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EXAMINATION OF THE RELATIONSHIPS BETWEEN ATMOSPHERIC OXIDANT AND VARIOUS POLLUTANT AND METEOROLOGICAL VARIABLES

by

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1. Executive Summary

While there is general agreement on the classes of reactants involved in the production of oxidants in the atmosphere, thirty years of research have provided limited scientifically or politically acceptable strategies for the control of photochemical oxidants. An empirical relationship between early morning concentrations of hydrocarbons and maximum (afternoon) concentrations of oxidants on the same day was used as a basis for a suggested control strategy in Appendix J to 40 CFR 50 (see Appendix B of this report).

Since the issuance of Appendix J, little has been done to develop models of the relationship between oxidant concentrations and concentrations of precursors. Most attempts have been frustrated by the fact that regressions between these variables have had small correlation coefficients. Smog chamber studies, which provide controlled conditions for experimentation, have yielded considerable knowledge concerning the classes of reactants involved in the production of photochemical oxidants. Several of these studies have shown positive relationships between oxidants and hydrocarbon concentrations. As this type of experimental study becomes more complex, however, the new data developed require correspondingly more complex models of the reactions involved. A complicating factor in attempting to relate chamber experiment data to control strategy development is the fact that the chamber studies, almost exclusively, have been concerned with the reactions taking place with time among a particular set of initial reactants. In real life new compounds are continually being injected into the air, with marked influence on the reactions taking place. Further, most chamber studies have been conducted using artificial light in lieu of actual sunlight; seldom has the radiation intensity of the artificial light been as great as natural sunlight. While providing invaluable data contributing to the understanding of the production of photochemical oxidants, chamber studies have not yet furnished the guidance needed for the development of control strategies. Aside from chamber experiments when both meteorological variables and concentrations of precursor pollutants have been considered, the meteorological variables frequently have proven to be more highly correlated with daily maximum hourly oxidant concentrations than have precursor concentrations.

The present study, using meteorological and aerometric data from the EPA data bank, examined relationships among pollutant concentrations and meteorological variables and the daily maximum hourly oxidant concentrations. Data sets from two areas, Los Angeles and Washington, having different characteristics with regard to photochemical oxidant problems were studied. Two stations of the Los Angeles County Air Pollution Control District--Downtown Los Angeles and Azusa--provided ambient pollutant concentrations that were used along with surface meteorological measurements from the U.S. Weather Service station at Los Angeles International Airport to make up one data set containing data for 1965, 1968 and 1972. The second data set containing data for 1973 only was comprised of ambient pollutant data from four Maryland stations in the suburban area of Washington, D. C., and records of the surface observations from the U.S. Weather Service Station at Dulles International Airport. Within these two data sets, missing values for one or more pollutant variables on given days reduced the useful sample size considerably particularly for the Washington, D. C. area. The analyses were made using data collected from May through October--the periods of highest ambient oxidant concentrations in both geographic areas--and 6-9 A.M. concentrations of the precursor pollutant variables--

since preliminary analysis did not indicate that other time periods gave higher correlations with daily maximum oxidant.

Summary statistics for the two areas show that the May through October frequency of occurrence of days with daily maximum hourly oxidant concentrations greater than 160 $\mu g/m^3$ (.08 ppm), the National Ambient Air Quality Standard (NAAQS) not to be exceeded more than once per year, decreased at Downtown Los Angeles and Azusa between 1968 and 1972 from 67.8 to 56.0 percent and from 85.1 to 75.6 percent, respectively. In the Washington, D. C., area for the Bethesda and Suitland, Maryland, stations the 1973 May through October corresponding frequencies for oxidant concentrations in excess of NAAQS were 37.5 and 28.8 percent, respectively. On a percentage basis, the maximum oxidant concentration occurred more often between the hours of 10:00 A.M. and 2:00 P.M. in Los Angeles than in Maryland. In Maryland, several days (17.4 percent in Hyattsville) reported all zero concentrations while in Los Angeles there were no days with all zero oxidant concentrations.

On the average, nitric oxide (NO), nitrogen dioxide (NO_2), total hydrocarbons (THC), solar radiation (SRAD), daily maximum temperature (MTEMP), and dewpoint temperature (DPT) values were found to be higher than average when maximum hourly average oxidant concentrations were high. Visibility (VIS), relative humidity (RH), wind speed at the time of the maximum oxidant reading (WS), and average wind speed from 7:00A.M. to 7:00 P.M. (AWS) were found to be lower than average when maximum hourly average oxidant concentrations were high.

Examination of the relationship between the 75th percentile values of the distribution of daily maximum oxidant concentrations (MOX) for given concentrations of THC and of NO_2 indicate that in Los Angeles the MOX concentrations have decreased between 1968 and 1972 but THC and NO_2 concentrations have not. Similar analysis of MOX and THC data from three Maryland stations combined into one data set shows the 75th percentile curve in Maryland to have a shape similar to that of the Downtown Los Angeles station within the range of THC concentrations measured. The range of THC concentrations for the Maryland data was about half of the range measured in Los Angeles. The shapes of the MOX 75th percentile curves for Azusa for both 1968 and 1972 data suggest a less rapid rate of increase with higher THC (or NO_2) concentrations; that is, the relationship is curvilinear. The percentile curves for Downtown Los Angeles, however, appears to be reasonably approximated by a linear relationship. (See Figure 1.)

Multiple variable analyses of the relationships between the several pollutant and meteorological variables and the daily maximum hourly oxidant concentrations indicate that in Los Angeles the most important pollutant variables in predicting maximum oxidant concentration are, as would be expected, THC and NO_2; none of the pollutant variables appear to be significant predictors in Maryland. With regard to THC, this latter result is possibly attributable to the small range of THC concentrations measured in Maryland. Among the meteorological variables, MTEMP, SRAD, and VIS are the most significant predictors. In Maryland, MTEMP and in Los Angeles, SRAD were the most important predictors. For the Los Angeles data, a positive linear relationship is still apparent between maximum oxidant and NO_2 and THC after adjustment has been made for important meteorological variables.

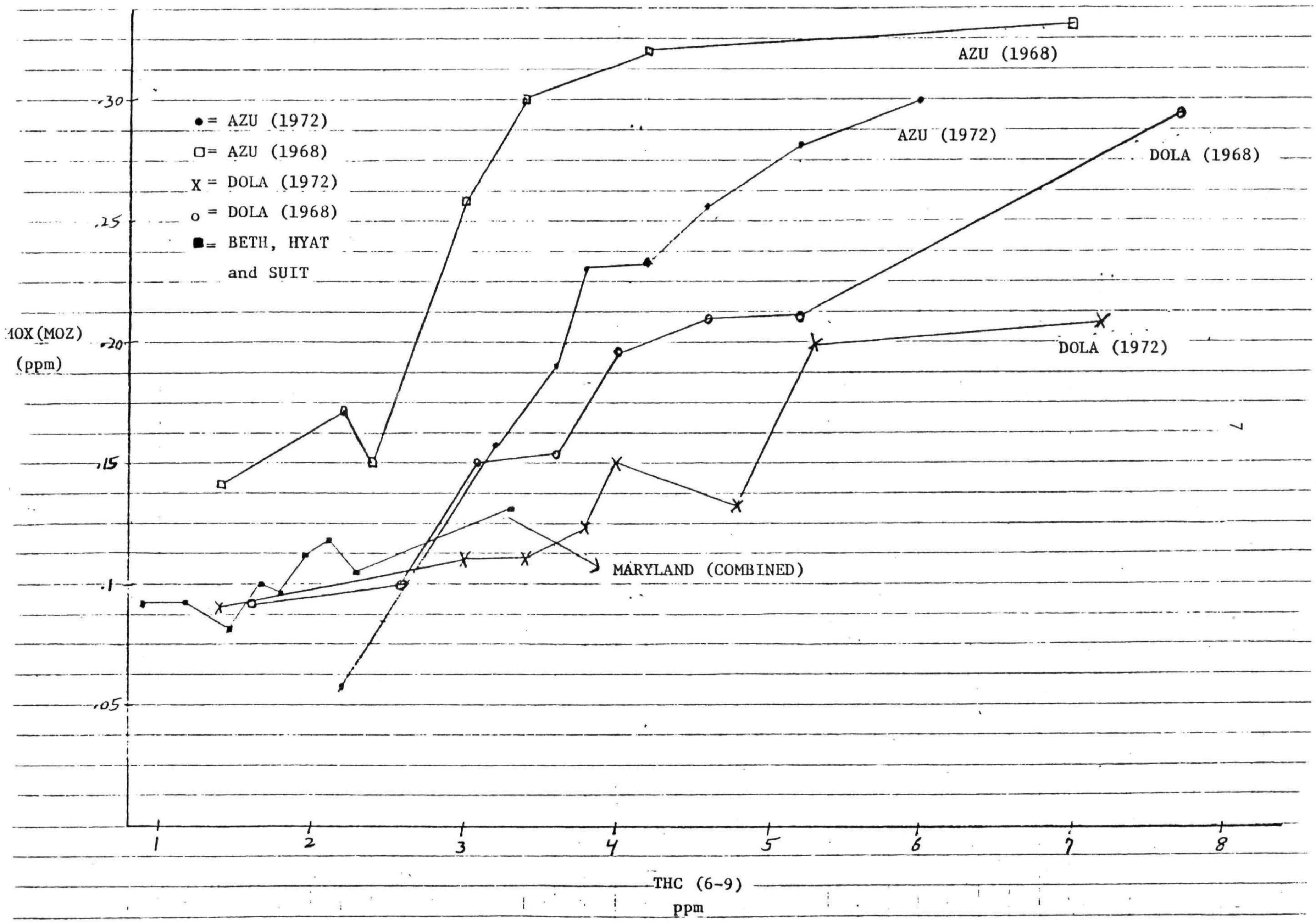
The data sets used in this analysis were not ideal. Missing concentration values for one or more of the pollutants or for oxidant limited the number of data points considerably. In Maryland, for example, only about half the days in the May through October period of 1973 had pollutant data for NO, NO_2, and THC; for 1965, no NO data and only a limited amount of THC data were available for Los Angeles. Accordingly, for analysis purposes the data set for Los Angeles only had pollutant data for 1968 and 1972 and meteorological data for 1972 while the data set for Maryland only had pollutant and meteorological data for half the days of interest in 1973. Meteorological data from stations up to 30 miles distant from the pollutant monitoring stations were used. In Maryland, this distance was thought to be unimportant. However, in the Los Angeles area the maritime influence on the coastal area, where meteorological data were available, probably caused conditions to differ greatly on occasion from the conditions at the inland pollutant monitoring stations.

The present study indicates that the use of statistical analysis of the many variable constituents and properties of the ambient air to develop relationships that can be used as guidance in the development of control strategies is a tenuous procedure. In the study of the oxidant precursor-oxidant relationship and other relationships involving secondary pollutants generated by reactions taking place in the atmosphere, the assumption is made that the ambient air sampled for the morning concentration values of precursors is representative of the air that reached the "downwind" station at the time the oxidant concentration was measured. Such an assumption is not warranted, a priori, since (1) the air from the site of the precursor measurements may never have reached the site of the oxidant measurement and (2) the air from the precursor site, although reaching the oxidant site, may have been modified by the introduction of additional pollutants en route so as to be unrecognizable.

Thus, while the large number of data points theoretically available from existing ambient air monitoring stations is enticing, the requirement for pairs of data--precursors at one station, oxidant at the other--may quickly reduce the useful data to a small sample population because of missing data resulting from various causes.

In general, the statistical analysis of current archived oxidant precursor and oxidant data appears to be an unfruitful method of attacking the development of oxidant precursor-oxidant relationships useful in the development of control strategies. There may be situations that are exceptions to this categorical statement, but each would have to be justified by "proof" that station data used are "representative" of the upwind and downwind geographic areas and that the meteorological conditions are sufficiently well documented to show on a day-to-day basis that the flow was from the "upwind" to the "downwind" stations. In addition, any study of this kind that is undertaken, should begin with several hundred days of data to overcome the problems caused by missing data that will undoubtedly occur due to various causes such as unfavorable meteorological conditions, instrument failure, etc.

Figure 1 Plot of 75th Percentile of the MOX (MOZ) Distribution for Given Levels of THC by Station and Year.



2. Introduction

2.1 General Background

Since the recognition, in the mid 1940s, of the importance of the role of photochemical reactions in the production of oxidants in polluted atmospheres, extensive research in the laboratory and in the use of measurements in the atmosphere has failed to provide a scientifically or politically acceptable strategy for the control of these oxidants. There is general agreement on the classes of reactants involved in the production of oxidants, viz.: hydrocarbons, nitric oxide, and nitrogen dioxide. Energy, in the form of solar radiation, is essential to the reaction, and there is evidence that ambient atmospheric temperature below a minimum value will restrain the maximum hourly ozone concentration from increasing to the established national ambient air quality standard of 160 $\mu g/m^3$ (.08 ppm). Other meteorological conditions, in addition to controlling the amount of solar radiation available for the reaction of oxidant precursors, provide ever-changing conditions under which the reaction occurs. Horizontal and vertical, convective and turbulent dispersions non-uniformly affect reactant concentrations, and horizontal transport by the wind over sources of pollutants produces continual variation in the concentrations and concentration ratios of the several reactants.

In summarizing a discussion of the relationship of atmospheric hydrocarbons to photochemical air pollution levels, the authors of Air Quality Criteria for Hydrocarbons [10] state: "the development of a model to relate emission rates of hydrocarbons to ambient air quality and then to secondary products of photochemical reactions has proved to be an elusive problem. Because of this lack of an appropriate model, the relationship between hydrocarbon emissions and subsequent maximum daily oxidant levels must be approached empirically." Such an approach was presented in this "criteria document" in the form of envelope curves that enclosed the maximum oxidant concentrations shown on a scatter diagram of maximum daily 1-hour oxidant concentrations plotted against the 6:00 to 9:00 AM average hydrocarbon (or nonmethane hydrocarbon) concentrations for the same day. Data for several cities and for several years were combined in two of the three plots presented in the document and reproduced here as Figures 2, 3, and 4. From the data sets used for Figure 2, Denver data were extracted to prepare Figure 3. However, Figure 4 was prepared from different data sets and, except in the case of the Los Angeles data shown, measured methane concentrations were subtracted from measured total hydrocarbon concentrations to arrive at the nonmethane hydrocarbon concentrations. Los Angeles total hydrocarbon concentrations were reduced to nonmethane hydrocarbon concentrations by the application of an empirical formula derived from measurements of methane and nonmethane hydrocarbon concentrations in downtown Los Angeles during the 6:00 to 9:00 AM period for 38 days.

The envelope drawn in Figure 4 provided the relationship for the development of the curve presented as Appendix J to 40 CFR 50 (see Appendix B of this report).

Scatter diagrams showing the relationship of maximum daily 1-hour oxidant concentrations to 6:00 to 9:00 AM total nitrogen oxides concentration were presented in Air Quality Criteria for Nitrogen Oxides [7] for several cities. Figure 5 is a copy of the scatter diagram for Washington, D.C., while Figure 6 shows, for Pasadena, California, the 6:00 to 9:00 AM nitrogen oxides concentration related to daily maximum 1-hour oxidant concentration with envelopes enclosing the associated (6:00 to 9:00 AM) calculated nonmethane hydrocarbon concentrations. The nitrogen oxides criteria document presents several conclusions following the discussion of ambient observations and laboratory data on the relationship of oxidant concentrations to concentrations of nitrogen oxides and hydrocarbons. In particular, three qualitative statements are of interest: (1) "The ambient levels of 6:00 to 9:00 AM precursors, HC and NO_x, are a reliable indicator of maximum attainable 1-hour-average-oxidant concentration that occurs 2 to 4 hours later, between 10:00 AM and 2:00 PM," (2) "The atmospheric conditions that lead to maximum oxidant potential, i.e., low windspeeds, high temperature, intense sunlight, and surface inversions occur on approximately 1 percent of the days,"* and (3) "Laboratory studies do permit the independent evaluation of the effects of varying either HC or NO_2. . . . The data base suggests that reductions in HC should be the primary step for control of oxidants. Coupled with HC control, NO_x must be controlled at a level that will hold ambient NO_2 values below the level of adverse health effect."

Subsequent to the publication of the criteria documents, which furnished an excellent summary of the state of knowledge of the relationship between photochemical oxidant and its precursors, numerous studies, including laboratory work (smog chambers), field studies involving new measurement station locations, and statistical manipulation of archived data, were made. For example, Cleveland and his colleagues [2,3,4,5,6] have analyzed 1973 ozone concentration data from the New York City-New Jersey area using statistical techniques. They conclude that: (1) correlations between ozone concentrations at nearby stations are quite high ($r > .80$), (2) daily 1-hour maximum ozone concentrations occur between 1:00 and 3:00 PM,

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*Although this statement was included in the "Summary," no discussion of necessary or sufficient meteorological conditions appeared in the main body of the text.

(3) Sunday ozone concentrations are slightly higher than workday concentrations while corresponding Sunday concentrations of nitrogen oxide, nitrogen dioxide, carbon monoxide, nonmethane hydrocarbons, and aerosols are markedly lower than workday concentrations, (4) ozone concentrations are correlated positively with solar radiation and temperature and negatively with wind speed, and a multiplicative model relating these variables provides a reasonable fit to observed data.

Jacobson and Salottolo [8] examined ozone concentration data from seven locations in and around New York City for the period 1970 through 1972. In general, their results only provide confirmation of work of other researchers, i.e., the highest concentrations of oxidants occurred during the months May through September; a diurnal pattern of oxidant concentrations existed with daily maximum values usually occurring between 12:00 and 5:00 PM; and urban areas with heavy motor vehicle traffic generally reported lower oxidant concentrations than sites in suburban areas. Relating oxidant concentrations to meteorological conditions showed that high concentrations occurred more frequently with winds from the southeast through southwest sectors at speeds between 6 and 11 mph, total daily solar radiation in excess of 400 Ly, temperatures greater than 75°F, and morning mixing depths less than 1000 m.

The need for additional study of the relationships between photochemical oxidant and its precursors is emphasized by Altshuler [1] in a review of CAMP station data for the period 1964-1973. He notes significant decreases with time in the oxidant concentrations observed at central city monitoring stations and suggests that hydrocarbon emission control strategies may already be effective in spite of the fact that the full impact of control devices for tailpipe and evaporative emissions has not been obtained. Altshuler indicates that the percentage decrease in the annual maximum hourly oxidant concentrations in Philadelphia and Washington, D.C., for example, between the 1964-1966 period and the 1971-1973 period amounted to 50 percent and 14 percent, respectively. These decreases are equal to or greater than the corresponding decreases of 33 percent and 14 percent, respectively, in monthly average nonmethane hydrocarbon concentrations over the same time interval.

Through this interval since the publication of the criteria, little has been done to develop models of the relationship between oxidant concentration and concentrations of precursors. One reason for this is the fact that most attempts have been frustrated by the fact that regressions between these variables have turned out to have small correlation coefficients. In those studies where both precursor pollutant concentrations and meteorological variables have been considered, the meteorological variables have proven to be more highly correlated with the daily maximum hourly oxidant concentration than have the precursor concentrations.

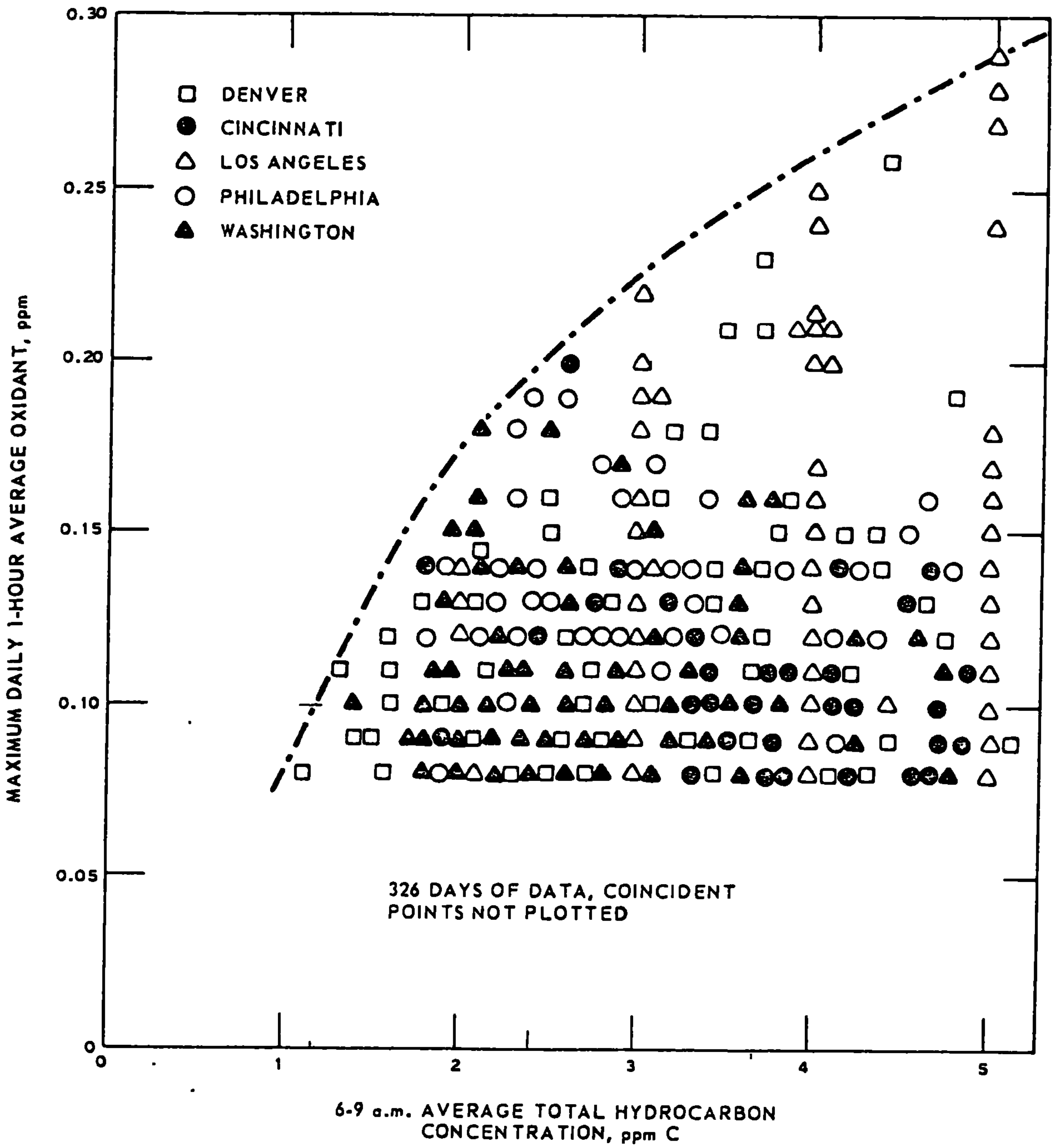


Figure 2. Maximum daily oxidant as a function of early morning total hydrocarbons, 1966-1968 for CAMP stations; May through October 1967 for Los Angeles

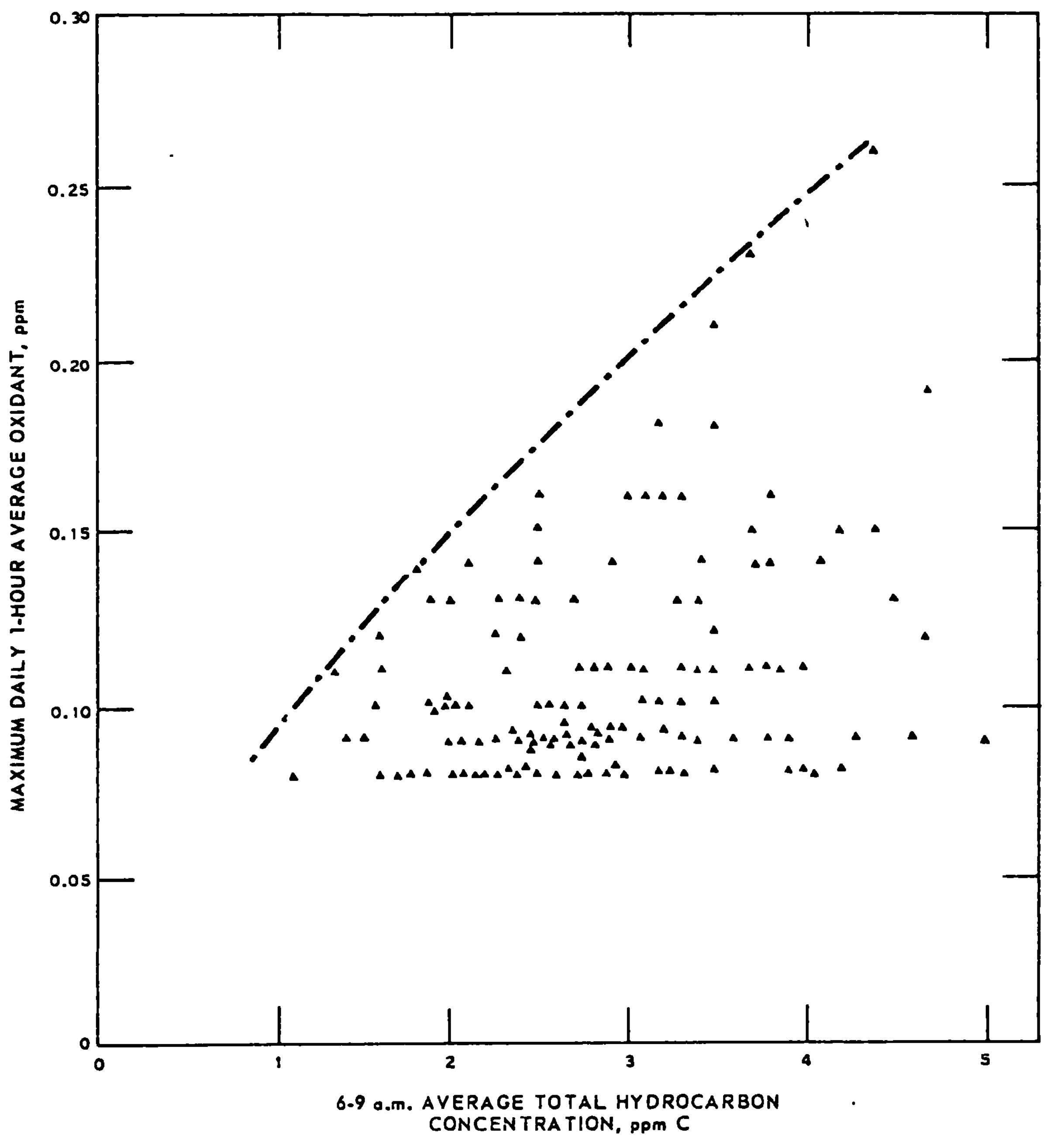


Figure 3. Maximum daily oxidant as a function of early morning total hydrocarbons, Denver, 1966-1968.

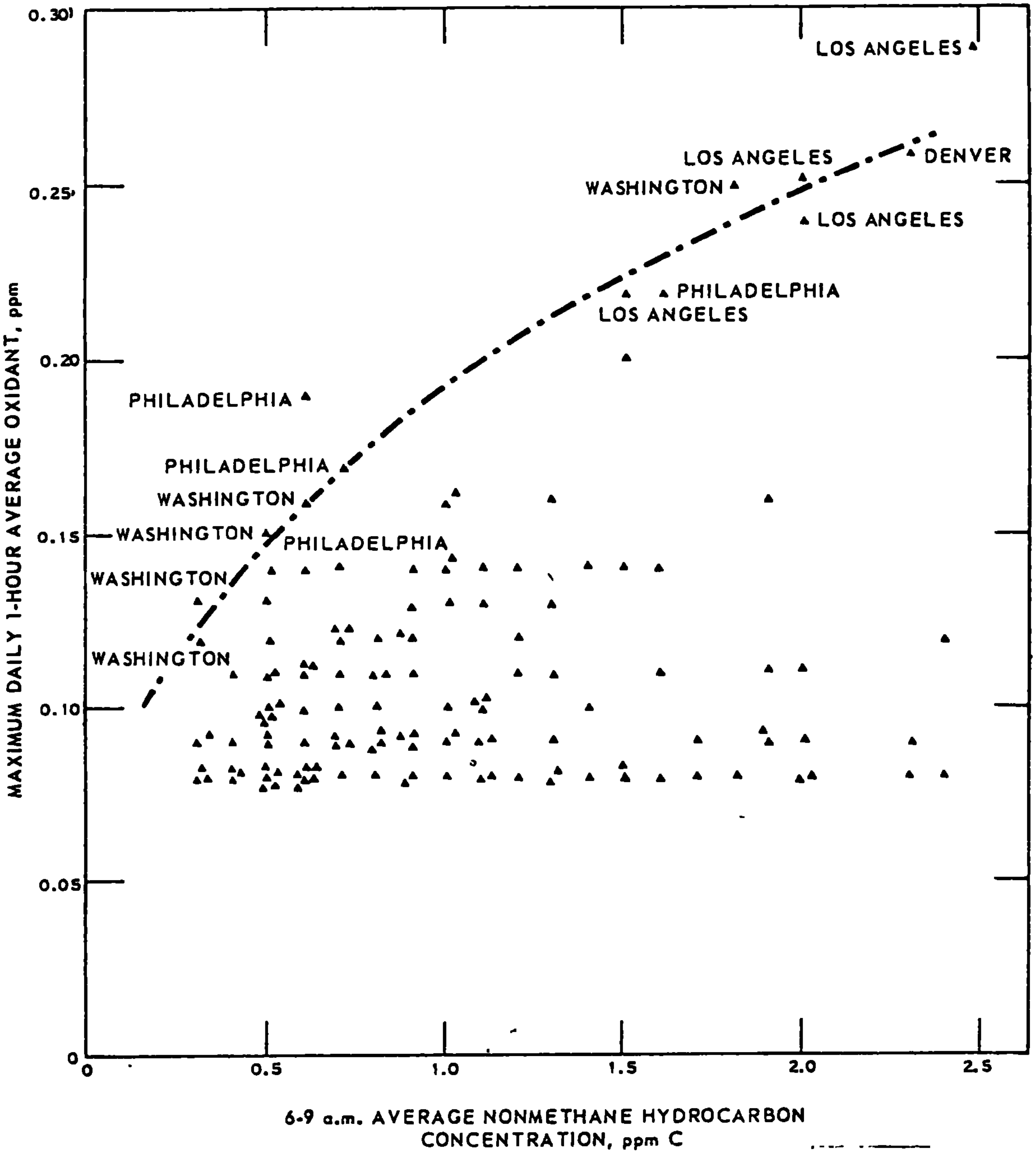


Figure 4. Maximum daily oxidant as a function of early morning nonmethane hydrocarbons, 1966-1968 for CAMP Stations; May through October 1967 for Los Angeles.

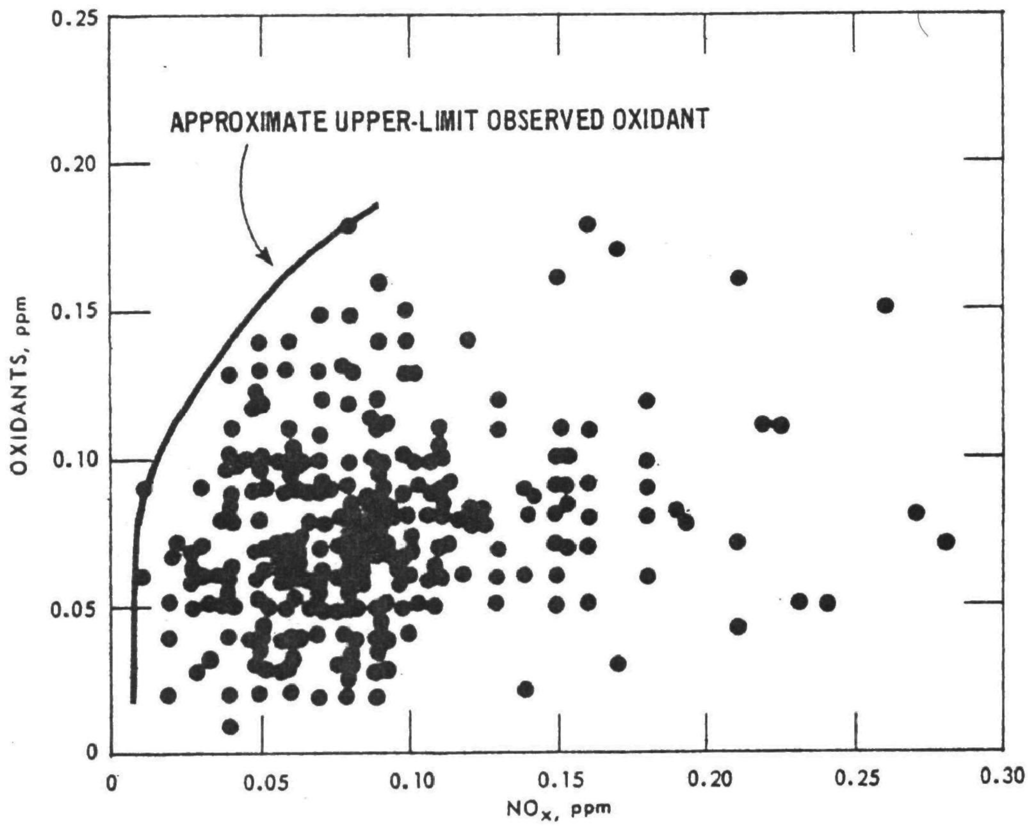


Figure 5. Maximum daily 1-hour-average oxidant concentrations as a function of 6- to 9-a.m. averages of total nitrogen oxides in Washington, D.C., June through September, 1966 through 1968.

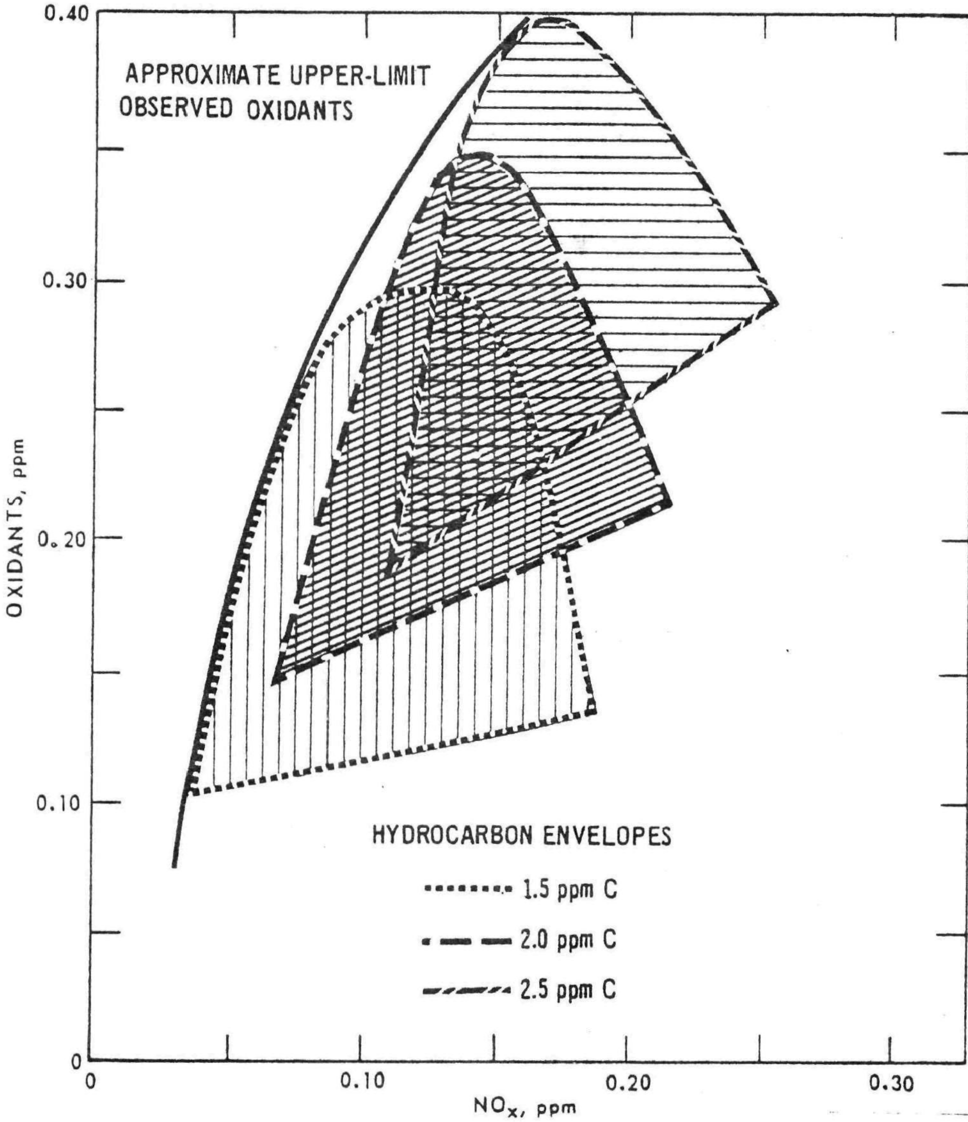


Figure 6. Hydrocarbon-oxidant envelopes superimposed on maximum daily 1-hour-average oxidant concentrations as a function of 6- to 9-a.m. average of total nitrogen oxides in Pasadena, California, May thorugh October 1967.

2.2 Study Objectives

The main objective of the present study was to examine the relationships between daily maximum oxidant (ozone) and the values of various pollutant and meteorological variables using atmospheric data from EPA's data bank. In particular, RTI was to examine atmospheric pollutant data supplied by EPA on computer tape from two stations in Los Angeles and four stations in Maryland. In addition, corresponding meteorological data from the U. S. Weather Bureau from two stations, one in Maryland, and one in Virginia for the Maryland pollutant data and one station in Los Angeles were merged with the pollutant data for analysis. Besides examining the oxidant relationships with the other variables being considered at each station, attention was to be given to examining the potential differences of the relationships from (i) station to station, and (ii) overtime (note, only the Los Angeles stations had data for more than one year.) In order to perform its analysis, RTI was to create a data base that could be used for the present study as well as future studies dealing with additional objectives such as investigation of the oxidant transport phenomena. In addition to the above objectives, EPA also requested that RTI (1) examine upper percentile plots of daily maximum oxidant (MOX) versus NO_2 and THC, and (2) contrast levels of the various variables between weekend and weekday. It is important to note here that the objective of the current study was not to determine a control strategy for oxidant but only to examine relationships between MOX and various other variables.

3. Data Selection and Description

3.1 Data Selection

In the selection of data for this study one objective was to obtain sets from at least two geographic areas having different characteristics with regard to photochemical oxidant problems. The Los Angeles area, with its long history of photochemical smog problems and presumably a correspondingly long period of record of required pollutant measurements, was an obvious choice. The controversy that arose after this choice concerning the techniques and procedures used for calibration of oxidant instruments by the Los Angeles County Air Pollution Control District (LACAPCD) was not considered a problem since only LACAPCD data were used and the data set, therefore, was internally consistent.

Two aerometric stations were selected for analysis, the downtown Los Angeles (DOLA) station at the LACAPCD headquarters, a metropolitan location, and the Azusa (AZU) station located in a suburban industrial area. Meteorological data required for the analysis were available only from the Los Angeles International Airport. It was recognized that the differences in weather conditions between the coastal location of the airport and the inland locations of DOLA and AZU can be appreciable. However, data availability was a deciding factor.

The east coast was selected as the source of the second data set. The long period of record of oxidant, hydrocarbon, and nitrogen oxides concentrations from New Jersey appeared attractive. However, the fact that these oxidant data were based on alkaline potassium-iodide determinations, known to be subject to interferences, made their use impractical. Accordingly, a compromise was made between quality of data and length of record and four stations using gas-phase chemiluminescence detectors for ozone in the

Maryland suburbs of Washington, D.C., were selected. These stations had only nine months of data available. Meteorological data to merge into this data set were available from both Dulles International Airport (Sterling, Virginia) and Baltimore-Washington International Airport (Linthicum, Maryland). Corresponding data were available from each of these airports except that solar radiation measurements are not made at Baltimore-Washington International.

3.2 Description of the Data and Data Editing Procedures

RTI received two sets of data on computer tapes from EPA. This data was from EPA's data bank and contained, for various years

(i) pollutant data from six stations (four in Maryland and two in Los Angeles) and

(ii) meteorological data from one station in Maryland, one station in Virginia, and one station in Los Angeles.

The site code, address, station and height of data collection for each of the six monitoring stations are given below.

Station	Site Code	Address-Location	Station Type	Height
Azusa, Calif.	050500002 I01 (AQCR 024)	803 Loren Avenue	Suburban-Industrial	Ground Level (sic)
Downtown Los Angeles	054180001 I01 (AQCR 024)	434 South Pedro St.	Center City-Commercial	100 ft. Above Ground
Bethesda, Maryland	210200005 F01 (AQCR 047)	National Institute of Health Wisconsin Ave. Trailer located in open field	Suburban-Residential	12 ft. Above Ground
Hyattsville, Maryland	210980003 F01 (AQCR 047)	Trailer located in northwest branch park grounds 100 feet south of Route 410	Suburban-Mobile	12 ft. Above Ground
Silver Spring, Maryland	211480006 F01 (AQCR 047)	Argyle Comm. Bldg., Okinawa Road Located 50 feet North of Interstate 95	Suburban-Mobile	12 ft. Above Ground
Suitland-Silver Hill, Maryland	211560001 F01 (AQCR 047)	Suitland Federal Center, Suitland Parkway	Suburban-Mobile	10 ft. Above Ground

In addition, the monitoring methods used in collecting the pollutant data at the two cities under study were the following:

City	Oxidant	Total Hydrocarbons	Nitric Oxide and Nitrogen Dioxide	Non-Methane Hydrocarbons
Los Angeles	Neutral-Buffered KI	Flame Ionization	Colorimetric Saltzman	
Maryland	Gas-Phase Chemiluminescent	Flame Ionization	Colorimetric Saltzman	Flame Ionization

Figures 7 and 8 present maps showing both the air and meteorological station locations.

Table 1 describes the times and locations of data collection for data received by RTI. The table shows that data was obtained in Los Angeles for various years on the pollutants nitric oxide (NO), nitrogen dioxide (NO_2), total hydrocarbons (THC), and oxidant (OX) while in Maryland the pollutant data obtained was only for 1973 on the pollutants NO, NO_2, THC, non-methane hydrocarbons (NMHC) and ozone (OZ). In addition, the table shows that the meteorological data received was from the Los Angeles International Airport for 1965 and 1972 and from Dulles and Baltimore Airports for 1973 only.

Before the raw data received by RTI could be analyzed, several preliminary data editing steps had to be completed. These steps included the following:

FIGURE 7

Location of Air and Meteorological Stations in Los Angeles Area

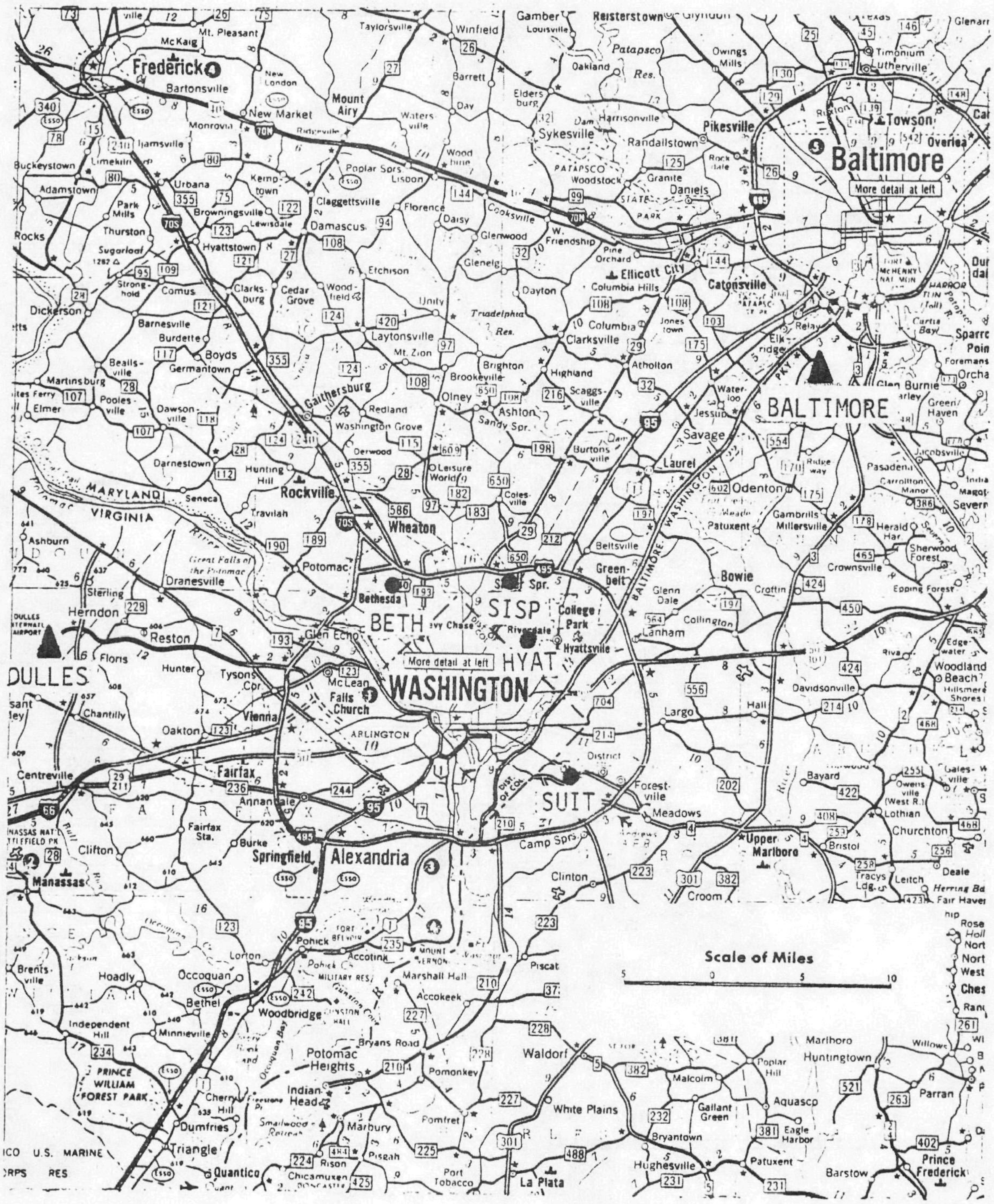


FIGURE 8

Location of Air and Meteorological Stations in Maryland Area

TABLE 1

Summary of the Times and Locations of Data Collection for the Pollutant and Meteorological Data Received on Tape from EPA's Data Bank

Station	Pollutant Data (Hourly Readings)[2/]					
	NO	NO_2	Total Hydrocarbons	Non-Methane Hydrocarbons	Oxidant	Ozone
AZU (Azusa)	1968-1973	1965-1973	1967-1973	---	1965-1973	---
DOLA (Downtown)	1968-1973	1965-1973	1965-1973	---	1965-1973	---
BETH (Bethesda)	1973 (Jan-Sept)	1973 (Jan-Sept)	1973 (Jan-Sept)	1973 (Jan-Sept)	---	1973
HYAT (Hyattsville)	1973	1973	1973	1973	---	1973
SISP (Silver Spring)	1973 (Jan-Sept)	1973 (Jan-Sept)	1973 (Jan-Sept)	1973 (Jan-Sept)	---	1973
SUIT (Suitland)	1973 (Jan-Sept)	1973 (Jan-Sept)	1973 (Jan-Sept)	1973 (Jan-Sept)	---	1973

Meteorological Data[1/]

Item	Present
1. Ceiling Height 2. Sky Condition 3. Visability 4. Sea Level Pressure 5. Dew Point Temperature 6. Wind Direction 7. Wind Speed 8. Station Pressure 9. Weather 10. Dry Bulb Temperature 11. Wet Bulb Temperature 12. Relative Humidity 13. Cloud Cover	Present at LA International 1965, 1972; Dulles and Baltimore 1973.
14. Solar Radiation	Present at LA International 1965, 1972; Dulles 1973.

1/ Meteorological data was recorded once every three hours except for Solar Radiation which was either hourly or daily total.

2/ NOTE: Oxidant collected in Los Angeles, ozone collected in Maryland. Also NMHC only collected in Maryland.

A. Create a data file by station and year of summary statistics for the pollutant data. This file included the following statistics for each day of the year:

(1) Date (Year, month, day)

(2) Daily max.[1/] oxidant (ozone) between 8 A.M. and 6 P.M. (denote by MOX or MOZ). (All analysis on oxidant (ozone) in this report was done on MOX or MOZ.)

(3) Second daily max. oxidant (ozone) between 8 A.M. and 6 P.M.

(4) Time of the first and second daily max. oxidant (Table 2 gives the frequency distribution of the time of max. oxidant (ozone) for three stations.)

(5) Number of oxidant readings between 8 A.M. and 6 P.M.

(6) Three-hour averages and number of readings present in the three-hour period for NO, NO_2, THC and NMHC. (All analysis on these pollutants in this report was with three-hour averages.) The three-hour averages computed were:

5 A.M. to 8 A.M.
6 A.M. to 9 A.M.
7 A.M. to 10 A.M.
8 A.M. to 11 A.M.
9 A.M. to 12 A.M.
10 A.M. to 1 P.M.

[1/] If max. occurred more than once then time of first max. was recorded.

TABLE 2. Frequency Distribution (in days) of Time of Maximum Oxidant (Ozone)[1/] for Three Stations

Time of Max. Oxidant	BETH (1973) Freq.	BETH (1973) Percent	HYAT (1973) Freq.	HYAT (1973) Percent	DOLA (1972) Freq.	DOLA (1972) Percent
8-9 A.M.	25	7.3	23	8.0	27	7.5
9-10	31	9.1	24	8.4	36	9.9
10-11	42	12.3	27	9.4	63	17.4
11-12	55	16.1	46	16.0	82	22.7
12-1 P.M.	68	19.9	54	18.8	75	21.0
1-2	44	12.9	35	12.2	40	11.0
2-3	19	5.6	9	3.1	15	4.1
3-4	11	3.2	13	4.5	16	4.4
4-5	8	2.3	4	1.4	6	1.7
5-6	7	2.1	2	.7	1	.3
all zero	31	9.1	50	17.4		
TOTAL	341	100	287	100	362	100

TABLE 3. Summary Statistics for Meteorological Data

The following meteorological variables were merged with the pollutant data.

	No.	Variable	Notation
AT TIME OF MAXIMUM OXIDANT (OZONE)	1.	Visibility (in miles)	VIS
	2.	Sea Level Pressure (in millibars)	SLP
	3.	Dew Point Temperature (in degrees, F)	DPT
	4.	Wind Direction, North-South (in knots)	XWD
	5.	Wind Direction, East-West (in knots)	YWD
	6.	Wind Speed (in knots)	WS
	7.	Relative Humidity (in percent)	RH
	8.	Maximum Temperature (from 7 A.M. to 7 P.M. in degrees, F)	MTEMP
	9.	Solar Radiation (daily total in Langleys)	SRAD
	10.	24-Hour Change in Relative Humidity (in percent)	RHC24
	11.	Average Wind Speed (from 7 A.M. to 7 P.M. in knots)	AWS
	12.	Average Wind Direction, North-South (from 7 A.M. to 7 P.M. in knots)	XAWD
	13.	Average Wind Direction, East-West (from 7 A.M. to 7 P.M. in knots)	YAWD

[1/] Max. between 8 A.M. and 6 P.M.

If all three hours in a particular time period were not present the average for the period was still computed (note, at a later date an editing rule was established to determine how many readings in a three-hour period must be present to consider the three-hour average as not missing, see E. below).

B. Create a data file by station and year of summary statistics for the meteorological data. These meteorological summary statistics are given in Table 3.

C. Merge data files created in A. and B. to give one data file by station and year of summary statistics for all pollutant and meteorological data.

D. Generate cross-tabulations from files created in C. to determine what data was available for analysis and to establish data editing rules. For example, one of the cross-tabulations generated was the following:

Body of Table = Number of Days Where Data Present

	Oxidant Hours Present Between 8 A.M. and 6 P.M.				
NO_2	10	9	8	7	6 or less
Three Hours Present 6 A.M.-9 A.M.					
Two Out of Three Present 6 A.M.-9 A.M.					
One Out of Three Present 6 A.M.-9 A.M.					
Zero Out of Three Present 6 A.M.-9 A.M.					

E. Using the cross-tabulations generated in D. the following data editing rules were established by RTI:

(i) the max. daily oxidant (ozone) reading for a day was considered present only if 9 or 10 hours of data were present between 8 A.M. and 6 P.M.

(ii) a three-hour average for NO, NO_2, THC and NMHC was considered present only if 2 or 3 hours of data were present during the three-hour period.

F. In addition to the data editing referred to in E., RTI, after discussions with EPA personnel, also eliminated a few days (approximately 1% of the total number of days) of data which had questionable readings. (Note: In this report not all of the data on the merged data file was analyzed in detail. However, the file was created so that in the future additional analysis may be undertaken.)

Having merged and edited the atmospheric pollutant and meteorological data received from EPA, RTI then examined the relationship between daily max. oxidant (ozone) and the other variables available. Section 5 describes the results of this examination.

4. Study Limitations

The present study had several limitations due to the data and time that were available for analysis. These limitations included the following:

(i) The meteorological data were collected at different sites than the pollutant data. In Los Angeles the meteorological data were collected at LA International while the pollutant stations were Downtown LA and Azusa which are approximately 12 and 30 miles respectively from LA International. In Maryland the meteorological data were collected at Dulles and Friendship Airports while the pollutant data were from four sites around the Washington area which varied from approximately 20 to 30 miles from Dulles.

(ii) The meteorological data obtained in Los Angeles were only for the two years 1965 and 1972.

(iii) The pollutant and meteorological data obtained for Maryland were only for 1973.

(iv) All data obtained were surface data, i.e., there were no upper atmospheric measurements.

(v) Time did not permit analysis of the transport phenomena, i.e., all analysis was on a one station at-a-time basis. (It should be mentioned here that the data base developed by RTI during this study may be used at a later date by EPA to investigate the transport phenomena).

(vi) Some of the pollutant variables had a large number of missing values (number of days where data was missing) for some time periods. For example, in Los Angeles in 1965 no NO data and a limited amount of THC data were available while for all four Maryland stations only about one-half of the days (1973) had pollutant data for NO, NO_2, THC and NMHC (see Tables 4 and 5 for sample sizes available). The presence of this missing data, particularly in Maryland, resulted in the loss of a great deal of information when various statistical tools such as regression and cluster analysis were employed. To illustrate the sample size problem consider the Bethesda (BETH), Maryland station. In BETH in 1973, after editing the data, there were 181 days with THC data, 149 days with NO_2 data, 161 days with NO data and 157 days with NMHC data (see Table 4). When analysis of this data was limited to the oxidant season (taken to be May thru October in this report), the corresponding sample sizes in BETH were THC=91 days, NO_2=73 days, NO=79 days and NMHC=89 days. Stepwise regression analysis was then applied to this data which has the limitation that if any day does not have information on all pollutants then this day's data are considered missing. The resultant sample size for the stepwise regression analysis in BETH was only 56 days (see Table 9). (Table 9 shows that all four Maryland stations had similar sample sizes for the stepwise regression analysis.)

(vii) The oxidant data collected in Los Angeles was not corrected for SO_2 and NO_x interferences. However, for the analysis presented in this report this was not considered to be a serious problem.

5. Data Analysis

5.1 Introduction

In this section the analysis of the merged and edited data described in Section 3.2 is presented. Recall that the main objective of this research was to examine the relationships between MOX and the various other variables under study. Accordingly, in this section the data analysis is presented as follows:

(i) First yearly summary statistics (e.g., means and correlations) and frequency distributions (for May through October data) are given for the pollutant variables (Sections 5.2 and 5.3). This analysis allows comparisons of (a) pollutant levels between and within locations; (b) monthly means and correlations and (c) the number of days of missing data for each pollutant.

(ii) Next, relationships between MOX and each of the pollutant and meteorological variables on a one-at-a-time basis are examined (Section 5.4) (that is, relationships between MOX and only one other variable). This analysis ignores the joint effect of the various variables on MOX but gives insight into how MOX is related to each of the other variables one-at-a-time. Included in this section are plots of the means of several of the pollutant and meteorological variables for different levels of MOX (MOZ)

(Section 5.4.1), correlations between MOX (MOZ) and the other variables under study (Section 5.4.2), scatter plots of MOX (MOZ) versus several of the other variables (Section 5.4.3), and maximum oxidant (ozone) versus day of the week (Section 5.4.4).

(iii) A somewhat different look at the data using upper percentile analyses is presented in Section 5.5. This is done for two reasons: (a) scatter plots between MOX and the other variables are very hard to interpret because of the relatively large variability in atmospheric data and (b) the present control strategy for oxidant is based on an upper envelope analyses.

(iv) Finally, in Section 5.6 multiple variable relationships are considered. That is, the relationships between MOX and a combination of several other variables are examined. This analysis attempts to study the joint effect of several variables on MOX. Included in this section are stepwise regression (Section 5.6.1), cluster analysis (Section 5.6.2) and linear regression analysis including regression of MOX on NO_2 and THC after adjustment for selected meteorological variables (Section 5.6.3).

5.2 Yearly Summary Statistics for the Pollutant Variables

A preliminary analysis was conducted for the pollutant variables. Table 4 presents summary statistics for the pollutant variables by year and station. Note that in Table 4, 6-9 A.M. averages were used for THC, NO_2, NO, and NMHC. In examining the table the reader is cautioned that the sample sizes vary a great deal; thus, making comparisons between pollutants difficult. In particular, the table shows that at the four Maryland stations a great deal of data is missing for THC, NO_2, NO and NMHC. Table 4 indicates that in Los Angeles the mean daily maximum oxidant has decreased since 1965 at the two stations examined (Altshuller [1] also noted a downward trend in oxidant levels over time). In addition, the table shows that the MOX readings in Los Angeles are substantially higher than the MOZ readings in Maryland and that AZU has higher MOX means than DOLA. (Altshuller [1] states in Los Angeles that sites near the ocean measure lower oxidant levels than sites well inland.) As would be expected, the THC, NO_2 and NO levels are higher at DOLA than at AZU. For the four Maryland stations SISP has the lowest MOZ levels and the highest levels of NO and NMHC. (This is undoubtedly due to the fact that SISP is located very near a major freeway.) In addition, to the means and standard deviations given in Table 4, RTI also calculated means and correlations (between MOX and the other pollutant variables) by month. For example, Figure 9 presents a plot of the means by month for MOX, NO, NO_2, THC and NMHC for AZU and DOLA (1972) and for SISP and SUIT (1973). (Plots of the means by month for BETH and HYAT were similar to those for SUIT.) The estimated correlations are not given here because many of them were based on relatively small sample sizes due to missing data. Examination of these means and correlations indicated, as expected, that the summer months had

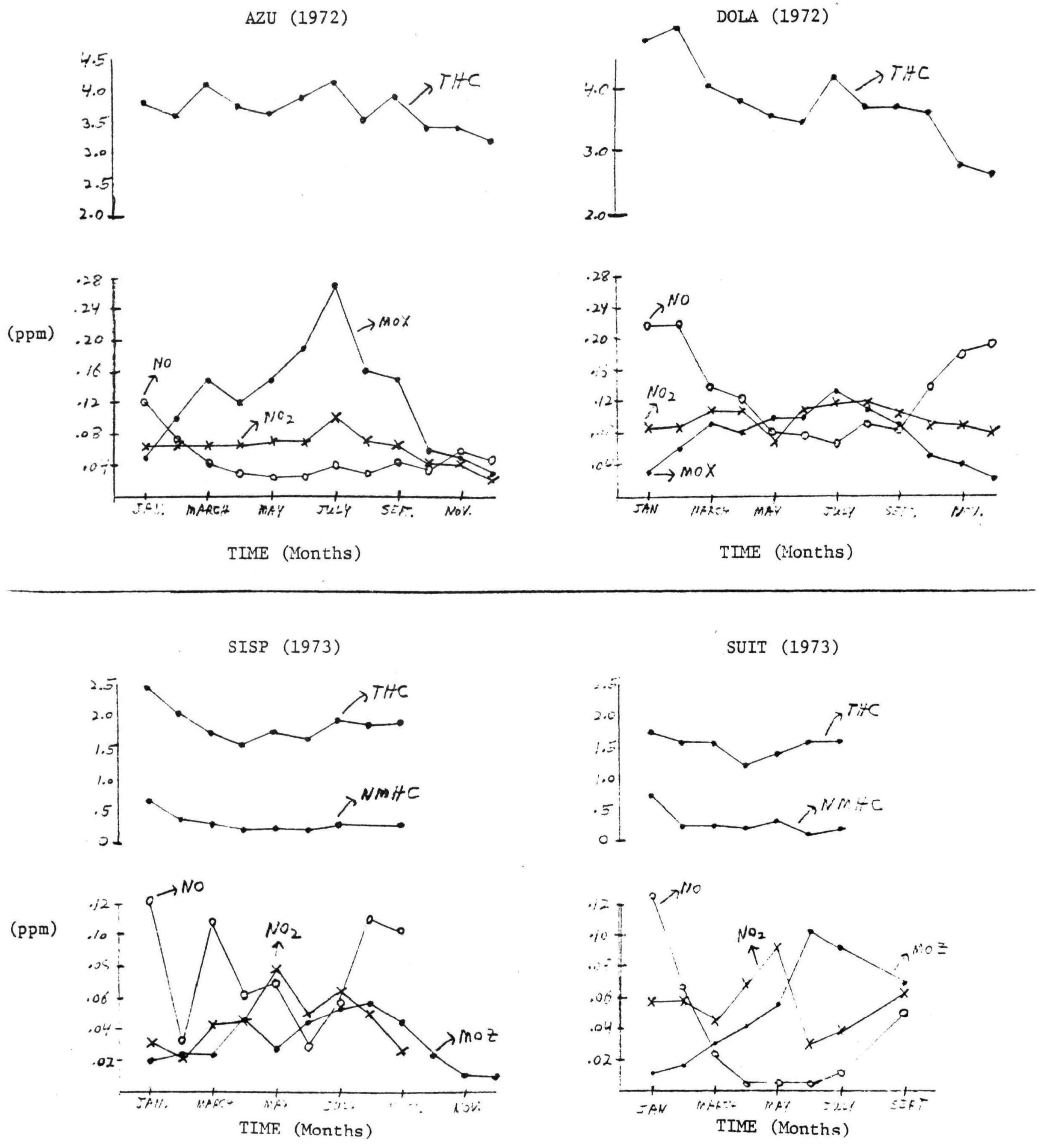
TABLE 4. Summary Statistics for Pollutant Variables by Year and Station (units = ppm)1/

Daily Maximum Oxidant (MOX)	Station AZU (Azusa) 1965	AZU 1968	AZU 1972	DOLA (Downtown) 1965	DOLA 1968	DOLA 1972	MOZ BETH 1973	MOZ HYAT 1973	MOZ SISP 1973	MOZ SUIT 1973
Mean	.158	.147	.121	.120	.100	.080	.053	.045	.033	.048
s.d.	.11	.094	.087	.088	.070	.052	.045	.043	.027	.044
Max.	.54	.44	.49	.58	.46	.25	.41	.20	.13	.40
No. Days Present	334	340	347	340	342	331	291	246	276	247
% of Days Where Max. >.08 ppm	62.6	68.2	55.3	55.6	49.7	40.8	19.2	17.5	6.2	15.0
THC (6-9 A.M. Average)										
Mean	3.05	2.92	3.68	4.52	3.94	3.79	1.22	2.01	1.90	1.54
s.d.	1.04	1.03	.96	2.44	1.69	1.36	.65	.90	.85	.40
No Days Present	103	318	340	253	336	330	181	224	181	145
NO_2 (6-9 A.M. Average)										
Mean	.045	.044	.065	.096	.077	.100	.046	.065	.048	.055
s.d.	.033	.038	.041	.063	.056	.054	.028	.039	.034	.041
No Days Present	259	324	322	329	312	320	149	205	177	151
NO (6-9 A.M. Average)										
Mean	---	.033	.047	---	.154	.134	.026	.054	.081	.045
s.d.	---	.027	.054	---	.137	.114	.059	.064	.113	.067
No Days Present	---	286	313	---	320	316	161	188	180	150
NMHC (6-9 A.M. Average)										
Mean	---	---	---	---	---	---	.241	.223	.385	.295
s.d.	---	---	---	---	---	---	.30	.35	.53	.39
No Days Present	---	---	---	---	---	---	157	180	169	124

1/ Note the number days where data present varies a great deal over years and pollutants.

Plot of Means of Daily Max. Oxidant (Ozone) and 6 A.M. to 9 A.M. Daily Averages of NO, NO_2, THC and NMHC

FIGURE 9



higher means for MOX (MOZ) and higher correlations between MOX (MOZ) and the other pollutant variables. In addition, monthly correlations between MOX (MOZ) and averages of the other pollutants for various time periods (e.g., 5-8 A.M., 6-9 A.M., 7-10 A.M., etc.) did not indicate that in general any one 3-hour period gave higher correlations. Accordingly, for the remainder of the analysis described in this report RTI only examined data for the months May through October (the oxidant season, see [9]) and 3-hour averages between 6-9 A.M. for NO, NO_2, THC and NMHC (6-9 A.M. was chosen because this is the time interval used in much of the literature, see [9]). Furthermore, because the 1965 Los Angeles NO and THC data had so many missing values no additional analysis was done with this 1965 data.

5.3 Frequency Distributions for the Pollutant Variables (May through October Data)

Frequency distributions and summary statistics were computed for the several stations using only data from May through October and 6-9 A.M. averages for NO, NO_2, THC and NMHC. Results of these calculations are given in Tables 5 and 6. Table 5 shows for the May through October data that:

(i) AZU has higher levels of MOX than DOLA,

(ii) MOX levels have decreased from 1968 to 1972 in both Los Angeles stations,

(iii) THC levels are about the same at both stations,

(iv) NO and NO_2 levels are higher at DOLA than at AZU,

(v) THC and NO_2 levels have increased somewhat from 1968 to 1972 at both stations.

Table 6 (for BETH and SUIT) shows that (the summary statistics for HYAT were similar to those for BETH and SUIT while those for SISP were distorted as shown in Table 4 due to its location near a major freeway):

(i) the levels of MOZ, THC, NO_2 and NMHC are about the same at BETH and SUIT,

(ii) the levels of MOZ are lower in Maryland than levels of MOX in Los Angeles,

(iii) the sample sizes (number of days) for THC, NO_2, NO and NMHC in Maryland are only about one-half of the corresponding sample sizes in Los Angeles,

(iv) the levels of THC are much higher in Los Angeles than in Maryland,

(v) NO levels are higher in Los Angeles than in Maryland.

TABLE 5. Daily Max. Oxidant, NO_2, NO and THC Frequency Distributions and Summary Statistics for 1968 and 1972 (May through Ocotber Data); for Stations AZU (Azusa) and DOLA (Downtown)

MOX Intervals (ppm)	Cum. Freq. Distribution AZU 1968 %	AZU 1972 %	DOLA 1968 %	DOLA 1972 %
0 -.04	2.8	5.1	6.3	8.6
.04-.08	14.9	24.4	32.2	44.0
.08-.12	26.5	38.6	56.3	75.5
.12-.16	40.3	56.8	74.7	85.2
.16-.20	54.1	72.2	86.8	94.9
.20-.24	69.1	83.0	92.5	98.9
.24-.28	82.3	92.0	96.0	100.0
>.28	100.0	100.0	100.0	
Mean	.193	.159	.126	.100
Std. dev.	.095	.091	.075	.054
N	181	176	174	175
% Days >1/ .08 (ppm)	85.1	75.6	67.8	56.0

THC (6-9 AM) Intervals (ppm)	Cum. Freq. Distribution AZU 1968 %	AZU 1972 %	DOLA 1968 %	DOLA 1972 %
0-1	0.0	0.0	0.0	0.0
1-2	.6	0.0	.6	1.1
2-3	43.9	4.6	26.4	10.9
3-4	79.0	54.0	63.2	58.3
4-5	94.2	90.2	85.6	85.1
5-6	98.3	99.4	96.5	94.9
>6	100.0	100.0	100.0	100.0
Mean	3.04	3.73	3.57	3.70
Std. dev.	1.07	.77	1.33	1.09
N	171	174	174	175

NO_2 (6-9 AM) Intervals (ppm)	Cum. Freq. Distribution AZU 1968 %	AZU 1972 %	DOLA 1968 %	DOLA 1972 %
0 -.03	39.3	13.3	15.6	2.9
.03-.06	61.9	43.4	37.8	25.3
.06-.09	81.6	66.9	67.1	51.1
.09-.12	90.5	83.8	82.1	70.5
.12-.15	97.0	97.6	88.7	82.3
.15-.18	98.8	99.4	91.7	89.4
>.18	100.0	100.0	100.0	100.0
Mean	.054	.074	.084	.103
Std. dev.	.044	.041	.063	.060
N	168	166	167	170

NO (6-9 AM) Intervals (ppm)	Cum. Freq. Distribution AZU 1968 %	AZU 1972 %	DOLA 1968 %	DOLA 1972 %
0 -.03	61.3	48.8	14.9	16.3
.03-.06	85.7	84.0	37.5	36.8
.06-.09	96.4	97.6	59.5	59.7
.09-.12	98.8	99.5	72.6	74.2
.12-.15	99.4	100.0	81.5	85.0
.15-.18	99.4	---	85.6	91.0
>.18	100.0	---	100.0	100.0
Mean	.031	.035	.104	.090
Std. dev.	.027	.023	.097	.066
N	168	162	168	166

1/ .08 ppm is the current yearly standard for MOX, N = number of days.

TABLE 6. Daily Max. Ozone, NO_2, NO, THC and NMHC Frequency Distributions and Summary Statistics for 1973 (May through October Data); for Stations BETH (Bethesda) and SUIT (Suitland)

MOZ Intervals (ppm)	Cum. Freq. Distribution BETH %	SUIT %	THC (6-9 AM) Intervals (ppm)	Cum. Freq. Distribution BETH %	SUIT %	NO_2 (6-9AM) Intervals (ppm)	Cum. Freq. Distribution BETH %	SUIT %
0 -.03	8.3	6.8	0-1	17.6	1.6	0 -.03	24.7	35.2
.03-.06	32.6	33.9	1-2	98.9	93.7	.03-.06	72.6	65.3
.06-.09	69.5	78.8	>2	100.0	100.0	.06-.09	90.4	85.0
.09-.12	88.9	92.4				.09-.12	97.2	92.0
.12-.15	96.5	99.2				>.12	100.0	100.0
>.15	100.0	100.0						
Mean	.076	.070	Mean	1.32	1.53	Mean	.048	.052
Std. Dev.	.039	.033	Std. Dev.	.30	.26	Std. Dev.	0.29	0.49
N	144	118	N	91	63	N	73	71
% Days > .08 (ppm)1/	37.5	28.8						

NO (6-9 AM) Intervals (ppm)	Cum. Freq. Distribution BETH %	SUIT %	NMHC (6-9 AM) Intervals (ppm)	Cum. Freq. Distribution BETH %	SUIT %
0 -.03	91.1	75.0	0 -.01	40.4	47.9
.03-.06	98.7	89.1	.01-.02	71.9	77.1
.06-.09	100.0	95.4	.02-.03	83.1	85.4
>.09	---	100.0	.03-.04	88.7	89.6
			.04-.05	95.4	89.6
			.05-.06	98.8	93.8
			>.06	100.0	100.0
Mean	.008	.023	Mean	.152	.162
Std. Dev.	.013	.034	Std. Dev.	.163	.230
N	79	64	N	89	48

1/ .08 ppm is the current yearly standard for MOZ, N = number of days.

5.4 One-At-A-Time Relationships Between MOX (MOZ) and the other Variables

5.4.1 Mean Plots of Several Variables Versus MOX (MOZ)

In examining the relationships between daily maximum oxidant (ozone) and the various pollutant and meteorological variables under study, RTI calculated and plotted the means of several of the pollutant and meteorological variables for three different levels of MOX (MOZ). Figure 10 presents these plots for AZU and DOLA (1972) and BETH and HYAT (1973) where the three levels of MOX in LA are:

(i) MOX $\leq$ .08 ppm,

(ii) .08 $<$ MOX $\leq$ .20 ppm, and

(iii) MOX $>$ .20 ppm.

and the three levels of MOZ in Maryland are:

(i) MOZ $\leq$ .04 ppm,

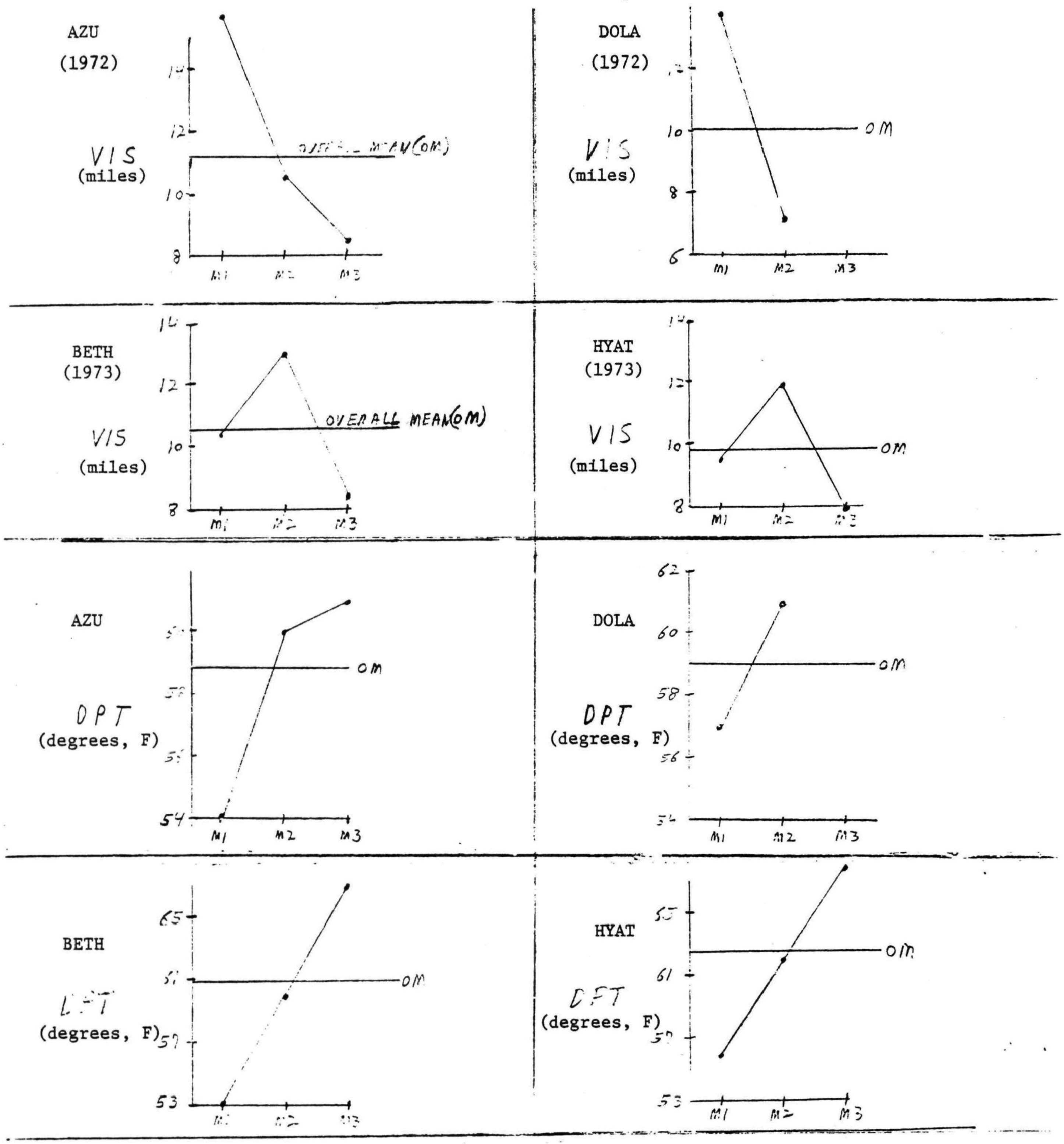
(ii) .04 $<$ MOZ $\leq$ .08 ppm, and

(iii) MOZ $>$ .08 ppm.

In addition, the plots give the overall means of the various variables. Before plotting the means in Figure 10, confidence limits for the means from the four stations were computed and as expected these limits were quite narrow except when sample sizes were small. In particular, in DOLA the sample size for the M3 means for all variables was only 9 leading to relatively wide confidence limits. For this reason the M3 means for DOLA were not plotted. The sample sizes for all of the means plotted were greater than 15; and therefore, confidence limits on these means are relatively narrow.

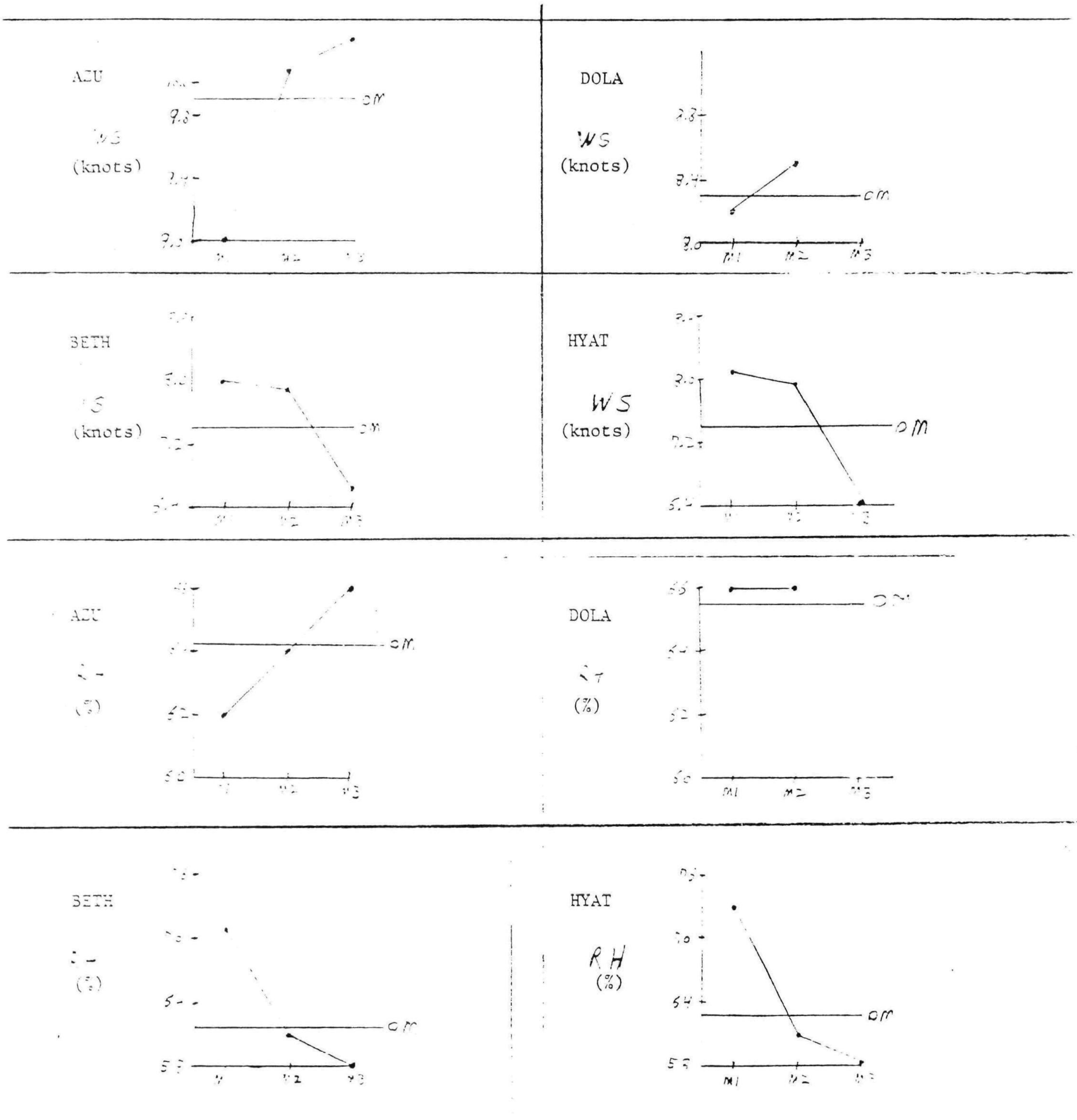
The plotted means in Figure 10 show fairly consistent patterns within location. The only exception to this is the quadratic pattern of NO_2 in HYAT. However, the reader should note the range of the three NO_2 means plotted is only from .061 to .077 ppm which is a relatively small range. Between locations, the plots show somewhat different patterns for VIS, WS, and RH. (Note Table 13 in Section 5.6.2 gives some of the means plotted in Figure 10.) Means for stations SISP and SUIT were not plotted here because they give essentially the same patterns as BETH and HYAT. The only exception to this were the means of SISP for NO_2 and THC which tended to decrease with increasing MOZ level. However, the results for this station are suspect because SISP is located near a major freeway.

FIGURE 10. Plots of the Means of Meteorological and Pollutant Variables for Three Levels of Daily Max. Oxidant (Ozone) (May through October Data).



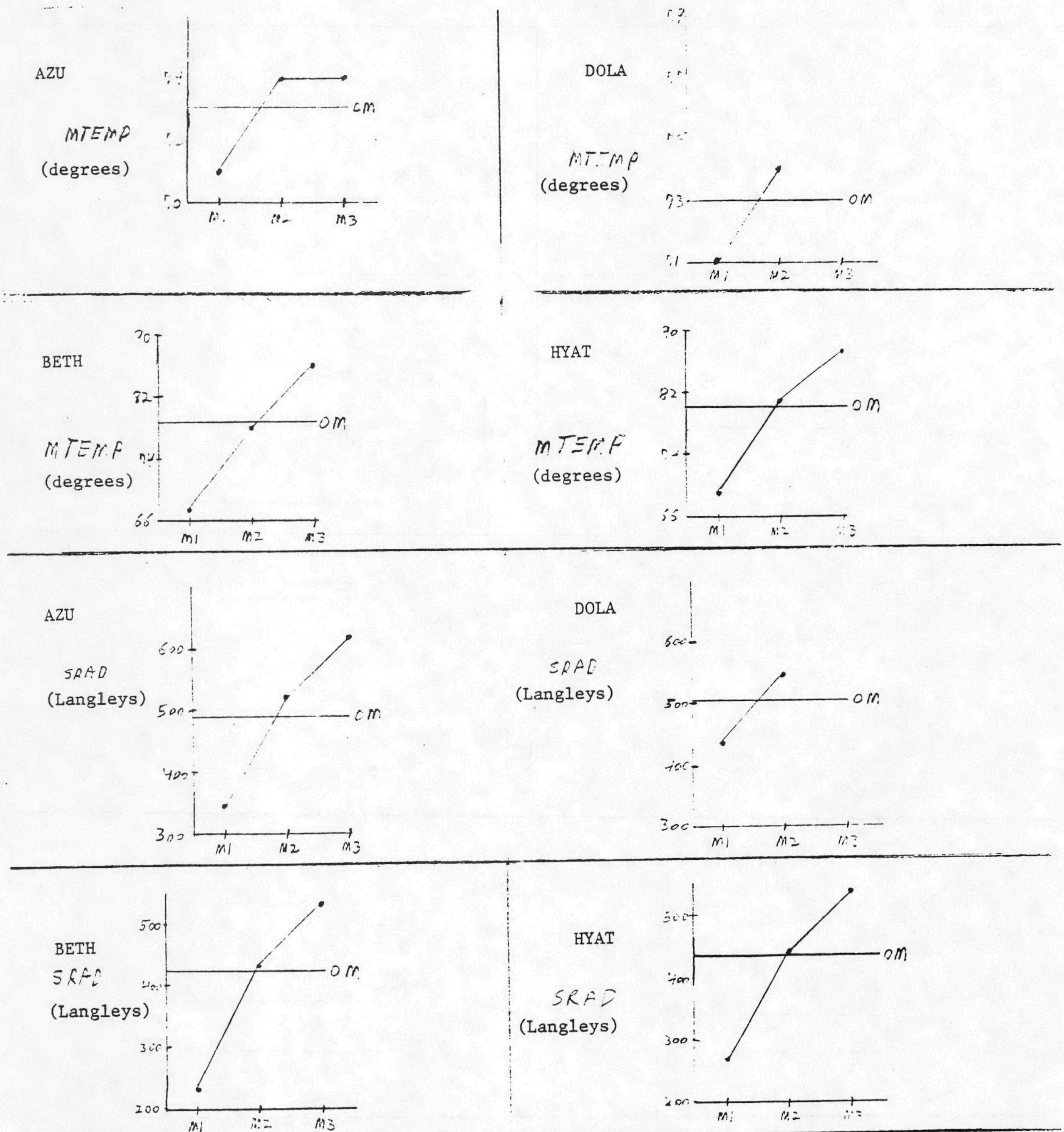
In AZU and DOLA, M1 = Mean when max. oxidant ≤ .08, M2 = Mean when max. oxidant .08 to .20 and M3 = Mean when max. oxidant > .20 ppm.
In BETH and HYAT, M1 = Mean when max. ozone ≤ .04, M2 = Mean when max. ozone .04 to .08 and M3 = Mean when max. ozone > .08 ppm. Note in DOLA only 9 readings were present for max. oxidant group M3; therefore, these means were not plotted. Sample sizes for all plotted means are ≥ 15.

FIGURE 10. continued Plots of the Means of Meteorological and Pollutant Variables for Three Levels of Daily Max. Oxidant (Ozone) (May through October Data).



In AZU and DOLA, M1 = Mean when max. oxidant ≤ .08, M2 = Mean when max. oxidant .08 to .20 and M3 = Mean when max. oxidant > .20 ppm.
In BETH and HYAT, M1 = Mean when max. ozone ≤ .04, M2 = Mean when max. ozone .04 to .08 and M3 = Mean when max. ozone > .08 ppm. Note in DOLA only 9 readings were present for max. oxidant group M3; therefore, these means were not plotted. Sample sizes for all plotted means are ≥ 15.

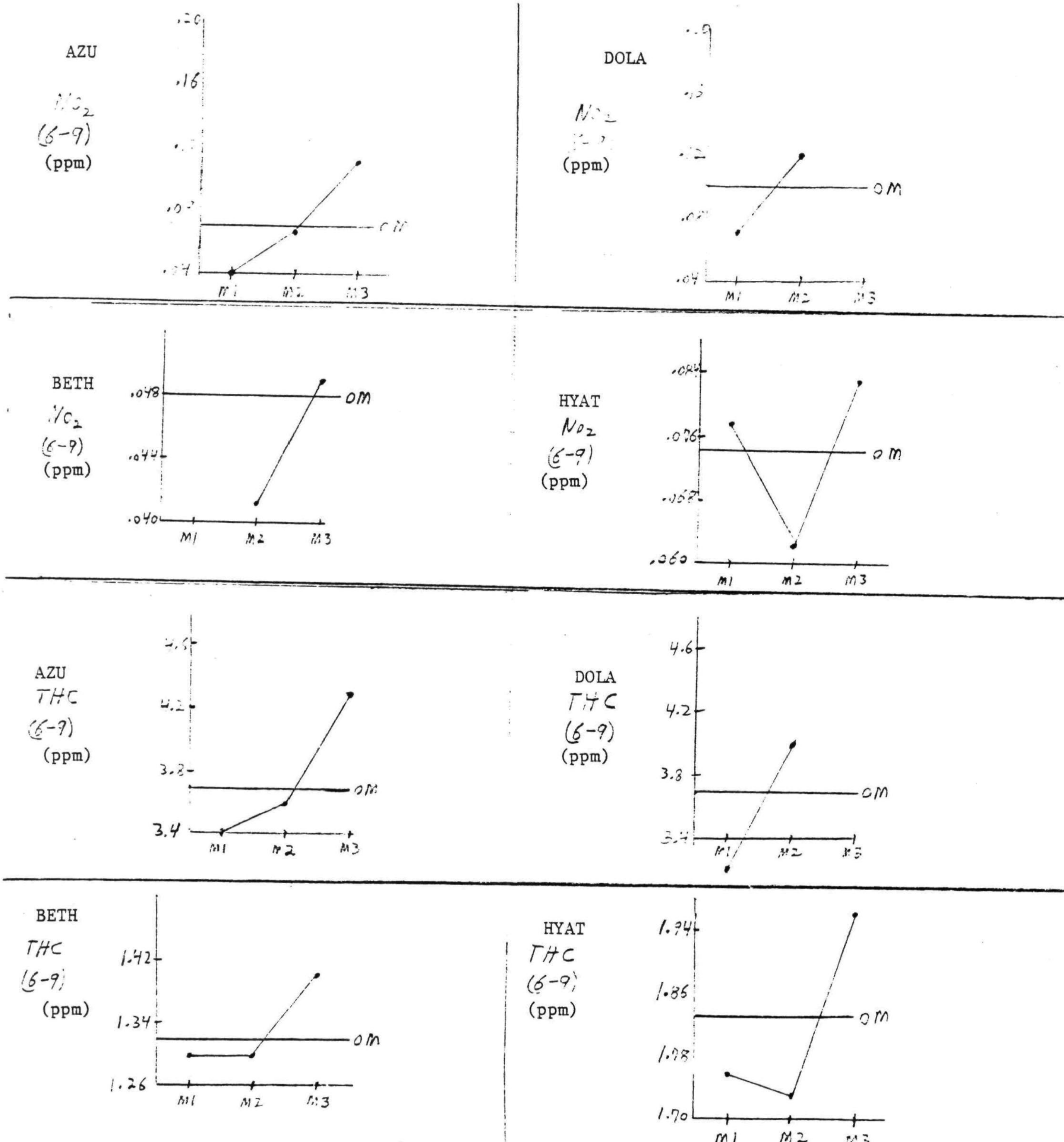
FIGURE 10. continued Plots of the Means of Meteorological and Pollutant Variables for Three Levels of Daily Max. Oxidant (Ozone) (May through October Data).



In AZU and DOLA, M1 = Mean when max. oxidant ≤ .08, M2 = Mean when max. oxidant .08 to .20 and M3 = Mean when max. oxidant > .20 ppm.

In BETH and HYAT, M1 = Mean when max. ozone ≤ .04, M2 = Mean when max. ozone .04 to .08 and M3 = Mean when max. ozone > .08 ppm. Note in DOLA only 9 readings were present for max. oxidant group M3; therefore, these means were not plotted. Sample sizes for all plotted means are ≥ 15.

FIGURE 10. continued — Plots of the Means of Meteorological and Pollutant Variables for Three Levels of Daily Max. Oxidant (Ozone) (May through October Data).



In AZU and DOLA, M1 = Mean when max. oxidant ≤ .08, M2 = Mean when max. oxidant .08 to .20 and M3 = Mean when max. oxidant > .20 ppm.

In BETH and HYAT, M1 = Mean when max. ozone ≤ .04, M2 = Mean when max. ozone .04 to .08 and M3 = Mean when max. ozone > .08 ppm. Note in DOLA only 9 readings were present for max. oxidant group M3; therefore, these means were not plotted. Sample sizes for all plotted means are ≥ 15.

Note in HYAT for NO_2 the plot shows a quadratic pattern. However, the reader should note the range of the means is only from .061 to .077 ppm.

5.4.2 Correlations

Table 7 presents the correlations between MOX (MOZ) versus the other variables for the six stations. (Note that the two sets of correlations given for Maryland are for meteorological data at Dulles and at Baltimore and that the correlations for Los Angeles are for 1972. In addition the numbers in [ ] for AZU and DOLA are correlations for 1968). The plots in Section 5.4.1 and the correlations in Table 7 show that:

(i) MTEMP and SRAD usually have a relatively high positive correlation with max. oxidant (ozone),

(ii) in Los Angeles THC and NO_2 have a relatively high positive correlation with MOX,

(iii) DPT usually has a relatively high positive correlation with MOX (MOZ) while RH in Maryland usually has a relatively high negative correlation with MOZ,

(iv) VIS has a negative correlation with MOX (MOZ),

(v) NO, NO_2, THC and NMHC in Maryland have relatively small correlations with MOZ,

(vi) WS and AWS have negative correlations with MOZ in Maryland,

(vii) the corresponding correlations for Dulles and Baltimore meteorological data are quite similar and they were both given here only for the sake of completeness (because of this fact only Dulles meteorological data was used in subsequent analysis).

(viii) the corresponding correlations in AZU and DOLA for the pollutant variables in 1968 and 1972 are similar.

It should be pointed out here that in order to exhibit high correlations between two variables, it is necessary to have a wide range of values for both variables. That is, if neither variable has a wide range of values the correlation between them cannot be demonstrated even if it exists. This is one explanation of why the correlations between MOZ and THC in Maryland are relatively low. Figure 19 in Section 5.5 demonstrates this clearly. The figure shows that the approximate ranges of THC in LA are from 1 to 8 ppm while in Maryland these ranges are only from .5 to 3.5 ppm.

On the other hand, the relatively low correlations between NO_2 and MOZ in Maryland cannot be explained by the above range argument since both LA and Maryland have similar ranges for NO_2. The lack of correlation between NO_2 and MOZ in Maryland is readily apparent in Appendix Figure A-11.

In addition to the correlations in Table 7, Table 8 also presents the correlations between MOX (MOZ) versus the other variables for days when MOX (MOZ) $>$ .08 ppm (the standard for oxidant) by station. The correlations for SISP are not given because the number of days when MOZ $>$ .08 ppm was less than 15 days for this station. Table 8 shows that

(i) In AZU and DOLA the correlations when MOX $>$ .08 tend to be smaller than the corresponding correlations for all data. For example, the correlations between MOX and SRAD for all data were .64 and

.53 for AZU and DOLA while these same correlations were .42 and .40 respectively on days when MOX > .08.

(ii) In Maryland the correlations which were relatively high for all data also tend to be smaller when MOZ > .08. For example, the correlations between MOZ and MTEMP for all data were .75, .76 and .66 for the three stations while for MOZ > .08 these correlations were reduced to .31, .31 and .35, respectively.

Thus, in general, deleting the lower range of MOX (MOZ) did not increase its correlations with the other variables under study.

TABLE 7

Correlations Between Daily Max. Ozone (Oxidant) Versus Pollutant and Meteorological Variables (May through October Data) by Station

	Variable*	BETH Dulles**	HYAT Dulles	SISP Dulles	SUIT Dulles	AZU 1972	DOLA 1972	BETH Balt.	HYAT Balt.	SISP Balt.	SUIT Balt.
Met.	VIS	-.26	-.12	.03	-.07	-.34✓	-.42✓	-.36✓	-.23	-.08	-.19
	SLP	.15	.31✓	.05	.11	-.13	-.20	.15	.32✓	.02	.09
	DPT	.52✓	.47✓	.31✓	.36✓	.33✓	.36✓	.52✓	.49✓	.35✓	.38✓
	XWD	-.14	-.18	.15	-.09	-.07	-.07	-.11	-.27	.11	-.10
	YWD	-.05	-.20	-.21	-.07	-.32✓	-.23	-.07	-.09	-.23	-.06
	WS	-.20	-.30✓	-.11	-.12	.17	.07	-.10	-.27	-.07	-.11
	RH	-.23	-.37✓	-.49✓	-.38✓	.13	-.05	-.24	-.40✓	-.48✓	-.41✓
	MTEMP	.75✓	.76✓	.64✓	.66✓	.19	.44✓	.67✓	.75✓	.66✓	.66✓
	SRAD	.58✓	.55✓	.59✓	.61✓	.64✓	.53✓	.51✓	.53✓	.59✓	.59✓
	RHC24	-.01	.00	-.22	-.10	.12	.06	-.05	-.04	-.19	-.17
	AWS	-.18	-.25	-.33✓	-.13	.26	-.00	-.20	-.28	-.25	-.15
	XAWD	-.14	-.30✓	.22	-.16	-.05	-.06	-.22	-.41✓	.17	-.21
	YAWD	-.09	-.11	-.34✓	-.08	-.34✓	-.08	-.06	-.10	-.32✓	-.09
Poll.	NO (6-9)	.09	.01	-.13	.01	.31✓[.30]	.15 [.58]				
	NO_2 (6-9)	.05	.12	-.13	-.07	.67✓[.53]	.63✓[.50]				
	THC (6-9)	.24	.20	-.10	.36✓	.51✓[.63]	.53✓[.71]				
	NMHC (6-9)	.24	.13	.04	-.10	----	----				
	Ave. Sample Size Met. (Days)	145	115	143	118	173	172	144	113	142	118
	Ave. Sample Size Poll. (Days)	84	89	97	63	167	170				

✓ = > |.30|

* Definitions of the various variables are given in Table 3.

** Dulles = meteorological data from Dulles, etc. for Baltimore.

[ ] = Correlations for LA in 1968.

Table 8

Correlations Between Daily Max. Ozone (Oxidant) Versus Pollutant and Meteorological Variables (May through October Data) for Days When MOX (MOZ) > .08 ppm by Station

Variable	BETH DULLES	HYAT DULLES	SISP	SUIT DULLES	AZU 1972	DOLA 1972
VIS	-.34✓	-.08		-.36✓	-.27	-.13
SLP	.25	.26		-.04	-.01	-.18
DPT	.34✓	.17		.32✓	.14	.17
XWD	-.05	.08		.04	.13	.16
YWD	-.02	.02		-.19	-.10	-.09
WS	-.19	-.17		-.22	.02	.03
RH	.16	-.16		-.03	.13	-.14
MTEMP	.31✓	.31✓		.35✓	-.04	.27
SRAD	-.08	-.15		.13	.42✓	.40✓
RHC24	.11	.10		.11	.18	-.10
AWS	-.15	-.18		-.13	.26	-.16
XAWD	.08	.16		-.01	.15	.14
YAWD	-.09	.04		-.15	-.29	.09
NO(6-9)	.15	.03		.39✓	.33✓	.12
NO_2(6-9)	.07	.22		.19	.56✓	.51✓
THC(6-9)	.09	.19		.28	.52✓	.40✓
NMHC(6-9)	-.06	.22		.00	-	-
Ave. Sample Size Met. (Days)	54	44	Sample Size <15	34	130	95
Ave. Sample Size Poll. (Days)	35	36	Sample Size <15	24	127	96

✓ = >|.30|

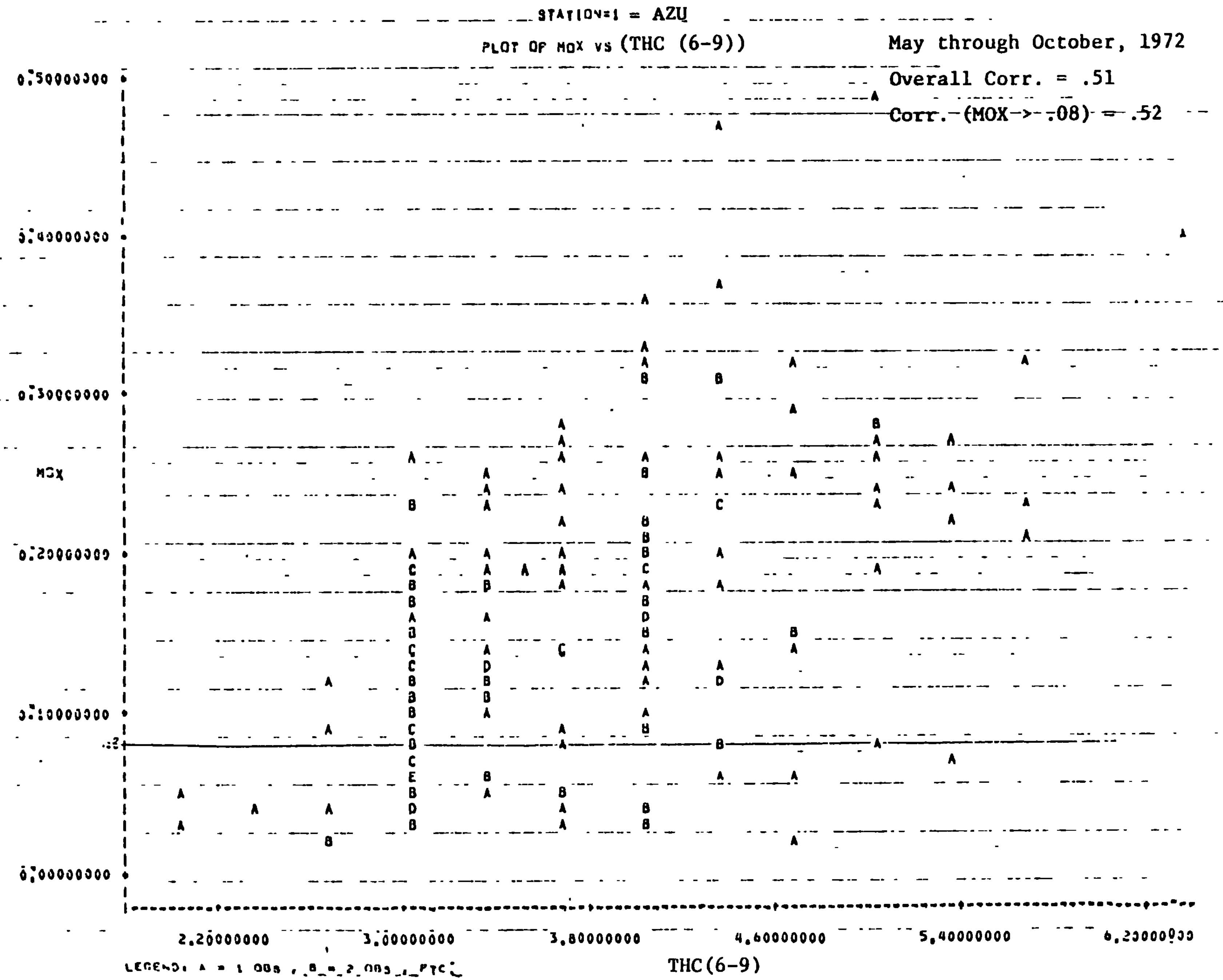
SISP correlations not given because the number of days when MOZ > .08 ppm was less than 15 days.

5.4.3 Scatter Plots

Scatter plots of MOX (MOZ) versus several of the variables were also plotted for the various stations. Figures 11 and 12, respectively, present plots of (i) MOX versus THC in AZU (1972) and (ii) MOZ versus THC in BETH. Several additional scatter plots are given in Appendix A.

The most striking feature of all the plots is the large variability in the data being examined. That is, for a given level of a pollutant or meteorological variable the range of MOX (MOZ) values observed is quite often very large. The effect of this variability was previously observed in the correlations given in Table 7.

FIGURE 11


STATION=1 = AZU
PLOT OF MOX vs (THC (6-9))
May through October, 1972
Overall Corr. = .51
Corr. (MOX->.08) = .52
0.50000000
0.40000000
0.30000000
0.20000000
0.10000000
0.00000000
MOX
2.20000000
3.00000000
3.80000000
4.60000000
5.40000000
6.20000000
THC(6-9)
LEGEND: A = 1 OBS , B = 2 OBS , ETC.

LEGEND: A = 1 OBS , B = 2 OBS , ETC,

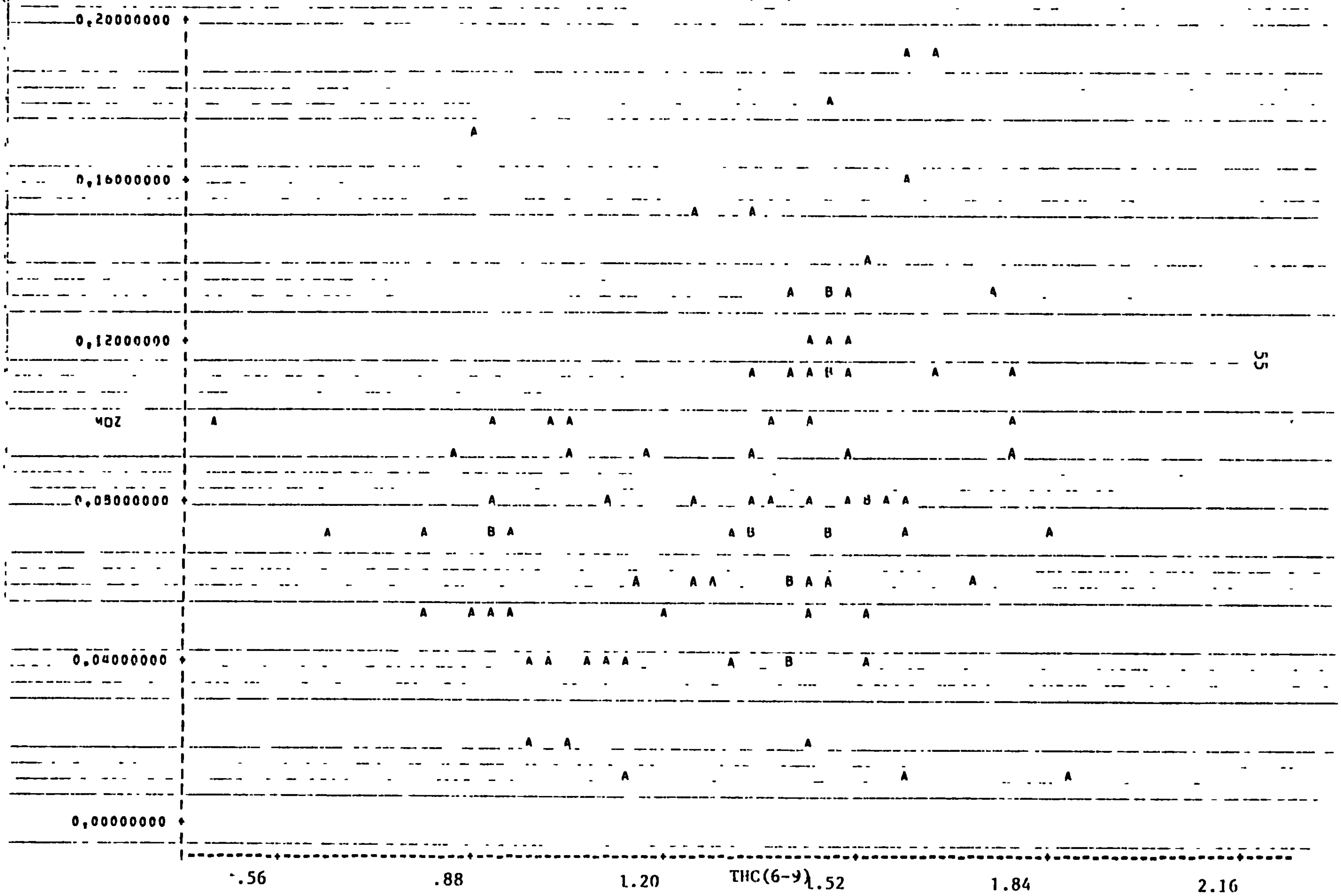
FIGURE 12

STATION = 3 = BETH

Plot of MOZ vs THC (6-9)

May through October, 1973

Overall Corr. = .24

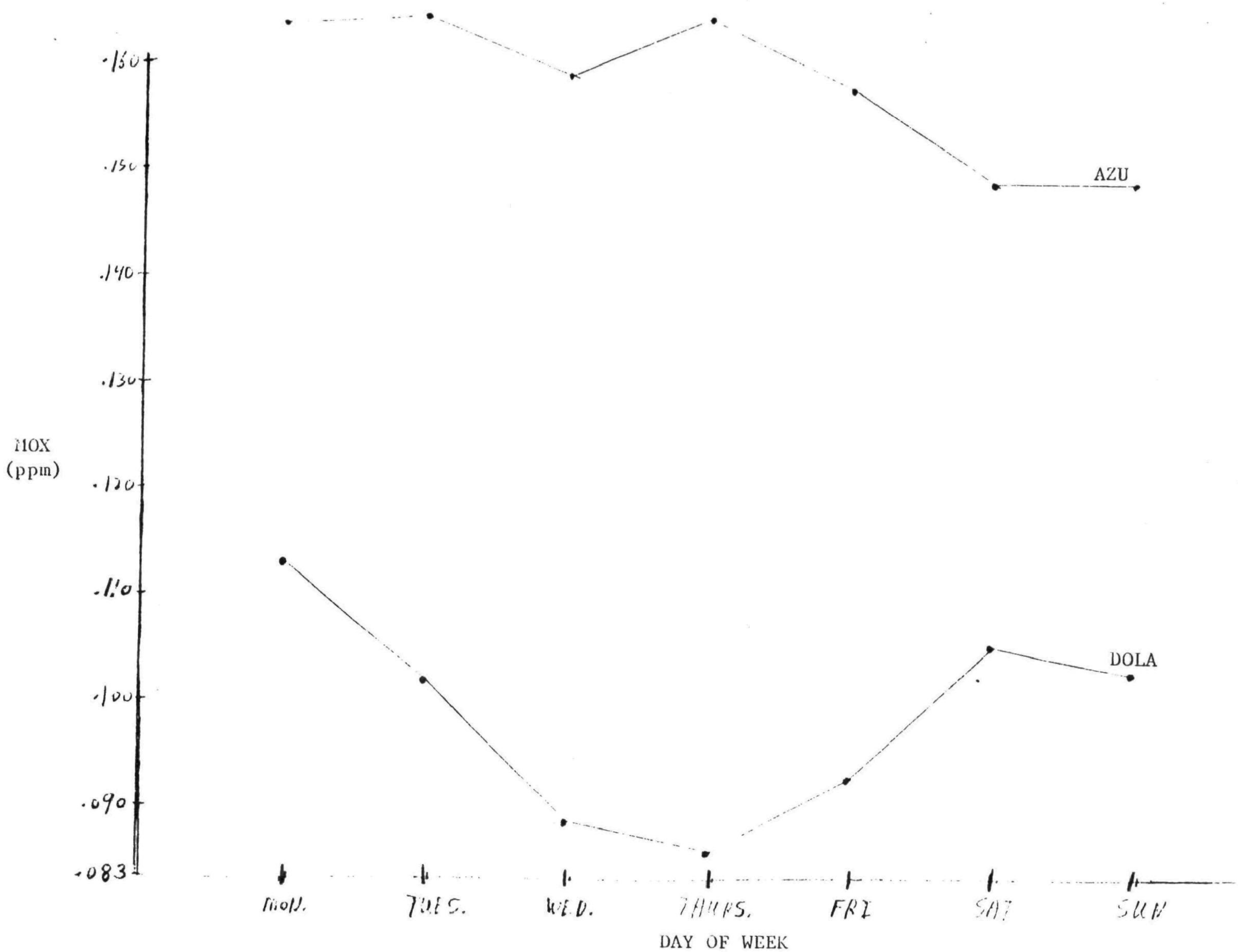


5.4.4 Means by Day of Week and Station

RTI also computed and plotted the means of several of the variables under study by day of week and station. Figures 13 and 14 present plots of MOX (MOZ) by day and station. Figure 13 shows that AZU has higher levels of MOX than DOLA and that AZU has its lowest MOX levels on the average on the weekends. Figure 14 shows that SISP has lower levels of MOZ than the other three Maryland stations and that BETH, HYAT, and SUIT have their lowest levels of MOZ on the average on Sundays. (Cleveland in looking at New York and New Jersey data found somewhat higher ozone levels on Sundays [4] while Altshuller [1] found oxidant levels to be about the same on Sundays for several CAMP Stations.) Figures 15 and 16 give plots of means of THC and SRAD by day and location. Figure 15 shows that both AZU and DOLA have their lowest THC levels on the weekends while LA International gave the highest levels of SRAD on Mondays. Figure 16 indicates that the levels of THC were lower at BETH than at the three other Maryland stations and that HYAT and SUIT had their lowest THC levels on Sunday. Figure 17 presents a plot of NO and NO_2 for AZU and DOLA by day of week. The figure shows that NO and NO_2 levels are higher at DOLA (recall that MOX levels were higher at AZU) and that the lowest levels of both NO and NO_2 are on the weekends. (Cleveland [4] found lower NO, NO_2 and NMHC levels on Sundays). Finally, Figure 18 presents a plot of MOX for two levels of SRAD for AZU and DOLA by day of week. As expected when SRAD is high, MOX is higher at both stations but unfortunately no other patterns by day are obvious. (This may be due to the small sample sizes ($\hat{=}$ 12 observations) that each mean is based upon.)

FIGURE 13

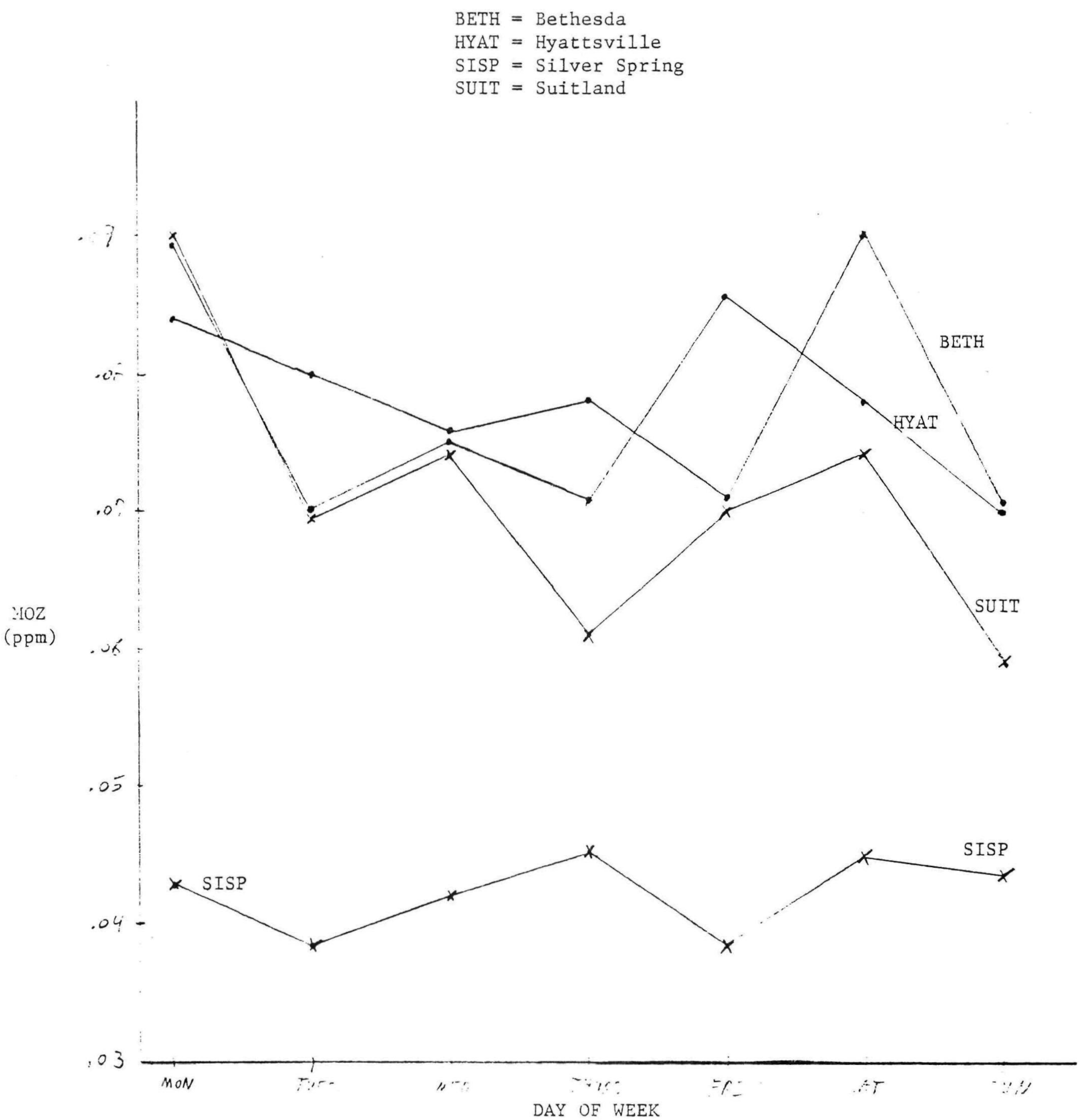
Plot of Means of Daily Maximum Oxidant by Day of Week[1/] and Station



1/ Data for 1972 May through October.
Each mean based on approximately 25 observations.

FIGURE 14

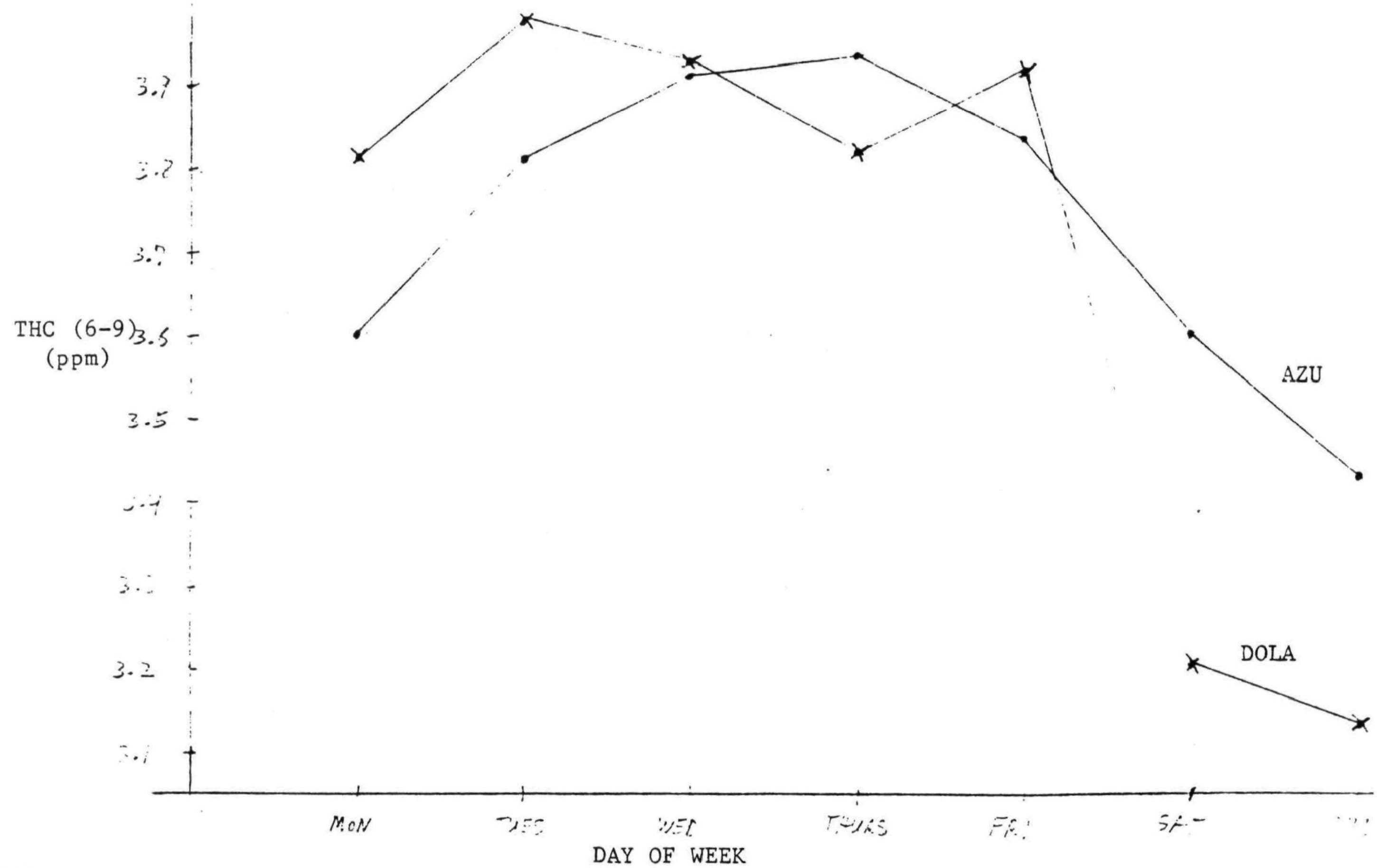
Plot of Means of Daily Maximum Ozone by Day of Week[1/] and Station



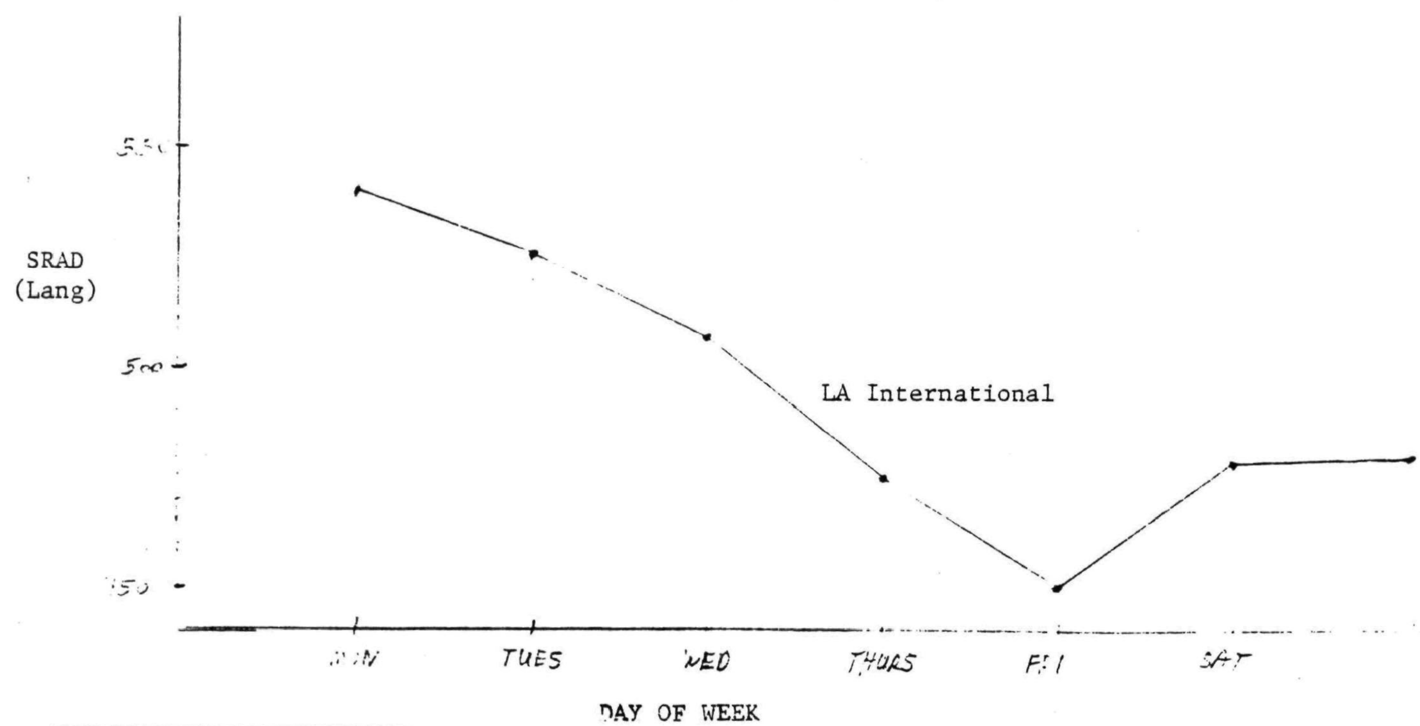
1/ Data for 1973, May through October.
Each mean based on approximately 20 observations.

FIGURE 15

Plot of Means of THC (6-9) by Day of Week and Station[1/]



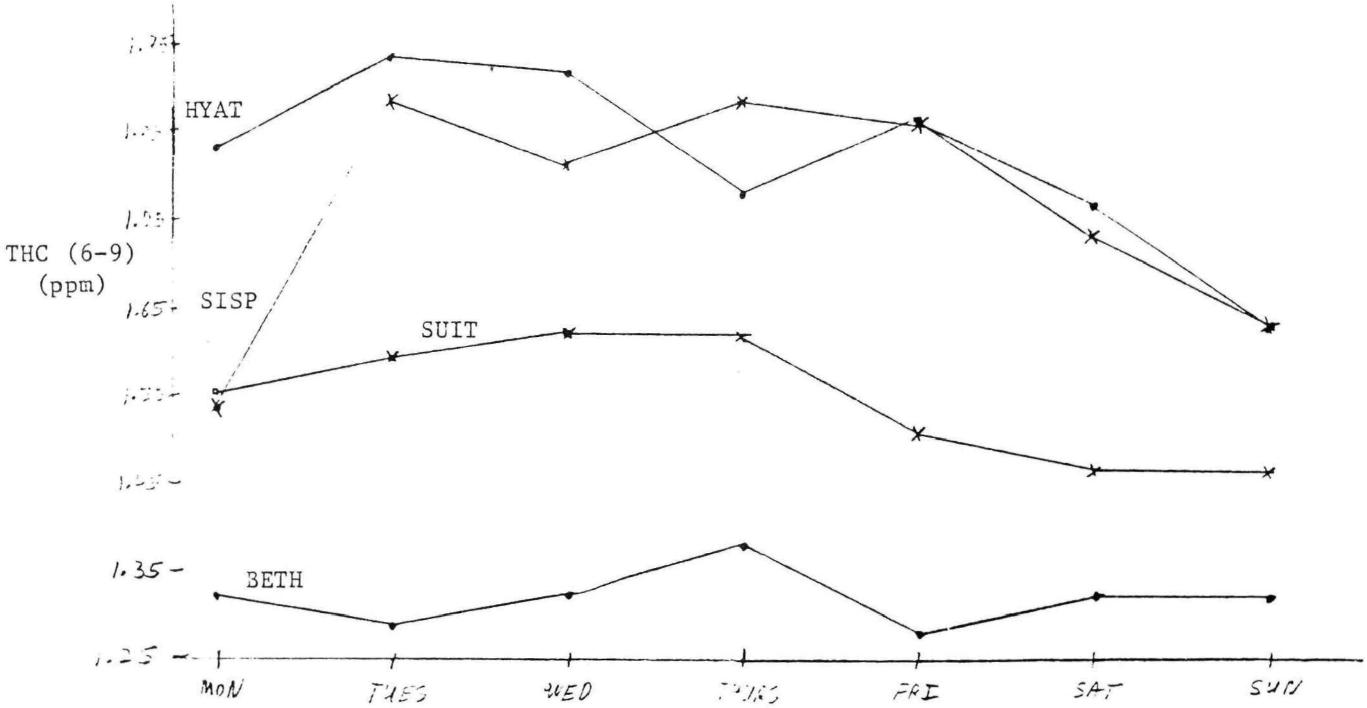
Plot of Means of SRAD (Daily Total) by Day of Week



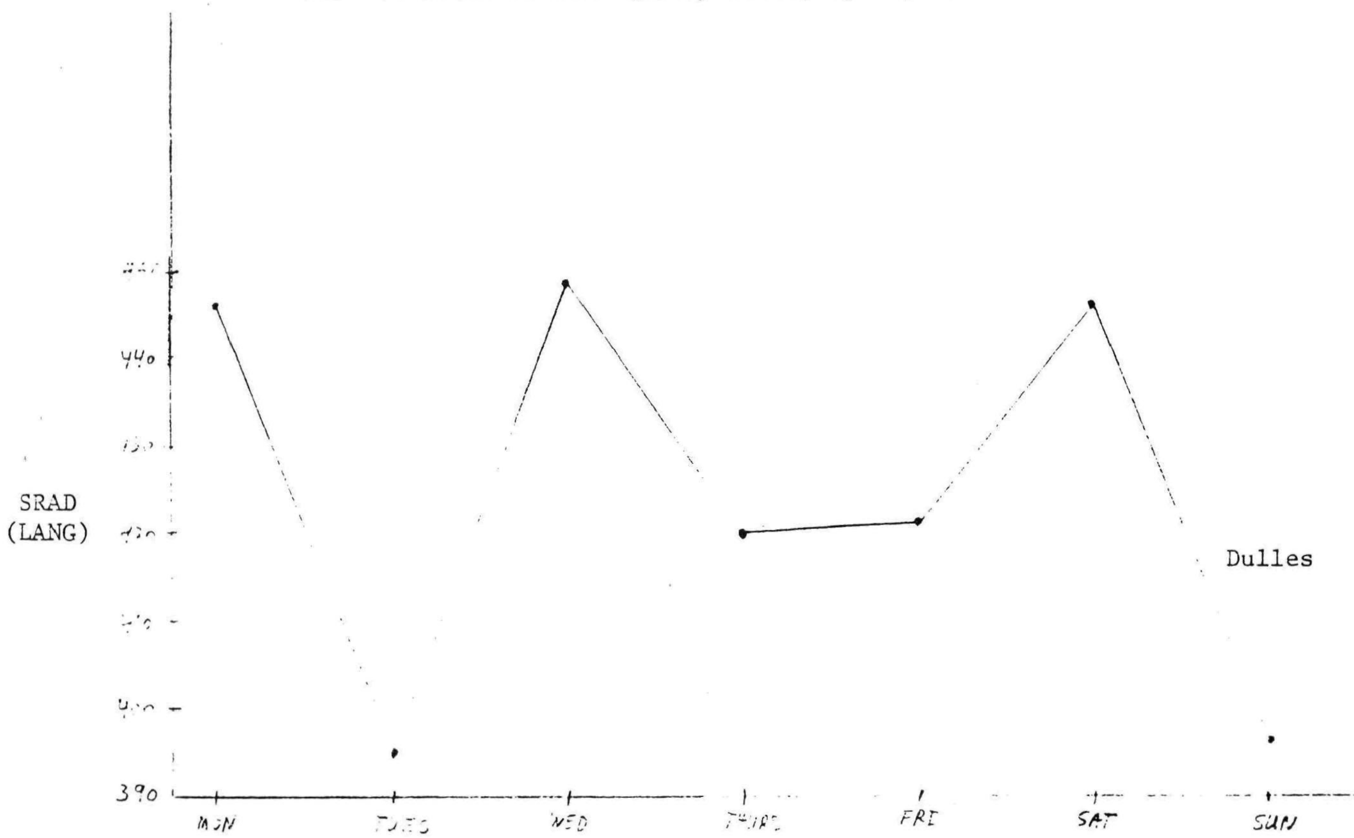
1/ May through October, 1972; each mean based on 20 to 27 observations.

FIGURE 16

Plot of Means of THC (6-9 A.M.) by Day of Week and Station[1/]



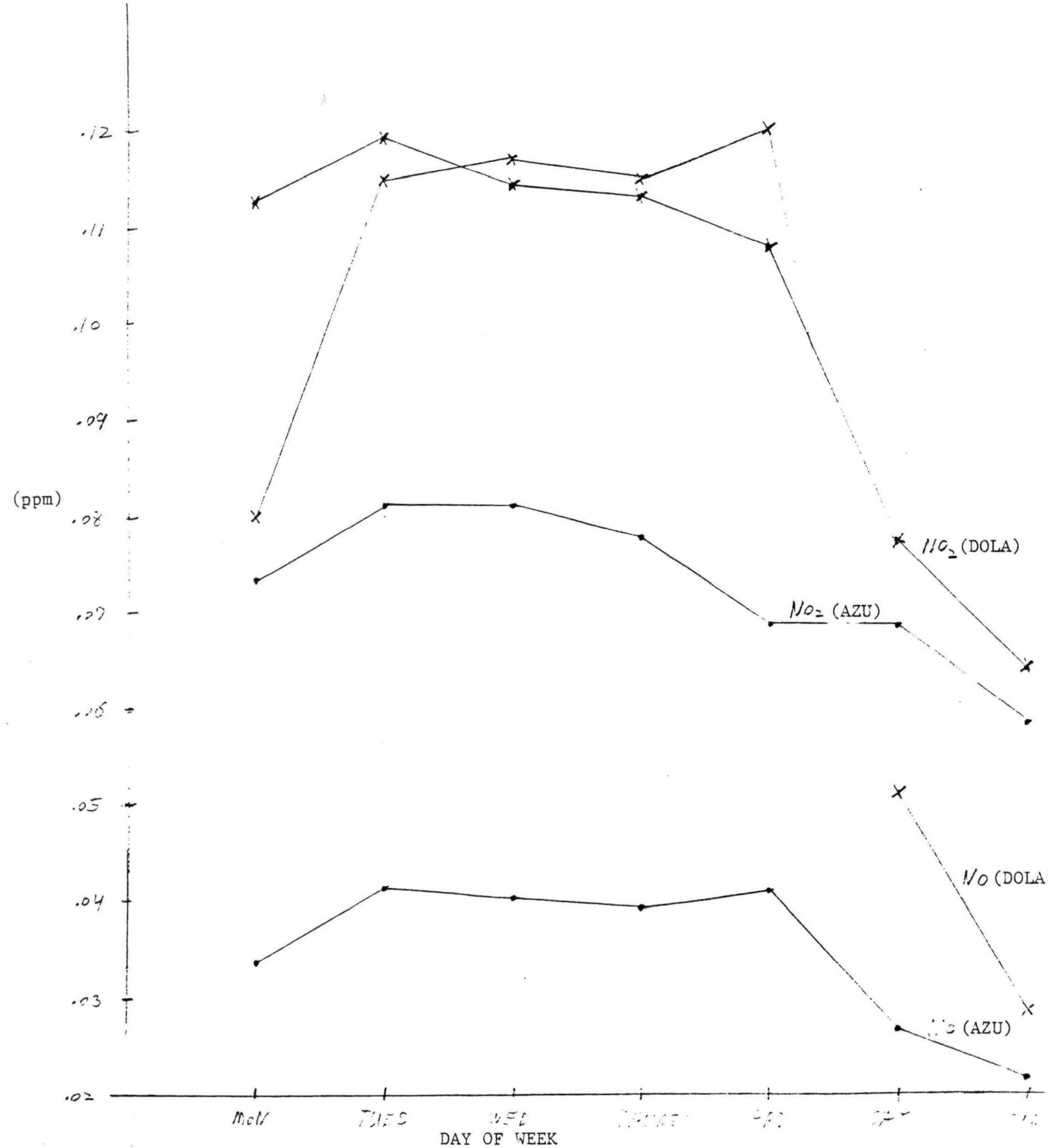
Plot of Means of SRAD (Daily Total) by Day of Week[1/]



[1/] May through October, 1973; SRAD means based on approximately 16 to 20 observations, THC means based on approximately 10 to 14 observations.

FIGURE 17

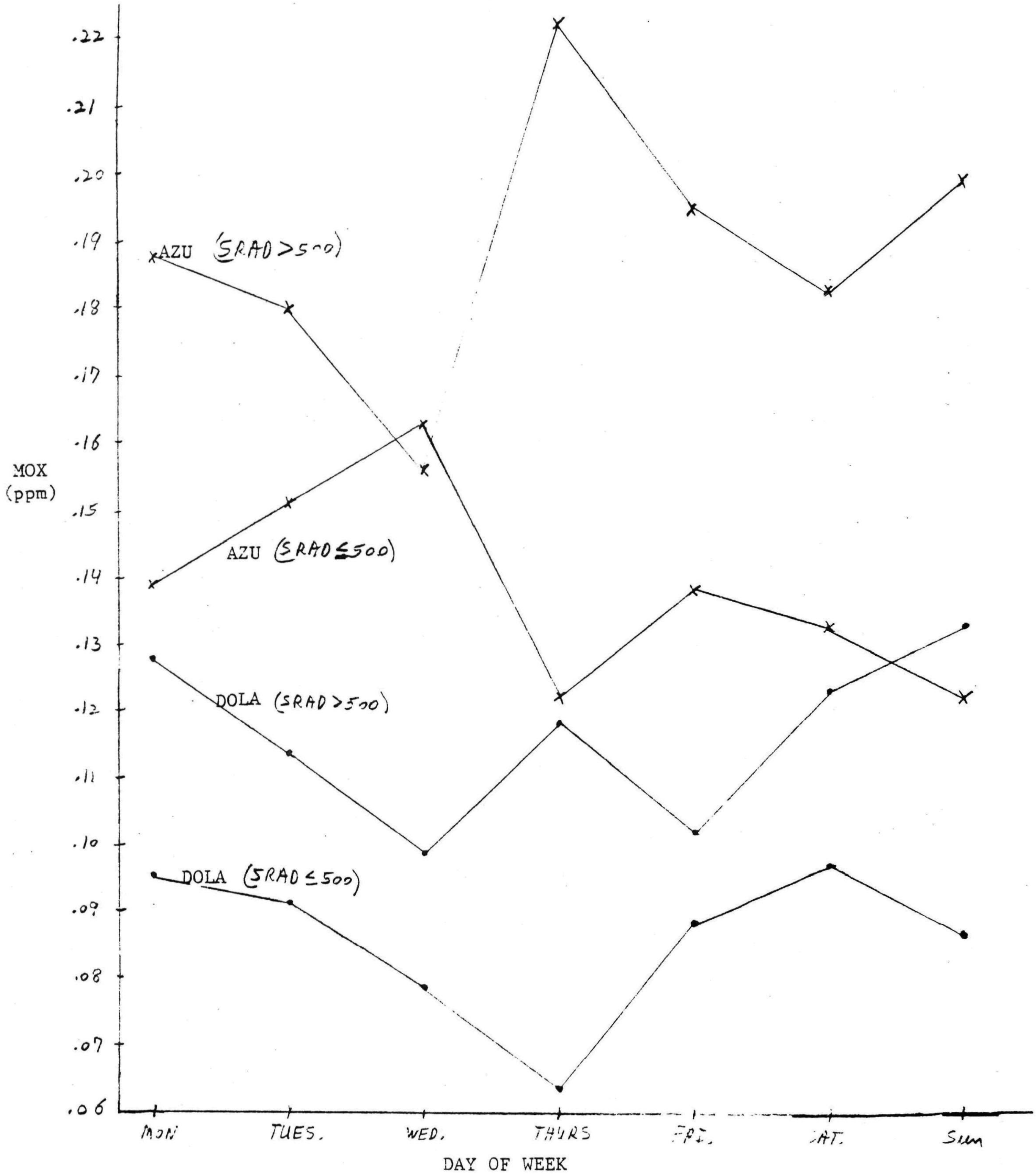
Plot of Means of NO_2 (6-9) and NO (6-9) by Day of Week and Station[1/]



1/ May through October, 1972; Each mean based on approximately 25 observations.

FIGURE 18

Plot of Means of Daily Maximum Oxidant by Day of Week[1/], High and Low Solar Radiation (SRAD) and Station



1/ Data for 1972, May through October; Each mean based on approximately 12 observations.

5.5 Upper Percentile Analysis

The scatter plots presented in Section 5.4.3 and Appendix A indicate large variability in the atmosphere data being examined in this report. For this reason it is very hard to interpret these plots. Accordingly, in the present section plots of the 75th and 50th percentiles of the MOX (MOZ) distribution for given levels of THC and NO_2 are examined. These plots give an indication of how the percentiles of the MOX distribution are changing as levels of THC and NO_2 increase.

Another reason for looking at percentile plots for MOX (MOZ) versus THC is that the current control strategy for controlling atmospheric oxidant pollution is based upon reducing hydrocarbon emissions by a certain percentage (see Appendix J of the August 14, 1971 Federal Register). The Appendix J curve was derived from an upper envelope curve of a scatter plot of MOX versus NMHC for several CAMP stations (see Section 2.1). RTI felt (especially with the sample sizes available for this report) that more could be gained by looking at upper percentile plots than upper envelope curves because an envelope curve is only dependent on the extreme value of the MOX distribution (which could be an outlier) while percentile plots take into account the shape of the MOX distribution and are not dependent on just one value of this distribution.

Appendix Figures C-1 through C-10 give for stations (i) AZU, (ii) DOLA, and (iii) BETH, HYAT and SUIT data combined 75th and 50th percentile plots of MOX (MOZ) versus THC and NO_2. A description of how these plots were obtained is given in Appendix C. SISP was not combined with the other three Maryland stations because it is located near a major freeway which leads to relatively low MOZ levels. Also, the reader is cautioned here to note that some of the intervals where the MOX percentiles were estimated have relatively few data points. Figures 19 and 20 summarize the MOX (MOZ) versus THC and NO_2 75th percentile plots for all stations and years. Figure 19 shows that:

(i) Both the AZU and DOLA 75th percentiles have shifted downward from 1968 to 1972. That is, for the same value of THC the 75th percentile points have decreased at both sites.

(ii) The AZU percentiles are higher than the DOLA percentiles.

(iii) The Maryland THC range is much smaller than that of both the LA stations (this was discussed in Section 5.4.2).

(iv) The Maryland 75th percentiles are similar to those for DOLA (1972) for the corresponding values of THC (it would be interesting to investigate this for several other years.) The fact that the Maryland 75th percentile curve is relatively flat indicates for the data examined here that there is not a strong relationship between MOZ and THC (Table 7 also indicates this result). Thus in Maryland for the range of THC examined here, reducing THC levels appears to have relatively little effect on MOZ levels.

(v) It appears a linear relationship would be a reasonable approximation to the 75th percentile line for DOLA (1968 and 1972) and Maryland combined while the AZU (1968 and 1972) 75th percentile lines appear to have some curvilinearity as THC increases. Thus, one could argue that for locations with MOX values less than or equal to DOLA that the 75th percentile line for MOX versus THC can be approximated by a linear relationship while for locations with levels as high as AZU a curvilinear relationship may be required (again the reader is cautioned that the sample sizes used to estimate the MOX (MOZ) 75th percentiles were quite small for some of the THC intervals, see Appendix C).

Figure 20 shows that:

(i) Both the AZU and DOLA 75th percentile lines have shifted downward from 1968 to 1972.

(ii) The AZU percentiles are higher than the DOLA percentiles.

(iii) The Maryland NO_2 range is approximately the same as that of the LA stations (this was discussed in Section 5.4.2).

(iv) The Maryland 75th percentile curve is relatively flat indicating that there is very little relationship between NO_2 and MOZ in Maryland for the data examined in this report (the correlations given in Table 7 also indicate this result).

(v) As with THC, it appears that a linear relationship would be a reasonable approximation to the NO_2 75th percentile lines for DOLA (1968 and 1972) while the AZU 75th percentile lines appear to have some curvilinearity as NO_2 increases.

Figure 19 Plot of 75th Percentile of the MOX (MOZ) Distribution for Given Levels of THC by Station and Year.

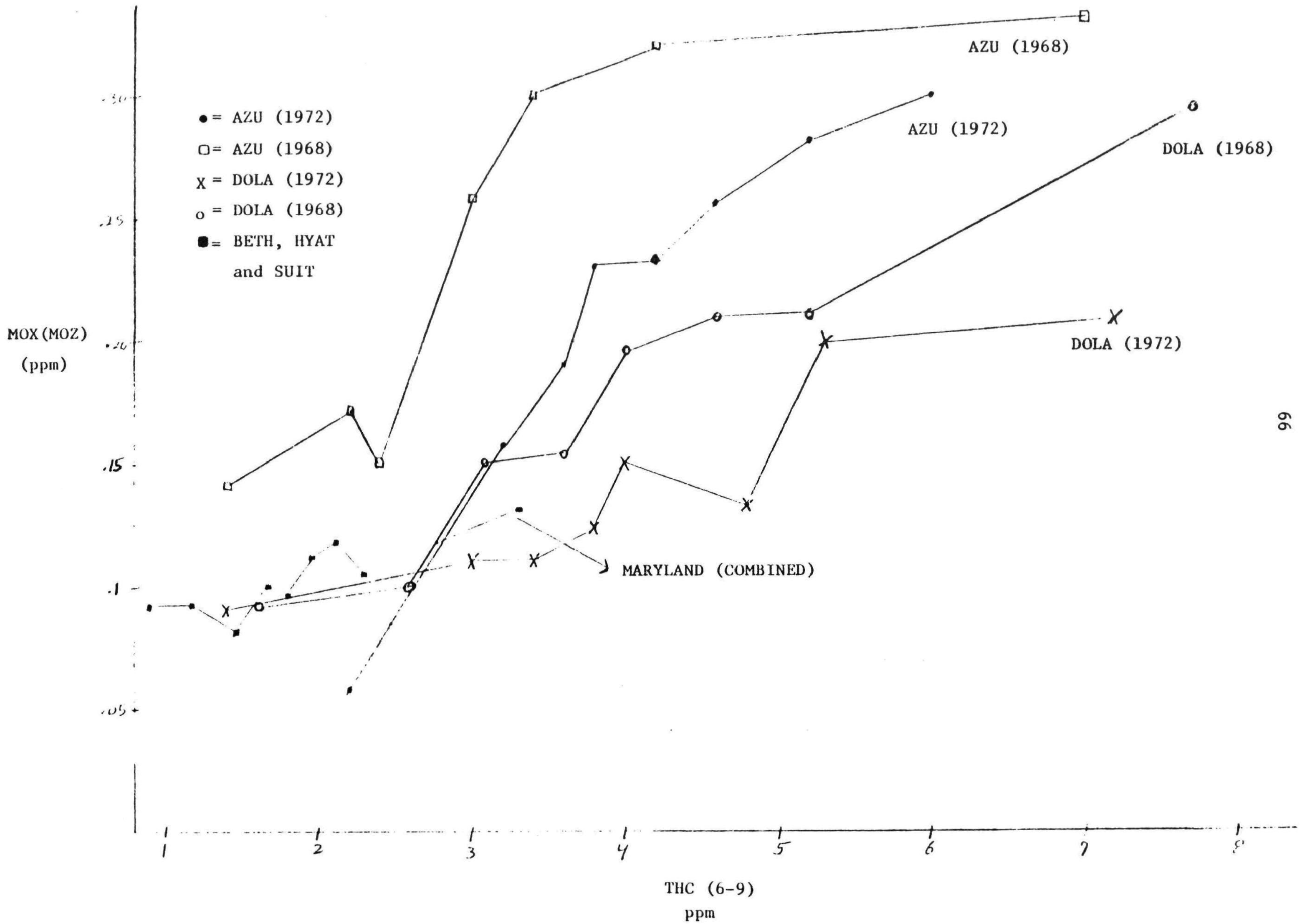
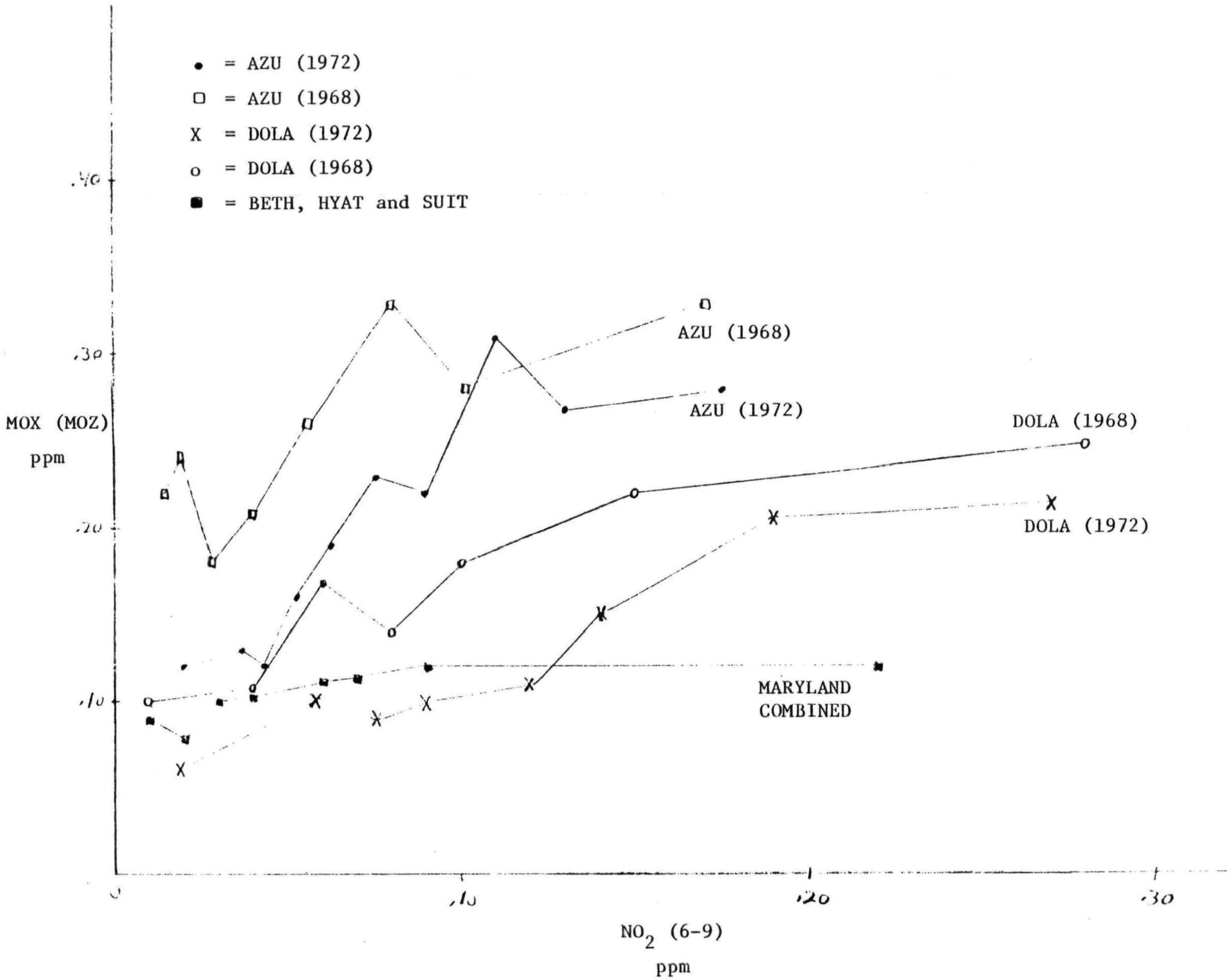


Figure 20 Plot of the 75th Percentile of the MOX (MOZ) Distribution for Given Levels of NO_2 by Station and Year.



5.6 Multiple Variable Relationships Between MOX (MOZ) and the Other Variables

The analysis presented to this point has compared MOX (MOZ) with various other variables on a one-at-a-time basis (e.g., correlations scatter plots, percentile plots). In this section the results of using two statistical procedures (stepwise regression and cluster analysis) are discussed which consider the relative strengths of the various variables in predicting max. oxidant after taking into account the effects of the other variables. Note that in the one variable at-a-time approach, the effect on MOX of one other variable was studied with no attempt to adjust for the effects of other variables. The main emphasis of the analysis is to determine which of the variables under study appear to be the best predictors of MOX (MOZ) in LA and Maryland not to actually obtain prediction equations; although, prediction equations will also be discussed.

5.6.1 Stepwise Regression

In this section the results of using stepwise regression are discussed. This procedure is commonly used by researchers to indicate which variables out of a large group of variables appear to be the most important in predicting a given variable (e.g., MOX). The procedure assumes that a linear relationship exists between the dependent variable (MOX) and the independent variables (e.g., MTEMP). For example,

$$MOX_i = a + B_1(THC_i) + B_2(MTEMP_i) + B_3(SRAD_i) + e_i$$

where a, B_1, B_2, and B_3 are unknown parameters and e_i is a random error term.

The stepwise regressions discussed here were run for each station (using 1972 LA and 1973 Maryland data) with MOX (MOZ) as the dependent variable and the various meteorological and pollutant variables as independent variables.

In brief, the stepwise regression procedure used consists of the following approach: The stepwise computer program finds the single-variable model (i.e., max. oxidant on only one variable) which produces the largest R^2 statistic (where R^2 is the square of the multiple correlation coefficient). After entering the variable with the largest R^2, the program uses the partial correlation coefficients to select the next variable to enter the regression. That is, the program enters the variable with the highest partial correlation coefficient with max. oxidant (given that the variable with the largest R^2 is already in the model). An F test is performed to determine if the variable to be entered has a probability greater than the specified "significance level for entry." After a variable is added, the program looks at all the variables already included in the model and computes a partial F-statistic to determine if these variables should remain the model. Any variable not producing a partial F significant at the specified "significance level for inclusion" is then deleted from the model. The process then continues by determining if any other variables should be added to the regression. The process terminates when no variable meets the conditions for inclusion or when the next variable to be added to the model is one just previously deleted from it. For the present analysis all variables in the final regression model were deemed significant at the .10 level of significance.

Tables 9 and 10 present the results of running stepwise regressions by station for two sets of independent variables. The independent variables considered in Table 10 are a subset of those used in Table 9 (i.e., in Table 10 SLP, XWD, YWD, XAWD and YAWD were not considered)[1/]. The tables show that:

(i) in Los Angeles VIS, MTEMP, SRAD and NO_2 appear to be the most important variables in predicting MOX,

(ii) in Maryland it is difficult to reach any general conclusions except that MTEMP appears to be the most important predictor. (Recall SISP is near a major freeway; therefore, its data is suspect).

It should be noted here that in Maryland the effective sample sizes for the stepwise regressions are relatively small and that the pollutant variables do not appear in general to be important predictors of MOZ.

[1/] Sea level pressure was dropped because its coefficient of variation (c.v. = std. deviation/mean) was so small. For example, in AZU the c.v. for SLP was only .26. Wind direction was dropped because of the fact that the meteorological data was collected at different locations than the pollutant data. For example, in Los Angeles, the meteorological data was collected at LA International while one of the pollutant stations under study was at Azusa.

TABLE 9

Results of Stepwise Regressions[1/] by Station[2/] with Daily Max. Oxidant (Ozone) as the Dependent Variable (May through October Data)

	Independent Variables Considered	1972 AZU* MOX	1972 DOLA MOX	1973 BETH[3/] MOZ	1973 HYAT MOZ	1973 SISP MOZ	1973 SUIT MOZ
Met.	VIS	4	1				2
	SLP			2	3		
	DPT		6			2	
	XWD				2		
	YWD		3				
	WS	3			4		
	RH				5	1	
	MTEMP	5	2	1	1		
	SRAD	2	5				1
	RHC24						
	AWS		8			4	
	XAWD					3	4
	YAWD						
Poll.	NO (6-9)		4				
	NO_2 (6-9)	1	9				
	THC (6-9)		7				3
	NMHC (6-9)	---	--				
	No. Days Used in regg.	125	130	56	54	70	35
	$R^2 = (Corr)^2$	.70	.71	.38	.75	.57	.63
	R = Corr	.84	.84	.62	.87	.75	.79

* AZU column indicates that MOX = linear function (NO_2, SRAD, WS, VIS, MTEMP). The correlation coefficient for this regression is .84.

1/ Table gives most sig. variable in final equation as 1, second most sig. as 2, etc.

2/ Stepwise procedure set up so that all variables in final equation are sig. at .10 level.

3/ Maryland = Dulles Met. Data

TABLE 10. Results of Stepwise Regressions[1/] by Station[2/] with Daily Max. Oxidant (Ozone) as the Dependent Variable (May through October Data)

	Independent Variables Considered	1972 AZU MOX	1972 DOLA MOX	1973 BETH[3/] MOZ	1973 HYAT MOZ	1973 SISP MOZ	1973 SUIT MOZ
Met. Variables	VIS	3	1				
	DPT					2	
	WS	4			3		
	RH		6			1	
	MTEMP	5	3	1	1		1
	SRAD	2	2				
	AWS					3	
Poll. Variables	NO (6-9)		4		4		
	NO_2 (6-9)	1	7		2		
	THC (6-9)		5				2
	NMHC (6-9)	---	---				
	No. Days Used in Regg.	125	130	56	54	70	36
	$R^2 = (Corr.)^2$	.70	.67	.29	.69	.60	.53
	R = Corr.	.84	.82	.54	.83	.78	.73

1/ Table gives most sig. variable in final equation as 1, second most sig. as 2, etc.

2/ Stepwise procedure set up so that all variables in final equation are sig. at .10 level.

3/ Maryland = Dulles Met. Data.

5.6.2 Cluster Analysis

In this section the results of using the Automatic Interaction Detector computer program (AID) are discussed. The AID program developed at the University of Michigan performs a type of cluster analysis which is useful in studying the interrelationships among a set of variables. Regarding MOX (MOZ) as a dependent variable, the program employs a nonsymmetrical branching process based on variance analysis techniques to subdivide the sample into a series of subgroups which maximize one's ability to predict values of the dependent variable. Thus, AID is something like a stepwise regression program where the independent variables (predictors) need not be quantitative. Unlike stepwise regression, AID does not assume a linear relationship between the dependent and independent variables.

The reasons for using the AID program for the present study were the following:

(i) Ideally, in the present case the results of the AID program give the combination of variables that lead to high (or low) MOX days. Thus, RTI felt that this type of analysis, if successful, could have results which would be very useful in interpreting the air pollution data being studied in this report. Accordingly, it was of interest to investigate the potential usefulness of a cluster analysis approach applied to air pollution data.

(ii) To compare the results of AID with those obtained by stepwise regression in Section 5.6.1.

In particular, the AID program operates by first finding that dichotomy based on any predictor (e.g., MTEMP) which gives the largest between-group sum of squared deviations for the dependent variate, MOX. That is, choose a division so as to maximize

$$N_1(\overline{MOX_1})^2 + N_2(\overline{MOX_2})^2$$

where N_1 is the sample size for group 1, $\overline{MOX_1}$ is the mean of MOX for group 1, etc. for group 2. Essentially this is the dichotomization which accounts for more of the variance of MOX than any other dichotomization based on grouping the categories of a single predictor into two groups. Having made this first dichotomy, the program then takes the eligible group with the largest within group sum of squared deviations for MOX and splits it in a similar manner. A group is eligible for splitting if it has a within group sum of squared deviations at least as great as a specified proportion (P1) of the original sum of squared deviations (in the present case P1 was set = .01). In addition, for a group to be split both resultant groups must have NMIN observations (NMIN was set = 10). Splits are made only if the within group sum of squared deviations (WSS) is reduced by some minimum proportion (P2) of the total sum of squares (P2 was set = .01). The process of dichotomizing groups continues until there are no eligible groups which can be split or until some specified maximum allowable number of groups (MAXGP) has been created at any point in the process which are eligible for split attempts (MAXGP was set = 20). In the present case the AID program was run for each of the six monitoring stations being considered using the same variables as were used for the stepwise regressions in Table 10. Before the program could be run it was necessary to categorize the independent variables. The categories used are given in Table 11.

TABLE 11 Categories Used in Running AID [1/]

Categories for Los Angeles

Independent Variable	Category	
1 NO	0	Less than .001
	1	.001 to .030
	2	.031 to .060
	3	.061 or over
2 NO_2	0	Less than .001
	1	.001 to .050
	2	.051 to .101
	3	.102 or over
3 THC	0	Less than 1
	1	1 to 3
	2	4 or over
4 VIS	0	Less than 10
	1	10 to 14
	2	15 or over
5 DPT	0	Less than 56
	1	56 to 59
	2	60 or over
6 WS	0	Less than 8
	1	8 to 10
	2	11 or over
7 RH	0	Less than 62
	1	62 to 66
	2	67 or over
8 MTEMP	0	Less than 71
	1	71 to 75
	2	76 or over
9 SRAD	0	Less than 1
	1	1 to 579
	2	580 or over
10 AWS	0	Less than 6
	1	6 to 7
	2	8 or over

Categories for Maryland

Independent Variable	Category	
1 NO	0	Less than .001
	1	.001 to .009
	2	.010 or over
2 NO_2	0	Less than .001
	1	.001 to .040
	2	.041 or over
3 THC	0	Less than 1
	1	1 or over
4 NMHC	0	Less than .001
	1	.001 to .149
	2	.150 or over
5 VIS	0	Less than 10
	1	10 to 14
	2	15 or over
6 DPT	0	Less than 56
	1	56 to 62
	2	63 or over
7 WS	0	Less than 6
	1	6 to 8
	2	9 or over
8 RH	0	Less than 57
	1	57 to 66
	2	67 or over
9 MTEMP	0	Less than 71
	1	71 to 77
	2	78 or over
10 SRAD	0	Less than 260
	1	260 to 499
	2	500 or over
11 AWS	0	Less than 4
	1	4 to 5
	2	6 or over

[1/] Definitions of the various variables are given in Table 3.

The results of running the AID program are given in Figures 21 and 22, Appendix Figures D-1 through D-4 and Table 12[1/]. For example, in Figure 21 the AID program splits on NO_2 and SRAD to obtain a group of 37 days where the average daily max. oxidant was .251 ppm while splits on NO_2 (twice), WS and DPT gave a group of 21 days where the average MOX was .049 ppm. The figures and table indicate that the most frequent variables leading to high daily max. oxidant (ozone) were NO_2, SRAD, MTEMP and VIS while the most frequent variables leading to low daily max. oxidant (ozone) were NO_2, SRAD and MTEMP. To further illustrate in which direction (increase or decrease) the means of the various variables go when MOX (MOZ) increases, Table 13 gives the means for the pollutant and meteorological variables for different levels of MOX (recall these means were plotted in Figure 10). Tables 12 and 13 indicate that usually NO, NO_2, THC, SRAD, MTEMP and DPT are higher than average when MOX (MOZ) is high while VIS, RH, WS and AWS are lower than average when MOX (MOZ) is high.

It is important to note here two major difficulties in running AID with the present data set:

(i) The data for each station could only be split by AID into a relatively few groups because the sample sizes were less than 180 days per station.

1/ Before examining the figures the reader should note the following limitation of the AID analysis. When AID splits the data on some variable (say NO_2), it may perform the split such that only one category of the variable is left in one of the split groups (call it S1). When this happens, AID can never split on this variable again in S1 since only one category of the variable is left in S1. To illustrate this point consider Figure 21. AID first splits on NO_2 such that days with $NO_2 > .102$ define one group (S1) and days with $NO_2 < .102$ define the other group (S2). Now in Table 11 it can be seen that NO_2 has four categories and that $NO_2 \geq .102$ contains only one of these categories. Therefore in S1, NO_2 can never again be used to split the data while in S2, NO_2 can again be used as a dichotomizing variable.

(ii) Since the program requires that the independent variable be categorized (see Table 11), the available sample sizes meant that the various categories for a particular variable did not contain very many days of data for each station. This also meant that only a few categories could be defined for each variable; thus, causing the problem noted in the footnote on the previous page. Because of these difficulties, the AID results presented here are of marginal value.

To summarize,

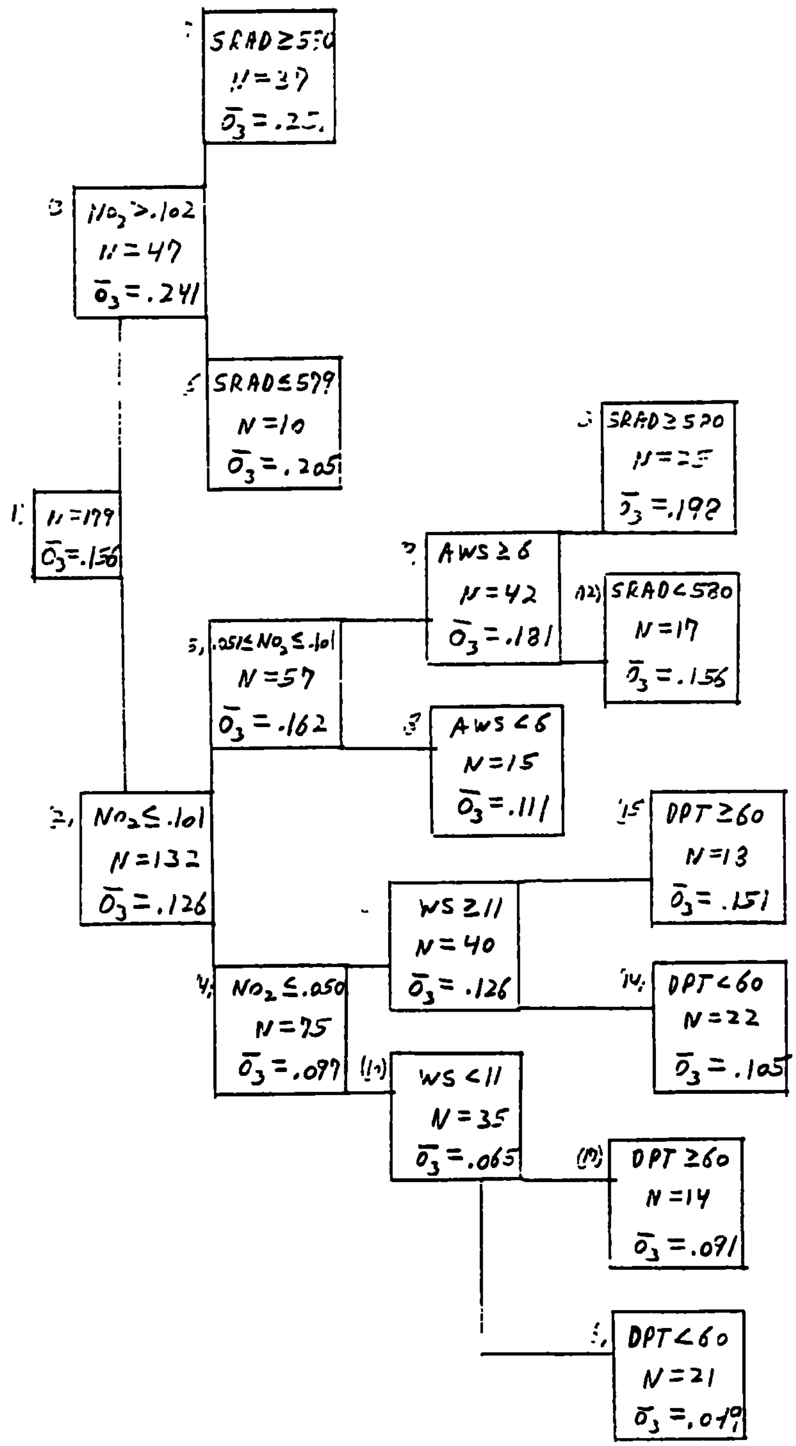
(i) the AID program gave results that were similar to those obtained by stepwise regression;

(ii) the AID analysis was severely limited because of the relatively small sample sizes of the present data and due to this fact AID did not contribute significantly to the present analysis;

(iii) the AID program may have some potential use as an analytic tool in analyzing air pollution data but only for data sets with a relatively large number (several hundred) of data points (e.g., data over several years or several monitoring stations).

(Text continued on page 83)

FIGURE 21. AID Results for AZU, May through October, 1972 Data



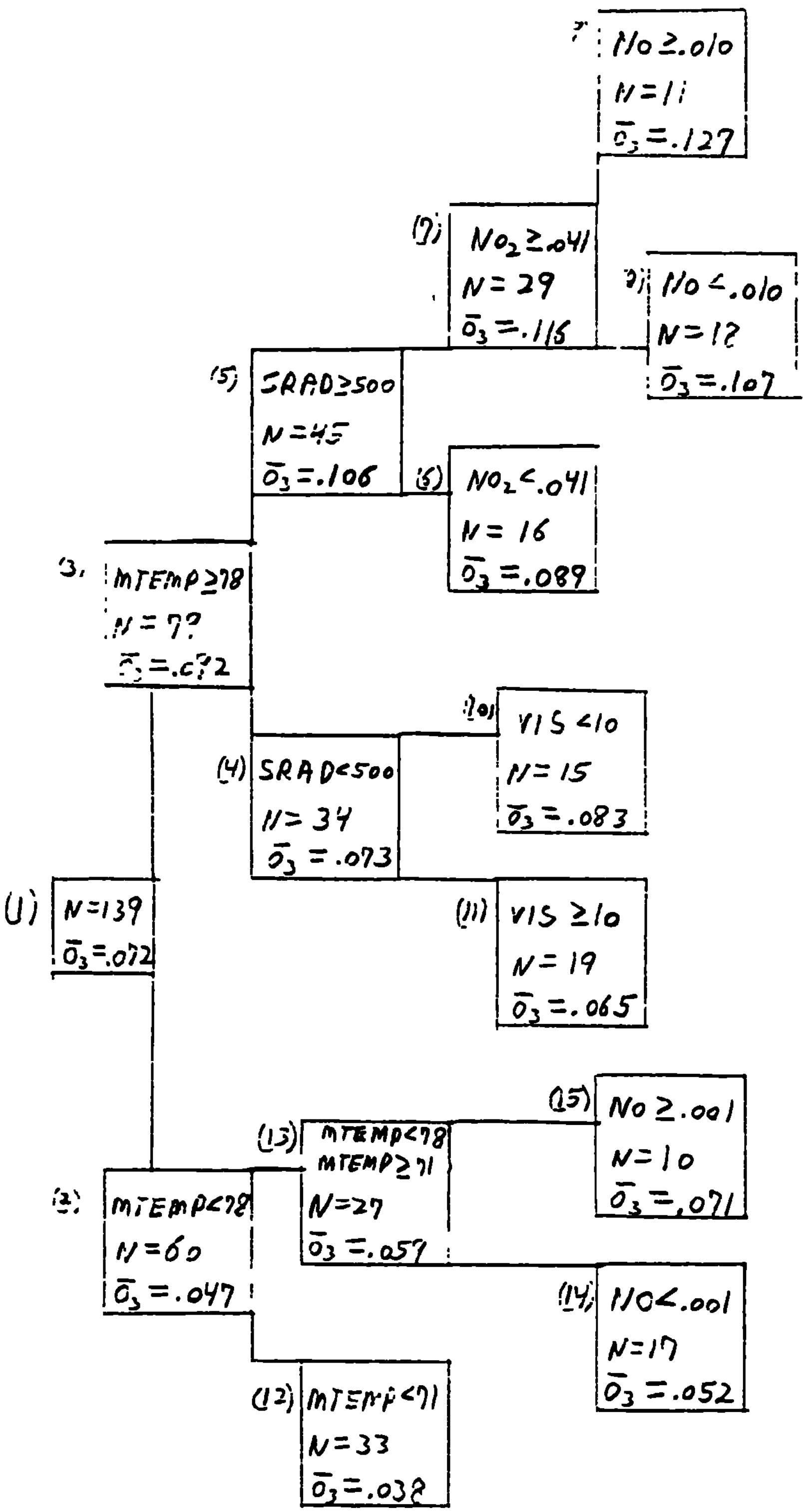
(1) = Initial group before any splitting.

N = Group sample size.

$\overline{O}_3$ = Group mean for daily max. oxidant (units = ppm).

NOTE: Groups with high $\overline{O}_3$ are at the top of the figure and groups with low O_3 are at the bottom of the figure.

FIGURE 22 AID Results for SUIT, May through October, 1973 Data



(1) = Initial group before any splitting.

N = Group sample size.

$\bar{O}_3$ = Group mean for daily max. ozone (units = ppm).

NOTE: Groups with high $\bar{O}_3$ are at the top of the figure and groups with low $\bar{O}_3$ are at the bottom of the figure.

TABLE 12. Summary of Variables Used to Split MOX (MOZ) Groups in AID Computer Runs (All Data Used was May through October Data)

Location	AID Results: Variables[1/2] Whose Split Lead to High O_3 Means		Variables[3] Whose Split Lead to Low O_3 Means		All Variables Used to Split Groups	Variables Selected by Stepwise Regression (See Table 10)
AZU(1972)	1. NO_2	+	NO_2	-	NO_2,SRAD,AWS,	1. NO_2
	2. SRAD	+	NO_2	-	WS,DPT	2. SRAD
	3.		WS	-		3. VIS
	4.		DPT	-		4. WS
						5. MTEMP
DOLA(1972)	1. NO_2	+	NO_2	-	NO_2,THC,MTEMP	1. VIS
	2. THC	+	VIS	+	AWS,NO,VIS,	2. SRAD
	3. MTEMP	+	SRAD	-	SRAD	3. MTEMP
						4. NO
						5. THC
						6. RH
						7. NO_2
BETH(1973)	1. MTEMP	+	MTEMP	-	MTEMP,VIS,	1. MTEMP
	2. VIS	-	MTEMP	-	SRAD,AWS,RH	
	3. SRAD	+				
	4. AWS	-				
HYAT(1973)	1. MTEMP	+	MTEMP	-	MTEMP,NO_2,RH,	1. MTEMP
	2. NO_2	+	SRAD	-	VIS,SRAD	2. NO_2
	3. RH	-				3. WS
	4. VIS	-				4. NO
SISP(1973)	1. SRAD	+	SRAD	-	SRAD,RH,VIS,	1. RH
	2. RH	-	MTEMP	-	NO_2,MTEMP,AWS	2. DPT
	3. VIS	-	SRAD	-		3. AWS
	4. NO_2	-				
SUIT(1973)	1. MTEMP	+	MTEMP	-	MTEMP,SRAD,	1. MTEMP
	2. SRAD	+	MTEMP	-	NO_2,NO,VIS	2. THC
	3. NO_2	+				
	4. NO	+				

TABLE 12 - CONTINUED

Summary Over Six Stations

Variable	Frequency of Occurrence of the Variable Over the Six Stations: High O_3	Low O_3	Overall	Stepwise
NO	1	0	2	2
NO_2	5	2	5	3
THC	1	0	1	2
SRAD	4	3	6	2
MTEMP	4	4	5	5
VIS	3	1	5	2
DPT	0	1	1	1
WS	0	1	1	2
RH	2	0	3	2
AWS	1	0	4	1

1/ 1. means first split on this variable, 2. means second split, etc. See Figures 21 and 22 and Appendix Figures D-1 through D-4.

2/ The + sign indicates that high NO_2 (etc.) gave high O_3, etc. for the - sign.

3/ Here the + sign indicates that high NO_2 (etc.) gave low O_3, etc.

TABLE 13. Means of Meteorological and Pollutant Variables for Different Levels of Daily Max. Oxidant (Ozone), May through October Data[1/]

Location	MOX(MOZ) Levels	Pollutant Variables NO	NO_2	THC	Meteorological Variables SRAD	MTEMP	VIS	DPT	RH	WS	AWS
AZU (1972)	MOX≤.08	.029	.040	3.4	345	70.6	15.7	54.0	62.3	9.0	6.7
	MOX>.20	.046	.111	4.3	616	73.5	8.3	60.7	66.1	10.3	8.0
	All Levels	.035	.074	3.7	492	73.1	11.2	58.8	64.2	9.9	7.3
DOLA (1972)	MOX≤.08	.080	.072	3.19	441	71.1	13.8	56.6	65.6	8.2	7.2
	MOX>.20	.121	.190	4.85	633	78.7	6.7	62.1	60.0	8.2	6.6
	All Levels	.090	.103	3.70	504	73.0	10.0	59.0	65.6	8.3	7.3
BETH (1973)	MOX≤.04	---	---	1.26	232	67.3	10.4	53.0	70.5	8.0	5.3
	MOX>.08	.008	.049	1.39	535	86.2	8.3	66.6	57.8	6.6	4.2
	All Levels	.008	.048	1.32	425	78.7	10.6	60.9	61.9	7.4	4.9
HYAT (1973)	MOX≤.04	.025	.077	1.76	266	69.1	9.6	55.7	73.3	8.1	5.9
	MOX>.08	.030	.083	1.96	541	87.4	7.9	67.7	58.5	6.4	4.4
	All Levels	.031	.074	1.83	440	80.5	9.8	62.8	62.8	7.4	5.1
SISP (1973)	MOX≤.04	.090	.063	1.87	356	75.2	10.1	59.2	69.8	7.3	5.6
	MOX>.08	.052	.048	1.79	550	87.5	8.0	67.0	57.5	6.2	3.4
	All Levels	.067	.052	1.76	424	78.8	10.9	61.0	64.3	7.1	5.0
SUIT (1973)	MOX≤.04	---	.065	1.46	223	66.5	10.0	54.2	74.6	7.7	5.3
	MOX>.08	.020	.046	1.63	550	84.4	10.4	63.1	54.1	7.0	4.6
	All Levels	.023	.052	1.54	412	77.2	11.4	59.4	62.2	7.5	5.2

Summary Over Six Stations

	NO	NO_2	THC	SRAD	MTEMP	VIS	DPT	RH	WS	AWS
No. times variable increased from Low to High level of MOX	3	3	5	6	6	1	6	1	1	1
No. times variable decreased from Low to High level of MOX	1	2	1	0	0	5	0	5	4	5

[1/] Units = ppm for pollutant variables, Meteorological units given in Table 3.

5.6.3 Regressions

The results of running the AID program and the stepwise regressions indicated that of the variables examined the most important meteorological variables in predicting high MOX (MOZ) were SRAD, MTEMP and VIS while the most important pollutant variables were NO_2 and THC. To further illustrate the relationship between MOX (MOZ) and these variables linear regressions were fit by least squares to the May through October data for all stations except SISP (as discussed previously, the data from SISP was of questionable value) and the results are given below. These regressions equations are given here only to illustrate relationships for the limited data available for this analysis and should not be used as general prediction equations for MOX or as evidence of causation. (This is rather obvious for a variable such as VIS which may be caused by pollution rather than vice versa.) In addition, the equations are not given as proof of linear relationships between MOX (MOZ) and the other variables. (For example, Cleveland [2] fits a multiplicative model to the relationship between MOX and SRAD, MTEMP and WS.) Finally, the reader should be aware of the fact that for uncontrolled data such as analyzed in this report the usual statistical assumptions underlying regression analysis are totally violated; and therefore, the estimated regressions do not have the nice statistical properties of estimates obtained in a controlled experiment. With these caveats in mind, the least squares estimates of the linear regressions are as follows (note in Maryland, NO_2 was not included in the regression equation because of its low correlation with MOZ):

AZU (1972)

$$MOX = -.2214 + .0026(MTEMP) + .00024(SRAD) - .0020(VIS) + .5932(NO_2) + .0105(THC)$$

The correlation coefficient (R) for this regression was .83 and the sample size (N) used to estimate the regression was 128. A test of the partial regression coefficients showed that only the partial coefficient of THC was not significant at the .10 level of significance.

DOLA (1972)

MOX = −.1652 + .0023(MTEMP) + .00013(SRAD) − .0024(VIS) + .1876(NO_2) + .0090(THC)

R = .82 N = 131

A test of the partial regression coefficients showed all coefficients significant at the .10 level.

BETH (1973)

MOZ = −.1183 + .0021(MTEMP) + .000082(SRAD) − .0021(VIS) + .0144(THC)

R = .79 N = 90

The test of the partial regression coefficients showed that only the coefficient of THC was not significant at the .10 level.

HYAT (1973)

MOZ = −.1717 + .0027(MTEMP) + .000065(SRAD) − .0012(VIS) + .0086(THC)

R = .79 N = 105

The test of the partial regression coefficients showed all coefficients significant at the .10 level.

SUIT (1973)

MOZ = −.0884 + .0011(MTEMP) + .000100(SRAD) − .0010(VIS) + .0284(THC)

R = .83 N = 62

The test of the partial regression coefficients showed all coefficients significant at the .10 level.

The above estimated regression equations have reasonably high correlation coefficients (.79 to .83) and are consistent with regard to the signs of the regression coefficients; i.e., MTEMP, SRAD, NO_2 and THC always have positive coefficients while VIS always has a negative coefficient.

Because of the fact that meteorological variables cannot be controlled, RTI also performed the following regression analysis for the five stations: (i) the readings of MOX (MOZ), NO_2 and THC were adjusted for the effects of the three important meteorological variables and then (ii) the relationships between adjusted MOX and adjusted NO_2 and THC were examined. The reader is cautioned here that adjusting for SRAD, MTEMP and VIS does not eliminate meteorological effects entirely from MOX (i.e., there are other meteorological variables which could have been included) but is done here only to reduce the effects of meteorological conditions so that the residual effects between MOX, NO_2 and THC may then be examined. In particular, RTI ran linear regressions of the following form for MOX, NO_2 and THC:

$$MOX_i = a + B_1(SRAD_i) + B_2(MTEMP_i) + B_3(VIS_i) + e_i \quad i=1, \ldots, n \text{ days} \qquad (1)$$

where a, B_1, B_2, B_3 are regression parameters and e_i is a random error term. The residuals from Equation (1) gave MOX_i adjusted for SRAD, MTEMP and VIS (similarly the residuals from (1) with MOX_i replaced with NO_2 or THC gave NO_2 and THC adjusted for the three meteorological variables).

The table below gives the percent of the total variation in MOX (MOZ) accounted for by the regression of MOX (MOZ) on SRAD, MTEMP and VIS by station (e.g., the table gives the square of the correlation coefficient = R^2).

	AZU(1972)	DOLA(1972)	BETH(1973)	HYAT(1973)	SUIT(1973)
(Percent of Variation) R^2	.58	.57	.48	.59	.64
(Correlation Coefficient) R	.76	.75	.69	.77	.80

Appendix Figures E-1 through E-10 present plots for the five stations of adjusted MOX (MOZ) versus adjusted NO_2 and THC. In addition, the plots give the correlations between the adjusted variables and the sample sizes involved. The plots and correlations are given to indicate if a relationship still exists between MOX and THC, NO_2 after adjustment for the meteorological variables. A summary of the correlations between MOX, NO_2 and THC before and after adjustment are given below:

Correlations Between MOX, NO_2 and THC Before and After Adjustment, By Station

	AZU(1972)	DOLA(1972)	BETH(1973)	HYAT(1973)	SUIT(1973)
Before Adjustment					
Corr(MOX, NO_2)	.67	.63	.05	.12	-.07
Corr(MOX, THC)	.51	.53	.24	.20	.36
After Adjustment					
Corr(MOX, NO_2)	.48	.46	.07	.13	.08
Corr(MOX, THC)	.39	.44	.19	.18	.37
N	128	131	56	82	50

The above correlations indicate that in Los Angeles there is still evidence of a positive linear relationship between MOX and the two pollutant variables NO_2 and THC after adjustment. In Maryland, the correlations before and after adjustment are about the same order of magnitude with only the correlation between MOX and THC at MD4 being greater than .30. Thus, the data analyzed in this report indicates that the linear relationship between MOX and NO_2 and THC is stronger in Los Angeles than in Maryland both before and after adjustment for three important meteorological variables SRAD, MTEMP and VIS. Of course, as indicated earlier this fact may be explained by the significantly higher MOX levels in Los Angeles.

Another interesting result to come out of the regression analysis was to note how adjusting MOX (MOZ) for SRAD, MTEMP and VIS affected the first order autocorrelations of MOX (i.e., correlations of MOX readings one day apart). That is, since meteorological conditions may last for several days this results in autocorrelation in the MOX values. For example, for the present data the first order autocorrelation for MOX in DOLA was .59. Accordingly, the table below summarizes the first order autocorrelations for MOX (MOZ) for three stations before and after adjustment.

	DOLA(1972)	HYAT(1973)	SUIT(1973)
Before Adjustment			
Corr(MOX_i, MOX_{i+1})	.59	.46	.38
After Adjustment			
Corr(MOX_i, MOX_{i+1})	.26	-.02	.08

The table shows that the first order autocorrelation in the two Maryland stations was reduced to essentially zero after adjustment while in DOLA this correlation was reduced by more than one-half. Thus, adjusting for SRAD, MTEMP and VIS appears to eliminate a large portion of the day to day correlation for MOX (MOZ). (Cleveland [2] also found this to be true in his analysis.)

6. Conclusions

Before discussing the results of the present study it is important to take note of the following caveats. The study described in this report was carried out on a relatively small and limited data base (i.e., six monitoring stations, three meteorological stations, one year of data in Maryland and two years of data in Los Angeles); and therefore, it should be realized that broad generalizations of the results of this study (or similar studies) cannot and should not be drawn. As is well known, the processes that affect the formation of atmospheric oxidant are quite complex and for this reason several studies using atmospheric and laboratory data will have to be combined to determine an effective control strategy for oxidant. In addition, the results that can be obtained from the type of analysis and data examined in this report are limited. Recall that the data analyzed here had pollutant data at one station and meteorological data at another station (up to 30 miles away). Thus, the observed relationships between daily maximum hourly oxidant concentrations (MOX) and meteorological variables such as wind direction and wind speed are suspect. In addition, because of the transport phenomena of oxidant, it may be unrealistic, as was done in this report, to determine relationships between MOX (which usually occurs in late morning or early afternoon) and pollutant variables which are measured at the same station in the early morning. Ideally, the type of analysis and data that should be examined would be pollutant and meteorological readings (such as wind direction) at one station and maximum oxidant and meteorological readings (such as SRAD) at a second station which is downwind of the first station. (As mentioned previously the data base developed by RTI for its analysis may allow this type of analysis in the future depending on the meteorology of the various stations examined.)

With the above caveats in mind, the data examined in this report did allow a great deal of analysis including the following: (a) The comparison of pollutant levels between the within locations and for Los Angeles the comparison of these levels over time. (b) The examination of the relationships between MOX readings and pollutant variable readings at the same monitoring station and meteorological variable readings at nearby stations (10 to 30 miles distant). These relationships included correlations, scatter plots, percentile analysis, and regression analysis.

For the data examined in this report, correlation analysis between MOX (MOZ) and averages of the other pollutants for various time periods (e.g., 5-8 A.M., 6-9 A.M., 7-10 A.M., etc.) did not indicate that in general any one 3-hour period gave higher correlations. A comparison of the pollutant levels between stations indicated that MOX levels in Los Angeles are substantially higher than MOZ levels in Maryland and AZU has higher MOX levels than DOLA. In addition, MOX levels have decreased from 1968 to 1972 in Los Angeles. (Several studies including Altshuller [1] have also shown similar results.)

Summary statistics for the two areas examined showed that the May through October frequency of occurrence of days with daily maximum hourly oxidant concentrations greater than 160 $\mu g/m^3$ (.08 ppm), the National Ambient Air Quality Standard (NAAQS) not to be exceeded more than once per year, decreased at Downtown Los Angeles and Azusa between 1968 and 1972 from 67.8 to 56.0 percent and from 85.1 to 75.6 percent, respectively. In the Washington, D.C., area for the Bethesda and Suitland, Maryland, stations the 1973 May through October corresponding frequencies for oxidant concentrations in excess of NAAQS were 37.5 and 28.8 percent, respectively. On a percentage basis, the maximum oxidant concentration occurred more often between the hours of 10:00 A.M.

and 2:00 P.M. in Los Angeles than in Maryland. In Maryland, several days (17.4 percent in Hyattsville) reported all zero ozone concentrations while in Los Angeles there were no days with all zero oxidant concentrations. Means by day of week gave inconclusive results for weekday versus weekend levels of daily maximum oxidant for the two areas studied.

On the average, nitric oxide (NO), nitrogen dioxide (NO_2), total hydrocarbons (THC), solar radiation (SRAD), daily maximum temperature (MTEMP), and dewpoint temperature (DPT) values were found to be higher than average when maximum hourly average oxidant concentrations were high. Visibility (VIS), relative humidity (RH), wind speed at the time of the maximum oxidant reading (WS), and average wind speed form 7:00 A.M. to 7:00 P.M. (AWS) were found to be lower than average when maximum hourly average oxidant concentrations were high.

Percentile plots were found to be a convenient way to graphically examine relationships between MOX and other variables because they are much easier to interpret than scatter plots. Examination of the relationship between the 75th percentile values of the distribution of daily maximum oxidant concentrations for given concentrations of THC and of NO_2 indicated that in Los Angeles the MOX concentrations have decreased between 1968 and 1972 but THC and NO_2 concentrations have not. Similar analysis of MOX and THC data from three Maryland stations combined into one data set shows the 75th percentile curve in Maryland to have a shape similar to that of the Downtown Los Angeles station within the range of THC concentrations measured. The range of THC concentrations for the Maryland data was about half of the range measured in Los Angeles. The shapes of the MOX 75th percentile curves for Azusa for both 1968 and 1972 data suggest a less rapid rate of increase with higher THC (or NO_2) concentrations; that is, the relationship is curvilinear. The percentile curves for Downtown Los Angeles, however, appears to be reasonably approximated by a linear relationship.

Multiple variable analyses of the relationships between the several pollutant and meteorological variables and the daily maximum hourly oxidant concentrations indicated that in Los Angeles the most important pollutant variables in predicting maximum oxidant concentration are, as would be expected, THC and NO_2; none of the pollutant variables appear to be significant predictors in Maryland. With regard to THC, this latter result is possibly attributable to the small range of THC concentrations measured in Maryland. Among the meteorological variables, MTEMP, SRAD, and VIS are the most significant predictors. In Maryland, MTEMP and in Los Angeles, SRAD were the most important predictors. For the Los Angeles data, a positive linear relationship is still apparent between maximum oxidant and NO_2 and THC after adjustment has been made for important meteorological variables.

Finally, the multiple variable analyses indicated that cluster analysis may have some potential use as an analytic tool in analyzing air pollution data but probably should only be used for data sets with a relatively large number of data points (several hundred). In addition, the presence of a large amount of missing data in any variable can severely limit the use of any multiple variable technique (e.g., stepwise regression) because of the fact that these techniques for a particular time period (e.g., day) must have data on all variables or consider the day's data as missing.

7. Recommendations

The use of statistical analysis of the many variable constituents and properties of the ambient air to develop relationships that can be used as guidance in the development of control strategies is a tenuous procedure. The history of attempts at strategy development and the analyses undertaken in this study suggest a need for additional research and the development of an adequate data base for future analyses.

Detailed knowledge of the reactants involved in the photochemical production of oxidants is necessary. The significance of concentrations and concentration ratios of all of the species of reactants, the effect of serially injecting fresh reactants into an on-going process, and the response of the reactions to one or more daylight-dark-daylight cycles are some of the questions that must be answered. The Los Angeles Reactive Pollutant (LARP) project may have acquired data useful for examining some of these questions, but these data are not yet available. To obtain definitive data concerning the reactants and reactions involved, appropriately designed and controlled chamber studies should be undertaken.

If ambient pollutant data are to be investigated in greater depth than was possible in this study, the monitoring network should be designed to provide a maximum opportunity for investigation of downwind transport of reactants and subsequent oxidant concentrations. This implies that meteorological conditions are sufficiently well documented to show on a day-to-day basis whether or not the flow of reactants was from the "upwind" to the "downwind" stations. A program to provide a data base should emphasize quality assurance, maintenance, and calibration activities to ensure that complete sets of usable data are obtained. In addition, any study of this kind that is undertaken should begin with several hundred days of data to (1) overcome the problems caused by missing data that will undoubtedly occur due to various causes such as the requirement of pairs of data - precursors at the "unwind" station, oxidant at the "downwind" station and (2) account for the relatively large variability in atmospheric data. One method that can be used to increase atmospheric sample sizes is to combine data over several years. It is also important to note in analyzing ambient pollutant data that considerable effort and time must be expended in the organization of the data. If this is not done then meaningful analysis is impossible.

Useful information on downwind transport of oxidant or oxidant precursors might be obtained from ambient monitoring networks such as that in the Maryland suburbs of Washington, D. C., except for the fact that on only a few occasions of high oxidant concentrations will the stations be oriented so that an upwind-downwind relationship exists. If the Maryland suburban data could be supplemented by data from stations in Washington, D. C., or adjacent Virginia, a larger number of applicable data points might be obtained. It should be pointed out, however, that the relatively small range of, and low values of, concentrations of hydrocarbons measured in the suburban Maryland area may make it impossible to establish statistically significant relationships with oxidant concentrations--which also have a relatively small range in Maryland.

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APPENDIX A

Plots of Daily Maximum Oxidant (Ozone) Versus Various Pollutant and Meteorological Variables by Station

FIGURE A-1

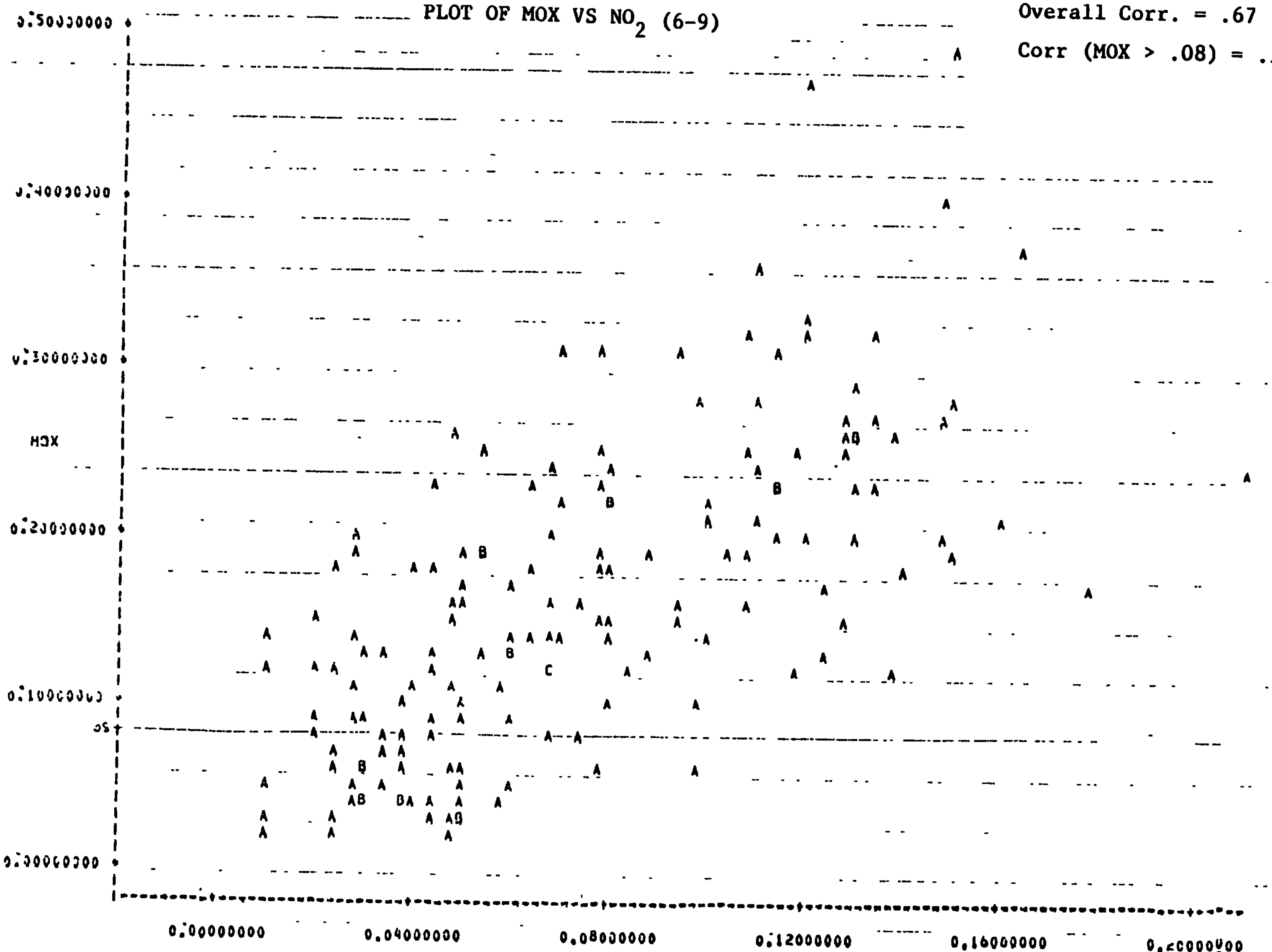
STATION - 1 = AZU

PLOT OF MOX VS NO_2 (6-9)

May through October, 1972

Overall Corr. = .67

Corr (MOX > .08) = .56



LEGEND: A = 1 OBS , B = 2 OBS , ETC.

NO_2(6-9)

FIGURE A-2

May through October, 1972

Overall Corr. = .64

Corr (MOX > .08) = .42

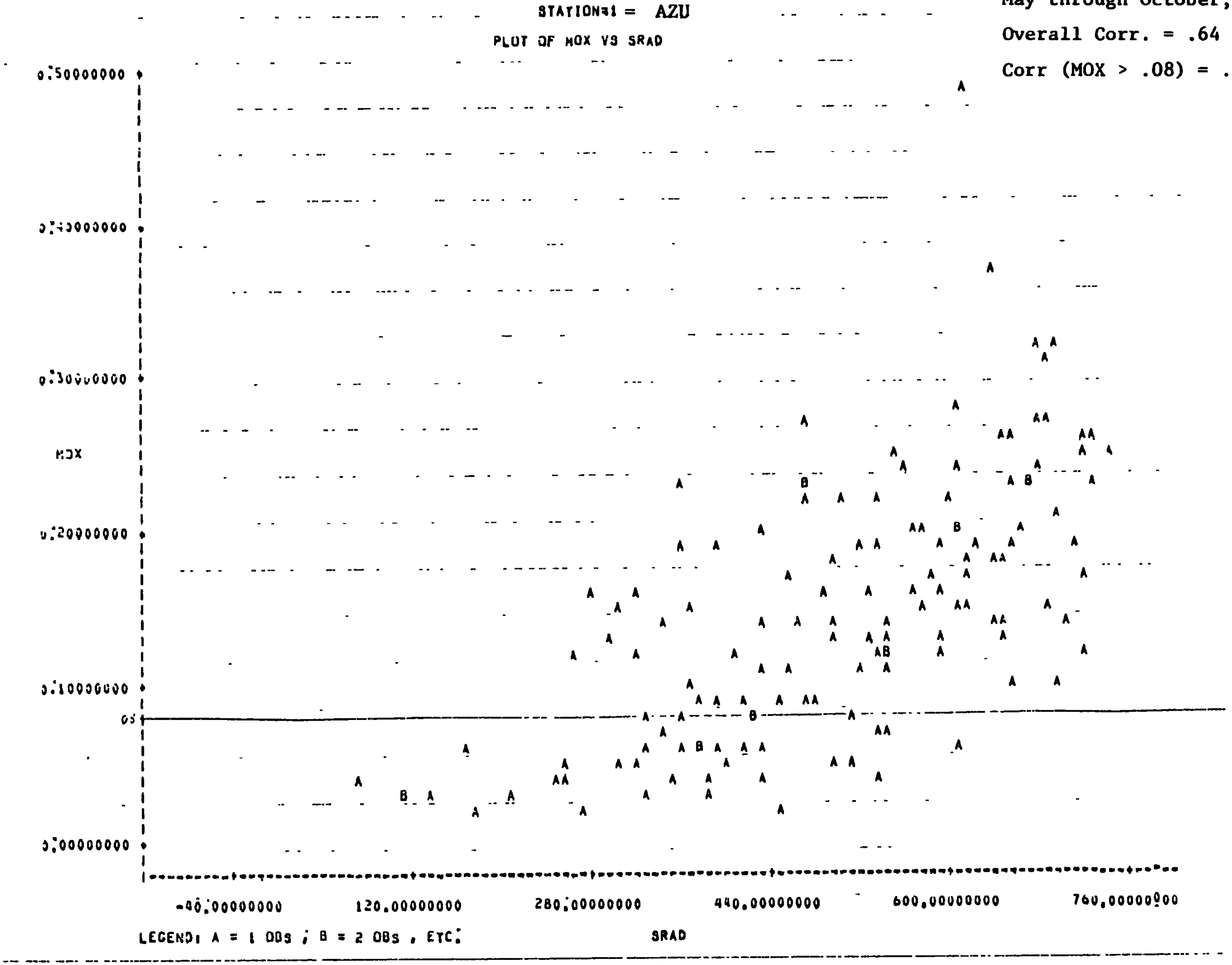


FIGURE A-3

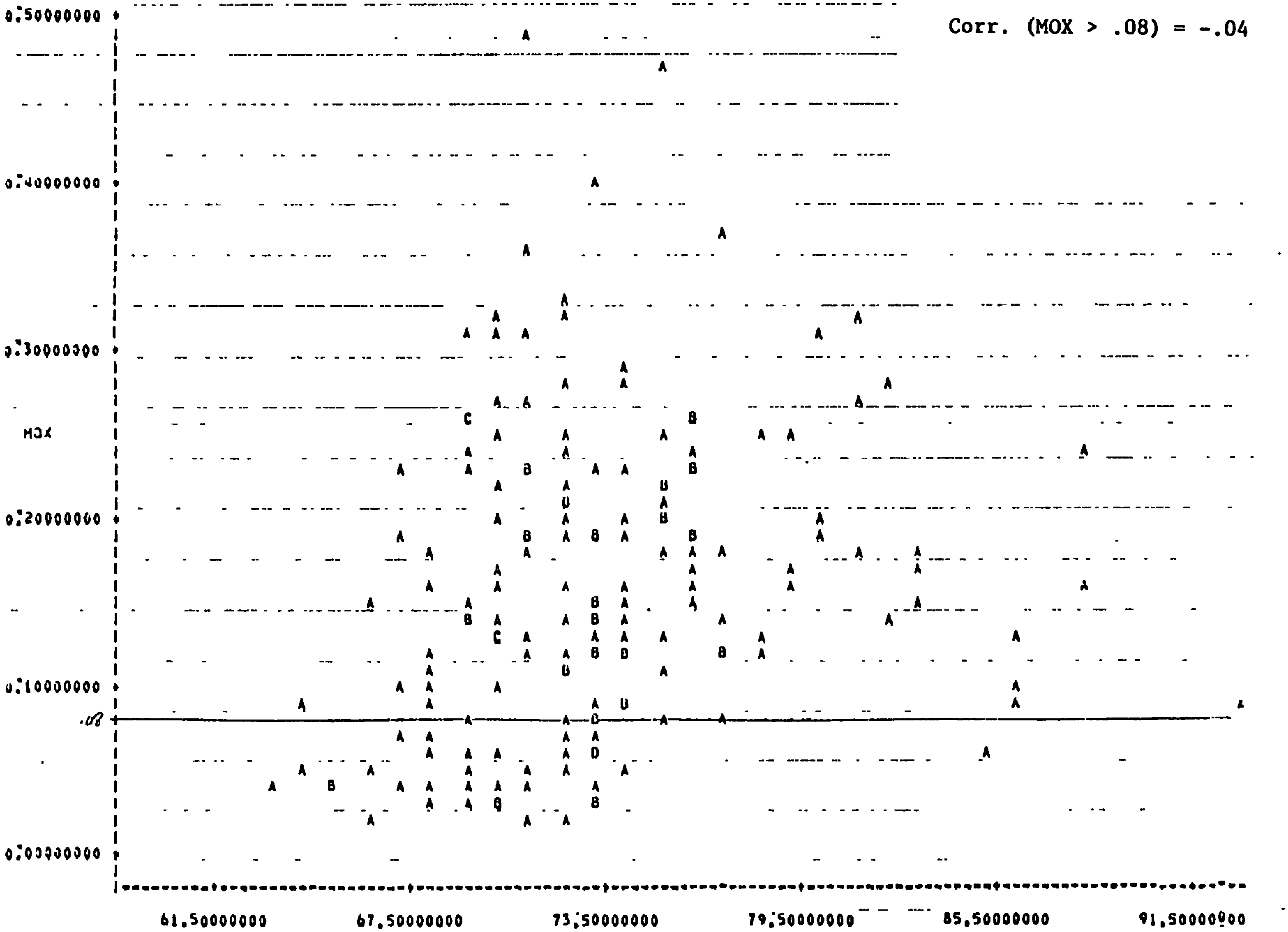
STATION=1= AZU

May through October, 1972

Overall Corr. = .19

Corr. (MOX > .08) = -.04

PLOT OF MOX VS MTEMP



LEGEND: A = 1 OBS , B = 2 OBS , ETC.

FIGURE A-4

STATION=1 = AZU

May through October, 1972

Overall Corr. = -.34

Corr. (MOX > .08) = -.27

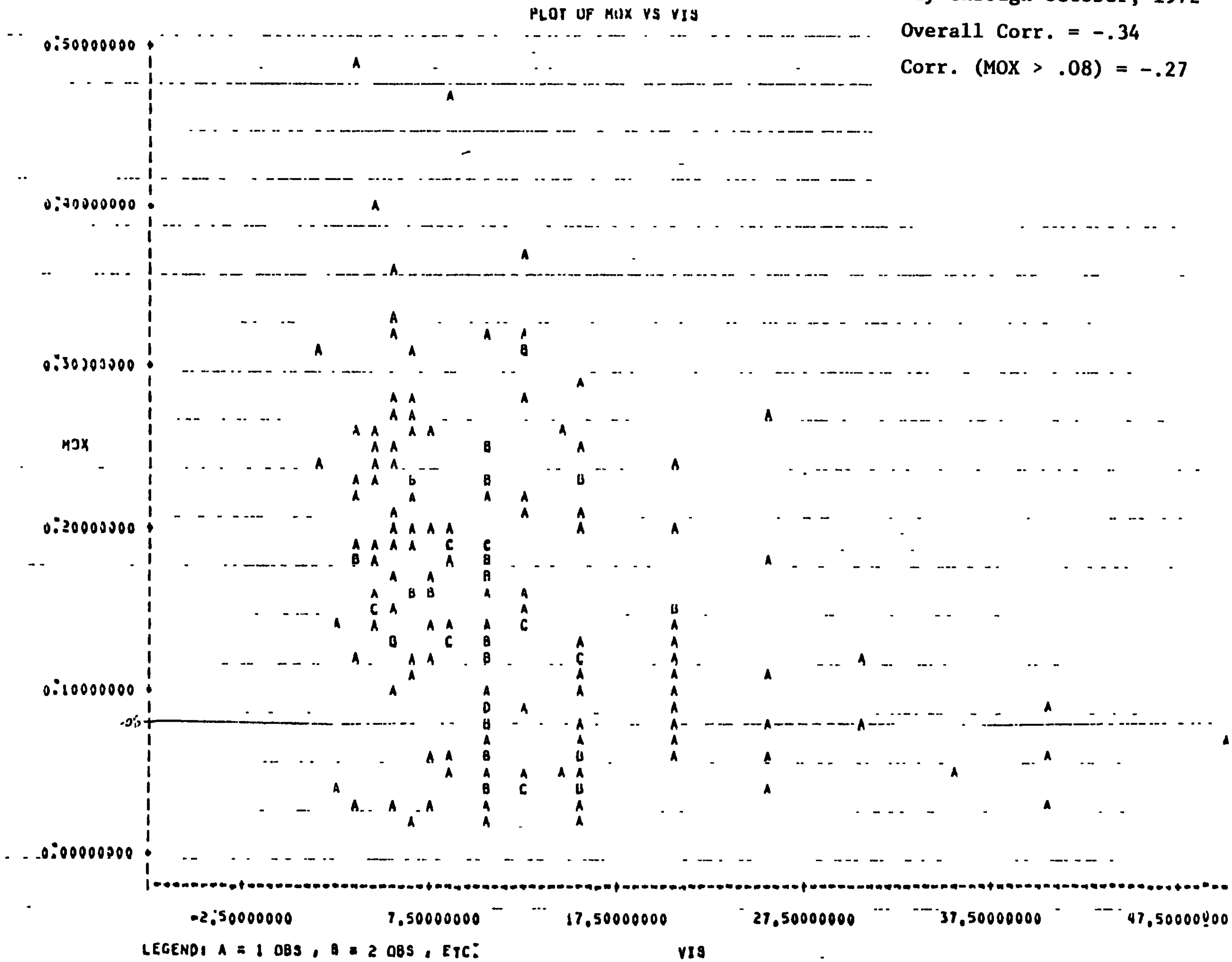


FIGURE A-5

STATION = 2 = DOLA

PLOT OF MOX VS THC (6-9)

May through October, 1972

Overall Corr. = .53

Corr (MOX > .08) = .40

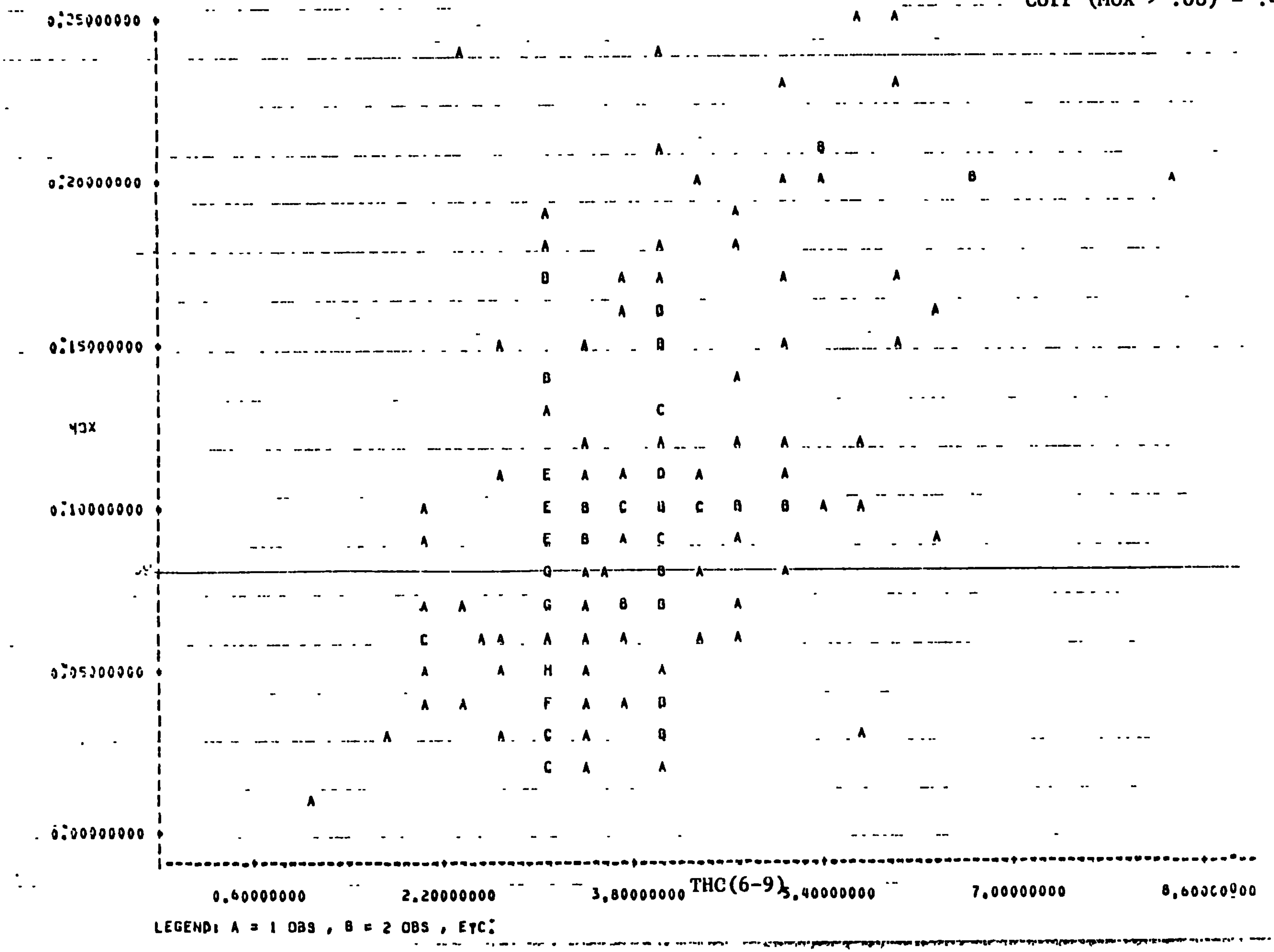


FIGURE A-6

STATION = 2 = DOLA

PLOT OF MOX VS NO_2 (6-9)

May through October, 1972

Overall Corr. = .63

Corr (MOX > .08) = .51

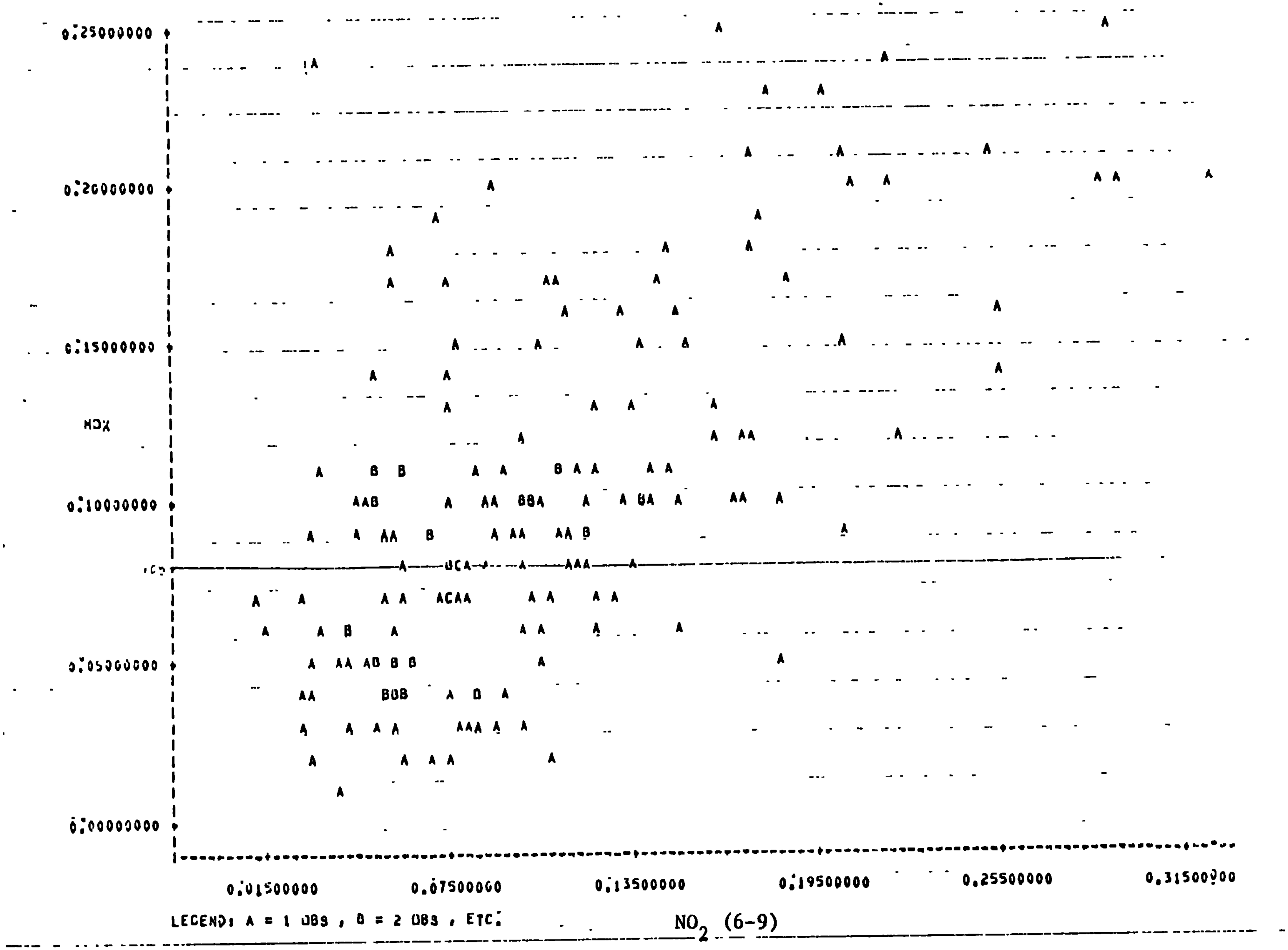


FIGURE A-7
STATION = 2 = DOLA
PLOT OF MOX VS SRAD

May through October, 1972
Overall Corr. = .53
Corr (MOX > .08) = .40

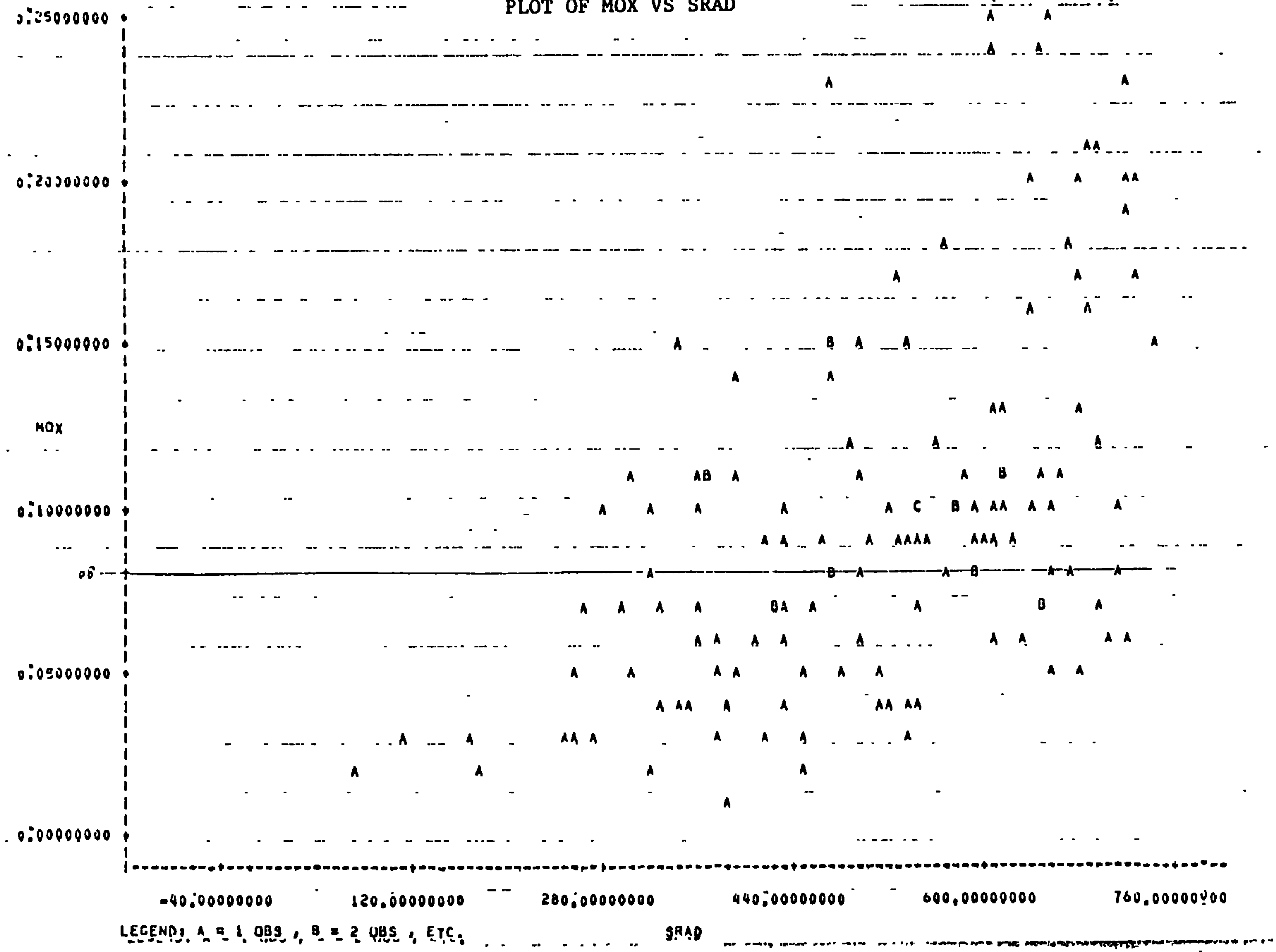


FIGURE A-8

STATION = 2 = DOLA

PLOT OF MOX VS MTEMP

May through October, 1972

Overall Corr. = .44

Corr (MOX > .08) = .27

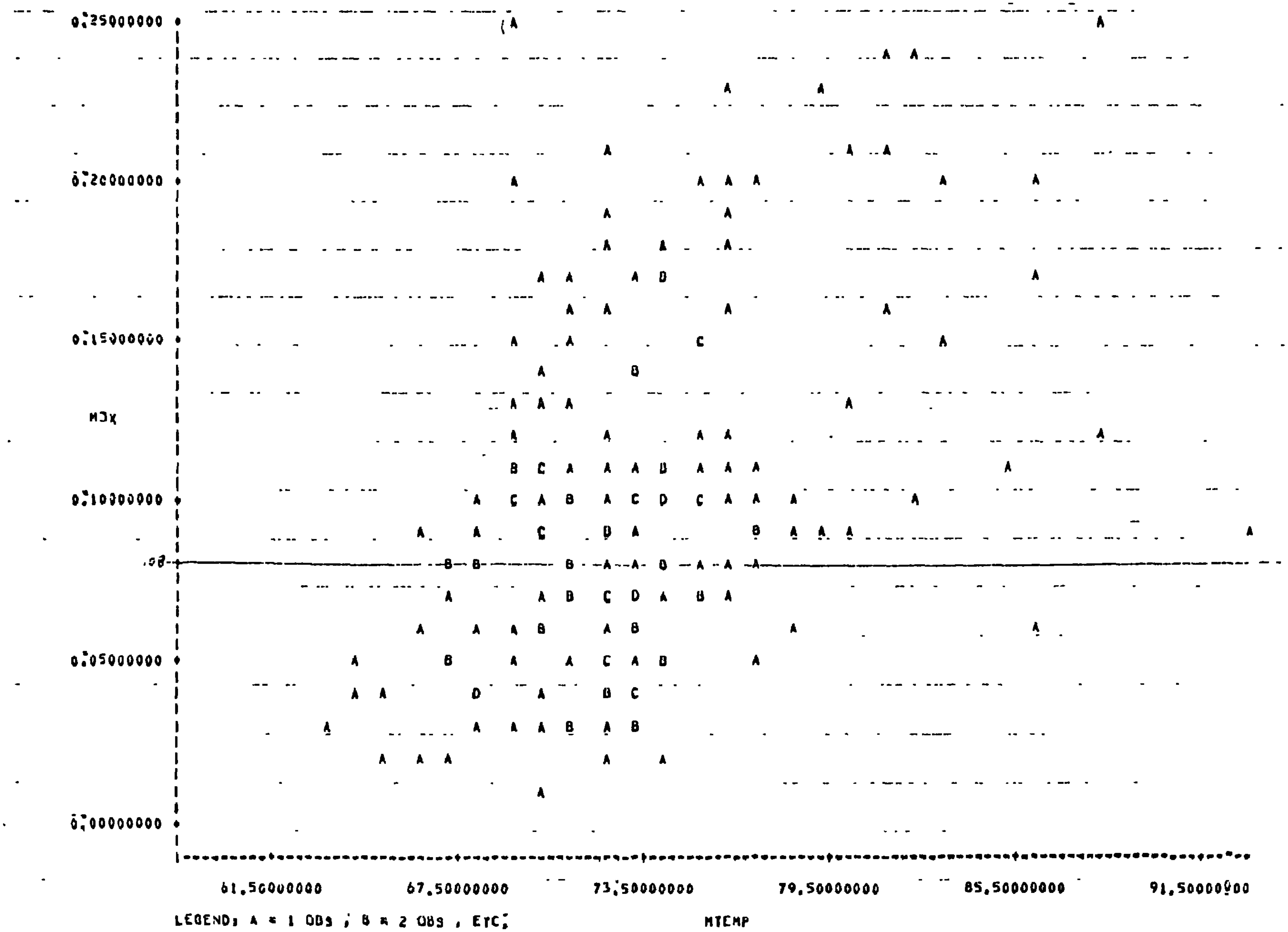


FIGURE A-9

STATION = 2 = DOLA

PLOT OF MOX VS VIS

May through October, 1972

Overall Corr. = -.42

Corr (MOX > .08) = -.13

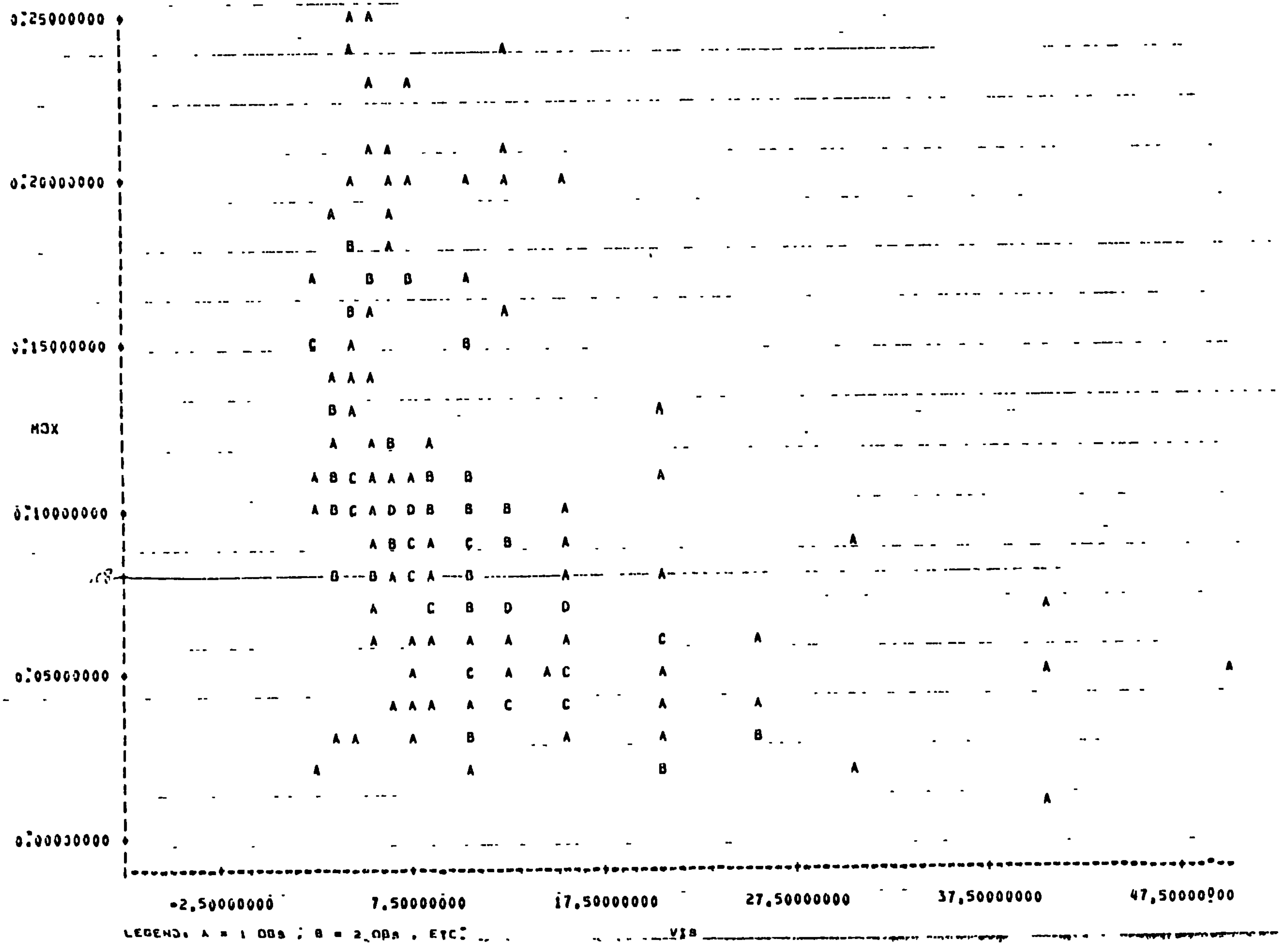


FIGURE A-10

STATIONS=BETH, HYAT and SUIT Combined

May through October, 1973

PLOT OF MOZ VS THC (6-9)

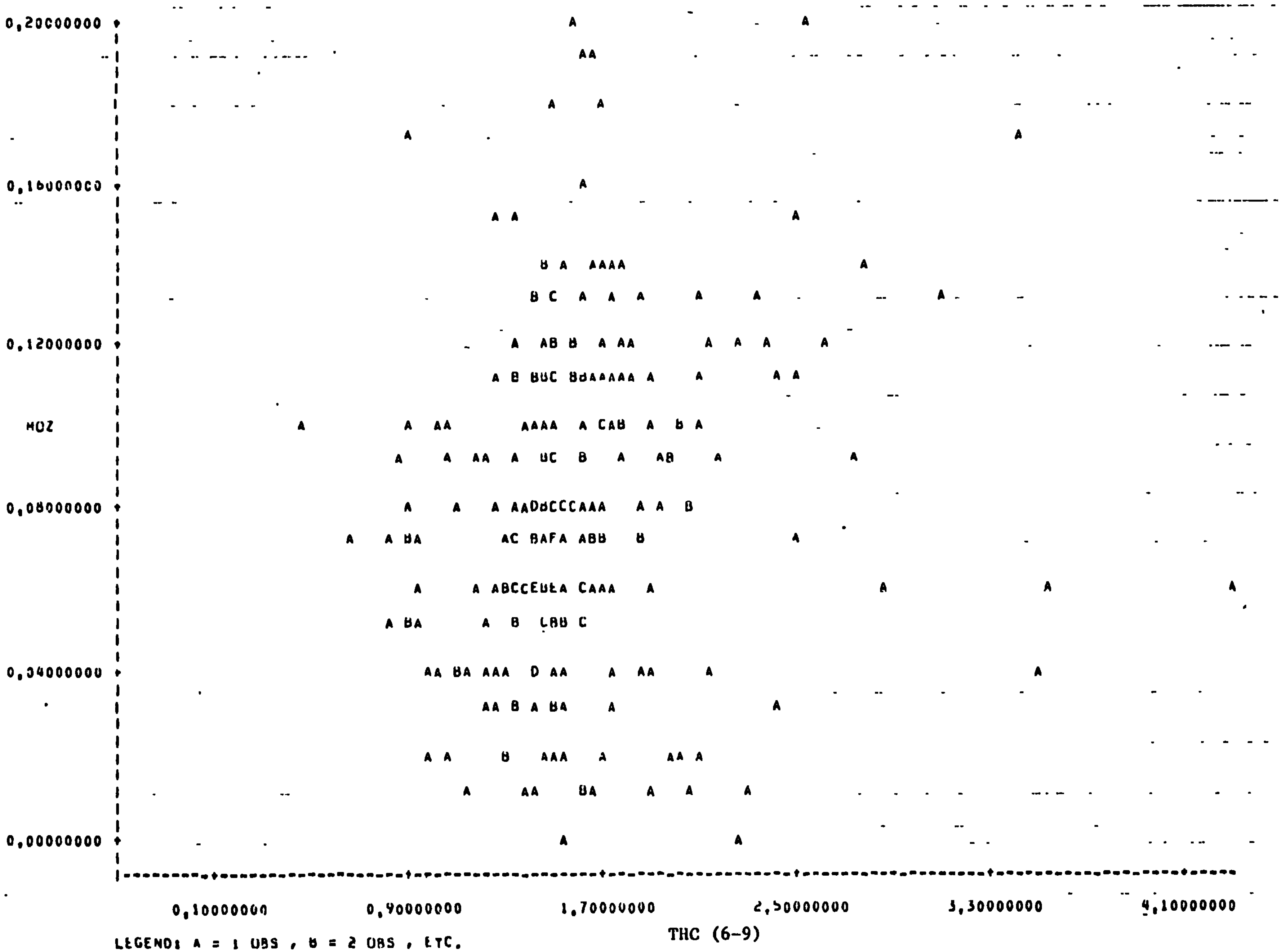


FIGURE A-11

STATIONS=BETH, HYAT & SUIT Combined May through October, 1973

PLOT OF MOZ VS NO_2 (6-9)

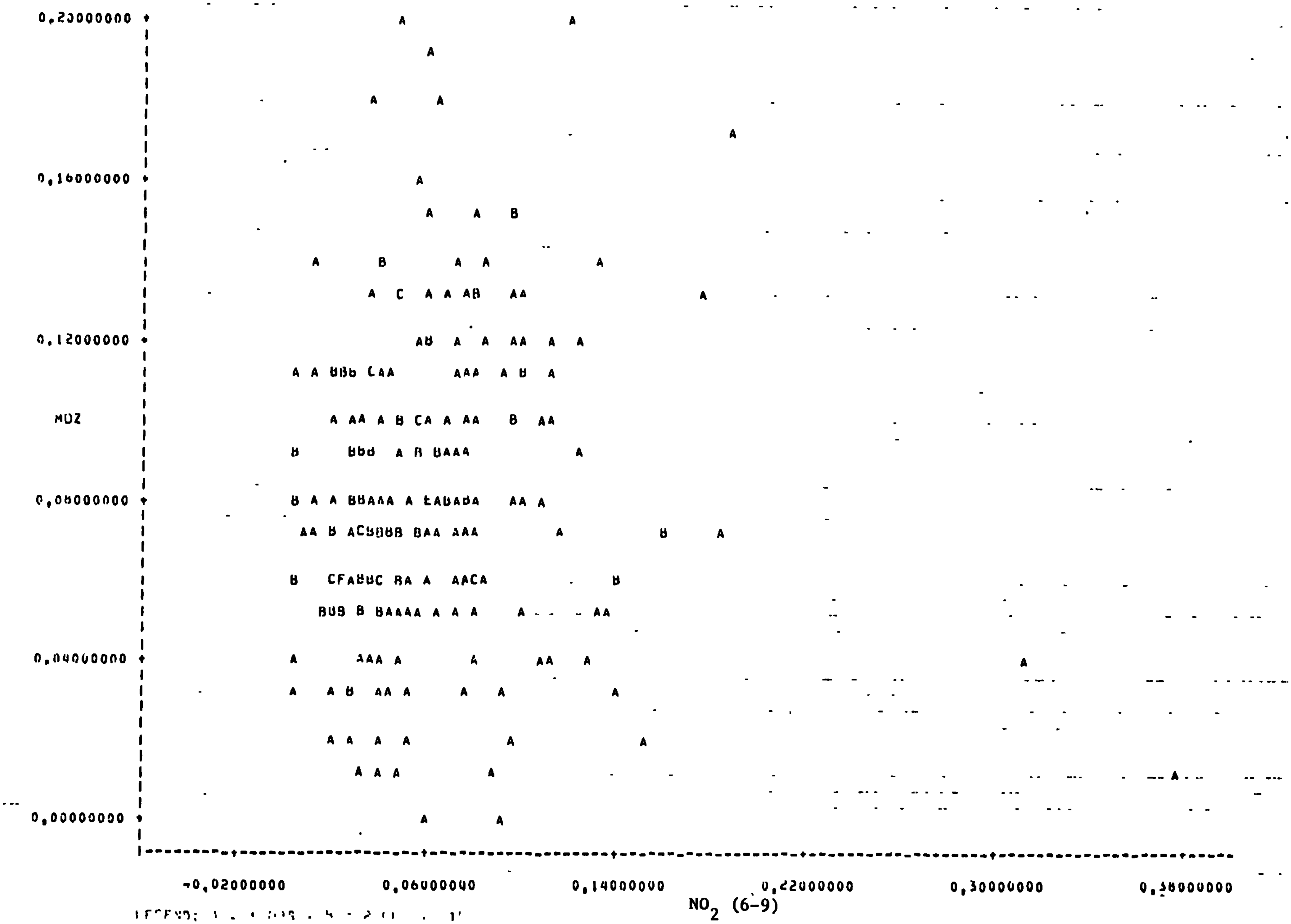


FIGURE A-12

STATION = 3 = BETH

PLOT OF MOZ VS NO_2 (6-9)

May through October, 1973

Corr. = .05

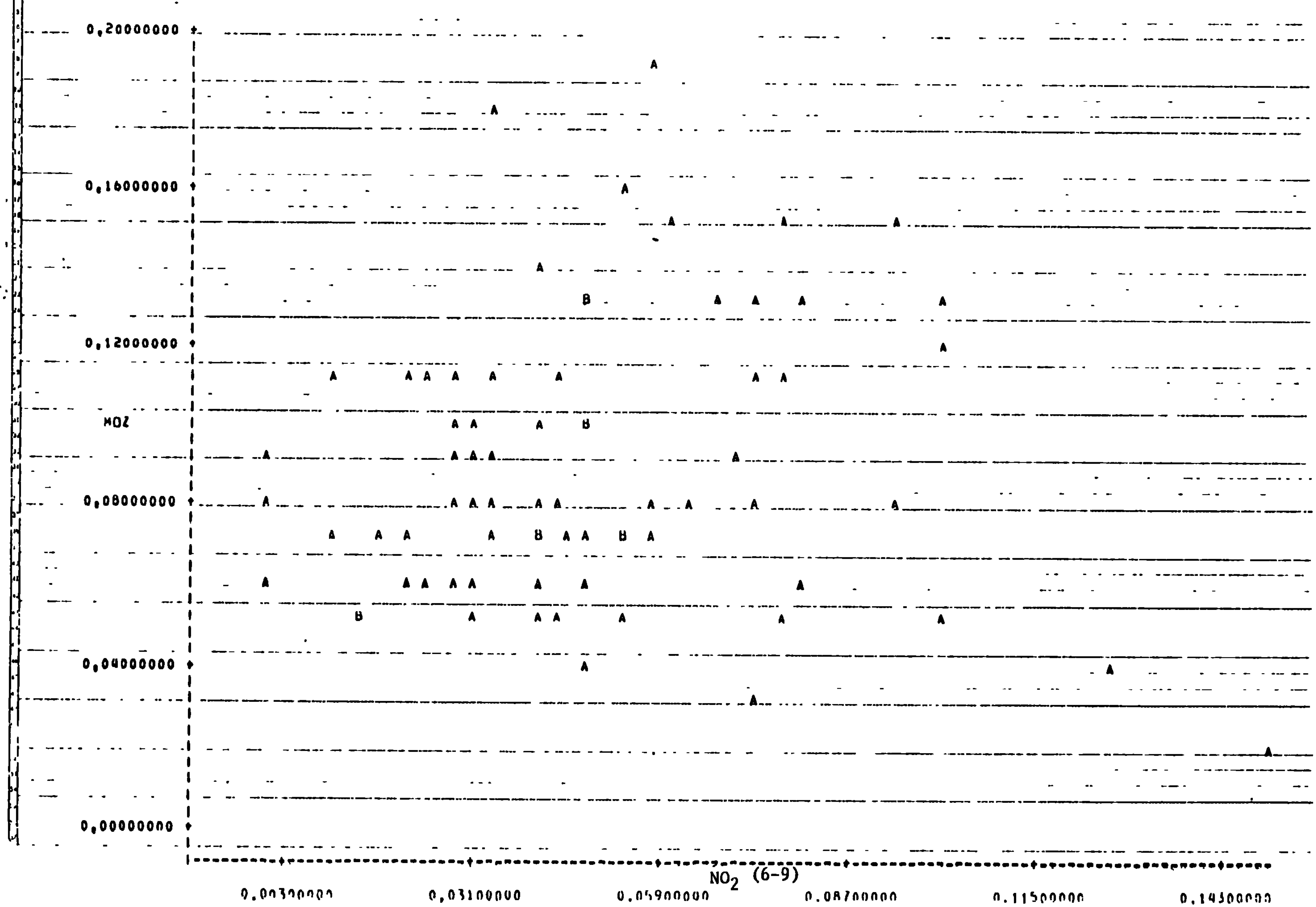


FIGURE A-13

STATION = 3 = BETH

PLOT OF MOZ VS SRAD

May through October, 1973

Corr. = .58

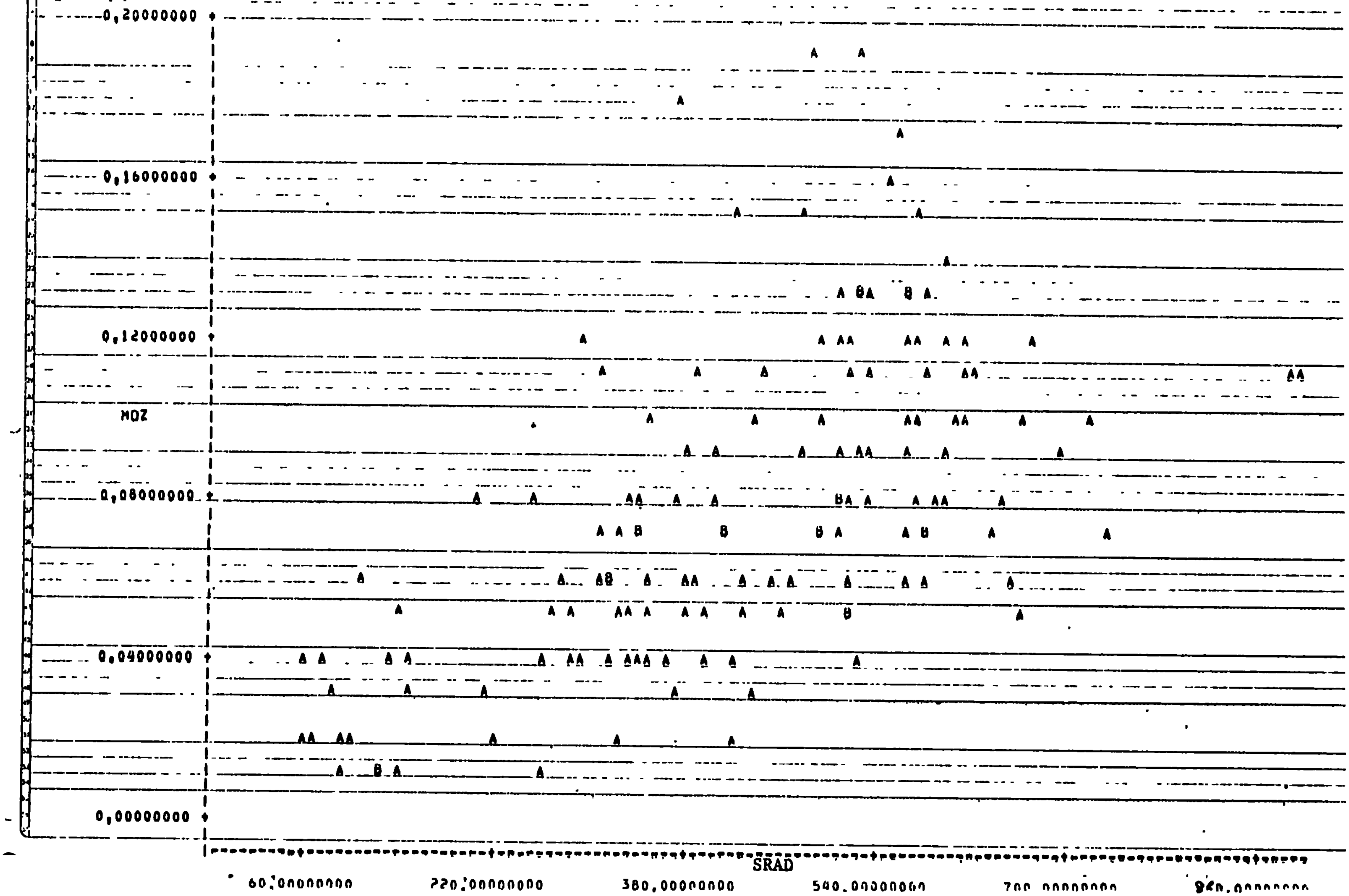


FIGURE A-14

STATION = 3 = BETH

PLOT OF MOZ VS MTEMP

May through October, 1973

Corr.=.75

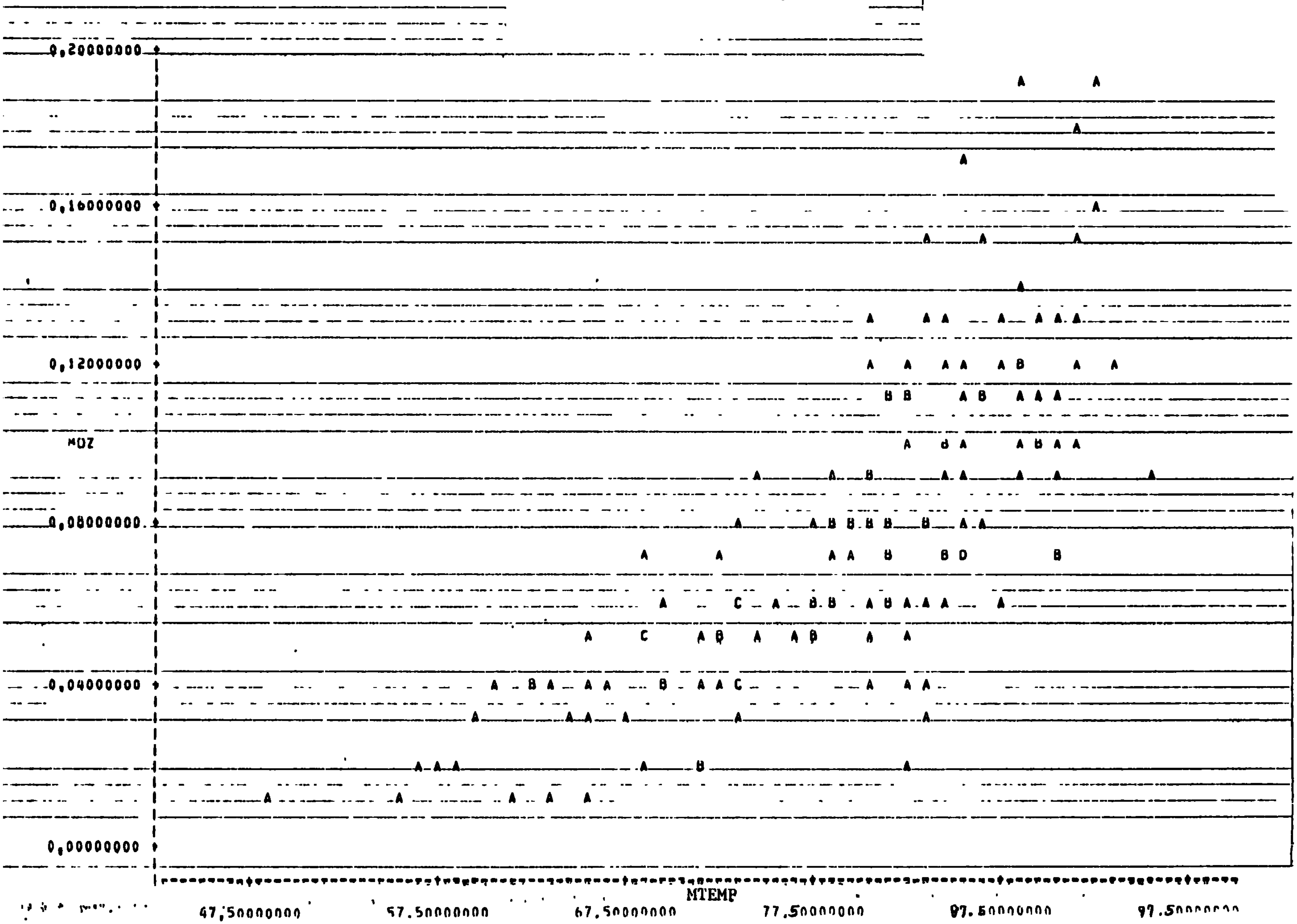


FIGURE A-15

May through October, 1973

Overall Corr. = .20

Corr (MOZ > .08) = .19

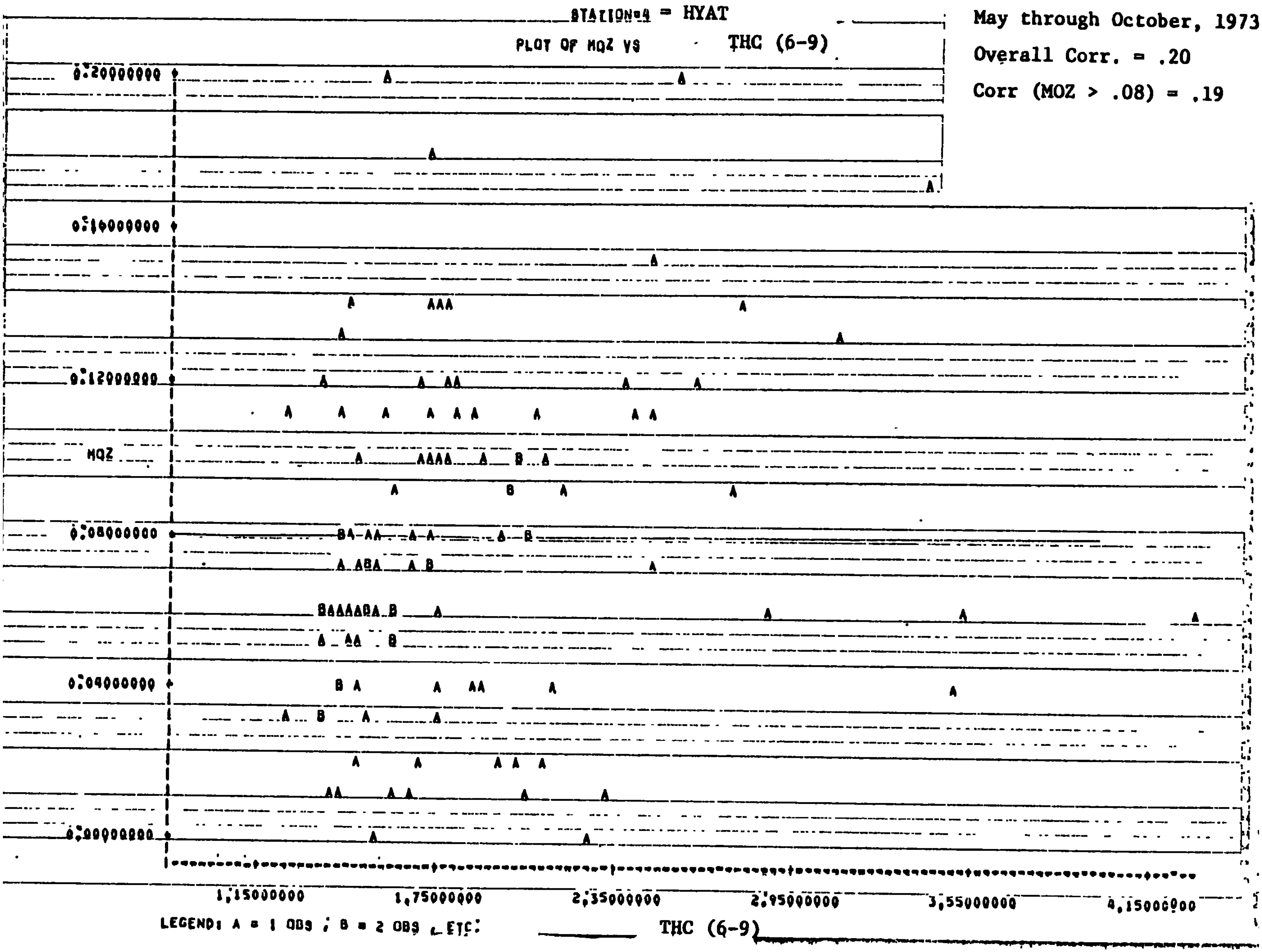


FIGURE A-16

May through October, 1973

Overall Corr = .55

Corr (MOZ > .08) = -.15

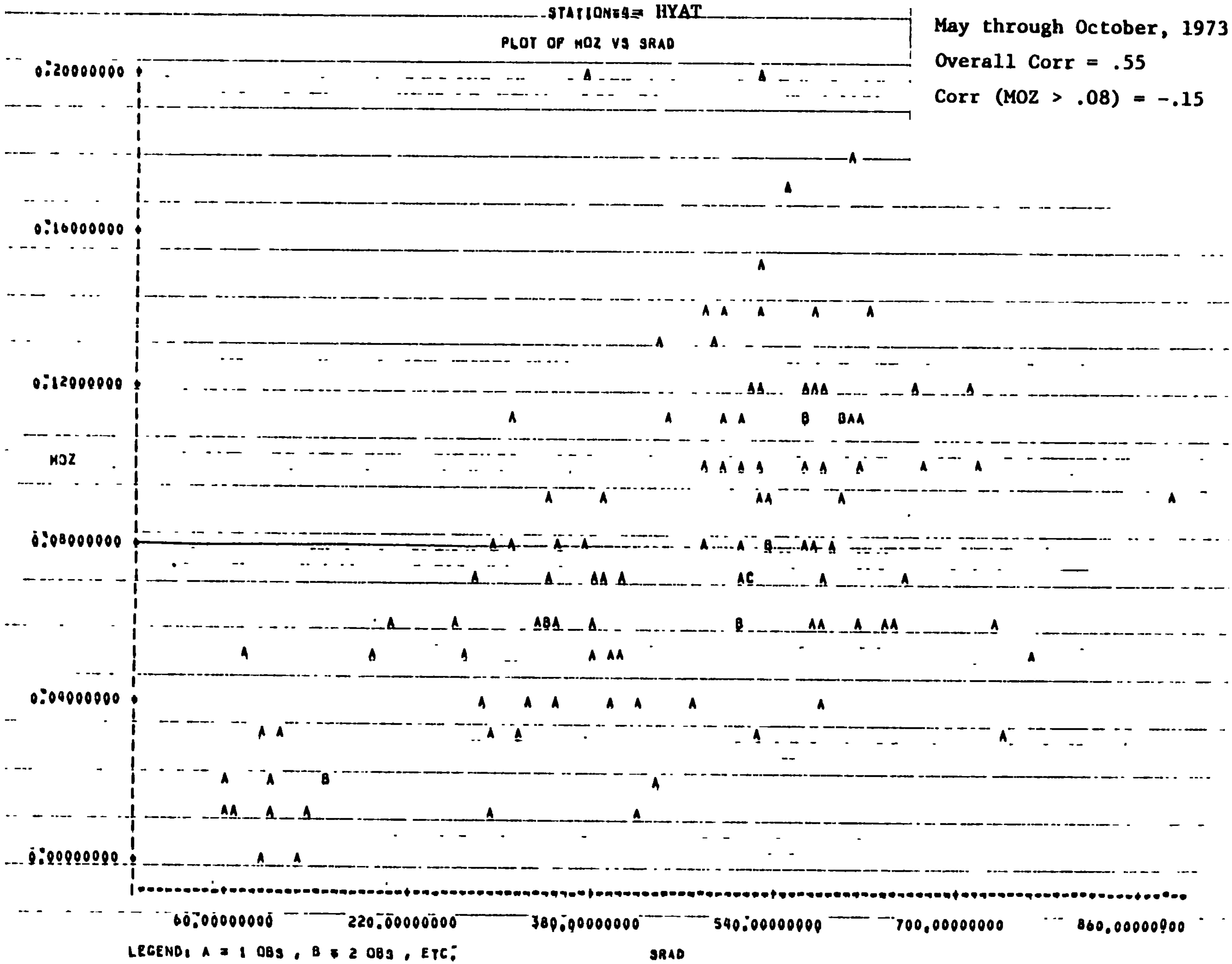


FIGURE A-17

STATION=4 = HYAT

PLOT OF MOZ VS MTEMP

May through October, 1973

Overall Corr. = .76

Corr (MOZ > .08) = .31

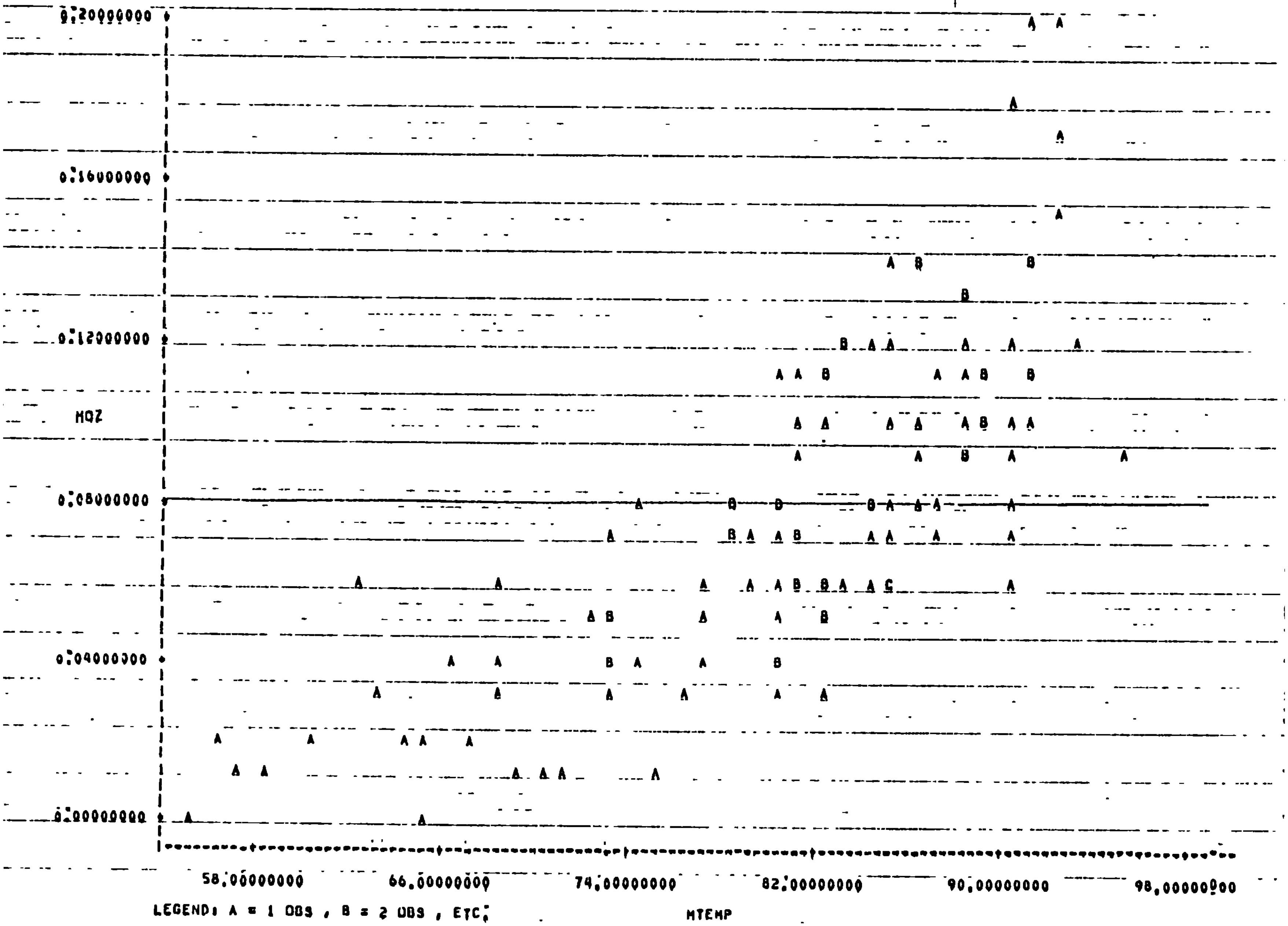


FIGURE A-18

May through October, 1973

STATION = 5 = SISP
(Silver Springs)

Overall Corr. = -.10

PLOT OF MOZ VS THC (6-9)

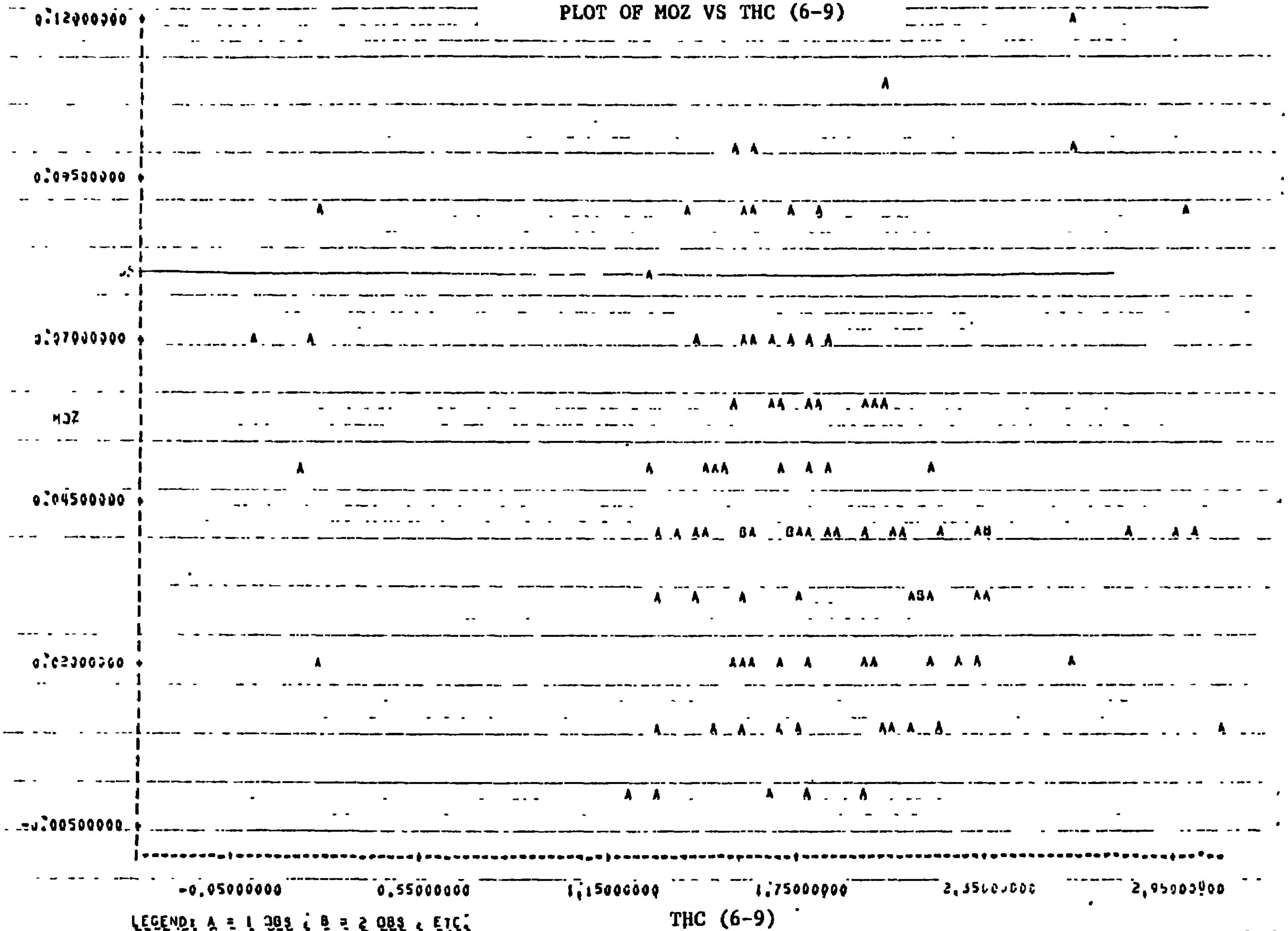


FIGURE A-19

STATION = 5 = SISP

PLOT OF MOZ VS SRAD

May through October, 1973

Overall Corr. = .59

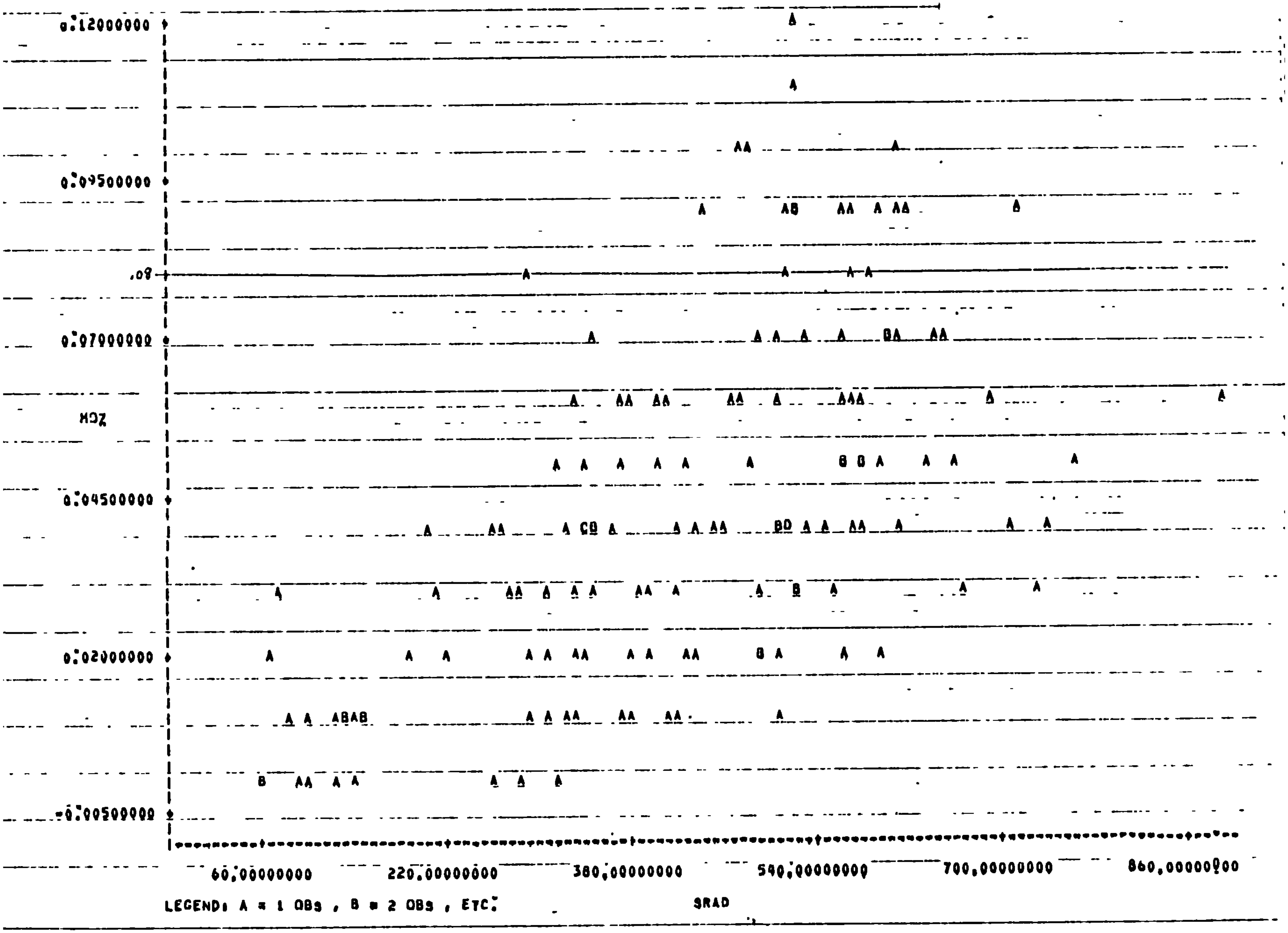


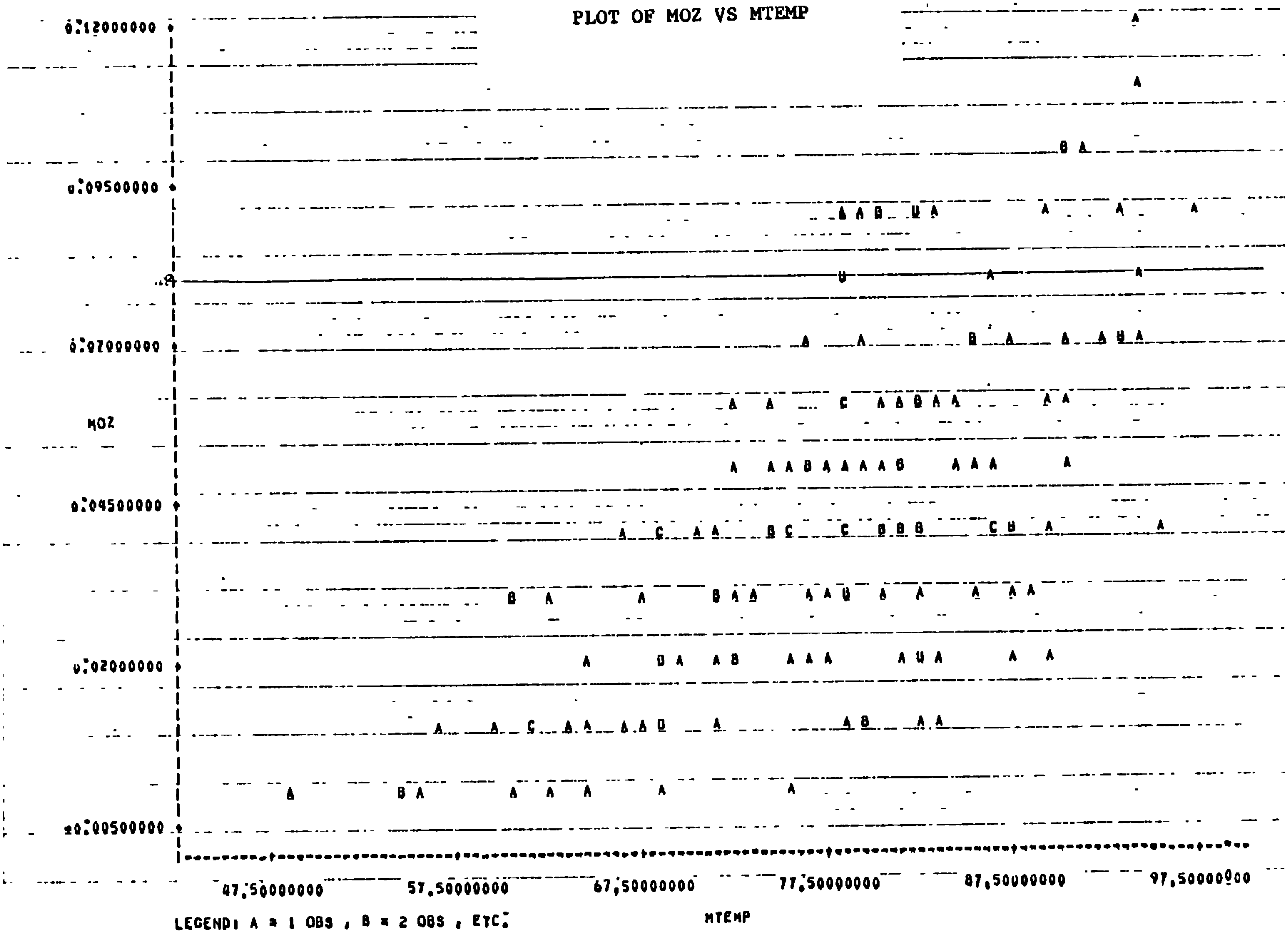
FIGURE A-20

STATION = 5 = SISP

May through October, 1973

Overall Corr. = .64

PLOT OF MOZ VS MTEMP



LEGEND: A = 1 OBS , B = 2 OBS , ETC,

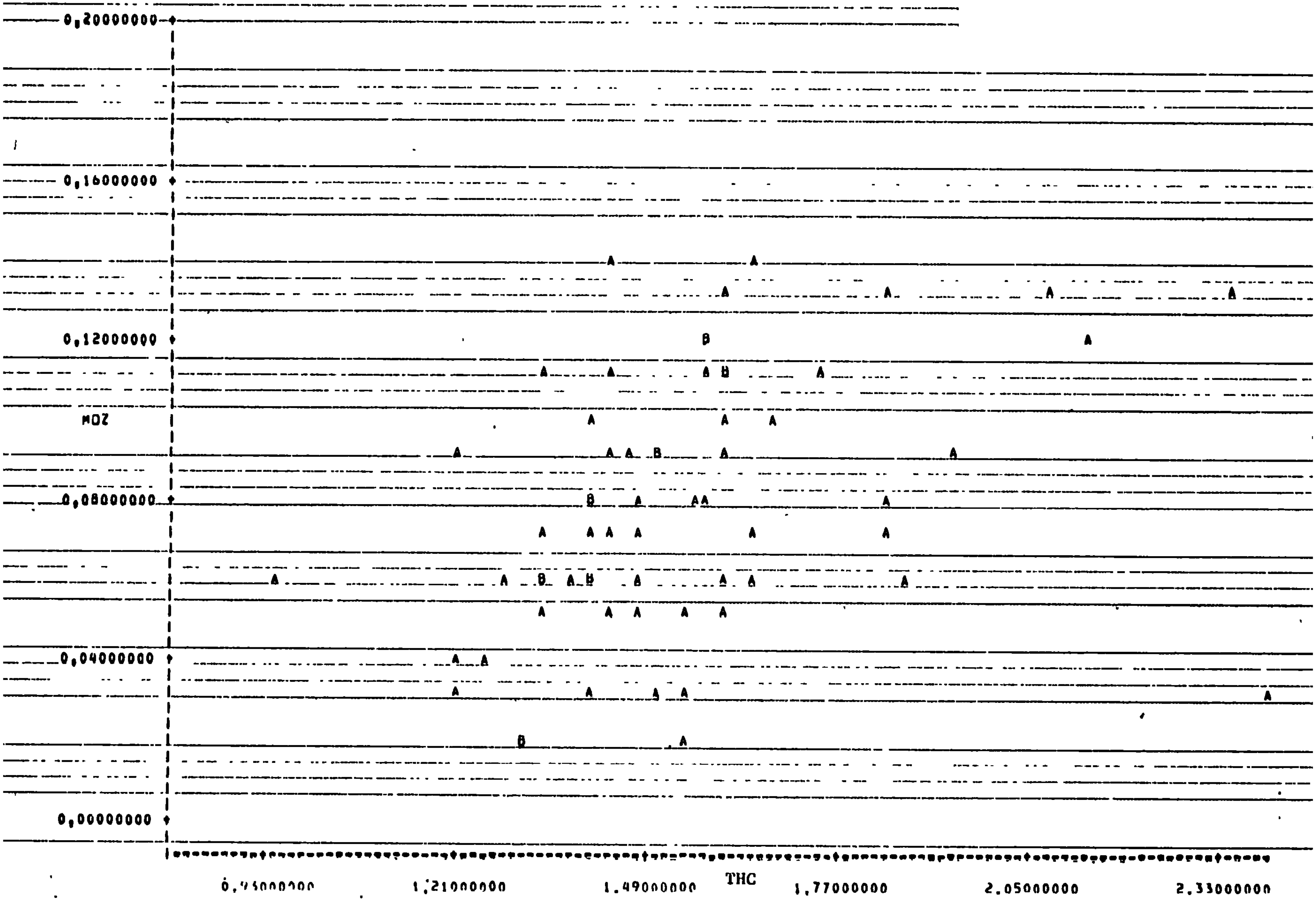
May through October, 1973

Corr. = .36

FIGURE A-21

STATION=6 = SUIT

PLOT OF MOZ VS THC (6-9)



LEGEND: A = 1 OBS , B = 2 OBS , ETC,

FIGURE A-22

STATION = SUIT

PLOT OF MOZ VS NO_2 (6-9)

May through October, 1973

Corr. = -.07

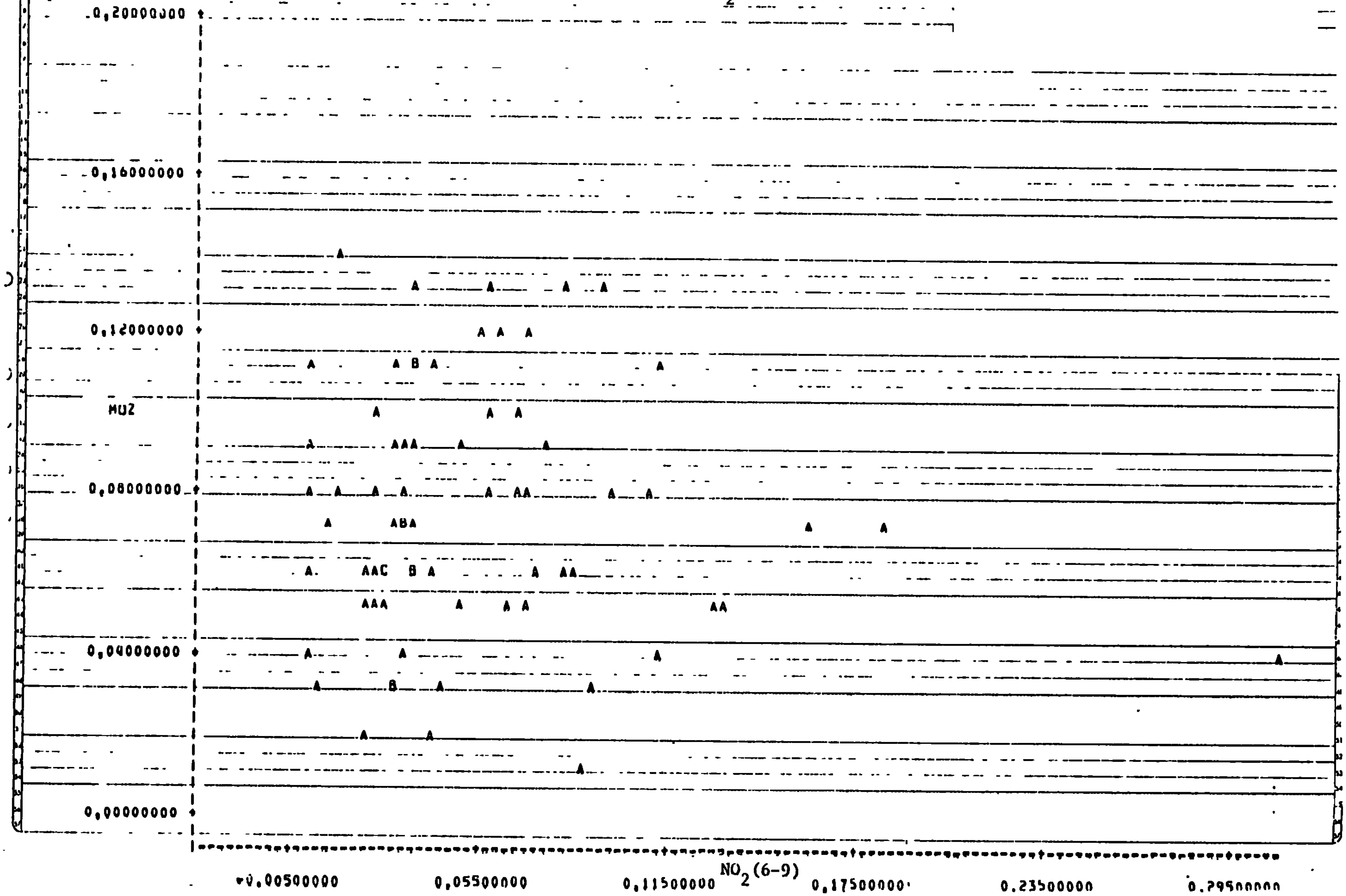


FIGURE A-23

STATION = 6 = SUIT

PLOT OF MOZ VS SRAD

May through October, 1973

Corr. = .61

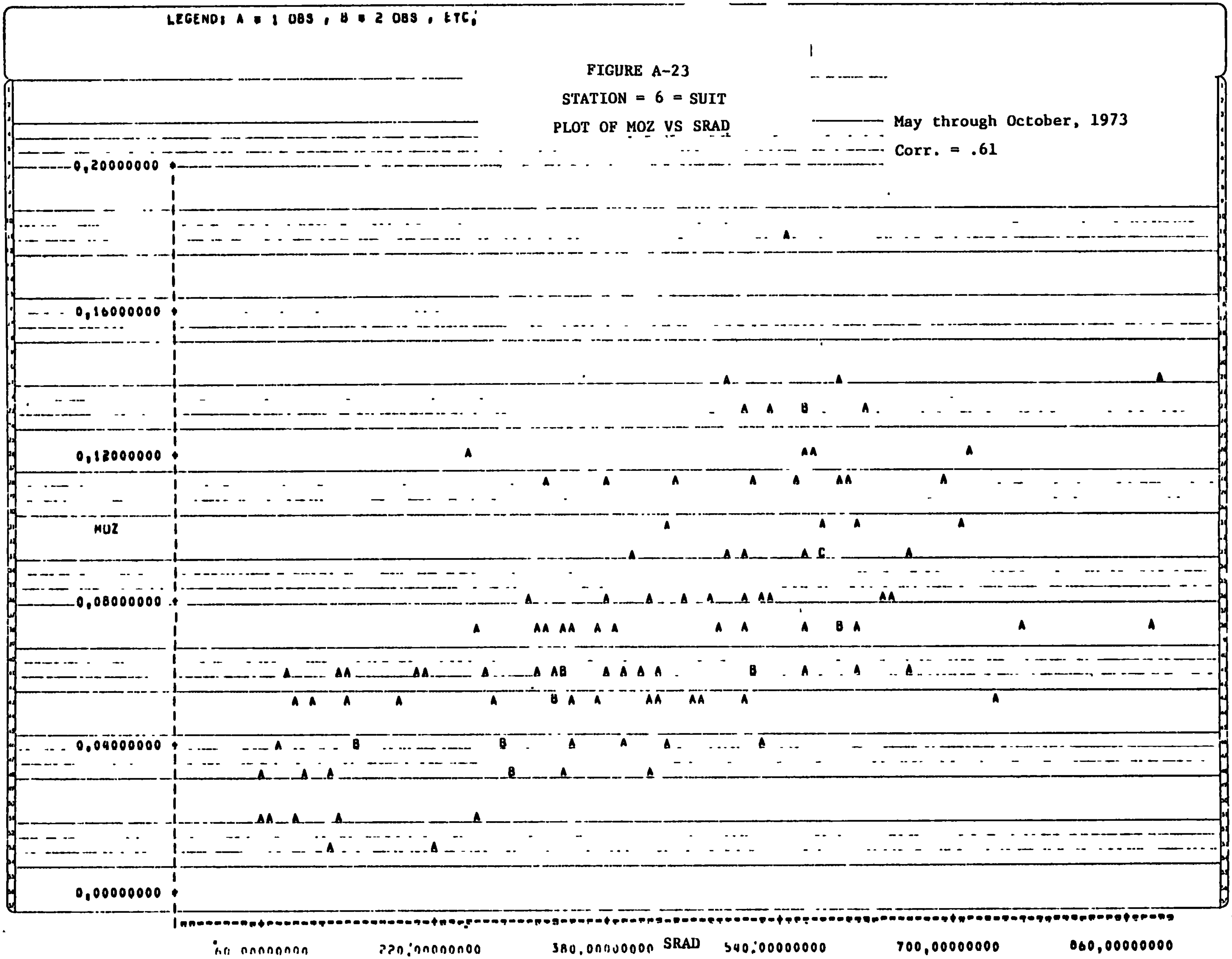


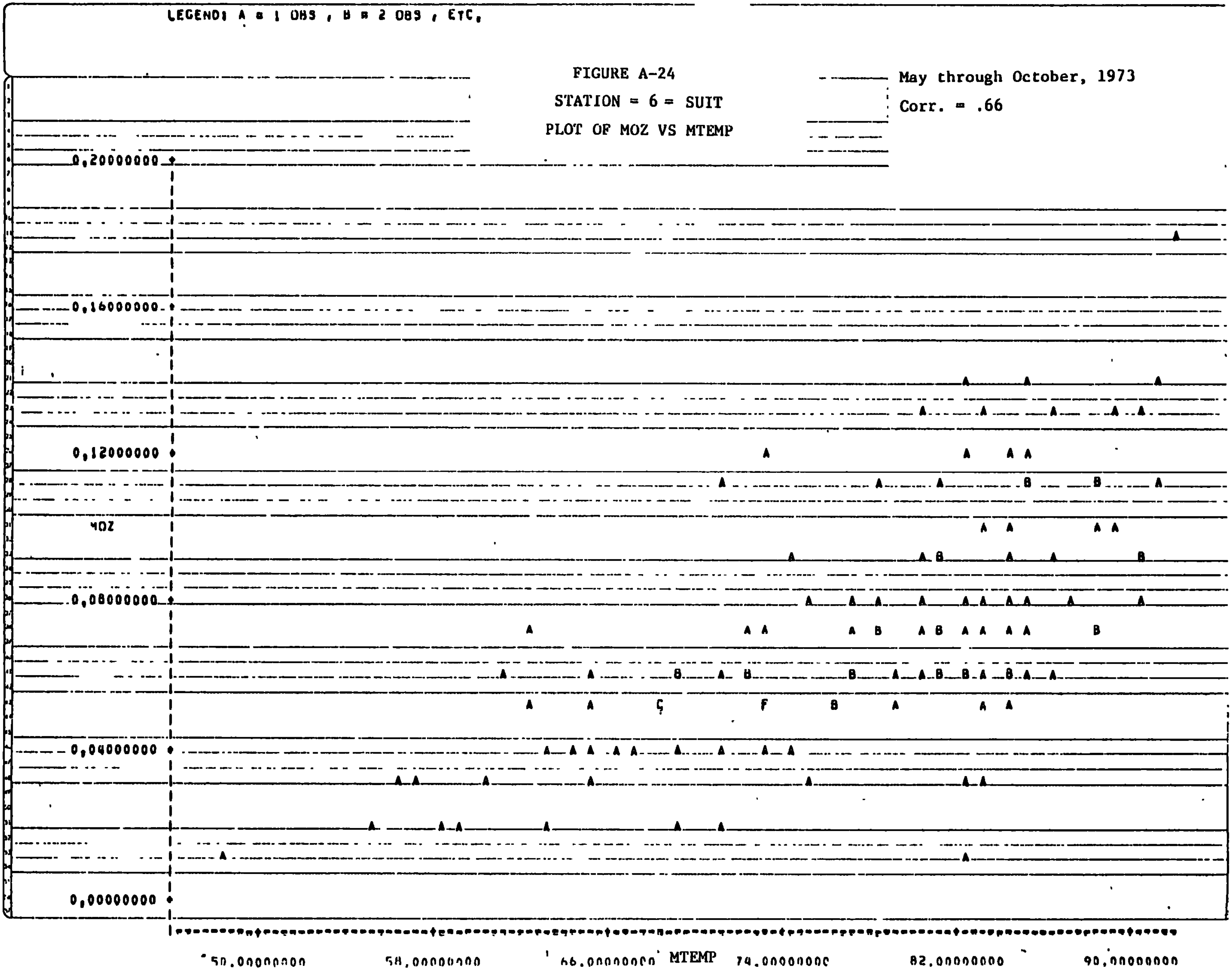
FIGURE A-24

STATION = 6 = SUIT

PLOT OF MOZ VS MTEMP

May through October, 1973

Corr. = .66



APPENDIX B

Appendix J of the August 14, 1971 Federal Register

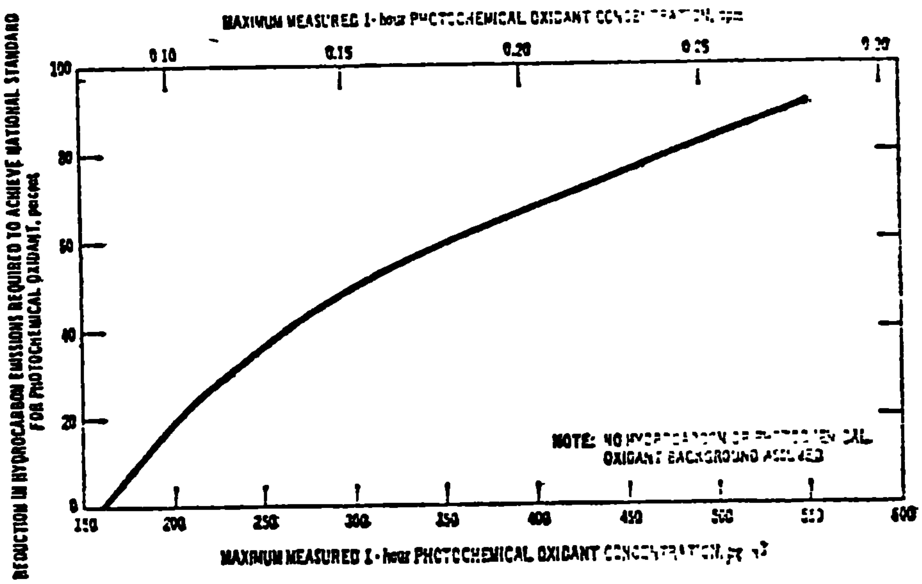


Figure 1. Required hydrocarbon emission control as a function of photochemical [illegible] concentration. (Reference: Air Quality Criteria for Nitrogen Oxides, AP-84, [illegible] Protection Agency, Washington, D.C., January 1971.)

APPENDIX C

Plots of the 75th and 50th Percentiles of the MOX (MOZ) Distribution for Given Levels of THC and NO_2 by Station and Year

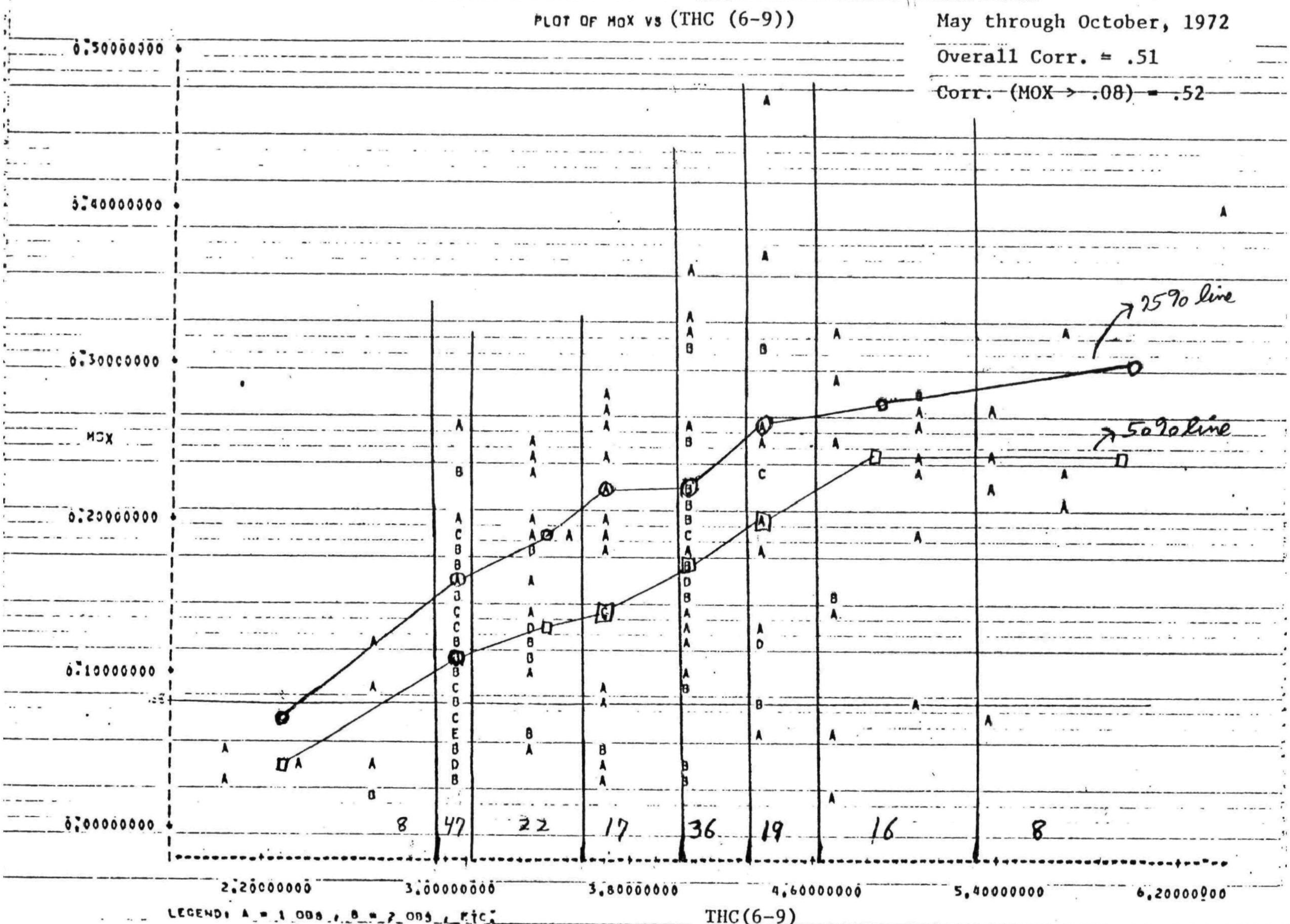
APPENDIX C: Plots of the 75th and 50th Percentiles of the MOX (MOZ) Distribution for Given Levels of THC and NO_2 by Station and Year

Appendix Figures C-1 through C-10 give for stations AZU and DOLA and years 1972 and 1968 plots of MOX versus THC and MOX versus NO_2. Figures C-9 and C-10 give for BETH, HYAT and SUIT data combined plots of MOZ versus THC and MOZ versus NO_2. In addition for each of the ten plots, the THC or NO_2 axis have been divided into intervals. (The intervals are different for each plot and were chosen so that the number of MOX readings in an interval were of a 'reasonable' size, i.e., not too many or too few observations in an interval.) For each interval, the 75^{th} and 50^{th} percentiles of the MOX distribution within the interval were located (75% of the MOX observations in the interval are below the 75^{th} percentile). Lines were then drawn between the 75^{th} percentiles and 50^{th} percentiles for each interval to give the 75% and 50% lines shown on the ten plots.

FIGURE C-1

STATION = AZU

PLOT OF MOX vs (THC (6-9))



75% line = for a particular interval 75% of observations are below this line, etc. for 50% line.
The number at the bottom of each interval indicates the number of observations in the interval.

FIGURE C-2

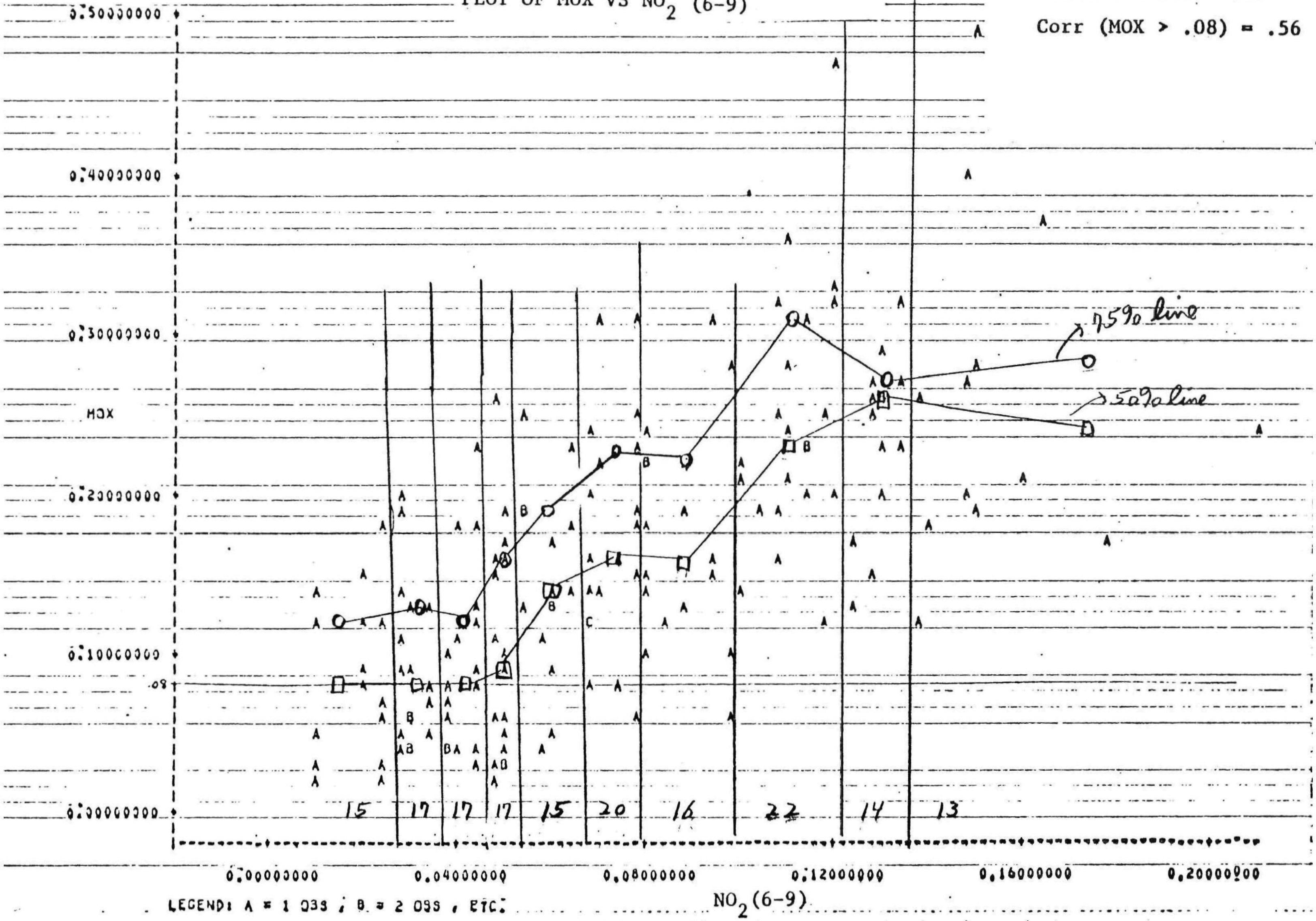
STATION=1 = AZU

PLOT OF MOX VS NO_2 (6-9)

May through October, 1972

Overall Corr. = .67

Corr (MOX > .08) = .56



75% line = for a particular interval 75% of observations are below this line, etc. for 50% line.
The number at the bottom of each interval indicates the number of observations in the interval.

FIGURE C-3

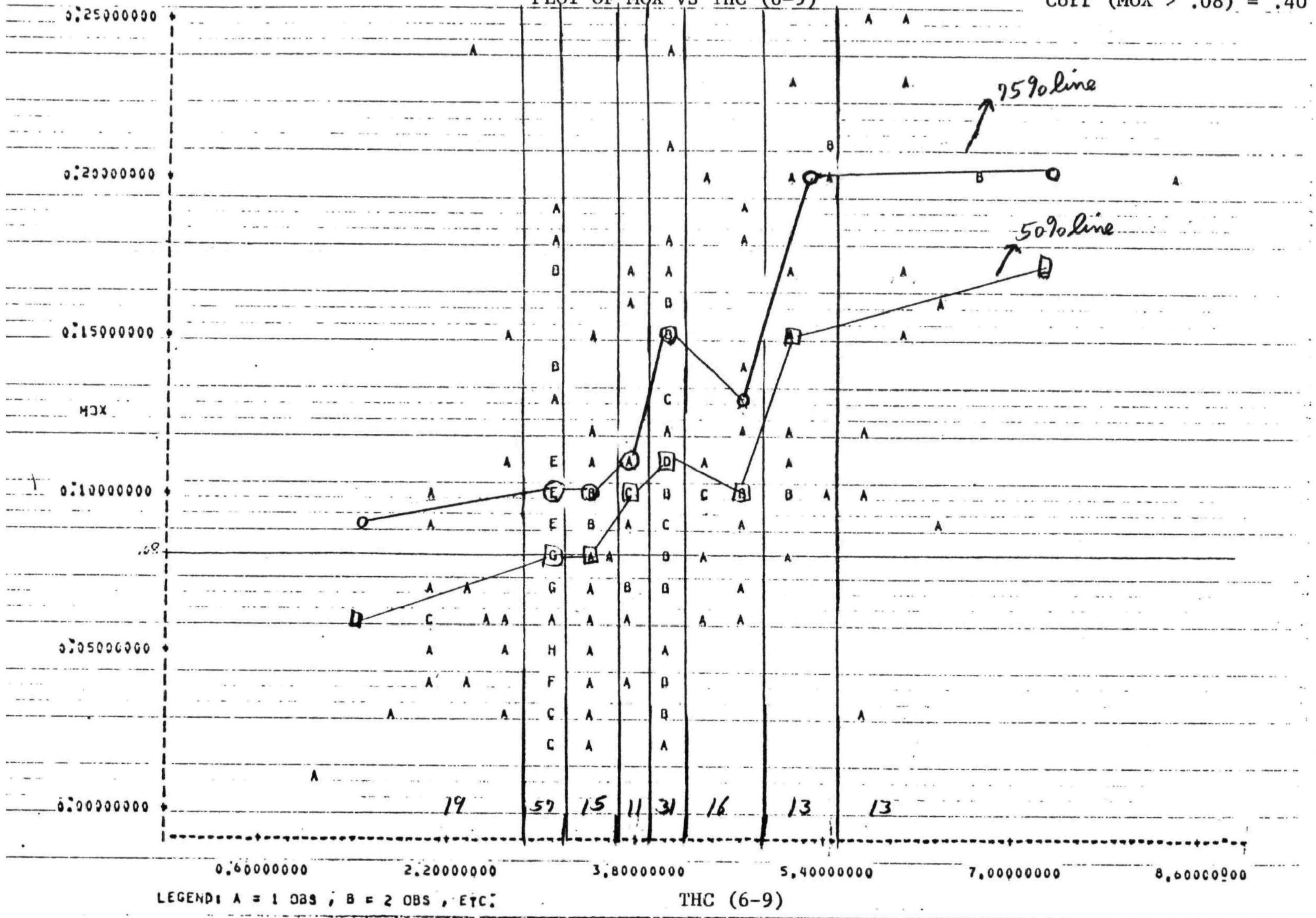
STATION = 2 = DOLA

PLOT OF MOX VS THC (6-9)

May through October, 1972

Overall Corr. = .53

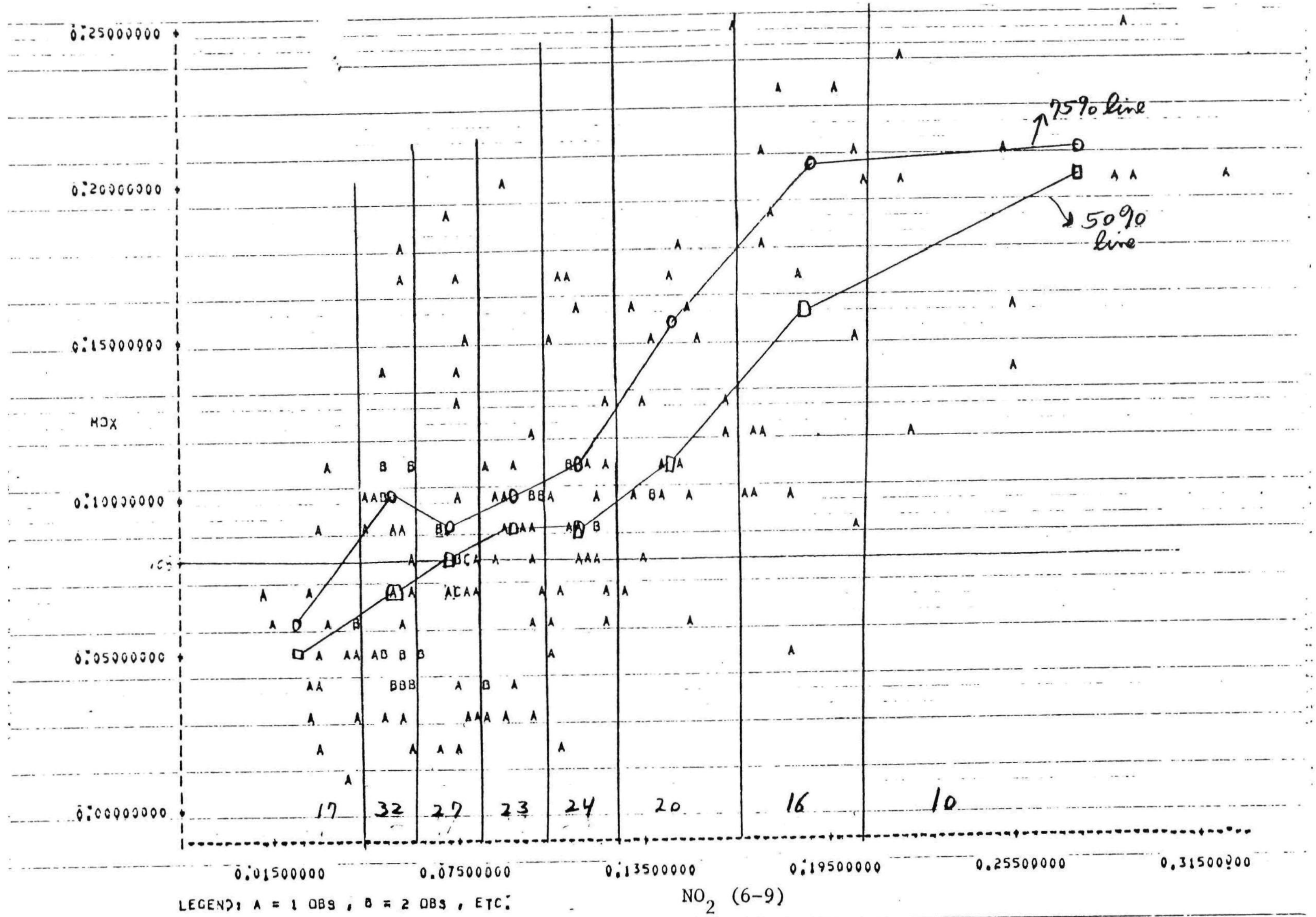
Corr (MOX > .08) = .40



75% line = for a particular interval 75% of observations are below this line, etc. for 50% line. The number at the bottom of each interval indicates the number of observations in the interval.

FIGURE C-4
STATION = 2 = DOLA
PLOT OF MOX VS NO_2 (6-9)

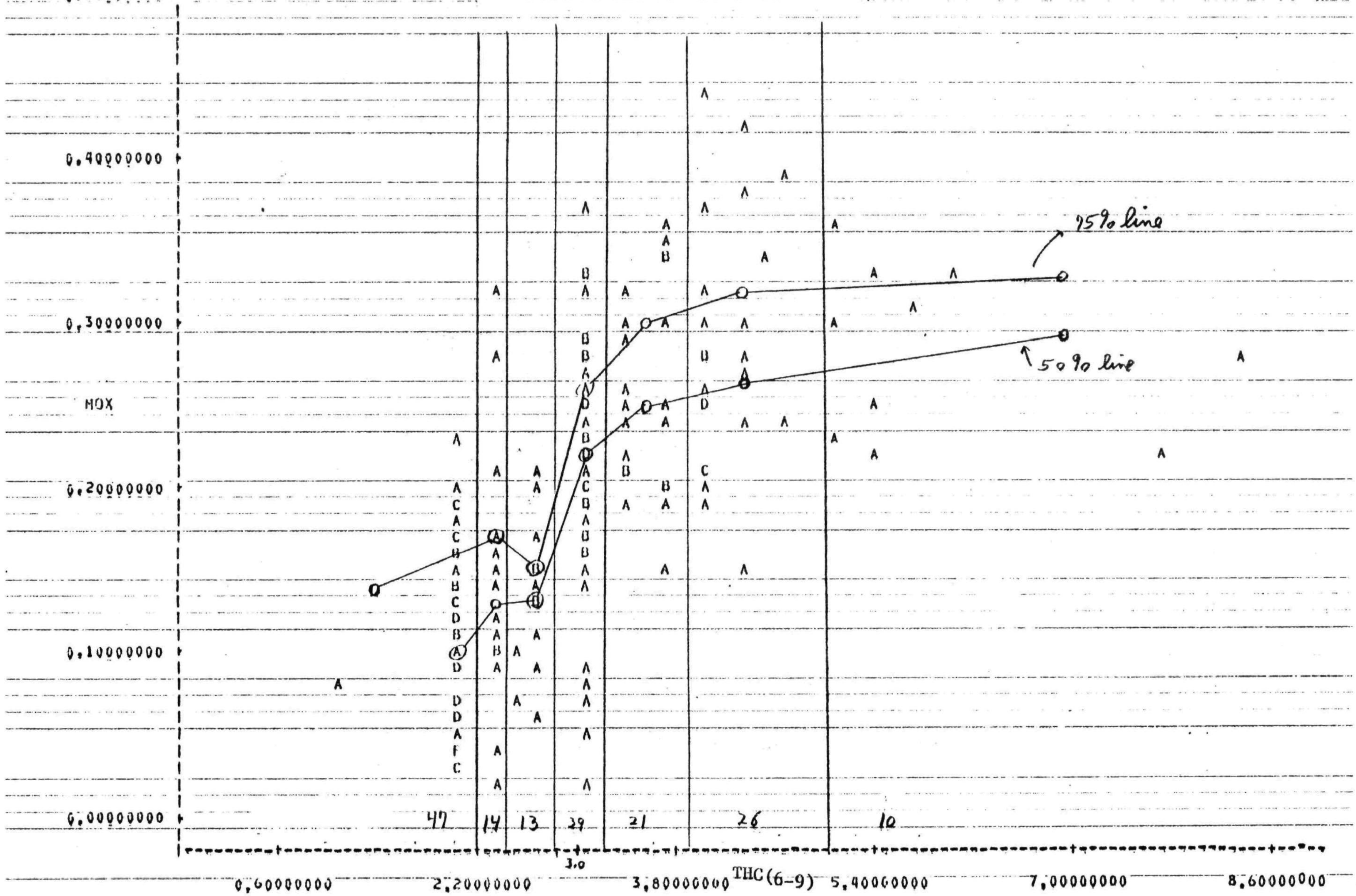
May through October, 1972
Overall Corr. = .63
Corr (MOX > .08) = .51



75% line = for a particular interval 75% of observations are below this line, etc. for 50% line.
The number at the bottom of each interval indicates the number of observations in the interval.

FIGURE C-5
STATION = 1 = AZU
PLOT OF MOX VS THC (6-9)

May through October, 1968

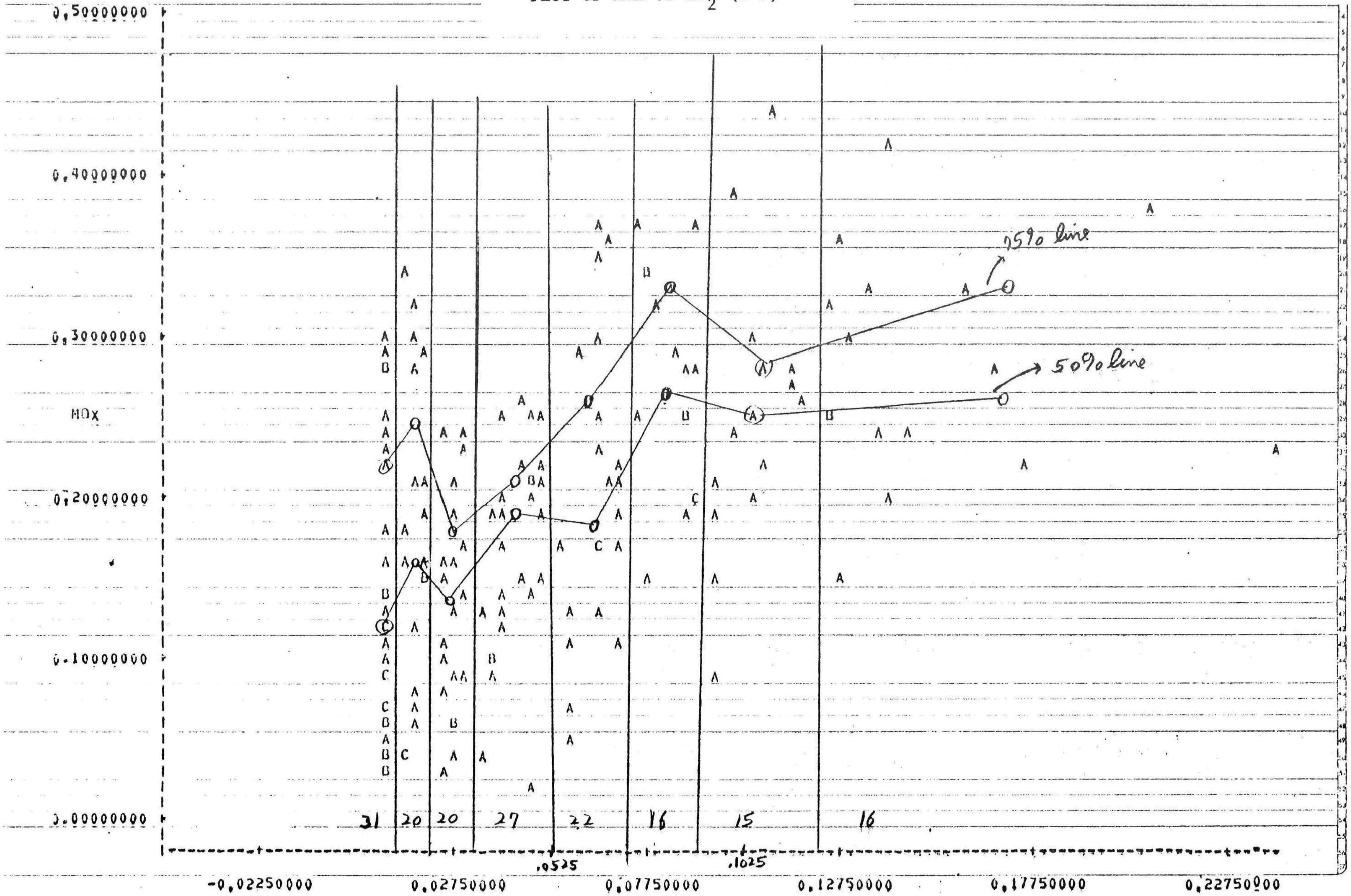


LEGEND: A = 1 OBS , B = 2 OBS , ETC.

75% line = for a particular interval 75% of observations are below this line, etc. for 50% line.
The number at the bottom of each interval indicates the number of observations in the interval.

FIGURE C-6
STATION = 1 = AZU
PLOT OF MOX VS NO_2 (6-9)

May through October, 1968



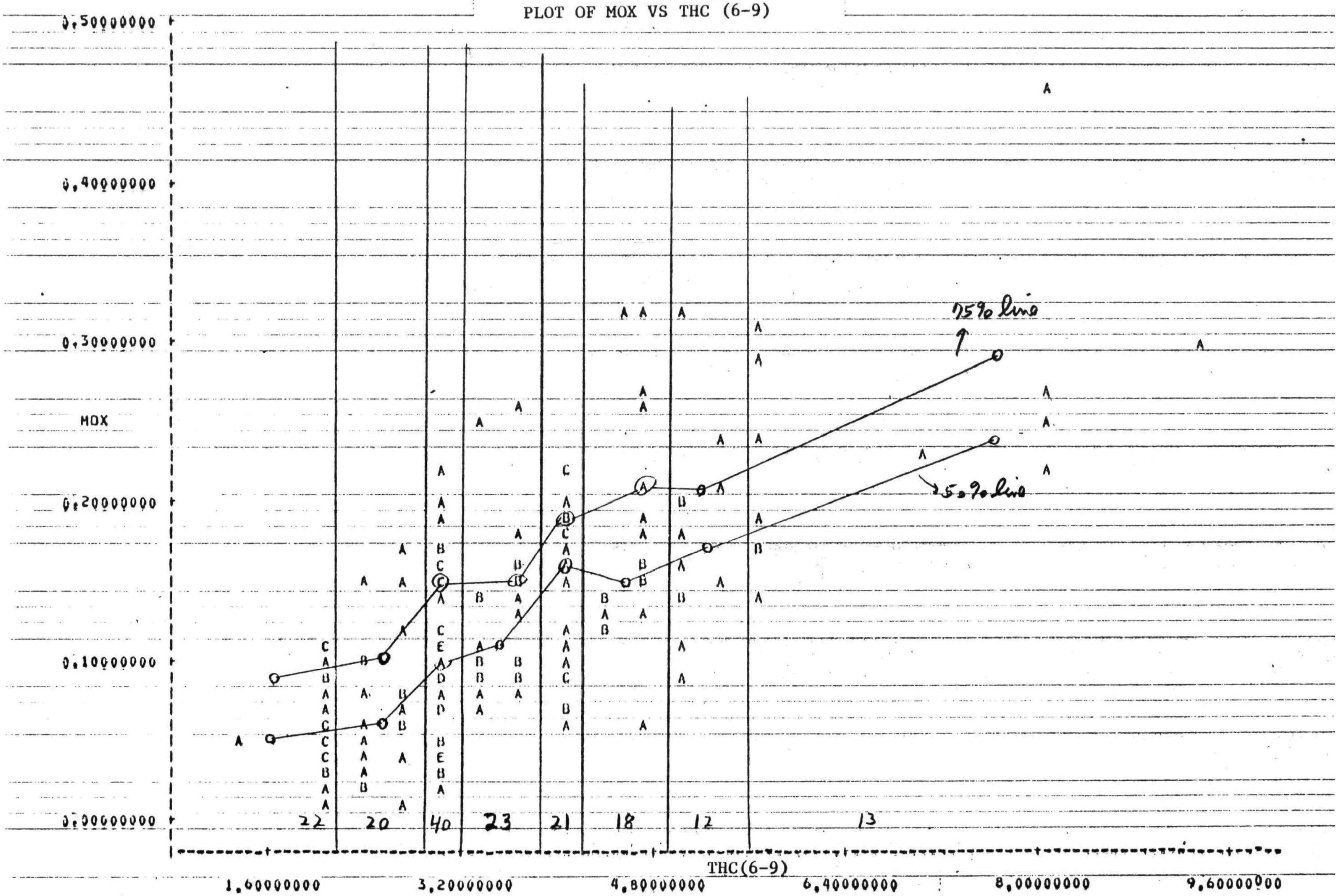
NO_2 (6-9)

LEGEND: A = 1 OBS , B = 2 OBS , ETC,

75% line = for a particular interval 75% of observations are below this line, etc. for 50% line.
The number at the bottom of each interval indicates the number of observations in the interval.

FIGURE C-7
STATION = 2 = DOLA
PLOT OF MOX VS THC (6-9)

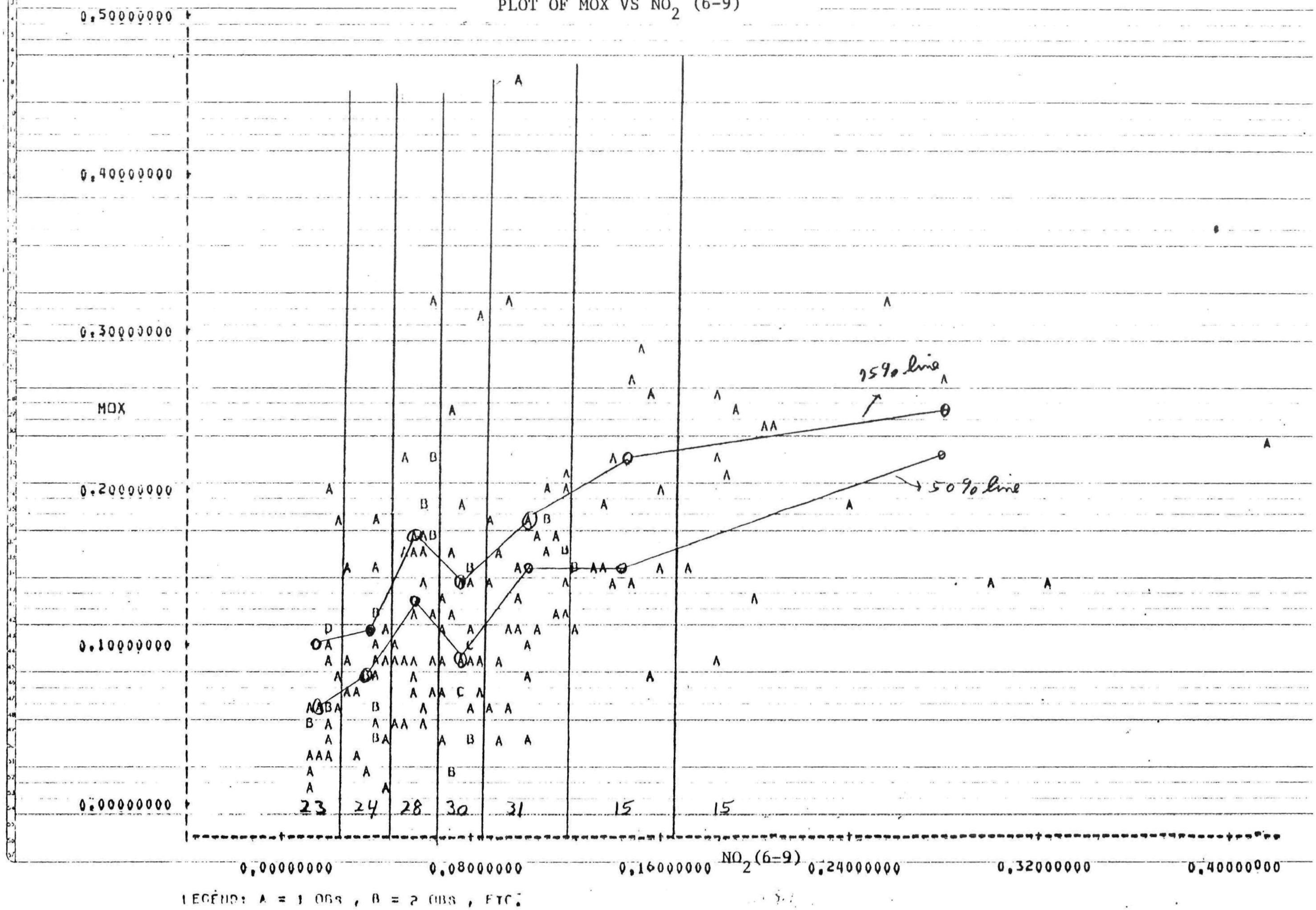
May through October, 1968



LEGEND: A = 1 OBS , B = 2 OBS , ETC.
75% line = for a particular interval 75% of observations are below this line, etc. for 50% line.
The number at the bottom of each interval indicates the number of observations in the interval.

May through October, 1968

FIGURE C-8
STATION = 2 = DOLA
PLOT OF MOX VS NO_2 (6-9)



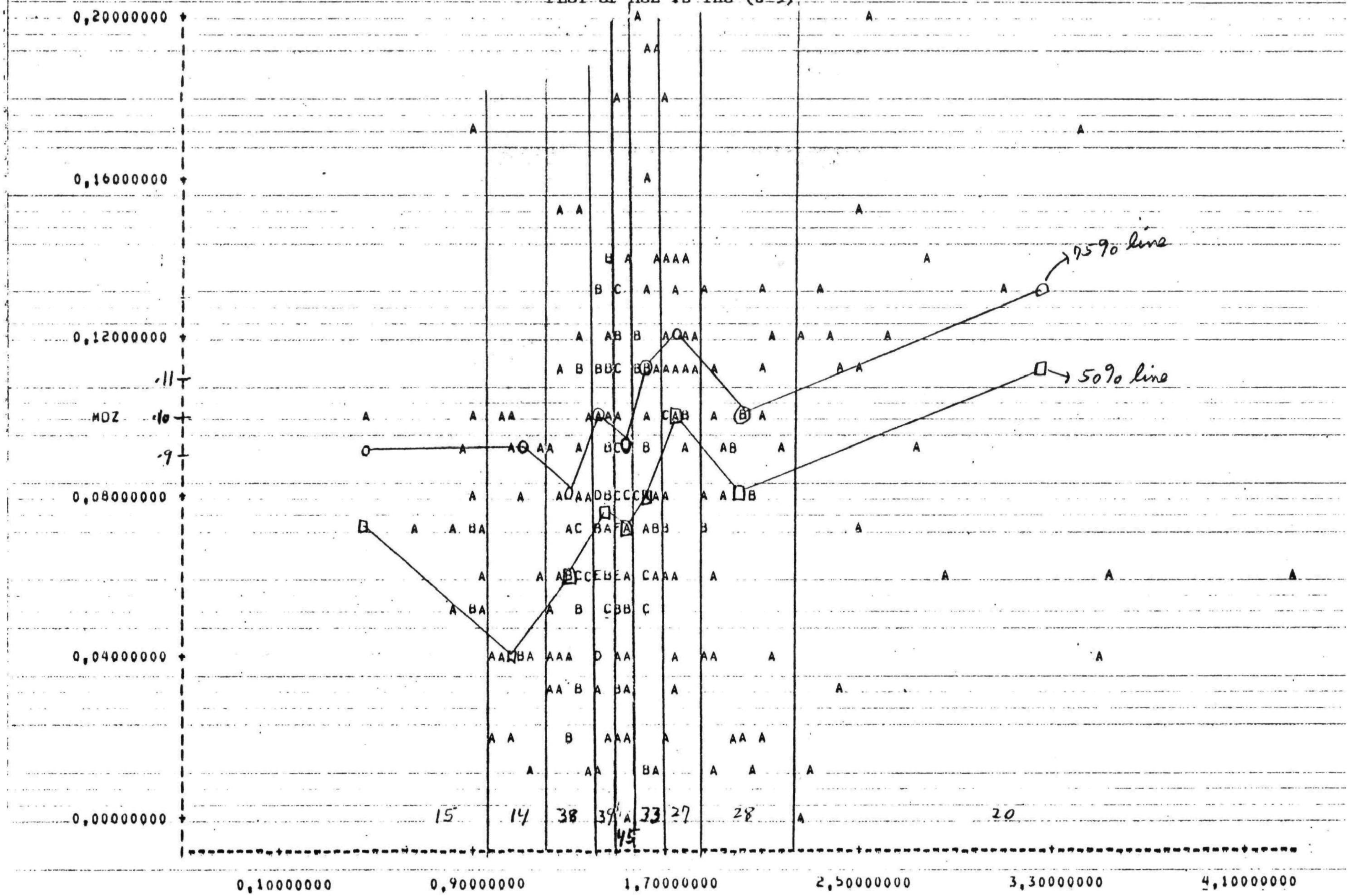
75% line = for a particular interval 75% of observations are below this line, etc. for 50% line.
The number at the bottom of each interval indicates the number of observations in the interval.

FIGURE C-9

May through October, 1973

STATIONS = BETH, HYAT and SUIT Combined

PLOT OF MOZ VS THC (6-9)



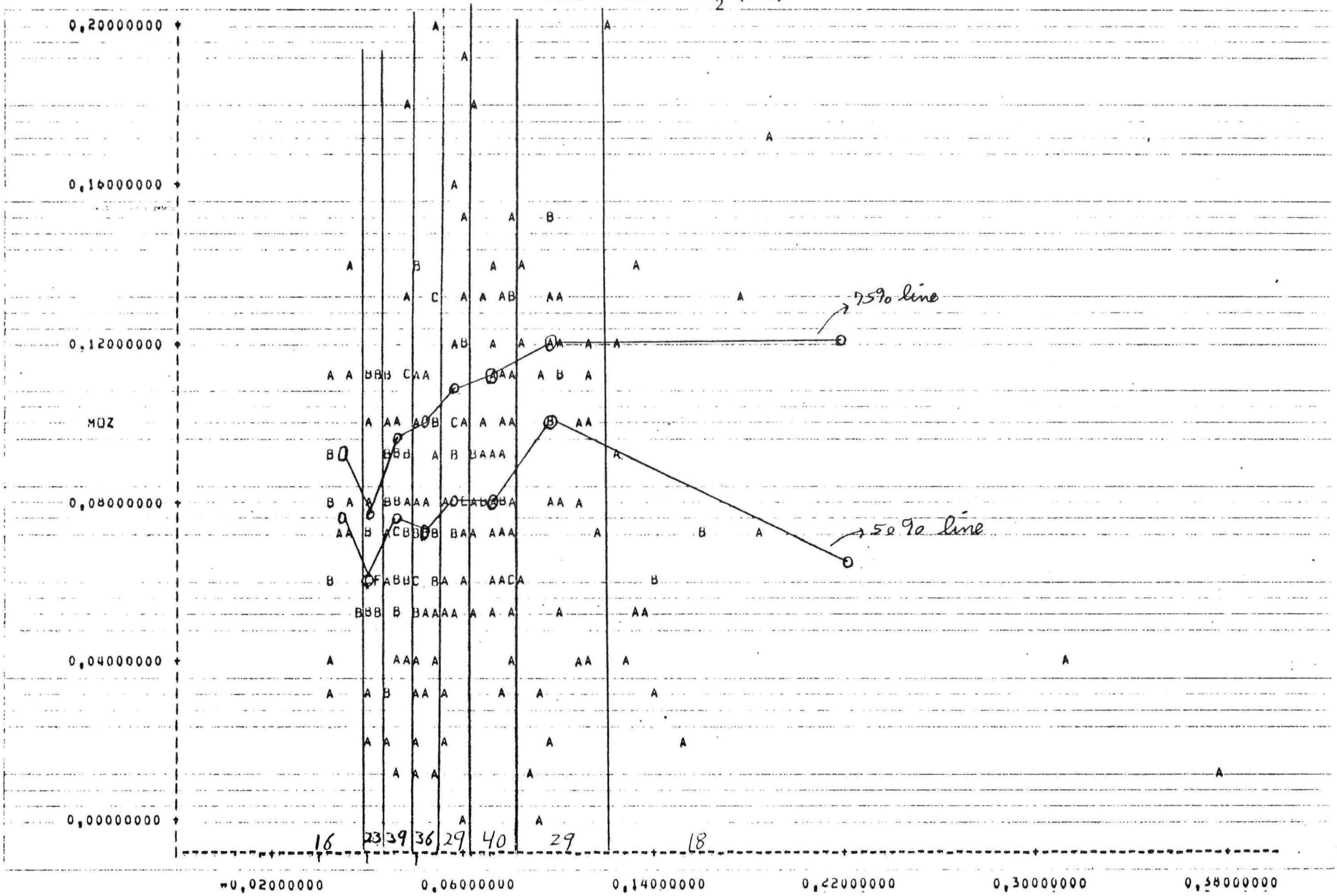
LEGEND: A = 1 OBS , B = 2 OBS , ETC.

THC (6-9)

75% line = for a particular interval 75% of observations are below this line, etc. for 50% line. The number at the bottom of each interval indicates the number of observations in the interval.

FIGURE C-10

STATIONS = BETH, HYAT and SUIT Combined
PLOT OF MOZ VS NO_2 (6-9)



NO_2 (6-9)

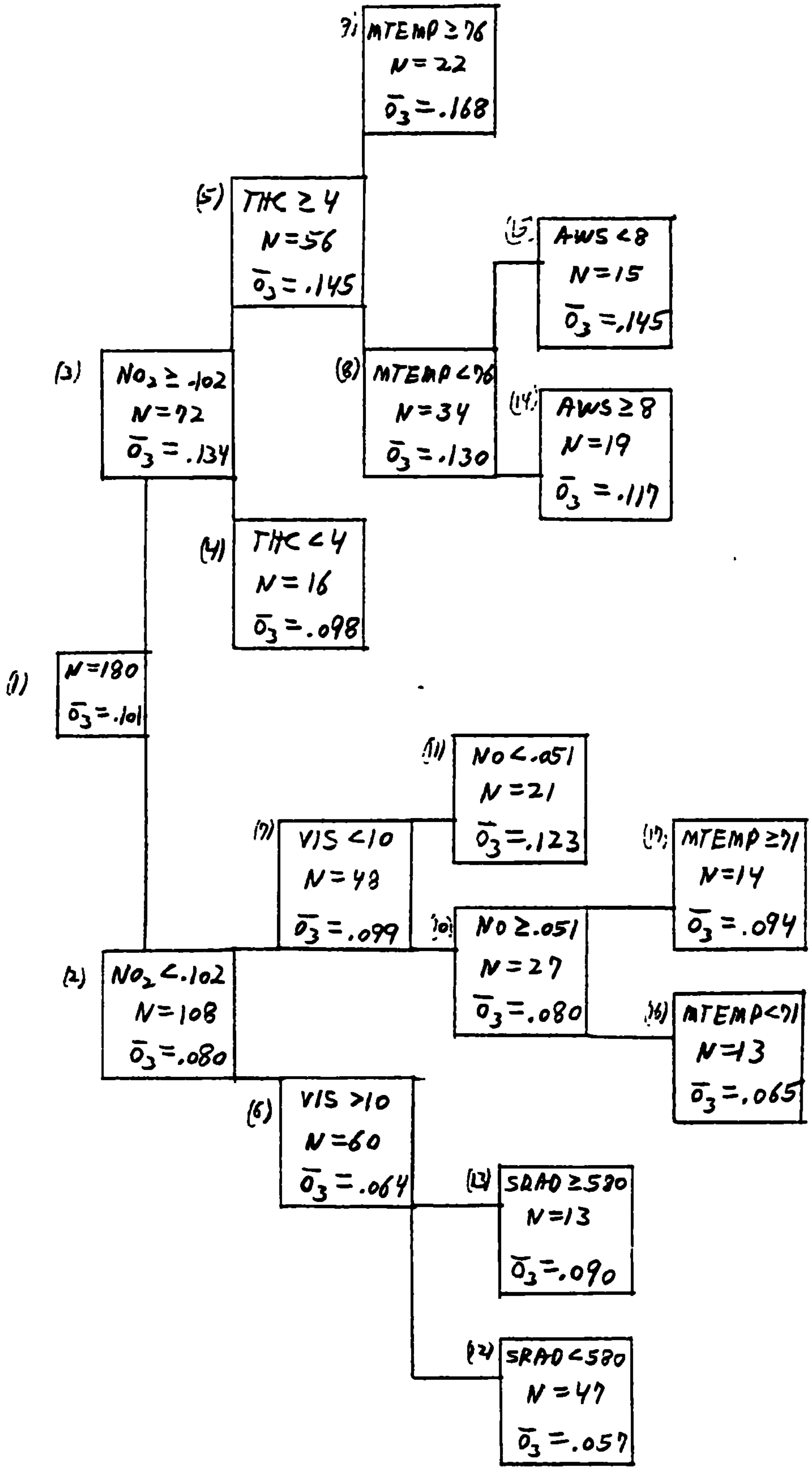
LEGEND: A = 1 OBS, B = 2 OBS, ETC.

75% line = for a particular interval 75% of observations are below this line, etc. for 50% line.
The number at the bottom of each interval indicates the number of observations in the interval.

APPENDIX D

AID Results for DOLA, BETH, HYAT and SISP

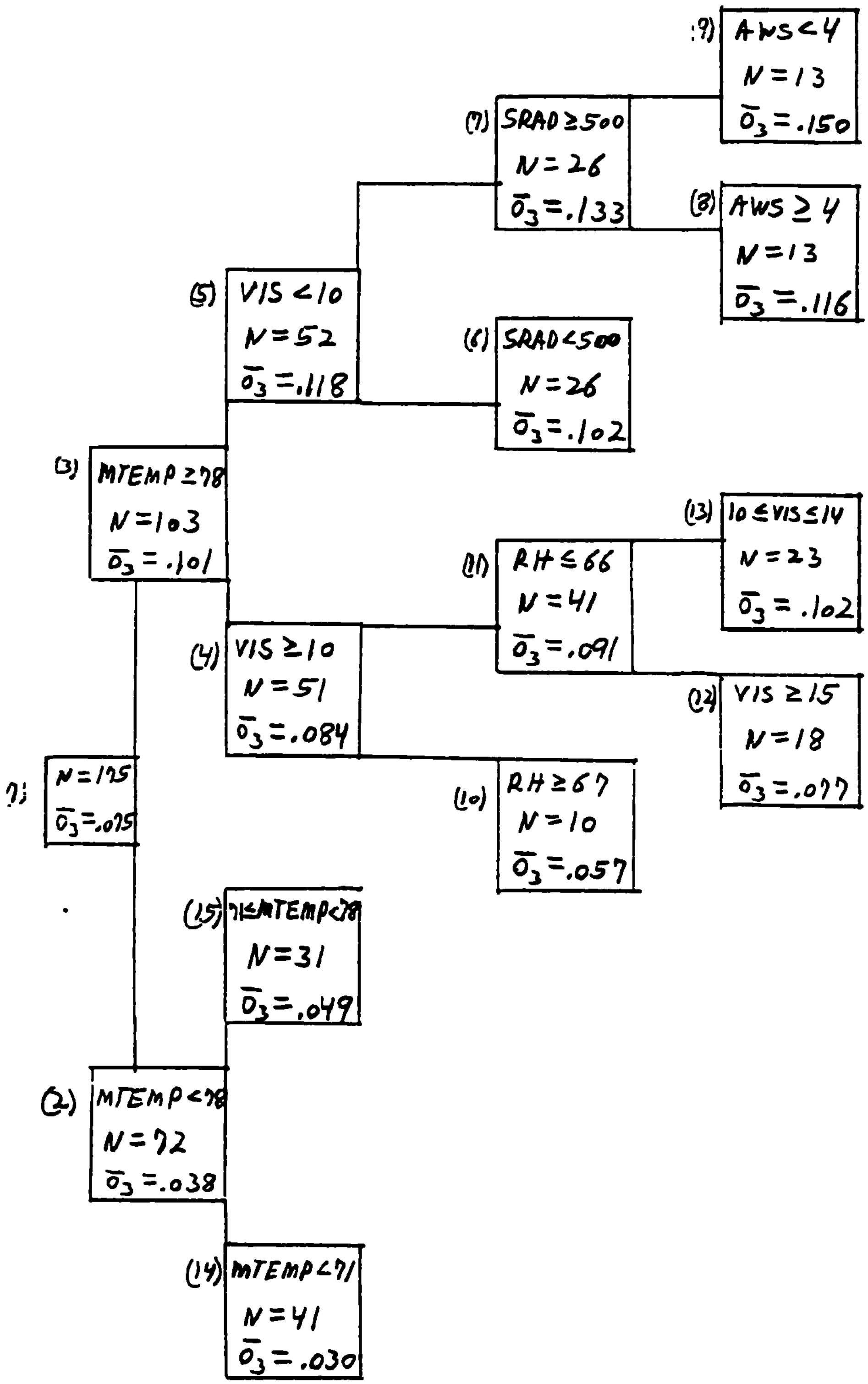
FIGURE D-1. AID Results for DOLA, May through October, 1972 Data



(1) = Initial group before any splitting.
N = Group sample size.
$\overline{O}_3$ = Group mean for daily max. oxidant (units = ppm).

NOTE: Groups with high $\overline{O}_3$ are at the top of the figure and groups with low $\overline{O}_3$ are at the bottom of the figure.

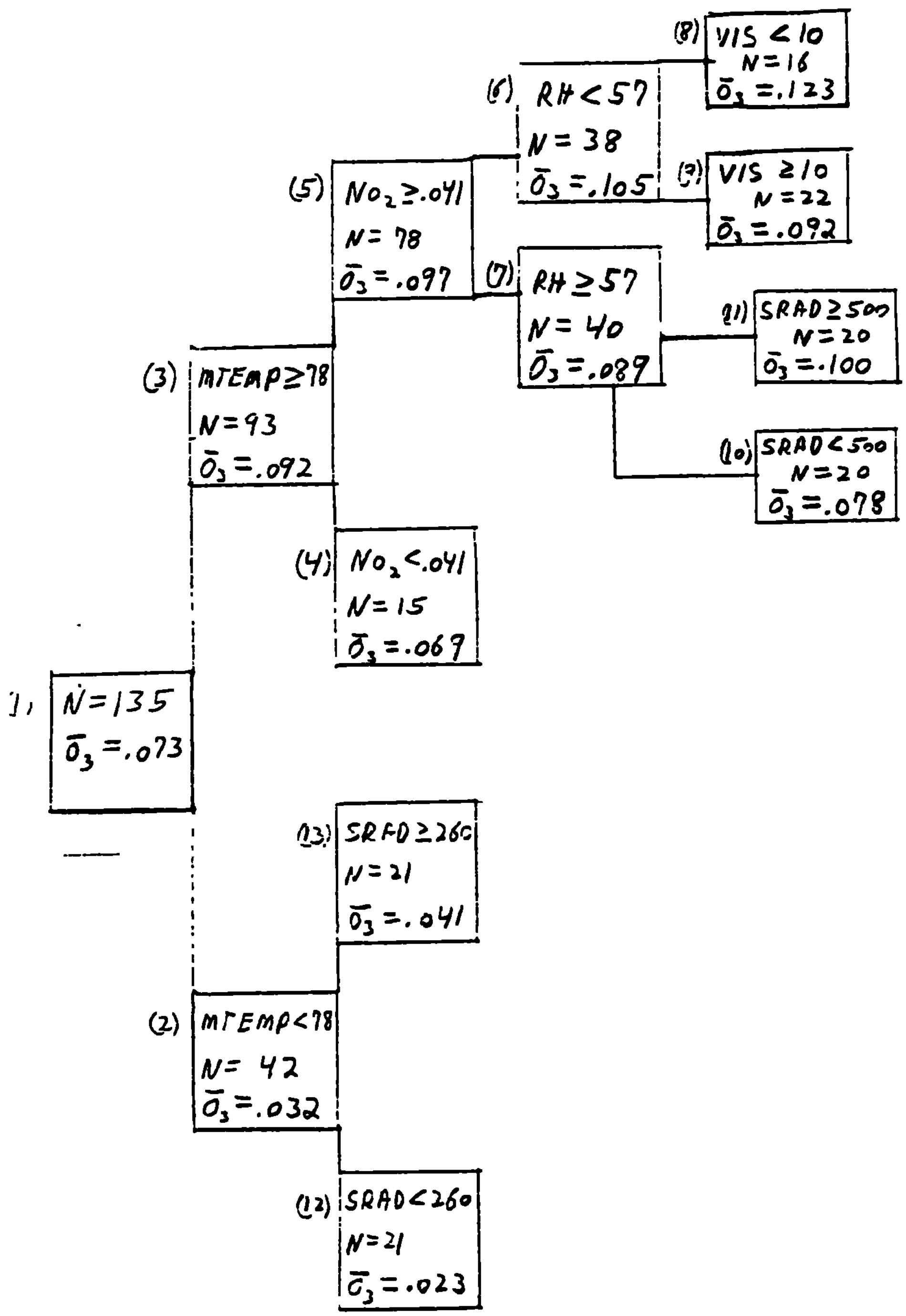
FIGURE D-2. AID Results for BETH, May through October, 1973 Data



(1) = Initial group before any splitting.
N = Group sample size.
$\bar{O}_3$ = Group mean for daily max. ozone (units = ppm).

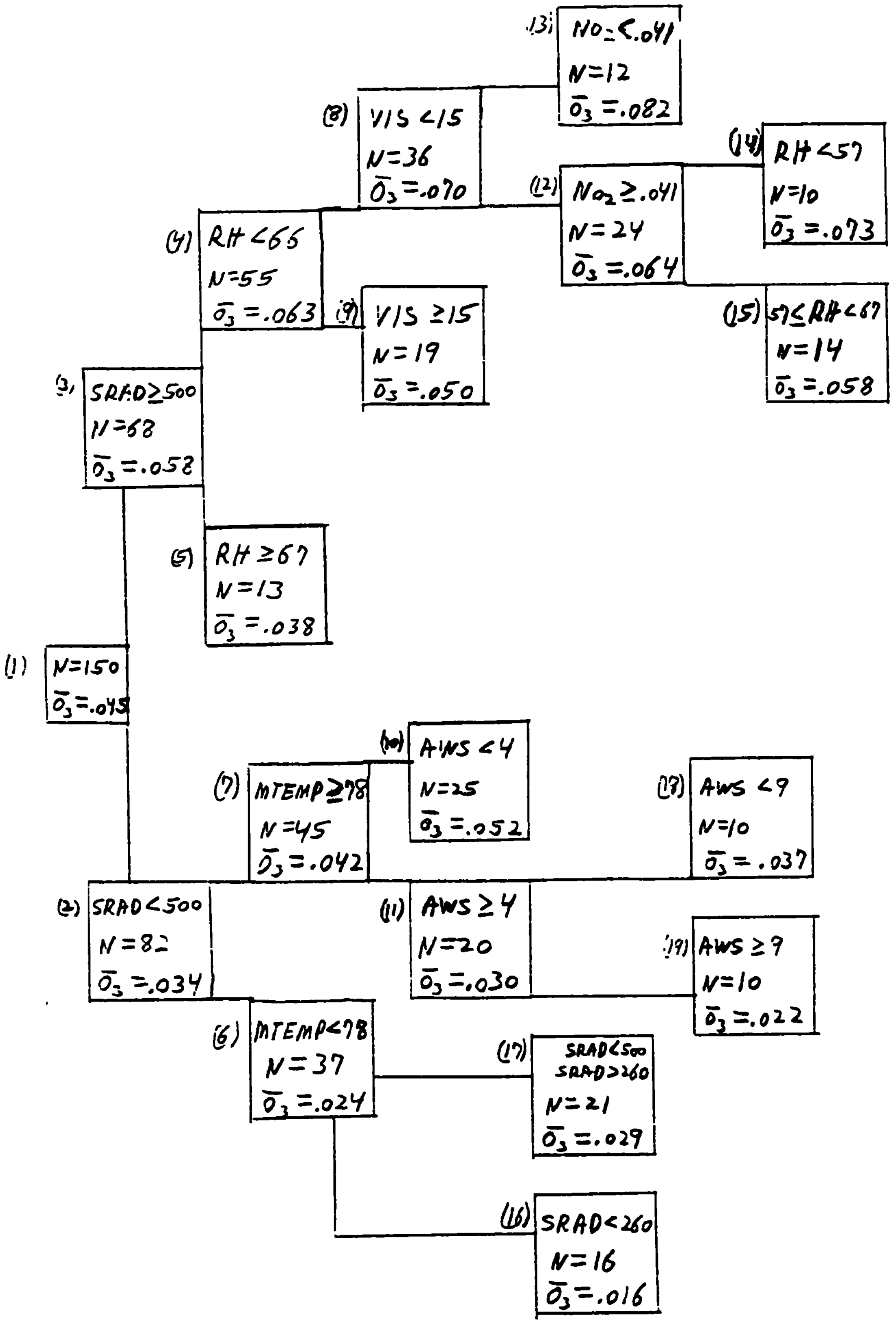
NOTE: Groups with high $\bar{O}_3$ are at the top of the figure and groups with low $\bar{O}_3$ are at the bottom of the figure.

FIGURE D-3. AID Results for HYAT, May through October, 1973 Data



(1) = Initial group before any splitting.
N = Group sample size.
$\bar{O}_3$ = Group mean for daily max. ozone (units = ppm).
NOTE: Groups with high $\bar{O}_3$ are at the top of the figure and groups with low $\bar{O}_3$ are at the bottom of the figure.

FIGURE D-4. AID Results for SISP, May through October, 1973 Data



(1) = Initial group before any splitting.

N = Group sample size.

$\bar{O}_3$ = Group mean for daily max. ozone (units = ppm).

NOTE: Groups with high $\bar{O}_3$ are at the top of the figure and groups with low $\bar{O}_3$ are at the bottom of the figure.

APPENDIX E

Plots of Adjusted MOX (MOZ) Versus Adjusted NO_2 and THC by Station (Adjusted for SRAD, MTEMP, VIS)

FIGURE F-1

AZU

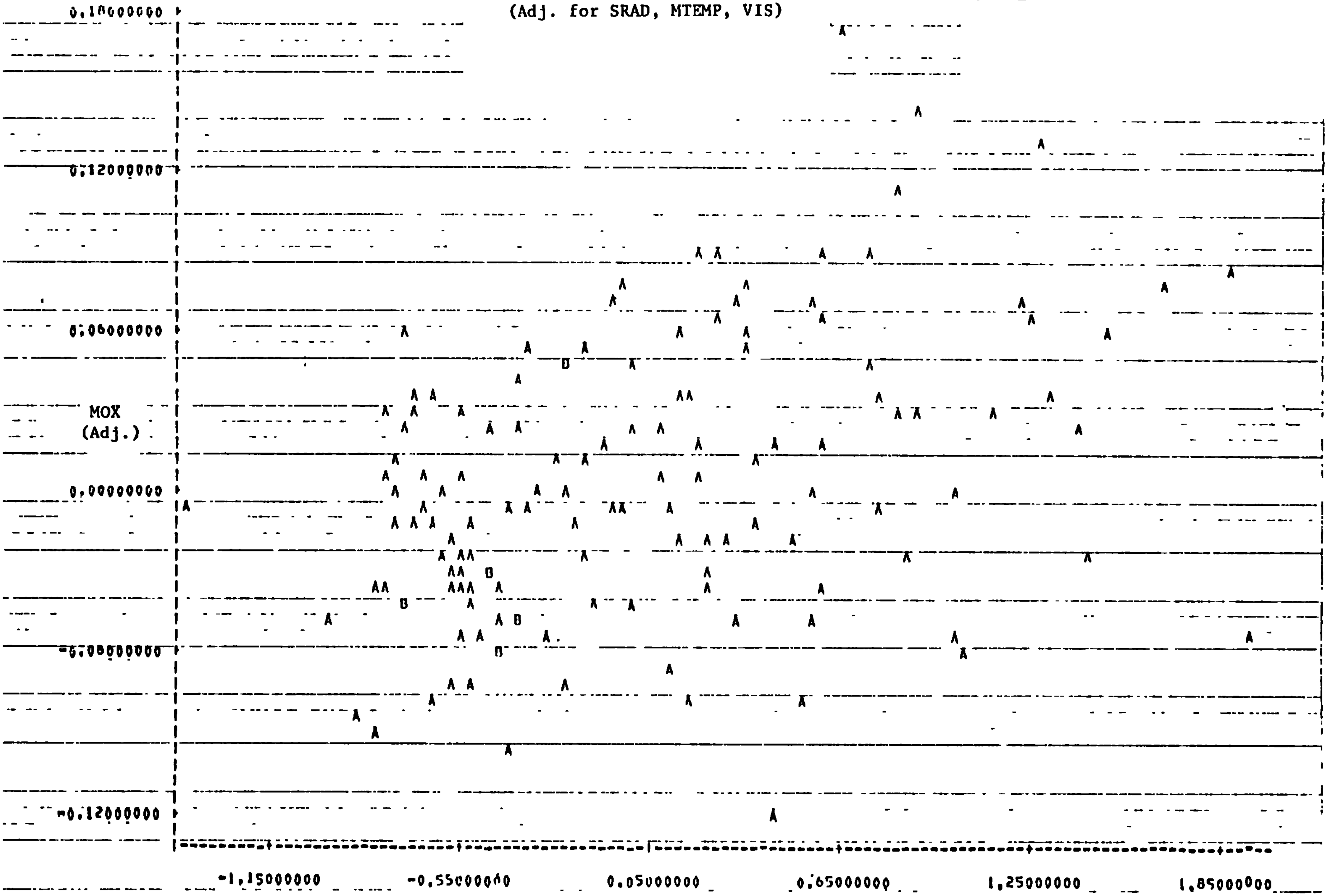
PLOT OF MOX VS THC (6-9)

(Adj. for SRAD, MTEMP, VIS)

May through October, 1972

Corr. = .39

N = 128



LEGEND: A = 1 OBS , B = 2 OBS , ETC.

THC (6-9) (Adj.)

FIGURE E-2

May through October, 1972

Corr. = .48

N = 128

AZU

PLOT OF MOX VS NO_2

(Adj. for SRAD, MTEMP, VIS)

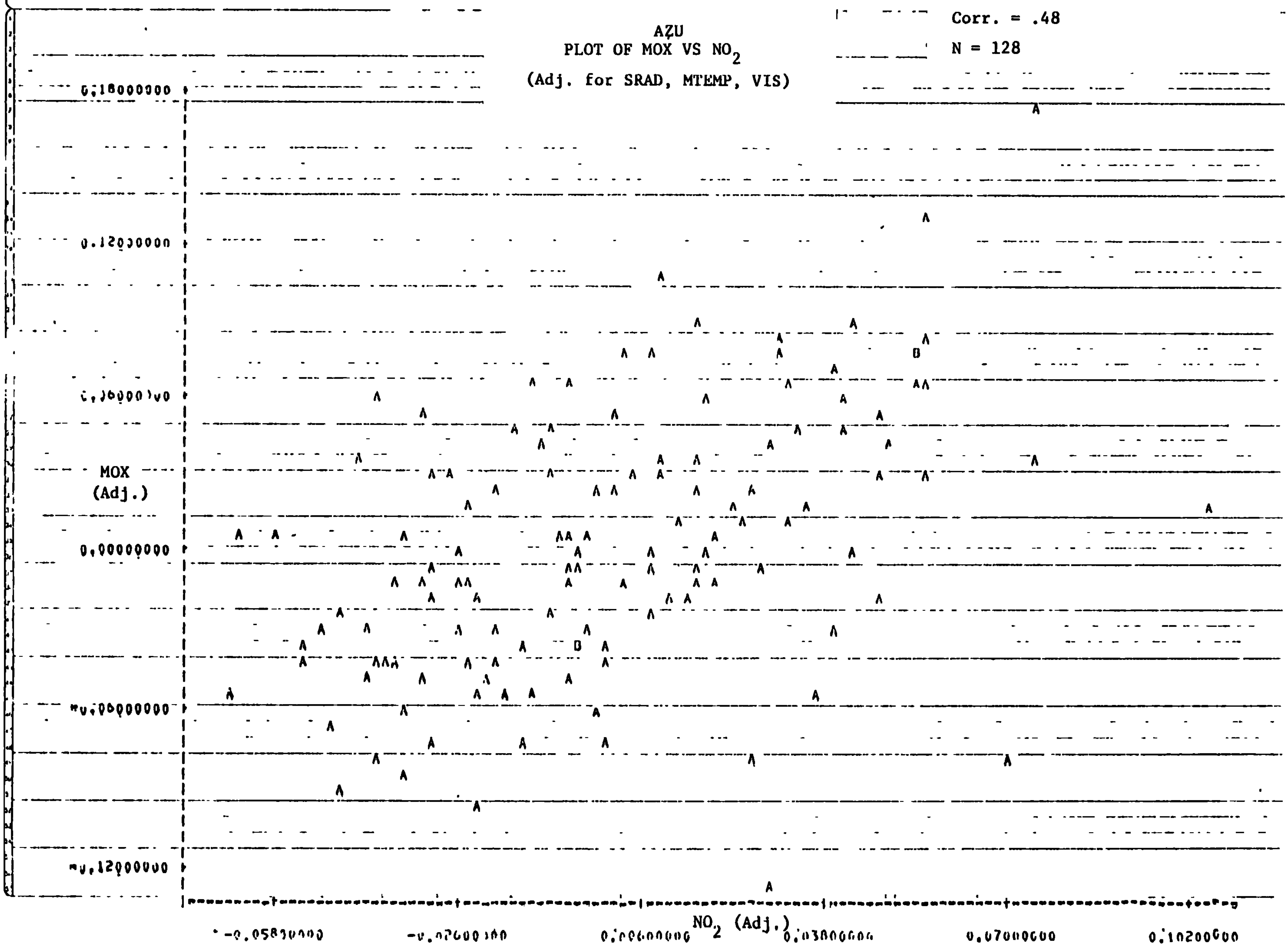


FIGURE E-3

DOLA

May through October, 1972
Corr. = .44
N = 131

PLOT OF MOX VS THC (6-9)
(Adj. for SRAD, MTEMP, VIS)

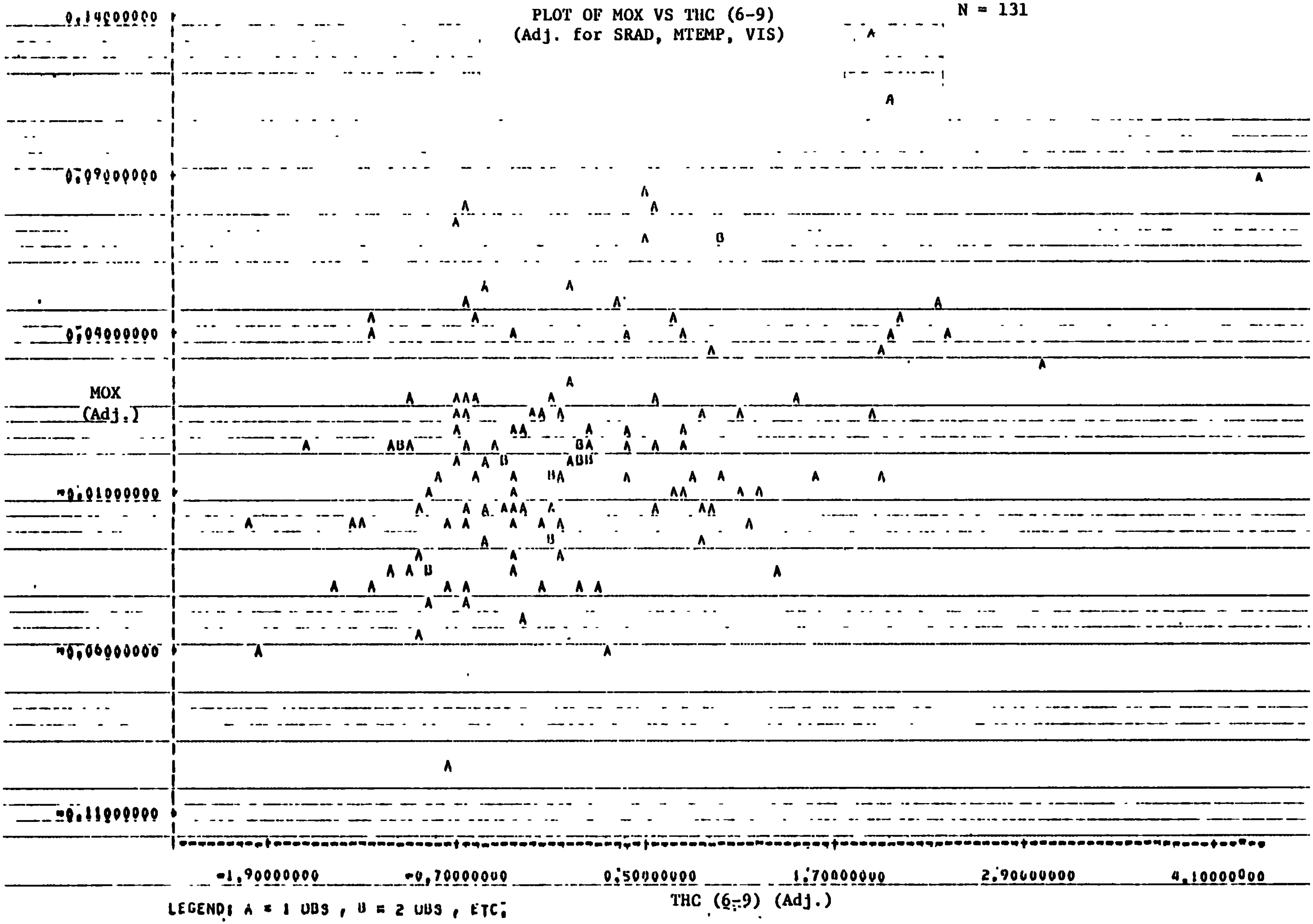


FIGURE E-4

DOLA

PLOT OF MOX VS NO_2 (6-9)

(Adj. for SRAD, MTEMP, VIS)

May through October, 1972

Corr. = .46

N = 131

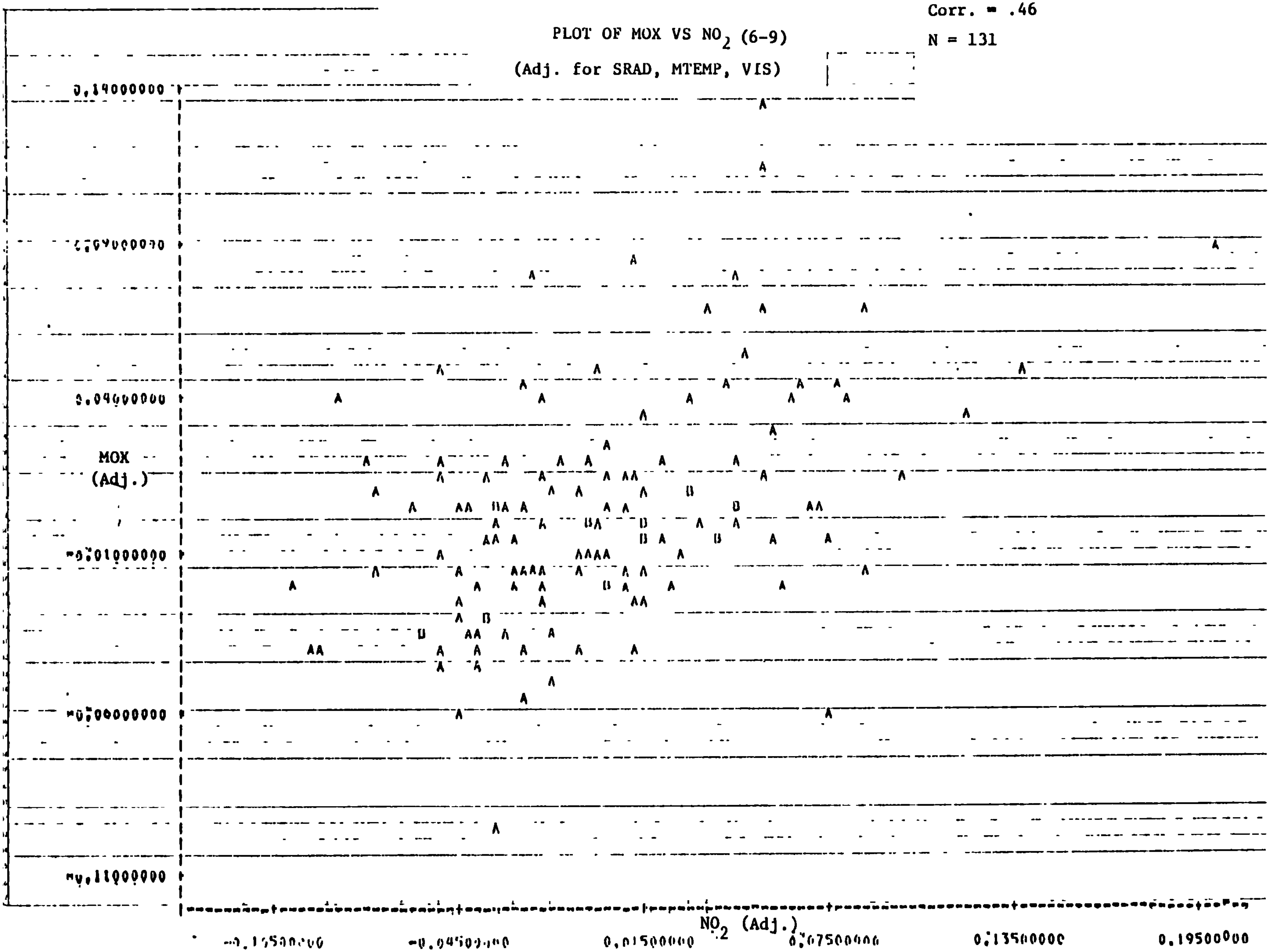
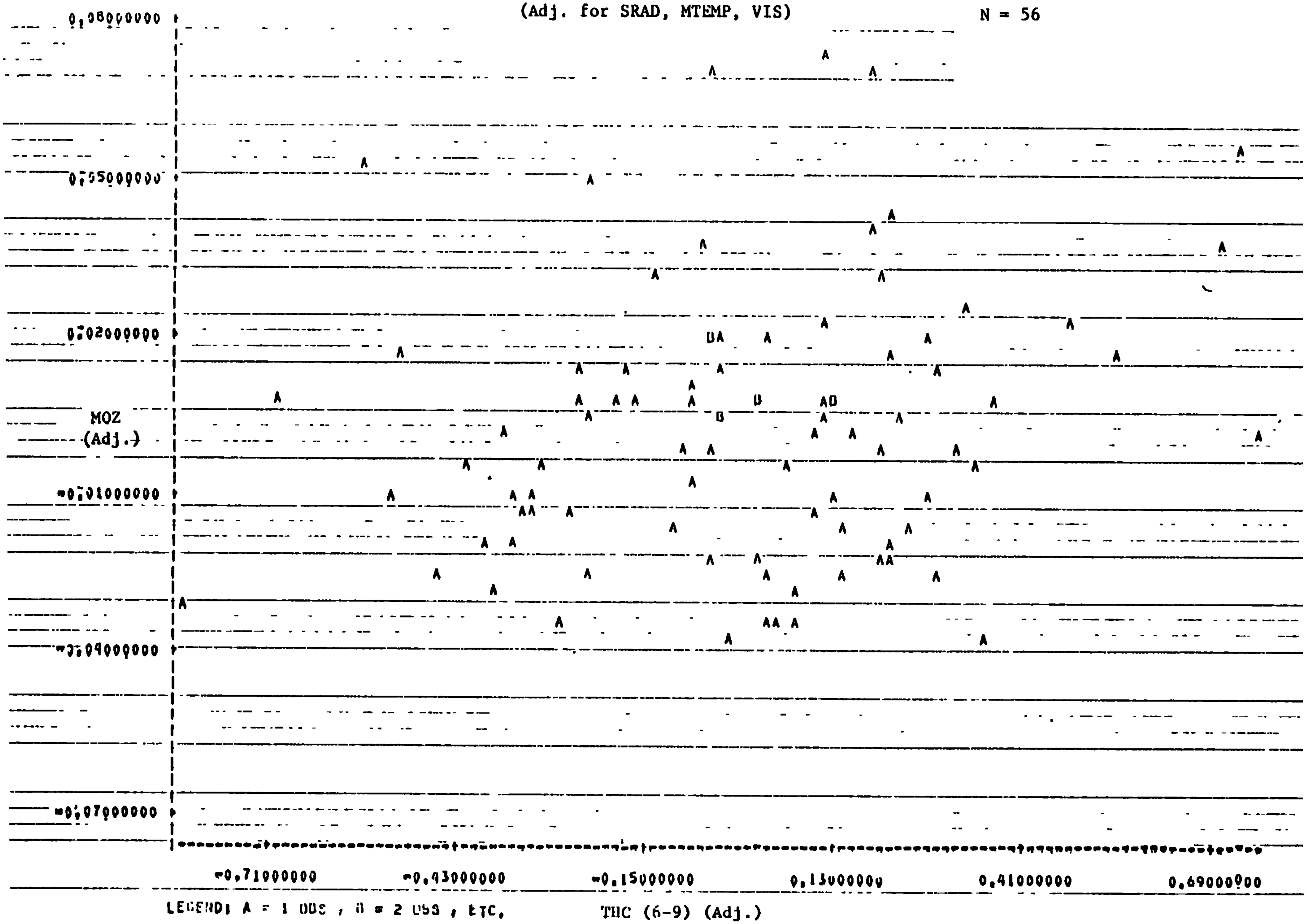


FIGURE E-5

BETH

PLOT OF MOZ VS THC (6-9)
(Adj. for SRAD, MTEMP, VIS)

May through October, 1973
Corr. = .19
N = 56



1

FIGURE E-6

BETH

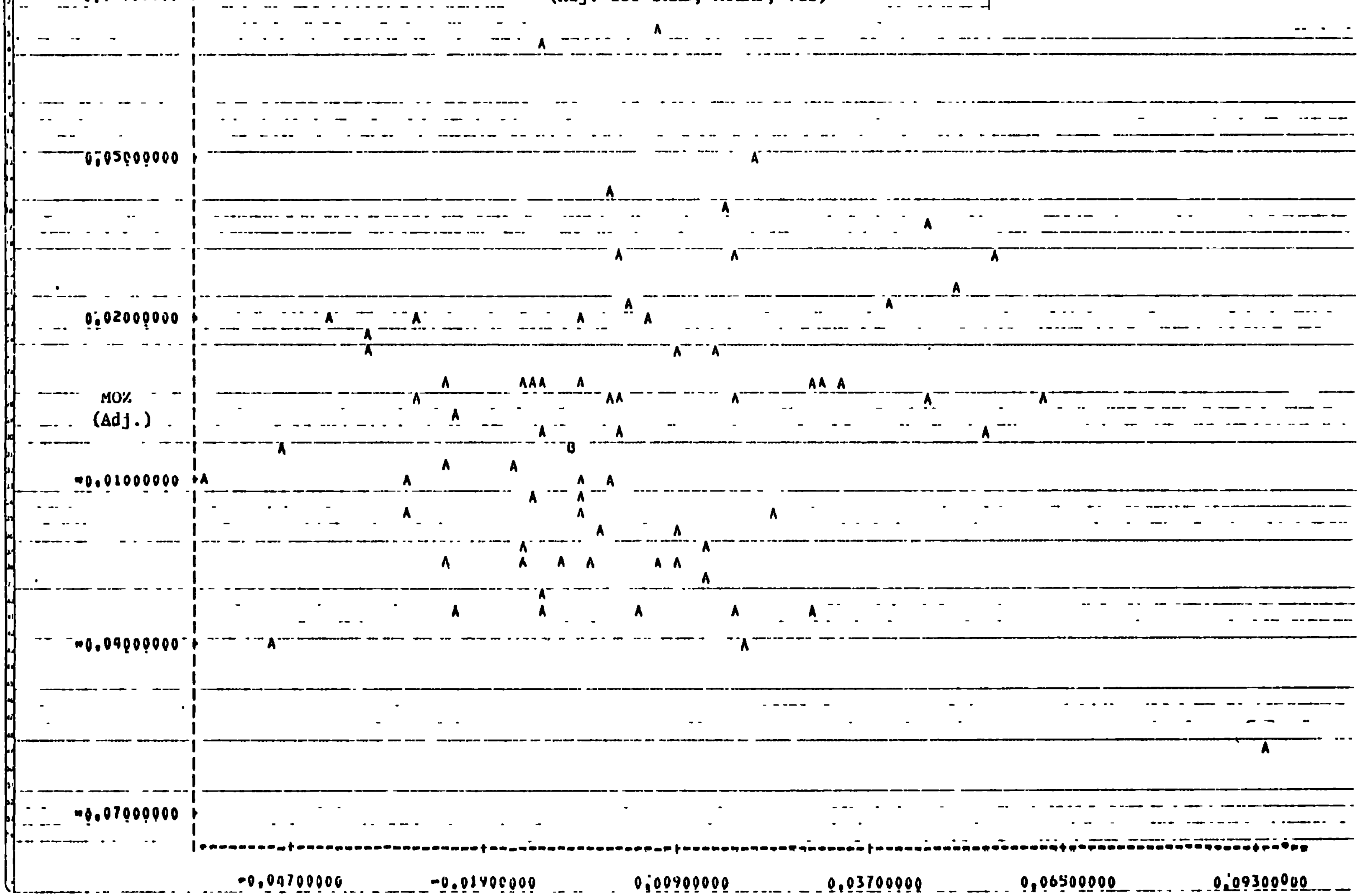
PLOT OF MOZ VS NO_2 (6-9)

(Adj. for SRAD, MTEMP, VIS)

May through October, 1973

Corr. = .07

N = 56



LEGEND: A = 1 OBS ; B = 2 OBS , ETC.

NO_2 (Adj.)

FIGURE E-7

HYAT

PLOT OF MOZ VS THC (6-9)

(Adj. for SRAD, MTEMP, VIS)

May through October, 1973

Corr. = .18

N = 82

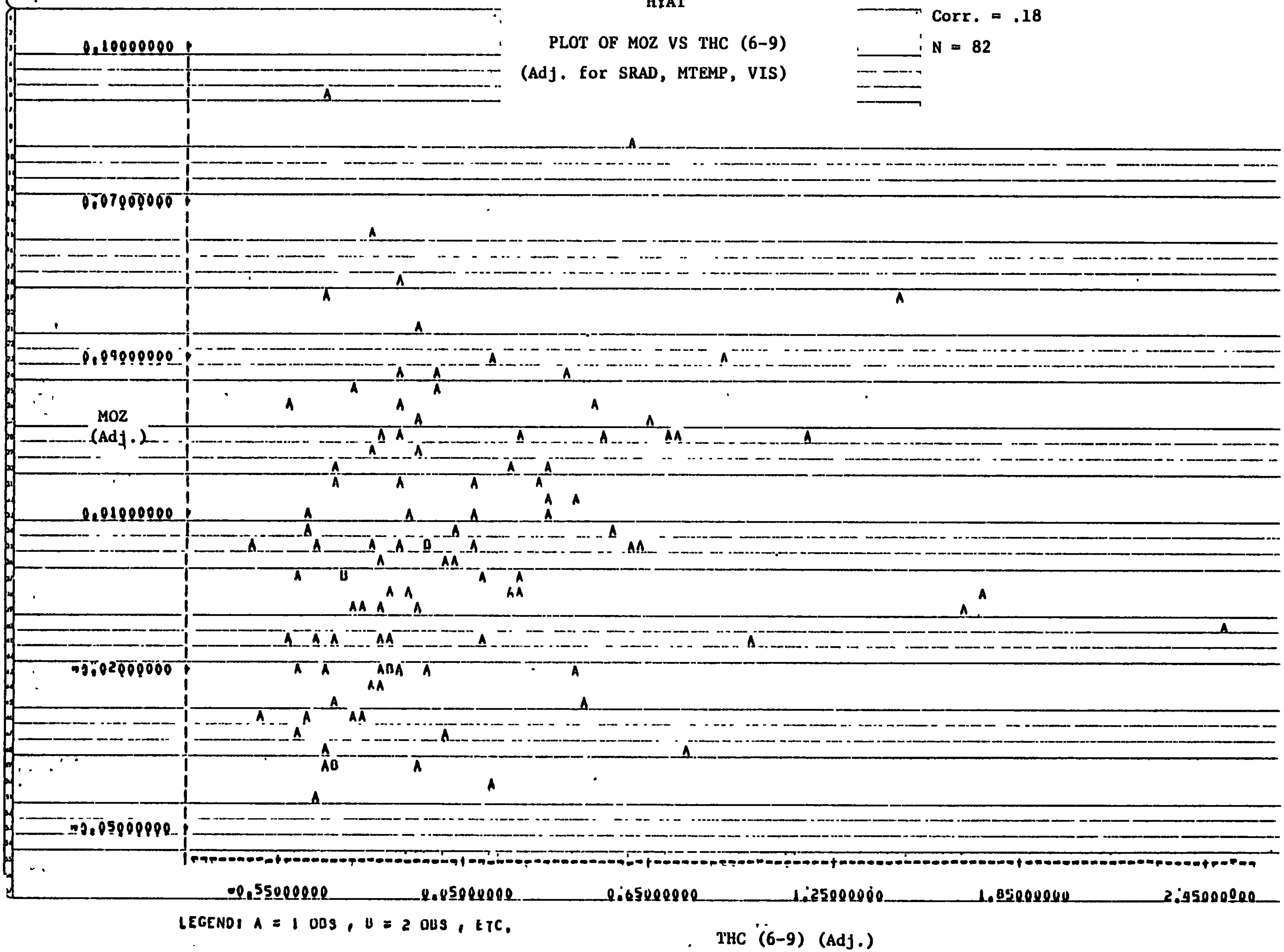


FIGURE E-8

HYAT

PLOT OF MOZ VS NO_2 (6-9)

(Adj. for SRAD, MTEMP, VIS)

May through October, 1973

Corr. = .13

N = 82

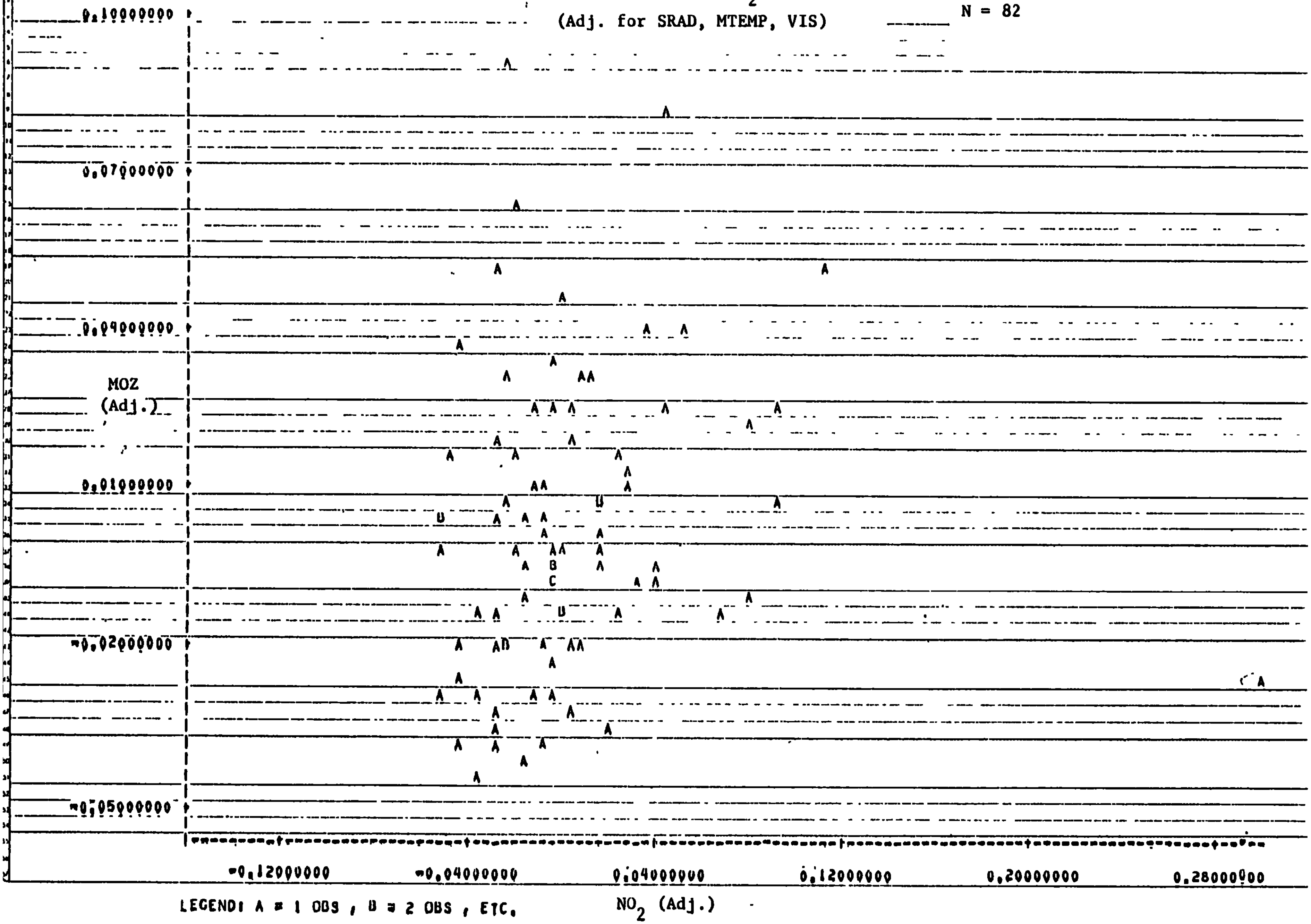


FIGURE E-9

SUIT

PLOT OF MOZ VS THC (6-9)

(Adj. for SRAD, MTEMP, VIS)

May through October, 1973

Corr. = .37

N = 50

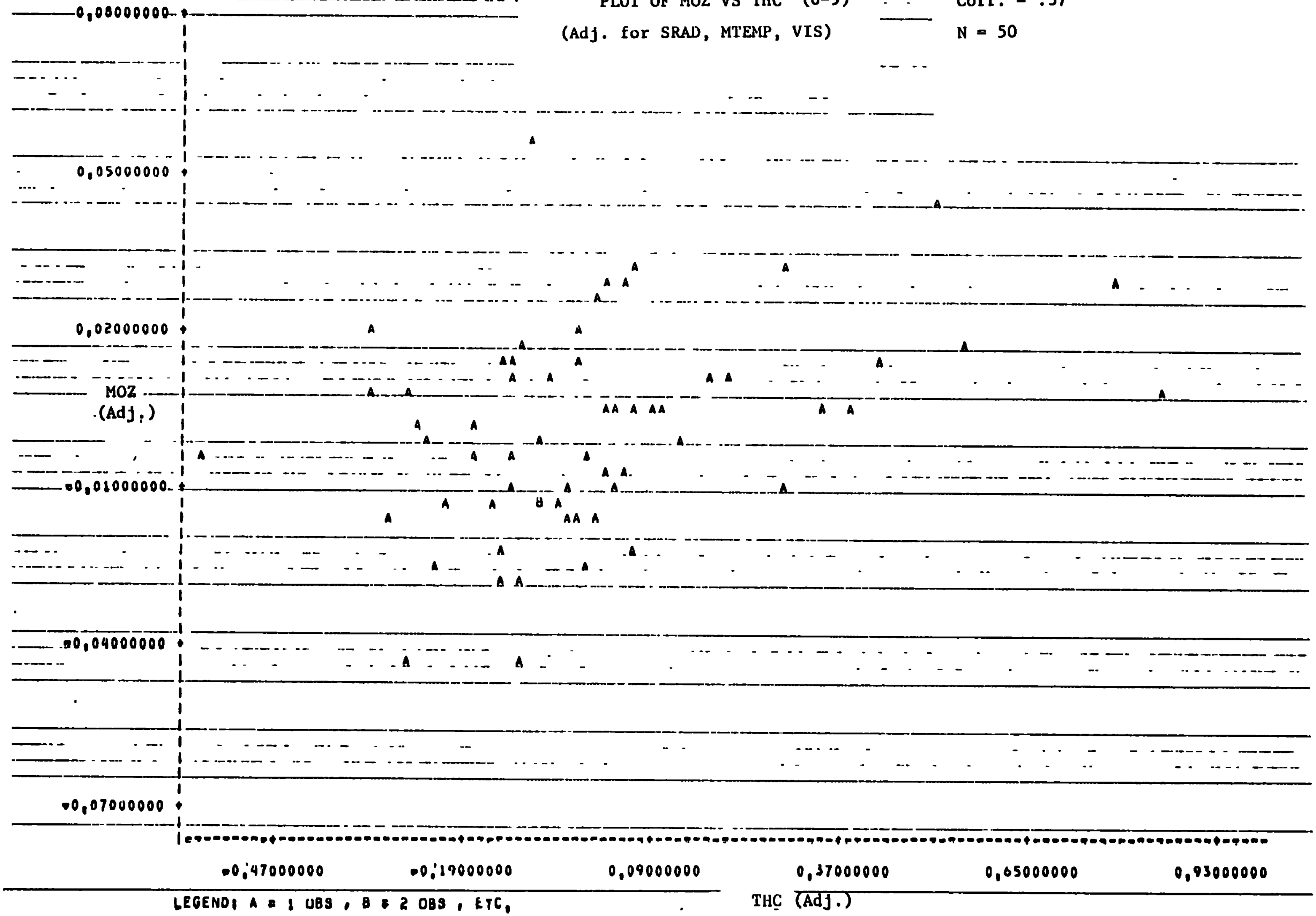


FIGURE E-10

SUIT

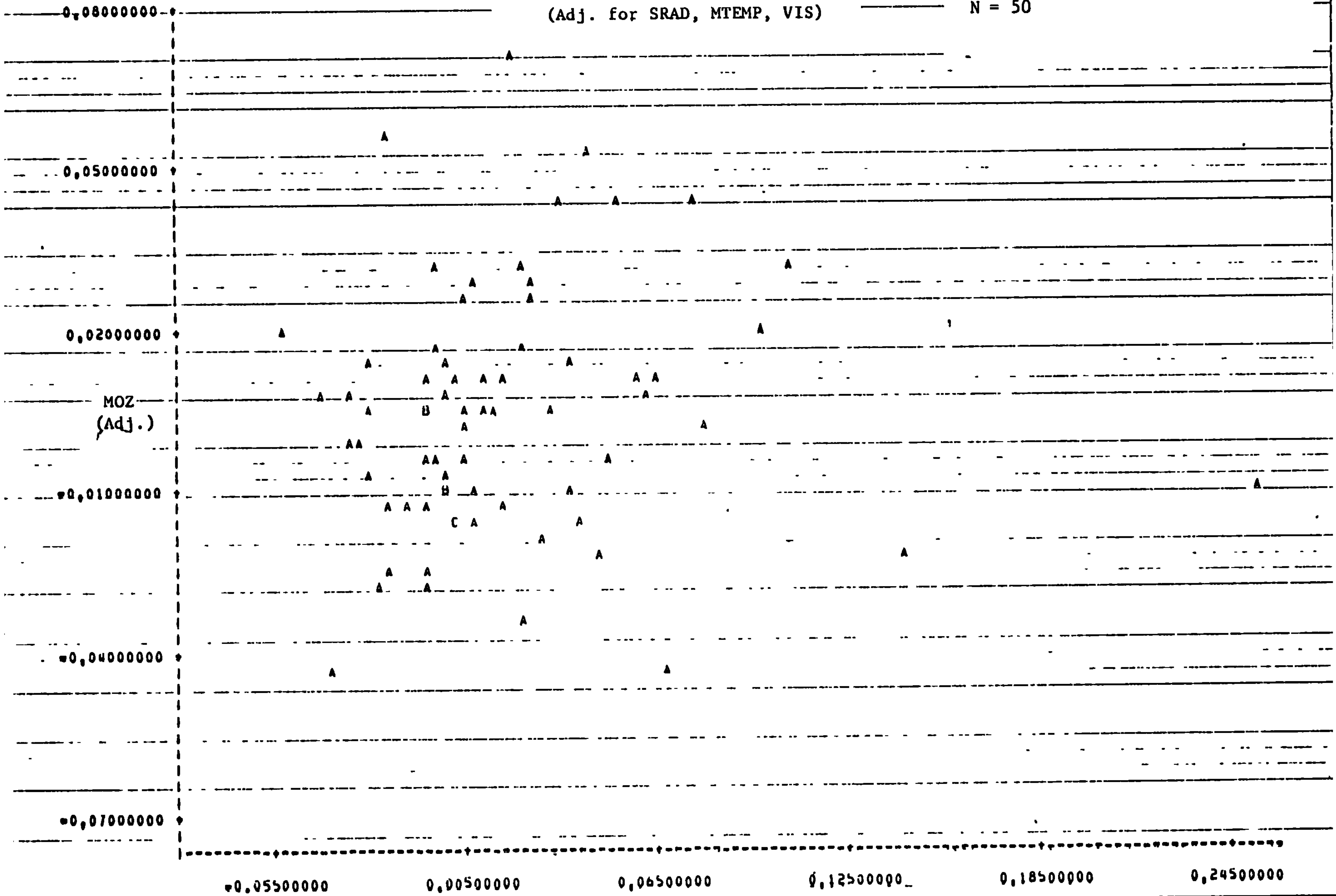
PLOT OF MOZ VS NO_2 (6-9)

(Adj. for SRAD, MTEMP, VIS)

May through October, 1973

Corr. = .08

N = 50



LEGEND: A = 1 OBS, B = 2 OBS, ETC.

NO_2 (Adj.)

Appendix F

Listing of Data

Appendix F: Listing of Data

A listing of a majority of the data analyzed in this report is given on the following pages. The data listing gives (a) May thru October data for AZU (Station = 1) and DOLA (Station = 2) for the two years 1972 and 1968; (b) May thru October data for BETH (Station = 3), HYAT (Station = 4), SISP (Station = 5) and SUIT (Station = 6) for the year 1973. The definitions of the various variables for which data is listed are given in Tables 3 and 4 of this report. Missing data values are indicated by blanks.

Data Listing (May thru October, 1972)

Station=1=AZU

OBS	YR/MO/DAY DATE	STATION	NOX	NO (6-9)	NO_2 (6-9)	THC (6-9)	MTEMP	SRAD	AWS	RH	VIS	DPT	WS
1	720501	1	.26	.083	.130	5.000	69	643	8.2	66	7	57	10
2	720502	1	.23	.073	.113	5.000	67	666	7.9	73	3	56	7
3	720503	1	.15	.063	.127	4.667	66	606	7.8	68	4	53	4
4	720504	1	.09	.010	.030	3.000	64	476	6.1	65	10	52	10
5	720505	1	.05	.010	.027	3.000	64	505	9.8	65	8	52	9
6	720506	1	.05	.013	.050	3.000	66	490	9.1	70	10	52	11
7	720507	1	.06	.013	.037	3.000	68	607	9.1	55	25	51	14
8	720508	1	.10	.020	.037	3.000	68	654	7.5	55	20	51	11
9	720509	1	.10	.033	.080	3.333	67	689	6.5	59	15	52	12
10	720510	1	.17	.010	.050	3.000	70	615	5.1	57	7	54	12
11	720511	1	.32	.043	.107	4.667	70	673	7.5	66	5	58	13
12	720512	1	.27	.070	.147	5.333	71	675	8.3	76	5	59	8
13	720513	1	.26	.027	.137	4.000	69	650	7.4	78	4	59	8
14	720514	1	.24	.047	.210	5.333	69	677	7.5	76	1	60	10
15	720515	1	.18	.040	.140	4.333	68		8.5	68	3	57	11
16	720516	1	.16	.010	.067	4.000	68		7.3	66	7	55	9
17	720517	1	.11	.013	.057	3.000	68	537	9.8	55	6	51	12
18	720518	1	.04	.017	.040	4.000	68	379	7.4	61	15	54	10
19	720519	1	.04	.010	.037	2.667	63	528	7.5	55	25	41	8
20	720520	1	.04	.010	.027	2.333	67		5.9	62	12	45	8
21	720521	1	.07	.010	.033	3.000	67		10.5	59	50	50	11
22	720522	1	.15	.033	.060	3.333	70		6.1	55	15	53	11
23	720523	1	.13	.017	.053	3.333	70	642	7.0	64	6	57	5
24	720524	1	.07	.010	.023	3.000	68	342	5.3	66	10	56	8
25	720525	1	.04	.010	.030	3.000	65	430	9.5	65	12	53	13
26	720526	1	.19	.023	.053	3.000	67	584	10.5	61	8	53	14
27	720527	1	.17	.020	.123	4.000	79	450	6.2	39	5	52	2
28	720528	1	.15	.010	.020	3.000	83	681	9.6	59	20	58	14
29	720529	1	.18	.017	.043	3.000	81	642	2.2	66	10	61	12
30	720530	1	.18	.020	.063	3.333	76	635	5.7	64	4	63	10
31	720531	1	.28	.063	.110	5.000	72		7.6	71	6	62	11
32	720601	1	.33	.030	.120	4.000	72		7.0	66	5	60	11
33	720602	1	.19	.033	.087	4.000	71		6.5	71	3	61	6
34	720603	1	.20	.010	.047	3.000	69		8.2	73	3	60	12
35	720604	1	.31	.013	.077	4.000	70		7.7	76	1	60	12
36	720605	1	.21	.033	.110	4.000	72		5.3	66	5	60	7
37	720606	1	.14	.027	.100	4.067	69		7.7	84	2	63	4
38	720607	1	.12	.023	.043	4.333	68		6.9	97	3	64	6
39	720608	1	.07	.023	.060	4.000	68		8.2	76	10	60	10
40	720609	1	.04	.047	.057	4.000	69	247	7.3	81	10	59	7
41	720610	1	.14	.020	.027	3.000	70	703	11.6	66	20	58	14
42	720611	1	.23	.017	.043	3.000	76	665	6.9	47	15	54	11
43	720612	1	.21	.033	.100	4.000	75	692	7.2	64	15	62	11
44	720613	1	.14	.030	.080	4.000	74	642	6.3	64	12	59	9
45	720614	1	.23		.077	3.333	71	654	8.9	64	10	58	14
46	720615	1	.19			3.500	72	651	9.6	71	10	60	10
47	720616	1	.22		.080	4.000	72	594	6.5	60	12	60	9
48	720617	1	.19		.027	3.000	73	386	7.1	66	5	61	11
49	720618	1	.14		.010	3.667	72	493	10.7	60	12	59	13
50	720619	1	.22	.027	.070	3.067	70	501	10.6	66	6	58	12
51	720620	1	.15	.053	.073	4.067	76		7.6	60	5	61	9
52	720621	1	.21	.023	.100	5.067	72		8.7	66	12	60	8
53	720623	1	.08	.020	.017	4.333	69		11.6	68	25	58	13

STATION=1

OBS	DATE	STATION	MOX	NO (6–9)	NO_2 (6–9)	THC (6–9)	MTEMP	SRAD	AWS	RH	VIS	DPT	WS
54	720624	1	.13	.010	.030	3.333	70		8.0	64	20	57	12
55	720625	1	.12	.010	.010	2.667	71		5.5	55	15	54	12
56	720626	1	.18	.020	.040	3.667	71		9.7	57	8	55	11
57	720627	1	.23	.053	.113	4.333	69		11.1	76	6	58	11
58	720628	1	.40	.067	.147	6.333	73		7.8	69	4	62	8
59	720630	1	.18	.047	.077	4.000	77		2.9	79	3	62	6
60	720701	1	.24	.020	.067	5.000	72		6.5	66	4	60	10
61	720702	1	.25	.020	.053	4.667	70		9.6	66	5	58	11
62	720703	1	.31	.033	.070	4.000	69		10.2	68	6	58	11
63	720704	1	.31	.027	.093	4.333	71		10.3	68	12	59	8
64	720705	1	.32	.107	.120	5.667	72		7.0	64	12	58	8
65	720706	1	.29	.073	.130	4.667	74		8.6	62	15	59	11
66	720707	1	.28	.070	.150	5.000	74		6.4	69	5	63	10
67	720708	1	.13	.050	.123	4.000	78		7.0	74	5	64	8
68	720709	1	.17	.040	.103	3.667	73		7.0	69	6	62	6
69	720710	1	.25	.053	.107	4.000	72		7.8	68	4	61	14
70	720711	1	.47	.037	.120	4.333	75		6.4	66	8	63	12
71	720712	1	.36	.053	.110	4.000	71	...	7.1	73	5	62	10
72	720713	1	.49	.050	.150	5.000	71	613	9.4	71	3	61	11
73	720715	1	.16	.020	.047	3.000	77	524	6.2	60	12	64	13
74	720716	1	.19	.020	.050	3.000	76	711	7.3	67	8	63	9
75	720719	1	.11	.020	.040	3.000	72	519	8.6	66	25	60	10
76	720722	1	.23	.020	.063	3.000	74	721	9.2	54	10	61	13
77	720723	1	.25	.017	.077	3.333	75	740	8.6	66	10	63	9
78	720724	1	.20	.060	.130	4.333	76	727	8.3	69	6	64	8
79	720725	1	.26	.050	.127	3.667	76	714	8.0	60	14	61	10
80	720726	1	.25	.043	.127	4.000	79	717	7.4	52	10	60	11
81	720727	1	.17	.063	.177	4.000	83	718	7.3	51	10	63	9
82	720728	1	.37	.087	.163	4.333	77	633	5.6	62	12	53	7
83	720729	1	.20	.040	.130	4.333	80	604	8.6	56	20	61	6
84	720730	1	.31	.020	.113	4.333	80	682	10.3	58	12	64	9
85	720731	1	.27	.023	.133	3.667	81	686	7.3	58	25	62	13
86	720801	1	.32	.037	.133	4.000	81	674	6.8	51	10	60	12
87	720802	1	.12	.053	.147	4.333	78	714	6.1	67	6	66	9
88	720803	1	.13	.023	.043	3.000	75	542	5.2	62	8	61	11
89	720804	1	.20	.010	.027	3.000	75	604	6.6	66	7	63	11
90	720805	1	.20	.037	.147	4.000	75	658	9.7	71	6	63	9
91	720806	1	.19	.033	.107	4.000	66	618	8.5	54	10	62	9
92	720807	1	.14			3.333	77	635	6.3	71	10	67	8
93	720808	1	.16	.043	.060	3.333	75	610	7.4	74	10	65	12
94	720809	1	.12	.030	.067	3.333	77	535	7.3	64	10	64	8
95	720810	1	.24	.060	.080	3.667	76	552	8.0	71	5	66	11
96	720811	1	.22	.033	.060	4.000	75	532	8.2	76	3	67	12
97	720812	1	.12	.017	.020	3.000	74	315	4.9	76	10	66	13
98	720813	1	.09			3.000	74	308	8.7	74	10	65	8
99	720814	1	.13			3.333	74	590	10.0	66	10	62	13
100	720815	1	.16				74	590	7.6	64	7	61	13
101	720816	1	.15	.037	.077	4.000	74	609	7.2	60	20	59	11
102	720817	1	.12	.067	.117	4.333	77	569	5.8	56	7	61	4
103	720818	1	.09	.010	.020	3.000	73	441	6.0	66	12	61	11
104	720819	1	.12	.010	.023	3.000	74	538	5.6	60	15	59	11
105	720820	1	.17	.013	.060	3.000	76	580	7.0	60	10	61	12
106	720821	1	.28	.027	.097	3.667	82	606	6.7	47	12	60	10

STATION=1

OBS	DATE	STATION	MOX	NO (6-9)	NO_2 (6-9)	THC (6-9)	MTEMP	SRAD	AWS	RH	VIS	DPT	WS
107	720822	1	.24	.040	.110	3.333	88	603	7.6	46	20	61	12
108	720823	1	.14	.010	.063	3.667	62	543	5.3	56	12	65	9
109	720824	1	.04	.020	.030	3.000	73		5.6	69	12	62	10
110	720825	1	.11	.013	.027	3.333	75	450	5.7	62	15	61	12
111	720826	1	.14	.047	.067	3.667	73	460	8.6	74	7	64	9
112	720827	1	.15	.020	.047	3.000	73	366	7.8	74	4	64	11
113	720828	1	.20	.057	.120	3.667	74	565	7.9	74	5	65	11
114	720829	1	.10	.050	.097	4.000	86		5.8	48	5	64	11
115	720830	1	.16	.017	.050	3.333	88	404	3.7	52	6	68	5
116	720831	1	.25	.063	.117	4.333	78	549	10.0	69	15	67	9
117	720901	1	.19	.027	.053	4.000	74	357	7.9	71	4	64	13
118	720902	1	.16	.043	.093	4.000	76	503	8.4	66	10	63	10
119	720903	1	.12	.043	.067	4.000	73	256	4.9	79	15	66	9
120	720904	1	.18	.013	.023	3.000	83	490	6.9	62	25	65	14
121	720905	1	.09	.043	.043	3.567	86	373	2.8	46	20	63	6
122	720906	1	.08	.020	.020	3.667	77	504	7.2	74	15	68	9
123	720907	1	.08	.040	.043	4.333	72	323	7.7	79	10	65	9
124	720908	1	.13	.043	.033	4.333	71	290	9.0	79	8	64	12
125	720909	1	.08	.020	.033	5.000	73	334	9.0	71	10	63	11
126	720910	1	.05			3.333	71	299	9.8	73	12	61	10
127	720911	1	.07			5.333	72	539	11.0	61	20	57	10
128	720912	1	.15	.040	.080	4.000	73	568	7.5	50	12	53	12
129	720913	1	.20	.067	.113	3.333	72	572	7.5	62	15	58	11
130	720914	1	.19	.063	.150	5.000	71	519	7.6	66	8	59	12
131	720915	1	.23	.093	.130	5.667	71	464	6.0	68	4	60	10
132	720916	1	.27	.050	.127	5.000	70	467	8.7	66	6	58	9
133	720917	1	.20	.030	.067	4.000	70	431	6.0	66	8	58	8
134	720918	1	.12	.043	.067	3.333	72	541	10.2	59	20	57	11
135	720919	1	.07	.023	.037	3.000	73	530	9.4	61	15	57	10
136	720920	1	.19	.087	.077	3.333	76	550	7.5	60	10	61	12
137	720921	1	.13	.017	.060	3.000	86	523	6.4	42	5	55	12
138	720922	1	.23	.110	.133	4.333	76	471	5.9	60	6	64	9
139	720923	1	.13	.037	.087	3.000	73	488	3.9	66	10	61	12
140	720924	1	.05	.010	.010	2.000	72	250	3.2	64	14	59	7
141	720925	1	.09	.013	.027	2.667	74	406	7.4	58	10	58	11
142	720926	1	.14	.017	.060	3.000	73	429	8.0	64	8	60	11
143	720927	1	.16	.033	.073	4.000	72	318	5.1	68	6	61	10
144	720928	1	.12	.070	.083	4.333	73	406	5.5	71	30	63	12
145	720929	1	.23			4.333	73	355	8.0	76	13	65	11
146	720930	1	.22	.043	.100	5.333	75	469	8.1	71	10	65	9
147	721001	1	.00	.030	.030	3.333	73	412	9.5	68	15	61	8
148	721002	1	.02	.010	.010	2.667	72	443	4.6	81	13	57	5
149	721003	1	.02	.080	.047	4.667	71	265	5.0	78	6	59	3
150	721004	1	.11	.020	.047	3.333	72	425	8.1	62	20	58	15
151	721005	1	.06	.010	.050	3.333	85	306	3.8	37	8	53	5
152	721006	1	.09	.050	.050	4.000	93	415	8.0	21	40	48	9
153	721007	1	.03	.010	.023	3.000	73	201	5.7	76	7	62	10
154	721008	1	.03	.037	.047	4.000	69	106	7.0	78	10	60	8
155	721009	1	.03	.070	.043	4.000	73	323	8.3	51	15	54	10
156	721010	1	.06			3.000	73	320	5.0	53	20	55	10
157	721011	1	.08	.037	.073	3.000	73	418	5.2	59	20	58	11
158	721013	1	.08	.077	.067	3.000	75	423	5.5	54	30	57	9
159	721014	1	.05	.027	.060	3.667	74	314	3.8	59	35	58	9

STATION=1

OBS	DATE	STATION	MOX	NO (6-9)	NO_2 (6-9)	THC (6-9)	HTEMP	SRAD	AWS	RH	VIS	DPT	WS
160	721015	1	.06	.010	.030	3,000	73	424	5.5	57	40	57	9
161	721016	1	.04	.027	.050	3,000	71	255	4.3	66	10	56	3
162	721017	1	.06	.127	.077	4,333	70	164	4.5	64	10	57	8
163	721018	1	.03	.030	.050	3,667	70	128	4.5	70	5	56	6
164	721019	1	.05	.027	.033	3,667	69	392	7.6	71	15	59	12
165	721020	1	.02	.010	.023	2,667	66	173	6.2	70	10	56	11
166	721021	1	.10	.043	.050	3,000	70	364	5.9	66	10	58	11
167	721022	1	.14	.027	.070	3,000	69	343	5.0	71	4	59	9
168	721023	1	.16	.057	.107	4,000	70	272	4.9	73	4	61	10
169	721024	1	.15				69	301	6.3	76	4	61	9
170	721025	1	.06	.073	.097	4,667	72	373	7.4	68	7	60	13
171	721026	1	.03	.023	.050	3,000	68	106	0.2	75	3	57	3
172	721027	1	.04	.050	.037	3,667	65	69	0.8	70	2	53	4
173	721028	1	.00	.023	.047	3,000	69	353	7.0	66	10	57	11
174	721029	1	.06	.013	.023	3,000	73	368	11.5	18	15	27	16
175	721030	1	.03	.010	.010	2,000	70	380	7.9	15	40	11	10
176	721031	1	.04	.047	.043	3,000	70	349	3.3	16	15	17	4

Station=2=DOLA

OBS	DATE	STATION	MOX	NO (6-9)	NO_2 (6-9)	THC (6-9)	HTEMP	SRAD	AWS	RH	VIS	DPT	WS
1	720501	2	.11		.060	5,000	69	603	8.2	70	3	57	7
2	720502	2	.06	.107	.087	5,000	67	666	7.9	73	3	56	7
3	720503	2	.09	.033	.067	4,000	66	606	7.8	63	10	53	12
4	720504	2	.05	.043	.063	3,000	64	876	6.1	73	10	53	10
5	720505	2	.04	.060	.060	3,000	64	565	9.8	65	8	52	9
6	720506	2	.06	.010	.033	2,000	66	490	9.1	59	12	51	15
7	720507	2	.06	.010	.013	2,000	66	607	9.1	65	20	50	9
8	720508	2	.08	.090	.073	3,000	68	654	7.5	65	20	53	12
9	720509	2	.07	.073	.073	4,000	67	689	6.5	59	15	52	12
10	720510	2	.11	.093	.060	3,000	70	615	5.1	57	7	54	12
11	720511	2	.13	.210	.160	4,000	70	673	7.5	68	4	58	7
12	720512	2	.17	.260	.185	6,000	71	675	8.3	76	5	59	8
13	720513	2	.25	.103	.163	5,667	69	650	7.4	68	4	58	10
14	720514	2	.20	.050	.090	4,333	69	677	7.5	66	4	58	10
15	720515	2	.10	.077	.100	4,000	68		8.5	70	3	57	8
16	720516	2	.08	.083	.077	3,000	68		7.3	66	7	55	9
17	720517	2	.09	.043	.053	3,000	68	537	9.8	55	6	51	12
18	720518	2	.04	.047	.057	3,000	68	379	7.4	61	15	54	10
19	720519	2	.03	.030	.027	2,667	63	528	7.5	53	20	41	5
20	720520	2	.05	.027	.037	2,067	67		5.9	49	40	47	10
21	720521	2	.05	.020	.050	3,000	67		10.5	59	50	50	11
22	720522	2	.09	.097	.043	3,333	70		6.1	63	10	56	8
23	720523	2	.07	.093	.073	3,333	70	642	7.0	64	8	57	5
24	720524	2	.04	.030	.073	3,000	68	342	5.3	66	10	56	8
25	720525	2	.04	.050	.027	3,000	65	430	9.5	65	12	55	13
26	720526	2	.08	.090	.080	3,000	67	584	10.5	70	6	54	7
27	720529	2	.24	.013	.033	2,333	67	642	2.2	51	12	61	8
28	720530	2	.16	.067	.113	3,667	81	655	5.7	64	4	63	10
29	720531	2	.12	.335	.160	5,667	76		7.6	71	6	61	9
30	720601	2	.16	.125	.150	4,000	72		7.0	68	4	61	8
31	720602	2	.08	.100	.115	4,000	71		8.5	71	3	61	6

STATION=2

OBS	DATE	STATION	NOX	NO (6-9)	NO_2 (6-9)	THC (6-9)	MTEMP	SRAD	AWS	RH	VIS	DPT	WS
32	720603	2	,13	,053	,073	3,000	69		8,2	73	3	60	12
33	720604	2	,17	,027	,110	3,000	70		7,7	71	2	60	9
34	720605	2	,21	,063	,173	4,000	72		5,5	66	5	60	7
35	720606	2	,10	,040	,087	4,000	69		7,7	64	2	63	4
36	720607	2	,04	,087	,093	4,000	68		6,9	87	6	63	10
37	720608	2	,04	,100	,057	3,667	68		8,2	78	7	61	5
38	720609	2	,03	,090	,096	3,333	69	247	7,3	81	10	59	7
39	720610	2	,06	,020	,040	2,000	70	703	11,6	66	20	58	9
40	720611	2	,18	,017	,057	3,000	76	665	6,9	58	6	58	10
41	720612	2	,12	,120	,220	4,667	75	692	7,2	66	8	62	9
42	720613	2	,07	,107	,100	3,000	74	642	6,3	58	8	58	6
43	720614	2	,10	,033	,137	3,667	71	654	8,9	66	6	57	4
44	720615	2	,05	,120	,183	4,000	72	651	9,6	71	10	60	10
45	720616	2	,09	,067	,110	3,000	72	594	6,5	68	8	61	12
46	720617	2	,14	,027	,050	3,000	73	366	7,1	73	5	59	4
47	720618	2	,11	,010	,033	3,000	72	493	10,7	66	5	59	9
48	720619	2	,09	,040	,090	3,000	70	501	10,6	68	6	58	7
49	720620	2	,07			3,667	76		7,6	60	5	61	9
50	720621	2	,07	,077	,127	3,667	72		8,7	66	12	60	8
51	720622	2	,02	,103	,067	3,000	67		6,9	76	20	57	6
52	720623	2	,05	,037	,050	3,000	69		11,6	68	15	58	12
53	720624	2	,06		,057	3,000	70		8,0	64	20	57	12
54	720625	2	,07		,010	2,000	71		5,5	51	15	51	3
55	720626	2	,08	,080	,120	3,500	71		9,7	59	7	55	10
56	720627	2	,10	,100	,130	3,667	69		11,1	68	3	57	14
57	720628	2	,12	,163	,170	5,000	69		9,4	73	3	58	13
58	720629	2	,14	,163	,253	4,667	73		7,8	69	4	62	8
59	720630	2	,11	,087	,110	4,000	77		2,9	62	4	63	5
60	720701	2	,19	,033	,070	3,000	72		6,5	71	3	60	4
61	720702	2	,11	,023	,050	3,000	70		9,6	81	3	59	9
62	720703	2	,10	,050	,075	3,000	69		10,2	73	5	58	9
63	720704	2	,11	,030	,083	3,333	71		10,3	64	20	58	16
64	720705	2	,09	,123	,120	4,667	72		9,0	64	12	58	8
65	720706	2	,10		,103	5,000	74		8,6	60	15	59	8
66	720707	2	,17	,105	,075	5,000	74		6,4	71	5	62	10
67	720708	2	,10	,080	,090	4,333	78		7,0	62	12	64	8
68	720709	2	,17	,040	,055	3,000	73		7,0	66	7	61	10
69	720710	2	,18	,083	,147	4,667	72		7,8	68	4	61	14
70	720711	2	,20	,130	,205	5,333	75		8,4	69	7	62	9
71	720712	2	,16	,090	,130	4,000	71		7,1	73	5	62	10
72	720713	2	,13	,087	,133	4,000	71	613	9,4	71	3	61	11
73	720714	2	,08	,070	,073	3,000	77	464	2,3	64	5	64	9
74	720715	2	,09	,013	,030	2,000	79	524	6,2	60	12	64	13
75	720716	2	,10	,013	,047	3,000	76	711	7,3	64	8	63	9
76	720717	2	,08	,067	,060	3,000	75	705	7,1	71	15	64	10
77	720718	2	,05	,073	,057	3,000	74	676	10,6	64	20	60	8
78	720719	2	,04	,040	,030	3,000	72	519	8,6	66	25	60	10
79	720720	2	,03	,020	,050	3,000	72	447	9,9	64	25	59	12
80	720721	2	,06	,033	,040	2,500	73	629	9,8	62	25	58	14
81	720722	2	,17	,017	,107	3,667	74	721	9,2	64	10	61	13
82	720723	2	,15	,020	,137	5,000	75	740	8,6	66	10	63	9
83	720724	2	,20	,097	,287	6,667	76	727	8,3	69	6	64	8
84	720725	2	,19	,073	,177	4,667	76	714	8,0	66	6	63	10

STATION=2

OBS	DATE	STATION	NOX	NO (6-9)	NO_2 (6-9)	THC (6-9)	MTEMP	SRAD	AWS	RH	VIS	DPT	WS
85	720726	2	.23	.077	.197	5.000	79	717	7.4	62	7	63	6
86	720727	2	.20	.120	.293	6.667	83	718	7.3	51	10	63	9
87	720728	2	.20	.167	.323	8.333	77	633	5.6	62	15	61	13
88	720729	2	.13	.073	.123	4.000	80	604	6.6	56	20	61	8
89	720730	2	.21	.063	.203	5.333	80	602	10.3	58	12	64	9
90	720731	2	.16	.123	.253	6.333	81	686	7.3	54	12	63	7
91	720801	2	.21	.127	.250	5.333	81	694	6.8	58	6	65	10
92	720802	2	.06	.073	.123	3.667	78	714	6.1	79	7	64	7
93	720803	2	.10	.063	.050	3.000	75	542	5.2	71	7	60	4
94	720804	2	.10	.053	.097	3.000	75	504	5.6	66	4	62	7
95	720805	2	.11	.033	.117	4.000	75	658	9.7	71	6	63	9
96	720806	2	.09	.027	.097	3.067	80	618	8.5	54	10	62	9
97	720807	2	.10	.123	.137	4.333	77	635	6.3	74	6	68	8
98	720808	2	.10	.100	.100	3.667	75	610	7.4	74	10	66	9
99	720809	2	.09	.150	.095	4.000	77	535	7.3	76	7	65	9
100	720810	2	.12	.143	.173	4.000	76	552	8.0	71	5	66	11
101	720811	2	.15	.083	.153	4.000	75	532	8.2	79	2	69	7
102	720812	2	.10	.027	.050	3.000	74	315	4.9	84	4	68	5
103	720813	2	.05	.037	.047	3.000	74	308	8.7	74	10	65	8
104	720814	2	.08	.053	.077	3.000	74	590	10.0	69	8	62	7
105	720815	2	.10	.093	.097	3.333	74	590	7.8	64	6	65	9
106	720816	2	.11	.153	.147	4.000	74	609	7.2	60	10	59	9
107	720817	2	.09	.127	.113	4.000	77	569	5.8	58	7	61	4
108	720818	2	.05	.063	.063	3.000	73	441	6.0	59	15	57	6
109	720819	2	.10	.030	.043	2.000	74	538	5.6	59	12	57	4
110	720820	2	.11	.090	.123	3.067	76	500	7.0	69	8	62	9
111	720821	2	.24	.180	.217	4.000	82	606	6.7	60	4	64	8
112	720822	2	.25	.203	.290	6.000	88	603	7.6	59	5	60	5
113	720823	2	.10	.143	.170	4.667	82	543	5.3	56	7	64	10
114	720824	2	.04	.027	.060	3.000	73		5.6	69	12	62	10
115	720825	2	.07	.060	.073	3.000	75	450	5.7	66	12	61	4
116	720826	2	.09	.053	.067	3.333	73	460	8.6	74	7	64	9
117	720827	2	.11	.037	.050	3.000	73	366	7.8	74	4	64	11
118	720828	2	.18	.100	.173	4.000	74	565	7.9	76	4	66	9
119	720829	2	.20	.147	.217	5.000	86		5.8	67	12	66	9
120	720830	2	.12	.100	.097	3.333	88	484	3.7	52	6	68	5
121	720831	2	.07	.087	.120	3.000	78	549	10.0	69	15	67	9
122	720901	2	.11	.103	.093	3.000	74	357	7.9	71	4	64	13
123	720902	2	.08	.050	.077	3.000	76	503	6.4	66	10	63	10
124	720903	2	.07	.057	.077	4.000	73	256	4.9	79	15	66	9
125	720904	2	.15	.067	.077	3.333	63	490	6.9	51	10	63	3
126	720905	2	.06	.123	.103	3.333	66	373	2.8	55	15	67	7
127	720906	2	.05	.053	.057	3.000	77	504	7.2	74	15	68	9
128	720907	2	.07	.063	.060	3.000	72	323	7.7	79	10	65	9
129	720908	2	.07	.073	.080	3.000	71	290	9.0	79	8	64	12
130	720909	2	.07	.020	.053	2.333	73	354	9.0	71	10	63	11
131	720910	2	.05	.010	.030	2.000	71	249	9.8	73	12	61	10
132	720911	2	.04	.033	.053	2.000	72	539	11.0	61	20	57	10
133	720912	2	.10	.113	.120	3.333	73	568	7.5	57	10	56	8
134	720913	2	.10	.167	.183	5.333	72	572	7.5	66	7	60	7
135	720914	2	.10	.143	.167	4.333	71	519	7.6	71	7	59	7
136	720915	2	.15	.123	.105	4.000	71	404	6.0	73	2	59	3
137	720916	2	.14	.020	.075	3.000	70	407	8.7	73	3	59	5

STATION=2

OBS	DATE	STATION	NOX	NO (6-9)	NO_2 (6-9)	THC (6-9)	MTEMP	SRAD	AWS	RH	VIS	DPT	MS
138	720917	2	,09	,010	,055	3,000	70	431	6,0	73	5	58	5
139	720918	2	,07	,035	,070	3,000	72	541	10,2	61	12	56	8
140	720919	2	,04	,110	,083	3,333	73	530	9,4	75	12	57	3
141	720921	2	,17	,153	,143	4,000	66	523	6,4	30	7	51	7
142	720922	2	,23	,183	,180	6,000	76	471	5,9	74	5	64	11
143	720923	2	,08	,070	,113	3,333	73	468	3,9	66	7	60	7
144	720924	2	,05	,010	,040	3,000	72	250	3,2	64	14	59	7
145	720925	2	,08	,090	,097	4,333	74	466	7,4	58	10	58	11
146	720926	2	,10	,130	,150	4,067	73	429	6,0	64	8	60	11
147	720927	2	,08	,057	,133	4,000	72	318	5,1	71	5	60	3
148	720928	2	,06	,140	,097	4,333	73	406	5,5	76	10	63	3
149	720929	2	,10	,243	,140	5,000	73	355	8,0	79	6	64	6
150	720930	2	,15	,197	,203	6,000	75	469	8,1	76	4	66	7
151	721001	2	,03	,013	,040	3,000	73	412	9,5	68	15	61	8
152	721002	2	,02	,047	,073	4,000	72	443	4,6	57	20	55	12
153	721003	2	,03	,220	,063	5,667	71.	265	5,0	68	25	58	10
154	721004	2	,06	,160	,150	4,667	72	425	8,1	66	8	59	9
155	721005	2	,11	,107	,110	4,333	85	386	3,8	39	8	57	10
156	721006	2	,09	,400	,203	6,333	93	415	8,0	26	30	51	4
157	721010	2	,04		,083	4,000	73	320	5,0	64	15	57	5
158	721011	2	,07	,187	,107	3,000	73	418	5,2	53	13	54	4
159	721013	2	,07	,193	,123	4,067	75	423	5,5	55	12	55	6
160	721014	2	,02	,053	,030	3,333	74	314	3,6	75	30	53	5
161	721015	2	,07	,013	,027	3,000	73	424	5,5	66	40	59	13
162	721016	2	,03	,163	,080	4,000	71	255	4,3	66	10	56	3
163	721017	2	,03	,157	,077	4,000	70	164	4,5	63	7	55	4
164	721020	2	,02	,133	,060	3,000	66	173	6,2	70	10	56	11
165	721021	2	,11			2,667	70	364	5,9	66	10	58	11
166	721022	2	,15			2,667	69	343	5,0	76	2	59	5
167	721023	2	,10			5,667	70	272	4,9	73	4	61	10
168	721024	2	,11	,095	,140	4,000	69	301	6,3	73	2	60	2
169	721025	2	,03	,273	,103	3,333	72	373	7,4	44	7	49	6
170	721026	2	,03	,183	,097	3,000	68	106	0,2	75	3	57	3
171	721027	2	,02	,230	,107	3,000	65	69	0,8	84	2	55	6
172	721028	2	,00	,133		2,667	69	353	7,0	70	5	56	6
173	721029	2	,03	,063	,057	1,667	73	368	11,5	87	4	52	5
174	721030	2	,01	,027	,037	1,000	70	380	7,9	15	40	11	10
175	721031	2	,04	,200	,053	2,333	70	349	3,3	16	15	17	4

Data Listing (May thru October, 1968)

Station=1=AZU

OBS	YR/MO/DAY DATE	STATION	MOX	NO (6-9)	NO_2 (6-9)	THC (6-9)	MTEMP	SRAD	AWS	RH	VIS	OPT	WS
1	680501	1	,14	,027	,010	3,000	69	477	2,2		3	54	7
2	680502	1	,12	,020	,010	2,333	66	385	4,6		5	55	6
3	680503	1	,07	,027	,010	2,500	65	462	9,5		6	54	8
4	680504	1	,16	,040	,010	3,000	68	572	9,6		7	52	8
5	680505	1	,06	,010	,010	2,000	63	364	7,8		9	53	5
6	680506	1	,12	,020	,010	2,000	67	678	9,0		7	51	5
7	680507	1	,16	,040	,023	2,333	68	534	4,6		5	52	5
8	680508	1	,09	,023	,010	2,333	66	390	7,6		4	53	6
9	680509	1	,10	,033	,010	2,333	66	707	8,5		12	52	3
10	680510	1	,12	,010	,010	2,000	66	563	6,1		10	51	4
11	680511	1	,06	,020	,010	2,000	68	442	8,9		7	52	3
12	680512	1	,04	,010	,010	2,000	64	658	10,7		10	46	6
13	680513	1	,03	,023	,010	2,000	63	615	9,3		12	44	8
14	680514	1	,07	,010	,010	2,000	65	774	10,1		20	46	4
15	680515	1	,16	,030	,013	2,000	68	762	7,4		7	47	5
16	680517	1	,32	,093	,017	3,333	70	714	7,1		3	56	6
17	680518	1	,25	,080	,010	4,000	75	732	5,3		4	57	5
18	680519	1	,30	,097	,017	4,000	73	677	6,4		5	59	3
19	680520	1	,10	,063	,020	3,000	72	722	7,5		4	59	6
20	680521	1	,06	,023	,027	2,000	70	682	10,6		8	55	8
21	680522	1	,06	,027	,017	2,000	69	750	9,1		12	54	6
22	680523	1	,09	,013	,010	2,000	67	728	8,1		5	53	8
23	680524	1	,14	,023	,010	2,000	69	767	6,9		6	53	7
24	680525	1	,22	,053	,010	3,000	73	762	6,7		5	52	4
25	680526	1	,28	,033	,010	3,000	80	769	7,0		8	55	4
26	680527	1	,24	,103	,023	3,667	82	761	5,7		6	55	7
27	680528	1	,19	,073	,027	3,333	78	736	3,6		5	59	9
28	680529	1	,21	,057	,017	2,333	72	650	6,4		4	56	6
29	680530	1	,12			2,000	69	293	6,6		7	55	4
30	680531	1	,20			2,000	71	657	8,0		6	56	5
31	680601	1	,32			3,000	70	663	6,7		3	57	0
32	680602	1	,30	,067	,010	3,067	70	632	6,9		1	58	4
33	680603	1	,24	,033	,010	3,000	72	545	5,6		1	59	3
34	680604	1	,07	,067	,017	3,000	66		4,5		4	58	6
35	680605	1	,05	,030	,010	2,000	69		8,9		7	53	11
36	680606	1	,04	,020	,010	2,000	70		6,1		20	48	6
37	680607	1	,02			2,333	68		6,7		8	53	2
38	680608	1	,03	,010	,010	2,000	69		5,9		10	51	5
39	680609	1	,13	,030	,010	2,000	70		10,3		8	53	9
40	680610	1	,28	,060	,010	2,333	73		9,1		6	55	3
41	680611	1	,25	,090	,040	3,067	71		8,5		5	57	4
42	680612	1	,18	,057	,010	3,000	74		5,0		4	57	6
43	680613	1	,29	,060	,010	3,333	72	715	6,3		4	57	5
44	680614	1	,21	,093	,020		74	746	6,6		2	59	6
45	680615	1	,21	,067	,027		77	728	6,2		3	59	4
46	680616	1	,28	,060	,017		73	711	8,1		4	58	4
47	680617	1	,24	,087	,030		68	556	7,9		4	56	4
48	680618	1	,29	,080	,020		71	678	8,6		2	56	5
49	680619	1	,34	,057	,013	4,500	71	734	7,0		2	55	3
50	680620	1	,36	,037	,127	5,000	70	774	8,1		4	58	5
51	680621	1	,44	,017	,110	4,000	72	752	6,5		2	59	4
52	680622	1	,27	,043	,113	4,333	71	524	5,7		1	61	5
53	680623	1	,12	,010	,040	2,000	71	650	6,9		4	59	3

STATION=1

OBS	DATE	STATION	MOX	NO (6-9)	NO_2 (6-9)	THC (6-9)	MTEMP	SRAD	AWS	RH	VIS	DPT	WS
54	680624	1	.15	.010	.020	2.333	70	342	4.4		7	57	11
55	680625	1	.13	.010	.040	2.067	69	304	4.0		3	59	7
56	680626	1	.22	.010	.043	3.000	67	278	9.5		3	58	7
57	680628	1	.13	.010	.033	2.667	67	245	8.1		3	57	6
58	680629	1	.09	.010	.010	2.000	69	613	8.9		4	57	4
59	680630	1	.14	.010	.030	2.000	72	631	3.9		8	55	7
60	680701	1	.25	.010	.073	3.000	67		10.5		3	55	4
61	680702	1	.29	.010	.060	3.000	68	708	8.5		3	55	3
62	680703	1	.26	.010	.043	3.333	72		6.5		3	58	5
63	680704	1	.25		.123	4.000	67	700	9.3		4	59	8
64	680705	1	.29	.010	.083	3.000	68	660	8.5		1	59	4
65	680706	1	.20	.040	.090	4.000	68	195	6.6		3	59	4
66	680707	1	.25	.020	.087	4.000	73	426	7.1		2	60	4
67	680708	1	.19	.010	.050	2.000	73	443	8.3		3	61	3
68	680709	1	.21	.010	.047	3.333	75	719	9.0		3	62	2
69	680710	1	.21	.010	.047	3.000	80	756	6.7		3	59	4
70	680711	1	.30	.013	.063	3.333	78	761	9.0		6	62	2
71	680712	1	.37	.020	.090		75	737	9.0		7	61	6
72	680713	1	.14	.010	.037	2.000	71	722	2.6		5	59	6
73	680714	1	.09	.010	.030	2.000	72	703	3.7		7	57	8
74	680715	1	.13	.013	.027	2.000	73	552	4.0		10	56	9
75	680716	1	.17	.010	.040	2.000	71	686	8.0		2	58	3
76	680717	1	.21	.010	.067	4.000	71	710	8.0		1	59	4
77	680718	1	.34	.017	.077	3.667	68	696	9.1		2	60	4
78	680719	1	.35	.017	.063	3.667	71	673	7.3			60	5
79	680720	1	.20	.013	.040	3.000	76	652	7.5		5	61	4
80	680721	1	.36	.020	.067	3.067	72	677	9.2		2	62	5
81	680722	1	.34	.027	.077	3.667	72	682	7.9		3	61	5
82	680723	1	.20	.040	.090	3.000	76	683	8.1		4	61	3
83	680724	1	.17	.010	.053	2.667	77	658	6.5		6	61	5
84	680725	1	.25	.047	.123	3.333	72	703	8.7		2	60	3
85	680726	1	.26	.020	.117	3.000	74	690	7.6		3	60	5
86	680727	1	.23	.050	.240	5.000	72	539	8.3		10	60	3
87	680728	1	.28	.013	.087	4.000	72	293	8.9		5	62	6
88	680729	1	.22			5.333	80	542	6.4		7	63	2
89	680730	1	.20	.057	.140	3.667	74	655	9.7		10	62	8
90	680731	1	.17	.040	.070	3.000	74	647	7.6		7	60	4
91	680801	1	.25	.010	.047	3.000	77	656	8.1		4	60	5
92	680802	1	.30				73	501	5.2		4	60	5
93	680803	1	.33			3.000	72	631	8.2		2	60	3
94	680804	1	.27			3.000	72	612	10.3		2	59	2
95	680805	1	.25	.015	.065	3.000	71	612	8.4		2	59	3
96	680806	1	.33			3.000	72	626	9.1		3	60	5
97	680807	1	.37	.017	.063	4.000	73	652	10.4		7	61	7
98	680808	1	.25	.050	.087	4.000	71	700	10.8		10	61	7
99	680809	1	.26	.053		4.000	74	685	8.9		7	62	3
100	680810	1	.23	.010	.010	3.000	74	589	8.2		2	61	5
101	680811	1	.22	.017	.050	3.000	74	640	6.1		5	60	6
102	680812	1	.20	.083	.090	3.000	71	446	6.9		5	59	3
103	680813	1	.11	.010	.023	2.000	70	514	9.9		7	59	4
104	680814	1	.15	.010	.023	2.000	73	589	5.7		6	57	6
105	680815	1	.19	.010	.020	2.000	73	566	6.6		4	59	6
106	680816	1	.10	.010	.023	2.333	70	323	7.3		5	59	3

STATION=1

OBS	DATE	STATION	MOX	NO (6-9)	NO_2 (6-9)	THC (6-9)	MTEMP	SRAD	AWS	RH	VIS	DPT	WS
107	680817	1	,11	,010	,010	2,000	73	545	8,3		10	59	5
108	680818	1	,19	,010	,040	2,000	72	518	6,1		6	59	5
109	680819	1	,20	,013	,047	2,667	72	502	8,1		3	59	3
110	680820	1	,07	,020	,057	2,000	73	646	9,8		8	61	6
111	680821	1	,09	,057	,093	3,000	70	702	11,7		15	55	7
112	680822	1	,17	,010	,063	2,000	72	669	7,2		10	55	7
113	680823	1	,16	,010	,027	2,000	90	663	3,6		25	48	5
114	680824	1	,21	,020	,070	3,333	77	625	6,4			61	4
115	680825	1	,20	,013	,103	3,667	75	652	9,6		1	60	6
116	680826	1	,23	,023	,063	3,000	77	582	8,8		9	60	5
117	680827	1	,21			4,000	78	631	6,5		10	55	5
118	680828	1	,38	,017	,207	4,333	77	596	5,9		10	58	5
119	680829	1	,31			5,667	77	571	4,7		1	64	6
120	680830	1	,28	,060	,090	3,000	72	574	8,3		2	62	3
121	680831	1	,22	,040	,107	3,333	69	305	7,7		2	60	5
122	680901	1	,24	,040	,143	3,333	72	496	5,5		2	60	5
123	680902	1	,17	,010	,063	2,000	74	456	2,7		4	61	4
124	680903	1	,07			2,000	71	351	6,3		14	58	4
125	680904	1	,23	,010	,030	2,000	72	394	9,7		5	60	6
126	680905	1	,30	,037	,103	4,333	72	562	7,1		3	60	4
127	680906	1	,39	,023	,100	4,667	75	584	7,2		3	62	4
128	680907	1	,37	,017	,073	3,000	77	583	6,7		4	62	3
129	680908	1	,32	,037	,123	4,000	78	583	6,7		4	62	2
130	680909	1	,32	,010	,080	2,333	80	597	7,3		4	60	4
131	680911	1	,28	,063	,113	4,333	73	606	7,2		5	61	3
132	680912	1	,28	,037	,107	4,000	72	555	6,5		2	60	4
133	680913	1	,19	,013	,070	3,667	73	440	4,5		3	60	3
134	680914	1	,10	,010	,037	2,000	71	349	5,9		12	57	5
135	680915	1	,08	,010	,017	1,000	69	242	5,0		10	58	6
136	680916	1	,21	,010	,050	2,667	74	510	8,5		4	60	6
137	680917	1	,22	,010	,070	3,000	69	402	9,1		4	59	3
138	680918	1	,19	,010	,057	3,000	69	358	7,4		4	59	5
139	680919	1	,04	,010	,013	2,000	68	191	7,5		5	57	7
140	680920	1	,04	,010	,013	2,333	70	501	6,8		6	55	4
141	680921	1	,12	,010	,017		71	532	4,8		6	51	7
142	680922	1	,15	,010	,020		76	551	6,4		5	55	0
143	680923	1	,13	,037	,057		85	561	6,2		12	38	5
144	680924	1	,17	,010	,030	2,333	91	562	4,9		20	32	4
145	680925	1	,17	,037	,063	3,000	87	543	6,7		7	40	3
146	680926	1	,33	,040	,160	6,000	70	496	7,8			60	5
147	680927	1	,24	,060	,137	4,333	70	431	5,1		1	60	3
148	680928	1	,19	,010	,087	3,000	70	337	5,0		2	57	3
149	680929	1	,07	,010	,010	2,000	70	174	3,0		10	56	6
150	680930	1	,04	,010	,027	2,000	68	199	8,1		10	56	8
151	681001	1	,02	,033	,047	3,000	68	134	7,0		8	57	4
152	681002	1	,11	,040	,057	2,667	68	260	5,0		4	56	4
153	681003	1	,05	,027	,057	3,000	70	404	6,7		8	58	6
154	681004	1	,08	,013	,023	3,000	69	243	7,1		2	59	3
155	681005	1	,25	,020	,050	3,000	69	370	5,8		2	56	4
156	681006	1	,14	,010	,040	2,667	67	110	2,7		1	58	4
157	681007	1	,06	,010	,027	2,667	70	381	7,1		4	56	4
158	681008	1	,15	,020	,043	2,667	69	430	8,8		6	57	6
159	681009	1	,15	,047	,093	3,667	69	313	6,0		3	58	3

STATION=1

OBS	DATE	STATION	MOX	NO (6-9)	NO_2 (6-9)	THC (6-9)	MTEMP	SRAD	AWS	RH	VIS	DPT	WS
160	681010	1	.15	.013	.050	2.667	69	284	3.7		4	57	5
161	681011	1	.15	.023	.077	3.000	69	227	3.0		2	57	5
162	681012	1	.18	.010	.013	2.000	69	377	4.2		4	54	4
163	681013	1	.13	.010	.063	2.000	69	367	4.3		1	55	5
164	681014	1	.03	.010	.023	2.000	66	142	4.9		1	59	11
165	681015	1	.09	.010	.027	2.000	75	483	8.2		25	41	15
166	681016	1	.10	.017	.037	2.500	78	451	4.5		15	39	4
167	681017	1	.09	.020	.037	2.667	83	457	4.3		15	39	5
168	681018	1	.11	.043	.070	2.333	77	370	2.6		15	36	3
169	681019	1	.21	.050	.093	4.000	69	383	4.1			58	5
170	681020	1	.19	.040	.093	4.000	67	389	6.3		2	56	2
171	681021	1	.25	.040	.103	5.333	68	374	4.9		1	53	6
172	681022	1	.42	.067	.140	4.333	67	405	6.2			55	3
173	681023	1	.30	.130	.130	5.000	73	394	7.2			56	6
174	681024	1	.14	.010	.047	2.333	90	418	3.2		8	48	6
175	681025	1	.24	.087	.100	4.667	72	308	4.0		1	57	3
176	681026	1	.28	.057	.167	8.333	69	329	5.6			56	5
177	681027	1	.33	.017	.133	5.333	67	366	5.3			57	3
178	681028	1	.22	.190	.173	7.667	66	312	6.6			57	6
179	681029	1	.15	.030	.127	4.333	65	312	2.5		4	54	4
180	681030	1	.04	.030	.033	2.000	68	379	7.3		7	58	9
181	681031	1	.04	.010	.013	2.000	67	206	3.2		7	54	6

Station=2=DOLA

OBS	DATE	STATION	MOX	NO (6-9)	NO_2 (6-9)	THC (6-9)	MTEMP	SRAD	AWS	RH	VIS	DPT	WS
1	680501	2	.06	.040	.087	2.000	69	477	2.2		3	54	7
2	680502	2	.07	.043	.075	2.000	66	385	4.6		5	55	6
3	680503	2	.06	.060	.080	2.000	65	462	9.5		6	54	8
4	680504	2	.09	.020	.037	2.000	68	572	9.6		7	52	8
5	680505	2	.05	.010	.040	2.000	63	364	7.8		9	53	5
6	680506	2	.07	.040	.073	3.000	67	678	9.0		7	51	5
7	680508	2	.07	.100	.083	3.000	66	390	7.6		4	53	6
8	680509	2	.04	.037	.090	3.000	66	707	8.5		12	52	3
9	680510	2	.02	.080	.070	3.000	66	563	6.1		10	51	4
10	680511	2	.02	.010	.010	2.000	68	442	8.9		7	52	3
11	680512	2	.01	.010	.010	2.000	64	658	10.7		10	46	6
12	680513	2	.01	.030	.043	2.667	63	615	9.3		12	44	8
13	680514	2	.02	.050	.070	2.333	65	774	10.1		20	46	4
14	680515	2	.09	.073	.090	3.667	68	762	7.4		7	47	5
15	680516	2	.11	.087	.097	4.000	70	728	5.2		6	53	7
16	680517	2	.24	.153	.203	5.667	70	714	7.1		3	56	6
17	680518	2	.18	.033	.087	4.000	75	732	5.3		4	57	5
18	680519	2	.18	.037	.103	3.067	73	677	6.4		5	59	3
19	680520	2	.10	.063	.080	3.067	72	722	7.5		4	59	6
20	680521	2	.05	.053	.060	3.000	70	682	10.6		8	55	8
21	680522	2	.09	.087	.083	3.000	69	750	9.1		12	54	6
22	680523	2	.07	.060	.053	2.667	67	728	8.1		5	53	8
23	680524	2	.10	.057	.077	3.000	69	767	6.9		6	53	7
24	680525	2	.15	.047	.130	3.667	73	762	6.7		5	52	4
25	680526	2	.20	.067	.120	5.000	80	769	7.0		8	55	4
26	680527	2	.26	.087	.183	4.667	82	761	5.7		6	55	7

STATION=2

OBS	DATE	STATION	MOX	NO (6-9)	NO_2 (6-9)	THC (6-9)	MTEMP	SRAD	AWS	RH	VIS	DPT	WS
27	680528	2	.14	.067	.073	3.333	78	736	3.6		5	59	9
28	680529	2	.12	.045	.085	3.000	72	650	6.4		4	56	6
29	680530	2	.06	.010	.017	2.000	69	293	6.6		7	55	4
30	680531	2	.10	.073	.077	3.333	71	657	8.0		6	56	5
31	680601	2	.12	.047	.120	4.000	70	663	6.7		3	57	0
32	680602	2	.18	.013	.023	4.000	70	632	6.9		1	58	4
33	680603	2	.16			3.000	72	545	5.6		1	59	3
34	680604	2	.04	.030	.103	3.000	66		4.5		4	58	6
35	680605	2	.04	.013	.043	2.000	69		8.9		7	53	11
36	680606	2	.04	.073	.060	2.667	70		6.1		20	48	6
37	680607	2	.04	.113	.080	3.000	68		6.7		8	53	2
38	680608	2	.04	.020	.040	2.000	69		5.9		10	51	5
39	680609	2	.08	.010	.040	2.000	70		10.3		8	53	9
40	680610	2	.14	.073	.140	3.333	73		9.1		6	55	3
41	680611	2	.14	.140	.323	5.667	71		8.5		5	57	4
42	680612	2	.08	.043	.103	3.000	74		5.0		4	57	6
43	680614	2	.13	.137	.197	4.667	74	746	6.6		2	59	6
44	680615	2	.11	.043	.093	3.000	77	728	6.2		3	59	4
45	680616	2	.15	.040	.097	3.000	73	711	8.1		4	58	4
46	680617	2	.06	.053	.153	3.333	68	556	7.9		4	56	4
47	680618	2	.17	.077	.107	3.000	71	678	8.6		2	56	5
48	680619	2	.19	.100	.237	4.000	71	734	7.0		2	55	3
49	680620	2	.14	.093	.300	5.000	70	774	8.1		4	58	5
50	680621	2	.23	.090	.415	7.000	72	752	6.5		2	59	4
51	680622	2	.06	.043	.093	4.667	71	524	5.7		1	61	5
52	680623	2	.06	.010	.040	2.333	71	650	6.9		4	59	3
53	680624	2	.06	.030	.020	2.667	70	342	4.4		7	57	11
54	680626	2	.12	.040	.070	3.000	67	278	9.5		3	58	7
55	680627	2	.07	.063	.073	3.000	66	215	6.4		2	57	3
56	680628	2	.04	.057	.067	3.000	67	245	8.1		3	57	6
57	680629	2	.06	.020	.010	2.000	69	613	8.9		4	57	4
58	680630	2	.09	.010	.017	2.000	72	631	3.9		8	55	7
59	680702	2	.11	.093	.123	3.000	68	708	8.5		3	55	3
60	680703	2	.16	.110	.120	4.667	72		6.5		3	58	5
61	680704	2	.13	.037	.067	3.667	67	700	9.3		4	59	8
62	680705	2	.16	.077	.090	4.000	68	660	8.5		1	59	4
63	680706	2	.07	.130	.067	4.000	68	195	6.6		3	59	4
64	680707	2	.09	.060	.047	4.000	73	426	7.1		2	60	4
65	680708	2	.25	.140	.070	3.333	73	443	8.3		3	61	3
66	680709	2	.26	.090	.153	3.667	75	719	9.0		3	62	2
67	680711	2	.27	.123	.147	4.667	78	761	9.0		6	62	2
68	680712	2	.29	.173	.150	5.667	75	737	9.0		7	61	6
69	680713	2	.11	.050	.020	2.000	71	722	2.6		5	59	6
70	680714	2	.05	.013	.010	2.000	72	703	3.7		7	57	8
71	680715	2	.10	.070	.017	2.000	73	552	4.0		10	56	9
72	680716	2	.17	.070	.063	3.000	71	686	8.0		2	58	3
73	680717	2	.16	.120	.110	4.667	71	710	8.0		1	59	4
74	680718	2	.21	.065	.185	5.333	68	696	9.1		2	60	4
75	680719	2	.15	.097	.133	4.667	71	673	7.3			60	5
76	680720	2	.16	.113	.117	4.667	76	652	7.5		5	61	4
77	680721	2	.16	.037	.057	3.667	72	677	9.2		2	62	5
78	680722	2	.15	.117	.123	4.000	72	682	7.9		3	61	5
79	680723	2	.18	.107	.110	5.000	76	683	8.1		4	61	3

STATION=2

OBS	DATE	STATION	MOX	NO (6-9)	NO_2 (6-9)	THC (6-9)	MTEMP	SRAD	AMS	RH	VIS	DPT	WS
80	680724	2	.09	.050	.027	3.000	77	658	6.5		6	61	5
81	680725	2	.14	.070	.147	3.667	72	703	8.7		2	60	3
82	680726	2	.20	.087	.110	4.000	74	690	7.6		3	60	5
83	680727	2	.09	.077	.080	3.333	72	539	8.3		10	60	3
84	680728	2	.09	.103	.073	4.000	72	293	8.9		5	62	6
85	680729	2	.15	.140	.157	4.667	80	542	6.4		7	63	2
86	680730	2	.10			3.333	74	655	9.7		10	62	8
87	680731	2	.08	.067	.053	2.667	74	647	7.6		7	60	4
88	680801	2	.15	.090	.123	3.667	77	636	8.1		4	60	5
89	680802	2	.19	.067	.073	3.000	73	501	5.2		4	60	5
90	680803	2	.16	.030	.070	3.000	72	631	8.2		2	60	3
91	680804	2	.16	.020	.050	3.000	72	612	10.3		2	59	2
92	680805	2	.14	.110	.087	3.000	71	612	8.4		2	59	3
93	680807	2	.14	.103	.120	5.000	73	652	10.4		7	61	7
94	680808	2	.10	.107	.103	3.667	71	700	10.8		10	61	7
95	680809	2	.09	.167	.183	5.000	74	685	8.9		7	62	3
96	680810	2	.12	.047	.053	3.000	74	589	8.2		2	61	5
97	680811	2	.11	.020	.020	2.000	74	640	6.1		5	60	6
98	680812	2	.09	.077	.053	3.667	71	446	6.9		5	59	3
99	680813	2	.05	.025	.030	2.333	70	514	9.9		7	59	4
100	680814	2	.10			2.333	73	589	5.7		6	57	6
101	680815	2	.15	.103	.080	2.333	73	566	6.6		4	59	6
102	680816	2	.06	.030	.060	2.667	70	323	7.3		5	59	3
103	680817	2	.06	.010	.023	2.000	73	545	8.3		10	59	5
104	680818	2	.10	.087	.037	2.333	72	518	6.1		6	59	5
105	680820	2	.04			2.000	73	646	9.8		8	61	6
106	680821	2	.05	.050	.010	2.000	70	702	11.7		15	55	7
107	680822	2	.09	.177	.043	3.000	72	669	7.2		10	55	7
108	680823	2	.17	.103	.063	2.667	90	663	3.6		25	48	5
109	680824	2	.21	.097	.120	4.667	77	625	6.4			61	4
110	680825	2	.12	.090	.063	4.333	75	652	9.6		1	60	6
111	680826	2	.22	.127	.063	4.000	77	562	8.8		9	60	5
112	680827	2	.17	.223	.053	4.000	78	631	6.5		10	55	5
113	680828	2	.32	.313	.093	5.000	77	596	5.9		10	58	5
114	680829	2	.19	.153	.060	4.667	77	571	4.7		1	64	6
115	680830	2	.09	.125	.050	4.000	72	574	8.3		2	62	3
116	680831	2	.08	.053	.033	2.667	69	305	7.7		2	60	5
117	680901	2	.15	.053	.040	2.667	72	496	5.5		2	60	5
118	680902	2	.11	.020	.020	2.000	74	456	2.7		4	61	4
119	680903	2	.06			2.000	71	351	6.3		14	58	4
120	680904	2	.11	.050	.043	3.000	72	394	9.7		5	60	6
121	680905	2	.22	.140	.063	4.000	72	562	7.1		3	60	4
122	680906	2	.25	.275	.190	8.000	75	584	7.2		3	62	4
123	680907	2	.31	.310	.083	5.667	77	583	6.7		4	62	3
124	680908	2	.20	.040	.020	3.000	78	583	6.7		4	62	2
125	680909	2	.46	.273	.097	8.000	80	597	7.3		4	60	4
126	680910	2	.17	.267	.060	5.667	77	591	8.5		5	60	3
127	680911	2	.16	.207	.053	3.667	73	606	7.2		5	61	3
128	680912	2	.14	.120	.080	4.333	72	555	6.5		2	60	4
129	680913	2	.15	.070	.027	3.000	73	440	4.5		3	60	3
130	680914	2	.06	.010	.013	2.000	71	349	5.9		12	57	5
131	680915	2	.05	.010	.020	1.333	69	242	5.0		10	58	6
132	680916	2	.12	.157	.040	3.000	74	510	8.5		4	60	6

STATION=2

OBS	DATE	STATION	MOX	NO (6-9)	NO_2 (6-9)	THC (6-9)	MTEMP	SRAD	AWS	RH	VIS	OPT	WS
133	680919	2	.04	.020	.040	2.333	68	191	7.5		5	57	7
134	680920	2	.05	.083	.047	3.000	70	501	6.8		6	55	4
135	680921	2	.12	.137	.037	2.667	71	532	4.8		6	51	7
136	680922	2	.19	.073	.097	4.000	76	551	6.4		5	55	0
137	680923	2	.11	.503	.077	5.000	85	561	6.2		12	38	5
138	680924	2	.22	.255	.050	4.000	91	562	4.9		20	32	4
139	680925	2	.32	.253	.063	4.667	87	543	6.7		7	40	3
140	680926	2	.30	.430		9.333	70	496	7.6			60	5
141	680927	2	.19	.140	.133	5.667	70	451	5.1		1	60	3
142	680928	2	.07	.017	.030	3.000	70	337	5.0		2	57	3
143	680929	2	.03	.010	.010	2.000	70	174	3.0		10	56	6
144	680930	2	.04	.040	.020	3.000	68	199	8.1		10	56	8
145	681001	2	.03			3.000	68	134	7.0		8	57	4
146	681002	2	.06	.220	.040	4.000	68	260	5.0		4	56	4
147	681003	2	.07	.103	.027	3.333	70	404	6.7		8	58	6
148	681004	2	.08	.193	.023	3.667	69	243	7.1		2	59	3
149	681005	2	.18	.133	.037	4.000	69	370	5.8		2	56	4
150	681006	2	.11	.010	.017	3.000	67	110	2.7		1	58	4
151	681007	2	.08	.030	.033	2.333	70	381	7.1		4	56	4
152	681008	2	.09	.123	.063	3.333	69	430	8.8		6	57	6
153	681009	2	.09	.110	.067	3.000	69	313	6.0		3	58	3
154	681010	2	.07	.170	.063	4.000	69	284	3.7		4	57	5
155	681011	2	.14	.240	.057	4.333	69	227	3.0		2	57	5
156	681012	2	.15	.027	.080	3.000	69	377	4.2		4	54	4
157	681013	2	.11	.073	.067	3.333	69	367	4.3		1	55	5
158	681014	2	.02	.040	.033	2.333	66	142	4.9		1	59	11
159	681015	2	.03	.057	.030	2.000	75	483	8.2		25	41	15
160	681016	2	.13	.350	.097	4.333	78	451	4.5		15	39	4
161	681018	2	.10	.263	.047	4.000	77	370	2.6		15	36	3
162	681019	2	.15	.227	.170	5.333	69	383	4.1			58	5
163	681020	2	.12	.120	.113	4.333	67	389	6.3		2	56	2
164	681021	2	.22	.320	.183	8.000	68	374	4.9		1	53	6
165	681022	2	.20	.207	.157	5.000	67	405	6.2			55	3
166	681023	2	.32	.553	.253	4.500	73	394	7.2			56	6
167	681024	2	.22	.363	.137	3.000	90	418	3.2		8	48	6
168	681025	2	.24	.467	.207	5.333	72	308	4.0		1	57	3
169	681026	2	.27	.280	.280	8.000	69	329	5.6			56	5
170	681027	2	.16	.133	.110	5.000	67	366	5.3			57	3
171	681028	2	.17	.197	.113	5.667	66	312	8.6			57	6
172	681029	2	.11	.127	.107	3.000	65	312	2.5		4	54	4
173	681030	2	.03	.073	.013	3.000	68	379	7.3		7	58	9
174	681031	2	.03	.063	.017	2.333	67	206	3.2		7	54	6

Data Listing (May thru October, 1973)

Station=3=BETH

OBS	YR/MO/DAY DATE	STATION	HOZ	NO (6-9)	NO_2 (6-9)	THC (6-9)	NMHC (6-9)	MTEMP	SRAD	AWS	RH	VIS	DPT	WS
1	730501	3	.09			0.833	.200	78	379	4.9	59	10	51	5
2	730502	3	.07	.003	.047	0.933	.033	81	500	11.9	66	10	59	12
3	730508	3	.05			1.200	.300	68	136	9.2	68	10	57	12
4	730509	3	.05	.000	.043	0.867	.067	76	459	5.2	73	15	62	6
5	730510	3	.08	.010	.093	1.100	.267	81	589	9.6	39	15	54	12
6	730511	3	.05	.000	.030	0.933	.133	77	656	11.8	65	20	53	6
7	730512	3	.05	.000	.040	0.900	.133	71	512	5.6	41	20	46	14
8	730513	3	.05	.000	.013	0.800	.000	68	514	3.6	45	20	46	6
9	730514	3	.05	.007	.100	1.433	.467	68	342	4.1	44	20	45	5
10	730515	3	.04	.005	.125	1.133	.067	66	394	8.2	39	15	40	13
11	730516	3	.07	.000	.053	0.900	.000	68	731	7.8	36	20	37	13
12	730517	3	.04			1.100	.000	62	256	5.5	60	10	48	9
13	730518	3	.04			0.967	.000	63	517	6.2	39	20	33	11
14	730519	3	.09			1.767	.167	74	563	6.0	36	20	45	8
15	730520	3	.04			1.067	.000	65	142	2.7	78	6	57	6
16	730522	3	.08			0.900	.000	77	638	5.9	39	12	50	10
17	730523	3	.01			1.867	.433	65	122	0.7	90	2	60	5
18	730524	3	.04			1.300	.000	60	58	5.0	93	1	58	7
19	730525	3	.01			1.133	.000	55	86	8.2	96	3	53	9
20	730526	3	.02	.000		1.033	.000	56	93	7.6	96	3	53	5
21	730527	3	.02	.000		0.967	.000	58	59	7.5	96	2	54	8
22	730528	3	.04	.000		1.000	.000	82	285	13.6	69	12	71	10
23	730529	3	.06					81	508	2.6	69	20	66	10
24	730530	3	.13	.000	.047	1.467	.100	80	556	5.9	50	12	59	4
25	730531	3	.06	.000	.023	1.150	.000	73	461	7.4	50	15	53	13
26	730602	3	.10	.000	.027	0.900	.000	82	711	0.9	43	15	57	7
27	730603	3	.11	.003	.027	1.433	.067	81	439	1.8	56	7	60	3
28	730604	3	.10			1.033	.000	89	561	3.8	54	10	70	10
29	730605	3	.11	.000	.043			86	579	5.5	59	10	70	7
30	730606	3	.07	.000	.040	0.900	.000	85	489	7.6	71	10	68	10
31	730609	3	.07	.000		0.800	.000	90	629	7.7	65	20	71	10
32	730610	3	.10	.000		1.000	.000	89	607	3.3	57	10	69	5
33	730612	3	.09	.000	.030	1.033	.133	88	592	7.9	72	12	73	8
34	730622	3	.08					80	337	3.1	56	12	63	6
35	730623	3	.15	.010	.077	1.233	.500	83	418	2.5	74	5	69	6
36	730624	3	.12	.010	.100	1.500	.933	84	611	3.7	55	5	64	5
37	730625	3	.17			0.867	.533	85	552	2.5	61	4	68	6
38	730626	3	.07	.000	.045	0.633	.333	84	408	8.0	63	5	67	7
39	730629	3	.11	.000	.033	1.333	.167	82	884	3.4	53	12	62	7
40	730630	3	.09	.000	.027	1.333	.133	85	686	3.5	41	12	56	5
41	730701	3	.10	.003	.047	1.767	.300	84	487	4.9	69	6	68	4
42	730702	3	.06	.010	.080	1.700	.400	78	300	2.9	79	4	71	4
43	730704	3	.11	.000	.010	1.400	.167	89	607	4.4	61	12	68	7
44	730705	3	.08	.000	.030	1.333	.167	85	567	5.9	53	10	66	8
45	730709	3	.12					91	588	3.4	50	3	70	7
46	730710	3	.13	.003	.067	1.733	.400	90	505	3.4	54	3	71	7
47	730711	3	.08	.000	.043	1.567	.233	83	501	6.9	74	5	69	8
48	730713	3	.10	.007	.047	0.433	.433	90	656	10.3	42	20	64	15
49	730714	3	.10	.000	.030	1.433	.000	91	599	3.5	57	12	70	5
50	730715	3	.06	.000	.020	1.467	.033	80		2.7	85	5	72	6
51	730716	3	.10	.007	.040			84	571	6.5	49	12	63	7
52	730717	3	.09					80	403	3.1	58	10	63	8
53	730718	3	.12					85	562	5.3	65	7	66	6

STATION=3

OBS	DATE	STATION	HOZ	NO (6-9)	NO_2 (6-9)	THC (6-9)	NMHC (6-9)	MTEMP	SRAD	AWS	RH	VIS	DPT	WS
54	730719	3	,12					88	661	8,2	42	15	61	9
55	730720	3	,10					88	428	5,2	65	7	71	7
56	730721	3	,05	,007	,013			82	263	1,5	90	3	73	6
57	730722	3	,06	,000	,030			73	101	5,8	87	2	69	6
58	730723	3	,09	,000	,070			84	506	2,9	82	2	70	3
59	730724	3	,13	,000	,100			84	573	2,5	49	10	63	7
60	730725	3	,08	,000	,040			78	367	8,9	64	15	65	11
61	730726	3	,13	,000	,047	1,500	,167	87	526	8,3	77	8	72	8
62	730727	3	,07	,020	,040	1,333	,033	90	579	5,9	48	15	68	8
63	730728	3	,14	,030	,040	1,533	,167	88	593	5,5	48	10	66	5
64	730729	3	,07	,000	,017	1,500	,000	84	572	7,0	56	12	65	8
65	730730	3	,11			1,633	,233	86	615	1,0	43	12	61	5
66	730731	3	,12			2,233	,467	88	510	3,1	69	4	71	4
67	730801	3	,08	,000	,063	1,500	,133	81	202	5,6	77	4	73	9
68	730802	3	,07	,003	,053	1,600	,133	85	409	3,2	70	10	72	3
69	730803	3	,05	,003	,077	1,533	,133	80	320	3,2	60	6	63	7
70	730804	3	,08	,000	,027	1,433	,033	86	583	3,9	61	6	67	5
71	730805	3	,06	,013	,027	1,400		87	651	3,0	35	20	55	8
72	730806	3	,15	,050	,093			86	564	3,7	61	7	67	3
73	730807	3	,12					87	505	6,6	67	4	69	8
74	730808	3	,13	,020	,080	1,467	,200	89	562	5,4	69	5	69	5
75	730809	3	,13	,027	,073	1,400	,133	91	516	2,2	65	5	71	4
76	730810	3	,15	,017	,060	1,333	,133	91	474	3,0	54	6	72	12
77	730811	3	,09	,000	,053	1,167	,000	90	529	6,3	52	8	69	9
78	730812	3	,11	,003	,020	1,467	,133	90	528	3,3	45	12	66	11
79	730813	3	,10			1,367	,067	85	344	2,3	59	8	67	6
80	730814	3	,12			1,433	,167	80	286	3,2	79	5	72	4
81	730815	3	,07	,003	,010			85	338	2,1	74	12	71	5
82	730816	3	,11	,003	,023	1,500	,200	85	510	4,5	53	8	65	8
83	730817	3	,11			1,467	,167	82	301	3,5	71	5	68	6
84	730818	3	,04			1,400	,100	80	311	2,9	69	8	68	9
85	730819	3	,06	,000	,000			80	398	3,9	65	6	67	7
86	730820	3	,12	,010				82	488	2,8	55	5	64	8
87	730822	3	,08	,013	,033	1,233	,000	78	512	10,2	58	14	61	14
88	730823	3	,06			1,233	,033	77	579	3,3	45	20	52	7
89	730824	3	,13					83	523	3,0	53	7	64	6
90	730825	3	,11	,013	,077	1,767	,167	81	385	6,0	67	4	69	8
91	730828	3	,09					95	523	6,5	61	3	75	12
92	730829	3	,12			1,467	,067	93	566	2,2	46	12	69	6
93	730830	3	,19			1,633	,167	92	521	2,0	52	7	72	5
94	730831	3	,16	,010	,053	1,600	,133	92	547	5,2	54	8	72	8
95	730901	3	,41	,000	,033	1,367	,000	92	519	3,6	68	3	74	5
96	730902	3	,18	,003	,033	1,467	,033	91	367	4,3	56	6	73	6
97	730904	3	,19	,030	,057	1,600		88	482	3,0	63	4	72	4
98	730905	3	,11	,013	,073			88	880	5,4	74	2	73	6
99	730906	3	,06	,027	,047	1,267	,000	84	273	4,5	77	4	71	8
100	730907	3	,07	,037	,057	1,467	,167	85	561	5,2	47	15	57	9
101	730908	3	,09	,000	,000	1,500	,167	80	468	2,8	45	15	56	6
102	730909	3	,06	,000	,000	1,400	,100	78	313	5,3	55	20	57	5
103	730910	3	,06			1,433	,200	77	562	2,9	40	40	49	7
104	730911	3	,08			1,533	,200	83	531	4,3	52	15	56	7
105	730912	3	,08	,040	,073	1,600	,300	79	506	1,5	47	20	55	6
106	730913	3	,07			1,833	,500	78	305	1,1	52	15	58	7

STATION=3

OBS	DATE	STATION	MOZ	NO (6-9)	NO_2 (6-9)	THC (6-9)	NMHC (6-9)	MTEMP	SRAD	AWS	RH	VIS	DPT	WS
107	730914	3	,04			1,533	,300	73	75	3,6	87	2	68	7
108	730915	3	,07	,010	,033	1,333	,067	79	333	2,3	60	8	63	4
109	730916	3	,07	,000	,020	1,467	,067	81	485	1,7	56	10	58	6
110	730917	3	,02			1,433	,233	71	323	3,7	61	15	54	9
111	730920	3	,06	,010	,040			75	450	4,2	61	12	54	10
112	730921	3	,01			1,600	,267	61	139	6,1	72	10	52	10
113	730922	3	,08	,020	,057	1,533	,100	79	326	9,6	67	5	67	15
114	730923	3	,04	,013	,047	1,400	,100	83	337	3,8	76	12	66	5
115	730925	3	,04					69	126	7,1	79	5	62	8
116	730926	3	,08			1,367	,067	73	245	3,9	71	7	60	4
117	730927	3	,06					83	425	6,5	61	14	67	9
118	730928	3	,02	,035	,150			82	218	2,6	100	7	60	4
119	730929	3	,03	,063	,073			83	204	4,4	67	12	71	8
120	730930	3	,05	,027	,053			72	422	7,0	59	20	55	8
121	731001	3	,04					71	276	3,8	57	20	53	7
122	731002	3	,02					71	62	0,8	97	2	67	4
123	731003	3	,06					81	343	5,1	60	15	66	8
124	731004	3	,06					82	379	3,5	67	10	66	5
125	731009	3	,02					68	88	2,8	87	10	62	6
126	731010	3	,05					74	276	3,0	71	7	63	4
127	731011	3	,03					64	144	4,3	73	8	54	6
128	731012	3	,05					72	379	7,0	73	10	57	10
129	731013	3	,06					73	381	8,0	55	10	56	9
130	731014	3	,04					73	415	10,9	32	20	41	13
131	731015	3	,05					77	392	9,7	46	40	48	14
132	731016	3	,03					67	430	9,7	43	20	41	11
133	731017	3	,02					57	413	9,2	51	20	35	12
134	731019	3	,03					59		1,8	62	20	40	5
135	731020	3	,03					73	371	3,9	44	15	50	7
136	731021	3	,04					62		2,3	54	15	43	6
137	731022	3	,05					65	328	1,0	54	10	45	4
138	731023	3	,06					69	310	2,7	100		47	3
139	731024	3	,07					72	316	4,6	55	6	53	7
140	731025	3	,04					72	359	5,1	67	4	49	8
141	731026	3	,04					73	326	4,4	43	9	48	10
142	731027	3	,04					69	347	2,8	63	10	49	9
143	731028	3	,03					65	82	10,0	78	9	54	14
144	731030	3	,01					48	120	3,3	96	12	42	5
145	731031	3	,01					63	254	6,6	83	15	47	6

Station=4=HYAT

OBS	DATE	STATION	MUZ	NO (6-9)	NO_2 (6-9)	THC (6-9)	NMHC (6-9)	MTEMP	SRAD	AWS	RH	VIS	DPT	WS
1	730501	4	,07	,090	,160			78	379	4,9	59	10	51	5
2	730502	4	,07	,030	,113	1,700	0,400	81	500	11,9	66	10	59	12
3	730514	4	,04			1,900	0,233	68	342	4,1	48	15	44	5
4	730515	4	,04			1,733	0,167	66	394	8,2	54	10	49	9
5	730516	4	,06			1,367	0,000	68	731	7,8	39	20	36	8
6	730517	4	,06			1,467	0,000	62	256	5,5	60	10	48	9
7	730518	4	,03		,137	1,333	0,000	63	517	6,2	35	20	35	8
8	730519	4	,08			1,933	0,133	74	563	6,0	38	20	43	8
9	730520	4	,02			1,667	0,033	65	142	2,7	93	5	54	9
10	730522	4	,06	,013	,070	1,400	0,067	77	638	5,9	39	12	50	10
11	730523	4	,00	,023	,090	2,233	0,533	65	122	0,7	93	1	59	7
12	730524	4	,02	,020	,050	1,950	0,450	60	58	5,0	87	2	55	5
13	730525	4	,00	,030	,060	1,533	0,133	55	86	8,2	96	1	51	8
14	730526	4	,02	,003	,027	1,467	0,033	56	93	7,6	90	7	53	8
15	730527	4	,01	,003	,030	1,367	0,000	58	59	7,5	96	2	54	8
16	730528	4	,03	,003	,020	1,333	0,000	82	285	13,6	82	15	70	19
17	730529	4	,07	,020	,043	1,700	0,267	81	508	2,6	69	20	66	10
18	730530	4	,11			1,700	0,100	80	556	5,9	50	12	59	4
19	730531	4	,04	,037	,033	1,400		73	461	7,4	93	20	58	5
20	730602	4	,10	,007	,093	2,000	0,233	82	711	0,9	50	15	57	6
21	730603	4	,11	,003	,070	1,800		81	439	1,8	56	8	64	5
22	730604	4	,10	,005	,110	2,100		89	561	3,8	54	10	70	10
23	730605	4	,10	,003	,093	1,900	0,267	86	579	5,5	72	8	70	10
24	730606	4	,14	,000	,040	1,433	0,100	85	484	7,6	87	10	67	8
25	730609	4	,06	,000	,023	1,333		90	629	7,7	65	20	71	10
26	730610	4	,11	,000	,023	1,233		89	607	3,3	57	10	69	5
27	730611	4	,18	,000	,063	1,700		90	596	5,4	59	5	71	7
28	730612	4	,09	,000	,053			88	592	7,9	72	12	73	8
29	730613	4	,06	,000	,037	1,500	0,067	85	609	7,2	63	7	67	9
30	730614	4	,05	,000	,030	1,467	0,167	82	759	7,8	35	40	51	8
31	730615	4	,12	,007	,093	1,767	0,200	83	706	4,5	34	20	50	9
32	730616	4	,06	,000	,030	1,500	0,100	82	329	8,6	72	5	71	10
33	730617	4	,05	,000	,023	1,600	0,033	73	181	6,9	81	4	61	12
34	730618	4	,01	,003	,047	1,633	0,200	69	127	5,0	90	3	62	5
35	730619	4	,01	,000	,040	1,400	0,000	75	286	7,4	84	5	62	9
36	730620	4	,10	,010	,077	1,733	0,133	85	516	7,2	76	3	66	6
37	730621	4	,09	,007	,053	1,600	0,067	86	334	7,1	77	5	72	8
38	730622	4	,06	,007	,057	3,500	1,467	80	337	3,1	56	12	63	6
39	730704	4	,10	,000	,053	1,700		89	607	4,4	61	12	68	7
40	730705	4	,06	,000	,047	1,350		85	567	5,9	53	10	66	8
41	730709	4	,11					91	588	3,4	63	3	73	5
42	730710	4	,10	,007	,107	1,767	0,267	90	505	3,4	61	3	74	5
43	730711	4	,06	,350	,077	1,433		83	501	6,9	56	5	65	10
44	730712	4	,03	,000	,050	1,233	0,000	76	732	7,7	44	20	46	12
45	730713	4	,12	,000	,057	1,333	0,000	90	656	10,3	43	20	61	11
46	730714	4	,11	,000	,020	1,400	0,000	91	599	3,5	48	10	68	9
47	730715	4	,04	,000	,040	1,467	0,000	80		2,7	85	5	72	6
48	730716	4	,08	,000	,060	1,400	0,033	84	571	6,5	51	15	63	8
49	730717	4	,07	,000	,077			80	403	3,1	82	4	69	7
50	730718	4	,12	,003	,123	2,600	0,867	85	562	5,3	65	7	66	6
51	730719	4	,10	,000	,073	1,667	0,133	88	661	8,2	62	10	66	7
52	730720	4	,13	,000	,047	1,400	0,033	88	428	5,2	55	7	70	6
53	730721	4	,05	,000	,040	1,333	0,000	82	263	1,5	90	3	73	6

STATION=4

OBS	DATE	STATION	MOZ	NO (6-9)	NO_2 (6-9)	THC (6-9)	NMHC (6-9)	MTEMP	SHAD	AWS	RH	VIS	DPT	WS
54	730722	4	,03	,000	,037	1,500	,033	73	101	5,8	87	2	67	7
55	730723	4	,08	,000	,073	1,633	,133	84	506	2,9	51	8	64	8
56	730724	4	,12	,007	,083	1,667	,100	84	573	2,5	49	10	63	7
57	730725	4	,08	,000	,050	1,533	,067	78	367	8,9	69	15	67	11
58	730726	4	,08	,000	,080	1,400		87	526	8,3	77	8	72	8
59	730727	4	,07	,033	,063	1,467	,100	90	579	5,9	63	10	72	8
60	730728	4	,11	,027	,090	1,867	,033	88	593	5,5	48	10	66	5
61	730729	4	,06	,007	,023	1,533	,000	84	572	7,0	49	10	63	8
62	730730	4	,14		,070	1,700	,033	86	615	1,0	46	12	62	4
63	730731	4	,12	,077	,110	2,367	,400	88	510	3,1	69	4	71	4
64	730801	4	,06			1,600	,033	81	202	5,6	79	6	73	5
65	730803	4	,04	,057	,077	1,850		80	320	3,2	60	6	63	7
66	730804	4	,08	,030	,060	1,700		86	583	3,9	61	6	67	5
67	730805	4	,07	,017	,030	1,500		87	651	3,0	35	20	55	8
68	730806	4	,14	,110	,130	2,767	,200	86	564	3,7	51	7	66	5
69	730807	4	,11		,100	2,467	,000	87	505	6,6	67	4	69	8
70	730808	4	,11		,100	2,067	,000	89	562	5,4	69	5	69	5
71	730809	4	,14	,045		1,733	,000	91	516	2,2	47	4	68	4
72	730810	4	,14	,030	,083	1,767		91	474	3,0	70	4	74	5
73	730811	4	,08	,007	,027	1,500		90	529	6,3	44	10	65	10
74	730812	4	,09	,023	,063	1,967		90	528	3,3	50	12	66	4
75	730813	4	,08	,043	,057	2,033		85	344	2,3	53	12	66	5
76	730814	4	,08	,057	,067	1,433		80	286	3,2	79	5	73	7
77	730815	4	,06	,027	,050	1,733		85	338	2,1	74	12	71	5
78	730816	4	,07	,040	,070	1,633		85	510	4,5	53	8	65	8
79	730817	4	,11			1,567		82	301	3,5	63	6	67	5
80	730818	4	,03	,103		1,733		80	311	2,9	69	8	68	9
81	730819	4	,05	,027		1,600		80	398	3,9	65	6	67	7
82	730820	4	,11	,140		2,400	,100	82	488	2,8	55	5	64	8
83	730821	4	,01	,090		1,600		70	92	8,2	93	4	67	10
84	730822	4	,07	,070		1,533		78	512	10,2	68	15	61	10
85	730823	4	,04			1,400	,000	77	579	3,3	45	20	52	7
86	730824	4	,12					83	523	3,0	53	7	64	6
87	730825	4	,09	,030	,067	1,967	,033	81	385	6,0	67	4	69	8
88	730828	4	,09	,020	,063	2,167	,100	95	523	6,5	56	4	74	9
89	730829	4	,12			1,800	,033	93	566	2,2	46	12	69	6
90	730830	4	,20	,010	,120	2,533	,367	92	521	2,0	52	7	72	5
91	730831	4	,17	,037	,187	3,400	,833	92	547	5,2	54	8	72	8
92	730901	4	,15	,070	,093	2,467	,400	92	519	3,6	54	5	73	6
93	730902	4	,20	,030	,047	1,567	,000	91	367	4,3	56	6	73	6
94	730903	4	,10	,033	,053	1,467	,000	91	471	1,9	54	4	72	6
95	730904	4	,13	,127	,173	3,100		88	482	3,0	77	5	72	5
96	730905	4	,09	,170	,123	2,733	,500	88	880	5,4	74	2	73	6
97	730906	4	,07	,045	,075	1,500	,033	84	273	4,5	77	4	71	8
98	730908	4	,08			2,033	,133	80	468	2,8	45	15	56	6
99	730912	4	,06			1,600	,033	79	506	1,5	47	20	55	6
100	730913	4	,08					78	305	1,1	52	15	58	7
101	730914	4	,05	,023	,050	1,433	,033	73	75	3,6	87	2	68	7
102	730915	4	,07	,050	,043	1,400	,000	79	333	2,3	60	8	63	4
103	730916	4	,10	,027	,053	2,000	,100	81	485	1,7	44	12	57	5
104	731002	4	,01		,375	2,300	,067	71	62	0,8	97	2	67	4
105	731003	4	,06	,073	,137	2,833	,067	81	343	5,1	93	8	67	6
106	731004	4	,06	,173	,140	4,300	,700	82	379	3,5	58	12	66	6

STATION=4

OBS	DATE	STATION	HOZ	NO (6-9)	NO_2 (6-9)	THC (6-9)	NMHC (6-9)	MTEMP	SRAD	AWS	RH	VIS	DPT	WS
107	731009	4	,03					68	88	2,8	87	10	62	6
108	731010	4	,04		,105	3,467	,600	74	276	3,0	71	7	63	4
109	731011	4	,02		,095	2,000	,033	64	144	4,3	73	8	54	5
110	731012	4	,05					72	379	7,0	61	10	57	8
111	731013	4	,07			2,467	,000	73	381	8,0	55	10	56	9
112	731014	4	,04			2,133	,000	73	415	10,9	32	20	41	13
113	731015	4	,05					77	392	9,7	43	40	52	12
114	731016	4	,02			2,100	,067	67	430	9,7	43	20	41	11
115	731017	4	,01			2,033	,000	57	413	9,2	51	20	35	12

Station=5=SISP

OBS	DATE	STATION	HOZ	NO (6-9)	NO_2 (6-9)	THC (6-9)	NMHC (6-9)	MTEMP	SRAD	AWS	RH	VIS	DPT	WS
1	730501	5	,02		,110	1,967	0,433	78	379	4,9	59	10	51	5
2	730502	5	,02	,103	,120	1,533	0,267	81	500	11,9	66	10	59	12
3	730508	5	,00			1,933	0,433	68	136	9,2	90	10	54	7
4	730509	5	,04	,093	,123	1,700	0,400	76	459	5,2	73	15	62	6
5	730511	5	,05	,017	,043	1,267	0,067	77	656	11,8	51	15	52	10
6	730512	5	,04	,083	,107	1,400	0,033	71	512	5,6	34	20	41	9
7	730513	5	,04	,020	,023	1,300	0,000	68	514	3,6	52	20	46	6
8	730514	5	,04		,120	2,200	0,533	68	342	4,1	44	20	45	5
9	730515	5	,03	,017	,087	1,567	0,067	66	394	8,2	39	15	40	13
10	730516	5	,03	,030	,093	1,400	0,133	68	731	7,8	39	20	36	8
11	730517	5	,04	,127	,150	1,733	0,467	62	256	5,5	60	10	48	9
12	730518	5	,03	,000	,043	1,300	0,000	63	517	6,2	39	20	33	11
13	730519	5	,02			2,167	0,700	74	563	6,0	38	20	43	8
14	730520	5	,01			1,467	0,067	65	142	2,7	75	7	57	4
15	730522	5	,07			1,400	0,133	77	638	5,9	39	12	50	10
16	730523	5	,01			3,100	1,000	65	122	0,7	87	2	61	4
17	730524	5	,00			1,767	0,167	60	58	5,0	96	1	55	8
18	730525	5	,00			1,200	0,000	55	86	8,2	96	3	51	8
19	730526	5	,00	,250	,037	1,633	0,233	56	93	7,6	96	3	53	5
20	730527	5	,00	,053	,030	1,300	0,000	58	59	7,5	96	2	54	8
21	730528	5	,01	,037	,030	1,300	0,067	82	285	13,6	69	12	71	10
22	730529	5	,04	,090	,050	1,700	0,300	81	508	2,6	54	20	63	12
23	730530	5	,05	,007	,030			80	556	5,9	56	15	60	8
24	730531	5	,06	,013	,030	1,750		73	461	7,4	53	15	53	14
25	730602	5	,09	,000	,030	1,367	0,000	82	711	0,9	43	15	57	4
26	730603	5	,09	,060	,073	1,600	0,167	81	439	1,8	56	7	60	3
27	730604	5	,07	,073	,053	1,700	0,200	89	561	3,8	65	8	69	3
28	730605	5	,05	,073	,077	1,833	0,400	86	579	5,5	72	8	70	10
29	730606	5	,02	,063	,047	0,200	0,033	85	489	7,6	71	10	68	10
30	730609	5	,05	,040	,037	0,133	0,033	90	629	7,7	65	20	71	10
31	730610	5	,09	,000	,010	0,200		89	607	3,3	57	10	69	5
32	730611	5	,07	,017	,043	0,167		90	596	5,4	59	5	71	7
33	730612	5	,02	,050	,047	1,933	0,433	88	592	7,9	72	12	73	8
34	730613	5	,07	,007	,020	1,567	0,067	85	609	7,2	53	5	66	8
35	730614	5	,05	,000	,013	1,467	0,033	82	759	7,8	35	40	51	8
36	730615	5	,04	,037	,060			83	706	4,5	34	20	50	9
37	730616	5	,02	,050	,057	1,767	0,333	82	329	8,6	67	8	70	13
38	730617	5	,02	,007	,010	1,667	0,000	73	181	6,9	90	1	70	12
39	730618	5	,01			2,033	0,533	69	127	5,0	84	5	63	5

STATION=5

OBS	DATE	STATION	MUZ	NO (6-9)	NO_2 (6-9)	THC (6-9)	NMHC (6-9)	MTEMP	SRAD	AWS	RH	VIS	DPT	WS
40	730619	5	.02	.007	.013	1.550	0.050	75	286	7.4	76	6	63	8
41	730620	5	.03	.040	.060	2.133	0.367	85	516	7.2	76	3	66	8
42	730621	5	.02	.047	.060	2.300	0.767	86	334	7.1	77	5	72	6
43	730622	5	.04	.030	.037	2.300	0.533	80	337	3.1	69	10	66	9
44	730623	5	.04	.040	.063	2.333	0.467	83	418	2.5	71	5	68	4
45	730624	5	.04	.037	.090	2.800		84	611	3.7	69	6	67	5
46	730625	5	.03	.067	.090	2.333		85	552	2.5	61	4	68	6
47	730626	5	.01	.053	.067	2.200	0.567	84	408	8.0	74	4	68	7
48	730629	5	.06	.017	.047			82	884	3.4	55	12	64	8
49	730630	5	.06	.000	.017	1.633	0.000	85	686	3.5	52	12	60	7
50	730701	5	.02	.047	.100	2.600	0.533	84	487	4.9	69	6	68	4
51	730702	5	.01	.060	.073	2.100	0.433	78	300	2.9	79	4	71	4
52	730704	5	.10	.000	.010	1.600		89	607	4.4	61	12	68	7
53	730705	5	.06	.003	.020			85	567	5.9	53	10	66	8
54	730709	5	.09					91	588	3.4	52	3	71	10
55	730710	5	.07	.000	.057	1.767	0.167	90	505	3.4	63	2	72	5
56	730711	5	.04	.000	.060	1.567	0.000	83	501	6.9	74	5	69	8
57	730712	5	.04		.017	1.433	0.000	76	732	7.7	44	20	46	12
58	730714	5	.07	.000	.083	1.633	0.133	91	599	3.5	57	12	70	5
59	730715	5	.05	.010	.090	1.767	0.133	80		2.7	77	12	72	6
60	730716	5	.09	.003	.063	1.700	0.050	84	571	6.5	51	15	63	8
61	730717	5	.06	.017	.070	1.967	0.267	80	403	3.1	58	10	63	8
62	730718	5	.09	.020	.103	2.967	0.967	85	562	5.3	53	9	64	7
63	730719	5	.03	.023	.073	2.100	0.500	88	661	8.2	62	10	66	7
64	730720	5	.04	.027	.063	1.933	0.467	88	428	5.2	65	7	71	7
65	730721	5	.04	.020	.053	1.833	0.333	82	263	1.5	77	4	74	6
66	730723	5	.01	.010	.107	2.000	0.467	84	506	2.9	82	2	70	3
67	730725	5	.01	.030	.053			78	367	8.9	64	20	65	10
68	730726	5	.04	.010	.067	2.067	0.533	87	526	8.3	77	8	72	8
69	730727	5	.04			1.850	0.350	90	579	5.9	48	15	68	8
70	730728	5	.05	.313	.087	2.167	0.367	88	593	5.5	61	9	70	4
71	730729	5	.06	.000	.003	1.533	0.000	84	572	7.0	54	12	63	10
72	730730	5	.09	.043	.027	1.567	0.000	86	615	1.0	46	12	62	4
73	730731	5	.04	.505	.115	2.933	0.933	88	510	3.1	55	4	70	6
74	730801	5	.04	.383	.073	2.333	0.533	81	202	5.6	79	6	73	5
75	730802	5	.06					85	409	3.2	70	10	72	3
76	730803	5	.04	.027	.040	1.767	0.067	80	320	3.2	60	6	65	5
77	730804	5	.08	.010	.027			86	583	3.9	61	6	67	5
78	730805	5	.07	.050	.023			87	651	3.0	35	20	55	8
79	730806	5	.04		.120			86	564	3.7	61	7	67	3
80	730807	5	.04	.327	.107	2.033	0.433	87	505	6.6	67	4	69	8
81	730812	5	.07	.117	.067	1.833	0.200	90	528	3.3	50	12	66	4
82	730813	5	.07	.017	.023	0.000		85	344	2.3	53	12	66	5
83	730814	5	.08	.200	.063	1.250		80	286	3.2	79	5	73	7
84	730815	5	.05	.173	.040			85	338	2.1	55	15	67	6
85	730816	5	.09	.017	.020			85	510	4.5	53	8	65	8
86	730817	5	.03					82	301	3.5	71	5	68	6
87	730818	5	.00	.193	.033			80	311	2.9	93	2	69	4
88	730819	5	.05	.000	.007			80	398	3.9	79	6	67	7
89	730820	5	.03					82	488	2.8	67	4	65	3
90	730821	5	.01	.023	.037			70	92	8.2	90	4	66	8
91	730822	5	.08	.003	.023			78	512	10.2	58	14	61	14
92	730823	5	.05	.007	.017	1.500	0.000	77	579	3.3	45	20	52	7

STATION=5

OBS	DATE	STATION	MOZ	NO (6-9)	NO_2 (6-9)	THC (6-9)	NMHC (6-9)	MTEMP	SHAD	AWS	RH	VIS	DPT	WS
93	730824	5	.09					83	523	3.0	53	7	64	6
94	730828	5	.09	.010	.045	1.800		95	523	6.5	61	3	75	12
95	730829	5	.08	.017	.043			93	566	2.2	46	12	69	6
96	730830	5	.12	.117	.127	2.600	0.950	92	521	2.0	52	7	72	5
97	730831	5	.04	.467	.130	3.000	1.167	92	547	5.2	63	5	73	6
98	730901	5	.11	.000	.017	2.000	0.200	92	519	3.6	54	5	73	6
99	730902	5	.06	.027	.013	1.800	0.000	91	367	4.3	56	6	73	6
100	730903	5	.10	.017		1.533	0.600	91	471	1.9	93	2	70	3
101	730904	5	.10	.395		2.600	0.867	88	482	3.0	77	5	72	5
102	730906	5	.03	.257	.080	2.167	0.767	84	273	4.5	77	4	71	8
103	730907	5	.06			1.933	0.400	85	561	5.2	41	20	58	6
104	730908	5	.06		.013	2.000		80	468	2.8	45	20	57	6
105	730909	5	.05	.047	.033	1.667		78	313	5.3	55	20	57	5
106	730910	5	.05	.000				77	562	2.9	40	40	49	7
107	730912	5	.06	.037	.027	1.667	0.333	79	506	1.5	47	20	55	6
108	730913	5	.02	.280	.070	2.250		78	305	1.1	55	15	55	6
109	730914	5	.03	.227	.083	2.133	0.467	73	75	3.6	87	15	69	7
110	730915	5	.04	.030	.017	1.600	0.033	79	333	2.3	69	12	63	5
111	730916	5	.07	.000	.000	1.600	0.000	81	485	1.7	44	12	57	5
112	730917	5	.01			1.567	0.033	71	323	3.7	61	15	54	9
113	730920	5	.04	.043	.020	1.333	0.000	75	450	4.2	61	12	54	10
114	730921	5	.01	.075	.005	1.733	0.000	61	139	6.1	72	10	52	10
115	730922	5	.03	.000	.000	2.300	0.533	79	326	9.6	81	4	62	8
116	730923	5	.04	.000	.000	1.567	0.000	83	337	3.8	76	12	66	5
117	730924	5	.05	.000	.000	1.450	0.000	84	479	1.9	51	12	64	6
118	730925	5	.01	.100	.033	1.667	0.067	69	126	7.1	93	3	63	7
119	730927	5	.05					83	425	6.5	59	15	67	7
120	730928	5	.02					82	218	2.6	67	12	66	7
121	730929	5	.03	.033	.043	1.733	0.133	83	204	4.4	67	12	71	8
122	730930	5	.02	.053	.007	1.600	0.000	72	422	7.0	51	20	53	5
123	731001	5	.00					71	276	3.8	100	12	56	5
124	731002	5	.02					71	62	0.8	97	2	67	4
125	731003	5	.03					61	343	5.1	93	8	67	6
126	731004	5	.06					82	379	3.5	67	10	66	5
127	731010	5	.03					74	276	3.0	71	7	63	4
128	731011	5	.01					64	144	4.3	73	8	54	5
129	731012	5	.01					72	379	7.0	73	10	57	10
130	731013	5	.03					73	381	8.0	55	10	56	9
131	731014	5	.03					73	415	10.9	49	20	50	15
132	731015	5	.02					77	392	9.7	46	40	48	14
133	731016	5	.02					67	430	9.7	72	20	48	5
134	731017	5	.01					57	413	9.2	51	20	35	12
135	731020	5	.05					73	371	3.9	44	15	50	7
136	731021	5	.03					62		2.3	54	15	43	6
137	731022	5	.01					65	328	1.0	93	5	47	4
138	731025	5	.04					72	359	5.1	100		37	5
139	731026	5	.06					73	326	4.4	72	5	49	4
140	731027	5	.04					69	347	2.8	47	12	47	9
141	731028	5	.01					65	82	10.0	78	9	54	14
142	731030	5	.00					48	120	3.3	96	15	35	5
143	731031	5	.00					63	254	6.6	100	15	45	3

Station=6=SUIT

OBS	DATE	STATION	MOZ	NO (6-9)	NO_2 (6-9)	THC (6-9)	NMHC (6-9)	MTEMP	SRAD	AWS	RH	VIS	DPT	WS
1	730501	6	.11	.040	.110			78	379	4.9	59	10	51	5
2	730502	6	.09		.075	1.933	0.800	81	500	11.9	47	15	59	14
3	730508	6	.05	.000	.133			68	136	9.2	75	10	56	12
4	730509	6	.05		.070			76	459	5.2	57	15	57	8
5	730510	6	.07		.183			81	589	9.6	50	12	56	10
6	730511	6	.06					77	656	11.8	51	15	52	10
7	730512	6	.06			0.933		71	512	5.6	41	20	46	14
8	730514	6	.05		.130	1.333		68	342	4.1	48	15	44	5
9	730515	6	.04		.310			66	394	8.2	39	15	40	13
10	730517	6	.07		.160			62	256	5.5	60	10	48	9
11	730518	6	.04		.110	1.250	0.000	63	517	6.2	59	20	36	9
12	730519	6	.09		.000	1.200	0.000	74	563	6.0	38	20	43	8
13	730520	6	.04		.000	1.200	0.000	65	142	2.7	93	5	58	9
14	730522	6	.08	.007	.067	1.550	0.500	77	638	5.9	43	12	48	7
15	730523	6	.03	.000	.090	1.533	0.500	65	122	0.7	90	2	60	5
16	730524	6	.03		.043	2.400	1.133	60	58	5.0	93	1	58	7
17	730525	6	.02			1.300	0.200	55	86	8.2	96	3	51	8
18	730526	6	.03	.010	.027	1.400	0.100	56	93	7.6	90	7	53	8
19	730527	6	.02	.000	.017	1.300	0.000	58	59	7.5	96	2	54	8
20	730528	6	.03	.017	.003	1.200	0.000	82	285	13.6	82	15	70	19
21	730529	6	.06		.023	1.267	0.000	81	508	2.6	69	20	66	10
22	730530	6	.13	.010	.093	2.067	0.333	80	556	5.9	50	12	59	4
23	730531	6	.05	.003	.047	1.533	0.233	73	461	7.4	93	20	58	5
24	730602	6	.12	.007	.070	2.133	0.133	82	711	0.9	43	15	57	7
25	730603	6	.11	.010	.027	1.600	0.100	81	439	1.8	56	8	64	5
26	730604	6	.13	.003	.033	1.600	0.000	89	561	3.8	65	8	69	3
27	730605	6	.09	.000	.030	1.600	0.033	86	579	5.5	59	10	70	7
28	730606	6	.14	.000	.010	1.433	0.067	85	489	7.6	71	10	68	10
29	730609	6	.08	.010	.010	1.400	0.000	90	629	7.7	65	20	71	10
30	730611	6	.23	.020	.057	1.700	0.200	90	596	5.4	59	5	71	7
31	730612	6	.07	.007	.007	1.400	0.150	88	592	7.9	72	12	73	8
32	730613	6	.07	.007	.030	1.467	0.167	85	609	7.2	57	10	68	11
33	730614	6	.07	.003	.027	1.433	0.000	82	759	7.8	35	40	51	8
34	730615	6	.10	.010	.057	1.600	0.033	83	706	4.5	34	20	50	9
35	730616	6	.06	.010	.023	1.400	0.167	82	329	8.6	72	5	71	10
36	730617	6	.05	.007	.023	1.600	0.033	73	181	6.9	81	4	61	12
37	730618	6	.02	.007	.040	1.533	0.233	69	127	5.0	90	3	62	5
38	730619	6	.03	.000	.027	1.500	0.067	75	286	7.4	71	8	65	8
39	730620	6	.08	.010	.030	1.567	0.000	85	516	7.2	76	3	66	6
40	730621	6	.06	.003	.020	1.467	0.067	86	334	7.1	77	5	72	8
41	730622	6	.07	.010	.033	1.833	0.367	80	337	3.1	69	10	66	9
42	730623	6	.08	.000	.000	1.467	0.100	83	418	2.5	74	5	69	6
43	730624	6	.06	.000	.000	1.333		84	611	3.7	55	5	64	5
44	730625	6	.11	.000	.000	1.333		85	552	2.5	79	2	68	4
45	730626	6	.06			1.400	0.000	84	408	8.0	63	5	67	7
46	730629	6	.14			1.633		82	884	3.4	53	12	62	7
47	730630	6	.11	.010	.033	1.600	0.033	85	686	3.5	52	12	60	7
48	730704	6	.10			1.667		89	607	4.4	61	12	68	7
49	730709	6	.14					91	588	3.4	52	3	71	10
50	730710	6	.13			2.333		90	505	3.4	54	3	71	7
51	730711	6	.07			1.633		83	501	6.9	56	5	65	10
52	730712	6	.05			1.407	0.067	76	732	7.7	40	20	50	8
53	730713	6	.09			1.450	0.200	90	656	10.3	56	15	61	10

STATION=6

OBS	DATE	STATION	MOZ	NO (6-9)	NO_2 (6-9)	THC (6-9)	NMHC (6-9)	MTEMP	SRAD	AWS	RH	VIS	DPT	WS
54	730714	6	,11			1,567	,067	91	599	3,5	48	10	68	9
55	730715	6	,06			1,367	,167	80		2,7	77	12	72	6
56	730716	6	,12			1,567	,067	84	571	6,5	49	12	63	7
57	730717	6	,04			1,500		80	403	3,1	58	10	64	8
58	730718	6	,12	,007	,060	1,567		85	562	5,3	53	9	64	7
59	730720	6	,10	,003	,020	1,400	,100	88	428	5,2	65	7	71	7
60	730721	6	,06	,003	,017	1,333		82	263	1,5	90	3	73	6
61	730722	6	,05	,000	,017	1,433	,100	73	101	5,8	87	2	69	6
62	730723	6	,08	,010	,070	1,833	,767	84	506	2,9	51	8	64	8
63	730724	6	,10	,007	,067			84	573	2,5	49	10	63	7
64	730725	6	,07	,000	,030	1,333		78	367	8,9	64	20	65	10
65	730726	6	,08	,000	,020	1,400		87	526	8,3	77	8	72	8
66	730727	6	,09	,030	,033	1,500	,100	90	579	5,9	63	10	72	8
67	730728	6	,11	,010	,033	1,433	,167	88	593	5,5	48	10	66	5
68	730729	6	,09	,010	,027	1,433	,067	84	572	7,0	49	10	63	8
69	730730	6	,13	,040	,057	1,833		86	615	1,0	46	12	62	4
70	730731	6	,11	,023	,040	1,733	,167	88	510	3,1	55	4	70	6
71	730801	6	,06	,013	,033	1,600		81	202	5,6	77	4	73	9
72	730831	6	,18	,100				92	547	5,2	54	4	73	6
73	730905	6	,07					88	880	5,4	74	2	73	6
74	730906	6	,05	,013	,020			84	273	4,5	77	4	71	8
75	730907	6	,06	,077	,080			85	561	5,2	41	20	58	6
76	730908	6	,06	,053	,097			80	468	2,8	45	15	56	6
77	730909	6	,07	,017				78	313	5,3	55	20	57	5
78	730910	6	,07	,063				77	562	2,9	40	40	49	7
79	730911	6	,13	,057	,080			83	531	4,3	37	20	54	6
80	730912	6	,05	,053	,063			79	506	1,5	50	9	55	5
81	730913	6	,08	,073	,057			78	305	1,1	52	15	68	7
82	730914	6	,04	,007	,030			73	75	3,6	87	2	68	7
83	730915	6	,06	,020	,033			79	333	2,3	60	8	63	4
84	730916	6	,09	,010	,047			81	485	1,7	44	12	57	5
85	730917	6	,11	,033				71	323	3,7	61	15	64	9
86	730920	6	,08	,117	,107			75	450	4,2	61	12	54	10
87	730921	6	,06	,033	,083			61	139	6,1	63	15	48	6
88	730923	6	,03					83	337	3,8	61	12	68	5
89	730924	6	,07					64	479	1,9	51	12	64	6
90	730925	6	,06	,013	,040			69	126	7,1	79	6	62	10
91	730926	6	,12	,050	,053			73	245	3,9	71	7	60	4
92	730927	6	,05					83	425	6,5	61	14	67	9
93	730928	6	,01	,193	,067			82	218	2,6	63	10	68	5
94	730929	6	,06	,077	,073	1,633	,100	83	204	4,4	67	12	71	8
95	730930	6	,06	,027	,023	1,867	,067	72	422	7,0	51	20	53	5
96	731001	6	,04					71	276	3,8	57	20	53	7
97	731002	6	,02					71	62	0,8	97	2	67	4
98	731003	6	,07					81	343	5,1	60	15	66	8
99	731004	6	,08					82	379	3,5	58	12	66	6
100	731009	6	,05					68	88	2,8	78	10	61	5
101	731010	6	,04					74	276	3,0	71	7	63	4
102	731011	6	,04					64	144	4,3	73	8	54	5
103	731012	6	,06					72	379	7,0	61	10	57	8
104	731013	6	,07					73	381	8,0	81	5	56	5
105	731014	6	,05					73	415	10,9	32	20	41	13
106	731015	6	,06					77	392	9,7	43	40	52	12

STATION=6

OBS	DATE	STATION	MOZ	NO (6-9)	NO_2 (6-9)	THC (6-9)	NMHC (6-9)	MTEMP	SRAD	AWS	RH	VIS	DPT	WS
107	731016	6	.04					67	430	9.7	43	20	41	11
108	731017	6	.05					57	413	9.2	51	20	35	12
109	731019	6	.02					59		1.8	62	20	40	5
110	731020	6	.05					73	371	3.9	44	15	50	7
111	731021	6	.05					62		2.3	54	15	43	6
112	731022	6	.05					65	328	1.0	54	10	45	4
113	731023	6	.06					69	310	2.7	100		47	3
114	731024	6	.07					72	316	4.6	55	6	53	7
115	731026	6	.05					73	326	4.4	43	9	48	10
116	731027	6	.04					69	347	2.8	47	12	47	9
117	731028	6	.06					65	82	10.0	86	10	50	10
118	731030	6	.01					48	120	3.3	96	12	42	5
119	731031	6	.02					63	254	6.6	83	15	47	6