.86 | 1.16 |
| | | Pb | 10 | 0.89 | 0.83 |
| | | S | 5 | 0.21 | 0.35 |
| | | Zn | 9 | 0.64 | 0.34 |
| SFU | 0.4 μm Nuclepore | Ca | 19 | 0.96 | 2.45 |
| | | Fe | 19 | 0.64 | 0.47 |
| | | K | 13 | 0.31 | 0.25 |
| | | Si | 17 | 0.23 | 0.35 |
| | | Br | 10 | 1.66 | 2.01 |
| | | Cl | 7 | 1.60 | 3.27 |
| | | Pb | 9 | 1.85 | 1.62 |
| | | S | 17 | 0.18 | 0.10 |
| | | Zn | 18 | 0.81 | 0.26 |
| Hivol | Whatman 41 | Ca | 6 | 0.92 | 0.66 |
| | | Fe | 2 | 0.33 | 0.24 |
| | | K | 3 | 2.17 | 0.29 |
| | | Si | 2 | 0.03 | 0.00 |
| | | Br | 4 | 2.05 | 0.82 |
| | | Cl | 5 | 0.50 | 0.20 |
| | | Pb | 5 | 2.33 | 0.46 |
| Lundgren | Whatman 41 After-filter | Ca | 8 | 1.62 | 1.76 |
| | | Fe | 5 | 1.11 | 0.43 |
| | | K | 3 | 1.45 | 0.67 |
| | | Si | 3 | 0.07 | 0.08 |
| | | Br | 4 | 0.88 | 0.09 |
| | | Cl | 3 | 0.15 | 0.08 |
| | | Pb | 4 | 1.13 | 0.15 |
| | | Zn | 8 | 0.96 | 0.23 |

Table 7 (Cont.)

| Instrument | Filter | Element | Number of Observations | Ratio (UCD/TACB) | |
|---|---|---|---|---|---|
| | | | | Mean | Standard Deviations |
| Lundgren | 0.4 μm Nuclepore After-filters | Ca | 41 | 1.44 | 2.12 |
| | | Fe | 8 | 1.41 | 1.19 |
| | | K | 9 | 1.34 | 1.79 |
| | | Si | 28 | 0.54 | 0.55 |
| | | Br | 23 | 4.86 | 5.00 |
| | | Cl | 10 | 0.65 | 0.43 |
| | | Pb | 24 | 3.96 | 3.37 |
| | | S | 37 | 0.77 | 0.57 |
| | | Zn | 52 | 2.50 | 4.09 |

standard deviations. This scatter would lead one to believe the data is very inconsistent, but the same general trends can be seen in the two analysis systems when their profiles are plotted. The comparison of these general trends and profiles are presented in the next section of this chapter.

One possible reason for the differences between the results of the two groups is that some particulates may simply have fallen off the filters between examinations. Since the surface of the Nuclepore filters is smooth and nonsticky, particulates are especially prone to falling off these filters. This is especially true of the particulates on the coarse filters and of the more elastic particles such as calcuim and silicon. There are three elements, lead, bromine, and, to a lesser extent, zinc, that do not appear to fall off the filters as easily (Cahill, 1979). Fine lead, in fact, seems to become physically bound to the filter surface and very little will be removed even by tearing the filters (Cahill, 1979). Particulates are not as prone to falling off the Whatman 41 filters because the particulates become enmeshed in the fibers.

Another discrepency between the results of the two systems may occur under low loading conditions. In such cases an element may have been present in smaller quantities than the XRF system could detect, but in quantities large enough for the more sensitive PIXE system to detect. Ahlberg and Adams (1978) have stated that the PIXE system is approximately three times as sensitive as the XRF system. The minimum sensitivities are largely determined by counting statistics, which are determined, in turn, primarily by filter material, filter thickness, and analysis beam characteristics. Whatman 41 filter paper is normally the thickest substrate used (~10 $mg/cm^2$) because of the exponentially increasing absorption losses in thicker substrates. Nuclepore membranes are much thinner than this, weighing 1.0 $mg/cm^2$ and

0.9 $mg/cm^2$ for the 8.0 μm and 0.4 μm filters, respectively. The minimum sensitivities of the two systems are given in Tables 8 and 9. The minimum sensitivities for the XRF system were obtained from Rhodes (1975) and are given only for Whatman 41 substrates. The values for Nuclepore filters will be no larger than these values, and probably much smaller. The values for the minimum sensitivities in terms of $\mu g/m^3$ given in Table 9, were calculated from the values in terms of $\mu g/cm^2$ by making use of the filter collection area, the flow rate, and the length of the run. The minimum sensitivities for the UCD analyses represent the maximum value supplied with the data for a particular filter type. These values were supplied with the data on a filter by filter basis and represented the minimum sensitivity for a missing element. These sensitivities change from filter to filter depending primarily upon the filter thickness, average particle size, and the amount and number of other elements present on the filter. One more discrepency between the two systems can arise because of differences in the calibration of the two systems. These blank and matrix correction factors are determined by the characteristics of the filter and the nature of the particulate loading on the two filters. The effects due to particulate loading are particularly sensitive to the relative sizes of the particulates on the working and calibration filters. These particle size effects are caused by significant absorption or enhancement of the fluorescent radiation within single grains. The problem is most serious for particles larger than 5 μm and for the light elements (i.e., iron, silicon, calcium). If the matrix correction factor for an element has a value near one, it is not necessary that the two calibration standards be composed of the same size particles, or that the field collected samples have the same size particles as the calibration

Table 8. Comparison of XRF and PIXE Minimum Sensitivities

| Analysis System | | Detection Limit (μg/cm² of filter) XRF | PIXE | | |
|---|---|---|---|---|---|
| Filter Type | | Whatman 41 | Whatman 41 | Nuclepore (8.0 μm) | Nuclepore (0.4 μm) |
| Element | Atomic Number | | | | |
| Al | 13 | 1.0 | 0.60 | 0.29 | 0.13 |
| Si | 14 | 1.0 | 0.55 | 0.20 | 0.10 |
| P | 15 | 0.5 | | | |
| S | 16 | 0.3 | 0.45 | 0.10 | 0.10 |
| Cl | 17 | 0.15 | 0.45 | 0.10 | 0.10 |
| K | 19 | 0.05 | 0.45 | 0.08 | 0.05 |
| Ca | 20 | 0.03 | 0.40 | 0.07 | 0.033 |
| Ti | 22 | 0.015 | 0.23 | 0.04 | 0.030 |
| V | 23 | 0.010 | 0.23 | 0.035 | 0.030 |
| Cr | 24 | 0.030 | 0.20 | 0.035 | 0.030 |
| Mn | 25 | 0.15 | 0.20 | 0.030 | 0.030 |
| Fe | 26 | 0.09 | 0.20 | 0.090 | 0.10 |
| Co | 27 | 0.065 | | | |
| Ni | 28 | 0.060 | 0.17 | 0.025 | 0.022 |
| Cu | 29 | 0.040 | 0.13 | 0.020 | 0.020 |
| Zn | 30 | 0.040 | 0.13 | 0.020 | 0.08 |
| As | 33 | 0.025 | | | |
| Br | 35 | 0.023 | 0.28 | 0.10 | 0.08 |
| Zr | 40 | 0.090 | 0.90 | 0.12 | 0.12 |
| Ba | 56 | 0.35 | 0.80 | 0.12 | 0.10 |
| Pb | 82 | 0.05 | 0.60 | 0.12 | 0.10 |

Table 9. Comparison of XRF and PIXE Minimum Sensitivities at Standard Operating Conditions

| Analysis System | | XRF | PIXE | | | | |
|---|---|---|---|---|---|---|---|
| | | Detection Limits ($\mu g/m^3$) | | | | | |
| Filter Types | | Whatman 41 | Whatman 41 | Nuclepore 8.0 μm | | Nuclepore 0.4 μm | |
| Flow Rates ($m^3/min$) | | 1.331 | 1.331 | 0.005 | 0.0225 | 0.005 | 0.0225 |
| Run Time (hrs) | | 2 | 2 | 2 | 11 | 2 | 11 |
| Element | Atomic Number | | | | | | |
| Al | 13 | 2.4 | 1.54 | 6.8 | 0.27 | 3.0 | 0.12 |
| Si | 14 | 2.4 | 1.41 | 4.7 | 0.19 | 2.3 | 0.094 |
| S | 16 | 0.8 | 1.16 | 2.3 | 0.094 | 2.3 | 0.094 |
| Cl | 17 | 0.36 | 1.16 | 2.3 | 0.094 | 2.3 | 0.094 |
| K | 19 | 0.12 | 1.16 | 1.9 | 0.075 | 1.2 | 0.047 |
| Ca | 20 | 0.07 | 1.03 | 1.6 | 0.066 | 0.77 | 0.031 |
| Ti | 22 | 0.036 | 0.59 | 0.93 | 0.038 | 0.70 | 0.028 |
| V | 23 | 0.024 | 0.59 | 0.82 | 0.038 | 0.70 | 0.028 |
| Cr | 24 | 0.072 | 0.51 | 0.82 | 0.038 | 0.70 | 0.028 |
| Mn | 25 | 0.36 | 0.51 | 0.70 | 0.028 | 0.70 | 0.028 |
| Fe | 26 | 0.22 | 0.51 | 2.1 | 0.085 | 2.3 | 0.094 |
| Ni | 28 | 0.14 | 0.44 | 0.58 | 0.024 | 0.51 | 0.021 |
| Cu | 29 | 0.10 | 0.33 | 0.47 | 0.019 | 0.47 | 0.019 |
| Zn | 30 | 0.10 | 0.33 | 0.47 | 0.019 | 1.9 | 0.075 |
| Br | 35 | 0.055 | 0.72 | 2.3 | 0.094 | 1.9 | 0.075 |
| Zr | 40 | 0.14 | 2.31 | 2.8 | 0.11 | 2.8 | 0.11 |
| Ba | 56 | 0.84 | 2.05 | 2.8 | 0.11 | 2.3 | 0.094 |
| Pb | 82 | 0.12 | 1.54 | 2.8 | 0.11 | 2.3 | 0.094 |

standards. However, as these factors become increasingly different from one, the fact that different calibration standards were used to calculate the matrix correction factors becomes increasingly important. For the elements lead, bromine, and zinc these matrix factors are usually close to one (e.g., $<1.05$), but for those elements lighter than calcium (i.e., chlorine, silicon, aluminum) these factors are generally greater than 1.3. These matrix correction factors become especially unreliable for those elements lighter than calcium when they are on a Whatman 41 substrate because absorption and geometric loss corrections become very important (Cahill, 1979; O'Conner, et al., 1975).

In addition to these general explanations for the discrepencies between the filters, a specific mechanism may occur for bromine loss on the filters. The bromine in automotive exhaust comes primarily from antiknock compounds containing ethylene dibromide and ethylene dichloride (Robbins and Snitz, 1972). These compounds react in the engine with the alkyl lead compounds present in leaded gasoline to form unstable lead halides. These compounds may be emitted directly into the air through the exhaust or they may collect in the exhaust train. Most of the bromine loss will occur from these halides within the first hour of their production (Ter Haar and Bayard, 1971; Robbins and Snitz, 1972). The most rapid loss comes from the lead halide, $PbBr_2$, with slower loss coming from PbClBr (Martens, et al., 1973). The former compound comes primarily from fresh automotive exhaust, while the latter compound comes primarily from particulate buildup in the exhaust train of the automobile. Habibi (1970) has shown that as little as 15% of the lead burned in an engine under simulated driving conditions is actually emitted from the exhaust. The lead halides that collect in the exhaust train of the automobile then flake out of the exhaust during acceleration and irregularly at other times. In addition to these bromine losses before and after collection, bromine is also lost when the sample is exposed to X-radiation during multi-element analyses (O'Connor, et al., 1977).

Discussion of Elemental Profiles and Comparison of TACB and UCD Analyses Using These Profiles

Data were selected from two representative days to draw horizontal and vertical profiles for lead, bromine, iron, and total suspended particulates (TSP) using data from the SFU filters. In addition, for comparitive analysis, all the filters from the ten operating SFU units for both days were analyzed by the Texas Air Control Board (TACB) and the Air Quality Group at the University of California at Davis (UCD).

The first day selected was October 20, 1977 in San Antonio. The run duration was 10.75 hours (0700-1745), during which time the wind direction did not vary significantly for more than one hour of the run duration. Figures 14 - 17 show the horizontal profiles for lead, bromine, iron, and TSP. Figures 14 and 15 show lead and bromine concentrations decreasing with increasing distance from the roadway for both the TACB and UCD analyses. The horizontal iron profile, Figure 16, does not show the same pattern of decreasing concentration with increasing distance. However, both the TACB and the UCD analyses show the same pattern. The iron concentrations found from the fine (0.4 μm) filters do not vary with horizontal distance. The horizontal TSP profile, Figure 17, shows the fine particulate concentrations decreasing with increased distance from the roadway. The TSP profile for the coarse particulates does not show this same pattern.

Figures 18 - 21 show the vertical profiles for lead, bromine, iron and TSP from October 20, 1977 data from San Antonio. The fine lead and bromine particulate concentrations, captured by the 0.4 μm pore filter, show decreasing

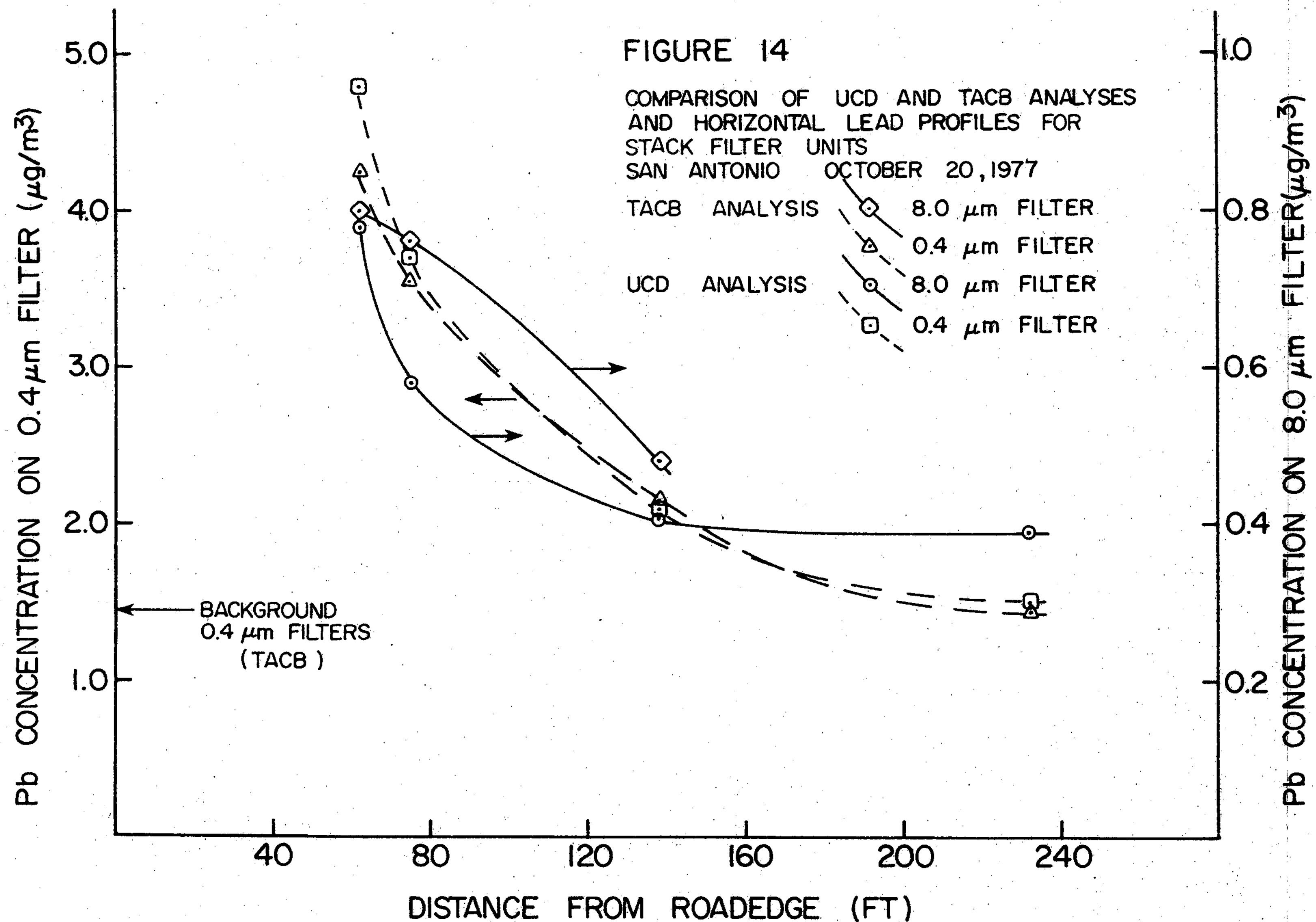



FIGURE 14

COMPARISON OF UCD AND TACB ANALYSES AND HORIZONTAL LEAD PROFILES FOR STACK FILTER UNITS
SAN ANTONIO OCTOBER 20, 1977

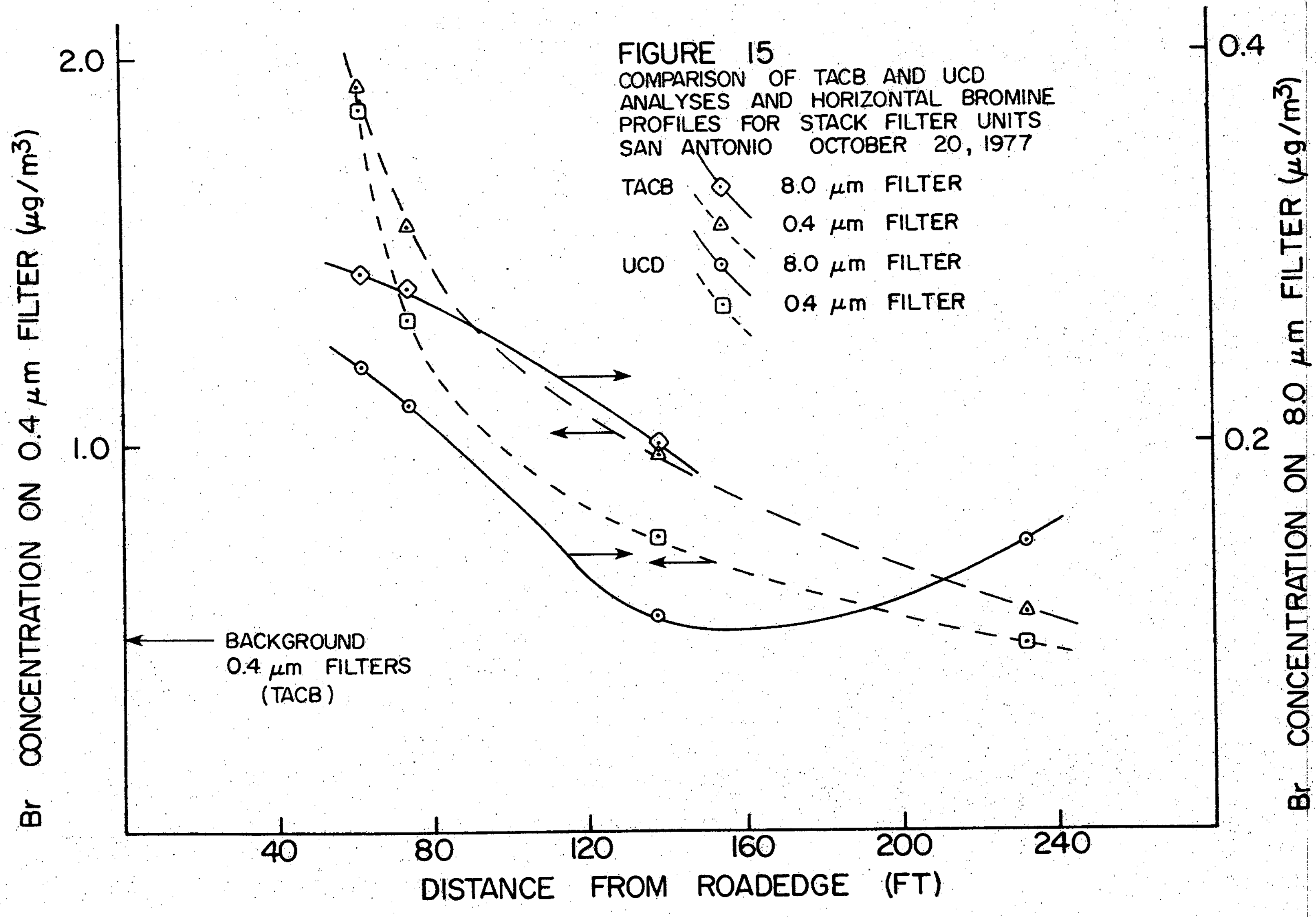



FIGURE 15
COMPARISON OF TACB AND UCD ANALYSES AND HORIZONTAL BROMINE PROFILES FOR STACK FILTER UNITS SAN ANTONIO OCTOBER 20, 1977

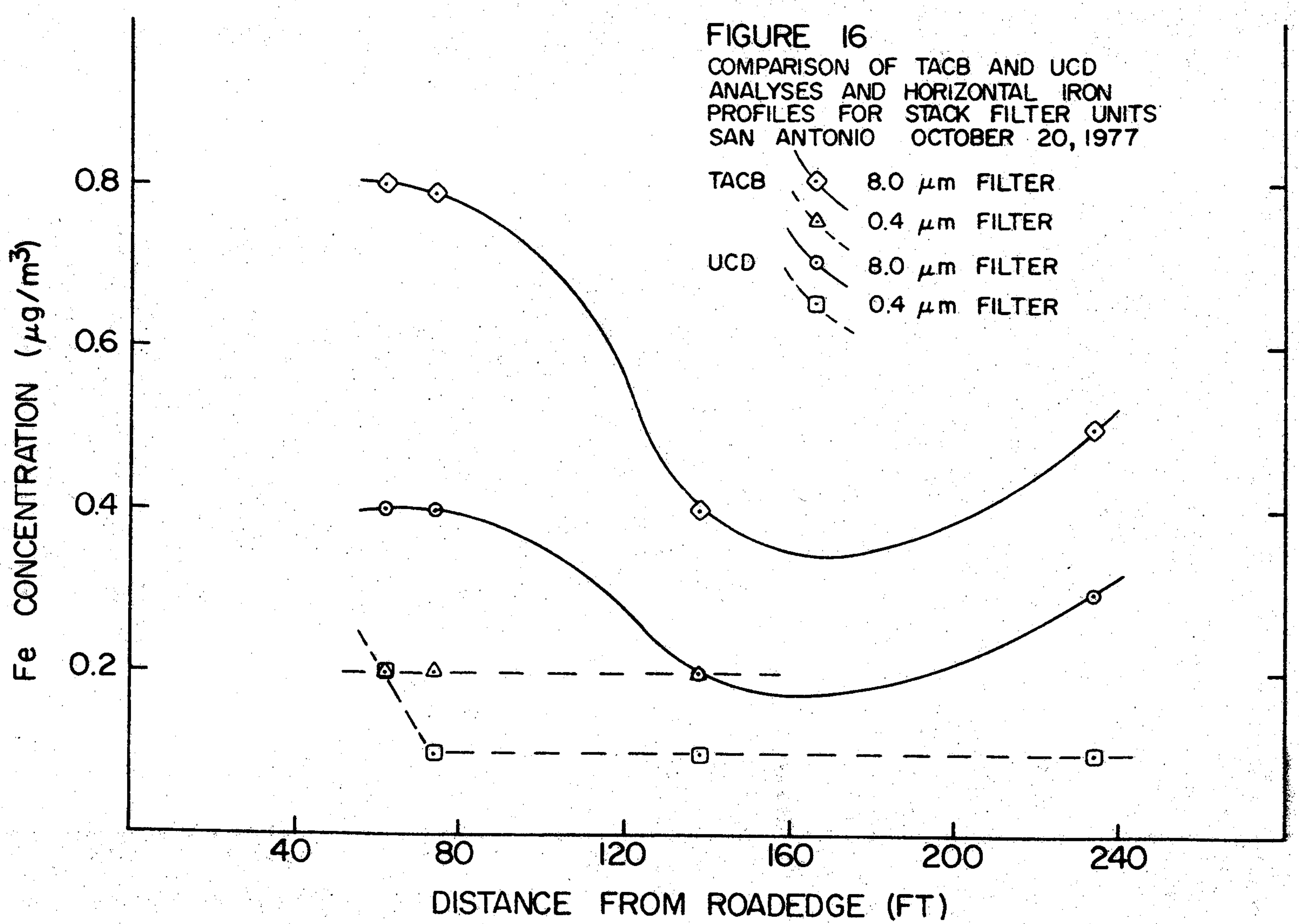



FIGURE 16
COMPARISON OF TACB AND UCD ANALYSES AND HORIZONTAL IRON PROFILES FOR STACK FILTER UNITS SAN ANTONIO OCTOBER 20, 1977

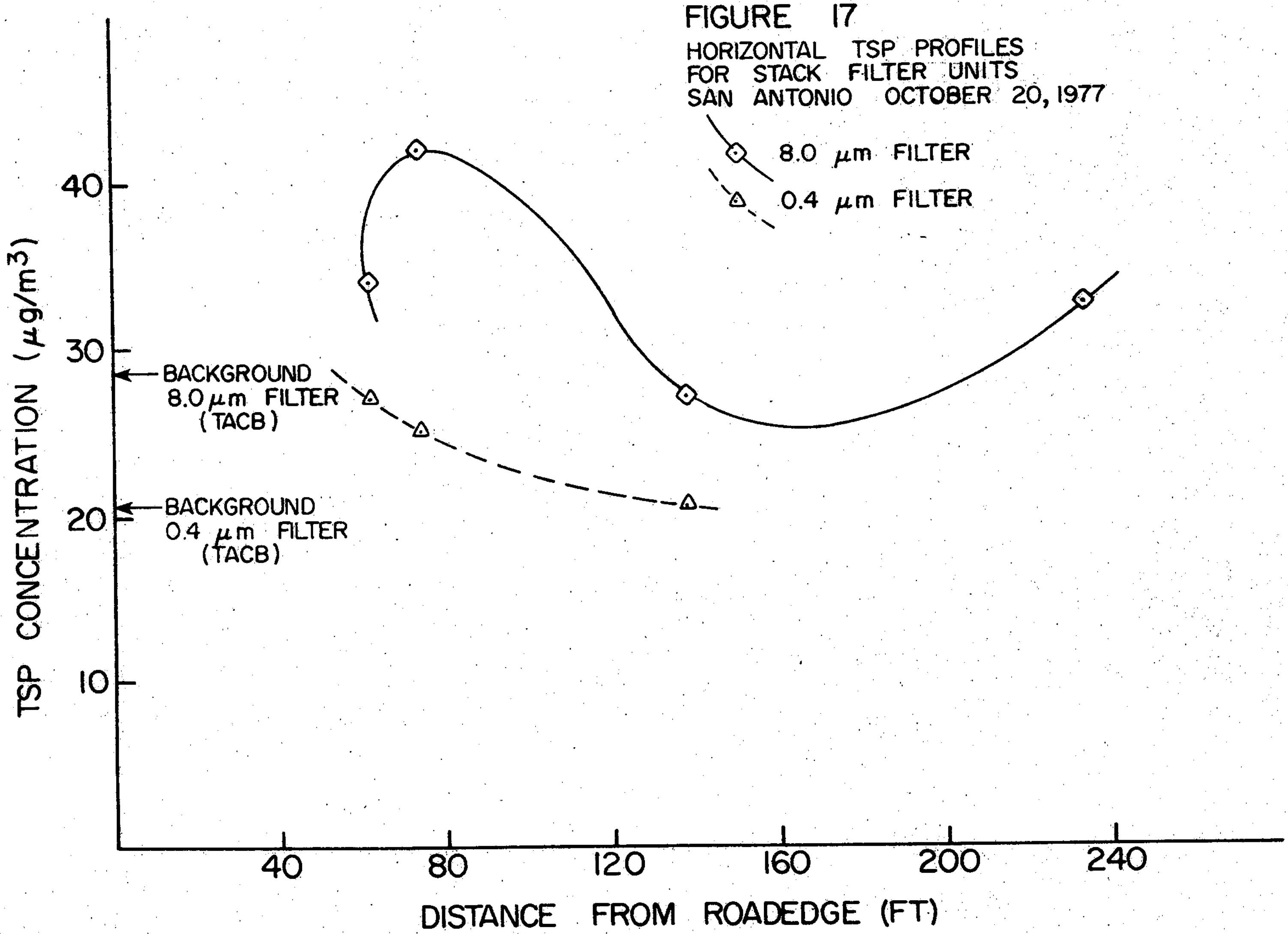



FIGURE 17
HORIZONTAL TSP PROFILES
FOR STACK FILTER UNITS
SAN ANTONIO OCTOBER 20, 1977

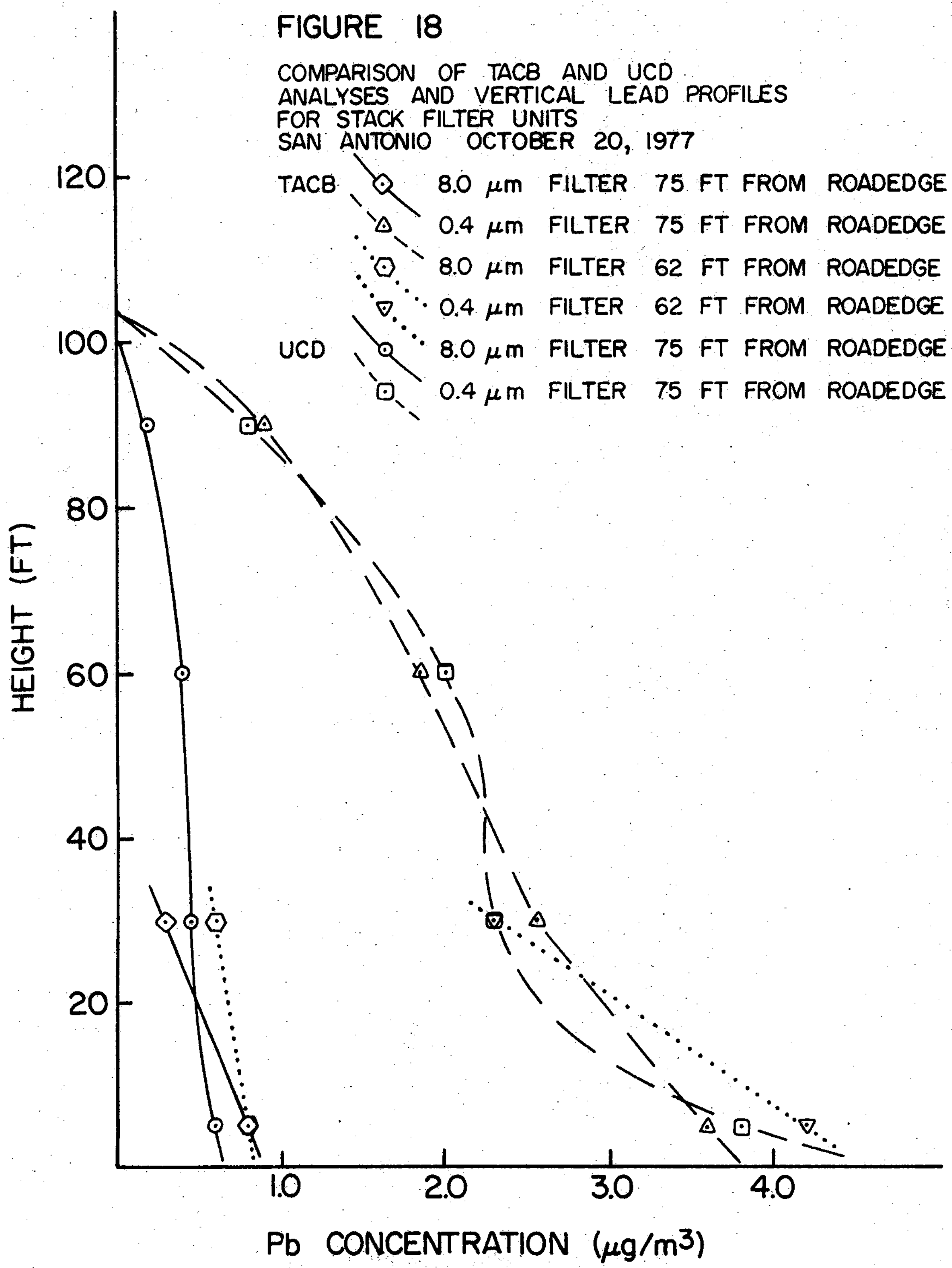


FIGURE 18
COMPARISON OF TACB AND UCD ANALYSES AND VERTICAL LEAD PROFILES FOR STACK FILTER UNITS
SAN ANTONIO OCTOBER 20, 1977
TACB
8.0 μm FILTER 75 FT FROM ROADEDGE
0.4 μm FILTER 75 FT FROM ROADEDGE
8.0 μm FILTER 62 FT FROM ROADEDGE
0.4 μm FILTER 62 FT FROM ROADEDGE
UCD
8.0 μm FILTER 75 FT FROM ROADEDGE
0.4 μm FILTER 75 FT FROM ROADEDGE
HEIGHT (FT)
120
100
80
60
40
20
1.0
2.0
3.0
4.0
Pb CONCENTRATION (μg/m3)

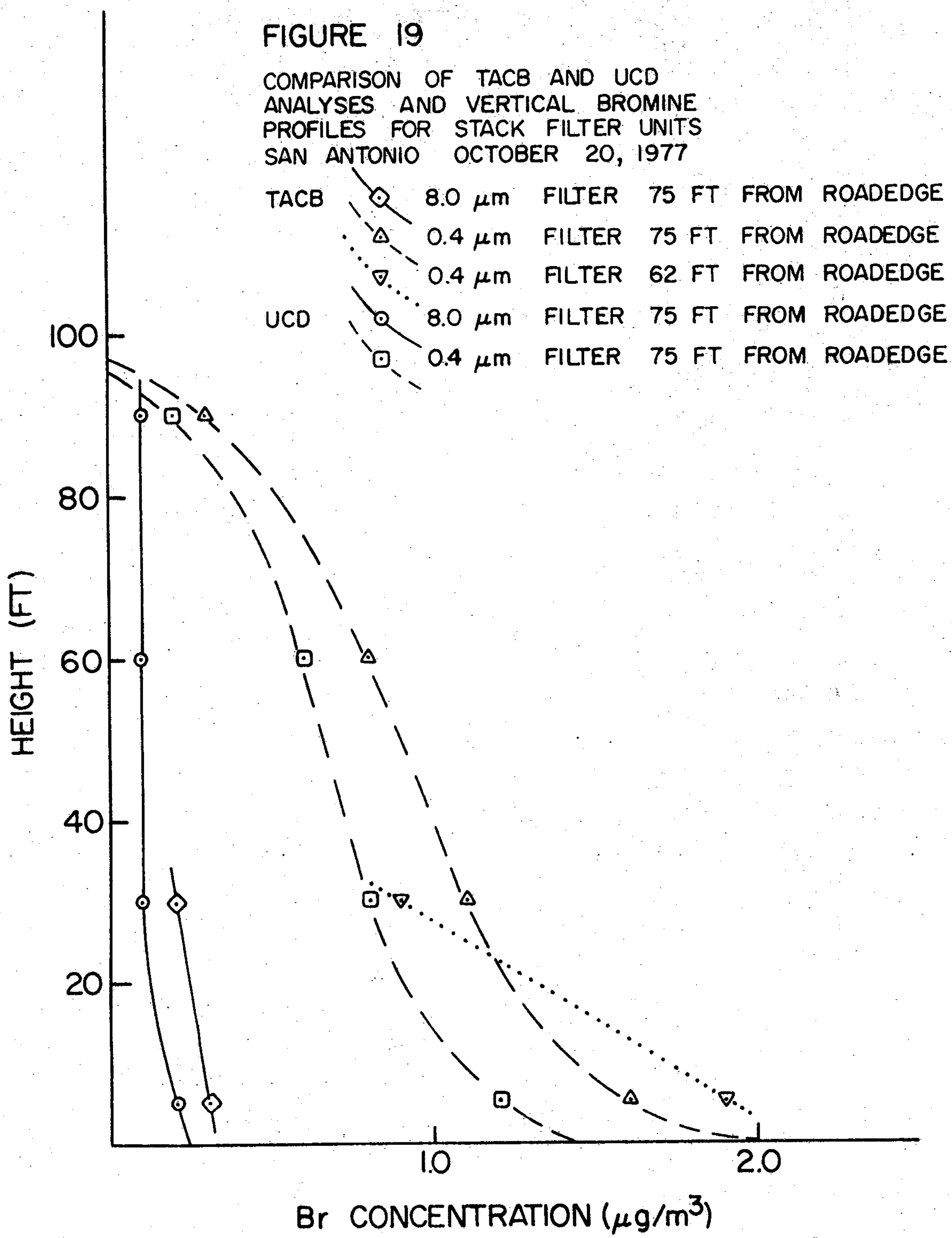


FIGURE 19
COMPARISON OF TACB AND UCD
ANALYSES AND VERTICAL BROMINE
PROFILES FOR STACK FILTER UNITS
SAN ANTONIO OCTOBER 20, 1977
TACB
8.0 μm FILTER 75 FT FROM ROADEDGE
0.4 μm FILTER 75 FT FROM ROADEDGE
0.4 μm FILTER 62 FT FROM ROADEDGE
UCD
8.0 μm FILTER 75 FT FROM ROADEDGE
0.4 μm FILTER 75 FT FROM ROADEDGE
HEIGHT (FT)
100
80
60
40
20
1.0
2.0
Br CONCENTRATION (μg/m3)

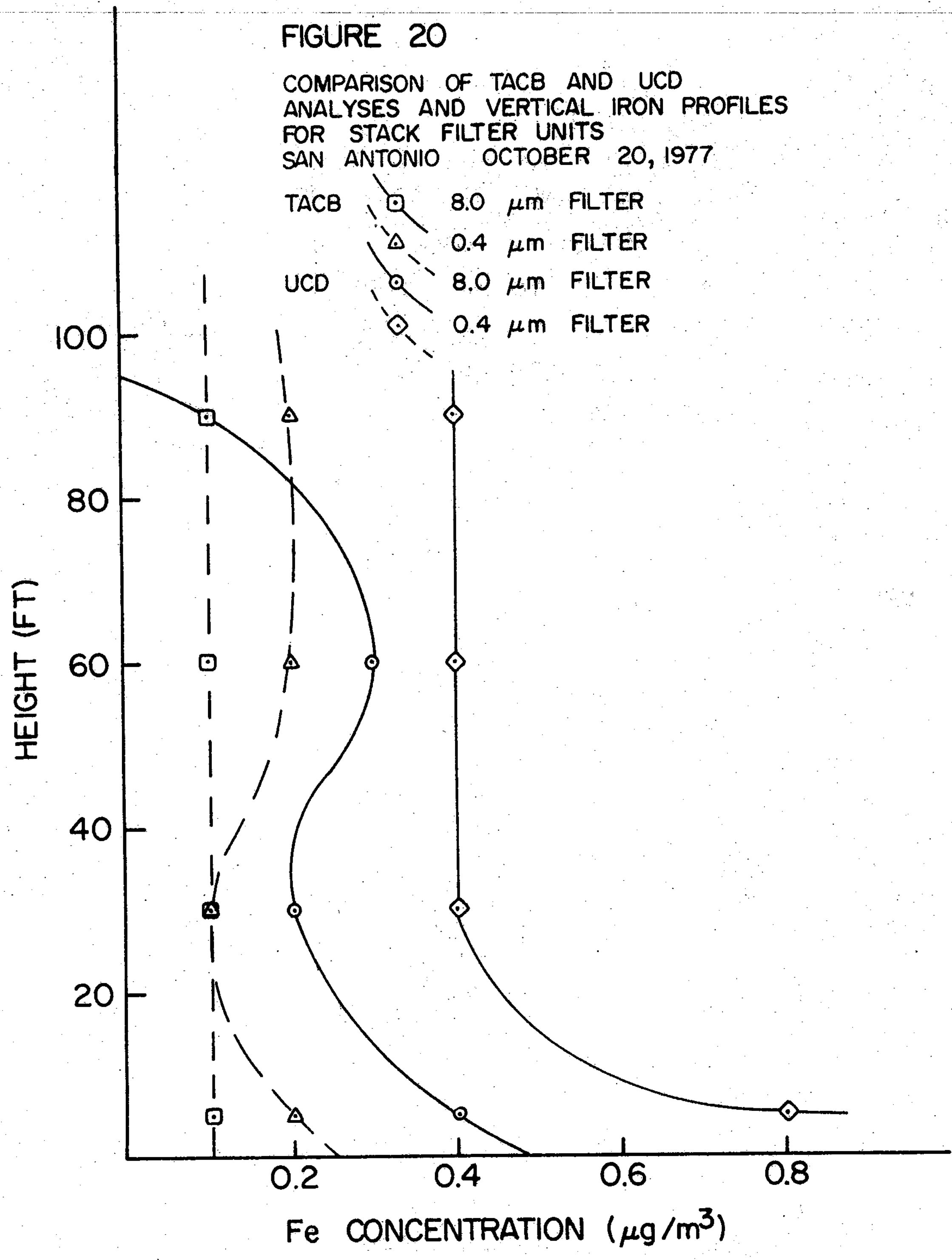


FIGURE 20
COMPARISON OF TACB AND UCD ANALYSES AND VERTICAL IRON PROFILES FOR STACK FILTER UNITS
SAN ANTONIO OCTOBER 20, 1977
TACB
8.0 μm FILTER
0.4 μm FILTER
UCD
8.0 μm FILTER
0.4 μm FILTER
HEIGHT (FT)
100
80
60
40
20
0.2
0.4
0.6
0.8
Fe CONCENTRATION (μg/m3)

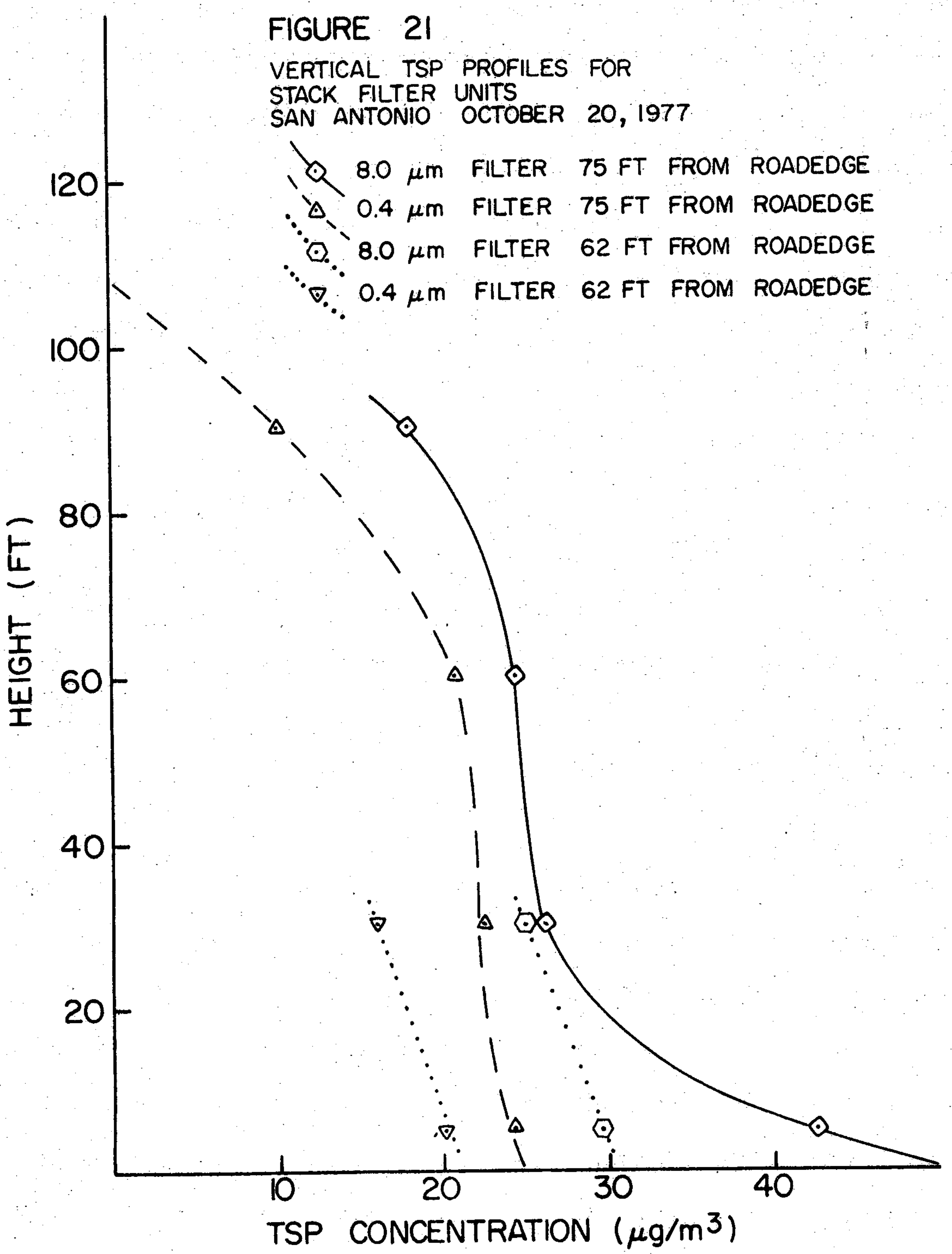


FIGURE 21
VERTICAL TSP PROFILES FOR
STACK FILTER UNITS
SAN ANTONIO OCTOBER 20, 1977
8.0 μm FILTER 75 FT FROM ROADEDGE
0.4 μm FILTER 75 FT FROM ROADEDGE
8.0 μm FILTER 62 FT FROM ROADEDGE
0.4 μm FILTER 62 FT FROM ROADEDGE
HEIGHT (FT)
120
100
80
60
40
20
10
20
30
40
TSP CONCENTRATION (μg/m3)

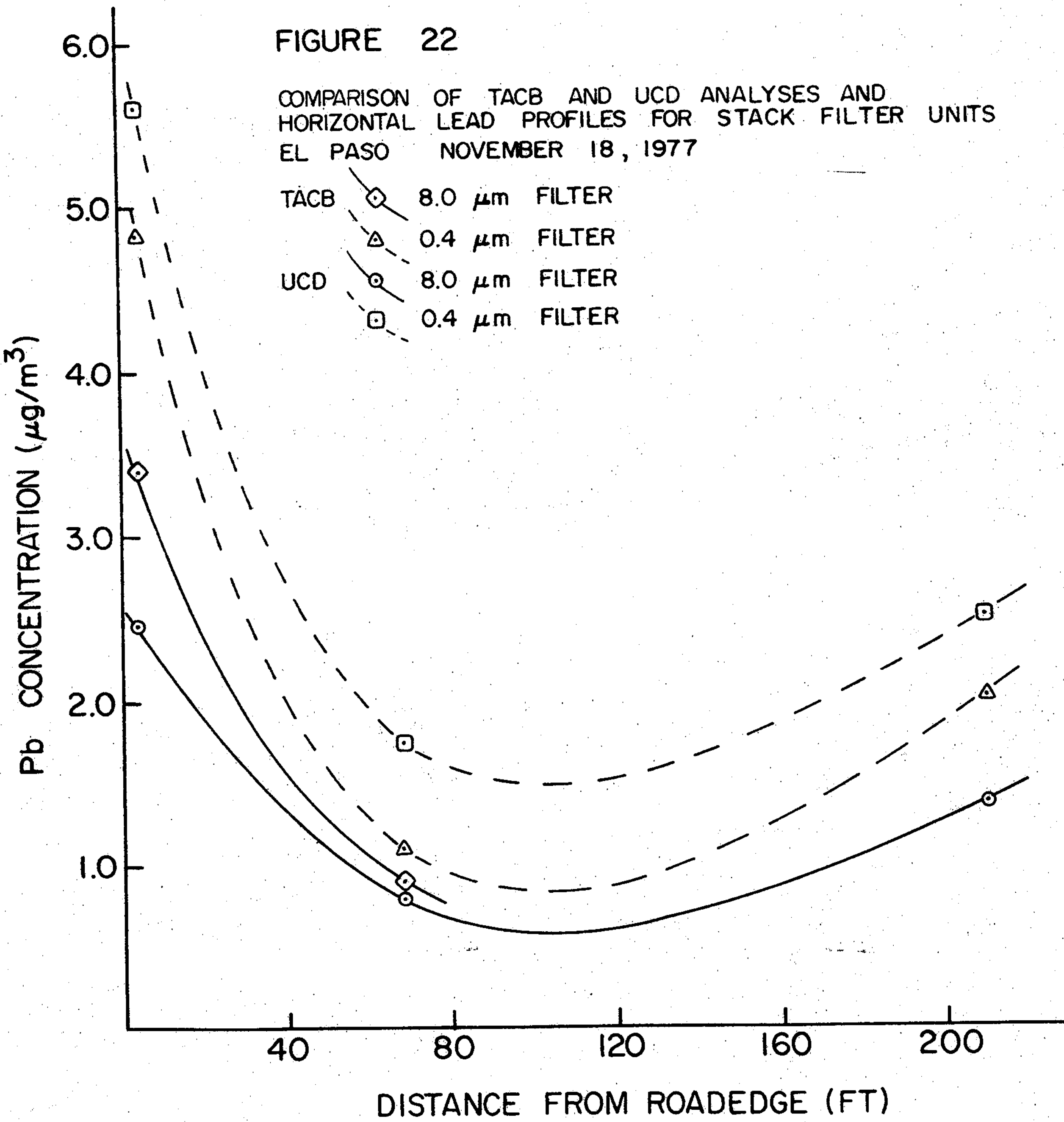
concentrations with increased height. The TACB and UCD analyses for the fine lead and bromine particulates agree closely. The coarse lead and bromine particulate concentrations vary only 0.2 μg/$m^3$, for both analysis systems, over the 85 foot altitude difference, suggesting coarse lead particulates had a fairly constant concentration with height at a distance of 75 feet from the road edge where the sampling tower was located. The vertical iron profile shows no definite concentration variation with height as shown in Figure 20. The TACB and UCD iron profiles do not show the same trends, probably due to the different detection limits for the two different analysis systems, since the concentrations were less than an order of magnitude above these detection limits. Figure 21 shows the TSP concentrations decreasing with increased altitude.

Figures 22 - 29 are the horizontal and vertical profiles for lead, bromine, iron and TSP from the El Paso data on November 18, 1977. The run duration was 4.25 hours (0645 - 1100). During this time the wind was varying from parallel to the roadway to perpendicular. Fifteen minute averages indicate the wind direction frequently varied by 90 degrees or more over a 30 foot altitude difference.

Figures 22 and 23 show no particular patterns in the lead and bromine horizontal profiles, although the TACB and UCD analyses show the same trends. The TACB and UCD analyses of the fine bromine particulates, captured by the 0.4 μm Nuclepore filter, show practically identical results. The horizontal iron profile from the El Paso data is shown in Figure 24. The TACB analyses show larger iron concentrations, on both the fine (0.4 μm) and the coarse (8.0 μm) filters, than the UCD analyses did. This difference may have been due to particulate losses during shipment before the UCD analyzed the filters. The fine

FIGURE 22

COMPARISON OF TACB AND UCD ANALYSES AND HORIZONTAL LEAD PROFILES FOR STACK FILTER UNITS
EL PASO NOVEMBER 18, 1977



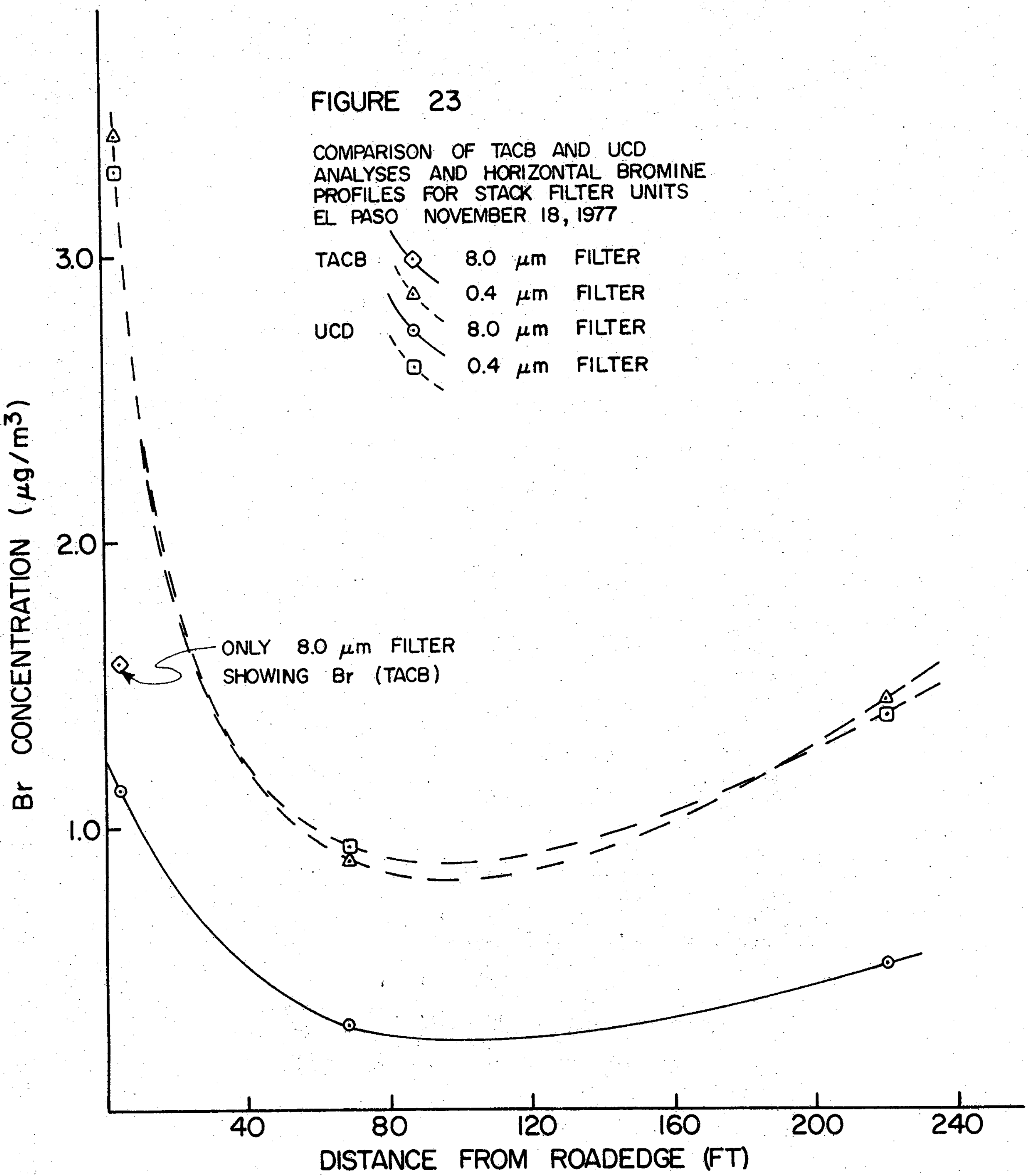


FIGURE 23
COMPARISON OF TACB AND UCD ANALYSES AND HORIZONTAL BROMINE PROFILES FOR STACK FILTER UNITS
EL PASO NOVEMBER 18, 1977
TACB
8.0 μm FILTER
0.4 μm FILTER
UCD
8.0 μm FILTER
0.4 μm FILTER
ONLY 8.0 μm FILTER SHOWING Br (TACB)
Br CONCENTRATION (μg/m3)
3.0
2.0
1.0
40
80
120
160
200
240
DISTANCE FROM ROADEDGE (FT)

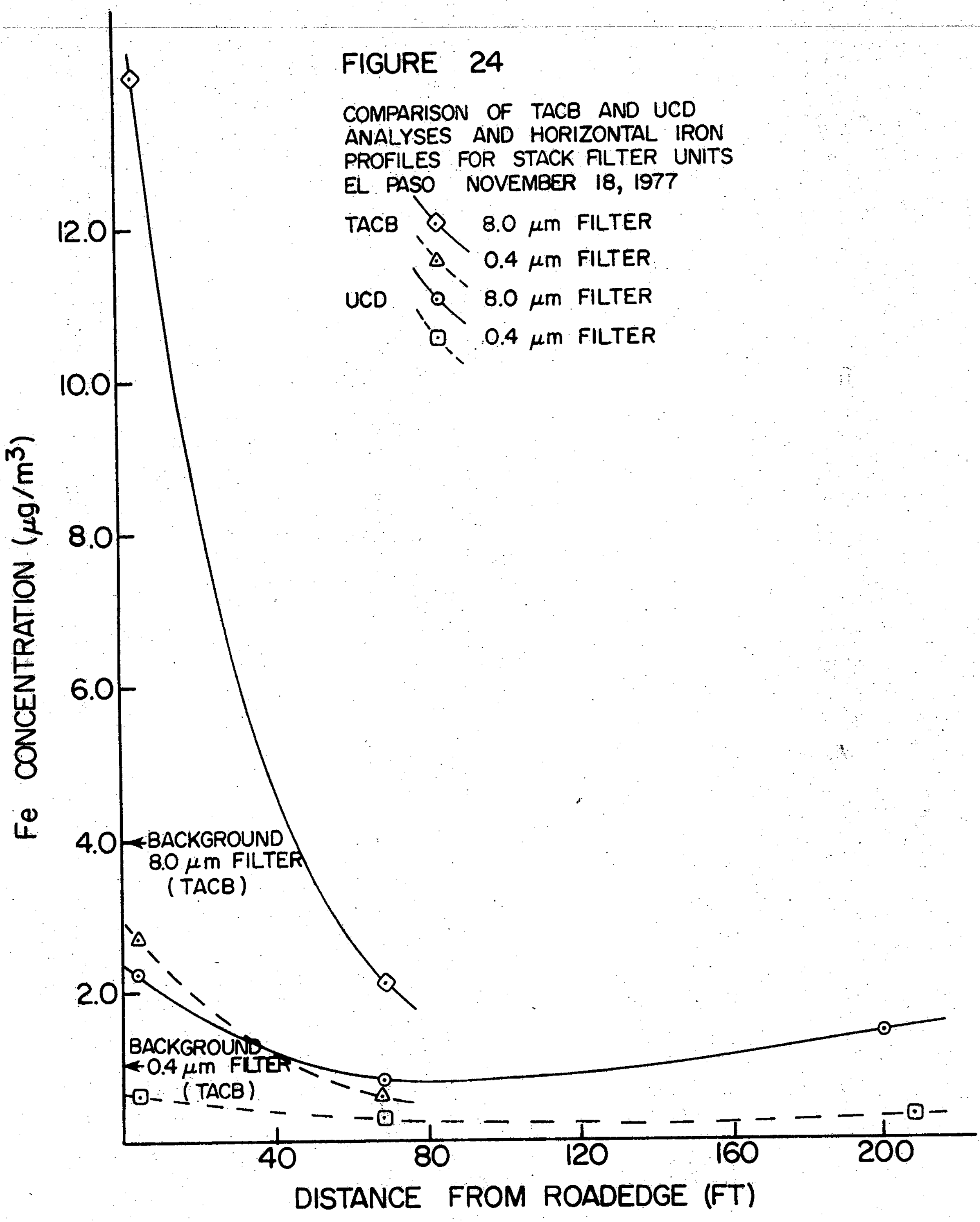


FIGURE 24
COMPARISON OF TACB AND UCD ANALYSES AND HORIZONTAL IRON PROFILES FOR STACK FILTER UNITS
EL PASO NOVEMBER 18, 1977
TACB
8.0 μm FILTER
0.4 μm FILTER
UCD
8.0 μm FILTER
0.4 μm FILTER
12.0
10.0
8.0
6.0
4.0
2.0
Fe CONCENTRATION (μg/m3)
BACKGROUND 8.0 μm FILTER (TACB)
BACKGROUND 0.4 μm FILTER (TACB)
40
80
120
160
200
DISTANCE FROM ROADEDGE (FT)

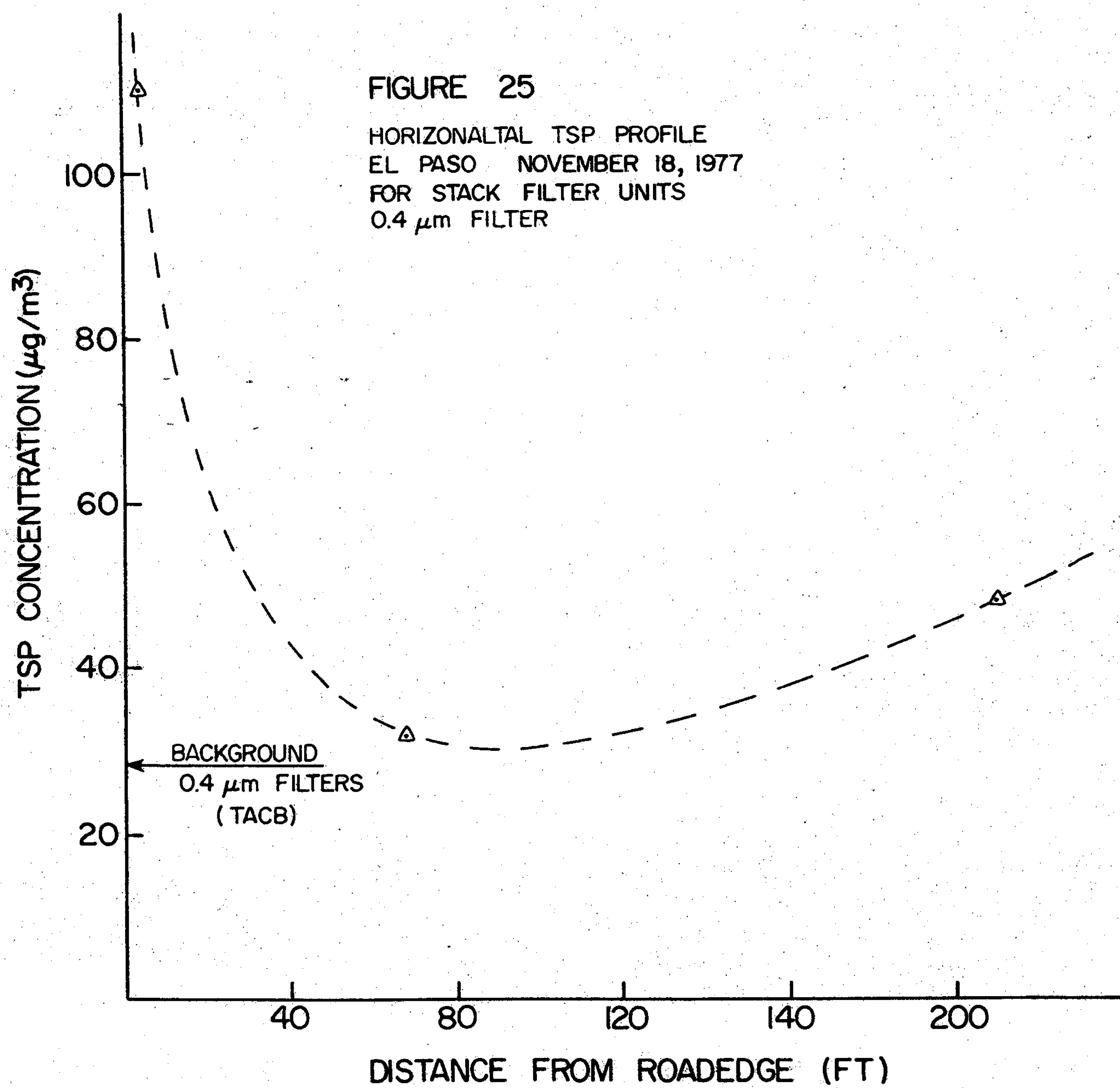



FIGURE 25

HORIZONALTAL TSP PROFILE
EL PASO NOVEMBER 18, 1977
FOR STACK FILTER UNITS
0.4 µm FILTER

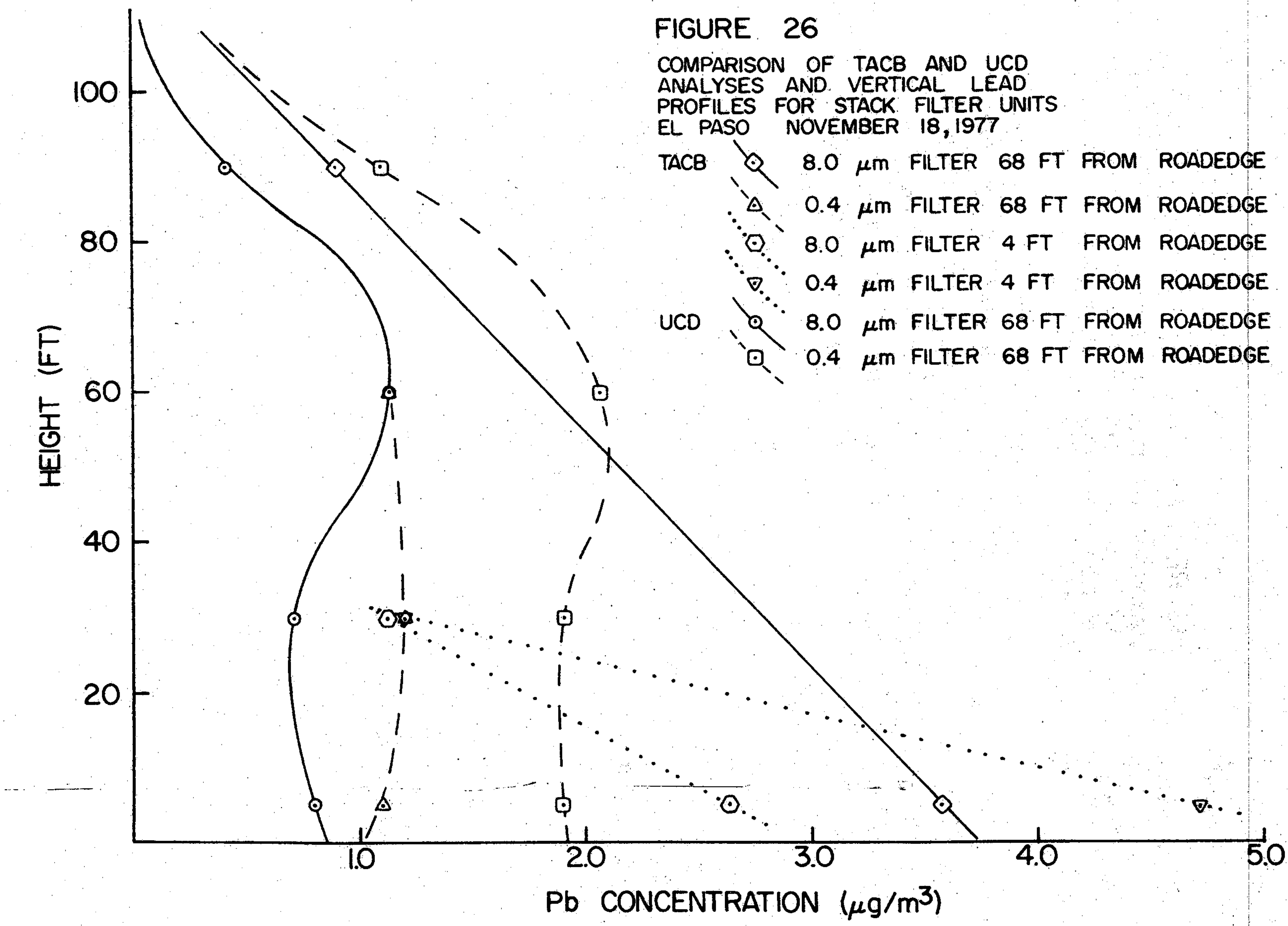



FIGURE 26

COMPARISON OF TACB AND UCD ANALYSES AND VERTICAL LEAD PROFILES FOR STACK FILTER UNITS EL PASO NOVEMBER 18, 1977

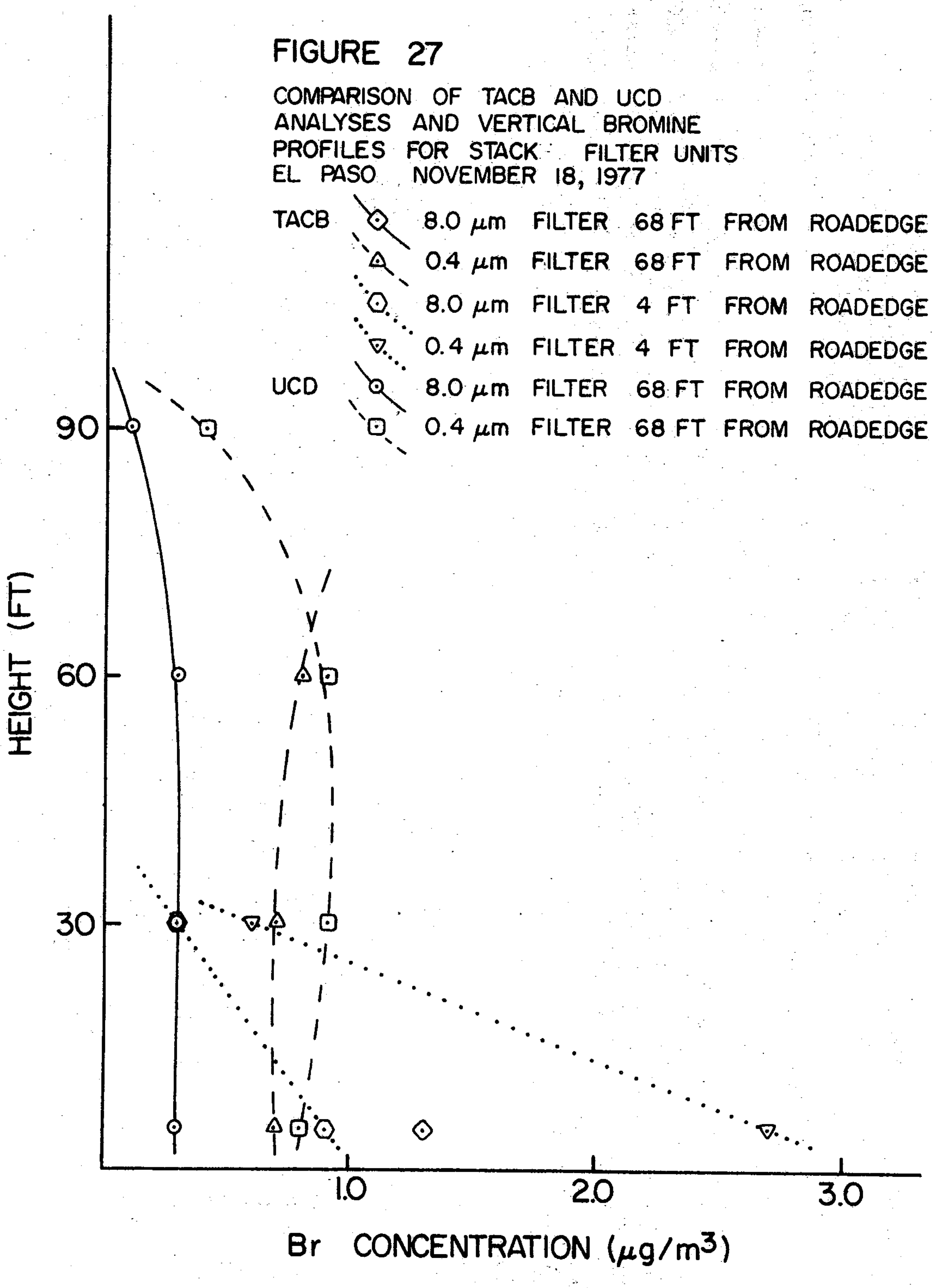



FIGURE 27

COMPARISON OF TACB AND UCD ANALYSES AND VERTICAL BROMINE PROFILES FOR STACK FILTER UNITS EL PASO NOVEMBER 18, 1977

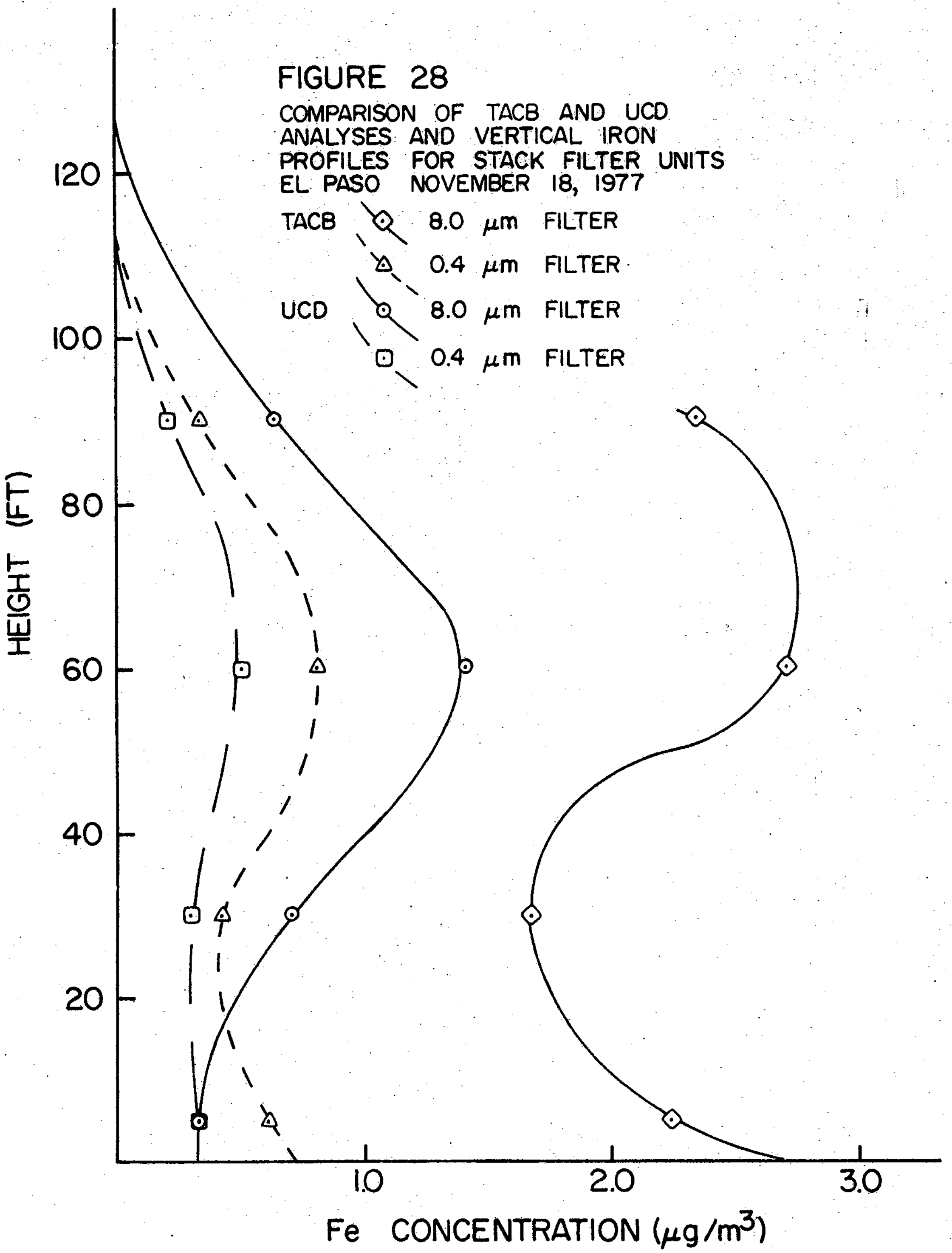


FIGURE 28
COMPARISON OF TACB AND UCD ANALYSES AND VERTICAL IRON PROFILES FOR STACK FILTER UNITS EL PASO NOVEMBER 18, 1977
TACB 8.0 μm FILTER
0.4 μm FILTER
UCD 8.0 μm FILTER
0.4 μm FILTER
HEIGHT (FT)
120
100
80
60
40
20
1.0
2.0
3.0
Fe CONCENTRATION (μg/m³)

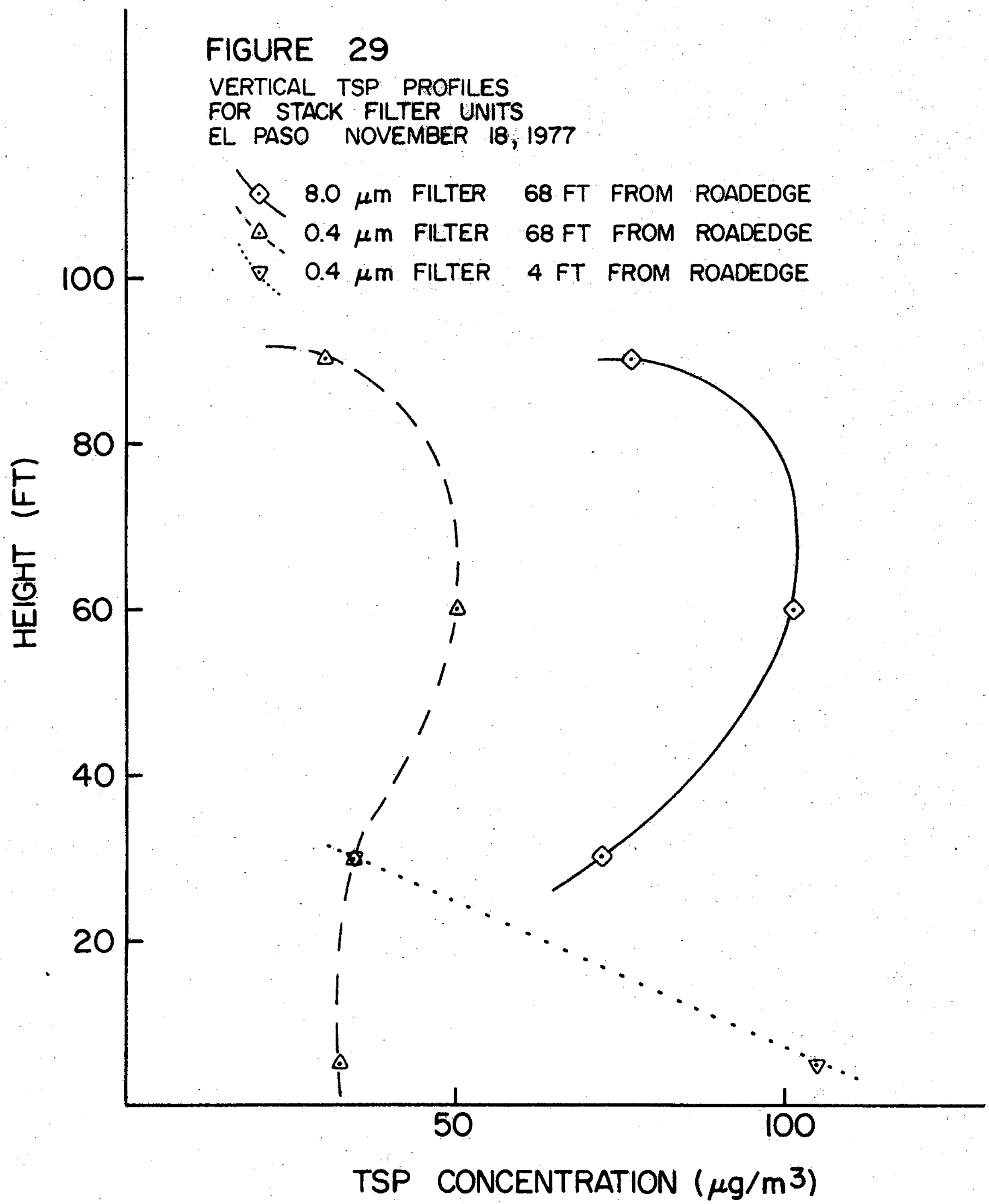


FIGURE 29
VERTICAL TSP PROFILES
FOR STACK FILTER UNITS
EL PASO NOVEMBER 18, 1977
8.0 μm FILTER 68 FT FROM ROADEDGE
0.4 μm FILTER 68 FT FROM ROADEDGE
0.4 μm FILTER 4 FT FROM ROADEDGE
HEIGHT (FT)
100
80
60
40
20
50
100
TSP CONCENTRATION (μg/m3)

and coarse iron particulate concentrations show a significant decrease from four to 68 feet from the road edge for the TACB analyses, but not for the UCD analyses. There was not enough data to draw the horizontal profile for the TSP captured by the 8.0 μm filters and the TSP data from the 0.4 μm filters show no distinct relationship between concentration and horizontal distance, as shown in Figure 25. This may have been due to a source other than the roadway, e.g. loose sand in the vicinity.

The vertical profiles, Figures 26 - 29, from the El Paso data show no definite trends in concentration variation with increased height except on the tower four feet from the road edge. These cases show that the lead, bromine, and TSP concentrations are less 30 feet above the roadway than five feet above the roadway. The concentration variations with height may have been due to changing wind directions and different wind directions at different altitudes. It should be noted that in the three elemental profiles the TACB and UCD analyses show the same trends in changing concentration with altitude.

The bromine to lead ratios were calculated for the data from the two selected days of October 20, 1977 in San Antonio and November 18, 1977 in El Paso. The horizontal and vertical Br/Pb ratio profiles are shown in Figures 30 - 33. Figures 30 and 31 show ratio variations of 0.15 or less with the exception of the UCD analyses for the San Antonio data. The TACB and UCD analyses show the same trends from the San Antonio 0.4 μm filter data. The differences between the analyses for the coarse particles may again have been particle loss from the filter between examinations.

The vertical profile for the October 20, 1977 San Antonio data, Figure 32, shows a slight decrease in the Br/Pb ratio with increased height for the

FIGURE 30

COMPARISON OF TACB AND UCD
ANALYSES AND HORIZONAL Br/Pb RATIO PROFILES
FOR STACK FILTER UNITS
SAN ANTONIO OCTOBER 20, 1977

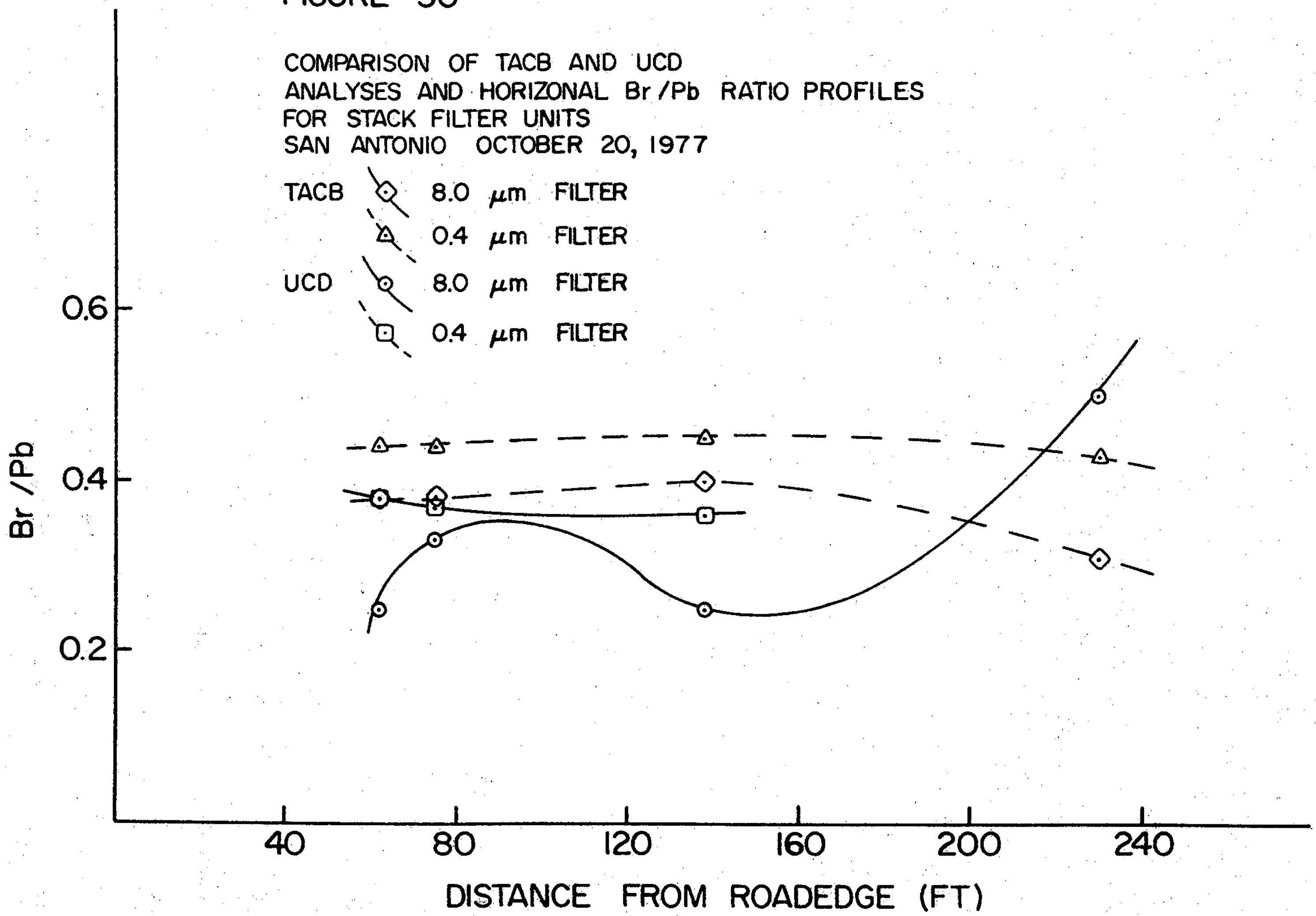


FIGURE 31

COMPARISON OF TACB AND UCD ANALYSES
AND VERTICAL Br/Pb RATIO PROFILES FOR
STACK FILTER UNITS EL PASO NOVEMBER 18, 1977

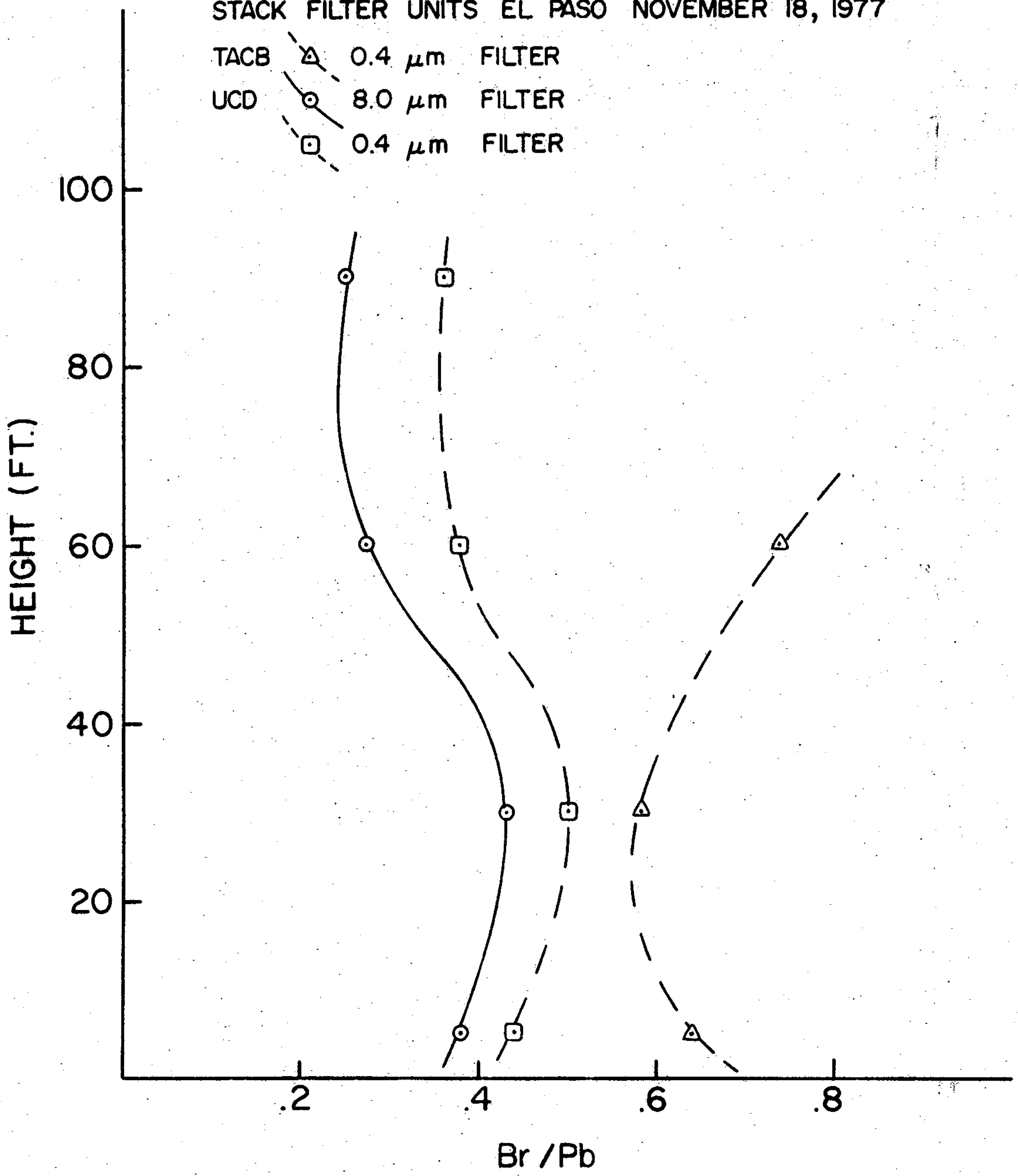


FIGURE 32

COMPARISON OF TACB AND UCD ANALYSES AND VERTICAL Br/Pb RATIO PROFILES FOR STACK FILTER UNITS SAN ANTONIO OCTOBER 20, 1977

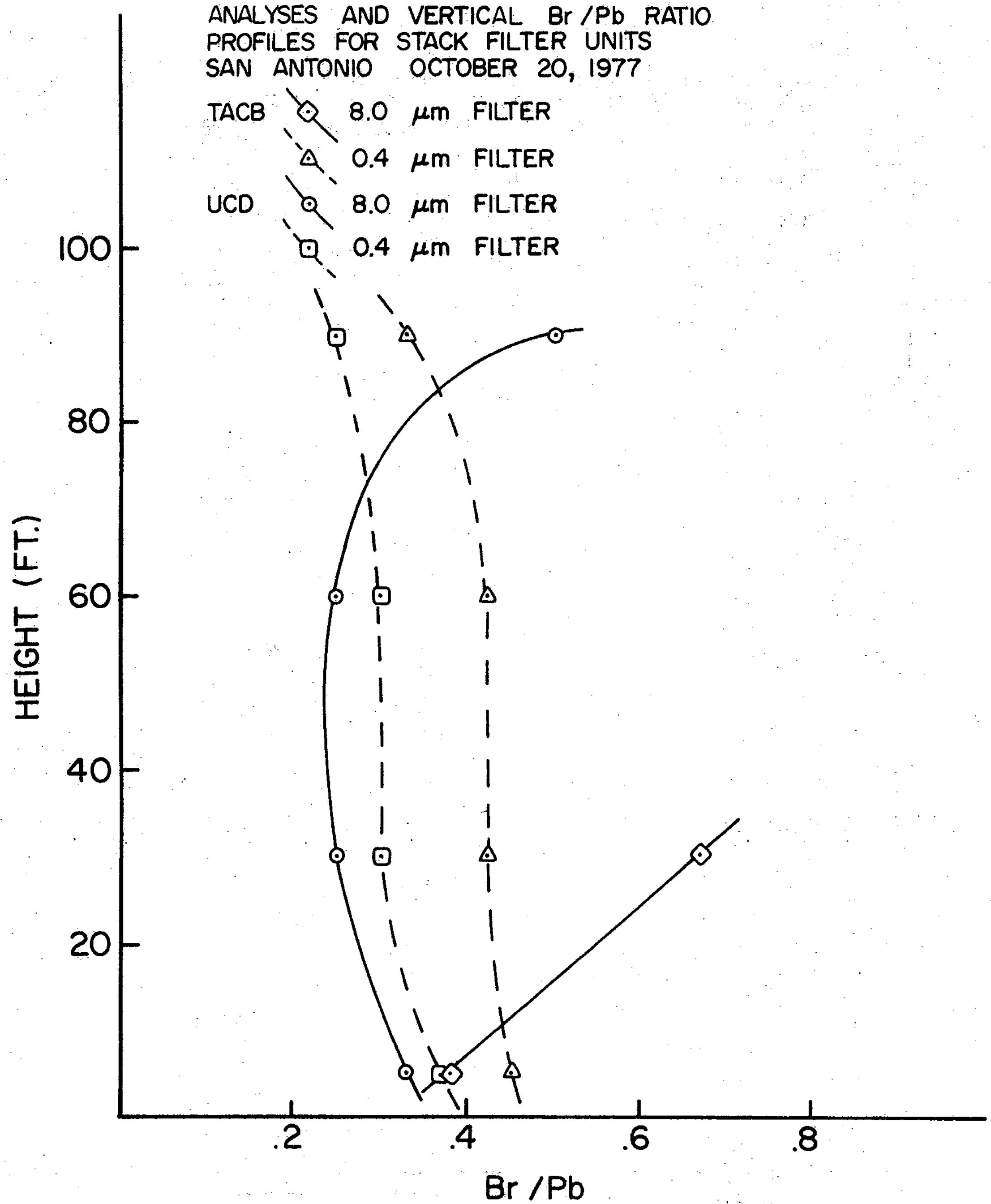
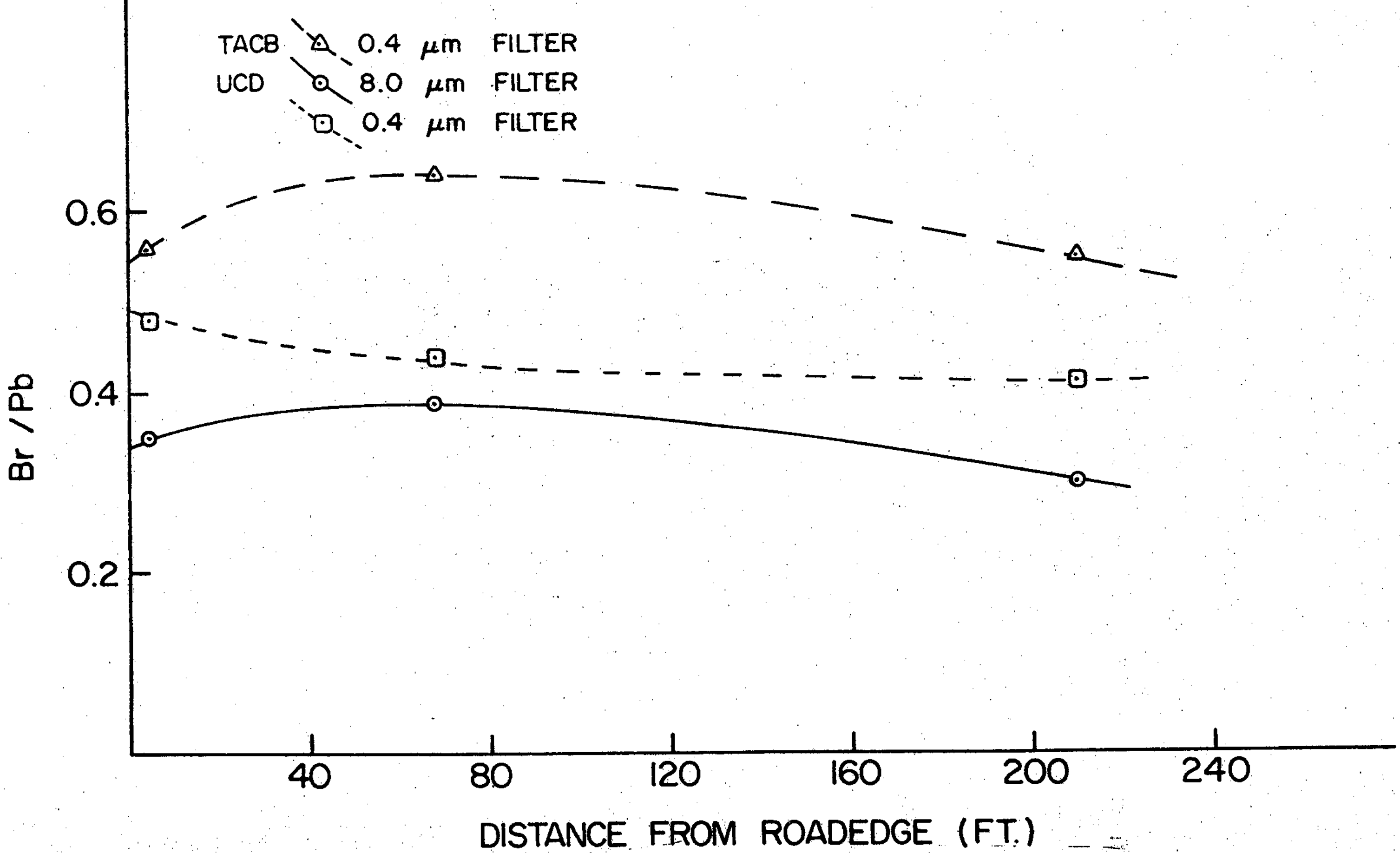


FIGURE 33

COMPARISON OF TACB AND UCD ANALYSES AND HORIZONAL Br/Pb RATIO PROFILES FOR STACK FILTER UNITS EL PASO NOVEMBER 18, 1977



fine filters and an increase in the ratio for the coarse filters, for both the TACB and UCD analyses. The horizontal profile of Br/Pb ratios for the El Paso data, Figure 33, shows no particular pattern between increased distance from the roadway and the Br/Pb ratio, possibly due to the variation in wind directions. The TACB and UCD analyses do not show the same trends for this case.

As can be seen from Figures 14 - 33, there are occasionally large differences between the TACB and UCD analyses. However, in general, the agreement is within about 20 percent. In addition, the trends of the concentration profiles, both horizontal and vertical, are quite consistent for both the TACB and UCD analyses.

## Correlation Studies

This section of the report presents the results of correlation studies between some of the elements reported in the data for the hivol filters, SFU filters, and the Lundgren impactor strips and afterfilters. The correlation coefficients between several elements were calculated for all four sites combined, and are listed in Tables 10 - 19. A summary of these results are shown in Table 20. Some sites carried more weight in these calculations simply because of the greater number of filters of a particular type run at that site. These coefficients will, however, give a general idea of the relationship between the elements. The correlation coefficients were calculated only for those cases where both elements were present in measurable quantities on a filter. This may have given undue weighting to some particular site. However, since the minimum sensitivity changed from element to element and filter to filter, there is no adequate method to modify the calculations to take the minimum sensitivity of an element into account. This problem is

Table 10. Correlation Coefficients for Hivol Filters

| | Al* | Ca | Fe | K | Si | Ti | Br | Cl | Pb | S | Zn |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Ca | 0.76 | | | | | | | | | | |
| Fe | 0.67 | 0.55 | | | | | | | | | |
| K | 0.77 | 0.59 | 0.85 | | | | | | | | |
| Si | 0.77 | 0.15 | 0.56 | 0.65 | | | | | | | |
| Ti | 1.00 | 0.18 | 0.79 | 0.66 | 0.60 | | | | | | |
| Br | 0.99 | 0.44 | 0.49 | 0.32 | 0.04 | 0.35 | | | | | |
| Cl | 0.72 | 0.51 | 0.53 | 0.39 | 0.12 | 0.37 | 0.75 | | | | |
| Pb | 1.00 | 0.56 | 0.57 | 0.44 | 0.12 | 0.40 | 0.96 | 0.75 | | | |
| S | 0.73 | 0.10 | 0.38 | 0.45 | 0.79 | 0.00 | 0.02 | 0.09 | 0.06 | | |
| Zn | -- | 0.15 | 0.22 | 0.31 | 0.36 | 0.26 | 0.45 | 0.33 | 0.52 | 0.26 | |

*Only 5 occurances of Al on hivol filters.

Table 11. Correlation Coefficients for Coarse (8 μm) SFU Filters (TACB Analyses)

| | Al | Ca | Fe | K | Si | Ti | Br | Cl | Pb | S | Zn |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Ca | 0.97 | | | | | | | | | | |
| Fe | 0.97 | 0.97 | | | | | | | | | |
| K | 0.97 | 0.98 | 0.99 | | | | | | | | |
| Si | 0.96* | 0.97 | 0.98 | 0.97 | | | | | | | |
| Ti | 0.98* | 0.99 | 0.99 | 0.99 | 0.96* | | | | | | |
| Br | 0.89* | 0.12 | 0.27 | 0.85* | 0.89* | 0.75* | | | | | |
| Cl | 0.14* | 0.97 | 0.24 | 0.25 | 0.10 | -0.04* | 0.71* | | | | |
| Pb | 0.92* | 0.51 | 0.56 | 0.91 | 0.91 | 0.89* | 0.96* | 0.23 | | | |
| S | 0.85 | 0.68 | 0.71 | 0.87 | 0.84 | 0.86 | 0.84* | 0.15 | 0.91 | | |
| Zn | 0.65* | 0.62 | 0.84 | 0.82 | 0.75 | 0.80 | 0.87* | 0.98 | 0.86 | 0.75 | |

*Less than 20 cases observed out of a total of 130 filters.

Table 12. Correlation Coefficients for Fine (0.4 μm) SFU Filters (TACB Analyses)

| | Al* | Ca | Fe | K | Si | Ti | Br | Cl | Pb | S | Zn |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Ca | 0.01 | | | | | | | | | | |
| Fe | 0.74 | 0.93 | | | | | | | | | |
| K | 0.99 | 0.86 | 0.94 | | | | | | | | |
| Si | 0.79 | 0.97 | 0.95 | 0.96 | | | | | | | |
| Ti | 1.00 | 0.93 | 0.95 | 0.98 | 0.97 | | | | | | |
| Br | 0.11 | 0.60 | 0.73 | 0.86 | 0.69 | 0.68* | | | | | |
| Cl | 0.83 | 0.25 | 0.39 | 0.55 | 0.34 | 0.54* | 0.86 | | | | |
| Pb | -0.18 | 0.56 | 0.68 | 0.80 | 0.63 | 0.52* | 0.94 | 0.76 | | | |
| S | 0.80 | 0.57 | 0.64 | 0.34 | 0.62 | 0.73 | 0.61 | 0.55 | 0.54 | | |
| Zn | 1.00 | 0.19 | 0.93 | 0.60 | 0.93 | 0.95* | 0.25 | 0.87 | 0.17 | 0.34 | |

*Less than 20 cases observed out of a total of 131 filters.

Table 13. Correlation Coefficients for Coarse (8.0 μm) SFU Filters (UCD Analyses)

| | Al | Ca | Fe | K | Si | Ti | Br | Cl | Pb | S | Zn |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Ca | 0.53 | | | | | | | | | | |
| Fe | 0.68 | 0.72 | | | | | | | | | |
| K | 0.59 | 0.34 | 0.59 | | | | | | | | |
| Si | 0.73 | 0.68 | 0.67 | 0.47 | | | | | | | |
| Ti | -- | 0.47 | 0.26 | 0.85 | 0.76 | | | | | | |
| Br | 0.41 | 0.86 | 0.87 | 0.88 | 0.81 | -- | | | | | |
| Cl | 0.40 | 0.07 | 0.29 | 0.69 | 0.26 | 0.54 | 0.62 | | | | |
| Pb | 0.38 | 0.70 | 0.75 | 0.72 | 0.64 | 0.65* | 0.99 | 0.51 | | | |
| S | 0.40* | -0.09 | 0.22 | 0.67 | -0.19 | 0.44 | 0.51* | 0.47 | -0.18 | | |
| Zn | 0.53 | 0.69 | 0.78 | 0.74 | 0.67 | -1.0* | 0.80 | 0.43 | 0.82 | 0.11* | |

*Less than 10 cases observed out of a total of 100 filters.

Table 14. Correlation Coefficient for Fine (0.4 μm) SFU Filters (UCD Analyses)

| | Al* | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Ca | 0.62 | Ca | | | | | | | | | |
| Fe | 1.0 | 0.60 | Fe | | | | | | | | |
| K | 0.93 | 0.54 | 0.67 | K | | | | | | | |
| Si | 0.95 | 0.72 | 0.79 | 0.75 | Si | | | | | | |
| Ti | -- | 0.43 | 0.69 | 0.80 | 0.37 | Ti | | | | | |
| Br | 0.76 | 0.79 | 0.75 | 0.27 | 0.24 | -1.0* | Br | | | | |
| Cl | 0.77 | 0.31 | 0.27 | 0.74 | 0.33 | 0.70* | 0.50 | Cl | | | |
| Pb | 0.73 | 0.43 | 0.50 | 0.43 | 0.26 | 0.73 | 0.97 | 0.43 | Pb | | |
| S | 0.02 | 0.31 | 0.72 | 0.66 | 0.68 | 0.66 | -0.04 | 0.26 | 0.37 | S | |
| Zn | -- | 0.11 | 0.13 | 0.54 | 0.49 | 0.00* | 0.44 | 0.68 | 0.25 | 0.62 | Zn |

*Less than 10 cases observed out of a total of 100 filters.

Table 15. Correlation Coefficients for the First Stage of the Lundgren Impactor (UCD Analyses)

| | Al* | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Ca | 0.85 | Ca | | | | | | | | | |
| Fe | 0.95 | 0.80 | Fe | | | | | | | | |
| K | 0.97 | 0.61 | 0.91 | K | | | | | | | |
| Si | 0.95 | 0.71 | 0.95 | 0.97 | Si | | | | | | |
| Ti | -- | -0.28 | 0.17 | 0.47 | 0.34 | Ti | | | | | |
| Br | -- | 0.32 | 0.05 | -0.07 | -0.01 | -0.65* | Br | | | | |
| Cl | -- | 0.32* | 0.19* | 0.28* | 0.11* | _0.27* | -- | Cl | | | |
| Pb | 0.90 | 0.54 | 0.62 | 0.34 | 0.46 | -0.36 | 0.62 | -- | Pb | | |
| S | -- | -- | -- | -- | -- | -- | -- | -- | -- | S | |
| Zn | 0.90 | 0.37 | 0.49 | 0.21 | 0.26 | -0.16 | 0.23* | -- | 0.84 | -- | Zn |

*Less than 10 cases observed out of a total of 28 filters.

Table 16. Correlation Coefficients for the Second Stage of the Lundgren Impactor (UCD Analyses)

| | Al* | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Ca | 0.91 | Ca | | | | | | | | |
| Fe | 0.91 | 0.74 | Fe | | | | | | | |
| K | -0.17 | 0.48 | 0.84 | K | | | | | | |
| Si | 0.50 | 0.68 | 0.96 | 0.88 | Si | | | | | |
| Ti | 0.89 | 0.08 | 0.15 | 0.18 | 0.09 | Ti | | | | |
| Br | -0.95 | 0.53 | 0.09 | -0.31 | 0.04 | -0.06 | Br | | | |
| Cl | 0.0 | 0.65 | 0.20 | -0.63 | -0.04 | 0.34 | 0.85 | Cl | | |
| Pb | -0.56 | 0.65 | 0.45 | 0.08 | 0.33 | -0.08 | 0.75 | 0.36 | Pb | |
| S | -- | -- | -- | -- | -- | -- | -- | -- | -- | |
| Zn | 0.0 | 0.15 | 0.04 | -0.34 | 0.08 | 0.19* | 0.35* | 0.0* | 0.37 | Zn |

*Less than 10 cases observed out of a total of 28 cases.

Table 17. Correlation Coefficients for the Third Stage of the Lundgren Impactor (UCD Analyses)

| | Al | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Ca | -- | Ca | | | | | | | | | |
| Fe | -- | 0.72 | Fe | | | | | | | | |
| K | -- | -0.45 | -0.13 | K | | | | | | | |
| Si | -- | 0.78 | 0.43 | -0.63 | Si | | | | | | |
| Ti | -- | -0.31 | -0.36* | 0.87* | -0.87* | Ti | | | | | |
| Br | -- | 0.56 | 0.53 | -0.39 | 0.14 | -1.0* | Br | | | | |
| Cl | -- | 0.06* | 0.63* | 0.56* | -0.58* | 0.0* | 0.11* | Cl | | | |
| Pb | -- | 0.71 | 0.60 | -0.42* | 0.37 | -0.27* | 0.90 | 0.17* | Pb | | |
| S | -- | -1.0* | 1.0* | 0.0* | -- | -- | 0.0* | -- | -1.0* | S | |
| Zn | -- | 0.81* | 0.32* | -0.96* | 0.96* | 0.0* | -0.33* | -- | 0.63* | -- | Zn |

*Less than 10 cases observed out of a total of 28 cases.

Table 18. Correlation Coefficients for the Fourth Stage of the Lundgren Impactor (UCD Analyses)

| | Al* | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Ca | -0.67 | Ca | | | | | | | | | |
| Fe | 0.41 | 0.49 | Fe | | | | | | | | |
| K | 0.0 | -0.04 | 0.52 | K | | | | | | | |
| Si | -- | 0.84 | 0.34 | -0.31 | Si | | | | | | |
| Ti | -1.0 | -0.20 | -0.41 | -0.25* | 0.00* | Ti | | | | | |
| Br | 0.0 | 0.55 | 0.50 | 0.11 | 0.25 | -0.41 | Br | | | | |
| Cl | -- | -0.60* | -0.53 | 0.25* | 0.00* | 0.00* | -0.33* | Cl | | | |
| Pb | -1.0 | 0.33 | 0.51 | 0.38 | 0.03 | 0.17 | 0.82 | 0.08 | Pb | | |
| S | 0.41 | -0.00 | 0.44 | 0.64 | -0.01 | 0.33* | 0.53 | 0.76 | 0.63 | S | |
| Zn | -- | 0.85 | 0.39 | -0.33 | 0.94 | -0.34* | 0.43 | -- | -0.00 | -0.20 | Zn |

*Less than 10 cases observed out of a total of 28 cases.

Table 19. Correlation Coefficients for Lundgren Afterfilters (UCD Analyses)

| | Al | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Ca | 0.0* | Ca | | | | | | | | | |
| Fe | -- | 0.89 | Fe | | | | | | | | |
| K | -- | 0.79 | 0.86 | K | | | | | | | |
| Si | -- | 0.74 | 0.57 | 0.57 | Si | | | | | | |
| Ti | -- | -0.89 | -0.41 | -0.29 | -0.64 | Ti | | | | | |
| Br | -- | 0.66 | 0.82 | 0.36 | 0.45 | -0.99* | Br | | | | |
| Cl | -- | 0.20 | -0.29 | 0.06 | 0.84 | -- | 0.44 | Cl | | | |
| Pb | -- | 0.48 | 0.72 | 0.41 | 0.38 | 0.46* | 0.99 | 0.40 | Pb | | |
| S | -- | 0.24 | -- | -0.10 | 0.24 | -- | 0.05 | -0.26 | 0.11 | S | |
| Zn | -- | 0.93 | 0.82 | 0.51 | 0.82 | -0.68* | 0.70 | 0.44 | 0.56 | 0.23 | Zn |

*Less than 5 cases were observed out of a total of 65 cases.

Table 20. Summary of Correlation Coefficients**

| | Lundgren Impactor | | | | | | Stacked Filter Units | | Hivol |
|---|---|---|---|---|---|---|---|---|---|
| | Stage 1 | Stage 2 | Stage 3 | Stage 4 | Afterfilter | Afterfilter UCD*** Analyses | 8.0 μm | 0.4 μm | |
| Fe/Ca | 0.80 | 0.74 | 0.72 | 0.49 | 0.91 | 0.89 | 0.97 | 0.93 | 0.55 |
| Fe/K | 0.91 | 0.84 | -0.13 | 0.52 | 0.94 | 0.86 | 0.99 | 0.94 | 0.85 |
| Fe/Si | 0.95 | 0.96 | 0.43 | 0.34 | 0.88 | 0.57 | 0.98 | 0.95 | 0.56 |
| K/Si | 0.97 | 0.88 | -0.63 | -0.31 | 0.92 | 0.57 | 0.97 | 0.96 | 0.65 |
| Ca/Si | 0.71 | 0.68 | 0.78 | 0.84 | 0.98 | 0.74 | 0.97 | 0.97 | 0.15 |
| Zn/Pb | 0.84 | 0.37 | 0.63* | 0.0 | 0.64 | 0.56 | 0.86 | 0.17 | 0.52 |
| Zn/Si | 0.26 | 0.08 | 0.96* | 0.94 | 0.92 | 0.82 | 0.75 | 0.93 | 0.36 |
| Zn/Fe | 0.49 | 0.04 | 0.32* | 0.39 | 0.94 | 0.82 | 0.84 | 0.93 | 0.22 |
| Pb/Br | 0.62 | 0.75 | 0.90 | 0.82 | 0.96 | 0.99 | 0.96* | 0.94 | 0.96 |

*Less than 5 cases observed in Data

**Correlation coefficients determined only when both elements of a pair were detected.

***All other analyses done by TACB.

illustrated by the bromine to lead relationship. On the average, approximately three times more lead will be found on a filter than bromine, but the ratio depends on the filter type, the location in relation to the roadway, and the wind direction. Although there is more lead than bromine on the filters, the XRF system is approximately twice as sensitive to bromine as it is to lead, while the PIXE system is almost 9 times more sensitive to bromine than to lead. The complex interplay between these relationships is very difficult to take into consideration in calculating the correlation coefficients where both elements were not found in detectable amounts on a filter.

Table 20 shows the correlation coefficients are larger for both the coarse and fine Nuclepore filters than for the hivol Whatman 41 filters. Part of this difference is attributed to the fact that the hivol filters capture larger particles than the stacked filter units and that there is fines penetration through the Whatman filters. The Lundgren impactor stage 4 and the afterfilter capture particles in the same size range as the 0.4 μm SFU filters do. All of the element pairs from the Lundgren afterfilters and fine SFU filters listed in Table 20 show high correlation coefficients with the exception of the zinc and lead pair. The correlation coefficients found for the Lundgren impactor show that the probability of a direct correlation between any two elements changes as the particle sizes change. An example of this can be seen with the lead-bromine pair. As the particles captured by the Lundgren Impactors get smaller the correlation coefficients get larger. From this trend, one would expect to find a larger correlation coefficient for the fine 0.4 μm filter than for the coarse SFU filter. This was not found, but the hivol lead to bromine correlation coefficient is also close to one. This indicates that bromine and lead were correlated in all the particulate sampling. This was expected since bromine and lead particulates come from automotive exhaust.

Good correlations were also anticipated between several of the primarily soil derived elements (i.e., Al, Si, K, Ca, Ti, Fe) which generally dominate the larger particle size ranges (Cahill, et al., 1979; Baum and Pitter, 1976). Several elements (i.e., Fe, Al, S, K, Zn) may be contributed by either soil or automotive sources. From the tables of correlation coefficients it can be seen that the soil related elements captured by the coarse (8.0 μm) SFU filters are highly correlated. The correlation coefficients between these soil related elements on the fine (0.4 μm) SFU filters indicate they are still probably related in the smaller particle sizes but not as closely related as among the larger sizes. Only two soil related element pairs, iron-potassium and iron-titanium, show correlation coefficients above 0.75 for the hivol filter data. One possible explanation for the improved correlations when the particulates are sized, is that particulates of one size could originate from the same source. This causes the composition of one particle size to remain essentially constant with the same elemental relationships. This reasoning would apply to both the SFU filters and the Lundgren Impactors which show better elemental correlations than the hivol which captures a large range of particle sizes.

The ratios between some of the elements that indicated correlations were calculated and are compared on a site by site basis for the hivol and the fine SFU filters, Tables 21 and 22. In Tables 23 and 24 these elemental ratios are presented for comparison between the hivol and the SFU filters from one of the Dallas sites and the San Antonio site. The bromine to lead ratios are approximately constant from site to site and have small standard deviations. Although the correlation coefficients for many of the element pairs analyzed from the fine SFU filters and the iron-titanium and iron-potassium pairs from the hivol filters indicated strong correlations, the means of the ratios vary

Table 21. Element Ratios from Hivol Data at Different Sites (TACB Analyses)

| Site | Dallas IH45 at Forest Avenue | | | Dallas IH30 at Motley Drive | | | San Antonio Loop 410 at Military Highway | | |
|---|---|---|---|---|---|---|---|---|---|
| Ratios | N* | Mean | Standard Deviation | N* | Mean | Standard Deviation | N* | Mean | Standard Deviation |
| Ti/Fe | 36 | 0.10 | 0.03 | 7 | 0.15 | 0.04 | 18 | 0.13 | 0.03 |
| Ti/Si | 30 | 0.05 | 0.02 | 7 | 0.03 | 0.01 | 16 | 0.08 | 0.03 |
| Ca/Si | 39 | 2.31 | 1.32 | 30 | 0.89 | 0.21 | 18 | 8.49 | 2.23 |
| Fe/Si | 35 | 0.51 | 0.25 | 28 | 0.19 | 0.08 | 18 | 0.59 | 0.14 |
| K/Si | 35 | 0.20 | 0.09 | 27 | 0.11 | 0.06 | 18 | 0.36 | 0.10 |
| K/Fe | 45 | 0.46 | 0.17 | 27 | 0.62 | 0.24 | 23 | 0.63 | 0.15 |
| Pb/Si | 29 | 0.72 | 0.53 | 18 | 0.34 | 0.40 | 18 | 1.29 | 0.51 |
| Br/Pb | 42 | 0.44 | 0.10 | 12 | 0.49 | 0.08 | 22 | 0.45 | 0.05 |
| Fe/Pb | 34 | 0.96 | 0.55 | 18 | 0.97 | 0.60 | 23 | 0.46 | 0.16 |
| K/Pb | 33 | 0.41 | 0.31 | 19 | 0.48 | 0.27 | 23 | 0.29 | 0.13 |
| Cl/Pb | 40 | 0.64 | 0.28 | 18 | 0.94 | 0.72 | 23 | 0.49 | 0.17 |
| S/Pb | 33 | 1.35 | 1.40 | 20 | 2.86 | 1.49 | 17 | 0.68 | 0.56 |
| Br/Cl | 39 | 0.86 | 0.51 | 10 | 1.12 | 0.79 | 22 | 1.12 | 0.72 |
| Br/Fe | 33 | 0.59 | 0.35 | 11 | 1.60 | 1.99 | 22 | 1.49 | 2.36 |
| Cl/S | 42 | 0.75 | 0.62 | 27 | 0.48 | 0.44 | 17 | 1.00 | 0.56 |

*N: Number of filters where both elements were detected

Table 22. Element Ratios From Fine (0.4 μm)

SFU Filters at Different Sites (TACB Analyses)

| Site | Dallas IH30 at Motley Drive | | | San Antonio Loop 410 at Military Highway | | | El Paso IH10 at Luna Street | | |
|---|---|---|---|---|---|---|---|---|---|
| Ratios | N* | Mean | Standard Deviation | N* | Mean | Standard Deviation | N* | Mean | Standard Deviation |
| Ti/Fe | 2 | 0.30 | 0.40 | -- | -- | -- | 12 | 0.16 | 0.04 |
| Ti/Si | 2 | 0.04 | 0.01 | -- | -- | -- | 10 | 0.01 | 0.005 |
| Ca/Si | 11 | 0.56 | 0.16 | 22 | 1.18 | 2.67 | 19 | 0.84 | 0.19 |
| Fe/Si | 10 | 0.13 | 0.04 | 8 | 0.27 | 0.31 | 19 | 0.10 | 0.03 |
| K/Si | 8 | 0.09 | 0.02 | 4 | 0.38 | 0.42 | 18 | 0.19 | 0.13 |
| K/Fe | 8 | 0.70 | 0.21 | 4 | 0.81 | 0.38 | 23 | 1.62 | 1.16 |
| Pb/Si | 3 | 0.11 | 0.02 | 23 | 1.70 | 1.08 | 13 | 0.30 | 0.18 |
| Br/Pb | 1 | 0.56 | -- | 59 | 0.43 | 0.09 | 19 | 0.50 | 0.13 |
| Fe/Pb | 3 | 1.25 | 0.34 | 15 | 0.11 | 0.06 | 19 | 0.49 | 0.29 |
| K/Pb | 3 | 0.84 | 0.10 | 7 | 0.18 | 0.13 | 18 | 0.67 | 0.05 |
| Cl/Pb | 3 | 2.26 | 0.78 | 27 | 0.42 | 0.39 | 13 | 1.06 | 0.44 |
| S/Pb | 4 | 7.34 | 2.59 | 51 | 3.07 | 1.44 | 19 | 4.16 | 1.47 |
| Br/Cl | 1 | 0.17 | -- | 27 | 1.92 | 1.39 | 15 | 0.72 | 0.66 |
| Br/Fe | -- | -- | -- | 15 | 5.11 | 2.92 | 21 | 1.23 | 0.70 |
| Cl/S | 16 | 0.52 | 0.52 | 27 | 0.16 | 0.11 | 17 | 0.29 | 0.21 |

*N: Number of filters where both elements were detected.

Table 23. Element Ratios From Different Filters, Dallas Site: IH30 at Motley Drive (TACB Analyses)

| | Hivol Filter | | | Coarse (8.0 μm) SFU Filter | | | Fine (0.4 μm) SFU Filter | | |
|---|---|---|---|---|---|---|---|---|---|
| Elements | N* | Mean | Standard Deviation | N* | Mean | Standard Deviation | N* | Mean | Standard Deviation |
| Ti/Fe | 7 | 0.15 | 0.04 | - | -- | -- | 2 | 0.30 | 0.04 |
| Ti/Si | 7 | 0.03 | 0.01 | - | -- | -- | 2 | 0.04 | 0.01 |
| Ca/Si | 30 | 0.89 | 0.21 | 2 | 0.55 | 0.01 | 11 | 0.56 | 0.16 |
| Fe/Si | 28 | 0.19 | 0.08 | 2 | 0.16 | 0.04 | 10 | 0.13 | 0.04 |
| K/Si | 27 | 0.11 | 0.06 | 1 | 0.10 | -- | 8 | 0.09 | 0.02 |
| K/Fe | 27 | 0.62 | 0.24 | 1 | 0.83 | -- | 8 | 0.70 | 0.21 |
| Pb/Si | 18 | 0.34 | 0.40 | - | -- | -- | 3 | 0.11 | 0.02 |
| Br/Pb | 12 | 0.49 | 0.08 | - | -- | -- | 1 | 0.56 | -- |
| Fe/Pb | 18 | 0.97 | 0.60 | - | -- | -- | 3 | 1.25 | 0.34 |
| K/Pb | 19 | 0.48 | 0.27 | - | -- | -- | 3 | 0.84 | 0.10 |
| Cl/Pb | 18 | 0.94 | 0.72 | - | -- | -- | 3 | 2.26 | 0.78 |
| S/Pb | 20 | 2.86 | 1.49 | - | -- | -- | 4 | 7.34 | 2.59 |
| Br/Cl | 10 | 1.12 | 0.79 | - | -- | -- | 1 | 0.17 | -- |
| Br/Fe | 11 | 1.60 | 1.99 | - | -- | -- | -- | -- | -- |
| Cl/S | 27 | 0.48 | 0.44 | - | -- | -- | 16 | 0.52 | 0.52 |

*N: Number of filters where both elements were detected.

Table 24. Element Ratios from Different Filters, San Antonio Site: Loop 410 at Military Highway (TACB Analyses)

| | Hivol Filter | | | Coarse (8.0 μm) SFU Filter | | | Fine (0.4 m) SFU Filter | | |
|---|---|---|---|---|---|---|---|---|---|
| Ratios | N* | Mean | Standard Deviation | N* | Mean | Standard Deviation | N* | Mean | Standard Deviation |
| Ti/Fe | 18 | 0.13 | 0.03 | -- | -- | -- | -- | -- | -- |
| Ti/Si | 16 | 0.08 | 0.03 | -- | -- | -- | -- | -- | -- |
| Ca/Si | 18 | 8.49 | 2.23 | 58 | 1.62 | 0.53 | 22 | 1.18 | 2.67 |
| Fe/Si | 18 | 0.59 | 0.14 | 58 | 0.13 | 0.03 | 8 | 0.27 | 0.31 |
| K/Si | 18 | 0.36 | 0.10 | 32 | 0.07 | 0.02 | 4 | 0.38 | 0.42 |
| K/Fe | 23 | 0.63 | 0.15 | 32 | 0.59 | 0.16 | 4 | 0.81 | 0.38 |
| Pb/Si | 18 | 1.29 | 0.51 | 23 | 0.15 | 0.09 | 23 | 1.70 | 1.08 |
| Br/Pb | 22 | 0.45 | 0.05 | 11 | 0.41 | 0.11 | 59 | 0.43 | 0.09 |
| Fe/Pb | 23 | 0.46 | 0.16 | 23 | 1.05 | 0.48 | 15 | 0.11 | 0.06 |
| K/Pb | 23 | 0.29 | 0.13 | 18 | 0.68 | 0.35 | 7 | 0.18 | 0.13 |
| Cl/Pb | 23 | 0.49 | 0.17 | 23 | 1.87 | 1.22 | 27 | 0.42 | 0.39 |
| S/Pb | 17 | 0.68 | 0.56 | 17 | 1.28 | 0.59 | 51 | 3.07 | 1.44 |
| Br/Cl | 22 | 1.12 | 0.72 | 12 | 0.30 | 0.17 | 27 | 1.92 | 1.39 |
| Br/Fe | 22 | 1.49 | 2.36 | 12 | 0.41 | 0.17 | 15 | 5.11 | 2.92 |
| Cl/S | 17 | 1.00 | 0.56 | 38 | 1.38 | 0.62 | 27 | 0.16 | 0.11 |

*N: Number of filters where both elements were detected.

from site to site and have large standard deviations.

Comparing the element ratios found on the different filter types, Tables 23 and 24, it is noted that the bromine to lead ratios vary only 15 percent between the different particle sizes. However, a comparison of the other element ratios found on the different filter types indicate the element ratios are different for different sized particles.

Combining the lead to bromine ratios for one filter type from all the sites yields a mean ratio of 0.45 ± 0.14 for 73 observations on the hivol filters, 0.39 ± 0.16 for 16 observations on the coarse SFU filters, and 0.45 ± 0.14 for 91 observations on the fine SFU filters. The bromine concentrations were plotted versus the lead concentrations for the three filter types and a least squares line was fitted to the points. These plots are shown in Figures 34 - 36. These results differ somewhat from the usually accepted bromine to lead ratio of 0.37 for fresh automotive exhaust emitted by vehicles burning leaded gasoline and 0.17 for aged aerosols (Cahill, et. al. 1979; Baum and Pitter, 1976).

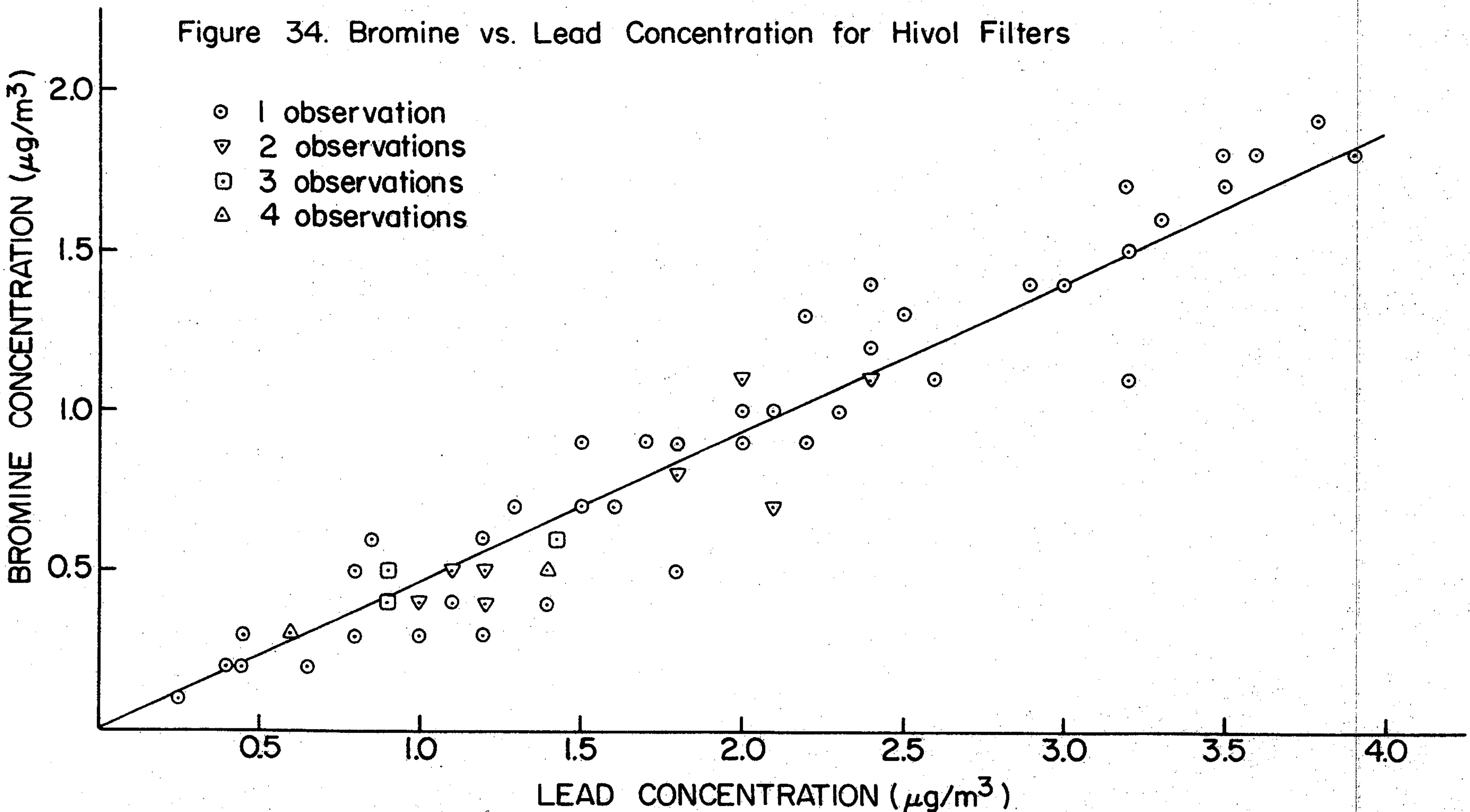
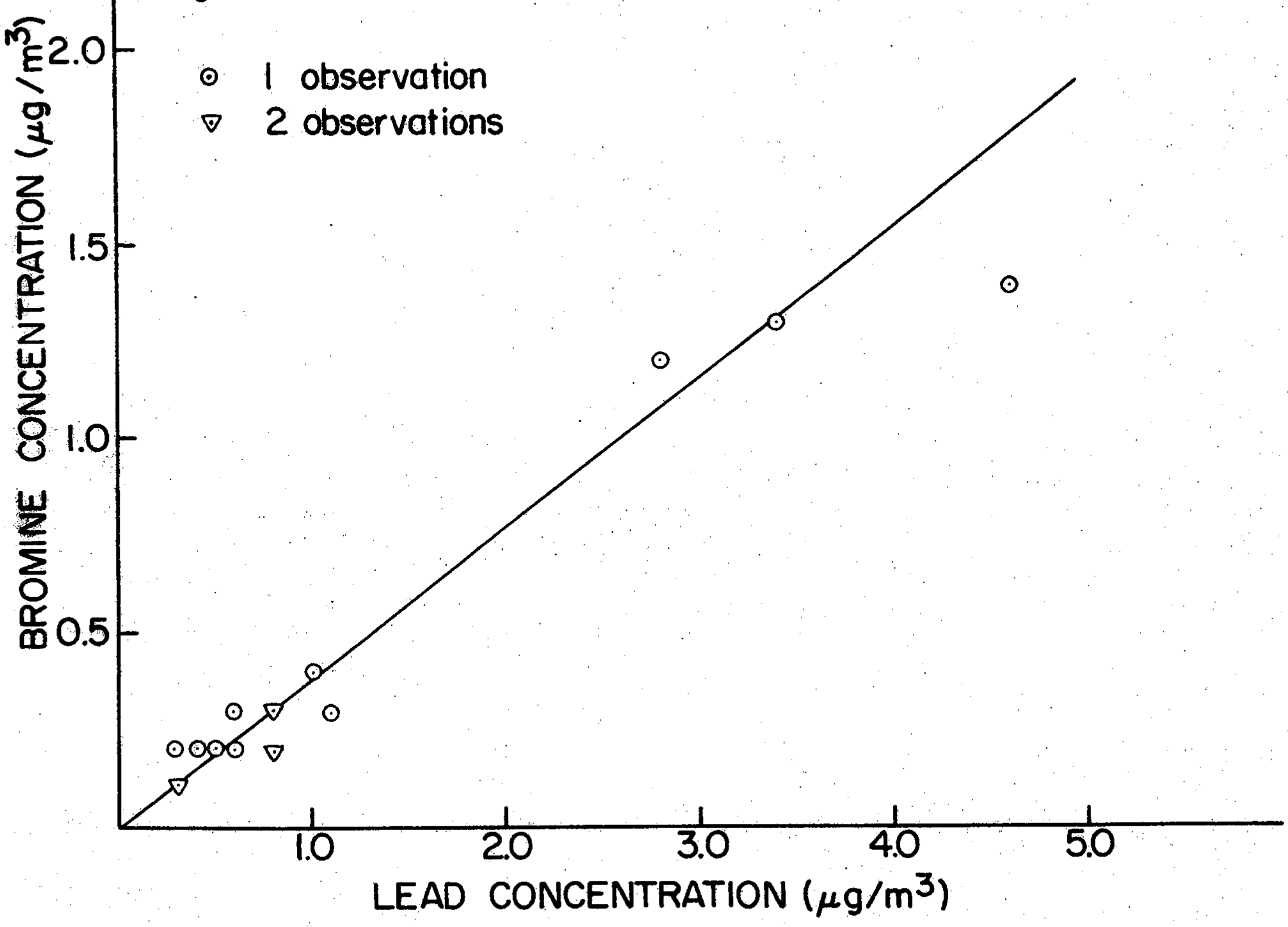



Figure 34. Bromine vs. Lead Concentration for Hivol Filters

Figure 35. Bromine vs. Lead Concentration for Coarse (8.0 μm) SFU Filter



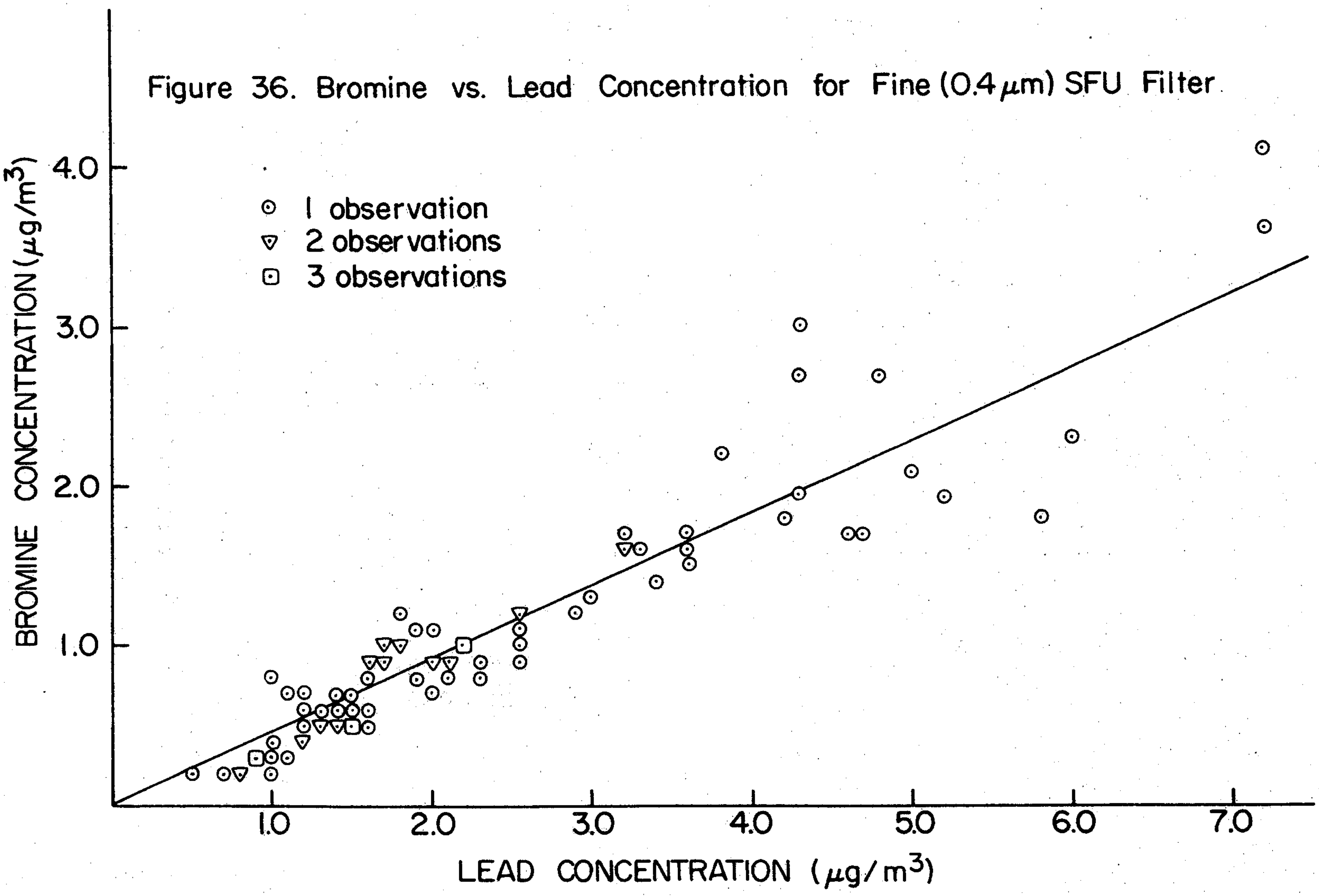



Figure 36. Bromine vs. Lead Concentration for Fine (0.4 $\mu$m) SFU Filter

Comparison of Stacked Filter Units and High Volume Samplers

This section discusses the reproducibility of the SFU and hivol data by comparing data from side-by-side operation of the units. Four stacked filter units were run side-by-side on two different days, September 28, 1977 and September 29, 1977, both in San Antonio. The four SFU's were set up next to the sampling tower at station 3, 32 feet from and in a line parallel to the access road. They were placed 14.5 feet, 18 feet, 22 feet, and 35 feet west of the sampling tower and identified as stations 3a - 3d, respectively.

Tables 25 and 26 show the data collected from the two days of side-by-side operation of the SFU's as analyzed by the TACB. The difference in the data from the four filter units is small and in the expected range of dissimilarities caused by particle capture anomalies, particle losses in handling, and possible differences in the XRF analyses. The largest differences between the collateral unit analyses are seen among the coarse filter data. On September 28, 1977 the coarse filter of SFU 3b showed a higher TSP concentration than did its neighbors. The calcium and silicon concentrations found by the coarse filter on unit 3b also show higher concentrations indicating more dust, high in calcium and silicon, was captured by SFU 3b than the other neighboring units. However, the calcium to silicon ratio remains constant for all four of the units. On September 29, 1977 the TSP, calcium, and silicon concentrations collected on the coarse filter of SFU 3a are higher when compared to the other filters, but again the calcium to silicon ratios remain the same for the four units run side-by-side on that day.

The total suspended particulate concentrations show the largest variations among the coarse particles captured by the 8.0 μm filter. For the September 28, 1977 data, the standard deviation is 18.3 percent of the mean TSP concentration among the coarse particulates and 27.5 percent of the mean TSP con-

Table 25. Data from Side-by-Side Operation of Four Stacked Filter Units on September 28, 1977 (TACB Analyses) San Antonio, Loop 410 at Military Highway

8.0 μm Pore Size Nuclepore Filter

| | Concentration ($\mu g/m^3$) | | | |
|---|---|---|---|---|
| Station | 3a | 3b | 3c | 3d |
| Element | | | | |
| Ca | 6.5 | 10.8 | 6.2 | 8.2 |
| K | 0.2 | 0.5 | 0.2 | 0.3 |
| Cl | 0.9 | 1.6 | 1.0 | 0.9 |
| S | 0.7 | 0.8 | 0.8 | 0.8 |
| Si | 3.9 | 6.7 | 3.4 | 4.6 |
| Fe | 0.5 | 0.8 | 0.5 | 0.6 |
| Pb | 0.3 | 0.3 | 0.0 | 0.0 |
| Br | 0.0 | 0.1 | 0.0 | 0.0 |
| Al | 1.5 | 2.2 | 0.0 | 0.0 |
| Zn | 0.0 | 0.0 | 0.0 | 0.0 |
| TSP* | 44.6 | 70.6 | 48.4 | 53.3 |

0.4 μm Pore Size Nuclepore Filter

| | Concentration ($\mu g/m^3$) | | | |
|---|---|---|---|---|
| Station | 3a | 3b | 3c | 3d |
| Element | | | | |
| Ca | 1.1 | 1.5 | 1.1 | 1.0 |
| K | 0.0 | 0.0 | 0.1 | 0.0 |
| Cl | 1.1 | 1.0 | 1.3 | 1.0 |
| S | 3.8 | 3.8 | 3.8 | 3.6 |
| Si | 1.1 | 1.3 | 1.0 | 0.9 |
| Fe | 0.0 | 0.0 | 0.4 | 0.0 |
| Pb | 1.9 | 1.7 | 1.8 | 1.6 |
| Br | 1.1 | 0.9 | 1.0 | 0.9 |
| Al | 3.1 | 3.0 | 2.4 | 2.8 |
| As | 0.0 | 0.0 | 0.2 | 0.0 |
| TSP* | 23.2 | 20.7 | 20.3 | 22.7 |

*TSP: Total Suspended Particulates

Table 26. Data from Side-by-Side Operation of Four Stacked Filter Units on September 29, 1977 (TACB Analyses) San Antonio, Loop 410 at Military Highway

8.0 μm Pore Size Nuclepore Filter

| | Concentration ($\mu g/m^3$) | | | |
|---|---|---|---|---|
| Station | 3a | 3b | 3c | 3d |
| Element | | | | |
| Ca | 7.5 | 7.1 | 6.0 | 5.4 |
| K | 0.3 | 0.3 | 0.0 | 0.0 |
| Cl | 1.1 | 1.2 | 0.8 | 1.0 |
| S | 0.9 | 0.7 | 0.8 | 0.7 |
| Si | 3.6 | 3.3 | 2.6 | 2.4 |
| Fe | 0.5 | 0.5 | 0.4 | 0.3 |
| TSP* | 61.5 | 42.6 | 35.3 | 30.9 |

0.4 μm Pore Size Nuclepore Filter

| | Concentration ($\mu g/m^3$) | | | |
|---|---|---|---|---|
| Station | 3a | 3b | 3c | 3d |
| Element | | | | |
| Ca | 1.5 | 1.0 | 0.9 | 1.1 |
| Cl | 1.3 | 1.3 | 1.1 | 1.1 |
| S | 4.4 | 4.2 | 3.9 | 4.4 |
| Si | 1.5 | 0.0 | 0.8 | 1.0 |
| Pb | 1.7 | 1.7 | 1.6 | 1.7 |
| Br | 1.0 | 0.9 | 0.9 | 1.0 |
| Al | 4.7 | 3.5 | 0.0 | 3.5 |
| TSP* | 23.7 | 26.2 | 29.1 | 27.5 |

*TSP: Total Suspended Particulates

centration on September 29, 1977. Among the fine particulates, the standard deviations are 5.5 percent of the mean TSP concentration on September 28, and 7.5 percent of the mean TSP concentration on September 29, 1977. When the TSP loadings are totaled from both the coarse and fine filters the standard deviations are 12 and 14 percent of the mean total TSP concentrations on September 28 and September 29, respectively.

Other deviations seen among the data collected from the collateral units are (a) aluminum loadings found on some filters but not on the same filter stage of neighboring units and (b) no detection of silicon on the fine filter of SFU 3c on September 29, 1977. These differences may be due to either analysis or particle collection discrepancies.

Three high volume air samplers were run side-by-side on September 29, 1977 at station 10 set in a line parallel to the road, 202 feet from the road edge. They were set up on the east side of tower 10 at distances, 0, 9, and 17 feet from the tower and indentified as stations 10a - 10c, respectively. The hivol at station 10b was placed with its face perpendicular to the road, while the hivols at stations 10a and 10c were faced parallel to the roadway (i.e. the hivols parallel to the road had the 10" sides of their filters paralleling the road). The hivol at station 10a was shutdown because of flow fluctuations; but the other two hivol units ran for 6.5 hours. The data from these two units is presented in Table 27. The data show close agreement among all the elemental concentrations and the difference in TSP concentrations found by the two units is ten percent. This agreement was not expected, since hivol results are dependent upon orientation with respect to wind directions.

A comparison was made between the SFU and hivol results for the times when the two type samplers were located close to each other. Table 28 presents the means and standard deviations of the SFU and hivol filter loading ratios

Table 27. Data from Side-by-Side Operation of Two Hivol Air Samplers on September 29, 1977 (TACB Analyses) San Antonio, Loop 410 at Military Highway

| | Concentration (μg/$m^3$) | |
|---|---|---|
| Station | 10b | 10c |
| Element | | |
| Ti | 0.1 | 0.1 |
| Ca | 9.8 | 11.5 |
| K | 0.4 | 0.5 |
| Cl | 0.9 | 0.9 |
| Si | 1.8 | 1.4 |
| Zn | 0.1 | 0.1 |
| Cu | 0.1 | 0.2 |
| Fe | 0.8 | 0.8 |
| Pb | 1.2 | 1.4 |
| Br | 0.6 | 0.6 |
| TSP* | 81.5 | 90.5 |

*TSP: Total Suspended Particulates

Table 28. Comparison of SFU and Hivol Loadings

Ratio: (Total SFU Loading, $\mu g/m^3$)/(Hivol Loading, $\mu g/m^3$)

| Element | N* | Mean | Standard Deviation |
|---|---|---|---|
| Ca | 20 | 0.71 | 0.53 |
| Fe | 17 | 0.84 | 0.61 |
| K | 12 | 1.21 | 0.93 |
| Si | 14 | 3.86 | 2.72 |
| Br | 15 | 1.15 | 0.31 |
| Cl | 19 | 2.52 | 3.42 |
| Pb | 17 | 1.33 | 0.53 |
| S | 17 | 6.24 | 2.51 |
| Zn | 3 | 1.67 | 1.15 |

*N: Number of Comparisons

along with the number of comparisons. All of the SFU - hivol comparisons were made at the second site in Dallas (IH30 at Motley Drive) and the San Antonio site (Loop 410 at Military Highway). The ratios in Table 28 represent the total SFU loadings divided by the hivol loadings. These ratios were calculated when the same element was collected by both of the sampling devices.

Calcium and iron are the only elements showing more loading on the hivol filters than the SFU filters. This is an indication that the particles containing iron and calcium are generally larger than the particles captured by the SFU filters. At a windspeed of 2 km/hr the SFU has a cutpoint of 16.1 μm and a 7.1 μm cutpoint at 8 km/hr (McFarland, 1979). Suspended particulates larger than the cutpoint for the SFU are captured by the hivols; since the hivols have no distinct cutpoint and may capture sand grains up to 1000 μm and even larger objects, such as grasshoppers. The elements other than calcium and iron show ratios greater than one. This indicates particles composed of these elements are small enough to penetrate the Whatman 41 filter paper used in the hivol samplers.

According to Cahill (1978), the Whatman 41 filter paper has a 25 percent fine lead penetration relative to 0.4 μm pore size Nuclepore filter paper. To correct the data for this fine lead penetration, 25 percent of the lead loading found by the 0.4 μm Nuclepore filter was added to the lead loading from the hivol filter. A new ratio was then calculated by dividing the total SFU lead loading by the hivol lead loading corrected by the above mentioned process. This ratio was found to be 0.98 ± 0.35 which strongly confirms the 25 percent fine lead penetration.

The ratios of the SFU to hivol total suspended particulate loadings (TSP) are shown in Table 29 along with the dates and stations that identify the neighboring samplers. The mean value of the ratios is 0.622 ± 0.103, excluding

Table 29. Comparison of SFU and Hivol TSP Loadings

| Date | Station Number | TSP Concentration ($\mu g/m^3$) Hivol | Stacked Filter Unit 8.0 µm Filter | Stacked Filter Unit 0.4 µm Filter | Stacked Filter Unit Total | (Total TSP Concentration, $\mu g/m^3$)/(Hivol TSP Concentration, $\mu g/m^3$) |
|---|---|---|---|---|---|---|
| 8-3-77 | 7 | 68.4 | NW* | NW* | -- | -- |
| 8-4-77 | 5 | 165.5 | NW* | NW* | -- | -- |
| 8-10-77 | 2 | 21.4 | 8.2 | 18.8 | 27.0 | 1.26** |
| 8-10-77 | 5 | 51.5 | 17.0 | 19.4 | 36.4 | 0.707 |
| 8-10-77 | 10 | 25.2 | 17.9 | 21.1 | 39.0 | 1.55*** |
| 9-28-77 | 3 | 135.8 | 44.6 | 23.2 | 67.8 | 0.499 |
| 9-29-77 | 3 | 95.1 | 42.6 | 26.6 | 69.2 | 0.728 |
| 10-5-77 | 5 | 93.9 | 34.5 | 23.6 | 58.1 | 0.619 |
| 10-6-77 | 1 | 55.8 | 20.2 | 21.1 | 41.3 | 0.740 |
| 10-6-77 | 5 | 69.8 | 25.5 | 23.2 | 48.7 | 0.698 |
| 10-6-77 | 9 | 67.2 | 95.2 | 25.7 | 120.9 | 1.80**** |
| 10-7-77 | 1 | 120.5 | 34.6 | 32.5 | 67.1 | 0.557 |
| 10-7-77 | 5 | 104.3 | 37.2 | 33.8 | 71.0 | 0.681 |
| 10-7-77 | 9 | 85.6 | 33.4 | 44.0 | 77.4 | 0.904 |
| 10-18-77 | 1 | 76.6 | 35.8 | 23.8 | 59.6 | 0.778 |
| 10-18-77 | 5 | 90.9 | 36.7 | 18.9 | 55.6 | 0.612 |
| 10-18-77 | 9 | 86.9 | 31.9 | NW* | -- | -- |
| 10-19-77 | 1 | 82.7 | 20.3 | 30.4 | 50.7 | 0.613 |
| 10-19-77 | 9 | 86.2 | 30.7 | 17.6 | 48.3 | 0.560 |
| 10-20-77 | 1 | 85.5 | 29.1 | 20.1 | 49.2 | 0.575 |
| | | | | | Mean: | 0.622 |
| | | | | | Standard Deviation: | 0.103 |

*NW: Filter was not weighed

**SFU unit was attached to elevated Hivol causing air flows on both units to be questionable. Not used in calculation of mean and standard deviation.

***Not used in calculation of mean and standard deviation.

****An equipment truck drove within a few feet of the sampling devices stirring up dust. Not used in calculation of mean and standard deviation.

the three data sets identified in the table. The standard deviation of 17 percent of the mean value indicates there may be a relationship between the TSP loadings of the two samplers; even though the hivols capture larger sized particles than the SFU's and the SFU's capture fine particles that pass through the hivol filters.

Road Vacuuming Operations

The particulates on a road surface come from rubber tires, tailpipe emissions, atmospheric fallout, spills from loads and undercarriages, anti-skid materials, and roadway erosion. Resuspended material is thought to build up to a constant level within five days after a rainfall after which there is a balance between the sources of particulates and the amount being removed. The removal processes include weathering of the particulate into the roadway surface, resuspension processes as a result of moving vehicles, and washing by rainfall.

As a part of Project 528 a small section of the roadway surface at each site was vacuumed in order to find out what elements were on the roadway. A standard high volume sampler with a cyclone preseparator to remove gravel and other large particles was used. A suitable length of clear plastic tubing was attached to the inlet of the cyclone preseparator. The intake fitting from a small vacuum cleaner was attached to the other end of the tubing. In order to define the area to be vacuumed on the roadway, two plywood cutouts were prepared with square cutouts of four and nine square feet respectively. A strip of one-inch wide weather stripping consisting of soft polyurethane foam was glued to the bottom surface of the cutout, so that the hivol would not pull in particles from outside the defined area.

A road maintenance crew from the Texas State Department of Highways and Public Transportation blocked off one lane of traffic for each road vacuuming operation. An outer lane was blocked off at one Dallas site, while an inner lane was blocked off at the other Dallas and the San Antonio site. In each case there were difficulties involved in shutting down the other lanes and in obtaining electrical power at those lanes. A sample was collected at the El Paso site, however, it was lost in transit to the TACB laboratory. The main difficulty in scheduling the roadway vacuuming operation was coordinating the roadway maintenance crew to stop traffic during a weekday at least five days after a rainfall. This problem forced some of the road vacuuming operations to be performed after the two projects had already stopped taking data at a site.

The data collected from the road vacuuming is presented in a table in Appendix B. From this data, ratios between selected elements were calculated and are presented in Table 30. It is interesting to note that the titanium to iron, bromine to lead, iron to copper, and silicon to copper ratios are approximately constant from site to site. The Ti/Fe ratio calculated from the hivol filter data, Table 21, is also essentially constant for the three different sites and in the same range as the ratios found from the vacuuming data. This suggests that the particles containing iron and titanium caught by the hivol filters come from the resuspension of roadway silt. The lead to bromine ratio found from the road vacuuming is quite different from the ratio (~0.45) found on all the filters at all of the sites. The Br/Pb road vacuuming ratios fall close to 0.17 which is the accepted value of this ratio for aged aeresols (Cahill et al., 1976, Baum and Pitter, 1976).

The calcium to silicon, calcium to iron, and calcium to copper ratios are much larger from the San Antonio site than the ratios from either of the Dallas sites. This is evidence of a cement plant in San Antonio, which was located upwind of the sampling site. The larger Ca/Si ratio for San Antonio is also

Table 30. Element Ratios from Road Vacuuming Data

| Site | San Antonio, Eastbound Loop 410 at Military Highway | | Dallas, Southbound IH45 at Forest Avenue | | Dallas, Westbound IH30 at Motley Drive | |
|---|---|---|---|---|---|---|
| Location | Inside Shoulder | Inside Lane | Inside Shoulder | Inside Lane | Outside Shoulder | Outside Lane |
| Element Ratio | | | | | | |
| Ti/Fe | 0.0712 | 0.0742 | 0.0636 | 0.0994 | 0.0781 | 0.0972 |
| Ti/Si | 0.0519 | 0.0472 | 0.0636 | 0.114 | 0.0654 | 0.0942 |
| Ti/Pb | 0.0859 | 0.100 | 0.202 | -- | 0.278 | 0.491 |
| Fe/Si | 0.729 | 0.636 | 1.00 | 1.15 | 0.837 | 0.969 |
| Fe/Cu | 107 | 85.8 | 99.3 | -- | 115 | -- |
| Fe/Pb | 1.20 | 1.35 | 3.18 | -- | 3.57 | 5.06 |
| Ca/Si | 12.7 | 13.2 | 4.90 | 5.37 | 4.68 | 5.27 |
| Ca/Cu | 1860 | 1780 | 486 | -- | 642 | -- |
| Ca/Fe | 17.4 | 20.78 | 4.89 | 4.68 | -5.59 | 5.43 |
| K/Si | 0.194 | 0.164 | 0.207 | 0.467 | 0.233 | 0.343 |
| K/Fe | 0.265 | 0.258 | 0.207 | 0.407 | 0.279 | 0.354 |
| Si/Cu | 147 | 135 | 99.2 | -- | 137 | -- |
| Br/Pb | 0.135 | 0.149 | 0.133 | -- | 0.163 | 0.201 |
| K/Pb | 0.319 | 0.347 | 0.659 | -- | 0.994 | 1.79 |
| Pb/Si | 0.606 | 0.472 | 0.314 | -- | 0.235 | 0.192 |
| Br/Fe | 0.113 | 0.111 | 0.0418 | -- | 0.0458 | 0.0400 |

seen in the hivol filter data.

The iron to lead ratios show the same trend as the titanium to lead ratios; they are large at the Dallas sites in comparison to the ratios at the San Antonio site. It was not surprising to find these ratios following the same trend since the Ti/Fe ratio was constant for all the sites. The higher iron and titanium content of the roadbed silt at the Dallas sites is probably due to a different topsoil and roadbed fill composition at the different sites. Dallas is located in the soil transition zone and its soil is likely to have a higher iron oxide content than the San Antonio soil. This trend of large Fe/Pb ratios at the Dallas sites can also be seen from the hivol filter data. In addition, the Ti/Si and the Fe/Si ratios from the vacuuming data indicate the highway silt at Dallas has a high iron and titanium content when compared to the San Antonio road silt.

## General Discussion of Experimental Work and Results

One of the major difficulties in the experimental work was getting sufficient power to the various instrument locations. The hivol samplers were the major power drain. Thus, in future experimental particulate studies involving a large number of samplers, special attention should be given to planning the power distribution system.

There were several sample collection problems encountered during the study. It was initially desired to sample with the SFU's for a two hour period in the morning and a two hour period in the afternoon using a 5 l/min flow rate. The filter loadings were insufficient for XRF analysis. A sampling period of 10 to 11 hours and a flow rate of 22 l/min were necessary to obtain good filter loadings for analysis. This long sampling period hindered the analysis and interpretation of the data since in essentially all cases the wind direction would swing across the roadway from the predominant direction for a period of two or more hours. If the sampling time was reduced to no more than four hours, the wind direction swing across the roadway could be reduced to a manageable level.

One sampling problem arose in El Paso which was peculiar to that site. At this particular site there was little vegetation and grass along the roadway. Thus, when clean filters were placed on the hivols in preparation for a run, the wind would blow sand on the filters even though the units were not operating. The filters would become visibly dirty within a day.

There were several anomalies in the experimental data. In particular, for several cases the far upwind and downwind elemental and TSP concentrations were above all of the other concentrations closer to the roadway. These findings were verified by both TACB and UCD in the cases where dual analyses occurred. No special circumstances were noted during these runs to warrant the higher far upwind and downwind concentrations.

In general, the contribution of the roadway to the ambient air total suspended particle loading was less than about 10 to 20 $\mu g/m^3$ based on the far upwind and far downwind sampling stations. These stations were usually about 200 ft from their respective road edge. There were several cases in the data where the TSP concentration exceeded the Environmental Protection Agency's maximum 24 hour allowable of 260 $\mu g/m^3$. Most of these cases were from the sampling stations located next to the roadway. Only in one or two cases was the 24 hour maximum concentration exceeded at the far upwind and downwind stations. These cases occurred in El Paso and blowing sand was usually responsible.

## Comparison of Results With Model Predictions

### Introduction:

The comparison of data with the results of numerical predictive dispersion models is limited in scope due to two major difficulties: 1) the lack of any models for particulate dispersion and 2) the lack of information on particulate emissions. An alternative to the use of a particulate dispersion model, however, is the application of models for dispersion of gaseous compounds to fine particulates by making the assumption that the fine particulates behave essentially as a gas. Four of these models were used for comparison here.

### Discussion of Models:

CALINE-2

This model is a revision of CALAIR, the original California line source dispersion model. It is based on the work of Turner (1970) and Ranzieri, et al. (1975). CALINE-2 employs a fixed box model together with a Gaussian dispersion model. The box model is used to simulate the initial dispersion of pollutants caused by the mechanical turbulence resulting from the moving vehicles. The box model assumes the emissions are uniformly distributed over the roadway and up to a fixed height, termed a "mixing lid." In an experimental program known as "Project Smoke" performed by the California Division of Highways (1972), this lid was determined to be about 12 feet above the roadway. The width of the box was determined to be equal to the width of all the traffic lanes plus the median plus a distance of about ten feet on both sides of the roadway. Three equations are used to predict the carbon monoxide concentrations for parallel, oblique and cross winds. The equations for the parallel and cross wind cases are based on the use of the continuous line source equation. The oblique case is treated as a trigonometric relationship of the other two. A calibration factor is not required for each site; however, the the model was validated with experimental data from California only.

HIWAY

The HIWAY model was developed for the Environmental Protection Agency by Zimmerman and Thompson (1974), based on Turner's (1970) work. The calculational procedure is centered around numerical integration of the Gaussian plume point source equation for a finite length. For certain unstable and neutral conditions, an equation of the form suggested by Bierly and Hewson (1962) is used. From a computational viewpoint, this model involves a fairly time-consuming numerical integration procedure. No site calibration is required.

AIRPOL-4

This model, developed by Carpenter and Clemena (1975), also uses the Gaussian type of formulation. However, AIRPOL-4 is unique in that it uses two Euclidean coordinate systems, mapping the roadway coordinate system onto the receptor coordinate system. This transformation allows the Gaussian equation to be integrated over all roadway points contributing to the pollution at a particular location. The values of the dispersion coefficients are obtained from the Pasquill-Gifford curves, but they are modified to account for sampling time as a function of stability. Carpenter and Clemena (1975) give two equations that greatly reduce the required computation time for cases of nearly perpendicular or nearly parallel winds. No site calibration is necessary; however, the model was validated from Virginia data only.

The TRAPS Models

The original TRAPS model was developed by Maldonado and Bullin (1977). This model uses a combination of empirical fits and gradient type diffusion formulas. It was verified using experimental data from Virginia, North Carolina, Tennessee and California. Data collected in Texas under Project 218 were not used in verifying either the original model or the TRAPS II and 52 models. The TRAPS II model (Polasek and Bullin, 1978) was developed from the original TRAPS model by making two simplifications that greatly increased the computational speed. The resulting model is approximately 50% faster than the original model, and ten times faster than any other highway pollution dispersion model. The original model was improved by substituting a polynomial equation for an iterative step in the program. In addition, the virtual origin, which will be discussed below, is now calculated by direct iteration rather than the secant method used in the original TRAPS model.

The total source of a highway is not concentrated in a single, thin line, but rather is diffused from a large area, with the original dispersion taking place due to the mechanical turbulance of the vehicles. The virtual origin is the location of a hypothetical line source that will produce a plume having the dispersion of the actual area source. In the TRAPS models, an empirical equation derived from dimensional and statistical analyses is used to calculate the roadedge concentration at a five foot height. The result is then matched to the Gaussian plume by direct iteration. Maldonado (1976) originally used the secant method to determine the virtual origin distance.

The equation describing the downwind, off the road concentrations employs the power law wind profile. However, the log-law profile more accurately describes the velocity profile near the earth, since it accounts for the site dependent friction velocity and surface roughness factors that the other does not. Therefore, the log-law profiles was determined for the site under the given conditions, and the power law profile fitted to the results through the use of a fourth degree polynomial equation. In the original model, the power law profile was fitted to the log-law profile through the use of an iterative procedure.

Application of Models:

All of the above models were applied to two cases in order to compare the shapes of the predicted concentration profiles for fine lead at the 5 ft. level to the actual data. The two cases used are July 21 and August 11, 1977 at the Dallas at-grade site.

The data values for fine lead concentrations are average values for the duration of the sampling period, therefore the meteorological inputs for the models were derived from the hourly averages for the particular day. The run of July 21 was from 7:00 a.m. - 9:00 a.m. The meteorological data are missing for the hour 8:00 a.m. - 9:00 a.m. on that date, therefore the 8:00 a.m. hourly average values were used. The run of August 11 lasted all day. During the last two hours the wind came from the north. However, this is one of the cases that the wind came from the north for the shortest period of time and is therefore used here. Average values for the meteorological data include the period 7:00 a.m. - 4:00 p.m.

The site and receptor parameters are consistent with the site description already given.

Inputs Peculiar to Models

In addition to the data above, each model, except CALINE-2, requires some other inputs peculiar to the model. These inputs are:

AIRPOL-4A - prediction interval (corresponds to run duration)
- source height (0 feet)
- source length upwind and downwind (1 mile each direction)

HIWAY - mixing layer height (5000 meters)

- emission rate for each lane (total rate divided by number of lanes)

TRAPS II - reference height (26 feet)

- roughness height (0.4 feet)

## Emission Factor and Manipulation of Model Outputs

Since no current emission factor for fine lead was available, a total emission factor of 100 gm/veh.mi. was used for all models. The predicted fine lead concentrations were in $\mu gm/m^3$ for the CALINE-2 and HIWAY models. The AIRPOL-4A and TRAPS II models output concentration as ppm CO. These values are converted to $\mu gm/m^3$ by multiplying ppm CO by 1250 $\mu gm/m^3$ppm CO.

The values of fine lead concentration resulting from the models were adjusted by a multiplying constant, c, in order to get them into the range of the data and compare the profiles to the data. A separate value of c was calculated for each model for each case. c is determined by a least squares routine as follows:

$$Er^2 = \sum_{i=1}^{4} ([Pb]_{mi} - c[Pb]_{pi})^2$$

$$\frac{dEr^2}{dc} = \sum_{i=1}^{4} - 2[Pb]_{pi} ([Pb]_{mi} - c[Pb]_{pi}) = 0$$

$$c = \sum_{i=1}^{4} [Pb]_{mi} / \sum_{i=1}^{4} [Pb]_{pi}$$

where $[Pb]_{mi}$ is the measured concentration at receptor i, and $[Pb]_{pi}$ is the model prediction for receptor i. The values determined for c are given in Table 3.

TABLE 31

ROADWAY POLLUTANT DISPERSION

MODEL ADJUSTMENT FACTORS

| Date | AIRPOL-4A | CALINE-2 | HIWAY | TRAPS II |
|---|---|---|---|---|
| July 21 | $2.0724 \times 10^{-3}$ | $2.6267 \times 10^{-3}$ | $5.6347 \times 10^{-4}$ | $1.3171 \times 10^{-3}$ |
| August 11 | $1.5997 \times 10^{-3}$ | $2.0441 \times 10^{-3}$ | $6.2417 \times 10^{-4}$ | $7.0325 \times 10^{-4}$ |

Discussion of Results:

Figures 37 and 38 display the adjusted 5 ft. fine lead concentration profile and the data values. It is easily observed that the shapes of the curves are fairly consistent and match the data suprisingly well. However upon inspection of Table 3, one sees that there is a wide variation in the adjustment factor between models for a given day. Since c is essentially an adjustment on the input emission factor for the model, it may be said that widely differing emission factors must be used in the different models in order to obtain approximately the same concentrations, or that there is little agreement in predicted concentration between models for the same emission factor.

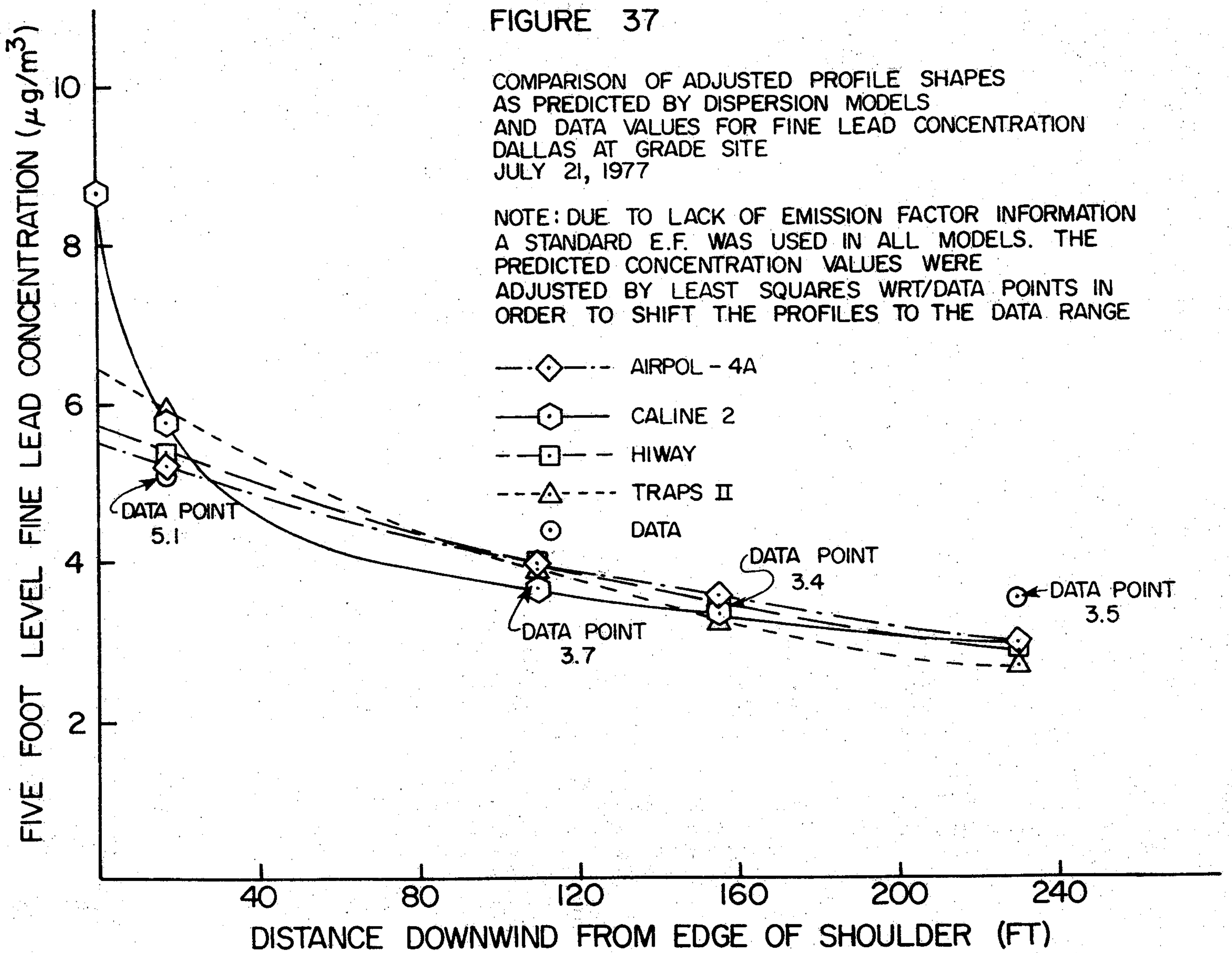



FIGURE 37

COMPARISON OF ADJUSTED PROFILE SHAPES AS PREDICTED BY DISPERSION MODELS AND DATA VALUES FOR FINE LEAD CONCENTRATION DALLAS AT GRADE SITE JULY 21, 1977

NOTE: DUE TO LACK OF EMISSION FACTOR INFORMATION A STANDARD E.F. WAS USED IN ALL MODELS. THE PREDICTED CONCENTRATION VALUES WERE ADJUSTED BY LEAST SQUARES WRT/DATA POINTS IN ORDER TO SHIFT THE PROFILES TO THE DATA RANGE

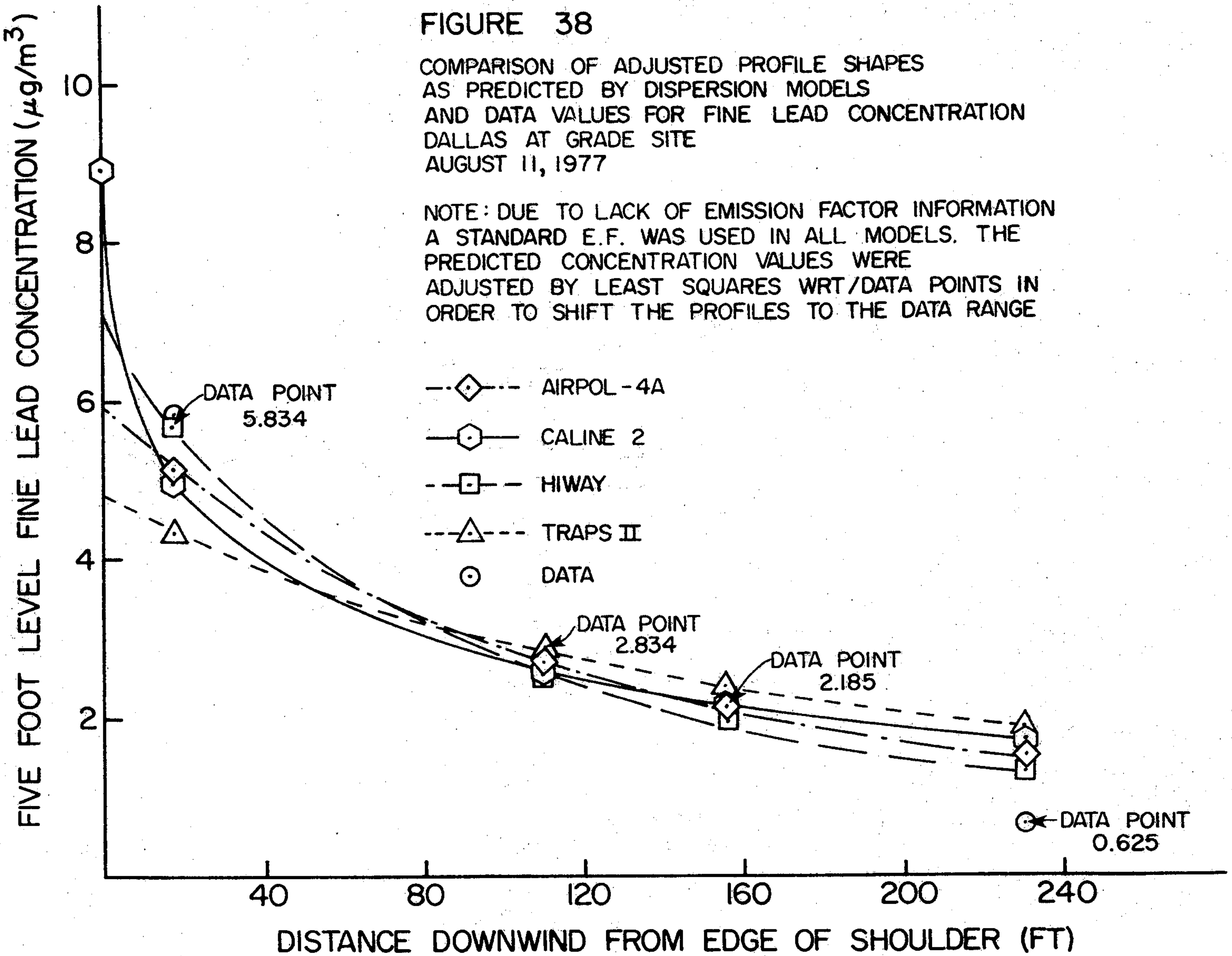



FIGURE 38

COMPARISON OF ADJUSTED PROFILE SHAPES AS PREDICTED BY DISPERSION MODELS AND DATA VALUES FOR FINE LEAD CONCENTRATION DALLAS AT GRADE SITE AUGUST 11, 1977

NOTE: DUE TO LACK OF EMISSION FACTOR INFORMATION A STANDARD E.F. WAS USED IN ALL MODELS. THE PREDICTED CONCENTRATION VALUES WERE ADJUSTED BY LEAST SQUARES WRT/DATA POINTS IN ORDER TO SHIFT THE PROFILES TO THE DATA RANGE

New York Particulate Data

As part of Project 528, the total suspended particulate data taken in New York under contract DOT-FH-11-9245 was manipulated into a more usable form. This involved calculating the average flow rates of the high volume air samplers used during each run and then reducing the total particulate weights on the filters to units of $\mu g/m^3$. The New York TSP data is presented in Appendix D.

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APPENDIX A

# APPENDIX A

## Filter Catalog

A total of 980 different samples were collected as a result of Project 528. This appendix subdivides that number into the number of filters of each type collected at each location. Quantitative elemental analyses were performed on the filters by the Texas Air Control Board in Austin and by the University of California at Davis/Air Quality Group. The number of filters analyzed by each group is tabulated as to filter type and sampling location.

## Appendix A

## Filter Catalog

Total Filter Count

| Site[2] | Instrument[1] SFU[3] | HV[3] | C | CAF[3] | LA[3] | L | Total |
|---|---|---|---|---|---|---|---|
| Dallas I | 126 | 41 | 110 | 22 | 32 | 32 | 339 |
| Dallas II | 76 | 23 | 60 | 12 | 36 | 32 | 239 |
| San Antonio | 98 | 21 | 3 | 1 | 34 | 28 | 185 |
| El Paso | 70 | -- | --- | -- | -- | 24 | 94 |
| Road Vacuuming | --- | 11 | 10 | 2 | -- | -- | 23 |
| Total | 370 | 96 | 183 | 37 | 78 | 116 | 980 |

(1) SFU: Stacked filter Unit

HV: High Volume Air Sampler

C: High Volume Cascade Impactor (Slotted Filters)

CAF: High Volume Cascade Impactors (Afterfilters)

L: Lundgren Impactors (Mylar Strips)

LA: Lundgren Impactors (Afterfilters)

(2) Site Location

Dallas I: Dallas, IH 45 at Forest Avenue

Dallas II: Dallas; IH 30 at Motley Drive

San Antonio: Loop 410 at Military Highway

El Paso: IH 10 at Luna Street

(3) All SFU, HV, CAF and LA filters were analyzed by the Texas Air Control Board.

Filters Analyzed by the University of California at Davis/Air Resources Board

Instrument

| Site | SFU* | HV* | C | CAF* | LA* | L | Total |
|---|---|---|---|---|---|---|---|
| Dallas I | 84 | -- | --- | -- | 8 | 8 | |
| Dallas II | 76 | 7 | 60 | 2 | 36 | 8 | |
| San Antonio | 20 | -- | 3 | -- | 34 | 7 | |
| El Paso | 18 | -- | --- | -- | -- | 6 | |
| Road Vacuuming | -- | -- | --- | 2 | -- | -- | |

* Reanalyzed using the UCD/ARB system.

APPENDIX B

# Appendix B

## Texas Particulate Data

This appendix presents all the data collected under Project 528, "Measurement and Analysis of Resuspended Dust from Texas Roadways." In addition, meteorological and traffic data for the particulate sampling days are presented. The meteorological and traffic data were collected under Project 218, "Analytical and Experimental Assessment of Highway Impact on Air Quality." All experimental data is available on magnetic tape from the Texas State Department of Highways and Public Transportation and NTIS. The report and data are also available at modest costs from Dr. Jerry A. Bullin, Chemical Engineering Department, Texas A&M University, College Station, Texas 77843, phone 713-845-3361.

The particulate data is arranged according to sampler type. Data from the different samplers are subdivided according to the sampling site, see the data directory. When both the Texas Air Control Board (TACB) and the Air Quality Group at the University of California at Davis (UCD) analyzed the same filter, the TACB analysis is followed by the UCD analysis.

The cascade afterfilter data is included in the hivol filter data, since both used the same size Whatman 41 filters. The cascade afterfilter data is marked and noted as cascade afterfilter data on the pages it appears. The cascade impactors were run at stations 1 and 3 at the Dallas "at grade" site (IH30 at Motley Drive), stations 2 and 7 at the Dallas elevated site (IH45 and Forest Avenue), and station 3 at the San Antonio Site on October 19, 1977.

The analyses from each of the four Lundgren impactor stages (when all had sufficient loading for analysis) plus the afterfilter data are grouped together from one run. The Lundgren impactors were run during the daylight hours of a sampling week, that is from 2 to 4 days. The afterfilters were changed more frequently than the Lundgren strips. Therefore, the dates on the Lundgren strip data represent the day the sampling week began. However, the dates on the Lundgren afterfilters represent the actual day the afterfilters were used. The Lundgren impactor data was not corrected for flow rate. In calculating the particulate concentrations captured by the afterfilters a flow rate of 4 cfm was assumed. In actuality, the flow varied from 2.8 to 4 cfm.

Following the Lundgren data is the cascade impactor data. The cascade impactor strips run at the Dallas elevated site were too lightly loaded for UCD analyses. The data are given in filter loadings in $\mu g/cm^2$, since the active filter area of the slotted cascade strips was not known.

Following the cascade impactor data is the road vacuuming data. This data is presented for the two Dallas sites and the San Antonio site. The samples from the El Paso site were lost.

Meteorological and traffic data is presented at the end of this appendix. The data is grouped according to the site. Hourly averages of the meteorological conditions and hourly traffic counts are presented for all of the particulate sampling days, with the exception of December 1-3, 1977. Data from these three days were excluded because the Lundgren impactor data is incomplete, that is the afterfilters were lost as were the other samples taken on those days. The traffic data from the Dallas elevated site includes only the traffic count for the three south bound lanes of traffic. The three northbound lanes of traffic could not be counted by radar, as is discussed previously in this report.

Table 32. Data Directory

DALLAS: IH 45 AT FOREST AV.
HIGH VOLUME AIR SAMPLER     TX. AIR CONTROL BOARD ANALYSIS

NOMINAL FLOW RATE= 1.1330 M**3/MIN
DATE= 6 1 77
START TIME= 7 A.M.
STOP TIME= 9 A.M.
NUMBER OF OBSERVATION STATIONS= 8
UNCORRECTED FOR 25% PENETRATION OF FINES

| | WEIGHT(UG/M**3) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| STATIONS | 1 | 2* | 3 | 4 | 5 | 6 | 7* | 8 |
| ELEMENT | | | | | | | | |
| TI | 0.1 | 0.0 | 0.1 | 0.1 | 0.0 | 0.1 | 0.0 | 0.1 |
| CA | 5.4 | 0.8 | 5.5 | 3.4 | 3.7 | 4.9 | 1.3 | 5.4 |
| K | 0.0 | 0.0 | 0.5 | 0.2 | 0.4 | 0.3 | 0.0 | 0.5 |
| CL | 1.2 | 0.0 | 0.9 | 0.0 | 0.8 | 0.7 | 0.4 | 0.5 |
| S | 0.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.6 |
| SI | 2.3 | 0.0 | 1.7 | 0.0 | 0.0 | 2.1 | 0.0 | 0.0 |
| ZN | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.1 | 0.0 | 0.1 |
| CU | 0.0 | 0.0 | 0.2 | 0.2 | 0.3 | 0.2 | 0.0 | 0.2 |
| FE | 1.1 | 0.0 | 1.2 | 0.8 | 1.0 | 1.1 | 0.0 | 1.2 |
| PB | 1.2 | 1.0 | 1.7 | 1.2 | 1.1 | 1.2 | 0.0 | 1.4 |
| BR | 0.5 | 0.4 | 0.8 | 0.3 | 0.4 | 0.4 | 0.0 | 0.5 |
| TSP (TOTAL WT.) | 36.8 | 14.7 | 36.8 | 0.0 | 29.4 | 22.1 | 14.7 | 22.1 |
| RUN (HRS) | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |

* Cascade Impactor Afterfilter

DALLAS: IH 45 AT FOREST AV.
HIGH VOLUME AIR SAMPLER TX. AIR CONTROL BOARD ANALYSIS
NOMINAL FLOW RATE= 1.1330 M**3/MIN
DATE= 6 1 77
START TIME= 4 P.M.
STOP TIME= 6 P.M.
NUMBER OF OBSERVATION STATIONS= 7
UNCORRECTED FOR 25% PENETRATION OF FINES

| | WEIGHT(UG/M**3) | | | | | | |
|---|---|---|---|---|---|---|---|
| STATIONS | 1 | 2* | 4 | 5 | 6 | 7* | 8 |
| ELEMENT | | | | | | | |
| TI | 0.1 | 0.0 | 0.1 | 0.0 | 0.1 | 0.0 | 0.1 |
| CA | 5.6 | 2.5 | 3.6 | 2.0 | 4.8 | 1.6 | 4.4 |
| K | 0.6 | 0.0 | 0.4 | 0.0 | 0.5 | 0.0 | 0.3 |
| CL | 0.8 | 0.0 | 0.6 | 0.0 | 0.6 | 0.0 | 0.0 |
| S | 1.2 | 1.4 | 1.5 | 0.9 | 2.0 | 1.4 | 1.6 |
| SI | 1.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| ZN | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| CU | 0.4 | 0.0 | 0.0 | 0.0 | 0.2 | 0.0 | 0.0 |
| FE | 1.5 | 0.0 | 0.6 | 0.0 | 0.9 | 0.0 | 0.7 |
| PB | 1.8 | 1.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| BR | 0.5 | 0.9 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| TSP (TOTAL WT.) | 98.1 | 44.1 | 147.1 | 44.1 | 139.7 | 14.7 | 103.0 |
| RUN (HRS) | 1.50 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |

* Cascade Impactor Afterfilter

DALLAS: IH 45 AT FOREST AV.
HIGH VOLUME AIR SAMPLER TX. AIR CONTROL BOARD ANALYSIS
NOMINAL FLOW RATE= 1.1330 M**3/MIN
DATE= 6 2 77
START TIME= 7 A.M.
STOP TIME= 9 A.M.
NUMBER OF OBSERVATION STATIONS= 5
UNCORRECTED FOR 25% PENETRATION OF FINES

| | WEIGHT(UG/M**3) | | | | |
|---|---|---|---|---|---|
| STATIONS | 2* | 4 | 5 | 6 | 7* |
| ELEMENT | | | | | |
| TI | 0.0 | 0.2 | 0.2 | 0.1 | 0.0 |
| CA | 1.3 | 11.7 | 11.6 | 8.0 | 1.0 |
| K | 0.0 | 0.5 | 0.8 | 0.6 | 0.0 |
| CL | 0.8 | 2.8 | 2.7 | 2.4 | 0.0 |
| S | 0.0 | 1.4 | 1.1 | 1.0 | 0.0 |
| SI | 0.0 | 2.8 | 2.5 | 1.9 | 0.0 |
| ZN | 0.0 | 0.0 | 0.2 | 0.0 | 0.0 |
| CU | 0.0 | 0.3 | 0.2 | 0.3 | 0.0 |
| FE | 0.0 | 2.1 | 2.3 | 1.1 | 0.0 |
| PB | 3.3 | 3.8 | 4.1 | 3.9 | 0.8 |
| BR | 1.6 | 1.9 | 2.1 | 1.7 | 0.0 |
| TSP (TOTAL WT.) | 80.9 | 191.2 | 213.3 | 183.9 | 80.9 |
| RUN (HRS) | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |

* Cascade Impactor Afterfilter

DALLAS: IH 45 AT FOREST AV.
HIGH VOLUME AIR SAMPLER TX. AIR CONTROL BOARD ANALYSIS

NOMINAL FLOW RATE= 1.1330 M**3/MIN
DATE= 6 2 77
START TIME= 4 P.M.
STOP TIME= 6 P.M.
NUMBER OF OBSERVATION STATIONS= 5
UNCORRECTED FOR 25% PENETRATION OF FINES

| | | | WEIGHT(UG/M**3) | | |
|---|---|---|---|---|---|
| STATIONS | 1 | 2* | 4 | 6 | 7* |
| ELEMENT | | | | | |
| TI | 0.1 | 0.0 | 0.1 | 0.2 | 0.0 |
| CA | 11.1 | 1.8 | 7.5 | 9.3 | 1.1 |
| K | 0.4 | 0.0 | 0.4 | 0.5 | 0.0 |
| CL | 1.5 | 0.8 | 0.8 | 0.0 | 0.0 |
| S | 2.0 | 1.7 | 1.7 | 2.8 | 1.1 |
| SI | 2.7 | 0.0 | 2.2 | 2.9 | 0.0 |
| CU | 0.0 | 0.0 | 0.0 | 0.2 | 0.0 |
| FE | 1.3 | 0.0 | 1.2 | 1.6 | 0.0 |
| PB | 2.1 | 0.9 | 0.7 | 0.0 | 0.0 |
| BR | 0.7 | 0.4 | 0.0 | 0.0 | 0.0 |
| TSP (TOTAL WT.) | 228.0 | 95.6 | 154.5 | 196.1 | 51.5 |
| RUN (HRS) | 2.00 | 2.00 | 2.00 | 1.50 | 2.00 |

* Cascade Impactor Afterfilter

DALLAS: IH 45 AT FOREST AV.
HIGH VOLUME AIR SAMPLER TX. AIR CONTROL BOARD ANALYSIS
NOMINAL FLOW RATE= 1.1330 M**3/MIN
DATE= 6 3 77
START TIME= 7 A.M.
STOP TIME= 9 A.M.
NUMBER OF OBSERVATION STATIONS= 7
UNCORRECTED FOR 25% PENETRATION OF FINES

WEIGHT(UG/M**3)

| STATIONS | 1 | 2* | 3 | 4 | 5 | 7* | 8 |
|---|---|---|---|---|---|---|---|
| ELEMENT | | | | | | | |
| TI | 0.2 | 0.0 | 0.1 | 0.2 | 0.1 | 0.0 | 0.1 |
| CA | 9.3 | 1.1 | 11.3 | 8.0 | 8.2 | 0.7 | 8.8 |
| K | 0.6 | 0.0 | 0.5 | 0.4 | 0.7 | 0.0 | 0.7 |
| CL | 3.3 | 0.7 | 2.8 | 1.9 | 2.4 | 0.5 | 1.4 |
| S | 1.9 | 1.1 | 2.5 | 2.0 | 1.3 | 0.0 | 2.1 |
| SI | 0.0 | 0.0 | 2.2 | 2.3 | 2.2 | 0.0 | 3.8 |
| ZN | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 |
| CU | 0.0 | 0.0 | 0.2 | 0.2 | 0.3 | 0.0 | 0.0 |
| FE | 1.3 | 0.0 | 2.0 | 1.3 | 1.9 | 0.0 | 1.6 |
| PB | 3.4 | 2.5 | 3.2 | 2.6 | 3.2 | 1.0 | 2.1 |
| BR | 1.8 | 1.3 | 1.5 | 1.1 | 1.7 | 0.4 | 0.7 |
| TSP (TOTAL WT.) | 147.1 | 44.1 | 132.4 | 117.7 | 169.2 | 44.1 | 88.3 |
| RUN (HRS) | 1.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |

DALLAS: IH 45 AT FOREST AV.
HIGH VOLUME AIR SAMPLER TX. AIR CONTROL BOARD ANALYSIS
NOMINAL FLOW RATE= 1.1330 M**3/MIN
DATE= 6 7 77
START TIME= 4 P.M.
STOP TIME= 6 P.M.
NUMBER OF OBSERVATION STATIONS= 4
UNCORRECTED FOR 25% PENETRATION OF FINES

WEIGHT(UG/M**3)

| STATIONS | 2* | 3 | 4 | 7* |
|---|---|---|---|---|
| ELEMENT | | | | |
| TI | 0.0 | 0.1 | 0.1 | 0.0 |
| CA | 2.0 | 5.6 | 4.9 | 0.8 |
| K | 0.3 | 0.7 | 0.6 | 0.3 |
| CL | 0.3 | 0.6 | 0.5 | 0.0 |
| S | 0.6 | 0.8 | 0.6 | 0.9 |
| SI | 0.0 | 2.6 | 2.8 | 0.0 |
| CU | 0.0 | 0.1 | 0.3 | 0.0 |
| FE | 0.4 | 1.3 | 1.1 | 0.0 |
| PB | 1.4 | 0.5 | 0.6 | 0.0 |
| BR | 0.5 | 0.3 | 0.0 | 0.0 |
| TSP (TOTAL WT.) | 80.9 | 132.4 | 110.3 | 66.2 |
| RUN (HRS) | 2.00 | 2.00 | 2.00 | 2.00 |

* Cascade Impactor Afterfilter

DALLAS: IH 45 AT FOREST AV.
HIGH VOLUME AIR SAMPLER TX. AIR CONTROL BOARD ANALYSIS
NOMINAL FLOW RATE= 1.1330 M**3/MIN
DATE= 6 8 77
START TIME= 7 A.M.
STOP TIME= 9 A.M.
NUMBER OF OBSERVATION STATIONS= 6
UNCORRECTED FOR 25% PENETRATION OF FINES

| | WEIGHT(UG/M**3) | | | | | |
|---|---|---|---|---|---|---|
| STATIONS | 1 | 2* | 4 | 5 | 7* | 8 |
| ELEMENT | | | | | | |
| TI | 0.2 | 0.0 | 0.2 | 0.2 | 0.0 | 0.2 |
| CA | 9.2 | 2.3 | 8.6 | 7.8 | 0.8 | 6.9 |
| K | 0.8 | 0.3 | 0.9 | 0.6 | 0.0 | 0.8 |
| CL | 1.0 | 0.5 | 1.2 | 1.0 | 0.0 | 0.8 |
| S | 0.0 | 0.0 | 0.7 | 0.7 | 0.0 | 1.1 |
| SI | 3.2 | 0.0 | 4.1 | 2.1 | 0.0 | 2.2 |
| ZN | 0.2 | 0.0 | 0.1 | 0.1 | 0.0 | 0.1 |
| CU | 0.2 | 0.0 | 0.2 | 0.0 | 0.0 | 0.3 |
| FE | 2.4 | 0.0 | 2.8 | 2.3 | 0.2 | 2.1 |
| PB | 2.2 | 2.2 | 2.4 | 2.3 | 0.7 | 1.2 |
| BR | 0.9 | 1.3 | 1.1 | 1.0 | 0.2 | 0.5 |
| ZR | 0.2 | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 |
| TSP (TOTAL WT.) | 235.4 | 125.0 | 191.2 | 147.1 | 125.0 | 88.3 |
| RUN (HRS) | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |

DALLAS: IH 45 AT FOREST AV.
HIGH VOLUME AIR SAMPLER TX. AIR CONTROL BOARD ANALYSIS
NOMINAL FLOW RATE= 1.1330 M**3/MIN
DATE= 6 8 77
START TIME= 4 P.M.
STOP TIME= 6 P.M.
NUMBER OF OBSERVATION STATIONS= 6
UNCORRECTED FOR 25% PENETRATION OF FINES

| | WEIGHT(UG/M**3) | | | | | |
|---|---|---|---|---|---|---|
| STATIONS | 1 | 2* | 4 | 5 | 7* | 8 |
| ELEMENT | | | | | | |
| TI | 0.1 | 0.0 | 0.1 | 0.1 | 0.0 | 0.1 |
| CA | 4.6 | 4.3 | 5.4 | 4.1 | 1.4 | 5.0 |
| K | 0.5 | 0.2 | 0.5 | 0.5 | 0.3 | 0.5 |
| CL | 0.5 | 0.8 | 0.5 | 0.7 | 0.0 | 0.5 |
| S | 0.9 | 0.0 | 0.7 | 0.0 | 0.7 | 0.7 |
| SI | 1.5 | 0.0 | 1.8 | 2.4 | 0.0 | 1.4 |
| CU | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| FE | 1.0 | 0.5 | 1.3 | 0.9 | 0.3 | 0.9 |
| PB | 0.0 | 0.9 | 0.0 | 0.0 | 0.0 | 0.0 |
| BR | 0.0 | 0.5 | 0.0 | 0.2 | 0.0 | 0.0 |
| ZR | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.0 |
| TSP (TOTAL WT.) | 139.7 | 66.2 | 161.8 | 110.3 | 51.5 | 117.7 |
| RUN (HRS) | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |

* Cascade Impactor Afterfilter

DALLAS: IH 45 AT FOREST AV.
HIGH VOLUME AIR SAMPLER        TX. AIR CONTROL BOARD ANALYSIS
NOMINAL FLOW RATE= 1.1330 M**3/MIN
DATE= 6 9 77
START TIME= 7 A.M.
STOP TIME= 9 A.M.
NUMBER OF OBSERVATION STATIONS= 6
UNCORRECTED FOR 25% PENETRATION OF FINES

| | WEIGHT(UG/M**3) | | | | | |
|---|---|---|---|---|---|---|
| STATIONS | 2* | 3 | 4 | 5 | 7* | 8 |
| ELEMENT | | | | | | |
| TI | 0.0 | 0.2 | 0.2 | 0.2 | 0.0 | 0.2 |
| CA | 2.1 | 10.0 | 10.7 | 12.4 | 1.6 | 9.4 |
| K | 0.0 | 1.0 | 1.1 | 1.1 | 0.4 | 1.1 |
| CL | 0.9 | 1.3 | 1.4 | 1.3 | 0.5 | 0.9 |
| S | 2.4 | 3.5 | 4.3 | 3.9 | 1.0 | 3.7 |
| SI | 2.0 | 11.5 | 13.0 | 15.3 | 0.0 | 11.1 |
| CU | 0.0 | 0.3 | 0.2 | 0.0 | 0.0 | 0.2 |
| FE | 0.0 | 2.2 | 2.6 | 2.9 | 0.4 | 2.1 |
| PB | 2.4 | 3.2 | 2.1 | 3.0 | 1.0 | 1.4 |
| BR | 1.4 | 1.1 | 1.0 | 1.4 | 0.3 | 0.4 |
| AS | 0.0 | 0.0 | 0.6 | 0.0 | 0.0 | 0.0 |
| ZN | 0.0 | 0.0 | 0.0 | 0.2 | 0.0 | 0.0 |
| SR | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.0 |
| TSP (TOTAL WT.) | 139.7 | 264.8 | 235.4 | 228.0 | 154.5 | 198.6 |
| RUN (HRS) | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |

* Cascade Impactor Afterfilter

DALLAS: IH 45 AT FOREST AV.
HIGH VOLUME AIR SAMPLER TX. AIR CONTROL BOARD ANALYSIS

NOMINAL FLOW RATE= 1.1330 M**3/MIN
DATE= 6 9 77
START TIME= 4 P.M.
STOP TIME= 6 P.M.
NUMBER OF OBSERVATION STATIONS= 5
UNCORRECTED FOR 25% PENETRATION OF FINES

| | WEIGHT(UG/M**3) | | | | |
|---|---|---|---|---|---|
| STATIONS | 2* | 4 | 5 | 7* | 8 |
| ELEMENT | | | | | |
| CA | 2.7 | 6.3 | 5.4 | 2.6 | 6.1 |
| K | 0.0 | 0.5 | 0.6 | 0.5 | 0.7 |
| CL | 0.7 | 0.9 | 0.7 | 0.5 | 0.6 |
| S | 2.8 | 3.2 | 3.7 | 1.9 | 3.5 |
| SI | 2.7 | 6.0 | 7.1 | 2.5 | 6.4 |
| FE | 0.0 | 1.0 | 1.0 | 0.0 | 1.1 |
| PB | 2.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| BR | 1.1 | 0.0 | 0.0 | 0.0 | 0.0 |
| AL | 0.0 | 0.0 | 0.0 | 0.0 | 7.9 |
| TSP (TOTAL WT.) | 0.0 | 154.5 | 161.8 | 95.6 | 147.1 |
| RUN (HRS) | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |

DALLAS: IH 45 AT FOREST AV.
HIGH VOLUME AIR SAMPLER TX. AIR CONTROL BOARD ANALYSIS

NOMINAL FLOW RATE= 1.1330 M**3/MIN
DATE= 6 10 77
START TIME= 7 A.M.
STOP TIME= 9 A.M.
NUMBER OF OBSERVATION STATIONS= 5
UNCORRECTED FOR 25% PENETRATION OF FINES

| | WEIGHT(UG/M**3) | | | | |
|---|---|---|---|---|---|
| STATIONS | 1 | 2* | 4 | 5 | 8 |
| ELEMENT | | | | | |
| TI | 0.2 | 0.0 | 0.0 | 0.0 | 0.2 |
| CA | 10.1 | 2.7 | 5.5 | 8.6 | 7.1 |
| K | 1.2 | 0.0 | 0.8 | 0.9 | 0.8 |
| CL | 0.9 | 0.7 | 1.2 | 1.2 | 0.8 |
| S | 5.2 | 2.8 | 5.4 | 6.0 | 4.1 |
| SI | 9.7 | 2.7 | 6.9 | 10.3 | 8.3 |
| CU | 0.4 | 0.0 | 0.3 | 0.0 | 0.2 |
| FE | 2.2 | 0.0 | 1.4 | 1.8 | 1.5 |
| PB | 1.4 | 2.0 | 1.1 | 0.9 | 0.0 |
| BR | 0.5 | 1.1 | 0.5 | 0.6 | 0.0 |
| AS | 0.0 | 0.0 | 0.0 | 0.7 | 0.0 |
| AL | 5.9 | 0.0 | 0.0 | 0.0 | 0.0 |
| TSP (TOTAL WT.) | 235.4 | 117.7 | 66.2 | 205.9 | 198.6 |
| RUN (HRS) | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |

* Cascade Impactor Afterfilter

DALLAS: IH30 AT MOTLEY DR.
HIGH VOLUME AIR SAMPLER TX. AIR CONTROL BOARD ANALYSIS
NOMINAL FLOW RATE= 1.1330 M**3/MIN
DATE= 7 20 77
START TIME= 4 P.M.
STOP TIME= 6 P.M.
NUMBER OF OBSERVATION STATIONS= 2
UNCORRECTED FOR 25% PENETRATION OF FINES

WEIGHT(UG/M**3)

| STATIONS | 2 | 3* |
|---|---|---|
| ELEMENT | | |
| CA | 1.1 | 1.7 |
| K | 0.0 | 0.4 |
| CL | 0.6 | 1.4 |
| S | 0.0 | 0.7 |
| SI | 0.0 | 1.9 |
| PB | 0.0 | 0.6 |
| TSP (TOTAL WT.) | 14.7 | 29.4 |
| RUN (HRS) | 2.00 | 2.00 |

* Cascade Impactor Afterfilter

DALLAS: IH30 AT MOTLEY DR.
HIGH VOLUME AIR SAMPLER TX. AIR CONTROL BOARD ANALYSIS
NOMINAL FLOW RATE= 1.1330 M**3/MIN
DATE= 7 21 77
START TIME= 7 A.M.
STOP TIME= 9 A.M.
NUMBER OF OBSERVATION STATIONS= 1
UNCORRECTED FOR 25% PENETRATION OF FINES
WEIGHT(UG/M**3)

| STATIONS | 2 |
|---|---|
| ELEMENT | |
| CA | 2.3 |
| K | 0.4 |
| CL | 2.0 |
| SI | 4.0 |
| FE | 0.7 |
| TSP (TOTAL WT.) | 67.2 |
| RUN (HRS) | 1.75 |

DALLAS: IH30 AT MOTLEY DR.
HIGH VOLUME AIR SAMPLER TX. AIR CONTROL BOARD ANALYSIS
NOMINAL FLOW RATE= 1.1330 M**3/MIN
DATE= 7 22 77
START TIME= 7 A.M.
STOP TIME= 9 A.M.
NUMBER OF OBSERVATION STATIONS= 5
UNCORRECTED FOR 25% PENETRATION OF FINES
WEIGHT(UG/M**3)

| STATIONS | 1* | 2 | 3* | 4 | 7 |
|---|---|---|---|---|---|
| ELEMENT | | | | | |
| CA | 0.8 | 3.5 | 1.5 | 5.7 | 4.5 |
| K | 0.0 | 0.0 | 0.0 | 0.4 | 0.3 |
| CL | 0.6 | 1.0 | 0.9 | 1.3 | 1.2 |
| S | 1.0 | 0.9 | 1.3 | 2.1 | 1.5 |
| SI | 0.0 | 2.3 | 3.0 | 6.1 | 4.4 |
| ZN | 0.0 | 0.0 | 0.0 | 0.4 | 0.0 |
| CU | 0.0 | 0.0 | 0.0 | 0.3 | 0.2 |
| FE | 0.0 | 0.4 | 0.0 | 0.9 | 0.8 |
| PB | 0.0 | 0.0 | 0.0 | 0.0 | 0.6 |
| TSP (TOTAL WT.) | 36.8 | 36.8 | 33.6 | 100.9 | 139.7 |
| RUN | 2.00 | 2.00 | 1.75 | 1.75 | 2.00 |

* Cascade Impactor Afterfilter

DALLAS: IH30 AT MOTLEY DR.
HIGH VOLUME AIR SAMPLER TX. AIR CONTROL BOARD ANALYSIS
NOMINAL FLOW RATE= 1.1330 M**3/MIN
DATE= 8 3 77
START TIME= 7 A.M.
STOP TIME= 6 P.M.
NUMBER OF OBSERVATION STATIONS= 5
UNCORRECTED FOR 25% PENETRATION OF FINES

| | | | | WEIGHT(UG/M**3) | |
|---|---|---|---|---|---|
| STATIONS | 1* | 3* | 4 | 7 | 10 |
| ELEMENT | | | | | |
| TI | 0.0 | 0.0 | 0.1 | 0.1 | 0.0 |
| CA | 0.2 | 0.4 | 2.9 | 2.7 | 2.1 |
| K | 0.1 | 0.1 | 0.3 | 0.3 | 0.3 |
| CL | 0.0 | 0.0 | 0.2 | 0.1 | 0.0 |
| S | 1.3 | 1.8 | 2.4 | 2.5 | 2.6 |
| SI | 0.0 | 0.0 | 3.1 | 2.8 | 2.6 |
| ZN | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 |
| CU | 0.0 | 0.0 | 0.1 | 0.1 | 0.2 |
| FE | 0.0 | 0.1 | 0.6 | 0.7 | 0.6 |
| PB | 0.0 | 0.9 | 0.6 | 0.5 | 0.4 |
| BR | 0.0 | 0.4 | 0.3 | 0.0 | 0.2 |
| TSP (TOTAL WT.) | 33.4 | 41.5 | 47.9 | 68.4 | 72.9 |
| RUN (HRS) | 11.00 | 11.00 | 10.75 | 10.75 | 10.50 |

* Cascade Impactor Afterfilter

DALLAS: IH30 AT MOTLEY DR.
HIGH VOLUME AIR SAMPLER TX. AIR CONTROL BOARD ANALYSIS
NOMINAL FLOW RATE= 1.1330 M**3/MIN
DATE= 8 4 77
START TIME= 7 A.M.
STOP TIME= 6 P.M.
NUMBER OF OBSERVATION STATIONS= 4
UNCORRECTED FOR 25% PENETRATION OF FINES

| | | | | WEIGHT(UG/M**3) |
|---|---|---|---|---|
| STATIONS | 1* | 3* | 5 | 10 |
| ELEMENT | | | | |
| TI | 0.0 | 0.0 | 0.1 | 0.1 |
| CA | 0.2 | 0.6 | 6.5 | 3.2 |
| K | 0.1 | 0.1 | 0.5 | 0.4 |
| CL | 0.0 | 0.2 | 0.9 | 0.3 |
| S | 1.6 | 2.5 | 3.7 | 3.0 |
| SI | 0.4 | 0.5 | 6.7 | 4.4 |
| CU | 0.0 | 0.0 | 0.1 | 0.1 |
| FE | 0.1 | 0.1 | 1.5 | 0.8 |
| PB | 0.0 | 0.8 | 1.6 | 0.6 |
| BR | 0.0 | 0.5 | 0.7 | 0.3 |
| AS | 0.0 | 0.1 | 0.0 | 0.0 |
| ZN | 0.0 | 0.0 | 0.1 | 0.0 |
| AL | 0.0 | 0.0 | 0.0 | 1.6 |
| TSP (TOTAL WT.) | 37.4 | 44.1 | 165.5 | 78.9 |
| RUN (HRS) | 11.00 | 11.00 | 4.00 | 11.00 |

* Cascade Impactor Afterfilter

DALLAS: IH30 AT MOTLEY DR.
HIGH VOLUME AIR SAMPLER TX. AIR CONTROL BOARD ANALYSIS

NOMINAL FLOW RATE= 1.1330 M**3/MIN
DATE= 8 5 77
START TIME= 7 A.M.
STOP TIME= 9 A.M.
NUMBER OF OBSERVATION STATIONS= 5
UNCORRECTED FOR 25% PENETRATION OF FINES

| | | | WEIGHT(UG/M**3) | | |
|---|---|---|---|---|---|
| STATIONS | 1* | 3* | 5 | 7 | 10 |
| ELEMENT | | | | | |
| CA | 3.5 | 0.0 | 4.4 | 3.7 | 2.7 |
| K | 0.4 | 0.0 | 0.4 | 0.3 | 0.4 |
| CL | 0.5 | 0.8 | 0.8 | 0.7 | 0.5 |
| S | 3.2 | 1.5 | 4.2 | 4.0 | 3.3 |
| SI | 5.4 | 0.0 | 6.5 | 5.7 | 3.7 |
| CU | 0.3 | 0.0 | 0.2 | 0.0 | 0.2 |
| FE | 0.4 | 0.0 | 0.8 | 0.6 | 0.6 |
| PB | 0.0 | 0.9 | 1.3 | 0.0 | 0.0 |
| BR | 0.0 | 0.5 | 0.7 | 0.0 | 0.0 |
| AS | 0.4 | 0.0 | 0.0 | 0.0 | 0.0 |
| TSP (TOTAL WT.) | 257.4 | 191.2 | 411.9 | 235.4 | 242.7 |
| RUN (HRS) | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |

* Cascade Impactor Afterfilter

DALLAS AT GRADE SITE: IH30 AT MOTLEY DRIVE

HIGH VOLUME AIR SAMPLER TX. AIR CONTROL BOARD ANALYSIS

NOMINAL FLOW RATE= 1.133

DATE= 8 10 77

START TIME= 7 A.M.

STOP TIME= 6 P.M.

WHATMAN 41 FILTER

| | WEIGHT(UG/M**3) | | | | | |
|---|---|---|---|---|---|---|
| STATION | 1* | 2 | 3* | 5 | 7 | 10 |
| ELEMENT | | | | | | |
| CA | 0.4 | 2.0 | 1.3 | 4.5 | 2.3 | 1.9 |
| FE | 0.2 | 0.4 | 0.2 | 0.7 | 0.4 | 0.3 |
| K | . | 0.2 | 0.2 | 0.5 | 0.2 | 0.2 |
| SI | 0.4 | 2.3 | 1.4 | 4.3 | 2.3 | 2.2 |
| CL | . | 0.2 | 0.3 | 1.6 | 0.5 | 0.5 |
| PB | . | . | 0.9 | 1.4 | 0.2 | 0.3 |
| S | 0.2 | 0.4 | 0.8 | 1.3 | 0.6 | 0.6 |
| TSP | 2.67 | 21.40 | 16.05 | 51.49 | 22.63 | 25.22 |
| RUN TIME(HRS) | 11.00 | 11.00 | 11.00 | 2.00 | 9.75 | 10.50 |

* Cascade Impactor Afterfilter

DALLAS: IH30 AT MOTLEY DR.
HIGH VOLUME AIR SAMPLER TX. AIR CONTROL BOARD ANALYSIS
NOMINAL FLOW RATE= 1.1330 M**3/MIN
DATE= 8 11 77
START TIME= 7 A.M.
STOP TIME= 6 P.M.
NUMBER OF OBSERVATION STATIONS= 7
UNCORRECTED FOR 25% PENETRATION OF FINES

| | WEIGHT(UG/M**3) | | | | | | |
|---|---|---|---|---|---|---|---|
| STATIONS | 1* | 2 | 3* | 4 | 7 | 9 | 10 |
| ELEMENT | | | | | | | |
| TI | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.1 | 0.1 |
| CA | 0.4 | 2.5 | 0.8 | 3.3 | 2.8 | 2.7 | 3.0 |
| K | 0.1 | 0.2 | 0.1 | 0.2 | 0.2 | 0.2 | 0.3 |
| CL | 0.0 | 0.3 | 0.2 | 0.5 | 0.3 | 0.4 | 0.3 |
| S | 0.6 | 1.1 | 1.2 | 1.4 | 1.4 | 1.4 | 1.2 |
| SI | 0.4 | 3.1 | 0.8 | 3.0 | 2.7 | 2.8 | 3.2 |
| ZN | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| CU | 0.0 | 0.3 | 0.0 | 0.1 | 0.1 | 0.3 | 0.3 |
| FE | 0.1 | 0.4 | 0.1 | 0.6 | 0.5 | 0.5 | 0.6 |
| PB | 0.0 | 0.0 | 0.9 | 0.6 | 0.4 | 0.5 | 0.3 |
| BR | 0.0 | 0.0 | 0.5 | 0.3 | 0.0 | 0.2 | 0.1 |
| AL | 0.0 | 1.4 | 0.0 | 1.4 | 0.0 | 0.0 | 0.0 |
| TSP (TOTAL WT.) | 2.7 | 33.4 | 16.8 | 43.4 | 37.8 | 50.2 | 37.8 |
| RUN (HRS) | 11.00 | 11.00 | 10.50 | 10.50 | 10.50 | 10.25 | 10.50 |

* Cascade Impactor Afterfilter

DALLAS AT GRADE SITE: IH30 AT MOTLEY DRIVE

HIGH VOLUME AIR SAMPLER UCD/AIR QUALITY GROUP ANALYSIS

NOMINAL FLOW RATE= 1.133 M**3/MIN

DATE= 8 11 77

WHATMAN 41 FILTER

| | | | WEIGHT(UG/M**3) | | | | |
|---|---|---|---|---|---|---|---|
| STATION | 1* | 2 | 3* | 4 | 7 | 9 | 10 |
| ELEMENT | | | | | | | |
| CA | 0.9 | 1.5 | 0.7 | . | 2.0 | 1.7 | 1.4 |
| FE | . | . | . | 0.3 | . | . | 0.1 |
| K | . | . | . | 0.5 | . | 0.4 | 0.6 |
| SI | . | . | . | 0.1 | . | 0.1 | . |
| TI | . | . | 0.6 | 0.5 | 0.9 | . | . |
| CO | . | 2.2 | . | . | . | . | . |
| BR | . | 0.1 | 0.7 | 0.4 | 0.3 | 0.5 | 0.3 |
| CL | . | 0.1 | . | 0.2 | 0.2 | 0.3 | 0.1 |
| MN | . | . | . | . | 0.5 | . | . |
| NI | . | . | . | . | 0.1 | . | . |
| PB | . | 0.5 | 1.7 | 1.3 | 0.8 | 1.3 | 0.9 |
| V | . | . | . | 0.5 | . | . | . |
| ZN | 0.1 | . | 0.1 | 0.1 | 0.2 | . | . |
| RUN TIME(HRS) | 11.00 | 11.00 | 10.50 | 10.50 | 10.50 | 10.50 | 10.50 |

* Cascade Impactor Afterfilter

SAN ANTONIO:LOOP 410 AT MILITARY HWY
HIGH VOLUME AIR SAMPLER TX. AIR CONTROL BOARD ANALYSIS
NOMINAL FLOW RATE= 1.1330 M**3/MIN
DATE= 9 28 77
START TIME= 8 A.M.
STOP TIME= 6 P.M.
NUMBER OF OBSERVATION STATIONS= 1
UNCORRECTED FOR 25% PENETRATION OF FINES

| | WEIGHT(UG/M**3) |
|---|---|
| STATIONS | 3 |
| ELEMENT | |
| TI | 0.1 |
| CA | 16.8 |
| K | 0.7 |
| CL | 1.6 |
| SI | 2.2 |
| ZN | 0.2 |
| CU | 0.2 |
| FE | 1.3 |
| PB | 3.4 |
| BR | 1.7 |
| TSP (TOTAL WT.) | 135.8 |
| RUN (HRS) | 9.75 |

SAN ANTONIO:LOOP 410 AT MILITARY HWY
HIGH VOLUME AIR SAMPLER TX. AIR CONTROL BOARD ANALYSIS
NOMINAL FLOW RATE= 1.1330 M**3/MIN
DATE= 9 29 77
START TIME= 8 A.M.
STOP TIME= 3 P.M.
NUMBER OF OBSERVATION STATIONS= 3
UNCORRECTED FOR 25% PENETRATION OF FINES
WEIGHT(UG/M**3)

| STATIONS | 3 | 10 | 10 |
|---|---|---|---|
| ELEMENT | | | |
| TI | 0.1 | 0.1 | 0.1 |
| CA | 15.3 | 9.8 | 11.5 |
| K | 0.4 | 0.4 | 0.5 |
| CL | 1.6 | 0.9 | 0.9 |
| SI | 1.9 | 1.8 | 1.4 |
| ZN | 0.1 | 0.1 | 0.1 |
| CU | 0.2 | 0.1 | 0.2 |
| FE | 1.2 | 0.8 | 0.8 |
| PB | 3.6 | 1.2 | 1.4 |
| BR | 1.8 | 0.6 | 0.6 |
| TSP (TOTAL WT.) | 95.1 | 81.5 | 90.5 |
| RUN (HRS) | 6.50 | 6.50 | 6.50 |

SAN ANTONIO:LOOP 410 AT MILITARY HWY
HIGH VOLUME AIR SAMPLER TX. AIR CONTROL BOARD ANALYSIS
NOMINAL FLOW RATE= 1.1330 M**3/MIN
DATE= 10 5 77
START TIME= 7 A.M.
STOP TIME= 6 P.M.
NUMBER OF OBSERVATION STATIONS= 2
UNCORRECTED FOR 25% PENETRATION OF FINES
WEIGHT(UG/M**3)

| STATIONS | 3 | 5 |
|---|---|---|
| ELEMENT | | |
| TI | 0.0 | 0.1 |
| CA | 14.7 | 10.2 |
| K | 0.5 | 0.4 |
| CL | 0.8 | 1.0 |
| S | 0.9 | 0.9 |
| ZN | 0.1 | 0.1 |
| CU | 0.2 | 0.2 |
| FE | 0.9 | 0.6 |
| PB | 2.0 | 1.8 |
| BR | 0.9 | 0.9 |
| BA | 0.2 | 0.0 |
| TSP (TOTAL WT.) | 120.5 | 93.9 |
| RUN (HRS) | 10.50 | 10.50 |

SAN ANTONIO:LOOP 410 AT MILITARY HWY
HIGH VOLUME AIR SAMPLER        TX. AIR CONTROL BOARD ANALYSIS
NOMINAL FLOW RATE=  1.1330 M**3/MIN
DATE=   10  5 77
START TIME=  7 A.M.
STOP TIME=  6 P.M.
NUMBER OF OBSERVATION STATIONS=    2
UNCORRECTED FOR 25% PENETRATION OF FINES
WEIGHT(UG/M**3)

| STATIONS | 3 | 3 |
|---|---|---|
| ELEMENT | | |
| TI | 0.1 | 0.0 |
| CA | 18.8 | 8.7 |
| K | 0.7 | 0.3 |
| CL | 1.1 | 0.5 |
| S | 1.2 | 0.5 |
| SI | 1.6 | 0.0 |
| ZN | 0.2 | 0.1 |
| CU | 0.3 | 0.1 |
| FE | 1.1 | 0.5 |
| PB | 2.4 | 1.4 |
| BR | 1.1 | 0.5 |
| BA | 0.3 | 0.0 |
| TSP (TOTAL WT.) | 138.9 | 93.5 |
| RUN (HRS) | 6.25 | 4.25 |

Sequential Operation

SAN ANTONIO:LOOP 410 AT MILITARY HWY
HIGH VOLUME AIR SAMPLER TX. AIR CONTROL BOARD ANALYSIS
NOMINAL FLOW RATE= 1.1330 M**3/MIN
DATE= 10 6 77
START TIME= 8 A.M.
STOP TIME= 7 P.M.
NUMBER OF OBSERVATION STATIONS= 3
UNCORRECTED FOR 25% PENETRATION OF FINES
WEIGHT(UG/M**3)

| STATIONS | 1 | 5 | 9 |
|---|---|---|---|
| ELEMENT | | | |
| TI | 0.1 | 0.1 | 0.0 |
| CA | 6.7 | 8.4 | 7.2 |
| K | 0.4 | 0.3 | 0.3 |
| CL | 0.4 | 0.5 | 0.4 |
| S | 1.5 | 1.1 | 1.4 |
| SI | 0.7 | 0.6 | 0.9 |
| ZN | 0.0 | 0.1 | 0.1 |
| CU | 0.2 | 0.2 | 0.2 |
| FE | 0.5 | 0.6 | 0.5 |
| PB | 0.6 | 1.4 | 0.9 |
| BR | 0.3 | 0.6 | 0.4 |
| TSP (TOTAL WT.) | 55.8 | 69.8 | 67.2 |
| RUN (HRS) | 11.33 | 11.17 | 11.17 |

SAN ANTONIO:LOOP 410 AT MILITARY HWY
HIGH VOLUME AIR SAMPLER          TX. AIR CONTROL BOARD ANALYSIS

NOMINAL FLOW RATE= 1.1330 M**3/MIN
DATE= 10 7 77
START TIME= 7 A.M.
STOP TIME= 1 P.M.
NUMBER OF OBSERVATION STATIONS= 4
UNCORRECTED FOR 25% PENETRATION OF FINES

| | WEIGHT(UG/M**3) | | | |
|---|---|---|---|---|
| STATIONS | 1 | 3 | 5 | 9 |
| ELEMENT | | | | |
| TI | 0.1 | 0.1 | 0.1 | 0.1 |
| CA | 13.7 | 14.2 | 13.8 | 12.1 |
| K | 0.5 | 0.5 | 0.4 | 0.5 |
| CL | 1.6 | 1.6 | 1.4 | 1.3 |
| S | 1.2 | 1.1 | 1.4 | 1.5 |
| SI | 1.3 | 1.3 | 0.0 | 1.2 |
| ZN | 0.1 | 0.2 | 0.1 | 0.1 |
| CU | 0.4 | 0.2 | 0.3 | 0.3 |
| FE | 0.9 | 0.9 | 0.9 | 0.7 |
| PB | 2.9 | 2.4 | 1.9 | 1.8 |
| BR | 1.4 | 0.0 | 0.9 | 0.8 |
| TSP (TOTAL WT.) | 120.5 | 112.3 | 104.3 | 85.6 |
| RUN (HRS) | 5.25 | 5.50 | 5.50 | 5.50 |

SAN ANTONIO:LOOP 410 AT MILITARY HWY
HIGH VOLUME AIR SAMPLER TX. AIR CONTROL BOARD ANALYSIS
NOMINAL FLOW RATE= 1.1330 M**3/MIN
DATE= 10 18 77
START TIME= 7 A.M.
STOP TIME= 6 P.M.
NUMBER OF OBSERVATION STATIONS= 4
UNCORRECTED FOR 25% PENETRATION OF FINES

| | | WEIGHT(UG/M**3) | | |
|---|---|---|---|---|
| STATIONS | 1 | 3 | 5 | 9 |
| ELEMENT | | | | |
| TI | 0.1 | 0.0 | 0.1 | 0.1 |
| CA | 8.4 | 7.0 | 12.5 | 9.4 |
| K | 0.6 | 0.2 | 0.7 | 0.6 |
| CL | 0.7 | 0.4 | 0.9 | 0.8 |
| S | 0.5 | 0.0 | 0.4 | 0.4 |
| SI | 1.2 | 1.0 | 1.8 | 1.6 |
| ZN | 0.1 | 0.1 | 0.2 | 0.1 |
| CU | 0.4 | 0.1 | 0.3 | 0.2 |
| FE | 0.7 | 0.4 | 0.9 | 0.7 |
| PB | 1.1 | 0.8 | 2.0 | 1.4 |
| BR | 0.5 | 0.3 | 1.0 | 0.6 |
| RB | 0.0 | 0.1 | 0.0 | 0.0 |
| TSP (TOTAL WT.) | 76.6 | 54.0 | 90.9 | 86.9 |
| RUN (HRS) | 11.33 | 11.17 | 11.17 | 11.17 |

SAN ANTONIO:LOOP 410 AT MILITARY HWY
HIGH VOLUME AIR SAMPLER TX. AIR CONTROL BOARD ANALYSIS
NOMINAL FLOW RATE= 1.1330 M**3/MIN
DATE= 10 19 77
START TIME= 7 A.M.
STOP TIME= 6 P.M.
NUMBER OF OBSERVATION STATIONS= 3
UNCORRECTED FOR 25% PENETRATION OF FINES

WEIGHT(UG/M**3)

| STATIONS | 1 | 3* | 9 |
|---|---|---|---|
| ELEMENT | | | |
| TI | 0.1 | 0.0 | 0.1 |
| CA | 10.0 | 1.4 | 11.4 |
| K | 0.5 | 0.1 | 0.5 |
| CL | 0.6 | 0.3 | 0.5 |
| S | 0.7 | 0.0 | 0.7 |
| SI | 1.4 | 0.0 | 1.4 |
| ZN | 0.1 | 0.0 | 0.1 |
| CU | 0.4 | 0.0 | 0.3 |
| FE | 0.7 | 0.1 | 0.8 |
| PB | 1.5 | 2.4 | 1.8 |
| BR | 0.7 | 1.2 | 0.8 |
| MN | 0.0 | 0.0 | 0.1 |
| V | 0.0 | 0.0 | 0.0 |
| TSP (TOTAL WT.) | 82.7 | 33.1 | 86.2 |
| RUN (HRS) | 10.50 | 10.67 | 10.75 |

* Cascade Impactor Afterfilter

SAN ANTONIO:LOOP 410 AT MILITARY HWY
HIGH VOLUME AIR SAMPLER        TX. AIR CONTROL BOARD ANALYSIS
NOMINAL FLOW RATE=  1.1330 M**3/MIN
DATE=   10 20 77
START TIME=  7 A.M.
STOP TIME=  6 P.M.
NUMBER OF OBSERVATION STATIONS=    1
UNCORRECTED FOR 25% PENETRATION OF FINES

| | WEIGHT(UG/M**3) |
|---|---|
| STATIONS | 1 |
| ELEMENT | |
| TI | 0.1 |
| CA | 10.4 |
| K | 0.4 |
| CL | 0.2 |
| S | 0.8 |
| SI | 1.6 |
| ZN | 0.1 |
| CU | 0.3 |
| FE | 0.8 |
| PB | 1.2 |
| BR | 0.4 |
| TSP (TOTAL WT.) | 85.5 |
| RUN (HRS) | 10.50 |

DALLAS: IH 45 AT FOREST AV.
STACKED FILTER UNIT TX. AIR CONTRO[illegible] ANALYSIS
NOMINAL FLOW RATE= 0.0050 M**3/MIN
DATE= 6 1 77
START TIME= 7 A.M.
STOP TIME= 9 A.M.
NUMBER OF OBSERVATION STATIONS= 6
PORE SIZE= 8.0 UM

| | WEIGHT(UG/M**3) | | | | | |
|---|---|---|---|---|---|---|
| STATIONS | 1 | 2 | 3 | 4 | 6 | 7 |
| ELEMENT | | | | | | |
| CA | 3.0 | 5.9 | 0.0 | 2.0 | 0.0 | 4.7 |
| ZR | 1.2 | 1.7 | 1.4 | 1.3 | 0.0 | 1.5 |
| RUN (HRS) | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |

PORE SIZE= 0.4 UM

| | WEIGHT(UG/M**3) | | | | | |
|---|---|---|---|---|---|---|
| STATIONS | 1 | 2 | 3 | 4 | 6 | 7 |
| ELEMENT | | | | | | |
| TI | 0.8 | 0.4 | 1.1 | 0.0 | 0.0 | 1.8 |
| CA | 35.4 | 16.3 | 33.1 | 4.1 | 3.7 | 62.4 |
| K | 6.1 | 2.1 | 7.6 | 0.0 | 0.0 | 14.1 |
| S | 8.0 | 13.3 | 13.2 | 9.9 | 7.0 | 16.8 |
| SI | 84.1 | 21.2 | 75.2 | 0.0 | 0.0 | 157.2 |
| FE | 7.1 | 3.4 | 16.5 | 0.0 | 0.0 | 23.9 |
| ZR | 1.2 | 1.2 | 2.1 | 0.0 | 1.6 | 1.3 |
| SR | 0.0 | 2.1 | 0.0 | 0.0 | 0.0 | 1.7 |
| PB | 0.0 | 4.7 | 0.0 | 0.0 | 0.0 | 0.0 |
| AL | 0.0 | 0.0 | 77.4 | 0.0 | 0.0 | 131.3 |
| CL | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4.7 |
| ZN | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.5 |
| CU | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.5 |
| RUN (HRS) | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |

DALLAS ELEVATED SITE: IH45 AT FOREST AVENUE
STACKED FILTER UNIT UCD/AIR QUALITY GROUP ANALYSIS
NOMINAL FLOW RATE= 0.005 M**3/MIN
DATE= 6 1 77
START TIME= 7 A.M.
STOP TIME= 9 A.M.
NUCLEPORE FILTER, PORE SIZE= 8.0 UM

WEIGHT(UG/M**3)

| STATION | 1 | 2 | 3 | 4 | 6 | 7 |
|---|---|---|---|---|---|---|
| ELEMENT | | | | | | |
| CA | 3.0 | 3.5 | 2.3 | 5.0 | 2.3 | 2.4 |
| FE | 3.8 | 1.4 | . | 1.5 | 1.1 | 0.6 |
| K | 1.5 | 0.4 | . | . | 2.6 | 1.3 |
| SI | 3.6 | . | 6.3 | 13.6 | . | . |
| TI | 0.8 | 0.5 | . | 1.6 | . | . |
| P | 3.2 | 1.1 | 1.8 | . | 2.4 | 0.6 |
| CO | . | . | . | . | 3.5 | . |
| CL | 2.8 | 3.3 | . | 6.4 | 6.3 | 3.7 |
| MN | 0.8 | . | . | . | . | . |
| PB | 2.3 | . | . | . | . | . |
| S | . | 0.8 | 5.7 | . | 2.4 | 0.9 |
| V | . | . | 1.5 | . | . | . |
| RUN TIME(HRS) | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |

DALLAS ELEVATED SITE: IH45 AT FOREST AVENUE
STACKED FILTER UNIT UCD/AIR QUALITY GROUP ANALYSIS
NOMINAL FLOW RATE= 0.005 M**3/MIN
DATE= 6 1 77
START TIME= 7 A.M.
STOP TIME= 9 A.M.
NUCLEPORE FILTER, PORE SIZE= 0.4 UM

WEIGHT(UG/M**3)

| STATION | 1 | 2 | 3 | 4 | 6 | 7 |
|---|---|---|---|---|---|---|
| ELEMENT | | | | | | |
| AL | . | . | 2.9 | . | . | . |
| CA | 1.2 | . | 1.2 | 5.8 | 1.9 | 1.2 |
| FE | 1.0 | 1.0 | 1.0 | 1.3 | 0.9 | . |
| K | . | . | . | 1.4 | 1.1 | 2.7 |
| SI | . | 2.5 | 3.4 | . | . | 1.1 |
| TI | 1.4 | . | . | . | . | . |
| P | . | . | . | 4.2 | . | 4.1 |
| CO | . | . | . | 6.1 | . | . |
| CL | 1.1 | 1.7 | 3.0 | 2.0 | 2.2 | . |
| MN | . | 0.6 | . | 0.8 | . | . |
| PB | 4.5 | 4.1 | 3.9 | 6.8 | 3.0 | 1.8 |
| S | 7.2 | 4.2 | 5.4 | 4.1 | 1.8 | 4.6 |
| V | . | 0.7 | 0.6 | . | 1.1 | 1.3 |
| ZN | . | . | . | . | . | 0.4 |
| RUN TIME(HRS) | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |

DALLAS: IH 45 AT FOREST AV.
STACKED FILTER UNIT TX. AIR CONTROL BOARD ANALYSIS

NOMINAL FLOW RATE= 0.0050 M**3/MIN
DATE= 6 1 77
START TIME= 4 P.M.
STOP TIME= 6 P.M.
NUMBER OF OBSERVATION STATIONS= 6
PORE SIZE= 8.0 UM

| | WEIGHT(UG/M**3) | | | | | |
|---|---|---|---|---|---|---|
| STATIONS | 1 | 2 | 3 | 4 | 6 | 7 |
| ELEMENT | | | | | | |
| CA | 0.0 | 4.9 | 11.3 | 2.2 | 4.1 | 0.0 |
| CL | 0.0 | 0.0 | 0.0 | 4.0 | 0.0 | 0.0 |
| SI | 0.0 | 0.0 | 26.3 | 0.0 | 0.0 | 0.0 |
| ZR | 0.0 | 1.5 | 0.0 | 1.3 | 0.0 | 1.3 |
| SR | 1.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| RUN (HRS) | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |

PORE SIZE= 0.4 UM

| | WEIGHT(UG/M**3) | | | | | |
|---|---|---|---|---|---|---|
| STATIONS | 1 | 2 | 3 | 4 | 6 | 7 |
| ELEMENT | | | | | | |
| K | 2.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| ZR | 1.4 | 1.5 | 0.0 | 1.2 | 0.0 | 1.5 |
| SR | 1.8 | 0.0 | 1.9 | 0.0 | 0.0 | 0.0 |
| PB | 4.6 | 0.0 | 5.2 | 0.0 | 0.0 | 0.0 |
| BR | 1.7 | 0.0 | 0.0 | 2.8 | 0.0 | 0.0 |
| S | 0.0 | 0.0 | 0.0 | 7.8 | 0.0 | 0.0 |
| RUN (HRS) | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |

DALLAS ELEVATED SITE: IH45 AT FOREST AVENUE

STACKED FILTER UNIT — UCD/AIR QUALITY GROUP ANALYSIS

NOMINAL FLOW RATE= 0.005 M**3/MIN

DATE= 6 1 77

START TIME= 4 P.M.

STOP TIME= 6 P.M.

NUCLEPORE FILTER, PORE SIZE= 8.0 UM

WEIGHT(UG/M**3)

| STATION | 1 | 2 | 3 | 4 | 6 | 7 |
|---|---|---|---|---|---|---|
| ELEMENT | | | | | | |
| CA | 3.4 | 5.8 | 2.7 | 2.8 | 3.6 | 3.2 |
| FE | 1.5 | 1.5 | 1.7 | 1.7 | 1.9 | 2.2 |
| K | . | 1.2 | 2.2 | 1.8 | . | . |
| SI | . | . | . | 9.7 | . | 3.1 |
| TI | . | 0.7 | . | . | 0.8 | 1.2 |
| P | 0.8 | . | . | 2.0 | . | 2.7 |
| CO | 6.3 | . | . | 6.6 | . | . |
| CL | . | 3.8 | 3.5 | . | . | . |
| MN | . | . | 0.9 | . | 0.8 | . |
| NI | . | 0.4 | 0.7 | 0.3 | . | . |
| PB | . | 1.6 | . | . | . | 1.3 |
| S | . | 3.8 | 5.1 | 3.2 | 5.9 | . |
| RUN TIME(HRS) | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |

DALLAS ELEVATED SITE: IH45 AT FOREST AVENUE

STACKED FILTER UNIT — UCD/AIR QUALITY GROUP ANALYSIS

NOMINAL FLOW RATE= 0.005 M**3/MIN

DATE= 6 1 77

START TIME= 4 P.M.

STOP TIME= 6 P.M.

NUCLEPORE FILTER, PORE SIZE= 0.4 UM

WEIGHT(UG/M**3)

| STATION | 1 | 2 | 3 | 4 | 6 | 7 |
|---|---|---|---|---|---|---|
| ELEMENT | | | | | | |
| CA | 4.6 | 2.4 | 4.3 | 1.6 | . | 6.1 |
| FE | 2.4 | 1.3 | 2.2 | 1.2 | 1.1 | 2.7 |
| K | 1.2 | . | . | 1.1 | 1.8 | 1.7 |
| SI | 4.8 | . | 9.2 | . | 3.6 | 11.4 |
| TI | . | 0.8 | . | . | 2.3 | . |
| P | . | . | . | . | 6.6 | . |
| CO | 2.8 | . | . | . | . | 2.4 |
| CL | 2.1 | 2.5 | 1.3 | . | . | 3.4 |
| MN | . | . | . | . | 1.0 | . |
| NI | . | . | . | 0.5 | 0.5 | . |
| PB | 2.2 | 5.0 | 3.8 | 3.5 | 2.0 | 4.4 |
| S | 3.9 | 4.2 | 8.8 | 8.2 | 6.6 | 5.0 |
| V | . | 1.0 | 0.9 | 1.3 | . | . |
| ZN | . | . | . | 0.3 | . | . |
| RUN TIME(HRS) | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |

DALLAS: IH 45 AT FOREST AV.

STACKED FILTER UNIT TX. AIR CONTROL BOARD ANALYSIS

NOMINAL FLOW RATE= 0.0050 M**3/MIN

DATE= 6 2 77

START TIME= 7 A.M.

STOP TIME= 9 A.M.

NUMBER OF OBSERVATION STATIONS= 6

PORE SIZE= 8.0 UM

| | WEIGHT(UG/M**3) | | | | | |
|---|---|---|---|---|---|---|
| STATIONS | 1 | 2 | 3 | 4 | 6 | 7 |
| ELEMENT | | | | | | |

PORE SIZE= 0.4 UM

| | WEIGHT(UG/M**3) | | | | | |
|---|---|---|---|---|---|---|
| STATIONS | 1 | 2 | 3 | 4 | 6 | 7 |
| ELEMENT | | | | | | |

DALLAS: IH 45 AT FOREST AV.

STACKED FILTER UNIT TX. AIR CONTROL BOARD ANALYSIS

NOMINAL FLOW RATE= 0.0050 M**3/MIN

DATE= 6 2 77

START TIME= 4 P.M.

STOP TIME= 6 P.M.

NUMBER OF OBSERVATION STATIONS= 5

PORE SIZE= 8.0 UM

| | WEIGHT(UG/M**3) | | | | |
|---|---|---|---|---|---|
| STATIONS | 1 | 2 | 4 | 6 | 7 |
| ELEMENT | | | | | |

PORE SIZE= 0.4 UM

| | WEIGHT(UG/M**3) | | | | |
|---|---|---|---|---|---|
| STATIONS | 1 | 2 | 4 | 6 | 7 |
| ELEMENT | | | | | |

DALLAS: IH 45 AT FOREST AV.

STACKED FILTER UNIT TX. AIR CONTROL BOARD ANALYSIS

NOMINAL FLOW RATE= 0.0050 M**3/MIN

DATE= 6 3 77

START TIME= 7 A.M.

STOP TIME= 9 A.M.

NUMBER OF OBSERVATION STATIONS= 5

PORE SIZE= 8.0 UM

| | WEIGHT(UG/M**3) | | | | |
|---|---|---|---|---|---|
| STATIONS | 1 | 2 | 3 | 4 | 6 |
| ELEMENT | | | | | |

PORE SIZE= 0.4 UM

| | WEIGHT(UG/M**3) | | | | |
|---|---|---|---|---|---|
| STATIONS | 1 | 2 | 3 | 4 | 6 |
| ELEMENT | | | | | |

DALLAS: IH 45 AT FOREST AV.

STACKED FILTER UNIT TX. AIR CONTROL BOARD ANALYSIS

NOMINAL FLOW RATE= 0.0050 M**3/MIN

DATE= 6 7 77

START TIME= 4 P.M.

STOP TIME= 6 P.M.

NUMBER OF OBSERVATION STATIONS= 6

PORE SIZE= 8.0 UM

WEIGHT(UG/M**3)

| STATIONS | 1 | 2 | 3 | 4 | 6 | 7 |
|---|---|---|---|---|---|---|
| ELEMENT | | | | | | |
| CA | 3.7 | 13.4 | 6.8 | 1.7 | 2.4 | 4.2 |
| ZR | 1.3 | 2.2 | 0.0 | 2.4 | 0.0 | 0.0 |
| BR | 2.5 | 0.0 | 0.0 | 0.0 | 0.0 | 1.9 |
| ZN | 0.0 | 0.8 | 0.0 | 0.0 | 0.0 | 0.0 |
| SI | 0.0 | 0.0 | 13.5 | 0.0 | 0.0 | 0.0 |
| FE | 0.0 | 0.0 | 3.0 | 0.0 | 0.0 | 0.0 |
| MO | 0.0 | 0.0 | 0.0 | 0.0 | 1.1 | 0.0 |
| RUN (HRS) | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |

PORE SIZE= 0.4 UM

WEIGHT(UG/M**3)

| STATIONS | 1 | 2 | 3 | 4 | 6 | 7 |
|---|---|---|---|---|---|---|
| ELEMENT | | | | | | |
| CA | 1.9 | 13.4 | 7.4 | 0.0 | 1.3 | 2.5 |
| S | 7.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| CU | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| MO | 1.5 | 1.5 | 1.7 | 0.0 | 0.0 | 0.0 |
| ZR | 1.7 | 0.0 | 1.6 | 0.0 | 1.4 | 1.5 |
| RB | 2.3 | 0.0 | 0.0 | 2.1 | 0.0 | 0.0 |
| PB | 6.0 | 6.0 | 5.0 | 4.7 | 0.0 | 0.0 |
| BR | 2.9 | 2.3 | 2.1 | 1.7 | 0.0 | 0.0 |
| MN | 0.0 | 1.9 | 0.0 | 0.0 | 2.0 | 0.0 |
| SR | 0.0 | 1.5 | 0.0 | 0.0 | 0.0 | 0.0 |
| SI | 0.0 | 0.0 | 13.0 | 0.0 | 0.0 | 0.0 |
| FE | 0.0 | 0.0 | 3.1 | 0.0 | 0.0 | 0.0 |
| RUN (HRS) | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |

DALLAS ELEVATED SITE: IH45 AT FOREST AVENUE

STACKED FILTER UNIT UCD/AIR QUALITY GROUP ANALYSIS

NOMINAL FLOW RATE= 0.005 M**3/MIN

DATE= 6 7 77

START TIME= 4 P.M.

STOP TIME= 6 P.M.

NUCLEPORE FILTER, PORE SIZE= 8.0 UM

WEIGHT(UG/M**3)

| STATION | 1 | 2 | 3 | 4 | 6 | 7 |
|---|---|---|---|---|---|---|
| ELEMENT | | | | | | |
| CA | 4.4 | 11.8 | 2.0 | 2.9 | 3.2 | . |
| FE | 1.7 | 2.2 | 0.3 | 0.9 | 1.8 | 0.9 |
| K | 0.9 | . | 2.5 | 1.3 | 1.4 | . |
| SI | 5.3 | 8.4 | . | . | . | . |
| TI | . | . | 1.1 | . | . | . |
| CO | . | 2.5 | . | 4.8 | . | 2.0 |
| CU | 1.1 | . | . | 1.0 | . | . |
| CL | . | 2.4 | 6.3 | 8.7 | . | 2.2 |
| NI | . | . | . | . | . | 0.3 |
| PB | 2.1 | . | . | . | . | 1.3 |
| S | . | . | 2.8 | . | 6.5 | 0.9 |
| V | 0.7 | 0.8 | . | . | 0.8 | . |
| RUN TIME(HRS) | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |

DALLAS ELEVATED SITE: IH45 AT FOREST AVENUE

STACKED FILTER UNIT UCD/AIR QUALITY GROUP ANALYSIS

NOMINAL FLOW RATE= 0.005 M**3/MIN

DATE= 6 7 77

START TIME= 4 P.M.

STOP TIME= 6 P.M.

NUCLEPORE FILTER, PORE SIZE= 0.4 UM

WEIGHT(UG/M**3)

| STATION | 1 | 2 | 3 | 4 | 6 | 7 |
|---|---|---|---|---|---|---|
| ELEMENT | | | | | | |
| CA | 2.5 | 7.5 | 3.7 | 1.5 | 0.9 | . |
| FE | 1.2 | 1.2 | 1.3 | 1.5 | . | . |
| K | . | 1.7 | . | 2.0 | . | 1.2 |
| SI | . | . | 11.5 | 1.6 | . | . |
| TI | . | . | 0.8 | 0.8 | 0.7 | . |
| P | . | 6.3 | . | . | 3.3 | 3.3 |
| CO | . | 3.5 | . | . | . | . |
| CL | 3.5 | 4.7 | 3.2 | . | 2.8 | 3.2 |
| MN | . | 0.6 | . | . | . | . |
| NI | 0.2 | . | 0.7 | . | . | . |
| PB | 7.1 | 5.6 | 2.4 | 3.2 | 1.3 | . |
| S | 1.7 | 2.1 | 6.3 | 6.1 | 3.4 | 3.3 |
| V | . | . | . | 1.3 | 0.7 | . |
| RUN TIME(HRS) | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |

DALLAS: IH 45 AT FOREST AV.
STACKED FILTER UNIT TX. AIR CONTROL BOARD ANALYSIS
NOMINAL FLOW RATE= 0.0050 M**3/MIN
DATE= 6 8 77
START TIME= 7 A.M.
STOP TIME= 9 A.M.
NUMBER OF OBSERVATION STATIONS= 6
PORE SIZE= 8.0 UM

| | WEIGHT(UG/M**3) | | | | | |
|---|---|---|---|---|---|---|
| STATIONS | 1 | 2 | 3 | 4 | 6 | 7 |
| ELEMENT | | | | | | |
| CA | 6.3 | 10.1 | 6.9 | 7.2 | 5.2 | 9.2 |
| ZR | 0.0 | 0.0 | 0.0 | 0.0 | 1.5 | 0.0 |
| SI | 0.0 | 16.1 | 0.0 | 0.0 | 0.0 | 13.9 |
| FE | 2.9 | 2.3 | 3.2 | 0.0 | 0.0 | 3.9 |
| CL | 7.0 | 0.0 | 0.0 | 0.0 | 6.4 | 0.0 |
| TI | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 |
| RUN (HRS) | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |

PORE SIZE= 0.4 UM

| | WEIGHT(UG/M**3) | | | | | |
|---|---|---|---|---|---|---|
| STATIONS | 1 | 2 | 3 | 4 | 6 | 7 |
| ELEMENT | | | | | | |
| TI | 0.0 | 0.2 | 0.4 | 0.0 | 0.0 | 0.0 |
| CA | 11.0 | 13.9 | 15.5 | 4.0 | 5.5 | 5.2 |
| S | 5.6 | 8.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| MO | 0.0 | 0.0 | 0.0 | 1.2 | 0.0 | 0.0 |
| ZR | 1.6 | 0.0 | 0.0 | 0.0 | 1.9 | 1.7 |
| PB | 4.2 | 7.4 | 4.4 | 5.8 | 5.2 | 0.0 |
| BR | 1.8 | 4.2 | 2.7 | 1.8 | 1.9 | 2.3 |
| SI | 23.7 | 27.1 | 26.3 | 12.1 | 0.0 | 0.0 |
| FE | 3.3 | 4.3 | 4.5 | 0.0 | 2.3 | 0.0 |
| CL | 4.6 | 7.4 | 7.4 | 4.7 | 4.2 | 4.0 |
| RUN (HRS) | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |

DALLAS ELEVATED SITE: IH45 AT FOREST AVENUE

STACKED FILTER UNIT UCD/AIR QUALITY GROUP ANALYSIS

NOMINAL FLOW RATE= 0.005 M**3/MIN

DATE= 6 8 77

START TIME= 7 A.M.

STOP TIME= 9 A.M.

NUCLEPORE FILTER, PORE SIZE= 8.0 UM

WEIGHT(UG/M**3)

| STATION | 1 | 2 | 3 | 4 | 6 | 7 |
|---|---|---|---|---|---|---|
| ELEMENT | | | | | | |
| CA | 3.5 | 4.1 | 2.0 | 3.1 | 3.7 | 3.2 |
| FE | 1.4 | 1.3 | 1.4 | 1.3 | 1.3 | 1.7 |
| K | . | 1.2 | . | 1.6 | 1.0 | . |
| SI | 11.9 | 2.5 | . | . | 10.0 | . |
| TI | . | . | . | 1.2 | . | . |
| P | . | 1.1 | . | 5.0 | . | . |
| CO | . | 3.1 | . | . | 7.6 | . |
| CL | . | 4.5 | 2.4 | 2.1 | 7.5 | 2.9 |
| MN | . | . | . | . | 0.5 | . |
| NI | 0.7 | . | . | 0.6 | 0.8 | . |
| PB | . | . | . | 1.4 | . | . |
| S | . | 3.2 | 4.0 | 1.2 | . | 2.6 |
| V | . | . | 0.8 | 0.9 | 1.0 | 1.2 |
| ZN | . | . | . | 0.2 | . | . |
| RUN TIME(HRS) | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |

DALLAS ELEVATED SITE: IH45 AT FOREST AVENUE

STACKED FILTER UNIT UCD/AIR QUALITY GROUP ANALYSIS

NOMINAL FLOW RATE= 0.005 M**3/MIN

DATE= 6 8 77

START TIME= 7 A.M.

STOP TIME= 9 A.M.

NUCLEPORE FILTER, PORE SIZE= 0.4 UM

WEIGHT(UG/M**3)

| STATION | 1 | 2 | 3 | 4 | 6 | 7 |
|---|---|---|---|---|---|---|
| ELEMENT | | | | | | |
| CA | 3.3 | 2.2 | 2.6 | 2.5 | 2.2 | 0.9 |
| FE | . | 1.6 | 1.2 | 1.0 | 1.4 | 1.2 |
| K | 2.8 | . | 1.3 | . | 1.6 | . |
| TI | . | 2.3 | . | . | . | . |
| P | . | . | 1.0 | . | . | . |
| CL | 9.3 | 3.3 | . | 3.0 | . | 5.3 |
| MN | . | . | 0.6 | . | 1.1 | . |
| NI | . | . | . | . | 1.1 | . |
| PB | 4.6 | 10.7 | 6.7 | 6.9 | 5.6 | 3.5 |
| S | 6.3 | 4.2 | 7.5 | 5.5 | 4.6 | 3.2 |
| V | . | . | . | . | . | 1.1 |
| ZN | 0.3 | . | . | . | 0.3 | 0.6 |
| RUN TIME(HRS) | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |

DALLAS: IH 45 AT FOREST AV.

STACKED FILTER UNIT TX. AIR CONTROL BOARD ANALYSIS

NOMINAL FLOW RATE= 0.0050 M**3/MIN

DATE= 6 8 77

START TIME= 4 P.M.

STOP TIME= 6 P.M.

NUMBER OF OBSERVATION STATIONS= 6

PORE SIZE= 8.0 UM

WEIGHT(UG/M**3)

| STATIONS | 1 | 2 | 3 | 4 | 6 | 7 |
|---|---|---|---|---|---|---|
| ELEMENT | | | | | | |
| CA | 5.7 | 9.9 | 15.0 | 4.9 | 3.3 | 4.5 |
| K | 0.0 | 0.0 | 0.0 | 0.0 | 2.1 | 0.0 |
| ZR | 0.0 | 2.2 | 1.4 | 0.0 | 0.0 | 0.0 |
| BR | 0.0 | 0.0 | 1.7 | 0.0 | 0.0 | 0.0 |
| SI | 0.0 | 14.7 | 0.0 | 0.0 | 0.0 | 0.0 |
| FE | 2.7 | 3.2 | 2.7 | 0.0 | 0.0 | 2.1 |
| MO | 0.0 | 1.2 | 0.0 | 0.0 | 0.0 | 0.0 |
| CL | 0.0 | 3.8 | 0.0 | 0.0 | 0.0 | 0.0 |
| TI | 0.0 | 0.3 | 0.0 | 0.0 | 0.0 | 0.0 |
| RUN (HRS) | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |

DALLAS ELEVATED SITE: IH45 AT FOREST AVENUE

STACKED FILTER UNIT UCD/AIR QUALITY GROUP ANALYSIS
NOMINAL FLOW RATE= 0.005 M**3/MIN
DATE= 6 8 77
START TIME= 4 P.M.
STOP TIME= 6 P.M.
NUCLEPORE FILTER, PORE SIZE= 8.0 UM

| | WEIGHT(UG/M**3) | | | | | |
|---|---|---|---|---|---|---|
| STATION | 1 | 2 | 3 | 4 | 6 | 7 |
| ELEMENT | | | | | | |
| CA | . | 4.5 | 7.5 | 4.0 | 1.7 | 4.0 |
| FE | . | 1.3 | 1.5 | 1.3 | . | 1.5 |
| K | 2.0 | 1.2 | 1.2 | 2.7 | 2.0 | 1.7 |
| SI | 4.1 | . | 8.2 | . | . | . |
| TI | . | . | . | 1.9 | . | . |
| P | . | . | . | 10.7 | . | . |
| CO | . | . | 7.5 | . | 4.3 | . |
| CL | . | 3.4 | 5.5 | . | 6.8 | 3.7 |
| MN | . | 0.9 | . | . | . | . |
| S | . | 5.7 | . | 4.2 | 2.2 | 5.8 |
| V | . | 1.3 | . | 1.6 | . | . |
| RUN TIME(HRS) | 2.25 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |

DALLAS ELEVATED SITE: IH45 AT FOREST AVENUE

STACKED FILTER UNIT UCD/AIR QUALITY GROUP ANALYSIS
NOMINAL FLOW RATE= 0.005 M**3/MIN
DATE= 6 8 77
START TIME= 4 P.M.
STOP TIME= 6 P.M.
NUCLEPORE FILTER, PORE SIZE= 0.4 UM

| | WEIGHT(UG/M**3) | | | | | |
|---|---|---|---|---|---|---|
| STATION | 1 | 2 | 3 | 4 | 6 | 7 |
| ELEMENT | | | | | | |
| CA | 3.3 | 2.0 | 4.3 | 1.9 | 2.1 | . |
| FE | 1.5 | 0.9 | 1.5 | 0.8 | 1.3 | 1.2 |
| K | 2.8 | 1.3 | . | . | 1.4 | . |
| SI | 4.9 | . | . | . | 3.3 | . |
| TI | . | 1.0 | . | . | . | . |
| P | 2.6 | 1.0 | . | . | 1.6 | . |
| CO | . | . | 3.5 | . | . | . |
| CL | 10.3 | . | 4.9 | 3.3 | 1.6 | . |
| MN | . | . | . | . | 0.5 | 0.5 |
| PB | . | 2.8 | 1.6 | . | . | . |
| S | 4.3 | 3.2 | 3.5 | 4.5 | 5.5 | 5.4 |
| ZN | . | . | . | . | . | 0.3 |
| RUN TIME(HRS) | 2.25 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |

DALLAS ELEVATED SITE: IH45 AT FOREST AVENUE
STACKED FILTER UNIT UCD/AIR QUALITY GROUP ANALYSIS
NOMINAL FLOW RATE= 0.005 M**3/MIN
DATE= 6 9 77
START TIME= 7 A.M.
STOP TIME= 9 A.M.
NUCLEPORE FILTER, PORE SIZE= 8.0 UM

| | WEIGHT(UG/M**3) | | | | |
|---|---|---|---|---|---|
| STATION | 1 | 2 | 3 | 6 | 7 |
| ELEMENT | | | | | |
| CA | 8.8 | 5.3 | 5.9 | 4.0 | 4.8 |
| FE | 2.3 | 1.8 | 1.9 | 1.5 | 2.1 |
| K | 0.9 | 2.5 | . | . | . |
| SI | 2.4 | 6.7 | 10.0 | . | . |
| TI | 1.1 | . | . | . | 1.7 |
| P | . | 1.6 | . | . | . |
| CO | . | 5.1 | 4.7 | . | . |
| CL | 3.4 | 4.8 | 5.2 | . | 2.5 |
| MN | . | 0.9 | 0.7 | . | 0.7 |
| NI | 0.4 | . | . | . | . |
| PB | 2.8 | 1.2 | . | . | . |
| S | 1.2 | 2.8 | . | 1.7 | 7.6 |
| V | . | 2.0 | 1.1 | . | . |
| ZN | 0.3 | . | . | . | . |
| RUN TIME(HRS) | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |

DALLAS ELEVATED SITE: IH45 AT FOREST AVENUE
STACKED FILTER UNIT UCD/AIR QUALITY GROUP ANALYSIS
NOMINAL FLOW RATE= 0.005 M**3/MIN
DATE= 6 9 77
START TIME= 7 A.M.
STOP TIME= 9 A.M.
NUCLEPORE FILTER, PORE SIZE= 0.4 UM

| | WEIGHT(UG/M**3) | | | | | |
|---|---|---|---|---|---|---|
| STATION | 1 | 2 | 3 | 4 | 6 | 7 |
| ELEMENT | | | | | | |
| CA | 1.2 | 2.4 | 18.6 | 1.5 | . | . |
| FE | 0.9 | 1.2 | 1.7 | 1.0 | . | . |
| K | . | 2.4 | . | . | 0.5 | . |
| SI | 2.3 | 9.5 | . | . | . | 3.1 |
| TI | . | . | 1.6 | . | . | . |
| P | . | . | . | 2.0 | . | . |
| BR | . | . | . | . | 2.3 | 1.0 |
| CL | . | . | 4.8 | 4.1 | 6.0 | . |
| PB | 10.5 | 8.1 | 7.5 | 8.8 | 6.4 | 2.9 |
| S | 4.7 | 4.8 | 4.0 | 3.2 | . | 2.0 |
| V | . | 0.5 | . | 0.4 | . | . |
| RUN TIME(HRS) | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |

DATE= 6 9 77
START TIME= 4 P.M.
STOP TIME= 6 P.M.
NUMBER OF OBSERVATION STATIONS= 6
PORE SIZE= 8.0 UM

| | WEIGHT(UG/M**3) | | | | | |
|---|---|---|---|---|---|---|
| STATIONS | 1 | 2 | 3 | 4 | 6 | 7 |
| ELEMENT | | | | | | |
| CA | 0.0 | 5.4 | 2.4 | 0.0 | 2.6 | 0.0 |
| RUN (HRS) | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |

PORE SIZE= 0.4 UM

| | WEIGHT(UG/M**3) | | | | | |
|---|---|---|---|---|---|---|
| STATIONS | 1 | 2 | 3 | 4 | 6 | 7 |
| ELEMENT | | | | | | |
| FE | 4.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| CA | 0.0 | 3.4 | 0.0 | 10.3 | 0.0 | 10.4 |
| S | 0.0 | 20.1 | 9.6 | 9.6 | 7.5 | 12.0 |
| SI | 0.0 | 0.0 | 0.0 | 22.6 | 0.0 | 27.4 |
| AL | 0.0 | 0.0 | 0.0 | 126.4 | 0.0 | 0.0 |
| CL | 4.8 | 6.7 | 0.0 | 0.0 | 0.0 | 0.0 |
| PB | 0.0 | 4.7 | 0.0 | 0.0 | 0.0 | 0.0 |
| RUN (HRS) | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |

DALLAS ELEVATED SITE: IH45 AT FOREST AVENUE
STACKED FILTER UNIT UCD/AIR QUALITY GROUP ANALYSIS
NOMINAL FLOW RATE= 0.005 M**3/MIN
DATE= 6 9 77
START TIME= 4 P.M.
STOP TIME= 6 P.M.
NUCLEPORE FILTER, PORE SIZE= 8.0 UM

| | WEIGHT(UG/M**3) | | | | | |
|---|---|---|---|---|---|---|
| STATION | 1 | 2 | 3 | 4 | 6 | 7 |
| ELEMENT | | | | | | |
| CA | 7.9 | 5.8 | 3.9 | 2.8 | 5.2 | 5.1 |
| FE | 1.5 | 2.4 | 1.1 | 1.9 | 1.8 | 1.6 |
| K | 1.3 | 1.5 | . | . | 3.3 | 1.9 |
| SI | 4.4 | . | 10.2 | . | 9.6 | 17.7 |
| TI | . | 0.6 | . | 1.8 | . | 1.4 |
| CO | . | . | . | . | 3.3 | . |
| CL | 6.2 | 6.2 | 3.1 | 4.8 | 15.0 | 7.4 |
| NI | . | 0.3 | . | . | . | . |
| S | 3.3 | 3.2 | . | 2.8 | . | 4.7 |
| V | 1.5 | . | . | . | . | . |
| ZN | . | . | 0.2 | . | . | . |
| RUN TIME(HRS) | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |

DALLAS ELEVATED SITE: IH45 AT FOREST AVENUE
STACKED FILTER UNIT UCD/AIR QUALITY GROUP ANALYSIS
NOMINAL FLOW RATE= 0.005 M**3/MIN
DATE= 6 9 77
START TIME= 4 P.M.
STOP TIME= 6 P.M.
NUCLEPORE FILTER, PORE SIZE= 0.4 UM

| | WEIGHT(UG/M**3) | | | | | |
|---|---|---|---|---|---|---|
| STATION | 1 | 2 | 3 | 4 | 6 | 7 |
| ELEMENT | | | | | | |
| AL | . | . | . | . | . | 1.6 |
| CA | . | 1.3 | . | . | . | . |
| SI | 3.1 | 2.3 | . | . | . | . |
| CO | . | . | 1.2 | . | . | . |
| PB | . | 2.8 | . | . | . | . |
| S | 3.4 | 2.8 | 2.0 | 3.0 | 1.9 | 2.0 |
| RUN TIME(HRS) | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |

DALLAS: IH 45 AT FOREST AV.

STACKED FILTER UNIT TX. AIR CONTROL BOARD ANALYSIS

NOMINAL FLOW RATE= 0.0050 M**3/MIN

DATE= 6 10 77

START TIME= 7 A.M.

STOP TIME= 9 A.M.

NUMBER OF OBSERVATION STATIONS= 5

PORE SIZE= 8.0 UM

| | WEIGHT(UG/M**3) | | | | |
|---|---|---|---|---|---|
| STATIONS | 1 | 2 | 4 | 6 | 7 |
| ELEMENT | | | | | |
| CA | 4.3 | 9.4 | 6.3 | 4.5 | 6.4 |
| RUN (HRS) | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |

PORE SIZE= 0.4 UM

| | WEIGHT(UG/M**3) | | | | |
|---|---|---|---|---|---|
| STATIONS | 1 | 2 | 4 | 6 | 7 |
| ELEMENT | | | | | |
| S | 15.5 | 0.0 | 20.2 | 2.9 | 22.0 |
| CL | 0.0 | 0.0 | 7.0 | 0.0 | 0.0 |
| K | 0.0 | 0.0 | 0.0 | 20.5 | 0.0 |
| RUN (HRS) | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |

DALLAS: IH30 AT MOTLEY DR.

STACKED FILTER UNIT TX. AIR CONTROL BOARD ANALYSIS

NOMINAL FLOW RATE= 0.0050 M**3/MIN

DATE= 7 20 77

START TIME= 4 P.M.

STOP TIME= 6 P.M.

NUMBER OF OBSERVATION STATIONS= 6

PORE SIZE= 8.0 UM

WEIGHT(UG/M**3)

| STATIONS | 1 | 5 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|
| ELEMENT | | | | | | |
| CL | 8.8 | 15.8 | 9.2 | 11.5 | 12.0 | 14.6 |
| ZN | 0.0 | 5.4 | 0.0 | 5.5 | 0.0 | 0.0 |
| CU | 0.0 | 0.0 | 0.0 | 0.7 | 0.0 | 0.0 |
| RUN (HRS) | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |

PORE SIZE= 0.4 UM

WEIGHT(UG/M**3)

| STATIONS | 1 | 3 | 5 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|
| ELEMENT | | | | | | | |
| CA | 11.4 | 3.1 | 6.1 | 8.7 | 0.0 | 14.6 | 5.4 |
| K | 0.0 | 0.0 | 0.0 | 3.1 | 0.0 | 0.0 | 0.0 |
| CL | 10.0 | 6.1 | 4.9 | 17.2 | 12.1 | 11.2 | 9.1 |
| S | 8.3 | 7.8 | 9.2 | 12.5 | 0.0 | 12.4 | 7.9 |
| SI | 25.7 | 0.0 | 17.6 | 24.0 | 0.0 | 0.0 | 0.0 |
| ZN | 0.0 | 0.0 | 0.0 | 0.0 | 4.2 | 0.0 | 0.0 |
| FE | 6.4 | 0.0 | 4.9 | 5.6 | 0.0 | 4.8 | 3.5 |
| AL | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 94.6 | 98.4 |
| RUN (HRS) | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |

DALLAS AT GRADE SITE: IH30 AT MOTLEY DRIVE
STACKED FILTER UNIT UCD/AIR QUALITY GROUP ANALYSIS
NOMINAL FLOW RATE= 0.005 M**3/MIN
DATE= 7 20 77
START TIME= 7 A.M.
STOP TIME= 9 A.M.
NUCLEPORE FILTER, PORE SIZE= 8.0 UM

WEIGHT(UG/M**3)

| STATION | 1 | 3 | 5 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|
| ELEMENT | | | | | | | |
| AL | . | 3.2 | . | . | . | . | . |
| CA | . | 1.9 | 3.8 | 1.4 | 1.2 | 1.5 | 2.1 |
| FE | . | . | 1.2 | . | . | . | 0.3 |
| K | 0.9 | . | 1.8 | 1.6 | 1.3 | 0.9 | 1.5 |
| SI | . | 6.7 | 2.2 | . | . | . | 2.1 |
| CO | . | . | . | . | 1.0 | 0.7 | 0.5 |
| CL | 7.7 | 5.8 | 14.1 | 7.9 | 7.6 | 7.5 | 10.2 |
| PB | . | . | 2.8 | . | . | . | . |
| RUN TIME(HRS) | 1.94 | 1.94 | 1.94 | 1.94 | 1.94 | 1.94 | 1.94 |

DALLAS AT GRADE SITE: IH30 AT MOTLEY DRIVE
STACKED FILTER UNIT UCD/AIR QUALITY GROUP ANALYSIS
NOMINAL FLOW RATE= 0.005 M**3/MIN
DATE= 7 20 77
START TIME= 7 A.M.
STOP TIME= 9 A.M.
NUCLEPORE FILTER, PORE SIZE= 0.4 UM

WEIGHT(UG/M**3)

| STATION | 1 | 3 | 5 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|
| ELEMENT | | | | | | | |
| CA | 1.1 | 0.8 | 1.0 | 1.5 | 0.8 | 1.7 | 1.1 |
| FE | . | . | . | 0.3 | . | . | . |
| K | 0.7 | . | 0.8 | 1.3 | . | . | . |
| SI | . | . | 1.7 | . | . | 2.1 | . |
| P | . | . | . | . | 1.0 | . | 0.7 |
| CO | . | . | . | . | . | 0.7 | . |
| CU | . | . | . | 0.2 | . | 0.2 | . |
| BR | . | 1.3 | . | . | . | . | . |
| CL | 0.9 | . | . | 4.7 | 2.0 | . | 1.1 |
| PB | . | 3.4 | . | . | . | 2.1 | 2.1 |
| S | 2.0 | . | . | 1.1 | 0.8 | . | 1.4 |
| V | . | . | . | 0.5 | . | 0.2 | . |
| RUN TIME(HRS) | 1.94 | 1.94 | 1.94 | 1.94 | 1.94 | 1.94 | 1.94 |

DALLAS: IH30 AT MOTLEY DR.

STACKED FILTER UNIT TX. AIR CONTROL BOARD ANALYSIS

NOMINAL FLOW RATE= 0.0050 M**3/MIN
DATE= 7 21 77
START TIME= 7 A.M.
STOP TIME= 9 A.M.
NUMBER OF OBSERVATION STATIONS= 5
PORE SIZE= 8.0 UM

| | | | WEIGHT(UG/M**3) | | |
|---|---|---|---|---|---|
| STATIONS | 2 | 3 | 5 | 9 | 10 |
| ELEMENT | | | | | |
| RUN (HRS) | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |

PORE SIZE= 0.4 UM

| | | | WEIGHT(UG/M**3) | | |
|---|---|---|---|---|---|
| STATIONS | 2 | 3 | 5 | 9 | 10 |
| ELEMENT | | | | | |
| CA | 0.0 | 4.9 | 0.0 | 0.0 | 4.8 |
| CL | 0.0 | 13.8 | 7.9 | 0.0 | 6.4 |
| S | 0.0 | 7.0 | 6.7 | 8.0 | 6.7 |
| ZN | 0.0 | 1.2 | 0.0 | 0.0 | 0.0 |
| AL | 90.6 | 0.0 | 0.0 | 0.0 | 98.7 |
| RUN (HRS) | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |

DALLAS AT GRADE SITE: IH30 AT MOTLEY DRIVE
STACKED FILTER UNIT UCD/AIR QUALITY GROUP ANALYSIS
NOMINAL FLOW RATE= 0.005 M**3/MIN
DATE= 7 21 77
START TIME= 7 A.M.
STOP TIME= 9 A.M.
NUCLEPORE FILTER, PORE SIZE= 8.0 UM

WEIGHT(UG/M**3)

| STATION | 2 | 3 | 5 | 9 | 10 |
|---|---|---|---|---|---|
| ELEMENT | | | | | |
| CA | 1.4 | 2.1 | 2.2 | 3.1 | 0.3 |
| FE | . | 0.7 | 1.1 | 1.4 | . |
| K | 1.9 | 1.2 | 0.8 | . | . |
| SI | 3.0 | . | . | 3.8 | . |
| P | . | . | . | 0.8 | . |
| CO | . | 0.7 | . | 0.5 | . |
| CL | 5.6 | 7.8 | 4.2 | 5.4 | 0.9 |
| PB | . | 3.1 | . | . | . |
| S | . | . | . | 0.8 | . |
| V | . | 0.6 | . | . | 0.1 |
| ZN | . | . | . | 0.4 | . |
| RUN TIME(HRS) | 1.94 | 1.94 | 1.94 | 1.94 | 1.94 |

DALLAS AT GRADE SITE: IH30 AT MOTLEY DRIVE
STACKED FILTER UNIT UCD/AIR QUALITY GROUP ANALYSIS
NOMINAL FLOW RATE= 0.005 M**3/MIN
DATE= 7 21 77
START TIME= 7 A.M.
STOP TIME= 9 A.M.
NUCLEPORE FILTER, PORE SIZE= 0.4 UM

WEIGHT(UG/M**3)

| STATION | 2 | 3 | 5 | 9 | 10 |
|---|---|---|---|---|---|
| ELEMENT | | | | | |
| AL | . | 1.8 | . | . | . |
| CA | 1.5 | 0.7 | 1.3 | 2.0 | 2.4 |
| FE | . | . | . | 0.7 | . |
| K | . | 0.5 | 1.9 | 3.7 | . |
| SI | . | 2.3 | 6.3 | 7.7 | 10.7 |
| BR | . | 1.7 | 1.4 | 1.3 | 1.6 |
| CL | 0.8 | 1.6 | 5.3 | 2.8 | 1.2 |
| PB | . | 5.1 | 3.7 | 3.4 | 3.5 |
| S | . | 1.4 | 1.0 | 3.5 | 4.6 |
| V | 0.5 | . | . | . | 0.7 |
| RUN TIME(HRS) | 1.94 | 1.94 | 1.94 | 1.94 | 1.94 |

DALLAS: IH30 AT MOTLEY DR.
STACKED FILTER UNIT TX. AIR CONTROL BOARD ANALYSIS
NOMINAL FLOW RATE= 0.0050 M**3/MIN
DATE= 7 22 77
START TIME= 7 A.M.
STOP TIME= 9 A.M.
NUMBER OF OBSERVATION STATIONS= 6
PORE SIZE= 8.0 UM

| STATIONS | 1 | 3 | 4 | 7 | 8 | 10 |
|---|---|---|---|---|---|---|
| | | | WEIGHT(UG/M**3) | | | |
| ELEMENT | | | | | | |
| RUN (HRS) | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |

PORE SIZE= 0.4 UM

| STATIONS | 1 | 3 | 4 | 7 | 8 | 10 |
|---|---|---|---|---|---|---|
| | | | WEIGHT(UG/M**3) | | | |
| ELEMENT | | | | | | |
| CA | 5.3 | 2.5 | 0.0 | 0.0 | 0.0 | 0.0 |
| K | 0.0 | 7.7 | 0.0 | 0.0 | 0.0 | 0.0 |
| CL | 0.0 | 20.2 | 0.0 | 6.5 | 0.0 | 0.0 |
| S | 8.3 | 9.2 | 5.8 | 9.4 | 7.8 | 8.9 |
| SI | 17.7 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| ZN | 0.0 | 5.6 | 1.3 | 0.0 | 0.0 | 0.0 |
| TI | 0.0 | 0.0 | 0.0 | 1.7 | 0.0 | 0.0 |
| RUN (HRS) | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |

DALLAS AT GRADE SITE: IH30 AT MOTLEY DRIVE

STACKED FILTER UNIT UCD/AIR QUALITY GROUP ANALYSIS

NOMINAL FLOW RATE= 0.005 M**3/MIN

DATE= 7 22 77

START TIME= 7 A.M.

STOP TIME= 9 A.M.

NUCLEPORE FILTER, PORE SIZE= 8.0 UM

WEIGHT(UG/M**3)

| STATION | 1 | 2 | 3 | 4 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|
| ELEMENT | | | | | | | | |
| CA | 4.9 | 4.9 | 1.0 | 0.8 | 1.7 | 1.7 | 1.1 | . |
| FE | 3.3 | 1.6 | . | 0.6 | 0.9 | 0.6 | 0.7 | . |
| K | 3.3 | 3.6 | 0.8 | . | . | . | . | . |
| SI | . | 3.3 | . | . | . | . | 3.2 | . |
| TI | . | . | . | . | 0.5 | . | . | . |
| CL | 7.1 | 5.4 | 5.0 | . | 1.7 | 2.9 | 4.0 | . |
| NI | 21.6 | . | 0.5 | . | . | . | . | . |
| S | 6.5 | 10.6 | . | 1.8 | . | 1.5 | . | . |
| V | 2.2 | . | . | . | . | . | . | . |
| RUN TIME(HRS) | 1.80 | 1.80 | 1.75 | 1.75 | 2.00 | 2.00 | 2.00 | 2.00 |

DALLAS AT GRADE SITE: IH30 AT MOTLEY DRIVE

STACKED FILTER UNIT UCD/AIR QUALITY GROUP ANALYSIS

NOMINAL FLOW RATE= 0.005 M**3/MIN

DATE= 7 22 77

START TIME= 7 A.M.

STOP TIME= 9 A.M.

NUCLEPORE FILTER, PORE SIZE= 0.4 UM

WEIGHT(UG/M**3)

| STATION | 1 | 2 | 3 | 4 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|
| ELEMENT | | | | | | | | |
| AL | . | 1.6 | . | . | . | 4.5 | 6.9 | . |
| CA | . | . | 2.1 | . | . | 0.7 | . | 1.0 |
| FE | . | . | 0.6 | . | . | . | . | 0.6 |
| K | . | . | 2.5 | . | . | . | . | . |
| SI | . | . | . | . | 17.7 | . | . | . |
| P | . | . | . | . | 2.7 | . | 1.3 | . |
| CL | . | . | 9.2 | 0.8 | . | 2.0 | . | 0.4 |
| NI | . | 0.3 | 0.3 | . | . | . | . | . |
| PB | 2.9 | 2.8 | . | 1.7 | 3.1 | . | . | . |
| S | 1.1 | . | . | . | 6.5 | 1.5 | 1.4 | . |
| ZN | . | . | 3.5 | . | . | . | . | . |
| RUN TIME(HRS) | 1.80 | 1.80 | 1.75 | 1.75 | 2.00 | 2.00 | 2.00 | 2.00 |

DALLAS: IH30 AT MOTLEY DR.
STACKED FILTER UNIT TX. AIR CONTROL BOARD ANALYSIS

NOMINAL FLOW RATE= 0.0050 M**3/MIN
DATE= 8 3 77
START TIME= 7 A.M.
STOP TIME= 6 P.M.
NUMBER OF OBSERVATION STATIONS= 6
PORE SIZE= 8.0 UM

| | WEIGHT(UG/M**3) | | | | | |
|---|---|---|---|---|---|---|
| STATIONS | 1 | 2 | 5 | 7 | 8 | 9 |
| ELEMENT | | | | | | |
| RUN (HRS) | 11.00 | 10.50 | 9.75 | 10.75 | 10.50 | 10.50 |

PORE SIZE= 0.4 UM

| | WEIGHT(UG/M**3) | | | | | |
|---|---|---|---|---|---|---|
| STATIONS | 1 | 2 | 5 | 7 | 8 | 9 |
| ELEMENT | | | | | | |
| CA | 5.3 | 3.8 | 7.8 | 5.7 | 2.0 | 7.2 |
| K | 0.6 | 0.6 | 1.0 | 0.8 | 0.0 | 0.7 |
| CL | 2.0 | 1.7 | 1.6 | 1.6 | 2.2 | 1.4 |
| S | 6.8 | 8.0 | 9.5 | 9.4 | 5.5 | 4.9 |
| SI | 9.2 | 5.6 | 12.0 | 12.4 | 0.0 | 10.4 |
| ZN | 0.0 | 0.4 | 0.5 | 0.0 | 0.0 | 0.2 |
| FE | 1.1 | 0.6 | 1.2 | 1.8 | 0.6 | 1.3 |
| PB | 0.0 | 0.0 | 0.0 | 1.1 | 0.0 | 0.0 |
| AL | 0.0 | 0.0 | 18.5 | 0.0 | 17.6 | 0.0 |
| RUN (HRS) | 11.00 | 10.50 | 9.75 | 10.75 | 10.50 | 10.50 |

DALLAS AT GRADE SITE: IH30 AT MOTLEY DRIVE

STACKED FILTER UNIT UCD/AIR QUALITY GROUP ANALYSIS

NOMINAL FLOW RATE= 0.005 M**3/MIN

DATE= 8 3 77

START TIME= 7 A.M.

STOP TIME= 6 P.M.

NUCLEPORE FILTER, PORE SIZE= 8.0 UM

WEIGHT(UG/M**3)

| STATION | 1 | 2 | 3 | 5 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|
| ELEMENT | | | | | | | |
| CA | 0.7 | 1.4 | 0.7 | 1.3 | 0.9 | 0.4 | 0.6 |
| FE | 0.2 | 0.5 | 0.2 | 0.3 | 0.2 | . | . |
| K | 0.3 | 0.4 | . | 0.3 | 0.2 | 0.3 | 0.3 |
| SI | . | 3.4 | 0.6 | 1.2 | . | . | . |
| TI | 0.2 | . | . | . | 0.3 | 0.5 | . |
| P | . | . | . | 0.2 | . | . | . |
| CO | 0.2 | . | . | . | 0.1 | . | . |
| CU | . | . | . | . | . | . | 0.1 |
| BR | . | . | . | . | . | . | 0.2 |
| CL | 0.5 | . | . | 0.4 | . | . | 0.3 |
| PB | . | . | . | 0.6 | 0.6 | . | 0.5 |
| S | . | . | . | . | . | 1.0 | . |
| V | . | . | 0.1 | . | . | . | . |
| ZN | . | 0.5 | . | . | . | . | . |
| RUN TIME(HRS) | 10.40 | 10.40 | 10.40 | 10.40 | 10.40 | 10.40 | 10.40 |

DALLAS AT GRADE SITE: IH30 AT MOTLEY DRIVE

STACKED FILTER UNIT UCD/AIR QUALITY GROUP ANALYSIS

NOMINAL FLOW RATE= 0.005 M**3/MIN

DATE= 8 3 77

START TIME= 7 A.M.

STOP TIME= 6 P.M.

NUCLEPORE FILTER, PORE SIZE= 0.4 UM

WEIGHT(UG/M**3)

| STATION | 1 | 2 | 3 | 5 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|
| ELEMENT | | | | | | | |
| AL | . | . | . | . | . | . | 0.4 |
| CA | 0.4 | 0.4 | 0.3 | 0.5 | 0.5 | 0.5 | 0.5 |
| FE | 0.1 | 0.2 | . | 0.2 | 0.2 | . | . |
| K | 0.2 | 0.1 | 0.2 | . | 0.2 | . | 0.3 |
| SI | 0.9 | . | 0.2 | 1.3 | 0.8 | . | 1.5 |
| TI | . | . | 0.1 | . | . | . | . |
| P | . | 1.4 | . | . | . | 0.5 | . |
| CO | . | 1.0 | . | . | 0.1 | . | . |
| CU | 0.1 | . | . | . | . | . | . |
| BR | . | . | . | 0.4 | 0.3 | . | . |
| CL | . | . | . | . | . | 0.7 | . |
| PB | 0.5 | 0.7 | 0.8 | 2.1 | 1.7 | . | 1.1 |
| S | 2.5 | 1.3 | 1.8 | 3.1 | 2.2 | 2.0 | 1.5 |
| ZN | . | . | . | 0.1 | . | . | . |
| RUN TIME(HRS) | 10.40 | 10.40 | 10.40 | 10.40 | 10.40 | 10.40 | 10.40 |

DALLAS: IH30 AT MOTLEY DR.
STACKED FILTER UNIT TX. AIR CONTROL BOARD ANALYSIS

NOMINAL FLOW RATE= 0.0050 M**3/MIN
DATE= 8 4 77
START TIME= 7 A.M.
STOP TIME= 6 P.M.
NUMBER OF OBSERVATION STATIONS= 5
PORE SIZE= 8.0 UM

| | WEIGHT(UG/M**3) | | | | |
|---|---|---|---|---|---|
| STATIONS | 1 | 2 | 5 | 8 | 9 |
| ELEMENT | | | | | |
| RUN (HRS) | 11.00 | 11.00 | 11.00 | 11.00 | 11.00 |

PORE SIZE= 0.4 UM

| | WEIGHT(UG/M**3) | | | | |
|---|---|---|---|---|---|
| STATIONS | 1 | 2 | 5 | 8 | 9 |
| ELEMENT | | | | | |
| CA | 3.1 | 4.4 | 4.7 | 3.1 | 3.6 |
| K | 0.0 | 0.6 | 0.9 | 0.0 | 0.8 |
| CL | 1.2 | 1.0 | 3.0 | 1.3 | 2.1 |
| S | 8.2 | 1.5 | 9.6 | 8.1 | 6.8 |
| SI | 5.7 | 5.0 | 9.6 | 8.1 | 6.8 |
| ZN | 0.0 | 0.0 | 0.3 | 0.0 | 0.2 |
| CU | 0.0 | 1.9 | 0.0 | 0.0 | 0.0 |
| FE | 0.9 | 1.1 | 1.1 | 0.9 | 0.9 |
| PB | 0.0 | 0.0 | 1.0 | 0.0 | 0.9 |
| TI | 0.0 | 0.0 | 0.3 | 0.0 | 0.3 |
| NI | 0.0 | 0.0 | 2.3 | 0.0 | 0.0 |
| RUN (HRS) | 11.00 | 11.00 | 11.00 | 11.00 | 11.00 |

DALLAS AT GRADE SITE: IH30 AT MOTLEY DRIVE
STACKED FILTER UNIT UCD/AIR QUALITY GROUP ANALYSIS
NOMINAL FLOW RATE= 0.005 M**3/MIN
DATE= 8 4 77
START TIME= 7 A.M.
STOP TIME= 6 P.M.
NUCLEPORE FILTER, PORE SIZE= 8.0 UM

| | | | WEIGHT(UG/M**3) | | |
|---|---|---|---|---|---|
| STATION | 1 | 2 | 5 | 8 | 9 |
| ELEMENT | | | | | |
| AL | . | . | 1.2 | 2.5 | . |
| CA | 0.9 | 0.4 | 1.2 | 2.0 | 0.9 |
| FE | 0.2 | . | 0.2 | 0.5 | 0.2 |
| K | . | 0.2 | . | 0.2 | 0.1 |
| SI | 0.4 | 0.4 | 1.5 | 3.0 | . |
| P | . | 0.4 | . | 0.2 | . |
| CO | . | . | . | . | 0.1 |
| BR | . | . | 0.2 | . | . |
| CL | 0.2 | 0.7 | 0.3 | 0.7 | . |
| RUN TIME(HRS) | 10.60 | 10.60 | 10.60 | 10.60 | 10.60 |

DALLAS AT GRADE SITE: IH30 AT MOTLEY DRIVE
STACKED FILTER UNIT UCD/AIR QUALITY GROUP ANALYSIS
NOMINAL FLOW RATE= 0.005 M**3/MIN
DATE= 8 4 77
START TIME= 7 A.M.
STOP TIME= 6 P.M.
NUCLEPORE FILTER, PORE SIZE= 0.4 UM

| | | | WEIGHT(UG/M**3) | | |
|---|---|---|---|---|---|
| STATION | 1 | 2 | 5 | 8 | 9 |
| ELEMENT | | | | | |
| AL | . | . | 0.2 | 0.3 | . |
| CA | 1.0 | . | 0.4 | 0.5 | 0.4 |
| FE | 0.3 | . | 0.1 | 0.2 | 0.2 |
| K | 0.2 | 0.2 | 0.1 | 0.2 | 0.3 |
| SI | 0.4 | . | 0.3 | 0.4 | 1.3 |
| TI | 0.1 | . | . | 0.2 | . |
| CO | . | . | 0.1 | . | . |
| CU | . | 0.1 | . | . | . |
| BR | . | . | 0.5 | 0.2 | 0.4 |
| CL | 0.2 | 0.4 | . | 0.2 | . |
| PB | 0.5 | . | 2.2 | 0.5 | 2.2 |
| S | 2.1 | . | 2.1 | 1.4 | 2.8 |
| V | . | . | . | . | 0.1 |
| ZN | 0.1 | . | . | . | . |
| RUN TIME(HRS) | 10.60 | 10.60 | 10.60 | 10.60 | 10.60 |

STACKED FILTER UNIT            TX. AIR CONTROL BOARD ANALYSIS

NOMINAL FLOW RATE=  0.0050 M**3/MIN
DATE=    8 10 77
START TIME=  7 A.M.
STOP TIME=  6 P.M.
NUMBER OF OBSERVATION STATIONS=    6
PORE SIZE=  8.0 UM

| | WEIGHT(UG/M**3) | | | | | |
|---|---|---|---|---|---|---|
| STATIONS | 1 | 2 | 3 | 5 | 9 | 10 |
| ELEMENT | | | | | | |
| CA | 1.5 | 0.9 | 2.6 | 0.9 | 0.4 | 1.1 |
| K | 0.0 | 0.0 | 0.5 | 0.0 | 0.5 | 0.6 |
| CL | 0.0 | 0.0 | 0.8 | 0.0 | 0.0 | 0.0 |
| SI | 2.7 | 0.0 | 4.8 | 0.0 | 0.0 | 0.0 |
| ZN | 0.0 | 0.0 | 0.2 | 0.0 | 0.0 | 0.0 |
| CU | 0.0 | 0.0 | 0.2 | 0.0 | 0.0 | 0.0 |
| FE | 0.5 | 0.0 | 0.6 | 0.0 | 0.0 | 0.0 |
| TSP (TOTAL WT.) | 0.0 | 8.2 | 29.1 | 17.0 | 14.2 | 17.9 |
| RUN (HRS) | 11.00 | 11.00 | 11.00 | 11.00 | 11.00 | 10.25 |

PORE SIZE=  0.4 UM

| | WEIGHT(UG/M**3) | | | | | |
|---|---|---|---|---|---|---|
| STATIONS | 1 | 2 | 3 | 5 | 9 | 10 |
| ELEMENT | | | | | | |
| CA | 1.0 | 0.5 | 0.5 | 0.0 | 0.0 | 0.0 |
| CL | 1.2 | 0.9 | 0.0 | 1.8 | 1.1 | 1.1 |
| S | 1.1 | 1.4 | 3.3 | 0.0 | 0.0 | 1.9 |
| PB | 0.0 | 0.0 | 0.9 | 0.0 | 0.0 | 0.0 |
| BR | 0.0 | 0.0 | 0.5 | 0.3 | 0.0 | 0.0 |
| TSP (TOTAL WT.) | 22.4 | 18.8 | 25.8 | 19.4 | 13.6 | 21.1 |
| RUN (HRS) | 11.00 | 11.00 | 11.00 | 11.00 | 11.00 | 10.25 |

DALLAS AT GRADE SITE: IH30 AT MOTLEY DRIVE
STACKED FILTER UNIT UCD/AIR QUALITY GROUP ANALYSIS
NOMINAL FLOW RATE= 0.005 M**3/MIN
DATE= 8 10 77
START TIME= 7 A.M.
STOP TIME= 6 P.M.
NUCLEPORE FILTER, PORE SIZE= 8.0 UM

WEIGHT(UG/M**3)

| STATION | 1 | 2 | 3 | 5 | 9 | 10 |
|---|---|---|---|---|---|---|
| ELEMENT | | | | | | |
| AL | . | . | 0.4 | . | . | . |
| CA | 0.6 | 0.5 | 0.9 | 0.5 | 0.4 | 0.7 |
| FE | . | . | 0.2 | 0.1 | . | 0.2 |
| K | 0.3 | 0.2 | . | . | . | 0.2 |
| SI | . | . | 1.3 | . | . | . |
| TI | . | . | . | . | 0.1 | . |
| P | . | 0.3 | . | . | 0.3 | . |
| CO | . | . | . | 0.2 | . | . |
| BR | . | . | 0.2 | . | . | . |
| CL | 0.6 | 1.1 | 1.0 | 0.9 | 0.9 | 0.8 |
| PB | . | . | 1.0 | 0.5 | 0.4 | . |
| S | . | . | . | . | . | 0.3 |
| V | 0.2 | . | . | 0.1 | . | . |
| RUN TIME(HRS) | 10.60 | 10.60 | 10.60 | 10.60 | 10.60 | 10.60 |

DALLAS AT GRADE SITE: IH30 AT MOTLEY DRIVE
STACKED FILTER UNIT UCD/AIR QUALITY GROUP ANALYSIS
NOMINAL FLOW RATE= 0.005 M**3/MIN
DATE= 8 10 77
START TIME= 7 A.M.
STOP TIME= 6 P.M.
NUCLEPORE FILTER, PORE SIZE= 0.4 UM

WEIGHT(UG/M**3)

| STATION | 1 | 2 | 3 | 5 | 9 | 10 |
|---|---|---|---|---|---|---|
| ELEMENT | | | | | | |
| AL | . | . | . | . | 1.1 | . |
| CA | 0.3 | 0.4 | 0.5 | 0.3 | 0.3 | 0.3 |
| FE | . | . | 0.1 | . | . | . |
| K | . | 0.3 | . | . | 0.4 | 0.1 |
| BR | . | . | 1.0 | 0.3 | 0.2 | 0.3 |
| CL | 0.2 | . | . | . | 0.5 | 0.2 |
| PB | . | . | 2.5 | 0.9 | 0.7 | 0.9 |
| S | . | 0.9 | . | . | . | . |
| RUN TIME(HRS) | 10.60 | 10.60 | 10.60 | 10.60 | 10.60 | 10.60 |

SAN ANTONIO:LOOP 410 AT MILITARY HWY
STACKED FILTER UNIT TX. AIR CONTROL BOARD ANALYSIS
NOMINAL FLOW RATE= 0.0225 M**3/MIN
DATE= 9 28 77
START TIME= 8 A.M.
STOP TIME= 6 P.M.
NUMBER OF OBSERVATION STATIONS= 4
PORE SIZE= 8.0 UM

| | WEIGHT(UG/M**3) | | | |
|---|---|---|---|---|
| STATIONS | 3 | 3 | 3 | 3 |
| ELEMENT | | | | |
| CA | 6.5 | 10.8 | 6.2 | 8.2 |
| K | 0.2 | 0.5 | 0.2 | 0.3 |
| CL | 0.9 | 1.6 | 1.0 | 0.9 |
| S | 0.7 | 0.8 | 0.8 | 0.8 |
| SI | 3.9 | 6.7 | 3.4 | 4.6 |
| FE | 0.5 | 0.8 | 0.5 | 0.6 |
| PB | 0.3 | 0.3 | 0.0 | 0.0 |
| BR | 0.0 | 0.1 | 0.0 | 0.0 |
| AL | 1.5 | 2.2 | 0.0 | 0.0 |
| ZN | 0.0 | 0.0 | 0.0 | 0.0 |
| TSP (TOTAL WT.) | 44.6 | 70.6 | 48.4 | 53.3 |
| RUN (HRS) | 9.75 | 9.75 | 9.75 | 9.75 |

PORE SIZE= 0.4 UM

| | WEIGHT(UG/M**3) | | | |
|---|---|---|---|---|
| STATIONS | 3 | 3 | 3 | 3 |
| ELEMENT | | | | |
| CA | 1.1 | 1.5 | 1.1 | 1.0 |
| K | 0.0 | 0.0 | 0.1 | 0.0 |
| CL | 1.1 | 1.0 | 1.3 | 1.0 |
| S | 3.8 | 3.8 | 3.8 | 3.6 |
| SI | 1.1 | 1.3 | 1.0 | 0.9 |
| FE | 0.0 | 0.0 | 0.4 | 0.0 |
| PB | 1.9 | 1.7 | 1.8 | 1.6 |
| BR | 1.1 | 0.9 | 1.0 | 0.9 |
| AL | 3.1 | 3.0 | 2.4 | 2.8 |
| AS | 0.0 | 0.0 | 0.2 | 0.0 |
| TSP (TOTAL WT.) | 23.2 | 20.7 | 20.3 | 22.7 |
| RUN (HRS) | 9.75 | 9.75 | 9.75 | 9.75 |

Note: Side-by-Side Operation

SAN ANTONIO:LOOP 410 AT MILITARY HWY
STACKED FILTER UNIT TX. AIR CONTROL BOARD ANALYSIS
NOMINAL FLOW RATE= 0.0225 M**3/MIN
DATE= 9 29 77
START TIME= 8 A.M.
STOP TIME= 3 P.M.
NUMBER OF OBSERVATION STATIONS= 4
PORE SIZE= 8.0 UM

| | WEIGHT(UG/M**3) | | | |
|---|---|---|---|---|
| STATIONS | 3 | 3 | 3 | 3 |
| ELEMENT | | | | |
| CA | 7.5 | 7.1 | 6.0 | 5.4 |
| K | 0.3 | 0.3 | 0.0 | 0.0 |
| CL | 1.1 | 1.2 | 0.8 | 1.0 |
| S | 0.9 | 0.7 | 0.8 | 0.7 |
| SI | 3.6 | 3.3 | 2.6 | 2.4 |
| FE | 0.5 | 0.5 | 0.4 | 0.3 |
| TSP (TOTAL WT.) | 61.5 | 42.6 | 35.3 | 30.9 |
| RUN (HRS) | 6.50 | 6.50 | 6.50 | 6.50 |

PORE SIZE= 0.4 UM

| | WEIGHT(UG/M**3) | | | |
|---|---|---|---|---|
| STATIONS | 3 | 3 | 3 | 3 |
| ELEMENT | | | | |
| CA | 1.5 | 1.0 | 0.9 | 1.1 |
| CL | 1.3 | 1.3 | 1.1 | 1.1 |
| S | 4.4 | 4.2 | 3.9 | 4.4 |
| SI | 1.5 | 0.0 | 0.8 | 1.0 |
| PB | 1.7 | 1.7 | 1.6 | 1.7 |
| BR | 1.0 | 0.9 | 0.9 | 1.0 |
| AL | 4.7 | 3.5 | 0.0 | 3.5 |
| TSP (TOTAL WT.) | 23.7 | 26.2 | 29.1 | 27.5 |
| RUN (HRS) | 6.50 | 6.50 | 6.50 | 6.50 |

Note: Side-by-Side Operation

SAN ANTONIO:LOOP 410 AT MILITARY HWY
STACKED FILTER UNIT          TX. AIR CONTROL BOARD ANALYSIS

NOMINAL FLOW RATE= 0.0225 M**3/MIN
DATE= 10 5 77
START TIME= 7 A.M.
STOP TIME= 6 P.M.
NUMBER OF OBSERVATION STATIONS= 6

PORE SIZE= 8.0 UM

| | WEIGHT(UG/M**3) | | | | | |
|---|---|---|---|---|---|---|
| STATIONS | 1 | 3 | 5 | 6 | 9 | 10 |
| ELEMENT | | | | | | |
| CA | 3.8 | 5.6 | 5.6 | 2.9 | 5.7 | 5.2 |
| K | 0.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| CL | 0.9 | 1.5 | 1.0 | 0.7 | 1.3 | 0.9 |
| S | 0.5 | 0.0 | 0.4 | 0.5 | 0.0 | 0.0 |
| SI | 2.9 | 2.8 | 2.9 | 1.1 | 4.1 | 3.2 |
| FE | 0.3 | 0.5 | 0.4 | 0.2 | 0.5 | 0.4 |
| TSP (TOTAL WT.) | 23.0 | 34.9 | 34.5 | 18.0 | 53.8 | 34.5 |
| RUN (HRS) | 10.50 | 10.50 | 10.50 | 10.50 | 10.50 | 10.50 |

PORE SIZE= 0.4 UM

| | WEIGHT(UG/M**3) | | | | | |
|---|---|---|---|---|---|---|
| STATIONS | 1 | 3 | 5 | 6 | 9 | 10 |
| ELEMENT | | | | | | |
| CA | 0.3 | 0.6 | 0.5 | 0.4 | 0.6 | 0.2 |
| SI | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.2 |
| S | 5.4 | 7.6 | 7.1 | 5.8 | 6.6 | 6.5 |
| FE | 0.0 | 0.0 | 0.2 | 0.0 | 0.0 | 0.0 |
| PB | 0.9 | 2.6 | 2.6 | 1.3 | 2.0 | 1.2 |
| BR | 0.3 | 1.2 | 1.0 | 0.5 | 0.7 | 0.4 |
| TSP (TOTAL WT.) | 18.6 | 34.1 | 23.6 | 21.0 | 29.6 | 29.8 |
| RUN (HRS) | 10.50 | 10.50 | 10.50 | 10.50 | 10.50 | 10.50 |

SAN ANTONIO:LOOP 410 AT MILITARY HWY
STACKED FILTER UNIT TX. AIR CONTROL BOARD ANALYSIS

NOMINAL FLOW RATE= 0.0225 M**3/MIN
DATE= 10 5 77
START TIME= 7 A.M.
STOP TIME= 6 P.M.
NUMBER OF OBSERVATION STATIONS= 8
PORE SIZE= 8.0 UM

WEIGHT(UG/M**3)

| STATIONS | 3 | 3 | 5 | 5 | 9 | 9 | 10 | 10 |
|---|---|---|---|---|---|---|---|---|
| ELEMENT | | | | | | | | |
| CA | 5.8 | 5.2 | 5.5 | 5.7 | 5.0 | 7.9 | 6.0 | 3.0 |
| CL | 1.3 | 1.8 | 1.0 | 0.9 | 1.1 | 1.8 | 0.8 | 0.9 |
| S | 0.0 | 0.0 | 0.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| SI | 2.3 | 3.6 | 2.2 | 4.9 | 2.6 | 8.1 | 2.8 | 4.3 |
| FE | 0.4 | 0.6 | 0.4 | 0.6 | 0.4 | 0.8 | 0.5 | 0.4 |
| TSP (TOTAL WT.) | 36.3 | 32.9 | 30.3 | 46.3 | 42.0 | 87.3 | 37.0 | 26.1 |
| RUN (HRS) | 6.00 | 4.50 | 7.75 | 2.75 | 7.75 | 2.75 | 7.75 | 2.75 |

PORE SIZE= 0.4 UM

WEIGHT(UG/M**3)

| STATIONS | 3 | 3 | 5 | 5 | 9 | 9 | 10 | 10 |
|---|---|---|---|---|---|---|---|---|
| ELEMENT | | | | | | | | |
| CA | 0.0 | 1.0 | 0.5 | 0.8 | 0.4 | 1.1 | 0.3 | 0.0 |
| SI | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4.4 |
| FE | 0.0 | 0.0 | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| PB | 2.1 | 3.2 | 2.3 | 3.6 | 1.6 | 3.4 | 1.1 | 1.4 |
| BR | 0.9 | 1.6 | 0.8 | 1.5 | 0.5 | 1.4 | 0.3 | 0.7 |
| TSP (TOTAL WT.) | 32.3 | 36.5 | 26.9 | 14.5 | 25.4 | 41.2 | 25.3 | 42.6 |
| RUN (HRS) | 6.00 | 4.50 | 7.75 | 2.75 | 7.75 | 2.75 | 7.75 | 2.75 |

SAN ANTONIO:LOOP 410 AT MILITARY HWY
STACKED FILTER UNIT TX. AIR CONTROL BOARD ANALYSIS
NOMINAL FLOW RATE= 0.0225 M**3/MIN
DATE= 10 6 77
START TIME= 7 A.M.
STOP TIME= 6 P.M.
NUMBER OF OBSERVATION STATIONS= 5
PORE SIZE= 8.0 UM

WEIGHT(UG/M**3)

| STATIONS | 1 | 3 | 5 | 9 | 10 |
|---|---|---|---|---|---|
| ELEMENT | | | | | |
| CA | 2.9 | 6.2 | 3.6 | 14.2 | 4.0 |
| K | 0.0 | 0.3 | 0.0 | 0.4 | 0.0 |
| CL | 0.4 | 1.0 | 0.9 | 0.0 | 0.6 |
| S | 0.0 | 0.5 | 0.4 | 0.0 | 0.4 |
| SI | 1.5 | 5.3 | 2.1 | 10.7 | 3.1 |
| AL | 0.0 | 2.4 | 0.0 | 0.0 | 0.0 |
| ZN | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 |
| CU | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 |
| FE | 0.3 | 0.7 | 0.3 | 0.9 | 0.3 |
| PB | 0.5 | 0.6 | 0.4 | 0.0 | 0.0 |
| BR | 0.0 | 0.2 | 0.0 | 0.0 | 0.0 |
| I | 0.0 | 0.0 | 0.0 | 0.0 | 0.4 |
| TSP (TOTAL WT.) | 20.2 | 43.2 | 25.5 | 95.2 | 42.6 |
| RUN (HRS) | 11.25 | 11.00 | 11.00 | 11.00 | 11.00 |

PORE SIZE= 0.4 UM

WEIGHT(UG/M**3)

| STATIONS | 1 | 3 | 5 | 9 | 10 |
|---|---|---|---|---|---|
| ELEMENT | | | | | |
| K | 0.0 | 0.0 | 0.0 | 0.2 | 0.0 |
| CA | 0.2 | 0.3 | 0.3 | 2.6 | 0.2 |
| CL | 0.0 | 0.0 | 0.2 | 0.0 | 0.0 |
| S | 6.6 | 7.5 | 7.1 | 6.2 | 6.5 |
| SI | 0.0 | 0.0 | 0.0 | 0.2 | 0.0 |
| ZN | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| FE | 0.0 | 0.0 | 0.0 | 0.2 | 0.0 |
| PB | 0.9 | 2.0 | 1.5 | 1.0 | 1.0 |
| BR | 0.3 | 0.9 | 0.6 | 0.5 | 0.2 |
| TSP (TOTAL WT.) | 21.1 | 25.3 | 23.2 | 25.7 | 0.0 |
| RUN (HRS) | 11.25 | 11.00 | 11.00 | 11.00 | 11.00 |

SAN ANTONIO:LOOP 410 AT MILITARY HWY
STACKED FILTER UNIT TX. AIR CONTROL BOARD ANALYSIS

NOMINAL FLOW RATE= 0.0225 M**3/MIN
DATE= 10 7 77
START TIME= 7 A.M.
STOP TIME= 9 A.M.
NUMBER OF OBSERVATION STATIONS= 6
PORE SIZE= 8.0 UM

| | WEIGHT(UG/M**3) | | | | | |
|---|---|---|---|---|---|---|
| STATIONS | 1 | 3 | 5 | 6 | 9 | 10 |
| ELEMENT | | | | | | |
| CA | 7.7 | 6.7 | 6.4 | 5.5 | 6.7 | 5.9 |
| K | 0.0 | 0.4 | 0.0 | 0.0 | 0.0 | 0.0 |
| CL | 2.7 | 1.5 | 2.0 | 2.1 | 2.1 | 1.5 |
| S | 0.0 | 0.0 | 0.0 | 1.0 | 0.9 | 0.0 |
| SI | 4.5 | 3.3 | 2.0 | 4.1 | 2.4 | 2.4 |
| FE | 0.5 | 0.5 | 0.5 | 0.4 | 0.4 | 0.2 |
| PB | 1.0 | 1.0 | 0.7 | 0.0 | 0.0 | 0.0 |
| BR | 0.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| TSP (TOTAL WT.) | 34.6 | 39.6 | 37.2 | 40.0 | 33.4 | 36.0 |
| RUN (HRS) | 5.25 | 5.50 | 5.50 | 5.00 | 5.50 | 5.50 |

PORE SIZE= 0.4 UM

| | WEIGHT(UG/M**3) | | | | | |
|---|---|---|---|---|---|---|
| STATIONS | 1 | 3 | 5 | 6 | 9 | 10 |
| ELEMENT | | | | | | |
| K | 0.0 | 0.0 | 0.4 | 0.6 | 0.0 | 0.0 |
| CL | 0.0 | 0.7 | 1.5 | 2.6 | 0.8 | 0.7 |
| S | 7.3 | 8.0 | 6.6 | 7.8 | 6.8 | 6.7 |
| PB | 3.2 | 2.9 | 2.6 | 1.3 | 2.2 | 1.5 |
| BR | 1.6 | 1.2 | 0.9 | 0.5 | 1.0 | 0.5 |
| TSP (TOTAL WT.) | 32.5 | 36.2 | 33.8 | 33.0 | 44.0 | 0.0 |
| RUN (HRS) | 5.25 | 5.50 | 5.50 | 5.00 | 5.50 | 5.50 |

DATE= 10 18 77
START TIME= 7 A.M.
STOP TIME= 6 P.M.
NUMBER OF OBSERVATION STATIONS= 7
PORE SIZE= 8.0 UM

WEIGHT(UG/M**3)

| STATIONS | 1 | 2 | 3 | 5 | 6 | 9 | 10 |
|---|---|---|---|---|---|---|---|
| ELEMENT | | | | | | | |
| CA | 6.1 | 4.7 | 7.8 | 6.6 | 5.0 | 5.5 | 4.7 |
| K | 0.4 | 0.3 | 0.4 | 0.3 | 0.3 | 0.3 | 0.4 |
| CL | 1.0 | 0.6 | 1.3 | 0.9 | 0.7 | 0.6 | 1.4 |
| S | 0.0 | 0.6 | 0.8 | 0.7 | 0.0 | 0.5 | 0.5 |
| SI | 5.7 | 4.0 | 5.5 | 4.1 | 4.8 | 4.1 | 3.7 |
| AL | 0.0 | 0.0 | 0.0 | 2.6 | 0.0 | 0.0 | 0.0 |
| ZN | 0.0 | 0.0 | 0.1 | 0.0 | 0.1 | 0.0 | 0.1 |
| FE | 0.5 | 0.4 | 0.6 | 0.5 | 0.5 | 0.5 | 0.4 |
| PB | 0.5 | 0.0 | 0.6 | 0.4 | 0.6 | 0.0 | 0.3 |
| BR | 0.0 | 0.2 | 0.3 | 0.2 | 0.0 | 0.0 | 0.0 |
| MN | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| ZR | 0.1 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 |
| TSP (TOTAL WT.) | 35.8 | 26.6 | 52.2 | 36.7 | 27.6 | 31.9 | 26.5 |
| RUN (HRS) | 10.00 | 10.00 | 10.40 | 10.75 | 10.75 | 11.00 | 11.00 |

PORE SIZE= 0.4 UM

WEIGHT(UG/M**3)

| STATIONS | 1 | 2 | 3 | 5 | 6 | 9 | 10 |
|---|---|---|---|---|---|---|---|
| ELEMENT | | | | | | | |
| K | 0.0 | 0.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| CA | 0.3 | 0.3 | 0.7 | 0.6 | 0.6 | 0.5 | 0.4 |
| CL | 0.3 | 0.3 | 0.3 | 0.0 | 0.3 | 0.0 | 0.0 |
| S | 3.7 | 3.6 | 4.2 | 3.9 | 3.9 | 3.5 | 3.1 |
| SI | 1.8 | 1.1 | 0.0 | 0.0 | 1.9 | 0.0 | 0.0 |
| FE | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.0 | 0.0 |
| ZR | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 |
| PB | 1.6 | 1.5 | 3.2 | 2.6 | 2.1 | 1.3 | 1.2 |
| BR | 0.8 | 0.7 | 1.7 | 1.2 | 0.9 | 0.6 | 0.4 |
| SN | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.4 |
| TSP (TOTAL WT.) | 23.8 | 20.1 | 24.4 | 18.9 | 23.2 | 0.0 | 18.0 |
| RUN (HRS) | 10.00 | 10.00 | 10.40 | 10.75 | 10.75 | 11.00 | 11.00 |

SAN ANTONIO:LOOP 410 AT MILITARY HWY
STACKED FILTER UNIT TX. AIR CONTROL BOARD ANALYSIS

NOMINAL FLOW RATE= 0.0225 M**3/MIN
DATE= 10 19 77
START TIME= 7 A.M.
STOP TIME= 6 P.M.
NUMBER OF OBSERVATION STATIONS= 9
PORE SIZE= 8.0 UM

WEIGHT(UG/M**3)

| STATIONS | 1 | 2 | 3 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|
| ELEMENT | | | | | | | | | |
| CA | 4.4 | 4.3 | 6.3 | 6.0 | 4.3 | 3.3 | 3.2 | 5.2 | 5.2 |
| K | 0.2 | 0.2 | 0.3 | 0.3 | 0.0 | 0.2 | 0.0 | 0.3 | 0.3 |
| CL | 0.4 | 0.3 | 0.6 | 0.6 | 0.6 | 0.4 | 0.2 | 0.3 | 0.4 |
| S | 0.4 | 0.6 | 0.7 | 0.5 | 0.5 | 0.6 | 0.0 | 0.4 | 0.4 |
| SI | 3.1 | 3.9 | 3.0 | 3.3 | 2.4 | 4.8 | 2.7 | 3.5 | 5.9 |
| ZN | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.1 |
| FE | 0.4 | 0.4 | 0.4 | 0.5 | 0.3 | 0.3 | 0.3 | 0.5 | 0.5 |
| PB | 0.0 | 0.0 | 0.5 | 0.8 | 0.4 | 0.0 | 0.0 | 0.3 | 0.4 |
| BR | 0.0 | 0.0 | 0.0 | 0.2 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 |
| TSP (TOTAL WT.) | 20.3 | 21.6 | 34.7 | 33.8 | 23.0 | 19.4 | 20.2 | 30.7 | 30.4 |
| RUN (HRS) | 10.50 | 10.50 | 10.75 | 10.75 | 11.00 | 11.00 | 11.00 | 10.75 | 10.75 |

PORE SIZE= 0.4 UM

WEIGHT(UG/M**3)

| STATIONS<br>ELEMENT | 1 | 2 | 3 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|
| CA | 0.3 | 0.2 | 0.4 | 0.5 | 0.8 | 0.2 | 0.3 | 0.7 | 0.3 |
| CL | 0.0 | 0.3 | 0.5 | 0.0 | 0.3 | 0.0 | 0.0 | 0.0 | 0.0 |
| S | 4.7 | 4.7 | 5.0 | 4.6 | 5.1 | 3.5 | 4.1 | 4.9 | 4.0 |
| SI | 2.7 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.5 | 0.0 | 1.1 |
| ZN | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.1 | 0.0 |
| FE | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 | 0.0 | 0.0 | 0.2 | 0.0 |
| PB | 1.8 | 1.5 | 3.3 | 3.0 | 2.1 | 1.0 | 0.8 | 2.2 | 1.6 |
| BR | 1.0 | 0.5 | 1.6 | 1.3 | 0.8 | 0.4 | 0.2 | 1.0 | 0.6 |
| SR | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 |
| TSP<br>(TOTAL WT.) | 30.4 | 18.8 | 23.6 | 22.1 | 21.6 | 15.5 | 27.6 | 17.6 | 20.7 |
| RUN<br>(HRS) | 10.50 | 10.50 | 10.75 | 10.75 | 11.00 | 11.00 | 11.00 | 10.75 | 10.75 |

SAN ANTONIO:LOOP 410 AT MILITARY HWY
STACKED FILTER UNIT TX. AIR CONTROL BOARD ANALYSIS
NOMINAL FLOW RATE= 0.0225 M**3/MIN
DATE= 10 20 77
START TIME= 7 A.M.
STOP TIME= 6 P.M.
NUMBER OF OBSERVATION STATIONS= 10
PORE SIZE= 8.0 UM

WEIGHT(UG/M**3)

| STATIONS | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| ELEMENT | | | | | | | | | | |
| CA | 6.3 | 5.2 | 7.9 | 5.7 | 8.6 | 5.4 | 4.8 | 3.6 | 4.6 | 6.2 |
| K | 0.4 | 0.3 | 0.4 | 0.2 | 0.3 | 0.2 | 0.2 | 0.0 | 0.2 | 0.0 |
| CL | 0.3 | 0.4 | 1.1 | 0.3 | 0.5 | 0.3 | 0.0 | 0.0 | 0.8 | 0.4 |
| S | 0.5 | 0.6 | 0.7 | 0.4 | 0.6 | 0.5 | 0.4 | 0.0 | 0.3 | 0.5 |
| SI | 6.5 | 3.8 | 7.0 | 4.8 | 6.2 | 3.3 | 3.5 | 3.2 | 3.0 | 0.0 |
| AL | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.6 | 0.0 |
| ZN | 0.1 | 0.0 | 0.1 | 0.0 | 0.1 | 0.0 | 0.1 | 0.0 | 0.3 | 0.0 |
| CU | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| FE | 0.7 | 0.5 | 0.8 | 0.5 | 0.8 | 0.4 | 0.4 | 0.4 | 0.4 | 0.5 |
| PB | 0.0 | 0.0 | 0.8 | 0.6 | 0.8 | 0.3 | 0.0 | 0.0 | 0.5 | 0.0 |
| BR | 0.0 | 0.0 | 0.3 | 0.0 | 0.3 | 0.2 | 0.0 | 0.0 | 0.2 | 0.0 |
| MO | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| SR | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 |
| TSP (TOTAL WT.) | 29.1 | 24.6 | 33.7 | 27.2 | 40.2 | 25.9 | 24.8 | 18.1 | 27.1 | 0.0 |
| RUN (HRS) | 10.50 | 10.50 | 11.00 | 11.00 | 11.00 | 11.00 | 11.00 | 11.00 | 11.00 | 11.00 |

PORE SIZE= 0.4 UM

WEIGHT(UG/M**3)

| STATIONS / ELEMENT | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| K | 0.0 | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.0 |
| CA | 0.4 | 0.5 | 0.8 | 0.5 | 0.9 | 0.4 | 0.4 | 0.0 | 1.3 | 0.4 |
| CL | 0.3 | 0.0 | 0.6 | 0.3 | 0.3 | 0.0 | 0.0 | 0.0 | 0.6 | 0.4 |
| S | 4.4 | 4.4 | 6.0 | 4.2 | 5.7 | 4.9 | 4.1 | 3.1 | 5.0 | 4.6 |
| SI | 1.3 | 0.0 | 1.1 | 1.0 | 1.1 | 1.4 | 0.0 | 0.0 | 1.5 | 1.0 |
| ZN | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 | 0.0 |
| CU | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| FE | 0.0 | 0.2 | 0.2 | 0.1 | 0.2 | 0.1 | 0.2 | 0.2 | 0.2 | 0.0 |
| ZR | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 |
| PB | 1.4 | 1.5 | 4.3 | 2.3 | 3.6 | 2.6 | 1.9 | 0.9 | 2.2 | 1.4 |
| BR | 0.5 | 0.5 | 1.9 | 0.9 | 1.6 | 1.1 | 0.8 | 0.3 | 1.0 | 0.6 |
| SR | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 |
| TSP (TOTAL WT.) | 20.1 | 15.7 | 27.1 | 0.0 | 24.3 | 22.4 | 20.6 | 10.0 | 20.5 | 115.5 |
| RUN (HRS) | 10.50 | 10.50 | 11.00 | 11.00 | 11.00 | 11.00 | 11.00 | 11.00 | 11.00 | 11.00 |

SAN ANTONIO SITE: IH410 AT MILITARY HIGHWAY
STACKED FILTER UNIT — UCD/AIR QUALITY GROUP ANALYSIS
NOMINAL FLOW RATE= 0.022 M**3/MIN
DATE= 10 20 77
START TIME= 7 A.M.
STOP TIME= 6 P.M.
NUCLEPORE FILTER, PORE SIZE= 8.0 UM

WEIGHT(UG/M**3)

| STATION<br>ELEMENT | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| AL | 0.2 | . | 2.0 | 0.4 | . | . | . | . | 0.2 | . |
| CA | 3.0 | 2.9 | 3.5 | 3.3 | 3.9 | 2.4 | 2.6 | 1.4 | 2.7 | 3.1 |
| FE | 0.3 | 0.3 | 0.4 | 0.3 | 0.4 | 0.2 | 0.3 | 0.1 | 0.2 | 0.3 |
| K | 0.2 | 0.1 | 0.2 | 0.2 | 0.2 | 0.1 | 0.3 | 0.1 | 0.2 | 0.2 |
| SI | 1.9 | 1.3 | 1.4 | 1.9 | 1.5 | 0.9 | 1.1 | 0.4 | 1.3 | 2.6 |
| BR | 0.1 | 0.1 | 0.2 | 0.1 | 0.2 | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 |
| CL | 0.3 | 0.2 | 0.6 | 0.3 | 0.2 | 0.2 | 0.1 | 0.1 | 0.5 | 0.2 |
| PB | 0.3 | 0.3 | 0.8 | 0.5 | 0.6 | 0.4 | 0.4 | 0.2 | 0.4 | 0.4 |
| ZN | 0.1 | . | 0.1 | 0.1 | 0.1 | . | 0.1 | . | . | . |
| RUN TIME(HRS) | 10.50 | 10.50 | 11.00 | 11.00 | 11.00 | 11.00 | 11.00 | 11.00 | 11.00 | 11.00 |

SAN ANTONIO SITE: IH410 AT MILITARY HIGHWAY
STACKED FILTER UNIT — UCD/AIR QUALITY GROUP ANALYSIS
NOMINAL FLOW RATE= 0.022 M**3/MIN
DATE= 10 20 77
START TIME= 7 A.M.
STOP TIME= 6 P.M.
NUCLEPORE FILTER, PORE SIZE= 0.4 UM

WEIGHT(UG/M**3)

| STATION<br>ELEMENT | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| CA | 0.2 | 0.3 | 0.5 | 0.2 | 0.5 | 0.3 | 0.4 | 0.2 | . | 0.3 |
| FE | 0.1 | 0.1 | 0.2 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| K | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| SI | 0.2 | 0.2 | 0.4 | 0.1 | 0.2 | 0.3 | 0.2 | . | 0.2 | 0.2 |
| BR | 0.4 | 0.3 | 1.9 | 0.6 | 1.4 | 0.7 | 0.6 | 0.2 | 0.8 | 0.5 |
| PB | 1.2 | 1.1 | 5.0 | 1.7 | 3.8 | 2.3 | 2.0 | 0.8 | 2.2 | 1.6 |
| S | 1.1 | 1.1 | 0.6 | 0.8 | 1.2 | 1.1 | 1.1 | 0.7 | . | 1.1 |
| V | . | . | 0.1 | . | . | . | . | . | . | . |
| RUN TIME(HRS) | 10.50 | 10.50 | 11.00 | 11.00 | 11.00 | 11.00 | 11.00 | 11.00 | 11.00 | 11.00 |

EL PASO: IH10 AT LUNA ST.
STACKED FILTER UNIT TX. AIR CONTROL BOARD ANALYSIS
NOMINAL FLOW RATE= 0.0225 M**3/MIN
DATE= 11 17 77
START TIME= 7 A.M.
STOP TIME= 6 P.M.
NUMBER OF OBSERVATION STATIONS= 8
PORE SIZE= 8.0 UM

WEIGHT(UG/M**3)

| STATIONS | 1 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|
| ELEMENT | | | | | | | | |
| TI | 0.4 | 0.3 | 0.1 | 0.2 | 0.2 | 0.1 | 0.1 | 0.2 |
| CA | 23.4 | 15.6 | 6.8 | 16.1 | 9.0 | 7.6 | 7.6 | 18.3 |
| K | 2.8 | 2.3 | 1.1 | 1.8 | 1.1 | 0.8 | 0.8 | 1.8 |
| CL | 0.0 | 0.5 | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| S | 1.2 | 2.4 | 3.2 | 2.7 | 1.2 | 1.4 | 1.4 | 2.2 |
| SI | 24.9 | 14.3 | 2.2 | 9.1 | 0.0 | 0.0 | 13.2 | 11.5 |
| AL | 10.4 | 3.2 | 2.5 | 6.3 | 3.8 | 0.0 | 0.0 | 4.6 |
| ZN | 0.2 | 0.2 | 0.1 | 0.2 | 0.1 | 0.1 | 0.1 | 0.3 |
| CU | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.1 | 0.0 | 0.1 |
| FE | 3.4 | 2.4 | 1.0 | 1.9 | 1.3 | 1.1 | 0.9 | 2.1 |
| PB | 0.4 | 0.5 | 0.4 | 1.1 | 0.4 | 0.4 | 0.0 | 0.8 |
| BR | 0.0 | 0.0 | 0.0 | 0.3 | 0.0 | 0.0 | 0.0 | 0.2 |
| TSP (TOTAL WT.) | 108.8 | 93.9 | 45.2 | 79.7 | 44.1 | 0.0 | 39.2 | 73.8 |
| RUN (HRS) | 10.15 | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 |

PORE SIZE= 0.4 UM

WEIGHT(UG/M**3)

| STATIONS | 1 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|
| ELEMENT | | | | | | | | |
| V | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| TI | 0.1 | 0.1 | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.1 |
| CA | 6.4 | 6.1 | 5.2 | 3.2 | 2.5 | 2.0 | 2.5 | 3.9 |
| K | 0.6 | 0.6 | 0.7 | 0.4 | 0.3 | 0.3 | 0.3 | 0.4 |
| CL | 0.7 | 0.3 | 0.3 | 0.0 | 0.0 | 0.0 | 0.3 | 0.0 |
| S | 6.0 | 6.9 | 3.0 | 3.8 | 3.0 | 3.6 | 3.4 | 4.3 |
| SI | 8.5 | 4.5 | 4.4 | 0.0 | 0.0 | 0.0 | 3.9 | 0.0 |
| ZN | 0.1 | 0.2 | 0.1 | 0.1 | 0.1 | 0.1 | 0.0 | 0.1 |
| FE | 0.7 | 0.8 | 0.7 | 0.4 | 0.4 | 0.3 | 0.3 | 0.5 |
| PB | 0.8 | 2.0 | 0.5 | 1.2 | 0.7 | 0.8 | 0.0 | 1.0 |
| BR | 0.5 | 0.9 | 0.2 | 0.5 | 0.2 | 0.2 | 0.2 | 0.3 |
| TSP (TOTAL WT.) | 41.0 | 59.3 | 20.4 | 25.1 | 17.6 | 29.7 | 20.4 | 25.9 |
| RUN (HRS) | 10.15 | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 |

EL PASO: IH10 AT LUNA ST.
STACKED FILTER UNIT TX. AIR CONTROL BOARD ANALYSIS
NOMINAL FLOW RATE= 0.0225 M**3/MIN
DATE= 11 17 77
START TIME= 7 A.M.
STOP TIME= 6 P.M.
NUMBER OF OBSERVATION STATIONS= 7
PORE SIZE= 8.0 UM

WEIGHT(UG/M**3)

| STATIONS | 1 | 1 | 1 | 3 | 3 | 4 | 4 |
|---|---|---|---|---|---|---|---|
| ELEMENT | | | | | | | |
| TI | 0.2 | 0.5 | 0.9 | 0.3 | 0.2 | 0.0 | 0.3 |
| CA | 18.2 | 17.5 | 44.1 | 16.2 | 14.6 | 3.1 | 13.5 |
| K | 2.0 | 2.6 | 5.0 | 2.7 | 1.6 | 0.7 | 1.7 |
| S | 1.6 | 1.7 | 0.0 | 2.3 | 2.4 | 3.9 | 2.0 |
| SI | 20.6 | 33.2 | 23.1 | 23.9 | 0.0 | 3.5 | 0.0 |
| AL | 6.6 | 9.8 | 19.7 | 5.3 | 0.0 | 0.0 | 7.2 |
| ZN | 0.1 | 0.2 | 0.3 | 0.2 | 0.3 | 0.0 | 0.3 |
| CU | 0.0 | 0.0 | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 |
| FE | 2.0 | 3.2 | 6.7 | 2.5 | 2.2 | 0.3 | 2.3 |
| PB | 0.0 | 0.0 | 1.7 | 0.0 | 1.2 | 0.6 | 0.0 |
| CL | 0.0 | 1.2 | 0.0 | 0.9 | 0.0 | 0.4 | 0.0 |
| TSP (TOTAL WT.) | 103.4 | 119.9 | 110.9 | 107.5 | 73.5 | 54.1 | 28.6 |
| RUN (HRS) | 4.50 | 3.25 | 2.25 | 6.00 | 4.00 | 6.50 | 3.50 |

PORE SIZE= 0.4 UM

WEIGHT(UG/M**3)

| STATIONS | 1 | 1 | 1 | 3 | 3 | 4 | 4 |
|---|---|---|---|---|---|---|---|
| ELEMENT | | | | | | | |
| TI | 0.1 | 0.1 | 0.0 | 0.1 | 0.0 | 0.1 | 0.0 |
| CA | 6.5 | 6.7 | 6.1 | 5.8 | 6.6 | 5.9 | 4.0 |
| K | 0.7 | 1.0 | 0.0 | 0.6 | 0.6 | 1.1 | 0.0 |
| S | 4.9 | 7.8 | 6.2 | 5.2 | 9.5 | 0.9 | 6.9 |
| SI | 8.3 | 9.6 | 7.7 | 7.4 | 0.0 | 6.8 | 0.0 |
| ZN | 0.1 | 0.2 | 0.0 | 0.1 | 0.3 | 0.1 | 0.3 |
| FE | 0.7 | 0.8 | 0.7 | 0.7 | 1.0 | 0.7 | 0.8 |
| PB | 1.8 | 0.0 | 0.0 | 0.9 | 3.6 | 0.0 | 1.4 |
| BR | 1.2 | 0.0 | 0.0 | 0.5 | 1.7 | 0.0 | 0.5 |
| CL | 1.6 | 0.0 | 0.0 | 0.5 | 0.0 | 0.5 | 0.0 |
| TSP (TOTAL WT.) | 49.4 | 41.9 | 25.7 | 37.0 | 92.6 | 12.0 | 36.0 |
| RUN (HRS) | 4.50 | 3.25 | 2.25 | 6.00 | 4.00 | 6.50 | 3.50 |

EL PASO: IH10 AT LUNA ST.
STACKED FILTER UNIT TX. AIR CONTROL BOARD ANALYSIS
NOMINAL FLOW RATE= 0.0225 M**3/MIN
DATE= 11 18 77
START TIME= 7 A.M.
STOP TIME= 6 P.M.
NUMBER OF OBSERVATION STATIONS= 8
PORE SIZE= 8.0 UM

WEIGHT(UG/M**3)

| STATIONS | 1 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|
| ELEMENT | | | | | | | | |
| V | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| TI | 0.4 | 1.5 | 0.2 | 0.3 | 0.2 | 0.2 | 0.2 | 0.4 |
| AL | 7.2 | 18.7 | 6.9 | 0.0 | 0.0 | 0.0 | 0.0 | 9.6 |
| CA | 26.9 | 82.5 | 14.2 | 16.4 | 12.4 | 19.4 | 14.0 | 26.8 |
| K | 3.4 | 9.9 | 2.9 | 1.7 | 1.5 | 2.7 | 1.9 | 3.5 |
| CL | 1.2 | 0.9 | 1.1 | 0.0 | 0.7 | 1.7 | 0.0 | 0.9 |
| S | 2.9 | 7.2 | 2.3 | 1.7 | 2.2 | 3.1 | 0.9 | 3.4 |
| SI | 39.5 | 62.1 | 15.5 | 0.0 | 16.1 | 25.8 | 0.0 | 36.6 |
| ZN | 0.2 | 0.7 | 0.2 | 0.3 | 0.1 | 0.3 | 0.3 | 0.0 |
| CU | 0.0 | 0.2 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 |
| FE | 4.0 | 14.0 | 1.8 | 2.2 | 1.7 | 2.7 | 2.3 | 0.0 |
| PB | 0.0 | 3.4 | 0.0 | 0.9 | 0.0 | 0.0 | 0.9 | 0.0 |
| BR | 0.0 | 1.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| TSP (TOTAL WT.) | 143.9 | 390.2 | 74.2 | 0.0 | 72.9 | 101.4 | 76.9 | 0.0 |
| RUN (HRS) | 4.50 | 4.25 | 4.25 | 4.25 | 4.25 | 4.25 | 4.25 | 4.25 |

PORE SIZE= 0.4 UM

WEIGHT(UG/M**3)

| STATIONS | 1 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|
| ELEMENT | | | | | | | | |
| TI | 0.1 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.1 |
| CA | 6.3 | 8.6 | 3.4 | 5.1 | 3.0 | 5.0 | 3.3 | 5.7 |
| K | 1.0 | 3.6 | 1.7 | 1.0 | 0.7 | 1.2 | 0.5 | 1.2 |
| CL | 0.9 | 6.8 | 2.1 | 1.3 | 1.4 | 1.3 | 0.6 | 2.4 |
| S | 5.5 | 11.6 | 4.7 | 6.2 | 4.4 | 6.4 | 4.8 | 6.9 |
| SI | 8.7 | 8.8 | 4.3 | 8.4 | 3.1 | 7.1 | 5.3 | 7.0 |
| ZN | 0.1 | 0.1 | 0.1 | 0.2 | 0.1 | 0.2 | 0.0 | 0.1 |
| FE | 0.8 | 1.2 | 0.3 | 0.6 | 0.4 | 0.8 | 0.3 | 0.6 |
| PB | 0.0 | 4.8 | 1.2 | 1.1 | 1.2 | 1.1 | 0.0 | 2.0 |
| BR | 0.4 | 2.7 | 0.6 | 0.7 | 0.7 | 0.8 | 0.0 | 1.1 |
| TSP (TOTAL WT.) | 50.4 | 109.6 | 34.2 | 32.4 | 34.9 | 49.8 | 30.8 | 48.6 |
| RUN (HRS) | 4.50 | 4.25 | 4.25 | 4.25 | 4.25 | 4.25 | 4.25 | 4.25 |

EL PASO: IH10 AT LUNA ST.
STACKED FILTER UNIT TX. AIR CONTROL BOARD ANALYSIS
NOMINAL FLOW RATE= 0.0225 M**3/MIN
DATE= 11 18 77
START TIME= 7 A.M.
STOP TIME= 6 P.M.
NUMBER OF OBSERVATION STATIONS= 2
PORE SIZE= 8.0 UM

WEIGHT(UG/M**3)

| STATIONS | 3 | 3 |
|---|---|---|
| ELEMENT | | |
| V | 0.1 | 0.0 |
| AL | 52.9 | 0.0 |
| TI | 3.1 | 0.5 |
| CA | 164.4 | 37.8 |
| K | 20.7 | 4.0 |
| CL | 0.0 | 1.4 |
| S | 8.5 | 5.1 |
| SI | 176.0 | 0.0 |
| N 2 | 0.1 | 0.5 |
| CU | 0.7 | 0.0 |
| FE | 30.2 | 5.2 |
| PB | 4.6 | 2.8 |
| BR | 1.4 | 1.2 |
| TSP (TOTAL WT.) | 176.8 | 506.7 |
| RUN (HRS) | 1.50 | 2.75 |

PORE SIZE= 0.4 UM

WEIGHT(UG/M**3)

| STATIONS | 3 | 3 |
|---|---|---|
| ELEMENT | | |
| CA | 9.9 | 7.9 |
| K | 4.2 | 3.4 |
| CL | 10.6 | 4.8 |
| S | 14.4 | 10.0 |
| SI | 10.6 | 7.9 |
| ZN | 0.0 | 0.2 |
| FE | 1.3 | 1.1 |
| PB | 6.7 | 3.8 |
| BR | 3.7 | 2.2 |
| (TOTAL WT.) | | |
| RUN | 1.50 | 2.75 |

EL PASO: IH10 AT LUNA STREET
STACKED FILTER UNIT UCD/AIR QUALITY GROUP ANALYSIS
NOMINAL FLOW RATE= 0.022 M**3/MIN
DATE= 11 18 77
START TIME= 7 A.M.
STOP TIME= 9 A.M.
NUCLEPORE FILTER, PORE SIZE= 8.0 UM

WEIGHT(UG/M**3)

| STATION<br>ELEMENT | 1 | 3 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|
| AL | 4.6 | . | 0.9 | . | 0.2 | 0.1 | 1.8 | . | 1.8 |
| CA | 8.1 | . | 4.2 | 2.1 | 1.5 | 2.6 | 6.2 | 2.7 | 5.9 |
| FE | 2.3 | . | 1.0 | 0.5 | 0.3 | 0.7 | 1.4 | 0.6 | 1.4 |
| K | 1.0 | . | 0.5 | 0.2 | 0.1 | 0.4 | 0.7 | 0.3 | 0.7 |
| SI | 12.9 | . | 4.9 | 5.3 | 1.5 | 1.0 | 8.1 | 3.8 | 8.3 |
| BR | 0.3 | . | 0.9 | 0.3 | 0.3 | 0.3 | 0.3 | 0.1 | 0.4 |
| CL | 0.4 | . | 0.3 | 0.1 | 0.2 | 0.1 | 0.1 | 0.2 | 0.4 |
| PB | 0.9 | . | 2.6 | 1.1 | 0.8 | 0.7 | 1.1 | 0.4 | 1.4 |
| S | 0.3 | . | 0.1 | . | . | . | 0.3 | . | 0.2 |
| ZN | 0.3 | . | 0.1 | 0.1 | 0.1 | 0.1 | 0.3 | 0.1 | 0.2 |
| RUN TIME(HRS) | 4.50 | 4.50 | 4.25 | 4.25 | 4.25 | 4.28 | 4.25 | 4.25 | 4.25 |

EL PASO: IH10 AT LUNA STREET
STACKED FILTER UNIT UCD/AIR QUALITY GROUP ANALYSIS
NOMINAL FLOW RATE= 0.022 M**3/MIN
DATE= 11 18 77
START TIME= 7 A.M.
STOP TIME= 9 A.M.
NUCLEPORE FILTER, PORE SIZE= 0.4 UM

WEIGHT(UG/M**3)

| STATION<br>ELEMENT | 1 | 3 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|
| CA | 1.6 | 2.6 | 1.2 | 1.2 | 1.2 | 1.1 | 2.1 | 1.1 | 1.5 |
| FE | 0.5 | 0.6 | 0.2 | 0.2 | 0.3 | 0.3 | 0.5 | 0.2 | 0.3 |
| K | 0.4 | 0.6 | 0.3 | 0.2 | 0.2 | 0.3 | 0.5 | 0.3 | 0.3 |
| SI | 0.8 | 1.2 | 1.0 | 1.0 | 0.1 | 0.5 | 1.5 | 0.8 | 0.7 |
| TI | 0.1 | . | . | . | . | . | . | . | . |
| BR | 0.3 | 2.7 | 1.0 | 0.9 | 0.8 | 0.9 | 0.9 | 0.4 | 1.1 |
| CL | 0.4 | 1.8 | 0.7 | 0.8 | . | . | . | . | 0.7 |
| PB | 1.0 | 5.8 | 1.9 | 1.9 | 1.8 | 1.8 | 2.4 | 1.1 | 2.6 |
| S | 0.7 | 0.4 | 0.5 | 0.5 | . | 0.7 | 1.3 | 1.3 | 0.4 |
| ZN | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 | 0.1 | 0.1 |
| RUN TIME(HRS) | 4.50 | 4.50 | 4.25 | 4.25 | 4.25 | 4.28 | 4.25 | 4.25 | 4.25 |

EL PASO: IH10 AT LUNA STREET
STACKED FILTER UNIT UCD/AIR QUALITY GROUP ANALYSIS
NOMINAL FLOW RATE= 0.022 M**3/MIN
DATE= 11 18 77
START TIME= 7 A.M.
STOP TIME= 9 A.M.
NUCLEPORE FILTER, PORE SIZE= 8.0 UM

WEIGHT(UG/M**3)

| STATION | 3 | 3 |
|---|---|---|
| ELEMENT | | |
| AL | 3.6 | 2.3 |
| CA | 12.4 | 16.9 |
| FE | 2.7 | 4.0 |
| K | 1.3 | 2.1 |
| SI | 15.7 | 18.5 |
| BR | 1.0 | 1.6 |
| CL | 1.2 | 1.0 |
| PB | 2.5 | 4.8 |
| S | . | 0.5 |
| ZN | . | 0.7 |
| RUN TIME(HRS) | 1.50 | 2.75 |

EL PASO: IH10 AT LUNA STREET
STACKED FILTER UNIT UCD/AIR QUALITY GROUP ANALYSIS
NOMINAL FLOW RATE= 0.022 M**3/MIN
DATE= 11 18 77
START TIME= 7 A.M.
STOP TIME= 9 A.M.
NUCLEPORE FILTER, PORE SIZE= 0.4 UM

WEIGHT(UG/M**3)

| STATION | 3 | 3 |
|---|---|---|
| ELEMENT | | |
| CA | 2.8 | 4.4 |
| FE | 0.7 | 1.1 |
| K | 0.6 | 0.9 |
| SI | 1.3 | 2.0 |
| BR | 4.0 | 3.6 |
| CL | 2.3 | 2.7 |
| PB | 8.1 | 8.3 |
| ZN | 0.1 | 0.3 |
| RUN TIME(HRS) | 1.50 | 2.75 |

EL PASO: IH10 AT LUNA ST.
STACKED FILTER UNIT TX. AIR CONTROL BOARD ANALYSIS
NOMINAL FLOW RATE= 0.0225 M**3/MIN
DATE= 11 29 77
START TIME= 7 A.M.
STOP TIME= 6 P.M.
NUMBER OF OBSERVATION STATIONS= 4
PORE SIZE= 8.0 UM

| | WEIGHT(UG/M**3) | | | |
|---|---|---|---|---|
| STATIONS | 1 | 3 | 4 | 5 |
| ELEMENT | | | | |
| TI | 0.3 | 0.2 | 0.3 | 0.3 |
| CA | 17.8 | 11.8 | 12.2 | 15.0 |
| K | 2.0 | 1.5 | 1.6 | 2.1 |
| S | 1.0 | 1.1 | 1.0 | 0.6 |
| SI | 8.9 | 0.0 | 0.0 | 8.4 |
| AL | 0.5 | 4.7 | 0.0 | 4.7 |
| ZN | 0.2 | 0.2 | 0.2 | 0.1 |
| FE | 0.0 | 2.0 | 2.1 | 2.4 |
| PB | 0.0 | 0.9 | 0.0 | 0.6 |
| BR | 0.0 | 0.3 | 0.0 | 0.0 |
| CU | 0.0 | 0.0 | 0.0 | 0.1 |
| CL | 0.0 | 0.0 | 0.5 | 0.0 |
| (TOTAL WT.) | | | | |
| RUN (HRS) | 7.00 | 7.00 | 7.00 | 7.00 |

PORE SIZE= 0.4 UM

| | WEIGHT(UG/M**3) | | | | |
|---|---|---|---|---|---|
| STATIONS | 1 | 3 | 4 | 5 | 6 |
| ELEMENT | | | | | |
| TI | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| CA | 5.2 | 3.1 | 4.3 | 4.4 | 3.8 |
| K | 0.7 | 0.4 | 0.3 | 0.8 | 0.6 |
| S | 2.0 | 3.6 | 1.5 | 3.3 | 2.8 |
| ZN | 0.1 | 0.1 | 0.0 | 0.1 | 0.1 |
| FE | 0.8 | 0.6 | 0.5 | 0.9 | 0.7 |
| PB | 0.6 | 2.1 | 0.6 | 1.7 | 1.1 |
| BR | 0.0 | 1.2 | 0.4 | 0.8 | 0.6 |
| AL | 0.0 | 4.3 | 0.0 | 0.0 | 0.0 |
| (TOTAL WT.) | | | | | |
| RUN (HRS) | 7.00 | 7.00 | 7.00 | 7.00 | 7.00 |

EL PASO: IH10 AT LUNA ST.

STACKED FILTER UNIT TX. AIR CONTROL BOARD ANALYSIS

NOMINAL FLOW RATE= 0.0225 M**3/MIN

DATE= 11 30 77

START TIME= 7 A.M.

STOP TIME= 6 P.M.

NUMBER OF OBSERVATION STATIONS= 8

PORE SIZE= 8.0 UM

WEIGHT(UG/M**3)

| STATIONS | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|
| ELEMENT | | | | | | | | |
| TI | 0.2 | 1.9 | 0.1 | 0.1 | 0.1 | 0.2 | 0.2 | 0.1 |
| CA | 10.0 | 85.3 | 6.5 | 9.5 | 7.9 | 10.0 | 11.1 | 8.0 |
| K | 1.3 | 10.4 | 0.8 | 1.2 | 0.9 | 1.0 | 1.4 | 0.9 |
| CL | 0.0 | 2.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| S | 0.7 | 4.7 | 0.6 | 1.0 | 0.9 | 0.6 | 1.1 | 0.6 |
| SI | 0.0 | 76.1 | 0.0 | 0.0 | 0.0 | 0.0 | 2.9 | 0.0 |
| AL | 4.1 | 24.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| ZN | 0.1 | 0.8 | 0.1 | 0.1 | 0.1 | 0.2 | 0.1 | 0.1 |
| CU | 0.0 | 0.5 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.0 |
| FE | 1.4 | 15.4 | 1.1 | 1.4 | 1.2 | 1.5 | 1.5 | 1.2 |
| PB | 0.5 | 3.2 | 0.0 | 0.6 | 0.6 | 0.4 | 0.5 | 0.5 |
| (TOTAL WT.) | | | | | | | | |
| RUN (HRS) | 8.50 | 2.00 | 8.50 | 8.50 | 8.50 | 8.50 | 8.50 | 8.50 |

PORE SIZE= 0.4 UM

WEIGHT(UG/M**3)

| STATIONS | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|
| ELEMENT | | | | | | | | |
| TI | 0.2 | 0.1 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.1 |
| CA | 5.2 | 4.2 | 1.4 | 2.5 | 1.4 | 3.6 | 3.9 | 4.7 |
| K | 1.0 | 0.5 | 0.0 | 0.3 | 0.0 | 0.5 | 0.3 | 0.7 |
| CL | 0.0 | 0.9 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| S | 1.8 | 2.6 | 1.1 | 2.5 | 2.4 | 2.1 | 0.9 | 2.2 |
| AL | 3.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 3.5 |
| ZN | 0.1 | 0.2 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| CU | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| FE | 1.4 | 0.7 | 0.2 | 0.4 | 0.2 | 0.7 | 0.7 | 0.8 |
| PB | 0.7 | 2.2 | 0.5 | 1.5 | 0.9 | 0.7 | 0.5 | 1.0 |
| BR | 0.2 | 1.0 | 0.0 | 0.7 | 0.4 | 0.2 | 0.0 | 0.2 |
| (TOTAL WT.) | | | | | | | | |
| RUN (HRS) | 8.50 | 8.50 | 8.50 | 8.50 | 8.50 | 8.50 | 8.50 | 8.50 |

DALLAS ELEVATED SITE: IH45 AT FOREST AVENUE
LUNDGREN IMPACTOR UCD/AIR QUALITY GROUP ANALYSIS
NOMINAL FLOW RATE= 0.130 M**3/MIN
RUN DURING WEEK OF 6 1 77
APIEZON-L COATED STRIPS, DRUM: 4

| | | | WEIGHT (UG/CM**2) | |
|---|---|---|---|---|
| STATION | 2 | 4 | 6 | 7 |
| ELEMENT | | | | |
| AL | . | . | 0.1 | . |
| CA | 2.6 | 1.5 | 1.5 | 2.4 |
| FE | 0.3 | 0.1 | 0.1 | 0.2 |
| K | 0.1 | . | 0.1 | 0.1 |
| SI | 0.9 | . | . | 3.4 |
| TI | . | 0.1 | 0.2 | 0.1 |
| BR | 0.2 | 0.2 | 0.1 | 0.2 |
| MN | 0.1 | 0.1 | . | . |
| PB | 1.1 | 0.6 | 0.6 | 0.6 |
| S | 0.7 | 0.9 | 0.8 | 0.5 |
| V | 0.1 | . | . | . |
| ZN | 0.7 | 0.1 | 0.1 | 0.7 |

DALLAS ELEVATED SITE: IH45 AT FOREST AVENUE
LUNDGREN IMPACTOR UCD/AIR QUALITY GROUP ANALYSIS
NOMINAL FLOW RATE= 0.130 M**3/MIN
RUN DURING WEEK OF 6 7 77
APIEZON-L COATED STRIPS, DRUM: 1

| | | | WEIGHT (UG/CM**2) | |
|---|---|---|---|---|
| STATION | 2 | 4 | 6 | 7 |
| ELEMENT | | | | |
| AL | . | . | 0.1 | . |
| CA | 15.6 | 11.1 | 5.4 | 3.2 |
| FE | 2.7 | 2.1 | 0.9 | 0.2 |
| K | 0.8 | 0.8 | 0.6 | . |
| SI | 15.9 | 11.8 | 2.6 | . |
| TI | 0.2 | 0.3 | . | . |
| CO | . | . | 1.9 | . |
| CU | . | . | 0.1 | . |
| BR | 0.2 | 0.2 | . | . |
| CL | . | . | . | 0.1 |
| MN | 0.1 | . | . | . |
| NI | . | . | . | 0.1 |
| PB | 1.5 | 0.9 | 0.3 | . |
| V | . | . | 0.2 | . |
| ZN | 0.3 | 0.1 | 0.1 | 0.1 |

DALLAS ELEVATED SITE: IH45 AT FOREST AVENUE
LUNDGREN IMPACTOR UCD/AIR QUALITY GROUP ANALYSIS
NOMINAL FLOW RATE= 0.130 M**3/MIN
RUN DURING WEEK OF 6 7 77
APIEZON-L COATED STRIPS, DRUM: 2

| | WEIGHT (UG/CM**2) | | | |
|---|---|---|---|---|
| STATION | 2 | 4 | 6 | 7 |
| ELEMENT | | | | |
| AL | . | . | . | 0.1 |
| CA | 9.1 | 6.0 | 3.7 | 1.9 |
| FE | 1.6 | 1.3 | 0.7 | 0.2 |
| K | 0.5 | 0.6 | 0.4 | . |
| SI | 7.0 | 5.4 | 2.0 | . |
| TI | 0.2 | 0.1 | . | 0.1 |
| CO | . | . | 1.1 | 0.5 |
| CU | . | . | . | 0.1 |
| BR | 0.3 | 0.2 | 0.1 | . |
| CL | . | . | . | 0.1 |
| MN | 0.1 | . | 0.1 | . |
| PB | 1.2 | 0.7 | 0.3 | . |
| V | . | 0.2 | . | . |
| ZN | 0.4 | . | 0.2 | 0.1 |

DALLAS ELEVATED SITE: IH45 AT FOREST AVENUE
LUNDGREN IMPACTOR UCD/AIR QUALITY GROUP ANALYSIS
NOMINAL FLOW RATE= 0.130 M**3/MIN
RUN DURING WEEK OF 6 7 77
APIEZON-L COATED STRIPS, DRUM: 3

| | WEIGHT (UG/CM**2) | | | |
|---|---|---|---|---|
| STATION | 2 | 4 | 6 | 7 |
| ELEMENT | | | | |
| CA | 4.0 | 2.4 | 2.4 | 1.3 |
| FE | 0.9 | 0.6 | 0.2 | 0.1 |
| K | 0.1 | . | 0.1 | . |
| SI | 2.0 | 0.4 | 2.4 | . |
| TI | . | 0.1 | . | . |
| CO | 0.1 | . | . | 0.1 |
| BR | 0.4 | 0.2 | 0.1 | . |
| PB | 1.1 | 0.6 | 0.3 | . |
| ZN | 0.6 | . | 0.7 | . |

DALLAS ELEVATED SITE: IH45 AT FOREST AVENUE

LUNDGREN IMPACTOR UCD/AIR QUALITY GROUP ANALYSIS

NOMINAL FLOW RATE= 0.130 M**3/MIN

RUN DURING WEEK OF 6 7 77

APIEZON-L COATED STRIPS, DRUM: 4

WEIGHT (UG/CM**2)

| STATION | 2 | 4 | 6 | 7 |
|---|---|---|---|---|
| ELEMENT | | | | |
| AL | . | 0.2 | . | . |
| CA | 2.1 | 1.4 | 3.2 | 1.8 |
| FE | 0.3 | 0.2 | 0.3 | 0.1 |
| K | 0.2 | 0.1 | 0.2 | . |
| SI | 2.0 | . | 9.2 | 1.0 |
| TI | . | . | . | 0.1 |
| CU | . | 0.1 | . | 0.1 |
| BR | 0.5 | 0.1 | 0.2 | . |
| PB | 1.3 | 0.4 | 0.5 | 0.1 |
| S | 3.2 | 1.8 | 0.9 | 0.7 |
| V | . | . | . | 0.1 |
| ZN | 1.0 | . | 2.3 | 0.3 |

DALLAS AT GRADE SITE: IH30 AT MOTLEY DRIVE

LUNDGREN IMPACTOR UCD/AIR QUALITY GROUP ANALYSIS

NOMINAL FLOW RATE= 0.130 M**3/MIN

RUN DURING WEEK OF 8 3 77

APIEZON-L COATED STRIPS, DRUM: 1

WEIGHT (UG/CM**2)

| STATION | 1 | 3 | 6 | 10 |
|---|---|---|---|---|
| ELEMENT | | | | |
| AL | 0.1 | . | . | . |
| CA | 2.9 | 8.2 | 5.3 | 4.2 |
| FE | 0.3 | 1.6 | 0.8 | 0.5 |
| K | . | 0.7 | 0.5 | 0.5 |
| SI | . | 7.2 | 2.6 | 1.1 |
| TI | . | 0.2 | . | 0.4 |
| CO | . | . | 1.0 | . |
| BR | . | 0.2 | 0.1 | . |
| MN | . | 0.1 | 0.2 | 0.2 |
| NI | . | . | 0.1 | . |
| PB | . | 0.8 | 0.4 | 0.3 |
| ZN | . | 0.2 | 0.1 | 0.1 |

DALLAS AT GRADE SITE: IH30 AT MOTLEY DRIVE

LUNDGREN IMPACTOR UCD/AIR QUALITY GROUP ANALYSIS

NOMINAL FLOW RATE= 0.130 M**3/MIN

RUN DURING WEEK OF 8 3 77

APIEZON-L COATED STRIPS, DRUM: 2

| | | | WEIGHT | (UG/CM**2) |
|---|---|---|---|---|
| STATION | 1 | 3 | 6 | 10 |
| ELEMENT | | | | |
| CA | 2.4 | 5.1 | 3.5 | 2.5 |
| FE | 0.4 | 1.0 | 0.5 | 0.3 |
| K | 0.4 | 0.5 | 0.4 | . |
| SI | 0.6 | 2.4 | 2.1 | 0.6 |
| TI | 0.1 | 0.2 | . | 0.3 |
| CO | 1.2 | . | . | . |
| BR | . | 0.2 | 0.1 | 0.1 |
| CL | 0.1 | . | . | 0.1 |
| MN | . | 0.1 | 0.1 | 0.1 |
| PB | 0.2 | 0.7 | 0.3 | 0.4 |
| V | . | . | . | 0.1 |
| ZN | 0.1 | 0.1 | 0.4 | . |

DALLAS AT GRADE SITE: IH30 AT MOTLEY DRIVE

LUNDGREN IMPACTOR UCD/AIR QUALITY GROUP ANALYSIS

NOMINAL FLOW RATE= 0.130 M**3/MIN

RUN DURING WEEK OF 8 3 77

APIEZON-L COATED STRIPS, DRUM: 3

| | | | WEIGHT | (UG/CM**2) |
|---|---|---|---|---|
| STATION | 1 | 3 | 6 | 10 |
| ELEMENT | | | | |
| CA | 1.5 | 1.9 | 2.2 | 1.6 |
| FE | 0.1 | 0.2 | 0.3 | 0.3 |
| K | . | 0.1 | . | . |
| SI | . | . | 0.9 | 0.2 |
| TI | 0.1 | . | . | . |
| CO | . | . | 0.2 | . |
| CU | 0.1 | . | . | . |
| BR | . | 0.1 | . | . |
| PB | . | 0.3 | 0.2 | 0.2 |
| V | . | . | 0.1 | . |
| ZN | . | . | 0.3 | 0.1 |

DALLAS AT GRADE SITE: IH30 AT MOTLEY DRIVE

LUNDGREN IMPACTOR UCD/AIR QUALITY GROUP ANALYSIS

NOMINAL FLOW RATE= 0.130 M**3/MIN

RUN DURING WEEK OF 8 3 77

APIEZON-L COATED STRIPS, DRUM: 4

| | | | WEIGHT (UG/CM**2) | |
|---|---|---|---|---|
| STATION | 1 | 3 | 6 | 10 |
| ELEMENT | | | | |
| AL | 0.2 | . | . | . |
| CA | 1.4 | 1.6 | 2.7 | 3.7 |
| FE | 0.1 | 0.4 | 0.2 | 0.3 |
| K | 0.1 | 1.6 | 0.1 | 0.1 |
| SI | . | . | 4.7 | 5.8 |
| TI | . | 0.1 | . | . |
| BR | . | 0.2 | . | . |
| PB | . | 1.0 | 0.3 | 0.2 |
| S | 0.3 | 3.2 | 0.8 | 0.1 |
| V | . | 0.1 | . | 0.1 |
| ZN | . | 0.1 | 1.7 | 1.5 |

DALLAS AT GRADE SITE: IH30 AT MOTLEY DRIVE

LUNDGREN IMPACTOR UCD/AIR QUALITY GROUP ANALYSIS

NOMINAL FLOW RATE= 0.130 M**3/MIN

RUN DURING WEEK OF 8 10 77

APIEZON-L COATED STRIPS, DRUM: 1

| | | | WEIGHT (UG/CM**2) | |
|---|---|---|---|---|
| STATION | 1 | 3 | 6 | 10 |
| ELEMENT | | | | |
| CA | 2.9 | 8.2 | 5.3 | 4.2 |
| FE | 0.3 | 1.6 | 0.8 | 0.5 |
| K | . | 0.5 | 0.5 | 0.6 |
| SI | 2.4 | 3.6 | 3.6 | 2.8 |
| TI | . | 0.2 | . | 0.4 |
| CO | 0.7 | . | 0.8 | 1.9 |
| BR | . | . | 0.1 | . |
| CL | . | 0.1 | 0.1 | 0.2 |
| MN | . | 0.1 | 0.2 | 0.2 |
| NI | . | . | 0.1 | . |
| PB | . | 0.4 | 0.4 | 0.3 |

DALLAS AT GRADE SITE: IH30 AT MOTLEY DRIVE
LUNDGREN IMPACTOR UCD/AIR QUALITY GROUP ANALYSIS
NOMINAL FLOW RATE= 0.130 M**3/MIN
RUN DURING WEEK OF 8 10 77
APIEZON-L COATED STRIPS, DRUM: 2

| | WEIGHT (UG/CM**2) | | | |
|---|---|---|---|---|
| STATION | 1 | 3 | 6 | 10 |
| ELEMENT | | | | |
| CA | 3.1 | 1.8 | 2.4 | 2.0 |
| FE | 0.3 | 0.5 | 0.4 | 0.4 |
| K | 0.4 | 0.4 | 0.4 | 0.4 |
| SI | 0.9 | 0.8 | 0.6 | 1.0 |
| TI | 0.2 | . | 0.2 | 0.1 |
| CO | . | . | . | 1.2 |
| BR | . | 0.1 | 0.1 | . |
| CL | 0.1 | 0.1 | 0.1 | 0.2 |
| MN | 0.1 | . | 0.1 | 0.1 |
| PB | 0.1 | 0.6 | 0.4 | 0.2 |
| V | 0.2 | 0.3 | . | . |
| ZN | 0.1 | . | . | . |

DALLAS AT GRADE SITE: IH30 AT MOTLEY DRIVE
LUNDGREN IMPACTOR UCD/AIR QUALITY GROUP ANALYSIS
NOMINAL FLOW RATE= 0.130 M**3/MIN
RUN DURING WEEK OF 8 10 77
APIEZON-L COATED STRIPS, DRUM: 3

| | WEIGHT (UG/CM**2) | | | |
|---|---|---|---|---|
| STATION | 1 | 3 | 6 | 10 |
| ELEMENT | | | | |
| CA | 0.8 | 1.8 | 0.9 | 0.7 |
| FE | 0.2 | 0.2 | 0.2 | 0.2 |
| K | 0.2 | . | 0.2 | . |
| SI | . | . | 0.1 | . |
| TI | . | . | . | 0.1 |
| CO | 0.3 | . | 0.2 | . |
| CU | . | 0.1 | . | . |
| BR | . | 0.2 | 0.2 | . |
| CL | . | . | 0.1 | . |
| MN | 0.1 | . | . | . |
| PB | . | 0.5 | 0.5 | 0.2 |
| V | 0.1 | 0.1 | . | 0.1 |

DALLAS AT GRADE SITE: IH30 AT MOTLEY DRIVE
LUNDGREN IMPACTOR UCD/AIR QUALITY GROUP ANALYSIS
NOMINAL FLOW RATE= 0.130 M**3/MIN
RUN DURING WEEK OF 8 10 77
APIEZON-L COATED STRIPS, DRUM: 4
WEIGHT (UG/CM**2)

| STATION | 1 | 3 | 6 | 10 |
|---|---|---|---|---|
| ELEMENT | | | | |
| AL | 0.1 | 0.2 | . | . |
| CA | 1.5 | 1.5 | 0.6 | 0.6 |
| FE | 0.1 | 0.1 | 0.1 | 0.1 |
| K | 0.1 | . | . | 0.1 |
| TI | . | 0.1 | . | . |
| CO | . | . | . | 0.8 |
| BR | . | 0.1 | 0.1 | . |
| CL | . | . | . | 0.1 |
| NI | 0.1 | . | 0.1 | . |
| PB | . | 0.4 | 0.2 | 0.1 |
| S | 0.3 | . | 0.3 | 0.3 |
| V | . | 0.1 | 0.1 | . |

SAN ANTONIO SITE: IH410 AT MILITARY HIGHWAY
LUNDGREN IMPACTOR UCD/AIR QUALITY GROUP ANALYSIS
NOMINAL FLOW RATE= 0.130 M**3/MIN
RUN DURING WEEK OF 9 28 77
APIEZON-L COATED STRIPS, DRUM: 1
WEIGHT (UG/CM**2)

| STATION | 3 |
|---|---|
| ELEMENT | |
| CA | 8.3 |
| FE | 2.3 |
| K | 1.1 |
| SI | 14.0 |
| TI | 0.2 |
| BR | 0.3 |
| MN | 0.1 |
| PB | 1.4 |
| ZN | 0.2 |

SAN ANTONIO SITE: IH410 AT MILITARY HIGHWAY
LUNDGREN IMPACTOR UCD/AIR QUALITY GROUP ANALYSIS
NOMINAL FLOW RATE= 0.130 M**3/MIN
RUN DURING WEEK OF 9 28 77
APIEZON-L COATED STRIPS, DRUM: 2

| | WEIGHT (UG/CM**2) |
|---|---|
| STATION | 3 |
| ELEMENT | |
| CA | 7.1 |
| FE | 0.6 |
| K | 0.3 |
| SI | 1.6 |
| TI | 0.3 |
| BR | 0.3 |
| CL | 1.0 |
| PB | 0.7 |
| V | 0.2 |

SAN ANTONIO SITE: IH410 AT MILITARY HIGHWAY
LUNDGREN IMPACTOR UCD/AIR QUALITY GROUP ANALYSIS
NOMINAL FLOW RATE= 0.130 M**3/MIN
RUN DURING WEEK OF 9 28 77
APIEZON-L COATED STRIPS, DRUM: 3

| | WEIGHT (UG/CM**2) |
|---|---|
| STATION | 3 |
| ELEMENT | |
| CA | 1.4 |
| FE | 0.3 |
| BR | 0.2 |
| CL | 0.4 |
| PB | 0.5 |

SAN ANTONIO SITE: IH410 AT MILITARY HIGHWAY
LUNDGREN IMPACTOR UCD/AIR QUALITY GROUP ANALYSIS
NOMINAL FLOW RATE= 0.130 M**3/MIN
RUN DURING WEEK OF 9 28 77
APIEZON-L COATED STRIPS, DRUM: 4
WEIGHT (UG/CM**2)

| STATION | 3 |
|---|---|
| ELEMENT | |
| CA | 0.7 |
| FE | 0.2 |
| SI | 0.2 |
| TI | 0.1 |
| BR | 0.1 |
| PB | 0.3 |
| S | 0.2 |
| ZN | 0.1 |

SAN ANTONIO SITE: IH410 AT MILITARY HIGHWAY
LUNDGREN IMPACTOR UCD/AIR QUALITY GROUP ANALYSIS
NOMINAL FLOW RATE= 0.130 M**3/MIN
RUN DURING WEEK OF 10 5 77
APIEZON-L COATED STRIPS, DRUM: 1
WEIGHT (UG/CM**2)

| STATION | 1 | 3 | 10 |
|---|---|---|---|
| ELEMENT | | | |
| CA | 12.8 | 22.7 | 7.3 |
| FE | 1.1 | 2.2 | 1.3 |
| K | 0.6 | 0.8 | 0.5 |
| SI | 5.3 | 10.2 | 1.8 |
| TI | 0.2 | 0.1 | . |
| CU | . | 0.3 | . |
| BR | . | 0.2 | . |
| CL | 0.5 | 0.3 | 0.4 |
| MN | 0.2 | . | . |
| NI | 0.1 | . | . |
| PB | 0.4 | 0.8 | 0.3 |
| V | . | . | 0.2 |
| ZN | . | 0.1 | 0.1 |

SAN ANTONIO SITE: IH410 AT MILITARY HIGHWAY
LUNDGREN IMPACTOR UCD/AIR QUALITY GROUP ANALYSIS
NOMINAL FLOW RATE= 0.130 M**3/MIN
RUN DURING WEEK OF 10 5 77
APIEZON-L COATED STRIPS, DRUM: 2

| | WEIGHT (UG/CM**2) | | |
|---|---|---|---|
| STATION | 1 | 3 | 10 |
| ELEMENT | | | |
| CA | . | 6.2 | 5.1 |
| FE | . | 0.5 | 0.6 |
| K | . | 0.3 | 0.3 |
| SI | . | 0.9 | 0.6 |
| CO | . | . | 0.7 |
| BR | . | 0.2 | . |
| CL | . | 0.7 | 0.6 |
| MN | . | . | 0.1 |
| PB | . | 0.5 | 0.3 |
| V | . | 0.2 | . |
| ZN | . | . | 0.1 |

SAN ANTONIO SITE: IH410 AT MILITARY HIGHWAY
LUNDGREN IMPACTOR UCD/AIR QUALITY GROUP ANALYSIS
NOMINAL FLOW RATE= 0.130 M**3/MIN
RUN DURING WEEK OF 10 5 77
APIEZON-L COATED STRIPS, DRUM: 3

| | WEIGHT (UG/CM**2) | | |
|---|---|---|---|
| STATION | 1 | 3 | 10 |
| ELEMENT | | | |
| CA | . | 1.0 | 0.8 |
| FE | . | 0.3 | 0.2 |
| K | . | 0.4 | 0.2 |
| SI | . | 0.1 | . |
| TI | . | . | 0.2 |
| BR | . | 0.1 | . |
| CL | . | 0.2 | 0.1 |
| PB | . | 0.3 | 0.2 |
| V | . | . | 0.1 |
| ZN | . | . | 0.1 |

SAN ANTONIO SITE: IH410 AT MILITARY HIGHWAY
LUNDGREN IMPACTOR UCD/AIR QUALITY GROUP ANALYSIS
NOMINAL FLOW RATE= 0.130 M**3/MIN
RUN DURING WEEK OF 10 5 77
APIEZON-L COATED STRIPS, DRUM: 4

| | | WEIGHT (UG/CM**2) | |
|---|---|---|---|
| STATION | 1 | 3 | 10 |
| ELEMENT | | | |
| CA | 0.6 | 0.7 | 0.7 |
| FE | 0.2 | 0.1 | 0.1 |
| K | . | . | 0.2 |
| SI | . | . | 0.3 |
| TI | . | 0.2 | . |
| BR | 0.1 | 0.1 | 0.1 |
| MN | 0.1 | . | . |
| PB | 0.2 | 0.5 | 0.2 |
| S | 1.5 | 2.7 | 1.0 |
| ZN | . | 0.1 | 0.1 |

SAN ANTONIO SITE: IH410 AT MILITARY HIGHWAY
LUNDGREN IMPACTOR UCD/AIR QUALITY GROUP ANALYSIS
NOMINAL FLOW RATE= 0.130 M**3/MIN
RUN DURING WEEK OF 10 18 77
APIEZON-L COATED STRIPS, DRUM: 1

| | | WEIGHT (UG/CM**2) | |
|---|---|---|---|
| STATION | 1 | 3 | 10 |
| ELEMENT | | | |
| CA | 7.7 | 18.6 | 6.2 |
| FE | 0.7 | 1.4 | 0.6 |
| K | 0.7 | 0.9 | 0.7 |
| SI | 4.0 | 8.0 | 2.7 |
| TI | 0.4 | 0.2 | . |
| CO | . | . | 1.6 |
| BR | . | 0.3 | . |
| MN | 0.2 | . | . |
| PB | 0.4 | 0.9 | 0.4 |
| ZN | . | 0.2 | . |

SAN ANTONIO SITE: IH410 AT MILITARY HIGHWAY
LUNDGREN IMPACTOR UCD/AIR QUALITY GROUP ANALYSIS
NOMINAL FLOW RATE= 0.130 M**3/MIN
RUN DURING WEEK OF 10 18 77
APIEZON-L COATED STRIPS, DRUM: 2
WEIGHT (UG/CM**2)

| STATION | 1 | 3 | 10 |
|---|---|---|---|
| ELEMENT | | | |
| CA | 8.0 | 6.2 | 4.0 |
| FE | 0.6 | 0.7 | 0.5 |
| K | 0.4 | 0.6 | 0.5 |
| SI | 1.6 | 1.7 | 1.1 |
| TI | 0.1 | 0.1 | 0.2 |
| CO | . | 0.3 | . |
| CU | . | . | 0.1 |
| BR | 0.2 | 0.2 | 0.1 |
| CL | 0.3 | 0.1 | 0.1 |
| MN | 0.1 | 0.1 | . |
| PB | 0.8 | 0.7 | 0.4 |
| V | . | 0.1 | 0.1 |

SAN ANTONIO SITE: IH410 AT MILITARY HIGHWAY
LUNDGREN IMPACTOR UCD/AIR QUALITY GROUP ANALYSIS
NOMINAL FLOW RATE= 0.130 M**3/MIN
RUN DURING WEEK OF 10 18 77
APIEZON-L COATED STRIPS, DRUM: 3
WEIGHT (UG/CM**2)

| STATION | 1 | 3 | 10 |
|---|---|---|---|
| ELEMENT | | | |
| CA | 1.3 | 1.4 | 0.6 |
| FE | 0.2 | 0.2 | 0.2 |
| K | 0.4 | 0.3 | 0.2 |
| SI | 0.2 | 0.2 | . |
| TI | 0.3 | . | . |
| CO | . | 0.5 | . |
| BR | 0.1 | 0.2 | 0.1 |
| CL | 0.1 | 0.1 | . |
| MN | . | 0.1 | . |
| NI | . | 0.1 | . |
| PB | 0.3 | 0.3 | 0.2 |
| S | . | . | 0.3 |

SAN ANTONIO SITE: IH410 AT MILITARY HIGHWAY

LUNDGREN IMPACTOR UCD/AIR QUALITY GROUP ANALYSIS

NOMINAL FLOW RATE= 0.130 M**3/MIN

RUN DURING WEEK OF 10 18 77

APIEZON-L COATED STRIPS, DRUM: 4

WEIGHT (UG/CM**2)

| STATION | 1 | 3 | 10 |
|---|---|---|---|
| ELEMENT | | | |
| CA | 0.6 | 0.6 | 0.9 |
| FE | 0.1 | 0.1 | 0.2 |
| K | 0.2 | 0.1 | 0.2 |
| SI | . | . | 0.2 |
| TI | . | . | 0.1 |
| CU | 0.1 | 0.1 | . |
| BR | 0.1 | 0.1 | 0.1 |
| CL | 0.3 | . | 0.1 |
| MN | . | 0.1 | 0.1 |
| PB | 0.3 | 0.4 | 0.2 |
| S | 0.4 | 0.4 | 0.1 |
| V | . | 0.2 | 0.1 |

EL PASO: IH10 AT LUNA STREET

LUNDGREN IMPACTOR UCD/AIR QUALITY GROUP ANALYSIS

NOMINAL FLOW RATE= 0.130 M**3/MIN

RUN DURING WEEK OF 12 1 77

APIEZON-L COATED STRIPS, DRUM: 1

WEIGHT (UG/CM**2)

| STATION | 1 | 3 | 5 |
|---|---|---|---|
| ELEMENT | | | |
| AL | . | 3.5 | 6.1 |
| CA | 18.8 | 19.1 | 15.9 |
| FE | 4.6 | 3.6 | 4.0 |
| K | 3.0 | 2.0 | 2.4 |
| SI | 42.5 | 26.3 | 30.0 |
| TI | 0.4 | 0.3 | 0.5 |
| BR | . | 0.2 | 0.1 |
| MN | 0.2 | 0.1 | 0.2 |
| PB | 0.6 | 0.8 | 0.8 |
| ZN | 0.1 | 0.2 | 0.2 |

EL PASO: IH10 AT LUNA STREET
LUNDGREN IMPACTOR UCD/AIR QUALITY GROUP ANALYSIS
NOMINAL FLOW RATE= 0.130 M**3/MIN
RUN DURING WEEK OF 12 1 77
APIEZON-L COATED STRIPS, DRUM: 2
WEIGHT (UG/CM**2)

| STATION | 1 | 3 | 5 |
|---|---|---|---|
| ELEMENT | | | |
| AL | 1.3 | 1.5 | 1.3 |
| CA | 7.2 | 9.5 | 6.3 |
| FE | 1.6 | 1.6 | 1.5 |
| K | 1.0 | 1.0 | 0.9 |
| SI | 8.4 | 7.5 | 6.8 |
| TI | 0.2 | 0.2 | 0.2 |
| BR | 0.1 | 0.1 | 0.1 |
| MN | 0.1 | 0.1 | 0.1 |
| NI | . | 0.1 | . |
| PB | 0.4 | 0.5 | 0.3 |
| ZN | . | 0.1 | 0.1 |

EL PASO: IH10 AT LUNA STREET
LUNDGREN IMPACTOR UCD/AIR QUALITY GROUP ANALYSIS
NOMINAL FLOW RATE= 0.130 M**3/MIN
RUN DURING WEEK OF 12 1 77
APIEZON-L COATED STRIPS, DRUM: 3
WEIGHT (UG/CM**2)

| STATION | 1 | 3 | 5 |
|---|---|---|---|
| ELEMENT | | | |
| AL | 0.1 | . | . |
| CA | 2.5 | 2.5 | 1.4 |
| FE | 0.6 | 0.6 | 0.4 |
| K | 0.3 | 0.2 | 0.2 |
| SI | 1.9 | 1.2 | . |
| TI | . | . | 0.1 |
| CO | 0.4 | . | . |
| BR | 0.1 | 0.1 | . |
| MN | 0.1 | . | 0.1 |
| PB | 0.4 | 0.4 | 0.3 |
| V | . | 0.1 | . |

EL PASO: IH10 AT LUNA STREET

LUNDGREN IMPACTOR UCD/AIR QUALITY GROUP ANALYSIS

NOMINAL FLOW RATE= 0.130 M**3/MIN

RUN DURING WEEK OF 12 1 77

APIEZON-L COATED STRIPS, DRUM: 4

| | | WEIGHT (UG/CM**2) | |
|---|---|---|---|
| STATION | 1 | 3 | 5 |
| ELEMENT | | | |
| CA | 1.0 | 0.9 | 1.3 |
| FE | 0.2 | 0.3 | 0.3 |
| K | 0.2 | 0.2 | 0.2 |
| SI | 0.4 | 0.3 | 0.7 |
| TI | 0.1 | 0.1 | . |
| CO | . | . | 0.4 |
| BR | 0.1 | 0.2 | 0.1 |
| CL | 0.1 | 0.1 | . |
| MN | 0.1 | . | 0.1 |
| PB | 0.3 | 0.5 | 0.3 |
| V | . | 0.1 | . |
| ZN | . | . | 0.1 |

EL PASO: IH10 AT LUNA STREET

LUNDGREN IMPACTOR UCD/AIR QUALITY GROUP ANALYSIS

NOMINAL FLOW RATE= 0.130 M**3/MIN

RUN DURING WEEK OF 12 2 77

APIEZON-L COATED STRIPS, DRUM: 1

| | | WEIGHT (UG/CM**2) | |
|---|---|---|---|
| STATION | 1 | 3 | 5 |
| ELEMENT | | | |
| CA | 1.6 | 12.7 | 1.8 |
| FE | 0.3 | 3.5 | 0.3 |
| K | . | 1.7 | . |
| SI | 0.2 | 18.9 | . |
| TI | . | 0.3 | . |
| CO | . | . | 3.4 |
| BR | . | 0.2 | . |
| CL | 0.3 | . | 0.3 |
| MN | . | 0.1 | . |
| PB | . | 1.4 | 0.2 |
| S | 0.1 | . | . |
| V | . | 0.1 | . |
| ZN | . | 0.3 | 0.1 |

EL PASO: IH10 AT LUNA STREET
LUNDGREN IMPACTOR UCD/AIR QUALITY GROUP ANALYSIS
NOMINAL FLOW RATE= 0.130 M**3/MIN
RUN DURING WEEK OF 12 2 77
APIEZON-L COATED STRIPS, DRUM: 2

| | | WEIGHT (UG/CM**2) | |
|---|---|---|---|
| STATION | 1 | 3 | 5 |
| ELEMENT | | | |
| AL | . | . | 0.8 |
| CA | 3.7 | 6.2 | 6.9 |
| FE | 1.0 | 1.6 | 1.5 |
| K | 0.7 | 0.8 | 1.0 |
| SI | 4.1 | 5.3 | 6.7 |
| TI | 0.3 | 0.2 | 0.2 |
| BR | . | 0.1 | 0.2 |
| CL | 0.1 | . | . |
| MN | 0.1 | 0.1 | 0.1 |
| PB | 0.2 | 0.8 | 0.6 |
| V | 0.2 | . | . |
| ZN | . | 0.1 | 0.1 |

EL PASO: IH10 AT LUNA STREET
LUNDGREN IMPACTOR UCD/AIR QUALITY GROUP ANALYSIS
NOMINAL FLOW RATE= 0.130 M**3/MIN
RUN DURING WEEK OF 12 2 77
APIEZON-L COATED STRIPS, DRUM: 3

| | | WEIGHT (UG/CM**2) | |
|---|---|---|---|
| STATION | 1 | 3 | 5 |
| ELEMENT | | | |
| CA | 1.4 | 2.0 | 0.8 |
| FE | 0.4 | 0.6 | 0.1 |
| K | 0.2 | 0.2 | 0.2 |
| SI | 0.6 | 0.7 | . |
| TI | 0.1 | . | . |
| CO | . | . | 0.6 |
| BR | . | 0.2 | 0.1 |
| MN | 0.1 | . | 0.1 |
| PB | 0.2 | 0.6 | 0.3 |
| S | . | . | 0.1 |
| ZN | 0.1 | . | . |

LUNDGREN AFTERFILTER TX. AIR CONTROL BOARD ANALYSIS

NOMINAL FLOW RATE= 0.1133 M**3/MIN

DATE= 6 1 77

START TIME= 0 P.M.

STOP TIME= 0 P.M.

NUMBER OF OBSERVATION STATIONS= 4

| | | WEIGHT(UG/M**3) | | |
|---|---|---|---|---|
| STATIONS | 2 | 4 | 6 | 7 |
| ELEMENT | | | | |
| TI | 0.1 | 0.0 | 0.0 | 0.1 |
| CA | 4.1 | 0.2 | 0.7 | 2.7 |
| K | 0.4 | 0.1 | 0.2 | 0.4 |
| CL | 1.8 | 0.6 | 0.9 | 0.7 |
| S | 2.3 | 0.0 | 2.2 | 2.0 |
| SI | 7.4 | 0.0 | 3.8 | 10.4 |
| ZN | 5.1 | 0.4 | 0.3 | 2.0 |
| CU | 0.1 | 0.0 | 0.0 | 0.0 |
| FE | 1.0 | 0.0 | 0.1 | 0.7 |
| ZR | 0.1 | 0.0 | 0.0 | 0.0 |
| SR | 0.1 | 0.0 | 0.0 | 0.1 |
| PB | 2.9 | 2.4 | 1.8 | 1.2 |
| BR | 1.7 | 1.2 | 0.9 | 0.5 |
| AL | 0.0 | 0.0 | 0.0 | 2.8 |
| RUN (HRS) | 10.00 | 10.00 | 10.00 | 10.00 |

DALLAS ELEVATED SITE: IH45 AT FOREST AVENUE

LUNDGREN AFTERFILTER UCD/AIR QUALITY GROUP ANALYSIS

NOMINAL FLOW RATE=

DATE= 6 1 77

WHATMAN 41 FILTER

| | | WEIGHT(UG/M**3) | | |
|---|---|---|---|---|
| STATION | 2 | 4 | 6 | 7 |
| ELEMENT | | | | |
| CA | 4.3 | 1.4 | 1.6 | 2.8 |
| FE | 1.3 | 0.5 | . | 0.9 |
| CO | . | . | . | 4.5 |
| CL | 0.2 | 0.2 | 0.2 | . |
| NI | . | 0.1 | 0.1 | 0.1 |
| ZN | 5.5 | 0.6 | 0.5 | 2.5 |
| RUN TIME(HRS) | 10.00 | 10.00 | 10.00 | 10.00 |

DALLAS: IH 45 AT FOREST AV.

LUNDGREN AFTERFILTER TX. AIR CONTROL BOARD ANALYSIS

NOMINAL FLOW RATE= 0.1133 M**3/MIN

DATE= 6 7 77

START TIME= 0 P.M.

STOP TIME= 0 P.M.

NUMBER OF OBSERVATION STATIONS= 4

WEIGHT(UG/M**3)

| STATIONS | 2 | 4 | 6 | 7 |
|---|---|---|---|---|
| ELEMENT | | | | |
| CA | 11.6 | 0.3 | 1.9 | 2.1 |
| K | 0.8 | 0.2 | 0.3 | 0.3 |
| CL | 0.6 | 0.8 | 0.5 | 0.4 |
| S | 3.7 | 3.2 | 2.8 | 2.4 |
| SI | 37.8 | 1.6 | 8.0 | 5.8 |
| ZN | 18.2 | 0.2 | 2.5 | 3.0 |
| CU | 0.1 | 0.0 | 0.0 | 0.1 |
| FE | 2.0 | 0.0 | 0.2 | 0.4 |
| PB | 3.4 | 2.2 | 1.7 | 1.6 |
| BR | 1.9 | 1.4 | 1.0 | 0.7 |
| NI | 0.0 | 0.1 | 0.0 | 0.0 |
| RUN (HRS) | 10.00 | 10.00 | 10.00 | 10.00 |

DALLAS ELEVATED SITE: IH45 AT FOREST AVENUE

LUNDGREN AFTERFILTER UCD/AIR QUALITY GROUP ANALYSIS

NOMINAL FLOW RATE=

DATE= 6 7 77

WHATMAN 41 FILTER

WEIGHT(UG/M**3)

| STATION | 2 | 4 | 6 | 7 |
|---|---|---|---|---|
| ELEMENT | | | | |
| CA | 7.5 | 0.8 | 2.9 | 2.5 |
| FE | 1.9 | 0.5 | 0.6 | 0.7 |
| K | 0.9 | . | 0.6 | 0.8 |
| SI | 9.4 | . | 0.2 | 0.3 |
| TI | 1.0 | . | . | 1.3 |
| BR | 2.7 | 1.5 | 1.3 | 0.9 |
| MN | . | . | 0.3 | . |
| NI | 0.1 | 0.2 | . | 0.1 |
| PB | 6.3 | 3.7 | 3.0 | 2.1 |
| ZN | 18.0 | 0.3 | 3.7 | 3.3 |
| RUN TIME(HRS) | 12.00 | 12.00 | 12.00 | 12.00 |

DALLAS AT GRADE SITE: IH30 AT MOTLEY DRIVE

LUNDGREN AFTERFILTER UCD/AIR QUALITY GROUP ANALYSIS

NOMINAL FLOW RATE=

DATE= 7 22 77

NUCLEPORE FILTER, PORE SIZE= 0.4 UM

| | WEIGHT(UG/M**3) | | | |
|---|---|---|---|---|
| STATION | 1 | 3 | 6 | 10 |
| ELEMENT | | | | |
| AL | . | 0.1 | . | . |
| CA | 0.4 | 0.4 | 0.3 | 1.6 |
| FE | 0.1 | 0.1 | 0.1 | 0.1 |
| K | 0.1 | . | . | 0.5 |
| SI | 1.2 | 2.4 | 1.5 | 8.1 |
| BR | 0.2 | 0.8 | 0.3 | 0.2 |
| CL | 0.1 | 0.3 | 0.2 | 0.7 |
| NI | . | . | . | 0.1 |
| PB | 0.4 | 1.6 | 0.7 | 0.3 |
| S | 0.1 | . | . | . |
| ZN | 1.0 | 0.6 | 0.5 | 3.4 |
| RUN TIME(HRS) | 2.00 | 2.00 | 2.00 | 2.00 |

DALLAS: IH30 AT MOTLEY DR.

LUNDGREN AFTERFILTER TX. AIR CONTROL BOARD ANALYSIS

NOMINAL FLOW RATE= 0.1133 M**3/MIN

DATE= 7 22 77

START TIME= 7 A.M.

STOP TIME= 6 P.M.

NUMBER OF OBSERVATION STATIONS= 4

| | WEIGHT(UG/M**3) | | | |
|---|---|---|---|---|
| STATIONS | 1 | 3 | 6 | 10 |
| ELEMENT | | | | |
| CA | 2.4 | 1.7 | 0.6 | 3.1 |
| K | 0.0 | 0.2 | 0.0 | 0.4 |
| CL | 0.0 | 0.9 | 0.0 | 0.0 |
| S | 0.5 | 2.2 | 0.9 | 0.6 |
| SI | 15.2 | 11.8 | 5.2 | 19.1 |
| ZN | 3.0 | 1.5 | 1.0 | 3.9 |
| FE | 0.2 | 0.2 | 0.0 | 0.3 |
| PB | 0.0 | 0.6 | 0.0 | 0.0 |
| BR | 0.0 | 0.4 | 0.2 | 0.0 |
| RUN (HRS) | 2.00 | 2.00 | 2.00 | 2.00 |

DALLAS: IH30 AT MOTLEY DR.
LUNDGREN AFTERFILTER TX. AIR CONTROL BOARD ANALYSIS
NOMINAL FLOW RATE= 0.1133 M**3/MIN
DATE= 8 3 77
START TIME= 7 A.M.
STOP TIME= 7 A.M.
NUMBER OF OBSERVATION STATIONS= 12

WEIGHT(UG/M**3)

| STATIONS | 1 | 1 | 3 | 3 | 3 | 3 | 6 | 6 | 6 | 10 | 10 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ELEMENT | | | | | | | | | | | | |
| CA | 0.0 | 0.0 | 0.2 | 0.7 | 0.0 | 0.0 | 0.3 | 0.0 | 0.0 | 0.2 | 0.4 | 0.0 |
| K | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| S | 0.4 | 0.9 | 2.2 | 0.9 | 0.8 | 1.4 | 0.3 | 1.0 | 1.2 | 1.2 | 1.2 | 1.0 |
| ZN | 0.0 | 0.0 | 0.4 | 1.1 | 0.0 | 0.1 | 0.5 | 0.1 | 0.1 | 0.2 | 0.4 | 0.1 |
| PB | 0.0 | 0.0 | 0.3 | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| BR | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| RUN (HRS) | 7.00 | 3.50 | 2.00 | 3.50 | 3.50 | 2.00 | 3.00 | 3.50 | 3.50 | 3.00 | 3.50 | 3.50 |

DALLAS AT GRADE SITE: IH30 AT MOTLEY DRIVE
LUNDGREN AFTERFILTER UCD/AIR QUALITY GROUP ANALYSIS
NOMINAL FLOW RATE=
DATE= 8 3 77
NUCLEPORE FILTER, PORE SIZE= 0.4 UM

WEIGHT(UG/M**3)

| STATION | 1 | 1 | 3 | 3 | 3 | 3 | 6 | 6 | 6 | 10 | 10 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ELEMENT | | | | | | | | | | | | |
| CA | . | . | 0.5 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.4 | 0.1 |
| FE | . | . | 0.1 | . | . | . | 0.1 | . | . | . | . | . |
| K | 0.1 | . | 0.1 | . | . | 0.1 | . | . | . | . | . | . |
| SI | 0.1 | . | 3.1 | 0.5 | 0.1 | 0.1 | 0.3 | 0.2 | 0.4 | 0.3 | 1.6 | 0.1 |
| TI | . | 0.1 | . | . | . | . | . | . | . | . | . | . |
| BR | . | . | 0.5 | 0.3 | 0.3 | 0.2 | 0.1 | 0.1 | 0.2 | 0.1 | 0.1 | 0.1 |
| CL | . | . | . | . | . | . | 0.1 | . | 0.1 | . | . | 0.1 |
| PB | 0.1 | 0.1 | 1.0 | 0.8 | 0.8 | 0.5 | 0.3 | 0.4 | 0.4 | 0.4 | 0.2 | 0.3 |
| S | 0.8 | . | 0.2 | 0.5 | 0.5 | 0.3 | 0.1 | 0.8 | 0.7 | 0.4 | 0.5 | 0.4 |
| ZN | 0.1 | . | 1.0 | 0.1 | 0.1 | 0.1 | 0.3 | 0.1 | 0.1 | 0.2 | 0.5 | 0.1 |
| RUN TIME(HRS) | 7.00 | 3.50 | 2.00 | 3.50 | 3.50 | 2.00 | 3.00 | 3.50 | 3.50 | 3.00 | 3.50 | 3.50 |

DALLAS: IH30 AT MOTLEY DR.

LUNDGREN AFTERFILTER TX. AIR CONTROL BOARD ANALYSIS

NOMINAL FLOW RATE= 0.1133 M**3/MIN

DATE= 8 4 77

START TIME= 7 A.M.

STOP TIME= 6 P.M.

NUMBER OF OBSERVATION STATIONS= 4

| | | WEIGHT(UG/M**3) | | |
|---|---|---|---|---|
| STATIONS | 3 | 3 | 3 | 3 |
| ELEMENT | | | | |
| CA | 0.4 | 1.3 | 0.2 | 0.8 |
| S | 1.3 | 2.7 | 1.0 | 2.5 |
| SI | 2.6 | 8.9 | 0.0 | 7.8 |
| ZN | 0.9 | 2.5 | 0.1 | 0.0 |
| PB | 0.5 | 0.2 | 0.0 | 0.0 |
| BR | 0.3 | 0.1 | 0.0 | 0.0 |
| RUN (HRS) | 2.50 | 2.50 | 3.75 | 1.00 |

DALLAS AT GRADE SITE: IH30 AT MOTLEY DRIVE

LUNDGREN AFTERFILTER UCD/AIR QUALITY GROUP ANALYSIS

NOMINAL FLOW RATE=

DATE= 8 4 77

NUCLEPORE FILTER, PORE SIZE= 0.4 UM

| | | WEIGHT(UG/M**3) | | |
|---|---|---|---|---|
| STATION | 3 | 3 | 3 | 3 |
| ELEMENT | | | | |
| AL | . | 0.1 | . | . |
| CA | 0.2 | 0.3 | 0.7 | 0.1 |
| FE | . | . | 0.1 | . |
| K | . | 0.1 | 0.1 | 0.1 |
| SI | 1.0 | 1.5 | 4.7 | . |
| CO | . | . | . | 0.1 |
| BR | 0.6 | 0.2 | 0.4 | 0.3 |
| PB | 1.3 | 0.6 | 1.1 | 0.7 |
| S | 0.3 | 0.3 | 1.1 | 0.4 |
| ZN | 0.3 | 0.6 | 1.9 | 0.1 |
| RUN TIME(HRS) | 2.50 | 2.50 | 3.75 | 1.00 |

DALLAS: IH30 AT MOTLEY DR.

LUNDGREN AFTERFILTER TX. AIR CONTROL BOARD ANALYSIS

NOMINAL FLOW RATE= 0.1133 M**3/MIN

DATE= 8 10 77

START TIME= 7 A.M.

STOP TIME= 6 P.M.

NUMBER OF OBSERVATION STATIONS= 8

WEIGHT(UG/M**3)

| STATIONS | 1 | 1 | 3 | 3 | 6 | 6 | 10 | 10 |
|---|---|---|---|---|---|---|---|---|
| ELEMENT | | | | | | | | |
| CA | 0.4 | 0.1 | 0.2 | 0.0 | 0.1 | 0.1 | 0.1 | 0.0 |
| CL | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| S | 0.0 | 0.2 | 0.7 | 0.5 | 0.4 | 0.3 | 0.1 | 0.1 |
| SI | 1.1 | 0.8 | 1.3 | 0.0 | 1.5 | 0.4 | 1.1 | 0.0 |
| ZN | 0.4 | 0.1 | 0.2 | 0.0 | 0.2 | 0.1 | 0.2 | 0.0 |
| FE | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 |
| PB | 0.0 | 0.0 | 0.3 | 0.3 | 0.1 | 0.0 | 0.0 | 0.0 |
| BR | 0.0 | 0.0 | 0.2 | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 |
| RUN (HRS) | 5.00 | 5.50 | 4.50 | 5.50 | 5.00 | 5.50 | 6.00 | 5.50 |

DALLAS AT GRADE SITE: IH30 AT MOTLEY DRIVE

LUNDGREN AFTERFILTER UCD/AIR QUALITY GROUP ANALYSIS

NOMINAL FLOW RATE=

DATE= 8 10 77

NUCLEPORE FILTER, PORE SIZE= 0.4 UM

WEIGHT(UG/M**3)

| STATION | 1 | 1 | 3 | 3 | 6 | 6 | 10 | 10 |
|---|---|---|---|---|---|---|---|---|
| ELEMENT | | | | | | | | |
| CA | 0.4 | 0.2 | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 | 0.1 |
| K | . | . | . | . | . | 0.5 | . | 0.1 |
| SI | 1.6 | 1.3 | 0.7 | 0.3 | 0.5 | 0.1 | 0.5 | 0.1 |
| CO | . | . | . | 0.1 | 0.1 | . | . | . |
| BR | . | . | 0.6 | 0.7 | 0.2 | 0.3 | 0.1 | 0.2 |
| CL | . | . | 0.1 | 0.3 | 0.1 | 0.1 | . | 0.1 |
| PB | 0.1 | 0.1 | 1.2 | 1.5 | 0.5 | 0.7 | 0.4 | 0.4 |
| S | 0.1 | 0.2 | . | . | 0.1 | . | . | 0.1 |
| ZN | 0.6 | 0.3 | 0.2 | 0.1 | 0.1 | 0.1 | 0.3 | 0.1 |
| RUN TIME(HRS) | 5.00 | 5.50 | 4.50 | 5.50 | 5.00 | 5.50 | 6.00 | 5.50 |

DALLAS: IH30 AT MOTLEY DR.
LUNDGREN AFTERFILTER TX. AIR CONTROL BOARD ANALYSIS
NOMINAL FLOW RATE= 0.1133 M**3/MIN
DATE= 8 11 77
START TIME= 7 A.M.
STOP TIME= 6 P.M.
NUMBER OF OBSERVATION STATIONS= 8

WEIGHT(UG/M**3)

| STATIONS | 1 | 1 | 3 | 3 | 6 | 6 | 10 | 10 |
|---|---|---|---|---|---|---|---|---|
| ELEMENT | | | | | | | | |
| CA | 0.0 | 0.2 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 |
| S | 0.5 | 0.4 | 0.7 | 0.8 | 0.5 | 0.3 | 0.5 | 0.5 |
| SI | 0.0 | 0.7 | 0.0 | 0.0 | 0.0 | 0.7 | 0.0 | 0.0 |
| ZN | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.2 | 0.0 | 0.0 |
| PB | 0.0 | 0.0 | 0.3 | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 |
| BR | 0.0 | 0.0 | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 |
| RUN (HRS) | 5.50 | 5.50 | 4.50 | 6.00 | 4.25 | 4.50 | 4.50 | 5.75 |

DALLAS AT GRADE SITE: IH30 AT MOTLEY DRIVE
LUNDGREN AFTERFILTER UCD/AIR QUALITY GROUP ANALYSIS
NOMINAL FLOW RATE=
DATE= 8 11 77
NUCLEPORE FILTER, PORE SIZE= 0.4 UM

WEIGHT(UG/M**3)

| STATION | 1 | 1 | 3 | 3 | 6 | 6 | 10 | 10 |
|---|---|---|---|---|---|---|---|---|
| ELEMENT | | | | | | | | |
| CA | 0.1 | 0.2 | . | 0.1 | . | 0.1 | 0.1 | 0.1 |
| K | 0.1 | 0.1 | . | . | . | . | . | . |
| SI | 0.3 | 0.6 | 0.1 | 0.3 | . | 0.3 | 0.2 | 0.2 |
| BR | 0.1 | . | 0.9 | 0.5 | 0.3 | 0.1 | 0.2 | 0.1 |
| CL | 0.1 | . | . | . | 0.2 | 0.1 | 0.1 | . |
| PB | 0.3 | 0.2 | 1.8 | 1.5 | 0.7 | 0.3 | 0.6 | 0.4 |
| S | 0.7 | 0.5 | 0.4 | 0.5 | . | 0.2 | 0.3 | 0.5 |
| ZN | 0.1 | 0.2 | 0.1 | 0.1 | . | 0.1 | 0.1 | 0.1 |
| RUN TIME(HRS) | 5.50 | 5.50 | 4.50 | 6.50 | 4.25 | 5.50 | 4.50 | 5.75 |

SAN ANTONIO:LOOP 410 AT MILITARY HWY
LUNDGREN AFTERFILTER TX. AIR CONTROL BOARD ANALYSIS
NOMINAL FLOW RATE= 0.1133 M**3/MIN
DATE= 10 5 77
START TIME= 7 A.M.
STOP TIME= 6 P.M.
NUMBER OF OBSERVATION STATIONS= 8

WEIGHT(UG/M**3)

| STATIONS | 1 | 1 | 1 | 3 | 3 | 10 | 10 | 10 |
|---|---|---|---|---|---|---|---|---|
| ELEMENT | | | | | | | | |
| CA | 41.9 | 2.2 | 0.7 | 55.0 | 2.9 | 5.5 | 0.0 | 0.5 |
| K | 2.2 | 0.3 | 0.0 | 3.2 | 0.0 | 0.5 | 0.0 | 0.0 |
| CL | 0.0 | 0.0 | 0.0 | 1.0 | 0.9 | 0.0 | 2.6 | 0.5 |
| S | 7.0 | 3.2 | 2.9 | 5.2 | 1.9 | 1.0 | 0.0 | 3.4 |
| SI | 130.0 | 9.1 | 3.9 | 181.1 | 4.8 | 22.5 | 0.0 | 0.0 |
| ZN | 19.2 | 1.3 | 0.3 | 56.1 | 1.7 | 5.6 | 0.0 | 0.0 |
| FE | 3.6 | 0.0 | 0.0 | 3.9 | 0.3 | 0.0 | 0.0 | 0.0 |
| PB | 2.1 | 0.0 | 0.0 | 0.0 | 1.9 | 0.0 | 0.0 | 0.0 |
| BR | 1.5 | 0.0 | 0.0 | 0.0 | 1.3 | 0.0 | 0.0 | 0.0 |
| RUN (HRS) | 2.00 | 4.50 | 4.00 | 2.00 | 4.00 | 3.00 | 3.70 | 4.00 |

SAN ANTONIO SITE: IH410 AT MILITARY HIGHWAY
LUNDGREN AFTERFILTER UCD/AIR QUALITY GROUP ANALYSIS
NOMINAL FLOW RATE=
DATE= 10 5 77
NUCLEPORE FILTER, PORE SIZE= 0.4 UM

WEIGHT(UG/M**3)

| STATION | 1 | 1 | 1 | 3 | 3 | 10 | 10 | 10 |
|---|---|---|---|---|---|---|---|---|
| ELEMENT | | | | | | | | |
| CA | 3.2 | 1.5 | 1.1 | 8.8 | 1.9 | 2.3 | 1.8 | 1.2 |
| FE | 0.6 | 0.5 | . | 1.2 | 0.7 | 0.6 | . | 0.6 |
| K | 0.4 | . | 0.6 | 0.8 | 0.7 | . | . | 0.4 |
| SI | 1.0 | . | . | 7.8 | . | . | . | . |
| TI | . | . | . | 0.4 | 1.3 | . | . | . |
| CO | . | 4.3 | . | . | . | . | . | 5.5 |
| BR | 0.3 | . | . | . | 0.5 | . | 0.3 | 0.4 |
| CL | . | . | . | . | 0.2 | 0.1 | 0.2 | 0.2 |
| NI | 0.2 | . | . | 0.2 | 0.2 | . | 0.1 | 0.2 |
| PB | 0.9 | 0.4 | . | 0.9 | 1.5 | . | 0.7 | 0.9 |
| V | . | . | . | 0.5 | . | . | 1.5 | . |
| ZN | 2.1 | 0.7 | 0.3 | 14.1 | 0.9 | 2.0 | . | . |
| RUN TIME(HRS) | 2.00 | 4.50 | 4.00 | 2.00 | 4.00 | 4.50 | 3.00 | 3.75 |

SAN ANTONIO:LOOP 410 AT MILITARY HWY
LUNDGREN AFTERFILTER TX. AIR CONTROL BOARD ANALYSIS
NOMINAL FLOW RATE= 0.1133 M**3/MIN
DATE= 10 6 77
START TIME= 7 A.M.
STOP TIME= 6 P.M.
NUMBER OF OBSERVATION STATIONS= 7

WEIGHT(UG/M**3)

| STATIONS | 1 | 1 | 3 | 3 | 3 | 10 | 10 |
|---|---|---|---|---|---|---|---|
| ELEMENT | | | | | | | |
| CA | 0.0 | 0.0 | 1.1 | 0.3 | 0.0 | 3.5 | 0.4 |
| K | 0.0 | 0.0 | 0.0 | 0.3 | 0.0 | 0.2 | 0.0 |
| CL | 0.0 | 0.0 | 1.6 | 0.7 | 0.0 | 0.0 | 0.0 |
| S | 3.2 | 2.4 | 5.8 | 1.9 | 0.0 | 0.8 | 2.0 |
| SI | 2.9 | 0.9 | 5.6 | 1.2 | 0.0 | 19.3 | 0.0 |
| ZN | 0.2 | 0.1 | 0.7 | 0.2 | 0.2 | 3.2 | 0.2 |
| FE | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.5 | 0.0 |
| PB | 1.0 | 0.0 | 5.1 | 1.6 | 1.1 | 0.0 | 0.0 |
| BR | 0.7 | 0.0 | 2.5 | 0.8 | 0.9 | 0.0 | 0.0 |
| RUN (HRS) | 3.00 | 8.50 | 2.50 | 6.00 | 2.75 | 8.00 | 3.00 |

SAN ANTONIO SITE: IH410 AT MILITARY HIGHWAY
LUNDGREN AFTERFILTER UCD/AIR QUALITY GROUP ANALYSIS
NOMINAL FLOW RATE=
DATE= 10 6 77
NUCLEPORE FILTER, PORE SIZE= 0.4 UM

WEIGHT(UG/M**3)

| STATION | 1 | 1 | 3 | 3 | 3 | 10 | 10 |
|---|---|---|---|---|---|---|---|
| ELEMENT | | | | | | | |
| CA | 0.6 | . | . | . | . | 2.8 | . |
| K | . | 0.9 | . | 1.1 | . | . | 0.9 |
| SI | . | . | . | . | . | 2.1 | . |
| CO | . | . | . | 4.6 | 4.7 | . | 5.8 |
| BR | 0.2 | 0.3 | 0.8 | 0.7 | 0.4 | 0.4 | 0.2 |
| CL | . | . | 0.2 | 0.2 | . | . | 0.2 |
| NI | . | 0.3 | . | . | . | 0.3 | . |
| PB | 0.8 | 0.5 | 1.7 | 1.4 | 0.9 | 0.7 | . |
| S | . | 0.3 | . | . | . | . | . |
| V | 1.5 | . | . | . | . | . | . |
| ZN | 0.2 | . | 0.3 | 0.2 | 0.2 | 2.8 | 0.2 |
| RUN TIME(HRS) | 3.00 | 8.50 | 2.50 | 6.00 | 2.75 | 8.00 | 3.00 |

SAN ANTONIO:LOOP 410 AT MILITARY HWY
LUNDGREN AFTERFILTER TX. AIR CONTROL BOARD ANALYSIS
NOMINAL FLOW RATE= 0.1133 M**3/MIN
DATE= 10 18 77
START TIME= 7 A.M.
STOP TIME= 6 P.M.
NUMBER OF OBSERVATION STATIONS= 7

WEIGHT(UG/M**3)

| STATIONS | 1 | 1 | 3 | 3 | 3 | 10 | 10 |
|---|---|---|---|---|---|---|---|
| ELEMENT | | | | | | | |
| CA | 3.2 | 3.4 | 2.2 | 0.9 | 0.8 | 0.0 | 0.2 |
| K | 0.0 | 0.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| CL | 1.4 | 0.0 | 0.0 | 0.4 | 0.0 | 0.0 | 0.0 |
| S | 4.5 | 4.0 | 1.5 | 4.1 | 6.8 | 0.0 | 3.2 |
| SI | 21.4 | 16.7 | 10.7 | 3.9 | 3.3 | 2.8 | 1.4 |
| ZN | 4.6 | 3.2 | 1.5 | 0.7 | 0.3 | 0.3 | 0.1 |
| FE | 0.3 | 0.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| PB | 2.4 | 0.0 | 0.0 | 2.6 | 3.1 | 0.0 | 0.7 |
| BR | 1.3 | 0.0 | 0.0 | 1.5 | 1.7 | 0.0 | 0.5 |
| CU | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 |
| RUN (HRS) | 5.50 | 4.50 | 2.00 | 5.00 | 3.50 | 4.00 | 7.00 |

SAN ANTONIO SITE: IH410 AT MILITARY HIGHWAY
LUNDGREN AFTERFILTER UCD/AIR QUALITY GROUP ANALYSIS
NOMINAL FLOW RATE=
DATE= 10 18 77
NUCLEPORE FILTER, PORE SIZE= 0.4 UM

WEIGHT(UG/M**3)

| STATION | 1 | 1 | 3 | 3 | 3 | 10 | 10 |
|---|---|---|---|---|---|---|---|
| ELEMENT | | | | | | | |
| CA | 0.8 | 0.7 | 0.4 | 0.2 | 0.1 | 0.3 | 0.2 |
| FE | 0.1 | 0.1 | 0.1 | . | . | 0.1 | . |
| K | 0.1 | 0.1 | 0.1 | . | 0.1 | 0.1 | 0.1 |
| SI | 2.3 | 2.9 | 0.9 | 1.1 | 0.1 | 0.2 | 0.2 |
| BR | 0.9 | 0.1 | 0.1 | 0.9 | 0.7 | . | . |
| CL | 0.4 | . | . | 0.4 | . | . | . |
| PB | 1.9 | 0.2 | 0.3 | 2.0 | 1.6 | . | 1.0 |
| S | . | 0.6 | . | 0.2 | 0.3 | . | 0.6 |
| ZN | 1.9 | 1.2 | 0.5 | 0.4 | 0.1 | 0.2 | 0.4 |
| RUN TIME(HRS) | 5.50 | 4.50 | 2.00 | 5.00 | 3.50 | 4.00 | 7.00 |

SAN ANTONIO:LOOP 410 AT MILITARY HWY
LUNDGREN AFTERFILTER TX. AIR CONTROL BOARD ANALYSIS
NOMINAL FLOW RATE= 0.1133 M**3/MIN
DATE= 10 19 77
START TIME= 7 A.M.
STOP TIME= 6 P.M.
NUMBER OF OBSERVATION STATIONS= 7

WEIGHT(UG/M**3)

| STATIONS | 1 | 1 | 3 | 3 | 3 | 10 | 10 |
|---|---|---|---|---|---|---|---|
| ELEMENT | | | | | | | |
| CA | 3.6 | 0.0 | 2.8 | 3.5 | 4.6 | 0.6 | 0.3 |
| K | 0.4 | 0.0 | 0.0 | 0.6 | 0.5 | 0.0 | 0.2 |
| CL | 0.8 | 0.0 | 0.0 | 0.8 | 0.6 | 0.0 | 0.0 |
| S | 3.9 | 3.8 | 2.4 | 4.4 | 4.8 | 2.0 | 0.0 |
| SI | 6.9 | 0.0 | 7.8 | 6.6 | 7.4 | 2.9 | 0.0 |
| ZN | 1.6 | 0.2 | 0.0 | 0.1 | 0.3 | 0.4 | 0.0 |
| CU | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 |
| FE | 0.4 | 0.0 | 0.4 | 0.3 | 0.6 | 0.0 | 0.0 |
| PB | 3.1 | 0.0 | 0.0 | 2.8 | 3.1 | 0.8 | 0.0 |
| BR | 1.8 | 0.0 | 0.0 | 0.1 | 0.1 | 0.0 | 0.0 |
| AS | 0.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| TI | 0.1 | 0.0 | 0.0 | 0.1 | 0.1 | 0.0 | 0.0 |
| RUN (HRS) | 6.00 | 4.50 | 2.25 | 4.00 | 4.50 | 3.50 | 7.25 |

SAN ANTONIO SITE: IH410 AT MILITARY HIGHWAY
LUNDGREN AFTERFILTER UCD/AIR QUALITY GROUP ANALYSIS
NOMINAL FLOW RATE=
DATE= 10 19 77
NUCLEPORE FILTER, PORE SIZE= 0.4 UM

WEIGHT(UG/M**3)

| STATION | 1 | 1 | 3 | 3 | 3 | 10 | 10 |
|---|---|---|---|---|---|---|---|
| ELEMENT | | | | | | | |
| AL | . | . | . | . | . | 0.1 | . |
| CA | 0.3 | 0.1 | 0.1 | 0.2 | 0.2 | 0.3 | 0.2 |
| FE | . | . | . | . | . | 0.1 | . |
| K | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| SI | 1.1 | 0.1 | . | 0.1 | 0.3 | 0.7 | 0.1 |
| CO | . | 0.1 | . | . | . | . | . |
| BR | 1.2 | 0.1 | 0.2 | 0.9 | 0.9 | 0.3 | 0.4 |
| CL | . | . | 0.2 | 0.3 | . | . | . |
| PB | 2.7 | 0.2 | 0.4 | 1.9 | 2.1 | 0.8 | 1.0 |
| S | 0.8 | 0.4 | 0.1 | 0.1 | 0.5 | 0.2 | 0.4 |
| ZN | 0.4 | 0.1 | . | . | 0.1 | 0.1 | 0.1 |
| RUN TIME(HRS) | 6.00 | 4.50 | 2.00 | 4.00 | 4.50 | 3.50 | 7.00 |

DALLAS AT GRADE SITE: IH30 AT MOTLEY DRIVE

HIGH VOLUME CASCADE IMPACTOR UCD/AIR QUALITY GROUP ANALYSIS

NOMINAL FLOW RATE= 1.133 M**3/MIN

DATE= 7 20 77

START TIME= 7 A.M.

STOP TIME= 9 A.M.

WHATMAN 41 FILTERS, STATION: 3

| | | | WEIGHT (UG/CM**2) | | |
|---|---|---|---|---|---|
| STAGE | 1 | 2 | 3 | 4 | 5 |
| ELEMENT | | | | | |
| SI | . | . | 0.4 | . | . |
| CL | . | . | 0.5 | . | . |
| RUN TIME(HRS) | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |

DALLAS AT GRADE SITE: IH30 AT MOTLEY DRIVE

HIGH VOLUME CASCADE IMPACTOR UCD/AIR QUALITY GROUP ANALYSIS

NOMINAL FLOW RATE= 1.133 M**3/MIN

DATE= 7 22 77

START TIME= 7 A.M.

STOP TIME= 9 A.M.

WHATMAN 41 FILTERS, STATION: 1

| | | | WEIGHT (UG/CM**2) | | |
|---|---|---|---|---|---|
| STAGE | 1 | 2 | 3 | 4 | 5 |
| ELEMENT | | | | | |
| CA | 0.2 | 0.3 | 0.3 | . | . |
| SI | . | . | 0.5 | . | 0.4 |
| P | 0.3 | . | . | . | 0.2 |
| BR | . | . | 0.1 | . | . |
| CL | . | . | . | . | 0.4 |
| PB | . | . | . | . | 0.4 |
| S | . | . | . | . | 0.5 |
| RUN TIME(HRS) | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |

DALLAS AT GRADE SITE: IH30 AT MOTLEY DRIVE
HIGH VOLUME CASCADE IMPACTOR UCD/AIR QUALITY GROUP ANALYSIS
NOMINAL FLOW RATE= 1.133 M**3/MIN
DATE= 7 22 77
START TIME= 7 A.M.
STOP TIME= 9 A.M.
WHATMAN 41 FILTERS, STATION: 3

| | WEIGHT (UG/CM**2) | | | | |
|---|---|---|---|---|---|
| STAGE | 1 | 2 | 3 | 4 | 5 |
| ELEMENT | | | | | |
| CA | 0.2 | 0.3 | 0.2 | 0.3 | . |
| FE | 0.2 | 0.1 | . | 0.2 | . |
| SI | . | 0.3 | . | 0.5 | 0.4 |
| P | . | 0.4 | 0.2 | 0.1 | . |
| BR | . | 0.2 | 0.2 | 0.6 | 0.4 |
| CL | . | 0.4 | . | . | . |
| PB | . | 0.5 | 0.5 | 1.5 | 1.1 |
| S | . | . | . | . | 0.7 |
| RUN TIME(HRS) | 1.75 | 1.75 | 1.75 | 1.75 | 1.75 |

DALLAS AT GRADE SITE: IH30 AT MOTLEY DRIVE
HIGH VOLUME CASCADE IMPACTOR UCD/AIR QUALITY GROUP ANALYSIS
NOMINAL FLOW RATE= 1.133 M**3/MIN
DATE= 8 3 77
START TIME= 7 A.M.
STOP TIME= 6 P.M.
WHATMAN 41 FILTERS, STATION: 1

| | WEIGHT (UG/CM**2) | | | | |
|---|---|---|---|---|---|
| STAGE | 1 | 2 | 3 | 4 | 5 |
| ELEMENT | | | | | |
| AL | . | 0.2 | . | . | . |
| CA | 0.3 | 1.2 | 0.7 | 0.5 | 0.3 |
| FE | . | 0.4 | 0.3 | 0.4 | 0.3 |
| SI | 0.6 | 1.3 | 1.0 | 1.0 | 0.4 |
| BR | . | . | 0.2 | 0.2 | 0.2 |
| PB | . | 0.3 | 0.3 | 0.3 | 0.6 |
| S | . | . | 0.2 | 1.2 | 6.4 |
| ZN | . | . | . | . | 0.1 |
| RUN TIME(HRS) | 11.00 | 11.00 | 11.00 | 11.00 | 11.00 |

DALLAS AT GRADE SITE: IH30 AT MOTLEY DRIVE
HIGH VOLUME CASCADE IMPACTOR UCD/AIR QUALITY GROUP ANALYSIS
NOMINAL FLOW RATE= 1.133 M**3/MIN
DATE= 8 3 77
START TIME= 7 A.M.
STOP TIME= 6 P.M.
WHATMAN 41 FILTERS, STATION: 3

| | WEIGHT (UG/CM**2) | | | | | |
|---|---|---|---|---|---|---|
| STAGE | 1 | 2 | 3 | 4 | 5 | 6 |
| ELEMENT | | | | | | |
| CA | 1.0 | 1.2 | 0.6 | 0.2 | 0.4 | . |
| FE | 0.3 | 0.4 | 0.2 | 0.1 | 0.3 | . |
| SI | 0.8 | 1.2 | 0.8 | 0.3 | 0.5 | . |
| BR | . | 0.3 | 0.3 | . | 0.4 | . |
| CL | . | 0.4 | . | . | . | . |
| PB | 0.4 | 0.7 | 0.5 | . | 1.2 | . |
| S | . | . | . | . | 3.7 | 0.9 |
| RUN TIME(HRS) | 11.00 | 11.00 | 11.00 | 11.00 | 11.00 | 11.00 |

DALLAS AT GRADE SITE: IH30 AT MOTLEY DRIVE
HIGH VOLUME CASCADE IMPACTOR UCD/AIR QUALITY GROUP ANALYSIS
NOMINAL FLOW RATE= 1.133 M**3/MIN
DATE= 8 4 77
START TIME= 7 A.M.
STOP TIME= 6 P.M.
WHATMAN 41 FILTERS, STATION: 1

| | WEIGHT (UG/CM**2) | | | | |
|---|---|---|---|---|---|
| STAGE | 1 | 2 | 3 | 4 | 5 |
| ELEMENT | | | | | |
| CA | 0.8 | 1.0 | 0.2 | 0.3 | . |
| FE | 0.2 | 0.4 | 0.2 | 0.2 | . |
| SI | 1.0 | 1.6 | 0.5 | 0.8 | 0.4 |
| S | . | . | . | 1.0 | 3.4 |
| RUN TIME(HRS) | 11.00 | 11.00 | 11.00 | 11.00 | 11.00 |

DALLAS AT GRADE SITE: IH30 AT MOTLEY DRIVE
HIGH VOLUME CASCADE IMPACTOR UCD/AIR QUALITY GROUP ANALYSIS
NOMINAL FLOW RATE= 1.133 M**3/MIN
DATE= 8 4 77
START TIME= 7 A.M.
STOP TIME= 6 P.M.
WHATMAN 41 FILTERS, STATION: 3

| | WEIGHT (UG/CM**2) | | | | |
|---|---|---|---|---|---|
| STAGE | 1 | 2 | 3 | 4 | 5 |
| ELEMENT | | | | | |
| AL | 0.1 | 0.1 | 0.1 | . | . |
| CA | 1.4 | 1.7 | 0.6 | 0.6 | 0.2 |
| FE | 0.4 | 0.6 | 0.3 | 0.4 | . |
| SI | 1.1 | 1.7 | 0.6 | 0.9 | 0.5 |
| BR | 0.2 | 0.3 | 0.2 | 0.4 | 0.2 |
| CL | . | 0.5 | . | . | . |
| PB | . | 0.5 | 0.5 | 0.8 | 0.6 |
| S | . | . | . | 1.4 | 1.8 |
| RUN TIME(HRS) | 11.00 | 11.00 | 11.00 | 11.00 | 11.00 |

DALLAS AT GRADE SITE: IH30 AT MOTLEY DRIVE
HIGH VOLUME CASCADE IMPACTOR UCD/AIR QUALITY GROUP ANALYSIS
NOMINAL FLOW RATE= 1.133 M**3/MIN
DATE= 8 5 77
START TIME= 7 A.M.
STOP TIME= 6 P.M.
WHATMAN 41 FILTERS, STATION: 3

| | WEIGHT (UG/CM**2) | | | | |
|---|---|---|---|---|---|
| STAGE | 1 | 2 | 3 | 4 | 5 |
| ELEMENT | | | | | |
| AL | . | . | . | 0.1 | . |
| SI | . | . | 0.4 | . | . |
| P | . | 0.3 | 0.3 | . | . |
| BR | . | . | . | 0.2 | 0.1 |
| PB | . | . | . | 0.4 | 0.3 |
| S | . | . | . | 0.9 | 1.2 |
| RUN TIME(HRS) | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |

DALLAS AT GRADE SITE: IH30 AT MOTLEY DRIVE
HIGH VOLUME CASCADE IMPACTOR UCD/AIR QUALITY GROUP ANALYSIS
NOMINAL FLOW RATE= 1.133 M**3/MIN
DATE= 8 10 77
START TIME= 7 A.M.
STOP TIME= 6 P.M.
WHATMAN 41 FILTERS, STATION: 1

| | WEIGHT (UG/CM**2) | | | | |
|---|---|---|---|---|---|
| STAGE | 1 | 2 | 3 | 4 | 5 |
| ELEMENT | | | | | |
| CA | 0.3 | 0.4 | 0.5 | 0.4 | 0.2 |
| FE | . | . | . | . | 0.1 |
| K | . | . | . | . | 0.2 |
| SI | 0.3 | 0.3 | 0.3 | 0.4 | . |
| S | . | . | . | 0.3 | . |
| RUN TIME(HRS) | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |

DALLAS AT GRADE SITE: IH30 AT MOTLEY DRIVE
HIGH VOLUME CASCADE IMPACTOR UCD/AIR QUALITY GROUP ANALYSIS
NOMINAL FLOW RATE= 1.133 M**3/MIN
DATE= 8 10 77
START TIME= 7 A.M.
STOP TIME= 6 P.M.
WHATMAN 41 FILTERS, STATION: 3

| | WEIGHT (UG/CM**2) | | | | |
|---|---|---|---|---|---|
| STAGE | 1 | 2 | 3 | 4 | 5 |
| ELEMENT | | | | | |
| AL | . | . | 0.1 | . | . |
| CA | 0.5 | 1.9 | 0.9 | 0.7 | 0.9 |
| FE | 0.1 | 0.5 | 0.2 | 0.2 | 0.4 |
| SI | 0.5 | 1.2 | 0.7 | 0.4 | 0.6 |
| BR | . | 0.2 | 0.2 | 0.2 | 0.6 |
| CL | . | 0.7 | 0.4 | . | . |
| PB | . | 0.6 | 0.5 | 0.5 | 1.7 |
| S | . | . | . | . | 0.6 |
| ZN | . | 0.1 | . | . | . |
| RUN TIME(HRS) | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |

DALLAS AT GRADE SITE: IH30 AT MOTLEY DRIVE
HIGH VOLUME CASCADE IMPACTOR UCD/AIR QUALITY GROUP ANALYSIS
NOMINAL FLOW RATE= 1.133 M**3/MIN
DATE= 8 11 77
START TIME= 7 A.M.
STOP TIME= 6 P.M.
WHATMAN 41 FILTERS, STATION: 1

WEIGHT (UG/CM**2)

| STAGE | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| ELEMENT | | | | | |
| CA | 0.4 | 0.7 | 1.0 | 0.5 | 0.2 |
| FE | 0.1 | 0.2 | . | 0.2 | . |
| SI | 0.6 | 0.8 | 0.7 | 0.5 | . |
| CL | 0.3 | 0.3 | . | . | . |
| S | . | . | . | 0.3 | 1.2 |
| RUN TIME(HRS) | 11.00 | 11.00 | 11.00 | 11.00 | 11.00 |

DALLAS AT GRADE SITE: IH30 AT MOTLEY DRIVE
HIGH VOLUME CASCADE IMPACTOR UCD/AIR QUALITY GROUP ANALYSIS
NOMINAL FLOW RATE= 1.133 M**3/MIN
DATE= 8 11 77
START TIME= 7 A.M.
STOP TIME= 6 P.M.
WHATMAN 41 FILTERS, STATION: 3

WEIGHT (UG/CM**2)

| STAGE | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| ELEMENT | | | | | |
| AL | 0.1 | . | . | . | . |
| CA | 1.1 | 0.6 | 1.3 | 1.0 | 0.6 |
| FE | 0.2 | 0.2 | 0.5 | 0.5 | 0.4 |
| SI | 0.7 | 0.3 | 0.8 | 0.8 | 0.4 |
| BR | 0.1 | . | 0.4 | 0.4 | 0.4 |
| CL | . | . | 0.5 | . | . |
| PB | . | . | 0.9 | 1.2 | 1.5 |
| S | . | . | . | 0.4 | 2.1 |
| RUN TIME(HRS) | 11.00 | 11.00 | 11.00 | 11.00 | 11.00 |

SAN ANTONIO SITE: IH410 AT MILITARY HIGHWAY
HIGH VOLUME CASCADE IMPACTOR UCD/AIR QUALITY GROUP ANALYSIS
NOMINAL FLOW RATE= 1.133 M**3/MIN
DATE= 10 19 77
START TIME= 7 A.M.
STOP TIME= 6 P.M.
WHATMAN 41 FILTERS, STATION: 3

| | | | WEIGHT (UG/CM**2) | |
|---|---|---|---|---|
| STAGE | 1 | 3 | 5 | 6 |
| ELEMENT | | | | |
| CA | 4.0 | 2.2 | 1.1 | 0.5 |
| FE | 0.3 | 0.3 | 0.3 | . |
| SI | 1.0 | 1.2 | . | 0.3 |
| BR | 0.2 | 0.3 | 0.6 | 1.5 |
| CL | 0.5 | 0.4 | . | . |
| PB | 0.6 | 0.9 | 2.1 | 4.0 |
| S | . | . | 2.9 | . |
| RUN TIME(HRS) | 10.75 | 10.75 | 10.75 | 10.75 |

Road Vacuuming Data

| | Surface Particulate Loading ($\mu g/m^2$) | | | | | |
|---|---|---|---|---|---|---|
| Site | San Antonio Loop 410 at Military Highway | | Dallas IH45 at Forest Avenue | | Dallas IH30 at Motley Drive | |
| Road Location | Inside Eastbound Shoulder | Inside Eastbound Lane | Inside Southbound Shoulder | Inside Southbound Lane | Outside Westbound Shoulder | Outside Westbound Lane |
| Date | 10-20-77 | 10-20-77 | 10-3-77 | 9-20-77 | 10-3-77 | 10-3-77 |
| Element | | | | | | |
| Ti | 277 | 215 | 405 | 9.3 | 192 | 51.5 |
| Ca | 67700 | 60300 | 31200 | 438 | 13700 | 28800 |
| K | 1030 | 747 | 1320 | 38.1 | 686 | 188 |
| Si | 5340 | 4560 | -- | 81.6 | 2940 | 547 |
| Zn | 296 | 210 | 6370 | 15.6 | 107 | 42.3 |
| Cu | 36.4 | 33.8 | 64.2 | -- | 21.4 | 530 |
| Fe | 3890 | 2900 | 6370 | 93.6 | 2460 | 105 |
| Pb | 3240 | 2150 | 2000 | -- | 690 | 21.1 |
| Br | 438 | 321 | 267 | -- | 113 | -- |
| Sr | 371 | 412 | 96.7 | -- | -- | -- |
| V | -- | -- | 10.5 | -- | -- | -- |
| Ni | -- | -- | 13.6 | -- | -- | -- |
| Mn | 58.2 | -- | 120 | -- | 41.0 | -- |
| Area Vacuumed ($m^2$) | 0.74 | 0.74 | 2.51 | 3.34 | 1.67 | 2.51 |
| TSPL* ($g/m^2$) | 0.250 | .091 | 0.172 | 0.0044 | 0.081 | 0.025 |

*TSPL: Total Surface Particulate Loading, excluding cyclone preseparator capture.

Table 33. List of Symbols and Abbreviations Used in Traffic and Meteorological Data

| Symbol or Abbreviation | Meaning and Units |
|---|---|
| TIME | Time of day of hourly average |
| TRFVOL | Total hourly traffic volume |
| RH5 | Percent relative humidity reading from psychrometer at 5 feet |
| RH82 | Percent relative humidity reading from psychrometer at 82 feet |
| SIG | Standard deviation of preceding reading |
| PYRAN | Radiation reading from heliopyranometer, $w/m^2$ |
| WV5 | Wind direction at 5 feet, degrees |
| WV26 | Wind direction at 26 feet, degrees |
| WV52 | Wind direction at 52 feet, degrees |
| WV102 | Wind direction at 102 feet, degrees |
| TMP5 | Temperature at 5 feet, °F |
| TMP29 | Temperature at 29 feet, °F |
| TMP42 | Temperature at 42 feet, °F |
| TMP82 | Temperature at 82 feet, °F |
| VA5 | Vertical wind speed at 5 feet, 0.1 mph |
| VA26 | Vertical wind speed at 26 feet, 0.1 mph |
| VA52 | Vertical wind speed at 52 feet, 0.1 mph |
| VA102 | Vertical wind speed at 102 feet, 0.1 mph |
| HA5 | Horizontal wind speed at 5 feet, mph |
| HA26 | Horizontal wind speed at 26 feet, mph |
| HA52 | Horizontal wind speed at 52 feet, mph |
| HA102 | Horizontal wind speed at 102 feet, mph |

DALLAS ELEVATED JUN01,1977

| TIME | TRFVOL | SPEED | RH5 | SIG | RH82 | SIG | PYRAN | SIG |
|---|---|---|---|---|---|---|---|---|
| 8: 0 | 915 | 50.3 | 75.4 | 1.44 | . | . | 106. | 38.8 |
| 9: 0 | 735 | 51.2 | 70.0 | 2.28 | . | . | 317. | 99.6 |
| 10: 0 | 737 | 51.2 | 62.2 | 2.96 | . | . | 606. | 79.8 |
| 11: 0 | 728 | 51.7 | 51.9 | 2.23 | . | . | 844. | 65.6 |
| 12: 0 | 746 | 51.1 | 45.7 | 0.77 | . | . | 966. | 157.6 |
| 13: 0 | 731 | 50.8 | 46.3 | 1.34 | . | . | . | . |
| 14: 0 | 787 | 50.2 | 42.7 | 2.23 | . | . | 1034. | 284.4 |
| 15: 0 | 983 | 49.9 | 40.0 | 0.84 | . | . | 987. | 265.1 |
| 16: 0 | 1413 | 49.0 | 38.6 | 1.33 | . | . | 991. | 55.0 |
| 17: 0 | 1953 | 49.5 | 40.8 | 1.58 | . | . | 515. | 290.1 |
| 18: 0 | 2045 | 49.4 | 41.2 | 0.69 | . | . | 471. | 186.8 |

DALLAS ELEVATED JUN01,1977

| TIME | HA5 | SIG | HA26 | SIG | HA52 | SIG | HA102 | SIG |
|---|---|---|---|---|---|---|---|---|
| 8: 0 | 2.5 | 0.92 | 3.7 | 1.17 | 4.2 | 1.51 | 4.5 | 1.34 |
| 9: 0 | 2.8 | 0.87 | 4.0 | 1.08 | 4.7 | 1.26 | 5.1 | 1.08 |
| 10: 0 | 3.1 | 0.98 | 6.0 | 2.12 | 8.0 | 2.61 | 7.8 | 2.01 |
| 11: 0 | 2.8 | 1.09 | 5.8 | 2.06 | 7.8 | 2.58 | 8.0 | 1.99 |
| 12: 0 | 3.4 | 1.30 | 6.0 | 2.22 | 7.3 | 2.43 | 7.4 | 2.15 |
| 13: 0 | 3.6 | 1.61 | 5.3 | 2.57 | 6.1 | 2.65 | 6.4 | 2.48 |
| 14: 0 | 2.6 | 0.89 | 3.7 | 1.65 | 4.1 | 1.89 | 4.2 | 1.81 |
| 15: 0 | 3.1 | 1.16 | 3.8 | 1.54 | 4.3 | 1.79 | 4.4 | 1.67 |
| 16: 0 | 2.7 | 0.91 | 4.1 | 1.86 | 5.1 | 2.14 | 5.3 | 2.25 |
| 17: 0 | 2.7 | 1.18 | 4.2 | 1.91 | 4.9 | 2.36 | 4.8 | 2.07 |
| 18: 0 | 2.3 | 0.77 | 3.7 | 1.45 | 4.5 | 1.73 | 4.4 | 1.63 |



DALLAS ELEVATED JUN01,1977

| TIME | VA5 | SIG | VA26 | SIG | VA52 | SIG | VA102 | SIG |
|---|---|---|---|---|---|---|---|---|
| 8: 0 | -0.7 | 2.12 | -2.5 | 4.56 | 1.8 | 4.90 | . | . |
| 9: 0 | -0.9 | 2.30 | -2.8 | 4.56 | 1.6 | 4.74 | . | . |
| 10: 0 | -1.0 | 5.06 | -5.3 | 6.44 | 0.1 | 6.01 | . | . |
| 11: 0 | -0.7 | 6.01 | -3.1 | 7.33 | -0.4 | 8.00 | . | . |
| 12: 0 | -0.2 | 4.87 | -0.9 | 7.60 | -2.7 | 7.24 | . | . |
| 13: 0 | 0.1 | 3.68 | 1.0 | 8.40 | -2.0 | 9.41 | . | . |
| 14: 0 | -0.2 | 3.71 | 0.5 | 6.66 | -0.4 | 8.42 | . | . |
| 15: 0 | 0.6 | 3.06 | 1.4 | 6.92 | 0.9 | 8.61 | . | . |
| 16: 0 | -0.3 | 3.84 | 0.4 | 6.89 | -1.1 | 7.74 | . | . |
| 17: 0 | -0.5 | 3.40 | -0.8 | 6.28 | -0.5 | 7.07 | . | . |
| 18: 0 | -0.5 | 3.42 | -1.2 | 5.07 | -0.7 | 5.84 | . | . |

DALLAS ELEVATED JUN01,1977

| TIME | WV5 | SIG | WV26 | SIG | WV52 | SIG | WV102 | SIG |
|---|---|---|---|---|---|---|---|---|
| 8: 0 | 316.3 | 25.84 | 3.0 | 27.27 | 6.7 | 20.40 | 344.8 | 15.99 |
| 9: 0 | 319.8 | 24.91 | 8.0 | 21.99 | 10.5 | 17.12 | 347.0 | 14.18 |
| 10: 0 | 283.3 | 45.14 | 45.0 | 24.90 | 43.3 | 20.44 | 21.7 | 24.86 |
| 11: 0 | 248.8 | 47.13 | 67.1 | 24.12 | 66.8 | 20.21 | 52.7 | 31.37 |
| 12: 0 | 191.2 | 41.25 | 104.5 | 30.10 | 99.1 | 26.61 | 98.5 | 30.09 |
| 13: 0 | 193.6 | 41.40 | 135.7 | 41.13 | 133.1 | 47.84 | 137.4 | 45.26 |
| 14: 0 | 197.7 | 47.65 | 125.4 | 48.86 | 116.9 | 50.58 | 112.9 | 50.47 |
| 15: 0 | 198.7 | 47.47 | 122.7 | 55.10 | 101.0 | 56.33 | 87.7 | 56.99 |
| 16: 0 | 196.3 | 45.43 | 105.6 | 38.92 | 98.0 | 38.64 | 92.7 | 39.93 |
| 17: 0 | 249.6 | 50.26 | 66.1 | 48.01 | 68.7 | 48.81 | 63.0 | 51.74 |
| 18: 0 | 243.2 | 48.28 | 65.6 | 37.35 | 74.9 | 35.97 | 66.8 | 41.15 |

DALLAS ELEVATED JUN01,1977

| TIME | TMP5 | SIG | TMP29 | SIG | TMP42 | SIG | TMP82 | SIG |
|---|---|---|---|---|---|---|---|---|
| 8: 0 | 69.5 | 0.46 | 70.3 | 0.51 | 69.8 | 0.38 | 68.9 | 0.27 |
| 9: 0 | 71.8 | 1.11 | 71.9 | 0.88 | 71.4 | 0.87 | 70.2 | 0.79 |
| 10: 0 | 76.1 | 1.68 | 75.0 | 1.04 | 73.9 | 0.86 | 73.7 | 1.19 |
| 11: 0 | 81.1 | 1.46 | 79.1 | 1.23 | 77.4 | 1.15 | 78.0 | 1.35 |
| 12: 0 | 83.8 | 0.67 | 81.5 | 0.73 | 79.6 | 0.80 | 81.2 | 0.73 |
| 13: 0 | 84.6 | 1.01 | 83.4 | 0.99 | 82.1 | 1.29 | 81.9 | 0.85 |
| 14: 0 | 87.5 | 1.92 | 85.6 | 1.34 | 83.9 | 1.48 | 85.0 | 1.75 |
| 15: 0 | 88.6 | 1.21 | 87.7 | 0.82 | 86.1 | 0.85 | 86.1 | 1.29 |
| 16: 0 | 91.1 | 1.41 | 89.1 | 1.00 | 86.7 | 1.19 | 88.5 | 1.06 |
| 17: 0 | 88.9 | 1.74 | 87.5 | 1.37 | 85.9 | 1.61 | 87.1 | 1.40 |
| 18: 0 | 90.1 | 1.27 | 88.0 | 0.83 | 86.2 | 1.08 | 88.2 | 1.29 |

DALLAS ELEVATED JUN02,1977

| TIME | TRFVOL | SPEED | RH5 | SIG | RH82 | SIG | PYRAN | SIG |
|---|---|---|---|---|---|---|---|---|
| 8: 0 | 974 | 50.7 | 76.0 | 2.65 | . | . | 134. | 76.7 |
| 9: 0 | 731 | 51.8 | 59.3 | 5.85 | . | . | 402. | 60.5 |
| 10: 0 | 668 | 51.6 | 51.5 | 1.76 | . | . | 643. | 73.6 |
| 11: 0 | 717 | 52.1 | 45.3 | 0.94 | . | . | 840. | 56.2 |
| 12: 0 | 790 | 51.9 | 42.9 | 1.65 | . | . | 919. | 247.7 |
| 13: 0 | 577 | 50.9 | . | . | . | . | . | . |
| 14: 0 | 877 | 50.0 | 36.5 | 0.87 | . | . | 1074. | 171.0 |
| 15: 0 | 971 | 50.0 | 33.8 | 0.93 | . | . | 1066. | 43.8 |
| 16: 0 | 1364 | 48.8 | 32.9 | 0.47 | . | . | 955. | 37.9 |
| 17: 0 | 2098 | 48.5 | . | . | . | . | 771. | 58.4 |
| 18: 0 | 1798 | 48.9 | . | . | . | . | 552. | 80.9 |

DALLAS ELEVATED JUN02,1977

| TIME | HA5 | SIG | HA26 | SIG | HA52 | SIG | HA102 | SIG |
|---|---|---|---|---|---|---|---|---|
| 8: 0 | 0.8 | 0.70 | 2.3 | 0.82 | 2.3 | 0.94 | 1.6 | 1.21 |
| 9: 0 | 1.4 | 0.91 | 2.4 | 1.40 | 2.5 | 0.94 | 2.9 | 1.54 |
| 10: 0 | 3.4 | 1.20 | 5.3 | 1.89 | 6.2 | 1.95 | 8.3 | 2.48 |
| 11: 0 | 3.3 | 1.36 | 5.6 | 2.30 | 6.0 | 2.27 | 7.6 | 2.30 |
| 12: 0 | 2.9 | 1.43 | 4.4 | 2.07 | 4.5 | 2.38 | 5.3 | 2.56 |
| 13: 0 | . | . | . | . | . | . | . | . |
| 14: 0 | 3.1 | 1.09 | 4.4 | 1.86 | 4.8 | 1.91 | 5.2 | 2.05 |
| 15: 0 | 2.9 | 1.10 | 4.4 | 1.99 | 4.9 | 2.10 | 5.6 | 2.06 |
| 16: 0 | 3.1 | 1.08 | 5.4 | 2.11 | 7.0 | 2.14 | 7.0 | 1.92 |
| 17: 0 | 2.7 | 0.93 | 4.5 | 1.75 | 5.9 | 2.04 | 6.1 | 1.98 |
| 18: 0 | 2.2 | 0.77 | 4.1 | 1.41 | 5.4 | 1.64 | 5.6 | 1.38 |

DALLAS ELEVATED JUN02,1977

| TIME | VA5 | SIG | VA26 | SIG | VA52 | SIG | VA102 | SIG |
|---|---|---|---|---|---|---|---|---|
| 8: 0 | -0.4 | 2.14 | -0.6 | 3.33 | -0.3 | 3.29 | . | . |
| 9: 0 | -0.1 | 2.30 | 1.2 | 4.90 | 1.0 | 5.22 | . | . |
| 10: 0 | 0.2 | 4.01 | 2.3 | 8.70 | -0.2 | 8.85 | . | . |
| 11: 0 | 0.7 | 4.42 | 2.7 | 8.41 | 0.7 | 9.46 | . | . |
| 12: 0 | 0.4 | 3.87 | 2.1 | 7.90 | 1.1 | 9.25 | . | . |
| 13: 0 | . | . | . | . | . | . | . | . |
| 14: 0 | 0.4 | 3.49 | 2.3 | 7.31 | -0.9 | 9.00 | . | . |
| 15: 0 | 0.3 | 3.37 | 2.7 | 7.53 | 1.2 | 9.49 | . | . |
| 16: 0 | -0.7 | 4.95 | -1.5 | 7.07 | -1.9 | 7.46 | . | . |
| 17: 0 | -0.1 | 3.81 | -1.1 | 6.76 | 0.4 | 8.45 | . | . |
| 18: 0 | -0.6 | 4.12 | -1.1 | 5.93 | -1.5 | 5.97 | . | . |

DALLAS ELEVATED JUN02,1977

| TIME | WV5 | SIG | WV26 | SIG | WV52 | SIG | WV102 | SIG |
|---|---|---|---|---|---|---|---|---|
| 8: 0 | 200.3 | 52.19 | 86.2 | 24.97 | 82.2 | 38.10 | 83.2 | 55.39 |
| 9: 0 | 218.7 | 45.21 | 184.3 | 54.52 | 260.2 | 55.86 | 274.0 | 54.13 |
| 10: 0 | 191.3 | 39.82 | 205.1 | 31.62 | 241.2 | 24.79 | 226.4 | 16.36 |
| 11: 0 | 208.1 | 51.31 | 229.3 | 29.77 | 256.3 | 28.22 | 237.1 | 20.82 |
| 12: 0 | 217.0 | 53.59 | 243.7 | 47.09 | 268.4 | 46.20 | 249.2 | 40.60 |
| 13: 0 | . | . | . | . | . | . | . | . |
| 14: 0 | 187.7 | 43.13 | 181.2 | 39.27 | 209.1 | 45.90 | 194.6 | 37.52 |
| 15: 0 | 194.0 | 44.88 | 174.5 | 51.30 | 199.3 | 54.81 | 189.1 | 50.87 |
| 16: 0 | 227.3 | 49.42 | 81.6 | 33.26 | 81.8 | 30.21 | 78.9 | 38.63 |
| 17: 0 | 228.0 | 47.68 | 83.6 | 36.03 | 79.4 | 34.17 | 68.4 | 41.30 |
| 18: 0 | 207.3 | 47.12 | 86.3 | 22.61 | 90.0 | 22.04 | 90.4 | 27.35 |

DALLAS ELEVATED JUN02,1977

| TIME | TMP5 | SIG | TMP29 | SIG | TMP42 | SIG | TMP82 | SIG |
|---|---|---|---|---|---|---|---|---|
| 8: 0 | 72.2 | 1.34 | 74.2 | 2.02 | 73.6 | 1.66 | 72.7 | 1.45 |
| 9: 0 | 78.9 | 2.03 | 80.8 | 1.71 | 80.5 | 2.25 | 77.5 | 0.88 |
| 10: 0 | 82.6 | 1.05 | 83.0 | 1.45 | 82.4 | 0.89 | 79.6 | 1.11 |
| 11: 0 | 86.5 | 1.15 | 86.0 | 0.84 | 85.3 | 1.01 | 82.9 | 0.83 |
| 12: 0 | 88.6 | 1.04 | 87.7 | 1.15 | 87.1 | 1.00 | 85.4 | 1.16 |
| 13: 0 | . | . | . | . | . | . | . | . |
| 14: 0 | 92.1 | 1.20 | 91.0 | 0.94 | 89.7 | 1.04 | 89.1 | 1.24 |
| 15: 0 | 94.4 | 1.05 | 93.2 | 0.98 | 91.7 | 1.08 | 91.2 | 0.95 |
| 16: 0 | 95.7 | 0.78 | 93.1 | 0.88 | 90.4 | 0.81 | 92.8 | 0.76 |
| 17: 0 | . | . | . | . | . | . | . | . |
| 18: 0 | . | . | . | . | . | . | . | . |

DALLAS ELEVATED JUN03,1977

| TIME | TMP5 | SIG | TMP29 | SIG | TMP42 | SIG | TMP82 | SIG |
|---|---|---|---|---|---|---|---|---|
| 8: 0 | 74.4 | 0.97 | 77.2 | 2.13 | 76.4 | 2.18 | 74.8 | 1.28 |
| 9: 0 | 80.3 | 2.11 | 83.4 | 1.13 | 82.8 | 0.80 | 78.5 | 0.94 |
| 10: 0 | 85.7 | 1.38 | 86.6 | 0.93 | 85.3 | 0.94 | 82.4 | 1.43 |
| 11: 0 | . | . | . | . | . | . | . | . |

DALLAS ELEVATED JUN03,1977

| TIME | TRF VOL | SPEED | RH5 | SIG | RH82 | SIG | PYRAN | SIG |
|---|---|---|---|---|---|---|---|---|
| 8: 0 | 898 | 50.4 | 70.6 | 2.86 | . | . | 130. | 75.0 |
| 9: 0 | 752 | 51.0 | 55.0 | 4.42 | . | . | 413. | 67.1 |
| 10: 0 | 767 | 50.3 | 47.8 | 1.45 | . | . | 645. | 65.6 |
| 11: 0 | 579 | 50.1 | . | . | . | . | . | . |

DALLAS ELEVATED JUN03,1977

| TIME | HA5 | SIG | HA26 | SIG | HA52 | SIG | HA102 | SIG |
|---|---|---|---|---|---|---|---|---|
| 8: 0 | 0.9 | 0.54 | 1.6 | 0.90 | 1.7 | 0.81 | 1.5 | 0.97 |
| 9: 0 | 1.2 | 0.55 | 1.9 | 0.89 | 1.8 | 0.83 | 2.0 | 0.84 |
| 10: 0 | 2.0 | 0.84 | 2.6 | 1.23 | 2.9 | 1.42 | 3.1 | 1.39 |
| 11: 0 | . | . | . | . | . | . | . | . |

DALLAS ELEVATED JUN03;1977

| TIME | VA5 | SIG | VA26 | SIG | VA52 | SIG | VA102 | SIG |
|---|---|---|---|---|---|---|---|---|
| 8: 0 | -0.3 | 1.49 | -0.3 | 3.10 | -0.5 | 3.15 | . | . |
| 9: 0 | 0.0 | 1.32 | 0.6 | 4.15 | -1.1 | 4.62 | . | . |
| 10: 0 | 0.1 | 2.16 | 1.6 | 5.16 | -1.0 | 6.17 | . | . |
| 11: 0 | . | . | . | . | . | . | . | . |

DALLAS ELEVATED JUN03,1977

| TIME | WV5 | SIG | WV26 | SIG | WV52 | SIG | WV102 | SIG |
|---|---|---|---|---|---|---|---|---|
| 8: 0 | 232.7 | 52.14 | 93.3 | 38.86 | 87.4 | 50.32 | 122.9 | 53.96 |
| 9: 0 | 191.8 | 45.32 | 211.2 | 27.54 | 238.4 | 35.78 | 238.4 | 28.77 |
| 10: 0 | 175.5 | 38.84 | 176.7 | 33.31 | 187.7 | 44.28 | 188.2 | 32.70 |
| 11: 0 | . | . | . | . | . | . | . | . |

DALLAS ELEVATED JUN07,1977

| TIME | TMP5 | SIG | TMP29 | SIG | TMP42 | SIG | TMP82 | SIG |
|---|---|---|---|---|---|---|---|---|
| 15: 0 | . | . | . | . | . | . | . | . |
| 16: 0 | 87.2 | 1.27 | 84.1 | 0.71 | 81.9 | 0.61 | 83.1 | 0.78 |
| 17: 0 | 86.9 | 0.98 | 84.9 | 0.77 | 83.0 | 0.72 | 84.2 | 0.69 |
| 18: 0 | . | . | . | . | . | . | . | . |

DALLAS ELEVATED JUN07,1977

| TIME | TRFVOL | SPEED | RH5 | SIG | RH82 | SIG | PYRAN | SIG |
|---|---|---|---|---|---|---|---|---|
| 15: 0 | 690 | 50.8 | . | . | . | . | . | . |
| 16: 0 | 1385 | 49.9 | 32.2 | 0.32 | . | . | 1008. | 39.4 |
| 17: 0 | 2041 | 49.4 | 31.8 | 0.23 | . | . | 842. | 58.7 |
| 18: 0 | 1958 | 50.0 | . | . | . | . | . | . |

## DALLAS ELEVATED JUN07,1977

| TIME | HA5 | SIG | HA26 | SIG | HA52 | SIG | HA102 | SIG |
|---|---|---|---|---|---|---|---|---|
| 15: 0 | . | . | . | . | . | . | . | . |
| 16: 0 | 4.5 | 2.12 | 8.2 | 3.18 | 10.5 | 3.28 | 10.3 | 2.88 |
| 17: 0 | 4.8 | 2.15 | 7.1 | 3.07 | 8.9 | 3.61 | 8.6 | 3.10 |
| 18: 0 | . | . | . | . | . | . | . | . |

## DALLAS ELEVATED JUN07,1977

| TIME | VA5 | SIG | VA26 | SIG | VA52 | SIG | VA102 | SIG |
|---|---|---|---|---|---|---|---|---|
| 15: 0 | . | . | . | . | . | . | . | . |
| 16: 0 | -1.3 | 6.34 | -5.5 | 8.78 | -0.2 | 8.73 | . | . |
| 17: 0 | -1.5 | 5.55 | -6.2 | 8.63 | 0.1 | 8.32 | . | . |
| 18: 0 | -1.7 | 5.46 | -5.2 | 8.12 | 0.8 | 8.32 | . | . |

## DALLAS ELEVATED JUN07,1977

| TIME | WV5 | SIG | WV26 | SIG | WV52 | SIG | WV102 | SIG |
|---|---|---|---|---|---|---|---|---|
| 15: 0 | . | . | . | . | . | . | . | . |
| 16: 0 | 261.5 | 47.68 | 52.4 | 32.63 | 50.8 | 29.78 | 35.7 | 37.25 |
| 17: 0 | 290.8 | 38.21 | 35.4 | 32.35 | 36.5 | 30.20 | 12.3 | 30.80 |
| 18: 0 | 289.1 | 37.17 | 36.6 | 28.31 | 39.0 | 26.85 | 19.2 | 30.53 |

DALLAS ELEVATED JUN08,1977

| TIME | TRF VOL | SPEED | RH5 | SIG | RH82 | SIG | PYRAN | SIG |
|---|---|---|---|---|---|---|---|---|
| 8: 0 | 846 | 50.6 | 62.3 | 1.79 | . | . | 117. | 94.2 |
| 9: 0 | 686 | 51.0 | 49.2 | 4.43 | . | . | 426. | 60.0 |
| 10: 0 | 27 | 51.7 | . | . | . | . | . | . |
| 11: 0 | 16 | 50.4 | . | . | . | . | . | . |
| 12: 0 | 792 | 50.3 | 32.8 | 0.51 | . | . | 1045. | 37.2 |
| 13: 0 | 747 | 50.0 | 31.3 | 0.47 | . | . | 1135. | 15.8 |
| 14: 0 | 803 | 50.2 | 29.6 | 0.55 | . | . | 1163. | 5.4 |
| 15: 0 | 982 | 49.1 | 28.3 | 0.38 | . | . | 1130. | 21.6 |
| 16: 0 | 1254 | 48.7 | 27.0 | 0.23 | . | . | 1028. | 38.0 |
| 17: 0 | 2065 | 48.3 | 26.5 | 0.14 | . | . | 864. | 55.5 |
| 18: 0 | 2048 | 48.4 | 26.7 | 0.23 | . | . | 649. | 69.0 |

DALLAS ELEVATED JUN08,1977

| TIME | HA5 | SIG | HA26 | SIG | HA52 | SIG | HA102 | SIG |
|---|---|---|---|---|---|---|---|---|
| 8: 0 | 1.9 | 0.94 | 3.4 | 1.11 | 3.7 | 1.11 | 3.9 | 1.25 |
| 9: 0 | 3.8 | 1.01 | 5.6 | 1.33 | 7.1 | 1.56 | 7.7 | 1.73 |
| 10: 0 | . | . | . | . | . | . | . | . |
| 11: 0 | . | . | . | . | . | . | . | . |
| 12: 0 | 4.7 | 1.45 | 7.0 | 1.94 | 8.5 | 1.99 | 8.8 | 1.89 |
| 13: 0 | 4.5 | 1.54 | 6.5 | 2.17 | 7.8 | 2.65 | 8.4 | 2.68 |
| 14: 0 | 3.8 | 1.45 | 5.6 | 2.25 | 6.8 | 2.61 | 7.4 | 2.71 |
| 15: 0 | 3.8 | 1.42 | 5.0 | 2.00 | 5.8 | 2.39 | 6.2 | 2.29 |
| 16: 0 | 4.1 | 1.37 | 5.5 | 1.92 | 6.6 | 2.29 | 7.1 | 2.30 |
| 17: 0 | 3.9 | 1.53 | 5.6 | 2.20 | 6.8 | 2.39 | 7.2 | 2.42 |
| 18: 0 | 3.8 | 1.40 | 6.1 | 1.92 | 7.8 | 2.23 | 8.2 | 2.23 |



DALLAS ELEVATED JUN08,1977

| TIME | VA5 | SIG | VA26 | SIG | VA52 | SIG | VA102 | SIG |
|---|---|---|---|---|---|---|---|---|
| 8: 0 | 0.3 | 1.94 | 1.3 | 3.97 | -1.2 | 4.87 | . | . |
| 9: 0 | 0.9 | 2.95 | 2.3 | 5.44 | -3.9 | 7.27 | . | . |
| 10: 0 | . | . | . | . | . | . | . | . |
| 11: 0 | . | . | . | . | . | . | . | . |
| 12: 0 | 0.9 | 4.09 | 2.2 | 6.93 | -5.2 | 8.67 | . | . |
| 13: 0 | 1.2 | 3.68 | 4.0 | 7.65 | -2.0 | 10.41 | . | . |
| 14: 0 | 0.6 | 4.23 | 1.9 | 7.72 | -3.2 | 9.97 | . | . |
| 15: 0 | 0.3 | 3.67 | 2.3 | 8.15 | -2.7 | 10.30 | . | . |
| 16: 0 | 0.4 | 3.63 | 3.0 | 6.73 | -1.6 | 9.25 | . | . |
| 17: 0 | 0.6 | 3.83 | 1.7 | 7.54 | -3.7 | 8.66 | . | . |
| 18: 0 | 0.0 | 3.77 | 0.8 | 6.64 | -4.6 | 7.18 | . | . |

DALLAS ELEVATED JUN08,1977

| TIME | WV5 | SIG | WV26 | SIG | WV52 | SIG | WV102 | SIG |
|---|---|---|---|---|---|---|---|---|
| 8: 0 | 173.4 | 18.04 | 145.1 | 23.05 | 154.7 | 32.30 | 156.6 | 18.59 |
| 9: 0 | 164.8 | 13.85 | 145.5 | 13.99 | 147.3 | 25.30 | 151.3 | 13.57 |
| 10: 0 | . | . | . | . | . | . | . | . |
| 11: 0 | . | . | . | . | . | . | . | . |
| 12: 0 | 165.5 | 16.50 | 138.9 | 18.85 | 142.1 | 27.08 | 146.8 | 19.04 |
| 13: 0 | 173.1 | 24.62 | 159.3 | 23.34 | 171.4 | 36.93 | 167.0 | 22.62 |
| 14: 0 | 175.1 | 33.46 | 157.3 | 29.71 | 166.0 | 41.07 | 160.2 | 31.10 |
| 15: 0 | 176.7 | 36.09 | 163.8 | 35.30 | 180.9 | 44.53 | 171.9 | 34.82 |
| 16: 0 | 169.2 | 24.67 | 149.7 | 25.49 | 154.3 | 36.67 | 155.9 | 24.69 |
| 17: 0 | 176.7 | 33.46 | 152.5 | 32.00 | 164.9 | 43.23 | 161.7 | 32.34 |
| 18: 0 | 167.2 | 23.09 | 126.1 | 22.50 | 126.8 | 24.29 | 133.4 | 22.57 |



DALLAS ELEVATED JUN08,1977

| TIME | TMP5 | SIG | TMP29 | SIG | TMP42 | SIG | TMP82 | SIG |
|---|---|---|---|---|---|---|---|---|
| 8: 0 | 65.1 | 0.89 | 67.3 | 1.12 | 67.1 | 1.55 | 64.9 | 0.78 |
| 9: 0 | 69.1 | 1.73 | 69.5 | 1.07 | 69.3 | 1.08 | 67.5 | 1.12 |
| 10: 0 | . | . | . | . | . | . | . | . |
| 11: 0 | . | . | . | . | . | . | . | . |
| 12: 0 | 82.5 | 0.74 | 80.5 | 0.72 | 79.5 | 0.86 | 79.4 | 0.77 |
| 13: 0 | 85.3 | 1.13 | 83.4 | 0.74 | 82.3 | 0.80 | 81.2 | 0.92 |
| 14: 0 | 87.5 | 0.92 | 85.3 | 1.09 | 83.8 | 1.15 | 83.7 | 1.09 |
| 15: 0 | 89.2 | 1.03 | 88.1 | 1.09 | 86.4 | 1.38 | 86.0 | 1.35 |
| 16: 0 | 90.9 | 0.64 | 89.7 | 0.61 | 87.9 | 0.83 | 87.6 | 0.66 |
| 17: 0 | 92.0 | 0.78 | 90.5 | 0.67 | 88.8 | 0.94 | 88.6 | 1.03 |
| 18: 0 | 92.3 | 0.64 | 90.2 | 0.55 | 88.4 | 0.68 | 89.8 | 0.71 |

DALLAS ELEVATED JUN09,1977

| TIME | TRFVOL | SPEED | RH5 | SIG | RH82 | SIG | PYRAN | SIG |
|---|---|---|---|---|---|---|---|---|
| 8: 0 | 823 | 50.1 | 66.8 | 0.44 | . | . | 117. | 70.0 |
| 9: 0 | 736 | 50.6 | 67.3 | 1.50 | . | . | 377. | 63.8 |
| 10: 0 | 762 | 50.4 | 60.7 | 4.71 | . | . | 584. | 118.5 |
| 11: 0 | 585 | 50.1 | 51.0 | 0.86 | . | . | 802. | 107.3 |
| 12: 0 | 706 | 50.4 | 48.4 | 0.88 | . | . | 986. | 47.3 |
| 13: 0 | 777 | 49.8 | 44.0 | 1.11 | . | . | 1027. | 231.5 |
| 14: 0 | 793 | 49.0 | 41.4 | 1.55 | . | . | 929. | 362.7 |
| 15: 0 | 963 | 49.3 | 39.3 | 0.99 | . | . | 886. | 370.4 |
| 16: 0 | 1395 | 48.2 | 35.9 | 0.35 | . | . | 911. | 242.8 |
| 17: 0 | 1964 | 48.2 | 34.0 | 0.59 | . | . | 770. | 182.5 |
| 18: 0 | 1927 | 48.1 | . | . | . | . | 579. | 138.6 |
| 19: 0 | 1082 | 49.4 | . | . | . | . | . | . |

## DALLAS ELEVATED JUN09,1977

| TIME | HA5 | SIG | HA26 | SIG | HA52 | SIG | HA102 | SIG |
|---|---|---|---|---|---|---|---|---|
| 8: 0 | 1.1 | 0.47 | 2.9 | 0.73 | 3.0 | 0.57 | 2.8 | 0.75 |
| 9: 0 | 2.5 | 1.16 | 3.8 | 1.44 | 4.5 | 1.77 | 4.8 | 1.82 |
| 10: 0 | 4.1 | 1.15 | 6.3 | 1.69 | 7.8 | 1.88 | 8.1 | 2.01 |
| 11: 0 | 5.0 | 1.45 | 7.5 | 2.10 | 9.1 | 2.46 | 10.1 | 2.45 |
| 12: 0 | 5.2 | 1.55 | 7.8 | 2.35 | 9.0 | 2.33 | 9.9 | 2.42 |
| 13: 0 | 5.2 | 1.77 | 8.1 | 2.49 | 9.6 | 2.71 | 10.4 | 2.92 |
| 14: 0 | 5.3 | 1.75 | 7.4 | 2.40 | 9.4 | 2.85 | 9.8 | 2.89 |
| 15: 0 | 5.2 | 1.68 | 7.6 | 2.74 | 9.6 | 2.84 | 10.1 | 2.91 |
| 16: 0 | 5.4 | 1.60 | 7.7 | 2.38 | 10.2 | 2.93 | 10.8 | 2.85 |
| 17: 0 | 5.6 | 1.56 | 8.0 | 2.03 | 10.7 | 2.57 | 11.4 | 2.72 |
| 18: 0 | 5.7 | 1.59 | 8.5 | 2.23 | 11.6 | 2.74 | 12.8 | 2.80 |
| 19: 0 | . | . | . | . | . | . | . | . |



## DALLAS ELEVATED JUN09,1977

| TIME | VA5 | SIG | VA26 | SIG | VA52 | SIG | VA102 | SIG |
|---|---|---|---|---|---|---|---|---|
| 8: 0 | -0.5 | 2.26 | -1.0 | 3.11 | -1.8 | 2.52 | . | . |
| 9: 0 | 0.4 | 2.33 | 1.1 | 4.26 | -2.9 | 6.05 | . | . |
| 10: 0 | 0.9 | 3.49 | 1.5 | 5.64 | -4.9 | 7.88 | . | . |
| 11: 0 | 1.2 | 4.11 | 3.8 | 7.03 | -4.4 | 9.89 | . | . |
| 12: 0 | 1.0 | 4.33 | 4.3 | 9.45 | -1.9 | 11.79 | . | . |
| 13: 0 | 1.0 | 4.55 | 4.7 | 8.91 | -2.8 | 11.70 | . | . |
| 14: 0 | 0.8 | 4.20 | 3.6 | 6.89 | -4.4 | 9.57 | . | . |
| 15: 0 | 0.9 | 4.23 | 4.0 | 7.44 | -4.0 | 9.88 | . | . |
| 16: 0 | 0.9 | 4.10 | 3.4 | 7.31 | -5.1 | 9.67 | . | . |
| 17: 0 | 1.2 | 4.45 | 4.4 | 7.71 | -4.6 | 10.82 | . | . |
| 18: 0 | 1.2 | 4.45 | 4.6 | 7.42 | -5.6 | 10.24 | . | . |
| 19: 0 | . | . | . | . | . | . | . | . |

DALLAS ELEVATED JUN09,1977

| TIME | WV5 | SIG | WV26 | SIG | WV52 | SIG | WV102 | SIG |
|---|---|---|---|---|---|---|---|---|
| 8: 0 | 178.0 | 30.73 | 103.5 | 10.49 | 104.9 | 14.44 | 111.3 | 16.68 |
| 9: 0 | 166.1 | 17.13 | 135.1 | 22.99 | 145.7 | 32.68 | 158.6 | 25.00 |
| 10: 0 | 165.8 | 15.08 | 144.7 | 15.30 | 148.2 | 28.14 | 154.0 | 17.51 |
| 11: 0 | 168.3 | 19.32 | . | . | . | . | . | . |
| 12: 0 | 178.4 | 22.51 | 175.0 | 19.40 | 205.9 | 27.23 | 190.9 | 15.06 |
| 13: 0 | 179.7 | 28.19 | 174.7 | 24.63 | 200.6 | 32.76 | 186.7 | 18.90 |
| 14: 0 | 170.8 | 23.61 | 151.9 | 21.79 | 160.0 | 35.57 | 161.0 | 20.46 |
| 15: 0 | 169.0 | 18.90 | 148.6 | 19.88 | 157.5 | 34.19 | 159.8 | 20.40 |
| 16: 0 | 169.0 | 17.58 | 148.0 | 15.81 | 155.1 | 31.71 | 157.0 | 16.41 |
| 17: 0 | 170.3 | 18.11 | 150.3 | 17.89 | 155.8 | 33.43 | 159.2 | 16.44 |
| 18: 0 | 169.8 | 16.17 | 148.1 | 14.77 | 152.1 | 31.39 | 155.6 | 13.55 |
| 19: 0 | . | . | . | . | . | . | . | . |



DALLAS ELEVATED JUN09,1977

| TIME | TMP5 | SIG | TMP29 | SIG | TMP42 | SIG | TMP82 | SIG |
|---|---|---|---|---|---|---|---|---|
| 8: 0 | 69.5 | 0.99 | 70.5 | 1.24 | 69.5 | 1.28 | 68.8 | 1.32 |
| 9: 0 | 75.7 | 2.17 | 76.4 | 1.48 | 75.7 | 1.69 | 74.2 | 1.49 |
| 10: 0 | 80.9 | 1.67 | 80.0 | 1.48 | 79.3 | 1.63 | 78.3 | 1.19 |
| 11: 0 | 85.6 | 1.83 | 84.4 | 1.93 | 83.6 | 1.88 | 82.0 | 1.52 |
| 12: 0 | 89.1 | 0.84 | 87.9 | 0.83 | 87.0 | 0.72 | 85.1 | 0.75 |
| 13: 0 | 91.3 | 1.02 | 89.9 | 0.83 | 88.8 | 0.73 | 87.3 | 0.82 |
| 14: 0 | 92.7 | 1.33 | 90.9 | 1.00 | 89.7 | 0.99 | 89.2 | 1.03 |
| 15: 0 | 93.9 | 1.18 | 92.2 | 0.90 | 90.7 | 0.85 | 90.5 | 0.91 |
| 16: 0 | 95.2 | 0.77 | 93.5 | 0.61 | 92.0 | 0.59 | 91.6 | 0.67 |
| 17: 0 | 95.6 | 0.67 | 93.9 | 0.59 | 92.6 | 0.54 | 91.9 | 0.69 |
| 18: 0 | . | . | . | . | . | . | . | . |
| 19: 0 | . | . | . | . | . | . | . | . |

## DALLAS ELEVATED JUN10,1977

| TIME | TMP5 | SIG | TMP29 | SIG | TMP42 | SIG | TMP82 | SIG |
|---|---|---|---|---|---|---|---|---|
| 8: 0 | 73.5 | 0.22 | 73.8 | 0.28 | 72.8 | 0.54 | 72.4 | 0.21 |
| 9: 0 | 76.3 | 1.47 | 76.4 | 1.08 | 75.4 | 1.25 | 74.8 | 1.02 |
| 10: 0 | 80.9 | 1.67 | 80.0 | 1.48 | 79.3 | 1.63 | 78.3 | 1.19 |
| 11: 0 | . | . | . | . | . | . | . | . |

## DALLAS ELEVATED JUN10,1977

| TIME | TRFVOL | SPEED | RH5 | SIG | RH82 | SIG | PYRAN | SIG |
|---|---|---|---|---|---|---|---|---|
| 8: 0 | 856 | 49.9 | 76.5 | 0.93 | . | . | 120. | 60.0 |
| 9: 0 | 763 | 50.9 | 70.3 | 3.00 | . | . | 379. | 69.1 |
| 10: 0 | 762 | 50.4 | 60.7 | 4.71 | . | . | 584. | 118.5 |
| 11: 0 | 411 | 50.1 | . | . | . | . | . | . |

DALLAS ELEVATED JUN10,1977

| TIME | HA5 | SIG | HA26 | SIG | HA52 | SIG | HA102 | SIG |
|---|---|---|---|---|---|---|---|---|
| 8: 0 | 2.3 | 0.64 | 4.5 | 1.12 | 5.3 | 0.97 | 5.4 | 1.04 |
| 9: 0 | 2.9 | 0.81 | 4.5 | 1.10 | 5.6 | 1.16 | 5.7 | 1.10 |
| 10: 0 | 4.1 | 1.15 | 6.3 | 1.69 | 7.8 | 1.88 | 8.1 | 2.01 |
| 11: 0 | . | . | . | . | . | . | . | . |

DALLAS ELEVATED JUN10,1977

| TIME | VA5 | SIG | VA26 | SIG | VA52 | SIG | VA102 | SIG |
|---|---|---|---|---|---|---|---|---|
| 8: 0 | 0.1 | 2.42 | 0.4 | 3.96 | -3.1 | 4.48 | . | . |
| 9: 0 | 0.4 | 2.64 | 0.7 | 4.69 | -3.7 | 5.78 | . | . |
| 10: 0 | 0.9 | 3.49 | 1.5 | 5.64 | -4.9 | 7.88 | . | . |
| 11: 0 | . | . | . | . | . | . | . | . |

DALLAS ELEVATED JUN10,1977

| TIME | WV5 | SIG | WV26 | SIG | WV52 | SIG | WV102 | SIG |
|---|---|---|---|---|---|---|---|---|
| 8: 0 | 172.1 | 14.96 | 129.3 | 16.02 | 128.8 | 21.06 | 137.2 | 15.45 |
| 9: 0 | 166.4 | 13.98 | 135.6 | 14.81 | 136.3 | 19.58 | 142.3 | 13.19 |
| 10: 0 | 165.8 | 15.08 | 144.7 | 15.30 | 148.2 | 28.14 | 154.0 | 17.51 |
| 11: 0 | . | . | . | . | . | . | . | . |

JUL.20,1977 DALLEV

| TIME | TRFVOL | SPEED | RH5 | SIG | RH82 | SIG | PYRAN | SIG |
|---|---|---|---|---|---|---|---|---|
| 8: 0 | 4239 | 51.6 | 74.8 | 1.63 | 83.6 | 0.82 | 125. | 44.6 |
| 9: 0 | 2775 | 51.9 | 71.8 | 1.23 | 82.7 | 1.49 | 297. | 51.5 |
| 10: 0 | 44 | 55.3 | 64.6 | 2.88 | 74.4 | 3.48 | . | ******** |
| 11: 0 | 1582 | 51.4 | . | . | . | . | 716. | 35.1 |
| 12: 0 | 2309 | 51.7 | . | . | . | . | 785. | 186.3 |
| 13: 0 | 317 | 50.4 | . | . | . | . | . | ******** |
| 14: 0 | 1011 | 52.6 | 42.6 | 1.06 | 44.4 | 1.34 | . | ******** |
| 15: 0 | 2608 | 52.0 | . | . | . | . | 877. | 258.7 |
| 16: 0 | 2729 | 52.5 | . | . | . | . | . | ******** |
| 17: 0 | 3976 | 53.9 | 37.3 | 0.63 | 36.9 | 0.57 | 688. | 176.2 |

JUL.20,1977 DALLEV

| TIME | WV5 | SIG | WV26 | SIG | WV52 | SIG | WV102 | SIG |
|---|---|---|---|---|---|---|---|---|
| 8: 0 | 159.7 | 20.47 | 207.6 | 15.12 | 171.8 | 12.87 | 172.5 | 11.16 |
| 9: 0 | . | . | . | . | . | . | . | . |
| 10: 0 | . | . | . | . | . | . | . | . |
| 11: 0 | 182.4 | 19.58 | 221.2 | 17.01 | 185.4 | 16.93 | 184.4 | 15.19 |
| 12: 0 | 178.3 | 21.65 | 216.3 | 18.70 | 180.8 | 18.65 | 179.3 | 16.68 |
| 13: 0 | . | . | . | . | . | . | . | . |
| 14: 0 | . | . | . | . | . | . | . | . |
| 15: 0 | 164.4 | 27.34 | 202.0 | 24.54 | 165.3 | 28.60 | 165.6 | 21.65 |
| 16: 0 | 169.7 | 25.39 | 204.5 | 22.87 | 166.4 | 28.88 | 166.2 | 20.13 |
| 17: 0 | 147.6 | 24.39 | 182.2 | 19.21 | 140.3 | 29.96 | 146.8 | 15.66 |

JUL.20,1977 DALLEV

| TIME | TMP5 | SIG | TMP29 | SIG | TMP42 | SIG | TMP82 | SIG |
|---|---|---|---|---|---|---|---|---|
| 8: 0 | 76.7 | 0.81 | 76.1 | 0.56 | 76.4 | 0.63 | 75.3 | 0.48 |
| 9: 0 | 78.8 | 0.90 | 77.4 | 0.71 | 78.0 | 0.68 | 76.5 | 0.77 |
| 10: 0 | 82.6 | 1.34 | 80.1 | 1.10 | 80.4 | 1.16 | 79.3 | 1.08 |
| 11: 0 | . | . | . | . | . | . | . | . |
| 12: 0 | . | . | . | . | . | . | . | . |
| 13: 0 | . | . | . | . | . | . | . | . |
| 14: 0 | 92.7 | 0.81 | 91.8 | 0.82 | 91.6 | 0.70 | 90.4 | 0.96 |
| 15: 0 | . | . | . | . | . | . | . | . |
| 16: 0 | . | . | . | . | . | . | . | . |
| 17: 0 | 95.7 | 0.96 | 95.6 | 1.00 | 94.9 | 1.06 | 94.7 | 0.87 |

JUL.20,1977 DALLEV

| TIME | VA5 | SIG | VA26 | SIG | VA52 | SIG | VA102 | SIG |
|---|---|---|---|---|---|---|---|---|
| 8: 0 | -0.7 | 2.54 | 4.1 | 4.28 | 3.9 | 4.93 | 1.5 | 5.51 |
| 9: 0 | 0.8 | 3.31 | . | . | . | . | . | . |
| 10: 0 | . | . | . | . | . | . | . | . |
| 11: 0 | . | . | 8.4 | 6.11 | 3.8 | 8.45 | 1.8 | 8.85 |
| 12: 0 | -0.1 | 3.50 | 7.3 | 6.69 | 3.7 | 8.13 | 1.4 | 10.42 |
| 13: 0 | . | . | . | . | . | . | . | . |
| 14: 0 | . | . | . | . | . | . | . | . |
| 15: 0 | -1.0 | 3.53 | 7.5 | 7.19 | 6.2 | 8.77 | 2.9 | 11.73 |
| 16: 0 | -0.4 | 3.98 | 8.3 | 7.57 | 5.9 | 9.07 | . | . |
| 17: 0 | -1.9 | 3.47 | 6.1 | 7.18 | 5.6 | 8.29 | -1.2 | 11.60 |

JUL.20,1977 DALLEV

| TIME | HA5 | SIG | HA26 | SIG | HA52 | SIG | HA102 | SIG |
|---|---|---|---|---|---|---|---|---|
| 8: 0 | 3.6 | 1.31 | 6.4 | 2.65 | 5.4 | 2.10 | 6.7 | 1.99 |
| 9: 0 | . | . | 9.8 | 2.10 | 7.2 | 2.21 | 9.3 | 1.75 |
| 10: 0 | . | . | . | . | . | . | . | . |
| 11: 0 | 6.1 | 1.79 | 10.7 | 2.41 | 9.3 | 3.00 | 10.5 | 1.94 |
| 12: 0 | 5.9 | 1.97 | 10.1 | 3.27 | 8.5 | 2.93 | 9.7 | 2.59 |
| 13: 0 | . | . | . | . | . | . | . | . |
| 14: 0 | . | . | . | . | . | . | . | . |
| 15: 0 | 6.0 | 2.22 | 9.5 | 3.53 | 9.0 | 3.17 | 9.6 | 2.82 |
| 16: 0 | . | . | . | . | . | . | . | . |
| 17: 0 | 6.6 | 2.09 | 9.3 | 2.77 | 10.8 | 3.20 | 10.5 | 2.76 |

JUL.21,1977 DALLEV

| TIME | TRFVOL | SPEED | RH5 | SIG | RH82 | SIG | PYRAN | SIG |
|---|---|---|---|---|---|---|---|---|
| 8: 0 | 4099 | 52.5 | 81.7 | 3.05 | 92.6 | 2.19 | 102. | 61.7 |
| 9: 0 | 2649 | 53.5 | . | . | . | . | . | ******** |
| 10: 0 | 2382 | 54.6 | 67.2 | 1.96 | 77.8 | 2.51 | 512. | 56.8 |
| 11: 0 | 1484 | 55.6 | . | . | . | . | . | ******** |
| 12: 0 | 65 | 51.4 | . | . | . | . | . | ******** |
| 13: 0 | 2213 | 55.4 | 46.8 | 1.72 | 50.7 | 2.48 | 941. | 203.9 |
| 14: 0 | 2467 | 56.0 | 43.4 | 1.35 | 45.3 | 1.44 | 867. | 332.6 |
| 15: 0 | 2734 | 54.9 | 46.3 | 7.63 | 47.1 | 8.84 | 458. | 375.8 |
| 16: 0 | 3262 | 53.2 | 83.1 | 3.06 | 85.1 | 2.73 | 195. | 193.6 |
| 17: 0 | 3974 | 55.8 | . | . | . | | 127 | 24.8 |

JUL.21,1977 DALLEV

| TIME | WV5 | SIG | WV26 | SIG | WV52 | SIG | WV102 | SIG |
|---|---|---|---|---|---|---|---|---|
| 8: 0 | 161.5 | 16.53 | 207.2 | 10.80 | 171.7 | 9.20 | 172.5 | 7.41 |
| 9: 0 | . | . | . | . | . | . | . | . |
| 10: 0 | 184.9 | 15.55 | 223.0 | 11.74 | 186.3 | 11.53 | 185.8 | 9.76 |
| 11: 0 | . | . | . | . | . | . | . | . |
| 12: 0 | . | . | . | . | . | . | . | . |
| 13: 0 | 166.6 | 31.71 | 204.6 | 25.64 | 167.5 | 28.41 | 168.7 | 21.50 |
| 14: 0 | 177.6 | 29.93 | 215.5 | 26.54 | 179.2 | 33.70 | 177.8 | 28.88 |
| 15: 0 | 114.2 | 56.09 | 153.8 | 54.21 | 95.2 | 56.71 | 117.8 | 52.81 |
| 16: 0 | 58.9 | 28.73 | 98.6 | 19.30 | 32.6 | 19.27 | 55.8 | 19.95 |
| 17: 0 | 91.6 | 17.48 | 127.0 | 13.29 | 60.3 | 13.31 | 86.4 | 12.90 |

JUL.21,1977 DALLEV

| TIME | TMP5 | SIG | TMP29 | SIG | TMP42 | SIG | TMP82 | SIG |
|---|---|---|---|---|---|---|---|---|
| 8: 0 | 75.6 | 1.02 | 74.8 | 0.84 | 75.1 | 0.85 | 74.2 | 0.64 |
| 9: 0 | . | . | . | . | . | . | . | . |
| 10: 0 | 81.7 | 1.04 | 79.8 | 1.00 | 80.2 | 0.89 | 78.7 | 0.89 |
| 11: 0 | . | . | . | . | . | . | . | . |
| 12: 0 | . | . | . | . | . | . | . | . |
| 13: 0 | 91.3 | 0.86 | 90.5 | 1.61 | 90.5 | 1.40 | 89.6 | 1.46 |
| 14: 0 | 93.0 | 1.20 | 92.0 | 1.14 | 92.1 | 1.12 | 90.8 | 1.01 |
| 15: 0 | 90.1 | 5.09 | 89.8 | 5.18 | 89.5 | 5.58 | 88.9 | 5.26 |
| 16: 0 | 77.5 | 1.80 | 77.4 | 1.65 | 77.0 | 1.61 | 77.1 | 1.58 |
| 17: 0 | . | . | . | . | . | . | . | . |

JUL.21,1977 DALLEV

| TIME | VA5 | SIG | VA26 | SIG | VA52 | SIG | VA102 | SIG |
|---|---|---|---|---|---|---|---|---|
| 8: 0 | -0.5 | 2.88 | 5.4 | 4.81 | 4.8 | 5.03 | 2.3 | 5.55 |
| 9: 0 | . | . | 8.2 | 5.96 | . | . | . | . |
| 10: 0 | 0.9 | 4.04 | 10.4 | 6.58 | 4.8 | 8.33 | 2.3 | 8.48 |
| 11: 0 | . | . | . | . | . | . | . | . |
| 12: 0 | . | . | . | . | . | . | . | . |
| 13: 0 | -0.6 | 3.35 | 5.3 | 6.69 | 3.3 | 9.12 | 1.2 | 11.88 |
| 14: 0 | -0.3 | 3.10 | 6.7 | 6.73 | 5.2 | 8.97 | 3.9 | 11.38 |
| 15: 0 | -1.1 | 3.91 | 1.1 | 11.39 | 0.1 | 13.08 | -0.5 | 12.95 |
| 16: 0 | -1.6 | 3.80 | -1.2 | 9.10 | -3.8 | 9.38 | -9.1 | 9.76 |
| 17: 0 | -2.2 | 3.25 | 0.2 | 5.51 | -0.3 | 6.91 | -5.0 | 6.68 |

JUL.21,1977 DALLEV

| TIME | HA5 | SIG | HA26 | SIG | HA52 | SIG | HA102 | SIG |
|---|---|---|---|---|---|---|---|---|
| 8: 0 | 4.1 | 1.29 | 7.8 | 2.38 | 6.6 | 1.86 | 8.0 | 1.69 |
| 9: 0 | . | . | . | . | . | . | . | . |
| 10: 0 | 7.2 | 1.91 | 13.2 | 2.81 | 9.7 | 2.68 | 12.1 | 2.04 |
| 11: 0 | . | . | . | . | . | . | . | . |
| 12: 0 | . | . | . | . | . | . | . | . |
| 13: 0 | 4.9 | 1.76 | 7.6 | 2.82 | 7.2 | 2.57 | 7.6 | 2.40 |
| 14: 0 | 4.6 | 1.91 | 7.4 | 2.94 | 6.5 | 2.43 | 7.3 | 2.52 |
| 15: 0 | 5.9 | 3.58 | 10.2 | 6.82 | 11.3 | 8.34 | 12.0 | 9.10 |
| 16: 0 | 6.6 | 1.93 | 7.5 | 5.84 | 13.8 | 4.52 | 16.6 | 4.83 |
| 17: 0 | 6.5 | 1.74 | 8.9 | 2.94 | 10.3 | 2.80 | 12.1 | 3.36 |

JUL.22,1977 DALLEV

| TIME | TRFVOL | SPEED | RH5 | SIG | RH82 | SIG | PYRAN | SIG |
|---|---|---|---|---|---|---|---|---|
| 7:55 | 4439 | 52.0 | 86.6 | 5.42 | 91.0 | 2.54 | 93. | 53.8 |
| 8:55 | 3466 | 53.1 | 69.3 | 1.48 | 70.6 | 3.44 | 300. | 49.4 |
| 9:55 | 2467 | 52.8 | . | . | . | . | . | ******** |

JUL.22,1977 DALLEV

| TIME | TMP5 | SIG | TMP29 | SIG | TMP42 | SIG | TMP82 | SIG |
|---|---|---|---|---|---|---|---|---|
| 7:55 | 74.9 | 1.88 | 75.2 | 0.78 | 76.0 | 0.67 | 75.4 | 0.60 |
| 8:55 | 79.9 | 0.69 | 79.0 | 0.71 | 79.2 | 0.62 | 78.5 | 0.64 |
| 9:55 | . | . | . | . | . | . | . | . |

JUL.22,1977 DALLEV

| TIME | WV5 | SIG | WV26 | SIG | WV52 | SIG | WV102 | SIG |
|---|---|---|---|---|---|---|---|---|
| 7:55 | 255.6 | 15.63 | 312.9 | 40.94 | 270.7 | 23.93 | 270.0 | 31.24 |
| 8:55 | 291.5 | 16.27 | 346.7 | 24.50 | 301.8 | 13.68 | 298.0 | 17.61 |
| 9:55 | . | . | . | . | . | . | . | . |

JUL.22,1977 DALLEV

| TIME | HA5 | SIG | HA26 | SIG | HA52 | SIG | HA102 | SIG |
|---|---|---|---|---|---|---|---|---|
| 7:55 | 2.5 | 1.03 | 4.6 | 1.44 | 4.5 | 1.57 | 4.3 | 1.81 |
| 8:55 | 4.0 | 1.25 | 5.3 | 1.54 | 4.8 | 1.42 | 5.1 | 1.46 |
| 9:55 | . | . | . | . | . | . | . | . |



JUL.22,1977 DALLEV

| TIME | VA5 | SIG | VA26 | SIG | VA52 | SIG | VA102 | SIG |
|---|---|---|---|---|---|---|---|---|
| 7:55 | -0.9 | 1.12 | 0.5 | 1.63 | -0.0 | 1.56 | 1.9 | 2.56 |
| 8:55 | -0.6 | 1.33 | -1.8 | 2.99 | 0.8 | 3.91 | 2.3 | 5.12 |
| 9:55 | . | . | . | . | . | . | . | . |

AUG. 3,1977 DALLEV

| TIME | TRFVOL | SPEED | RH5 | SIG | RH82 | SIG | PYRAN | SIG |
|---|---|---|---|---|---|---|---|---|
| 8: 0 | 4042 | 52.6 | 73.7 | 2.48 | 79.2 | 1.52 | 112. | 55.6 |
| 9: 0 | 2654 | 54.0 | 65.6 | 2.45 | 71.4 | 3.08 | 356. | 91.4 |
| 10: 0 | 3053 | 54.3 | 53.5 | 3.33 | 59.6 | 2.29 | 589. | 85.6 |
| 11: 0 | 3068 | 54.3 | 48.6 | 2.82 | 55.3 | 1.20 | 757. | 63.8 |
| 12: 0 | 2538 | 55.6 | . | . | . | . | 853. | 34.8 |
| 13: 0 | 1960 | 54.9 | . | . | . | . | . | ******** |
| 14: 0 | 2736 | 55.1 | 39.0 | 0.67 | 38.0 | 0.84 | 950. | 9.4 |
| 15: 0 | 2814 | 56.0 | 35.3 | 1.67 | 33.4 | 1.64 | 917. | 16.6 |
| 16: 0 | 3140 | 58.1 | 35.4 | 0.89 | 32.4 | 0.79 | 821. | 37.4 |
| 17: 0 | 4216 | 60.0 | . | . | . | . | 663. | 55.7 |
| 18: 0 | 3078 | 60.0 | . | . | . | . | . | ******** |
| 19: 0 | 0 | 0.0 | . | . | . | . | . | ******** |

AUG. 5,1977 DALLEV

| TIME | WV5 | SIG | WV26 | SIG | WV52 | SIG | WV102 | SIG |
|---|---|---|---|---|---|---|---|---|
| 8: 0 | 112.9 | 15.24 | 123.7 | 10.62 | 107.9 | 26.52 | 129.7 | 9.04 |
| 9: 0 | 135.0 | 26.36 | 135.0 | 17.09 | 118.4 | 29.24 | 126.0 | 28.89 |
| 10: 0 | 165.9 | 40.85 | 173.9 | 37.68 | 165.2 | 36.66 | 148.9 | 22.16 |
| 11: 0 | 189.8 | 42.08 | 206.2 | 33.28 | 197.0 | 24.67 | 173.6 | 23.24 |
| 12: 0 | 220.1 | 41.29 | 214.9 | 38.75 | 224.3 | 37.65 | 220.5 | 35.20 |
| 13: 0 | 123.3 | 50.10 | 109.2 | 45.47 | 81.5 | 46.14 | 99.5 | 44.53 |
| 14: 0 | 76.9 | 41.53 | 79.1 | 36.52 | 55.0 | 40.57 | 83.5 | 37.33 |
| 15: 0 | 82.6 | 41.42 | 86.0 | 34.67 | 60.2 | 40.67 | 87.9 | 36.28 |
| 16: 0 | 68.5 | 48.25 | 65.6 | 40.60 | 40.4 | 42.90 | 69.7 | 43.96 |
| 17: 0 | 79.8 | 29.04 | 78.1 | 22.53 | 54.8 | 21.70 | 83.6 | 20.85 |
| 18: 0 | . | . | . | . | . | . | . | . |
| 19: 0 | . | . | . | . | . | . | . | . |

AUG. 3,1977 DALLEV

| TIME | TMP5 | SIG | TMP29 | SIG | TMP42 | SIG | TMP82 | SIG |
|---|---|---|---|---|---|---|---|---|
| 8: 0 | 75.2 | 1.15 | 74.3 | 1.01 | 74.9 | 1.05 | 74.1 | 0.81 |
| 9: 0 | 79.0 | 1.20 | 78.8 | 1.39 | 79.2 | 1.36 | 78.0 | 1.45 |
| 10: 0 | 82.8 | 1.22 | 83.0 | 1.38 | 83.8 | 1.23 | 80.9 | 1.48 |
| 11: 0 | 86.2 | 0.96 | 85.0 | 1.08 | 85.7 | 1.11 | 83.3 | 0.82 |
| 12: 0 | . | . | . | . | . | . | . | . |
| 13: 0 | . | . | . | . | . | . | . | . |
| 14: 0 | 92.2 | 0.66 | 92.0 | 0.96 | 91.5 | 1.09 | 91.2 | 0.99 |
| 15: 0 | 93.2 | 0.80 | 93.6 | 1.69 | 93.0 | 1.58 | 92.9 | 1.63 |
| 16: 0 | 94.1 | 0.88 | 94.5 | 1.08 | 93.7 | 1.27 | 93.5 | 1.24 |
| 17: 0 | . | . | . | . | . | . | . | . |
| 18: 0 | . | . | . | . | . | . | . | . |
| 19: 0 | . | . | . | . | . | . | . | . |

AUG. 3,1977 DALLEV

| TIME | VA5 | SIG | VA26 | SIG | VA52 | SIG | VA102 | SIG |
|---|---|---|---|---|---|---|---|---|
| 8: 0 | -1.0 | 1.48 | 1.6 | 3.10 | 2.1 | 3.48 | -0.7 | 3.85 |
| 9: 0 | -0.4 | 1.84 | 1.8 | 4.08 | -0.0 | 5.38 | -1.2 | 4.66 |
| 10: 0 | 0.1 | 2.94 | 3.0 | 7.24 | 0.9 | 7.59 | -0.6 | 4.76 |
| 11: 0 | 0.4 | 3.28 | 4.4 | 7.42 | 2.1 | 8.52 | 0.8 | 6.46 |
| 12: 0 | -0.0 | 1.12 | 3.1 | 5.98 | 1.6 | 7.44 | 1.7 | 9.45 |
| 13: 0 | -0.8 | 2.76 | 3.0 | 6.74 | 2.4 | 9.46 | . | . |
| 14: 0 | -1.3 | 2.72 | -0.0 | 7.31 | -1.9 | 9.01 | -4.9 | 10.64 |
| 15: 0 | -1.4 | 2.42 | 1.3 | 7.54 | -0.2 | 10.24 | -3.3 | 12.49 |
| 16: 0 | -1.1 | 2.20 | 0.8 | 6.70 | -0.2 | 8.72 | -3.1 | 10.64 |
| 17: 0 | -2.0 | 2.64 | 1.1 | 6.55 | -0.3 | 8.98 | -4.5 | 11.17 |
| 18: 0 | . | . | . | . | . | . | . | . |
| 19: 0 | . | . | . | . | . | . | . | . |

## AUG. 3,1977 DALLEV

| TIME | HA5 | SIG | HA26 | SIG | HA52 | SIG | HA102 | SIG |
|---|---|---|---|---|---|---|---|---|
| 8: 0 | 3.2 | 0.74 | 4.1 | 1.10 | 5.0 | 1.12 | 5.5 | 0.85 |
| 9: 0 | 3.1 | 0.83 | 4.1 | 1.02 | 4.1 | 0.99 | 4.3 | 1.05 |
| 10: 0 | 3.1 | 1.23 | 4.7 | 2.05 | 5.1 | 2.12 | 6.2 | 3.11 |
| 11: 0 | 3.5 | 1.19 | 6.2 | 2.11 | 5.9 | 2.15 | 7.1 | 2.16 |
| 12: 0 | 3.3 | 1.25 | 5.3 | 1.81 | 4.8 | 1.85 | 4.9 | 1.52 |
| 13: 0 | 3.7 | 1.73 | 4.8 | 2.75 | 5.7 | 3.65 | 6.2 | 3.94 |
| 14: 0 | 4.6 | 2.18 | 6.2 | 2.83 | 6.8 | 2.90 | 7.1 | 3.05 |
| 15: 0 | 4.6 | 1.99 | 5.5 | 2.50 | 6.3 | 2.84 | 6.6 | 2.64 |
| 16: 0 | 4.3 | 2.19 | 5.4 | 2.66 | 6.0 | 2.99 | 6.0 | 3.05 |
| 17: 0 | 6.1 | 2.15 | 7.4 | 2.63 | 8.7 | 2.58 | 9.5 | 2.86 |
| 18: 0 | . | . | . | . | . | . | . | . |
| 19: 0 | . | . | . | . | . | . | . | . |

AUG. 4,1977 DALLEV

| TIME | TRFVOL | SPEED | RH5 | SIG | RH82 | SIG | PYRAN | SIG |
|---|---|---|---|---|---|---|---|---|
| 8: 0 | 4320 | 53.4 | 72.6 | 0.62 | 76.4 | 0.62 | 38. | 37.4 |
| 9: 0 | 3267 | 53.5 | 66.5 | 2.05 | 72.2 | 1.69 | 255. | 60.7 |
| 10: 0 | 2553 | 54.6 | 61.5 | 1.78 | 67.8 | 1.80 | 497. | 62.1 |
| 11: 0 | 2502 | 55.4 | 54.9 | 1.63 | 60.3 | 2.15 | 690. | 55.1 |
| 12: 0 | 2462 | 55.1 | 47.7 | 2.30 | 50.0 | 3.16 | 768. | 73.9 |
| 13: 0 | 2610 | 55.0 | 42.8 | 0.97 | 44.1 | 1.08 | 912. | 13.5 |
| 14: 0 | 2665 | 56.3 | 40.1 | 1.29 | 40.5 | 1.65 | 951. | 37.9 |
| 15: 0 | 2892 | 55.2 | 37.8 | 0.39 | 37.1 | 0.37 | 769. | 293.8 |
| 16: 0 | 3439 | 57.7 | 36.6 | 0.39 | 35.6 | 0.37 | 700. | 259.5 |
| 17: 0 | 4268 | 57.5 | 37.9 | 0.63 | 36.3 | 0.59 | 532. | 165.3 |
| 18: 0 | 4720 | 50.9 | 36.3 | 0.89 | 34.5 | 1.04 | 460. | 60.4 |
| 19: 0 | 1908 | 51.8 | . | . | . | . | . | ******** |

AUG. 4,1977 DALLEV

| TIME | WV5 | SIG | WV26 | SIG | WV52 | SIG | WV102 | SIG |
|---|---|---|---|---|---|---|---|---|
| 8: 0 | 119.4 | 15.27 | 131.2 | 9.52 | 132.7 | 22.74 | 143.4 | 5.81 |
| 9: 0 | 133.6 | 17.58 | 137.8 | 11.58 | 141.0 | 22.57 | 147.6 | 9.71 |
| 10: 0 | 162.4 | 20.29 | 158.8 | 16.22 | 163.5 | 17.90 | 164.2 | 12.38 |
| 11: 0 | 174.1 | 19.25 | 171.1 | 15.42 | 177.2 | 15.42 | 177.0 | 12.63 |
| 12: 0 | 168.9 | 17.26 | 164.8 | 15.18 | 169.7 | 16.03 | 169.9 | 12.46 |
| 13: 0 | 173.9 | 20.13 | 170.5 | 17.71 | 176.2 | 18.52 | 174.0 | 15.30 |
| 14: 0 | 150.8 | 26.95 | 147.2 | 23.58 | 147.0 | 33.98 | 153.1 | 21.51 |
| 15: 0 | 144.1 | 25.66 | 139.3 | 22.20 | 135.5 | 34.70 | 144.4 | 20.31 |
| 16: 0 | 138.2 | 20.45 | 131.8 | 16.53 | 122.5 | 31.85 | 134.6 | 14.77 |
| 17: 0 | 132.7 | 16.86 | 126.8 | 13.08 | 114.6 | 32.27 | 132.7 | 11.75 |
| 18: 0 | 139.2 | 16.51 | 133.2 | 12.64 | 127.0 | 31.82 | 137.0 | 11.67 |
| 19: 0 | . | . | . | . | . | . | . | . |

AUG. 4,1977 DALLEV

| TIME | TMP5 | SIG | TMP29 | SIG | TMP42 | SIG | TMP82 | SIG |
|---|---|---|---|---|---|---|---|---|
| 8: 0 | 71.3 | 0.67 | 70.9 | 0.54 | 71.3 | 0.54 | 71.0 | 0.50 |
| 9: 0 | 75.8 | 1.56 | 75.2 | 1.76 | 75.6 | 1.72 | 74.7 | 1.59 |
| 10: 0 | 80.8 | 1.41 | 80.4 | 1.32 | 80.8 | 1.40 | 79.5 | 1.12 |
| 11: 0 | 85.0 | 1.04 | 83.6 | 1.53 | 84.2 | 1.35 | 82.7 | 1.53 |
| 12: 0 | 88.2 | 1.02 | 87.4 | 1.12 | 87.4 | 0.91 | 86.7 | 1.21 |
| 13: 0 | 91.0 | 0.92 | 89.6 | 1.07 | 89.8 | 0.99 | 88.9 | 1.17 |
| 14: 0 | 92.8 | 0.61 | 92.1 | 0.70 | 92.0 | 0.62 | 91.5 | 0.85 |
| 15: 0 | 93.5 | 1.01 | 93.2 | 0.97 | 92.8 | 0.86 | 92.7 | 0.96 |
| 16: 0 | 94.3 | 1.03 | 94.3 | 1.03 | 93.6 | 0.96 | 93.7 | 0.96 |
| 17: 0 | 93.5 | 0.79 | 93.3 | 0.74 | 92.7 | 0.71 | 92.9 | 0.72 |
| 18: 0 | 93.6 | 0.55 | 93.7 | 0.54 | 93.2 | 0.55 | 93.3 | 0.54 |
| 19: 0 | . | . | . | . | . | . | . | . |

AUG. 4,1977 DALLEV

| TIME | VA5 | SIG | VA26 | SIG | VA52 | SIG | VA102 | SIG |
|---|---|---|---|---|---|---|---|---|
| 8: 0 | -1.0 | 1.70 | 2.4 | 2.94 | 2.8 | 2.94 | 0.3 | 2.64 |
| 9: 0 | -1.0 | 2.38 | 3.8 | 4.34 | 3.8 | 4.83 | 0.5 | 5.37 |
| 10: 0 | 0.0 | 2.86 | 5.7 | 4.96 | 4.3 | 6.38 | 1.7 | 6.78 |
| 11: 0 | 0.6 | 3.31 | 8.5 | 6.16 | 4.5 | 7.40 | 1.9 | 8.76 |
| 12: 0 | 0.4 | 3.83 | 8.9 | 7.08 | 5.8 | 8.68 | 1.9 | 9.16 |
| 13: 0 | 1.1 | 4.03 | 9.3 | 7.11 | 5.6 | 8.83 | 3.7 | 11.13 |
| 14: 0 | -0.7 | 3.65 | 6.4 | 7.24 | 5.0 | 9.07 | 0.7 | 11.18 |
| 15: 0 | -1.1 | 3.61 | 6.3 | 7.31 | 4.6 | 8.86 | -0.8 | 10.94 |
| 16: 0 | -1.7 | 3.63 | 6.3 | 7.36 | 5.9 | 8.07 | -0.4 | 9.89 |
| 17: 0 | -2.4 | 3.77 | 6.0 | 7.10 | 5.3 | 8.23 | -2.1 | 9.55 |
| 18: 0 | -2.0 | 4.13 | 7.5 | 7.34 | 6.6 | 8.51 | -1.5 | 9.91 |
| 19: 0 | . | . | . | . | . | . | . | . |

AUG. 4,1977 DALLEV

| TIME | HA5 | SIG | HA26 | SIG | HA52 | SIG | HA102 | SIG |
|---|---|---|---|---|---|---|---|---|
| 8: 0 | 3.3 | 0.63 | 4.4 | 0.80 | 5.4 | 0.91 | 6.6 | 0.85 |
| 9: 0 | 4.0 | 0.83 | 5.5 | 1.09 | 6.2 | 0.95 | 6.5 | 1.03 |
| 10: 0 | 4.4 | 1.17 | 7.3 | 1.81 | 6.8 | 1.48 | 7.1 | 1.27 |
| 11: 0 | 5.3 | 1.59 | 9.8 | 2.38 | 8.4 | 2.32 | 9.4 | 1.84 |
| 12: 0 | 6.6 | 1.70 | 11.4 | 2.50 | 10.3 | 2.53 | 11.3 | 2.22 |
| 13: 0 | 6.2 | 1.75 | 10.7 | 3.25 | 8.5 | 2.71 | 10.6 | 2.49 |
| 14: 0 | 6.3 | 2.30 | 9.5 | 3.26 | 9.6 | 3.49 | 9.9 | 2.83 |
| 15: 0 | 6.3 | 2.35 | 9.0 | 3.13 | 10.0 | 3.35 | 9.9 | 2.81 |
| 16: 0 | 7.1 | 2.16 | 10.1 | 2.89 | 12.0 | 3.12 | 11.3 | 2.82 |
| 17: 0 | 8.4 | 2.25 | 11.8 | 3.19 | 14.1 | 3.40 | 13.5 | 2.95 |
| 18: 0 | 8.3 | 1.95 | 12.0 | 2.97 | 14.3 | 2.90 | 13.9 | 2.69 |
| 19: 0 | . | . | . | . | . | . | . | . |

AUG. 5,1977 DALLEV

| TIME | WV5 | SIG | WV26 | SIG | WV52 | SIG | WV102 | SIG |
|---|---|---|---|---|---|---|---|---|
| 8: 0 | 142.4 | 15.47 | 144.7 | 10.06 | 150.1 | 15.35 | 153.2 | 8.63 |

AUG. 5,1977 DALLEV

| TIME | TRFVOL | SPEED | RH5 | SIG | RH82 | SIG | PYRAN | SIG |
|---|---|---|---|---|---|---|---|---|
| 8: 0 | 4317 | 52.8 | 83.2 | 1.29 | 92.0 | 0.81 | 79. | 49.9 |

AUG. 5,1977 DALLEV

| TIME | TMP5 | SIG | TMP29 | SIG | TMP42 | SIG | TMP82 | SIG |
|---|---|---|---|---|---|---|---|---|
| 8: 0 | 74.6 | 0.75 | 74.0 | 0.69 | 74.6 | 0.66 | 73.9 | 0.61 |

AUG. 5,1977 DALLEV

| TIME | HA5 | SIG | HA26 | SIG | HA52 | SIG | HA102 | SIG |
|---|---|---|---|---|---|---|---|---|
| 8: 0 | 4.9 | 1.07 | 8.2 | 1.69 | 9.0 | 1.61 | 9.2 | 1.67 |

AUG. 5,1977 DALLEV

| TIME | VA5 | SIG | VA26 | SIG | VA52 | SIG | VA102 | SIG |
|---|---|---|---|---|---|---|---|---|
| 8: 0 | -1.2 | 2.93 | 4.9 | 5.69 | 4.8 | 6.61 | 0.9 | 7.26 |

AUG.10,1977 DALLEV

| TIME | TRFVOL | SPEED | RH5 | SIG | RH82 | SIG | PYRAN | SIG |
|---|---|---|---|---|---|---|---|---|
| 8: 0 | 3668 | 51.6 | 74.3 | 1.94 | 81.4 | 1.31 | 128. | 65.9 |
| 9: 0 | 3046 | 52.7 | 67.8 | 2.33 | 75.8 | 1.92 | 338. | 60.7 |
| 10: 0 | 2443 | 53.1 | 58.1 | 3.11 | 65.3 | 3.75 | 544. | 52.5 |
| 11: 0 | 2306 | 53.3 | 51.1 | 1.61 | 56.6 | 2.55 | 696. | 45.9 |
| 12: 0 | 2395 | 53.6 | 45.9 | 1.55 | 48.6 | 2.05 | 791. | 105.2 |
| 13: 0 | 2629 | 53.6 | 41.5 | 1.15 | 43.0 | 1.65 | 933. | 16.6 |
| 14: 0 | 2706 | 52.8 | 39.3 | 0.61 | 39.4 | 0.73 | 951. | -2.1 |
| 15: 0 | 2868 | 53.9 | 38.0 | 0.43 | 37.5 | 0.45 | 895. | 180.3 |
| 16: 0 | 3319 | 55.1 | 37.7 | 0.51 | 36.9 | 0.34 | 607. | 309.6 |
| 17: 0 | 4196 | 58.5 | 37.3 | 0.68 | 36.3 | 0.54 | 558. | 266.9 |
| 18: 0 | 4410 | 59.6 | 36.8 | 0.96 | 35.4 | 1.00 | 411. | 167.7 |
| 19: 0 | 3536 | 58.1 | 35.3 | 0.34 | 33.3 | 0.43 | 277. | 64.2 |

AUG.10,1977 DALLEV

| TIME | WV5 | SIG | WV26 | SIG | WV52 | SIG | WV102 | SIG |
|---|---|---|---|---|---|---|---|---|
| 8: 0 | 151.9 | 18.24 | 155.8 | 12.18 | 162.6 | 11.68 | 163.5 | 9.60 |
| 9: 0 | 173.0 | 23.33 | 169.2 | 19.14 | 174.0 | 18.66 | 173.8 | 16.28 |
| 10: 0 | 193.5 | 19.14 | 188.3 | 15.28 | 195.1 | 15.13 | 193.3 | 12.15 |
| 11: 0 | 195.6 | 26.21 | 189.0 | 20.29 | 196.2 | 20.76 | 193.7 | 17.57 |
| 12: 0 | 178.0 | 33.76 | 169.9 | 27.28 | 176.5 | 28.97 | 177.5 | 20.45 |
| 13: 0 | 159.4 | 40.21 | 154.1 | 35.08 | 156.6 | 42.69 | 161.2 | 32.96 |
| 14: 0 | 155.6 | 37.59 | 150.7 | 31.99 | 150.8 | 41.56 | 157.5 | 31.11 |
| 15: 0 | 127.6 | 32.53 | 122.0 | 29.44 | 110.1 | 39.71 | 130.9 | 27.74 |
| 16: 0 | 132.1 | 26.79 | 128.8 | 22.72 | 121.8 | 35.83 | 136.9 | 19.52 |
| 17: 0 | 152.4 | 26.79 | 144.0 | 22.57 | 143.5 | 33.06 | 149.3 | 20.23 |
| 18: 0 | 143.2 | 18.43 | 134.2 | 14.27 | 127.9 | 31.64 | 138.7 | 11.63 |
| 19: 0 | 135.7 | 14.94 | 128.2 | 10.50 | 116.5 | 29.86 | 133.9 | 8.68 |

AUG.10,1977 DALLEV

| TIME | TMP5 | SIG | TMP29 | SIG | TMP42 | SIG | TMP82 | SIG |
|---|---|---|---|---|---|---|---|---|
| 8: 0 | 78.5 | 0.84 | 77.8 | 0.88 | 78.5 | 0.86 | 77.4 | 0.73 |
| 9: 0 | 81.2 | 1.20 | 80.2 | 0.68 | 80.6 | 0.73 | 79.4 | 0.57 |
| 10: 0 | 85.2 | 1.40 | 82.7 | 0.90 | 83.2 | 0.86 | 81.8 | 0.96 |
| 11: 0 | 88.1 | 1.23 | 85.4 | 1.64 | 85.9 | 1.60 | 84.6 | 1.39 |
| 12: 0 | 90.6 | 1.25 | 89.3 | 1.63 | 89.7 | 1.53 | 88.4 | 1.78 |
| 13: 0 | 93.2 | 0.70 | 92.2 | 1.35 | 92.1 | 1.23 | 91.7 | 1.55 |
| 14: 0 | 94.5 | 0.90 | 94.1 | 0.83 | 93.8 | 0.86 | 93.5 | 0.75 |
| 15: 0 | 95.4 | 0.86 | 95.8 | 0.77 | 95.3 | 0.85 | 95.2 | 0.80 |
| 16: 0 | 95.5 | 1.13 | 95.7 | 1.15 | 94.9 | 1.18 | 95.1 | 0.93 |
| 17: 0 | 96.2 | 1.43 | 96.1 | 1.40 | 95.6 | 1.42 | 95.5 | 1.26 |
| 18: 0 | 95.8 | 1.09 | 96.1 | 1.22 | 95.6 | 1.19 | 95.7 | 1.12 |
| 19: 0 | 95.4 | 0.59 | 96.1 | 0.46 | 95.5 | 0.53 | 95.6 | 0.53 |

AUG.10,1977 DALLEV

| TIME | VA5 | SIG | VA26 | SIG | VA52 | SIG | VA102 | SIG |
|---|---|---|---|---|---|---|---|---|
| 8: 0 | -1.0 | 2.52 | 4.3 | 4.30 | 3.9 | 5.11 | 1.5 | 5.75 |
| 9: 0 | -0.2 | 3.28 | 6.9 | 5.39 | 4.6 | 7.42 | 1.8 | 7.53 |
| 10: 0 | 0.6 | 3.09 | 7.5 | 5.63 | 3.2 | 8.05 | 3.2 | 9.46 |
| 11: 0 | 0.2 | 2.97 | 6.8 | 5.93 | 1.9 | 7.53 | 1.7 | 9.40 |
| 12: 0 | 0.0 | 3.03 | 5.1 | 6.00 | 2.5 | 7.63 | 0.8 | 9.79 |
| 13: 0 | -1.0 | 2.75 | 5.0 | 6.92 | 3.8 | 8.70 | 1.4 | 10.94 |
| 14: 0 | -1.2 | 2.92 | 4.6 | 7.40 | 2.7 | 9.51 | -1.4 | 11.77 |
| 15: 0 | -1.5 | 2.94 | 4.5 | 6.80 | 3.5 | 8.27 | -0.1 | 11.69 |
| 16: 0 | -1.8 | 2.75 | 3.9 | 5.80 | 3.0 | 7.84 | -2.9 | 9.39 |
| 17: 0 | -1.4 | 3.13 | 6.2 | 6.78 | 4.6 | 7.94 | -1.3 | 10.26 |
| 18: 0 | -2.0 | 3.22 | 6.6 | 6.64 | 5.9 | 7.48 | -1.1 | 9.50 |
| 19: 0 | -2.4 | 3.05 | 6.3 | 6.18 | 5.7 | 6.86 | -1.4 | 8.68 |

AUG.10,1977 DALLEV

| TIME | HA5 | SIG | HA26 | SIG | HA52 | SIG | HA102 | SIG |
|---|---|---|---|---|---|---|---|---|
| 8: 0 | 3.5 | 1.11 | 6.5 | 1.85 | 6.4 | 1.55 | 6.9 | 1.39 |
| 9: 0 | 4.9 | 1.34 | 9.0 | 2.06 | 8.2 | 2.30 | 8.9 | 1.62 |
| 10: 0 | 4.4 | 1.32 | 8.3 | 1.87 | 7.0 | 2.48 | 8.2 | 1.45 |
| 11: 0 | 4.2 | 1.43 | 7.7 | 2.11 | 6.7 | 2.58 | 7.5 | 1.90 |
| 12: 0 | 3.6 | 1.44 | 6.1 | 2.56 | 5.2 | 2.32 | 5.9 | 2.22 |
| 13: 0 | 4.3 | 1.67 | 6.2 | 2.45 | 6.4 | 2.36 | 6.3 | 2.04 |
| 14: 0 | 4.7 | 2.19 | 6.6 | 2.90 | 7.3 | 3.19 | 7.3 | 2.49 |
| 15: 0 | 5.6 | 2.32 | 7.0 | 2.89 | 8.0 | 3.49 | 7.6 | 3.00 |
| 16: 0 | . | . | . | . | . | . | 8.3 | 2.52 |
| 17: 0 | 5.9 | 2.12 | 9.0 | 2.86 | 9.9 | 3.18 | 9.8 | 2.53 |
| 18: 0 | 6.7 | 1.82 | 9.7 | 2.53 | 11.4 | 2.69 | 10.9 | 2.39 |
| 19: 0 | 7.5 | 1.61 | 10.1 | 2.04 | 12.2 | 2.35 | 11.3 | 1.96 |

AUG.11,1977 DALLEV

| TIME | VA5 | SIG | VA26 | SIG | VA52 | SIG | VA102 | SIG |
|---|---|---|---|---|---|---|---|---|
| 8: 0 | -0.8 | 1.85 | 2.5 | 3.34 | 2.1 | 3.40 | 0.3 | 3.60 |
| 9: 0 | -1.0 | 2.08 | 4.1 | 4.25 | 3.7 | 5.09 | 1.6 | 6.14 |
| 10: 0 | -0.0 | 2.12 | 3.8 | 4.89 | 1.5 | 5.62 | 0.7 | 7.29 |
| 11: 0 | -0.2 | 2.05 | 3.1 | 5.89 | 1.9 | 7.34 | 2.6 | 10.74 |
| 12: 0 | -0.4 | 2.58 | 4.0 | 6.93 | 2.0 | 8.48 | -1.4 | 9.82 |
| 13: 0 | -0.8 | 2.70 | 3.8 | 7.47 | 1.4 | 9.79 | -0.8 | 11.90 |
| 14: 0 | -0.5 | 2.89 | 4.6 | 6.73 | 2.0 | 8.95 | -0.3 | 12.29 |
| 15: 0 | -1.2 | 2.77 | 4.5 | 7.77 | 3.1 | 10.26 | 1.0 | 14.11 |
| 16: 0 | -0.9 | 2.36 | 3.2 | 6.61 | 1.8 | 8.72 | -1.1 | 11.01 |
| 17: 0 | -1.3 | 2.44 | 0.9 | 6.23 | -1.0 | 7.80 | -4.6 | 10.42 |

AUG.11,1977 DALLEV

| TIME | HA5 | SIG | HA26 | SIG | HA52 | SIG | HA102 | SIG |
|---|---|---|---|---|---|---|---|---|
| 8: 0 | 2.9 | 0.86 | 4.0 | 1.52 | 4.3 | 1.45 | 4.8 | 1.34 |
| 9: 0 | 3.5 | 0.97 | 5.4 | 1.53 | 5.4 | 1.30 | 5.3 | 1.19 |
| 10: 0 | 2.6 | 0.92 | 4.7 | 1.56 | 3.6 | 1.38 | 4.4 | 1.21 |
| 11: 0 | 2.3 | 1.03 | 3.8 | 1.77 | 3.3 | 1.53 | 3.6 | 1.50 |
| 12: 0 | 3.8 | 1.55 | 6.2 | 2.43 | 5.6 | 2.19 | 5.7 | 2.31 |
| 13: 0 | 3.7 | 1.80 | 5.6 | 2.80 | 5.3 | 2.88 | 5.2 | 2.43 |
| 14: 0 | 3.8 | 1.83 | 5.8 | 2.73 | 5.7 | 2.81 | 5.7 | 2.54 |
| 15: 0 | 4.4 | 2.10 | 5.7 | 2.82 | 6.3 | 2.97 | 6.3 | 2.63 |
| 16: 0 | 3.8 | 1.75 | 4.7 | 2.53 | 5.1 | 2.92 | 4.9 | 2.71 |
| 17: 0 | 4.8 | 2.76 | 6.3 | 3.60 | 6.5 | 3.22 | 6.6 | 3.48 |

AUG.11,1977 DALLEV

| TIME | TMP5 | SIG | TMP29 | SIG | TMP42 | SIG | TMP82 | SIG |
|---|---|---|---|---|---|---|---|---|
| 8: 0 | 76.9 | 0.91 | 76.3 | 0.86 | 77.0 | 0.90 | 76.0 | 0.74 |
| 9: 0 | 79.9 | 1.43 | 79.4 | 1.40 | 80.0 | 1.53 | 78.6 | 1.13 |
| 10: 0 | 84.6 | 1.58 | 82.9 | 1.29 | 83.9 | 1.27 | 81.7 | 1.32 |
| 11: 0 | 88.8 | 1.06 | 87.1 | 1.55 | 88.0 | 1.72 | 85.8 | 1.31 |
| 12: 0 | 90.2 | 0.83 | 89.6 | 1.11 | 89.9 | 1.10 | 89.0 | 0.92 |
| 13: 0 | 92.2 | 0.84 | 91.4 | 1.28 | 91.3 | 1.33 | 90.9 | 1.31 |
| 14: 0 | 93.9 | 1.23 | 93.0 | 1.52 | 93.0 | 1.59 | 92.5 | 1.43 |
| 15: 0 | 95.5 | 0.89 | 95.8 | 1.07 | 95.3 | 0.97 | 94.8 | 1.07 |
| 16: 0 | 96.6 | 1.56 | 97.7 | 1.60 | 97.0 | 1.76 | 96.7 | 1.55 |
| 17: 0 | 95.1 | 1.70 | 95.7 | 2.03 | 95.1 | 2.18 | 95.1 | 2.01 |

AUG.11,1977 DALLEV

| TIME | WV5 | SIG | WV26 | SIG | WV52 | SIG | WV102 | SIG |
|---|---|---|---|---|---|---|---|---|
| 8: 0 | 129.4 | 19.99 | 141.4 | 12.30 | 150.1 | 13.61 | 154.3 | 8.26 |
| 9: 0 | 145.5 | 20.74 | 147.7 | 15.11 | 153.1 | 18.25 | 157.5 | 12.41 |
| 10: 0 | 184.2 | 29.47 | 180.3 | 20.60 | 188.6 | 20.07 | 187.6 | 16.77 |
| 11: 0 | 194.4 | 42.35 | 186.9 | 37.31 | 194.4 | 37.21 | 194.8 | 27.12 |
| 12: 0 | 174.2 | 40.45 | 166.0 | 37.98 | 174.6 | 39.02 | 174.6 | 32.40 |
| 13: 0 | 184.5 | 47.86 | 179.2 | 44.56 | 188.3 | 45.31 | 181.8 | 40.45 |
| 14: 0 | 169.1 | 45.82 | 156.8 | 41.61 | 162.6 | 47.99 | 166.6 | 40.74 |
| 15: 0 | 134.0 | 47.16 | 124.7 | 40.79 | 122.7 | 48.57 | 139.1 | 38.66 |
| 16: 0 | 144.7 | 51.77 | 138.6 | 49.72 | 133.2 | 52.66 | 152.1 | 48.02 |
| 17: 0 | 83.7 | 45.59 | 82.2 | 41.27 | 56.3 | 45.21 | 87.3 | 38.18 |

## SPT. 28, 1977 SAN ANTONIO

| TIME | TMP5 | SIG | TMP29 | SIG | TMP42 | SIG | TMP82 | SIG |
|---|---|---|---|---|---|---|---|---|
| 9:15 | 74.6 | . | 74.3 | . | 74.3 | . | 73.3 | . |
| 10:15 | 75.4 | . | 75.1 | . | 75.1 | . | 74.2 | . |
| 11:15 | 80.0 | . | 79.3 | . | 79.0 | . | 78.1 | . |
| 12:15 | 84.1 | . | 83.3 | . | 82.4 | . | 81.4 | . |
| 13:15 | 87.6 | . | 86.6 | . | 85.6 | . | 84.8 | . |
| 14:15 | 90.3 | . | 89.3 | . | 88.6 | . | 88.0 | . |
| 15:15 | 92.5 | . | 91.2 | . | 90.5 | . | 90.1 | . |
| 16:15 | 93.3 | . | 92.0 | . | 91.3 | . | 91.0 | . |
| 17:15 | 93.6 | . | 92.0 | . | 91.3 | . | 91.3 | . |



## SPT. 28, 1977 SAN ANTONIO

| TIME | TRFVOL | SPEED | RH5 | SIG | RH82 | SIG | PYRAN | SIG |
|---|---|---|---|---|---|---|---|---|
| 9:15 | 5464 | . | 82.8 | . | . | . | . | . |
| 10:15 | 4466 | . | 77.6 | . | . | . | . | . |
| 11:15 | 4733 | . | 62.1 | . | . | . | . | . |
| 12:15 | 5349 | . | 52.5 | . | . | . | . | . |
| 13:15 | 5289 | . | 44.8 | . | . | . | . | . |
| 14:15 | 3985 | . | 39.3 | . | . | . | . | . |
| 15:15 | 6466 | . | 35.8 | . | . | . | . | . |
| 16:15 | 7515 | . | 33.0 | . | . | . | . | . |
| 17:15 | 9467 | . | 33.1 | . | . | . | . | . |

SPT. 28, 1977 SAN ANTONIO

| TIME | HA5 | SIG | HA26 | SIG | HA52 | SIG | HA102 | SIG |
|---|---|---|---|---|---|---|---|---|
| 9:15 | 3.9 | . | 5.7 | . | 6.3 | . | 6.8 | . |
| 10:15 | 5.4 | . | 7.2 | . | 8.2 | . | 8.9 | . |
| 11:15 | 6.0 | . | 8.5 | . | 9.1 | . | 10.3 | . |
| 12:15 | 5.4 | . | 7.2 | . | 8.0 | . | 8.6 | . |
| 13:15 | 5.0 | . | 6.8 | . | 7.5 | . | 8.4 | . |
| 14:15 | 4.9 | . | 6.6 | . | 7.4 | . | 8.2 | . |
| 15:15 | 4.7 | . | 7.1 | . | 8.3 | . | 9.3 | . |
| 16:15 | 5.9 | . | 8.9 | . | 10.7 | . | 12.0 | . |
| 17:15 | 6.4 | . | 9.6 | . | 12.0 | . | 13.3 | . |

SPT. 28, 1977 SAN ANTONIO

| TIME | WV5 | SIG | WV26 | SIG | WV52 | SIG | WV102 | SIG |
|---|---|---|---|---|---|---|---|---|
| 9:15 | 190.3 | . | 191.0 | . | 196.6 | . | 188.0 | . |
| 10:15 | 202.0 | . | 207.5 | . | 209.3 | . | 199.8 | . |
| 11:15 | 178.3 | . | 181.0 | . | 179.1 | . | 173.1 | . |
| 12:15 | 188.8 | . | 192.0 | . | 192.8 | . | 183.3 | . |
| 13:15 | 181.0 | . | 183.0 | . | 182.8 | . | 175.8 | . |
| 14:15 | 159.1 | . | 153.8 | . | 163.8 | . | 152.0 | . |
| 15:15 | 152.1 | . | 149.1 | . | 150.0 | . | 147.5 | . |
| 16:15 | 148.0 | . | 148.5 | . | 147.8 | . | 145.3 | . |
| 17:15 | 130.6 | . | 131.5 | . | 132.3 | . | 131.3 | . |

## SEP.29,1977 SA LEVEL

| TIME | TRFVOL | SPEED | RH5 | SIG | RH82 | SIG | PYRAN | SIG |
|---|---|---|---|---|---|---|---|---|
| 8:55 | 7534 | 51.8 | 85.3 | 1.76 | . | . | . | ******** |
| 9:55 | 5040 | 52.3 | 73.5 | 4.32 | . | . | . | ******** |
| 10:55 | 5287 | 52.6 | 64.2 | 4.30 | . | . | . | ******** |
| 11:55 | 5649 | 52.4 | 53.3 | 2.46 | . | . | . | ******** |
| 12:55 | 6120 | 51.8 | 45.0 | 2.07 | . | . | . | ******** |
| 13:55 | 6004 | 51.8 | 40.2 | 1.09 | . | . | . | ******** |

SEP.29,1977 SA LEVEL

| TIME | WV5 | SIG | WV26 | SIG | WV52 | SIG | WV102 | SIG |
|---|---|---|---|---|---|---|---|---|
| 8:55 | 181.1 | 17.99 | 185.4 | 15.28 | 183.7 | 14.51 | 176.9 | 11.52 |
| 9:55 | 188.3 | 18.66 | 193.5 | 16.78 | 191.8 | 17.29 | 184.7 | 14.12 |
| 10:55 | 191.1 | 15.57 | 194.3 | 13.86 | 193.5 | 14.50 | 185.8 | 11.08 |
| 11:55 | 187.9 | 18.81 | 190.8 | 17.23 | 188.3 | 18.14 | 180.8 | 14.87 |
| 12:55 | 186.7 | 19.73 | 188.1 | 20.76 | 187.3 | 20.74 | 180.0 | 17.71 |
| 13:55 | 194.3 | 21.21 | 196.3 | 20.12 | 195.4 | 22.39 | 186.2 | 19.24 |

SEP.29,1977 SA LEVEL

| TIME | TMP5 | SIG | TMP29 | SIG | TMP42 | SIG | TMP82 | SIG |
|---|---|---|---|---|---|---|---|---|
| 8:55 | 73.4 | 0.63 | 73.1 | 0.60 | 73.4 | 0.52 | 72.6 | 0.46 |
| 9:55 | 76.8 | 1.34 | 76.3 | 1.23 | 76.2 | 1.16 | 75.2 | 1.14 |
| 10:55 | 79.5 | 1.50 | 78.8 | 1.43 | 78.6 | 1.30 | 77.6 | 1.25 |
| 11:55 | 83.2 | 1.20 | 82.4 | 1.16 | 82.0 | 1.09 | 80.9 | 1.03 |
| 12:55 | 86.4 | 1.35 | 85.4 | 1.35 | 84.9 | 1.19 | 83.9 | 1.18 |
| 13:55 | 88.9 | 0.97 | 87.7 | 1.02 | 87.2 | 1.05 | 86.2 | 1.02 |

## SEP.29,1977 SA LEVEL

| TIME | HA5 | SIG | HA26 | SIG | HA52 | SIG | HA102 | SIG |
|---|---|---|---|---|---|---|---|---|
| 8:55 | 5.0 | 1.55 | 7.5 | 2.07 | 8.4 | 2.06 | 9.9 | 2.26 |
| 9:55 | . | . | . | . | . | . | . | . |
| 10:55 | 7.2 | 1.78 | 9.6 | 2.22 | 10.9 | 2.36 | 12.1 | 2.28 |
| 11:55 | 7.4 | 2.26 | 9.8 | 2.63 | 10.8 | 2.81 | 12.3 | 2.99 |
| 12:55 | 7.4 | 2.33 | 9.8 | 2.94 | 11.2 | 3.13 | 12.4 | 3.03 |
| 13:55 | 7.9 | 2.26 | 10.4 | 2.87 | 11.8 | 3.03 | 12.7 | 2.93 |



## SEP.29,1977 SA LEVEL

| TIME | VA5 | SIG | VA26 | SIG | VA52 | SIG | VA102 | SIG |
|---|---|---|---|---|---|---|---|---|
| 8:55 | 0.4 | 3.09 | -2.4 | 6.84 | -0.5 | 8.25 | 0.7 | 8.56 |
| 9:55 | 0.3 | 2.94 | -2.1 | 6.44 | 0.8 | 8.07 | 2.8 | 8.93 |
| 10:55 | 0.6 | 3.69 | -3.0 | 8.04 | -0.3 | 9.26 | 1.5 | 9.83 |
| 11:55 | 0.6 | 3.71 | -2.8 | 8.01 | -0.4 | 9.40 | 1.4 | 11.12 |
| 12:55 | 0.6 | 3.83 | -2.3 | 8.66 | 0.1 | 10.07 | 1.7 | 10.79 |
| 13:55 | 0.5 | 3.88 | -2.6 | 8.35 | -0.1 | 10.09 | 0.8 | 11.09 |

OCT. 5,1977 SA LEVEL

| TIME | TRFVOL | SPEED | RH5 | SIG | RH82 | SIG | PYRAN | SIG |
|---|---|---|---|---|---|---|---|---|
| 8:15 | 9135 | 50.9 | 91.3 | 2.81 | . | . | -74. | 481.6 |
| 9:15 | 6145 | 53.2 | 80.3 | 3.29 | . | . | 238. | 65.3 |
| 10:15 | 4929 | 54.7 | 67.8 | 4.06 | . | . | 455. | 60.5 |
| 11:15 | 2861 | 56.6 | . | . | . | . | . | ******** |

OCT. 5,1977 SA LEVEL

| TIME | TMP5 | SIG | TMP29 | SIG | TMP42 | SIG | TMP82 | SIG |
|---|---|---|---|---|---|---|---|---|
| 8:15 | 59.1 | 0.98 | 59.6 | 0.58 | 59.8 | 3.79 | 59.9 | 0.45 |
| 9:15 | 62.7 | 1.32 | 62.3 | 1.37 | 59.3 | 14.81 | 62.2 | 1.21 |
| 10:15 | 67.8 | 1.78 | 67.2 | 1.75 | 67.5 | 1.63 | 66.9 | 1.60 |
| 11:15 | . | . | . | . | . | . | . | . |

OCT. 5,1977 SA LEVEL

| TIME | WV5 | SIG | WV26 | SIG | WV52 | SIG | WV102 | SIG |
|---|---|---|---|---|---|---|---|---|
| 8:15 | 44.3 | 24.04 | 49.4 | 11.69 | 47.7 | 23.44 | 54.8 | 8.31 |
| 9:15 | 72.1 | 18.85 | 65.4 | 12.84 | 65.1 | 16.78 | 65.3 | 12.15 |
| 10:15 | 85.2 | 21.96 | 81.4 | 18.03 | 83.8 | 17.84 | 84.2 | 15.66 |
| 11:15 | . | . | . | . | . | . | . | . |

OCT. 5,1977 SA LEVEL

| TIME | VA5 | SIG | VA26 | SIG | VA52 | SIG | VA102 | SIG |
|---|---|---|---|---|---|---|---|---|
| 8:15 | 1.0 | 2.17 | 0.7 | 2.97 | 0.4 | 3.22 | 0.1 | 3.30 |
| 9:15 | -0.1 | 2.59 | 0.3 | 5.13 | -0.2 | 5.81 | 1.0 | 6.94 |
| 10:15 | -0.4 | 2.37 | 1.2 | 5.32 | 0.1 | 6.09 | 1.8 | 8.05 |
| 11:15 | . | . | . | . | . | . | . | . |

OCT. 5,1977 SA LEVEL

| TIME | HA5 | SIG | HA26 | SIG | HA52 | SIG | HA102 | SIG |
|---|---|---|---|---|---|---|---|---|
| 8:15 | 1.9 | 0.78 | 3.6 | 0.87 | 3.8 | 0.87 | 5.3 | 0.78 |
| 9:15 | 4.3 | 1.14 | 5.5 | 1.26 | 5.6 | 1.35 | 5.8 | 1.33 |
| 10:15 | 4.4 | 1.31 | 5.7 | 1.41 | 5.9 | 1.41 | 5.8 | 1.23 |
| 11:15 | . | . | . | . | . | . | . | . |

OCT. 6,1977 SA LEVEL

| TIME | TRFVOL | SPEED | RH5 | SIG | RH82 | SIG | PYRAN | SIG |
|---|---|---|---|---|---|---|---|---|
| 8:15 | 8074 | 51.3 | 88.7 | 0.48 | . | . | 17. | 17.9 |
| 9:15 | 4959 | 52.6 | 83.3 | 3.72 | . | . | 165. | 94.8 |
| 10:15 | 5197 | 52.7 | 71.0 | 2.40 | . | . | 385. | 91.4 |
| 11:15 | 5444 | 54.5 | 65.4 | 3.33 | . | . | 548. | 140.5 |
| 12:15 | 6115 | 55.2 | 58.0 | 2.19 | . | . | 728. | 136.1 |
| 13:15 | 6006 | 54.6 | 50.4 | 1.89 | . | . | 698. | 259.7 |
| 14:15 | 6207 | 53.7 | 43.8 | 1.53 | . | . | 780. | 196.1 |
| 15:15 | 6423 | 54.5 | 41.1 | 0.93 | . | . | 630. | 244.6 |
| 16:15 | 7546 | 53.5 | 40.7 | 0.84 | . | . | 473. | 225.7 |
| 17:15 | 7862 | 52.5 | 41.9 | 0.88 | . | . | 329. | 165.6 |
| 18:15 | 8377 | 53.0 | 41.3 | 0.39 | . | . | 180. | 53.0 |
| 19:15 | 3859 | 53.4 | . | . | . | . | . | ******** |

OCT. 6,1977 SA LEVEL

| TIME | WV5 | SIG | WV26 | SIG | WV52 | SIG | WV102 | SIG |
|---|---|---|---|---|---|---|---|---|
| 8:15 | 64.0 | 19.79 | 61.2 | 12.91 | 62.3 | 17.89 | 62.7 | 10.55 |
| 9:15 | 74.8 | 19.94 | 69.6 | 13.73 | 71.3 | 15.32 | 72.7 | 11.90 |
| 10:15 | 83.7 | 20.31 | 79.3 | 17.85 | 81.9 | 17.96 | 82.6 | 14.71 |
| 11:15 | 82.1 | 22.81 | 79.3 | 19.05 | 80.8 | 18.61 | 81.2 | 16.78 |
| 12:15 | 95.2 | 25.35 | 91.7 | 21.57 | 95.8 | 19.76 | 97.5 | 17.87 |
| 13:15 | 104.1 | 29.34 | 102.7 | 24.82 | 103.4 | 21.11 | 102.1 | 17.23 |
| 14:15 | 101.4 | 26.69 | 98.3 | 23.98 | 99.7 | 23.88 | 98.6 | 20.89 |
| 15:15 | 99.6 | 28.08 | 94.1 | 24.78 | 96.1 | 22.43 | 96.7 | 19.62 |
| 16:15 | 100.1 | 24.59 | 96.8 | 23.21 | 97.9 | 21.39 | 97.2 | 19.11 |
| 17:15 | 92.8 | 21.13 | 88.1 | 17.65 | 90.6 | 16.07 | 90.4 | 13.52 |
| 18:15 | 102.0 | 18.09 | 99.6 | 17.57 | 101.4 | 15.89 | 101.1 | 14.06 |
| 19:15 | . | . | . | . | . | . | . | . |

OCT. 6,1977 SA LEVEL

| TIME | TMP5 | SIG | TMP29 | SIG | TMP42 | SIG | TMP82 | SIG |
|---|---|---|---|---|---|---|---|---|
| 8:15 | 65.6 | 0.35 | 65.8 | 0.35 | 66.4 | 0.39 | 65.9 | 0.36 |
| 9:15 | 67.3 | 1.17 | 67.2 | 1.01 | 67.7 | 0.92 | 67.2 | 0.94 |
| 10:15 | 71.1 | 0.90 | 70.5 | 0.84 | 71.0 | 1.03 | 70.3 | 0.94 |
| 11:15 | 73.8 | 1.47 | 73.0 | 1.30 | 73.3 | 1.18 | 72.6 | 1.14 |
| 12:15 | 77.6 | 1.23 | 76.4 | 1.06 | 76.5 | 1.04 | 75.9 | 1.00 |
| 13:15 | 79.8 | 0.91 | 78.9 | 0.95 | 78.7 | 0.76 | 78.1 | 0.76 |
| 14:15 | 82.2 | 1.18 | 80.4 | 1.19 | 80.4 | 0.99 | 80.0 | 1.04 |
| 15:15 | 82.8 | 1.13 | 81.3 | 0.87 | 81.2 | 0.78 | 80.9 | 0.83 |
| 16:15 | 83.1 | 1.43 | 81.9 | 1.06 | 81.8 | 0.94 | 81.5 | 0.99 |
| 17:15 | 82.4 | 1.13 | 81.5 | 0.74 | 81.5 | 0.79 | 81.1 | 0.79 |
| 18:15 | 82.3 | 0.79 | 81.4 | 0.50 | 81.5 | 0.50 | 81.3 | 0.50 |
| 19:15 | . | . | . | . | . | . | . | . |

OCT. 6,1977 SA LEVEL

| TIME | VA5 | SIG | VA26 | SIG | VA52 | SIG | VA102 | SIG |
|---|---|---|---|---|---|---|---|---|
| 8:15 | 0.3 | 3.39 | 0.4 | 5.48 | 0.5 | 6.44 | 0.9 | 7.43 |
| 9:15 | . | . | . | . | -0.2 | 5.52 | 1.1 | 6.64 |
| 10:15 | -0.2 | 2.68 | 1.3 | 5.38 | -0.2 | 5.91 | 1.0 | 7.65 |
| 11:15 | -0.4 | 3.20 | 2.3 | 5.99 | 0.7 | 7.33 | 2.5 | 9.33 |
| 12:15 | -0.3 | 2.78 | 2.8 | 6.36 | 0.8 | 7.83 | 2.9 | 10.20 |
| 13:15 | -0.4 | 2.80 | 2.1 | 6.80 | -0.5 | 7.78 | 1.7 | 9.49 |
| 14:15 | -0.6 | 3.67 | 2.2 | 6.73 | 0.2 | 7.85 | 2.0 | 9.35 |
| 15:15 | -0.7 | 3.32 | 2.0 | 7.22 | -0.7 | 8.35 | 1.4 | 11.13 |
| 16:15 | -0.9 | 3.03 | 2.5 | 7.10 | 0.4 | 8.21 | 3.0 | 10.02 |
| 17:15 | -0.4 | 3.83 | 3.5 | 6.72 | . | . | 2.4 | 9.02 |
| 18:15 | -0.6 | 2.37 | 3.5 | 6.05 | 0.2 | 6.77 | 3.5 | 7.74 |
| 19:15 | . | . | . | . | . | . | . | . |

OCT. 6,1977 SA LEVEL

| TIME | HA5 | SIG | HA26 | SIG | HA52 | SIG | HA102 | SIG |
|---|---|---|---|---|---|---|---|---|
| 8:15 | 4.3 | 1.35 | 5.8 | 1.50 | 6.1 | 1.57 | 6.7 | 1.45 |
| 9:15 | 4.3 | 1.22 | 5.7 | 1.40 | 5.9 | 1.43 | 5.8 | 1.26 |
| 10:15 | 4.8 | 1.23 | 6.1 | 1.33 | 6.2 | 1.40 | 6.3 | 1.53 |
| 11:15 | 5.7 | 1.80 | 7.1 | 1.89 | 7.4 | 1.90 | 7.3 | 1.52 |
| 12:15 | 5.2 | 1.74 | 6.6 | 1.89 | 7.2 | 2.17 | 7.3 | 2.21 |
| 13:15 | 5.4 | 2.06 | 7.0 | 2.68 | 8.0 | 2.88 | 8.3 | 2.88 |
| 14:15 | 6.5 | 2.11 | 8.7 | 2.31 | 10.0 | 2.55 | 10.3 | 2.62 |
| 15:15 | 7.1 | 2.28 | 9.4 | 2.61 | 10.5 | 2.98 | 10.8 | 3.18 |
| 16:15 | 6.6 | 1.93 | 8.8 | 2.17 | 10.0 | 2.83 | 10.4 | 2.51 |
| 17:15 | 7.2 | 2.17 | 9.3 | 2.39 | 10.4 | 2.59 | 10.7 | 2.76 |
| 18:15 | 6.5 | 1.64 | 8.7 | 1.56 | 10.2 | 1.98 | 10.8 | 2.07 |
| 19:15 | . | . | . | . | . | . | . | . |

OCT. 7,1977 SA LEVEL

| TIME | TMP5 | SIG | TMP29 | SIG | TMP42 | SIG | TMP82 | SIG |
|---|---|---|---|---|---|---|---|---|
| 8: 0 | 60.0 | 0.45 | 61.1 | 0.76 | 62.7 | 0.82 | 63.4 | 0.62 |
| 9: 0 | 63.7 | 1.42 | 64.2 | 1.37 | 65.1 | 1.18 | 65.5 | 0.77 |
| 10: 0 | 68.6 | 2.61 | 70.2 | 3.56 | 70.7 | 3.49 | 70.0 | 3.20 |
| 11: 0 | 74.7 | 1.69 | 74.4 | 1.58 | 73.6 | 2.52 | 72.7 | 1.34 |
| 12: 0 | 78.7 | 0.91 | 77.9 | 0.91 | 77.4 | 0.89 | 76.4 | 0.93 |



OCT. 7,1977 SA LEVEL

| TIME | TRFVOL | SPEED | RH5 | SIG | RH82 | SIG | PYRAN | SIG |
|---|---|---|---|---|---|---|---|---|
| 8: 0 | 8688 | 50.6 | 93.5 | 0.92 | . | . | 12. | 17.1 |
| 9: 0 | 7193 | 50.7 | 86.1 | 2.49 | . | . | 76. | 10.3 |
| 10: 0 | 5422 | 51.9 | 75.8 | 6.68 | . | . | 265. | 150.5 |
| 11: 0 | 5661 | 52.5 | 67.9 | 3.36 | . | . | 497. | 144.4 |
| 12: 0 | 6317 | 52.2 | 54.4 | 3.51 | . | . | 693. | 118.5 |

## OCT. 7,1977 SA LEVEL

| TIME | WV5 | SIG | WV26 | SIG | WV52 | SIG | WV102 | SIG |
|---|---|---|---|---|---|---|---|---|
| 8: 0 | 278.1 | 18.58 | 332.0 | 38.37 | 329.8 | 42.67 | 78.2 | 54.20 |
| 9: 0 | 278.0 | 19.50 | 292.6 | 26.09 | 296.3 | 17.35 | 291.4 | 40.75 |
| 10: 0 | 287.8 | 44.28 | 297.7 | 46.04 | 298.9 | 40.40 | 314.7 | 45.42 |
| 11: 0 | 177.7 | 29.50 | 177.3 | 23.63 | 178.6 | 22.22 | 171.0 | 19.78 |
| 12: 0 | 192.4 | 20.83 | 191.7 | 18.01 | 190.6 | 18.33 | 182.6 | 14.67 |

## OCT. 7,1977 SA LEVEL

| TIME | VA5 | SIG | VA26 | SIG | VA52 | SIG | VA102 | SIG |
|---|---|---|---|---|---|---|---|---|
| 8: 0 | -0.1 | 0.53 | 0.1 | 0.92 | 0.3 | 1.53 | -0.4 | 1.40 |
| 9: 0 | -0.2 | 0.61 | 0.3 | 1.20 | -0.3 | 0.81 | -0.6 | 0.99 |
| 10: 0 | -0.2 | 1.25 | -0.0 | 3.15 | 0.0 | 3.35 | -0.2 | 4.29 |
| 11: 0 | 0.0 | 2.19 | -0.3 | 5.59 | 0.6 | 6.50 | 1.2 | 7.74 |
| 12: 0 | 0.4 | 2.93 | -2.0 | 6.58 | -0.4 | 7.39 | 0.8 | 8.54 |

## OCT. 7,1977 SA LEVEL

| TIME | HA5 | SIG | HA26 | SIG | HA52 | SIG | HA102 | SIG |
|---|---|---|---|---|---|---|---|---|
| 8: 0 | 0.6 | 0.51 | 1.8 | 1.35 | 2.4 | 1.56 | 1.6 | 0.90 |
| 9: 0 | 0.9 | 0.53 | 1.7 | 0.58 | 1.8 | 0.64 | 1.5 | 0.61 |
| 10: 0 | 1.0 | 0.71 | 1.7 | 0.72 | 1.6 | 0.74 | 1.8 | 0.84 |
| 11: 0 | 2.6 | 1.15 | 4.0 | 1.66 | 4.3 | 1.70 | 4.9 | 1.79 |
| 12: 0 | 5.2 | 1.58 | 7.3 | 1.95 | 8.3 | 2.11 | 9.1 | 2.28 |

## OCT.18,1977 SA LEVEL

| TIME | HA5 | SIG | HA26 | SIG | HA52 | SIG | HA102 | SIG |
|---|---|---|---|---|---|---|---|---|
| 8:20 | 0.6 | 0.36 | 1.6 | 0.39 | 2.6 | 0.73 | 2.0 | 0.45 |
| 9:20 | 1.1 | 0.53 | 2.0 | 0.58 | 2.2 | 0.63 | 2.6 | 0.67 |
| 10:20 | 1.7 | 0.79 | 2.5 | 0.77 | 2.3 | 0.84 | 2.4 | 0.97 |
| 11:20 | 3.2 | 1.51 | 4.3 | 2.11 | 4.8 | 2.34 | 5.2 | 2.65 |
| 12:20 | 4.2 | 1.39 | 6.2 | 2.03 | 6.7 | 2.23 | 7.4 | 2.29 |
| 13:20 | 4.2 | 1.40 | 5.9 | 1.87 | 6.4 | 1.99 | 6.8 | 2.10 |
| 14:20 | 4.1 | 1.54 | 5.4 | 1.93 | 5.9 | 2.26 | 6.3 | 2.35 |
| 15:20 | 3.9 | 1.44 | 4.7 | 1.55 | 5.3 | 1.83 | 5.5 | 1.82 |
| 16:20 | 4.4 | 1.80 | 5.9 | 2.25 | 6.6 | 2.57 | 7.0 | 2.70 |
| 17:20 | 3.9 | 1.51 | 4.8 | 1.91 | 5.5 | 2.28 | 6.2 | 2.41 |
| 18:20 | 3.3 | 0.93 | 4.2 | 1.09 | 4.9 | 1.40 | 5.8 | 1.48 |
| 19:20 | . | . | . | . | . | . | . | . |

OCT.18,1977 SA LEVEL

| TIME | TRFVOL | SPEED | RH5 | SIG | RH82 | SIG | PYRAN | SIG |
|---|---|---|---|---|---|---|---|---|
| 8:20 | 9398 | 50.9 | 98.8 | 0.49 | . | . | 23. | 21.7 |
| 9:20 | 6356 | 54.1 | 91.7 | 4.19 | . | . | . | ******** |
| 10:20 | 5166 | 55.7 | 74.6 | 6.69 | . | . | 318. | 103.5 |
| 11:20 | 5410 | 58.5 | 61.8 | 1.27 | . | . | 479. | 144.2 |
| 12:20 | 6014 | 55.9 | 57.2 | 3.01 | . | . | 546. | 243.7 |
| 13:20 | 6197 | 56.7 | 48.3 | 2.87 | . | . | 730. | 233.2 |
| 14:20 | 6378 | 56.1 | 40.5 | 1.19 | . | . | 759. | 238.5 |
| 15:20 | 6437 | 56.3 | 38.1 | 1.68 | . | . | 709. | 210.8 |
| 16:20 | 7414 | 56.1 | 35.2 | 0.75 | . | . | 486. | 201.4 |
| 17:20 | 9312 | 54.7 | 36.3 | 0.90 | . | . | 244. | 149.5 |
| 18:20 | 7618 | 53.9 | 36.7 | 0.90 | . | . | 151. | 84.6 |
| 19:20 | 4725 | 54.3 | . | . | . | . | . | ******** |

OCT.18,1977 SA LEVEL

| TIME | TMP5 | SIG | TMP29 | SIG | TMP42 | SIG | TMP82 | SIG |
|---|---|---|---|---|---|---|---|---|
| 8:20 | 55.4 | 0.83 | 56.6 | 0.83 | 58.3 | 0.83 | 61.0 | 0.83 |
| 9:20 | 60.6 | 1.99 | 62.3 | 2.12 | 63.2 | 2.04 | 63.5 | 1.39 |
| 10:20 | 68.2 | 2.13 | 69.9 | 1.67 | 70.3 | 1.30 | 69.2 | 1.21 |
| 11:20 | 73.4 | 0.80 | 73.2 | 0.84 | 72.7 | 0.73 | 71.4 | 0.69 |
| 12:20 | 75.9 | 1.50 | 74.9 | 1.29 | 74.5 | 1.17 | 73.5 | 1.11 |
| 13:20 | 79.7 | 1.44 | 78.3 | 1.21 | 77.7 | 1.21 | 76.7 | 1.25 |
| 14:20 | 82.8 | 1.18 | 81.3 | 1.23 | 80.8 | 1.12 | 80.0 | 1.07 |
| 15:20 | 84.1 | 1.61 | 82.7 | 1.38 | 82.5 | 1.53 | 82.0 | 1.39 |
| 16:20 | 84.2 | 1.35 | 82.7 | 0.92 | 82.6 | 0.90 | 82.2 | 0.87 |
| 17:20 | 83.1 | 1.81 | 82.4 | 1.40 | 82.2 | 1.34 | 81.8 | 1.35 |
| 18:20 | 82.4 | 1.41 | 81.7 | 0.96 | 81.7 | 0.92 | 81.4 | 0.95 |
| 19:20 | . | . | . | . | . | . | . | . |

OCT.18,1977 SA LEVEL

| TIME | VA5 | SIG | VA26 | SIG | VA52 | SIG | VA102 | SIG |
|---|---|---|---|---|---|---|---|---|
| 8:20 | -0.0 | 0.17 | 0.1 | 0.29 | 1.0 | 1.22 | -0.6 | 0.50 |
| 9:20 | 0.0 | 0.85 | 0.1 | 1.12 | 0.1 | 1.67 | -0.5 | 1.53 |
| 10:20 | -0.2 | 1.52 | 0.5 | 3.83 | 0.2 | 4.59 | -0.4 | 4.99 |
| 11:20 | 0.1 | 2.32 | -1.2 | 6.39 | -0.1 | 7.15 | 0.8 | 8.00 |
| 12:20 | 0.1 | 2.87 | -1.1 | 6.69 | -1.0 | 7.69 | 0.4 | 8.82 |
| 13:20 | 0.1 | 2.68 | -1.3 | 6.32 | -0.8 | 7.34 | 0.6 | 8.55 |
| 14:20 | -0.2 | 2.88 | 1.0 | 7.10 | 0.2 | 7.90 | 2.0 | 10.11 |
| 15:20 | -0.3 | 2.36 | 1.3 | 5.80 | -0.7 | 6.85 | 0.2 | 9.08 |
| 16:20 | 0.1 | 3.04 | 0.8 | 6.06 | -1.2 | 7.36 | 0.0 | 10.15 |
| 17:20 | -0.3 | 2.15 | 1.6 | 4.92 | -0.1 | 5.47 | 1.6 | 7.34 |
| 18:20 | -0.3 | 1.56 | 1.6 | 3.98 | -0.5 | 4.01 | 0.6 | 4.56 |
| 19:20 | . | . | . | . | . | . | . | . |

OCT.18,1977 SA LEVEL

| TIME | WV5 | SIG | WV26 | SIG | WV52 | SIG | WV102 | SIG |
|---|---|---|---|---|---|---|---|---|
| 8:20 | 259.1 | 22.17 | 304.3 | 25.48 | 318.9 | 6.70 | 336.8 | 9.20 |
| 9:20 | 309.4 | 21.15 | 346.6 | 25.74 | 325.1 | 10.99 | 354.9 | 8.22 |
| 10:20 | 271.9 | 45.89 | 273.0 | 51.28 | 274.8 | 50.11 | 307.8 | 55.45 |
| 11:20 | 194.8 | 26.74 | 189.2 | 22.26 | 192.4 | 22.35 | 180.3 | 21.67 |
| 12:20 | 175.6 | 27.81 | 177.2 | 23.03 | 176.1 | 22.20 | 169.3 | 18.58 |
| 13:20 | 178.6 | 30.64 | 177.1 | 27.47 | 178.0 | 26.25 | 169.1 | 22.62 |
| 14:20 | 145.1 | 40.06 | 145.4 | 36.89 | 147.2 | 35.17 | 144.5 | 31.21 |
| 15:20 | 105.2 | 30.87 | 104.2 | 23.47 | 108.1 | 21.36 | 107.2 | 18.03 |
| 16:20 | 112.1 | 38.76 | 113.3 | 34.32 | 117.2 | 31.73 | 117.4 | 28.51 |
| 17:20 | 114.7 | 22.82 | 117.6 | 22.65 | 121.0 | 20.18 | 119.0 | 17.55 |
| 18:20 | 115.7 | 17.99 | 117.2 | 17.40 | 117.3 | 14.97 | 114.0 | 14.03 |
| 19:20 | . | . | . | . | . | . | . | . |

OCT.19,1977 SA LEVEL

| TIME | TRFVOL | SPEED | RH5 | SIG | RH82 | SIG | PYRAN | SIG |
|---|---|---|---|---|---|---|---|---|
| 8: 5 | 9205 | 54.1 | 99.0 | 0.38 | . | . | 9. | 13.7 |
| 9: 5 | 7290 | 54.7 | 92.7 | 6.46 | . | . | 134. | 54.0 |
| 10: 5 | 5426 | 55.7 | 72.8 | 3.10 | . | . | 273. | 72.5 |
| 11: 5 | 5226 | 56.3 | 66.4 | 4.73 | . | . | 495. | 121.0 |
| 12: 5 | 5899 | 56.9 | 57.2 | 0.81 | . | . | 578. | 104.4 |
| 13: 5 | 6186 | 56.5 | 49.5 | 1.95 | . | . | 717. | 84.7 |
| 14: 5 | 6286 | 56.1 | 41.3 | 2.61 | . | . | 752. | 240.9 |
| 15: 5 | 6527 | 56.2 | 36.0 | 0.58 | . | . | 725. | 370.8 |
| 16: 5 | 7135 | 56.3 | 34.7 | 1.10 | . | . | 652. | 49.9 |
| 17: 5 | 9048 | 56.0 | 33.2 | 0.62 | . | . | 388. | 145.0 |
| 18: 5 | 10163 | 53.9 | 35.6 | 0.69 | . | . | 185. | 72.9 |
| 19: 5 | 7286 | 53.9 | . | . | . | . | . | ******** |

OCT.19,1977 SA LEVEL

| TIME | WV5 | SIG | WV26 | SIG | WV52 | SIG | WV102 | SIG |
|---|---|---|---|---|---|---|---|---|
| 8: 5 | 268.2 | 12.12 | 322.4 | 24.08 | 310.5 | 7.45 | 294.0 | 14.69 |
| 9: 5 | 302.9 | 26.92 | 325.1 | 25.48 | 312.7 | 9.91 | 323.0 | 10.95 |
| 10: 5 | 278.0 | 41.37 | 290.3 | 50.39 | 287.1 | 40.06 | 288.1 | 44.72 |
| 11: 5 | 201.3 | 25.83 | 199.5 | 21.01 | 202.5 | 21.81 | 195.4 | 17.97 |
| 12: 5 | 187.4 | 22.37 | 188.5 | 17.43 | 188.0 | 18.16 | 181.2 | 13.52 |
| 13: 5 | 181.0 | 25.30 | 182.1 | 21.22 | 182.9 | 20.74 | 177.4 | 16.85 |
| 14: 5 | 158.1 | 41.26 | 159.0 | 35.43 | 162.9 | 33.29 | 157.7 | 27.73 |
| 15: 5 | 198.2 | 42.63 | 195.5 | 39.54 | 198.8 | 38.78 | 188.7 | 37.36 |
| 16: 5 | 202.7 | 29.31 | 201.8 | 26.11 | 205.5 | 26.84 | 195.7 | 27.29 |
| 17: 5 | 155.9 | 33.60 | 155.3 | 30.92 | 156.6 | 29.44 | 150.6 | 26.06 |
| 18: 5 | 118.4 | 14.85 | 120.5 | 14.96 | 122.6 | 13.02 | 119.7 | 10.81 |
| 19: 5 | . | . | . | . | . | . | . | . |

OCT.19,1977 SA LEVEL

| TIME | TMP5 | SIG | TMP29 | SIG | TMP42 | SIG | TMP82 | SIG |
|---|---|---|---|---|---|---|---|---|
| 8: 5 | 57.9 | 0.92 | 59.6 | 0.67 | 62.0 | 0.52 | 64.0 | 0.35 |
| 9: 5 | 62.9 | 2.14 | 65.8 | 3.26 | 67.2 | 2.97 | 66.8 | 2.06 |
| 10: 5 | 70.0 | 1.45 | 73.6 | 0.98 | 74.3 | 1.22 | 72.6 | 1.14 |
| 11: 5 | 74.1 | 1.76 | 74.1 | 1.25 | 73.7 | 1.13 | 72.3 | 1.07 |
| 12: 5 | 76.7 | 0.78 | 75.9 | 0.84 | 75.5 | 0.79 | 74.3 | 0.75 |
| 13: 5 | 80.0 | 0.96 | 78.8 | 0.83 | 78.1 | 0.80 | 77.0 | 0.76 |
| 14: 5 | 83.5 | 1.74 | 82.4 | 1.84 | 81.6 | 2.06 | 80.5 | 1.59 |
| 15: 5 | 85.1 | 0.79 | 84.3 | 1.02 | 83.7 | 1.11 | 82.7 | 1.06 |
| 16: 5 | 86.1 | 1.10 | 85.0 | 1.19 | 84.3 | 1.36 | 83.3 | 1.31 |
| 17: 5 | 86.2 | 1.12 | 84.6 | 0.86 | 83.9 | 0.87 | 83.4 | 0.92 |
| 18: 5 | 84.0 | 0.91 | 83.1 | 0.67 | 82.8 | 0.67 | 82.7 | 0.76 |
| 19: 5 | . | . | . | . | . | . | . | . |

OCT.19,1977 SA LEVEL

| TIME | VA5 | SIG | VA26 | SIG | VA52 | SIG | VA102 | SIG |
|---|---|---|---|---|---|---|---|---|
| 8: 5 | -0.0 | 0.13 | 0.1 | 0.24 | 1.9 | 1.12 | -0.5 | 0.54 |
| 9: 5 | -0.0 | 0.85 | 0.6 | 1.45 | 1.3 | 2.34 | -0.1 | 1.92 |
| 10: 5 | 0.0 | 1.21 | 0.5 | 3.52 | 0.6 | 4.43 | 0.5 | 5.28 |
| 11: 5 | 0.0 | 2.25 | -1.3 | 5.59 | -0.2 | 6.48 | 0.0 | 6.77 |
| 12: 5 | 0.3 | 2.94 | -2.0 | 5.77 | -0.8 | 7.19 | 1.0 | 8.10 |
| 13: 5 | 0.3 | 3.00 | -1.4 | 6.64 | -0.6 | 7.38 | 0.4 | 8.60 |
| 14: 5 | 0.1 | 2.67 | -0.4 | 6.30 | -0.8 | 7.95 | 0.3 | 10.31 |
| 15: 5 | -0.3 | 3.03 | 0.1 | 6.76 | -0.7 | 8.40 | -1.8 | 9.70 |
| 16: 5 | -0.3 | 2.69 | -0.5 | 6.86 | 0.6 | 8.10 | 1.8 | 8.75 |
| 17: 5 | -0.1 | 2.49 | -0.0 | 5.12 | -0.6 | 5.70 | -0.4 | 6.50 |
| 18: 5 | -0.4 | 1.59 | 1.0 | 3.86 | -1.0 | 3.49 | -0.2 | 3.91 |
| 19: 5 | . | . | . | . | . | . | . | . |

OCT.19,1977 SA LEVEL

| TIME | HA5 | SIG | HA26 | SIG | HA52 | SIG | HA102 | SIG |
|---|---|---|---|---|---|---|---|---|
| 8: 5 | 0.1 | 0.15 | 1.4 | 0.65 | 3.5 | 0.64 | 3.9 | 0.42 |
| 9: 5 | 1.2 | 0.82 | 2.2 | 0.65 | 2.5 | 0.54 | 4.0 | 1.27 |
| 10: 5 | 1.1 | 0.62 | 2.0 | 0.70 | 1.8 | 0.70 | 1.9 | 0.67 |
| 11: 5 | 3.6 | 1.57 | 4.7 | 2.09 | 5.1 | 2.30 | 5.5 | 2.30 |
| 12: 5 | 4.6 | 1.18 | 6.6 | 1.59 | 7.1 | 1.50 | 7.8 | 1.50 |
| 13: 5 | 4.5 | 1.42 | 6.6 | 1.92 | 7.2 | 1.82 | 8.0 | 1.82 |
| 14: 5 | 3.6 | 1.28 | 5.0 | 1.94 | 5.3 | 2.04 | 5.8 | 2.31 |
| 15: 5 | 3.6 | 1.47 | 5.0 | 2.32 | 5.3 | 2.38 | 5.5 | 2.34 |
| 16: 5 | 4.3 | 1.54 | 5.8 | 1.90 | 6.4 | 1.95 | 6.7 | 2.06 |
| 17: 5 | 3.6 | 1.39 | 5.1 | 1.80 | 5.8 | 2.19 | 6.3 | 2.14 |
| 18: 5 | 3.5 | 0.70 | 4.2 | 0.95 | 4.9 | 1.25 | 5.4 | 1.33 |
| 19: 5 | . | . | . | . | . | . | . | . |

OCT. 20, 1977 SAN ANTONIO

| TIME | TMP5 | SIG | TMP29 | SIG | TMP42 | SIG | TMP82 | SIG |
|---|---|---|---|---|---|---|---|---|
| 8: 0 | 64.7 | . | 66.0 | . | 62.0 | . | 66.6 | . |
| 9: 0 | 66.0 | . | 66.8 | . | 67.4 | . | 67.0 | . |
| 10: 0 | 69.6 | . | 69.3 | . | 69.4 | . | 69.0 | . |
| 11: 0 | 74.3 | . | 74.4 | . | 74.0 | . | 72.5 | . |
| 12: 0 | 78.2 | . | 78.7 | . | 78.1 | . | 76.6 | . |
| 13: 0 | 81.2 | . | 80.3 | . | 79.4 | . | 78.6 | . |
| 14: 0 | 83.2 | . | 81.4 | . | 80.7 | . | 80.1 | . |
| 15: 0 | 83.3 | . | 81.7 | . | 81.3 | . | 81.0 | . |
| 16: 0 | 84.1 | . | 82.5 | . | 82.1 | . | 81.8 | . |
| 17: 0 | 85.3 | . | 83.3 | . | 82.9 | . | 82.7 | . |
| 18: 0 | 83.6 | . | 82.2 | . | 82.0 | . | 81.9 | . |
| 19: 0 | 80.6 | . | 80.0 | . | 80.1 | . | 80.1 | . |



OCT. 20, 1977 SAN ANTONIO

| TIME | TRFVOL | SPEED | RH5 | SIG | RH82 | SIG | PYRAN | SIG |
|---|---|---|---|---|---|---|---|---|
| 8: 0 | 8986 | . | 92.6 | . | . | . | 4. | . |
| 9: 0 | 7593 | . | 88.9 | . | . | . | 75. | . |
| 10: 0 | 5646 | . | 80.5 | . | . | . | 189. | . |
| 11: 0 | 4714 | . | 66.8 | . | . | . | 481. | . |
| 12: 0 | 6066 | . | 54.5 | . | . | . | 624. | . |
| 13: 0 | 6370 | . | 47.0 | . | . | . | 743. | . |
| 14: 0 | 6343 | . | 42.1 | . | . | . | 675. | . |
| 15: 0 | 6648 | . | 40.4 | . | . | . | 532. | . |
| 16: 0 | 7444 | . | 37.5 | . | . | . | 467. | . |
| 17: 0 | 9092 | . | 35.7 | . | . | . | 463. | . |
| 18: 0 | 10195 | . | 37.3 | . | . | . | 237. | . |
| 19: 0 | 7911 | . | 39.8 | . | . | . | 60. | . |

OCT. 20, 1977 SAN ANTONIO

| TIME | HA5 | SIG | HA26 | SIG | HA52 | SIG | HA102 | SIG |
|---|---|---|---|---|---|---|---|---|
| 8: 0 | 0.7 | . | 1.4 | . | 0.9 | . | 1.9 | . |
| 9: 0 | 1.3 | . | 2.6 | . | 2.6 | . | 3.0 | . |
| 10: 0 | 2.2 | . | 2.8 | . | 2.7 | . | 2.9 | . |
| 11: 0 | 2.4 | . | 3.3 | . | 3.3 | . | 3.6 | . |
| 12: 0 | 3.0 | . | 3.8 | . | 3.9 | . | 4.4 | . |
| 13: 0 | 3.5 | . | 5.0 | . | 5.4 | . | 5.8 | . |
| 14: 0 | 4.5 | . | 6.2 | . | 7.1 | . | 7.8 | . |
| 15: 0 | 5.0 | . | 7.0 | . | 8.3 | . | 9.3 | . |
| 16: 0 | 5.7 | . | 7.9 | . | 9.5 | . | 10.5 | . |
| 17: 0 | 5.6 | . | 7.6 | . | 9.4 | . | 10.3 | . |
| 18: 0 | 5.6 | . | 7.6 | . | 9.4 | . | 10.8 | . |
| 19: 0 | 5.1 | . | 7.3 | . | 9.4 | . | 10.9 | . |



OCT. 20, 1977 SAN ANTONIO

| TIME | WV5 | SIG | WV26 | SIG | WV52 | SIG | WV102 | SIG |
|---|---|---|---|---|---|---|---|---|
| 8: 0 | 285.3 | . | . | . | 215.0 | . | 144.6 | . |
| 9: 0 | 118.8 | . | 68.5 | . | 82.0 | . | 81.6 | . |
| 10: 0 | 106.5 | . | 106.1 | . | 111.3 | . | 112.3 | . |
| 11: 0 | 187.1 | . | 175.6 | . | 192.6 | . | 174.3 | . |
| 12: 0 | 189.0 | . | 170.8 | . | 188.8 | . | 147.8 | . |
| 13: 0 | 157.5 | . | 151.6 | . | 154.0 | . | 149.1 | . |
| 14: 0 | 135.3 | . | 136.6 | . | 138.0 | . | 136.6 | . |
| 15: 0 | 124.8 | . | 125.5 | . | 126.8 | . | 126.0 | . |
| 16: 0 | 124.8 | . | 123.1 | . | 124.0 | . | 122.5 | . |
| 17: 0 | 121.8 | . | 121.5 | . | 122.8 | . | 121.5 | . |
| 18: 0 | 117.3 | . | 118.0 | . | 118.6 | . | 116.5 | . |
| 19: 0 | 118.0 | . | 115.6 | . | 116.3 | . | 114.6 | . |

NOV. 17,1977 ELP LEVEL

| TIME | TRFVOL | SPEED | RH5 | SIG | RH82 | SIG | PYRAN | SIG |
|---|---|---|---|---|---|---|---|---|
| 8: 0 | 7076 | 53.9 | 48.5 | 1.73 | . | . | 150. | 55.1 |
| 9: 0 | 5590 | 54.6 | 42.0 | 1.96 | . | . | 329. | 89.2 |
| 10: 0 | 4597 | 54.6 | 36.4 | 1.21 | . | . | 380. | 193.9 |
| 11: 0 | 4369 | 55.7 | . | . | . | . | . | . |
| 13: 0 | 3167 | 54.1 | . | . | . | . | . | . |
| 14: 0 | 475 | 54.5 | . | . | . | . | . | . |
| 15: 0 | 6178 | 54.4 | 25.4 | 0.18 | . | . | 448. | 52.7 |
| 16: 0 | 6551 | 54.6 | 24.9 | 0.13 | . | . | 270. | 59.7 |
| 17: 0 | 7605 | 53.9 | 24.9 | 0.13 | . | . | 79. | 49.4 |
| 18: 0 | 7646 | 51.9 | . | . | . | . | 3. | 2.1 |

NOV. 17,1977 ELP LEVEL

| TIME | TMP5 | SIG | TMP29 | SIG | TMP42 | SIG | TMP82 | SIG |
|---|---|---|---|---|---|---|---|---|
| 8: 0 | 42.3 | 1.68 | 41.4 | 1.38 | 42.9 | 1.27 | 41.1 | 1.23 |
| 9: 0 | 49.2 | 1.94 | 48.7 | 2.33 | 50.0 | 2.39 | 48.2 | 2.44 |
| 10: 0 | 55.3 | 1.10 | 54.9 | 1.18 | 55.7 | 1.29 | 53.7 | 1.09 |
| 11: 0 | . | . | . | . | . | . | . | . |
| 13: 0 | . | . | . | . | . | . | . | . |
| 14: 0 | . | . | . | . | . | . | . | . |
| 15: 0 | 74.0 | 0.70 | 71.5 | 0.69 | 71.7 | 0.59 | 71.3 | 0.59 |
| 16: 0 | 73.6 | 0.62 | 71.6 | 0.72 | 71.9 | 0.66 | 71.2 | 0.52 |
| 17: 0 | 71.7 | 1.49 | 71.3 | 0.80 | 71.6 | 0.80 | 70.4 | 0.75 |
| 18: 0 | . | . | . | . | . | . | . | . |

NOV. 17,1977 ELP LEVEL

| TIME | WV5 | SIG | WV26 | SIG | WV52 | SIG | WV102 | SIG |
|---|---|---|---|---|---|---|---|---|
| 8: 0 | 35.9 | 21.64 | 111.7 | 14.99 | 306.2 | 17.42 | 334.2 | 25.15 |
| 9: 0 | 37.5 | 28.96 | 117.5 | 24.44 | 312.4 | 36.05 | 339.7 | 40.18 |
| 10: 0 | 7.3 | 39.55 | 97.6 | 25.10 | 292.7 | 26.89 | 322.9 | 29.24 |
| 11: 0 | 35.8 | 33.39 | 115.2 | 32.05 | 297.8 | 35.15 | 320.5 | 36.16 |
| 13: 0 | . | . | . | . | . | . | . | . |
| 14: 0 | . | . | . | . | . | . | . | . |
| 15: 0 | 100.0 | 36.65 | 291.9 | 31.24 | 168.2 | 24.27 | 197.9 | 20.92 |
| 16: 0 | 134.3 | 31.52 | 281.9 | 20.39 | 155.4 | 16.31 | 185.3 | 14.17 |
| 17: 0 | 96.1 | 37.42 | 262.2 | 17.65 | 135.2 | 15.56 | 165.8 | 13.39 |
| 18: 0 | 66.5 | 39.78 | 265.4 | 20.57 | 143.3 | 11.56 | 175.4 | 9.52 |

NOV. 17,1977 ELP LEVEL

| TIME | VA5 | SIG | VA26 | SIG | VA52 | SIG | VA102 | SIG |
|---|---|---|---|---|---|---|---|---|
| 8: 0 | -0.4 | 1.00 | -4.0 | 3.24 | -2.0 | 3.41 | . | . |
| 9: 0 | -0.3 | 1.46 | -3.2 | 3.67 | -0.6 | 4.39 | . | . |
| 10: 0 | -0.5 | 1.55 | -4.4 | 4.63 | -1.6 | 5.46 | . | . |
| 11: 0 | -0.5 | 1.38 | -3.6 | 5.06 | -2.0 | 6.02 | . | . |
| 13: 0 | . | . | . | . | . | . | . | . |
| 14: 0 | . | . | . | . | . | . | . | . |
| 15: 0 | 0.2 | 3.73 | -3.3 | 6.09 | 3.9 | 6.91 | . | . |
| 16: 0 | 0.5 | 3.72 | -4.3 | 5.93 | 3.8 | 6.11 | . | . |
| 17: 0 | 0.2 | 3.36 | -4.4 | 4.33 | 2.0 | 4.54 | . | . |
| 18: 0 | -0.4 | 2.34 | -1.1 | 3.05 | 1.4 | 2.53 | . | . |

NOV. 17,1977 ELP LEVEL

| TIME | HA5 | SIG | HA26 | SIG | HA52 | SIG | HA102 | SIG |
|---|---|---|---|---|---|---|---|---|
| 8: 0 | 2.6 | 0.76 | 2.9 | 0.90 | 3.0 | 0.80 | 3.2 | 0.80 |
| 9: 0 | 2.8 | 0.98 | 3.0 | 1.37 | 2.9 | 1.10 | 2.6 | 0.82 |
| 10: 0 | 2.9 | 1.03 | 3.5 | 1.38 | 3.6 | 1.34 | 3.5 | 1.32 |
| 11: 0 | . | . | . | . | . | . | . | . |
| 13: 0 | . | . | . | . | . | . | . | . |
| 14: 0 | . | . | . | . | . | . | . | . |
| 15: 0 | 3.9 | 1.65 | 7.1 | 3.13 | 6.7 | 2.86 | 7.9 | 2.61 |
| 16: 0 | 4.2 | 1.52 | 7.9 | 2.62 | 7.6 | 2.91 | 8.4 | 2.51 |
| 17: 0 | 3.3 | 0.82 | 5.8 | 1.51 | 5.2 | 1.61 | 5.8 | 1.33 |
| 18: 0 | 2.4 | 0.74 | 4.3 | 1.44 | 4.0 | 1.83 | 5.2 | 1.58 |

NOV. 18,1977 ELP LEVEL

| TIME | TRFVOL | SPEED | RH5 | SIG | RH82 | SIG | PYRAN | SIG |
|---|---|---|---|---|---|---|---|---|
| 8: 0 | 7642 | 53.4 | 54.9 | 3.13 | . | . | 134. | 56.2 |
| 9: 0 | 6301 | 53.4 | 46.0 | 1.90 | . | . | 296. | 79.7 |
| 10: 0 | 4715 | 54.0 | 39.6 | 1.82 | . | . | 364. | 172.5 |
| 11: 0 | 5280 | 56.9 | 34.6 | 1.23 | . | . | 587. | 152.3 |
| 12: 0 | 5888 | 55.1 | . | . | . | . | 648. | 100.6 |

NOV. 18,1977 ELP LEVEL

| TIME | HA5 | SIG | HA26 | SIG | HA52 | SIG | HA102 | SIG |
|---|---|---|---|---|---|---|---|---|
| 8: 0 | 3.4 | 1.15 | 2.5 | 1.08 | 1.8 | 0.89 | 1.9 | 0.86 |
| 9: 0 | 4.2 | 1.15 | 3.4 | 0.78 | 3.0 | 0.76 | 2.8 | 0.90 |
| 10: 0 | 4.1 | 1.57 | 4.3 | 2.53 | 3.9 | 2.29 | 4.3 | 2.97 |
| 11: 0 | 8.9 | 3.80 | 14.6 | 5.68 | 14.0 | 5.55 | 16.1 | 5.75 |
| 12: 0 | . | . | . | . | . | . | . | . |



NOV. 18,1977 ELP LEVEL

| TIME | VA5 | SIG | VA26 | SIG | VA52 | SIG | VA102 | SIG |
|---|---|---|---|---|---|---|---|---|
| 8: 0 | -0.4 | 2.40 | -2.8 | 4.64 | -0.6 | 3.27 | . | . |
| 9: 0 | -0.3 | 2.43 | -2.3 | 4.33 | -0.0 | 3.68 | . | . |
| 10: 0 | -0.4 | 2.71 | -3.1 | 5.04 | 0.1 | 6.22 | . | . |
| 11: 0 | 0.9 | 5.14 | -4.5 | 8.62 | 8.5 | 10.27 | . | . |
| 12: 0 | . | . | . | . | . | . | . | . |

NOV. 18,1977 ELP LEVEL

| TIME | WV5 | SIG | WV26 | SIG | WV52 | SIG | WV102 | SIG |
|---|---|---|---|---|---|---|---|---|
| 8: 0 | 72.9 | 28.62 | 187.7 | 22.72 | 72.3 | 27.30 | 85.7 | 17.07 |
| 9: 0 | 82.7 | 21.78 | 194.7 | 15.98 | 72.5 | 15.35 | 96.7 | 14.46 |
| 10: 0 | 45.6 | 51.81 | 207.3 | 37.33 | 85.4 | 36.99 | 114.6 | 35.34 |
| 11: 0 | 204.4 | 23.15 | 297.3 | 14.35 | 169.5 | 11.40 | 198.5 | 9.62 |
| 12: 0 | 211.6 | 14.41 | 289.5 | 13.30 | 162.5 | 12.30 | 190.7 | 10.41 |



NOV. 18,1977 ELP LEVEL

| TIME | TMP5 | SIG | TMP29 | SIG | TMP42 | SIG | TMP82 | SIG |
|---|---|---|---|---|---|---|---|---|
| 8: 0 | 45.3 | 1.90 | 44.5 | 1.76 | 46.5 | 1.70 | 44.4 | 1.59 |
| 9: 0 | 51.4 | 1.88 | 51.0 | 2.20 | 52.7 | 2.17 | 50.5 | 2.07 |
| 10: 0 | 59.8 | 2.74 | 60.1 | 2.43 | 61.7 | 2.52 | 59.4 | 2.57 |
| 11: 0 | 66.3 | 1.30 | 64.7 | 1.41 | 65.7 | 1.25 | 64.7 | 1.34 |
| 12: 0 | . | . | . | . | . | . | . | . |

NOV. 29,1977 ELP LEVEL

| TIME | TRFVOL | SPEED | RH5 | SIG | RH82 | SIG | PYRAN | SIG |
|---|---|---|---|---|---|---|---|---|
| 8: 0 | 3841 | 53.8 | . | . | . | . | . | . |
| 9: 0 | 4825 | 49.6 | 50.9 | 1.69 | . | . | 304. | 56.0 |
| 10: 0 | 2952 | 51.6 | 46.1 | 1.38 | . | . | 353. | 164.4 |
| 11: 0 | 4290 | 52.6 | 41.7 | 1.19 | . | . | 559. | 115.0 |
| 12: 0 | 4900 | 51.0 | 38.8 | 0.73 | . | . | 639. | 4.8 |
| 13: 0 | 5268 | 52.6 | 36.5 | 0.57 | . | . | 618. | 16.4 |
| 14: 0 | 4889 | 52.8 | 35.1 | 0.38 | . | . | 536. | 32.0 |
| 15: 0 | 4824 | 52.6 | 34.0 | 0.11 | . | . | 401. | 60.6 |
| 16: 0 | 6325 | 52.1 | 34.2 | 0.02 | . | . | 222. | 58.7 |
| 17: 0 | 7616 | 52.6 | 34.6 | 0.23 | . | . | 61. | 36.1 |
| 18: 0 | 7255 | 50.4 | 35.6 | 0.42 | . | . | 3. | 1.8 |

NOV. 29,1977 ELP LEVEL

| TIME | TMP5 | SIG | TMP29 | SIG | TMP42 | SIG | TMP82 | SIG |
|---|---|---|---|---|---|---|---|---|
| 8: 0 | . | . | . | . | . | . | . | . |
| 9: 0 | 47.0 | 0.57 | 46.3 | 0.52 | 47.5 | 0.37 | 46.3 | 0.37 |
| 10: 0 | 48.7 | 0.79 | 47.8 | 0.68 | 48.8 | 0.89 | 47.1 | 0.66 |
| 11: 0 | 51.7 | 0.93 | 50.6 | 0.82 | 51.8 | 0.91 | 49.9 | 0.95 |
| 12: 0 | 54.4 | 0.86 | 53.0 | 0.88 | 54.0 | 0.97 | 52.6 | 1.00 |
| 13: 0 | 56.6 | 1.19 | 55.4 | 1.28 | 56.7 | 1.58 | 55.4 | 1.76 |
| 14: 0 | 58.2 | 1.01 | 56.8 | 0.91 | 58.1 | 1.28 | 57.5 | 1.46 |
| 15: 0 | 58.4 | 0.65 | 57.4 | 0.79 | 58.4 | 1.17 | 57.9 | 1.34 |
| 16: 0 | 58.5 | 0.70 | 57.3 | 1.01 | 57.9 | 0.65 | 57.2 | 1.23 |
| 17: 0 | 56.5 | 1.03 | 55.6 | 0.82 | 56.7 | 0.77 | 55.2 | 0.80 |
| 18: 0 | 53.4 | 0.60 | 54.1 | 0.41 | 54.5 | 0.43 | 53.4 | 0.29 |

NOV. 29,1977 ELP LEVEL

| TIME | WV5 | SIG | WV26 | SIG | WV52 | SIG | WV102 | SIG |
|---|---|---|---|---|---|---|---|---|
| 8: 0 | . | . | . | . | . | . | . | . |
| 9: 0 | 29.8 | 27.62 | 33.3 | 13.62 | 4.5 | 12.71 | 3.1 | 17.21 |
| 10: 0 | 57.9 | 22.70 | 61.0 | 14.91 | 38.6 | 29.60 | 51.0 | 26.72 |
| 11: 0 | 58.1 | 24.44 | 64.8 | 17.81 | 48.3 | 34.29 | 56.3 | 29.09 |
| 12: 0 | 54.8 | 27.48 | 62.5 | 22.56 | 49.4 | 37.47 | 52.2 | 34.41 |
| 13: 0 | 58.1 | 42.28 | 68.8 | 38.66 | 57.4 | 48.19 | 66.6 | 46.37 |
| 14: 0 | 68.3 | 49.52 | 80.7 | 48.97 | 74.8 | 54.07 | 84.9 | 50.51 |
| 15: 0 | 69.4 | 32.29 | 78.9 | 25.24 | 70.6 | 39.11 | 74.4 | 37.80 |
| 16: 0 | 157.7 | 42.11 | 176.5 | 31.07 | 189.9 | 30.19 | 189.7 | 27.94 |
| 17: 0 | 173.0 | 45.21 | 194.2 | 29.69 | 204.0 | 25.48 | 202.8 | 23.73 |
| 18: 0 | 228.1 | 36.15 | 221.2 | 20.31 | 229.7 | 13.65 | 232.8 | 11.77 |

NOV. 29,1977 ELP LEVEL

| TIME | HA5 | SIG | HA26 | SIG | HA52 | SIG | HA102 | SIG |
|---|---|---|---|---|---|---|---|---|
| 8: 0 | . | . | . | . | . | . | . | . |
| 9: 0 | 5.6 | 1.66 | 8.1 | 2.11 | 8.6 | 1.99 | 9.1 | 1.85 |
| 10: 0 | 5.8 | 1.48 | 7.8 | 1.96 | 7.7 | 1.59 | 8.1 | 1.47 |
| 11: 0 | 5.5 | 1.65 | 7.1 | 2.28 | 7.1 | 2.09 | 7.4 | 2.11 |
| 12: 0 | 5.6 | 1.85 | 6.9 | 2.60 | 7.3 | 2.50 | 7.4 | 2.53 |
| 13: 0 | 4.4 | 1.97 | 4.7 | 2.65 | 4.6 | 2.66 | 5.4 | 2.59 |
| 14: 0 | 4.1 | 1.99 | 4.4 | 2.58 | 4.8 | 2.66 | 5.0 | 2.74 |
| 15: 0 | 4.4 | 1.55 | 4.8 | 2.22 | 4.9 | 2.02 | 4.8 | 1.91 |
| 16: 0 | 3.8 | 1.33 | 5.2 | 1.96 | 4.8 | 2.18 | 4.6 | 1.85 |
| 17: 0 | 3.1 | 1.00 | 4.8 | 2.13 | 3.6 | 1.53 | 3.9 | 1.63 |
| 18: 0 | 2.5 | 0.84 | 5.1 | 1.57 | 4.9 | 1.70 | 5.1 | 1.28 |

NOV. 29,1977 ELP LEVEL

| TIME | VA5 | SIG | VA26 | SIG | VA52 | SIG | VA102 | SIG |
|---|---|---|---|---|---|---|---|---|
| 8: 0 | . | . | . | . | . | . | . | . |
| 9: 0 | . | . | -2.3 | 7.20 | -1.5 | 8.11 | . | . |
| 10: 0 | . | . | 0.7 | 6.26 | -5.0 | 6.23 | . | . |
| 11: 0 | . | . | -0.1 | 6.14 | -3.5 | 6.76 | . | . |
| 12: 0 | . | . | -0.8 | 6.39 | -3.6 | 7.17 | . | . |
| 13: 0 | . | . | -2.0 | 6.30 | -2.3 | 7.62 | . | . |
| 14: 0 | . | . | -4.7 | 6.79 | -2.8 | 9.24 | . | . |
| 15: 0 | . | . | -2.0 | 5.82 | -2.0 | 7.11 | . | . |
| 16: 0 | . | . | -4.9 | 4.84 | -0.1 | 6.13 | . | . |
| 17: 0 | . | . | -4.8 | 4.48 | 1.2 | 4.57 | . | . |
| 18: 0 | . | . | -0.4 | 4.48 | 3.7 | 4.47 | . | . |

NOV. 30,1977 ELP LEVEL

| TIME | TRFVOL | SPEED | RH5 | SIG | RH82 | SIG | PYRAN | SIG |
|---|---|---|---|---|---|---|---|---|
| 7: 0 | 1852 | 52.7 | . | . | . | . | . | . |
| 8: 0 | 6950 | 55.5 | . | . | . | . | 115. | 63.3 |
| 9: 0 | 6802 | 60.8 | 46.5 | 1.69 | . | . | 317. | 53.0 |
| 10: 0 | 5105 | 59.6 | 41.3 | 0.62 | . | . | 333. | 184.6 |
| 11: 0 | 5028 | 59.4 | 39.1 | 0.68 | . | . | 564. | 119.9 |
| 12: 0 | 5804 | 58.6 | 36.8 | 0.56 | . | . | 645. | 11.1 |
| 13: 0 | 5906 | 58.8 | 34.3 | 0.98 | . | . | 628. | 12.0 |
| 14: 0 | 5935 | 59.2 | 31.3 | 0.62 | . | . | 550. | 32.8 |
| 15: 0 | 2273 | 58.2 | . | . | . | . | . | . |
| 16: 0 | 3353 | 57.0 | . | . | . | . | . | . |
| 17: 0 | 8248 | 51.8 | 28.5 | 0.08 | . | . | 53. | 41.1 |
| 18: 0 | 7658 | 50.5 | 28.8 | 0.18 | . | . | 3. | 2.7 |

NOV. 30,1977 ELP LEVEL

| TIME | TMP5 | SIG | TMP29 | SIG | TMP42 | SIG | TMP82 | SIG |
|---|---|---|---|---|---|---|---|---|
| 7: 0 | . | . | . | . | . | . | . | . |
| 8: 0 | . | . | . | . | . | . | . | . |
| 9: 0 | 46.1 | 2.36 | 45.4 | 2.28 | 46.9 | 2.16 | 45.9 | 2.26 |
| 10: 0 | 50.6 | 0.81 | 49.3 | 0.88 | 50.1 | 1.00 | 49.3 | 0.96 |
| 11: 0 | 52.9 | 0.76 | 51.1 | 0.67 | 51.8 | 0.77 | 50.9 | 0.75 |
| 12: 0 | 55.4 | 0.84 | 52.8 | 0.72 | 53.9 | 0.72 | 52.9 | 0.68 |
| 13: 0 | 59.4 | 1.70 | 57.3 | 2.04 | 58.1 | 1.84 | 57.4 | 1.82 |
| 14: 0 | 63.7 | 0.75 | 61.8 | 0.73 | 62.2 | 0.81 | 62.0 | 0.90 |
| 15: 0 | . | . | . | . | . | . | . | . |
| 16: 0 | . | . | . | . | . | . | . | . |
| 17: 0 | 62.1 | 1.88 | 61.9 | 1.37 | 62.5 | 1.15 | 62.0 | 1.23 |
| 18: 0 | 56.4 | 0.96 | 58.4 | 0.78 | 58.8 | 0.78 | 58.5 | 0.71 |

NOV. 30,1977 ELP LEVEL

| TIME | WV5 | SIG | WV26 | SIG | WV52 | SIG | WV102 | SIG |
|---|---|---|---|---|---|---|---|---|
| 7: 0 | . | . | . | . | . | . | . | . |
| 8: 0 | 158.2 | 25.64 | 166.9 | 17.92 | 174.9 | 17.93 | 182.7 | 20.48 |
| 9: 0 | 193.3 | 36.96 | 200.1 | 35.12 | 213.6 | 28.60 | 223.2 | 26.77 |
| 10: 0 | 226.7 | 17.77 | 223.0 | 14.45 | 232.4 | 12.63 | 238.0 | 11.68 |
| 11: 0 | 235.5 | 14.86 | 231.6 | 15.22 | 239.2 | 10.78 | 241.9 | 9.27 |
| 12: 0 | 230.8 | 16.76 | 227.2 | 12.75 | 234.6 | 10.39 | 236.4 | 8.73 |
| 13: 0 | 239.0 | 43.34 | 249.4 | 44.18 | 254.3 | 32.64 | 255.7 | 26.99 |
| 14: 0 | 294.7 | 46.38 | 330.4 | 38.74 | 303.0 | 25.25 | 301.5 | 22.20 |
| 15: 0 | . | . | . | . | . | . | . | . |
| 16: 0 | . | . | . | . | . | . | . | . |
| 17: 0 | 348.0 | 37.68 | 4.3 | 16.72 | 332.4 | 17.32 | 331.9 | 15.91 |
| 18: 0 | 347.3 | 33.21 | 6.2 | 10.56 | 333.4 | 7.87 | 333.0 | 6.46 |

NOV. 30,1977 ELP LEVEL

| TIME | HA5 | SIG | HA26 | SIG | HA52 | SIG | HA102 | SIG |
|---|---|---|---|---|---|---|---|---|
| 7: 0 | . | . | . | . | . | . | . | . |
| 8: 0 | . | . | . | . | . | . | . | . |
| 9: 0 | 5.6 | 1.88 | 10.5 | 3.94 | 9.9 | 3.69 | 9.7 | 3.20 |
| 10: 0 | 7.4 | 1.89 | 13.8 | 2.94 | 13.5 | 3.34 | 13.5 | 2.33 |
| 11: 0 | 8.8 | 2.77 | 14.3 | 3.66 | 13.3 | 3.07 | 15.3 | 3.66 |
| 12: 0 | 6.7 | 1.77 | 11.5 | 2.48 | 11.0 | 3.08 | 11.2 | 2.22 |
| 13: 0 | 4.5 | 1.98 | 7.1 | 3.29 | 7.3 | 3.49 | 8.0 | 3.58 |
| 14: 0 | 4.8 | 2.21 | 8.0 | 4.00 | 10.7 | 5.02 | 10.4 | 4.94 |
| 15: 0 | . | . | . | . | . | . | . | . |
| 16: 0 | . | . | . | . | . | . | . | . |
| 17: 0 | 3.4 | 1.14 | 6.9 | 2.16 | 8.1 | 2.18 | 8.4 | 2.24 |
| 18: 0 | 2.2 | 0.79 | 5.8 | 1.37 | 7.5 | 1.35 | 8.6 | 1.20 |

NOV. 30,1977 ELP LEVEL

| TIME | VA5 | SIG | VA26 | SIG | VA52 | SIG | VA102 | SIG |
|---|---|---|---|---|---|---|---|---|
| 7: 0 | . | . | . | . | . | . | . | . |
| 8: 0 | 1.4 | 4.75 | -4.6 | 6.37 | 0.3 | 7.84 | . | . |
| 9: 0 | 1.5 | 5.35 | -4.0 | 6.21 | 3.4 | 7.42 | . | . |
| 10: 0 | 0.9 | 4.99 | -3.9 | 7.09 | 6.8 | 8.17 | . | . |
| 11: 0 | -0.4 | 4.65 | -4.0 | 7.62 | 8.1 | 8.36 | . | . |
| 12: 0 | -0.2 | 3.97 | -4.4 | 6.79 | 5.3 | 7.68 | . | . |
| 13: 0 | -0.6 | 3.63 | -3.7 | 7.27 | 2.8 | 10.75 | . | . |
| 14: 0 | -2.2 | 4.81 | -3.0 | 9.71 | 1.3 | 10.60 | . | . |
| 15: 0 | . | . | . | . | . | . | . | . |
| 16: 0 | . | . | . | . | . | . | . | . |
| 17: 0 | -1.5 | 2.96 | -5.0 | 5.63 | -0.9 | 6.00 | . | . |
| 18: 0 | -1.3 | 1.74 | -1.3 | 3.11 | -1.2 | 3.67 | . | . |

APPENDIX C

Appendix C

Sample Calculations

The particulate data are presented in Appendix B, in terms of average concentration over the sampling period. To arrive at the particulate concentrations, it is necessary to know the flow rate of air passing through the filter, the run duration, the active filter area, and the initial and final filter weights. To determine the total suspended particulate (TSP) concentrations, the initial filter weight is subtracted from the final filter weight to obtain the TSP loading per filter. The TACB elemental analyses reported the data in loading per filter. However, the UCD elemental analyses were expressed in loading per area which were first converted to loading per filter.

An example case is solved here to show the procedure used to convert filter loadings to concentrations. For this example, data was chosen from October 20, 1977 in San Antonio at Loop 410 at Military Highway. Data from the SFU unit at Station 1, located approximately 150 feet south of the roadway are used for this example. The following data were obtained:

| Pore Size | Filter Number | Initial Weight (μg) | Final Weight (μg) | Calcium Loading | |
|---|---|---|---|---|---|
| | | | | TACB Analysis (μg/filter) | UCD Analysis ($ng/cm^2$) |
| 8.0 μm | 194 | 15307 | 15719 | 89.57 | 2970 |
| 0.4 μm | 165 | 15935 | 16220 | 6.38 | 237 |

The SFU unit at station 1 was run at a flow rate of 22.5 l/min for 10.5 hours.

The total particulate loadings necessary to determine the TSP concentrations are found by the following equation

Total loading = Final filter weight - Initial filter weight.

Use of this equation yields a 412 μg/filter loading for the 8.0 μm filter and a 285 μg/filter loading for the 0.4 μm filter. Filter loadings expressed in mass per area may be converted to loadings in mass per filter by the following:

Filter loading = Mass loading x Active filter area.

Applying the above equation along with a conversion factor, the calcium loading from the UCD analysis for the 8.0 μm filter is

$$\text{Ca loading} = \frac{2970\ \text{ng}}{\text{cm}^2} \left| \frac{14.4\ \text{cm}^2}{\text{filter}} \right| \frac{1\ \mu\text{g}}{1000\ \text{ng}}$$

where the active area of the SFU filter is 14.4 $cm^2$. The Ca loading for the 0.4 μm filter is calculated to be 3.41 μg/filter using the above equation.

From the filter loadings expressed in mass per filter, the average sampling concentration is calculated from the following:

Average Concentration = (filter loading ÷ flow rate) ÷ run duration.

The TSP concentration from the 8.0 μm filter is found below using the above equation and conversion factors to make the units consistent. The TSP concentration from the 8.0 μm filter is therefore

$$\text{TSP concentration} = \frac{412\ \mu\text{g}}{\text{filter}} \left| \frac{\text{min}}{22.5\ \text{l}} \right| \frac{1000\ \text{l}}{1\ \text{m}^3} \left| \frac{\text{filter}}{10.5\ \text{hrs}} \right| \frac{\text{hr}}{60\ \text{min}}$$

$$= 29.1\ \frac{\mu\text{g}}{\text{m}^3}$$

Application of the equation for average concentration yields

| Pore Size | Filter Loading (μg/filter) | | | Average Concentration (μg/m$^3$) | | |
|---|---|---|---|---|---|---|
| | Total Particulate | Ca (TACB) | Ca (UCD) | TSP | Ca (TACB) | Ca (UCD) |
| 8.0 | 412 | 89.57 | 42.8 | 29.1 | 6.3 | 3.0 |
| 0.4 | 285 | 6.38 | 3.41 | 20.1 | 0.4 | 0.2 |

This same procedure was followed to convert the filter loadings to average particulate concentrations for the hivol and Lundgren afterfilters, using the applicable flow rate, run duration, and active filter area.

APPENDIX D

## APPENDIX D

### New York Total Suspended Particulate Data

This appendix presents the data taken by the New York Division of Air Resources under contract DOT-FH-11-9245. The total particulate weights on the hivol filters used in that project were reduced to units of $\mu g/m^3$. Since the hivols were not under flow control, the flow rates used in making these calculations were calculated from the visi-float readings taken at the beginning and end of each run. Each visi-float--hivol combination had been calibrated twice while the data was being taken. Each visi-float reading was converted into a flow rate in cfm using the averaged calibration curve of the particular visi-float--hivol combination given for that filter. Filter loading was assumed to have taken place linearly, as was the decrease in flow rate during the run. The average flow rate was then calculated by simply averaging the start and shutdown flow rates. Where no visi-float reading had been given for a particular hivol, an average flow rate of 65.0 cfm (1.8 m/min) was assumed. Where the length of the run had not been given, the average run length during that sampling period was given. If no start time was given the start time is reported as 0.

The particulate data, presented in this appendix, along with the meteorological and traffic data from the New York site are available on magnetic tape from NTIS. The New York site description and other additional information are available from the New York Division of Air Resources.

# NEW YORK TSP DATA

DATE= 2 24 77

| STATION | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| START TIME | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 |
| HRS. RUN | 24.1 | 24.1 | 24.3 | 7.2 | 7.7 | 7.4 |
| FLOW RATE(M**3/MIN) | 1.9 | 1.9 | 1.9 | 2.0 | 2.1 | 2.1 |
| TSP(UG/M**3) | 25.9 | 37.0 | 57.8 | 133.6 | 81.1 | 55.7 |

DATE= 2 27 77

| STATION | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| START TIME | 15.0 | 15.0 | 15.0 | 15.0 | 15.0 | 15.0 |
| HRS. RUN | 24.2 | 24.0 | 24.3 | 24.1 | 24.8 | 24.2 |
| FLOW RATE(M**3/MIN) | 2.0 | 1.8 | 1.8 | 1.8 | 2.0 | 2.0 |
| TSP(UG/M**3) | 23.1 | 32.6 | 56.8 | 64.9 | 33.9 | 26.2 |

DATE= 2 28 77

| STATION | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| START TIME | 16.0 | 16.0 | 16.0 | 16.0 | 16.0 | 16.0 |
| HRS. RUN | 24.1 | 24.1 | 24.1 | 24.0 | 24.0 | 24.0 |
| FLOW RATE(M**3/MIN) | 1.7 | 1.8 | 1.8 | 1.9 | 2.0 | 2.0 |
| TSP(UG/M**3) | 49.6 | 77.3 | 110.8 | 109.4 | 68.9 | 58.7 |

DATE= 3 1 77

| STATION | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| START TIME | 16.0 | 16.0 | 16.0 | 16.0 | 16.0 | 16.0 |
| HRS. RUN | 24.0 | 24.0 | 24.0 | 24.0 | 24.1 | 24.1 |
| FLOW RATE(M**3/MIN) | 1.9 | 1.8 | 1.8 | 1.9 | 2.1 | 1.8 |
| TSP(UG/M**3) | 28.8 | 36.7 | 59.3 | 232.1 | 54.9 | 49.1 |

DATE= 3 2 77

| STATION | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| START TIME | 16.0 | 16.0 | 16.0 | 16.0 | 16.0 | 16.0 |
| HRS. RUN | 24.3 | 24.1 | 24.8 | 24.2 | 24.1 | 15.7 |
| FLOW RATE(M**3/MIN) | 1.8 | 1.7 | 1.7 | 1.8 | 2.0 | 1.5 |
| TSP(UG/M**3) | 85.7 | 108.5 | 191.6 | 119.4 | 85.3 | 157.2 |

DATE= 3 3 77

| STATION | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| START TIME | 17.0 | 17.0 | 17.0 | 15.0 | 17.0 | 17.0 |
| HRS. RUN | 11.9 | 11.9 | 11.9 | 9.4 | 9.4 | 9.5 |
| FLOW RATE(M**3/MIN) | 1.9 | 2.0 | 1.9 | 1.9 | 2.2 | 1.6 |
| TSP(UG/M**3) | 84.6 | 100.2 | 147.8 | 161.8 | 92.8 | 112.2 |

DATE= 3 7 77

| STATION | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| START TIME | 17.0 | 17.0 | 17.0 | 17.0 | 17.0 | 17.0 |
| HRS. RUN | 18.8 | 18.8 | 18.8 | 18.4 | 18.4 | 18.0 |
| FLOW RATE(M**3/MIN) | 1.9 | 1.8 | 1.9 | 2.1 | 2.1 | 1.7 |
| TSP(UG/M**3) | 25.1 | 29.2 | 40.3 | 88.7 | 47.5 | 78.7 |

DATE= 3 8 77

| STATION | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| START TIME | 11.0 | 11.0 | 11.0 | 11.0 | 11.0 | 11.0 |
| HRS. RUN | 23.0 | 23.0 | 23.0 | 23.5 | 23.5 | 23.5 |
| FLOW RATE(M**3/MIN) | 1.8 | 1.8 | 1.9 | 2.1 | 2.1 | 1.8 |
| TSP(UG/M**3) | 79.1 | 101.0 | 154.3 | 97.6 | 72.0 | 76.4 |

NEW YORK TSP DATA

| DATE= | 3 9 77 | | | | | |
|---|---|---|---|---|---|---|
| STATION | 1 | 2 | 3 | 4 | 5 | 6 |
| START TIME | 11.0 | 11.0 | 11.0 | 11.0 | 11.0 | 11.0 |
| HRS. RUN | 23.5 | 23.5 | 23.5 | 23.5 | 23.5 | 22.7 |
| FLOW RATE(M**3/MIN) | 1.7 | 1.7 | 1.9 | 2.0 | 2.1 | 2.0 |
| TSP(UG/M**3) | 70.4 | 92.6 | 146.6 | 56.0 | 50.5 | 53.1 |

| DATE= | 3 10 77 | | | | | |
|---|---|---|---|---|---|---|
| STATION | 1 | 2 | 3 | 4 | 5 | 6 |
| START TIME | 11.0 | 11.0 | 11.0 | 11.0 | 11.0 | 11.0 |
| HRS. RUN | 13.6 | 13.6 | 13.6 | 24.4 | 24.4 | 24.4 |
| FLOW RATE(M**3/MIN) | 1.7 | 1.7 | 1.8 | 2.0 | 2.1 | 1.9 |
| TSP(UG/M**3) | 80.0 | 100.4 | 165.7 | 84.7 | 66.0 | 78.7 |

| DATE= | 3 13 77 | | | | | |
|---|---|---|---|---|---|---|
| STATION | 1 | 2 | 3 | 4 | 5 | 6 |
| START TIME | 11.0 | 11.0 | 11.0 | 11.0 | 11.0 | 11.0 |
| HRS. RUN | 24.6 | 24.3 | 23.9 | 24.1 | 24.0 | 24.1 |
| FLOW RATE(M**3/MIN) | 1.9 | 1.8 | 1.9 | 2.0 | 2.1 | 1.9 |
| TSP(UG/M**3) | 21.6 | 25.9 | 40.9 | 42.7 | 27.3 | 32.1 |

| DATE= | 3 14 77 | | | | | |
|---|---|---|---|---|---|---|
| STATION | 1 | 2 | 3 | 4 | 5 | 6 |
| START TIME | 0.0 | 0.0 | 17.0 | 0.0 | 0.0 | 0.0 |
| HRS. RUN | 23.6 | 23.6 | 26.9 | 23.6 | 23.5 | 23.3 |
| FLOW RATE(M**3/MIN) | 1.9 | 1.9 | 2.1 | 1.9 | 2.2 | 2.0 |
| TSP(UG/M**3) | 16.7 | 17.8 | 18.5 | 70.6 | 31.4 | 29.2 |

| DATE= | 3 15 77 | | | | | |
|---|---|---|---|---|---|---|
| STATION | 1 | 2 | 3 | 4 | 5 | 6 |
| START TIME | 17.0 | 17.0 | 17.0 | 17.0 | 17.0 | 17.0 |
| HRS. RUN | 1.2 | 1.2 | 1.2 | 23.6 | 23.7 | 23.8 |
| FLOW RATE(M**3/MIN) | 1.9 | 1.9 | 2.0 | 2.1 | 2.2 | 2.0 |
| TSP(UG/M**3) | 458.2 | 620.4 | 1518.6 | 56.3 | 34.0 | 42.1 |

| DATE= | 3 16 77 | | | | | |
|---|---|---|---|---|---|---|
| STATION | 1 | 2 | 3 | 4 | 5 | 6 |
| START TIME | 17.0 | 17.0 | 17.0 | 17.0 | 17.0 | 17.0 |
| HRS. RUN | 17.7 | 17.7 | 17.7 | 24.2 | 24.2 | 24.2 |
| FLOW RATE(M**3/MIN) | 2.0 | 1.9 | 2.0 | 2.1 | 2.2 | 2.0 |
| TSP(UG/M**3) | 15.5 | 21.5 | 25.8 | 60.9 | 34.4 | 31.4 |

| DATE= | 3 17 77 | | | | | |
|---|---|---|---|---|---|---|
| STATION | 1 | 2 | 3 | 4 | 5 | 6 |
| START TIME | 17.0 | 17.0 | 17.0 | 17.0 | 17.0 | 17.0 |
| HRS. RUN | 16.6 | 16.5 | 16.6 | 16.6 | 16.6 | 16.6 |
| FLOW RATE(M**3/MIN) | 1.7 | 1.8 | 1.9 | 2.0 | 2.2 | 2.1 |
| TSP(UG/M**3) | 28.5 | 36.2 | 47.9 | 64.8 | 33.6 | 30.8 |

| DATE= | 3 20 77 | | | | | |
|---|---|---|---|---|---|---|
| STATION | 1 | 2 | 3 | 4 | 5 | 6 |
| START TIME | 11.0 | 11.0 | 11.0 | 11.0 | 11.0 | 11.0 |
| HRS. RUN | 23.3 | 25.5 | 24.0 | 24.2 | 24.0 | 24.0 |
| FLOW RATE(M**3/MIN) | 1.9 | 2.0 | 1.9 | 2.0 | 2.1 | 2.1 |
| TSP(UG/M**3) | 22.8 | 24.9 | 41.5 | 57.8 | 32.5 | 27.1 |

NEW YORK TSP DATA

DATE= 3 21 77

| STATION | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| START TIME | 15.0 | 15.0 | 15.0 | 15.0 | 15.0 | 15.0 |
| HRS. RUN | 4.2 | 4.2 | 4.2 | 23.1 | 23.1 | 23.1 |
| FLOW RATE(M**3/MIN) | 1.7 | 1.9 | 2.0 | 2.0 | 1.8 | 2.0 |
| TSP(UG/M**3) | 70.0 | 67.3 | 120.0 | 43.8 | 39.4 | 37.3 |

DATE= 3 23 77

| STATION | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| START TIME | 9.0 | 9.0 | 9.0 | 9.0 | 9.0 | 9.0 |
| HRS. RUN | 26.9 | 25.3 | 25.3 | 25.3 | 25.4 | 25.5 |
| FLOW RATE(M**3/MIN) | 1.7 | 2.0 | 1.9 | 2.0 | 2.1 | 2.0 |
| TSP(UG/M**3) | 44.1 | 34.7 | 44.1 | 70.1 | 40.0 | 35.8 |

DATE= 3 24 77

| STATION | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| START TIME | 9.0 | 9.0 | 9.0 | 9.0 | 9.0 | 9.0 |
| HRS. RUN | 14.8 | 14.8 | 14.8 | 24.4 | 24.4 | 24.4 |
| FLOW RATE(M**3/MIN) | 1.8 | 2.1 | 1.9 | 1.9 | 2.1 | 2.1 |
| TSP(UG/M**3) | 23.1 | 22.6 | 28.0 | 160.9 | 36.3 | 31.1 |

DATE= 3 27 77

| STATION | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| START TIME | 0.0 | 0.0 | 0.0 | 11.0 | 11.0 | 11.0 |
| HRS. RUN | 11.0 | 11.0 | 11.0 | 11.3 | 12.1 | 11.8 |
| FLOW RATE(M**3/MIN) | 1.8 | 1.8 | 1.8 | 2.0 | 2.1 | 2.1 |
| TSP(UG/M**3) | 39.5 | 47.7 | 44.5 | 26.7 | 27.3 | 32.1 |

DATE= 3 29 77

| STATION | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| START TIME | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 |
| HRS. RUN | 15.9 | 16.6 | 15.9 | 12.9 | 23.1 | 23.2 |
| FLOW RATE(M**3/MIN) | 2.0 | 2.1 | 2.0 | 2.0 | 2.0 | 2.0 |
| TSP(UG/M**3) | 74.3 | 77.0 | 134.6 | 90.3 | 65.2 | 68.2 |

DATE= 3 30 77

| STATION | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| START TIME | 12.0 | 12.0 | 12.0 | 8.0 | 8.0 | 8.0 |
| HRS. RUN | 7.5 | 7.5 | 7.4 | 20.5 | 20.5 | 20.6 |
| FLOW RATE(M**3/MIN) | 1.8 | 2.0 | 2.0 | 2.0 | 2.1 | 2.0 |
| TSP(UG/M**3) | 79.3 | 79.8 | 159.8 | 49.9 | 43.3 | 44.9 |

DATE= 3 0 77

| STATION | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| START TIME | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 |
| HRS. RUN | 24.1 | 24.0 | 23.9 | 22.4 | 22.3 | 22.1 |
| FLOW RATE(M**3/MIN) | 1.6 | 2.0 | 1.9 | 2.0 | 2.1 | 2.0 |
| TSP(UG/M**3) | 35.0 | 33.9 | 47.5 | 61.0 | 42.9 | 69.0 |

DATE= 4 1 77

| STATION | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| START TIME | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 |
| HRS. RUN | 23.9 | 24.0 | 23.9 | 23.2 | 23.7 | 23.7 |
| FLOW RATE(M**3/MIN) | 1.6 | 2.1 | 1.8 | 2.2 | 2.1 | 2.2 |
| TSP(UG/M**3) | 19.2 | 17.1 | 3.1 | 37.3 | 32.3 | 24.6 |

NEW YORK TSP DATA

| DATE= | 4 4 77 | | | | | |
|---|---|---|---|---|---|---|
| STATION | 1 | 2 | 3 | 4 | 5 | 6 |
| START TIME | 11.0 | 11.0 | 11.0 | 11.0 | 11.0 | 11.0 |
| HRS. RUN | 26.0 | 26.1 | 26.2 | 25.9 | 26.6 | 25.5 |
| FLOW RATE(M**3/MIN) | 1.7 | 2.0 | 1.8 | 1.9 | 2.1 | 2.0 |
| TSP(UG/M**3) | 19.3 | 18.1 | 34.9 | 30.8 | 18.6 | 12.4 |

| DATE= | 4 5 77 | | | | | |
|---|---|---|---|---|---|---|
| STATION | 1 | 2 | 3 | 4 | 5 | 6 |
| START TIME | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| HRS. RUN | 23.0 | 23.0 | 23.1 | 23.3 | 23.3 | 23.3 |
| FLOW RATE(M**3/MIN) | 1.7 | 1.8 | 1.8 | 2.0 | 2.1 | 2.1 |
| TSP(UG/M**3) | 29.0 | 0.0 | 67.1 | 43.9 | 27.7 | 23.6 |

| DATE= | 4 6 77 | | | | | |
|---|---|---|---|---|---|---|
| STATION | 1 | 2 | 3 | 4 | 5 | 6 |
| START TIME | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| HRS. RUN | 23.7 | 23.8 | 23.8 | 23.8 | 7.3 | 23.8 |
| FLOW RATE(M**3/MIN) | 1.8 | 1.8 | 1.8 | 2.0 | 2.0 | 2.0 |
| TSP(UG/M**3) | 39.5 | 0.0 | 68.3 | 23.3 | 112.9 | 10.8 |

| DATE= | 4 7 77 | | | | | |
|---|---|---|---|---|---|---|
| STATION | 1 | 2 | 3 | 4 | 5 | 6 |
| START TIME | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| HRS. RUN | 10.4 | 23.7 | 23.7 | 18.7 | 24.1 | 18.4 |
| FLOW RATE(M**3/MIN) | 1.8 | 2.0 | 1.9 | 2.2 | 2.0 | 1.9 |
| TSP(UG/M**3) | 127.4 | 15.7 | 0.0 | 51.7 | 36.9 | 37.4 |

| DATE= | 4 10 77 | | | | | |
|---|---|---|---|---|---|---|
| STATION | 1 | 2 | 3 | 4 | 5 | 6 |
| START TIME | 9.0 | 9.0 | 9.0 | 9.0 | 9.0 | 9.0 |
| HRS. RUN | 24.1 | 25.8 | 24.1 | 17.6 | 23.2 | 19.3 |
| FLOW RATE(M**3/MIN) | 2.0 | 2.0 | 1.9 | 2.1 | 1.9 | 1.5 |
| TSP(UG/M**3) | 34.3 | 39.5 | 68.1 | 73.4 | 52.3 | 70.2 |

| DATE= | 4 11 77 | | | | | |
|---|---|---|---|---|---|---|
| STATION | 1 | 2 | 3 | 4 | 5 | 6 |
| START TIME | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 |
| HRS. RUN | 24.5 | 24.7 | 24.5 | 15.7 | 24.5 | 15.6 |
| FLOW RATE(M**3/MIN) | 1.8 | 1.9 | 1.9 | 2.0 | 2.1 | 1.9 |
| TSP(UG/M**3) | 62.3 | 75.9 | 113.7 | 72.0 | 61.0 | 62.1 |

| DATE= | 4 12 77 | | | | | |
|---|---|---|---|---|---|---|
| STATION | 1 | 2 | 3 | 4 | 5 | 6 |
| START TIME | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 |
| HRS. RUN | 23.5 | 23.5 | 23.8 | 23.6 | 23.6 | 23.6 |
| FLOW RATE(M**3/MIN) | 1.8 | 1.8 | 1.8 | 2.0 | 2.1 | 1.6 |
| TSP(UG/M**3) | 155.0 | 98.3 | 125.5 | 166.7 | 119.5 | 162.8 |

| DATE= | 4 13 0 | | | | | |
|---|---|---|---|---|---|---|
| STATION | 1 | 2 | 3 | 4 | 5 | 6 |
| START TIME | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 |
| HRS. RUN | 24.6 | 24.5 | 24.3 | 24.3 | 24.3 | 24.3 |
| FLOW RATE(M**3/MIN) | 1.7 | 1.8 | 1.8 | 1.7 | 2.0 | 2.0 |
| TSP(UG/M**3) | 80.2 | 93.5 | 124.0 | 128.4 | 87.0 | 101.1 |

NEW YORK TSP DATA

| DATE= | 4 14 77 | | | | | |
|---|---|---|---|---|---|---|
| STATION | 1 | 2 | 3 | 4 | 5 | 6 |
| START TIME | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 |
| HRS. RUN | 24.6 | 24.6 | 24.6 | 24.4 | 24.5 | 24.5 |
| FLOW RATE(M**3/MIN) | 1.7 | 1.8 | 1.9 | 1.9 | 2.0 | 2.1 |
| TSP(UG/M**3) | 32.1 | 33.9 | 48.6 | 90.5 | 51.1 | 17.8 |

| DATE= | 4 15 77 | | | | | |
|---|---|---|---|---|---|---|
| STATION | 1 | 2 | 3 | 4 | 5 | 6 |
| START TIME | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| HRS. RUN | 23.9 | 23.6 | 24.1 | 23.7 | 24.4 | 24.8 |
| FLOW RATE(M**3/MIN) | 1.8 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 |
| TSP(UG/M**3) | 47.1 | 59.4 | 82.5 | 87.7 | 61.7 | 53.8 |

| DATE= | 4 17 77 | | | | | |
|---|---|---|---|---|---|---|
| STATION | 1 | 2 | 3 | 4 | 5 | 6 |
| START TIME | 11.0 | 11.0 | 11.0 | 11.0 | 11.0 | 11.0 |
| HRS. RUN | 23.7 | 23.7 | 23.8 | 24.2 | 24.2 | 24.2 |
| FLOW RATE(M**3/MIN) | 1.8 | 1.7 | 1.8 | 1.7 | 2.1 | 1.8 |
| TSP(UG/M**3) | 68.0 | 76.8 | 104.3 | 87.1 | 50.1 | 73.2 |

| DATE= | 4 18 77 | | | | | |
|---|---|---|---|---|---|---|
| STATION | 1 | 2 | 3 | 4 | 5 | 6 |
| START TIME | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 |
| HRS. RUN | 23.4 | 23.4 | 23.4 | 24.2 | 24.2 | 24.2 |
| FLOW RATE(M**3/MIN) | 1.7 | 1.7 | 2.0 | 1.8 | 2.1 | 2.1 |
| TSP(UG/M**3) | 73.2 | 84.8 | 78.4 | 119.1 | 87.0 | 83.3 |

| DATE= | 4 19 77 | | | | | |
|---|---|---|---|---|---|---|
| STATION | 1 | 2 | 3 | 4 | 5 | 6 |
| START TIME | 11.0 | 11.0 | 11.0 | 11.0 | 11.0 | 11.0 |
| HRS. RUN | 23.7 | 23.7 | 23.8 | 23.7 | 23.8 | 23.8 |
| FLOW RATE(M**3/MIN) | 1.9 | 1.8 | 2.0 | 1.8 | 1.9 | 2.0 |
| TSP(UG/M**3) | 50.4 | 64.2 | 72.5 | 84.9 | 65.8 | 51.1 |

| DATE= | 4 20 77 | | | | | |
|---|---|---|---|---|---|---|
| STATION | 1 | 2 | 3 | 4 | 5 | 6 |
| START TIME | 11.0 | 11.0 | 11.0 | 11.0 | 11.0 | 11.0 |
| HRS. RUN | 23.9 | 23.9 | 23.9 | 23.9 | 23.9 | 23.9 |
| FLOW RATE(M**3/MIN) | 1.9 | 1.7 | 2.0 | 1.9 | 2.0 | 2.0 |
| TSP(UG/M**3) | 55.0 | 68.0 | 79.2 | 78.2 | 62.9 | 63.4 |

| DATE= | 4 21 77 | | | | | |
|---|---|---|---|---|---|---|
| STATION | 1 | 2 | 3 | 4 | 5 | 6 |
| START TIME | 11.0 | 11.0 | 11.0 | 11.0 | 11.0 | 11.0 |
| HRS. RUN | 25.0 | 25.0 | 25.0 | 23.0 | 25.0 | 25.0 |
| FLOW RATE(M**3/MIN) | 1.9 | 1.7 | 1.9 | 1.7 | 1.9 | 1.8 |
| TSP(UG/M**3) | 100.4 | 96.0 | 109.9 | 92.9 | 68.9 | 74.2 |

| DATE= | 4 22 77 | | | | | |
|---|---|---|---|---|---|---|
| STATION | 1 | 2 | 3 | 4 | 5 | 6 |
| START TIME | 11.0 | 11.0 | 11.0 | 11.0 | 11.0 | 11.0 |
| HRS. RUN | 23.1 | 23.2 | 22.1 | 22.3 | 24.1 | 22.8 |
| FLOW RATE(M**3/MIN) | 2.0 | 1.7 | 2.1 | 2.0 | 2.0 | 2.0 |
| TSP(UG/M**3) | 19.9 | 15.9 | 11.3 | 8.0 | 25.9 | 58.8 |

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NEW YORK TSP DATA

| DATE= | 4 24 0 | | | | | |
|---|---|---|---|---|---|---|
| STATION | 1 | 2 | 3 | 4 | 5 | 6 |
| START TIME | 11.0 | 11.0 | 11.0 | 11.0 | 11.0 | 11.0 |
| HRS. RUN | 23.7 | 23.8 | 23.9 | 23.5 | 23.6 | 23.6 |
| FLOW RATE(M**3/MIN) | 2.0 | 1.8 | 2.3 | 2.1 | 2.1 | 2.1 |
| TSP(UG/M**3) | 47.2 | 59.5 | 55.5 | 59.1 | 41.4 | 39.1 |

| DATE= | 4 26 77 | | | | | |
|---|---|---|---|---|---|---|
| STATION | 1 | 2 | 3 | 4 | 5 | 6 |
| START TIME | 11.0 | 11.0 | 11.0 | 11.0 | 11.0 | 11.0 |
| HRS. RUN | 26.1 | 26.1 | 26.0 | 26.5 | 26.5 | 26.5 |
| FLOW RATE(M**3/MIN) | 1.9 | 1.8 | 2.1 | 1.9 | 2.2 | 2.1 |
| TSP(UG/M**3) | 58.4 | 66.8 | 81.6 | 58.2 | 37.5 | 40.7 |

| DATE= | 4 28 77 | | | | | |
|---|---|---|---|---|---|---|
| STATION | 1 | 2 | 3 | 4 | 5 | 6 |
| START TIME | 9.0 | 9.0 | 9.0 | 9.0 | 9.0 | 9.0 |
| HRS. RUN | 20.8 | 24.1 | 25.6 | 8.4 | 24.1 | 8.2 |
| FLOW RATE(M**3/MIN) | 1.8 | 1.8 | 1.9 | 2.0 | 2.2 | 2.3 |
| TSP(UG/M**3) | 47.7 | 46.0 | 48.4 | 133.0 | 44.5 | 74.6 |

| DATE= | 5 1 77 | | | | | |
|---|---|---|---|---|---|---|
| STATION | 1 | 2 | 3 | 4 | 5 | 6 |
| START TIME | 9.0 | 9.0 | 9.0 | 9.0 | 9.0 | 9.0 |
| HRS. RUN | 27.5 | 24.1 | 22.7 | 24.0 | 23.8 | 24.1 |
| FLOW RATE(M**3/MIN) | 1.8 | 1.9 | 2.3 | 2.0 | 2.1 | 2.2 |
| TSP(UG/M**3) | 44.6 | 52.9 | 66.0 | 35.3 | 39.3 | 28.7 |

| DATE= | 5 5 77 | | | | | |
|---|---|---|---|---|---|---|
| STATION | 1 | 2 | 3 | 4 | 5 | 6 |
| START TIME | 3.0 | 3.0 | 3.0 | 0.0 | 3.0 | 0.0 |
| HRS. RUN | 18.4 | 21.5 | 24.8 | 21.0 | 21.9 | 21.0 |
| FLOW RATE(M**3/MIN) | 1.9 | 1.8 | 2.1 | 2.1 | 1.8 | 1.8 |
| TSP(UG/M**3) | 62.5 | 69.8 | 55.2 | 83.0 | 0.0 | 0.0 |

| DATE= | 5 8 77 | | | | | |
|---|---|---|---|---|---|---|
| STATION | 1 | 2 | 3 | 4 | 5 | 6 |
| START TIME | 9.0 | 9.0 | 9.0 | 9.0 | 9.0 | 9.0 |
| HRS. RUN | 24.0 | 21.9 | 24.0 | 24.0 | 24.0 | 24.1 |
| FLOW RATE(M**3/MIN) | 1.8 | 1.9 | 1.9 | 1.7 | 1.9 | 1.8 |
| TSP(UG/M**3) | 41.4 | 47.0 | 57.4 | 50.5 | 49.3 | 40.8 |

| DATE= | 5 9 77 | | | | | |
|---|---|---|---|---|---|---|
| STATION | 1 | 2 | 3 | 4 | 5 | 6 |
| START TIME | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 |
| HRS. RUN | 24.2 | 24.2 | 24.3 | 1.2 | 24.3 | 24.3 |
| FLOW RATE(M**3/MIN) | 1.9 | 1.8 | 1.9 | 1.7 | 1.9 | 2.2 |
| TSP(UG/M**3) | 14.7 | 11.0 | 16.4 | 157.5 | 30.6 | 21.5 |

| DATE= | 5 10 77 | | | | | |
|---|---|---|---|---|---|---|
| STATION | 1 | 2 | 3 | 4 | 5 | 6 |
| START TIME | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 |
| HRS. RUN | 27.6 | 25.4 | 22.1 | 25.5 | 0.4 | 25.4 |
| FLOW RATE(M**3/MIN) | 1.8 | 1.8 | 2.2 | 1.9 | 1.7 | 2.1 |
| TSP(UG/M**3) | 20.7 | 22.9 | 21.5 | 57.9 | 1126.3 | 32.2 |

# NEW YORK TSP DATA

DATE= 5 11 77

| STATION | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| START TIME | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 |
| HRS. RUN | 24.0 | 23.9 | 23.9 | 23.8 | 23.8 | 23.9 |
| FLOW RATE(M**3/MIN) | 1.9 | 1.8 | 2.0 | 1.8 | 1.9 | 2.1 |
| TSP(UG/M**3) | 41.2 | 45.5 | 47.5 | 86.6 | 49.1 | 42.2 |

DATE= 5 12 77

| STATION | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| START TIME | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 |
| HRS. RUN | 23.6 | 23.6 | 23.6 | 23.7 | 23.6 | 23.6 |
| FLOW RATE(M**3/MIN) | 2.0 | 1.7 | 1.9 | 2.0 | 2.0 | 2.1 |
| TSP(UG/M**3) | 63.6 | 77.6 | 88.5 | 92.3 | 68.8 | 70.8 |

DATE= 5 15 77

| STATION | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| START TIME | 9.0 | 9.0 | 9.0 | 9.0 | 9.0 | 9.0 |
| HRS. RUN | 24.1 | 23.6 | 23.9 | 23.0 | 24.3 | 26.5 |
| FLOW RATE(M**3/MIN) | 2.0 | 1.8 | 2.1 | 1.9 | 1.9 | 2.1 |
| TSP(UG/M**3) | 38.3 | 45.2 | 51.2 | 89.3 | 53.4 | 45.8 |

DATE= 5 16 77

| STATION | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| START TIME | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 |
| HRS. RUN | 23.8 | 23.9 | 24.0 | 24.1 | 24.1 | 24.1 |
| FLOW RATE(M**3/MIN) | 1.8 | 2.1 | 2.0 | 1.9 | 1.9 | 2.0 |
| TSP(UG/M**3) | 97.1 | 93.8 | 118.7 | 120.2 | 89.5 | 97.9 |

DATE= 5 17 77

| STATION | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| START TIME | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 |
| HRS. RUN | 24.9 | 24.8 | 24.7 | 24.3 | 24.3 | 24.3 |
| FLOW RATE(M**3/MIN) | 1.8 | 1.7 | 1.9 | 1.8 | 1.9 | 1.9 |
| TSP(UG/M**3) | 125.3 | 155.0 | 144.0 | 171.8 | 133.7 | 172.3 |

DATE= 5 18 77

| STATION | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| START TIME | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 |
| HRS. RUN | 24.6 | 24.6 | 24.6 | 24.7 | 24.7 | 24.7 |
| FLOW RATE(M**3/MIN) | 1.8 | 1.8 | 1.9 | 2.0 | 1.9 | 2.1 |
| TSP(UG/M**3) | 87.2 | 157.5 | 114.5 | 128.1 | 103.2 | 104.5 |

DATE= 5 19 77

| STATION | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| START TIME | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 |
| HRS. RUN | 22.4 | 22.4 | 22.5 | 22.6 | 22.6 | 18.9 |
| FLOW RATE(M**3/MIN) | 1.9 | 1.9 | 2.0 | 2.0 | 2.0 | 2.1 |
| TSP(UG/M**3) | 45.0 | 53.0 | 61.1 | 77.1 | 48.4 | 52.4 |

DATE= 5 22 77

| STATION | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| START TIME | 9.0 | 9.0 | 9.0 | 9.0 | 9.0 | 9.0 |
| HRS. RUN | 24.4 | 23.6 | 23.8 | 22.7 | 24.2 | 24.0 |
| FLOW RATE(M**3/MIN) | 1.9 | 1.9 | 2.1 | 1.9 | 1.9 | 2.0 |
| TSP(UG/M**3) | 59.1 | 59.6 | 78.5 | 55.8 | 50.0 | 41.8 |

NEW YORK TSP DATA

| | | | | | | |
|---|---|---|---|---|---|---|
| DATE= | 5 23 77 | | | | | |
| STATION | 1 | 2 | 3 | 4 | 5 | 6 |
| START TIME | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| HRS. RUN | 19.0 | 22.3 | 26.6 | 65.8 | 23.0 | 19.8 |
| FLOW RATE(M**3/MIN) | 1.8 | 1.7 | 2.1 | 2.0 | 2.0 | 2.2 |
| TSP(UG/M**3) | 128.1 | 87.1 | 81.2 | 23.3 | 66.8 | 127.6 |

| | | | | | | |
|---|---|---|---|---|---|---|
| DATE= | 5 24 77 | | | | | |
| STATION | 1 | 2 | 3 | 4 | 5 | 6 |
| START TIME | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| HRS. RUN | 47.6 | 43.8 | 39.9 | 42.9 | 43.2 | 43.4 |
| FLOW RATE(M**3/MIN) | 1.8 | 1.8 | 2.1 | 1.8 | 1.9 | 2.2 |
| TSP(UG/M**3) | 125.5 | 100.4 | 186.5 | 105.5 | 86.3 | 110.1 |

| | | | | | | |
|---|---|---|---|---|---|---|
| DATE= | 5 25 77 | | | | | |
| STATION | 1 | 2 | 3 | 4 | 5 | 6 |
| START TIME | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| HRS. RUN | 20.7 | 24.5 | 28.3 | 32.3 | 24.5 | 24.5 |
| FLOW RATE(M**3/MIN) | 1.9 | 1.8 | 2.3 | 1.6 | 1.8 | 1.9 |
| TSP(UG/M**3) | 86.5 | 337.5 | 116.0 | 123.8 | 98.3 | 87.3 |

| | | | | | | |
|---|---|---|---|---|---|---|
| DATE= | 5 26 77 | | | | | |
| STATION | 1 | 2 | 3 | 4 | 5 | 6 |
| START TIME | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 |
| HRS. RUN | 24.5 | 24.5 | 23.7 | 25.7 | 24.5 | 24.5 |
| FLOW RATE(M**3/MIN) | 1.9 | 1.7 | 1.9 | 1.8 | 2.0 | 2.1 |
| TSP(UG/M**3) | 93.7 | 452.7 | 226.7 | 164.5 | 110.4 | 105.2 |

| | | | | | | |
|---|---|---|---|---|---|---|
| DATE= | 5 27 77 | | | | | |
| STATION | 1 | 2 | 3 | 4 | 5 | 6 |
| START TIME | 11.0 | 11.0 | 11.0 | 11.0 | 11.0 | 11.0 |
| HRS. RUN | 25.1 | 25.1 | 25.1 | 25.2 | 25.5 | 25.2 |
| FLOW RATE(M**3/MIN) | 1.9 | 1.6 | 1.8 | 1.7 | 1.8 | 2.0 |
| TSP(UG/M**3) | 154.3 | 135.2 | 122.0 | 125.0 | 95.3 | 99.1 |

| | | | | | | |
|---|---|---|---|---|---|---|
| DATE= | 5 28 77 | | | | | |
| STATION | 1 | 2 | 3 | 4 | 5 | 6 |
| START TIME | 11.0 | 11.0 | 11.0 | 11.0 | 11.0 | 11.0 |
| HRS. RUN | 21.9 | 21.9 | 21.9 | 22.1 | 22.1 | 22.1 |
| FLOW RATE(M**3/MIN) | 2.0 | 1.9 | 2.0 | 1.8 | 2.0 | 2.3 |
| TSP(UG/M**3) | 40.0 | 19.8 | 52.2 | 69.4 | 47.1 | 37.9 |

| | | | | | | |
|---|---|---|---|---|---|---|
| DATE= | 5 31 77 | | | | | |
| STATION | 1 | 2 | 3 | 4 | 5 | 6 |
| START TIME | 11.0 | 11.0 | 11.0 | 11.0 | 11.0 | 11.0 |
| HRS. RUN | 15.3 | 26.6 | 23.2 | 24.4 | 24.4 | 24.1 |
| FLOW RATE(M**3/MIN) | 1.9 | 1.8 | 1.9 | 1.8 | 2.1 | 2.2 |
| TSP(UG/M**3) | 65.8 | 74.8 | 64.4 | 64.1 | 65.9 | 67.5 |

| | | | | | | |
|---|---|---|---|---|---|---|
| DATE= | 6 1 77 | | | | | |
| STATION | 1 | 2 | 3 | 4 | 5 | 6 |
| START TIME | 11.0 | 11.0 | 11.0 | 11.0 | 11.0 | 11.0 |
| HRS. RUN | 20.4 | 117.7 | 18.9 | 19.2 | 74.3 | 66.1 |
| FLOW RATE(M**3/MIN) | 1.7 | 1.7 | 1.9 | 1.7 | 1.9 | 2.2 |
| TSP(UG/M**3) | 81.3 | 14.6 | 90.0 | 102.3 | 19.4 | 17.3 |

NEW YORK TSP DATA

| DATE= | 6 2 77 | | | | | |
|---|---|---|---|---|---|---|
| STATION | 1 | 2 | 3 | 4 | 5 | 6 |
| START TIME | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 |
| HRS. RUN | 24.4 | 27.1 | 13.8 | 23.1 | 23.1 | 23.1 |
| FLOW RATE(M**3/MIN) | 1.8 | 1.6 | 2.2 | 1.8 | 1.8 | 1.8 |
| TSP(UG/M**3) | 26.2 | 134.3 | 166.3 | 110.8 | 78.4 | 72.0 |

| DATE= | 6 3 77 | | | | | |
|---|---|---|---|---|---|---|
| STATION | 1 | 2 | 3 | 4 | 5 | 6 |
| START TIME | 11.0 | 11.0 | 11.0 | 11.0 | 11.0 | 11.0 |
| HRS. RUN | 24.5 | 24.5 | 24.5 | 24.0 | 24.6 | 24.6 |
| FLOW RATE(M**3/MIN) | 2.0 | 1.9 | 2.0 | 1.9 | 2.0 | 1.8 |
| TSP(UG/M**3) | 51.4 | 192.4 | 158.6 | 105.8 | 78.6 | 118.6 |

| DATE= | 6 4 77 | | | | | |
|---|---|---|---|---|---|---|
| STATION | 1 | 2 | 3 | 4 | 5 | 6 |
| START TIME | 11.0 | 11.0 | 11.0 | 11.0 | 11.0 | 11.0 |
| HRS. RUN | 23.8 | 23.8 | 23.8 | 24.0 | 23.8 | 23.7 |
| FLOW RATE(M**3/MIN) | 1.9 | 1.8 | 2.0 | 1.9 | 2.0 | 2.0 |
| TSP(UG/M**3) | 54.4 | 198.9 | 100.2 | 101.2 | 69.6 | 69.3 |

| DATE= | 6 5 77 | | | | | |
|---|---|---|---|---|---|---|
| STATION | 1 | 2 | 3 | 4 | 5 | 6 |
| START TIME | 11.0 | 11.0 | 11.0 | 11.0 | 11.0 | 11.0 |
| HRS. RUN | 23.5 | 23.6 | 23.7 | 7.3 | 23.9 | 19.0 |
| FLOW RATE(M**3/MIN) | 1.8 | 1.9 | 2.1 | 1.9 | 2.2 | 2.2 |
| TSP(UG/M**3) | 36.7 | 35.1 | 43.0 | 175.2 | 28.9 | 46.9 |