Technical Report Documentation Page

| | | |
|---|---|---|
| 1. Report No. TX-97/2979-1F | 2. Government Accession No. | 3. Recipient's Catalog No. |
| 4. Title and Subtitle ANALYSIS OF TRAFFIC CONGESTION AND TROPOSPHERIC OZONE LEVELS IN SAN ANTONIO | | 5. Report Date May 1997 |
| | | 6. Performing Organization Code |
| 7. Author(s) Michael Martello and Michael T. McNerney | | 8. Performing Organization Report No. Research Report 2979-1F |
| 9. Performing Organization Name and Address Center for Transportation Research The University of Texas at Austin 3208 Red River, Suite 200 Austin, Texas 78705-2650 | | 10. Work Unit No. (TRAIS) |
| | | 11. Contract or Grant No. Research Project 7-2979 |
| 12. Sponsoring Agency Name and Address Texas Department of Transportation Research and Technology Transfer Office P. O. Box 5080 Austin, Texas 78763-5080 | | 13. Type of Report and Period Covered Final |
| | | 14. Sponsoring Agency Code |

15. Supplementary Notes

Project conducted in cooperation with the Texas Department of Transportation.
Research project title: "Traffic Congestion and Ozone Correlation on Loop 410"

16. Abstract

The findings of this report are based on (1) a statistical analysis of data collected in the San Antonio area, (2) a literature review, and (3) expert advice on tropospheric ozone formation. The results of the study suggest that a highway construction work zone with lane closure can impact the daily peak ozone or episodic peak ozone concentration. These impacts depend on particular circumstances, such as the severity of the work zone's impact on traffic congestion, the general level of traffic congestion without the work zone, the work zones' location relative to the ozone monitor, and various meteorological and atmospheric phenomena associated with the formation of tropospheric ozone.

The statistical analyses conducted indicate that the range of impacts associated with ozone formation is wide, from near zero parts per billion to much higher levels. Additionally, the literature suggests that the net effect of emissions of the ozone precursor NOx depends on when and where they occur, and that such emissions can be harmful and/or beneficial to ozone formation depending on particular circumstances.

Thus, given the potential severity that a work zone lane closure can have on the daily peak ozone concentration and, hence, the potential contribution that a work zone lane closure could have on a metropolitan area becoming classified as a non-attainment area for ozone, we recommend that TxDOT officials consider requiring a detailed air quality impact analysis on ozone formation under various scenarios of the parameters mentioned above (and detailed in this report) before a work zone lane closure is allowed.

| | |
|---|---|
| 17. Key Words Traffic congestion, San Antonio, tropospheric ozone, work zones, TransGuide | 18. Distribution Statement No restrictions. This document is available to the public through the National Technical Information Service, Springfield, Virginia 22161. |

| | | | |
|---|---|---|---|
| 19. Security Classif. (of this report) Unclassified | 20. Security Classif. (of this page) Unclassified | 21. No. of Pages 375 | 22. Price |

Form DOT F 1700.7 (8-72) Reproduction of completed page authorized

# ANALYSIS OF TRAFFIC CONGESTION AND TROPOSPHERIC OZONE LEVELS IN SAN ANTONIO

Michael Martello
Michael T. McNerney

Research Report Number 2979-1F

Research Project 7-2979
*Traffic Congestion and Ozone Correlation on Loop 410*

conducted for the

**TEXAS DEPARTMENT OF TRANSPORTATION**

by the

**CENTER FOR TRANSPORTATION RESEARCH**
**Bureau of Engineering Research**
**THE UNIVERSITY OF TEXAS AT AUSTIN**

May 1997

## IMPLEMENTATION RECOMMENDATION

The findings of this report are based on (1) a statistical analysis of data collected in the San Antonio area, (2) a literature review, and (3) expert advice on tropospheric ozone formation. The results of the study suggest that a highway construction work zone with lane closure can impact the daily peak ozone or episodic peak ozone concentration. These impacts depend on particular circumstances, such as the severity of the work zone's impact on traffic congestion, the general level of traffic congestion without the work zone, the work zones' location relative to the ozone monitor, and various meteorological and atmospheric phenomena associated with the formation of tropospheric ozone.

The statistical analyses conducted indicate that the range of impacts associated with ozone formation is wide, from near zero parts per billion to much higher levels. Additionally, the literature suggests that the net effect of emissions of the ozone precursor $NO_X$ depends on when and where they occur, and that such emissions can be harmful and/or beneficial to ozone formation depending on particular circumstances.

Thus, given the potential severity that a work zone lane closure can have on the daily peak ozone concentration and, hence, the potential contribution that a work zone lane closure could have on a metropolitan area becoming classified as a non-attainment area for ozone, we recommend that TxDOT officials consider requiring a detailed air quality impact analysis on ozone formation under various scenarios of the parameters mentioned above (and detailed in this report) before a work zone lane closure is allowed.

Prepared in cooperation with the Texas Department of Transportation.

## DISCLAIMERS

The contents of this report reflect the views of the authors, who are responsible for the facts and the accuracy of the data presented herein. The contents do not necessarily reflect the official views or policies of the Federal Highway Administration or the Texas Department of Transportation. This report does not constitute a standard, specification, or regulation.

There was no invention or discovery conceived or first actually reduced to practice in the course of or under this contract, including any art, method, process, machine, manufacture, design or composition of matter, or any new and useful improvement thereof, or any variety of plant, which is or may be patentable under the patent laws of the United States of America or any foreign country.

NOT INTENDED FOR CONSTRUCTION,
BIDDING, OR PERMIT PURPOSES

Michael T. McNerney, P.E. (Texas No. 70176)
*Research Supervisor*

## TABLE OF CONTENTS

## SUMMARY

Multivariate linear regression analyses were performed with traffic, tropospheric ozone, and meteorological data in San Antonio, Texas, over the period from December 1995 through September 1996. The primary purpose of the analyses was primarily to discover any correlation between traffic congestion and peak ozone concentrations, and to extrapolate the results to better inform highway construction work zone environmental policy.

The daily peak ozone concentration was designated as the response or dependent variable, while the cumulative "morning" traffic congestion, along with six meteorological and initial morning ozone concentration variables, was designated as the predictor or independent variables. Traffic data were collected from San Antonio's newly installed Automated Traffic Management System (ATMS) or Transportation Guidance System (i.e., "TransGuide"). Point density, vehicle flow divided by vehicle speed at a given point (veh/mi/ln), was calculated from the TransGuide data and used as the traffic congestion index and as a proxy for the level of mobile emissions.

Several scenarios were analyzed by controlling for various meteorological and ozone episodic conditions. The results indicate that a positive correlation exists between the daily peak ozone concentrations and the traffic congestion parameter. The strength and confidence of the association varies under different scenarios.

Hypothetical work zone scenarios requiring highway lane closures were then assessed under differing levels of traffic demand. These hypothetical work zone scenarios were evaluated in terms of their potential for causing additional traffic congestion and, based on the statistical analyses performed, their potential for impacting the daily peak ozone concentration in San Antonio. The results imply that a work zone lane closure that occurs during some traffic demand conditions can cause an increase in traffic congestion sufficient to negatively impact the daily peak ozone concentration.

As with any statistical analysis, a hypothesis that explains the underlying fundamental physical processes involved in the phenomena being investigated and that explains why the variables included in the analysis might be correlated must be articulated. While this hypothesis provides corroboration for any correlation detected, correlation does not prove causation.

As for this study, we hypothesize that the daily cumulative morning TransGuide network traffic point density (veh/mi/ln) from 6AM to 2 hours before the time of the daily peak ozone is related to the level of mobile emissions and, thus, is generally related to the level of peak ozone. However, point density is affected by both traffic volume and traffic speed, and traffic speed is known to not be linearly related to emissions. For the same level of traffic volume, a reduction in cruise speed could result in a reduction in $NO_x$ and could thus reduce ozone formation, depending on particular circumstances. But it was not within the scope of this study to measure "microscopic" driving cycles of individual vehicles for acceleration, deceleration, idle, and cruise operating modes and their associated emissions. Conceivably, all of these aspects of the driving cycle exist within the data we collected.

Therefore, the results of this study should be viewed from a general perspective; that is, over the long-run, our traffic congestion parameter on the TransGuide network was found to be correlated with the daily peak ozone concentration; intervals of the strength of association and confidence of the association were also found. On any given day, the correlation between the traffic congestion parameter and the daily peak ozone should fall somewhere within these intervals. The hypothetical highway construction work zones can be evaluated in terms of their potential impacts on the traffic congestion parameter (point density) and should be assumed to be located within the limits of the TransGuide network.

If it is determined that these intervals of potential impacts are not adequate to serve as a basis for highway work zone environmental policy, and that finer estimations of impacts are desired, further analysis would need to be conducted. Owing to the intricate nature of the ozone-formation phenomena, a finer estimation of ozone formation resulting from highway work zone impacts at various locations would require an analysis using mobile emission and atmospheric dispersion models. It is also possible that finer estimations of impacts on ozone formation can be found through additional statistical analysis by collecting more data over time and by collecting data on many more variables.

# CHAPTER 1. INTRODUCTION

National Ambient Air Quality Standards (NAAQS) established by the Environmental Protection Agency under the Clean Air Act specify that ozone concentrations (daily 1-hour maximum) in urban areas and counties shall not exceed 120 parts per billion more than 1 day per year, averaged over a 3-year period. Otherwise, the area is classified as being in non-attainment.[1]

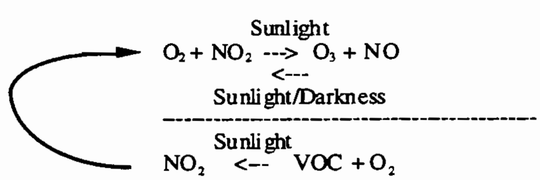
The 1990 Clean Air Act Amendments classify ozone non-attainment areas, from marginal to extreme, by a percentage over the 120-ppb standard. The greater the extent of non-attainment classification (marginal, moderate, serious, severe, extreme), the greater the potential costs in terms of human health, agricultural productivity, and in the implementation of measures to bring air quality into compliance with the NAAQS. San Antonio has recently come close to being classified as a marginal non-attainment area for ozone.

Urban air quality is, in part, a function of traffic congestion levels. As such, construction management traffic plans need to consider potential impacts on air quality, especially in areas at risk of being classified as a non-attainment area for ozone. The Texas Department of Transportation (TxDOT) would like to formulate policy on highway construction management traffic plans that take into consideration potential air quality impacts. Accomplishment of this goal will require both an appreciation of the complexity of the formation and dispersion dynamics of tropospheric ozone as well as an understanding of the limited scope of this project.

## OVERVIEW OF OZONE FORMATION AND DISPERSION

Ozone concentrations in the San Antonio metropolitan area are measured by two Continuous Air Monitoring Stations (CAMS) located in north and northwest San Antonio; they are operated by the Texas Natural Resource Conservation Commission (TNRCC).

The formation, dispersion and destruction of tropospheric ozone ($O_3$) is a complex, cyclic process that involves the reactions of ozone precursors, nitrogen oxides ($NO_X$) and nonmethane reactive hydrocarbons (or volatile organic compounds, VOCs), with oxygen and sunlight. Ozone formation, dispersion and destruction are sensitive to many meteorological characteristics as well, including wind speed and direction, relative humidity, and cloud cover. Atmospheric stability, such as when a high pressure system encompasses an area, and temperature play significant roles in ozone formation (Ref 3). The ozone cycle can be summarized by the following reactions (Ref 4):




[1] EPA has recommended that this standard be changed to some type of 8-hour average standard. Preliminary analysis of this new ozone standard, if officially adopted, will put several Texas metropolitan areas into non-attainment status, including San Antonio.

Mobile sources account for about 40 percent of the supply of the ozone precursors $NO_X$ and VOCs (Ref 3). The remaining supply of ozone precursors comes from electrical generating stations, industrial, chemical and petroleum industries, soil, vegetation, and lighting. In addition, intrusion of stratospheric ozone into the troposphere can contribute to ozone concentrations along with the transport of tropospheric ozone or its precursors from one geographic area to another. Figure 1 (Ref 3) illustrates the ozone cycle, from emission to deposition.

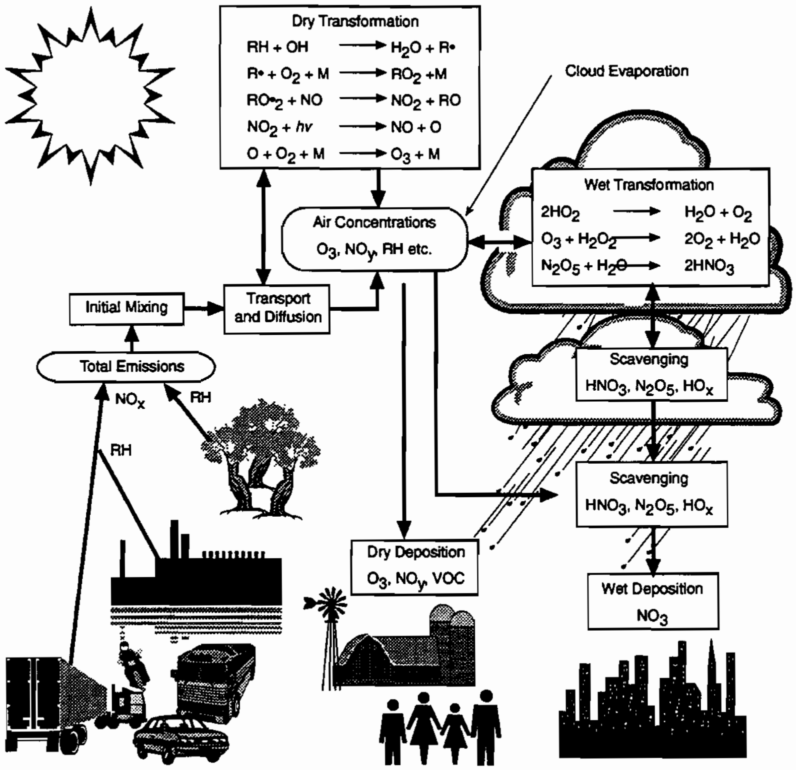



*Figure 1. The Ozone Cycle (adapted from Ref 3)*

## INCREMENTAL IMPACTS OF VOCS AND $NO_X$ ON OZONE FORMATION

Because of the complex ozone photochemistry process (as represented in the reaction shown above), the impact that incremental changes in VOC or $NO_X$ concentrations have on ozone formation appears to be sensitive to the overall VOC-to-$NO_X$ ratio present in the atmosphere (Refs 3, 5). Figure 2 (Ref 5) shows hypothetical ozone isopleths based on EKMA modeling for varying levels of VOCs and $NO_X$.

If an area of ozone formation is "VOC Limited," i.e., the VOC-to-$NO_X$ ratio is low, the impact on ozone formation is sensitive to incremental changes in both VOCs and $NO_X$. In Figure 2, "VOC Limited" zones are considered to be to the left of the ridge (i.e., a VOC-to-$NO_X$ ratio less than 8:1 [Ref 3]). Incremental decreases in VOCs will reduce ozone levels. However, an incremental decrease in NOx concentrations under "VOC Limited" conditions can actually worsen the ozone problem while increases in $NO_X$ can actually improve the ozone problem (when holding the level of VOCs constant). Some highly polluted urban areas are characterized by "VOC Limited" conditions (Ref 3).

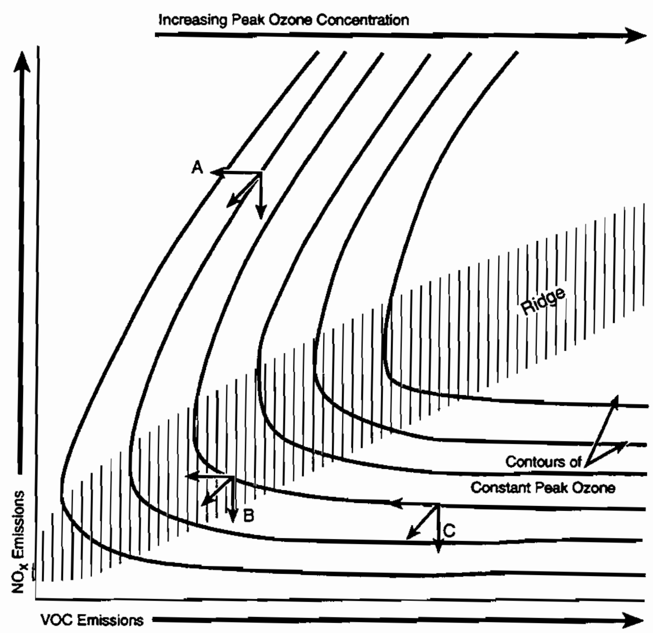



*Figure 2. Hypothetical Ozone Isopleths Based on EKMA Modeling for Varying Levels of VOCs and $NO_X$ (based on Ref 5)*

It is also possible for a polluted area to be characterized by "$NO_X$ Limited" conditions ("NOx Limited" region is to the right of the ridge in Figure 2). Under this scenario, ozone concentration is not sensitive to incremental changes in VOCs and is sensitive to incremental changes in $NO_X$ levels. Rural areas and suburbs downwind of city centers that are experiencing ozone problems are characterized by "$NO_X$ Limited" conditions (Ref 3). In summary, $NO_X$ emissions can be harmful and/or beneficial depending on when and where they occur. If VOC emissions are significant, they are harmful.[2]

## TRAFFIC OPERATIONS AND OZONE FORMATION

Figure 3 (Ref 6) shows the non-linear relationships between emission rates of VOCs (hydrocarbons) and $NO_X$ and average vehicle speeds. VOC emissions tend to increases when average speeds decrease. However, $NO_X$ emissions tend to decrease when average vehicle speed decreases, up to a certain point.

---

[2] Neece, James D. *The Effect of $NO_x$ Emissions on Ozone Formation and Destruction*. Texas Natural Resource Conservation Commission, Austin. August 3, 1994. One-page ozone "fact" summary sheet.

The interaction of the average vehicle speed/emission rate relationship with the "VOC Limited" or "$NO_X$ Limited" phenomenon can, theoretically, affect the outcome of incremental changes in ozone precursors on ozone formation.

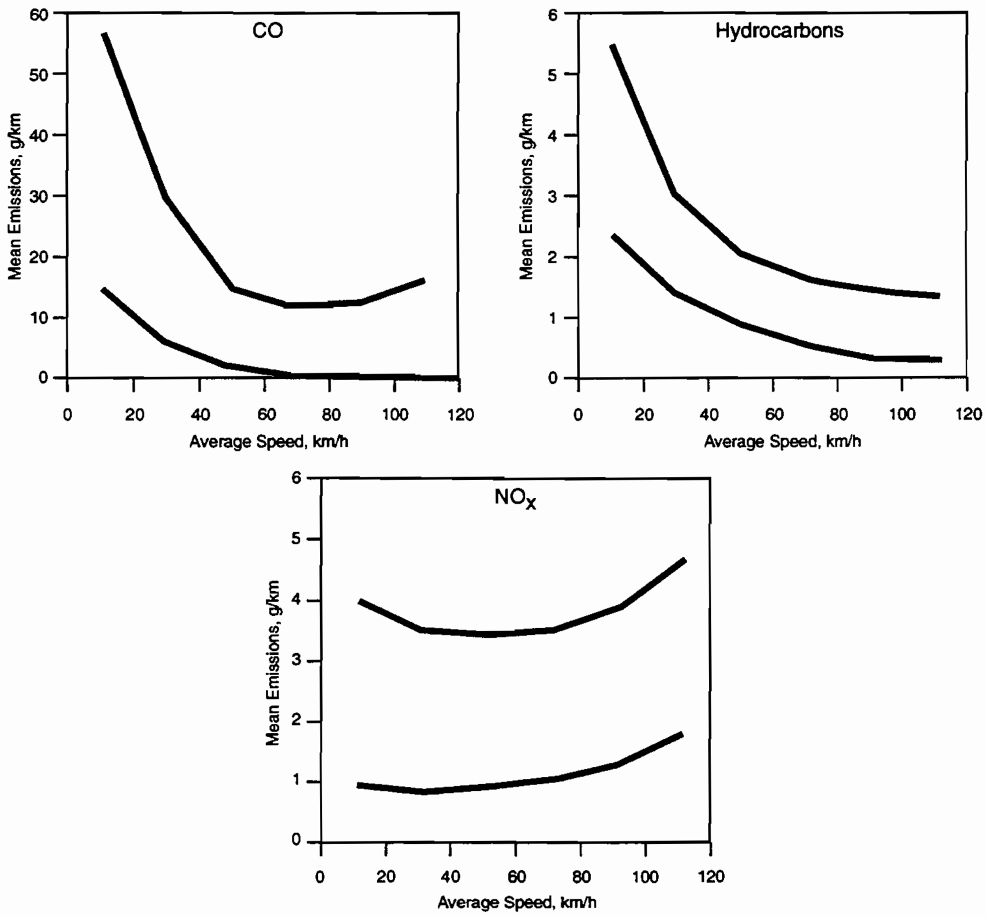



*Figure 3. Non-linear Relationships between Emission Eates of VOCs (hydrocarbons) and $NO_X$ and Average Vehicle Speeds*

For example, consider an ozone problem area where an overall "VOC Limited" condition exists and average vehicle speeds are 60 mph. According to the ozone isopleths shown in Figure 2, if average vehicle speeds were to be reduced, VOC emissions would increase and $NO_X$ emissions would decrease. The net incremental effect on ozone concentration would be an increase.

However, under the conditions of a "$NO_X$ Limited" area, the ozone concentration could actually decrease with a reduction in average vehicle speed. This paradox is made possible due to the fact that $NO_X$ emissions can be lower at reduced average vehicle speeds (Figure 2) and that ozone formation under "$NO_X$ Limited" conditions is apparently not sensitive to changes in VOC levels (Figure 2). This hypothetical scenario illustrates the importance of considering the VOC-to-$NO_X$ ratio in an area experiencing ozone problems when assessing the incremental impacts of changes in VOC and $NO_X$ emissions on ozone formation.

Ozone is often referred to as an areawide phenomena, however, this statement is somewhat misleading because levels of ozone across an urban area are known to be non-uniform. Even the levels of the ozone precursor emissions are known to be non-uniform across an urban area. Rather, the description of ozone as being areawide really refers to the fact that the activities that produce ozone precursor emissions generally exist over the entire urban area. The non-uniformity of urban ozone concentration is a result of the complex interaction of precursor emissions and meteorology.

## STUDY APPROACH

The discussion in the preceding sections illustrates the complex nature of the formation of tropospheric ozone. However, it is not the purpose of this study to conduct such "microscopic" analyses of ozone formation in San Antonio. The approach of this study is to conduct a statistical analysis of ozone, traffic and meteorological data over a period of time in order to discover any possible correlation between some type of daily traffic congestion parameter and the daily peak ozone concentration. The results of this analysis are then extrapolated in order to evaluate highway work zone sites and their potential impacts on daily peak ozone levels.

It is hypothesized that the overall amount of daily vehicular emissions are positively correlated to the overall amount of the daily traffic congestion parameter "point density" (veh/mi/ln) and that these emissions are linearly related to the daily peak ozone concentration when the data is controlled for various meteorological and ozone episodic factors. It is hypothesized that when controlling for these factors, at least a portion of the potential correlation between daily traffic congestion and daily peak ozone will be discovered that would otherwise go undetected. The reason being that meteorological and ozone episodic factors can cause significantly different daily peak ozone concentrations for a given amount of area wide emissions, which include mobile emissions.

This approach can be thought of as a "macroscopic" analysis in that general relationships between traffic and ozone are determined. The traffic data collected conceivably contains all types of vehicular modal operation regimes which affect vehicular emissions such as idle, cruise, deceleration and acceleration regimes. The traffic data collected does not distinguish between these vehicle operating modes but rather reflects a daily "aggregated" operating mode.

In addition, many of the factors described in the preceding sections are not controlled for in the data collected. Data on emissions or proxies for emissions from other sources, either mobile, stationary, or areawide are not collected other than from the TransGuide highway network limits. Ambient levels of $NO_X$ and VOCs are not controlled for nor is ultra-violet radiation intensity data (except for separately analyzing the months of April through September as a proxy for controlling for UV intensity).

Therefore, what this approach produces is information on *intervals* of the levels of association between traffic congestion and ozone that can be detected from the data collected and controlled for over time at various confidence levels. These intervals of the strength of association between the traffic congestion parameter and ozone can be wide, spanning from near zero to much higher levels. For a given analysis scenario, any point within the interval is equally likely to be the actual strength of association.

## DATA COLLECTION

Traffic data were collected from San Antonio's Transportation Guidance System, dubbed "TransGuide," a newly operational Automated Traffic Management System (ATMS) (see Figure 3). Phase I of the network, completed during this study, includes 42 km (26 miles) of five highways: IH-10, IH-35, IH-37, US281, and US90, including the upper and lower decks of IH-10 and IH-35. Using 325 inductive lane loop detectors at 99 locations throughout the network,[3] we collected 15-minute average vehicle speed, hourly equivalent volume, loop occupancy, and highway name and mile-point of loop location data. These data were collected daily from December 1995 through September 1996.[4] On average, the locations of the lane loop detectors are spaced approximately 0.97 km (0.6 mile) apart, ranging from 0.48 km (0.3 mile) to 3.06 km (1.9 miles).

Average hourly tropospheric ozone concentration data in parts per billion (ppb) were collected daily over the same period by the Texas Natural Resource Conservation Commission (TNRCC). The TNRCC operates two Continuous Air Monitoring Stations (CAMS) in San Antonio: the Northwest CAMS and the North CAMS; data were collected from both stations (see Figure 3). In addition to ozone data, several meteorological parameters, including ambient temperature, wind speed, and wind direction, are monitored by the CAMS and averaged on an hourly basis. These data were collected as well.

Meteorological data from the National Climatic Data Center were also collected. These data included hourly surface data as well as a summary of the day data. The parameters included ambient temperature, wind speed, and wind direction (as with the TNRCC CAMS) and a multitude of additional parameters, the most important of which was average hourly cloud cover. Hourly present weather condition data, which included information on precipitation, were not available for the entire study period and thus were not utilized. However, as stated, cloud cover data did exist and are assumed to be sufficient for controlling for days without precipitation (clear to scattered cloud cover or zero to four oktas).

Current ultra-violet (UV) radiation intensity data could not be located for the San Antonio area. However, controlling for the months of the year during the official ozone season from April through October was possible. These months correspond with the time of the year when UV radiation intensity per unit area at the earth's surface in North America is at its maximum as a result of the earth's axial tilt toward the sun.

---

[3] Based on analysis of January 1996 data received from TransGuide.

[4] Throughout the 10-month period, a few weeks of data were missing and could not be located by TransGuide: Missing Days of Data: Feb 19 - Feb 29; Mar 1 - Mar 5; Apr 23 - Apr 30; half-day May 31st; and Aug 1 - Aug 9.

## LINEAR REGRESSION MODEL DEVELOPMENT

Several analysis scenarios were developed by controlling for various meteorological parameters and ozone episodic parameters. The scenarios analyzed are based on controlling for such factors as:

- months of the peak ozone season (April - September[5]);
- average cloud cover from 6AM to the time that the daily peak ozone occurred;
- average wind speed from 6AM to the time that the daily peak ozone occurred;
- days in which the cumulative traffic congestion parameter from 6AM to 2 hours before the time of peak ozone is greater than or less than the median level;
- all individual days during all ozone episodes (an ozone episode being defined as consecutive days where the current days' peak ozone is greater than or equal to the preceding days' peak ozone); and
- a summation of the traffic congestion parameter for each ozone episode.

Wind direction is not controlled for owing to problems with determining when the wind direction is "variable." We assume that by controlling for ozone episodes, we are implicitly capturing the influence of wind direction as well as other atmospheric parameters that contribute to ozone episodes.

By controlling for these factors, we hypothesize that a correlation between the traffic congestion parameter and the ozone parameter will be revealed that otherwise would not have been detected. This is due to the fact that meteorological phenomena can cause significantly different levels of ozone formation for the same amount of ambient emissions of $NO_X$ and VOCs.

In all scenarios analyzed, the data set that results from some combination of these controls is the "intersection" of these controls. In other words, all controls must simultaneously be true. In programming jargon, the Boolean operator used between each line of SAS© code that specifies the data set controls is the "and" operator.

For each scenario analyzed, the stepwise linear regression model building option in the SAS© statistical software package is utilized. The minimum alpha-level for a variable to remain in the final model is 0.20. Seven variables were specified in each model to be evaluated for inclusion as the explanatory or independent variables via the stepwise model building option. In all scenarios analyzed, these seven variables are as follows:

1) <u>PTDCUMAM</u> — This variable is the cumulative point density (veh/mi/ln) from 6AM to 2 hours before the time of the daily peak ozone calculated from all loop detectors on all highways on the TransGuide network. It is calculated from the 15-minute average lane loop detector data received from the TransGuide center by dividing the hourly equivalent traffic volume by the speed in each lane. Based on the January

[5] The peak ozone season actually extends through October, though no data were collected for this month.

1996 data received, there are a total of 99 locations where loop detectors are installed on the 42-km (26-mile) network and 325 total lane loop detectors.

1A) EPSUMPTD — This variable is calculated in lieu of PTDCUMAM in the case of the scenarios analyzed where the summation of PTDCUMAM over each ozone episode is utilized.

2) OZINT — This variable is the initial morning hourly average ozone concentration (ppb) of the two CAMS located in San Antonio. If data are not missing for 5AM, then OZINT is set at 5AM. If missing, then OZINT is set at either 6AM, 4AM, or 7AM, whichever hour has non-missing data, in that order.

3) CLDAVGT2 — This variable is the average hourly cloud cover (oktas) from 6AM to the time of peak ozone and is based on the hourly surface data collected from the National Climatic Data Center (NCDC).

4) WSNC1T2 — This variable is the average hourly wind speed (mph) from 6AM to the time of peak ozone and is based on the hourly surface data collected from the NCDC.

5) WDSPGSD — This variable is the average daily wind speed (knots) based on the global summary of the day data collected from the NCDC.

6) TMAXDAY — This variable is the maximum daily ambient temperature (°F) based on data received from the TNRCC CAMS.

7) TMINDAY — This variable is the minimum daily ambient temperature (°F) based on data received from the TNRCC CAMS.

The dependent variable in all scenarios, OZMAX, is the daily maximum ozone concentration (ppb) based on the average of the hourly ozone concentrations measured by the two CAMS in San Antonio, except for scenarios where the summation of the traffic congestion parameter for each ozone episode was assessed. The dependent variable in this case, EMAXOZMX, is the maximum ozone concentration (ppb) of the episode, which is the last day of the episode. The seven variables listed above are also on the last day of the episode under this scenario.

Throughout this report, we utilize the estimate of the independent variable's coefficient and the confidence intervals of the estimate of the coefficient as the relative measure of strength of association among the various scenarios analyzed, strength of association between the independent variable, and the dependent variable in the multivariate models. A given parameter's coefficient is the slope of the multivariate regression line while holding other parameters constant and is dependent on the units of measurement of the independent variable. We are specifically interested in the traffic congestion independent variable (PTDCUMAM or EPSUMPTD) and its strength of association with the dependent variable (OZMAX or EMAXOZMX).

We also utilize the Pearson correlation value of a bivariate regression as another measure of the strength of association. The Pearson correlation value can be interpreted as a standardized slope that does not depend on the units of measurement of the independent variable. In the case of a bivariate model, this value is a measure of the strength of association without considering the effect of other variables in the model.

# CHAPTER 2. RESULTS OF SCENARIOS

The first four scenarios assessed are controlled for months of the year as well as average "morning" ( 6AM to the time that the peak ozone occurs) cloud cover and wind speed. They can be summarized as follows:

<u>Scenario 1 Controls:</u>
- No Controls

<u>Scenario 2 Controls:</u>
- Controlled for Peak Ozone Season

<u>Scenario 3 Controls:</u>
- Cloud Cover
- Wind Speed

<u>Scenario 4 Controls:</u>
- Controlled for Peak Ozone Season
- Cloud Cover
- Wind Speed

## SCENARIO 1

In Scenario 1, we include all months of data collected from December 1995 through September 1996 and do not control for any variables. Table 1 summarizes the results of the model and Table 2 summarizes the raw data for Scenario 1 sorted by date.

Under this scenario, the traffic congestion parameter PTDCUMAM was not found to be significant enough (at a minimum required 80 percent confidence level) to be included in the model. All six other explanatory variables were significant enough to be included in the model. The finding of a lack of significance of the traffic congestion parameter under this scenario does not prove that the parameter does not affect the daily peak ozone level. We can only conclude that under the conditions of this scenario, we are not able to detect any possible relationship that might exist.

Figure 4 and Figure 5 plot the daily peak ozone (OZMAX) and the daily cumulative traffic congestion parameter (PTDCUMAM) over time. Figure 6 through Figure 12 graphically summarize the relationships between the response and predictor variables.

*Table 1. Scenario 1 Results*

| | | | RANGE OF VARIABLES |
|---|---|---|---|
| **DATA CONTROLS** | 1) DEC 1995 - SEP 1996 | | |
| **MODEL SIGNIFICANT PARAMETERS (units)** | Y --- OZMAX (ppb)<br>X0 --- INTERCEPT<br>X1 --- OZINT (ppb)<br>X2 --- CLDAVGT2 (oktas)<br>X3 --- WSNC1T2 (mph)<br>X4 --- TMAXDAY (° F)<br>X5 --- WDSPGSD (knots)<br>X6 --- TMINDAY (° F) | | 8 to 126<br><br>0 to 47<br>0 to 8<br>2.8 to 23.4<br>32 to 99.5<br>2.2 to 17.5<br>19.5 to 83 |
| **SIGNIFICANT PARAMETER COEFFICIENT ESTIMATES AND BIVARIATE CORRELATIONS (r)** | 22.84369691 X0<br>0.57250482 X1<br>-1.92432452 X2<br>-0.95398904 X3<br>0.72067640 X4<br>-1.23701580 X5<br>-0.26169851 X6 | ---<br>0.0250<br>-0.4013<br>-0.3439<br>0.4126<br>-0.2786<br>0.2670 | |
| **TRAFFIC VARIABLE COEFFICIENT CONFIDENCE-LEVEL** | NA | | |
| **MODEL R-SQUARE** | 0.47 | | |
| **TRAFFIC VARIABLE PARTIAL R-SQUARE** | NA | | |
| **SAMPLE SIZE** | 254 | | |
| **1st ORDER AUTO-CORRELATION Durbin-Watson Statistic** | 1.279 | | |
| **P-VALUE SUPPORTING $H_O$: No Heteroskedasticity** | 0.1858 | | |

*Table 2. Scenario 1 Data*

| DATECST | OZMAX | PTDCUMAM | OZINT | CLDAVGT2 | WSNC1T2 | TMAXDAY | WDSPGSD | TMINDAY |
|---|---|---|---|---|---|---|---|---|
| 12/1/95 | 37.5 | 98,911 | 10 | 7.76 | 9.17 | 70 | 6.6 | 56 |
| 12/2/95 | 42.0 | 61,250 | 17 | 6.70 | 12.08 | 76 | 7.2 | 65 |
| 12/3/95 | 42.0 | 30,470 | 13 | 5.41 | 8.64 | 79 | 5.9 | 62 |
| 12/4/95 | 65.5 | 115,843 | 34 | 0.11 | 7.33 | 75 | 4.5 | 53 |
| 12/5/95 | 39.0 | 103,239 | 11.5 | 5.00 | 8.96 | 82 | 5.5 | 56 |
| 12/6/95 | 66.0 | 113,569 | 30.5 | 1.22 | 6.14 | 74 | 5.7 | 51 |
| 12/7/95 | 33.0 | 113,677 | 29 | 7.12 | 14.36 | 61.5 | 7.1 | 52.5 |
| 12/8/95 | 22.0 | 122,269 | 7 | 7.64 | 5.57 | 67 | 5.8 | 48 |
| 12/9/95 | 27.5 | 71,780 | 10 | 2.50 | 19.04 | 50 | 13.5 | 32.5 |
| 12/10/95 | 27.0 | 57,496 | 13 | 1.27 | 9.05 | 48 | 7.1 | 26.5 |
| 12/11/95 | 31.5 | 108,697 | 19.5 | 7.30 | 7.30 | 61 | 6.5 | 45 |
| 12/12/95 | 35.5 | 98,172 | 4.5 | 4.57 | 12.69 | 73 | 7.9 | 55 |
| 12/13/95 | 39.0 | 96,818 | 15.5 | 4.95 | 11.91 | 77 | 9 | 58.5 |
| 12/14/95 | 41.0 | 116,686 | 15 | 3.25 | 12.10 | 79 | 8.4 | 63.5 |
| 12/15/95 | 33.0 | 117,225 | 8.5 | 4.00 | 9.59 | 80 | 8.9 | 61 |
| 12/19/95 | 31.0 | 93,831 | 13.5 | 1.00 | 11.01 | 57 | 9.4 | 40.5 |
| 12/20/95 | 23.0 | 96,745 | 5.5 | 4.44 | 9.33 | 46 | 5 | 35.5 |
| 12/21/95 | 15.0 | 76,554 | 6.5 | 8.00 | 12.02 | 43 | 8.1 | 37 |
| 12/22/95 | 16.5 | 44,209 | 5 | 5.33 | 9.34 | 48 | 7.2 | 39.5 |
| 12/23/95 | 25.5 | 67,993 | 20 | 4.59 | 8.11 | 47.5 | 6.4 | 36 |
| 12/24/95 | 22.5 | 33,673 | 0 | 8.00 | 4.83 | 48 | 2.2 | 33 |
| 12/25/95 | 37.0 | 33,500 | 6.5 | 5.68 | 5.78 | 59 | 3.5 | 44.5 |
| 12/26/95 | 18.5 | 33,175 | 1.5 | 3.00 | 3.55 | 55 | 3.1 | 39 |
| 12/27/95 | 46.0 | 93,809 | 0 | 1.88 | 5.88 | 63 | 3.9 | 37 |
| 12/28/95 | 37.0 | 97,626 | 8.5 | 1.11 | 10.83 | 56 | 5.5 | 40.5 |
| 12/29/95 | 8.0 | 54,452 | 1 | 7.67 | 9.48 | 50 | 5.4 | 38 |
| 1/1/96 | 21.7 | 17,595 | 0 | 6.00 | 9.34 | 60 | 5.8 | 41 |
| 1/2/96 | 28.5 | 59,958 | 27.5 | 1.17 | 18.85 | 48.5 | 14.2 | 37.5 |
| 1/3/96 | 30.5 | 91,286 | 5.5 | 0.27 | 7.68 | 53 | 6.8 | 29.5 |
| 1/4/96 | 35.5 | 109,338 | 2.5 | 0.94 | 9.27 | 66 | 6.7 | 34 |
| 1/5/96 | 23.0 | 86,206 | 1 | 2.76 | 10.41 | 61 | 5 | 41.5 |
| 1/6/96 | 24.5 | 69,798 | 18.5 | 7.08 | 18.00 | 44 | 12.9 | 30.5 |
| 1/7/96 | 36.0 | 31,789 | 24.5 | 0.25 | 13.16 | 45 | 8.6 | 25 |
| 1/8/96 | 35.0 | 116,563 | 1.5 | 0.11 | 7.18 | 50.5 | 4.6 | 22 |
| 1/9/96 | 43.5 | 112,755 | 19 | 0.00 | 10.30 | 64 | 7.2 | 35 |
| 1/10/96 | 40.0 | 93,327 | 1 | 2.40 | 5.93 | 67 | 3.6 | 36.5 |
| 1/11/96 | 35.5 | 92,097 | 14 | 2.14 | 16.70 | 65 | 8.9 | 42 |
| 1/12/96 | 38.0 | 84,915 | 12 | 0.29 | 9.58 | 74 | 6 | 40 |
| 1/13/96 | 43.0 | 44,330 | 0 | 0.43 | 5.91 | 73 | 4.6 | 42 |

*Table 2. Scenario 1 Data (continued)*

| DATECST | OZMAX | PTDCUMAM | OZINT | CLDAVGT2 | WSNC1T2 | TMAXDAY | WDSPGSD | TMINDAY |
|---|---|---|---|---|---|---|---|---|
| 1/14/96 | 49.5 | 48,991 | 8 | 1.44 | 9.58 | 74.5 | 5.1 | 44 |
| 1/15/96 | 56.0 | 99,454 | 3 | 0.78 | 4.99 | 75 | 2.6 | 47.5 |
| 1/17/96 | 35.0 | 111,857 | 27 | 5.68 | 18.53 | 77 | 11.6 | 60 |
| 1/18/96 | 19.0 | 95,376 | 26 | 0.43 | 23.41 | 66 | 13.5 | 37 |
| 1/20/96 | 46.0 | 46,348 | 12 | 3.75 | 8.08 | 66 | 6.3 | 32 |
| 1/21/96 | 52.0 | 45,640 | 27 | 0.00 | 7.97 | 71 | 3.6 | 45 |
| 1/22/96 | 35.5 | 96,633 | 20 | 7.00 | 11.84 | 74 | 9.2 | 55 |
| 1/23/96 | 33.0 | 86,407 | 21.5 | 6.00 | 14.26 | 78 | 10.9 | 60 |
| 1/24/96 | 30.0 | 109,209 | 2 | 0.00 | 3.74 | 61 | 4.8 | 38 |
| 1/25/96 | 44.0 | 115,551 | 0 | 4.32 | 9.55 | 67 | 5.5 | 38 |
| 1/26/96 | 38.0 | 99,359 | 10.5 | 0.57 | 11.02 | 74 | 9.4 | 43.5 |
| 1/27/96 | 29.5 | 46,823 | 23.5 | 1.43 | 11.18 | 53 | 8.9 | 33.5 |
| 1/28/96 | 25.0 | 43,666 | 19 | 7.71 | 6.62 | 58 | 4.7 | 41 |
| 1/29/96 | 41.0 | 81,415 | 0 | 5.46 | 3.90 | 75 | 2.3 | 55 |
| 1/30/96 | 31.0 | 113,258 | 8.5 | 7.36 | 10.24 | 74 | 7.1 | 46 |
| 1/31/96 | 17.0 | 81,025 | 15.5 | 8.00 | 15.54 | 43 | 13.2 | 31 |
| 2/1/96 | 11.0 | 167,974 | 16 | 8.00 | 13.68 | 32 | 8.5 | 28 |
| 2/2/96 | 23.0 | 1,899 | 13.5 | 8.00 | 15.14 | 32 | 11 | 27.5 |
| 2/3/96 | 31.5 | 55,581 | 24.5 | 7.05 | 13.21 | 33 | 8.7 | 27 |
| 2/4/96 | 33.0 | 26,324 | 18.5 | 0.29 | 9.69 | 40 | 5.6 | 19.5 |
| 2/5/96 | 34.5 | 88,084 | 28 | 8.00 | 10.04 | 51 | 7.5 | 31.5 |
| 2/6/96 | 44.0 | 94,245 | 8 | 5.50 | 6.93 | 71 | 5 | 50 |
| 2/7/96 | 42.5 | 101,830 | 4 | 2.95 | 11.25 | 74 | 9 | 50 |
| 2/8/96 | 35.0 | 112,494 | 11 | 2.88 | 14.88 | 77 | 10.6 | 56.5 |
| 2/9/96 | 42.0 | 102,967 | 0 | 6.42 | 4.12 | 75.5 | 3.7 | 51 |
| 2/10/96 | 39.5 | 79,924 | 19 | 5.00 | 10.21 | 80 | 7.6 | 63 |
| 2/11/96 | 35.5 | 56,631 | 29 | 2.12 | 20.04 | 64 | 12.2 | 48.5 |
| 2/12/96 | 40.0 | 103,061 | 22 | 2.50 | 10.28 | 64 | 5.4 | 40 |
| 2/13/96 | 44.5 | 103,596 | 0 | 1.00 | 7.42 | 67 | 4.8 | 39 |
| 2/14/96 | 45.0 | 89,558 | 24.5 | 0.86 | 10.92 | 79.5 | 8.1 | 49 |
| 2/15/96 | 40.0 | 104,881 | 26 | 0.27 | 17.15 | 72 | 8.5 | 53.5 |
| 2/16/96 | 39.0 | 121,353 | 30.5 | 0.00 | 12.24 | 56 | 8.3 | 42.5 |
| 2/17/96 | 53.0 | 65,381 | 2 | 2.00 | 10.35 | 69 | 6.3 | 35 |
| 2/18/96 | 48.0 | 50,705 | 0 | 6.57 | 8.34 | 74.5 | 4.8 | 50.5 |
| 3/6/96 | 36.0 | 130,105 | 8.5 | 6.73 | 7.88 | 82 | 7.3 | 41.5 |
| 3/7/96 | 35.5 | 97,216 | 30 | 1.44 | 19.88 | 50 | 17.5 | 31.5 |
| 3/8/96 | 37.5 | 116,633 | 28 | 3.10 | 13.96 | 48 | 9.6 | 30 |
| 3/9/96 | 35.5 | 91,103 | 6 | 0.82 | 9.61 | 52 | 5.9 | 28.5 |
| 3/10/96 | 62.0 | 54,976 | 0 | 0.42 | 8.18 | 61 | 4.4 | 30 |

*Table 2. Scenario 1 Data (continued)*

| DATECST | OZMAX | PTDCUMAM | OZINT | CLDAVGT2 | WSNC1T2 | TMAXDAY | WDSPGSD | TMINDAY |
|---|---|---|---|---|---|---|---|---|
| 3/11/96 | 56.5 | 100,257 | 4 | 1.00 | 11.86 | 66 | 7.3 | 37 |
| 3/12/96 | 47.5 | 85,513 | 1.5 | 6.00 | 8.92 | 75 | 8.6 | 42 |
| 3/13/96 | 45.5 | 72,334 | 3.5 | 1.90 | 9.85 | 82 | 10 | 51.5 |
| 3/14/96 | 62.0 | 117,977 | 26.5 | 5.33 | 9.12 | 82 | 9.4 | 64 |
| 3/15/96 | 65.0 | 122,914 | 22 | 2.63 | 9.32 | 79.5 | 5.9 | 62 |
| 3/16/96 | 60.0 | 49,650 | 18.5 | 5.18 | 3.79 | 80 | 2.9 | 60.5 |
| 3/17/96 | 53.5 | 20,589 | 6 | 0.50 | 8.07 | 83 | 6.1 | 56 |
| 3/18/96 | 41.5 | 139,638 | 33 | 2.00 | 21.99 | 67 | 11.2 | 49 |
| 3/19/96 | 45.0 | 93,187 | 27.5 | 0.13 | 13.23 | 67 | 6.9 | 45 |
| 3/20/96 | 46.5 | 93,131 | 17.5 | 0.00 | 10.21 | 66 | 5.9 | 40.5 |
| 3/21/96 | 59.0 | 79,438 | 0 | 0.13 | 7.82 | 73 | 4.8 | 38.5 |
| 3/22/96 | 48.5 | 72,130 | 24.5 | 5.40 | 12.34 | 77.5 | 9.5 | 53.5 |
| 3/23/96 | 48.5 | 22,214 | 46.5 | 8.00 | 15.54 | 66.5 | 14.3 | 61.5 |
| 3/24/96 | 46.0 | 38,648 | 31.5 | 7.18 | 11.98 | 81 | 9.9 | 64 |
| 3/25/96 | 35.0 | 72,492 | 29 | 2.67 | 23.01 | 66 | 11 | 46 |
| 3/26/96 | 26.5 | 42,450 | 27 | 7.80 | 19.67 | 48 | 14 | 38.5 |
| 3/27/96 | 15.5 | 116,585 | 15 | 7.91 | 12.70 | 48 | 7.3 | 39 |
| 3/28/96 | 60.5 | 141,006 | 21 | 2.70 | 5.47 | 71 | 4 | 42.5 |
| 3/29/96 | 39.0 | 91,495 | 5 | 8.00 | 7.43 | 64 | 4.8 | 48 |
| 3/30/96 | 63.0 | 48,388 | 18 | 3.78 | 8.17 | 86 | 8 | 64 |
| 3/31/96 | 49.0 | 66,257 | 35 | 2.63 | 13.61 | 72 | 9.4 | 52 |
| 4/1/96 | 63.0 | 128,397 | 47 | 0.44 | 14.51 | 74 | 8.5 | 56 |
| 4/2/96 | 60.5 | 99,169 | 1.5 | 2.53 | 10.89 | 72.5 | 6.3 | 44.5 |
| 4/3/96 | 48.5 | 73,201 | 34 | 6.12 | 13.37 | 75.5 | 9.7 | 57.5 |
| 4/4/96 | 54.5 | 71,110 | 24 | 7.27 | 7.87 | 81 | 9 | 60.5 |
| 4/5/96 | 25.5 | 179,760 | 27.5 | 7.83 | 18.41 | 58.5 | 13.6 | 39.5 |
| 4/6/96 | 50.0 | 50,850 | 28.5 | 3.63 | 13.86 | 62.5 | 11 | 40 |
| 4/7/96 | 63.0 | 80,590 | 13 | 1.45 | 5.27 | 66 | 3.8 | 41 |
| 4/8/96 | 82.5 | 138,109 | 17 | 0.13 | 6.33 | 79.5 | 3.9 | 49 |
| 4/9/96 | 62.0 | 83,988 | 17.5 | 0.40 | 11.07 | 88.5 | 4.7 | 57 |
| 4/10/96 | 62.5 | 81,961 | 16 | 0.57 | 6.55 | 86 | 4.8 | 56.5 |
| 4/11/96 | 46.5 | 145,343 | 23 | 5.22 | 18.58 | 80 | 11.9 | 65.5 |
| 4/12/96 | 47.5 | 132,995 | 28 | 5.47 | 11.05 | 90 | 13 | 63.5 |
| 4/13/96 | 59.5 | 52,465 | 7 | 6.00 | 7.22 | 91 | . | 58.5 |
| 4/14/96 | 54.5 | 47,000 | 22 | 2.67 | 10.41 | 88 | 9.8 | 66 |
| 4/15/96 | 44.5 | 113,429 | 35 | 0.38 | 15.76 | 76 | 12.5 | 53 |
| 4/16/96 | 63.5 | 144,610 | 0 | 1.64 | 9.72 | 77 | 7.2 | 46 |
| 4/17/96 | 53.5 | 96,940 | 31.5 | 4.53 | 10.72 | 82 | 9 | 59.5 |
| 4/18/96 | 52.0 | 170,519 | 31 | 1.92 | 8.68 | 93 | 11.4 | 68 |

*Table 2. Scenario 1 Data (continued)*

| DATECST | OZMAX | PTDCUMAM | OZINT | CLDAVGT2 | WSNC1T2 | TMAXDAY | WDSPGSD | TMINDAY |
|---|---|---|---|---|---|---|---|---|
| 4/19/96 | 52.0 | 133,172 | 20.5 | 2.22 | 13.75 | 97 | 8.2 | 68.5 |
| 4/20/96 | 54.5 | 100,705 | 0 | 3.52 | 12.99 | 83 | 7.6 | 68 |
| 4/21/96 | 42.5 | 90,964 | 20 | 5.82 | 16.98 | 88 | 11.2 | 71 |
| 4/22/96 | 44.5 | 171,288 | 18 | 6.68 | 12.13 | 78.5 | . | 61 |
| 5/1/96 | 66.0 | 189,529 | 27 | 0.95 | 14.05 | 84.5 | 10.3 | 56 |
| 5/2/96 | 45.5 | 111,000 | 17.5 | 8.00 | 11.76 | 78 | . | 67 |
| 5/3/96 | 48.5 | 131,880 | 22 | 6.85 | 15.18 | 86.5 | 12.6 | 70 |
| 5/4/96 | 55.0 | 88,226 | 29 | 5.71 | 13.45 | 87 | 12.6 | 70 |
| 5/5/96 | 41.0 | 19,101 | 22 | 6.57 | 11.58 | 87 | 9.8 | 69.5 |
| 5/6/96 | 33.0 | 112,036 | 16 | 7.91 | 15.50 | 83 | 13 | 73 |
| 5/7/96 | 35.5 | 125,392 | 9 | 6.46 | 14.33 | 84.5 | 11.3 | 72 |
| 5/8/96 | 35.5 | 98,806 | 21.5 | 6.63 | 16.21 | 83 | 11.4 | 71 |
| 5/9/96 | 37.0 | 98,731 | 13 | 5.85 | 16.66 | 87 | 7.8 | 72 |
| 5/10/96 | 33.5 | 98,712 | 10 | 6.18 | 16.71 | 89 | 12.5 | 72.5 |
| 5/11/96 | 50.0 | 103,665 | 26 | 1.91 | 9.94 | 87 | 9 | 65.5 |
| 5/12/96 | 68.0 | 51,761 | 15.5 | 7.48 | 6.76 | 86 | 5 | 65 |
| 5/13/96 | 40.0 | 155,609 | 4 | 4.89 | 14.24 | 90 | 8.9 | 71 |
| 5/14/96 | 44.0 | 110,364 | 22 | 5.24 | 15.60 | 88.5 | 12 | 70 |
| 5/15/96 | 44.0 | 142,712 | 9.5 | 3.47 | 16.04 | 91.5 | 12.8 | 72 |
| 5/16/96 | 50.0 | 79,096 | 14 | 3.50 | 14.36 | 93.5 | 12.5 | 71.5 |
| 5/17/96 | 37.0 | 99,211 | 18.5 | 2.80 | 16.10 | 93 | 14.2 | 72.5 |
| 5/18/96 | 35.5 | 102,115 | 20 | 3.62 | 16.96 | 91.5 | 12.5 | 73.5 |
| 5/19/96 | 36.0 | 75,940 | 19.5 | 3.05 | 16.77 | 93 | 13.7 | 73 |
| 5/20/96 | 39.0 | 159,670 | 16.5 | 3.52 | 15.05 | 95.5 | 12.6 | 73 |
| 5/21/96 | 46.0 | 140,220 | 15 | 2.52 | 11.94 | 95 | 10.2 | 73.5 |
| 5/22/96 | 49.0 | 124,190 | 12 | 2.67 | 13.04 | 95.5 | 10.1 | 72.5 |
| 5/23/96 | 46.5 | 96,602 | 16 | 5.18 | 16.36 | 94.5 | 12 | 73 |
| 5/24/96 | 48.5 | 129,182 | 19 | 5.68 | 16.73 | 89 | 14.2 | 75 |
| 5/25/96 | 42.5 | 59,984 | 18 | 5.86 | 17.73 | 91.5 | 13.2 | 76 |
| 5/26/96 | 38.0 | 38,124 | 9 | 5.88 | 16.67 | 91.5 | . | 76.5 |
| 5/27/96 | 53.0 | 99,086 | 14.5 | 5.70 | 7.32 | 89 | 9.5 | 69.5 |
| 5/28/96 | 47.0 | 109,472 | 10.5 | 6.11 | 10.28 | 91 | 7.3 | 81.5 |
| 5/29/96 | 45.5 | 96,224 | 4.5 | 4.13 | 10.77 | 96 | . | 77 |
| 5/30/96 | 42.0 | 96,544 | 8 | 4.50 | 11.86 | 94 | 9.3 | 77.5 |
| 6/1/96 | 46.5 | 98,585 | 10.5 | 3.48 | 12.32 | 89.5 | . | 72.5 |
| 6/2/96 | 52.0 | 75,557 | 1.5 | 4.61 | 5.65 | 92.5 | 6.8 | 69.5 |
| 6/3/96 | 120.0 | 158,194 | 8 | 1.27 | 4.36 | 91.5 | 7.5 | 68 |
| 6/4/96 | 58.0 | 66,574 | 35 | 2.77 | 9.34 | 91.5 | 5.8 | 69 |

*Table 2. Scenario 1 Data (continued)*

| DATECST | OZMAX | PTDCUMAM | OZINT | CLDAVGT2 | WSNC1T2 | TMAXDAY | WDSPGSD | TMINDAY |
|---|---|---|---|---|---|---|---|---|
| 6/5/96 | 54.5 | 112,916 | 7 | 2.40 | 9.66 | 93.5 | 9.4 | 73.5 |
| 6/6/96 | 48.5 | 25,272 | 18.5 | 3.37 | 16.39 | 93 | 11.8 | 73.5 |
| 6/7/96 | 46.0 | 195,817 | 13.5 | 5.76 | 12.55 | 85.5 | 9.8 | 67 |
| 6/8/96 | 63.5 | 54,669 | 12 | 0.25 | 6.92 | 90 | 3.4 | 64.5 |
| 6/9/96 | 84.0 | 80,549 | 12.5 | 1.68 | 8.37 | 90.5 | 4.5 | 64.5 |
| 6/10/96 | 69.5 | 127,024 | 21.5 | 1.27 | 12.83 | 96.5 | 9.4 | 70.5 |
| 6/11/96 | 48.0 | 138,021 | 40.5 | 4.70 | 11.44 | 94 | 9.3 | 71.5 |
| 6/12/96 | 46.0 | 143,310 | 18.5 | 3.48 | 9.68 | 94 | 9.8 | 78 |
| 6/13/96 | 49.0 | 106,210 | 2.5 | 3.81 | 8.06 | 95 | 7 | 76 |
| 6/14/96 | 44.5 | 83,580 | 4 | 2.86 | 7.63 | 95 | 7.8 | 76.5 |
| 6/15/96 | 40.5 | 46,819 | 6.5 | 2.29 | 8.29 | 94 | 8.6 | 75.5 |
| 6/16/96 | 35.0 | 39,835 | 2.5 | 2.94 | 7.82 | 95 | 7.7 | 75 |
| 6/17/96 | 56.5 | 113,027 | 3 | 1.18 | 5.98 | 96 | 4.5 | 76 |
| 6/18/96 | 67.0 | 115,719 | 2.5 | 1.11 | 8.31 | 97.5 | 5.2 | 76.5 |
| 6/19/96 | 51.5 | 113,469 | 1 | 0.67 | 9.45 | 99.5 | 7.2 | 76.5 |
| 6/20/96 | 70.0 | 97,560 | 1.5 | 1.06 | 7.57 | 99.5 | 7.5 | 76.5 |
| 6/21/96 | 59.5 | 129,152 | 5 | 3.91 | 8.30 | 96 | 6.3 | 76 |
| 6/22/96 | 33.5 | 73,263 | 8 | 4.20 | 11.82 | 88 | 9.9 | 78 |
| 6/23/96 | 40.0 | 28,486 | 20.5 | 5.13 | 7.32 | 89 | 8.3 | 76 |
| 6/24/96 | 52.5 | 90,962 | 6.5 | 3.78 | 7.86 | 92 | 9.6 | 76.5 |
| 6/25/96 | 36.0 | 79,059 | 11 | 5.89 | 9.20 | 82 | 8.1 | 76.5 |
| 6/26/96 | 20.0 | 65,469 | 5 | 5.75 | 9.89 | 86 | 7.5 | 76 |
| 6/27/96 | 39.0 | 89,069 | 0 | 3.14 | 11.58 | 91 | 8.9 | 76.5 |
| 6/28/96 | 38.0 | 130,161 | 1.5 | 3.52 | 9.17 | 92.5 | 8.6 | 76 |
| 6/29/96 | 40.5 | 72,845 | 1 | 5.00 | 7.65 | 92 | 5.9 | 75 |
| 6/30/96 | 60.5 | 28,900 | 0 | 1.00 | 3.99 | 92 | 6.4 | 73 |
| 7/1/96 | 69.0 | 103,954 | 0 | 1.50 | 6.61 | 95 | 5.6 | 75 |
| 7/2/96 | 98.0 | 88,279 | 3 | 0.56 | 5.24 | 96 | 5.8 | 75.5 |
| 7/3/96 | 99.5 | 78,502 | 0.5 | 0.25 | 5.39 | 95.5 | 7.1 | 74.5 |
| 7/4/96 | 105.5 | 15,650 | 4.5 | 1.00 | 3.15 | 96 | 5.6 | 74.5 |
| 7/5/96 | 58.5 | 73,601 | 6.5 | 2.22 | 6.77 | 96 | 7 | 74.5 |
| 7/6/96 | 54.5 | 63,346 | 5.5 | 3.88 | 7.88 | 97 | 7.9 | 76 |
| 7/7/96 | 63.0 | 47,373 | 7 | 1.80 | 6.52 | 97.5 | 7.3 | 76 |
| 7/8/96 | 41.5 | 75,141 | 3 | 4.05 | 8.11 | 96.5 | 8 | 77.5 |
| 7/9/96 | 40.5 | 131,979 | 4.5 | 4.59 | 9.75 | 97 | 9.1 | 77 |
| 7/10/96 | 48.5 | 120,871 | 1 | 5.41 | 7.43 | 90 | 8.1 | 73.5 |
| 7/11/96 | 40.5 | 105,242 | 0.5 | 5.67 | 9.18 | 94 | 8.2 | 77 |
| 7/12/96 | 42.0 | 146,141 | 3.5 | 2.65 | 10.43 | 96 | 10.5 | 77.5 |
| 7/13/96 | 41.0 | 75,441 | 1 | 2.38 | 8.97 | 96.5 | 8.3 | 76.5 |
| 7/14/96 | 46.5 | 87,219 | 8.5 | 3.39 | 10.66 | 96.5 | 9.3 | 76.5 |

*Table 2. Scenario 1 Data (continued)*

| DATECST | OZMAX | PTDCUMAM | OZINT | CLDAVGT2 | WSNC1T2 | TMAXDAY | WDSPGSD | TMINDAY |
|---|---|---|---|---|---|---|---|---|
| 7/15/96 | 41.0 | 91,860 | 3.5 | 6.17 | 6.15 | 96 | 7.5 | 78 |
| 7/16/96 | 37.0 | 107,791 | 7 | 5.83 | 12.45 | 96 | 10.1 | 77 |
| 7/17/96 | 33.5 | 133,312 | 4 | 4.41 | 11.82 | 95.5 | 10.5 | 76.5 |
| 7/18/96 | 31.5 | 110,139 | 4.5 | 4.29 | 10.06 | 96.5 | 9.6 | 77.5 |
| 7/19/96 | 32.5 | 105,349 | 7 | 5.18 | 12.41 | 97 | 10.5 | 78 |
| 7/20/96 | 39.0 | 58,253 | 7.5 | 2.53 | 10.58 | 98 | 9.4 | 76.5 |
| 7/21/96 | 36.0 | 38,347 | 5 | 2.91 | 10.62 | 97 | 10 | 75.5 |
| 7/22/96 | 31.0 | 125,541 | 17.5 | 4.61 | 9.91 | 97 | 9.2 | 83 |
| 7/23/96 | 42.0 | 105,730 | 5 | 3.17 | 11.04 | 98.5 | 9.3 | 78 |
| 7/24/96 | 35.0 | 120,185 | 3 | 6.11 | 11.34 | 95 | 10 | 79 |
| 7/25/96 | 42.5 | 119,147 | 3.5 | 4.78 | 10.25 | 96 | 8.1 | 73.5 |
| 7/26/96 | 46.0 | 122,801 | 0.5 | 3.77 | 6.32 | 93.5 | 6.2 | 73 |
| 7/27/96 | 37.5 | 82,168 | 1.5 | 5.31 | 7.72 | 93.5 | 5.3 | 75 |
| 7/28/96 | 40.5 | 46,771 | 7 | 5.97 | 6.83 | 94.5 | 8.4 | 77 |
| 7/29/96 | 39.0 | 90,328 | 3 | 5.66 | 9.41 | 95 | 8.2 | 76 |
| 7/30/96 | 33.0 | 116,883 | 3 | 4.57 | 11.01 | 95 | 9.7 | 76.5 |
| 7/31/96 | 38.0 | 105,650 | 0.5 | 1.86 | 10.90 | 97 | 8.8 | 76.5 |
| 8/10/96 | 35.0 | 59,379 | 6.5 | 1.95 | 7.66 | 94.5 | 8.2 | 76.5 |
| 8/11/96 | 44.5 | 37,932 | 4 | 1.78 | 6.48 | 94.5 | 8 | 76.5 |
| 8/12/96 | 75.5 | 158,255 | 0.5 | 1.58 | 7.70 | 98.5 | 6.5 | 77.5 |
| 8/13/96 | 63.5 | 96,748 | 0 | 4.11 | 5.55 | 93.5 | 4.5 | 76 |
| 8/14/96 | 32.0 | 71,537 | 0 | 3.80 | 4.38 | 93 | 5.9 | 73.5 |
| 8/15/96 | 44.0 | 138,841 | 0 | 3.79 | 7.05 | 94 | 4.9 | 69.5 |
| 8/16/96 | 42.0 | 111,759 | 1 | 2.13 | 5.99 | 94 | 7.8 | 74.5 |
| 8/17/96 | 42.5 | 68,937 | 11.5 | 2.90 | 7.91 | 94 | 8.3 | 75.5 |
| 8/18/96 | 37.5 | 72,537 | 10 | 3.21 | 11.07 | 93.5 | 10 | 74.5 |
| 8/19/96 | 30.0 | 79,734 | 6.5 | 5.81 | 9.50 | 91 | 9.6 | 75 |
| 8/20/96 | 40.0 | 103,438 | 19.5 | 3.48 | 5.08 | 94 | 5.4 | 77 |
| 8/21/96 | 60.5 | 108,007 | 0 | 2.10 | 6.09 | 93 | 5.3 | 71.5 |
| 8/22/96 | 26.5 | 106,716 | 10.5 | 7.40 | 11.78 | 81 | 9.6 | 74.5 |
| 8/23/96 | 38.5 | 109,606 | 0.5 | 7.57 | 10.78 | 86 | 8.9 | 74 |
| 8/24/96 | 33.5 | 80,906 | 4.5 | 6.88 | 8.76 | 85.5 | 7.5 | 73.5 |
| 8/25/96 | 22.5 | 24,305 | 1.5 | 6.78 | 6.41 | 79 | 3.6 | 72 |
| 8/26/96 | 25.0 | 79,692 | 0.5 | 6.90 | 5.96 | 83 | 4.5 | 72.5 |
| 8/27/96 | 30.5 | 79,922 | 2 | 7.40 | 5.03 | 88 | 4.9 | 76 |
| 8/28/96 | 39.0 | 82,387 | 1 | 5.26 | 5.75 | 91 | 7 | 76 |
| 8/29/96 | 34.0 | 135,929 | 7 | 6.14 | 7.41 | 89 | 7.9 | 74 |
| 8/30/96 | 24.0 | 98,612 | 5 | 7.18 | 4.32 | 81 | 5.7 | 75 |
| 8/31/96 | 54.0 | 79,018 | 1.5 | 7.12 | 4.28 | 85 | 4 | 74.5 |

*Table 2. Scenario 1 Data (continued)*

| DATECST | OZMAX | PTDCUMAM | OZINT | CLDAVGT2 | WSNC1T2 | TMAXDAY | WDSPGSD | TMINDAY |
|---|---|---|---|---|---|---|---|---|
| 9/1/96 | 62.0 | 34,060 | 18 | 3.05 | 6.24 | 86 | 4.7 | 75.5 |
| 9/2/96 | 45.0 | 45,258 | 1.5 | 4.12 | 3.82 | 89 | 3.3 | 73 |
| 9/3/96 | 45.0 | 99,919 | 3 | 4.23 | 6.11 | 91 | 6.4 | 72 |
| 9/4/96 | 47.0 | 107,909 | 0 | 6.13 | 3.60 | 89 | 5.2 | 73 |
| 9/5/96 | 64.5 | 96,327 | 0 | 5.11 | 4.53 | 87.5 | 3.1 | 74.5 |
| 9/6/96 | 58.0 | 80,528 | 0 | 1.13 | 3.73 | 88.5 | 3.9 | 72 |
| 9/7/96 | 41.5 | 82,302 | 4 | 4.89 | 3.65 | 88 | 4.2 | 74.5 |
| 9/8/96 | 49.0 | 55,875 | 6 | 6.40 | 5.30 | 86 | 3.5 | 74.5 |
| 9/9/96 | 58.0 | 75,180 | 0 | 6.35 | 3.53 | 88 | 3.6 | 74 |
| 9/10/96 | 84.0 | 52,634 | 0 | 2.35 | 5.92 | 90 | 4.2 | 73 |
| 9/11/96 | 87.0 | 102,476 | 2 | 0.90 | 5.78 | 90 | 4.3 | 68 |
| 9/12/96 | 126.0 | 105,346 | 25 | 3.58 | 2.85 | 87 | 3.4 | 69 |
| 9/13/96 | 93.0 | 82,455 | 19.5 | 7.53 | 5.34 | 82.5 | 4.4 | 72.5 |
| 9/14/96 | 35.0 | 122,650 | 17.5 | 6.62 | 5.92 | 86 | 3.8 | 73.5 |
| 9/15/96 | 28.5 | 80,795 | 17.5 | 5.63 | 10.26 | 90 | 12.2 | 71.5 |
| 9/16/96 | 67.0 | 91,576 | 0.5 | 2.72 | 5.30 | 94.5 | 4.2 | 75 |
| 9/17/96 | 30.5 | 130,561 | 1 | 6.25 | 8.35 | 90.5 | 6.2 | 77 |
| 9/18/96 | 32.0 | 106,072 | 1 | 5.66 | 8.77 | 90 | 9 | 76 |
| 9/19/96 | 40.0 | 105,998 | 0 | 5.21 | 8.81 | 90 | 7 | 76 |
| 9/20/96 | 41.0 | 96,181 | 13 | 4.42 | 6.32 | 87 | 6.9 | 71 |
| 9/21/96 | 42.0 | 50,868 | 0 | 5.22 | 5.63 | 87 | 6.1 | 74 |
| 9/22/96 | 52.0 | 23,721 | 19 | 7.07 | 7.50 | 88 | 6.3 | 76 |
| 9/23/96 | 34.0 | 129,701 | 20 | 4.74 | 8.92 | 89 | 8.8 | 77 |
| 9/24/96 | 54.0 | 104,865 | 0 | 4.27 | 5.18 | 90 | 6.2 | 72 |
| 9/25/96 | 32.0 | 85,429 | 0 | 7.48 | 5.51 | 85 | 4.2 | 73 |
| 9/26/96 | 22.0 | 76,939 | 0 | 7.10 | 11.04 | 89 | 10.1 | 77 |

Figure 4. SAN ANTONIO DECEMBER'95-SEPTEMBER'96 MODEL T2.1.0

DAILY MAXIMUM OZONE

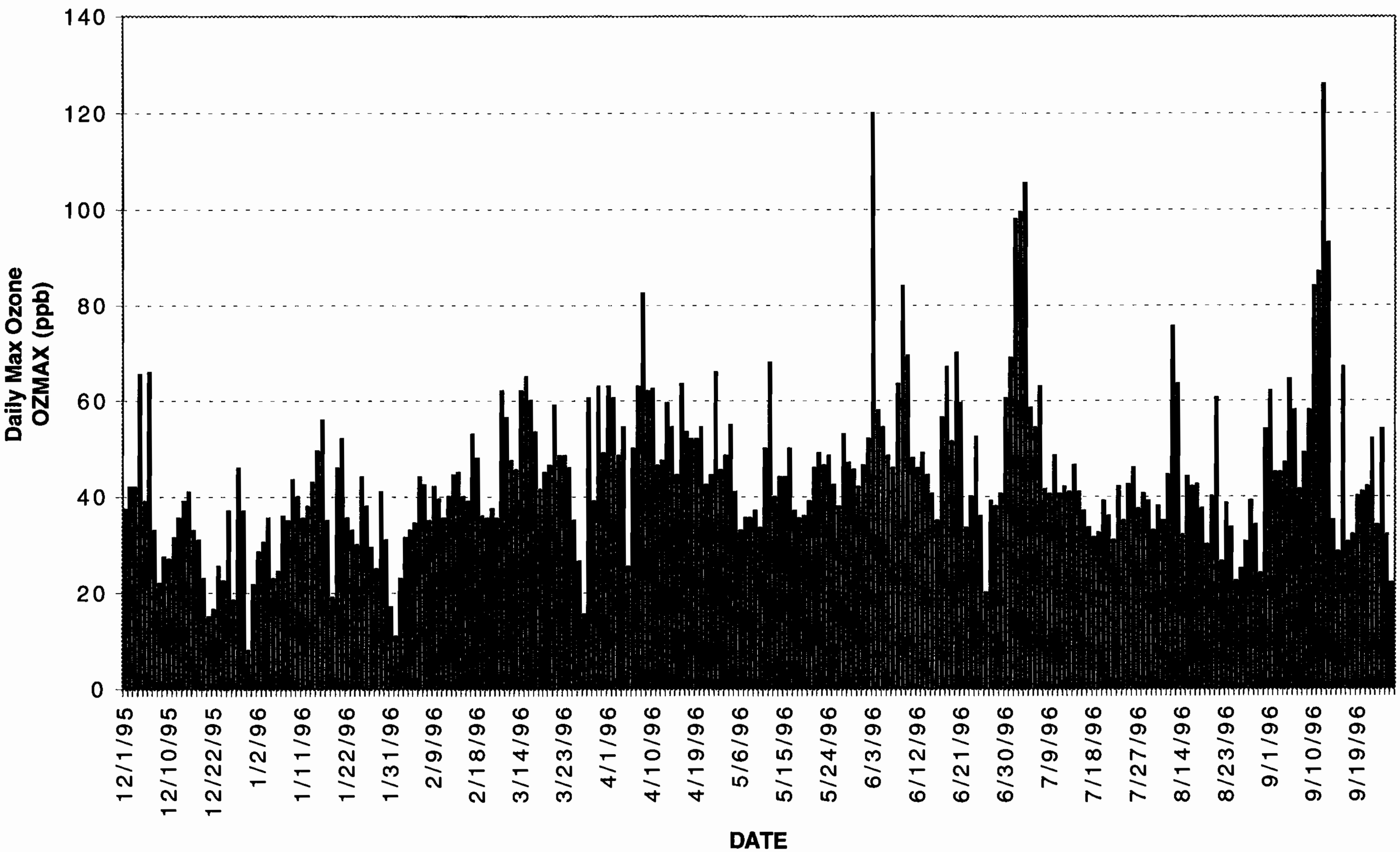


Figure 5. SAN ANTONIO DECEMBER'95-SEPTEMBER'96 MODEL T2.1.0

DAILY CUMULATIVE TRANSGUIDE NETWORK TRAFFIC DENSITY
6AM To 2-HOURS BEFORE TIME OF MAX OZONE

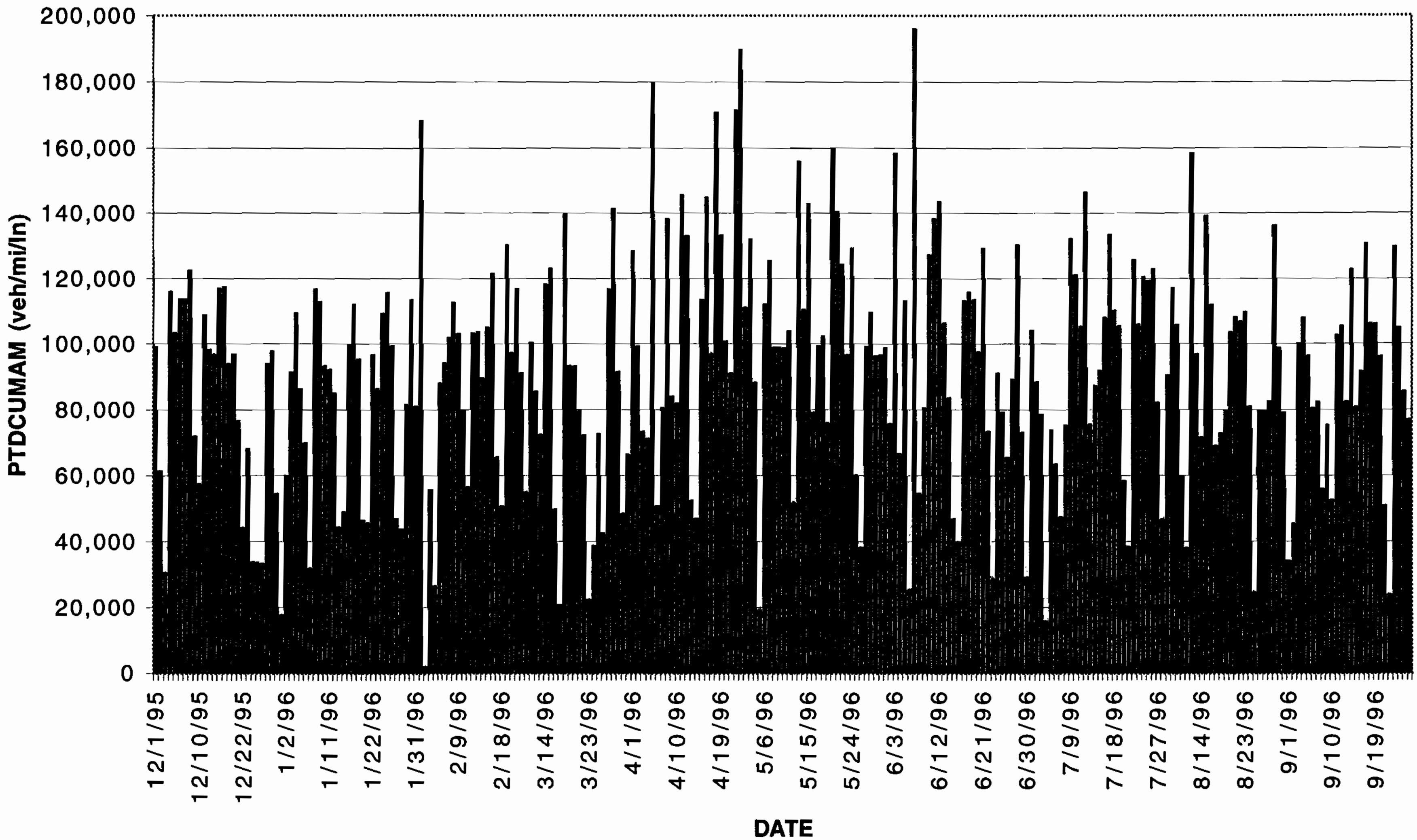


Figure 6. SAN ANTONIO DECEMBER'95-SEPTEMBER'96 MODEL T2.1.0

DAILY MAX OZONE AS A FUNCTION OF DAILY CUMULATIVE TRANSGUIDE NETWORK TRAFFIC DENSITY
6AM To 2-Hrs BEFORE TIME OF MAX OZONE

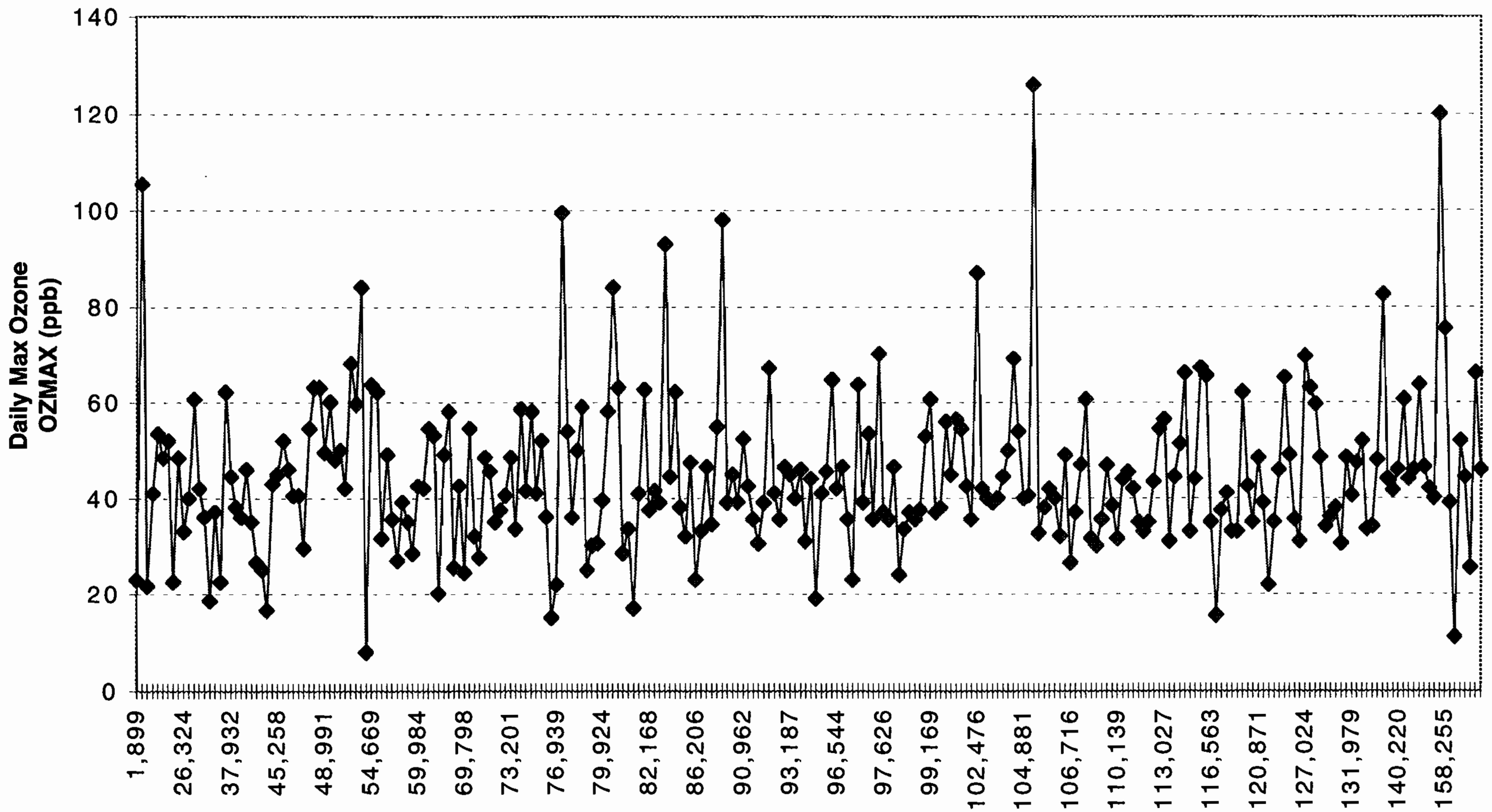


Figure 7. SAN ANTONIO DECEMBER'95-SEPTEMBER'96 MODEL T2.1.0

DAILY MAX OZONE AS A FUNCTION OF DAILY INITAL MORNING OZONE

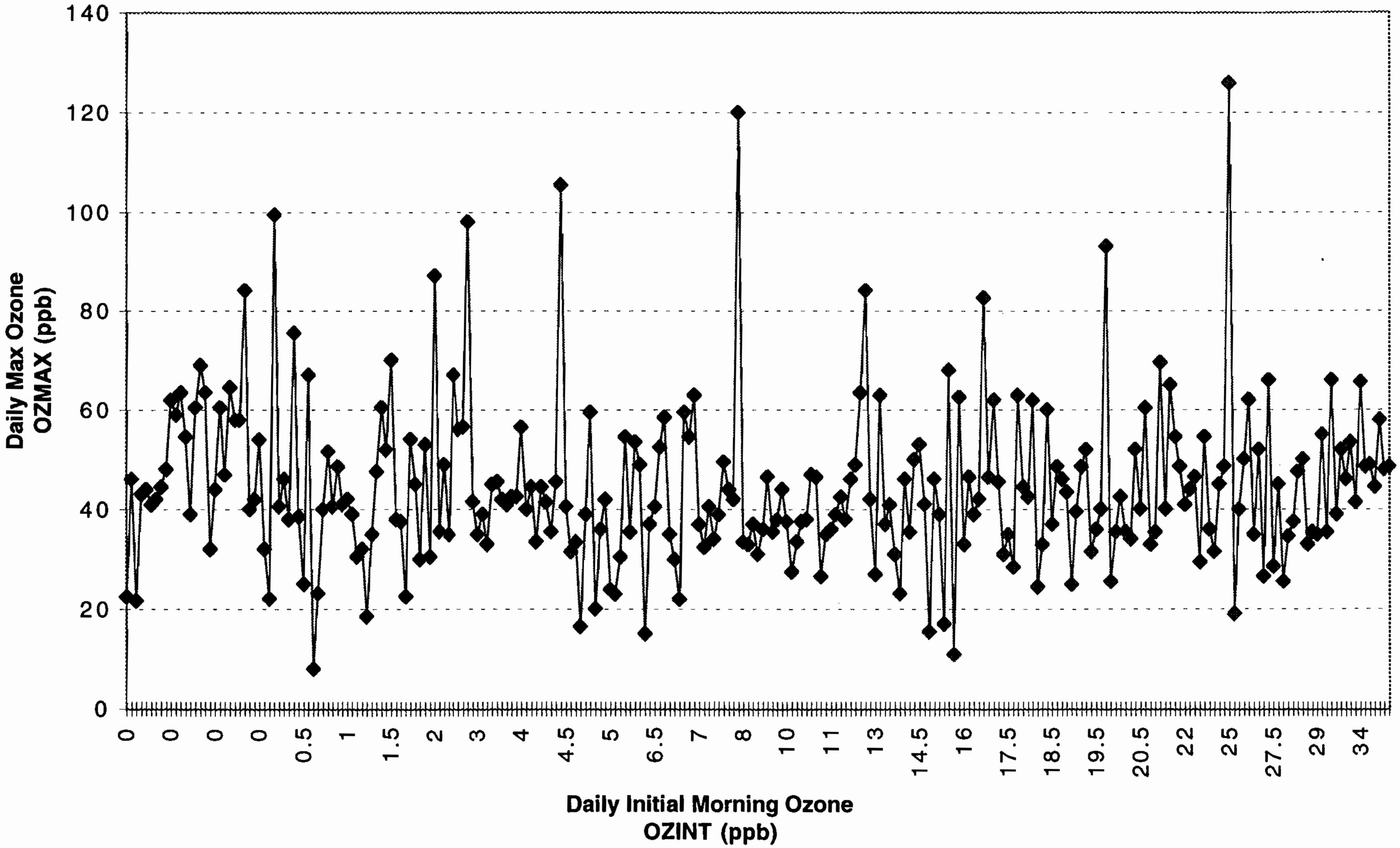


Figure 8. SAN ANTONIO DECEMBER'95-SEPTEMBER'96 MODEL T2.1.0

DAILY MAX OZONE AS A FUNCTION OF AVERAGE DAILY CLOUD COVER FROM 6AM TO TIME OF MAX OZONE

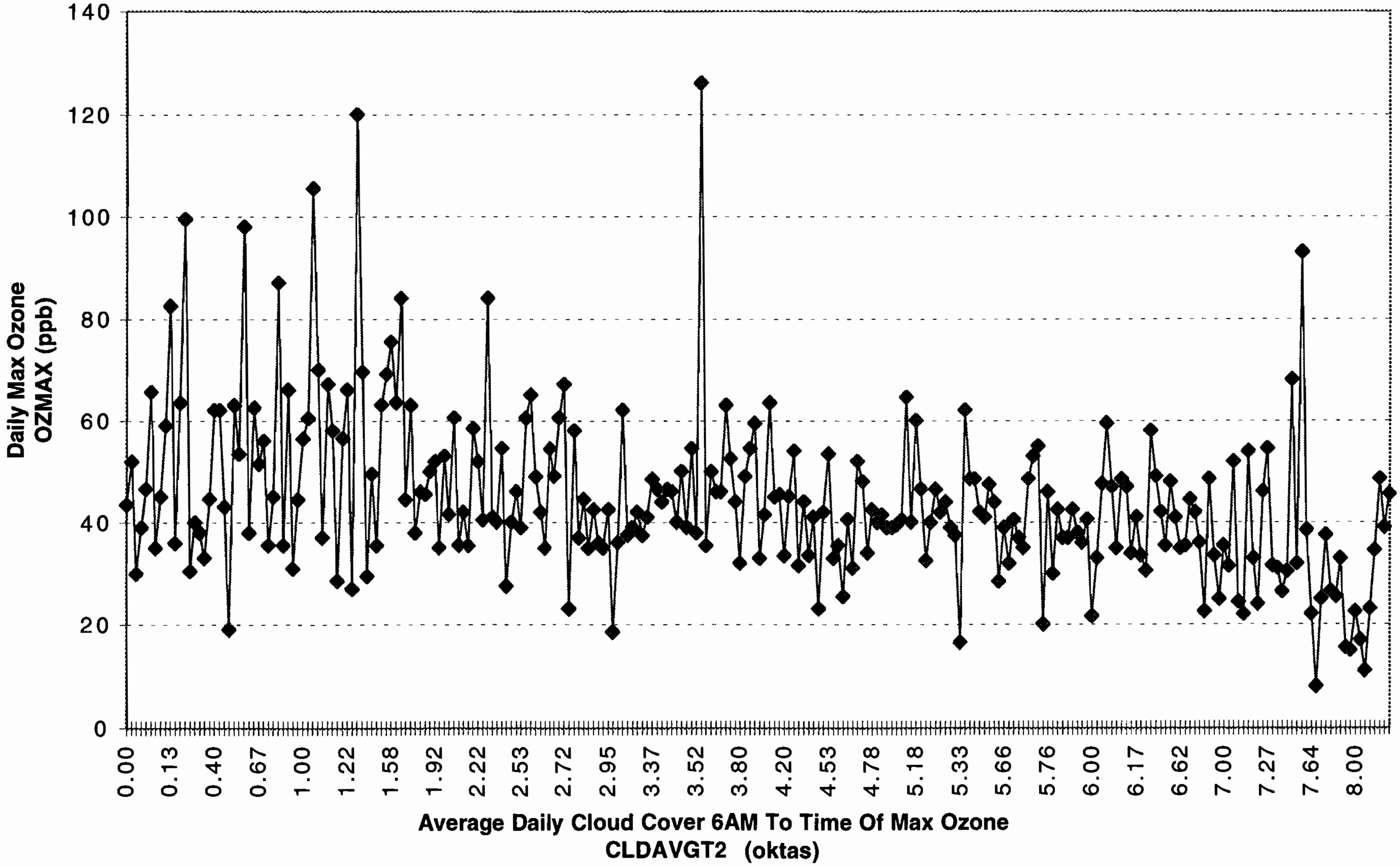


**Figure 9. SAN ANTONIO DECEMBER'95-SEPTEMBER'96 MODEL T2.1.0**

**DAILY MAX OZONE AS A FUNCTION OF AVERAGE DAILY WIND SPEED FROM 6AM TO TIME OF MAX OZONE**

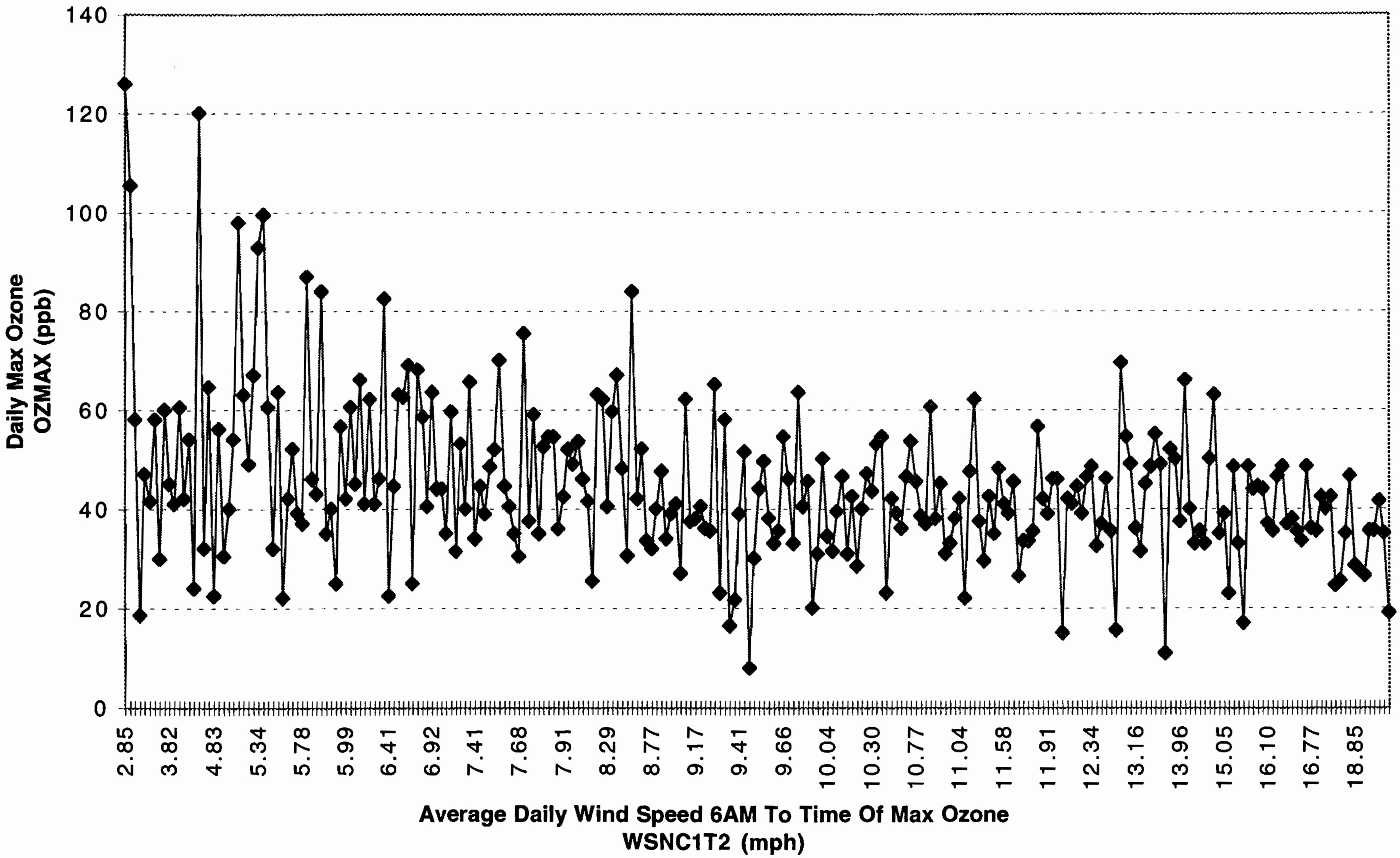


**Figure 10. SAN ANTONIO DECEMBER'95-SEPTEMBER'96 MODEL T2.1.0**

**DAILY MAX OZONE AS A FUNCTION OF MAXIMUM DAILY TEMPERATURE**

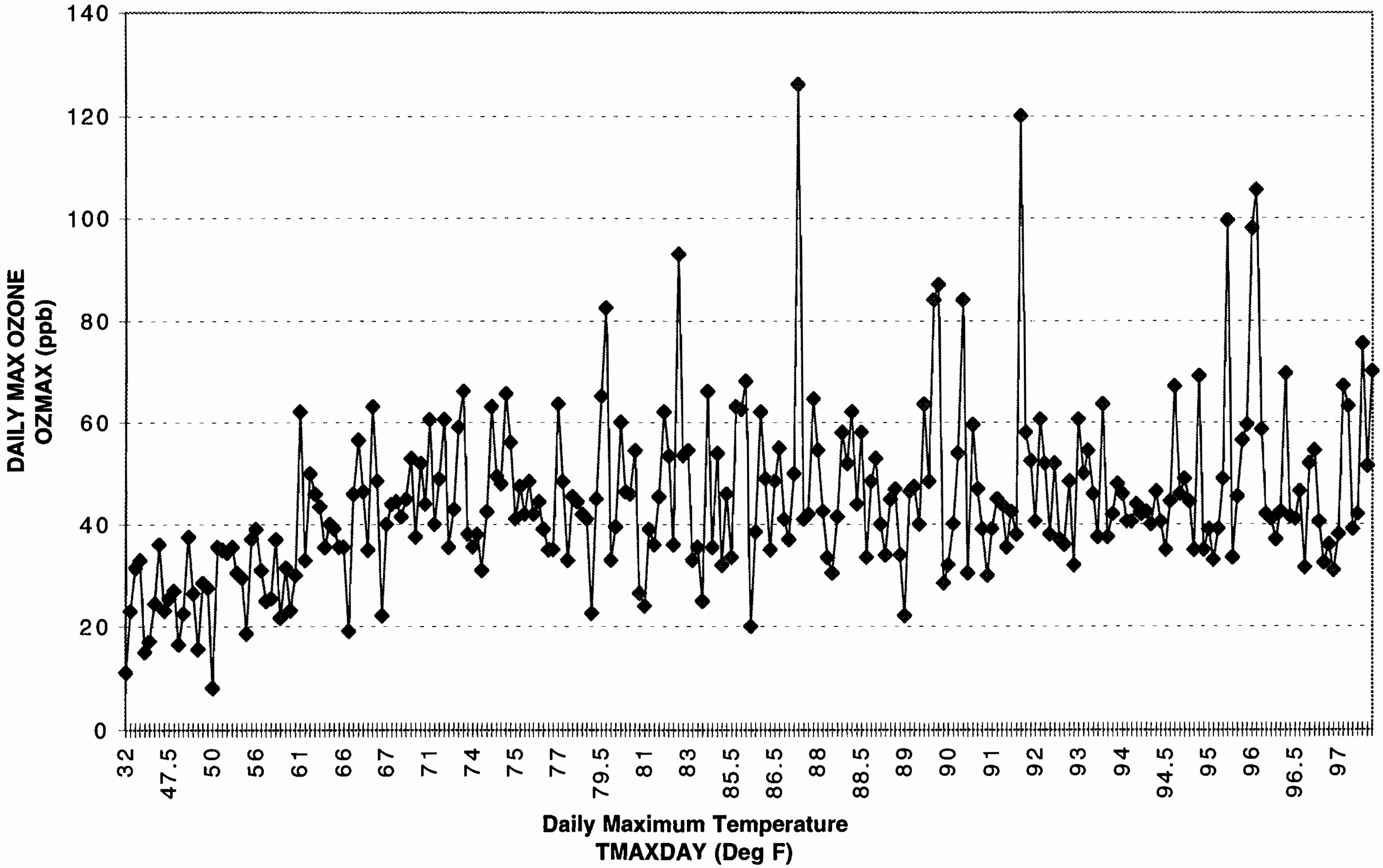


Figure 11. SAN ANTONIO DECEMBER'95-SEPTEMBER'96 MODEL T2.1.0

DAILY MAX OZONE AS A FUNCTION OF AVERAGE DAILY WIND SPEED

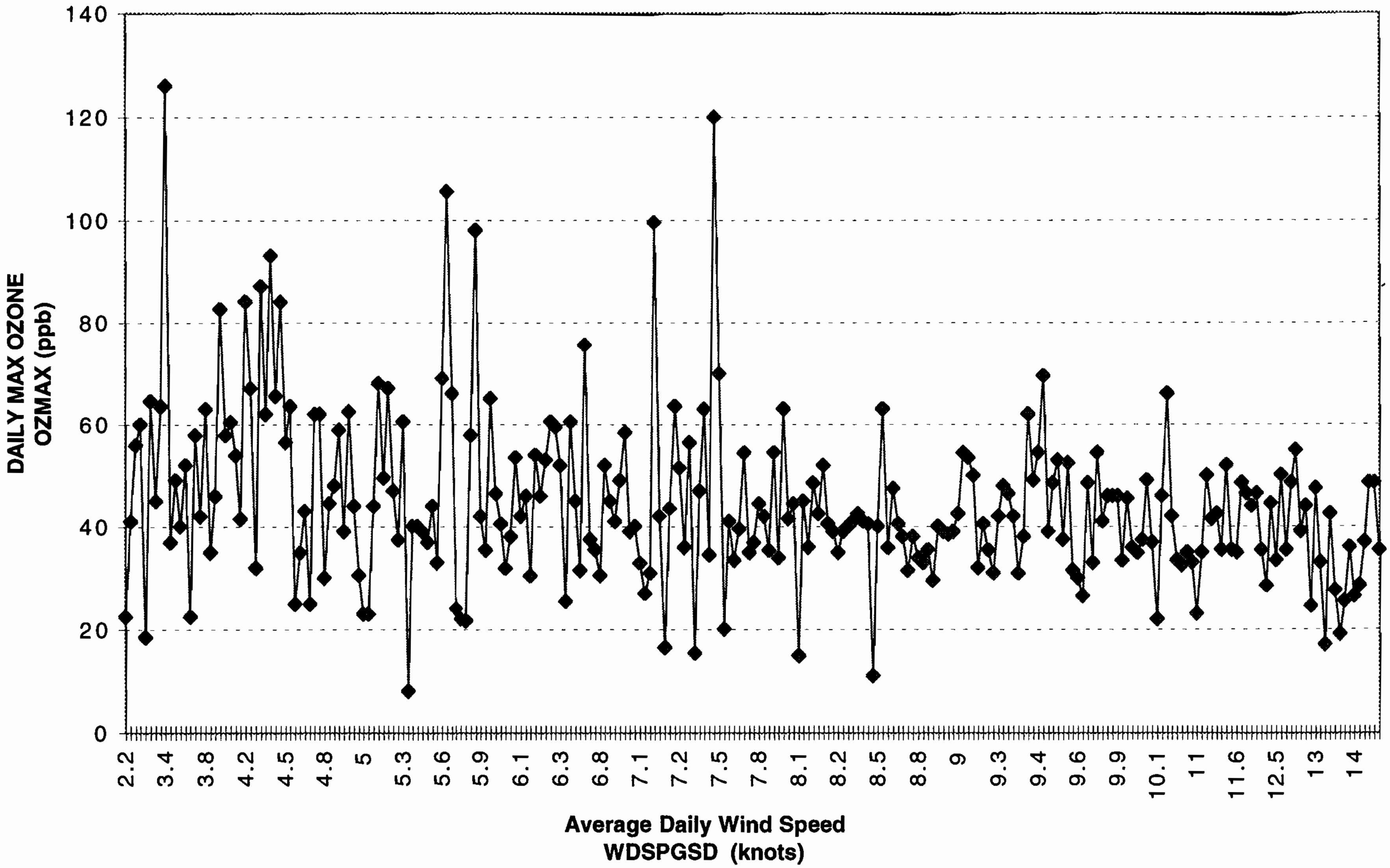
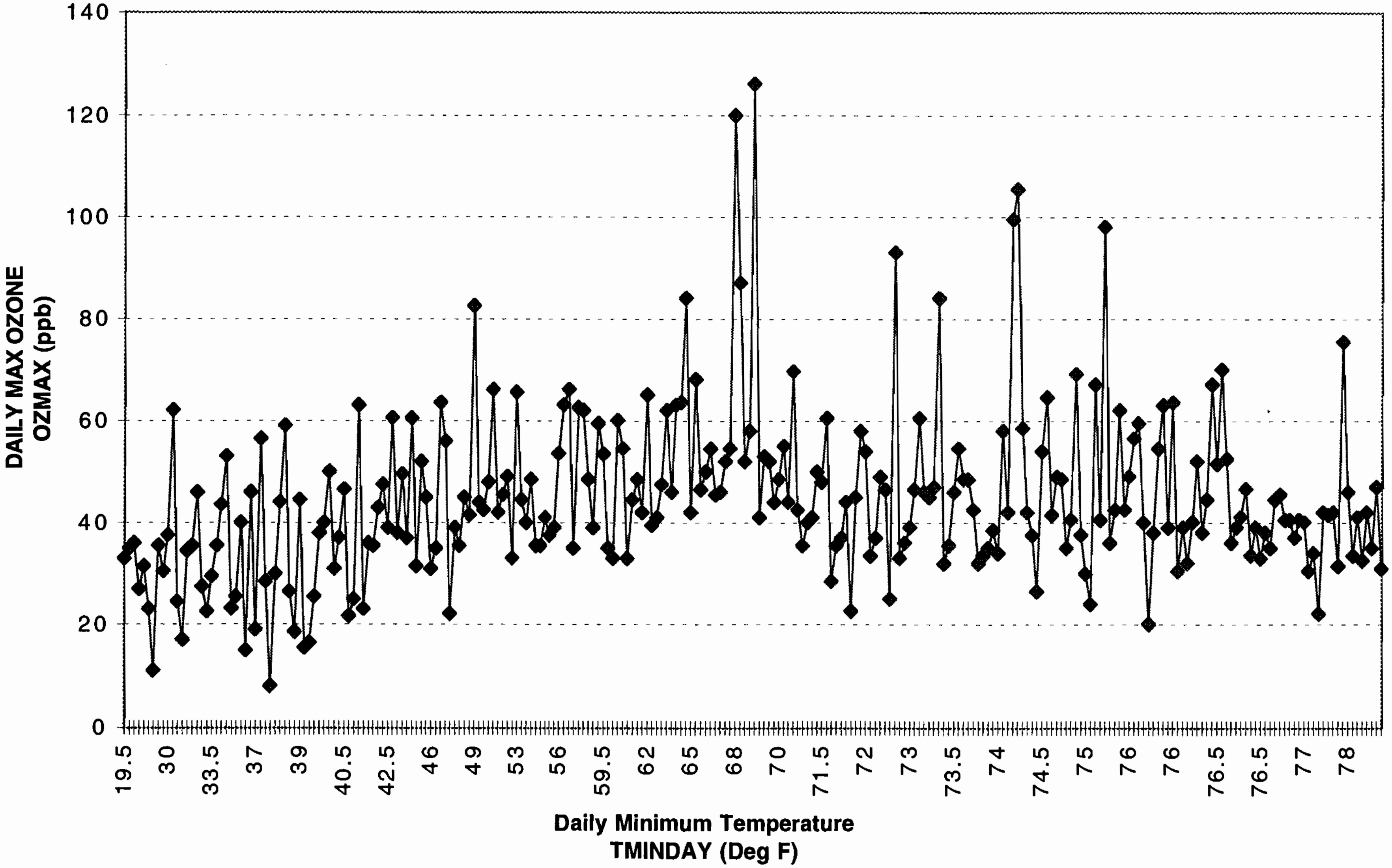


Figure 12. SAN ANTONIO DECEMBER'95-SEPTEMBER'96 MODEL T2.1.0

DAILY MAX OZONE AS A FUNCTION OF MINIMUM DAILY TEMPERATURE



**SCENARIO 2**

In Scenario 2, we repeat the analysis of Scenario 1, except that we control for the months of data collected during the peak ozone season. These data extend from April 1996 through September 1996. Controlling for these months acts, to some degree, as a proxy for controlling for UV intensity and any other meteorological variables that are characteristic during these months. Under this scenario, we are able to detect a significant relationship between the traffic congestion parameter (PTDCUMAM) and the daily peak ozone concentration (OZMAX).

Table 3 summarizes the results of the model and Table 4 summarizes the strength of the traffic parameter's association with the daily peak ozone. Confidence intervals of the parameter's model coefficient per 10,000 units of PTDCUMAM are calculated at the 80, 90, and 95 percent confidence levels. Table 5 summarizes the raw data for Scenario 2 sorted by date.

We can say that under this scenario at the 80 percent confidence level, the potential increase to the daily peak ozone in ppb per a 10,000 unit increase in the traffic congestion parameter PTDCUMAM has a range from about 0.1 to about 0.8 ppb. It is equally likely that the potential increase in the daily peak ozone would fall at any point within this range. The results presented in Table 4 also indicate that the traffic congestion parameter is not significant at the 90 or 95 percent confidence level.

Figure 13 and Figure 14 plot the daily peak ozone (OZMAX) and the daily cumulative traffic congestion parameter (PTDCUMAM) over time. Figure 15 through Figure 21 graphically summarize the relationships between the response and predictor variables. Figure 22 depicts an 80 percent confidence level prediction band of OZMAX as a function of PTDCUMAM, while holding the other significant variables constant at their median levels. We can say at an 80 percent confidence level that the daily peak ozone will fall somewhere within the band on Figure 22. As shown, the 80 percent confidence prediction band with this linear model under this scenario does not encompass any of the daily peak ozone concentrations near 70 ppb or greater at fixed median levels of the other significant variables.

*Table 3. Scenario 2 Results*

| | | | RANGE OF VARIABLES |
|---|---|---|---|
| **DATA CONTROLS** | 1) APR 1996 - SEP 1996 | | |
| **MODEL SIGNIFICANT PARAMETERS (units)** | Y --- OZMAX (ppb) | | 20 to 126 |
| | X0 --- INTERCEPT | | |
| | X1 --- PTDCUMAM (veh/mi/ln) | | 15,650 to 195,820 |
| | X2 --- OZINT (ppb) | | 0 to 47 |
| | X3 --- CLDAVGT2 (oktas) | | 0.1 to 8 |
| | X4 --- WSNC1T2 (mph) | | 2.8 to 18.6 |
| | X5 --- WDSPGSD (knots) | | 3.1 to 14.2 |
| **SIGNIFICANT PARAMETER COEFFICIENT ESTIMATES AND BIVARIATE CORRELATIONS (r)** | 77.7273309 X0 | --- | |
| | 0.0000442384 X1 | -0.0002 | |
| | 0.2856969 X2 | 0.0732 | |
| | -3.4906457 X3 | -0.5257 | |
| | -1.1623902 X4 | -0.3482 | |
| | -1.3436688 X5 | -0.3863 | |
| **TRAFFIC VARIABLE COEFFICIENT CONFIDENCE-LEVEL** | 87% | | |
| **MODEL R-SQUARE** | 0.36 | | |
| **TRAFFIC VARIABLE PARTIAL R-SQUARE** | [a] 0.0079 | | |
| **SAMPLE SIZE** | 155 | | |
| **1st ORDER AUTO-CORRELATION Durbin-Watson Statistic** | 1.8678 | | |
| **P-VALUE SUPPORTING $H_O$: No Heteroskedasticity** | [a] 0.2791 | | |

*Table 4. Scenario 2 Results (cont.)*

| | |
|---|---|
| **TRAFFIC PARAMETER ESTIMATE PER 10,000 PTDCUMAM** | **0.4424** |
| **TRAFFIC PARAMETER ESTIMATE STANDARD ERROR PER 10,000 PTDCUMAM** | **0.2900** |
| **n** | **155** |
| **k** | **5** |
| **df** | **149** |
| $t_{(.10)}$ | **1.282** |
| $t_{(.05)}$ | **1.645** |
| $t_{(.025)}$ | **1.960** |
| **80 PERCENT CONFIDENCE INTERVAL OF TRAFFIC PARAMETER ESTIMATE PER 10,000 UNITS OF PTDCUMAM** | **0.07 to 0.81** |
| **90 PERCENT CONFIDENCE INTERVAL OF TRAFFIC PARAMETER ESTIMATE PER 10,000 UNITS OF PTDCUMAM** | **-0.03 to 0.92** |
| **95 PERCENT CONFIDENCE INTERVAL OF TRAFFIC PARAMETER ESTIMATE PER 10,000 UNITS OF PTDCUMAM** | **-0.13 to 1.01** |

*Table 5. Scenario 2 Data*

| DATECST | OZMAX | PTDCUMAM | OZINT | CLDAVGT2 | WSNC1T2 | TMAXDAY | WDSPGSD | TMINDAY |
|---|---|---|---|---|---|---|---|---|
| 4/1/96 | 63.0 | 128,397 | 47 | 0.44 | 14.51 | 74 | 8.5 | 56 |
| 4/2/96 | 60.5 | 99,169 | 1.5 | 2.53 | 10.89 | 72.5 | 6.3 | 44.5 |
| 4/3/96 | 48.5 | 73,201 | 34 | 6.12 | 13.37 | 75.5 | 9.7 | 57.5 |
| 4/4/96 | 54.5 | 71,110 | 24 | 7.27 | 7.87 | 81 | 9 | 60.5 |
| 4/5/96 | 25.5 | 179,760 | 27.5 | 7.83 | 18.41 | 58.5 | 13.6 | 39.5 |
| 4/6/96 | 50.0 | 50,850 | 28.5 | 3.63 | 13.86 | 62.5 | 11 | 40 |
| 4/7/96 | 63.0 | 80,590 | 13 | 1.45 | 5.27 | 66 | 3.8 | 41 |
| 4/8/96 | 82.5 | 138,109 | 17 | 0.13 | 6.33 | 79.5 | 3.9 | 49 |
| 4/9/96 | 62.0 | 83,988 | 17.5 | 0.40 | 11.07 | 88.5 | 4.7 | 57 |
| 4/10/96 | 62.5 | 81,961 | 16 | 0.57 | 6.55 | 86 | 4.8 | 56.5 |
| 4/11/96 | 46.5 | 145,343 | 23 | 5.22 | 18.58 | 80 | 11.9 | 65.5 |
| 4/12/96 | 47.5 | 132,995 | 28 | 5.47 | 11.05 | 90 | 13 | 63.5 |
| 4/13/96 | 59.5 | 52,465 | 7 | 6.00 | 7.22 | 91 | . | 58.5 |
| 4/14/96 | 54.5 | 47,000 | 22 | 2.67 | 10.41 | 88 | 9.8 | 66 |
| 4/15/96 | 44.5 | 113,429 | 35 | 0.38 | 15.76 | 76 | 12.5 | 53 |
| 4/16/96 | 63.5 | 144,610 | 0 | 1.64 | 9.72 | 77 | 7.2 | 46 |
| 4/17/96 | 53.5 | 96,940 | 31.5 | 4.53 | 10.72 | 82 | 9 | 59.5 |
| 4/18/96 | 52.0 | 170,519 | 31 | 1.92 | 8.68 | 93 | 11.4 | 68 |
| 4/19/96 | 52.0 | 133,172 | 20.5 | 2.22 | 13.75 | 97 | 8.2 | 68.5 |
| 4/20/96 | 54.5 | 100,705 | 0 | 3.52 | 12.99 | 83 | 7.6 | 68 |
| 4/21/96 | 42.5 | 90,964 | 20 | 5.82 | 16.98 | 88 | 11.2 | 71 |
| 4/22/96 | 44.5 | 171,288 | 18 | 6.68 | 12.13 | 78.5 | . | 61 |
| 5/1/96 | 66.0 | 189,529 | 27 | 0.95 | 14.05 | 84.5 | 10.3 | 56 |
| 5/2/96 | 45.5 | 111,000 | 17.5 | 8.00 | 11.76 | 78 | . | 67 |
| 5/3/96 | 48.5 | 131,880 | 22 | 6.85 | 15.18 | 86.5 | 12.6 | 70 |
| 5/4/96 | 55.0 | 88,226 | 29 | 5.71 | 13.45 | 87 | 12.6 | 70 |
| 5/5/96 | 41.0 | 19,101 | 22 | 6.57 | 11.58 | 87 | 9.8 | 69.5 |
| 5/6/96 | 33.0 | 112,036 | 16 | 7.91 | 15.50 | 83 | 13 | 73 |
| 5/7/96 | 35.5 | 125,392 | 9 | 6.46 | 14.33 | 84.5 | 11.3 | 72 |
| 5/8/96 | 35.5 | 98,806 | 21.5 | 6.63 | 16.21 | 83 | 11.4 | 71 |
| 5/9/96 | 37.0 | 98,731 | 13 | 5.85 | 16.66 | 87 | 7.8 | 72 |
| 5/10/96 | 33.5 | 98,712 | 10 | 6.18 | 16.71 | 89 | 12.5 | 72.5 |
| 5/11/96 | 50.0 | 103,665 | 26 | 1.91 | 9.94 | 87 | 9 | 65.5 |
| 5/12/96 | 68.0 | 51,761 | 15.5 | 7.48 | 6.76 | 86 | 5 | 65 |
| 5/13/96 | 40.0 | 155,609 | 4 | 4.89 | 14.24 | 90 | 8.9 | 71 |
| 5/14/96 | 44.0 | 110,364 | 22 | 5.24 | 15.60 | 88.5 | 12 | 70 |
| 5/15/96 | 44.0 | 142,712 | 9.5 | 3.47 | 16.04 | 91.5 | 12.8 | 72 |
| 5/16/96 | 50.0 | 79,096 | 14 | 3.50 | 14.36 | 93.5 | 12.5 | 71.5 |
| 5/17/96 | 37.0 | 99,211 | 18.5 | 2.80 | 16.10 | 93 | 14.2 | 72.5 |

*Table 5. Scenario 2 Data (continued)*

| DATECST | OZMAX | PTDCUMAM | OZINT | CLDAVGT2 | WSNC1T2 | TMAXDAY | WDSPGSD | TMINDAY |
|---|---|---|---|---|---|---|---|---|
| 5/18/96 | 35.5 | 102,115 | 20 | 3.62 | 16.96 | 91.5 | 12.5 | 73.5 |
| 5/19/96 | 36.0 | 75,940 | 19.5 | 3.05 | 16.77 | 93 | 13.7 | 73 |
| 5/20/96 | 39.0 | 159,670 | 16.5 | 3.52 | 15.05 | 95.5 | 12.6 | 73 |
| 5/21/96 | 46.0 | 140,220 | 15 | 2.52 | 11.94 | 95 | 10.2 | 73.5 |
| 5/22/96 | 49.0 | 124,190 | 12 | 2.67 | 13.04 | 95.5 | 10.1 | 72.5 |
| 5/23/96 | 46.5 | 96,602 | 16 | 5.18 | 16.36 | 94.5 | 12 | 73 |
| 5/24/96 | 48.5 | 129,182 | 19 | 5.68 | 16.73 | 89 | 14.2 | 75 |
| 5/25/96 | 42.5 | 59,984 | 18 | 5.86 | 17.73 | 91.5 | 13.2 | 76 |
| 5/26/96 | 38.0 | 38,124 | 9 | 5.88 | 16.67 | 91.5 | . | 76.5 |
| 5/27/96 | 53.0 | 99,086 | 14.5 | 5.70 | 7.32 | 89 | 9.5 | 69.5 |
| 5/28/96 | 47.0 | 109,472 | 10.5 | 6.11 | 10.28 | 91 | 7.3 | 81.5 |
| 5/29/96 | 45.5 | 96,224 | 4.5 | 4.13 | 10.77 | 96 | . | 77 |
| 5/30/96 | 42.0 | 96,544 | 8 | 4.50 | 11.86 | 94 | 9.3 | 77.5 |
| 6/1/96 | 46.5 | 98,585 | 10.5 | 3.48 | 12.32 | 89.5 | . | 72.5 |
| 6/2/96 | 52.0 | 75,557 | 1.5 | 4.61 | 5.65 | 92.5 | 6.8 | 69.5 |
| 6/3/96 | 120.0 | 158,194 | 8 | 1.27 | 4.36 | 91.5 | 7.5 | 68 |
| 6/4/96 | 58.0 | 66,574 | 35 | 2.77 | 9.34 | 91.5 | 5.8 | 69 |
| 6/5/96 | 54.5 | 112,916 | 7 | 2.40 | 9.66 | 93.5 | 9.4 | 73.5 |
| 6/6/96 | 48.5 | 25,272 | 18.5 | 3.37 | 16.39 | 93 | 11.8 | 73.5 |
| 6/7/96 | 46.0 | 195,817 | 13.5 | 5.76 | 12.55 | 85.5 | 9.8 | 67 |
| 6/8/96 | 63.5 | 54,669 | 12 | 0.25 | 6.92 | 90 | 3.4 | 64.5 |
| 6/9/96 | 84.0 | 80,549 | 12.5 | 1.68 | 8.37 | 90.5 | 4.5 | 64.5 |
| 6/10/96 | 69.5 | 127,024 | 21.5 | 1.27 | 12.83 | 96.5 | 9.4 | 70.5 |
| 6/11/96 | 48.0 | 138,021 | 40.5 | 4.70 | 11.44 | 94 | 9.3 | 71.5 |
| 6/12/96 | 46.0 | 143,310 | 18.5 | 3.48 | 9.68 | 94 | 9.8 | 78 |
| 6/13/96 | 49.0 | 106,210 | 2.5 | 3.81 | 8.06 | 95 | 7 | 76 |
| 6/14/96 | 44.5 | 83,580 | 4 | 2.86 | 7.63 | 95 | 7.8 | 76.5 |
| 6/15/96 | 40.5 | 46,819 | 6.5 | 2.29 | 8.29 | 94 | 8.6 | 75.5 |
| 6/16/96 | 35.0 | 39,835 | 2.5 | 2.94 | 7.82 | 95 | 7.7 | 75 |
| 6/17/96 | 56.5 | 113,027 | 3 | 1.18 | 5.98 | 96 | 4.5 | 76 |
| 6/18/96 | 67.0 | 115,719 | 2.5 | 1.11 | 8.31 | 97.5 | 5.2 | 76.5 |
| 6/19/96 | 51.5 | 113,469 | 1 | 0.67 | 9.45 | 99.5 | 7.2 | 76.5 |
| 6/20/96 | 70.0 | 97,560 | 1.5 | 1.06 | 7.57 | 99.5 | 7.5 | 76.5 |
| 6/21/96 | 59.5 | 129,152 | 5 | 3.91 | 8.30 | 96 | 6.3 | 76 |
| 6/22/96 | 33.5 | 73,263 | 8 | 4.20 | 11.82 | 88 | 9.9 | 78 |
| 6/23/96 | 40.0 | 28,486 | 20.5 | 5.13 | 7.32 | 89 | 8.3 | 76 |
| 6/24/96 | 52.5 | 90,962 | 6.5 | 3.78 | 7.86 | 92 | 9.6 | 76.5 |
| 6/25/96 | 36.0 | 79,059 | 11 | 5.89 | 9.20 | 82 | 8.1 | 76.5 |
| 6/26/96 | 20.0 | 65,469 | 5 | 5.75 | 9.89 | 86 | 7.5 | 76 |

*Table 5. Scenario 2 Data (continued)*

| DATECST | OZMAX | PTDCUMAM | OZINT | CLDAVGT2 | WSNC1T2 | TMAXDAY | WDSPGSD | TMINDAY |
|---|---|---|---|---|---|---|---|---|
| 6/27/96 | 39.0 | 89,069 | 0 | 3.14 | 11.58 | 91 | 8.9 | 76.5 |
| 6/28/96 | 38.0 | 130,161 | 1.5 | 3.52 | 9.17 | 92.5 | 8.6 | 76 |
| 6/29/96 | 40.5 | 72,845 | 1 | 5.00 | 7.65 | 92 | 5.9 | 75 |
| 6/30/96 | 60.5 | 28,900 | 0 | 1.00 | 3.99 | 92 | 6.4 | 73 |
| 7/1/96 | 69.0 | 103,954 | 0 | 1.50 | 6.61 | 95 | 5.6 | 75 |
| 7/2/96 | 98.0 | 88,279 | 3 | 0.56 | 5.24 | 96 | 5.8 | 75.5 |
| 7/3/96 | 99.5 | 78,502 | 0.5 | 0.25 | 5.39 | 95.5 | 7.1 | 74.5 |
| 7/4/96 | 105.5 | 15,650 | 4.5 | 1.00 | 3.15 | 96 | 5.6 | 74.5 |
| 7/5/96 | 58.5 | 73,601 | 6.5 | 2.22 | 6.77 | 96 | 7 | 74.5 |
| 7/6/96 | 54.5 | 63,346 | 5.5 | 3.88 | 7.88 | 97 | 7.9 | 76 |
| 7/7/96 | 63.0 | 47,373 | 7 | 1.80 | 6.52 | 97.5 | 7.3 | 76 |
| 7/8/96 | 41.5 | 75,141 | 3 | 4.05 | 8.11 | 96.5 | 8 | 77.5 |
| 7/9/96 | 40.5 | 131,979 | 4.5 | 4.59 | 9.75 | 97 | 9.1 | 77 |
| 7/10/96 | 48.5 | 120,871 | 1 | 5.41 | 7.43 | 90 | 8.1 | 73.5 |
| 7/11/96 | 40.5 | 105,242 | 0.5 | 5.67 | 9.18 | 94 | 8.2 | 77 |
| 7/12/96 | 42.0 | 146,141 | 3.5 | 2.65 | 10.43 | 96 | 10.5 | 77.5 |
| 7/13/96 | 41.0 | 75,441 | 1 | 2.38 | 8.97 | 96.5 | 8.3 | 76.5 |
| 7/14/96 | 46.5 | 87,219 | 8.5 | 3.39 | 10.66 | 96.5 | 9.3 | 76.5 |
| 7/15/96 | 41.0 | 91,860 | 3.5 | 6.17 | 6.15 | 96 | 7.5 | 78 |
| 7/16/96 | 37.0 | 107,791 | 7 | 5.83 | 12.45 | 96 | 10.1 | 77 |
| 7/17/96 | 33.5 | 133,312 | 4 | 4.41 | 11.82 | 95.5 | 10.5 | 76.5 |
| 7/18/96 | 31.5 | 110,139 | 4.5 | 4.29 | 10.06 | 96.5 | 9.6 | 77.5 |
| 7/19/96 | 32.5 | 105,349 | 7 | 5.18 | 12.41 | 97 | 10.5 | 78 |
| 7/20/96 | 39.0 | 58,253 | 7.5 | 2.53 | 10.58 | 98 | 9.4 | 76.5 |
| 7/21/96 | 36.0 | 38,347 | 5 | 2.91 | 10.62 | 97 | 10 | 75.5 |
| 7/22/96 | 31.0 | 125,541 | 17.5 | 4.61 | 9.91 | 97 | 9.2 | 83 |
| 7/23/96 | 42.0 | 105,730 | 5 | 3.17 | 11.04 | 98.5 | 9.3 | 78 |
| 7/24/96 | 35.0 | 120,185 | 3 | 6.11 | 11.34 | 95 | 10 | 79 |
| 7/25/96 | 42.5 | 119,147 | 3.5 | 4.78 | 10.25 | 96 | 8.1 | 73.5 |
| 7/26/96 | 46.0 | 122,801 | 0.5 | 3.77 | 6.32 | 93.5 | 6.2 | 73 |
| 7/27/96 | 37.5 | 82,168 | 1.5 | 5.31 | 7.72 | 93.5 | 5.3 | 75 |
| 7/28/96 | 40.5 | 46,771 | 7 | 5.97 | 6.83 | 94.5 | 8.4 | 77 |
| 7/29/96 | 39.0 | 90,328 | 3 | 5.66 | 9.41 | 95 | 8.2 | 76 |
| 7/30/96 | 33.0 | 116,883 | 3 | 4.57 | 11.01 | 95 | 9.7 | 76.5 |
| 7/31/96 | 38.0 | 105,650 | 0.5 | 1.86 | 10.90 | 97 | 8.8 | 76.5 |
| 8/10/96 | 35.0 | 59,379 | 6.5 | 1.95 | 7.66 | 94.5 | 8.2 | 76.5 |
| 8/11/96 | 44.5 | 37,932 | 4 | 1.78 | 6.48 | 94.5 | 8 | 76.5 |
| 8/12/96 | 75.5 | 158,255 | 0.5 | 1.58 | 7.70 | 98.5 | 6.5 | 77.5 |
| 8/13/96 | 63.5 | 96,748 | 0 | 4.11 | 5.55 | 93.5 | 4.5 | 76 |

*Table 5. Scenario 2 Data (continued)*

| DATECST | OZMAX | PTDCUMAM | OZINT | CLDAVGT2 | WSNC1T2 | TMAXDAY | WDSPGSD | TMINDAY |
|---|---|---|---|---|---|---|---|---|
| 8/14/96 | 32.0 | 71,537 | 0 | 3.80 | 4.38 | 93 | 5.9 | 73.5 |
| 8/15/96 | 44.0 | 138,841 | 0 | 3.79 | 7.05 | 94 | 4.9 | 69.5 |
| 8/16/96 | 42.0 | 111,759 | 1 | 2.13 | 5.99 | 94 | 7.8 | 74.5 |
| 8/17/96 | 42.5 | 68,937 | 11.5 | 2.90 | 7.91 | 94 | 8.3 | 75.5 |
| 8/18/96 | 37.5 | 72,537 | 10 | 3.21 | 11.07 | 93.5 | 10 | 74.5 |
| 8/19/96 | 30.0 | 79,734 | 6.5 | 5.81 | 9.50 | 91 | 9.6 | 75 |
| 8/20/96 | 40.0 | 103,438 | 19.5 | 3.48 | 5.08 | 94 | 5.4 | 77 |
| 8/21/96 | 60.5 | 108,007 | 0 | 2.10 | 6.09 | 93 | 5.3 | 71.5 |
| 8/22/96 | 26.5 | 106,716 | 10.5 | 7.40 | 11.78 | 81 | 9.6 | 74.5 |
| 8/23/96 | 38.5 | 109,606 | 0.5 | 7.57 | 10.78 | 86 | 8.9 | 74 |
| 8/24/96 | 33.5 | 80,906 | 4.5 | 6.88 | 8.76 | 85.5 | 7.5 | 73.5 |
| 8/25/96 | 22.5 | 24,305 | 1.5 | 6.78 | 6.41 | 79 | 3.6 | 72 |
| 8/26/96 | 25.0 | 79,692 | 0.5 | 6.90 | 5.96 | 83 | 4.5 | 72.5 |
| 8/27/96 | 30.5 | 79,922 | 2 | 7.40 | 5.03 | 88 | 4.9 | 76 |
| 8/28/96 | 39.0 | 82,387 | 1 | 5.26 | 5.75 | 91 | 7 | 76 |
| 8/29/96 | 34.0 | 135,929 | 7 | 6.14 | 7.41 | 89 | 7.9 | 74 |
| 8/30/96 | 24.0 | 98,612 | 5 | 7.18 | 4.32 | 81 | 5.7 | 75 |
| 8/31/96 | 54.0 | 79,018 | 1.5 | 7.12 | 4.28 | 85 | 4 | 74.5 |
| 9/1/96 | 62.0 | 34,060 | 18 | 3.05 | 6.24 | 86 | 4.7 | 75.5 |
| 9/2/96 | 45.0 | 45,258 | 1.5 | 4.12 | 3.82 | 89 | 3.3 | 73 |
| 9/3/96 | 45.0 | 99,919 | 3 | 4.23 | 6.11 | 91 | 6.4 | 72 |
| 9/4/96 | 47.0 | 107,909 | 0 | 6.13 | 3.60 | 89 | 5.2 | 73 |
| 9/5/96 | 64.5 | 96,327 | 0 | 5.11 | 4.53 | 87.5 | 3.1 | 74.5 |
| 9/6/96 | 58.0 | 80,528 | 0 | 1.13 | 3.73 | 88.5 | 3.9 | 72 |
| 9/7/96 | 41.5 | 82,302 | 4 | 4.89 | 3.65 | 88 | 4.2 | 74.5 |
| 9/8/96 | 49.0 | 55,875 | 6 | 6.40 | 5.30 | 86 | 3.5 | 74.5 |
| 9/9/96 | 58.0 | 75,180 | 0 | 6.35 | 3.53 | 88 | 3.6 | 74 |
| 9/10/96 | 84.0 | 52,634 | 0 | 2.35 | 5.92 | 90 | 4.2 | 73 |
| 9/11/96 | 87.0 | 102,476 | 2 | 0.90 | 5.78 | 90 | 4.3 | 68 |
| 9/12/96 | 126.0 | 105,346 | 25 | 3.58 | 2.85 | 87 | 3.4 | 69 |
| 9/13/96 | 93.0 | 82,455 | 19.5 | 7.53 | 5.34 | 82.5 | 4.4 | 72.5 |
| 9/14/96 | 35.0 | 122,650 | 17.5 | 6.62 | 5.92 | 86 | 3.8 | 73.5 |
| 9/15/96 | 28.5 | 80,795 | 17.5 | 5.63 | 10.26 | 90 | 12.2 | 71.5 |
| 9/16/96 | 67.0 | 91,576 | 0.5 | 2.72 | 5.30 | 94.5 | 4.2 | 75 |
| 9/17/96 | 30.5 | 130,561 | 1 | 6.25 | 8.35 | 90.5 | 6.2 | 77 |
| 9/18/96 | 32.0 | 106,072 | 1 | 5.66 | 8.77 | 90 | 9 | 76 |
| 9/19/96 | 40.0 | 105,998 | 0 | 5.21 | 8.81 | 90 | 7 | 76 |
| 9/20/96 | 41.0 | 96,181 | 13 | 4.42 | 6.32 | 87 | 6.9 | 71 |
| 9/21/96 | 42.0 | 50,868 | 0 | 5.22 | 5.63 | 87 | 6.1 | 74 |

*Table 5. Scenario 2 Data (continued)*

| DATECST | OZMAX | PTDCUMAM | OZINT | CLDAVGT2 | WSNC1T2 | TMAXDAY | WDSPGSD | TMINDAY |
|---|---|---|---|---|---|---|---|---|
| 9/22/96 | 52.0 | 23,721 | 19 | 7.07 | 7.50 | 88 | 6.3 | 76 |
| 9/23/96 | 34.0 | 129,701 | 20 | 4.74 | 8.92 | 89 | 8.8 | 77 |
| 9/24/96 | 54.0 | 104,865 | 0 | 4.27 | 5.18 | 90 | 6.2 | 72 |
| 9/25/96 | 32.0 | 85,429 | 0 | 7.48 | 5.51 | 85 | 4.2 | 73 |
| 9/26/96 | 22.0 | 76,939 | 0 | 7.10 | 11.04 | 89 | 10.1 | 77 |

**Figure 13. SAN ANTONIO APR'96-SEP'96**
**MODEL T2.1**
**DAILY MAXIMUM OZONE**

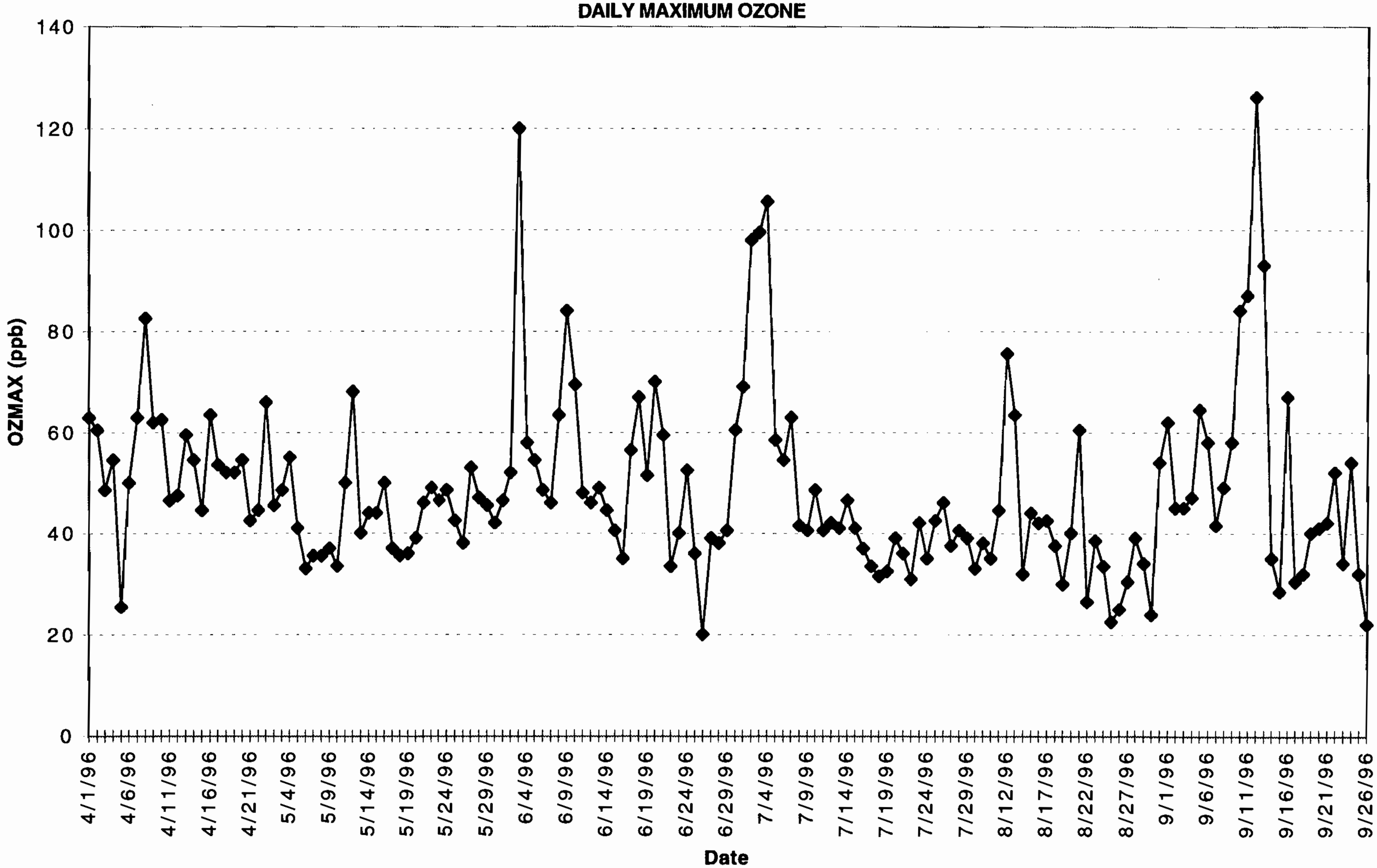


Figure 14. SAN ANTONIO APR'96-SEP'96 MODEL T2.1
Daily Cumulative TransGuide Network Traffic Density
6AM To 2-Hrs Before Time Of Max Ozone

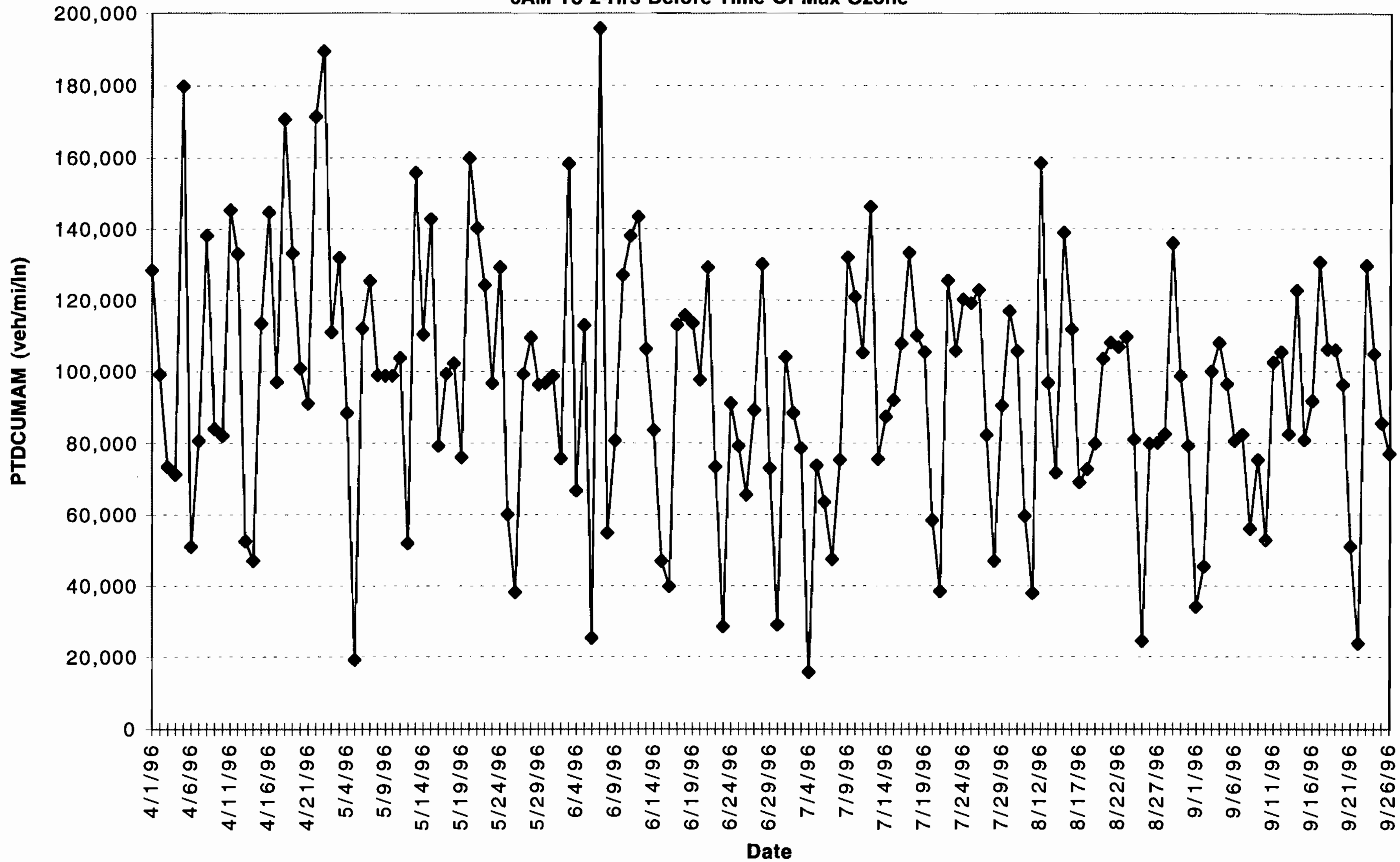


Figure 15. SAN ANTONIO APR'96-SEP'96 MODEL T2.1

DAILY MAX OZONE AS A FUNCTION OF DAILY CUMULATIVE TRANSGUIDE NETWORK TRAFFIC DENSITY
6AM To 2-Hrs BEFORE TIME OF MAX OZONE

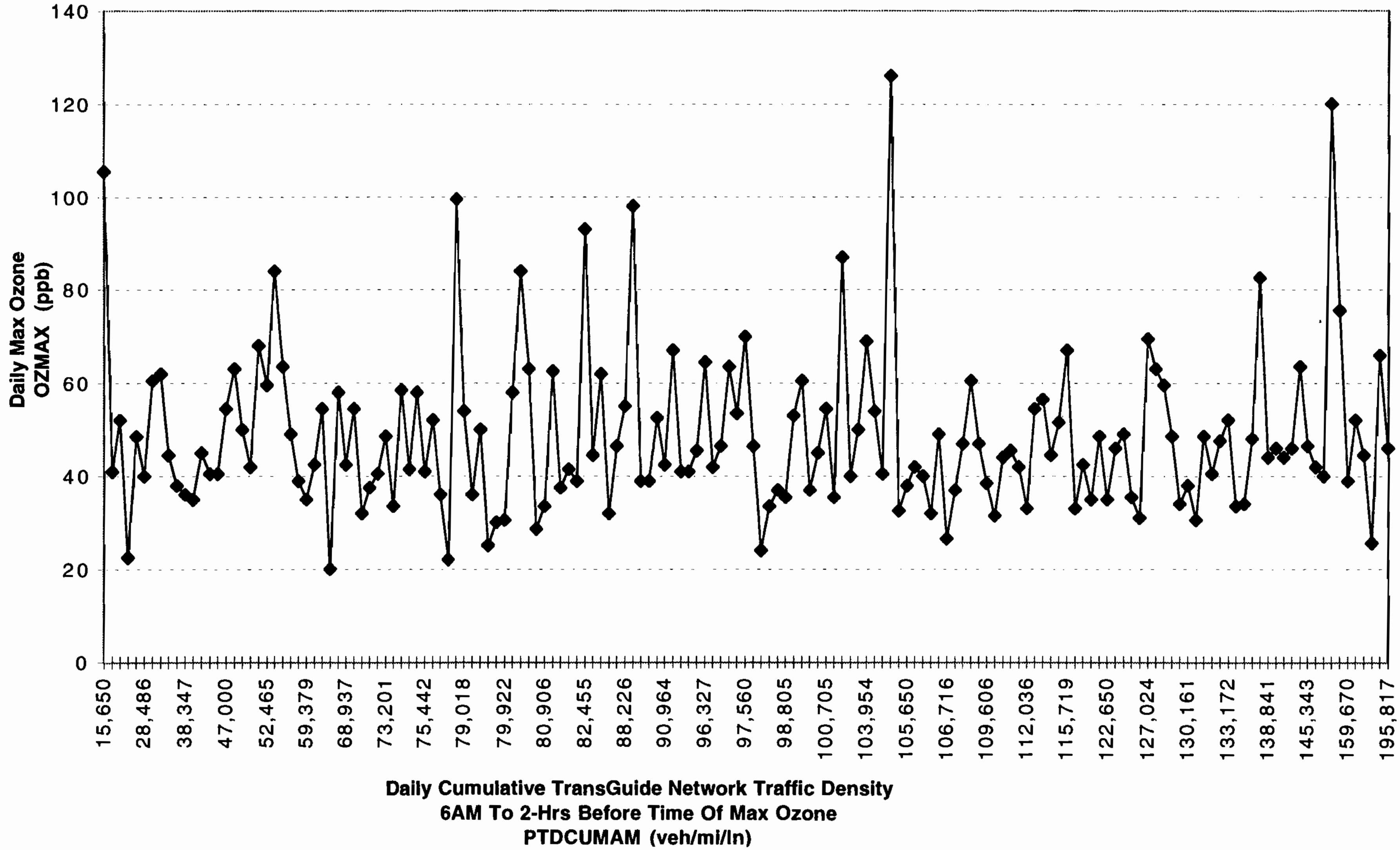


Figure 16. SAN ANTONIO APR'96-SEP'96 - MODEL T2.1
Daily Max Ozone As A Function Of Daily Initial Morning Ozone

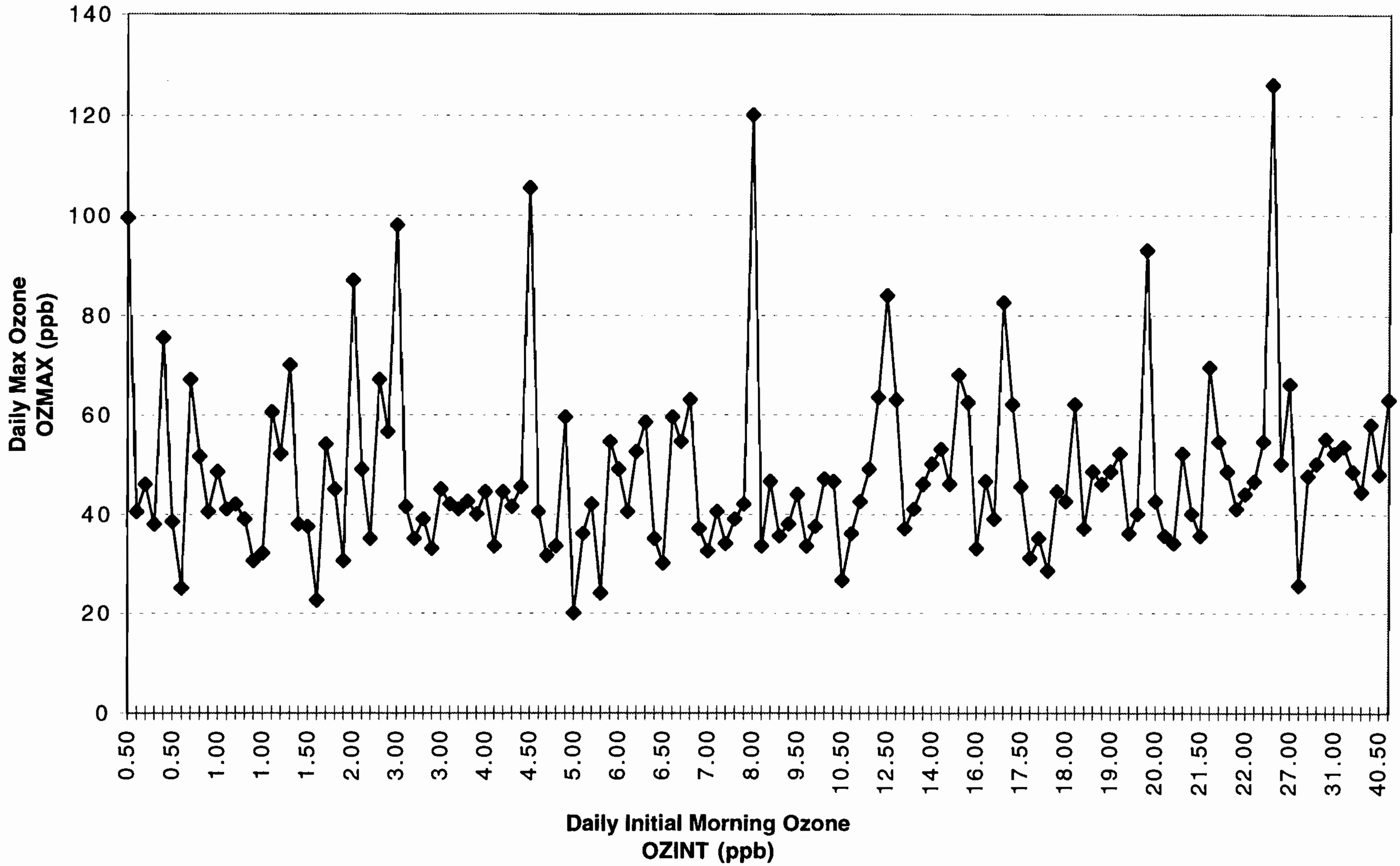


Figure 17. SAN ANTONIO APR'96-SEP'96 MODEL T2.1
Daily Max Ozone As A Function Of
Average Daily Cloud Cover From 6AM To Time Of Max Ozone

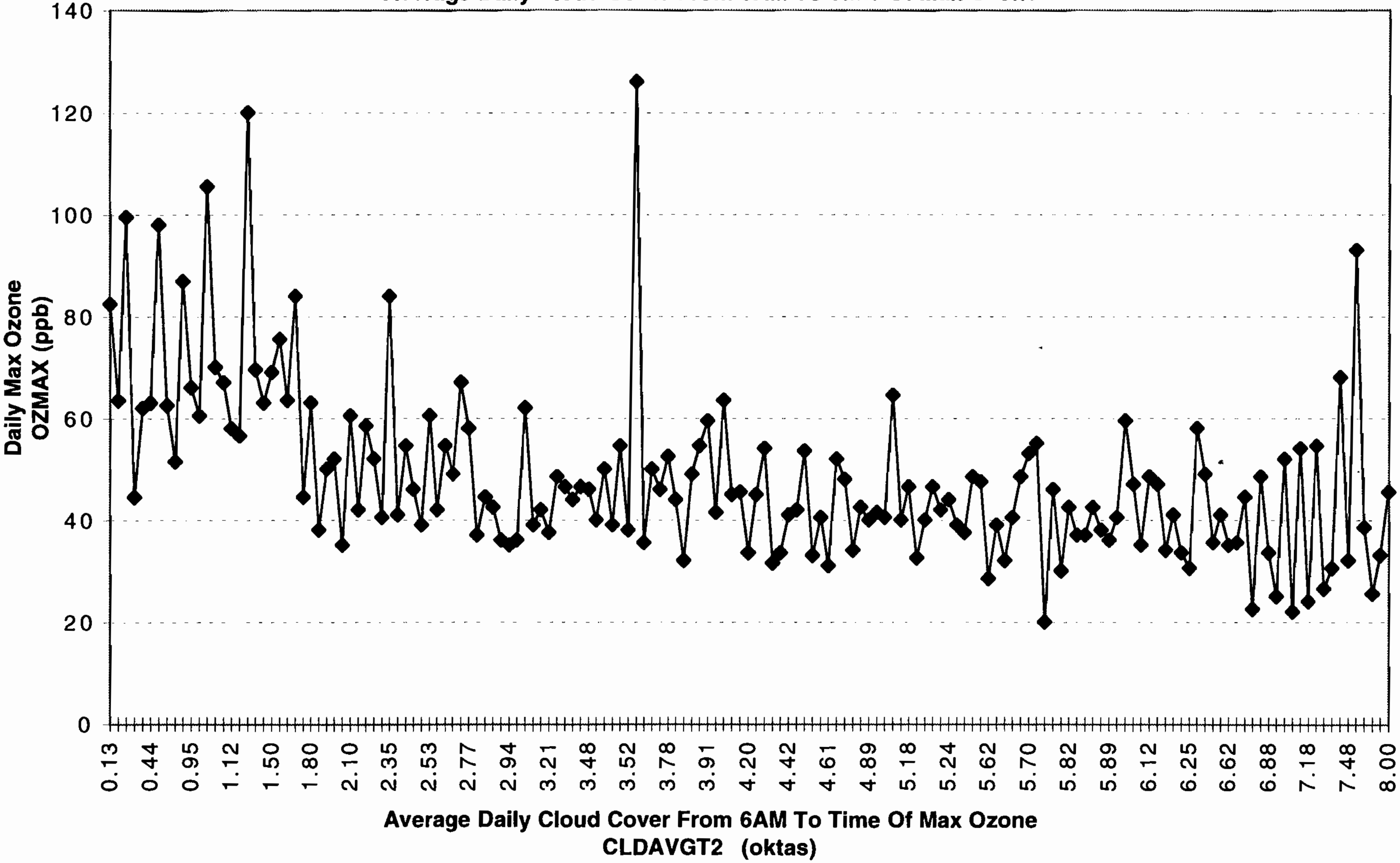


Figure 18. SAN ANTONIO APR'96-SEP'96 MODEL T2.1
Daily Max Ozone As A Function Of
Average Daily Wind Speed From 6AM To Time Of Max Ozone

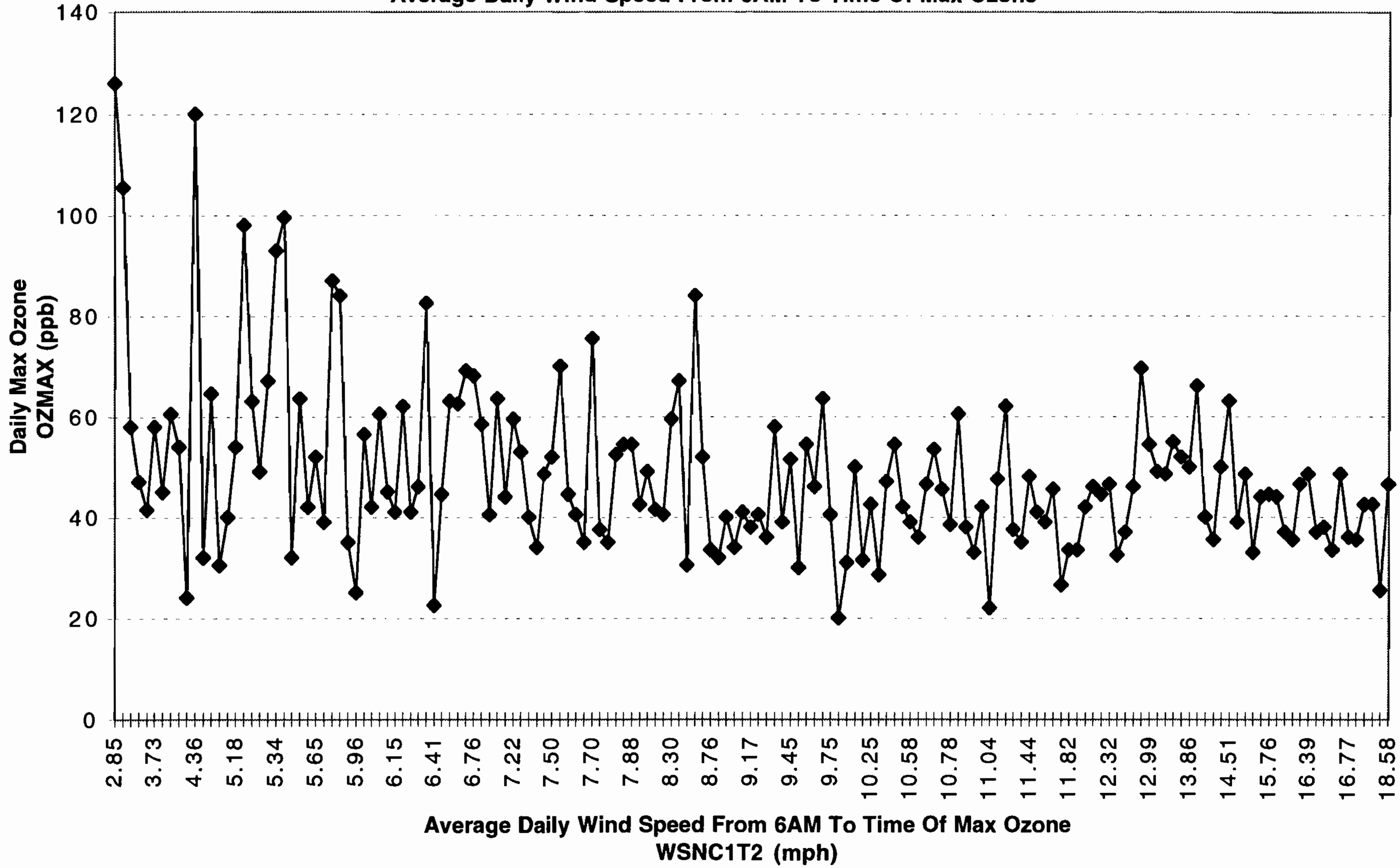


Figure 19. SAN ANTONIO APR'96-SEP'96 MODEL T2.1
Daily Max Ozone As A Function Of
Daily Maximum Temperature

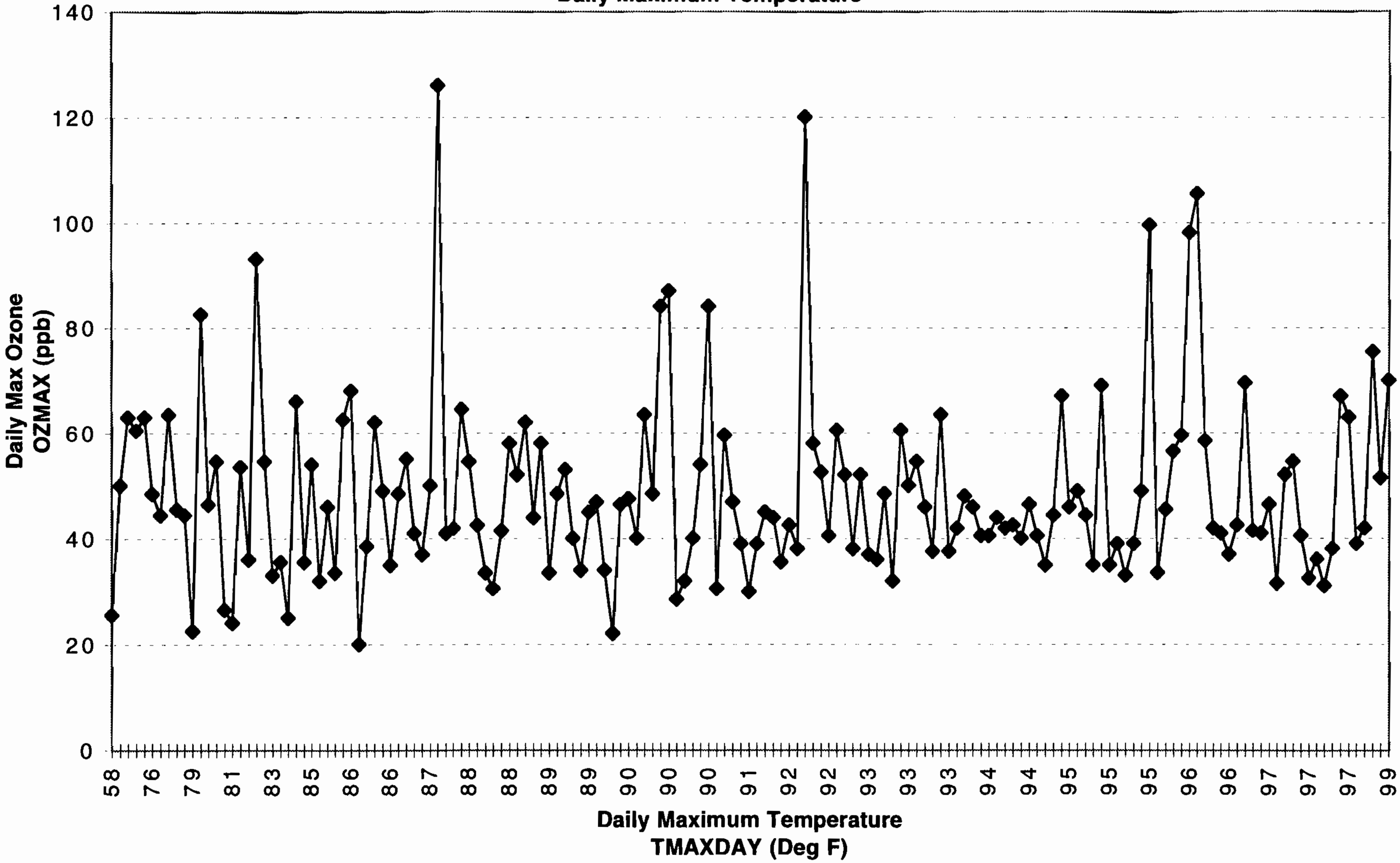


Figure 20. SAN ANTONIO APR'96-SEP'96 MODEL T2.1
Daily Max Ozone As A Function Of
Average Daily Wind Speed

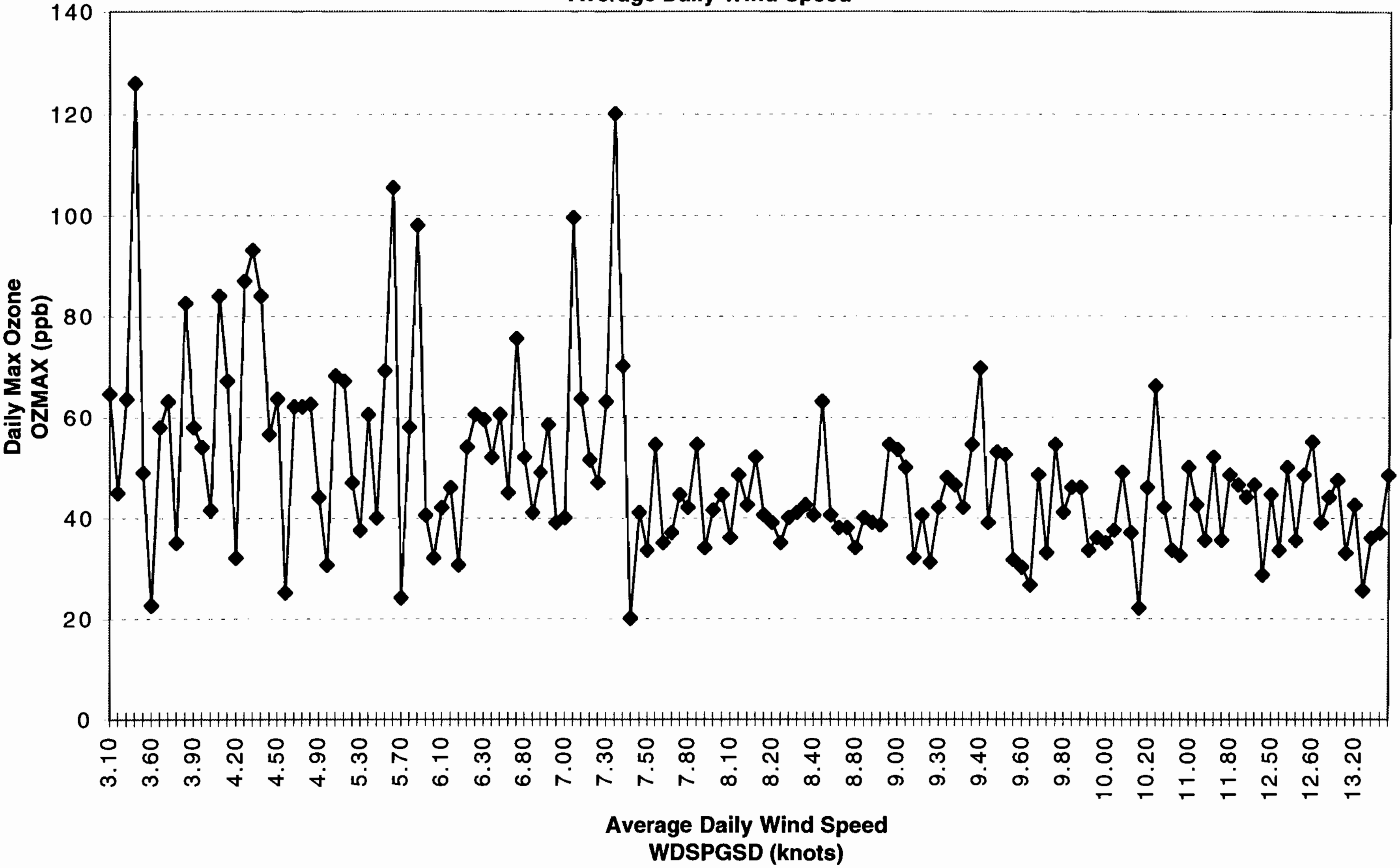
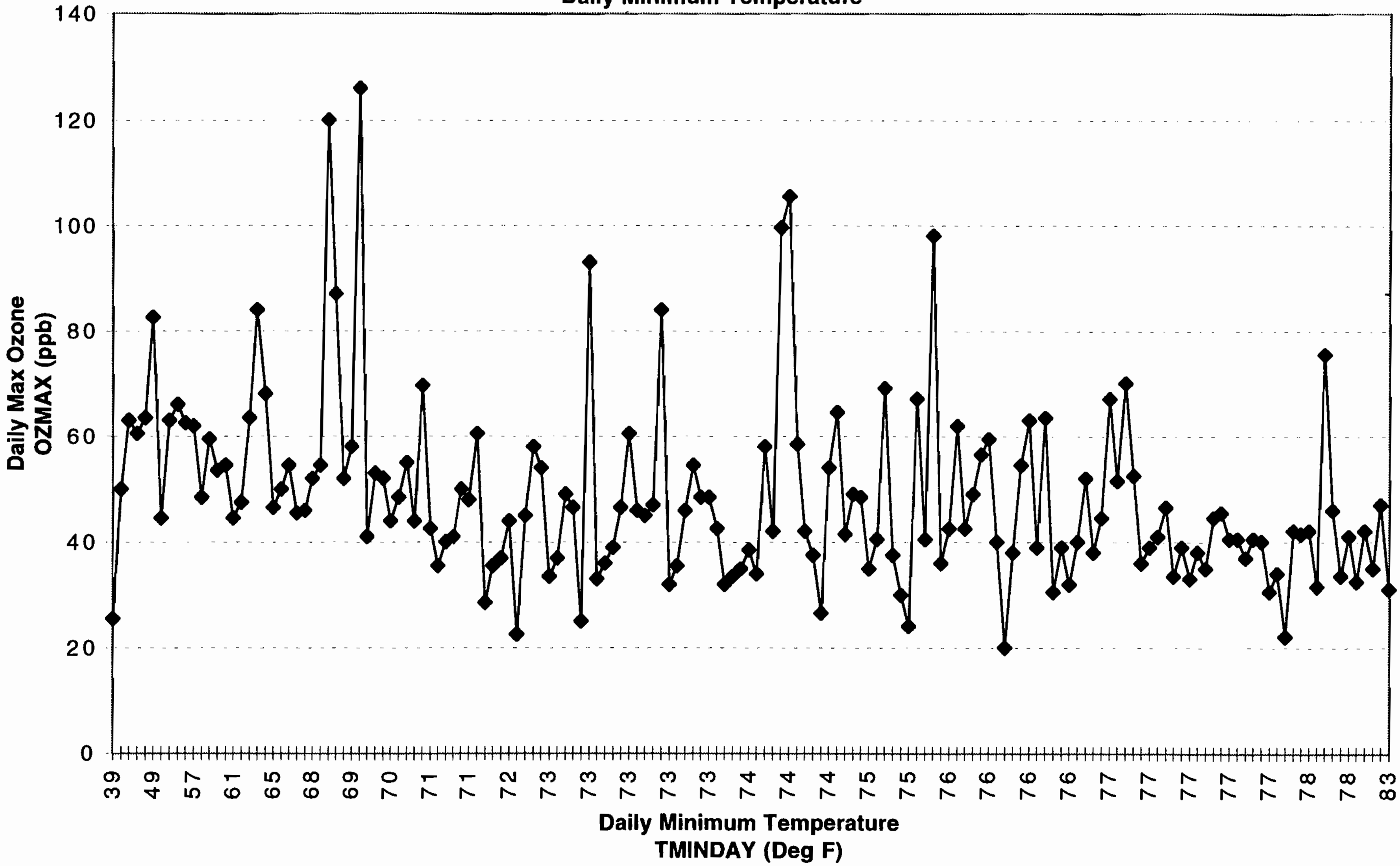
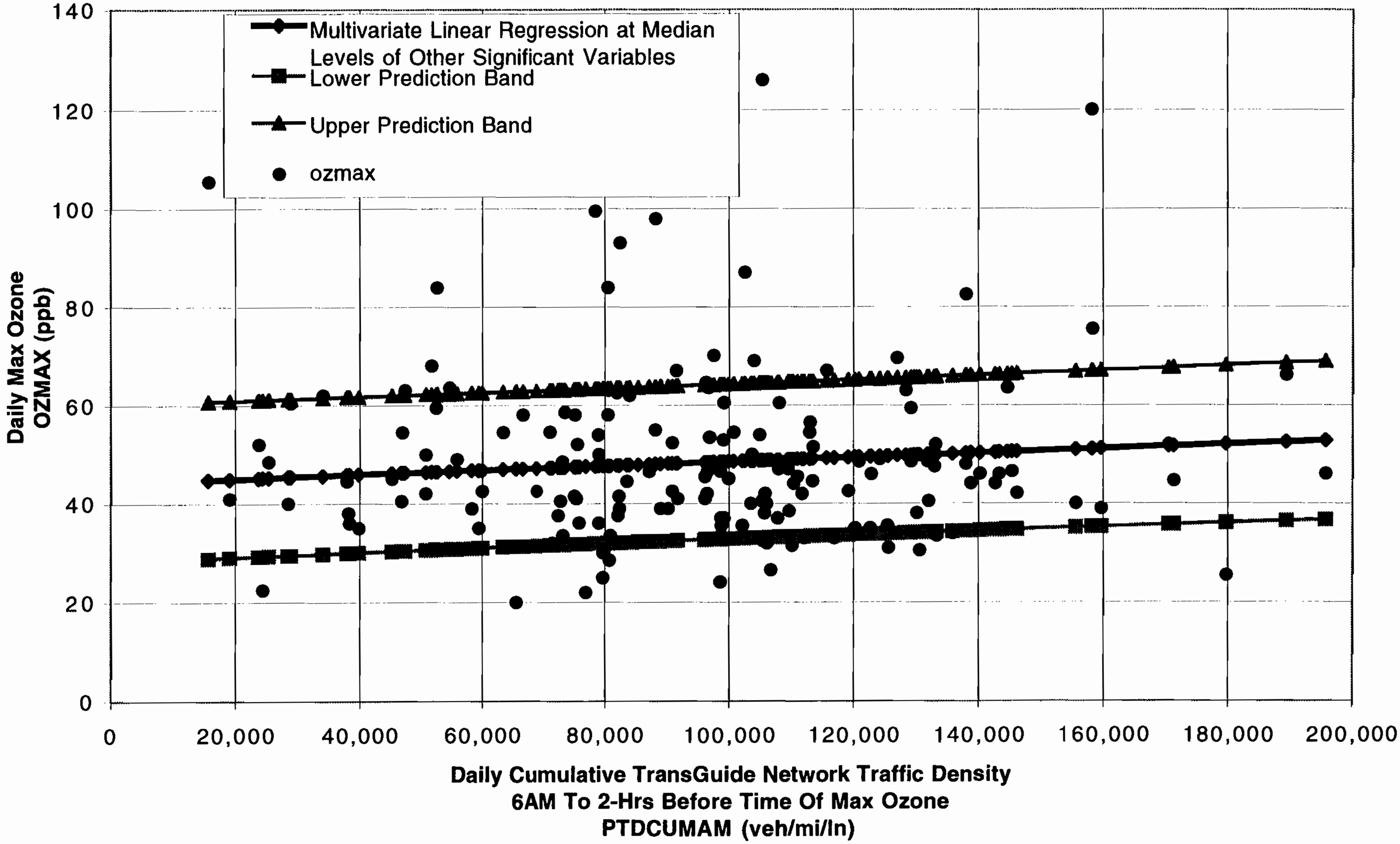


**Figure 21. SAN ANTONIO APR'96-SEP'96 MODEL T2.1**
**Daily Max Ozone As A Function Of**
**Daily Minimum Temperature**



OZINT= 6.5
CLDAVGT2= 4.1
WSNC1T2= 8.9
WDSPGSD= 8.1

**Figure 22. SAN ANTONIO APR'96-SEP'96 MODEL T2.1**
**80% Confidence Prediction Band On Daily Max Ozone As A Function Of Daily Cumulative TransGuide Network Traffic Density 6AM To 2-Hrs Before Time Of Max Ozone**



**SCENARIO 3**

In Scenario 3, we analyze all months of data from December 1995 through September 1996 and control for the average hourly wind speed (WSNC1T2) and the average hourly cloud cover (CLDAVGT2) from 6AM to the time of peak ozone. Table 6 summarizes the results of the model and Table 7 summarizes the strength of the traffic parameter's association with the daily peak ozone. Confidence intervals of the parameter's model coefficient per 10,000 units of PTDCUMAM are calculated at the 80, 90, and 95 percent confidence levels. Table 8 summarizes the raw data for Scenario 3 sorted by date.

We can say that under this scenario at the 80 percent confidence level, the potential increase to the daily peak ozone in ppb per a 10,000 unit increase in the traffic congestion parameter PTDCUMAM has a range from about 0.2 to about 1.8 ppb. It is equally likely that the potential increase in the daily peak ozone would fall at any point within this range. The results presented in Table 7 also indicate that the traffic congestion parameter is not significant at the 95 percent confidence level.

Comparing Scenario 3 to Scenario 1, we can see that when controlling for average cloud cover and wind speed, an association is revealed between the traffic congestion parameter PTDCUMAM and the daily peak ozone. Based on ozone formation literature and discussions with TNRCC staff, we hypothesize that this occurs because these meteorological parameters contribute to the controlling of the level of activity of atmospheric reactions that produce tropospheric ozone for a given amount of precursor emissions.

Figure 23 and Figure 24 plot the daily peak ozone (OZMAX) and the daily cumulative traffic congestion parameter (PTDCUMAM) over time. Figure 25 through Figure 31 graphically summarize the relationships between the response and predictor variables. Figure 32 depicts an 80 percent confidence level prediction band of OZMAX as a function of PTDCUMAM, while holding the other significant variables constant at their median levels. We can say at an 80 percent confidence level that the daily peak ozone will fall somewhere within the band on Figure 32. As shown, the 80 percent confidence prediction band with this linear model under this scenario does not encompass any of the daily peak ozone concentrations near 100 ppb or greater at fixed median levels of the other significant variables.

*Table 6. Scenario 3 Results*

| | | | RANGE OF VARIABLES |
|---|---|---|---|
| **DATA CONTROLS** | 1) DEC 1995 -SEP 1996<br>2) AVG WIND SPEED FROM 6AM TO TIME OF MAX OZONE LE 50th PERCENTILE<br>3) AVG CLOUD COVER FROM 6AM TO TIME OF MAX OZONE LE 3 OKTAS | | |
| **MODEL SIGNIFICANT PARAMETERS (units)** | Y --- OZMAX (ppb)<br>X0 --- INTERCEPT<br>X1 --- PTDCUMAM (veh/mi/ln)<br>X2 --- CLDAVGT2 (oktas)<br>X3 --- WSNC1T2 (mph)<br>X4 --- TMAXDAY (° F)<br>X5 --- TMINDAY (° F) | | 18.5 to 120<br><br>15,650 to 170,520<br>0.0 to 2.9<br>3.1 to 9.1<br>48 to 99.5<br>22 to 77.5 |
| **SIGNIFICANT PARAMETER COEFFICIENT ESTIMATES AND BIVARIATE CORRELATIONS (r)** | -13.66292535 X0<br>0.00010380 X1<br>-7.43408041 X2<br>-4.94270132 X3<br>2.06529728 X4<br>-1.09393361 X5 | <br>0.2273<br>-0.2442<br>-0.2956<br>0.4667<br>0.3900 | |
| **TRAFFIC VARIABLE COEFFICIENT CONFIDENCE-LEVEL** | 90% | | |
| **MODEL R-SQUARE** | 0.55 | | |
| **TRAFFIC VARIABLE PARTIAL R-SQUARE** | 0.0462 | | |
| **SAMPLE SIZE** | 48 | | |
| **1st ORDER AUTO-CORRELATION Durbin-Watson Statistic** | 1.764 | | |
| **P-VALUE SUPPORTING $H_O$: No Heteroskedasticity** | 0.2932 | | |

*Table 7. Scenario 3 Results (cont.)*

| | |
|---|---|
| **TRAFFIC PARAMETER ESTIMATE PER 10,000 PTDCUMAM** | **1.0380** |
| **TRAFFIC PARAMETER ESTIMATE STANDARD ERROR PER 10,000 PTDCUMAM** | **0.6231** |
| **n** | **48** |
| **k** | **5** |
| **df** | **42** |
| $t_{(.10)}$ | **1.282** |
| $t_{(.05)}$ | **1.645** |
| $t_{(.025)}$ | **1.960** |
| **80 PERCENT CONFIDENCE INTERVAL OF TRAFFIC PARAMETER ESTIMATE PER 10,000 UNITS OF PTDCUMAM** | **0.24 to 1.84** |
| **90 PERCENT CONFIDENCE INTERVAL OF TRAFFIC PARAMETER ESTIMATE PER 10,000 UNITS OF PTDCUMAM** | **0.01 to 2.06** |
| **95 PERCENT CONFIDENCE INTERVAL OF TRAFFIC PARAMETER ESTIMATE PER 10,000 UNITS OF PTDCUMAM** | **-0.18 to 2.26** |

*Table 8. Scenario 3 Data*

| DATECST | OZMAX (ppb) | PTDCUMAM (veh/mi/ln) | OZINT (ppb) | CLDAVGT2 (oktas) | WSNC1T2 (mph) | TMAXDAY (° F) | WDSPGSD (knots) | TMINDAY (° F) |
|---|---|---|---|---|---|---|---|---|
| 12/4/95 | 65.5 | 115,843 | 34 | 0.11 | 7.33 | 75 | 4.5 | 53 |
| 12/6/95 | 66 | 113,569 | 30.5 | 1.22 | 6.14 | 74 | 5.7 | 51 |
| 12/10/95 | 27 | 57,496 | 13 | 1.27 | 9.05 | 48 | 7.1 | 26.5 |
| 12/26/95 | 18.5 | 33,175 | 1.5 | 3.00 | 3.55 | 55 | 3.1 | 39 |
| 12/27/95 | 46 | 93,809 | 0 | 1.88 | 5.88 | 63 | 3.9 | 37 |
| 1/3/96 | 30.5 | 91,286 | 5.5 | 0.27 | 7.68 | 53 | 6.8 | 29.5 |
| 1/8/96 | 35 | 116,563 | 1.5 | 0.11 | 7.18 | 50.5 | 4.6 | 22 |
| 1/10/96 | 40 | 93,327 | 1 | 2.40 | 5.93 | 67 | 3.6 | 36.5 |
| 1/13/96 | 43 | 44,330 | 0 | 0.43 | 5.91 | 73 | 4.6 | 42 |
| 1/15/96 | 56 | 99,454 | 3 | 0.78 | 4.99 | 75 | 2.6 | 47.5 |
| 1/21/96 | 52 | 45,640 | 27 | 0.00 | 7.97 | 71 | 3.6 | 45 |
| 1/24/96 | 30 | 109,209 | 2 | 0.00 | 3.74 | 61 | 4.8 | 38 |
| 2/13/96 | 44.5 | 103,596 | 0 | 1.00 | 7.42 | 67 | 4.8 | 39 |
| 3/10/96 | 62 | 54,976 | 0 | 0.42 | 8.18 | 61 | 4.4 | 30 |
| 3/17/96 | 53.5 | 20,589 | 6 | 0.50 | 8.07 | 83 | 6.1 | 56 |
| 3/21/96 | 59 | 79,438 | 0 | 0.13 | 7.82 | 73 | 4.8 | 38.5 |
| 3/28/96 | 60.5 | 141,006 | 21 | 2.70 | 5.47 | 71 | 4 | 42.5 |
| 4/7/96 | 63 | 80,590 | 13 | 1.45 | 5.27 | 66 | 3.8 | 41 |
| 4/8/96 | 82.5 | 138,109 | 17 | 0.13 | 6.33 | 79.5 | 3.9 | 49 |
| 4/10/96 | 62.5 | 81,961 | 16 | 0.57 | 6.55 | 86 | 4.8 | 56.5 |
| 4/18/96 | 52 | 170,519 | 31 | 1.92 | 8.68 | 93 | 11.4 | 68 |
| 6/3/96 | 120 | 158,194 | 8 | 1.27 | 4.36 | 91.5 | 7.5 | 68 |
| 6/8/96 | 63.5 | 54,669 | 12 | 0.25 | 6.92 | 90 | 3.4 | 64.5 |
| 6/9/96 | 84 | 80,549 | 12.5 | 1.68 | 8.37 | 90.5 | 4.5 | 64.5 |
| 6/14/96 | 44.5 | 83,580 | 4 | 2.86 | 7.63 | 95 | 7.8 | 76.5 |
| 6/15/96 | 40.5 | 46,819 | 6.5 | 2.29 | 8.29 | 94 | 8.6 | 75.5 |
| 6/16/96 | 35 | 39,835 | 2.5 | 2.94 | 7.82 | 95 | 7.7 | 75 |
| 6/17/96 | 56.5 | 113,027 | 3 | 1.18 | 5.98 | 96 | 4.5 | 76 |
| 6/18/96 | 67 | 115,719 | 2.5 | 1.11 | 8.31 | 97.5 | 5.2 | 76.5 |
| 6/20/96 | 70 | 97,560 | 1.5 | 1.06 | 7.57 | 99.5 | 7.5 | 76.5 |
| 6/30/96 | 60.5 | 28,900 | 0 | 1.00 | 3.99 | 92 | 6.4 | 73 |
| 7/1/96 | 69 | 103,954 | 0 | 1.50 | 6.61 | 95 | 5.6 | 75 |
| 7/2/96 | 98 | 88,279 | 3 | 0.56 | 5.24 | 96 | 5.8 | 75.5 |
| 7/3/96 | 99.5 | 78,502 | 0.5 | 0.25 | 5.39 | 95.5 | 7.1 | 74.5 |
| 7/4/96 | 105.5 | 15,650 | 4.5 | 1.00 | 3.15 | 96 | 5.6 | 74.5 |
| 7/5/96 | 58.5 | 73,601 | 6.5 | 2.22 | 6.77 | 96 | 7 | 74.5 |
| 7/7/96 | 63 | 47,373 | 7 | 1.80 | 6.52 | 97.5 | 7.3 | 76 |
| 7/13/96 | 41 | 75,441 | 1 | 2.38 | 8.97 | 96.5 | 8.3 | 76.5 |

*Table 8. Scenario 3 Data (continued)*

| DATECST | OZMAX (ppb) | PTDCUMAM (veh/mi/ln) | OZINT (ppb) | CLDAVGT2 (oktas) | WSNC1T2 (mph) | TMAXDAY (° F) | WDSPGSD (knots) | TMINDAY (° F) |
|---|---|---|---|---|---|---|---|---|
| 8/10/96 | 35 | 59,379 | 6.5 | 1.95 | 7.66 | 94.5 | 8.2 | 76.5 |
| 8/11/96 | 44.5 | 37,932 | 4 | 1.78 | 6.48 | 94.5 | 8 | 76.5 |
| 8/12/96 | 75.5 | 158,255 | 0.5 | 1.58 | 7.70 | 98.5 | 6.5 | 77.5 |
| 8/16/96 | 42 | 111,759 | 1 | 2.13 | 5.99 | 94 | 7.8 | 74.5 |
| 8/17/96 | 42.5 | 68,937 | 11.5 | 2.90 | 7.91 | 94 | 8.3 | 75.5 |
| 8/21/96 | 60.5 | 108,007 | 0 | 2.10 | 6.09 | 93 | 5.3 | 71.5 |
| 9/6/96 | 58 | 80,528 | 0 | 1.13 | 3.73 | 88.5 | 3.9 | 72 |
| 9/10/96 | 84 | 52,634 | 0 | 2.35 | 5.92 | 90 | 4.2 | 73 |
| 9/11/96 | 87 | 102,476 | 2 | 0.90 | 5.78 | 90 | 4.3 | 68 |
| 9/16/96 | 67 | 91,576 | 0.5 | 2.72 | 5.30 | 94.5 | 4.2 | 75 |

**Figure 23. SAN ANTONIO DAILY MAX OZONE APR'96-SEP'96 MODEL T2.3**
**DATA CONTROLLED FOR DAILY AVERAGE CLOUD COVER 6AM TO TIME OF MAX OZONE LE 3 OKTAS**
**AND DAILY AVERAGE WIND SPEED 6AM TO TIME OF MAX OZONE LE 9.2 MPH**

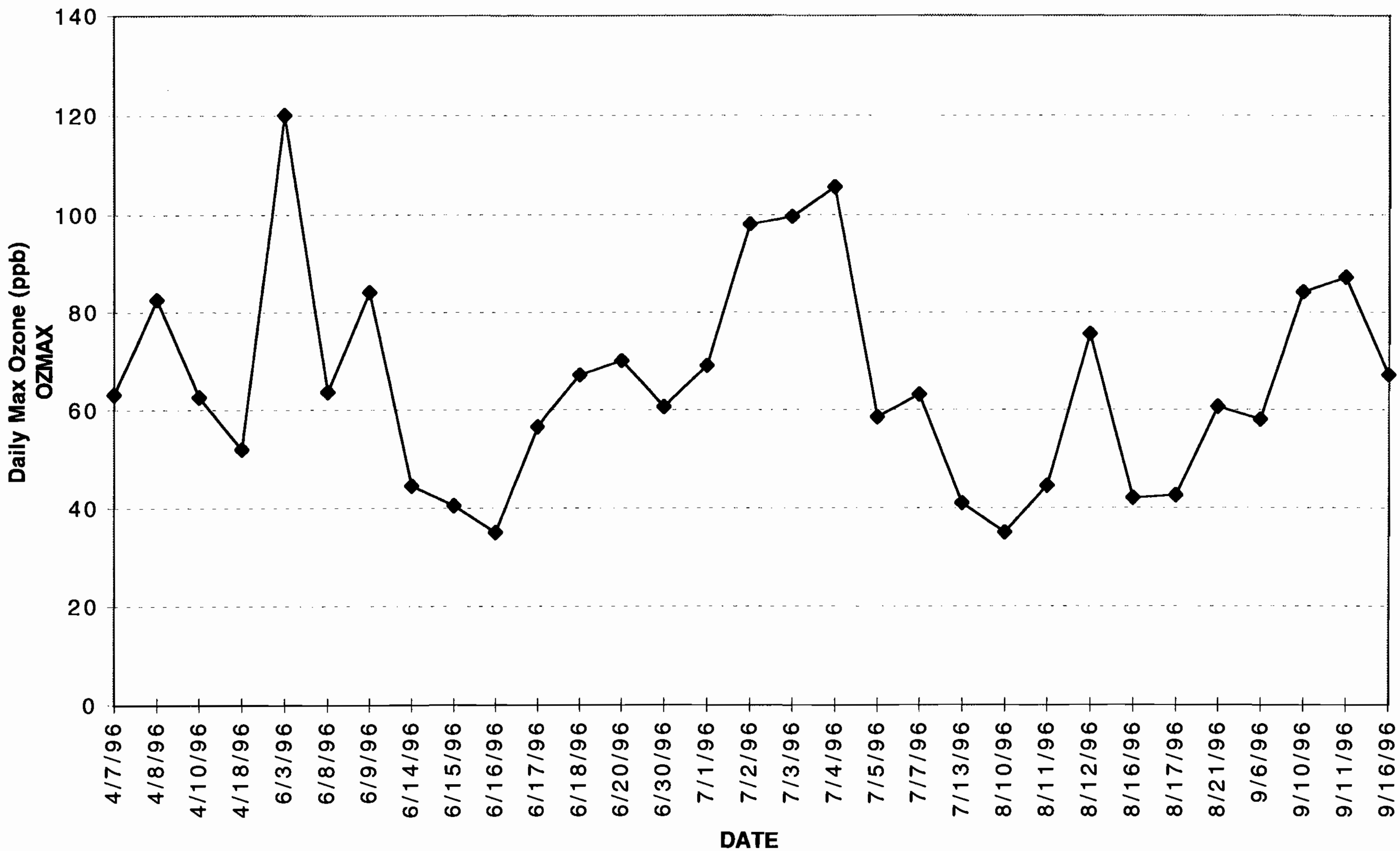


Figure 24. SAN ANTONIO DAILY MAX OZONE APR'96-SEP'96 MODEL T2.3
DATA CONTROLLED FOR DAILY AVERAGE CLOUD COVER 6AM TO TIME OF MAX OZONE LE 3 OKTAS
AND DAILY AVERAGE WIND SPEED 6AM TO TIME OF MAX OZONE LE 9.2 MPH

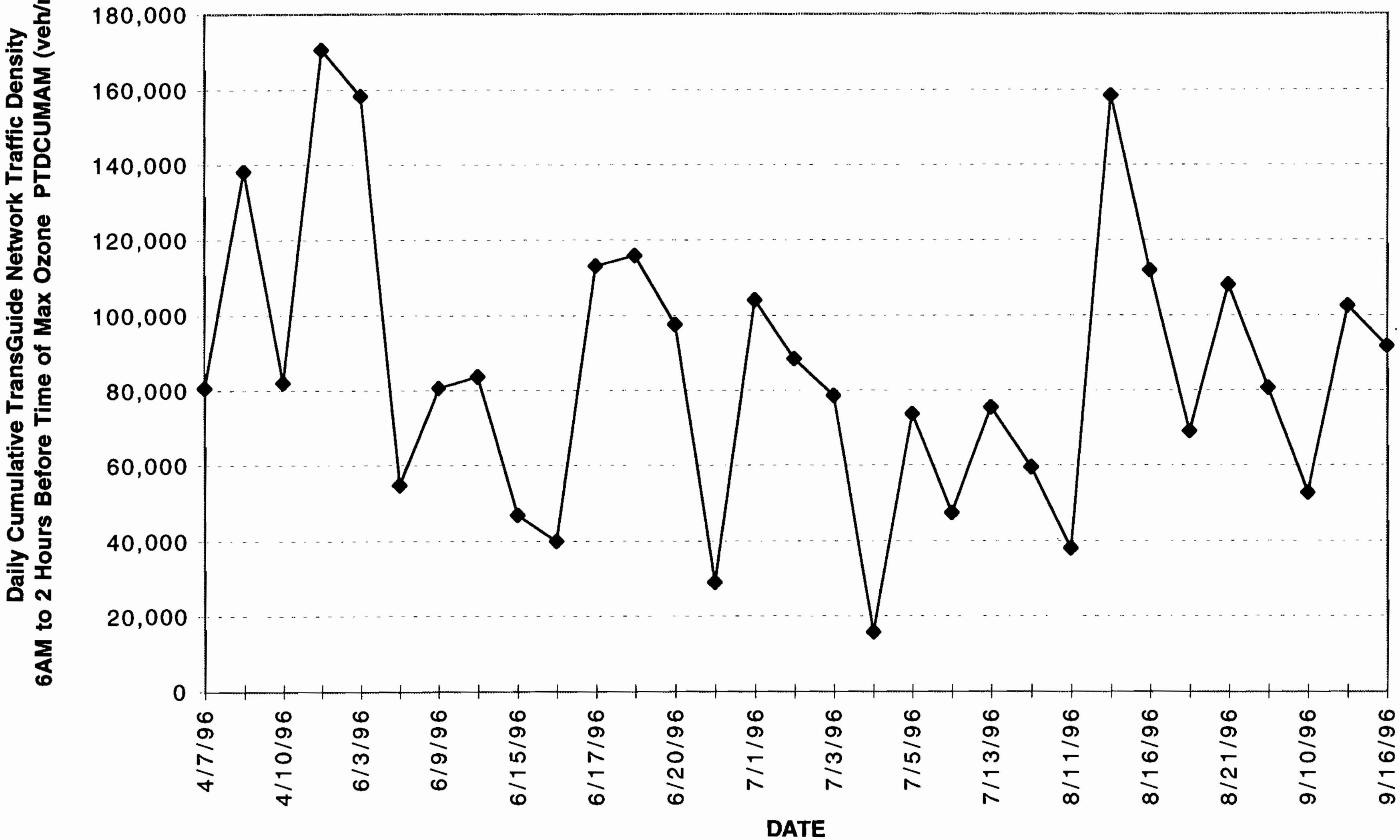


**Figure 25. SAN ANTONIO DAILY MAX OZONE APR'96-SEP'96 MODEL T2.3**
**Daily Max Ozone As A Function Of Daily Cumulative TransGuide Network Traffic Density**
**6AM To 2-Hrs Before Time Of Max Ozone**
**DATA CONTROLLED FOR DAILY AVERAGE CLOUD COVER 6AM TO TIME OF MAX OZONE LE 3 OKTAS**
**AND DAILY AVERAGE WIND SPEED 6AM TO TIME OF MAX OZONE LE 9.2 MPH**

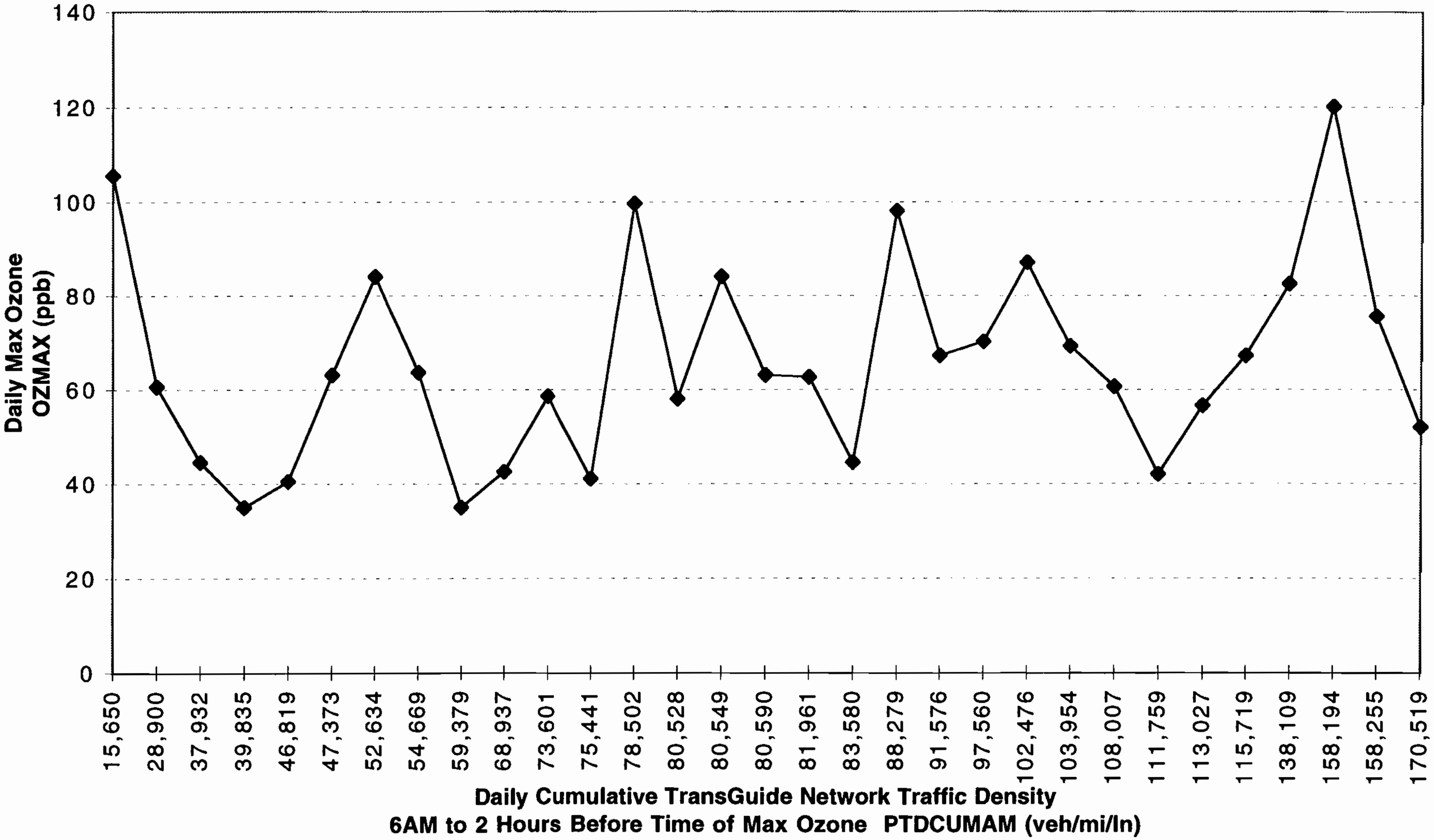


Figure 26. SAN ANTONIO DAILY MAX OZONE APR'96-SEP'96 MODEL 2.3
Daily Max Ozone As A Function Of Daily Initial Morning Ozone
DATA CONTROLLED FOR DAILY AVERAGE CLOUD COVER 6AM TO TIME OF MAX OZONE LE 3 OKTAS
AND DAILY AVERAGE WIND SPEED 6AM TO TIME OF MAX OZONE LE 9.2 MPH

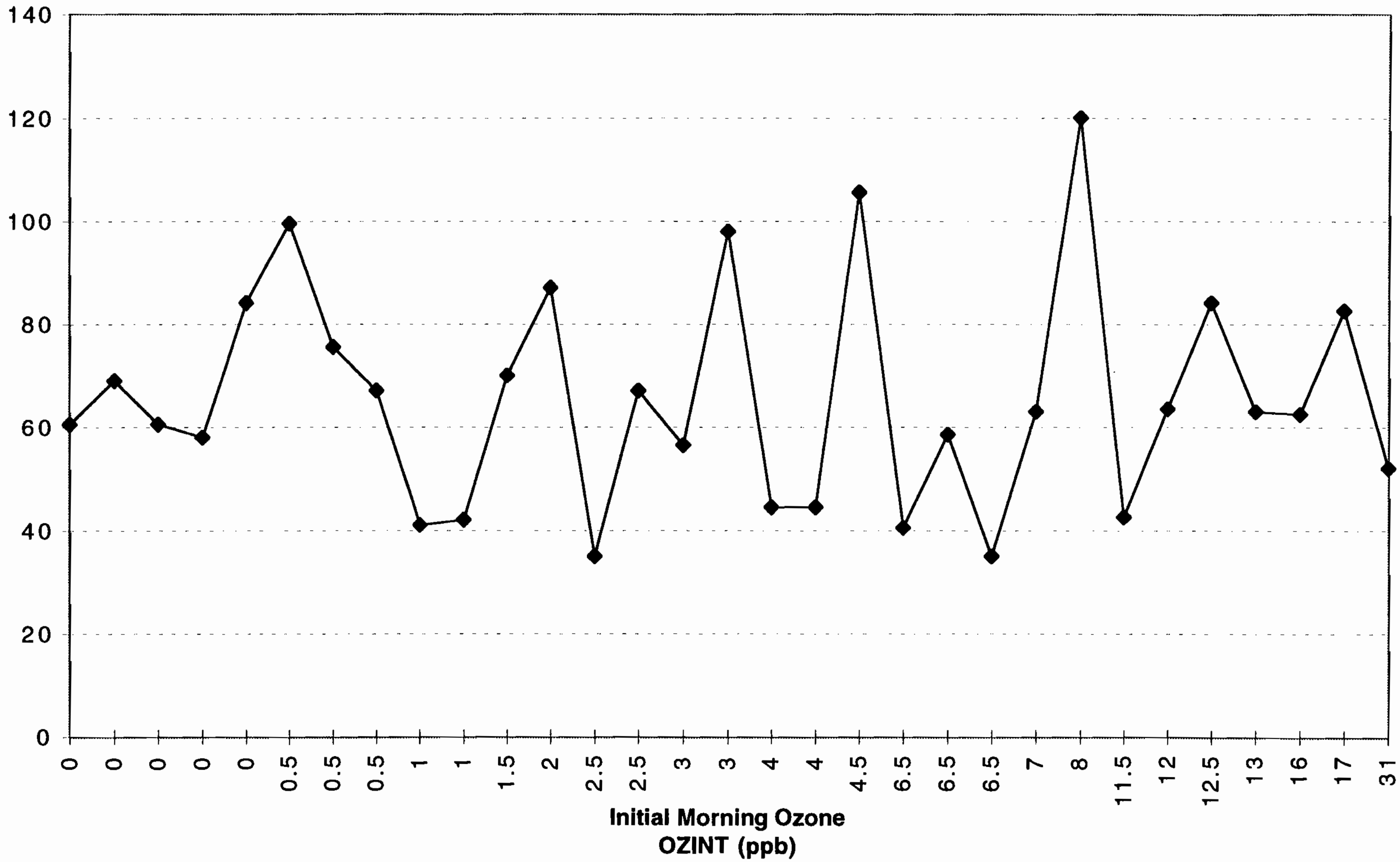


Figure 27. SAN ANTONIO APR'96-SEP'96 MODEL T2.3
Daily Max Ozone As A Function Of
Average Daily Cloud Cover From 6AM To Time Of Max Ozone
DATA CONTROLLED FOR DAILY AVERAGE CLOUD COVER 6AM TO TIME OF MAX OZONE LE 3 OKTAS
AND DAILY AVERAGE WIND SPEED 6AM TO TIME OF MAX OZONE LE 9.2 MPH

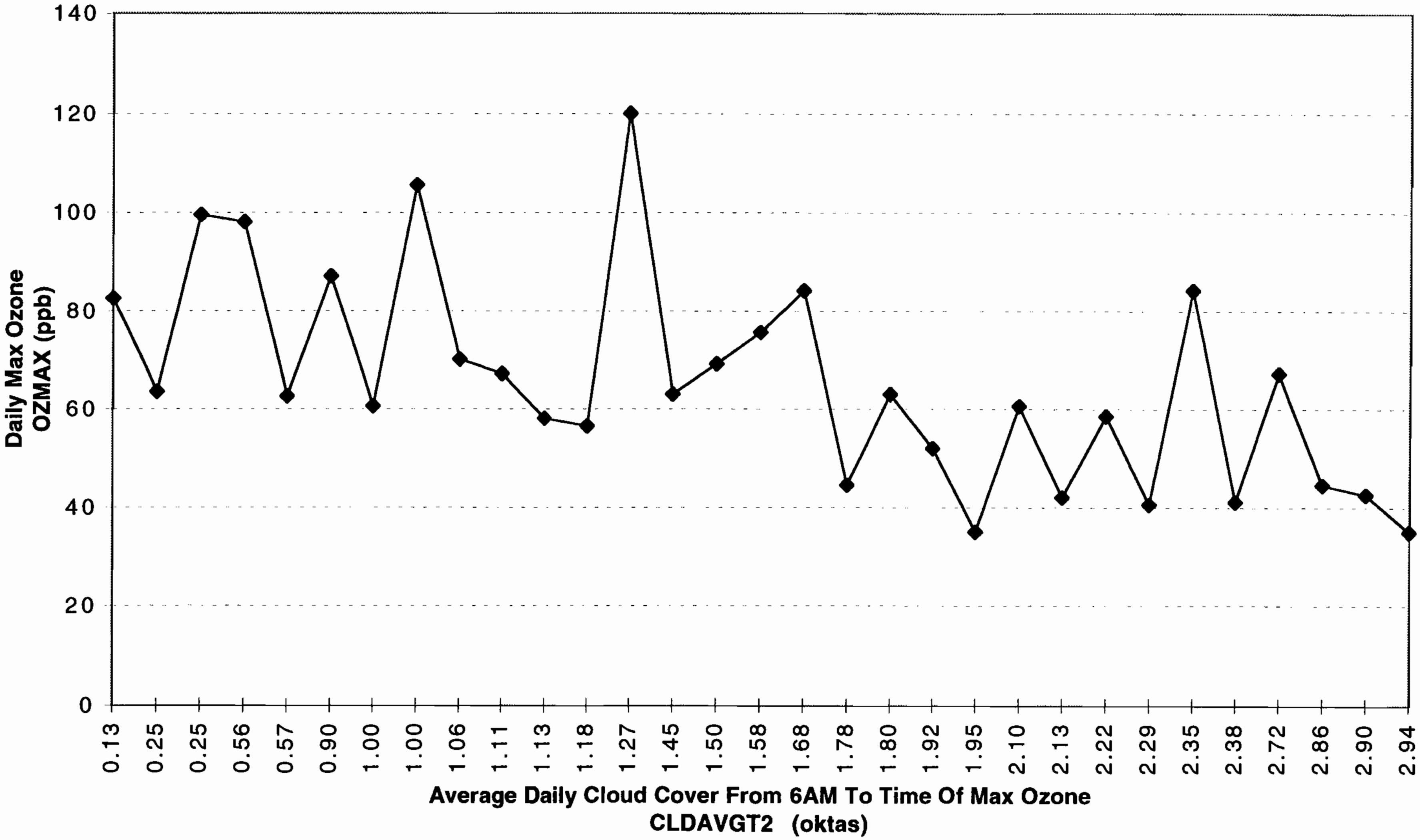


Figure 28. SAN ANTONIO APR'96-SEP'96 MODEL T2.3
Daily Max Ozone As A Function Of
Average Daily Wind Speed From 6AM To Time Of Max Ozone
DATA CONTROLLED FOR DAILY AVERAGE CLOUD COVER 6AM TO TIME OF MAX OZONE LE 3 OKTAS
AND DAILY AVERAGE WIND SPEED 6AM TO TIME OF MAX OZONE LE 9.2 MPH

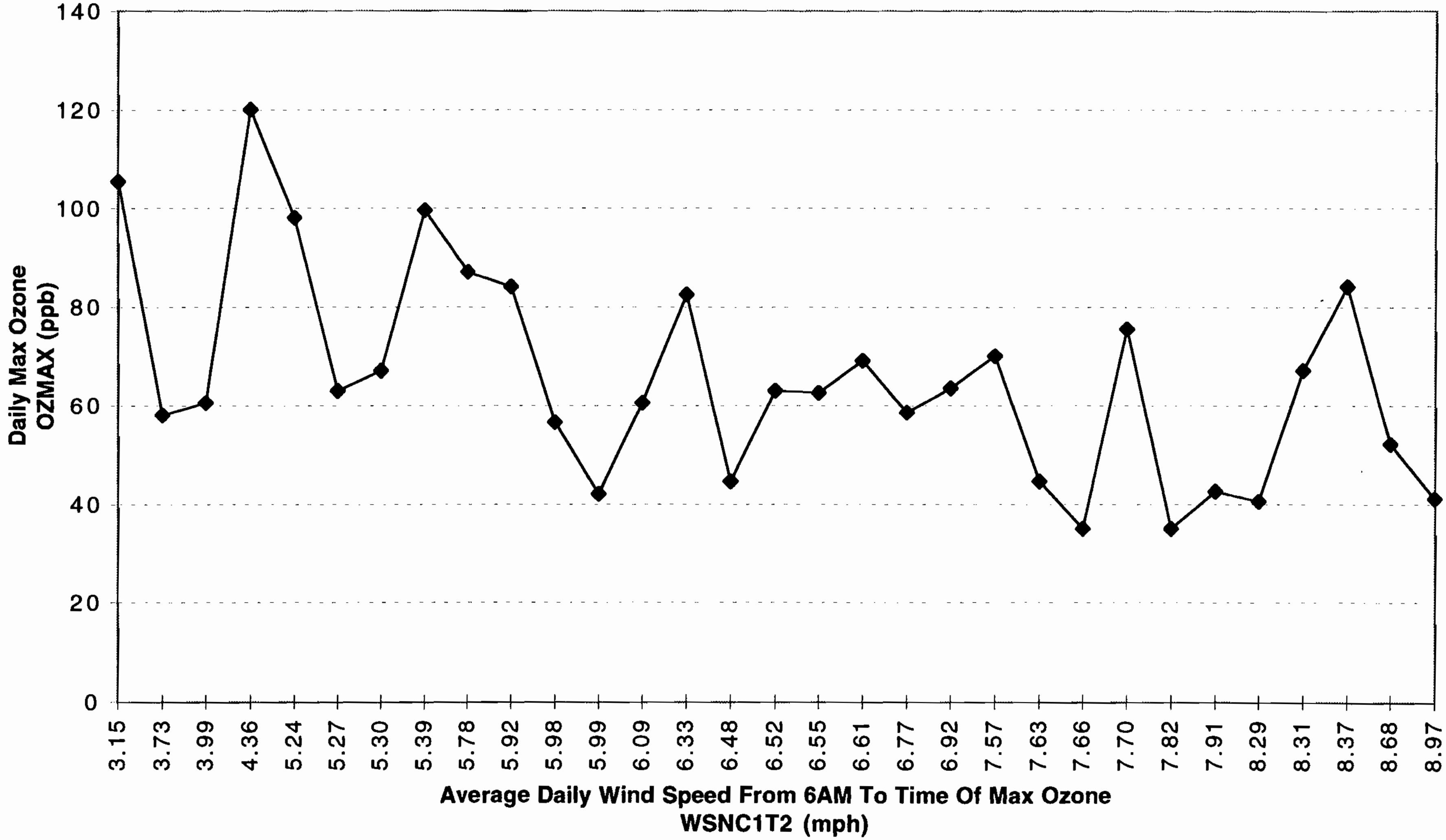


**Figure 29. SAN ANTONIO APR'96-SEP'96 MODEL T2.3**
**Daily Max Ozone As A Function Of Daily Maximum Temperature**
**DATA CONTROLLED FOR DAILY AVERAGE CLOUD COVER 6AM TO TIME OF MAX OZONE LE 3 OKTAS**
**AND DAILY AVERAGE WIND SPEED 6AM TO TIME OF MAX OZONE LE 9.2 MPH**

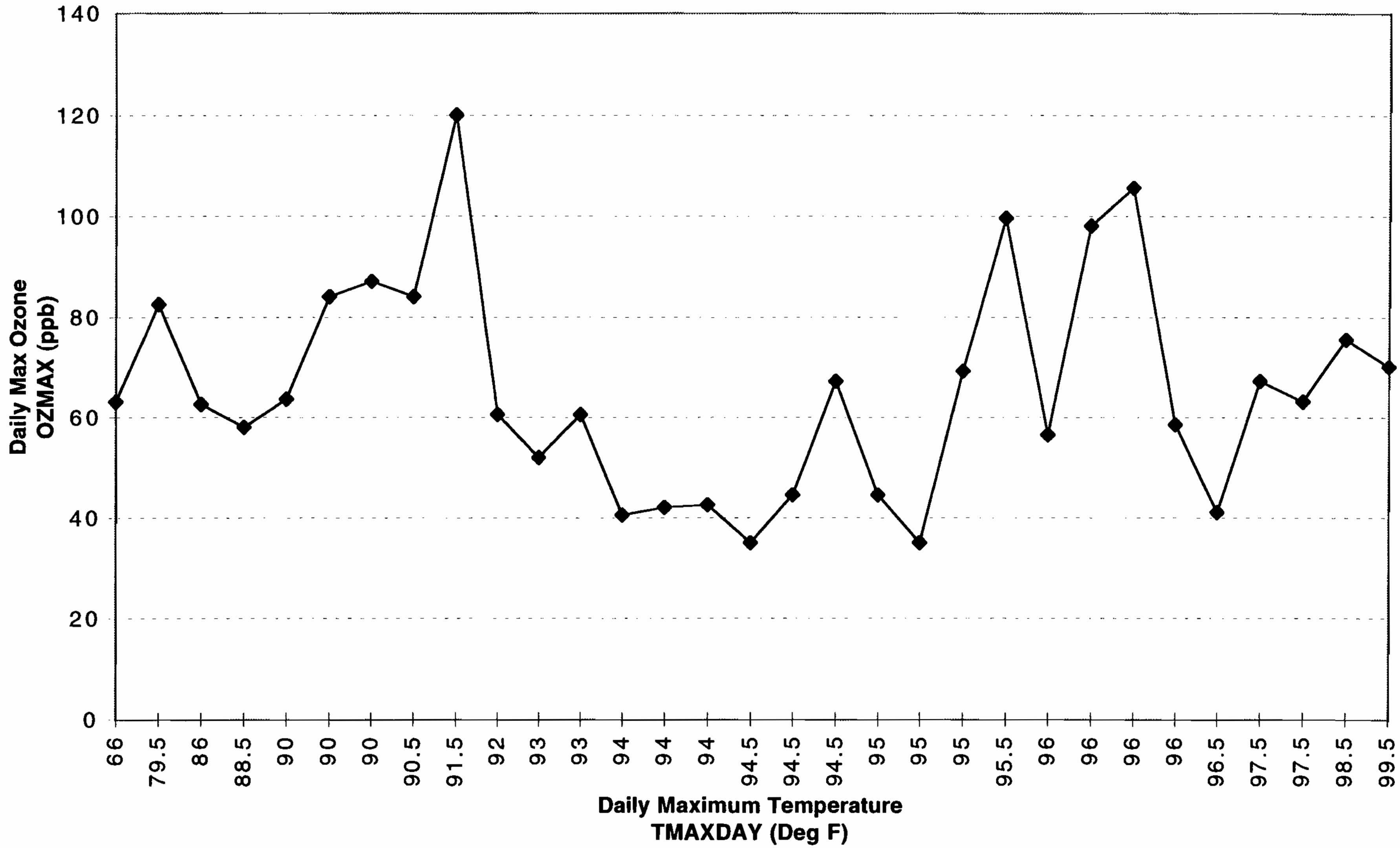


Figure 30. SAN ANTONIO APR'96-SEP'96 MODEL T2.3
Daily Max Ozone As A Function Of Average Daily Wind Speed
DATA CONTROLLED FOR DAILY AVERAGE CLOUD COVER 6AM TO TIME OF MAX OZONE LE 3 OKTAS
AND DAILY AVERAGE WIND SPEED 6AM TO TIME OF MAX OZONE LE 9.2 MPH

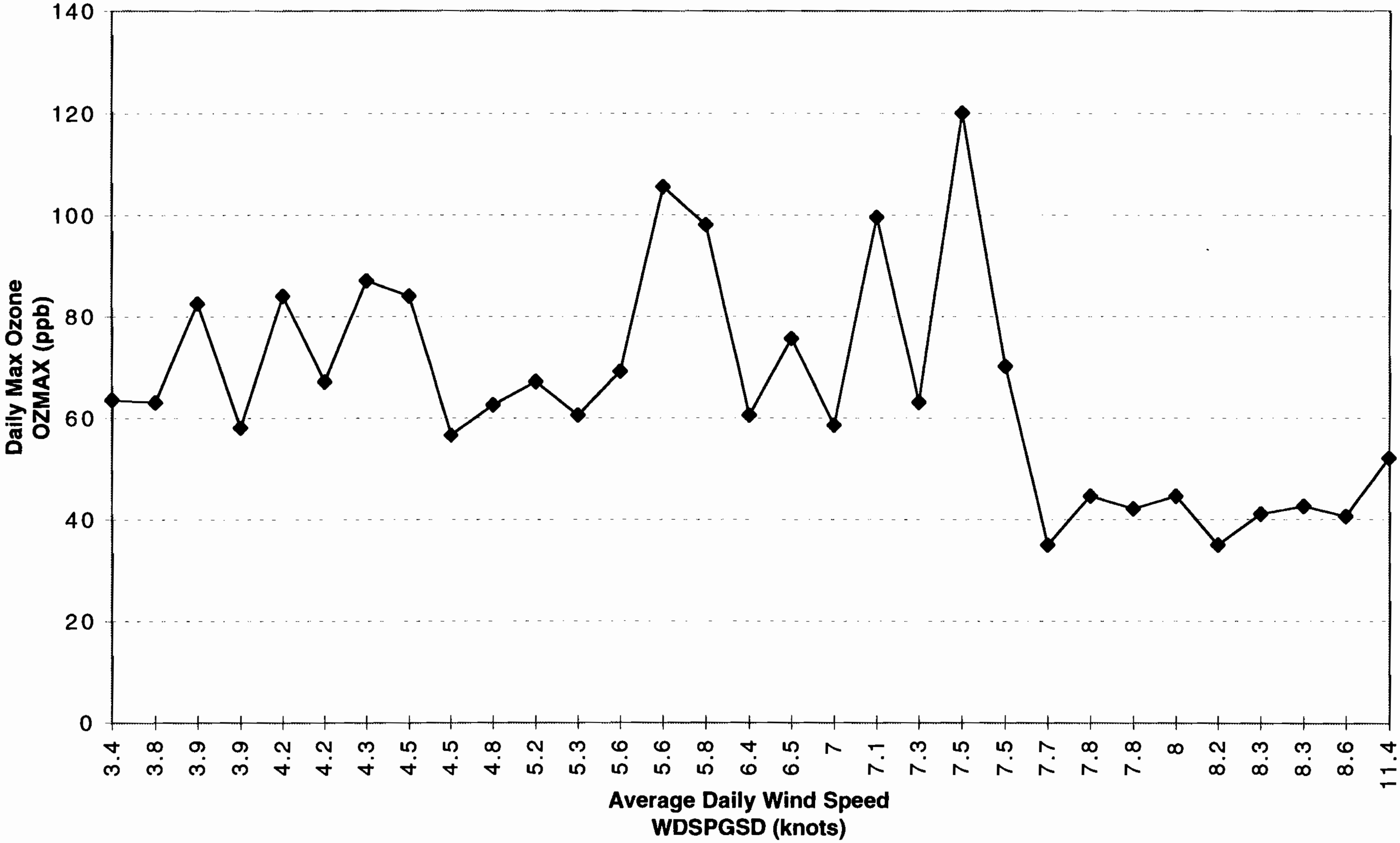
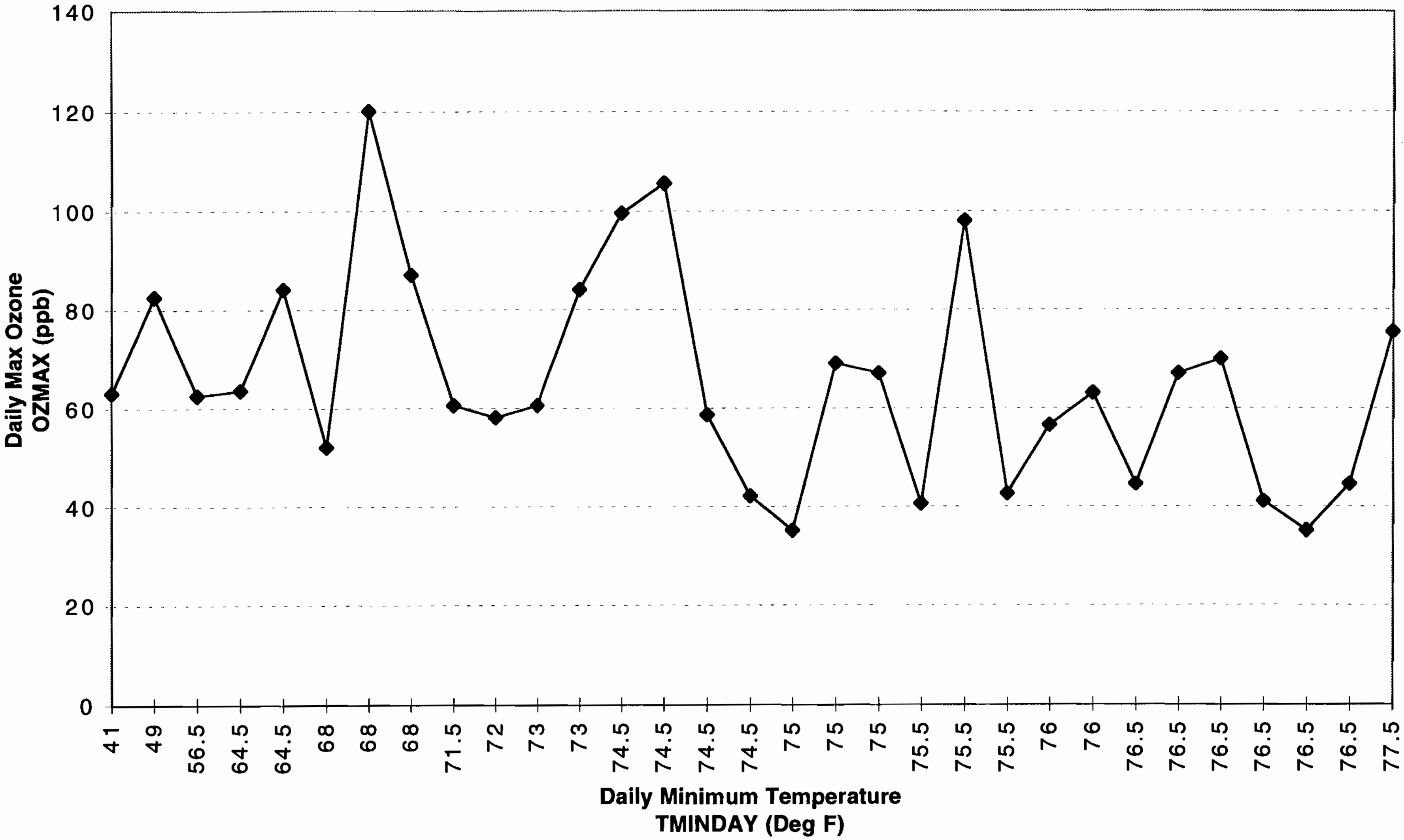
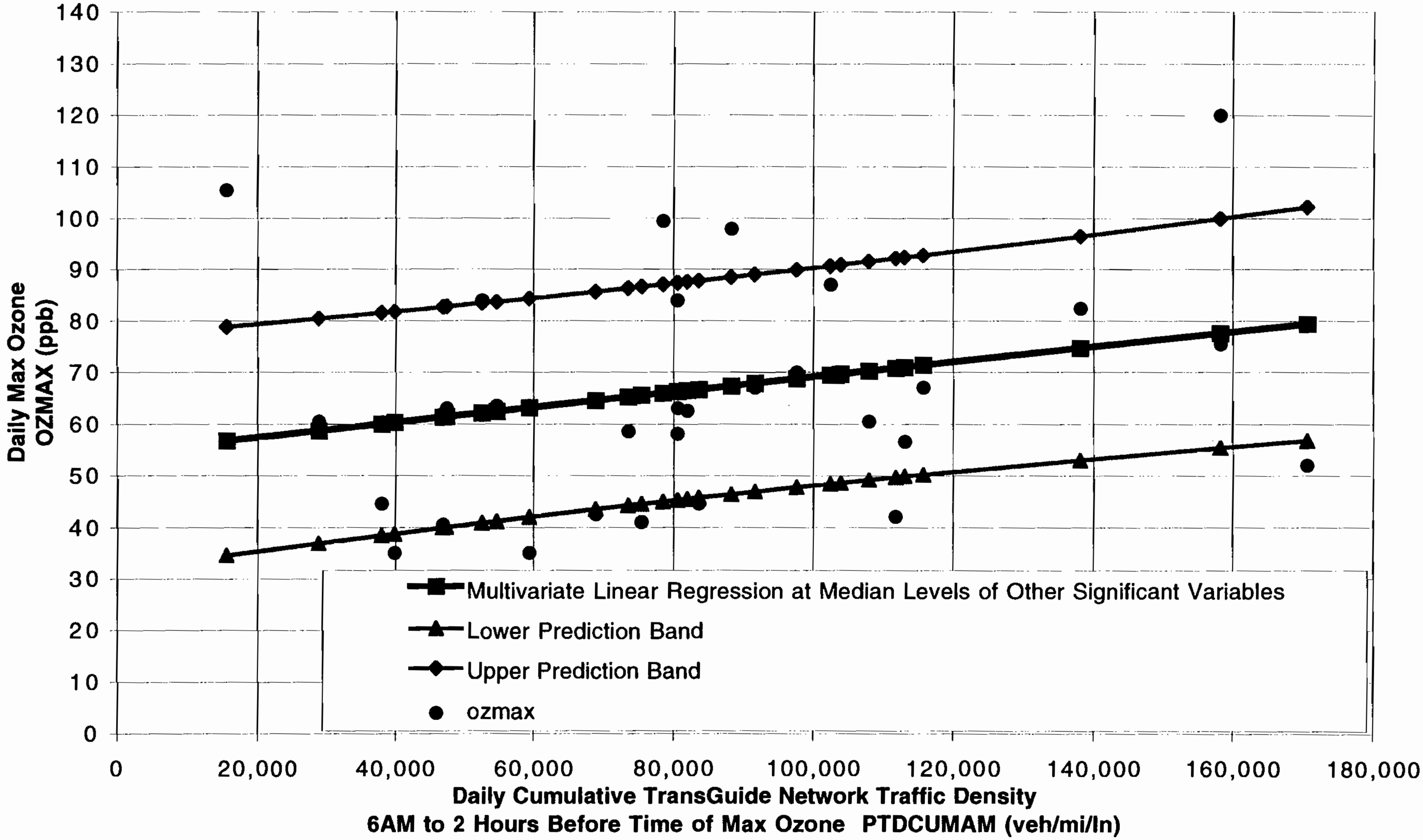


**Figure 31. SAN ANTONIO APR'96-SEP'96 MODEL T2.3**
**Daily Max Ozone As A Function Of Daily Minimum Temperature**
**DATA CONTROLLED FOR DAILY AVERAGE CLOUD COVER 6AM TO TIME OF MAX OZONE LE 3 OKTAS**
**AND DAILY AVERAGE WIND SPEED 6AM TO TIME OF MAX OZONE LE 9.2 MPH**



CLDAVGT2 = 1.5 oktas
WSNC1T2 = 6.4 mph

Figure 32. SAN ANTONIO APR'96-SEP'96 MODEL T2.3
80% Confidence Prediction Band On Daily Max Ozone As A Function Of Daily Cumulative TransGuide Network Traffic Density From 6AM To 2-Hrs Before Time Of Max Ozone
DATA CONTROLLED FOR DAILY AVERAGE CLOUD COVER 6AM TO TIME OF MAX OZONE LE 3 OKTAS
AND DAILY AVERAGE WIND SPEED 6AM TO TIME OF MAX OZONE LE 9.2 MPH



## SCENARIO 4

Scenario 4 is the same as Scenario 3 except that the data are controlled for the months of April through September, a period that coincides with the first 6 months of the official 7-month peak ozone season. Table 9 summarizes the results of the model and Table 10 summarizes the strength of the traffic parameter's association with the daily peak ozone. Confidence intervals of the parameter's model coefficient per 10,000 units of PTDCUMAM are calculated at the 80, 90, and 95 percent confidence levels. Table 11 summarizes the raw data for Scenario 4 sorted by date.

We can say that under this scenario at the 80 percent confidence level, the potential increase to the daily peak ozone in ppb per a 10,000 unit increase in the traffic congestion parameter PTDCUMAM has a range from about 0.4 to about 2.5 ppb. It is equally likely that the potential increase in the daily peak ozone would fall at any point within this range. The results presented in Table 10 also indicate that the traffic congestion parameter is not significant at the 95 percent confidence level.

The results under Scenario 4 at the 80 and 90 percent confidence levels show a stronger association between the daily traffic congestion parameter and the daily peak ozone than Scenario 3. We can hypothesize that this stronger association is due to the fact that the level of UV intensity is being controlled for, at least to some degree, by controlling the data for the months of April through September, rather than including the months of December through March.

In addition, when comparing the results of Scenario 4 with Scenario 2, we can see that controlling for average cloud cover and wind speed results in a stronger association being revealed between the traffic congestion parameter PTDCUMAM and the daily peak ozone. Based on ozone formation literature and discussions with TNRCC staff, we hypothesize that this occurs because these meteorological parameters contribute to the controlling of the level of activity of atmospheric reactions that produce tropospheric ozone for a given amount of precursor emissions.

Figure 33 and Figure 34 plot the daily peak ozone (OZMAX) and the daily cumulative traffic congestion parameter (PTDCUMAM) over time. Figure 35 through Figure 41 graphically summarize the relationships between the response and predictor variables. Figure 42 depicts an 80 percent confidence level prediction band of OZMAX as a function of PTDCUMAM, while holding the other significant variables constant at their median levels. We can say at an 80 percent confidence level that the daily peak ozone will fall somewhere within the band shown in Figure 42.

As shown, the 80 percent confidence prediction band with this linear model under this scenario does not encompass any of the daily peak ozone concentrations near 100 ppb or greater at fixed median levels of the other significant variables. All four data points outside the prediction band occur during two separate ozone episodes. The first is a 3-day episode from 6/1/96 through 6/3/96, culminating in a peak episodic ozone level of 120 ppb. This 120 ppb peak ozone level is one of the four data points referred to. The other three data points referred to occur during another ozone episode, a 6-day episode from 6/28/96 through 7/4/96. The three daily peak ozone levels at or near 100 ppb occurred on the last 3 days of this 6-day episode (98 ppb, 99.5 ppb and 105.5 ppb).

*Table 9. Scenario 4 Results*

| | | | RANGE OF VARIABLES |
|---|---|---|---|
| **DATA CONTROLS** | 1) APR 1996 - SEP 1996<br><br>2) AVG WIND SPEED FROM 6AM TO TIME OF MAX OZONE LE 50th PERCENTILE (Apr 96-Sep 96)<br><br>3) AVG CLOUD COVER FROM 6AM TO TIME OF MAX OZONE LE 3 OKTAS | | |
| **MODEL SIGNIFICANT PARAMETERS (units)** | Y --- OZMAX (ppb)<br>X0 --- INTERCEPT<br>X1 --- PTDCUMAM (veh/mi/ln)<br>X2 --- CLDAVGT2 (oktas)<br>X3 --- WSNC1T2 (mph) | | 35 to 120<br><br>15,650 to 170,520<br>0.1 to 2.9<br>3.1 to 9.0 |
| **SIGNIFICANT PARAMETER COEFFICIENT ESTIMATES AND BIVARIATE CORRELATIONS (r)** | 109.15712906 X0<br>0.00014690 X1<br>-9.88907050 X2<br>-6.24135870 X3 | <br>0.2361<br>-0.5862<br>-0.5390 | |
| **TRAFFIC VARIABLE COEFFICIENT CONFIDENCE-LEVEL** | 92% | | |
| **MODEL R-SQUARE** | 0.51 | | |
| **TRAFFIC VARIABLE PARTIAL R-SQUARE** | 0.0608 | | |
| **SAMPLE SIZE** | 31 | | |
| **1st ORDER AUTO-CORRELATION Durbin-Watson Statistic** | 2.107 | | |
| **P-VALUE SUPPORTING $H_O$: No Heteroskedasticity** | 0.4797 | | |

*Table 10. Scenario 4 Results (cont.)*

| | |
|---|---|
| **TRAFFIC PARAMETER ESTIMATE PER 10,000 PTDCUMAM** | **1.4690** |
| **TRAFFIC PARAMETER ESTIMATE STANDARD ERROR PER 10,000 PTDCUMAM** | **0.8002** |
| **n** | **31** |
| **k** | **3** |
| **df** | **27** |
| $t_{(.10)}$ | **1.314** |
| $t_{(.05)}$ | **1.703** |
| $t_{(.025)}$ | **2.052** |
| **80 PERCENT CONFIDENCE INTERVAL OF TRAFFIC PARAMETER ESTIMATE PER 10,000 UNITS OF PTDCUMAM** | **0.42 to 2.52** |
| **90 PERCENT CONFIDENCE INTERVAL OF TRAFFIC PARAMETER ESTIMATE PER 10,000 UNITS OF PTDCUMAM** | **0.11 to 2.83** |
| **95 PERCENT CONFIDENCE INTERVAL OF TRAFFIC PARAMETER ESTIMATE PER 10,000 UNITS OF PTDCUMAM** | **-0.17 to 3.11** |

*Table 11. Scenario 4 Data*

| DATECST | OZMAX (ppb) | PTDCUMAM (veh/mi/ln) | OZINT (ppb) | CLDAVGT2 (oktas) | WSNC1T2 (mph) | TMAXDAY (° F) | WDSPGSD (knots) | TMINDAY (° F) |
|---|---|---|---|---|---|---|---|---|
| 4/7/96 | 63 | 80,590 | 13 | 1.45 | 5.27 | 66 | 3.8 | 41 |
| 4/8/96 | 82.5 | 138,109 | 17 | 0.13 | 6.33 | 79.5 | 3.9 | 49 |
| 4/10/96 | 62.5 | 81,961 | 16 | 0.57 | 6.55 | 86 | 4.8 | 56.5 |
| 4/18/96 | 52 | 170,519 | 31 | 1.92 | 8.68 | 93 | 11.4 | 68 |
| 6/3/96 | 120 | 158,194 | 8 | 1.27 | 4.36 | 91.5 | 7.5 | 68 |
| 6/8/96 | 63.5 | 54,669 | 12 | 0.25 | 6.92 | 90 | 3.4 | 64.5 |
| 6/9/96 | 84 | 80,549 | 12.5 | 1.68 | 8.37 | 90.5 | 4.5 | 64.5 |
| 6/14/96 | 44.5 | 83,580 | 4 | 2.86 | 7.63 | 95 | 7.8 | 76.5 |
| 6/15/96 | 40.5 | 46,819 | 6.5 | 2.29 | 8.29 | 94 | 8.6 | 75.5 |
| 6/16/96 | 35 | 39,835 | 2.5 | 2.94 | 7.82 | 95 | 7.7 | 75 |
| 6/17/96 | 56.5 | 113,027 | 3 | 1.18 | 5.98 | 96 | 4.5 | 76 |
| 6/18/96 | 67 | 115,719 | 2.5 | 1.11 | 8.31 | 97.5 | 5.2 | 76.5 |
| 6/20/96 | 70 | 97,560 | 1.5 | 1.06 | 7.57 | 99.5 | 7.5 | 76.5 |
| 6/30/96 | 60.5 | 28,900 | 0 | 1.00 | 3.99 | 92 | 6.4 | 73 |
| 7/1/96 | 69 | 103,954 | 0 | 1.50 | 6.61 | 95 | 5.6 | 75 |
| 7/2/96 | 98 | 88,279 | 3 | 0.56 | 5.24 | 96 | 5.8 | 75.5 |
| 7/3/96 | 99.5 | 78,502 | 0.5 | 0.25 | 5.39 | 95.5 | 7.1 | 74.5 |
| 7/4/96 | 105.5 | 15,650 | 4.5 | 1.00 | 3.15 | 96 | 5.6 | 74.5 |
| 7/5/96 | 58.5 | 73,601 | 6.5 | 2.22 | 6.77 | 96 | 7 | 74.5 |
| 7/7/96 | 63 | 47,373 | 7 | 1.80 | 6.52 | 97.5 | 7.3 | 76 |
| 7/13/96 | 41 | 75,441 | 1 | 2.38 | 8.97 | 96.5 | 8.3 | 76.5 |
| 8/10/96 | 35 | 59,379 | 6.5 | 1.95 | 7.66 | 94.5 | 8.2 | 76.5 |
| 8/11/96 | 44.5 | 37,932 | 4 | 1.78 | 6.48 | 94.5 | 8 | 76.5 |
| 8/12/96 | 75.5 | 158,255 | 0.5 | 1.58 | 7.70 | 98.5 | 6.5 | 77.5 |
| 8/16/96 | 42 | 111,759 | 1 | 2.13 | 5.99 | 94 | 7.8 | 74.5 |
| 8/17/96 | 42.5 | 68,937 | 11.5 | 2.90 | 7.91 | 94 | 8.3 | 75.5 |
| 8/21/96 | 60.5 | 108,007 | 0 | 2.10 | 6.09 | 93 | 5.3 | 71.5 |
| 9/6/96 | 58 | 80,528 | 0 | 1.13 | 3.73 | 88.5 | 3.9 | 72 |
| 9/10/96 | 84 | 52,634 | 0 | 2.35 | 5.92 | 90 | 4.2 | 73 |
| 9/11/96 | 87 | 102,476 | 2 | 0.90 | 5.78 | 90 | 4.3 | 68 |
| 9/16/96 | 67 | 91,576 | 0.5 | 2.72 | 5.30 | 94.5 | 4.2 | 75 |

Figure 33. SAN ANTONIO DAILY MAX OZONE APR'96-SEP'96 MODEL T2.3
DATA CONTROLLED FOR DAILY AVERAGE CLOUD COVER 6AM TO TIME OF MAX OZONE LE 3 OKTAS
AND DAILY AVERAGE WIND SPEED 6AM TO TIME OF MAX OZONE LE 9.2 MPH

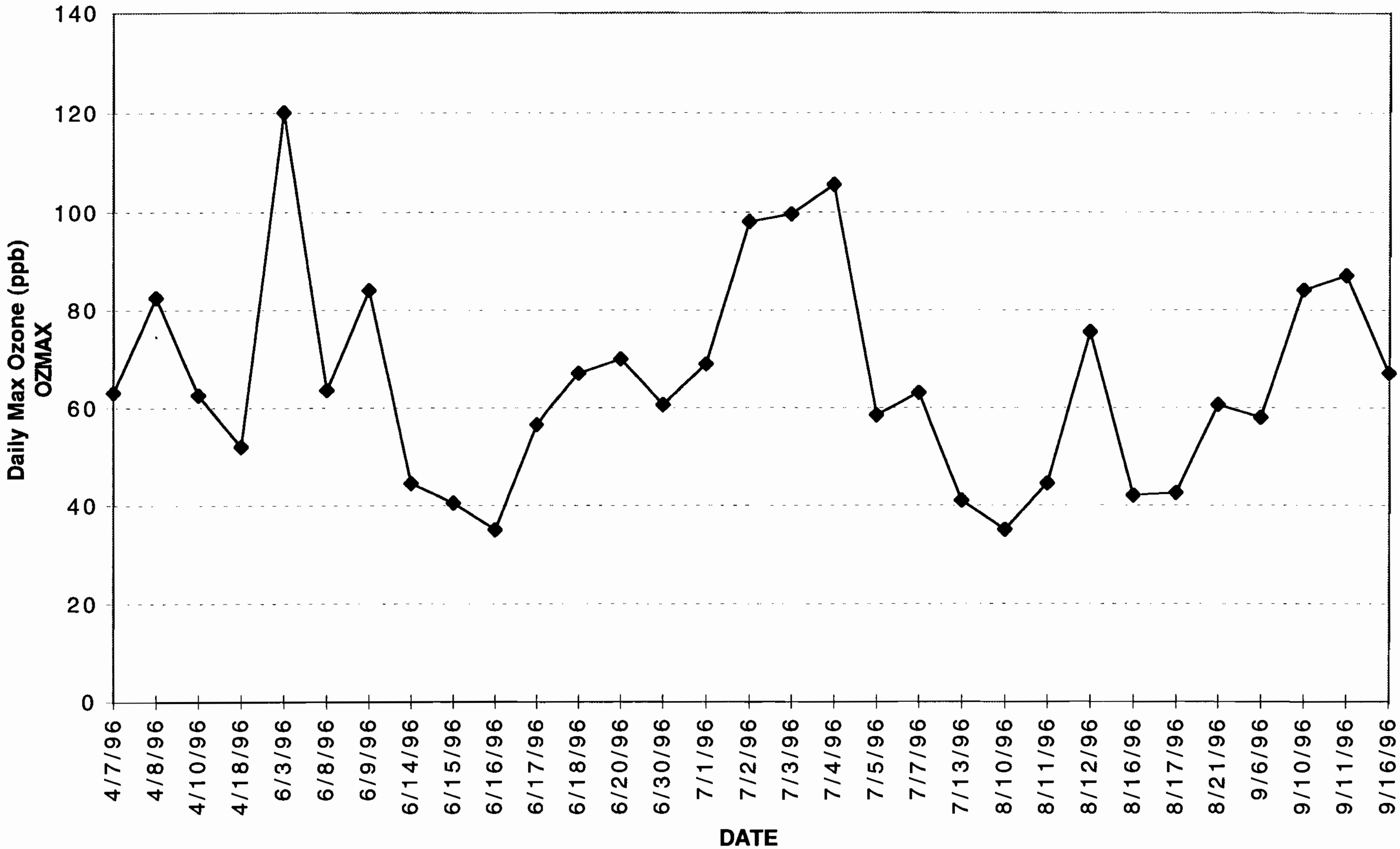


Figure 34. SAN ANTONIO DAILY MAX OZONE APR'96-SEP'96 MODEL T2.3
DATA CONTROLLED FOR DAILY AVERAGE CLOUD COVER 6AM TO TIME OF MAX OZONE LE 3 OKTAS
AND DAILY AVERAGE WIND SPEED 6AM TO TIME OF MAX OZONE LE 9.2 MPH

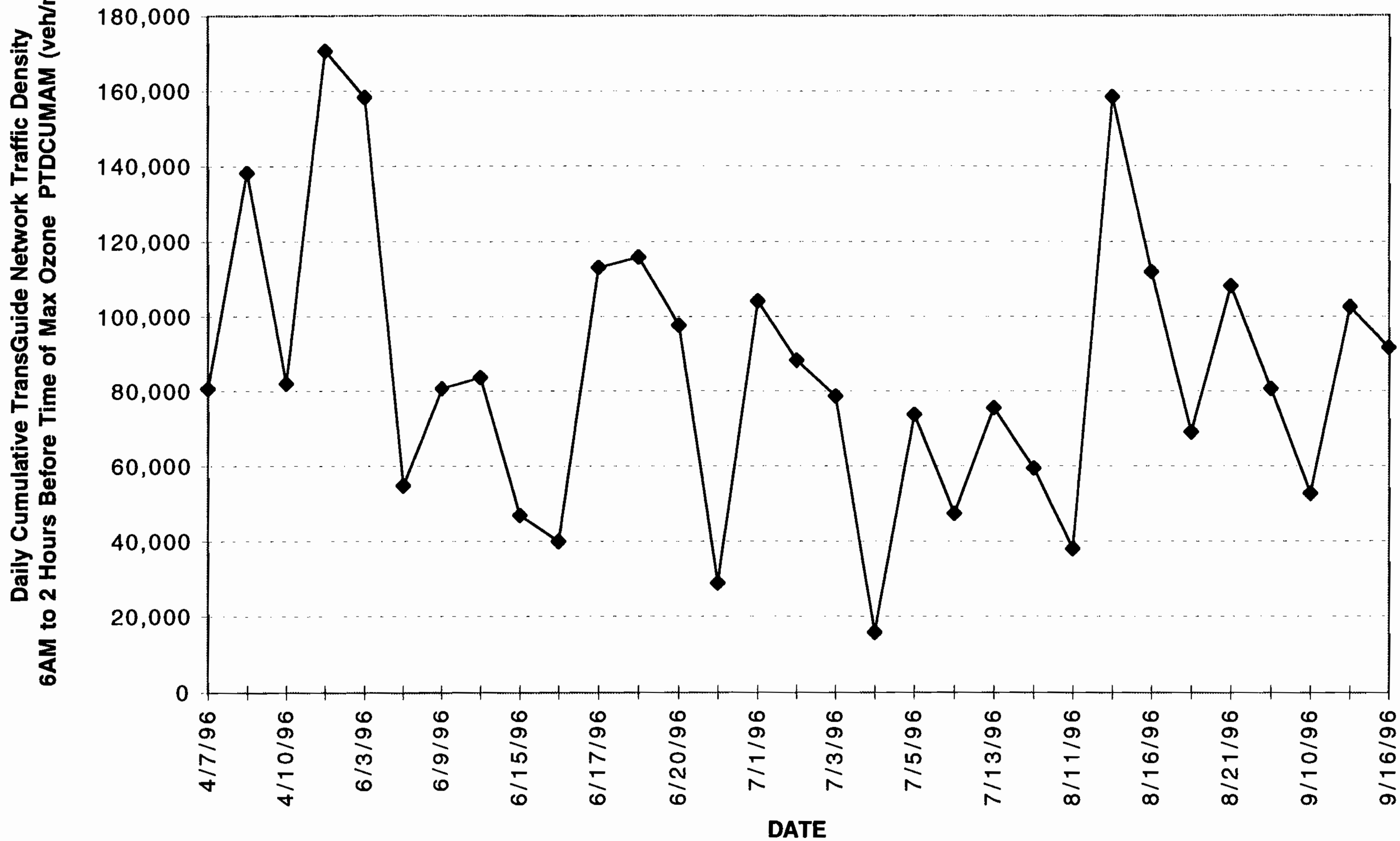


**Figure 35. SAN ANTONIO DAILY MAX OZONE APR'96-SEP'96 MODEL T2.3**
**Daily Max Ozone As A Function Of Daily Cumulative TransGuide Network Traffic Density**
**6AM To 2-Hrs Before Time Of Max Ozone**
**DATA CONTROLLED FOR DAILY AVERAGE CLOUD COVER 6AM TO TIME OF MAX OZONE LE 3 OKTAS**
**AND DAILY AVERAGE WIND SPEED 6AM TO TIME OF MAX OZONE LE 9.2 MPH**

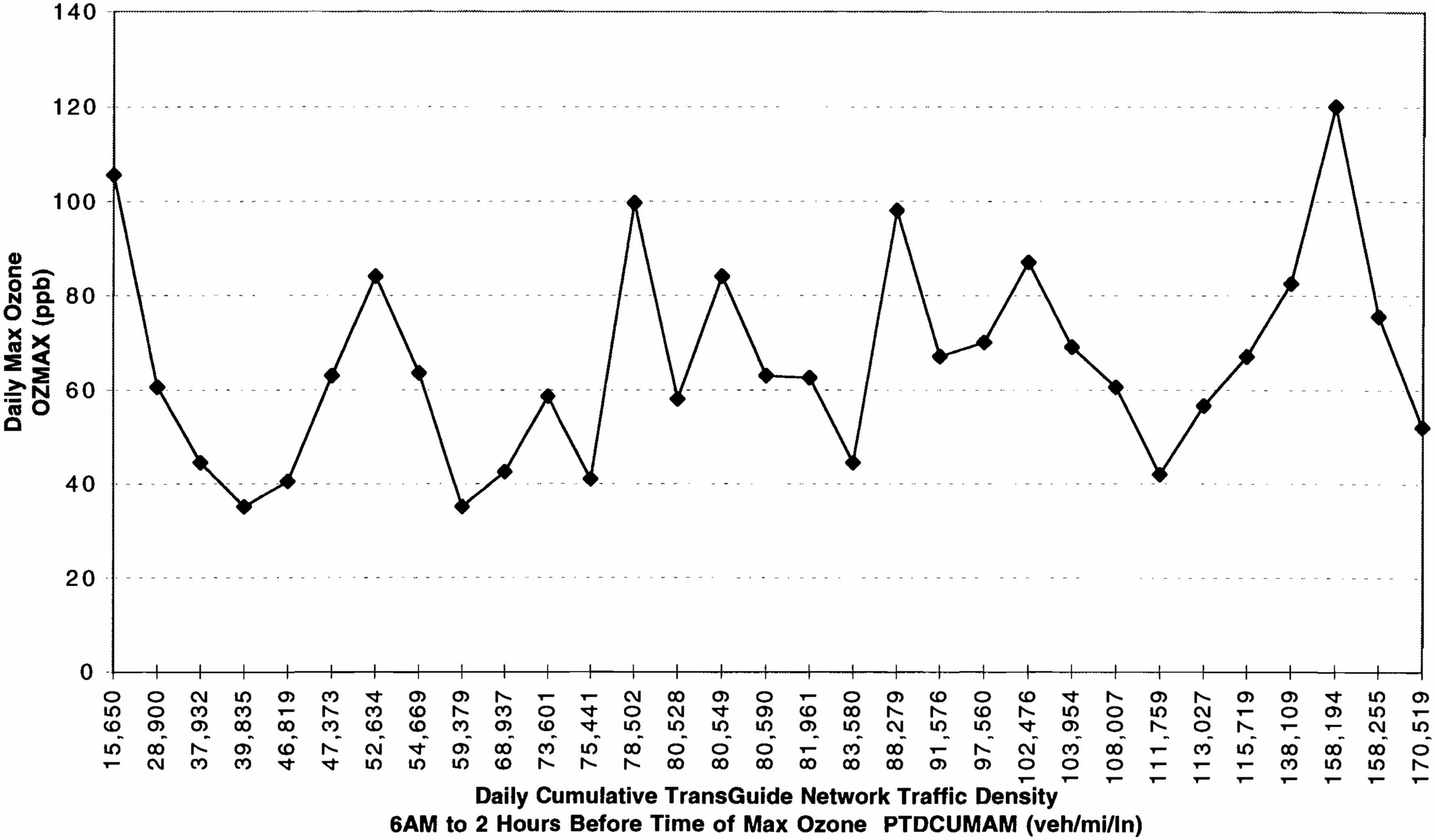


**Figure 36. SAN ANTONIO DAILY MAX OZONE APR'96-SEP'96 MODEL 2.3**
**Daily Max Ozone As A Function Of Daily Initial Morning Ozone**
**DATA CONTROLLED FOR DAILY AVERAGE CLOUD COVER 6AM TO TIME OF MAX OZONE LE 3 OKTAS**
**AND DAILY AVERAGE WIND SPEED 6AM TO TIME OF MAX OZONE LE 9.2 MPH**

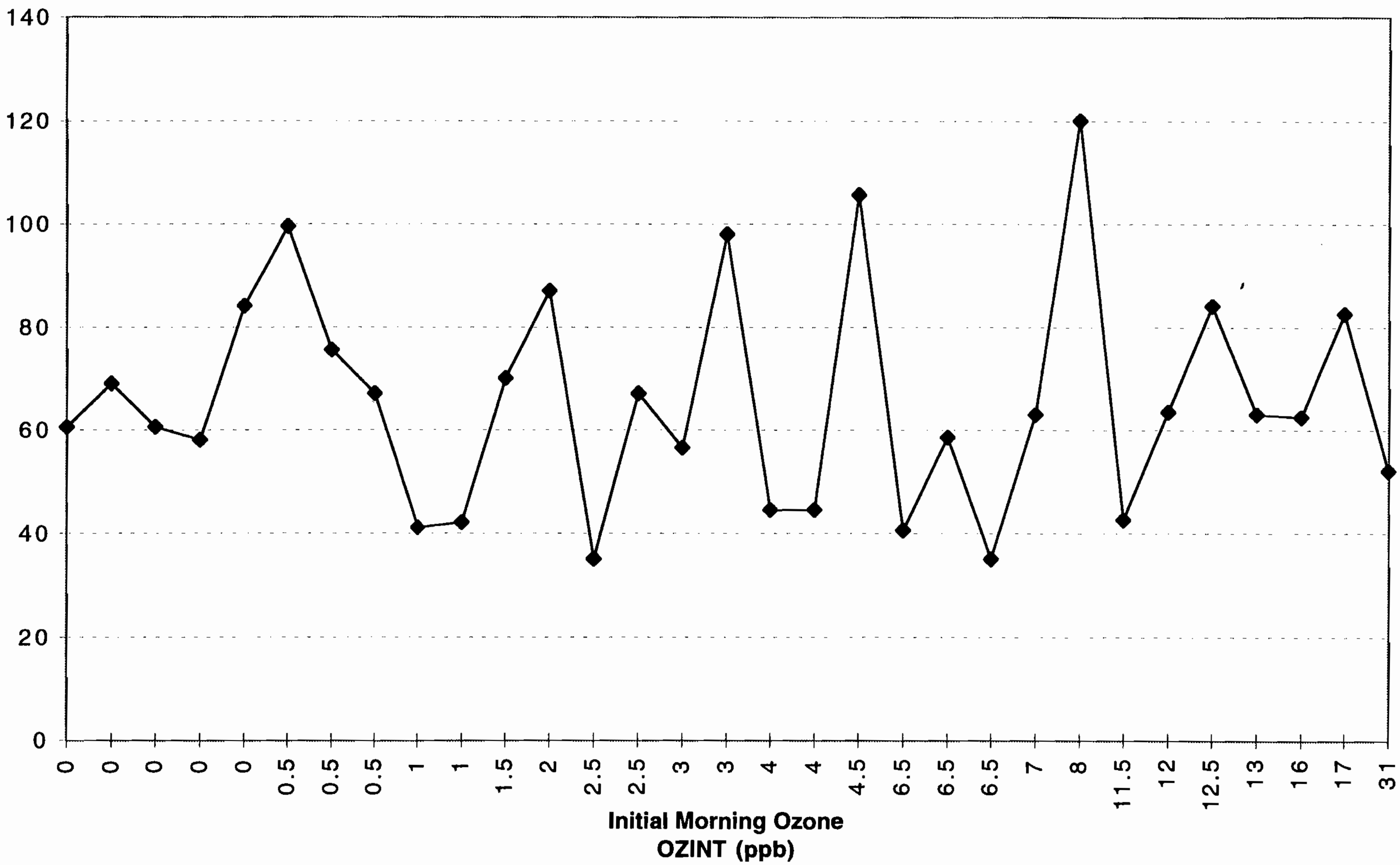


Figure 37. SAN ANTONIO APR'96-SEP'96 MODEL T2.3
Daily Max Ozone As A Function Of
Average Daily Cloud Cover From 6AM To Time Of Max Ozone
DATA CONTROLLED FOR DAILY AVERAGE CLOUD COVER 6AM TO TIME OF MAX OZONE LE 3 OKTAS
AND DAILY AVERAGE WIND SPEED 6AM TO TIME OF MAX OZONE LE 9.2 MPH

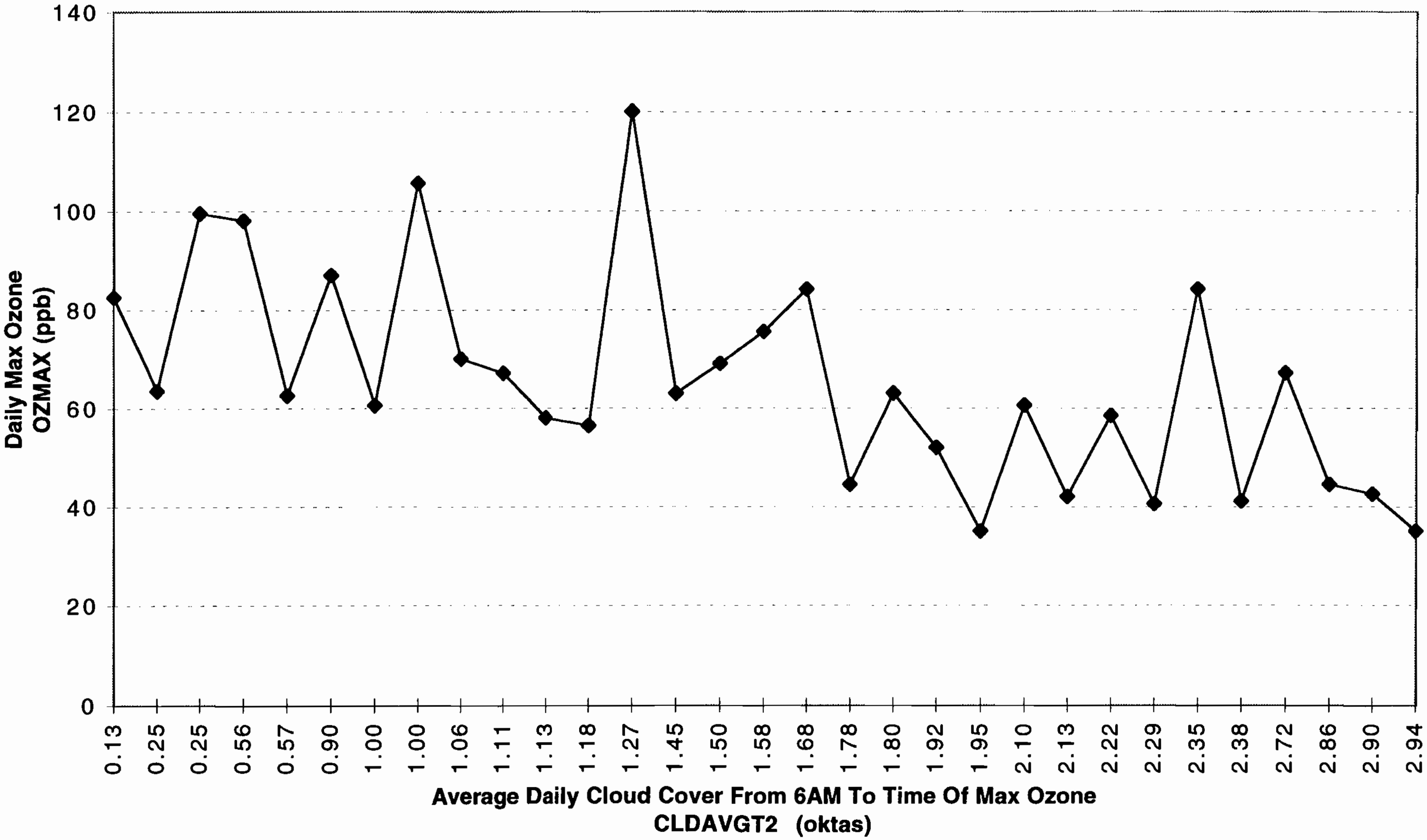


Figure 38. SAN ANTONIO APR'96-SEP'96 MODEL T2.3
Daily Max Ozone As A Function Of
Average Daily Wind Speed From 6AM To Time Of Max Ozone
DATA CONTROLLED FOR DAILY AVERAGE CLOUD COVER 6AM TO TIME OF MAX OZONE LE 3 OKTAS
AND DAILY AVERAGE WIND SPEED 6AM TO TIME OF MAX OZONE LE 9.2 MPH

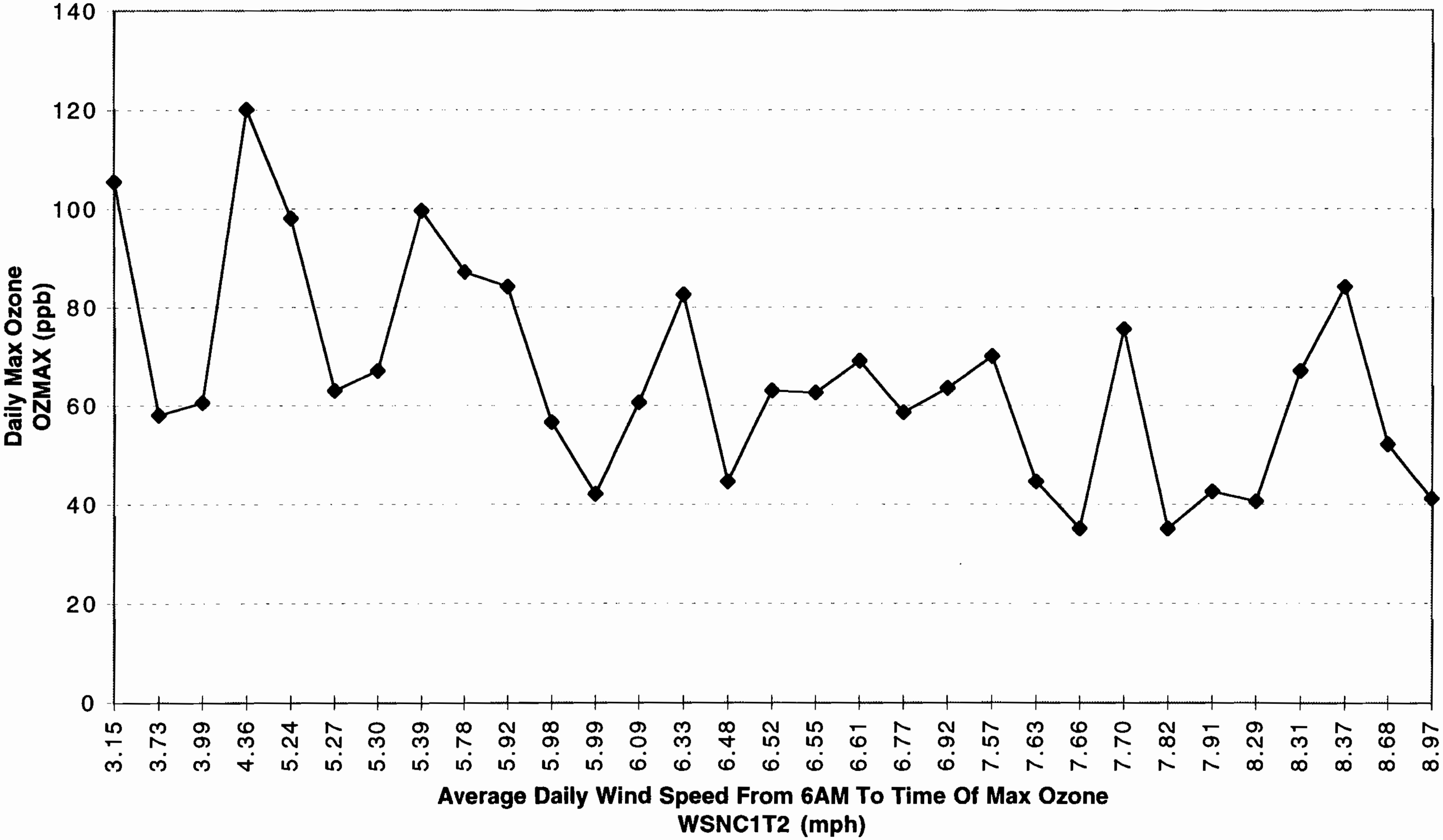


**Figure 39. SAN ANTONIO APR'96-SEP'96 MODEL T2.3**
**Daily Max Ozone As A Function Of Daily Maximum Temperature**
**DATA CONTROLLED FOR DAILY AVERAGE CLOUD COVER 6AM TO TIME OF MAX OZONE LE 3 OKTAS**
**AND DAILY AVERAGE WIND SPEED 6AM TO TIME OF MAX OZONE LE 9.2 MPH**

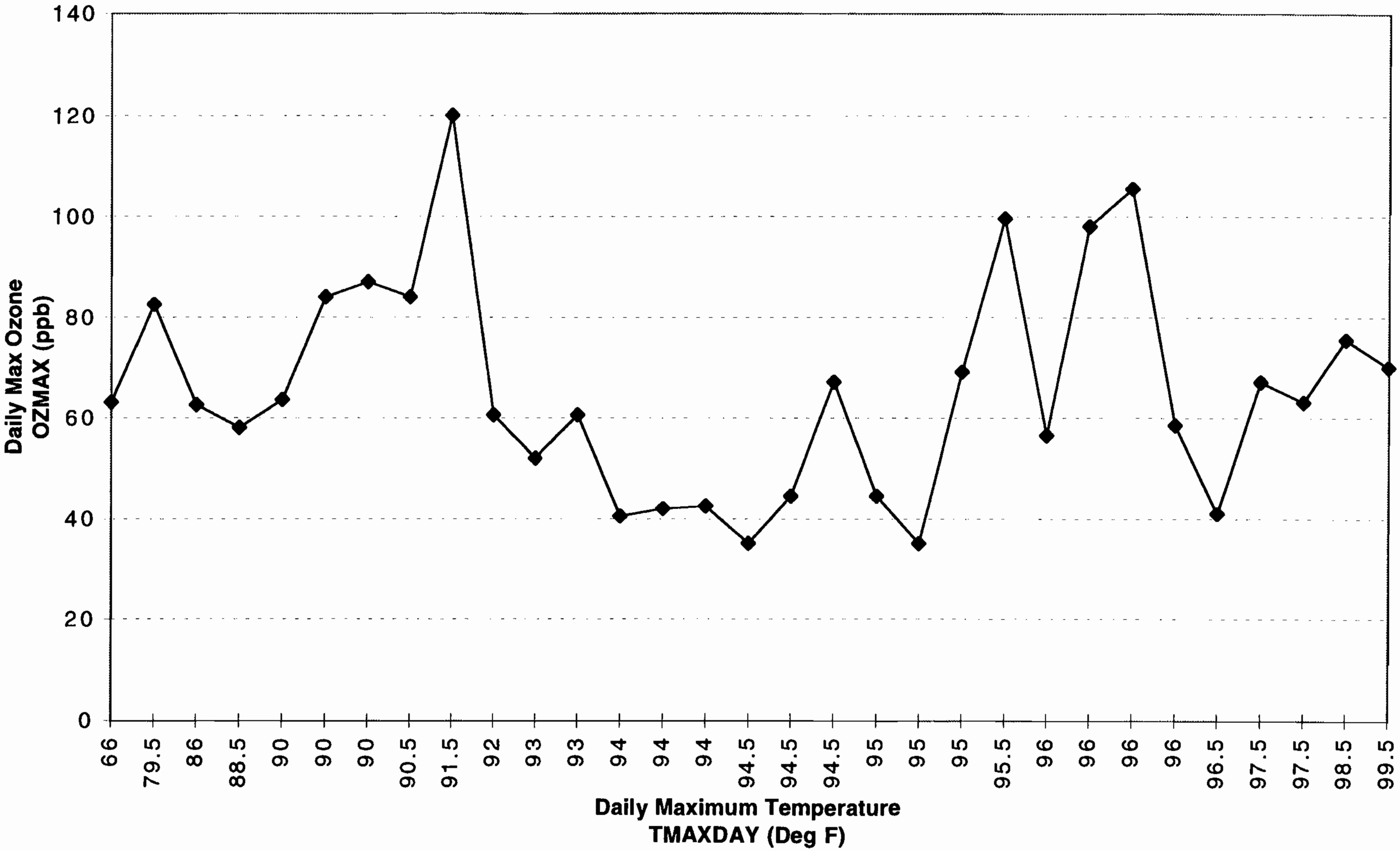


**Figure 40. SAN ANTONIO APR'96-SEP'96 MODEL T2.3**
**Daily Max Ozone As A Function Of Average Daily Wind Speed**
**DATA CONTROLLED FOR DAILY AVERAGE CLOUD COVER 6AM TO TIME OF MAX OZONE LE 3 OKTAS**
**AND DAILY AVERAGE WIND SPEED 6AM TO TIME OF MAX OZONE LE 9.2 MPH**

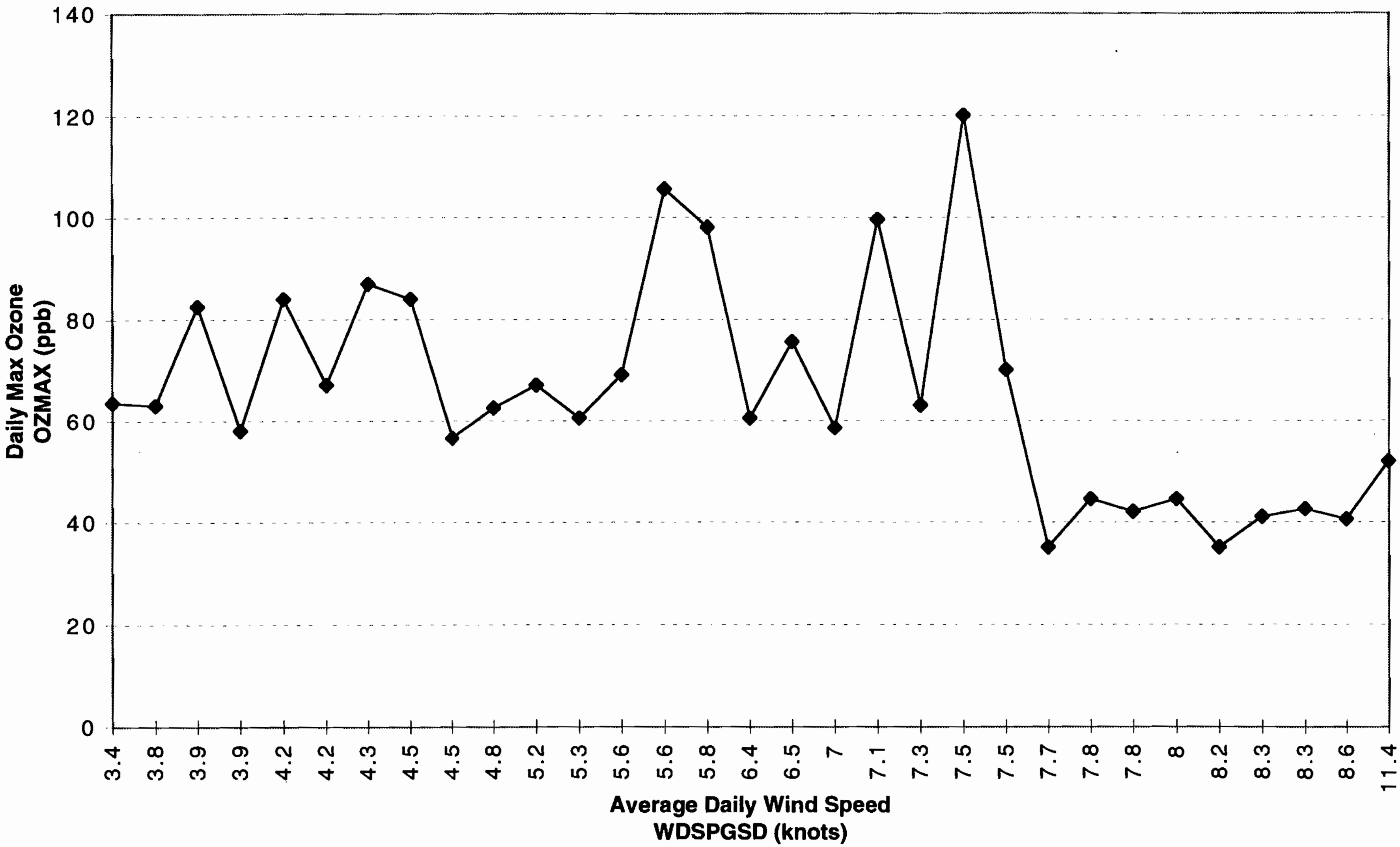
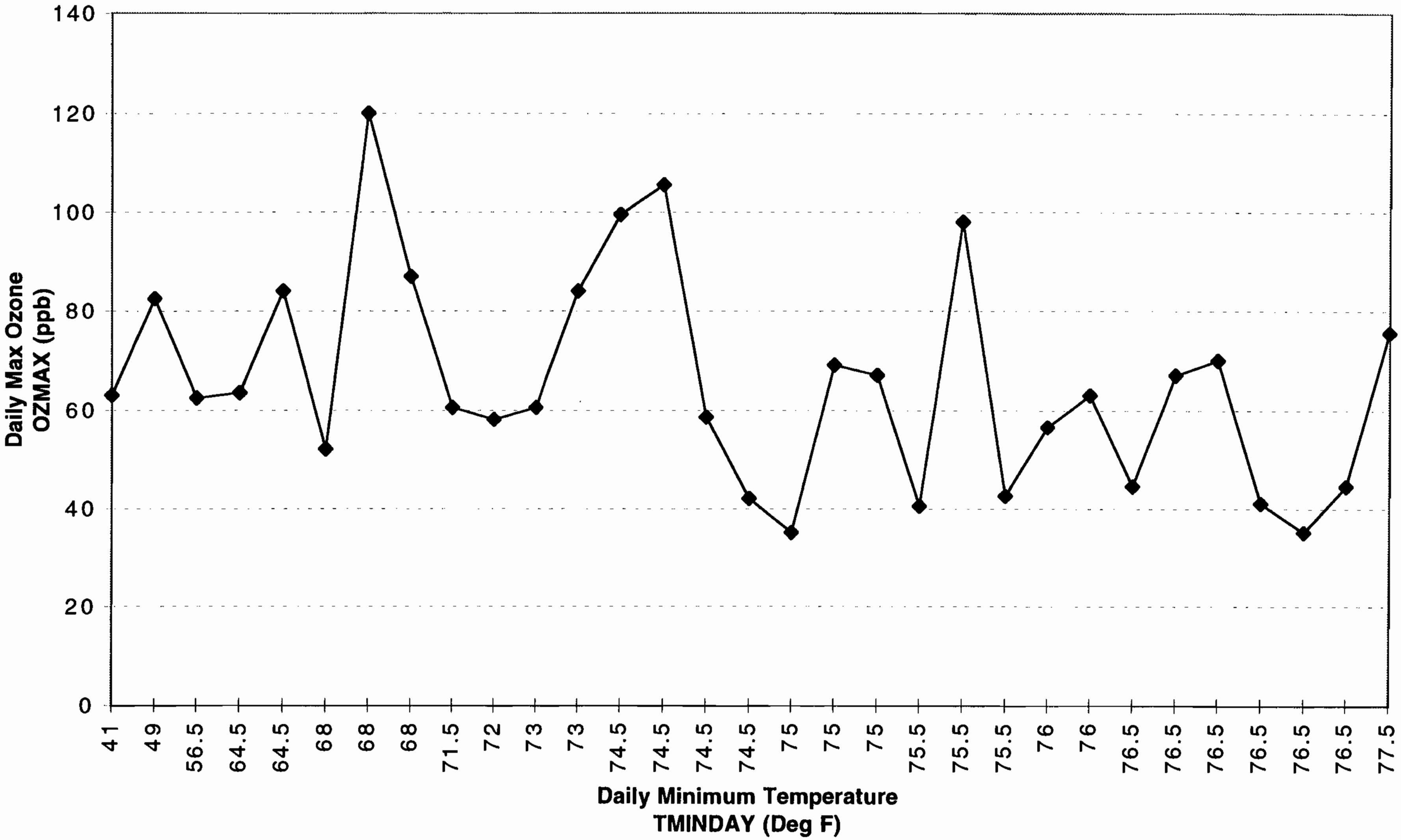
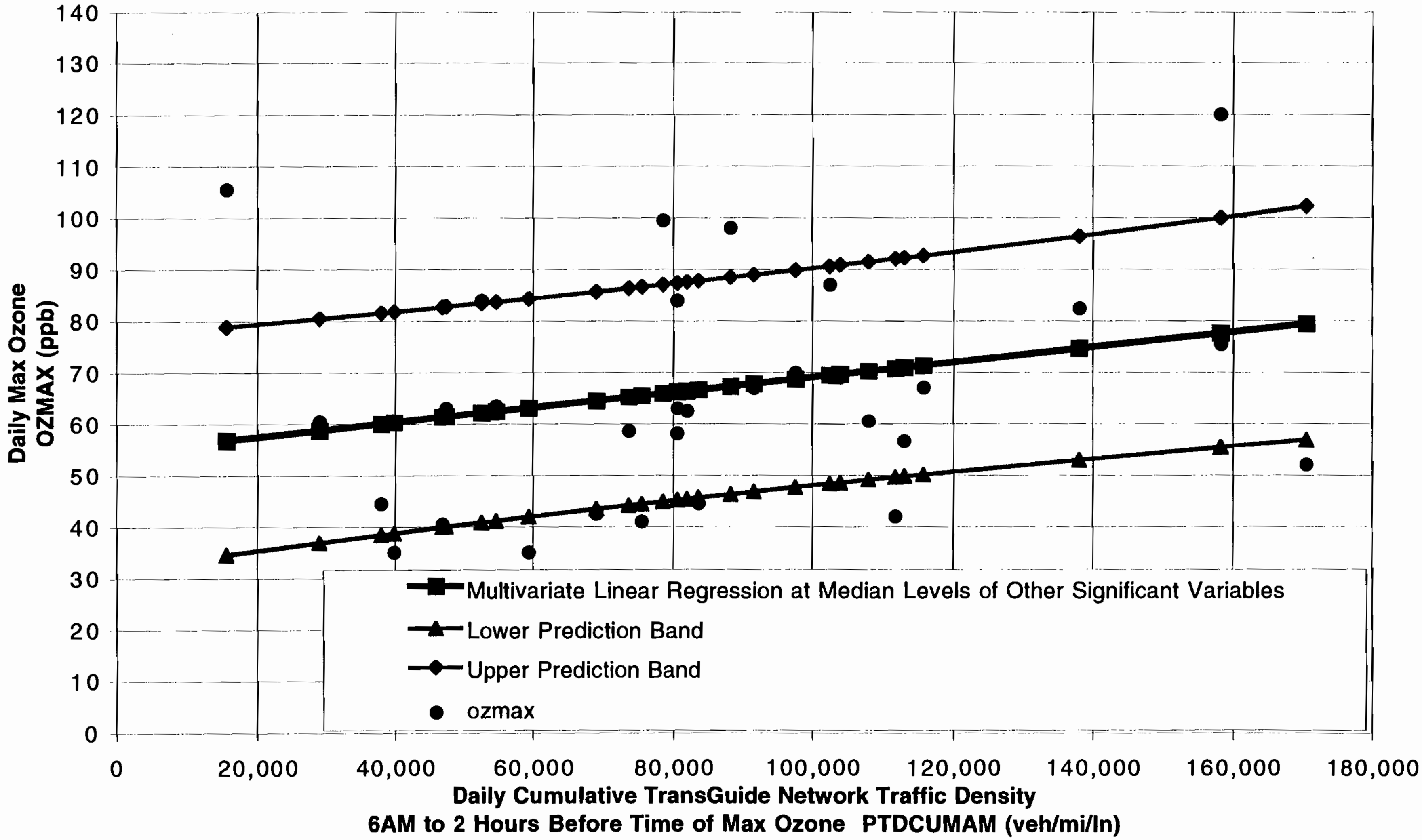


Figure 41. SAN ANTONIO APR'96-SEP'96 MODEL T2.3
Daily Max Ozone As A Function Of Daily Minimum Temperature
DATA CONTROLLED FOR DAILY AVERAGE CLOUD COVER 6AM TO TIME OF MAX OZONE LE 3 OKTAS
AND DAILY AVERAGE WIND SPEED 6AM TO TIME OF MAX OZONE LE 9.2 MPH



CLDAVGT2 = 1.5 oktas
WSNC1T2 = 6.4 mph

**Figure 42. SAN ANTONIO APR'96-SEP'96 MODEL T2.3**
**80% Confidence Prediction Band On Daily Max Ozone As A Function Of Daily Cumulative TransGuide Network Traffic Density From 6AM To 2-Hrs Before Time Of Max Ozone**
**DATA CONTROLLED FOR DAILY AVERAGE CLOUD COVER 6AM TO TIME OF MAX OZONE LE 3 OKTAS**
**AND DAILY AVERAGE WIND SPEED 6AM TO TIME OF MAX OZONE LE 9.2 MPH**



## CHAPTER 3. RESULTS OF SCENARIOS: PART II

The next four scenarios assessed, Scenario 5 through Scenario 8, control for various combinations of months of the year, the level of traffic congestion on the TransGuide network, and morning cloud cover. They can be summarized as follows:

Scenario 5 Controls:

- High Level of Traffic Congestion
- Low Level of Cloud Cover

Scenario 6 Controls:

- Peak Ozone Season
- High Level of Traffic Congestion
- Low Level of Cloud Cover

Scenario 7 Controls:

- Low Level of Traffic Congestion
- Low Level of Cloud Cover

Scenario 8 Controls:

- Peak Ozone Season
- Low Level of Traffic Congestion
- Low Level of Cloud Cover

### SCENARIO 5

In Scenario 5, we analyze all months of data from December 1995 through September 1996 and control for the traffic congestion parameter (PTDCUMAM) to be greater than or equal to the median traffic congestion level and for the average hourly cloud cover (CLDAVGT2) from 6AM to the time of peak ozone to be less than or equal to 3 oktas. Table 12 summarizes the results of the model and Table 13 summarizes the strength of the traffic parameter's association with the daily peak ozone. Confidence intervals of the parameter's model coefficient per 10,000 units of PTDCUMAM are calculated at the 80, 90 and 95 percent confidence levels. Table 14 summarizes the raw data sorted by date for Scenario 5.

We can say that under this scenario at the 80 percent confidence level, the potential increase to the daily peak ozone in ppb per a 10,000 unit increase in the traffic congestion parameter PTDCUMAM has a range from about 1.8 to about 4.2 ppb. It is equally likely that the potential increase in the daily peak ozone would fall at any point within this range. The results presented in Table 13 also indicate that the traffic congestion parameter remains significant even at the 95 percent confidence level.

The strength of association when controlling for the higher levels of traffic congestion under Scenario 5 increases considerably relative to all other scenarios discussed so far. These results suggest that the relationship between the traffic congestion parameter and the peak ozone concentration is not constant for all levels of traffic congestion.

Figure 43 and Figure 44 plot the daily peak ozone (OZMAX) and the daily cumulative traffic congestion parameter (PTDCUMAM) over time. Figure 45 through Figure 51 graphically summarize the relationships between the response and predictor variables. Figure 52 depicts an 80 percent confidence level prediction band of OZMAX as a function of PTDCUMAM while holding the other significant variables constant at their median levels.

We can say at an 80 percent confidence level that the daily peak ozone will fall somewhere within the band on Figure 52. As shown, the 80 percent confidence prediction band with this linear model under this scenario does not encompass several of the higher daily peak ozone concentrations at fixed median levels of the other significant variables.

*Table 12. Scenario 5 Results*

| | | | RANGE OF VARIABLES |
|---|---|---|---|
| **DATA CONTROLS** | 1) DEC 1995 - SEP 1996<br><br>2) TRAFFIC CONGESTION LEVEL GREATER THAN OR EQUAL TO THE MEDIAN LEVEL<br><br>3) AVG CLOUD COVER FROM 6AM TO TIME OF MAX OZONE LE 3 OKTAS | | |
| **MODEL SIGNIFICANT PARAMETERS (units)** | Y --- OZMAX (ppb)<br>X0 --- INTERCEPT<br>X1 --- PTDCUMAM (veh/mi/ln)<br>X2 --- TMAXDAY (° F))<br>X3 --- WDSPGSD (knots) | | 19 to 120<br><br>93,830 to 189,530<br>50 to 99.5<br>2.6 to 17.5 |
| **SIGNIFICANT PARAMETER COEFFICIENT ESTIMATES AND BIVARIATE CORRELATIONS (r)** | 3.31703381 X0<br>0.0003002773 X1<br>0.42014513 X2<br>-2.47669720 X3 | <br>0.4266<br>0.4664<br>-0.3955 | |
| **TRAFFIC VARIABLE COEFFICIENT CONFIDENCE-LEVEL** | 99% | | |
| **MODEL R-SQUARE** | 0.48 | | |
| **TRAFFIC VARIABLE PARTIAL R-SQUARE** | [a] 0.16 | | |
| **SAMPLE SIZE** | 48 | | |
| **1st ORDER AUTO-CORRELATION Durbin-Watson Statistic** | 1.831 | | |
| **P-VALUE SUPPORTING $H_O$: No Heteroskedasticity** | [a] 0.6375 | | |

*Table 13. Scenario 5 Results (cont.)*

| | |
|---|---|
| **TRAFFIC PARAMETER ESTIMATE PER 10,000 PTDCUMAM** | **3.0028** |
| **TRAFFIC PARAMETER ESTIMATE STANDARD ERROR PER 10,000 PTDCUMAM** | **0.9500** |
| **n** | **48** |
| **k** | **3** |
| **df** | **44** |
| $t_{(.10)}$ | **1.282** |
| $t_{(.05)}$ | **1.645** |
| $t_{(.025)}$ | **1.960** |
| **80 PERCENT CONFIDENCE INTERVAL OF TRAFFIC PARAMETER ESTIMATE PER 10,000 UNITS OF PTDCUMAM** | **1.78 to 4.22** |
| **90 PERCENT CONFIDENCE INTERVAL OF TRAFFIC PARAMETER ESTIMATE PER 10,000 UNITS OF PTDCUMAM** | **1.44 to 4.57** |
| **95 PERCENT CONFIDENCE INTERVAL OF TRAFFIC PARAMETER ESTIMATE PER 10,000 UNITS OF PTDCUMAM** | **1.14 to 4.86** |

*Table 14. Scenario 5 Data*

| DATECST | OZMAX (ppb) | PTDCUMAM (veh/mi/ln) | OZINT (ppb) | CLDAVGT2 (oktas) | WSNC1T2 (mph) | TMAXDAY (° F) | WDSPGSD (knots) | TMINDAY (° F) |
|---|---|---|---|---|---|---|---|---|
| 12/4/95 | 65.5 | 115,843 | 34 | 0.11 | 7.33 | 75 | 4.5 | 53 |
| 12/6/95 | 66 | 113,569 | 30.5 | 1.22 | 6.14 | 74 | 5.7 | 51 |
| 12/19/95 | 31 | 93,831 | 13.5 | 1.00 | 11.01 | 57 | 9.4 | 40.5 |
| 12/28/95 | 37 | 97,626 | 8.5 | 1.11 | 10.83 | 56 | 5.5 | 40.5 |
| 1/4/96 | 35.5 | 109,338 | 2.5 | 0.94 | 9.27 | 66 | 6.7 | 34 |
| 1/8/96 | 35 | 116,563 | 1.5 | 0.11 | 7.18 | 50.5 | 4.6 | 22 |
| 1/9/96 | 43.5 | 112,755 | 19 | 0.00 | 10.30 | 64 | 7.2 | 35 |
| 1/15/96 | 56 | 99,454 | 3 | 0.78 | 4.99 | 75 | 2.6 | 47.5 |
| 1/18/96 | 19 | 95,376 | 26 | 0.43 | 23.41 | 66 | 13.5 | 37 |
| 1/24/96 | 30 | 109,209 | 2 | 0.00 | 3.74 | 61 | 4.8 | 38 |
| 1/26/96 | 38 | 99,359 | 10.5 | 0.57 | 11.02 | 74 | 9.4 | 43.5 |
| 2/7/96 | 42.5 | 101,830 | 4 | 2.95 | 11.25 | 74 | 9 | 50 |
| 2/8/96 | 35 | 112,494 | 11 | 2.88 | 14.88 | 77 | 10.6 | 56.5 |
| 2/12/96 | 40 | 103,061 | 22 | 2.50 | 10.28 | 64 | 5.4 | 40 |
| 2/13/96 | 44.5 | 103,596 | 0 | 1.00 | 7.42 | 67 | 4.8 | 39 |

*Table 14. Scenario 5 Data (continued)*

| DATECST | OZMAX (ppb) | PTDCUMAM (veh/mi/ln) | OZINT (ppb) | CLDAVGT2 (oktas) | WSNC1T2 (mph) | TMAXDAY (° F) | WDSPGSD (knots) | TMINDAY (° F) |
|---|---|---|---|---|---|---|---|---|
| 2/15/96 | 40 | 104,881 | 26 | 0.27 | 17.15 | 72 | 8.5 | 53.5 |
| 2/16/96 | 39 | 121,353 | 30.5 | 0.00 | 12.24 | 56 | 8.3 | 42.5 |
| 3/7/96 | 35.5 | 97,216 | 30 | 1.44 | 19.88 | 50 | 17.5 | 31.5 |
| 3/11/96 | 56.5 | 100,257 | 4 | 1.00 | 11.86 | 66 | 7.3 | 37 |
| 3/15/96 | 65 | 122,914 | 22 | 2.63 | 9.32 | 79.5 | 5.9 | 62 |
| 3/18/96 | 41.5 | 139,638 | 33 | 2.00 | 21.99 | 67 | 11.2 | 49 |
| 3/28/96 | 60.5 | 141,006 | 21 | 2.70 | 5.47 | 71 | 4 | 42.5 |
| 4/1/96 | 63 | 128,397 | 47 | 0.44 | 14.51 | 74 | 8.5 | 56 |
| 4/2/96 | 60.5 | 99,169 | 1.5 | 2.53 | 10.89 | 72.5 | 6.3 | 44.5 |
| 4/8/96 | 82.5 | 138,109 | 17 | 0.13 | 6.33 | 79.5 | 3.9 | 49 |
| 4/15/96 | 44.5 | 113,429 | 35 | 0.38 | 15.76 | 76 | 12.5 | 53 |
| 4/16/96 | 63.5 | 144,610 | 0 | 1.64 | 9.72 | 77 | 7.2 | 46 |
| 4/18/96 | 52 | 170,519 | 31 | 1.92 | 8.68 | 93 | 11.4 | 68 |
| 4/19/96 | 52 | 133,172 | 20.5 | 2.22 | 13.75 | 97 | 8.2 | 68.5 |
| 5/1/96 | 66 | 189,529 | 27 | 0.95 | 14.05 | 84.5 | 10.3 | 56 |
| 5/11/96 | 50 | 103,665 | 26 | 1.91 | 9.94 | 87 | 9 | 65.5 |
| 5/17/96 | 37 | 99,211 | 18.5 | 2.80 | 16.10 | 93 | 14.2 | 72.5 |
| 5/21/96 | 46 | 140,220 | 15 | 2.52 | 11.94 | 95 | 10.2 | 73.5 |
| 5/22/96 | 49 | 124,190 | 12 | 2.67 | 13.04 | 95.5 | 10.1 | 72.5 |
| 6/3/96 | 120 | 158,194 | 8 | 1.27 | 4.36 | 91.5 | 7.5 | 68 |
| 6/5/96 | 54.5 | 112,916 | 7 | 2.40 | 9.66 | 93.5 | 9.4 | 73.5 |
| 6/10/96 | 69.5 | 127,024 | 21.5 | 1.27 | 12.83 | 96.5 | 9.4 | 70.5 |
| 6/17/96 | 56.5 | 113,027 | 3 | 1.18 | 5.98 | 96 | 4.5 | 76 |
| 6/18/96 | 67 | 115,719 | 2.5 | 1.11 | 8.31 | 97.5 | 5.2 | 76.5 |
| 6/19/96 | 51.5 | 113,469 | 1 | 0.67 | 9.45 | 99.5 | 7.2 | 76.5 |
| 6/20/96 | 70 | 97,560 | 1.5 | 1.06 | 7.57 | 99.5 | 7.5 | 76.5 |
| 7/1/96 | 69 | 103,954 | 0 | 1.50 | 6.61 | 95 | 5.6 | 75 |
| 7/12/96 | 42 | 146,141 | 3.5 | 2.65 | 10.43 | 96 | 10.5 | 77.5 |
| 7/31/96 | 38 | 105,650 | 0.5 | 1.86 | 10.90 | 97 | 8.8 | 76.5 |
| 8/12/96 | 75.5 | 158,255 | 0.5 | 1.58 | 7.70 | 98.5 | 6.5 | 77.5 |
| 8/16/96 | 42 | 111,759 | 1 | 2.13 | 5.99 | 94 | 7.8 | 74.5 |
| 8/21/96 | 60.5 | 108,007 | 0 | 2.10 | 6.09 | 93 | 5.3 | 71.5 |
| 9/11/96 | 87 | 102,476 | 2 | 0.90 | 5.78 | 90 | 4.3 | 68 |

**Figure 43. SAN ANTONIO DEC'95-SEP'96 MODEL T10.1**
**DATA CONTROLLED FOR TRAFFIC CONGESTION PARAMETER GE 50th PERCENTILE**
**AND DAYS WITH CLDAVGT2 LE 3**

**DAILY MAXIMUM OZONE CONCENTRATIONS**

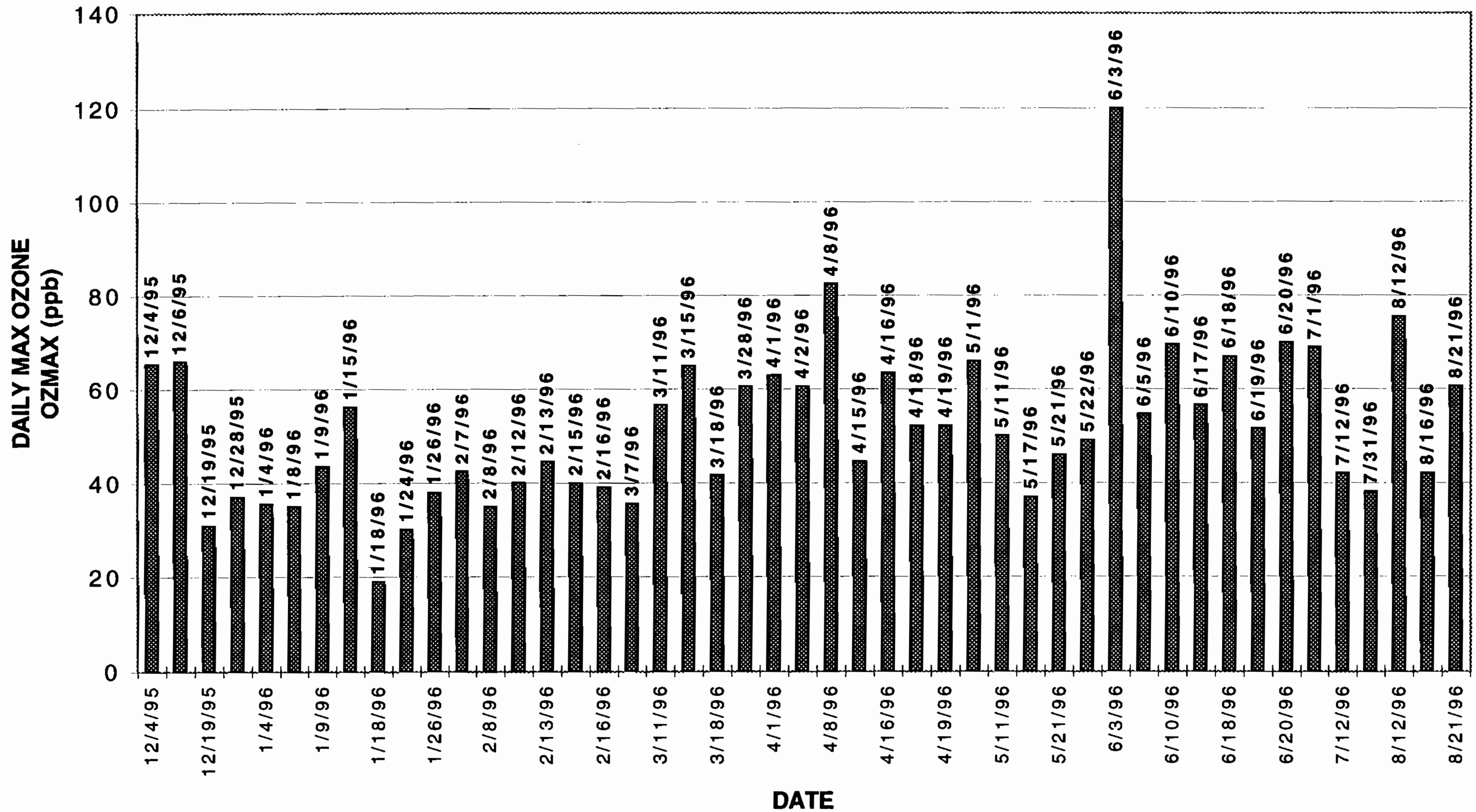


Figure 44. SAN ANTONIO DEC'95-SEP'96 MODEL T10.1
DATA CONTROLLED FOR TRAFFIC CONGESTION PARAMETER GE 50th PERCENTILE
AND DAYS WITH CLDAVGT2 LE 3

DAILY CUMULATIVE TRANSGUIDE NETWORK TRAFFIC DENSITY
6AM to 2 HOURS BEFORE TIME of MAX OZONE

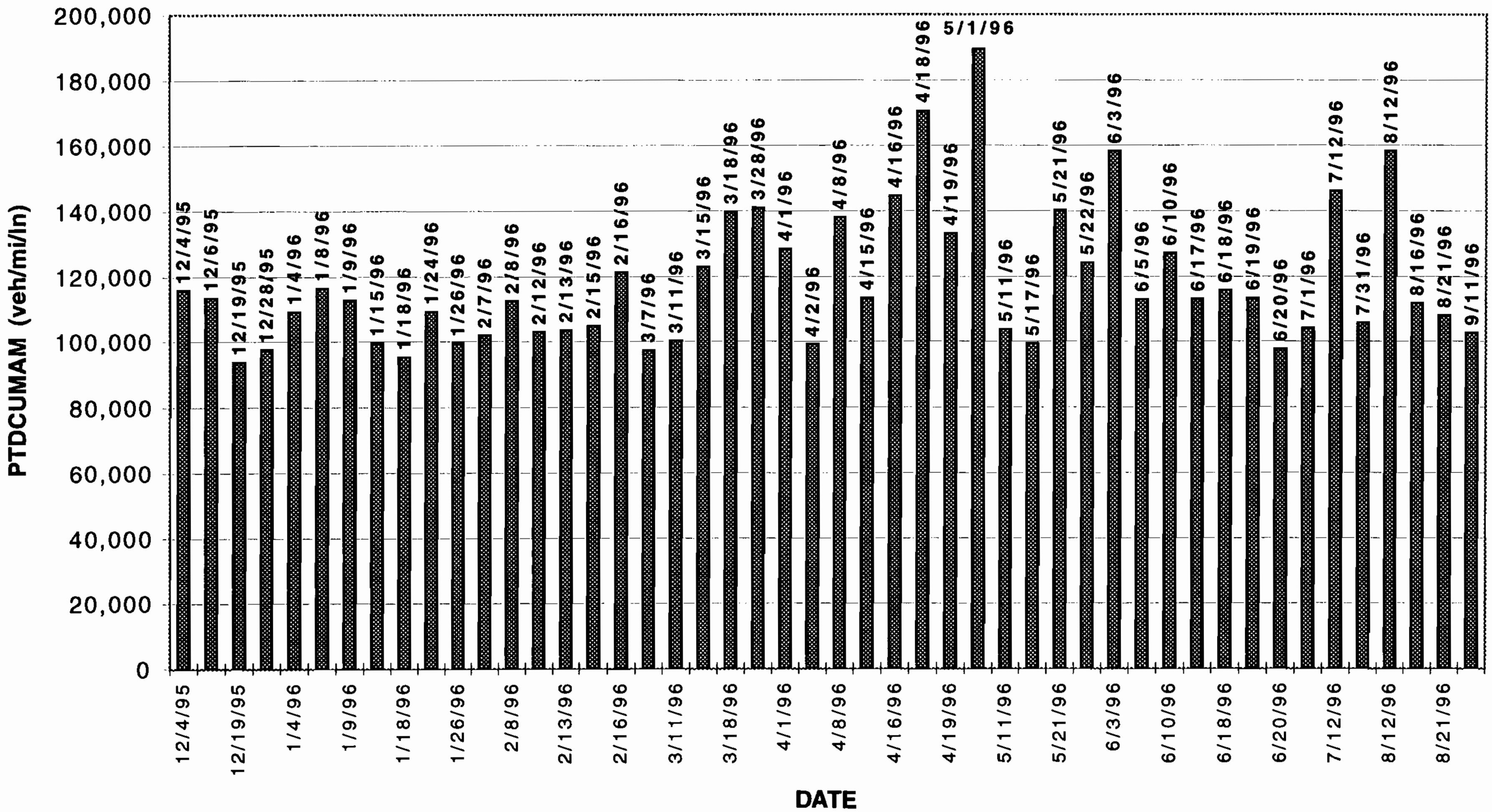


Figure 45. SAN ANTONIO DEC'95-SEP'96 MODEL T10.1
DATA CONTROLLED FOR TRAFFIC CONGESTION PARAMETER GE 50th PERCENTILE
AND DAYS WITH CLDAVGT2 LE 3

DAILY MAX OZONE AS A FUNCTION OF DAILY CUMULATIVE TRANSGUIDE NETWORK TRAFFIC DENSITY
6AM to 2 HOURS BEFORE TIME of MAX OZONE

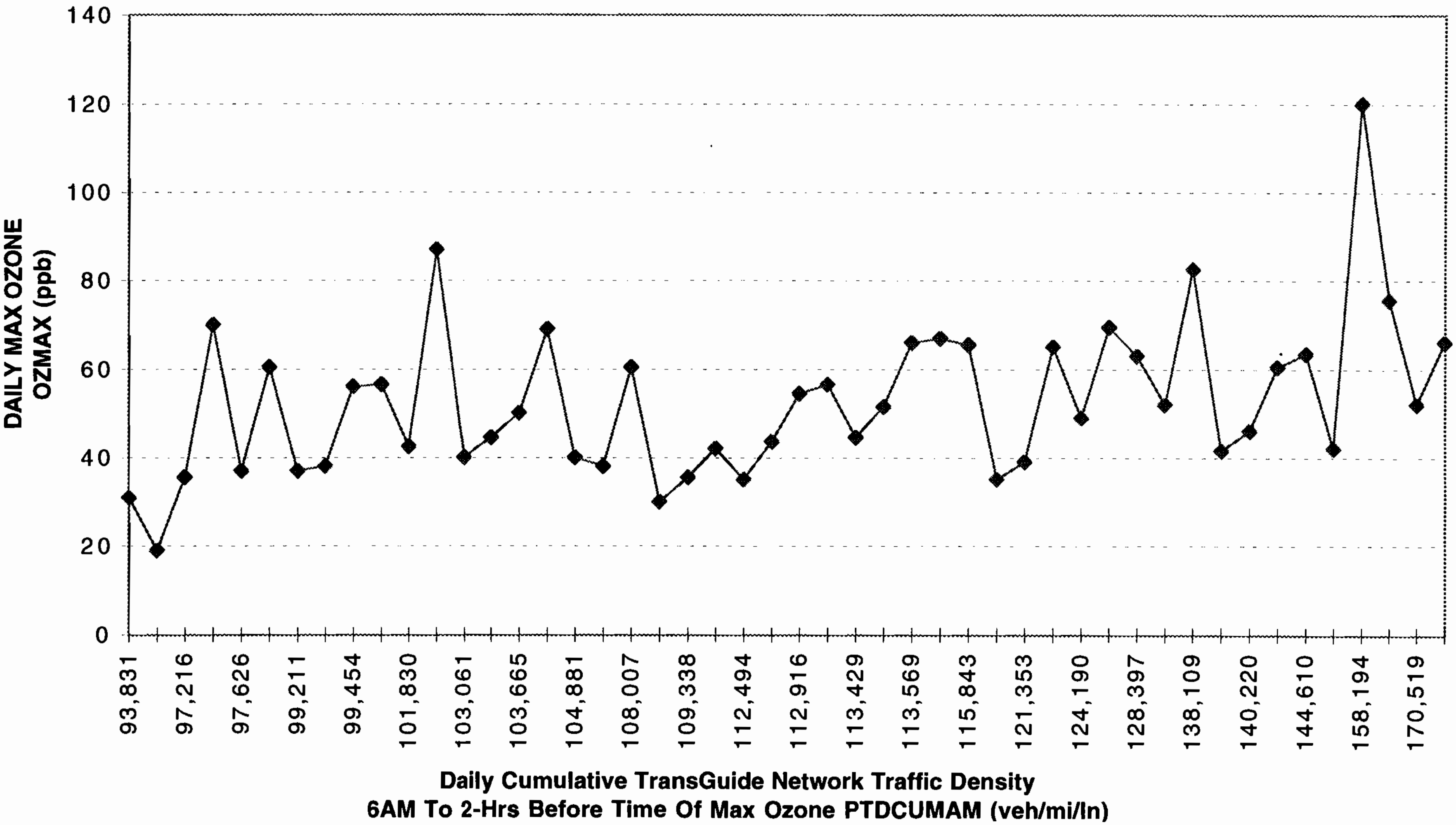


Figure 46. SAN ANTONIO DEC'95-SEP'96 MODEL T10.1
DATA CONTROLLED FOR TRAFFIC CONGESTION PARAMETER GE 50th PERCENTILE
AND DAYS WITH CLDAVGT2 LE 3

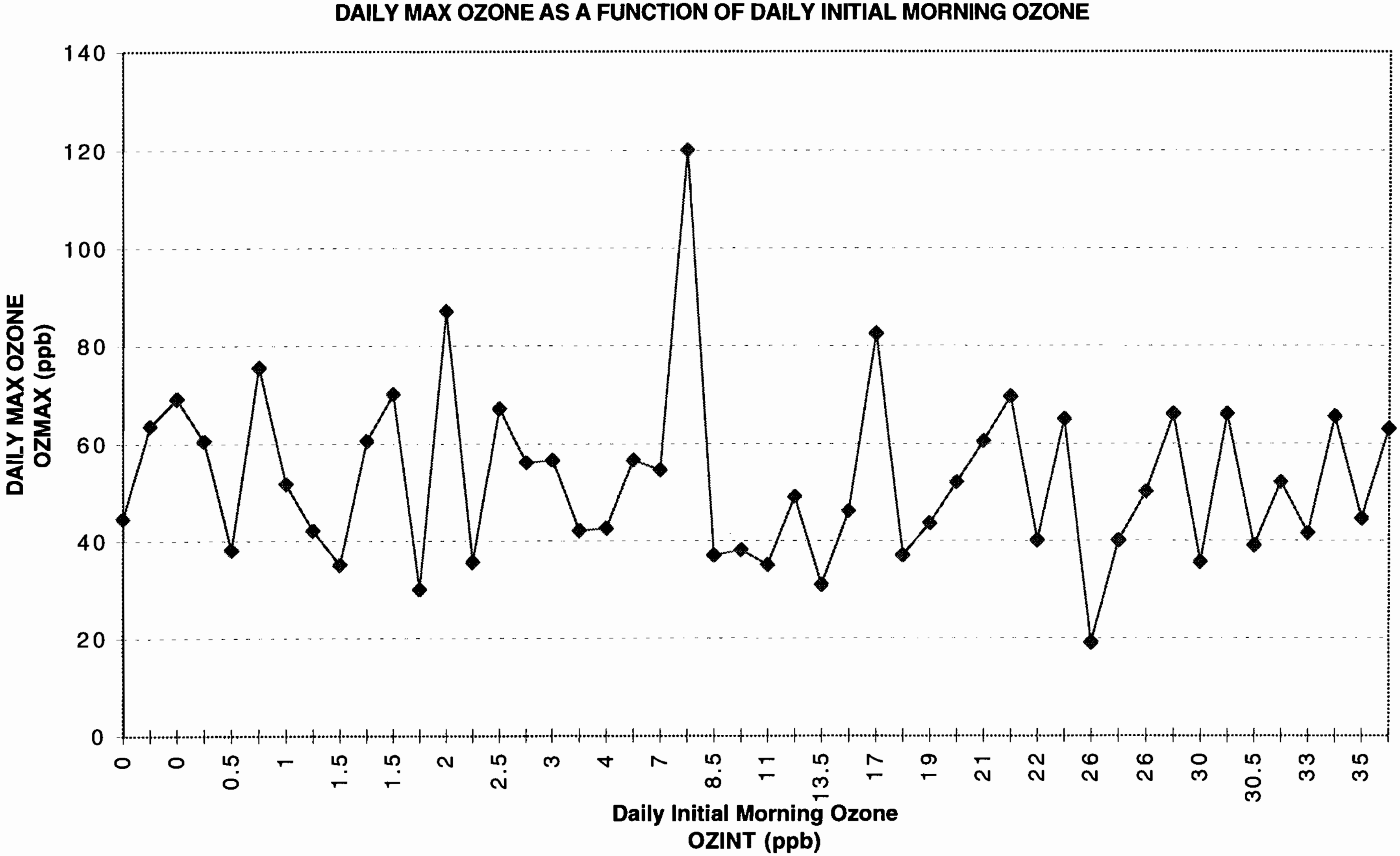


**Figure 47. SAN ANTONIO DEC'95-SEP'96 MODEL T10.1**
**DATA CONTROLLED FOR TRAFFIC CONGESTION PARAMETER GE 50th PERCENTILE**
**AND DAYS WITH CLDAVGT2 LE 3**

**DAILY MAX OZONE AS A FUNCTION OF AVERAGE DAILY CLOUD COVER FROM 6AM TO TIME OF MAX OZONE**

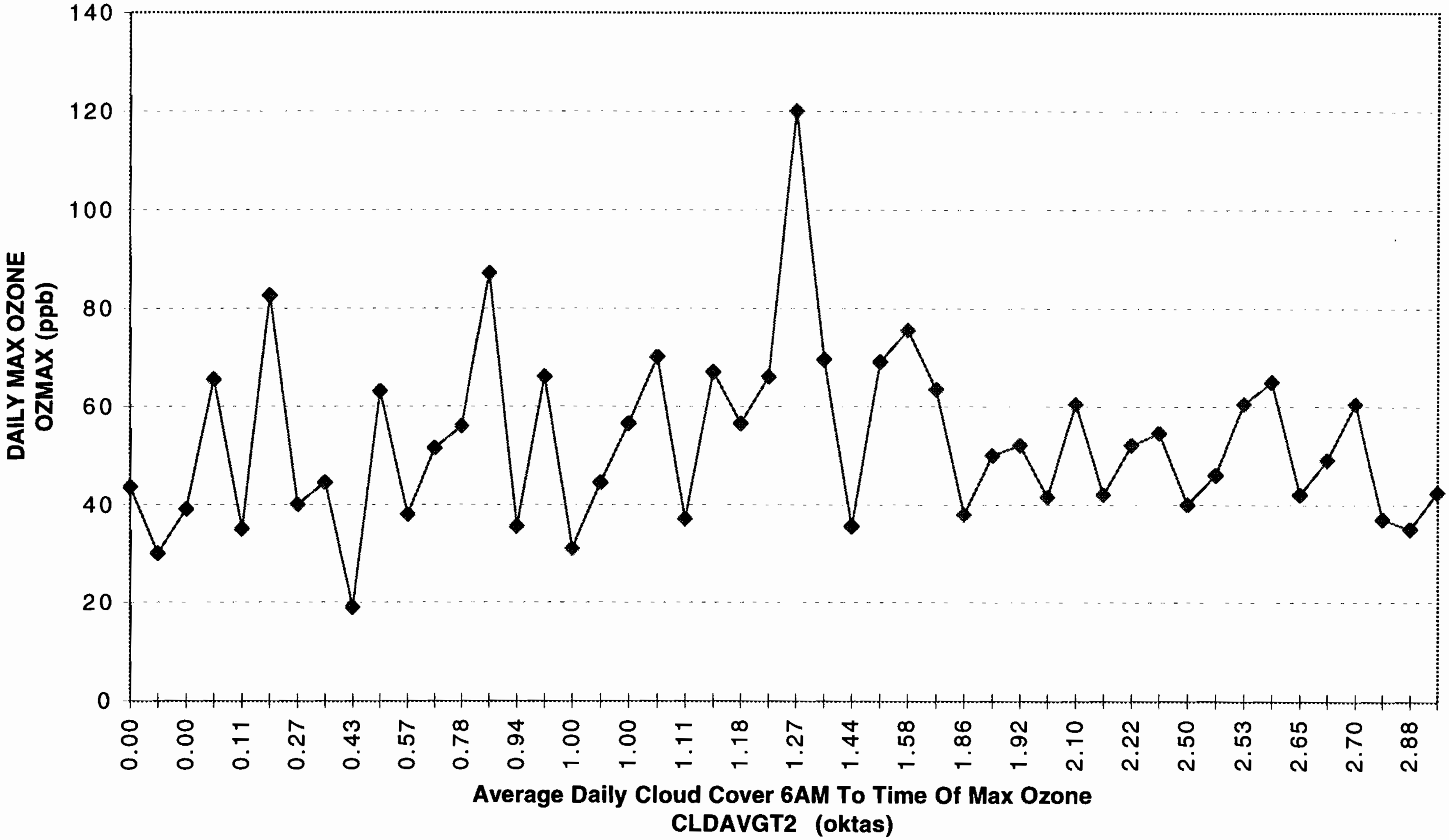


**Figure 48. SAN ANTONIO DEC'95-SEP'96 MODEL T10.1**
**DATA CONTROLLED FOR TRAFFIC CONGESTION PARAMETER GE 50th PERCENTILE**
**AND DAYS WITH CLDAVGT2 LE 3**

**DAILY MAX OZONE AS A FUNCTION OF AVERAGE DAILY WIND SPEED FROM 6AM TO TIME OF MAX OZONE**

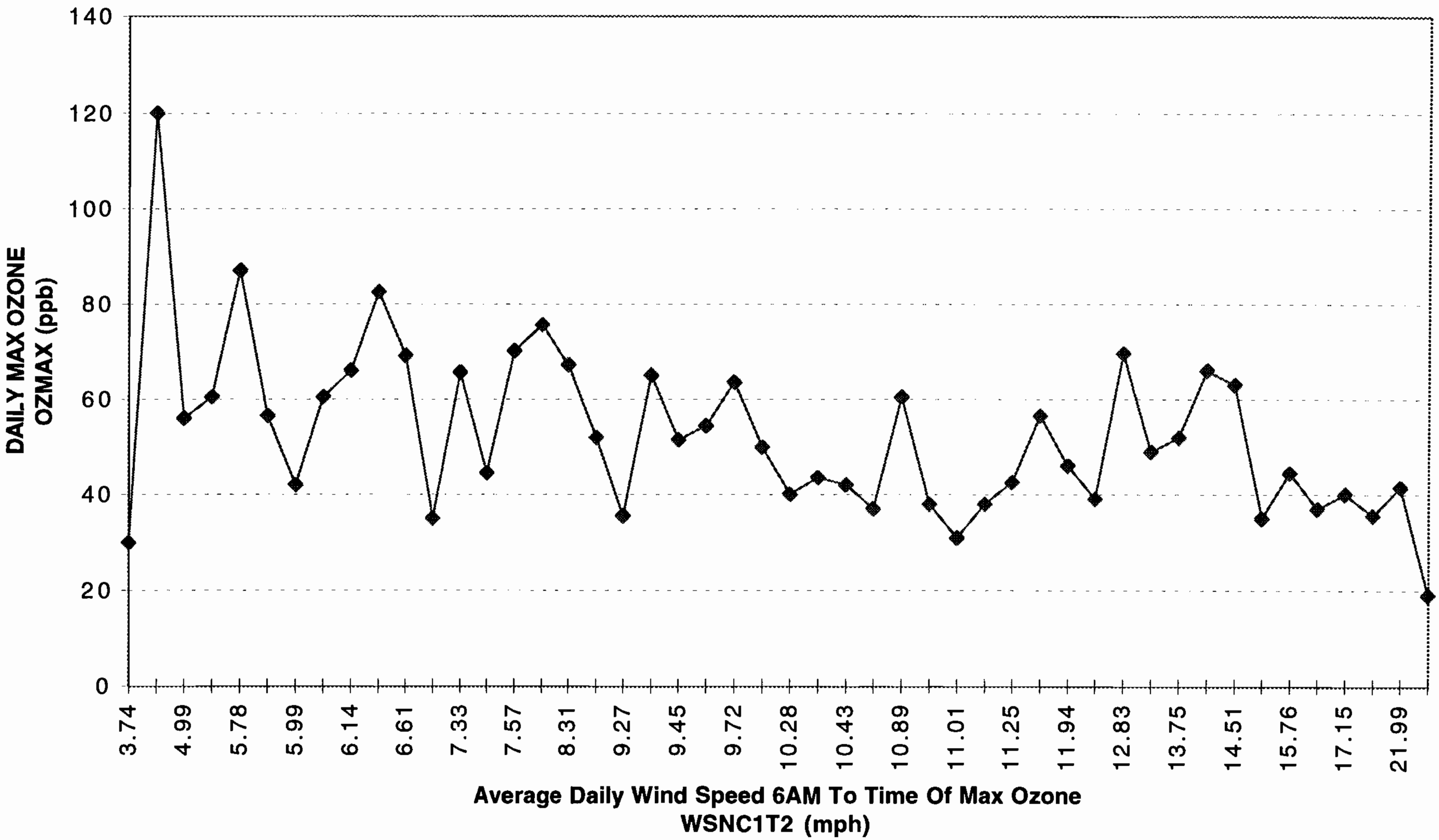


**Figure 49. SAN ANTONIO DEC'95-SEP'96 MODEL T10.1**
**DATA CONTROLLED FOR TRAFFIC CONGESTION PARAMETER GE 50th PERCENTILE**
**AND DAYS WITH CLDAVGT2 LE 3**

**DAILY MAX OZONE AS A FUNCTION OF MAXIMUM DAILY TEMPERATURE**

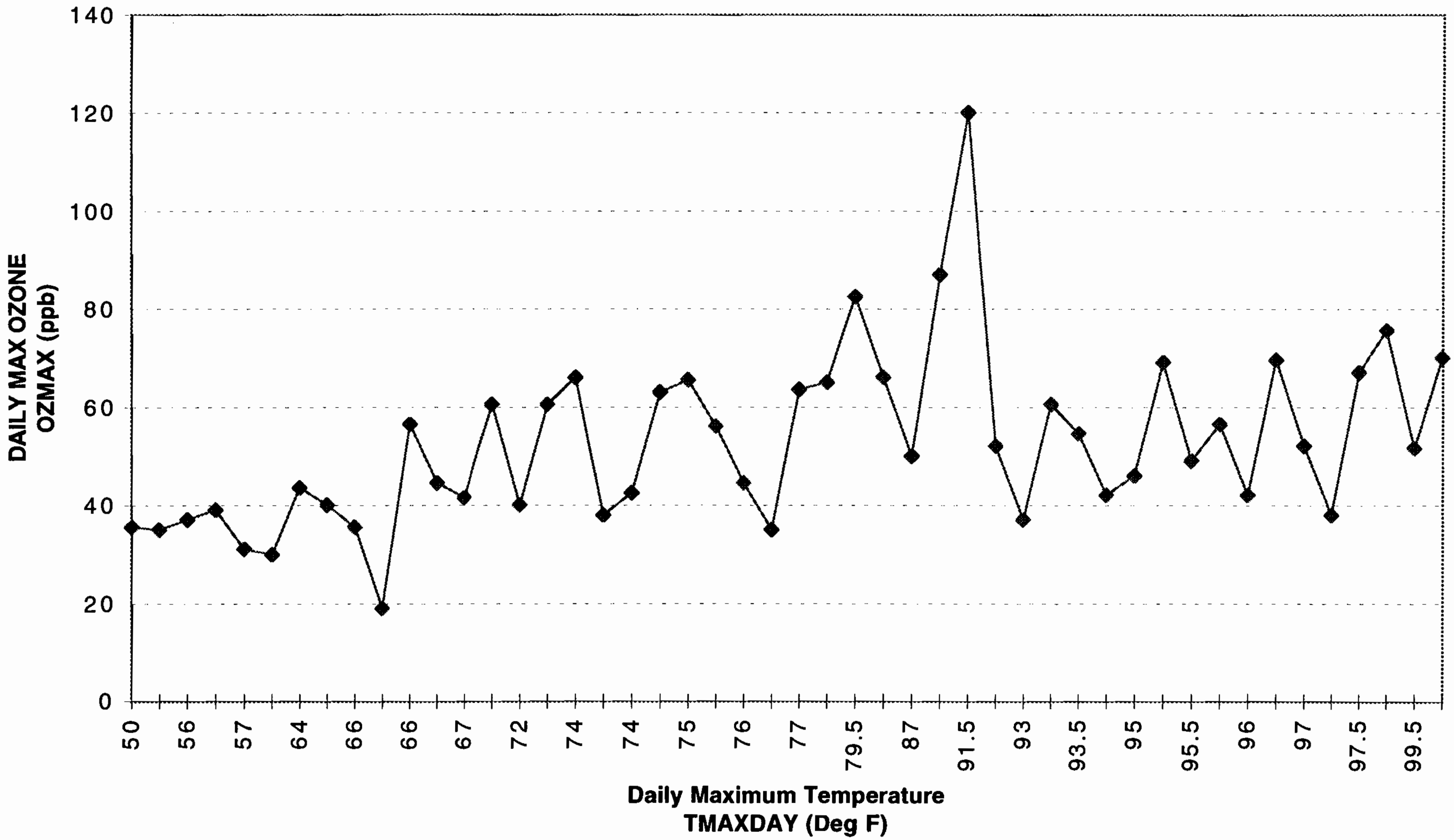


**Figure 50. SAN ANTONIO DEC'95-SEP'96 MODEL T10.1**
**DATA CONTROLLED FOR TRAFFIC CONGESTION PARAMETER GE 50th PERCENTILE**
**AND DAYS WITH CLDAVGT2 LE 3**

**DAILY MAX OZONE AS A FUNCTION OF AVERAGE DAILY WIND SPEED**

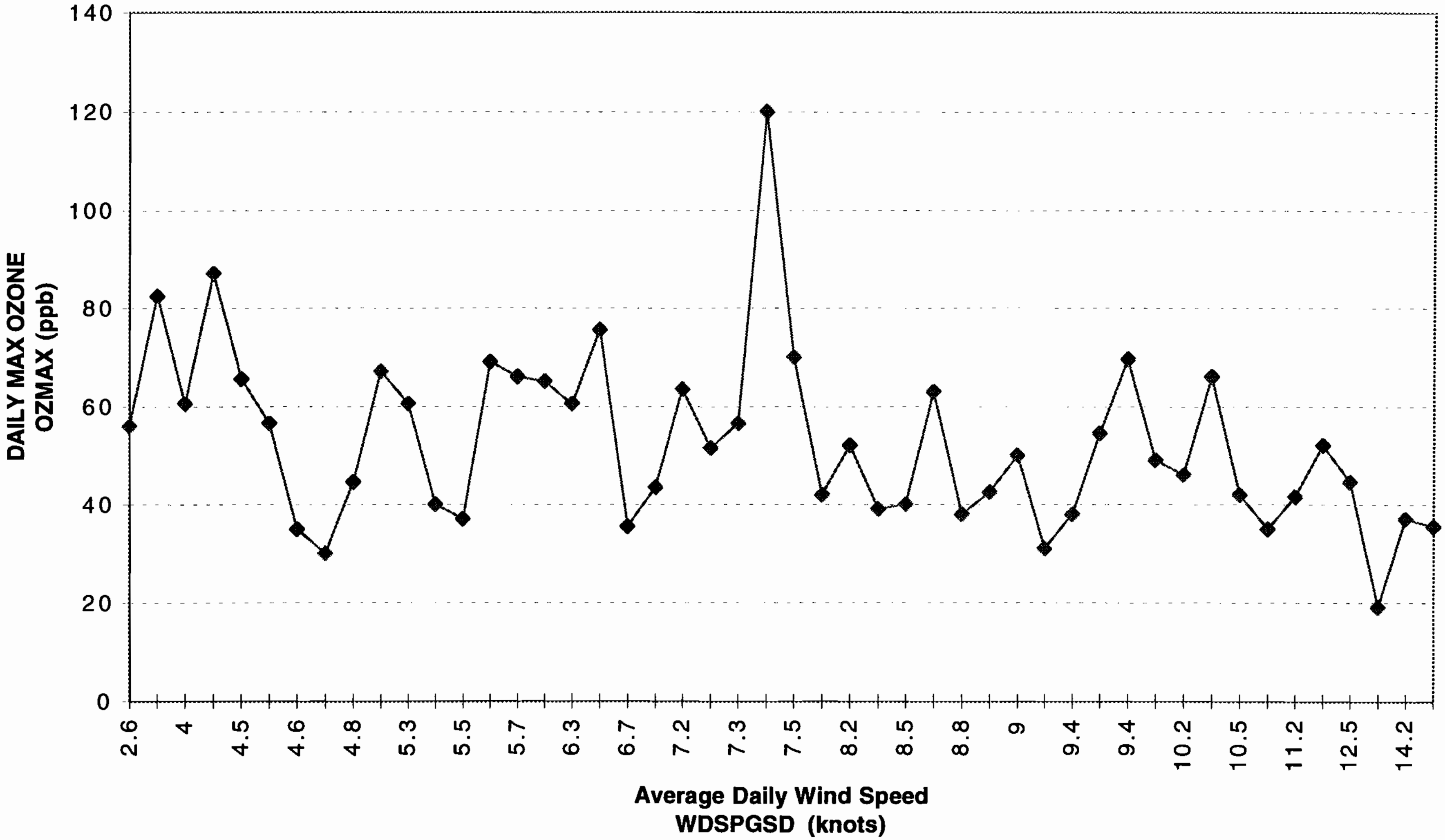


**Figure 51. SAN ANTONIO DEC'95-SEP'96 MODEL T10.1**
**DATA CONTROLLED FOR TRAFFIC CONGESTION PARAMETER GE 50th PERCENTILE**
**AND DAYS WITH CLDAVGT2 LE 3**

**DAILY MAX OZONE AS A FUNCTION OF MINIMUM DAILY TEMPERATURE**

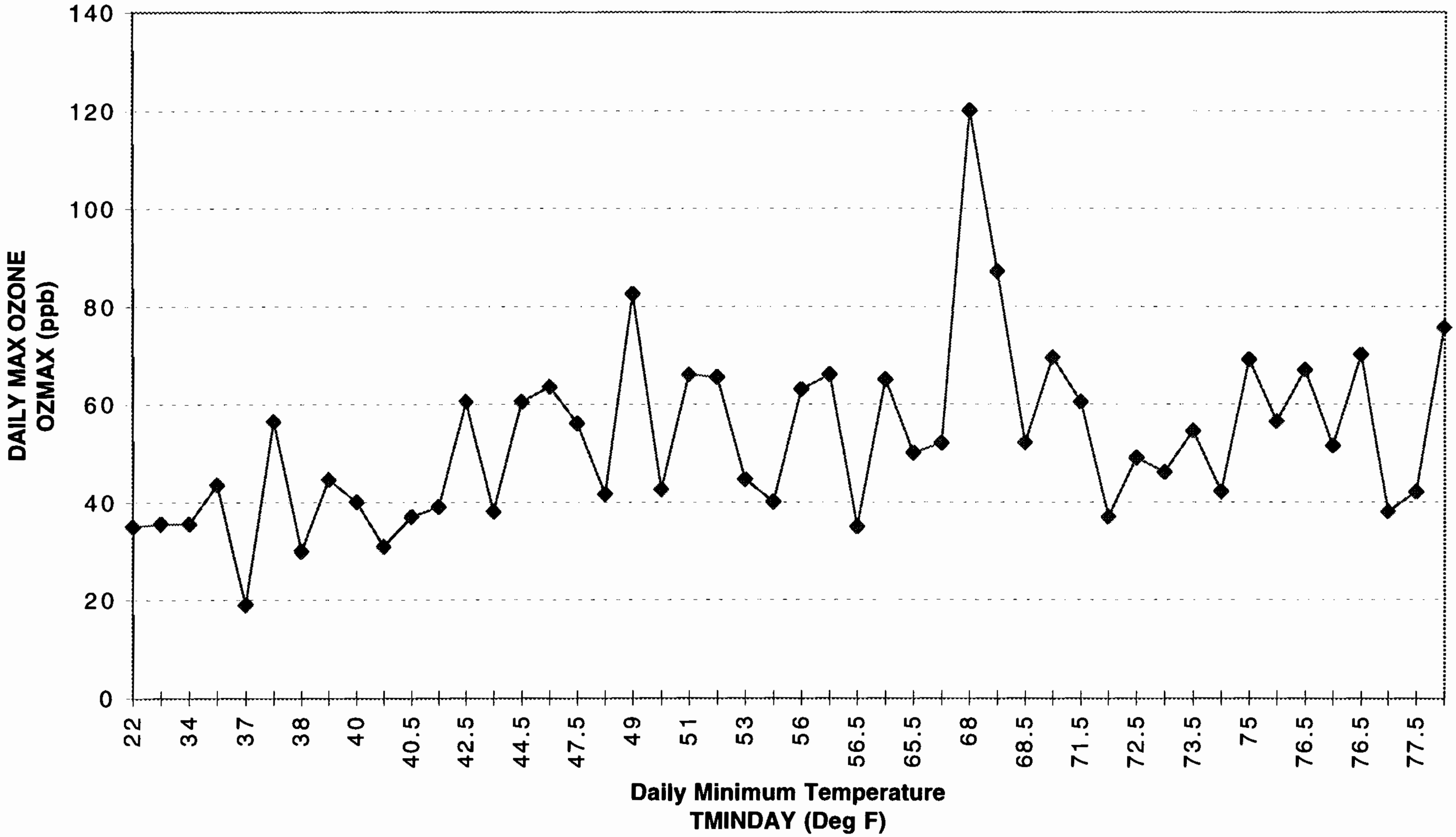
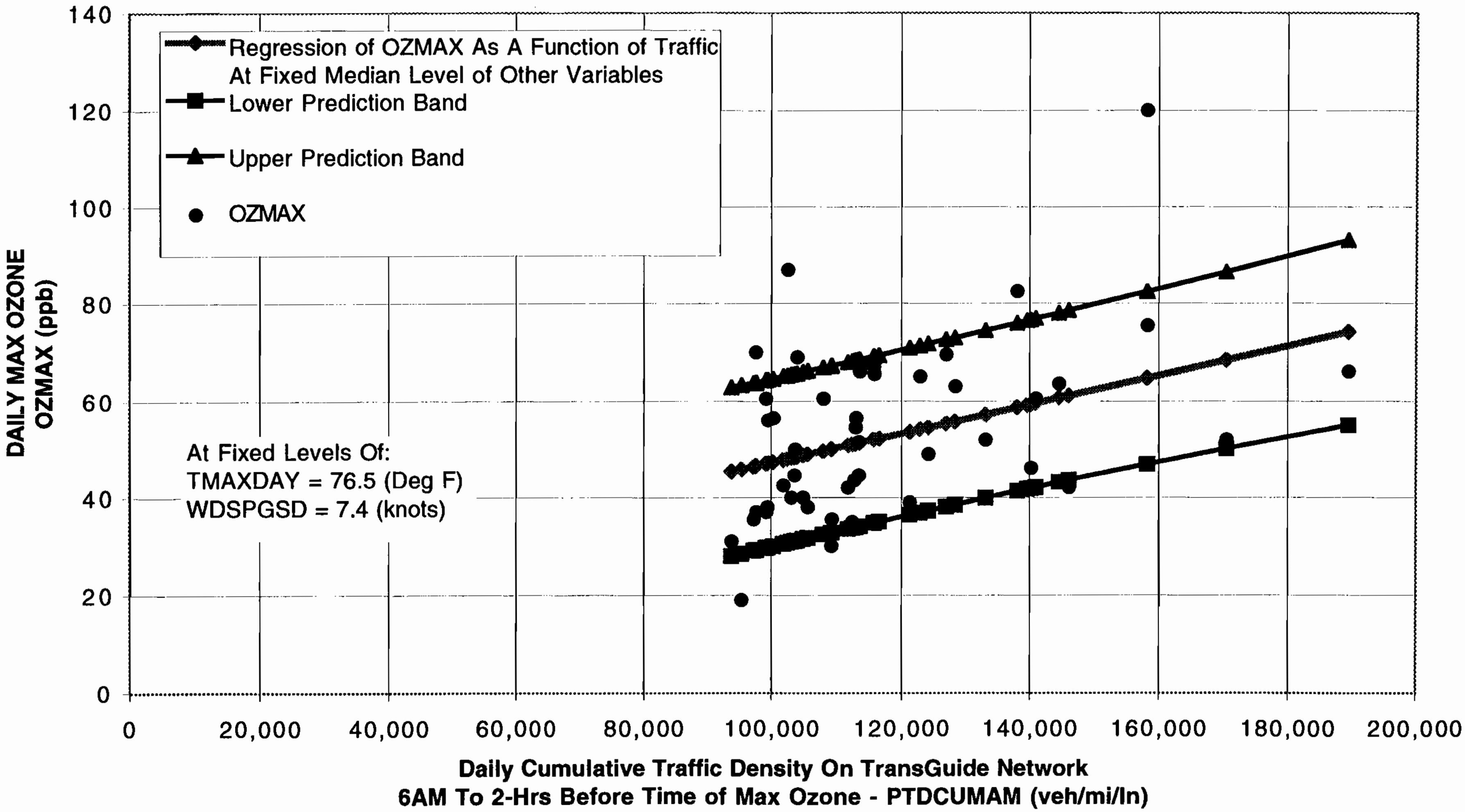


**Figure 52. SAN ANTONIO DEC'95-SEP'96 MODEL T10.1**
**DATA CONTROLLED FOR TRAFFIC CONGESTION PARAMETER GE 50th PERCENTILE**
**AND DAYS WITH CLDAVGT2 LE 3**

**80% CONFIDENCE PREDICTION BAND ON DAILY MAX OZONE AS A FUNCTION OF TRANSGUIDE NETWORK CUMULATIVE TRAFFIC DENSITY AT FIXED LEVELS OF OTHER INDEPENDENT VARIABLES (MEDIAN LEVELS)**



**SCENARIO 6**

In Scenario 6, we analyze data from April 1996 through September 1996 and control for the traffic congestion parameter (PTDCUMAM) to be greater than or equal to the median traffic congestion level and for the average hourly cloud cover (CLDAVGT2) from 6AM to the time of peak ozone to be less than or equal to 3 oktas. Scenario 6 is identical to Scenario 5 except for the fact of restricting the data between April through September. Table 15 summarizes the results of the model and Table 16 summarizes the strength of the traffic parameter's association with the daily peak ozone. Confidence intervals of the parameter's model coefficient per 10,000 units of PTDCUMAM are calculated at the 80, 90 and 95 percent confidence levels. Table 17 summarizes the raw data sorted by date for Scenario 6.

We can say that under this scenario at the 80 percent confidence level, the potential increase to the daily peak ozone in ppb per a 10,000 unit increase in the traffic congestion parameter PTDCUMAM has a range from about 0.6 to about 3.4 ppb. It is equally likely that the potential increase in the daily peak ozone would fall at any point within this range. The results presented in Table 16 also indicate that the traffic congestion parameter is not significant at the 95 percent confidence level.

The strength of association when controlling for the higher levels of traffic congestion under Scenario 6 increases considerably relative to scenarios one, two and three and to a lesser extent Scenario 4. These results again provide evidence that suggests that the relationship between the traffic congestion parameter and the peak ozone concentration is not constant for all levels of traffic congestion. The results also indicate that the strength of association is greater under Scenario 5 than Scenario 6, even though the months of April through September are being controlled for under Scenario 6.

Figure 53 and Figure 54 plot the daily peak ozone (OZMAX) and the daily cumulative traffic congestion parameter (PTDCUMAM) over time. Figure 55 through Figure 61 graphically summarize the relationships between the response and predictor variables. Figure 62 depicts an 80 percent confidence level prediction band of OZMAX as a function of PTDCUMAM while holding the other significant variables constant at their median levels.

We can say at an 80 percent confidence level that the daily peak ozone will fall somewhere within the band on Figure 62. As shown, the 80 percent confidence prediction band with this linear model under this scenario does not encompass several of the higher daily peak ozone concentrations at fixed median levels of the other significant variables.

*Table 15. Scenario 6 Results*

| | | | RANGE OF VARIABLES |
|---|---|---|---|
| **DATA CONTROLS** | 1) APR 1996 - SEP 1996<br><br>2) DAYS WITH PTDCUMAM GE 50th PERCENTILE<br><br>3) AVG CLOUD COVER FROM 6AM TO TIME OF MAX OZONE LE 3 OKTAS | | |
| **MODEL SIGNIFICANT PARAMETERS (units)** | Y — OZMAX (ppb)<br>XO — INTERCEPT<br>X1 --- PTDCUMAM (veh/mi/ln)<br>X2 --- CLDAVGT2 (oktas)<br>X3 --- WSNC1T2 (mph) | | 37 to 120<br><br>97,560 to 189,530<br>0.1 to 2.8<br>4.4 to 16.1 |
| **SIGNIFICANT PARAMETER COEFFICIENT ESTIMATES AND BIVARIATE CORRELATIONS (r)** | 75.41626727<br>0.00019956 X1<br>-8.49138250 X2<br>-2.68059455 X3 | <br>0.2732<br>-0.4754<br>-0.5440 | |
| **TRAFFIC VARIABLE COEFFICIENT CONFIDENCE-LEVEL** | 92% | | |
| **MODEL R-SQUARE** | 0.52 | | |
| **TRAFFIC VARIABLE PARTIAL R-SQUARE** | 0.07 | | |
| **SAMPLE SIZE** | 26 | | |
| **1st ORDER AUTO-CORRELATION Durbin-Watson Statistic** | 1.929 | | |
| **P-VALUE SUPPORTING $H_O$: No Heteroskedasticity** | 0.8854 | | |

*Table 16. Scenario 6 Results (cont.)*

| | |
|---|---|
| **Traffic parameter estimate per 10,000 PTDCUMAM** | **1.9956** |
| **Traffic parameter estimate standard error per 10,000 PTDCUMAM** | **1.0965** |
| **n** | **26** |
| **k** | **3** |
| **df** | **22** |
| $t_{(.10)}$ | **1.321** |
| $t_{(.05)}$ | **1.717** |
| $t_{(.025)}$ | **2.074** |
| **80 percent confidence interval of traffic parameter estimate per 10,000 units of PTDCUMAM** | **0.55 to 3.44** |
| **90 percent confidence interval of traffic parameter estimate per 10,000 units of PTDCUMAM** | **0.11 to 3.88** |
| **95 percent confidence interval of traffic parameter estimate per 10,000 units of PTDCUMAM** | **-0.28 to 4.27** |

*Table 17. Scenario 6 Data*

| DATECST | OZMAX (ppb) | PTDCUMAM (veh/mi/ln) | OZINT (ppb) | CLDAVGT2 (oktas) | WSNC1T2 (mph) | TMAXDAY (°F) | WDSPGSD (knots) | TMINDAY (°F) |
|---|---|---|---|---|---|---|---|---|
| 4/1/96 | 63 | 128,397 | 47 | 0.44 | 14.51 | 74 | 8.5 | 56 |
| 4/2/96 | 60.5 | 99,169 | 1.5 | 2.53 | 10.89 | 72.5 | 6.3 | 44.5 |
| 4/8/96 | 82.5 | 138,109 | 17 | 0.13 | 6.33 | 79.5 | 3.9 | 49 |
| 4/15/96 | 44.5 | 113,429 | 35 | 0.38 | 15.76 | 76 | 12.5 | 53 |
| 4/16/96 | 63.5 | 144,610 | 0 | 1.64 | 9.72 | 77 | 7.2 | 46 |
| 4/18/96 | 52 | 170,519 | 31 | 1.92 | 8.68 | 93 | 11.4 | 68 |
| 4/19/96 | 52 | 133,172 | 20.5 | 2.22 | 13.75 | 97 | 8.2 | 68.5 |
| 5/1/96 | 66 | 189,529 | 27 | 0.95 | 14.05 | 84.5 | 10.3 | 56 |
| 5/11/96 | 50 | 103,665 | 26 | 1.91 | 9.94 | 87 | 9 | 65.5 |
| 5/17/96 | 37 | 99,211 | 18.5 | 2.80 | 16.10 | 93 | 14.2 | 72.5 |
| 5/21/96 | 46 | 140,220 | 15 | 2.52 | 11.94 | 95 | 10.2 | 73.5 |
| 5/22/96 | 49 | 124,190 | 12 | 2.67 | 13.04 | 95.5 | 10.1 | 72.5 |
| 6/3/96 | 120 | 158,194 | 8 | 1.27 | 4.36 | 91.5 | 7.5 | 68 |
| 6/5/96 | 54.5 | 112,916 | 7 | 2.40 | 9.66 | 93.5 | 9.4 | 73.5 |
| 6/10/96 | 69.5 | 127,024 | 21.5 | 1.27 | 12.83 | 96.5 | 9.4 | 70.5 |
| 6/17/96 | 56.5 | 113,027 | 3 | 1.18 | 5.98 | 96 | 4.5 | 76 |
| 6/18/96 | 67 | 115,719 | 2.5 | 1.11 | 8.31 | 97.5 | 5.2 | 76.5 |
| 6/19/96 | 51.5 | 113,469 | 1 | 0.67 | 9.45 | 99.5 | 7.2 | 76.5 |
| 6/20/96 | 70 | 97,560 | 1.5 | 1.06 | 7.57 | 99.5 | 7.5 | 76.5 |
| 7/1/96 | 69 | 103,954 | 0 | 1.50 | 6.61 | 95 | 5.6 | 75 |
| 7/12/96 | 42 | 146,141 | 3.5 | 2.65 | 10.43 | 96 | 10.5 | 77.5 |
| 7/31/96 | 38 | 105,650 | 0.5 | 1.86 | 10.90 | 97 | 8.8 | 76.5 |
| 8/12/96 | 75.5 | 158,255 | 0.5 | 1.58 | 7.70 | 98.5 | 6.5 | 77.5 |
| 8/16/96 | 42 | 111,759 | 1 | 2.13 | 5.99 | 94 | 7.8 | 74.5 |
| 8/21/96 | 60.5 | 108,007 | 0 | 2.10 | 6.09 | 93 | 5.3 | 71.5 |
| 9/11/96 | 87 | 102,476 | 2 | 0.90 | 5.78 | 90 | 4.3 | 68 |

Figure 53. SAN ANTONIO APR'96-SEP'96 MODEL T11.1
DATA CONTROLLED FOR TRAFFIC CONGESTION PARAMETER GE 50th PERCENTILE
AND DAYS WITH CLDAVGT2 LE 3

DAILY MAXIMUM OZONE CONCENTRATIONS

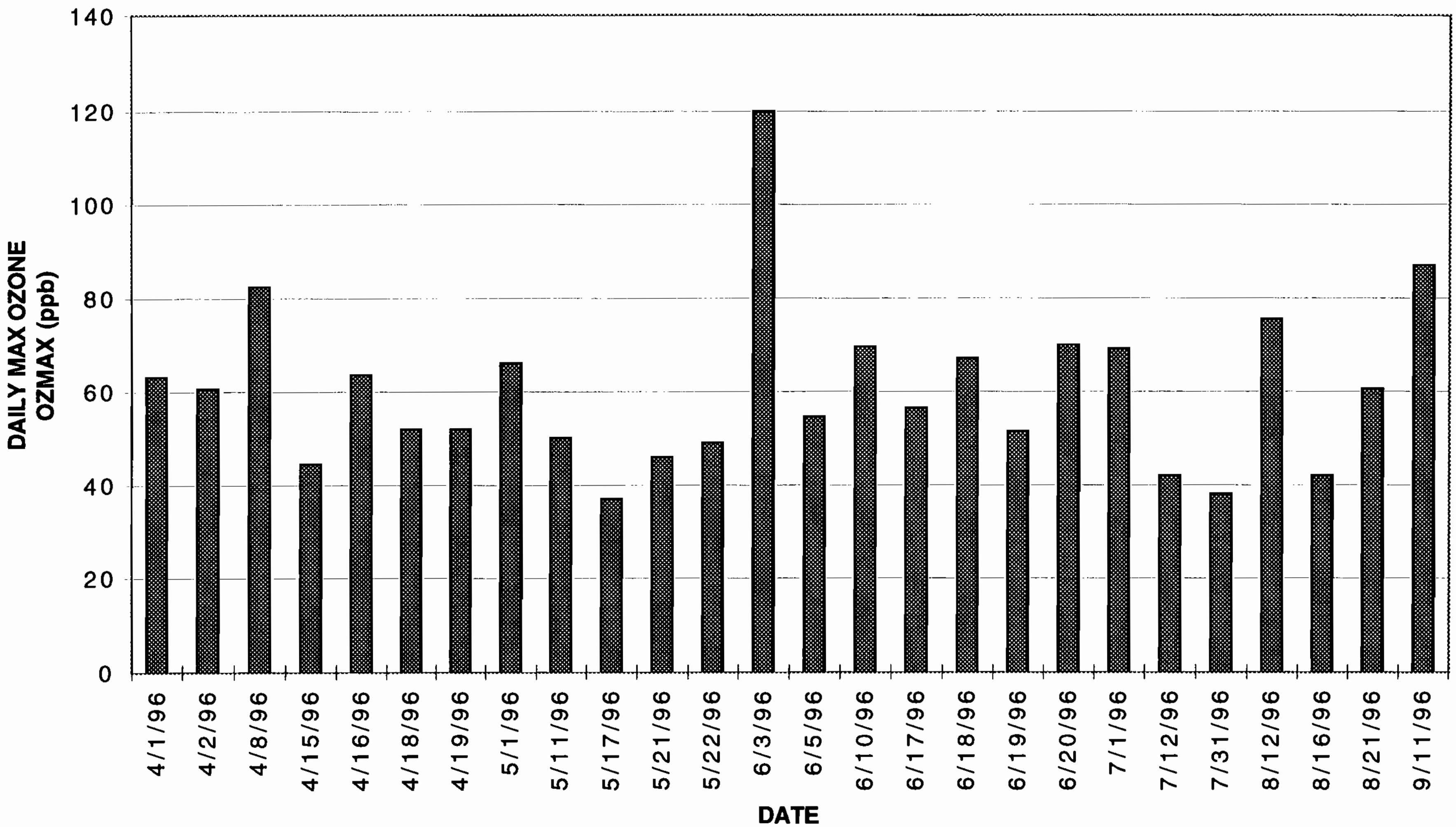


Figure 54. SAN ANTONIO APR'96-SEP'96 MODEL T11.1
DATA CONTROLLED FOR TRAFFIC CONGESTION PARAMETER GE 50th PERCENTILE
AND DAYS WITH CLDAVGT2 LE 3

DAILY CUMULATIVE TRANSGUIDE NETWORK TRAFFIC DENSITY
6AM to 2 HOURS BEFORE TIME of MAX OZONE

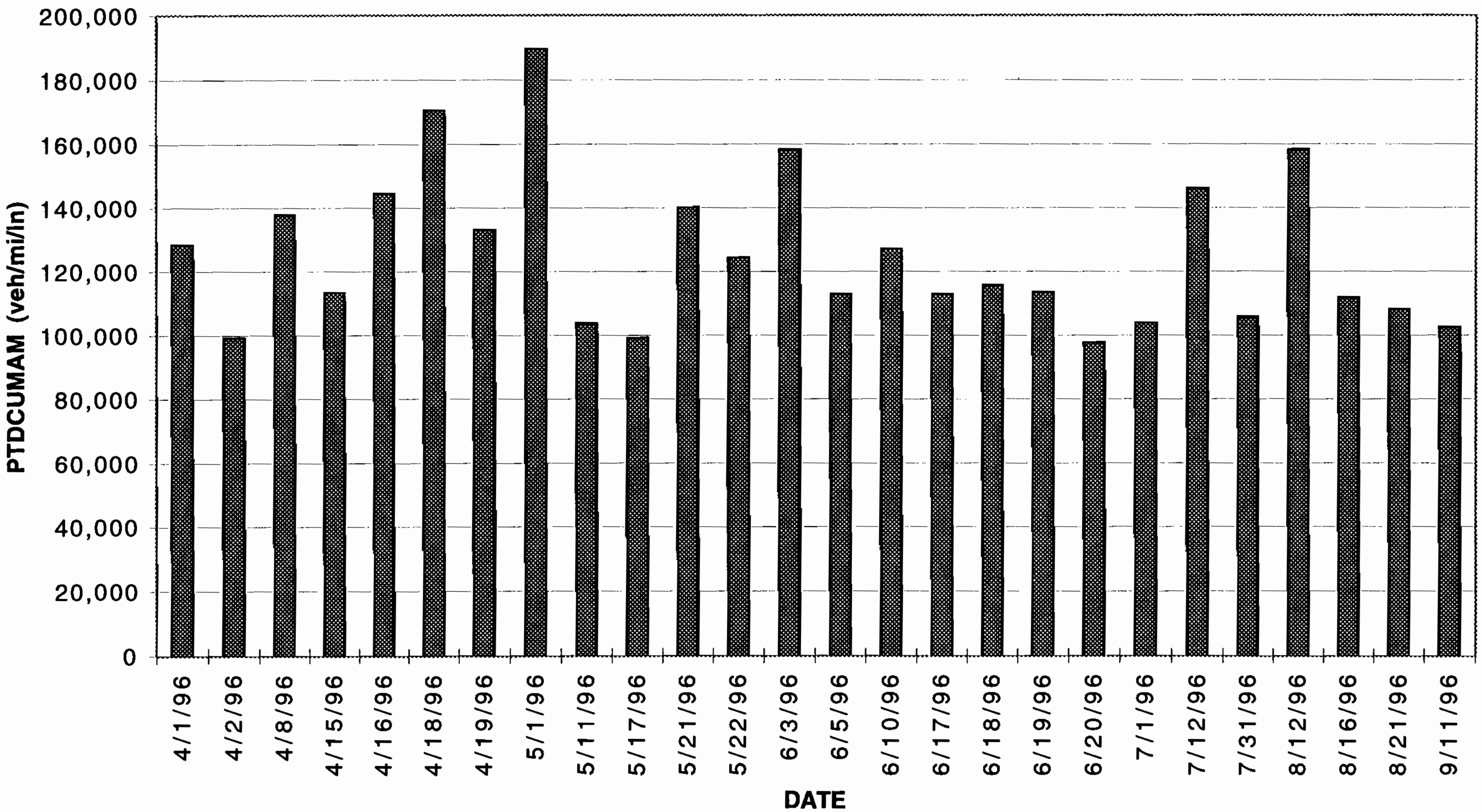


**Figure 55. SAN ANTONIO APR'96-SEP'96 MODEL T11.1**
**DATA CONTROLLED FOR TRAFFIC CONGESTION PARAMETER GE 50th PERCENTILE**
**AND DAYS WITH CLDAVGT2 LE 3**

**DAILY MAX OZONE AS A FUNCTION OF DAILY CUMULATIVE TRANSGUIDE NETWORK TRAFFIC DENSITY**
**6AM to 2 HOURS BEFORE TIME of MAX OZONE**

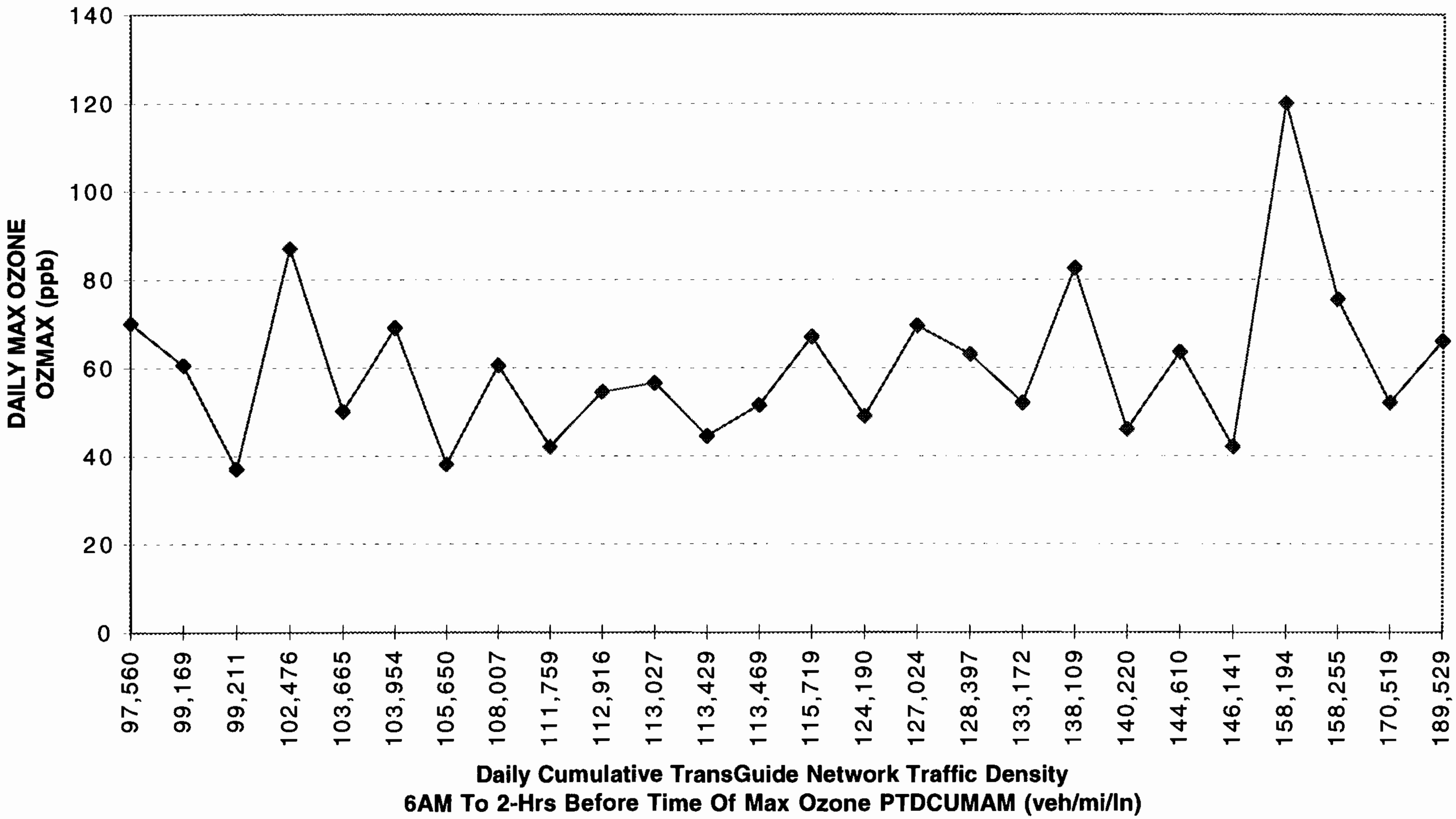


Figure 56. SAN ANTONIO APR'96-SEP'96 MODEL T11.1
DATA CONTROLLED FOR TRAFFIC CONGESTION PARAMETER GE 50th PERCENTILE
AND DAYS WITH CLDAVGT2 LE 3

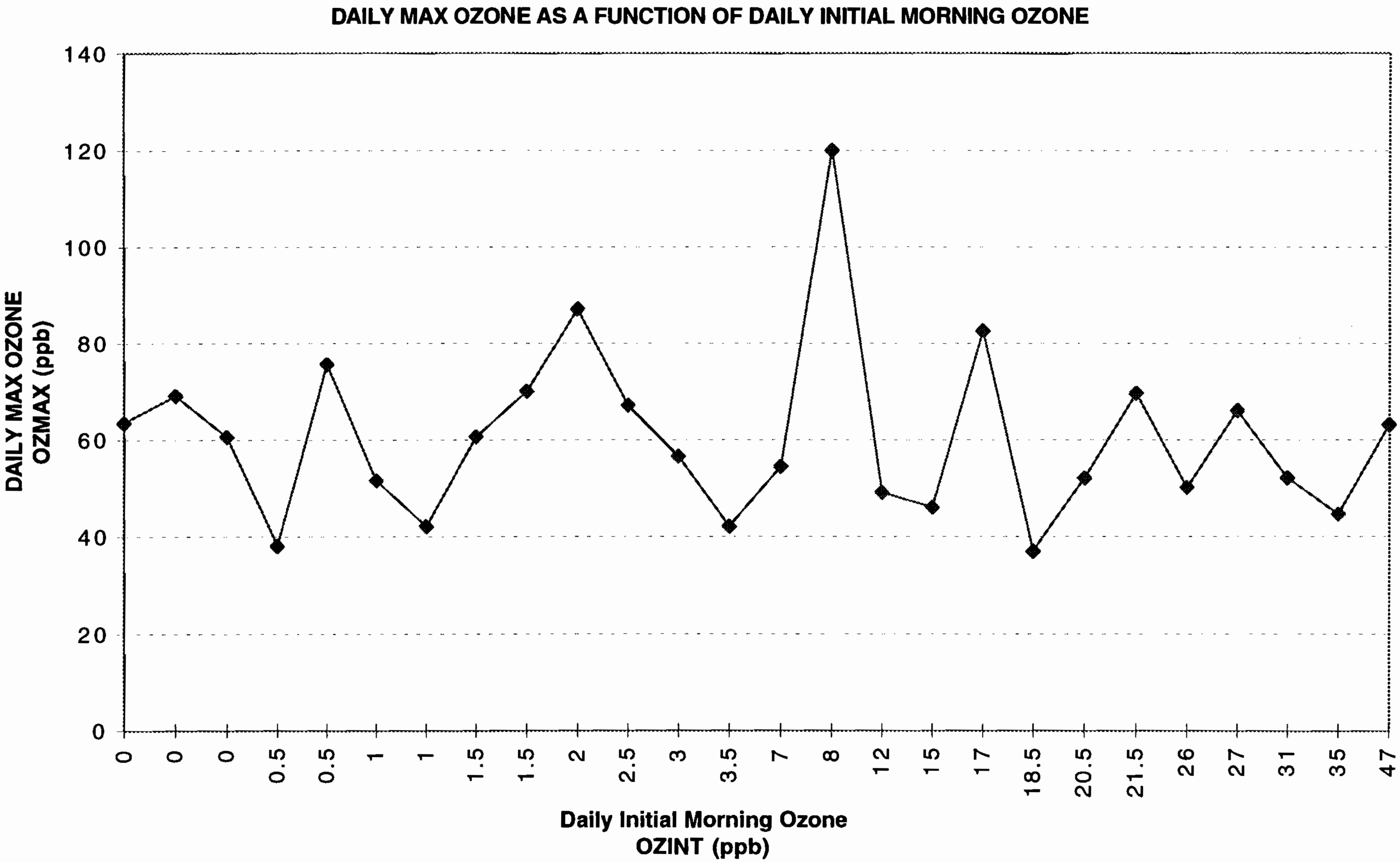


Figure 57. SAN ANTONIO APR'96-SEP'96 MODEL T11.1
DATA CONTROLLED FOR TRAFFIC CONGESTION PARAMETER GE 50th PERCENTILE
AND DAYS WITH CLDAVGT2 LE 3

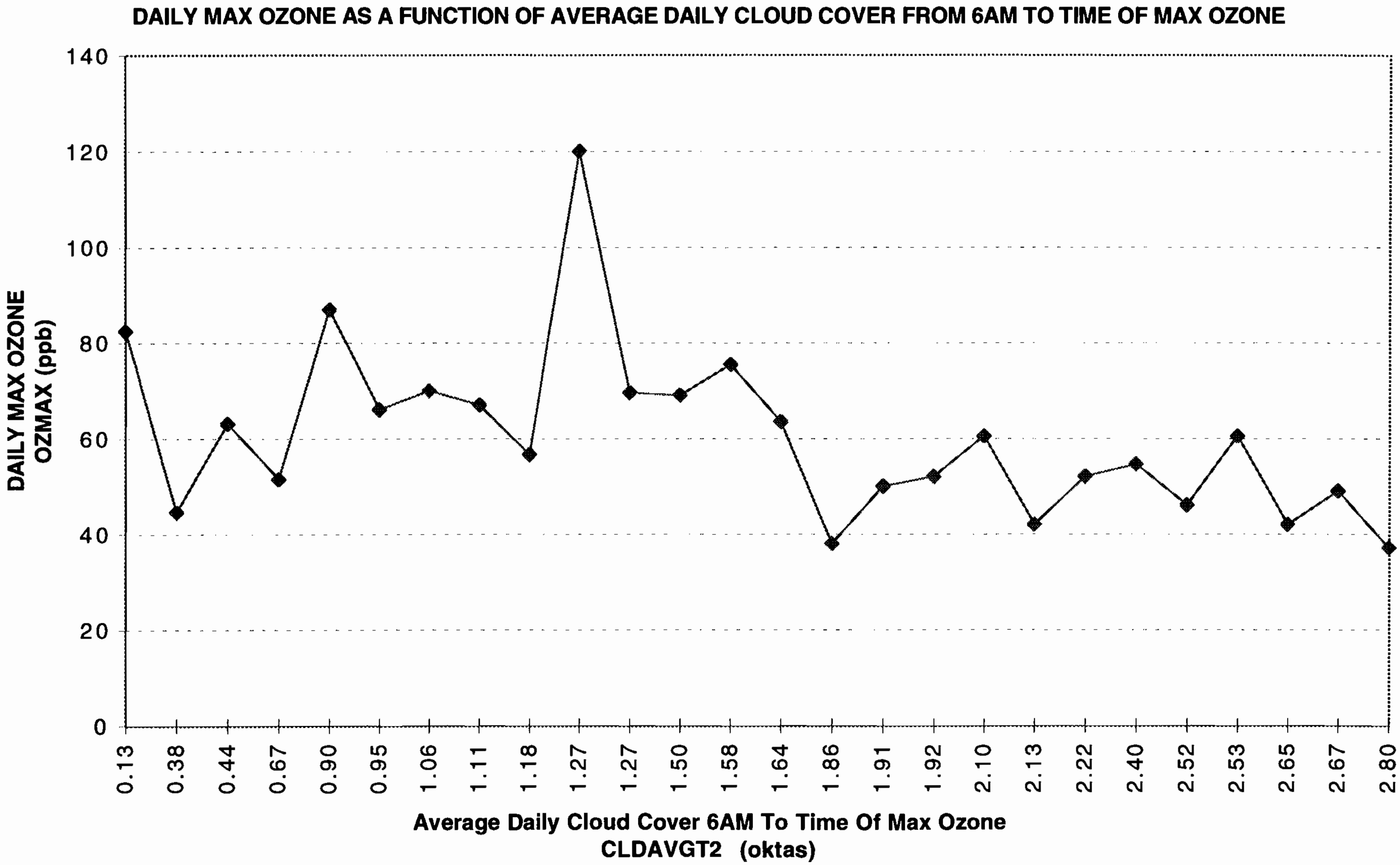


**Figure 58. SAN ANTONIO APR'96-SEP'96 MODEL T11.1**
**DATA CONTROLLED FOR TRAFFIC CONGESTION PARAMETER GE 50th PERCENTILE**
**AND DAYS WITH CLDAVGT2 LE 3**

**DAILY MAX OZONE AS A FUNCTION OF AVERAGE DAILY WIND SPEED FROM 6AM TO TIME OF MAX OZONE**

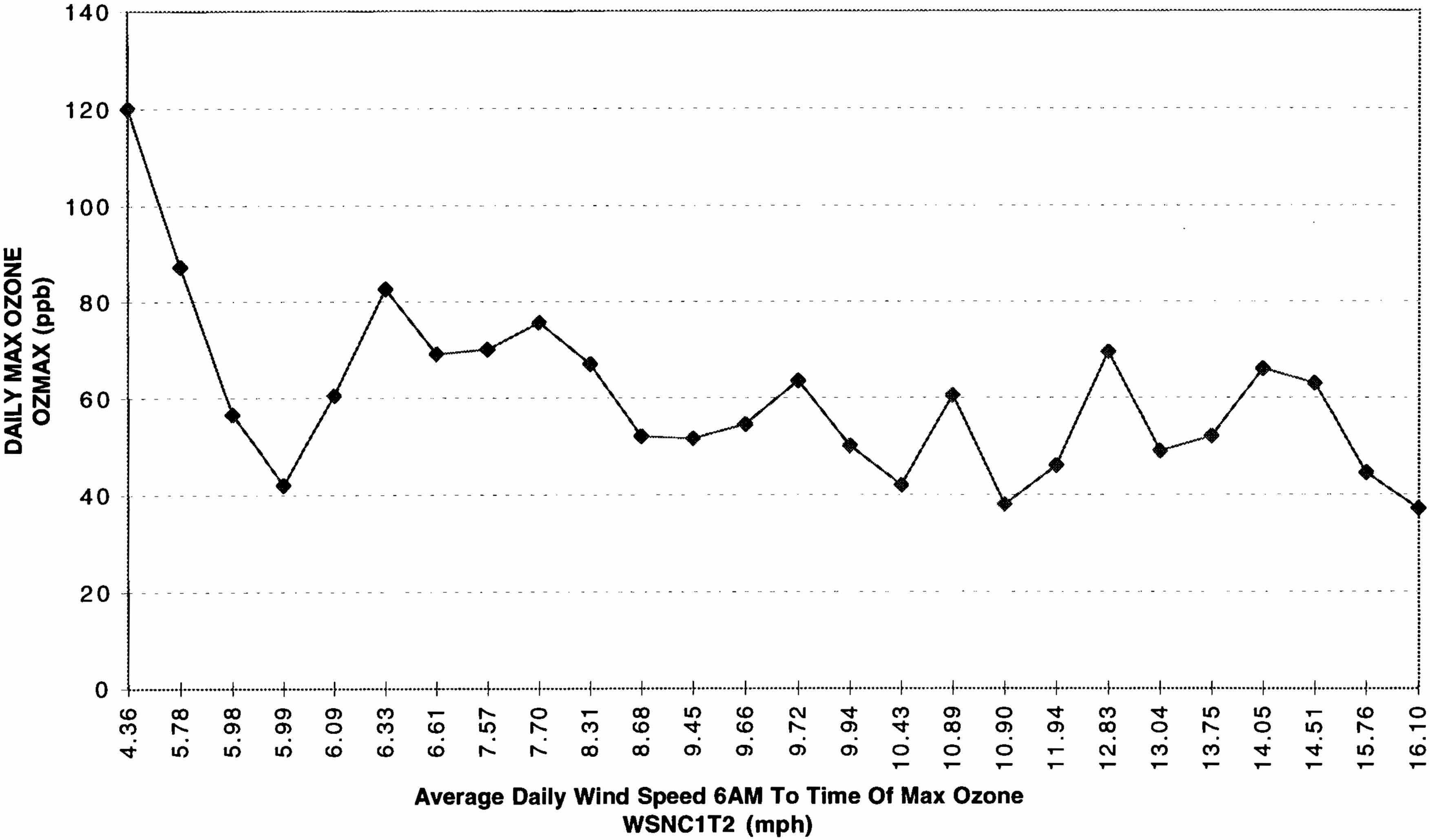
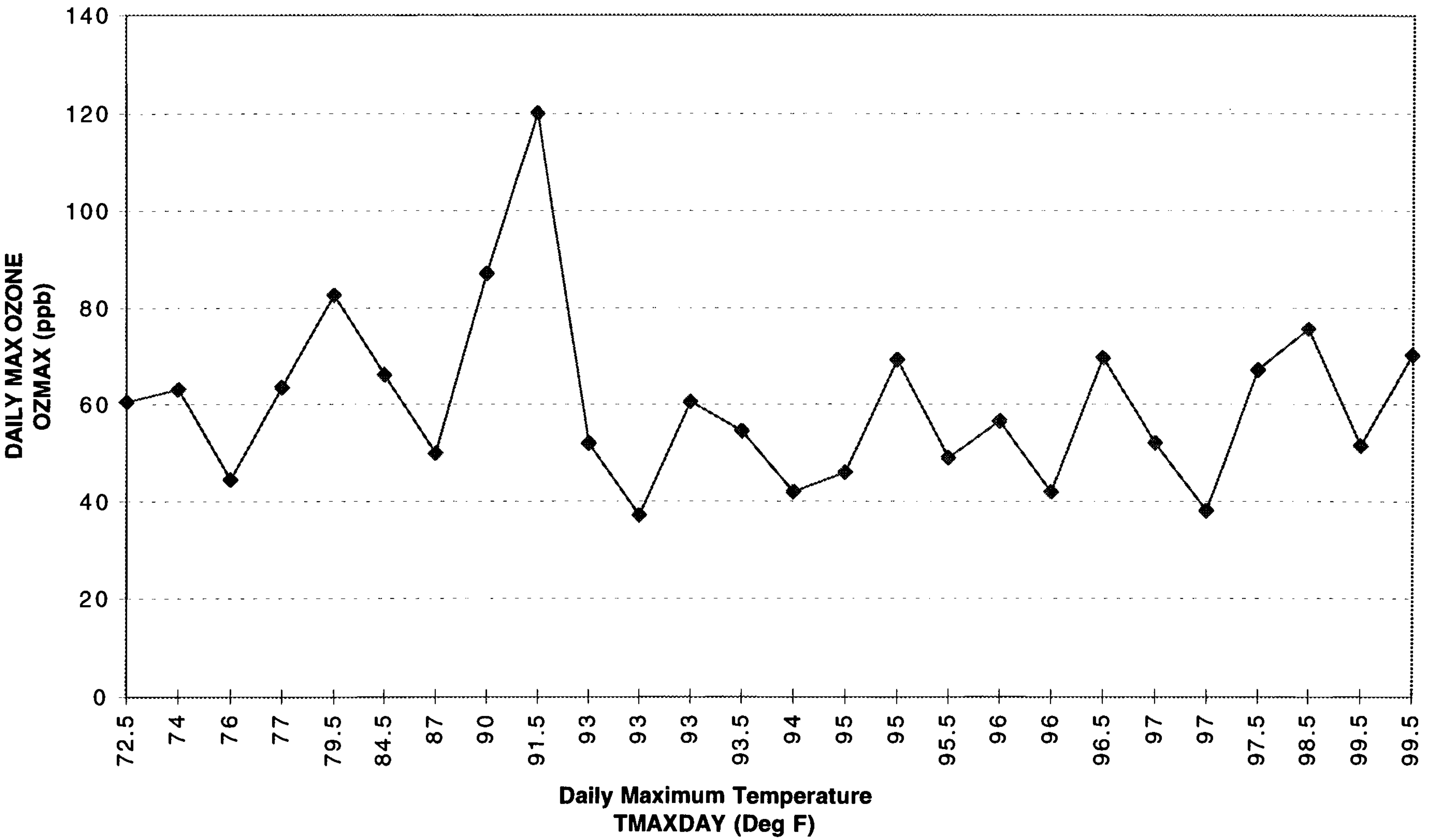


**Figure 59. SAN ANTONIO APR'96-SEP'96 MODEL T11.1**
**DATA CONTROLLED FOR TRAFFIC CONGESTION PARAMETER GE 50th PERCENTILE**
**AND DAYS WITH CLDAVGT2 LE 3**

**DAILY MAX OZONE AS A FUNCTION OF MAXIMUM DAILY TEMPERATURE**




5/23/97

Figure 60. SAN ANTONIO APR'96-SEP'96 MODEL T11.1
DATA CONTROLLED FOR TRAFFIC CONGESTION PARAMETER GE 50th PERCENTILE
AND DAYS WITH CLDAVGT2 LE 3

DAILY MAX OZONE AS A FUNCTION OF AVERAGE DAILY WIND SPEED

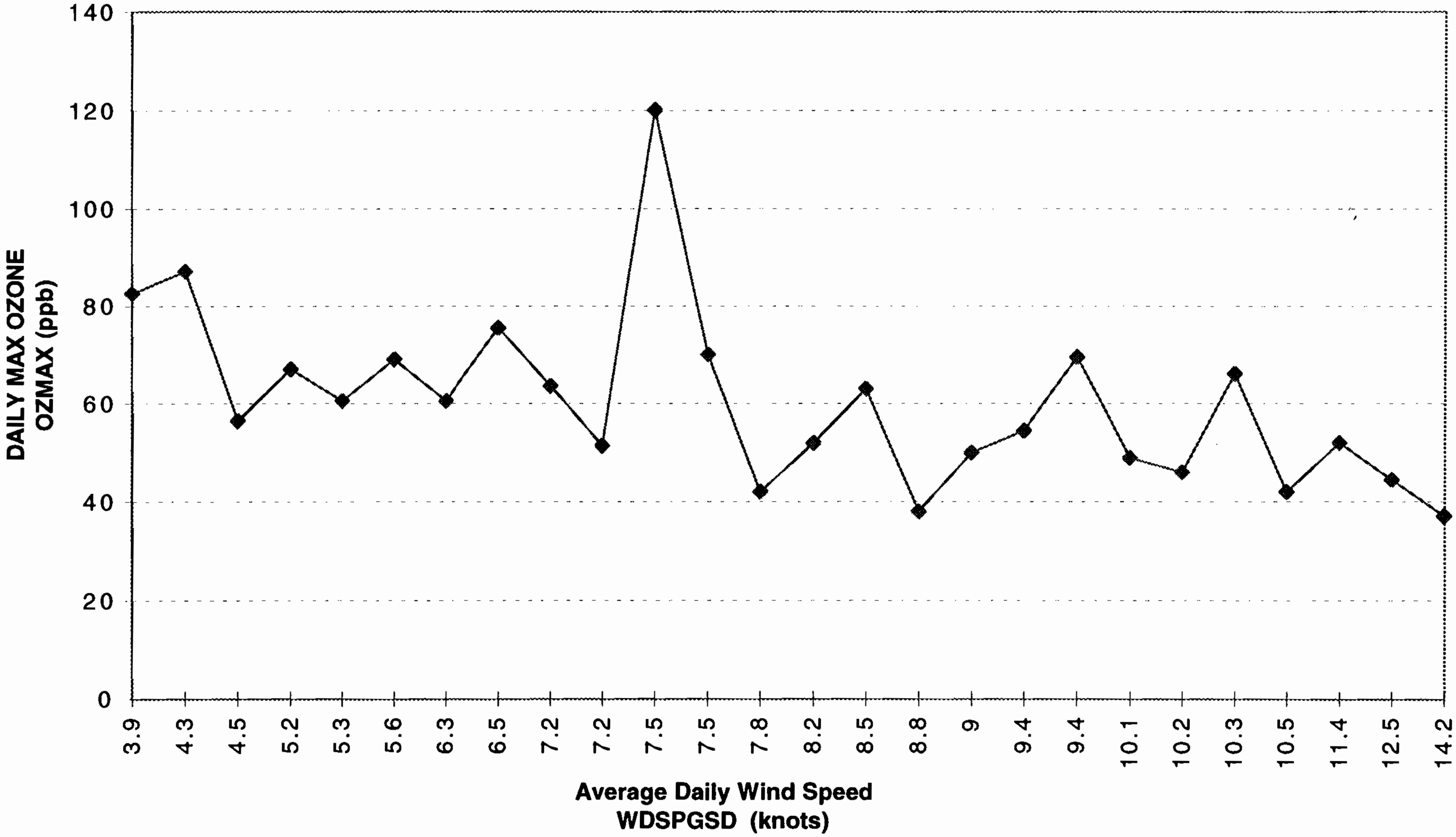


**Figure 61. SAN ANTONIO DEC'95-SEP'96 MODEL T11.1**
**DATA CONTROLLED FOR TRAFFIC CONGESTION PARAMETER GE 50th PERCENTILE**
**AND DAYS WITH CLDAVGT2 LE 3**

**DAILY MAX OZONE AS A FUNCTION OF MINIMUM DAILY TEMPERATURE**

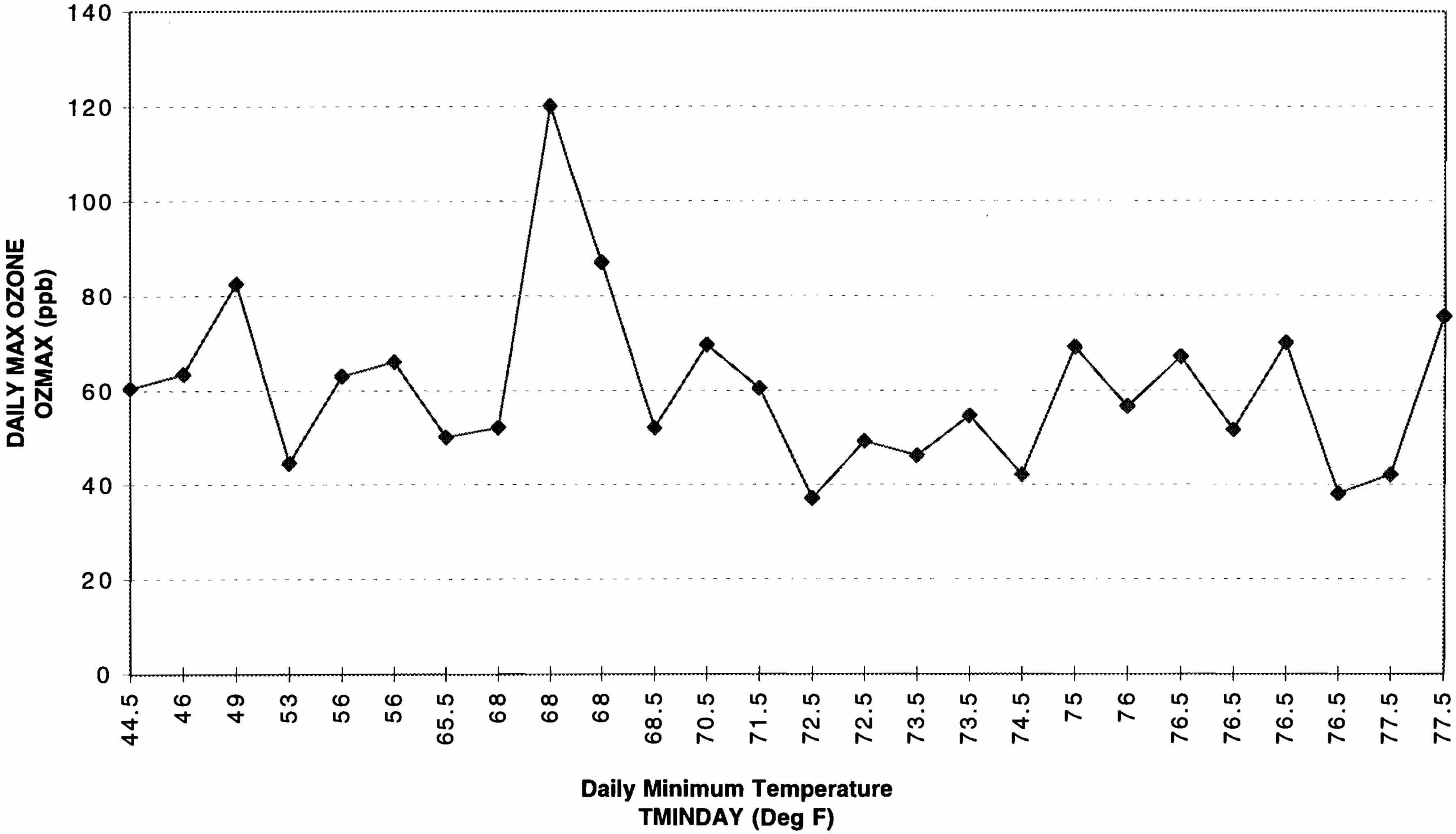
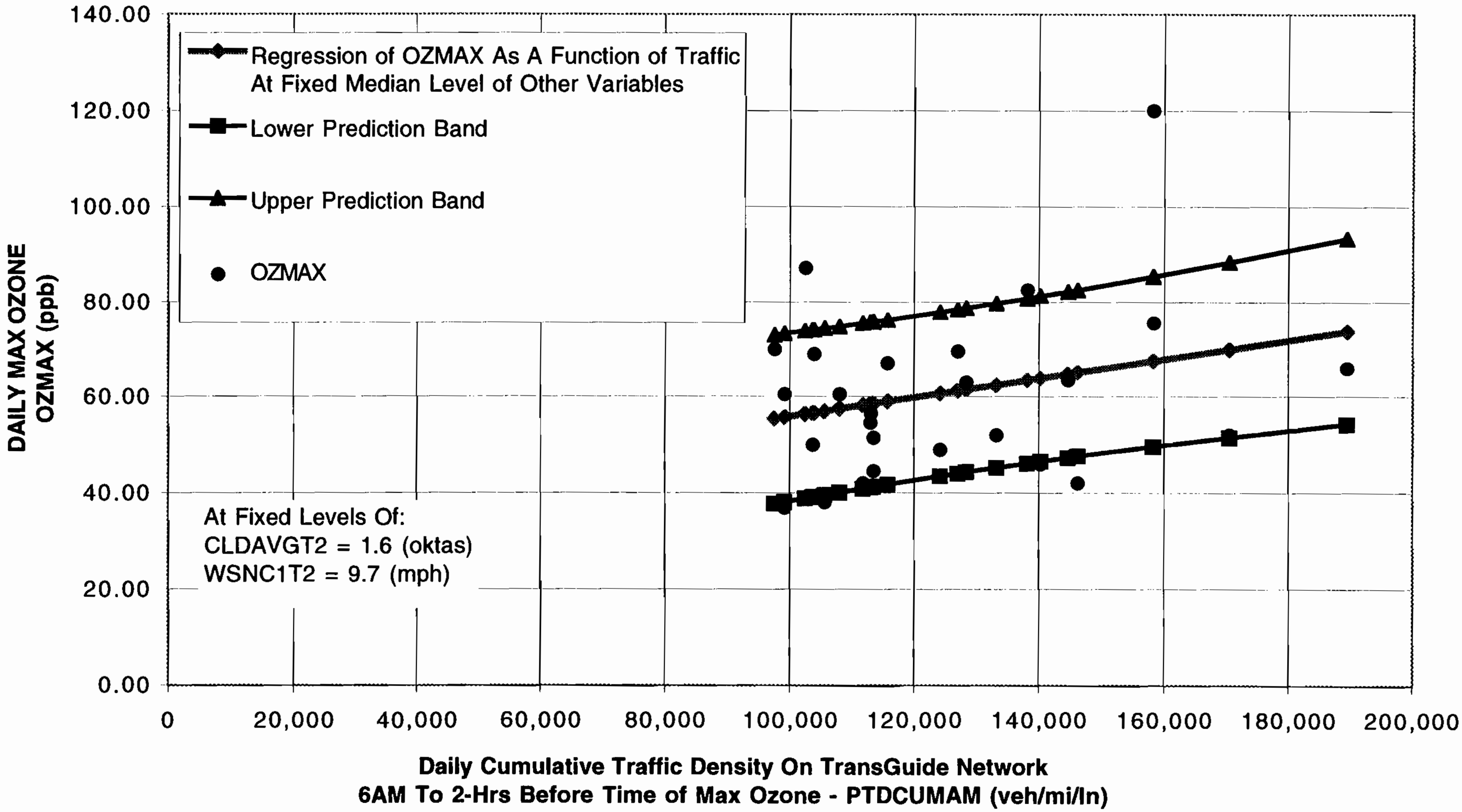


**Figure 62. SAN ANTONIO DEC'95-SEP'96 MODEL T11.1**
**DATA CONTROLLED FOR TRAFFIC CONGESTION PARAMETER GE 50th PERCENTILE**
**AND DAYS WITH CLDAVGT2 LE 3**

**80% CONFIDENCE PREDICTION BAND ON DAILY MAX OZONE AS A FUNCTION OF TRANSGUIDE NETWORK CUMULATIVE TRAFFIC DENSITY AT FIXED LEVELS OF OTHER INDEPENDENT VARIABLES (MEDIAN LEVELS)**



## SCENARIO 7

In Scenario 7, we repeat the analysis of Scenario 5 except that we control for days where the traffic congestion parameter PTDCUMAM is less than, rather than greater than or equal to as in Scenario 5, the median traffic congestion level for the months from December 1995 through September 1996. The analysis results in no detection of a significant association between the traffic congestion parameter and the peak ozone concentration.

The finding of a lack of significance of the traffic congestion parameter under this scenario does not prove that, when the parameter is less than the median level, it does not affect the daily peak ozone concentration. We can only conclude that under the conditions of this scenario, we are not able to detect any possible relationship that might exist at our minimum confidence level of 80 percent. Table 18 summarizes the results of the model and Table 19 summarizes the raw data for Scenario 7 sorted by date.

Figure 63 and Figure 64 plot the daily peak ozone (OZMAX) and the daily cumulative traffic congestion parameter (PTDCUMAM) over time. Figure 65 through Figure 71 graphically summarize the relationships between the response and predictor variables.

*Table 18. Scenario 7 Results*

| | | | RANGE OF VARIABLES |
|---|---|---|---|
| **DATA CONTROLS** | 1) DEC 1995 - SEP 1996<br><br>2) DAYS WITH PTDCUMAM LT 50th PERCENTILE<br><br>3) AVG CLOUD COVER FROM 6AM TO TIME OF MAX OZONE LE 3 OKTAS | | |
| **MODEL SIGNIFICANT PARAMETERS (units)** | Y --- OZMAX (ppb)<br>XO --- INTERCEPT<br>X1 --- CLDAVGT2 (oktas)<br>X2 --- TMAXDAY ( Deg F)<br>X3 --- WDSPGSD (knots) | | 18.5 to 105.5<br><br>0 to 3<br>40 to 98<br>3.1 to 14.2 |
| **SIGNIFICANT PARAMETER COEFFICIENT ESTIMATES AND BIVARIATE CORRELATIONS (r)** | 17.15344090 X0<br>-6.88355144 X1<br>0.69353318 X2<br>-1.53784384 X3 | <br>-0.2636<br>0.5580<br>-0.3895 | |
| **TRAFFIC VARIABLE COEFFICIENT CONFIDENCE-LEVEL** | NA | | |
| **MODEL R-SQUARE** | 0.53 | | |
| **TRAFFIC VARIABLE PARTIAL R-SQUARE** | NA | | |
| **SAMPLE SIZE** | 53 | | |
| **1st ORDER AUTO-CORRELATION Durbin-Watson Statistic** | 1.219 | | |
| **P-VALUE SUPPORTING $H_O$: No Heteroskedasticity** | 0.5522 | | |

*Table 19. Scenario 7 Data*

| DATECST | OZMAX | PTDCUMAM | OZINT | CLDAVGT2 | WSNC1T2 | TMAXDAY | WDSPGSD | TMINDAY |
|---|---|---|---|---|---|---|---|---|
| 12/9/95 | 27.5 | 71,780 | 10 | 2.50 | 19.04 | 50 | 13.5 | 32.5 |
| 12/10/95 | 27 | 57,496 | 13 | 1.27 | 9.05 | 48 | 7.1 | 26.5 |
| 12/26/95 | 18.5 | 33,175 | 1.5 | 3.00 | 3.55 | 55 | 3.1 | 39 |
| 12/27/95 | 46 | 93,809 | 0 | 1.88 | 5.88 | 63 | 3.9 | 37 |
| 1/2/96 | 28.5 | 59,958 | 27.5 | 1.17 | 18.85 | 48.5 | 14.2 | 37.5 |
| 1/3/96 | 30.5 | 91,286 | 5.5 | 0.27 | 7.68 | 53 | 6.8 | 29.5 |
| 1/5/96 | 23 | 86,206 | 1 | 2.76 | 10.41 | 61 | 5 | 41.5 |
| 1/7/96 | 36 | 31,789 | 24.5 | 0.25 | 13.16 | 45 | 8.6 | 25 |
| 1/10/96 | 40 | 93,327 | 1 | 2.40 | 5.93 | 67 | 3.6 | 36.5 |
| 1/11/96 | 35.5 | 92,097 | 14 | 2.14 | 16.70 | 65 | 8.9 | 42 |
| 1/12/96 | 38 | 84,915 | 12 | 0.29 | 9.58 | 74 | 6 | 40 |
| 1/13/96 | 43 | 44,330 | 0 | 0.43 | 5.91 | 73 | 4.6 | 42 |
| 1/14/96 | 49.5 | 48,991 | 8 | 1.44 | 9.58 | 74.5 | 5.1 | 44 |
| 1/21/96 | 52 | 45,640 | 27 | 0.00 | 7.97 | 71 | 3.6 | 45 |
| 1/27/96 | 29.5 | 46,823 | 23.5 | 1.43 | 11.18 | 53 | 8.9 | 33.5 |
| 2/4/96 | 33 | 26,324 | 18.5 | 0.29 | 9.69 | 40 | 5.6 | 19.5 |
| 2/11/96 | 35.5 | 56,631 | 29 | 2.12 | 20.04 | 64 | 12.2 | 48.5 |
| 2/14/96 | 45 | 89,558 | 24.5 | 0.86 | 10.92 | 79.5 | 8.1 | 49 |
| 2/17/96 | 53 | 65,381 | 2 | 2.00 | 10.35 | 69 | 6.3 | 35 |
| 3/9/96 | 35.5 | 91,103 | 6 | 0.82 | 9.61 | 52 | 5.9 | 28.5 |
| 3/10/96 | 62 | 54,976 | 0 | 0.42 | 8.18 | 61 | 4.4 | 30 |
| 3/13/96 | 45.5 | 72,334 | 3.5 | 1.90 | 9.85 | 82 | 10 | 51.5 |
| 3/17/96 | 53.5 | 20,589 | 6 | 0.50 | 8.07 | 83 | 6.1 | 56 |
| 3/19/96 | 45 | 93,187 | 27.5 | 0.13 | 13.23 | 67 | 6.9 | 45 |
| 3/20/96 | 46.5 | 93,131 | 17.5 | 0.00 | 10.21 | 66 | 5.9 | 40.5 |
| 3/21/96 | 59 | 79,438 | 0 | 0.13 | 7.82 | 73 | 4.8 | 38.5 |
| 3/25/96 | 35 | 72,492 | 29 | 2.67 | 23.01 | 66 | 11 | 46 |
| 3/31/96 | 49 | 66,257 | 35 | 2.63 | 13.61 | 72 | 9.4 | 52 |
| 4/7/96 | 63 | 80,590 | 13 | 1.45 | 5.27 | 66 | 3.8 | 41 |
| 4/9/96 | 62 | 83,988 | 17.5 | 0.40 | 11.07 | 88.5 | 4.7 | 57 |
| 4/10/96 | 62.5 | 81,961 | 16 | 0.57 | 6.55 | 86 | 4.8 | 56.5 |
| 4/14/96 | 54.5 | 47,000 | 22 | 2.67 | 10.41 | 88 | 9.8 | 66 |
| 6/4/96 | 58 | 66,574 | 35 | 2.77 | 9.34 | 91.5 | 5.8 | 69 |
| 6/8/96 | 63.5 | 54,669 | 12 | 0.25 | 6.92 | 90 | 3.4 | 64.5 |
| 6/9/96 | 84 | 80,549 | 12.5 | 1.68 | 8.37 | 90.5 | 4.5 | 64.5 |
| 6/14/96 | 44.5 | 83,580 | 4 | 2.86 | 7.63 | 95 | 7.8 | 76.5 |

*Table 19. Scenario 7 Data (continued)*

| DATECST | OZMAX | PTDCUMAM | OZINT | CLDAVGT2 | WSNC1T2 | TMAXDAY | WDSPGSD | TMINDAY |
|---|---|---|---|---|---|---|---|---|
| 6/15/96 | 40.5 | 46,819 | 6.5 | 2.29 | 8.29 | 94 | 8.6 | 75.5 |
| 6/16/96 | 35 | 39,835 | 2.5 | 2.94 | 7.82 | 95 | 7.7 | 75 |
| 6/30/96 | 60.5 | 28,900 | 0 | 1.00 | 3.99 | 92 | 6.4 | 73 |
| 7/2/96 | 98 | 88,279 | 3 | 0.56 | 5.24 | 96 | 5.8 | 75.5 |
| 7/3/96 | 99.5 | 78,502 | 0.5 | 0.25 | 5.39 | 95.5 | 7.1 | 74.5 |
| 7/4/96 | 105.5 | 15,650 | 4.5 | 1.00 | 3.15 | 96 | 5.6 | 74.5 |
| 7/5/96 | 58.5 | 73,601 | 6.5 | 2.22 | 6.77 | 96 | 7 | 74.5 |
| 7/7/96 | 63 | 47,373 | 7 | 1.80 | 6.52 | 97.5 | 7.3 | 76 |
| 7/13/96 | 41 | 75,441 | 1 | 2.38 | 8.97 | 96.5 | 8.3 | 76.5 |
| 7/20/96 | 39 | 58,253 | 7.5 | 2.53 | 10.58 | 98 | 9.4 | 76.5 |
| 7/21/96 | 36 | 38,347 | 5 | 2.91 | 10.62 | 97 | 10 | 75.5 |
| 8/10/96 | 35 | 59,379 | 6.5 | 1.95 | 7.66 | 94.5 | 8.2 | 76.5 |
| 8/11/96 | 44.5 | 37,932 | 4 | 1.78 | 6.48 | 94.5 | 8 | 76.5 |
| 8/17/96 | 42.5 | 68,937 | 11.5 | 2.90 | 7.91 | 94 | 8.3 | 75.5 |
| 9/6/96 | 58 | 80,528 | 0 | 1.13 | 3.73 | 88.5 | 3.9 | 72 |
| 9/10/96 | 84 | 52,634 | 0 | 2.35 | 5.92 | 90 | 4.2 | 73 |
| 9/16/96 | 67 | 91,576 | 0.5 | 2.72 | 5.30 | 94.5 | 4.2 | 75 |

**Figure 63. SAN ANTONIO DEC'95-SEP'96 MODEL T10.1
DATA CONTROLLED FOR TRAFFIC CONGESTION PARAMETER GE 50th PERCENTILE
AND DAYS WITH CLDAVGT2 LE 3**

**DAILY MAXIMUM OZONE CONCENTRATIONS**

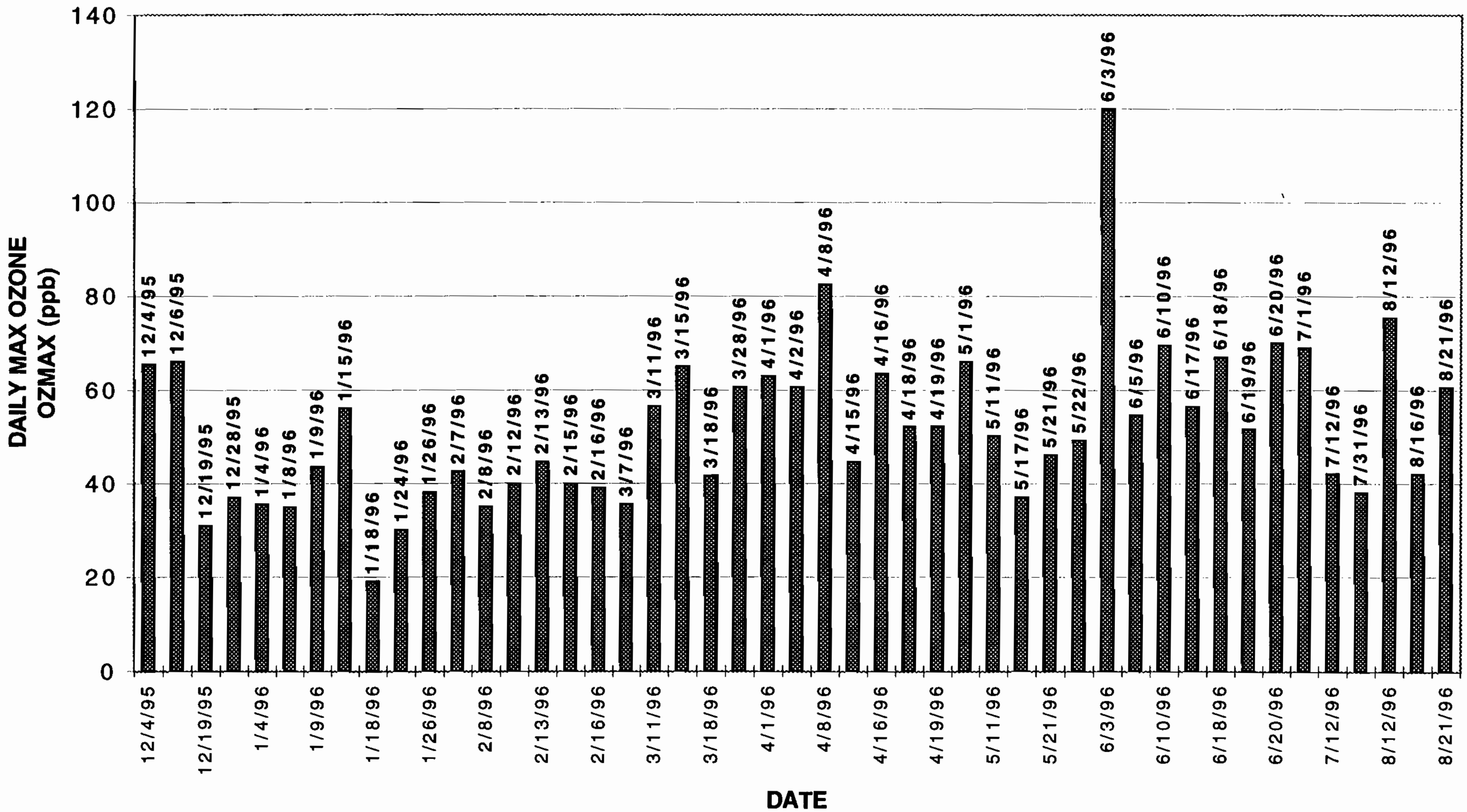


Figure 64. SAN ANTONIO DEC'95-SEP'96 MODEL T10.1
DATA CONTROLLED FOR TRAFFIC CONGESTION PARAMETER GE 50th PERCENTILE
AND DAYS WITH CLDAVGT2 LE 3

DAILY CUMULATIVE TRANSGUIDE NETWORK TRAFFIC DENSITY
6AM to 2 HOURS BEFORE TIME of MAX OZONE

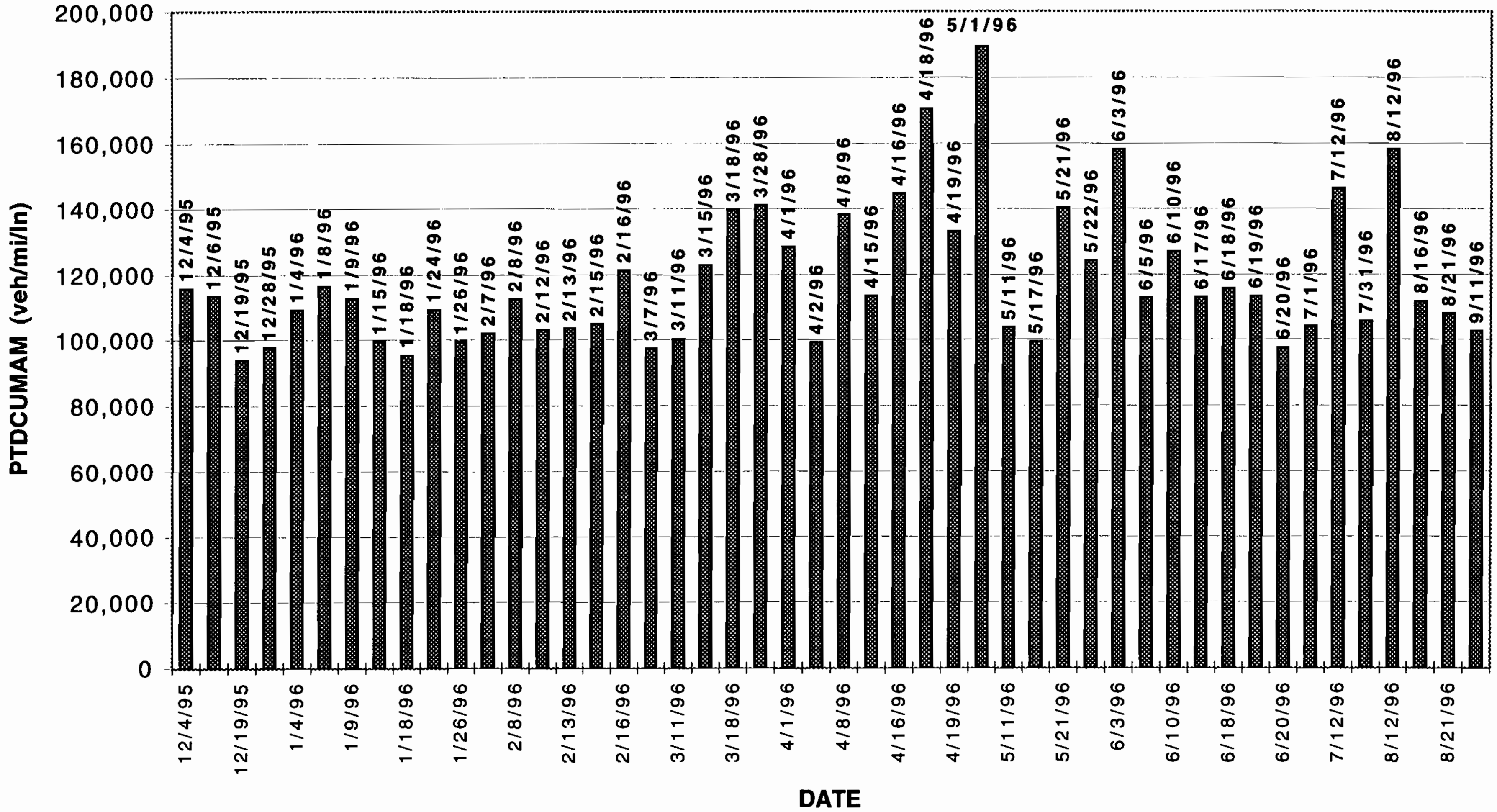


Figure 65. SAN ANTONIO DEC'95-SEP'96 MODEL T10.1
DATA CONTROLLED FOR TRAFFIC CONGESTION PARAMETER GE 50th PERCENTILE
AND DAYS WITH CLDAVGT2 LE 3

DAILY MAX OZONE AS A FUNCTION OF DAILY CUMULATIVE TRANSGUIDE NETWORK TRAFFIC DENSITY
6AM to 2 HOURS BEFORE TIME of MAX OZONE

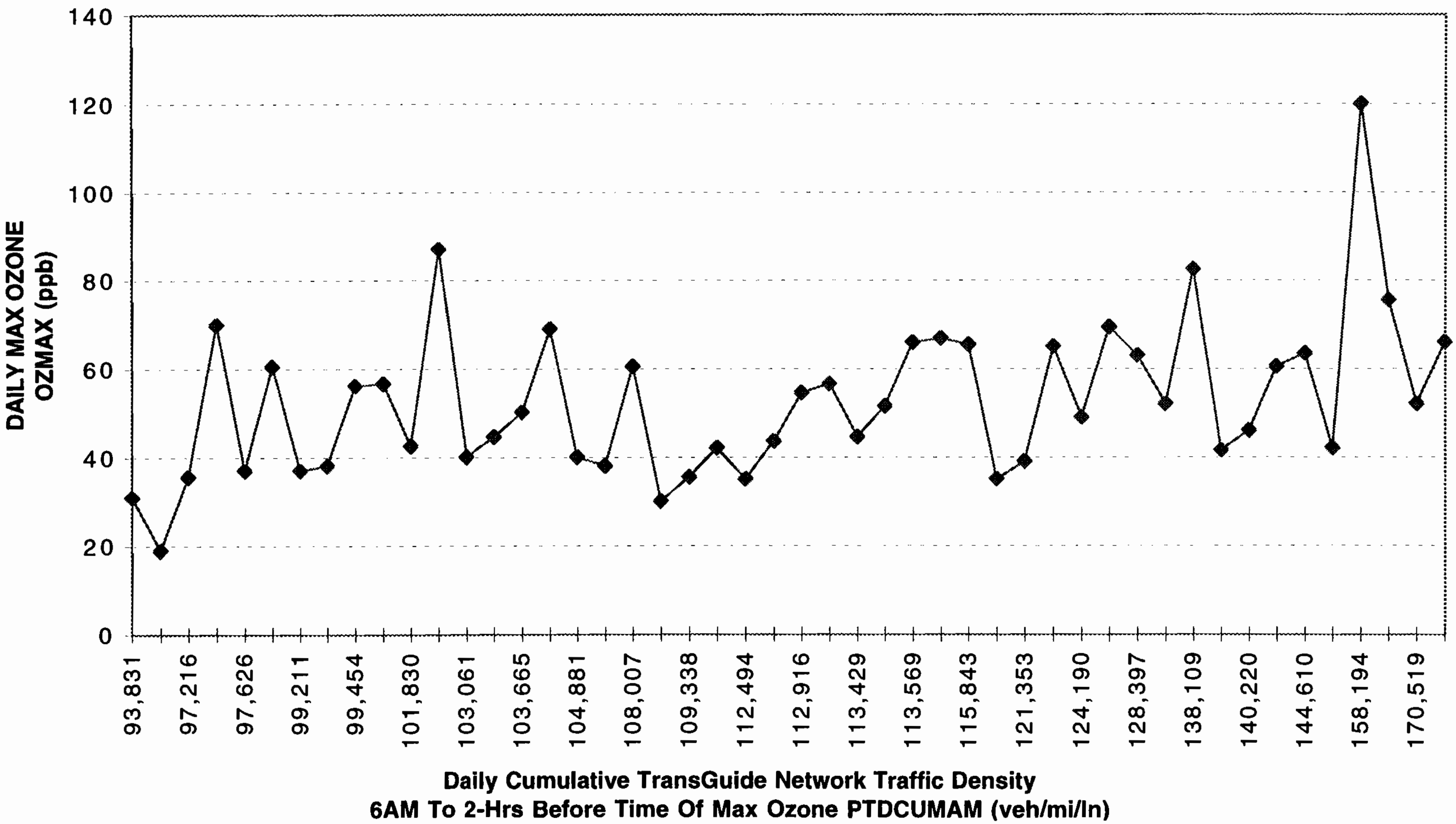


Figure 66. SAN ANTONIO DEC'95-SEP'96 MODEL T10.1
DATA CONTROLLED FOR TRAFFIC CONGESTION PARAMETER GE 50th PERCENTILE
AND DAYS WITH CLDAVGT2 LE 3

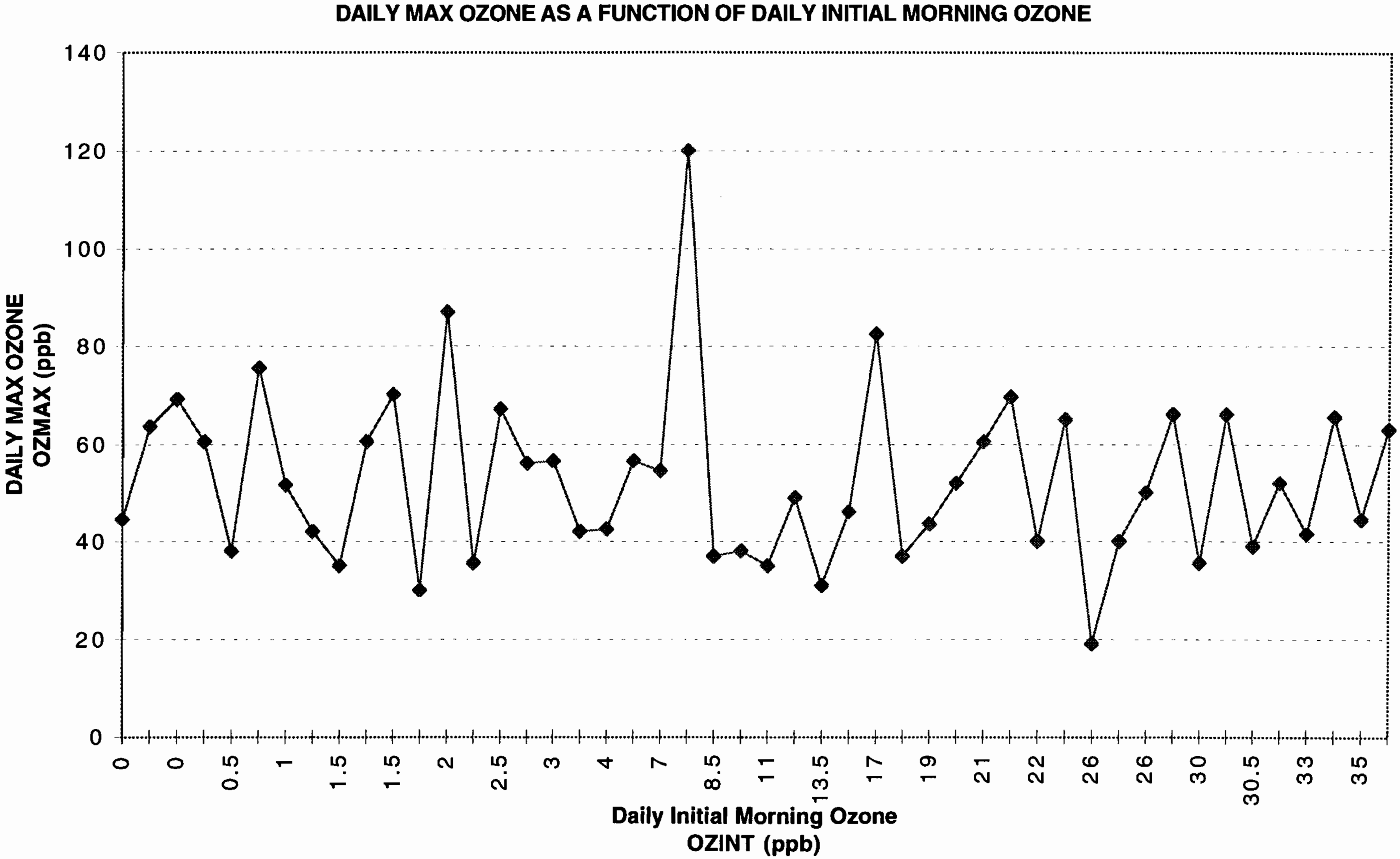


Figure 67. SAN ANTONIO DEC'95-SEP'96 MODEL T10.1
DATA CONTROLLED FOR TRAFFIC CONGESTION PARAMETER GE 50th PERCENTILE
AND DAYS WITH CLDAVGT2 LE 3

DAILY MAX OZONE AS A FUNCTION OF AVERAGE DAILY CLOUD COVER FROM 6AM TO TIME OF MAX OZONE

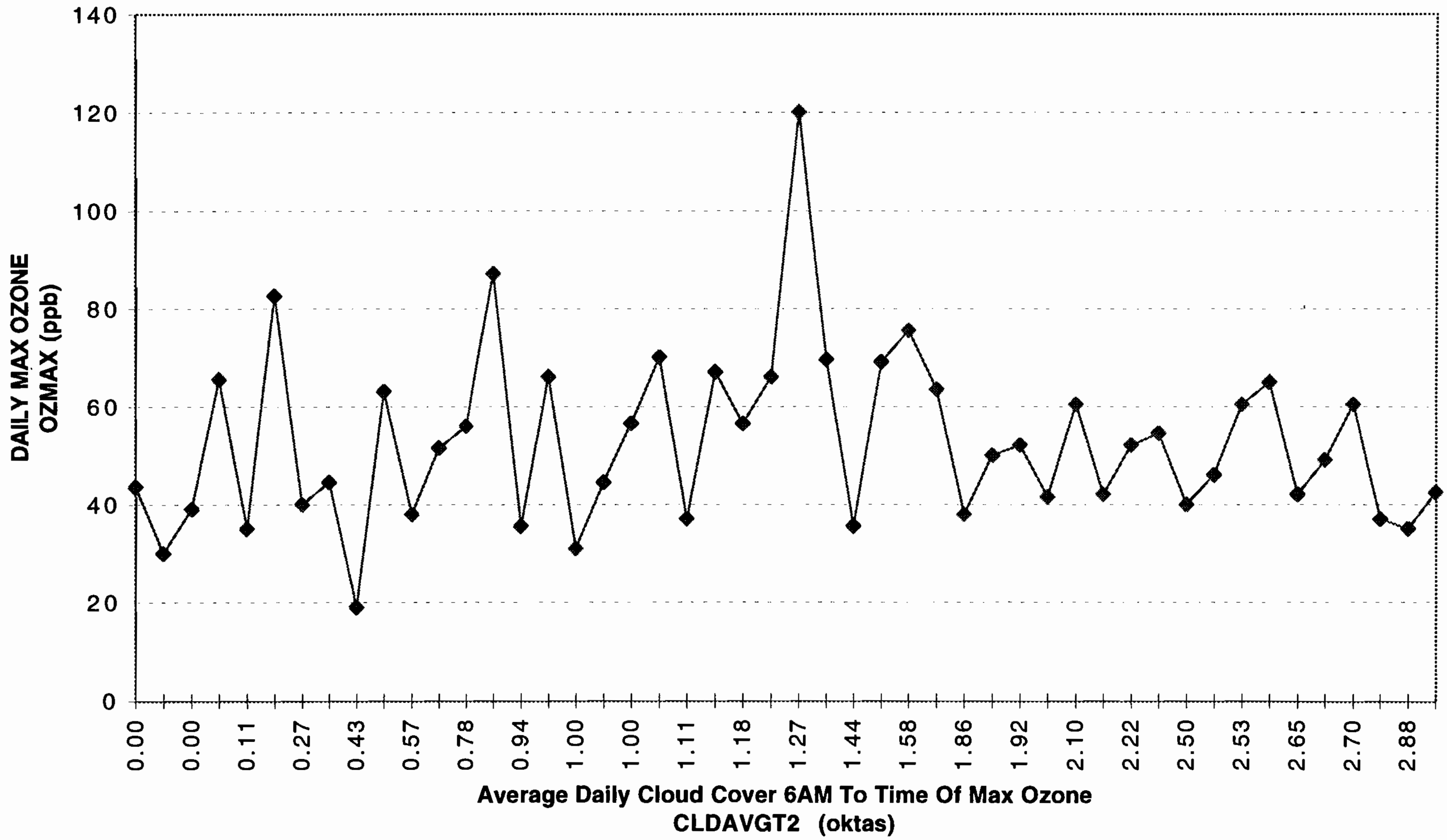


**Figure 68. SAN ANTONIO DEC'95-SEP'96 MODEL T10.1**
**DATA CONTROLLED FOR TRAFFIC CONGESTION PARAMETER GE 50th PERCENTILE**
**AND DAYS WITH CLDAVGT2 LE 3**

**DAILY MAX OZONE AS A FUNCTION OF AVERAGE DAILY WIND SPEED FROM 6AM TO TIME OF MAX OZONE**

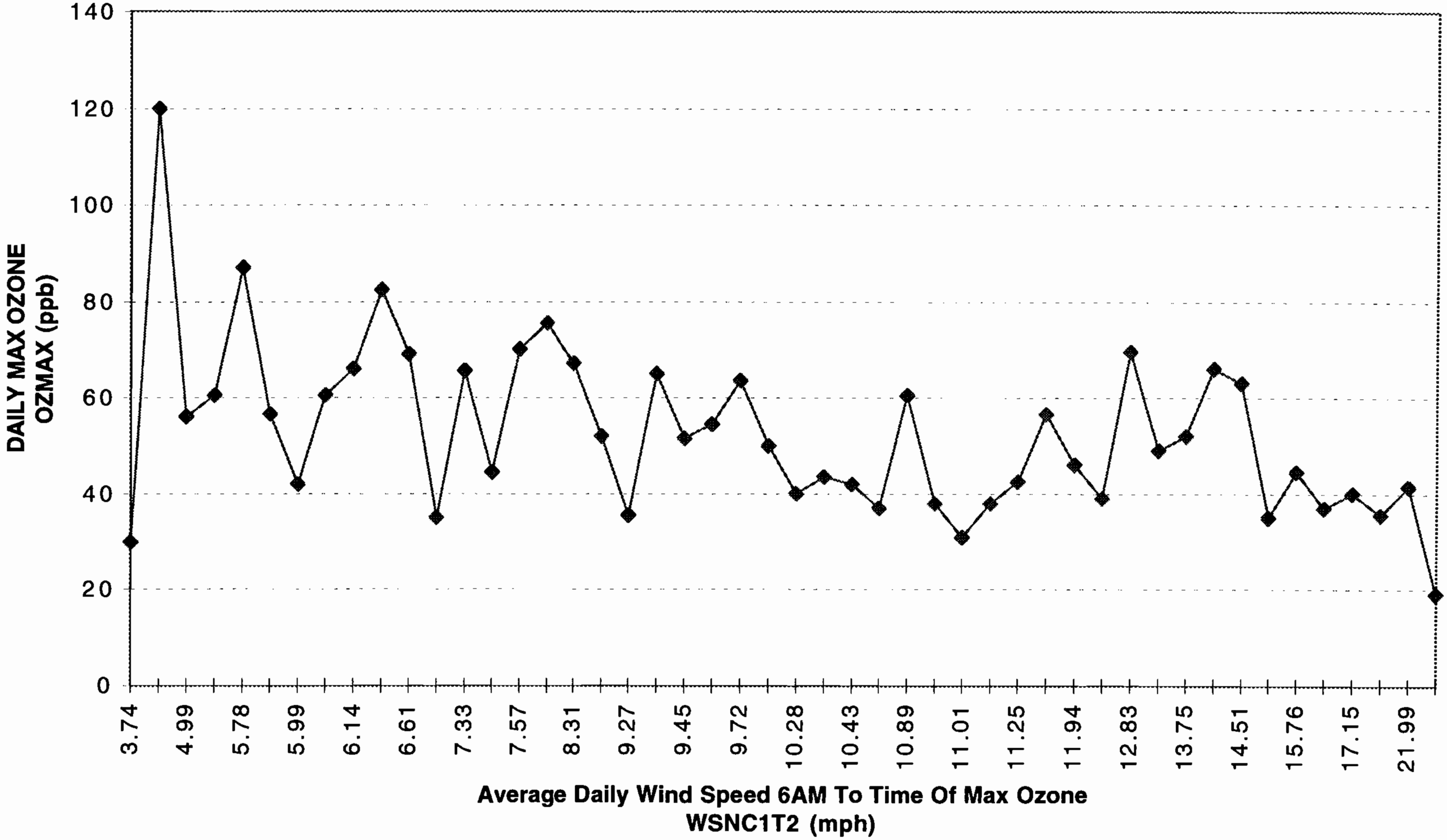


Figure 69. SAN ANTONIO DEC'95-SEP'96 MODEL T10.1
DATA CONTROLLED FOR TRAFFIC CONGESTION PARAMETER GE 50th PERCENTILE
AND DAYS WITH CLDAVGT2 LE 3

DAILY MAX OZONE AS A FUNCTION OF MAXIMUM DAILY TEMPERATURE

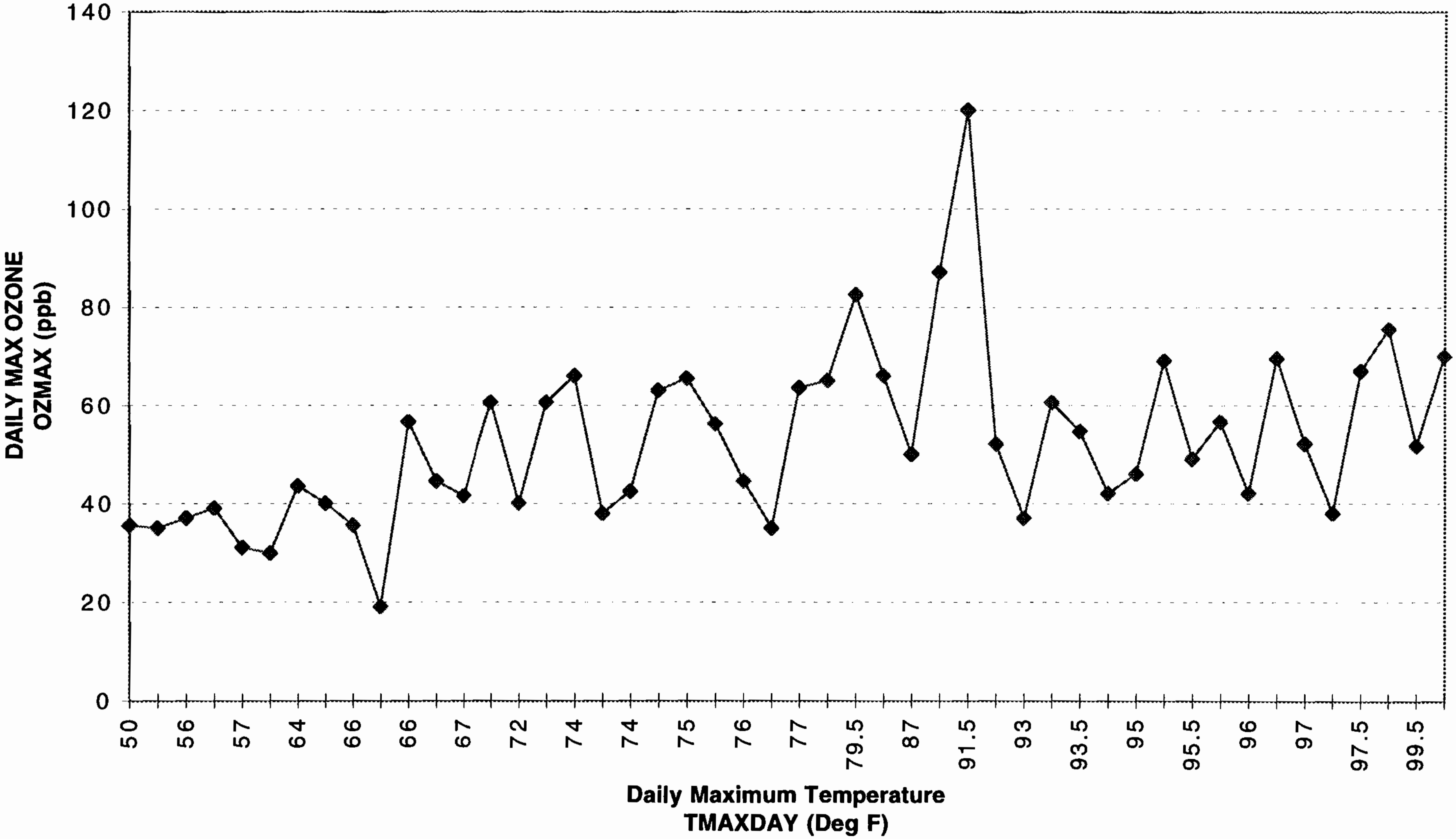


**Figure 70. SAN ANTONIO DEC'95-SEP'96 MODEL T10.1**
**DATA CONTROLLED FOR TRAFFIC CONGESTION PARAMETER GE 50th PERCENTILE**
**AND DAYS WITH CLDAVGT2 LE 3**

**DAILY MAX OZONE AS A FUNCTION OF AVERAGE DAILY WIND SPEED**

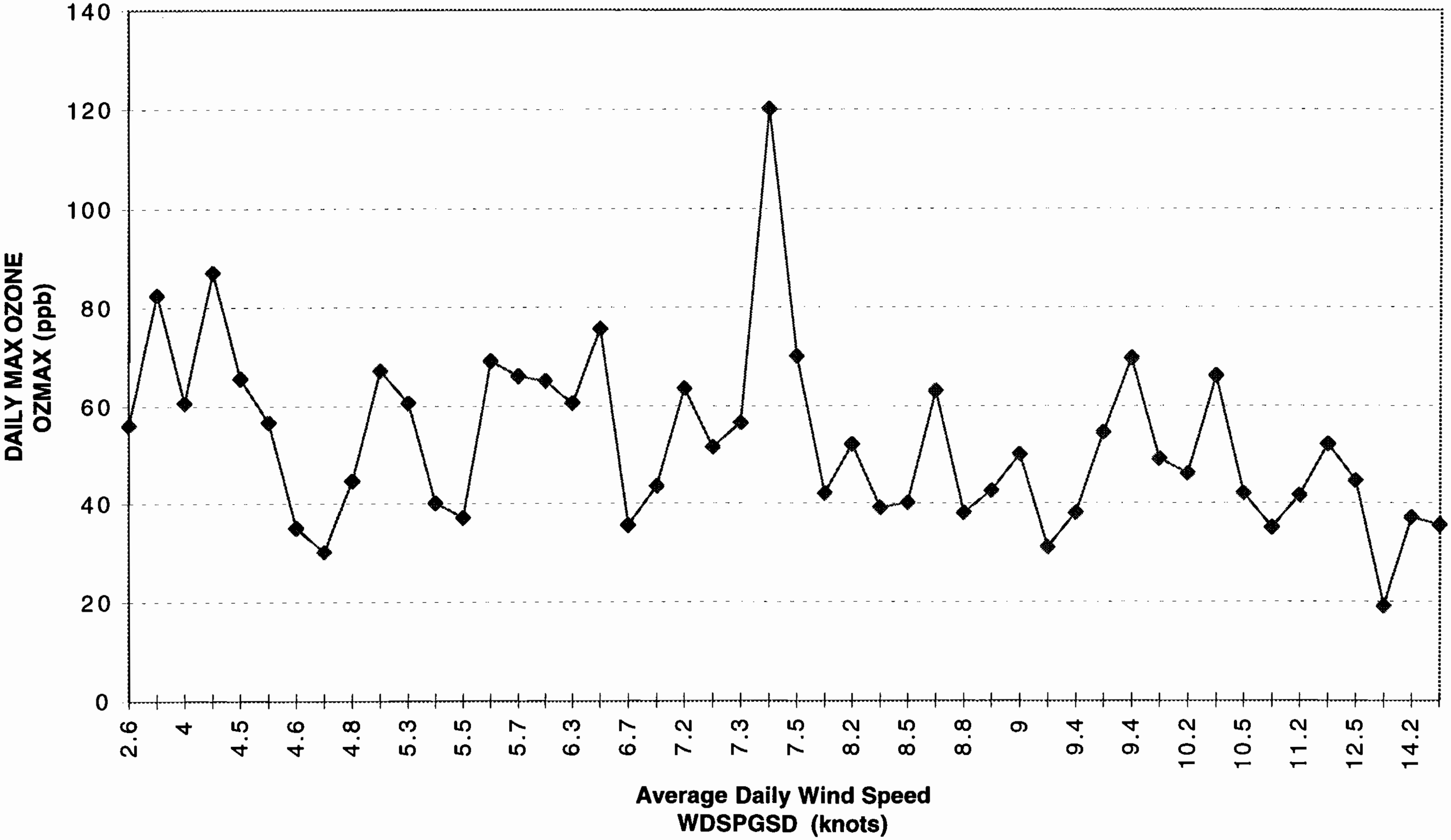
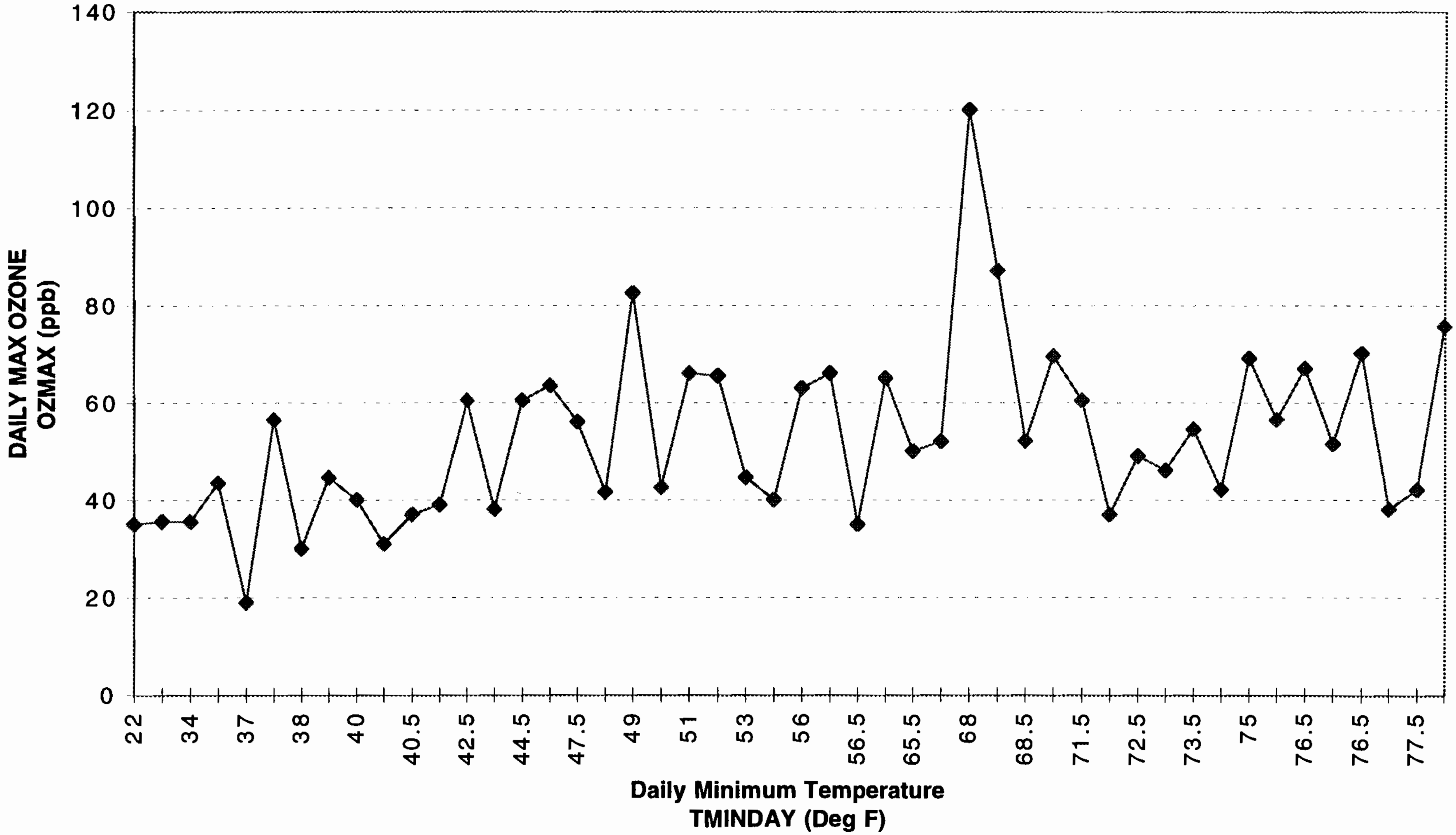


**Figure 71. SAN ANTONIO DEC'95-SEP'96 MODEL T10.1**
**DATA CONTROLLED FOR TRAFFIC CONGESTION PARAMETER GE 50th PERCENTILE**
**AND DAYS WITH CLDAVGT2 LE 3**

**DAILY MAX OZONE AS A FUNCTION OF MINIMUM DAILY TEMPERATURE**



## SCENARIO 8

In Scenario 8, we repeat the analysis of Scenario 6 except that we control for days where the traffic congestion parameter PTDCUMAM is less than, rather than greater than or equal to as in Scenario 6, the median traffic congestion level for the months from April 1996 through September 1996. The analysis results in no detection of a significant association between the traffic congestion parameter and the peak ozone concentration.

The finding of a lack of significance of the traffic congestion parameter under this scenario does not prove that, when the parameter is less than the median level, it does not affect the daily peak ozone concentration. We can only conclude that under the conditions of this scenario, we are not able to detect any possible relationship that might exist at our minimum confidence level of 80 percent. Table 20 summarizes the results of the model and Table 21 summarizes the raw data for Scenario 8 sorted by date.

Figure 72 and Figure 73 plot the daily peak ozone (OZMAX) and the daily cumulative traffic congestion parameter (PTDCUMAM) over time. Figure 74 through Figure 80 graphically summarize the relationships between the response and predictor variables.

*Table 20. Scenario 8 Results*

| | | | RANGE OF VARIABLES |
|---|---|---|---|
| **DATA CONTROLS** | 1) APR 1996 - SEP 1996<br><br>2) DAYS WITH PTDCUMAM LT 50th PERCENTILE<br><br>3) AVG CLOUD COVER FROM 6AM TO TIME OF MAX OZONE LE 3 OKTAS | | |
| **MODEL SIGNIFICANT PARAMETERS (units)** | Y --- OZMAX (ppb)<br>XO --- INTERCEPT<br>X1 --- CLDAVGT2 (oktas)<br>X2 --- WSNC1T2 (mph) | | 18.5 to 105.5<br><br>0.3 to 2.9<br>3.1 to 11.1 |
| **SIGNIFICANT PARAMETER COEFFICIENT ESTIMATES AND BIVARIATE CORRELATIONS (r)** | 102.13356207 X0<br>-9.81778898 X1<br>-3.38419705 X2 | <br>-0.6041<br>-0.5592 | |
| **TRAFFIC VARIABLE COEFFICIENT CONFIDENCE-LEVEL** | NA | | |
| **MODEL R-SQUARE** | 0.47 | | |
| **TRAFFIC VARIABLE PARTIAL R-SQUARE** | NA | | |
| **SAMPLE SIZE** | 25 | | |
| **1st ORDER AUTO-CORRELATION Durbin-Watson Statistic** | 1.758 | | |
| **P-VALUE SUPPORTING $H_O$: No Heteroskedasticity** | 0.1237 | | |

*Table 21. Scenario 8 Data*

| DATECST | OZMAX | PTDCUMAM | OZINT | CLDAVGT2 | WSNC1T2 | TMAXDAY | WDSPGSD | TMINDAY |
|---|---|---|---|---|---|---|---|---|
| 4/7/96 | 63 | 80,590 | 13 | 1.45 | 5.27 | 66 | 3.8 | 41 |
| 4/9/96 | 62 | 83,988 | 17.5 | 0.40 | 11.07 | 88.5 | 4.7 | 57 |
| 4/10/96 | 62.5 | 81,961 | 16 | 0.57 | 6.55 | 86 | 4.8 | 56.5 |
| 4/14/96 | 54.5 | 47,000 | 22 | 2.67 | 10.41 | 88 | 9.8 | 66 |
| 6/4/96 | 58 | 66,574 | 35 | 2.77 | 9.34 | 91.5 | 5.8 | 69 |
| 6/8/96 | 63.5 | 54,669 | 12 | 0.25 | 6.92 | 90 | 3.4 | 64.5 |
| 6/9/96 | 84 | 80,549 | 12.5 | 1.68 | 8.37 | 90.5 | 4.5 | 64.5 |
| 6/14/96 | 44.5 | 83,580 | 4 | 2.86 | 7.63 | 95 | 7.8 | 76.5 |
| 6/15/96 | 40.5 | 46,819 | 6.5 | 2.29 | 8.29 | 94 | 8.6 | 75.5 |
| 6/16/96 | 35 | 39,835 | 2.5 | 2.94 | 7.82 | 95 | 7.7 | 75 |
| 6/30/96 | 60.5 | 28,900 | 0 | 1.00 | 3.99 | 92 | 6.4 | 73 |
| 7/2/96 | 98 | 88,279 | 3 | 0.56 | 5.24 | 96 | 5.8 | 75.5 |
| 7/3/96 | 99.5 | 78,502 | 0.5 | 0.25 | 5.39 | 95.5 | 7.1 | 74.5 |
| 7/4/96 | 105.5 | 15,650 | 4.5 | 1.00 | 3.15 | 96 | 5.6 | 74.5 |
| 7/5/96 | 58.5 | 73,601 | 6.5 | 2.22 | 6.77 | 96 | 7 | 74.5 |
| 7/7/96 | 63 | 47,373 | 7 | 1.80 | 6.52 | 97.5 | 7.3 | 76 |
| 7/13/96 | 41 | 75,441 | 1 | 2.38 | 8.97 | 96.5 | 8.3 | 76.5 |
| 7/20/96 | 39 | 58,253 | 7.5 | 2.53 | 10.58 | 98 | 9.4 | 76.5 |
| 7/21/96 | 36 | 38,347 | 5 | 2.91 | 10.62 | 97 | 10 | 75.5 |
| 8/10/96 | 35 | 59,379 | 6.5 | 1.95 | 7.66 | 94.5 | 8.2 | 76.5 |
| 8/11/96 | 44.5 | 37,932 | 4 | 1.78 | 6.48 | 94.5 | 8 | 76.5 |
| 8/17/96 | 42.5 | 68,937 | 11.5 | 2.90 | 7.91 | 94 | 8.3 | 75.5 |
| 9/6/96 | 58 | 80,528 | 0 | 1.13 | 3.73 | 88.5 | 3.9 | 72 |
| 9/10/96 | 84 | 52,634 | 0 | 2.35 | 5.92 | 90 | 4.2 | 73 |
| 9/16/96 | 67 | 91,576 | 0.5 | 2.72 | 5.30 | 94.5 | 4.2 | 75 |

Figure 72. SAN ANTONIO APR'96-SEP'96 MODEL T11.2
DATA CONTROLLED FOR TRAFFIC CONGESTION PARAMETER LT 50th PERCENTILE
AND DAYS WITH CLDAVGT2 LE 3

DAILY MAXIMUM OZONE CONCENTRATIONS

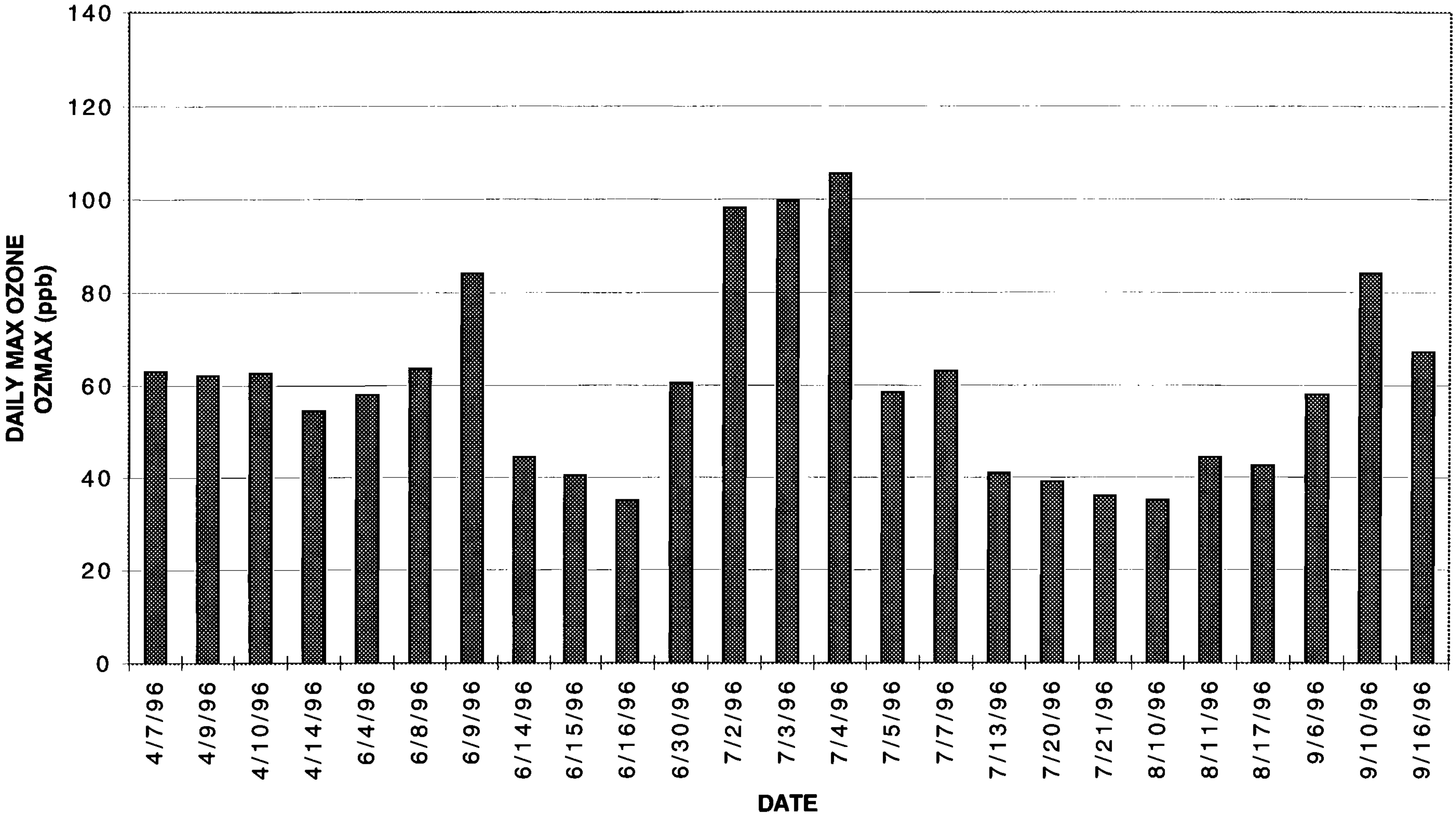


Figure 73. SAN ANTONIO APR'96-SEP'96 MODEL T11.2
DATA CONTROLLED FOR TRAFFIC CONGESTION PARAMETER LT 50th PERCENTILE
AND DAYS WITH CLDAVGT2 LE 3

DAILY CUMULATIVE TRANSGUIDE NETWORK TRAFFIC DENSITY
6AM to 2 HOURS BEFORE TIME of MAX OZONE

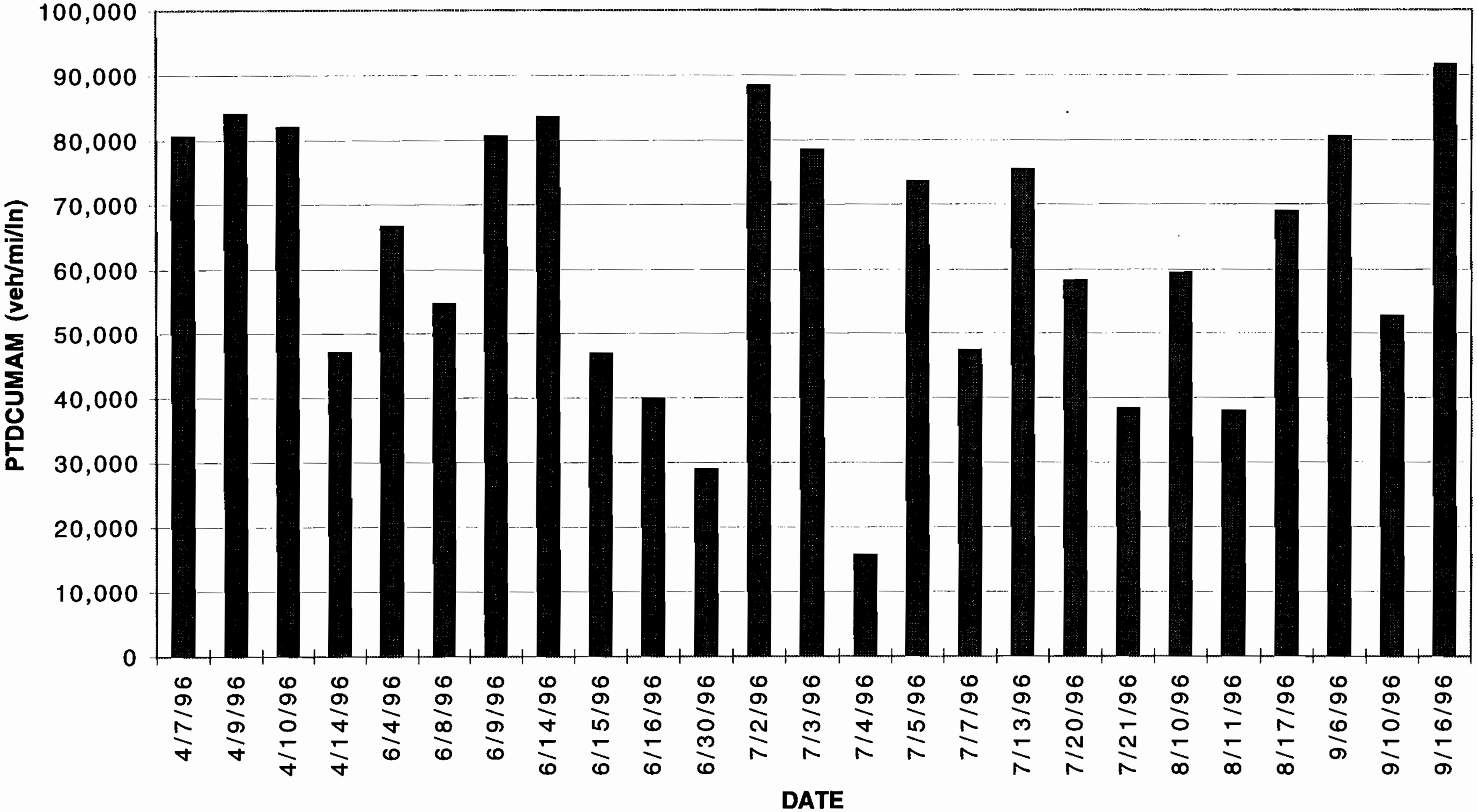


**Figure 74. SAN ANTONIO APR'96-SEP'96 MODEL T11.2**
**DATA CONTROLLED FOR TRAFFIC CONGESTION PARAMETER LT 50th PERCENTILE**
**AND DAYS WITH CLDAVGT2 LE 3**

**DAILY MAX OZONE AS A FUNCTION OF DAILY CUMULATIVE TRANSGUIDE NETWORK TRAFFIC DENSITY**
**6AM to 2 HOURS BEFORE TIME of MAX OZONE**

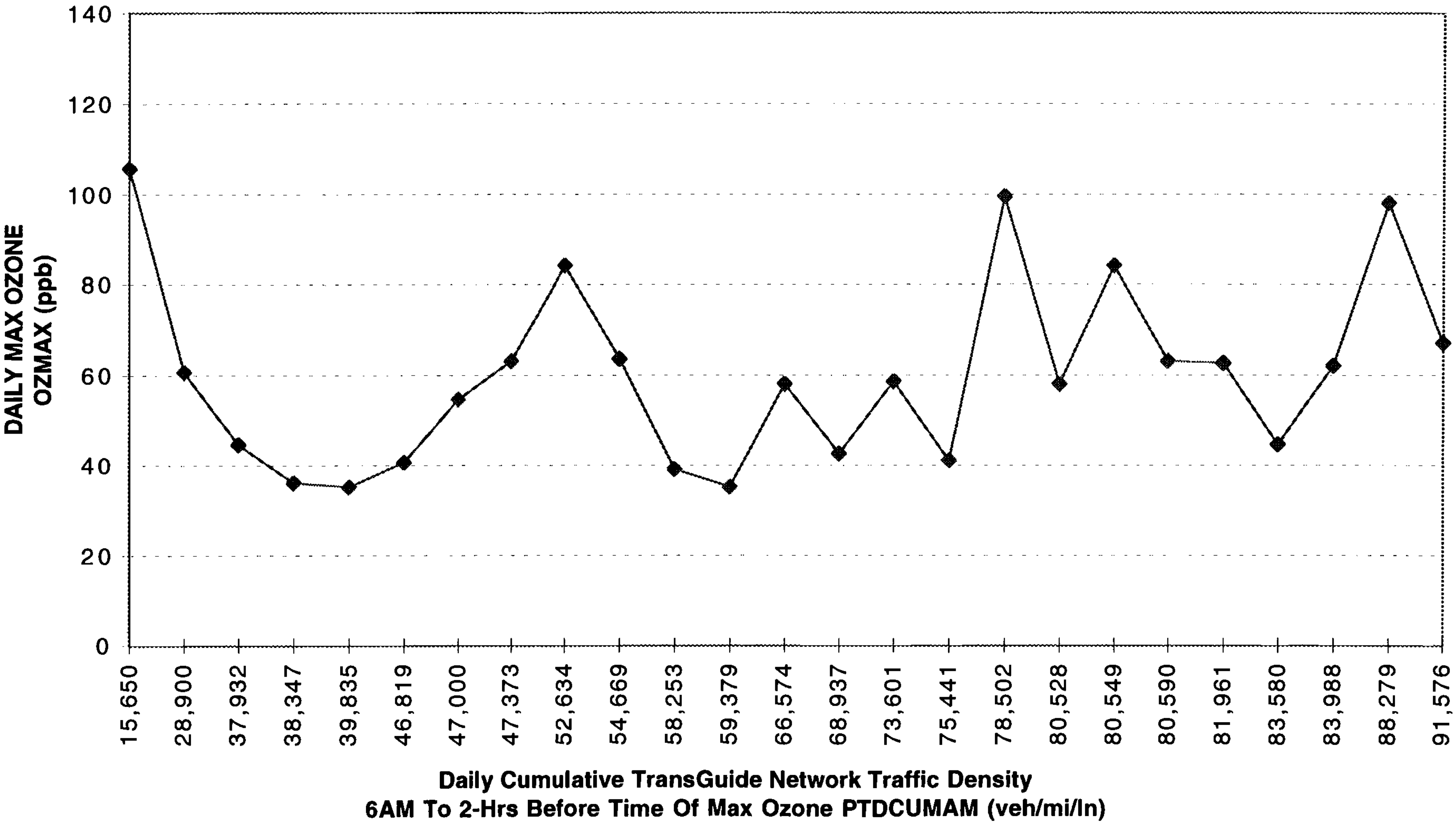


Figure 75. SAN ANTONIO APR'96-SEP'96 MODEL T11.2
DATA CONTROLLED FOR TRAFFIC CONGESTION PARAMETER LT 50th PERCENTILE
AND DAYS WITH CLDAVGT2 LE 3

DAILY MAX OZONE AS A FUNCTION OF DAILY INITIAL MORNING OZONE

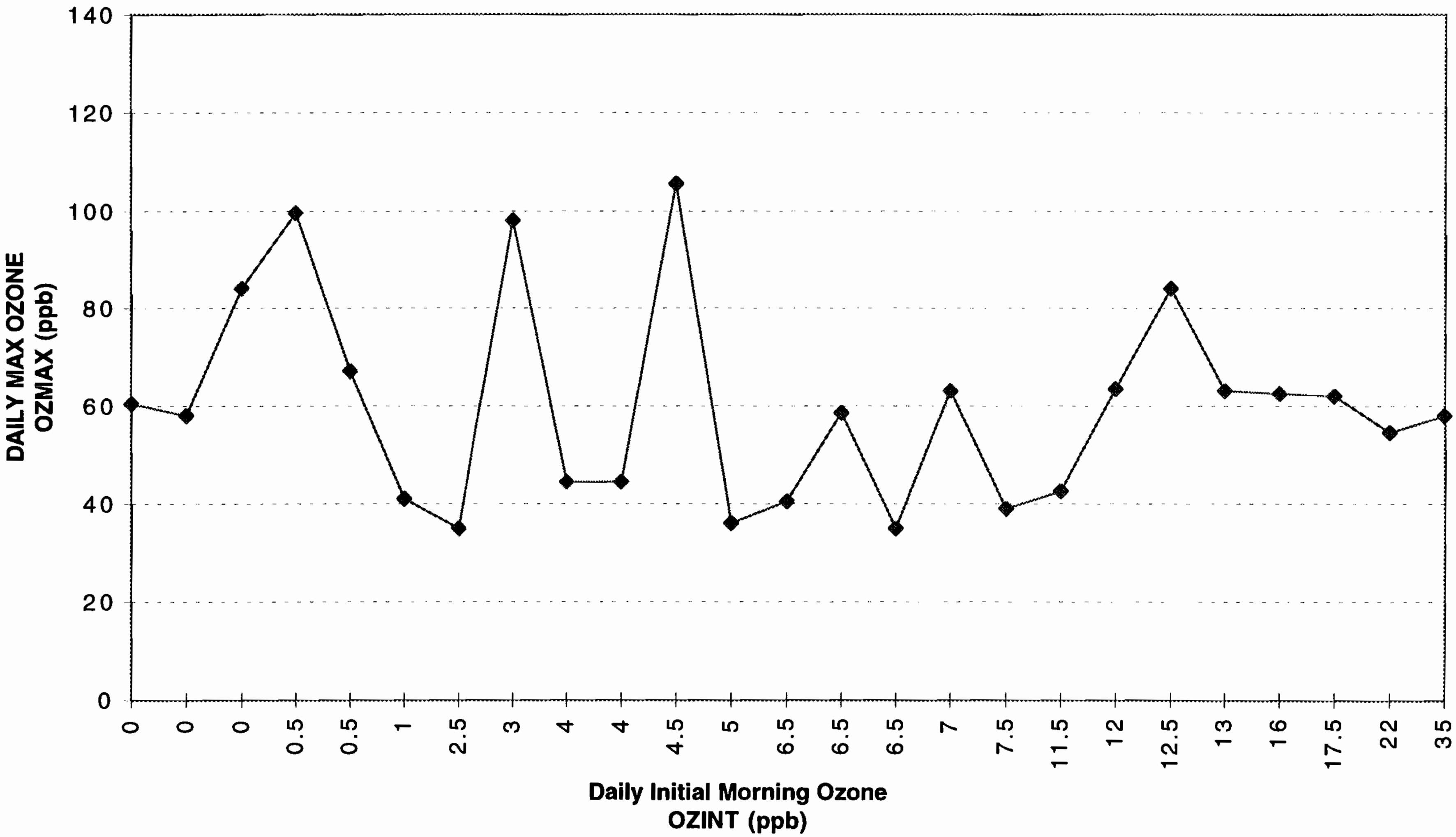


Figure 76. SAN ANTONIO APR'96-SEP'96 MODEL T11.2
DATA CONTROLLED FOR TRAFFIC CONGESTION PARAMETER LT 50th PERCENTILE
AND DAYS WITH CLDAVGT2 LE 3

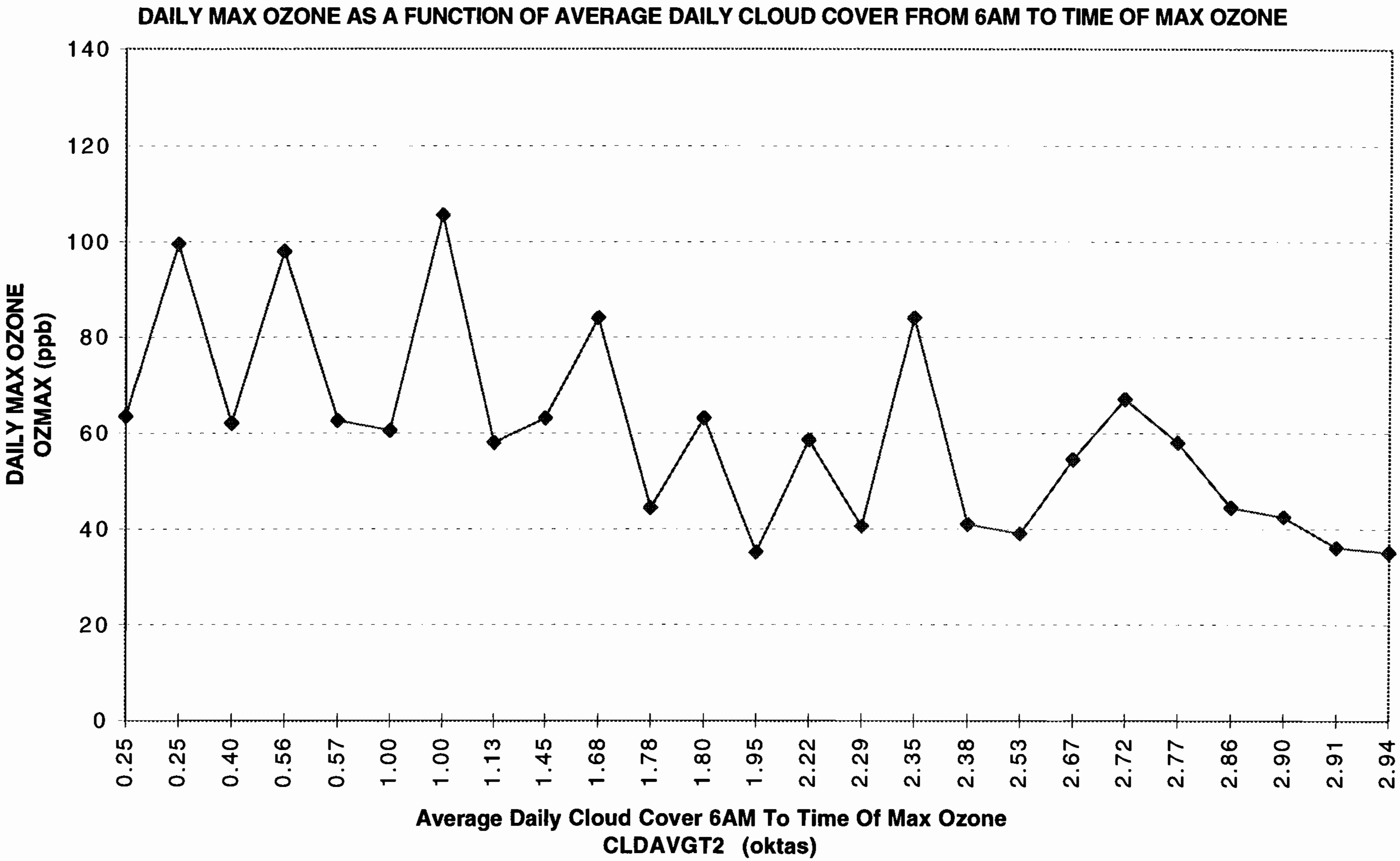


**Figure 77. SAN ANTONIO APR'96-SEP'96 MODEL T11.2**
**DATA CONTROLLED FOR TRAFFIC CONGESTION PARAMETER LT 50th PERCENTILE**
**AND DAYS WITH CLDAVGT2 LE 3**

**DAILY MAX OZONE AS A FUNCTION OF AVERAGE DAILY WIND SPEED FROM 6AM TO TIME OF MAX OZONE**

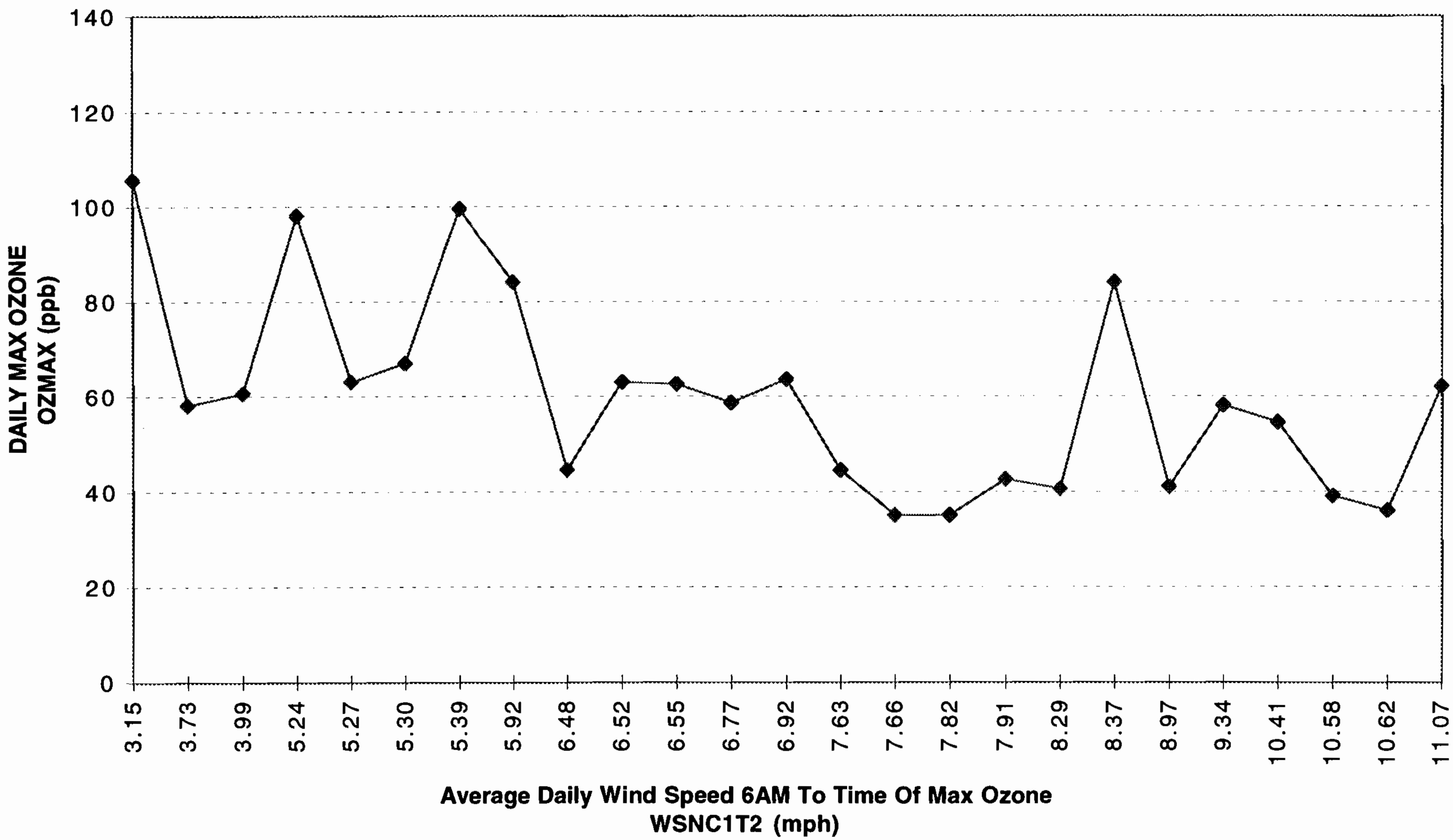


Figure 78. SAN ANTONIO APR'96-SEP'96 MODEL T11.2
DATA CONTROLLED FOR TRAFFIC CONGESTION PARAMETER LT 50th PERCENTILE
AND DAYS WITH CLDAVGT2 LE 3

DAILY MAX OZONE AS A FUNCTION OF MAXIMUM DAILY TEMPERATURE

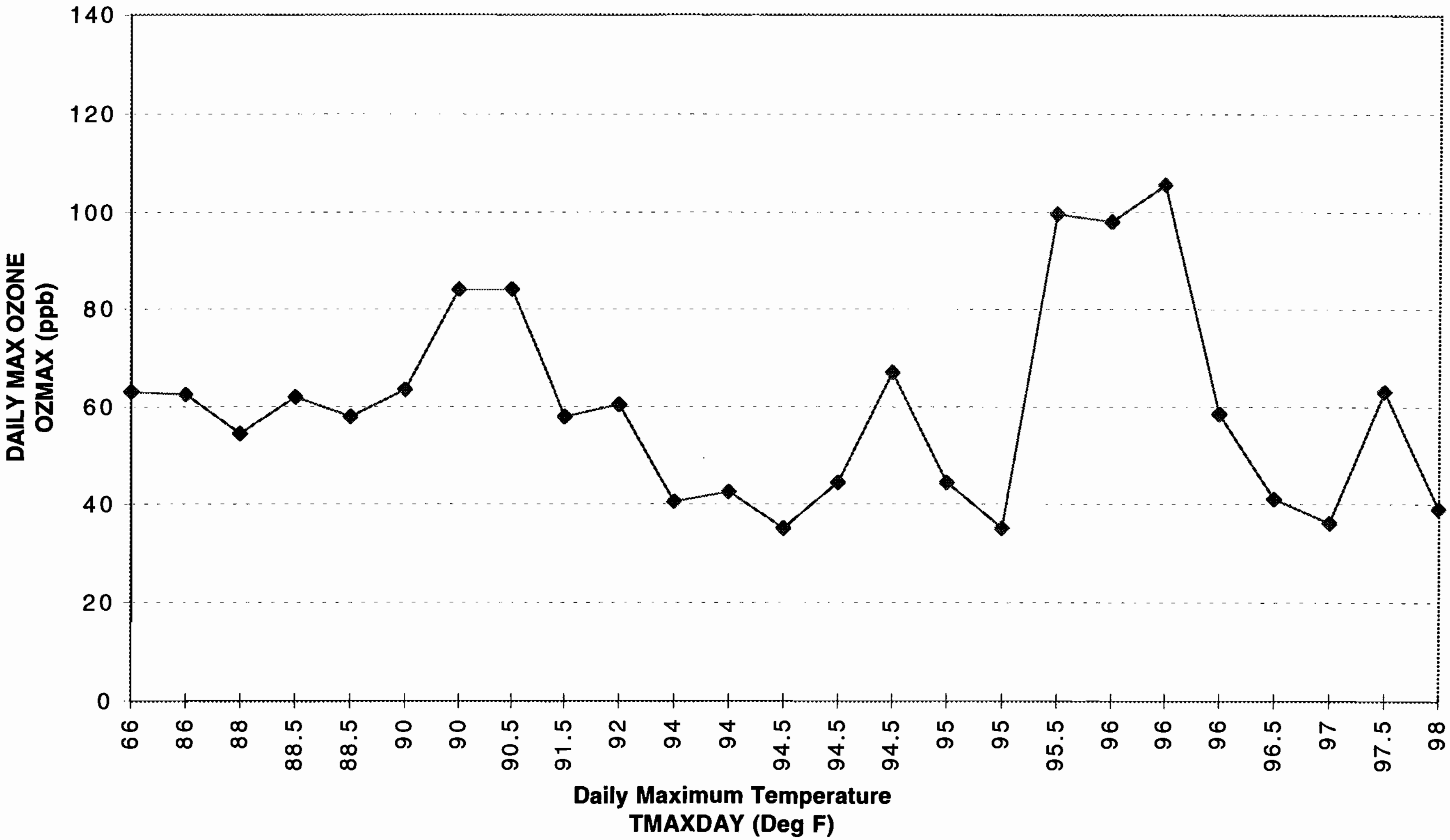


Figure 79. SAN ANTONIO APR'96-SEP'96 MODEL T11.2
DATA CONTROLLED FOR TRAFFIC CONGESTION PARAMETER LT 50th PERCENTILE
AND DAYS WITH CLDAVGT2 LE 3

DAILY MAX OZONE AS A FUNCTION OF AVERAGE DAILY WIND SPEED

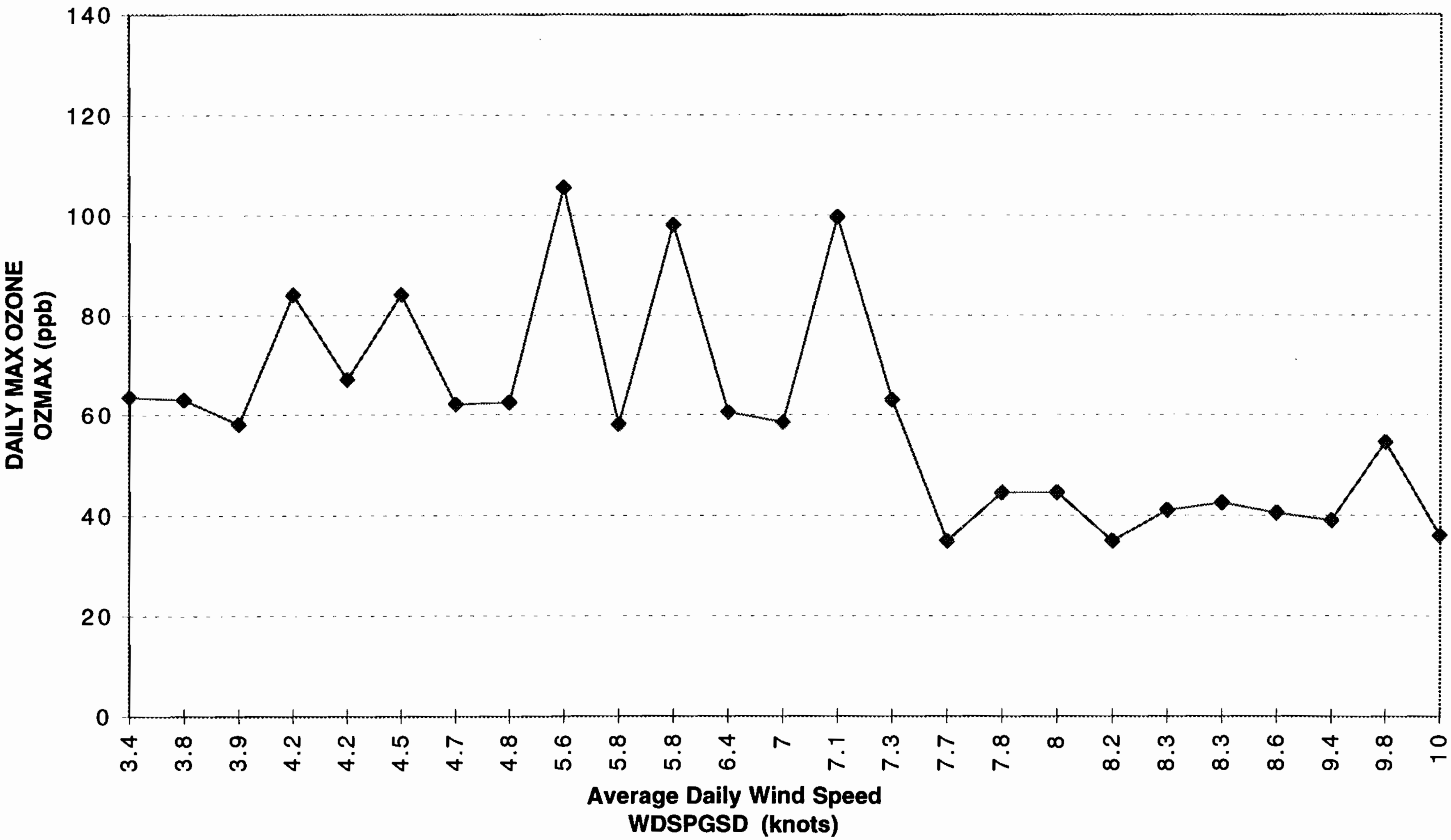
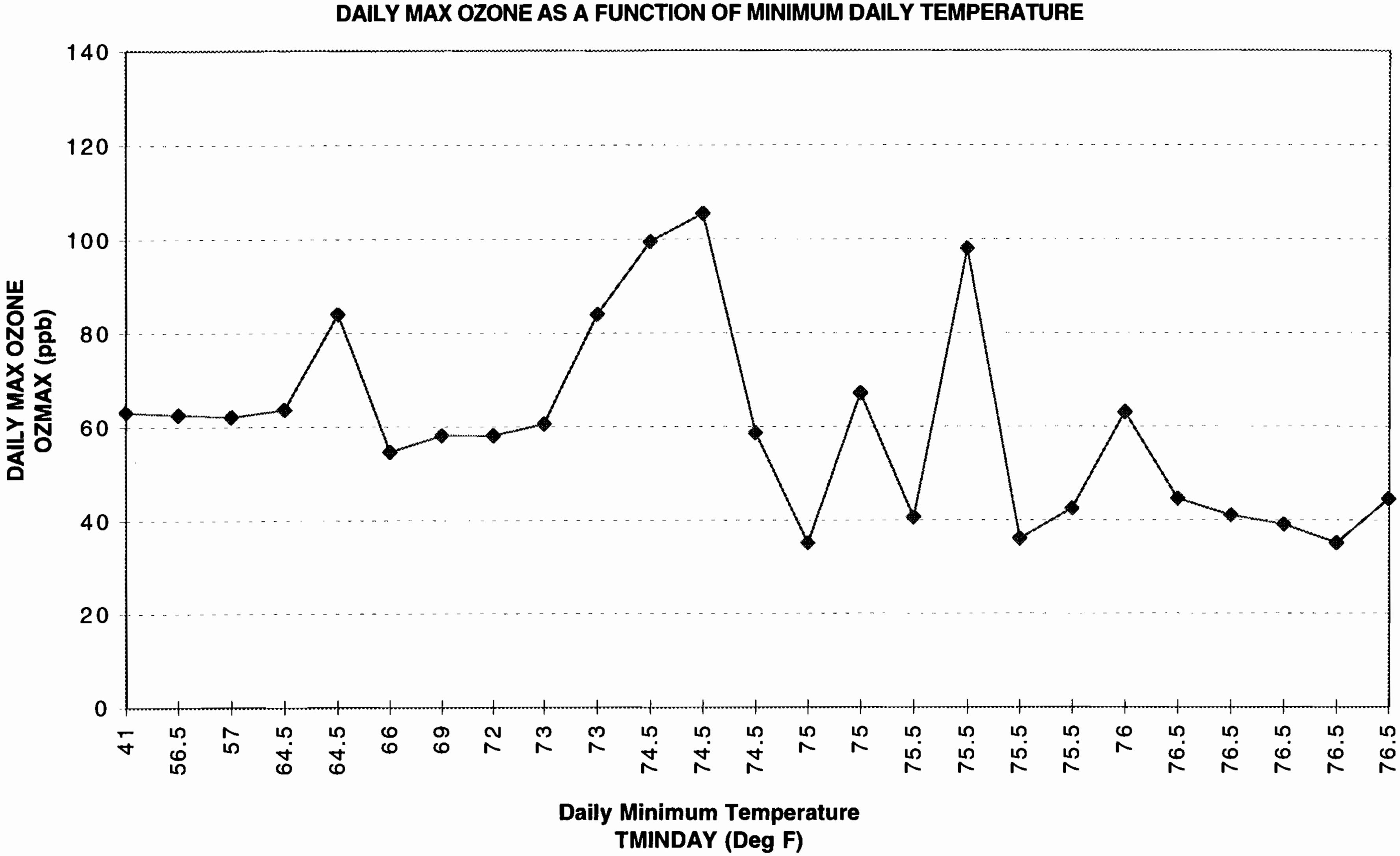


Figure 80. SAN ANTONIO DEC'95-SEP'96 MODEL T11.2
DATA CONTROLLED FOR TRAFFIC CONGESTION PARAMETER LT 50th PERCENTILE
AND DAYS WITH CLDAVGT2 LE 3



# CHAPTER 4. RESULTS OF SCENARIOS: PART III

The next twelve scenarios, Scenario 9 through Scenario 20, are a series of analyses controlling for days that are a part of an ozone episode. In addition, various combinations of other controls such as months during the peak ozone season, the level of traffic congestion on the TransGuide network, and cloud cover are assessed. They can be summarized as follows:

Scenario 9 Controls:
- Days During Ozone Episodes

Scenario 10 Controls:
- Peak Ozone Season
- Days During Ozone Episodes

Scenario 11 Controls:
- Days During Ozone Episodes
- Low Level of Cloud Cover

Scenario 12 Controls:
- Peak Ozone Season
- Days During Ozone Episodes
- Low Level of Cloud Cover

Scenario 13 Controls:
- Days During Ozone Episodes
- Low Level of Traffic Congestion
- Low Level of Cloud Cover

Scenario 14 Controls:
- Peak Ozone Season
- Days During Ozone Episodes
- Low Level of Traffic Congestion
- Low Level of Cloud Cover

Scenario 15 Controls:
- Days During Ozone Episodes
- High Level of Traffic Congestion
- Low Level of Cloud Cover

Scenario 16 Controls:
- Peak Ozone Season

- Days During Ozone Episodes
- High Level of Traffic Congestion
- Low Level of Cloud Cover

<u>Scenario 17 Controls:</u>

- Days During Ozone Episodes Greater Than 1-Day Episodes
- Low Level of Traffic Congestion

<u>Scenario 18 Controls:</u>

- Peak Ozone Season
- Days During Ozone Episodes Greater Than 1-Day Episodes
- Low Level of Traffic Congestion

<u>Scenario 19 Controls:</u>

- Days During Ozone Episodes Greater Than 1-Day Episodes
- High Level of Traffic Congestion

<u>Scenario 20 Controls:</u>

- Peak Ozone Season
- Days During Ozone Episodes Greater Than 1-Day Episodes
- High Level of Traffic Congestion

## SCENARIO 9

With Scenario 9, we begin to consider those days which occur during ozone episodes as the principal control variable. Ozone episodes are defined as consecutive days where the peak ozone concentration is greater than or equal to the previous day. We hypothesize that the days during which ozone episodes occur encompass meteorological and other ambient parameters that we are not collecting data for in this study and thus, these days act as a proxy for those parameters.

In Scenario 9, we include all days which are part of an ozone episode for the months from December 1995 through September 1996. The analysis results in no detection of a significant (80 percent confidence level or higher) association between the traffic congestion parameter and the peak ozone concentration.

The finding of a lack of significance of the traffic congestion parameter under this scenario does not prove that the parameter does not affect the daily peak ozone concentration. We can only conclude that under the conditions of this scenario, we are not able to detect any possible relationship that might exist at our minimum confidence level of 80 percent. Table 22 summarizes the results of the model and Table 23 summarizes the raw data for Scenario 9 sorted by date.

Figure 81 and Figure 82 plot the daily peak ozone (OZMAX) and the daily cumulative traffic congestion parameter (PTDCUMAM) over time. Figure 83 through Figure 89 graphically summarize the relationships between the response and predictor variables.

*Table 22. Scenario 9 Results*

| | | | RANGE OF VARIABLES |
|---|---|---|---|
| **DATA CONTROLS** | 1) DEC 1995 - SEP 1996<br><br>2) DAYS DURING OZONE EPISODES | | |
| **MODEL SIGNIFICANT PARAMETERS (units)** | Y --- OZMAX (ppb)<br>XO --- INTERCEPT<br>X1 --- OZINT (ppb)<br>X2 --- CLDAVGT2 (oktas)<br>X3 --- WSNC1T2 (mph)<br>X4 -- TMAXDAY (Deg F) | | 16.5 to 126<br><br>0 to 47<br>0 to 8<br>2.8 to 19.0<br>32 to 99.5 |
| **SIGNIFICANT PARAMETER COEFFICIENT ESTIMATES AND BIVARIATE CORRELATIONS (r)** | 38.83993741 X0<br>0.52578039 X1<br>-2.65954785 X2<br>-2.14558984 X3<br>0.42830114 X4 | <br>-0.0365<br>-0.3965<br>-0.4423<br>0.3960 | |
| **TRAFFIC VARIABLE COEFFICIENT CONFIDENCE-LEVEL** | NA | | |
| **MODEL R-SQUARE** | 0.47 | | |
| **TRAFFIC VARIABLE PARTIAL R-SQUARE** | NA | | |
| **SAMPLE SIZE** | 129 | | |
| **1st ORDER AUTO-CORRELATION Durbin-Watson Statistic** | 1.404 | | |
| **P-VALUE SUPPORTING $H_O$: No Heteroskedasticity** | 0.2035 | | |

*Table 23. Scenario 9 Data*

| DATECST | OZMAX | PTDCUMAM | OZINT | CLDAVGT2 | WSNC1T2 | TMAXDAY | WDSPGSD | TMINDAY |
|---|---|---|---|---|---|---|---|---|
| 12/2/95 | 42 | 61,250 | 17 | 6.70 | 12.08 | 76 | 7.2 | 65 |
| 12/3/95 | 42 | 30,470 | 13 | 5.41 | 8.64 | 79 | 5.9 | 62 |
| 12/4/95 | 65.5 | 115,843 | 34 | 0.11 | 7.33 | 75 | 4.5 | 53 |
| 12/6/95 | 66 | 113,569 | 30.5 | 1.22 | 6.14 | 74 | 5.7 | 51 |
| 12/9/95 | 27.5 | 71,780 | 10 | 2.50 | 19.04 | 50 | 13.5 | 32.5 |
| 12/11/95 | 31.5 | 108,697 | 19.5 | 7.30 | 7.30 | 61 | 6.5 | 45 |
| 12/12/95 | 35.5 | 98,172 | 4.5 | 4.57 | 12.69 | 73 | 7.9 | 55 |
| 12/13/95 | 39 | 96,818 | 15.5 | 4.95 | 11.91 | 77 | 9 | 58.5 |
| 12/14/95 | 41 | 116,686 | 15 | 3.25 | 12.10 | 79 | 8.4 | 63.5 |
| 12/22/95 | 16.5 | 44,209 | 5 | 5.33 | 9.34 | 48 | 7.2 | 39.5 |
| 12/23/95 | 25.5 | 67,993 | 20 | 4.59 | 8.11 | 47.5 | 6.4 | 36 |
| 12/25/95 | 37 | 33,500 | 6.5 | 5.68 | 5.78 | 59 | 3.5 | 44.5 |
| 12/27/95 | 46 | 93,809 | 0 | 1.88 | 5.88 | 63 | 3.9 | 37 |

*Table 23. Scenario 9 Data (continued)*

| DATECST | OZMAX | PTDCUMAM | OZINT | CLDAVGT2 | WSNC1T2 | TMAXDAY | WDSPGSD | TMINDAY |
|---|---|---|---|---|---|---|---|---|
| 1/2/96 | 28.5 | 59,958 | 27.5 | 1.17 | 18.85 | 48.5 | 14.2 | 37.5 |
| 1/3/96 | 30.5 | 91,286 | 5.5 | 0.27 | 7.68 | 53 | 6.8 | 29.5 |
| 1/4/96 | 35.5 | 109,338 | 2.5 | 0.94 | 9.27 | 66 | 6.7 | 34 |
| 1/6/96 | 24.5 | 69,798 | 18.5 | 7.08 | 18.00 | 44 | 12.9 | 30.5 |
| 1/7/96 | 36 | 31,789 | 24.5 | 0.25 | 13.16 | 45 | 8.6 | 25 |
| 1/9/96 | 43.5 | 112,755 | 19 | 0.00 | 10.30 | 64 | 7.2 | 35 |
| 1/12/96 | 38 | 84,915 | 12 | 0.29 | 9.58 | 74 | 6 | 40 |
| 1/13/96 | 43 | 44,330 | 0 | 0.43 | 5.91 | 73 | 4.6 | 42 |
| 1/14/96 | 49.5 | 48,991 | 8 | 1.44 | 9.58 | 74.5 | 5.1 | 44 |
| 1/15/96 | 56 | 99,454 | 3 | 0.78 | 4.99 | 75 | 2.6 | 47.5 |
| 1/20/96 | 46 | 46,348 | 12 | 3.75 | 8.08 | 66 | 6.3 | 32 |
| 1/21/96 | 52 | 45,640 | 27 | 0.00 | 7.97 | 71 | 3.6 | 45 |
| 1/25/96 | 44 | 115,551 | 0 | 4.32 | 9.55 | 67 | 5.5 | 38 |
| 1/29/96 | 41 | 81,415 | 0 | 5.46 | 3.90 | 75 | 2.3 | 55 |
| 2/2/96 | 23 | 1,899 | 13.5 | 8.00 | 15.14 | 32 | 11 | 27.5 |
| 2/3/96 | 31.5 | 55,581 | 24.5 | 7.05 | 13.21 | 33 | 8.7 | 27 |
| 2/4/96 | 33 | 26,324 | 18.5 | 0.29 | 9.69 | 40 | 5.6 | 19.5 |
| 2/5/96 | 34.5 | 88,084 | 28 | 8.00 | 10.04 | 51 | 7.5 | 31.5 |
| 2/6/96 | 44 | 94,245 | 8 | 5.50 | 6.93 | 71 | 5 | 50 |
| 2/9/96 | 42 | 102,967 | 0 | 6.42 | 4.12 | 75.5 | 3.7 | 51 |
| 2/12/96 | 40 | 103,061 | 22 | 2.50 | 10.28 | 64 | 5.4 | 40 |
| 2/13/96 | 44.5 | 103,596 | 0 | 1.00 | 7.42 | 67 | 4.8 | 39 |
| 2/14/96 | 45 | 89,558 | 24.5 | 0.86 | 10.92 | 79.5 | 8.1 | 49 |
| 2/17/96 | 53 | 65,381 | 2 | 2.00 | 10.35 | 69 | 6.3 | 35 |
| 3/8/96 | 37.5 | 116,633 | 28 | 3.10 | 13.96 | 48 | 9.6 | 30 |
| 3/10/96 | 62 | 54,976 | 0 | 0.42 | 8.18 | 61 | 4.4 | 30 |
| 3/14/96 | 62 | 117,977 | 26.5 | 5.33 | 9.12 | 82 | 9.4 | 64 |
| 3/15/96 | 65 | 122,914 | 22 | 2.63 | 9.32 | 79.5 | 5.9 | 62 |
| 3/19/96 | 45 | 93,187 | 27.5 | 0.13 | 13.23 | 67 | 6.9 | 45 |
| 3/20/96 | 46.5 | 93,131 | 17.5 | 0.00 | 10.21 | 66 | 5.9 | 40.5 |
| 3/21/96 | 59 | 79,438 | 0 | 0.13 | 7.82 | 73 | 4.8 | 38.5 |
| 3/23/96 | 48.5 | 22,214 | 46.5 | 8.00 | 15.54 | 66.5 | 14.3 | 61.5 |
| 3/28/96 | 60.5 | 141,006 | 21 | 2.70 | 5.47 | 71 | 4 | 42.5 |
| 3/30/96 | 63 | 48,388 | 18 | 3.78 | 8.17 | 86 | 8 | 64 |
| 4/1/96 | 63 | 128,397 | 47 | 0.44 | 14.51 | 74 | 8.5 | 56 |
| 4/4/96 | 54.5 | 71,110 | 24 | 7.27 | 7.87 | 81 | 9 | 60.5 |
| 4/6/96 | 50 | 50,850 | 28.5 | 3.63 | 13.86 | 62.5 | 11 | 40 |
| 4/7/96 | 63 | 80,590 | 13 | 1.45 | 5.27 | 66 | 3.8 | 41 |
| 4/8/96 | 82.5 | 138,109 | 17 | 0.13 | 6.33 | 79.5 | 3.9 | 49 |

*Table 23. Scenario 9 Data (continued)*

| DATECST | OZMAX | PTDCUMAM | OZINT | CLDAVGT2 | WSNC1T2 | TMAXDAY | WDSPGSD | TMINDAY |
|---|---|---|---|---|---|---|---|---|
| 4/10/96 | 62.5 | 81,961 | 16 | 0.57 | 6.55 | 86 | 4.8 | 56.5 |
| 4/12/96 | 47.5 | 132,995 | 28 | 5.47 | 11.05 | 90 | 13 | 63.5 |
| 4/13/96 | 59.5 | 52,465 | 7 | 6.00 | 7.22 | 91 | . | 58.5 |
| 4/16/96 | 63.5 | 144,610 | 0 | 1.64 | 9.72 | 77 | 7.2 | 46 |
| 4/19/96 | 52 | 133,172 | 20.5 | 2.22 | 13.75 | 97 | 8.2 | 68.5 |
| 4/20/96 | 54.5 | 100,705 | 0 | 3.52 | 12.99 | 83 | 7.6 | 68 |
| 4/22/96 | 44.5 | 171,288 | 18 | 6.68 | 12.13 | 78.5 | . | 61 |
| 5/1/96 | 66 | 189,529 | 27 | 0.95 | 14.05 | 84.5 | 10.3 | 56 |
| 5/3/96 | 48.5 | 131,880 | 22 | 6.85 | 15.18 | 86.5 | 12.6 | 70 |
| 5/4/96 | 55 | 88,226 | 29 | 5.71 | 13.45 | 87 | 12.6 | 70 |
| 5/7/96 | 35.5 | 125,392 | 9 | 6.46 | 14.33 | 84.5 | 11.3 | 72 |
| 5/8/96 | 35.5 | 98,806 | 21.5 | 6.63 | 16.21 | 83 | 11.4 | 71 |
| 5/9/96 | 37 | 98,731 | 13 | 5.85 | 16.66 | 87 | 7.8 | 72 |
| 5/11/96 | 50 | 103,665 | 26 | 1.91 | 9.94 | 87 | 9 | 65.5 |
| 5/12/96 | 68 | 51,761 | 15.5 | 7.48 | 6.76 | 86 | 5 | 65 |
| 5/14/96 | 44 | 110,364 | 22 | 5.24 | 15.60 | 88.5 | 12 | 70 |
| 5/15/96 | 44 | 142,712 | 9.5 | 3.47 | 16.04 | 91.5 | 12.8 | 72 |
| 5/16/96 | 50 | 79,096 | 14 | 3.50 | 14.36 | 93.5 | 12.5 | 71.5 |
| 5/19/96 | 36 | 75,940 | 19.5 | 3.05 | 16.77 | 93 | 13.7 | 73 |
| 5/20/96 | 39 | 159,670 | 16.5 | 3.52 | 15.05 | 95.5 | 12.6 | 73 |
| 5/21/96 | 46 | 140,220 | 15 | 2.52 | 11.94 | 95 | 10.2 | 73.5 |
| 5/22/96 | 49 | 124,190 | 12 | 2.67 | 13.04 | 95.5 | 10.1 | 72.5 |
| 5/24/96 | 48.5 | 129,182 | 19 | 5.68 | 16.73 | 89 | 14.2 | 75 |
| 5/27/96 | 53 | 99,086 | 14.5 | 5.70 | 7.32 | 89 | 9.5 | 69.5 |
| 6/1/96 | 46.5 | 98,585 | 10.5 | 3.48 | 12.32 | 89.5 | . | 72.5 |
| 6/2/96 | 52 | 75,557 | 1.5 | 4.61 | 5.65 | 92.5 | 6.8 | 69.5 |
| 6/3/96 | 120 | 158,194 | 8 | 1.27 | 4.36 | 91.5 | 7.5 | 68 |
| 6/8/96 | 63.5 | 54,669 | 12 | 0.25 | 6.92 | 90 | 3.4 | 64.5 |
| 6/9/96 | 84 | 80,549 | 12.5 | 1.68 | 8.37 | 90.5 | 4.5 | 64.5 |
| 6/13/96 | 49 | 106,210 | 2.5 | 3.81 | 8.06 | 95 | 7 | 76 |
| 6/17/96 | 56.5 | 113,027 | 3 | 1.18 | 5.98 | 96 | 4.5 | 76 |
| 6/18/96 | 67 | 115,719 | 2.5 | 1.11 | 8.31 | 97.5 | 5.2 | 76.5 |
| 6/20/96 | 70 | 97,560 | 1.5 | 1.06 | 7.57 | 99.5 | 7.5 | 76.5 |
| 6/23/96 | 40 | 28,486 | 20.5 | 5.13 | 7.32 | 89 | 8.3 | 76 |
| 6/24/96 | 52.5 | 90,962 | 6.5 | 3.78 | 7.86 | 92 | 9.6 | 76.5 |
| 6/27/96 | 39 | 89,069 | 0 | 3.14 | 11.58 | 91 | 8.9 | 76.5 |
| 6/29/96 | 40.5 | 72,845 | 1 | 5.00 | 7.65 | 92 | 5.9 | 75 |
| 6/30/96 | 60.5 | 28,900 | 0 | 1.00 | 3.99 | 92 | 6.4 | 73 |
| 7/1/96 | 69 | 103,954 | 0 | 1.50 | 6.61 | 95 | 5.6 | 75 |

*Table 23. Scenario 9 Data (continued)*

| DATECST | OZMAX | PTDCUMAM | OZINT | CLDAVGT2 | WSNC1T2 | TMAXDAY | WDSPGSD | TMINDAY |
|---|---|---|---|---|---|---|---|---|
| 7/2/96 | 98 | 88,279 | 3 | 0.56 | 5.24 | 96 | 5.8 | 75.5 |
| 7/3/96 | 99.5 | 78,502 | 0.5 | 0.25 | 5.39 | 95.5 | 7.1 | 74.5 |
| 7/4/96 | 105.5 | 15,650 | 4.5 | 1.00 | 3.15 | 96 | 5.6 | 74.5 |
| 7/7/96 | 63 | 47,373 | 7 | 1.80 | 6.52 | 97.5 | 7.3 | 76 |
| 7/10/96 | 48.5 | 120,871 | 1 | 5.41 | 7.43 | 90 | 8.1 | 73.5 |
| 7/12/96 | 42 | 146,141 | 3.5 | 2.65 | 10.43 | 96 | 10.5 | 77.5 |
| 7/14/96 | 46.5 | 87,219 | 8.5 | 3.39 | 10.66 | 96.5 | 9.3 | 76.5 |
| 7/19/96 | 32.5 | 105,349 | 7 | 5.18 | 12.41 | 97 | 10.5 | 78 |
| 7/20/96 | 39 | 58,253 | 7.5 | 2.53 | 10.58 | 98 | 9.4 | 76.5 |
| 7/23/96 | 42 | 105,730 | 5 | 3.17 | 11.04 | 98.5 | 9.3 | 78 |
| 7/25/96 | 42.5 | 119,147 | 3.5 | 4.78 | 10.25 | 96 | 8.1 | 73.5 |
| 7/26/96 | 46 | 122,801 | 0.5 | 3.77 | 6.32 | 93.5 | 6.2 | 73 |
| 7/28/96 | 40.5 | 46,771 | 7 | 5.97 | 6.83 | 94.5 | 8.4 | 77 |
| 7/31/96 | 38 | 105,650 | 0.5 | 1.86 | 10.90 | 97 | 8.8 | 76.5 |
| 8/11/96 | 44.5 | 37,932 | 4 | 1.78 | 6.48 | 94.5 | 8 | 76.5 |
| 8/12/96 | 75.5 | 158,255 | 0.5 | 1.58 | 7.70 | 98.5 | 6.5 | 77.5 |
| 8/15/96 | 44 | 138,841 | 0 | 3.79 | 7.05 | 94 | 4.9 | 69.5 |
| 8/17/96 | 42.5 | 68,937 | 11.5 | 2.90 | 7.91 | 94 | 8.3 | 75.5 |
| 8/20/96 | 40 | 103,438 | 19.5 | 3.48 | 5.08 | 94 | 5.4 | 77 |
| 8/21/96 | 60.5 | 108,007 | 0 | 2.10 | 6.09 | 93 | 5.3 | 71.5 |
| 8/23/96 | 38.5 | 109,606 | 0.5 | 7.57 | 10.78 | 86 | 8.9 | 74 |
| 8/26/96 | 25 | 79,692 | 0.5 | 6.90 | 5.96 | 83 | 4.5 | 72.5 |
| 8/27/96 | 30.5 | 79,922 | 2 | 7.40 | 5.03 | 88 | 4.9 | 76 |
| 8/28/96 | 39 | 82,387 | 1 | 5.26 | 5.75 | 91 | 7 | 76 |
| 8/31/96 | 54 | 79,018 | 1.5 | 7.12 | 4.28 | 85 | 4 | 74.5 |
| 9/1/96 | 62 | 34,060 | 18 | 3.05 | 6.24 | 86 | 4.7 | 75.5 |
| 9/3/96 | 45 | 99,919 | 3 | 4.23 | 6.11 | 91 | 6.4 | 72 |
| 9/4/96 | 47 | 107,909 | 0 | 6.13 | 3.60 | 89 | 5.2 | 73 |
| 9/5/96 | 64.5 | 96,327 | 0 | 5.11 | 4.53 | 87.5 | 3.1 | 74.5 |
| 9/8/96 | 49 | 55,875 | 6 | 6.40 | 5.30 | 86 | 3.5 | 74.5 |
| 9/9/96 | 58 | 75,180 | 0 | 6.35 | 3.53 | 88 | 3.6 | 74 |
| 9/10/96 | 84 | 52,634 | 0 | 2.35 | 5.92 | 90 | 4.2 | 73 |
| 9/11/96 | 87 | 102,476 | 2 | 0.90 | 5.78 | 90 | 4.3 | 68 |
| 9/12/96 | 126 | 105,346 | 25 | 3.58 | 2.85 | 87 | 3.4 | 69 |
| 9/16/96 | 67 | 91,576 | 0.5 | 2.72 | 5.30 | 94.5 | 4.2 | 75 |
| 9/18/96 | 32 | 106,072 | 1 | 5.66 | 8.77 | 90 | 9 | 76 |
| 9/19/96 | 40 | 105,998 | 0 | 5.21 | 8.81 | 90 | 7 | 76 |
| 9/20/96 | 41 | 96,181 | 13 | 4.42 | 6.32 | 87 | 6.9 | 71 |
| 9/21/96 | 42 | 50,868 | 0 | 5.22 | 5.63 | 87 | 6.1 | 74 |
| 9/22/96 | 52 | 23,721 | 19 | 7.07 | 7.50 | 88 | 6.3 | 76 |
| 9/24/96 | 54 | 104,865 | 0 | 4.27 | 5.18 | 90 | 6.2 | 72 |

Figure 81. SAN ANTONIO DECEMBER'95 - SEPTEMBER'96 MODEL T22.0
DATA CONTROLLED FOR DAYS DURING OZONE EPISODES

DAILY MAXIMUM OZONE CONCENTRATIONS

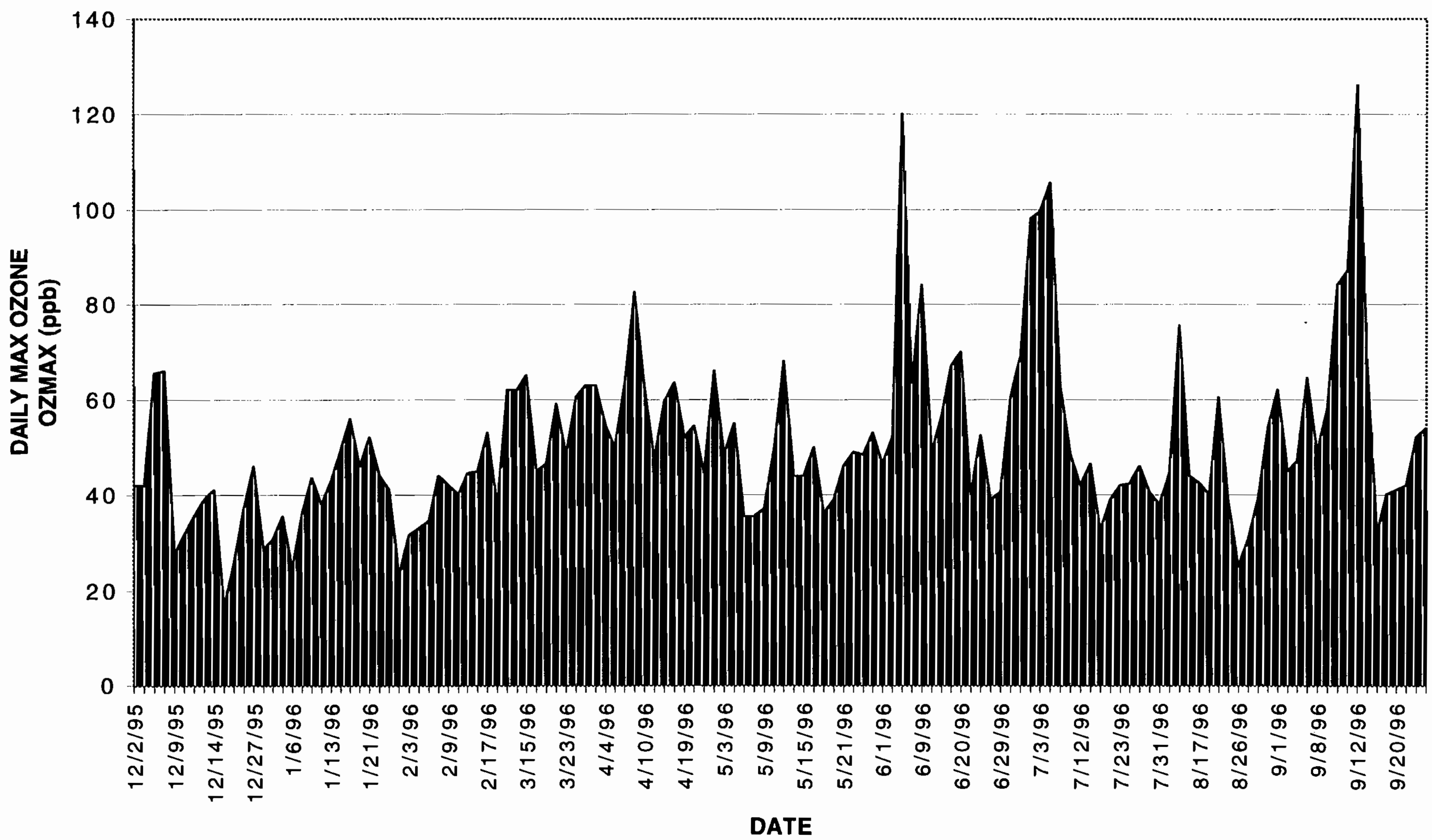


Figure 82. SAN ANTONIO DECEMBER'95 - SEPTEMBER'96 MODEL T22.0
DATA CONTROLLED FOR DAYS DURING OZONE EPISODES

DAILY CUMULATIVE TRANSGUIDE NETWORK TRAFFIC DENSITY
6AM to 2 HOURS BEFORE TIME of MAX OZONE

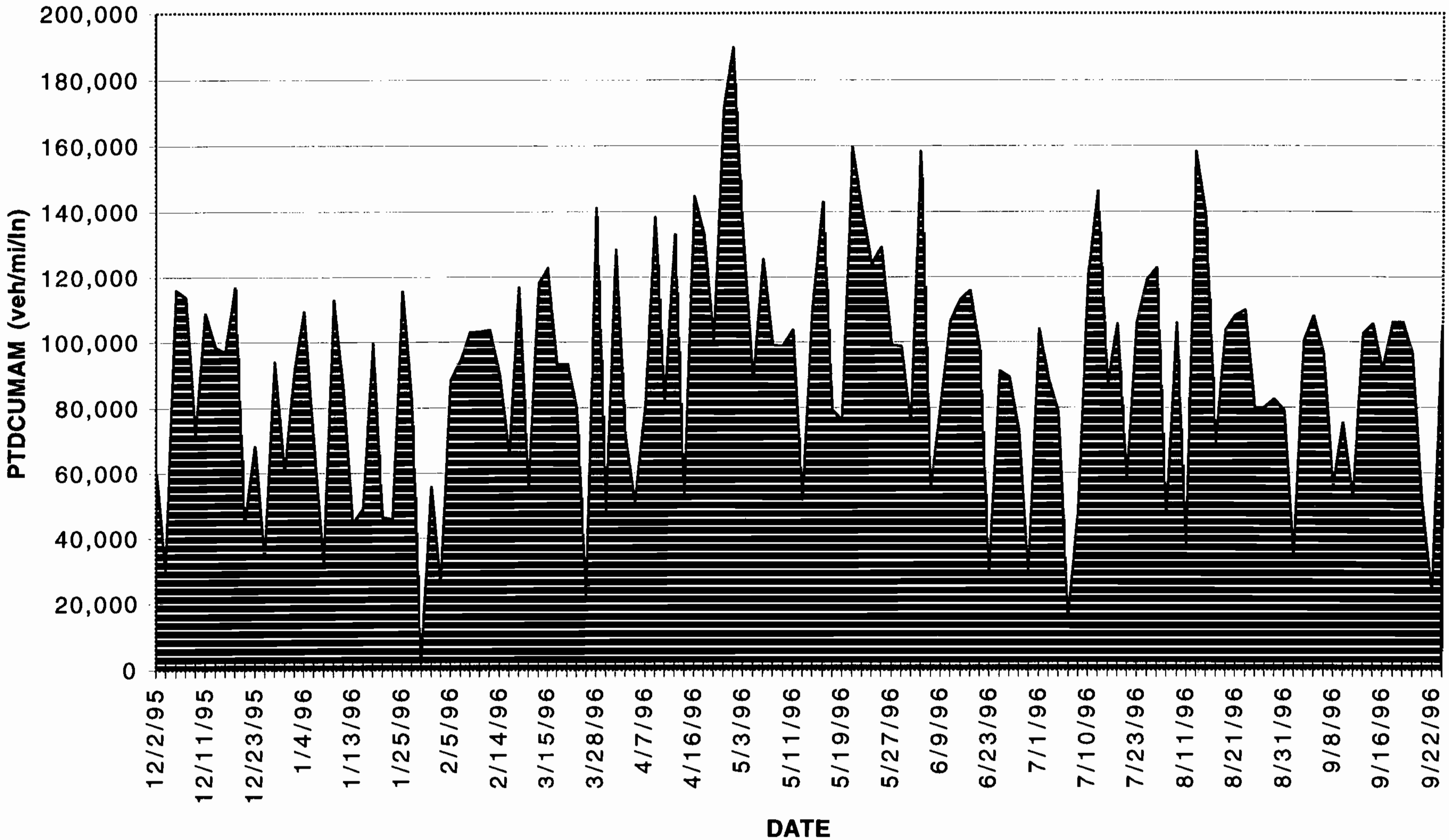


**Figure 83. SAN ANTONIO DECEMBER'95 - SEPTEMBER'96 MODEL T22.0**
**DATA CONTROLLED FOR DAYS DURING OZONE EPISODES**

**DAILY MAX OZONE AS A FUNCTION OF DAILY CUMULATIVE TRAFFIC DENSITY ON TRANSGUIDE NETWORK**
**FROM 6AM TO 2-HRS BEFORE TIME OF MAX OZONE**

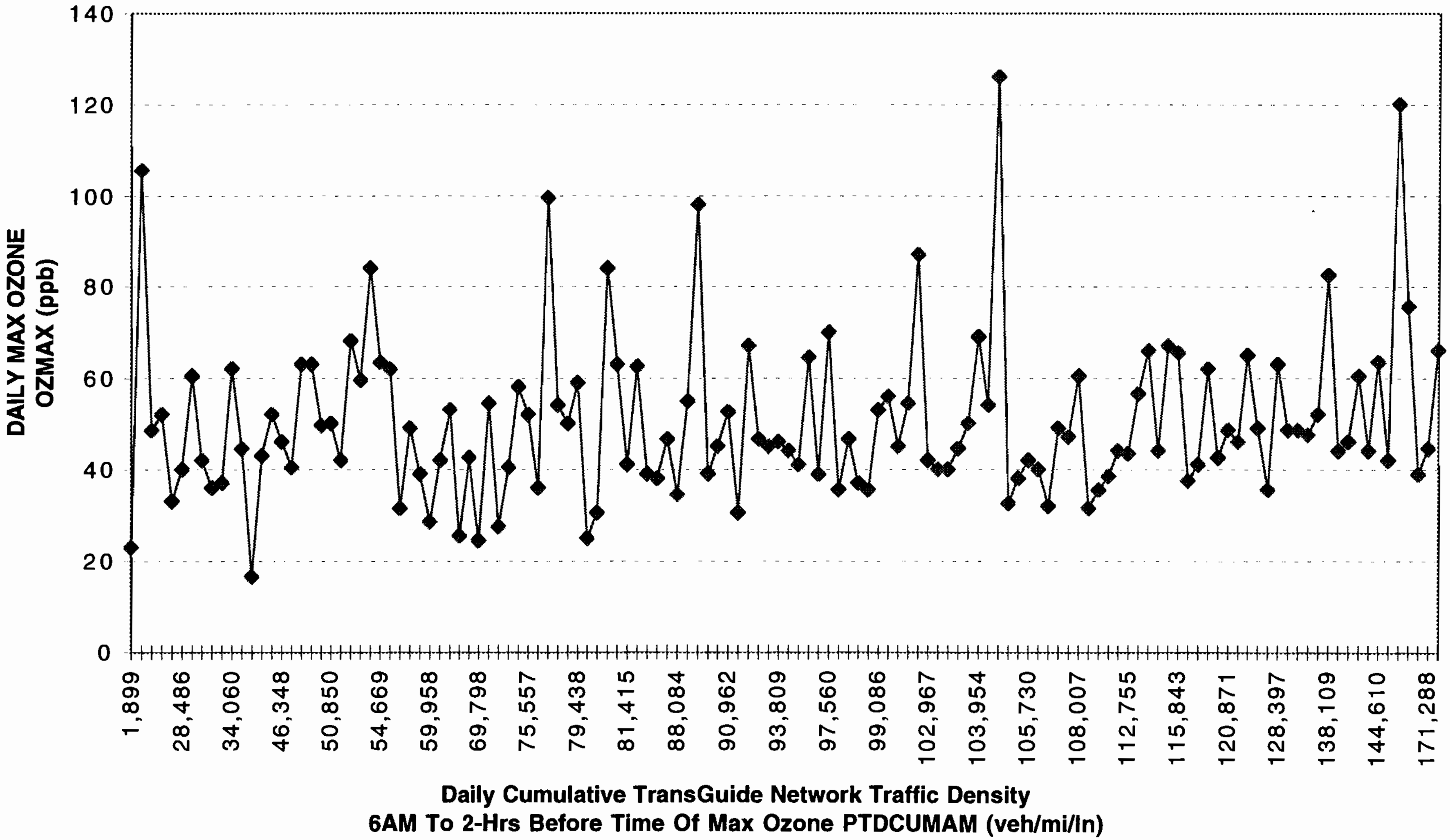


**Figure 84. SAN ANTONIO DECEMBER'95 - SEPTEMBER'96 MODEL T22.0**
**DATA CONTROLLED FOR DAYS DURING OZONE EPISODES**

**DAILY MAX OZONE AS A FUNCTION OF DAILY INITIAL MORNING OZONE**

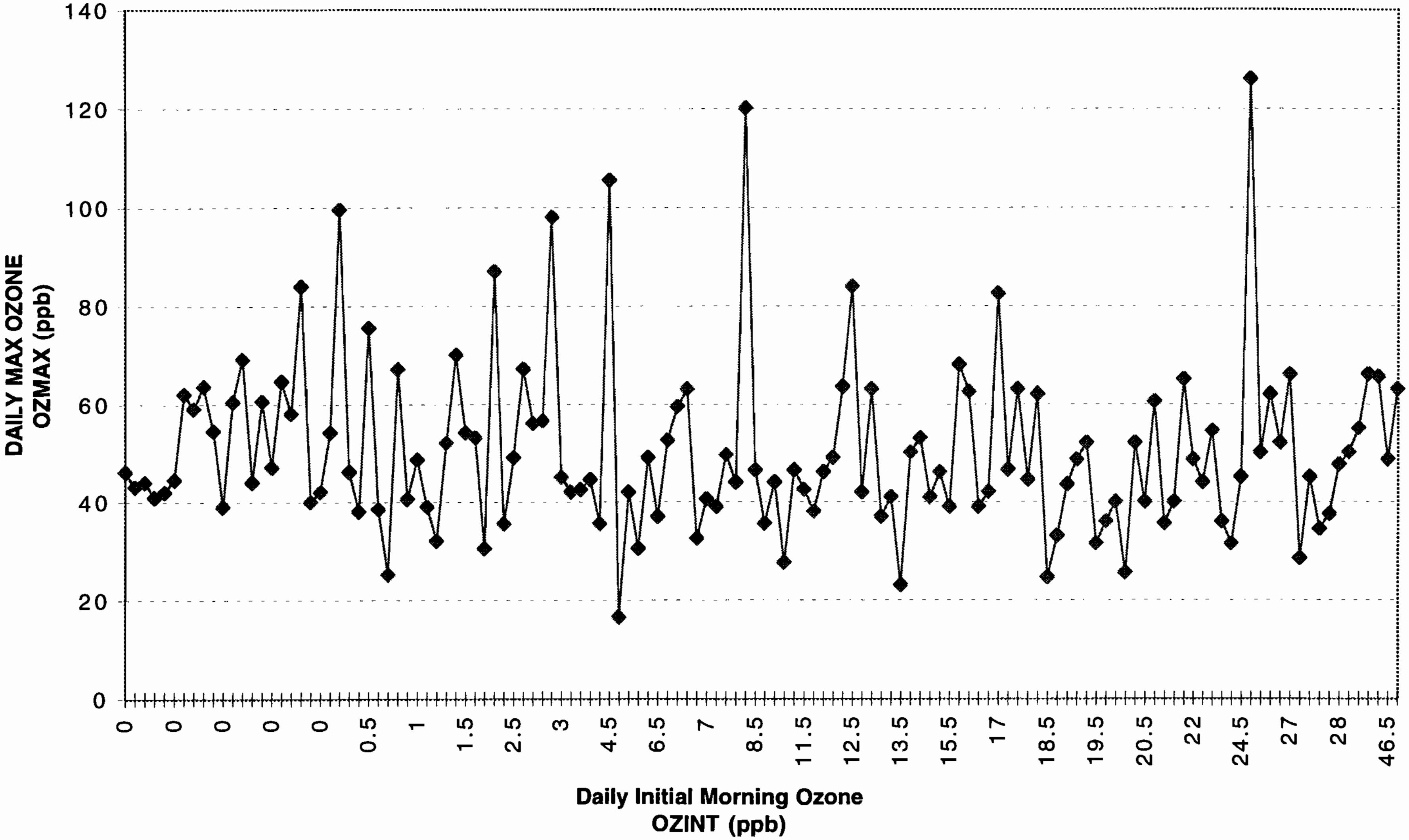
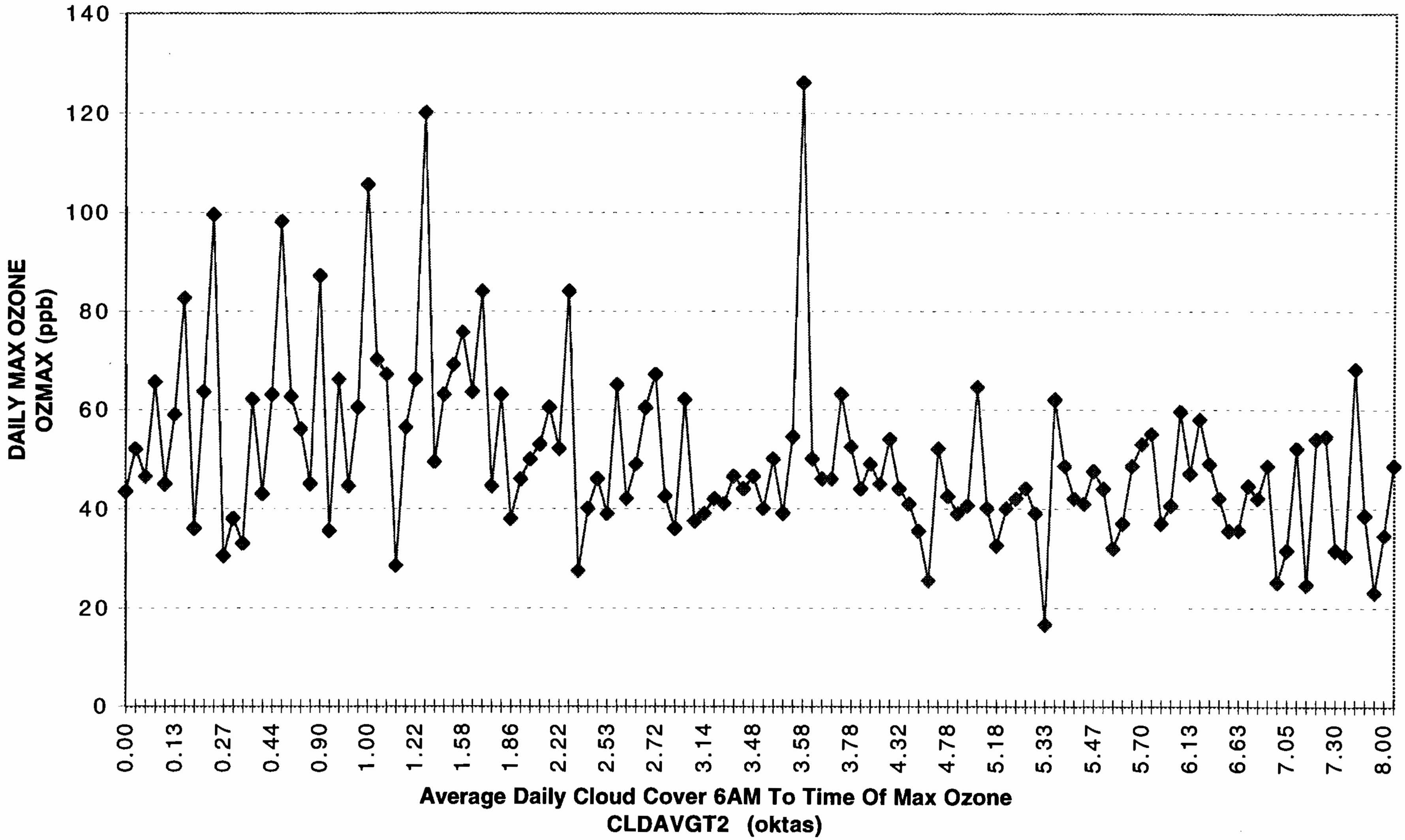


Figure 85. SAN ANTONIO DECEMBER'95 - SEPTEMBER'96 MODEL T22.0
DATA CONTROLLED FOR DAYS DURING OZONE EPISODES

DAILY MAX OZONE AS A FUNCTION OF AVERAGE "MORNING" CLOUD COVER



# Figure 86. SAN ANTONIO DECEMBER'95 - SEPTEMBER'96 MODEL T22.0
## DATA CONTROLLED FOR DAYS DURING OZONE EPISODES

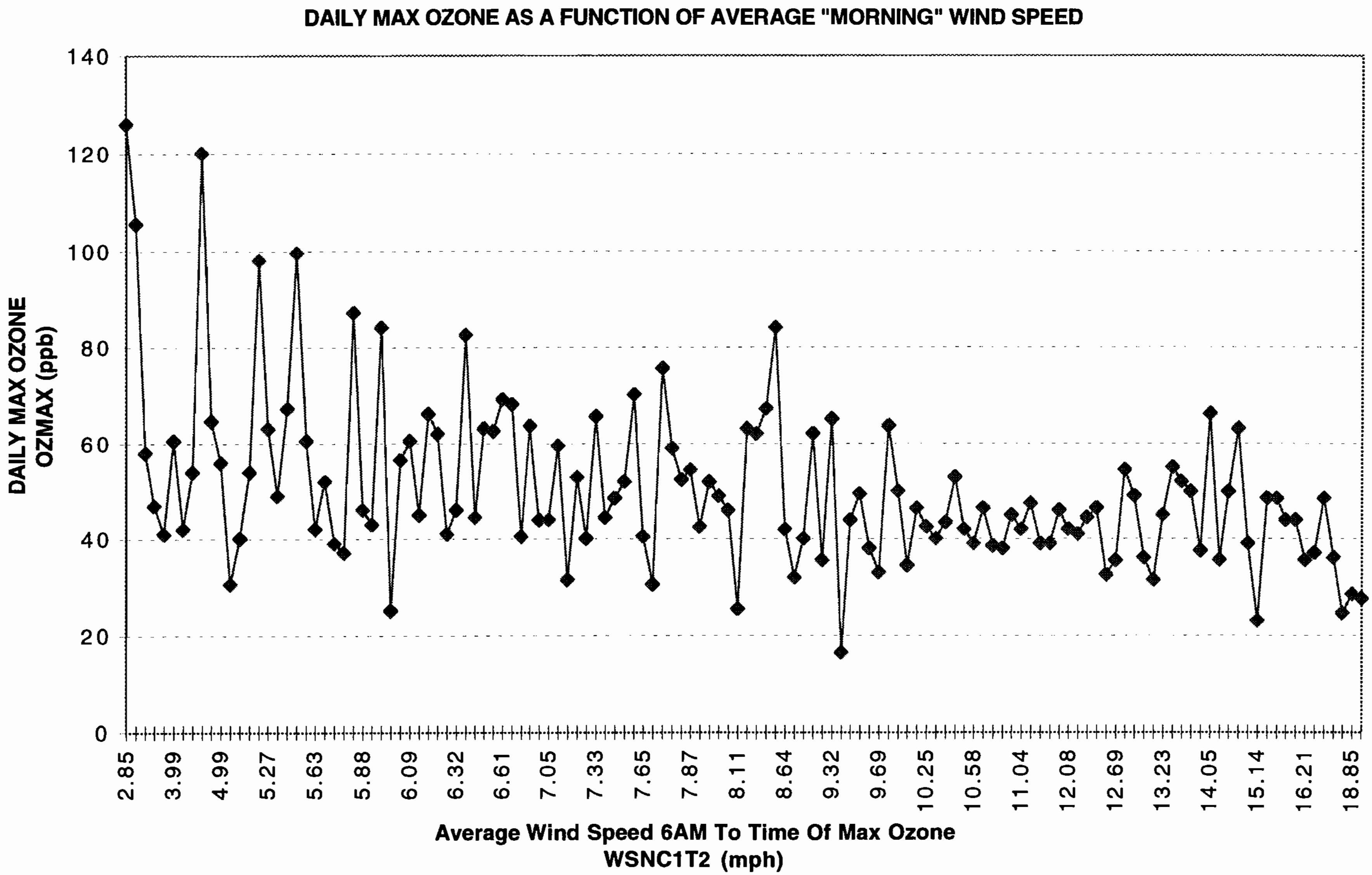


Figure 87. SAN ANTONIO DECEMBER'95 - SEPTEMBER'96 MODEL T22.0
DATA CONTROLLED FOR DAYS DURING OZONE EPISODES

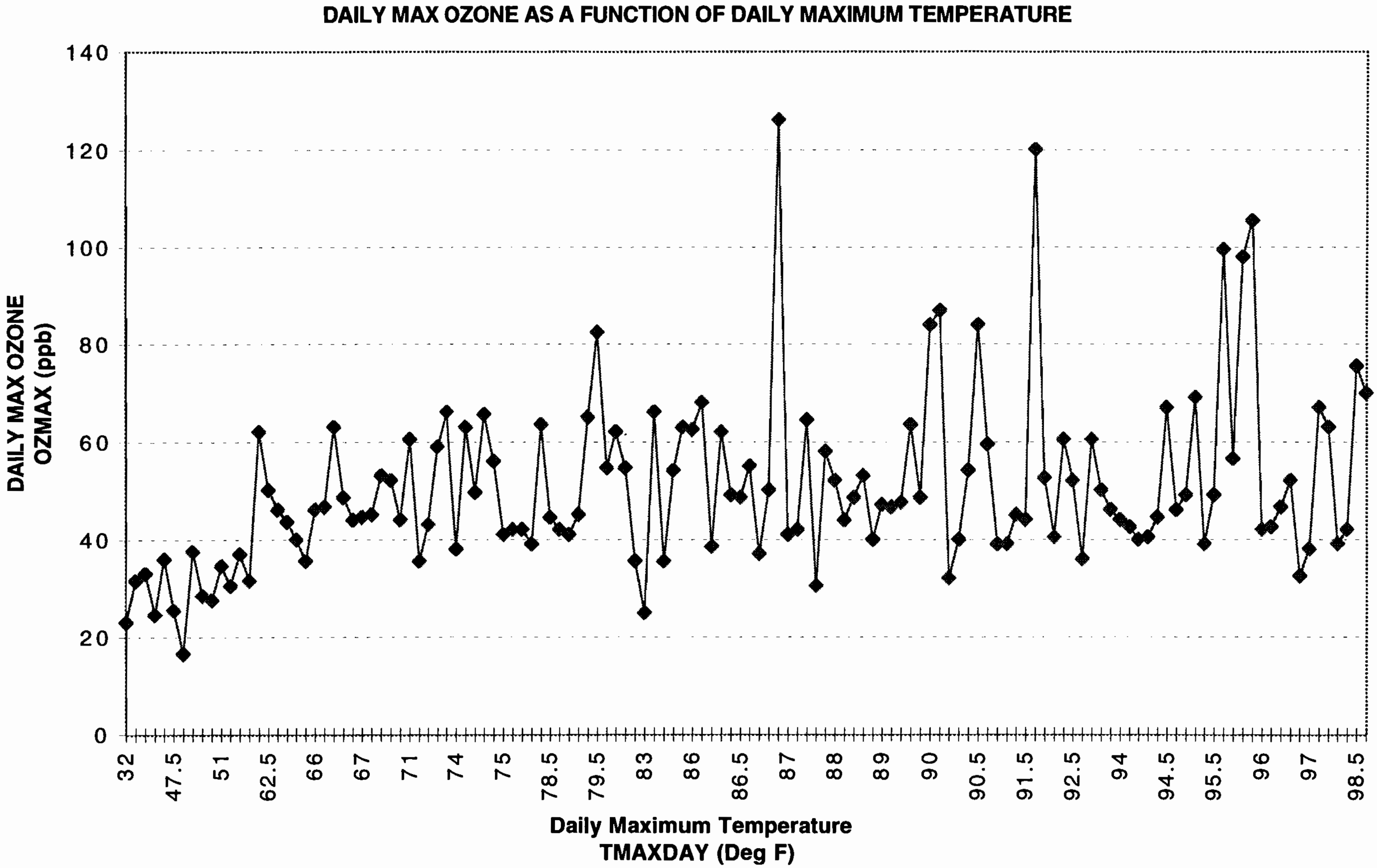


Figure 88. SAN ANTONIO DECEMBER'95 - SEPTEMBER'96 MODEL T22.0
DATA CONTROLLED FOR DAYS DURING OZONE EPISODES

DAILY MAX OZONE AS A FUNCTION OF AVERAGE DAILY WIND SPEED

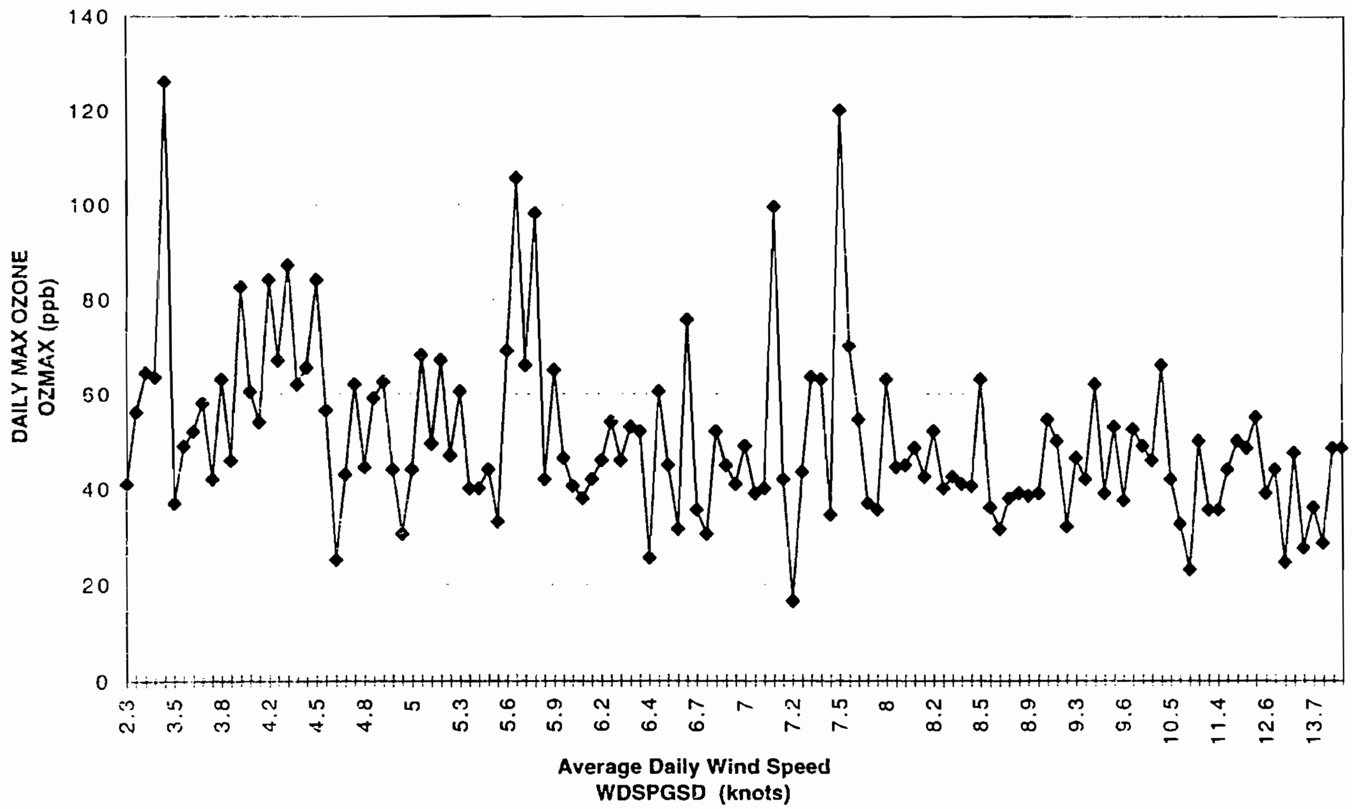
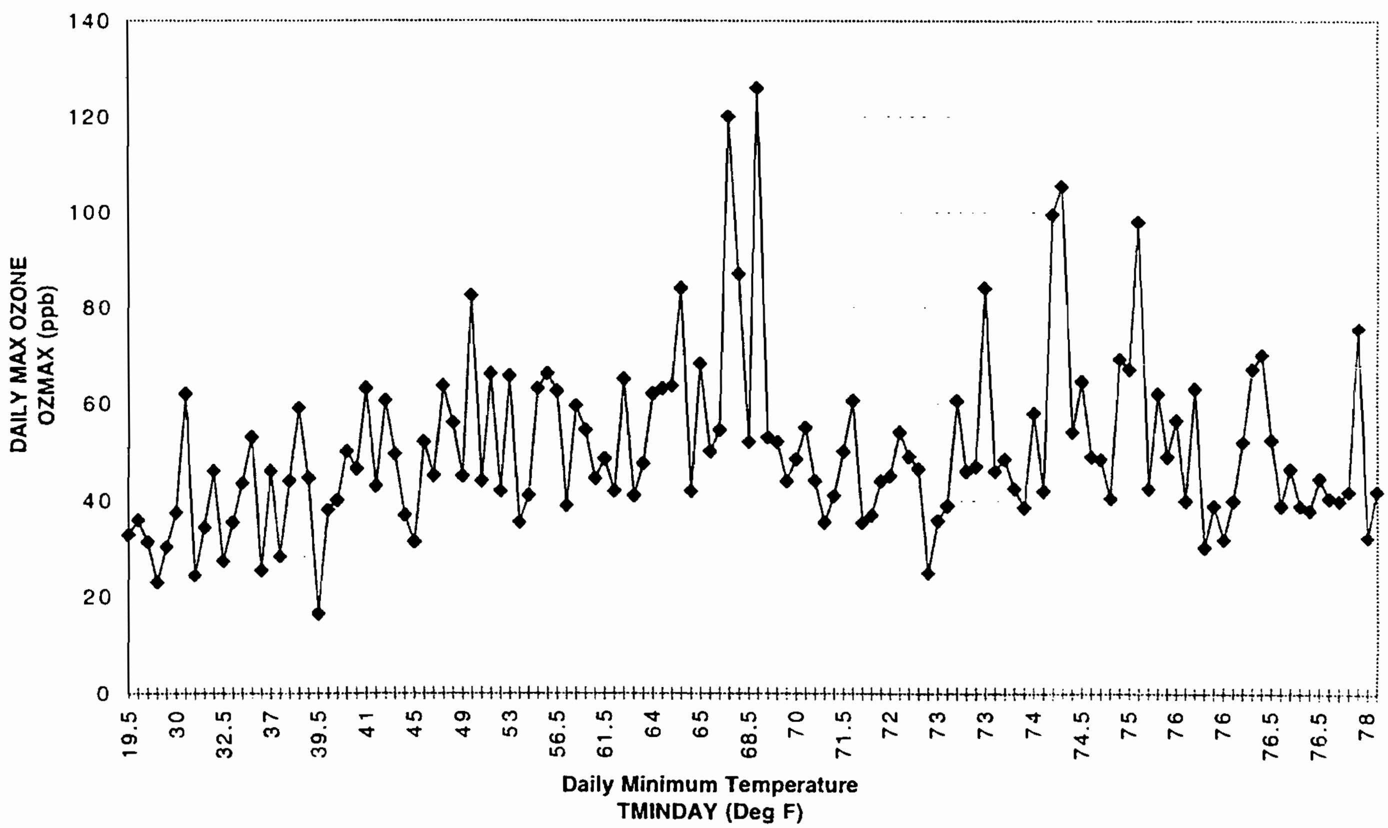



Figure 89. SAN ANTONIO DECEMBER'95 - SEPTEMBER'96 MODEL T22.0
DATA CONTROLLED FOR DAYS DURING OZONE EPISODES

DAILY MAX OZONE AS A FUNCTION OF DAILY MINIMUM TEMPERATURE



## SCENARIO 10

In Scenario 10, we repeat the analysis of Scenario 9 of controlling for days that are a part of an ozone episode except that we control for the months from April 1996 through September 1996. The results of the analysis reveal a significant association between the daily traffic congestion parameter PTDCUMAM and the daily peak ozone concentration. Table 24 summarizes the results of the model and Table 25 summarizes the strength of the traffic parameter's association with the daily peak ozone. Confidence intervals of the parameter's model coefficient per 10,000 units of PTDCUMAM are calculated at the 80, 90 and 95 percent confidence levels. Table 26 summarizes the raw data sorted by date for Scenario 10.

We can say that under this scenario at the 80 percent confidence level, the potential increase to the daily peak ozone in ppb per a 10,000 unit increase in the traffic congestion parameter PTDCUMAM has a range from about 0.2 to about 1.4 ppb. It is equally likely that the potential increase in the daily peak ozone would fall at any point within this range. The results presented in Table 25 also indicate that the traffic congestion parameter is not significant at the 95 percent confidence level.

Figure 90 and Figure 91 plot the daily peak ozone (OZMAX) and the daily cumulative traffic congestion parameter (PTDCUMAM) over time. Figure 92 through Figure 98 graphically summarize the relationships between the response and predictor variables. Figure 99 depicts an 80 percent confidence level prediction band of OZMAX as a function of PTDCUMAM while holding the other significant variables constant at their median levels.

We can say at an 80 percent confidence level that the daily peak ozone will fall somewhere within the band on Figure 99. As shown, the 80 percent confidence prediction band with this linear model under this scenario does not encompass several of the higher daily peak ozone concentrations at fixed median levels of the other significant variables.

*Table 24. Scenario 10 Results*

| | | | RANGE OF VARIABLES |
|---|---|---|---|
| **DATA CONTROLS** | 1) APR 1996 - SEP 1996<br><br>2) DAYS DURING OZONE EPISODES | | |
| **MODEL SIGNIFICANT PARAMETERS (units)** | Y --- OZMAX (ppb)<br>XO --- INTERCEPT<br>X1 --- PTDCUMAM (veh/mi/ln)<br>X2 --- OZINT (ppb)<br>X3 --- CLDAVGT2 (oktas)<br>X4 --- WSNC1T2 (mph) | | 25 to 126<br><br>15,650 to 189,530<br>0 to 47<br>0.1 to 7.6<br>2.8 to 16.8 |
| **SIGNIFICANT PARAMETER COEFFICIENT ESTIMATES AND BIVARIATE CORRELATIONS (r)** | 79.9956742 X0<br>0.0000827766 X1<br>0.5081876 X2<br>-3.4648806 X3<br>-2.8570894 X4 | <br>-0.0028<br>0.0258<br>-0.5377<br>-0.4228 | |
| **TRAFFIC VARIABLE COEFFICIENT CONFIDENCE-LEVEL** | 92% | | |
| **MODEL R-SQUARE** | 0.42 | | |
| **TRAFFIC VARIABLE PARTIAL R-SQUARE** | [a] 0.0140 | | |
| **SAMPLE SIZE** | 82 | | |
| **1st ORDER AUTO-CORRELATION Durbin-Watson Statistic** | 1.9559 | | |
| **P-VALUE SUPPORTING $H_O$: No Heteroskedasticity** | [a] 0.6604 | | |

*Table 25. Scenario 10 Results (cont.)*

| | |
|---|---|
| **Traffic parameter estimate per 10,000 PTDCUMAM** | **0.8278** |
| **Traffic parameter estimate standard error PER 10,000 PTDCUMAM** | **0.4600** |
| **n** | **82** |
| **k** | **4** |
| **df** | **77** |
| $t_{(.10)}$ | **1.282** |
| $t_{(.05)}$ | **1.645** |
| $t_{(.025)}$ | **1.960** |
| **80 percent confidence interval of traffic parameter estimate per 10,000 units of PTDCUMAM** | **0.24 to 1.42** |
| **90 percent confidence interval of traffic parameter estimate per 10,000 units of PTDCUMAM** | **0.07 to 1.58** |
| **95 percent confidence interval of traffic parameter estimate per 10,000 units of PTDCUMAM** | **-0.07 to 1.73** |

*Table 26. Scenario 10 Data*

| DATECST | OZMAX | PTDCUMAM | OZINT | CLDAVGT2 | WSNC1T2 | TMAXDAY | WDSPGSD | TMINDAY |
|---|---|---|---|---|---|---|---|---|
| 4/1/96 | 63 | 128,397 | 47 | 0.44 | 14.51 | 74 | 8.5 | 56 |
| 4/4/96 | 54.5 | 71,110 | 24 | 7.27 | 7.87 | 81 | 9 | 60.5 |
| 4/6/96 | 50 | 50,850 | 28.5 | 3.63 | 13.86 | 62.5 | 11 | 40 |
| 4/7/96 | 63 | 80,590 | 13 | 1.45 | 5.27 | 66 | 3.8 | 41 |
| 4/8/96 | 82.5 | 138,109 | 17 | 0.13 | 6.33 | 79.5 | 3.9 | 49 |
| 4/10/96 | 62.5 | 81,961 | 16 | 0.57 | 6.55 | 86 | 4.8 | 56.5 |
| 4/12/96 | 47.5 | 132,995 | 28 | 5.47 | 11.05 | 90 | 13 | 63.5 |
| 4/13/96 | 59.5 | 52,465 | 7 | 6.00 | 7.22 | 91 | . | 58.5 |
| 4/16/96 | 63.5 | 144,610 | 0 | 1.64 | 9.72 | 77 | 7.2 | 46 |
| 4/19/96 | 52 | 133,172 | 20.5 | 2.22 | 13.75 | 97 | 8.2 | 68.5 |
| 4/20/96 | 54.5 | 100,705 | 0 | 3.52 | 12.99 | 83 | 7.6 | 68 |
| 4/22/96 | 44.5 | 171,288 | 18 | 6.68 | 12.13 | 78.5 | . | 61 |
| 5/1/96 | 66 | 189,529 | 27 | 0.95 | 14.05 | 84.5 | 10.3 | 56 |
| 5/3/96 | 48.5 | 131,880 | 22 | 6.85 | 15.18 | 86.5 | 12.6 | 70 |
| 5/4/96 | 55 | 88,226 | 29 | 5.71 | 13.45 | 87 | 12.6 | 70 |
| 5/7/96 | 35.5 | 125,392 | 9 | 6.46 | 14.33 | 84.5 | 11.3 | 72 |
| 5/8/96 | 35.5 | 98,806 | 21.5 | 6.63 | 16.21 | 83 | 11.4 | 71 |
| 5/9/96 | 37 | 98,731 | 13 | 5.85 | 16.66 | 87 | 7.8 | 72 |
| 5/11/96 | 50 | 103,665 | 26 | 1.91 | 9.94 | 87 | 9 | 65.5 |
| 5/12/96 | 68 | 51,761 | 15.5 | 7.48 | 6.76 | 86 | 5 | 65 |
| 5/14/96 | 44 | 110,364 | 22 | 5.24 | 15.60 | 88.5 | 12 | 70 |
| 5/15/96 | 44 | 142,712 | 9.5 | 3.47 | 16.04 | 91.5 | 12.8 | 72 |
| 5/16/96 | 50 | 79,096 | 14 | 3.50 | 14.36 | 93.5 | 12.5 | 71.5 |
| 5/19/96 | 36 | 75,940 | 19.5 | 3.05 | 16.77 | 93 | 13.7 | 73 |
| 5/20/96 | 39 | 159,670 | 16.5 | 3.52 | 15.05 | 95.5 | 12.6 | 73 |
| 5/21/96 | 46 | 140,220 | 15 | 2.52 | 11.94 | 95 | 10.2 | 73.5 |
| 5/22/96 | 49 | 124,190 | 12 | 2.67 | 13.04 | 95.5 | 10.1 | 72.5 |
| 5/24/96 | 48.5 | 129,182 | 19 | 5.68 | 16.73 | 89 | 14.2 | 75 |
| 5/27/96 | 53 | 99,086 | 14.5 | 5.70 | 7.32 | 89 | 9.5 | 69.5 |
| 6/1/96 | 46.5 | 98,585 | 10.5 | 3.48 | 12.32 | 89.5 | . | 72.5 |
| 6/2/96 | 52 | 75,557 | 1.5 | 4.61 | 5.65 | 92.5 | 6.8 | 69.5 |
| 6/3/96 | 120 | 158,194 | 8 | 1.27 | 4.36 | 91.5 | 7.5 | 68 |
| 6/8/96 | 63.5 | 54,669 | 12 | 0.25 | 6.92 | 90 | 3.4 | 64.5 |
| 6/9/96 | 84 | 80,549 | 12.5 | 1.68 | 8.37 | 90.5 | 4.5 | 64.5 |
| 6/13/96 | 49 | 106,210 | 2.5 | 3.81 | 8.06 | 95 | 7 | 76 |
| 6/17/96 | 56.5 | 113,027 | 3 | 1.18 | 5.98 | 96 | 4.5 | 76 |
| 6/18/96 | 67 | 115,719 | 2.5 | 1.11 | 8.31 | 97.5 | 5.2 | 76.5 |
| 6/20/96 | 70 | 97,560 | 1.5 | 1.06 | 7.57 | 99.5 | 7.5 | 76.5 |
| 6/23/96 | 40 | 28,486 | 20.5 | 5.13 | 7.32 | 89 | 8.3 | 76 |
| 6/24/96 | 52.5 | 90,962 | 6.5 | 3.78 | 7.86 | 92 | 9.6 | 76.5 |
| 6/27/96 | 39 | 89,069 | 0 | 3.14 | 11.58 | 91 | 8.9 | 76.5 |
| 6/29/96 | 40.5 | 72,845 | 1 | 5.00 | 7.65 | 92 | 5.9 | 75 |
| 6/30/96 | 60.5 | 28,900 | 0 | 1.00 | 3.99 | 92 | 6.4 | 73 |
| 7/1/96 | 69 | 103,954 | 0 | 1.50 | 6.61 | 95 | 5.6 | 75 |
| 7/2/96 | 98 | 88,279 | 3 | 0.56 | 5.24 | 96 | 5.8 | 75.5 |
| 7/3/96 | 99.5 | 78,502 | 0.5 | 0.25 | 5.39 | 95.5 | 7.1 | 74.5 |
| 7/4/96 | 105.5 | 15,650 | 4.5 | 1.00 | 3.15 | 96 | 5.6 | 74.5 |
| 7/7/96 | 63 | 47,373 | 7 | 1.80 | 6.52 | 97.5 | 7.3 | 76 |
| 7/10/96 | 48.5 | 120,871 | 1 | 5.41 | 7.43 | 90 | 8.1 | 73.5 |
| 7/12/96 | 42 | 146,141 | 3.5 | 2.65 | 10.43 | 96 | 10.5 | 77.5 |

*Table 26. Scenario 10 Data (continued)*

| DATECST | OZMAX | PTDCUMAM | OZINT | CLDAVGT2 | WSNC1T2 | TMAXDAY | WDSPGSD | TMINDAY |
|---|---|---|---|---|---|---|---|---|
| 7/14/96 | 46.5 | 87,219 | 8.5 | 3.39 | 10.66 | 96.5 | 9.3 | 76.5 |
| 7/19/96 | 32.5 | 105,349 | 7 | 5.18 | 12.41 | 97 | 10.5 | 78 |
| 7/20/96 | 39 | 58,253 | 7.5 | 2.53 | 10.58 | 98 | 9.4 | 76.5 |
| 7/23/96 | 42 | 105,730 | 5 | 3.17 | 11.04 | 98.5 | 9.3 | 78 |
| 7/25/96 | 42.5 | 119,147 | 3.5 | 4.78 | 10.25 | 96 | 8.1 | 73.5 |
| 7/26/96 | 46 | 122,801 | 0.5 | 3.77 | 6.32 | 93.5 | 6.2 | 73 |
| 7/28/96 | 40.5 | 46,771 | 7 | 5.97 | 6.83 | 94.5 | 8.4 | 77 |
| 7/31/96 | 38 | 105,650 | 0.5 | 1.86 | 10.90 | 97 | 8.8 | 76.5 |
| 8/11/96 | 44.5 | 37,932 | 4 | 1.78 | 6.48 | 94.5 | 8 | 76.5 |
| 8/12/96 | 75.5 | 158,255 | 0.5 | 1.58 | 7.70 | 98.5 | 6.5 | 77.5 |
| 8/15/96 | 44 | 138,841 | 0 | 3.79 | 7.05 | 94 | 4.9 | 69.5 |
| 8/17/96 | 42.5 | 68,937 | 11.5 | 2.90 | 7.91 | 94 | 8.3 | 75.5 |
| 8/20/96 | 40 | 103,438 | 19.5 | 3.48 | 5.08 | 94 | 5.4 | 77 |
| 8/21/96 | 60.5 | 108,007 | 0 | 2.10 | 6.09 | 93 | 5.3 | 71.5 |
| 8/23/96 | 38.5 | 109,606 | 0.5 | 7.57 | 10.78 | 86 | 8.9 | 74 |
| 8/26/96 | 25 | 79,692 | 0.5 | 6.90 | 5.96 | 83 | 4.5 | 72.5 |
| 8/27/96 | 30.5 | 79,922 | 2 | 7.40 | 5.03 | 88 | 4.9 | 76 |
| 8/28/96 | 39 | 82,387 | 1 | 5.26 | 5.75 | 91 | 7 | 76 |
| 8/31/96 | 54 | 79,018 | 1.5 | 7.12 | 4.28 | 85 | 4 | 74.5 |
| 9/1/96 | 62 | 34,060 | 18 | 3.05 | 6.24 | 86 | 4.7 | 75.5 |
| 9/3/96 | 45 | 99,919 | 3 | 4.23 | 6.11 | 91 | 6.4 | 72 |
| 9/4/96 | 47 | 107,909 | 0 | 6.13 | 3.60 | 89 | 5.2 | 73 |
| 9/5/96 | 64.5 | 96,327 | 0 | 5.11 | 4.53 | 87.5 | 3.1 | 74.5 |
| 9/8/96 | 49 | 55,875 | 6 | 6.40 | 5.30 | 86 | 3.5 | 74.5 |
| 9/9/96 | 58 | 75,180 | 0 | 6.35 | 3.53 | 88 | 3.6 | 74 |
| 9/10/96 | 84 | 52,634 | 0 | 2.35 | 5.92 | 90 | 4.2 | 73 |
| 9/11/96 | 87 | 102,476 | 2 | 0.90 | 5.78 | 90 | 4.3 | 68 |
| 9/12/96 | 126 | 105,346 | 25 | 3.58 | 2.85 | 87 | 3.4 | 69 |
| 9/16/96 | 67 | 91,576 | 0.5 | 2.72 | 5.30 | 94.5 | 4.2 | 75 |
| 9/18/96 | 32 | 106,072 | 1 | 5.66 | 8.77 | 90 | 9 | 76 |
| 9/19/96 | 40 | 105,998 | 0 | 5.21 | 8.81 | 90 | 7 | 76 |
| 9/20/96 | 41 | 96,181 | 13 | 4.42 | 6.32 | 87 | 6.9 | 71 |
| 9/21/96 | 42 | 50,868 | 0 | 5.22 | 5.63 | 87 | 6.1 | 74 |
| 9/22/96 | 52 | 23,721 | 19 | 7.07 | 7.50 | 88 | 6.3 | 76 |
| 9/24/96 | 54 | 104,865 | 0 | 4.27 | 5.18 | 90 | 6.2 | 72 |

**Figure 90. SAN ANTONIO APR'96-SEP'96 MODEL T22**
**DATA CONTROLLED FOR DAYS DURING OZONE EPISODES**
**DAILY CUMULATIVE TRANSGUIDE NETWORK TRAFFIC DENSITY**
**6AM to 2 HOURS BEFORE TIME of MAX OZONE**

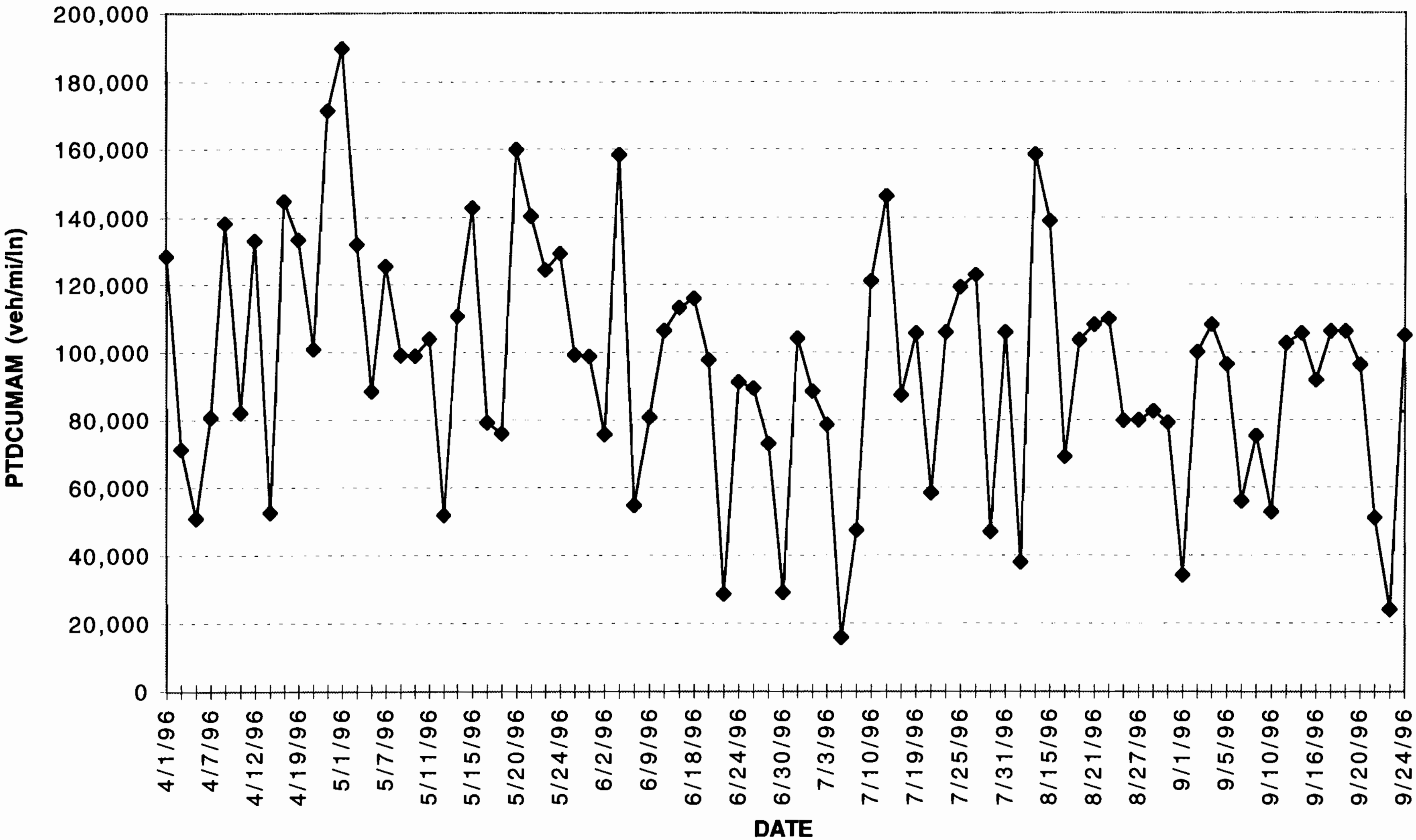


Figure 91. SAN ANTONIO APR'96-SEP'96 MODEL T22
DATA CONTROLLED FOR DAYS DURING OZONE EPISODES
DAILY MAXIMUM OZONE CONCENTRATIONS

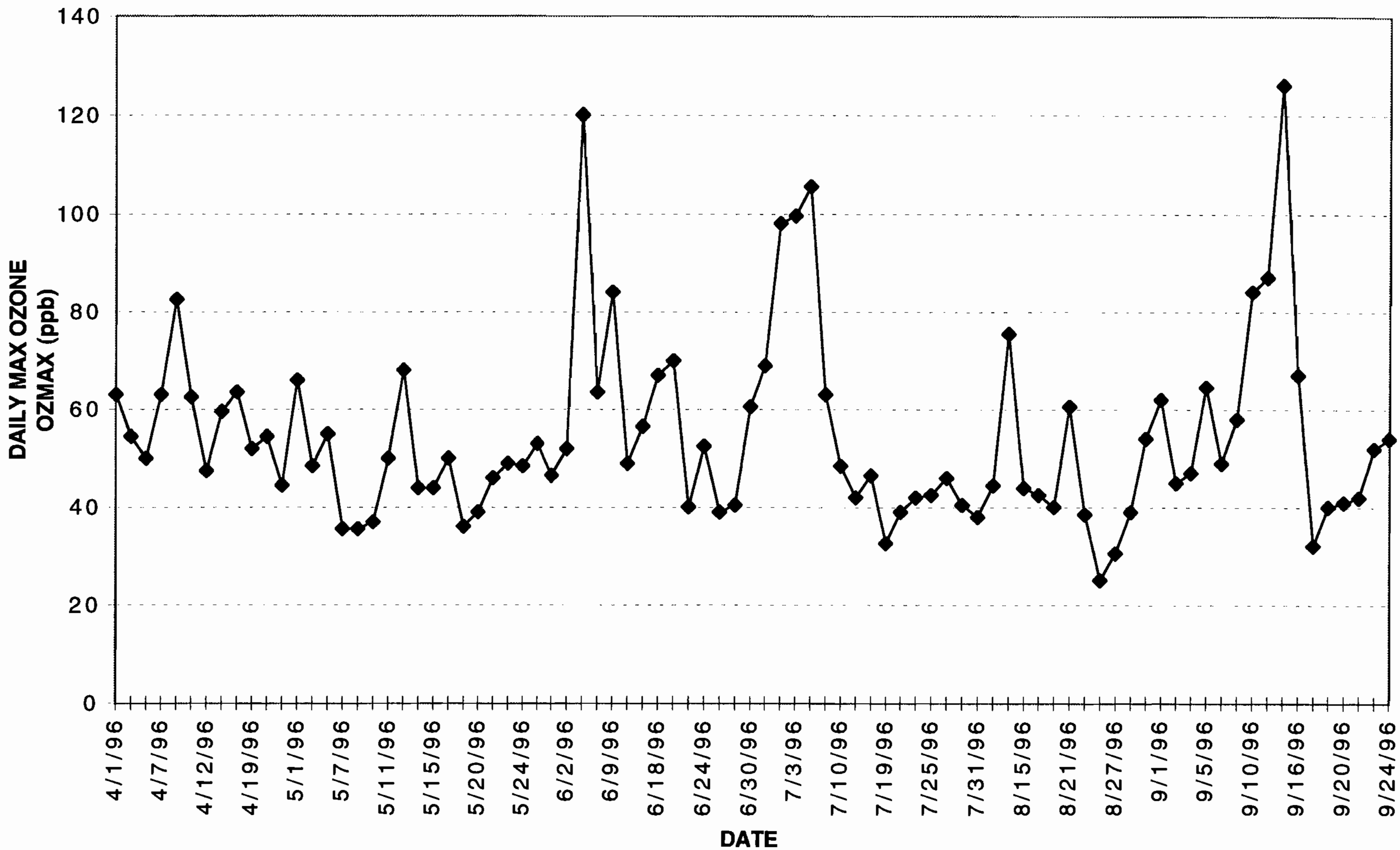


**Figure 92. SAN ANTONIO APR'96-SEP'96 MODEL T22
DATA CONTROLLED FOR DAYS DURING OZONE EPISODES
DAILY MAX OZONE AS A FUNCTION OF DAILY CUMULATIVE TRAFFIC DENSITY ON TRANSGUIDE NETWORK
FROM 6AM TO 2-HRS BEFORE TIME OF MAX OZONE**

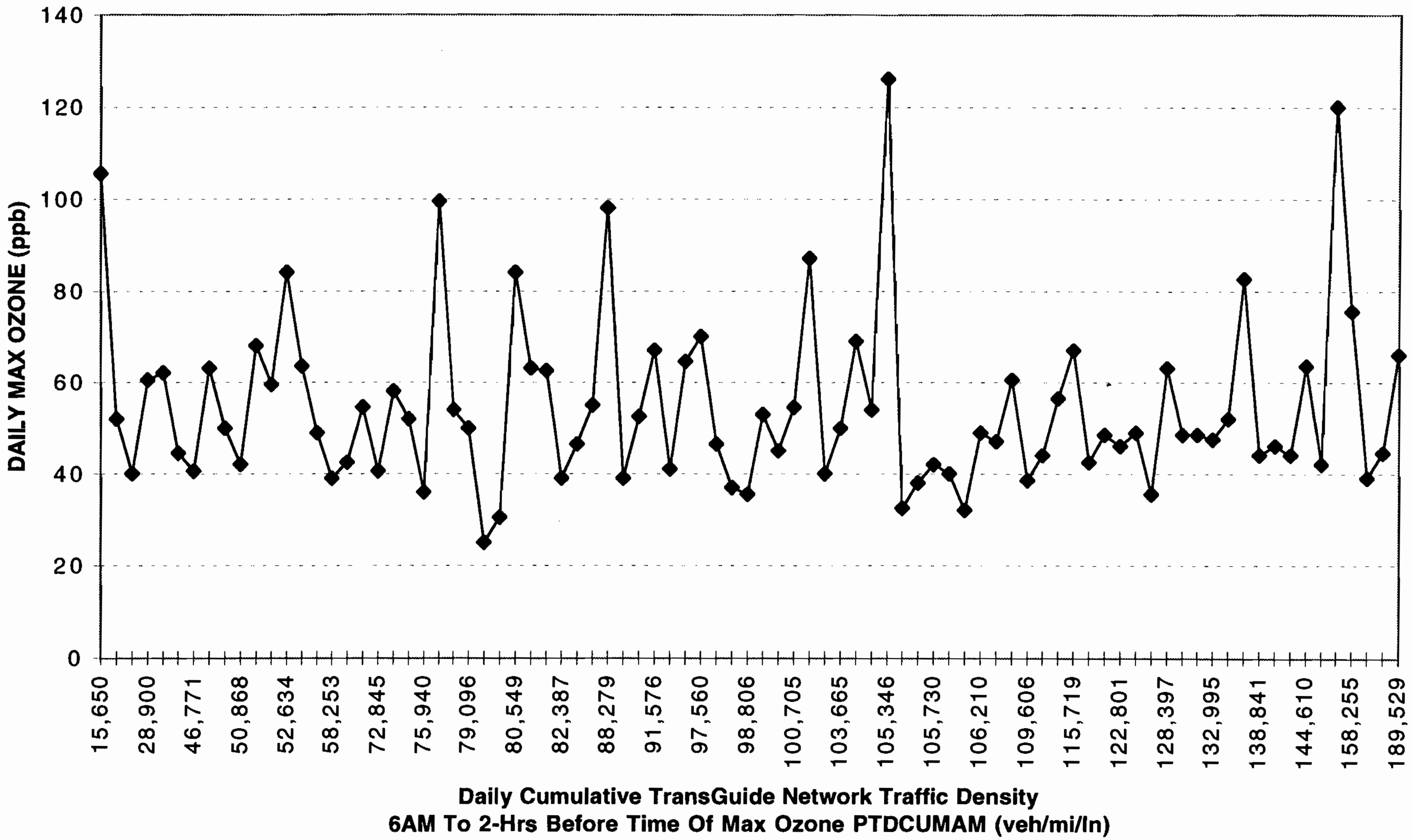


**Figure 93. SAN ANTONIO APR'96-SEP'96 MODEL T22**
**DATA CONTROLLED FOR DAYS DURING OZONE EPISODES**
**DAILY MAX OZONE AS A FUNCTION OF DAILY INITIAL MORNING OZONE**

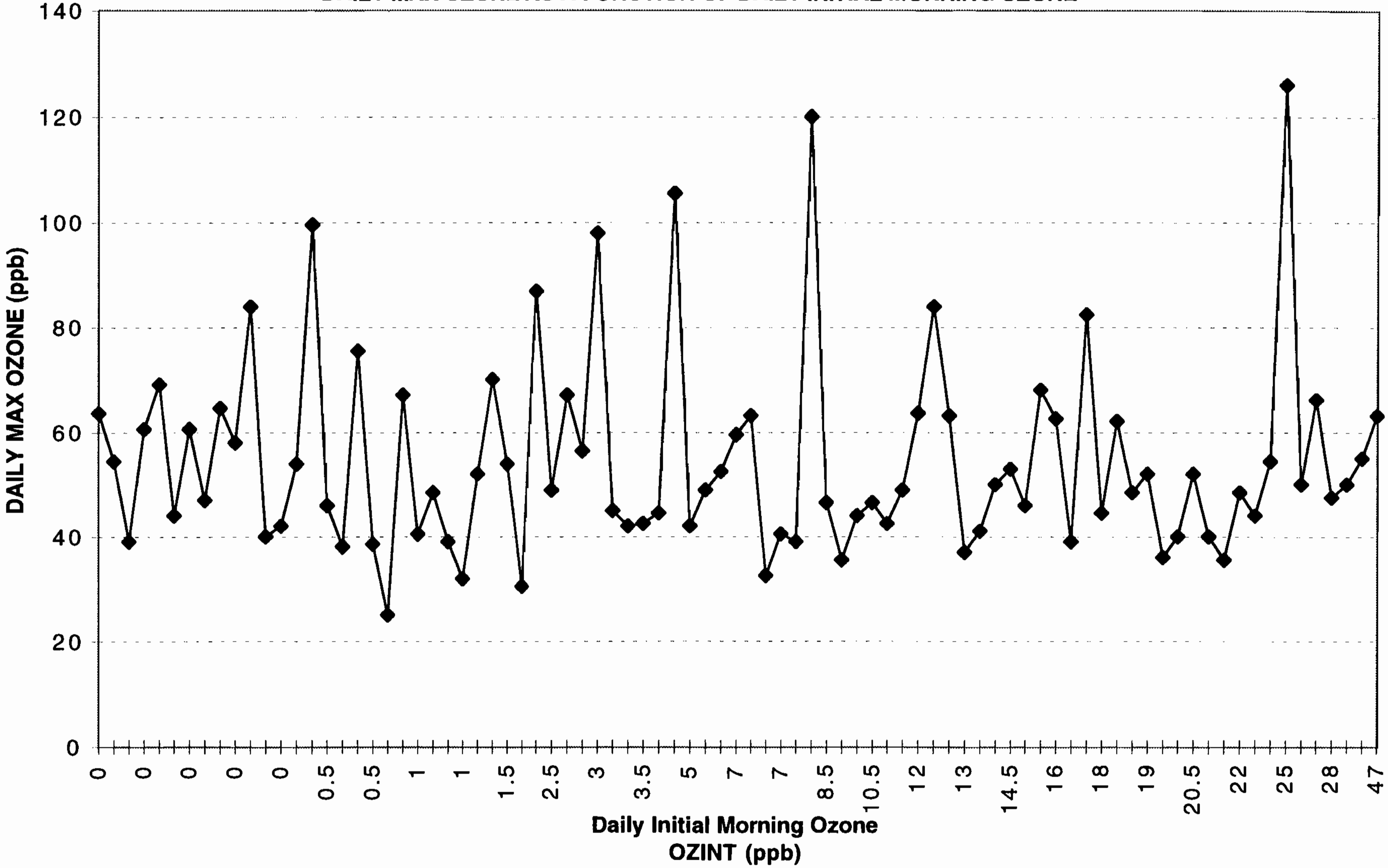


Figure 94. SAN ANTONIO APR'96-SEP'96 MODEL T22
DATA CONTROLLED FOR DAYS DURING OZONE EPISODES

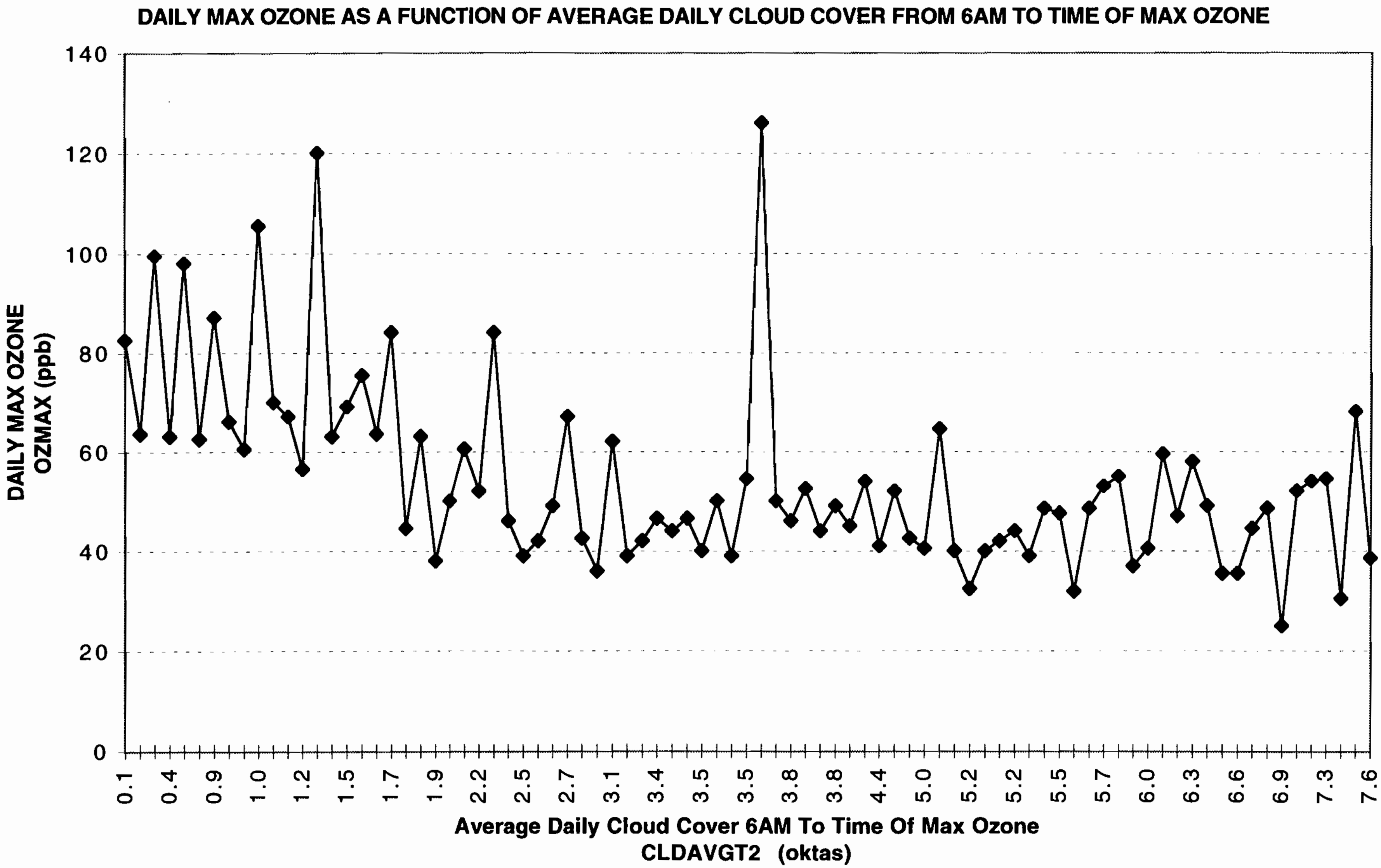
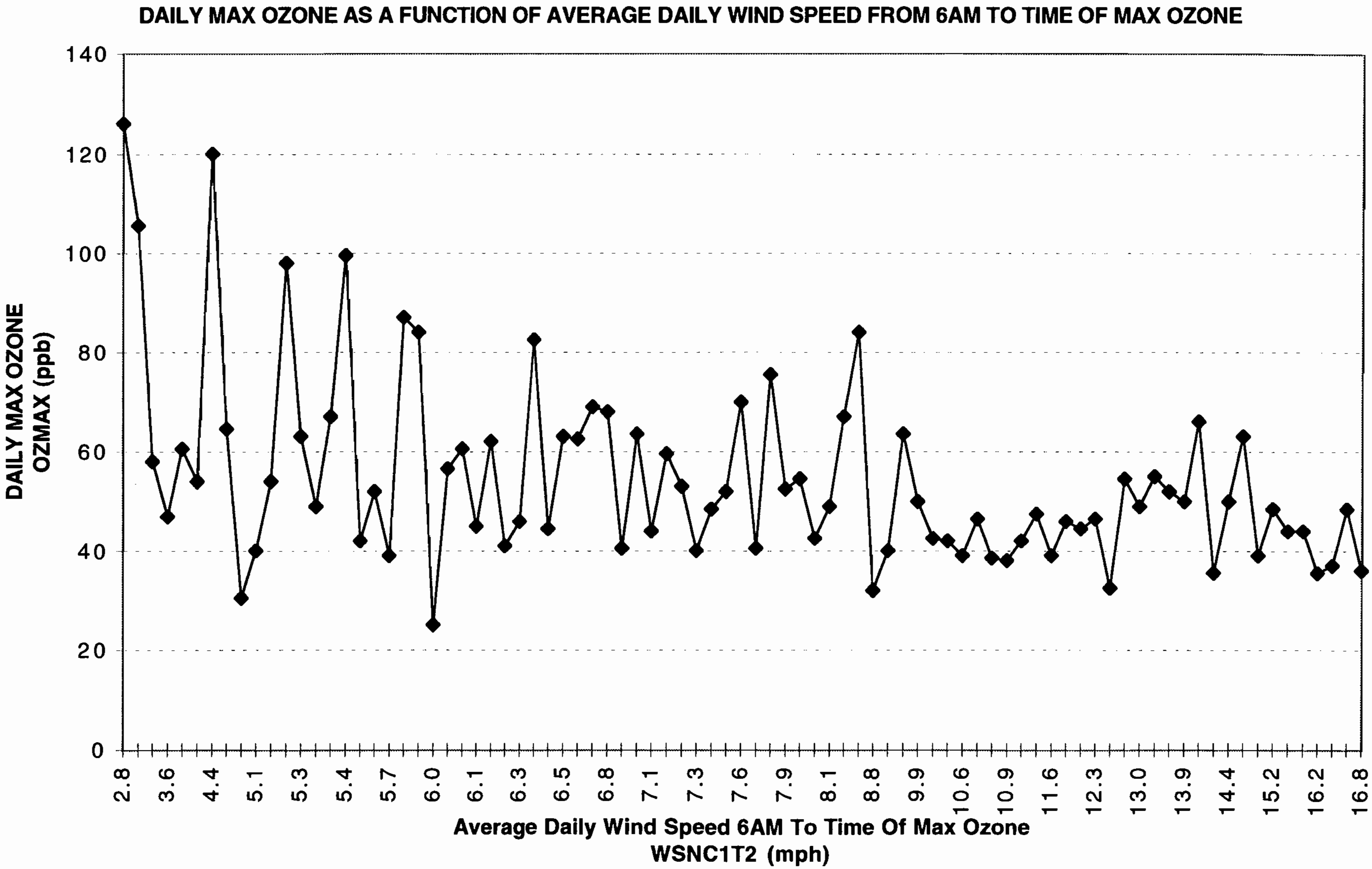


Figure 95. SAN ANTONIO APR'96-SEP'96 MODEL T22
DATA CONTROLLED FOR DAYS DURING OZONE EPISODES



## Figure 96. SAN ANTONIO APR'96-SEP'96 MODEL T22
## DATA CONTROLLED FOR DAYS DURING OZONE EPISODES

### DAILY MAX OZONE AS A FUNCTION OF MAXIMUM DAILY TEMPERATURE

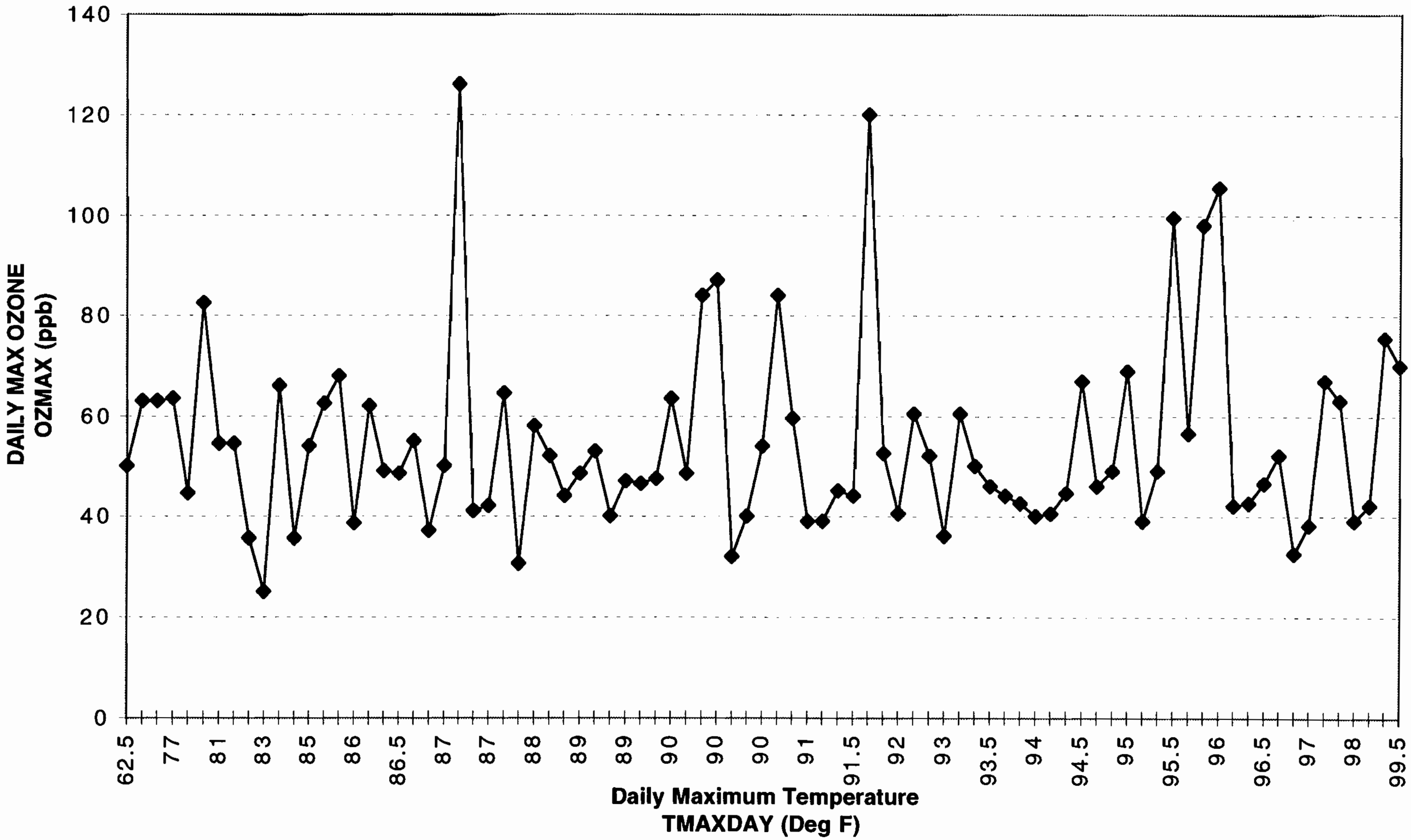


Figure 97. SAN ANTONIO APR'96-SEP'96 MODEL T22
DATA CONTROLLED FOR DAYS DURING OZONE EPISODES
DAILY MAX OZONE AS A FUNCTION OF AVERAGE DAILY WIND SPEED

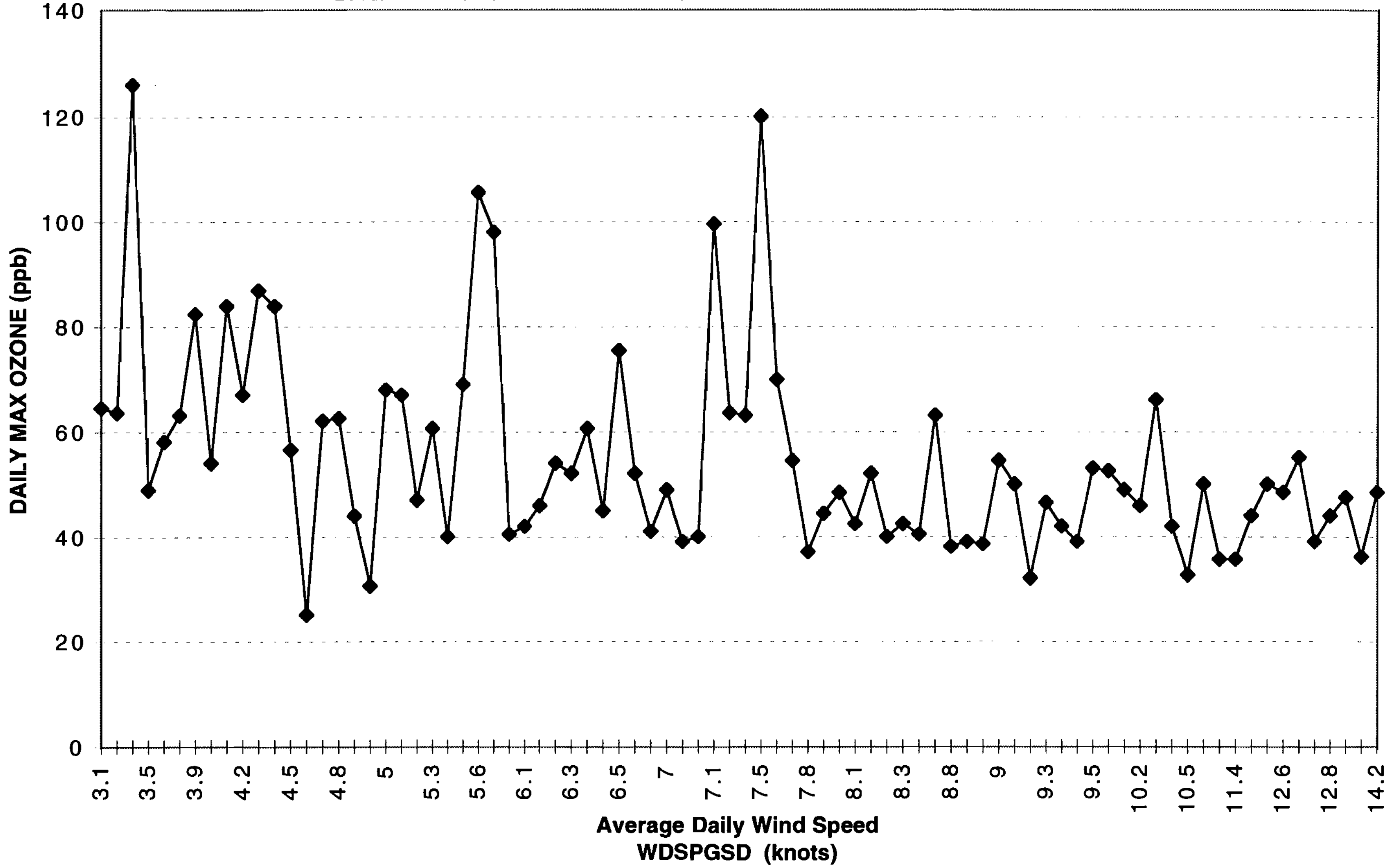


Figure 98. SAN ANTONIO APR'96-SEP'96 MODEL T22
DATA CONTROLLED FOR DAYS DURING OZONE EPISODES
DAILY MAX OZONE AS A FUNCTION OF MINIMUM DAILY TEMPERATURE

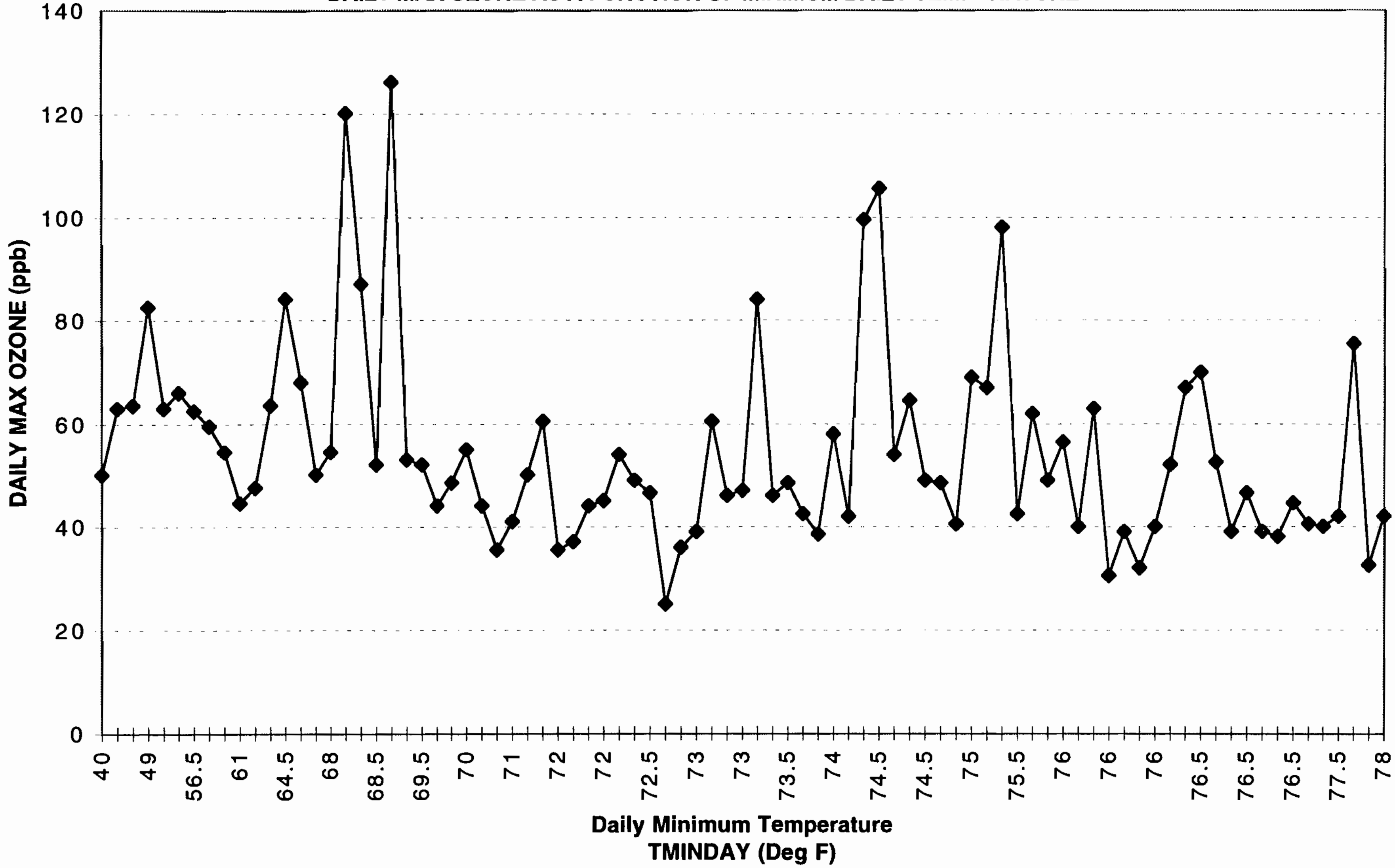
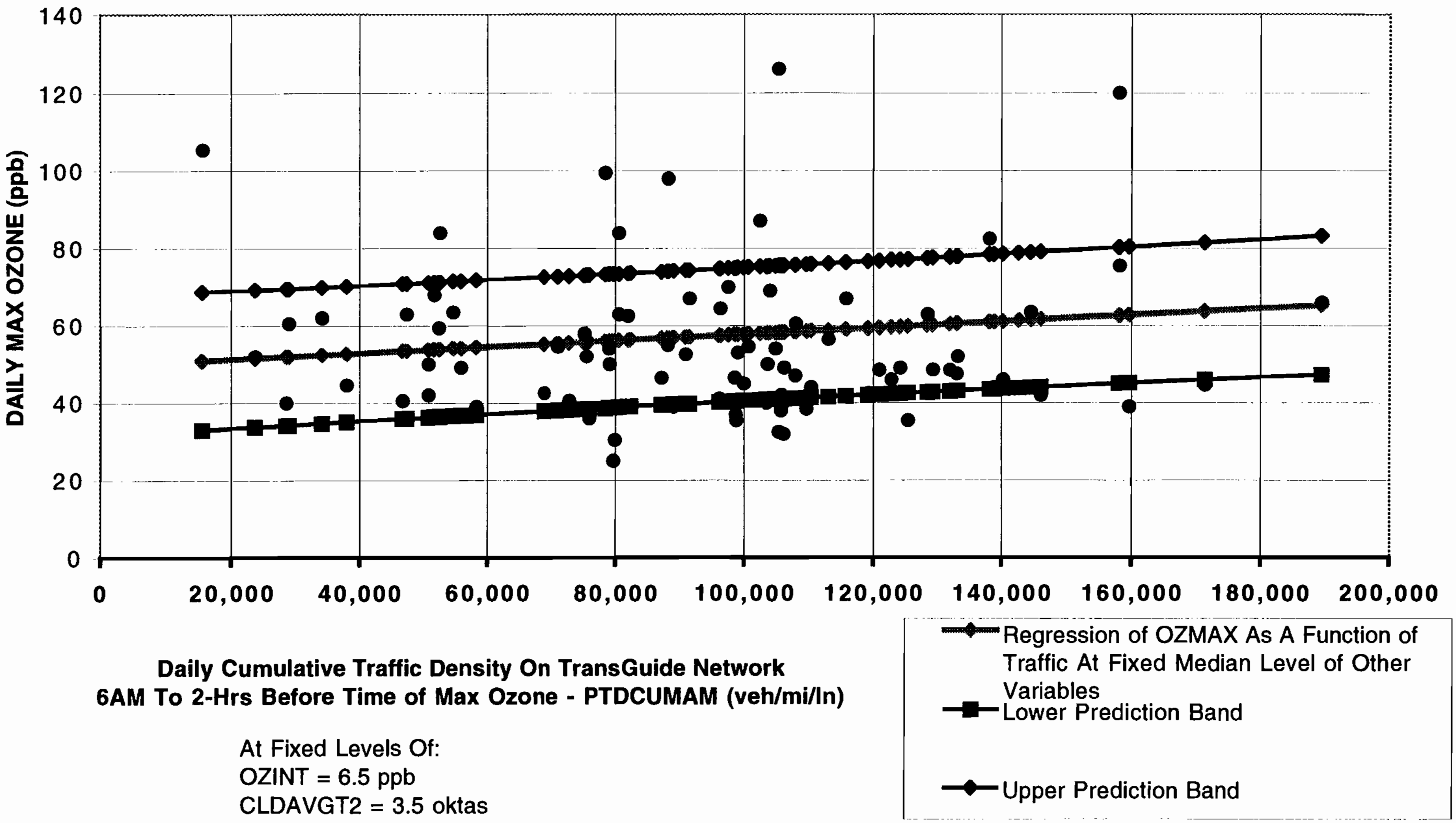


Figure 99. SAN ANTONIO APR'96-SEP'96 MODEL T22
DATA CONTROLLED FOR DAYS DURING OZONE EPISODES
80% CONFIDENCE PREDICTION BAND ON DAILY MAX OZONE AS A FUNCTION OF TRANSGUIDE NETWORK CUMULATIVE TRAFFIC DENSITY AT FIXED LEVELS OF OTHER INDEPENDENT VARIABLES (MEDIAN LEVELS)




Daily Cumulative Traffic Density On TransGuide Network
6AM To 2-Hrs Before Time of Max Ozone - PTDCUMAM (veh/mi/ln)

At Fixed Levels Of:
OZINT = 6.5 ppb
CLDAVGT2 = 3.5 oktas
WSNC1T2 = 7.6 mph

## SCENARIO 11

In Scenario 11, we repeat the analysis of Scenario 9 of controlling for days that are a part of an ozone episode between the months of December 1995 through September 1996 except that additionally we control for the average "morning" cloud cover (CLDAVGT2) to be less than or equal to 3 oktas. The results of the analysis reveal a significant association between the daily traffic congestion parameter PTDCUMAM and the daily peak ozone concentration. Table 27 summarizes the results of the model and Table 28 summarizes the strength of the traffic parameter's association with the daily peak ozone. Confidence intervals of the parameter's model coefficient per 10,000 units of PTDCUMAM are calculated at the 80, 90 and 95 percent confidence levels. Table 29 summarizes the raw data sorted by date for Scenario 11.

We can say that under this scenario at the 80 percent confidence level, the potential increase to the daily peak ozone in ppb per a 10,000 unit increase in the traffic congestion parameter PTDCUMAM has a range from about 0.5 to about 1.8 ppb. It is equally likely that the potential increase in the daily peak ozone would fall at any point within this range. The results presented in Table 28 also indicate that the traffic congestion parameter remains significant at the 95 percent confidence level.

Figure 100 and Figure 101 plot the daily peak ozone (OZMAX) and the daily cumulative traffic congestion parameter (PTDCUMAM) over time. Figure 102 through Figure 108 graphically summarize the relationships between the response and predictor variables. Figure 109 depicts an 80 percent confidence level prediction band of OZMAX as a function of PTDCUMAM while holding the other significant variables constant at their median levels.

We can say at an 80 percent confidence level that the daily peak ozone will fall somewhere within the band on Figure 109. As shown, the 80 percent confidence prediction band with this linear model under this scenario does not encompass several of the higher daily peak ozone concentrations at fixed median levels of the other significant variables.

*Table 27. Scenario 11 Results*

| | | | RANGE OF VARIABLES |
|---|---|---|---|
| **Data controls** | 1) DEC 1995 - SEP 1996<br>2) DAYS DURING OZONE EPISODES<br>3) AVG CLOUD COVER FROM 6AM TO TIME OF MAX OZONE LE 3 OKTAS | | |
| **Model significant parameters (units)** | Y --- OZMAX (ppb)<br>XO --- INTERCEPT<br>X1 --- PTDCUMAM (veh/mi/ln)<br>X2 --- CLDAVGT2 (oktas)<br>X3 --- WSNC1T2 (mph)<br>X4 --- TMINDAY (Deg F) | | 27.5 to 120<br><br>15,650 to 189,530<br>0 to 2.9<br>3.1 to 19.0<br>19.5 to 77.5 |
| **Significant parameter coefficient estimates And bivariate correlations (r)** | 49.1038320 X0<br>0.0001104987 X1<br>-5.2945948 X2<br>-2.3051155 X3<br>0.4509396 X4 | <br>0.1725<br>-0.0954<br>-0.5803<br>0.4829 | |
| **Traffic variable coefficient confidence-level** | 96% | | |
| **Model R-Square** | 0.47 | | |
| **Traffic variable partial R-SQUARE** | [a] 0.0310 | | |
| **Sample size** | 57 | | |
| **1st Order auto-correlation Durbin-Watson Statistic** | 1.9273 | | |
| **P-value supporting $H_O$: No Heteroskedasticity** | [a] 0.4848 | | |

*Table 28. Scenario 11 Results (cont.)*

| | |
|---|---|
| **Traffic parameter estimate per 10,000 PTDCUMAM** | **1.1050** |
| **Traffic parameter estimate standard error per 10,000 PTDCUMAM** | **0.5000** |
| **n** | **57** |
| **k** | **4** |
| **df** | **52** |
| $t_{(.10)}$ | **1.282** |
| $t_{(.05)}$ | **1.645** |
| $t_{(.025)}$ | **1.960** |
| **80 percent confidence interval of traffic parameter estimate per 10,000 units of PTDCUMAM** | **0.46 to 1.75** |
| **90 percent confidence interval of traffic parameter estimate per 10,000 units of PTDCUMAM** | **0.28 to 1.93** |
| **95 percent confidence interval of traffic parameter estimate per 10,000 units of PTDCUMAM** | **0.12 to 2.08** |

*Table 29. Scenario 11 Data*

| DATECST | OZMAX | PTDCUMAM | OZINT | CLDAVGT2 | WSNC1T2 | TMAXDAY | WDSPGSD | TMINDAY |
|---|---|---|---|---|---|---|---|---|
| 12/4/95 | 65.5 | 115,843 | 34 | 0.11 | 7.33 | 75 | 4.5 | 53 |
| 12/6/95 | 66 | 113,569 | 30.5 | 1.22 | 6.14 | 74 | 5.7 | 51 |
| 12/9/95 | 27.5 | 71,780 | 10 | 2.50 | 19.04 | 50 | 13.5 | 32.5 |
| 12/27/95 | 46 | 93,809 | 0 | 1.88 | 5.88 | 63 | 3.9 | 37 |
| 1/2/96 | 28.5 | 59,958 | 27.5 | 1.17 | 18.85 | 48.5 | 14.2 | 37.5 |
| 1/3/96 | 30.5 | 91,286 | 5.5 | 0.27 | 7.68 | 53 | 6.8 | 29.5 |
| 1/4/96 | 35.5 | 109,338 | 2.5 | 0.94 | 9.27 | 66 | 6.7 | 34 |
| 1/7/96 | 36 | 31,789 | 24.5 | 0.25 | 13.16 | 45 | 8.6 | 25 |
| 1/9/96 | 43.5 | 112,755 | 19 | 0.00 | 10.30 | 64 | 7.2 | 35 |
| 1/12/96 | 38 | 84,915 | 12 | 0.29 | 9.58 | 74 | 6 | 40 |
| 1/13/96 | 43 | 44,330 | 0 | 0.43 | 5.91 | 73 | 4.6 | 42 |
| 1/14/96 | 49.5 | 48,991 | 8 | 1.44 | 9.58 | 74.5 | 5.1 | 44 |
| 1/15/96 | 56 | 99,454 | 3 | 0.78 | 4.99 | 75 | 2.6 | 47.5 |
| 1/21/96 | 52 | 45,640 | 27 | 0.00 | 7.97 | 71 | 3.6 | 45 |
| 2/4/96 | 33 | 26,324 | 18.5 | 0.29 | 9.69 | 40 | 5.6 | 19.5 |
| 2/12/96 | 40 | 103,061 | 22 | 2.50 | 10.28 | 64 | 5.4 | 40 |
| 2/13/96 | 44.5 | 103,596 | 0 | 1.00 | 7.42 | 67 | 4.8 | 39 |
| 2/14/96 | 45 | 89,558 | 24.5 | 0.86 | 10.92 | 79.5 | 8.1 | 49 |
| 2/17/96 | 53 | 65,381 | 2 | 2.00 | 10.35 | 69 | 6.3 | 35 |
| 3/10/96 | 62 | 54,976 | 0 | 0.42 | 8.18 | 61 | 4.4 | 30 |
| 3/15/96 | 65 | 122,914 | 22 | 2.63 | 9.32 | 79.5 | 5.9 | 62 |
| 3/19/96 | 45 | 93,187 | 27.5 | 0.13 | 13.23 | 67 | 6.9 | 45 |
| 3/20/96 | 46.5 | 93,131 | 17.5 | 0.00 | 10.21 | 66 | 5.9 | 40.5 |
| 3/21/96 | 59 | 79,438 | 0 | 0.13 | 7.82 | 73 | 4.8 | 38.5 |
| 3/28/96 | 60.5 | 141,006 | 21 | 2.70 | 5.47 | 71 | 4 | 42.5 |
| 4/1/96 | 63 | 128,397 | 47 | 0.44 | 14.51 | 74 | 8.5 | 56 |
| 4/7/96 | 63 | 80,590 | 13 | 1.45 | 5.27 | 66 | 3.8 | 41 |
| 4/8/96 | 82.5 | 138,109 | 17 | 0.13 | 6.33 | 79.5 | 3.9 | 49 |
| 4/10/96 | 62.5 | 81,961 | 16 | 0.57 | 6.55 | 86 | 4.8 | 56.5 |
| 4/16/96 | 63.5 | 144,610 | 0 | 1.64 | 9.72 | 77 | 7.2 | 46 |
| 4/19/96 | 52 | 133,172 | 20.5 | 2.22 | 13.75 | 97 | 8.2 | 68.5 |
| 5/1/96 | 66 | 189,529 | 27 | 0.95 | 14.05 | 84.5 | 10.3 | 56 |
| 5/11/96 | 50 | 103,665 | 26 | 1.91 | 9.94 | 87 | 9 | 65.5 |
| 5/21/96 | 46 | 140,220 | 15 | 2.52 | 11.94 | 95 | 10.2 | 73.5 |
| 5/22/96 | 49 | 124,190 | 12 | 2.67 | 13.04 | 95.5 | 10.1 | 72.5 |
| 6/3/96 | 120 | 158,194 | 8 | 1.27 | 4.36 | 91.5 | 7.5 | 68 |
| 6/8/96 | 63.5 | 54,669 | 12 | 0.25 | 6.92 | 90 | 3.4 | 64.5 |
| 6/9/96 | 84 | 80,549 | 12.5 | 1.68 | 8.37 | 90.5 | 4.5 | 64.5 |
| 6/17/96 | 56.5 | 113,027 | 3 | 1.18 | 5.98 | 96 | 4.5 | 76 |

*Table 29. Scenario 11 Data (continued)*

| DATECST | OZMAX | PTDCUMAM | OZINT | CLDAVGT2 | WSNC1T2 | TMAXDAY | WDSPGSD | TMINDAY |
|---|---|---|---|---|---|---|---|---|
| 6/18/96 | 67 | 115,719 | 2.5 | 1.11 | 8.31 | 97.5 | 5.2 | 76.5 |
| 6/20/96 | 70 | 97,560 | 1.5 | 1.06 | 7.57 | 99.5 | 7.5 | 76.5 |
| 6/30/96 | 60.5 | 28,900 | 0 | 1.00 | 3.99 | 92 | 6.4 | 73 |
| 7/1/96 | 69 | 103,954 | 0 | 1.50 | 6.61 | 95 | 5.6 | 75 |
| 7/2/96 | 98 | 88,279 | 3 | 0.56 | 5.24 | 96 | 5.8 | 75.5 |
| 7/3/96 | 99.5 | 78,502 | 0.5 | 0.25 | 5.39 | 95.5 | 7.1 | 74.5 |
| 7/4/96 | 105.5 | 15,650 | 4.5 | 1.00 | 3.15 | 96 | 5.6 | 74.5 |
| 7/7/96 | 63 | 47,373 | 7 | 1.80 | 6.52 | 97.5 | 7.3 | 76 |
| 7/12/96 | 42 | 146,141 | 3.5 | 2.65 | 10.43 | 96 | 10.5 | 77.5 |
| 7/20/96 | 39 | 58,253 | 7.5 | 2.53 | 10.58 | 98 | 9.4 | 76.5 |
| 7/31/96 | 38 | 105,650 | 0.5 | 1.86 | 10.90 | 97 | 8.8 | 76.5 |
| 8/11/96 | 44.5 | 37,932 | 4 | 1.78 | 6.48 | 94.5 | 8 | 76.5 |
| 8/12/96 | 75.5 | 158,255 | 0.5 | 1.58 | 7.70 | 98.5 | 6.5 | 77.5 |
| 8/17/96 | 42.5 | 68,937 | 11.5 | 2.90 | 7.91 | 94 | 8.3 | 75.5 |
| 8/21/96 | 60.5 | 108,007 | 0 | 2.10 | 6.09 | 93 | 5.3 | 71.5 |
| 9/10/96 | 84 | 52,634 | 0 | 2.35 | 5.92 | 90 | 4.2 | 73 |
| 9/11/96 | 87 | 102,476 | 2 | 0.90 | 5.78 | 90 | 4.3 | 68 |
| 9/16/96 | 67 | 91,576 | 0.5 | 2.72 | 5.30 | 94.5 | 4.2 | 75 |

**Figure 100. SAN ANTONIO TRANSGUIDE NETWORK TRAFFIC DATA DEC'96 - SEP'96 MODEL T20.1**
**DATA CONTROLLED FOR CLDAVGT2 LE 3 & DAYS OF OZONE EPISODES**

**DAILY MAXIMUM OZONE CONCENTRATION**

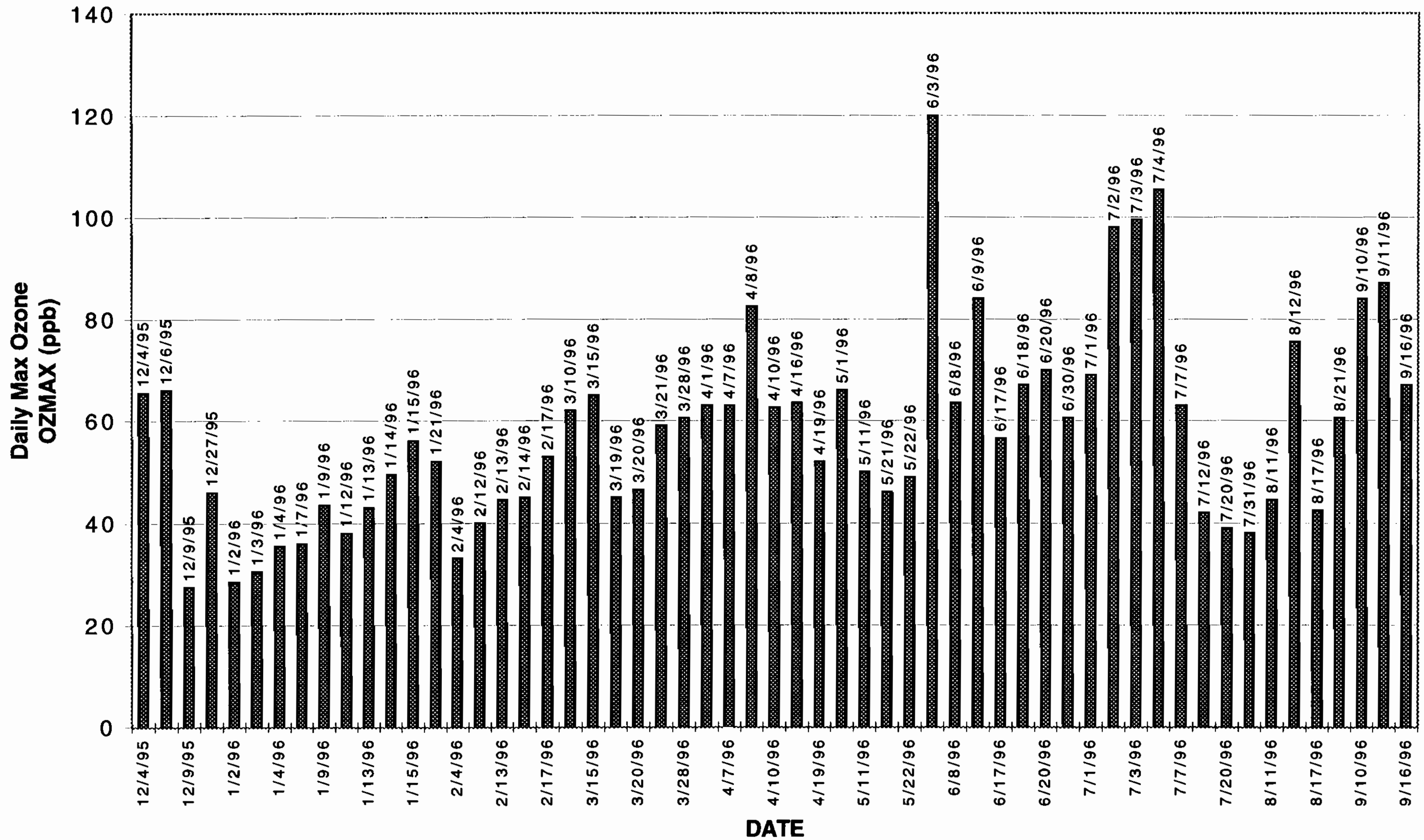


**Figure 101. SAN ANTONIO TRANSGUIDE NETWORK TRAFFIC DATA DEC'96 - SEP'96 MODEL T20.1**
**DATA CONTROLLED FOR CLDAVGT2 LE 3 & DAYS OF OZONE EPISODES**

**DAILY CUMULATIVE TRANSGUIDE NETWORK TRAFFIC DENSITY**
**6AM to 2 HOURS BEFORE TIME of MAX OZONE**

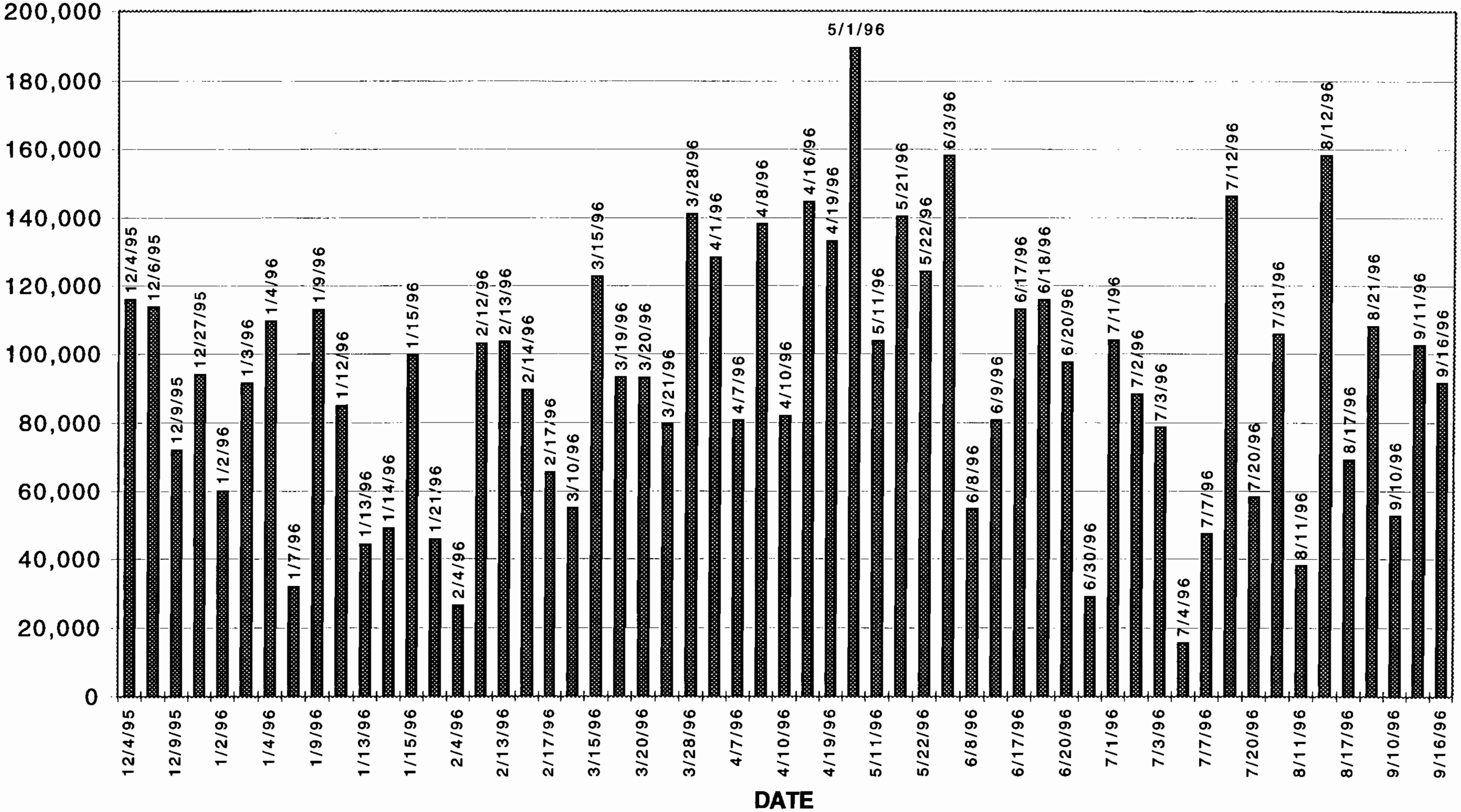


Figure 102. SAN ANTONIO TRANSGUIDE NETWORK TRAFFIC DATA DEC'96 - SEP'96 MODEL T20.1
DATA CONTROLLED FOR CLDAVGT2 LE 3 & DAYS OF OZONE EPISODES

DAILY MAX OZONE AS A FUNCTION OF DAILY CUMULATIVE TRAFFIC DENSITY ON TRANSGUIDE NETWORK

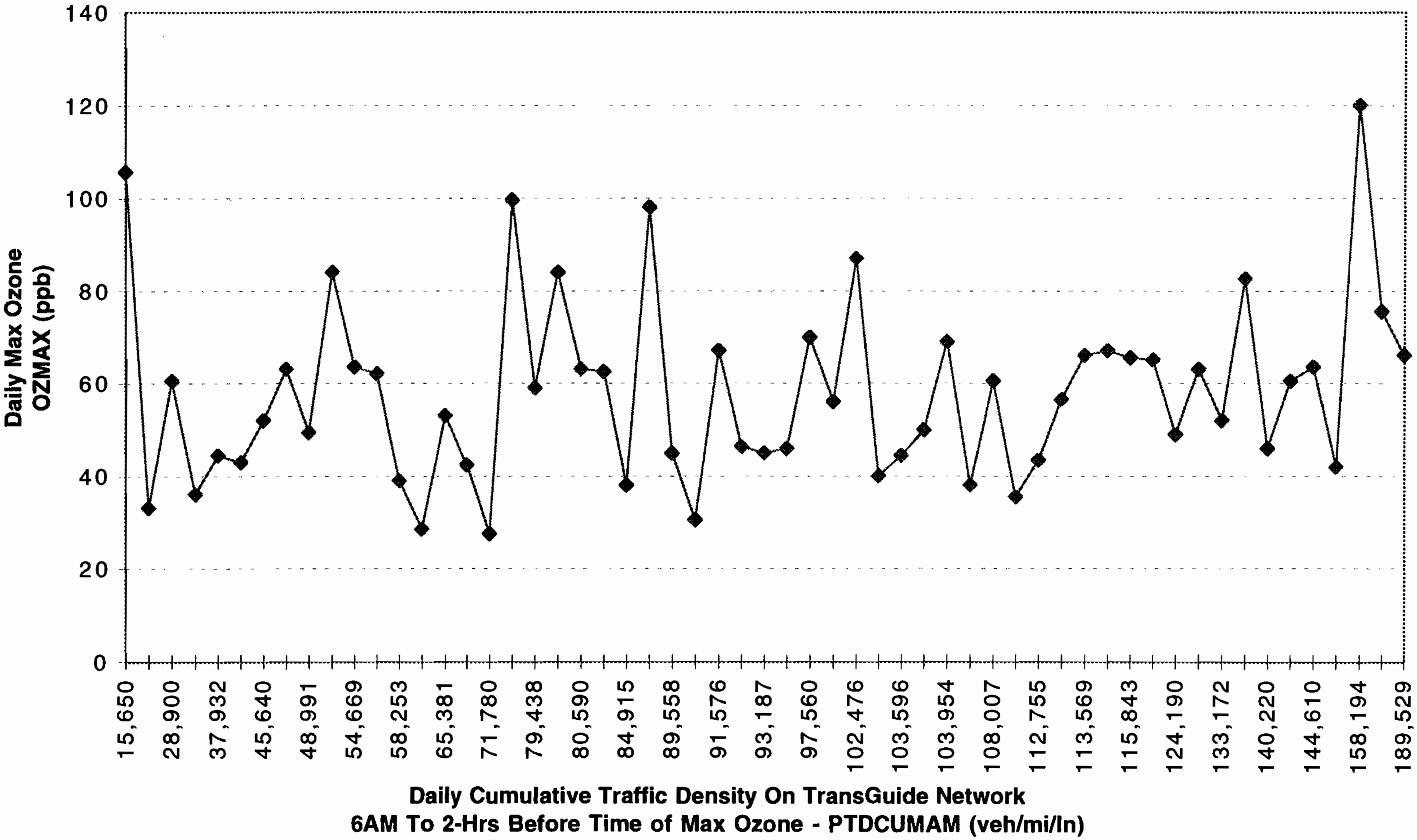


**Figure 103. SAN ANTONIO TRANSGUIDE NETWORK TRAFFIC DATA DEC'96 - SEP'96 MODEL T20.1**
**DATA CONTROLLED FOR CLDAVGT2 LE 3 & DAYS OF OZONE EPISODES**

**DAILY MAX OZONE AS A FUNCTION OF DAILY INITIAL MORNING OZONE**

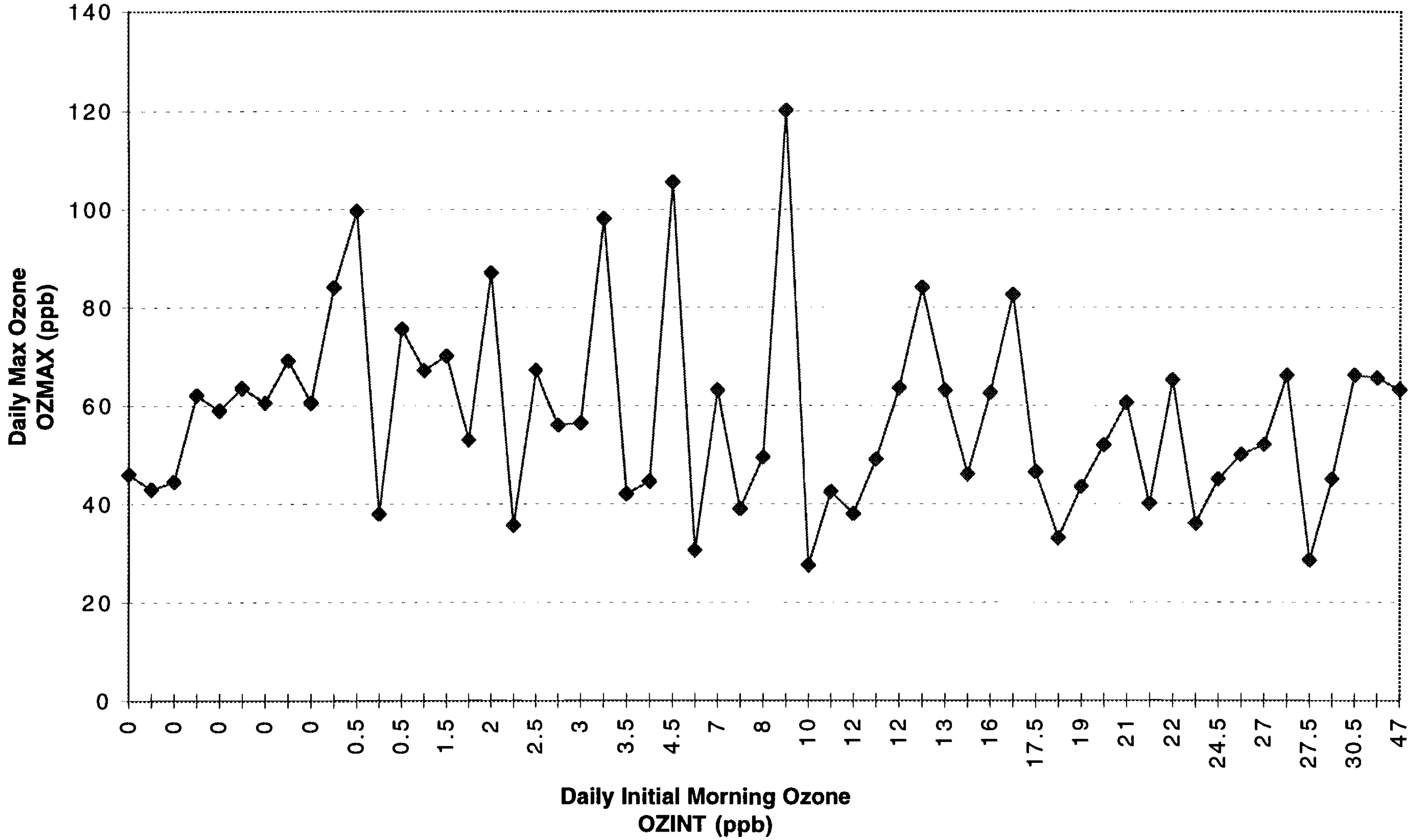


**Figure 104. SAN ANTONIO TRANSGUIDE NETWORK TRAFFIC DATA DEC'96 - SEP'96 MODEL T20.1**
**DATA CONTROLLED FOR CLDAVGT2 LE 3 & DAYS OF OZONE EPISODES**

**DAILY MAX OZONE AS A FUNCTION OF AVERAGE DAILY CLOUD COVER UPTO TIME OF MAX OZONE**

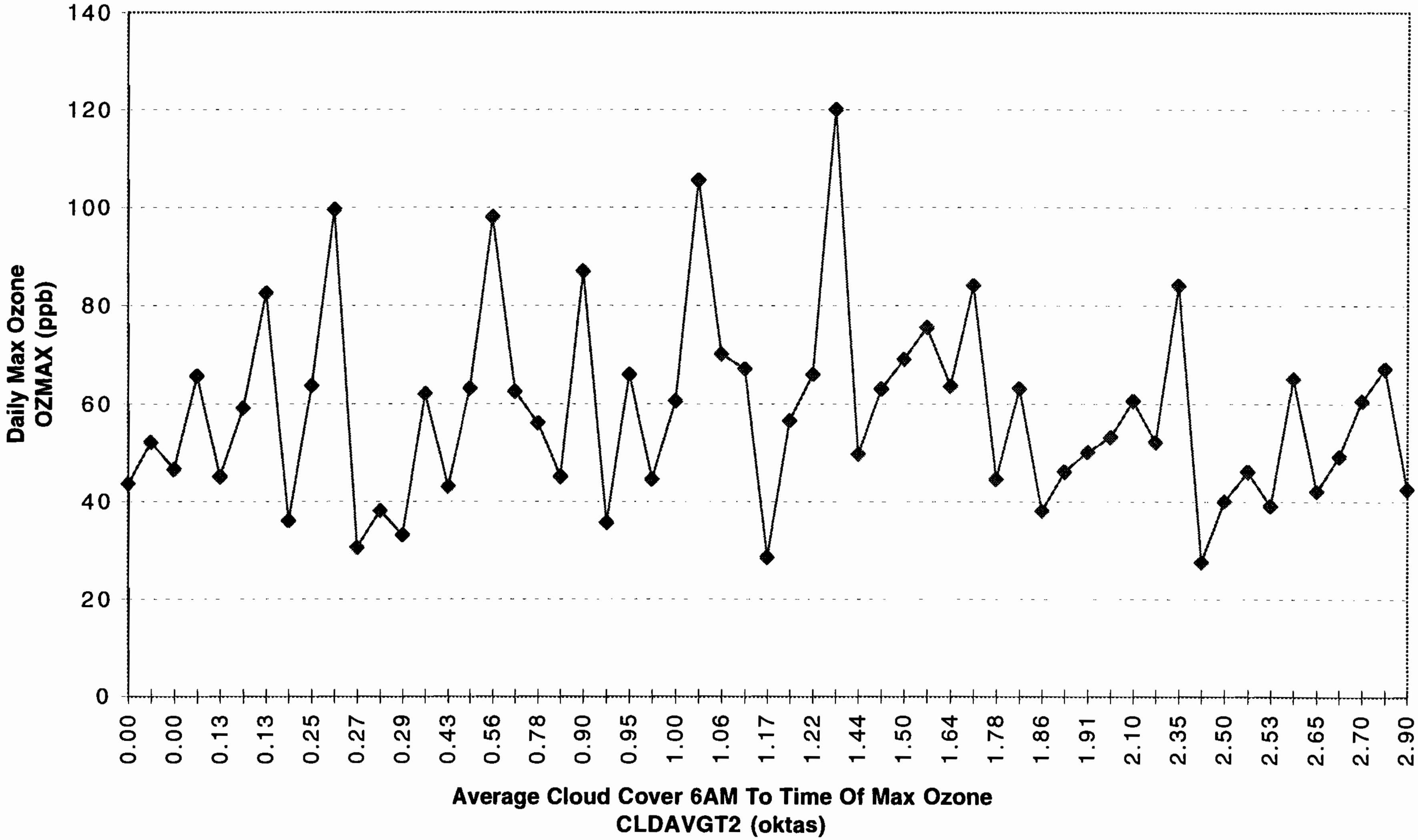


Figure 105. SAN ANTONIO TRANSGUIDE NETWORK TRAFFIC DATA DEC'96 - SEP'96 MODEL T20.1
DATA CONTROLLED FOR CLDAVGT2 LE 3 & DAYS OF OZONE EPISODES

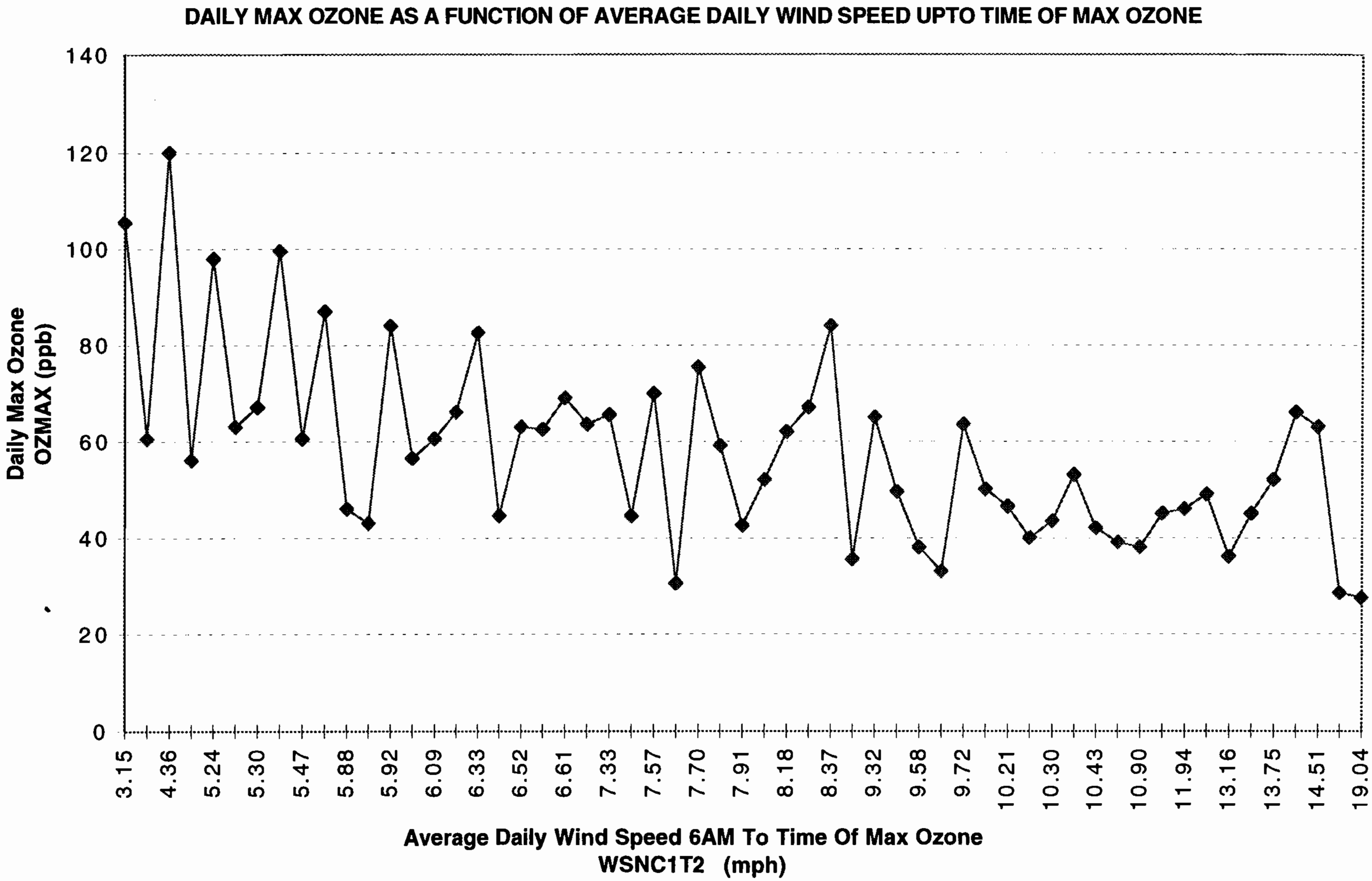


Figure 106. SAN ANTONIO TRANSGUIDE NETWORK TRAFFIC DATA DEC'96 - SEP'96 MODEL T20.1
DATA CONTROLLED FOR CLDAVGT2 LE 3 & DAYS OF OZONE EPISODES

DAILY MAX OZONE AS A FUNCTION OF MAXIMUM DAILY TEMPERATURE

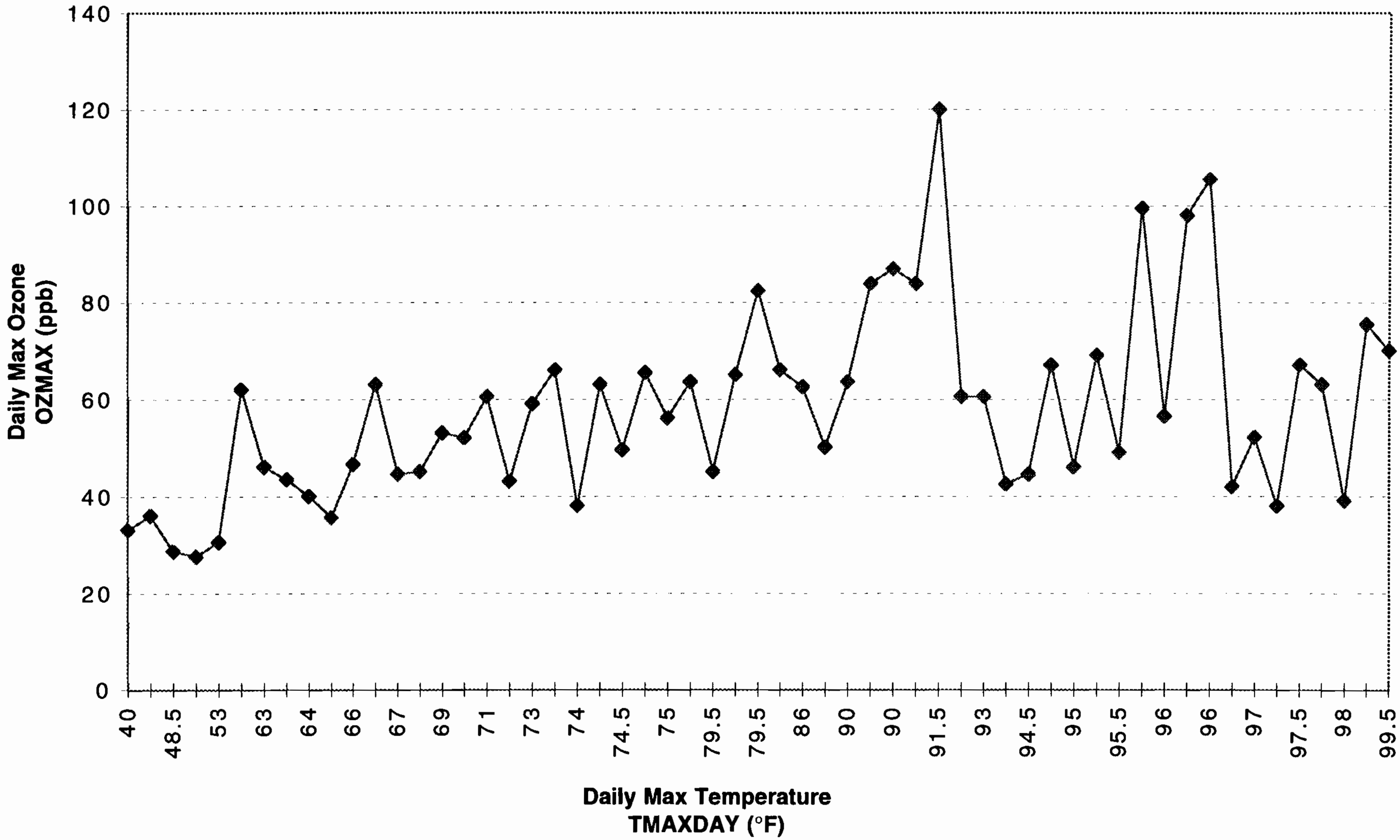


Figure 107. SAN ANTONIO TRANSGUIDE NETWORK TRAFFIC DATA DEC'96 - SEP'96 MODEL T20.1
DATA CONTROLLED FOR CLDAVGT2 LE 3 & DAYS OF OZONE EPISODES

DAILY MAX OZONE AS A FUNCTION OF AVERAGE DAILY WIND SPEED

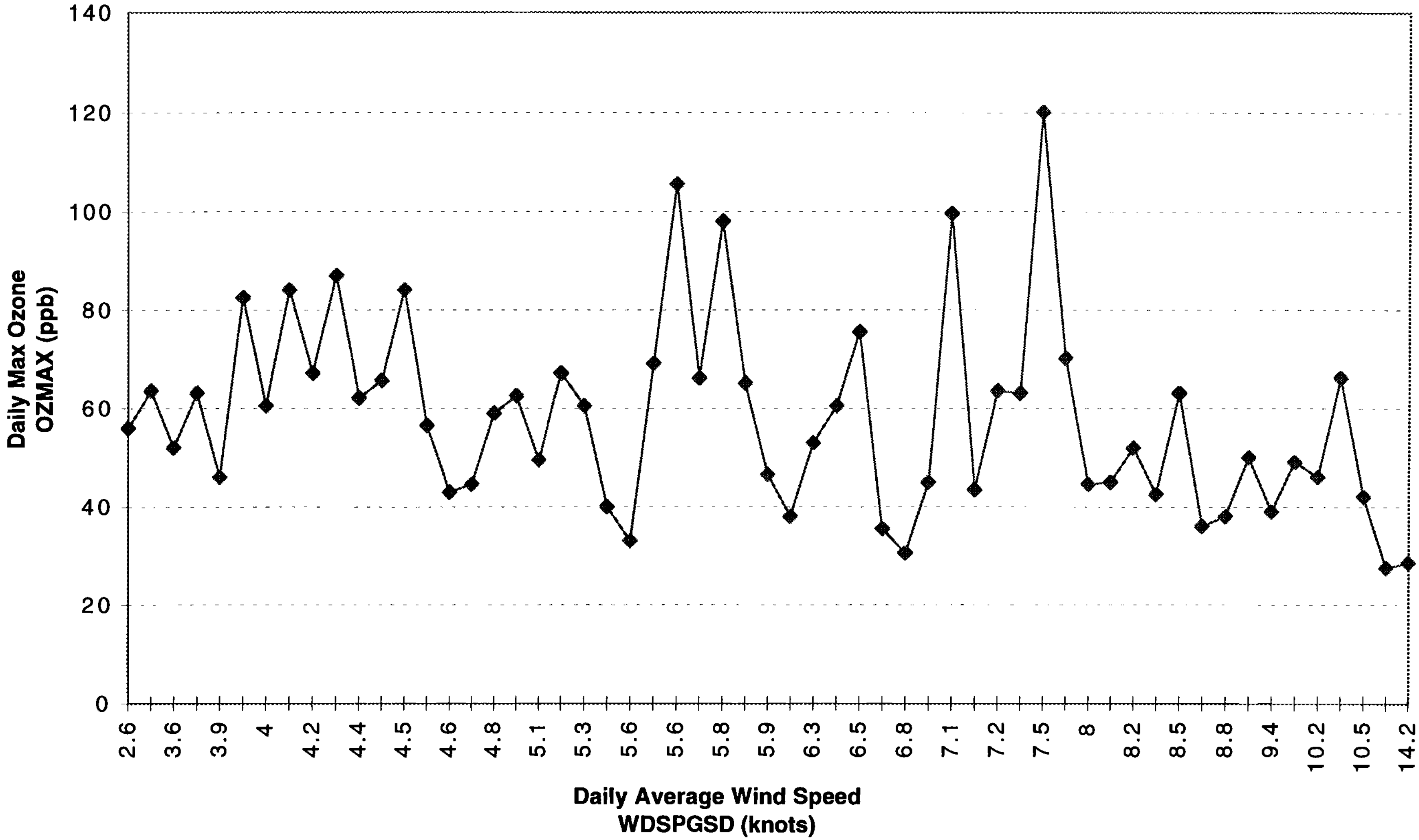


Figure 108. SAN ANTONIO TRANSGUIDE NETWORK TRAFFIC DATA DEC'96 - SEP'96 MODEL T20.1
DATA CONTROLLED FOR CLDAVGT2 LE 3 & DAYS OF OZONE EPISODES

DAILY MAX OZONE AS A FUNCTION OF MINIMUM DAILY TEMPERATURE

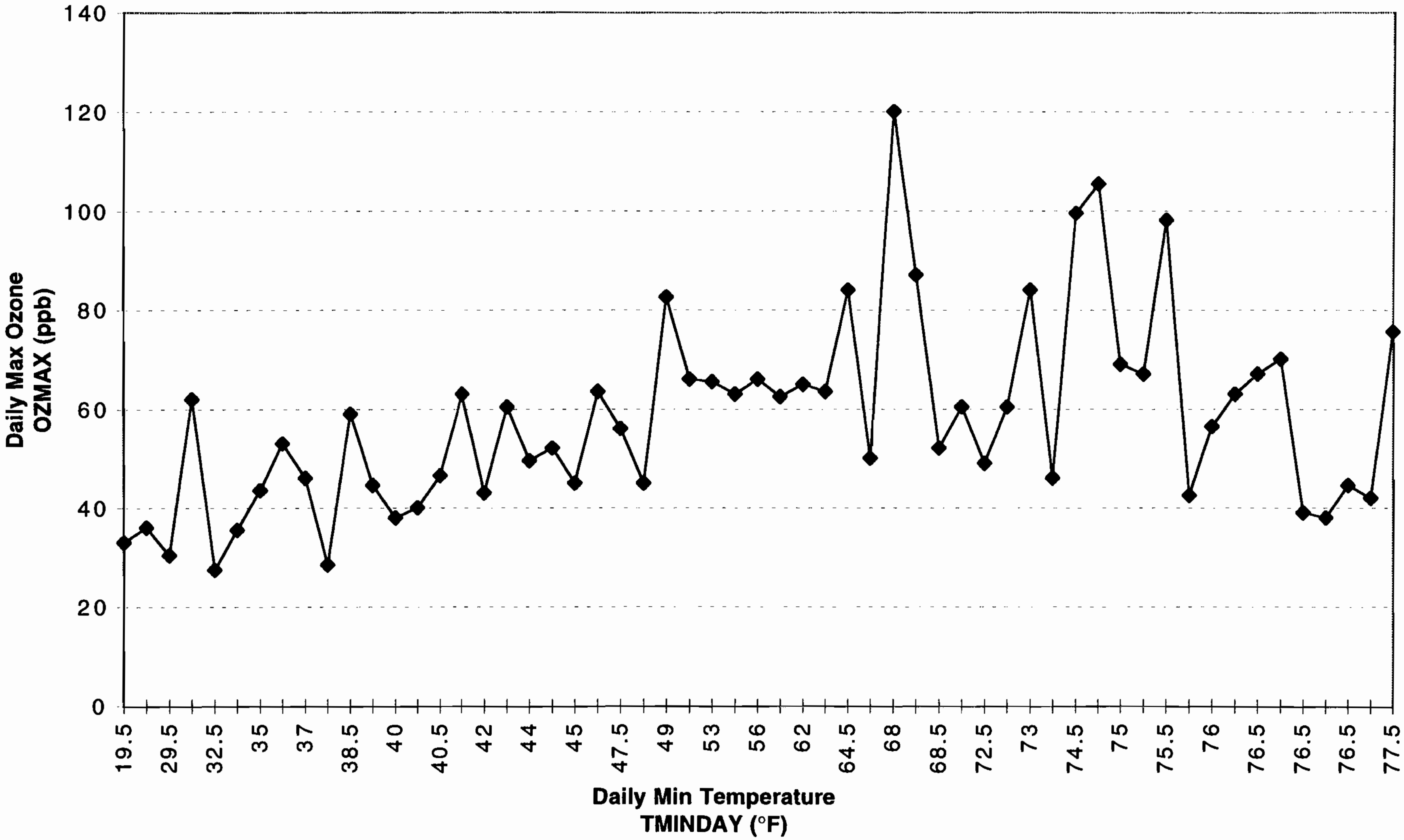
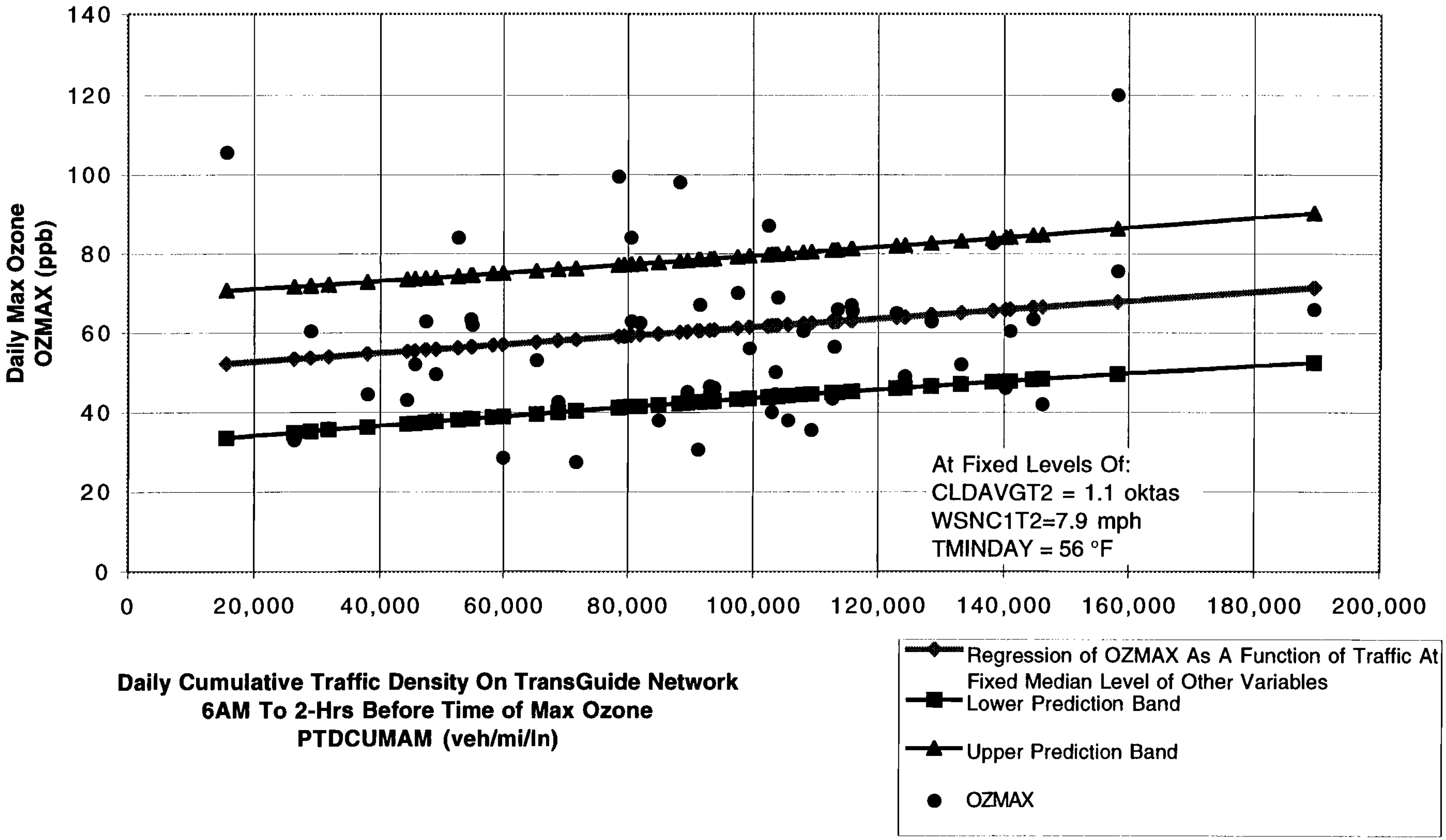


Figure 109. SAN ANTONIO TRANSGUIDE NETWORK TRAFFIC DATA DEC'96 - SEP'96 MODEL T20.1
DATA CONTROLLED FOR CLDAVGT2 LE 3 & DAYS OF OZONE EPISODES

80% CONFIDENCE PREDICTION BAND ON DAILY MAX OZONE AS A FUNCTION OF TRANSGUIDE NETWORK CUMULATIVE TRAFFIC DENSITY AT FIXED LEVELS OF OTHER INDEPENDENT VARIABLES (MEDIAN LEVELS)



## SCENARIO 12

In Scenario 12, we repeat the analysis of Scenario 10 of controlling for days that are a part of an ozone episode and controlling for the months of April 1996 through September 1996 except that additionally we control for the average "morning" cloud cover (CLDAVGT2) to be less than or equal to 3 oktas. The results of the analysis reveal a stronger association between the daily traffic congestion parameter PTDCUMAM and the daily peak ozone concentration relative to Scenario 10. The results also reveal a stronger association between the daily traffic congestion parameter PTDCUMAM and the daily peak ozone concentration relative to Scenario 11.

Table 30 summarizes the results of the model and Table 31 summarizes the strength of the traffic parameter's association with the daily peak ozone. Confidence intervals of the parameter's model coefficient per 10,000 units of PTDCUMAM are calculated at the 80, 90 and 95 percent confidence levels. Table 32 summarizes the raw data sorted by date for Scenario 12.

We can say that under this scenario at the 80 percent confidence level, the potential increase to the daily peak ozone in ppb per a 10,000 unit increase in the traffic congestion parameter PTDCUMAM has a range from about 0.7 to about 2.7 ppb. It is equally likely that the potential increase in the daily peak ozone would fall at any point within this range. The results presented in Table 31 also indicate that the traffic congestion parameter remains significant at the 95 percent confidence level.

Figure 110 and Figure 111 plot the daily peak ozone (OZMAX) and the daily cumulative traffic congestion parameter (PTDCUMAM) over time. Figure 112 through Figure 118 graphically summarize the relationships between the response and predictor variables. Figure 119 depicts an 80 percent confidence level prediction band of OZMAX as a function of PTDCUMAM while holding the other significant variables constant at their median levels.

We can say at an 80 percent confidence level that the daily peak ozone will fall somewhere within the band on Figure 119. As shown, the 80 percent confidence prediction band with this linear model under this scenario does not encompass several of the higher daily peak ozone concentrations at fixed median levels of the other significant variables.

*Table 30. Scenario 12 Results*

| | | | RANGE OF VARIABLES |
|---|---|---|---|
| **DATA CONTROLS** | 1) APR 1996 - SEP 1996<br><br>2) DAYS DURING OZONE EPISODES<br><br>3) AVG CLOUD COVER FROM 6AM TO TIME OF MAX OZONE LE 3 OKTAS | | |
| **Model significant parameters (units)** | Y --- OZMAX (ppb)<br>XO --- INTERCEPT<br>X1 --- PTDCUMAM (veh/mi/ln)<br>X2 --- CLDAVGT2 (oktas)<br>X3 --- WSNC1T2 (mph) | | 38 to 120<br><br>15,650 to 189,530<br>0.1 to 2.9<br>3.1 to 14.5 |
| **Significant parameter coefficient estimates and bivariate correlations (r)** | 97.56240321 X0<br>0.00016671 X1<br>-9.08813684 X2<br>-4.22861580 X3 | <br>-0.0242<br>-0.5440<br>-0.5647 | |
| **Traffic variable coefficient confidence-level** | 96% | | |
| **Model R-Square** | 0.55 | | |
| **Traffic variable partial R-Square** | 0.0787 | | |
| **Sample size** | 32 | | |
| **1st Order auto-correlation Durbin-Watson Statistic** | 1.877 | | |
| **P-Value supporting $H_O$: No Heteroskedasticity** | 0.6408 | | |

*Table 31. Scenario 12 Results (cont.)*

| | |
|---|---|
| **Traffic parameter estimate per 10,000 PTDCUMAM** | **1.6671** |
| **Traffic parameter estimate standard error per 10,000 PTDCUMAM** | **0.7502** |
| **n** | **32** |
| **k** | **3** |
| **df** | **28** |
| $t_{(.10)}$ | **1.313** |
| $t_{(.05)}$ | **1.701** |
| $t_{(.025)}$ | **2.048** |
| **80 percent confidence interval of traffic parameter estimate per 10,000 units of PTDCUMAM** | **0.68 to 2.65** |
| **90 percent confidence interval of traffic parameter estimate per 10,000 units of PTDCUMAM** | **0.39 to 2.94** |
| **95 percent confidence interval of traffic parameter estimate per 10,000 units of PTDCUMAM** | **0.13 to 3.20** |

*Table 32. Scenario 12 Data*

| DATECST | OZMAX | PTDCUMAM | OZINT | CLDAVGT2 | WSNC1T2 | TMAXDAY | WDSPGSD | TMINDAY |
|---|---|---|---|---|---|---|---|---|
| 4/1/96 | 63 | 128,397 | 47 | 0.44 | 14.51 | 74 | 8.5 | 56 |
| 4/7/96 | 63 | 80,590 | 13 | 1.45 | 5.27 | 66 | 3.8 | 41 |
| 4/8/96 | 82.5 | 138,109 | 17 | 0.13 | 6.33 | 79.5 | 3.9 | 49 |
| 4/10/96 | 62.5 | 81,961 | 16 | 0.57 | 6.55 | 86 | 4.8 | 56.5 |
| 4/16/96 | 63.5 | 144,610 | 0 | 1.64 | 9.72 | 77 | 7.2 | 46 |
| 4/19/96 | 52 | 133,172 | 20.5 | 2.22 | 13.75 | 97 | 8.2 | 68.5 |
| 5/1/96 | 66 | 189,529 | 27 | 0.95 | 14.05 | 84.5 | 10.3 | 56 |
| 5/11/96 | 50 | 103,665 | 26 | 1.91 | 9.94 | 87 | 9 | 65.5 |
| 5/21/96 | 46 | 140,220 | 15 | 2.52 | 11.94 | 95 | 10.2 | 73.5 |
| 5/22/96 | 49 | 124,190 | 12 | 2.67 | 13.04 | 95.5 | 10.1 | 72.5 |
| 6/3/96 | 120 | 158,194 | 8 | 1.27 | 4.36 | 91.5 | 7.5 | 68 |
| 6/8/96 | 63.5 | 54,669 | 12 | 0.25 | 6.92 | 90 | 3.4 | 64.5 |
| 6/9/96 | 84 | 80,549 | 12.5 | 1.68 | 8.37 | 90.5 | 4.5 | 64.5 |
| 6/17/96 | 56.5 | 113,027 | 3 | 1.18 | 5.98 | 96 | 4.5 | 76 |
| 6/18/96 | 67 | 115,719 | 2.5 | 1.11 | 8.31 | 97.5 | 5.2 | 76.5 |
| 6/20/96 | 70 | 97,560 | 1.5 | 1.06 | 7.57 | 99.5 | 7.5 | 76.5 |
| 6/30/96 | 60.5 | 28,900 | 0 | 1.00 | 3.99 | 92 | 6.4 | 73 |
| 7/1/96 | 69 | 103,954 | 0 | 1.50 | 6.61 | 95 | 5.6 | 75 |
| 7/2/96 | 98 | 88,279 | 3 | 0.56 | 5.24 | 96 | 5.8 | 75.5 |
| 7/3/96 | 99.5 | 78,502 | 0.5 | 0.25 | 5.39 | 95.5 | 7.1 | 74.5 |
| 7/4/96 | 105.5 | 15,650 | 4.5 | 1.00 | 3.15 | 96 | 5.6 | 74.5 |
| 7/7/96 | 63 | 47,373 | 7 | 1.80 | 6.52 | 97.5 | 7.3 | 76 |
| 7/12/96 | 42 | 146,141 | 3.5 | 2.65 | 10.43 | 96 | 10.5 | 77.5 |
| 7/20/96 | 39 | 58,253 | 7.5 | 2.53 | 10.58 | 98 | 9.4 | 76.5 |
| 7/31/96 | 38 | 105,650 | 0.5 | 1.86 | 10.90 | 97 | 8.8 | 76.5 |
| 8/11/96 | 44.5 | 37,932 | 4 | 1.78 | 6.48 | 94.5 | 8 | 76.5 |
| 8/12/96 | 75.5 | 158,255 | 0.5 | 1.58 | 7.70 | 98.5 | 6.5 | 77.5 |
| 8/17/96 | 42.5 | 68,937 | 11.5 | 2.90 | 7.91 | 94 | 8.3 | 75.5 |
| 8/21/96 | 60.5 | 108,007 | 0 | 2.10 | 6.09 | 93 | 5.3 | 71.5 |
| 9/10/96 | 84 | 52,634 | 0 | 2.35 | 5.92 | 90 | 4.2 | 73 |
| 9/11/96 | 87 | 102,476 | 2 | 0.90 | 5.78 | 90 | 4.3 | 68 |
| 9/16/96 | 67 | 91,576 | 0.5 | 2.72 | 5.30 | 94.5 | 4.2 | 75 |

Figure 110. SAN ANTONIO DAILY MAX OZONE APR'96-SEP'96 MODEL T20
DATA CONTROLLED FOR CLDAVGT2 LE 3 & DAYS OF OZONE EPISODES

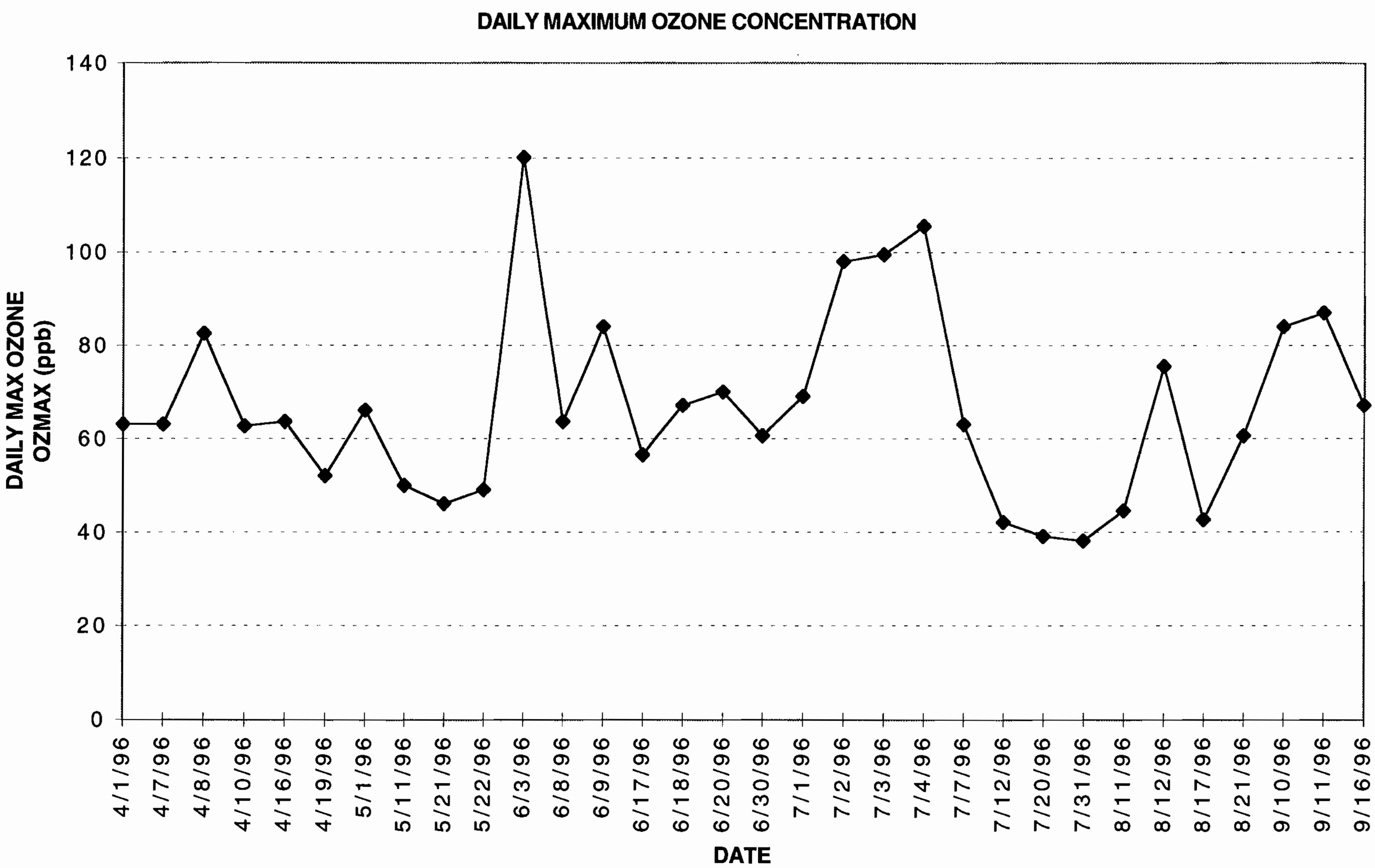


**Figure 111. SAN ANTONIO TRANSGUIDE NETWORK TRAFFIC DATA APR'96-SEP'96 MODEL T20**
**DATA CONTROLLED FOR CLDAVGT2 LE 3 & DAYS OF OZONE EPISODES**

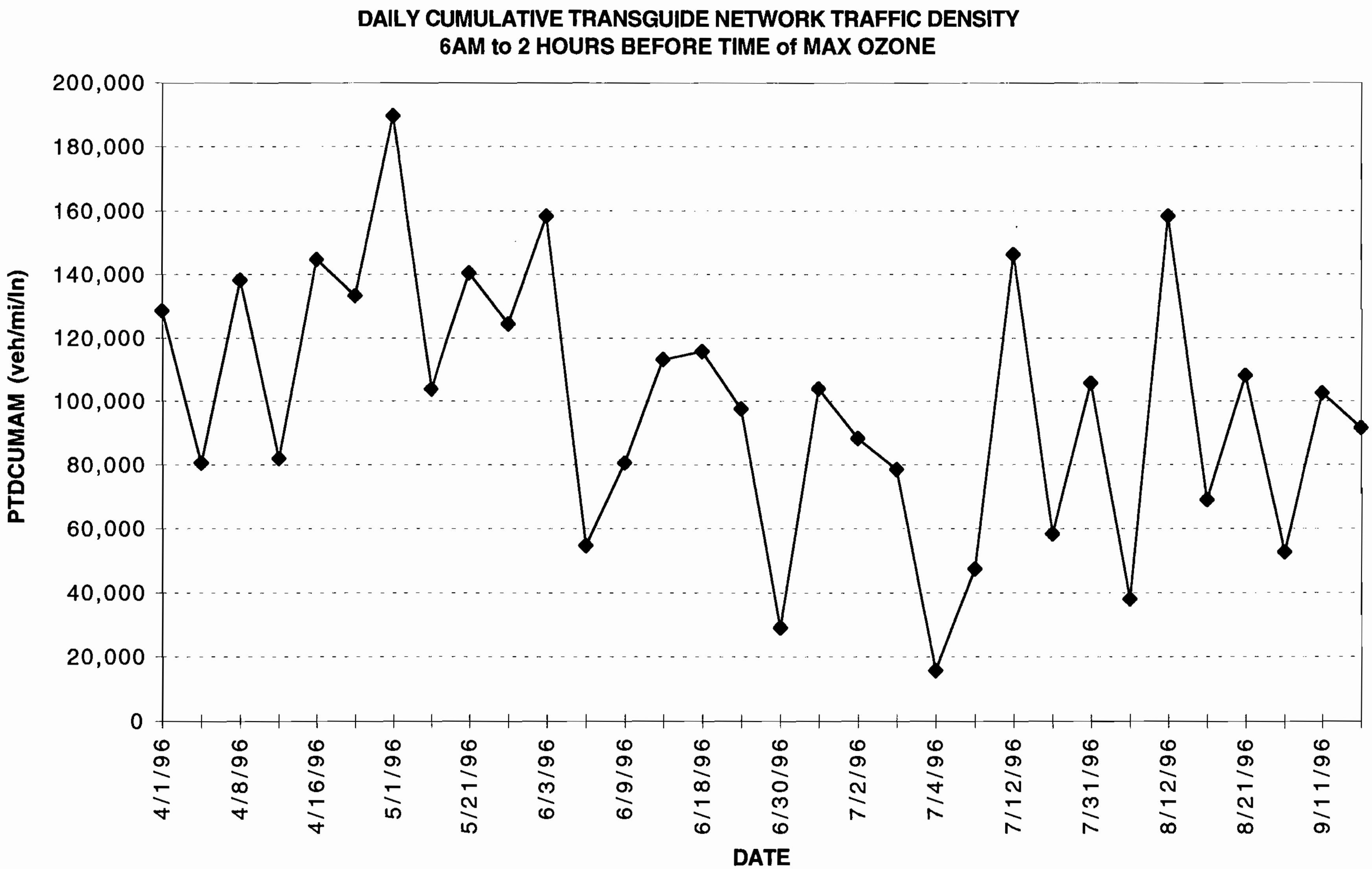


Figure 112. SAN ANTONIO APR'96-SEP'96 MODEL T20
DATA CONTROLLED FOR CLDAVGT2 LE 3 & DAYS OF OZONE EPISODES

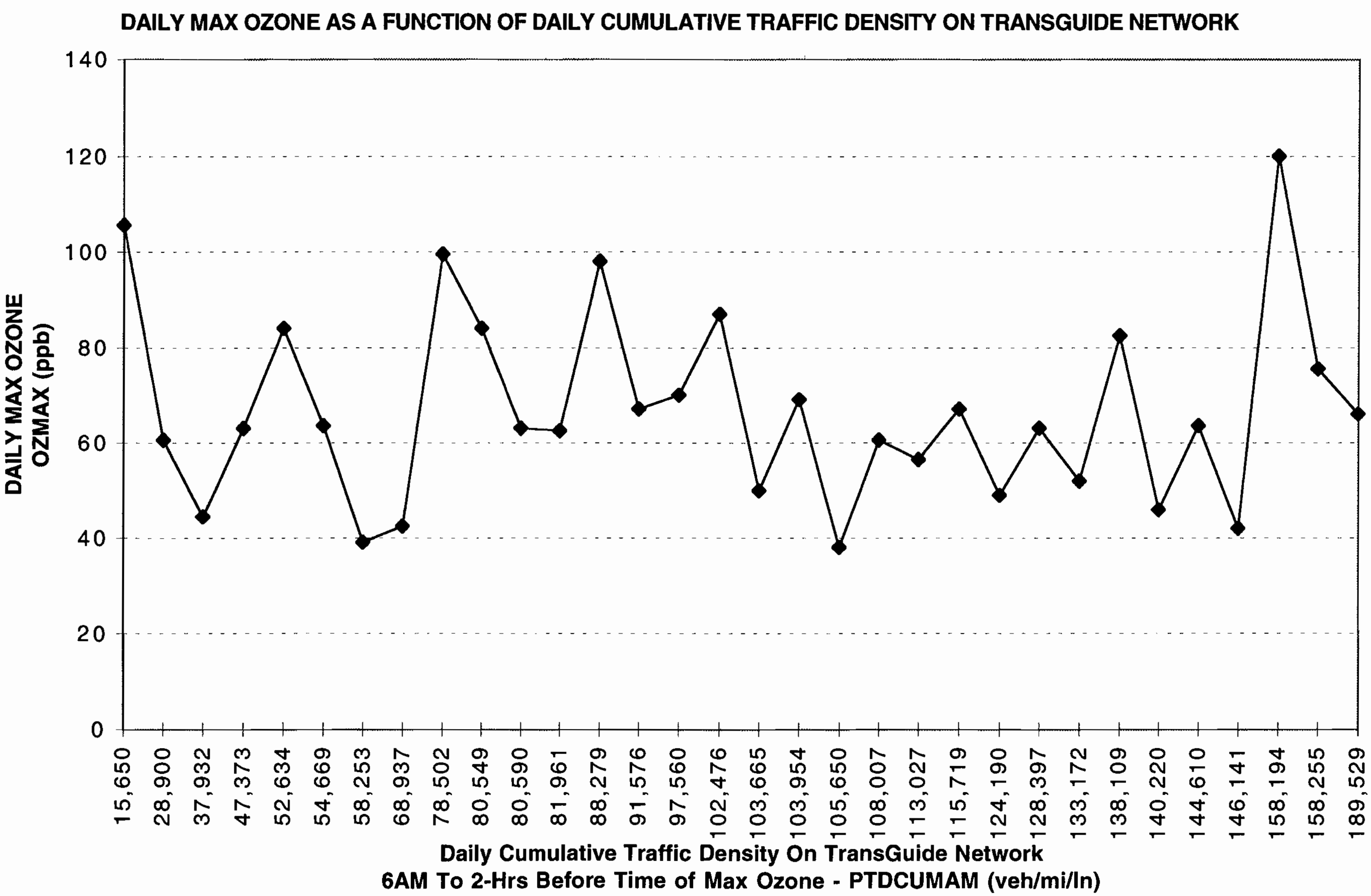


**Figure 113. SAN ANTONIO APR'96-SEP'96 MODEL T20**
**DATA CONTROLLED FOR CLDAVGT2 LE 3 & DAYS OF OZONE EPISODES**

**DAILY MAX OZONE AS A FUNCTION OF DAILY INITIAL MORNING OZONE**

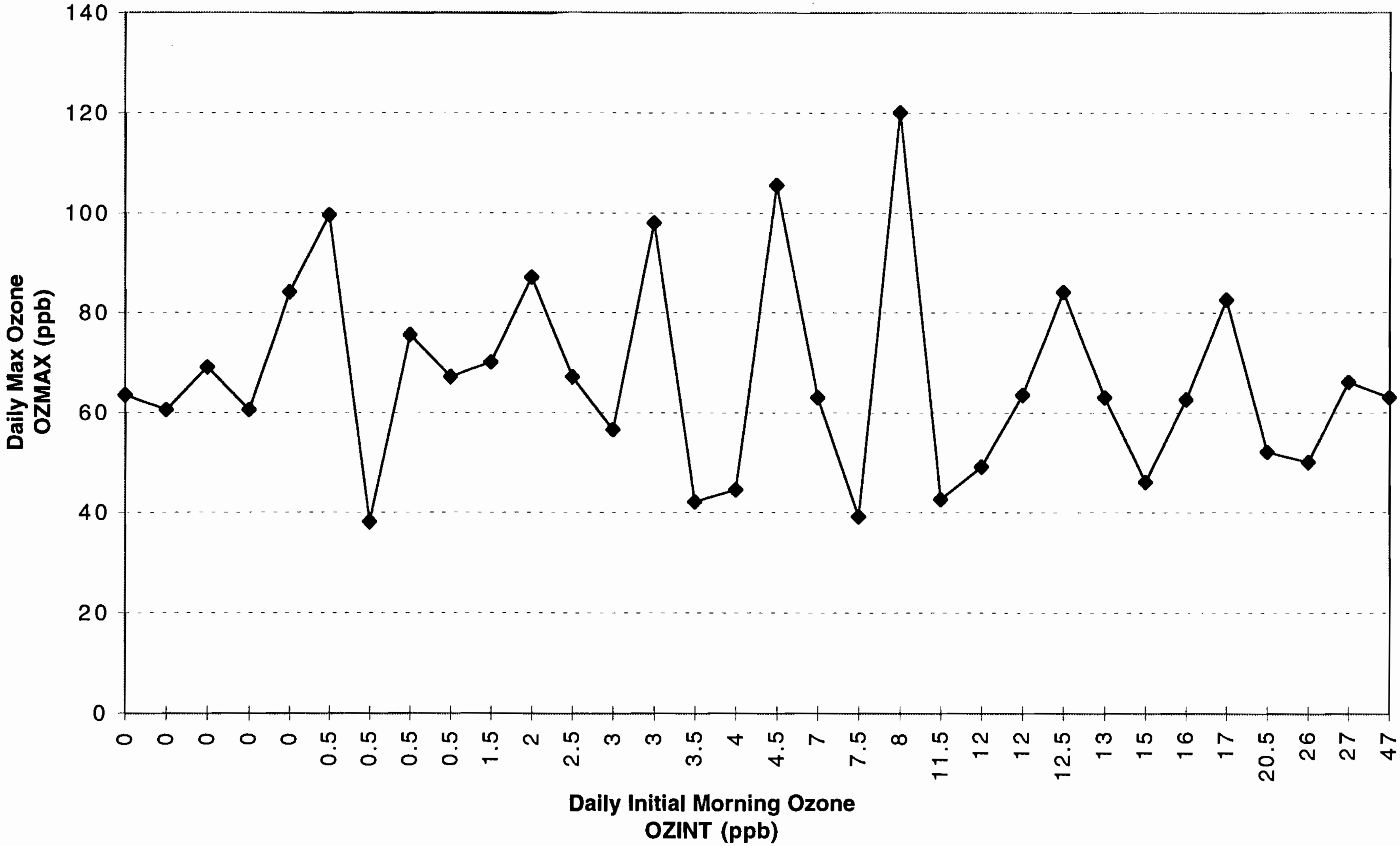


**Figure 114. SAN ANTONIO APR'96-SEP'96 MODEL T20**
**DATA CONTROLLED FOR CLDAVGT2 LE 3 & DAYS OF OZONE EPISODES**

**DAILY MAX OZONE AS A FUNCTION OF AVERAGE DAILY CLOUD COVER UPTO TIME OF MAX OZONE**

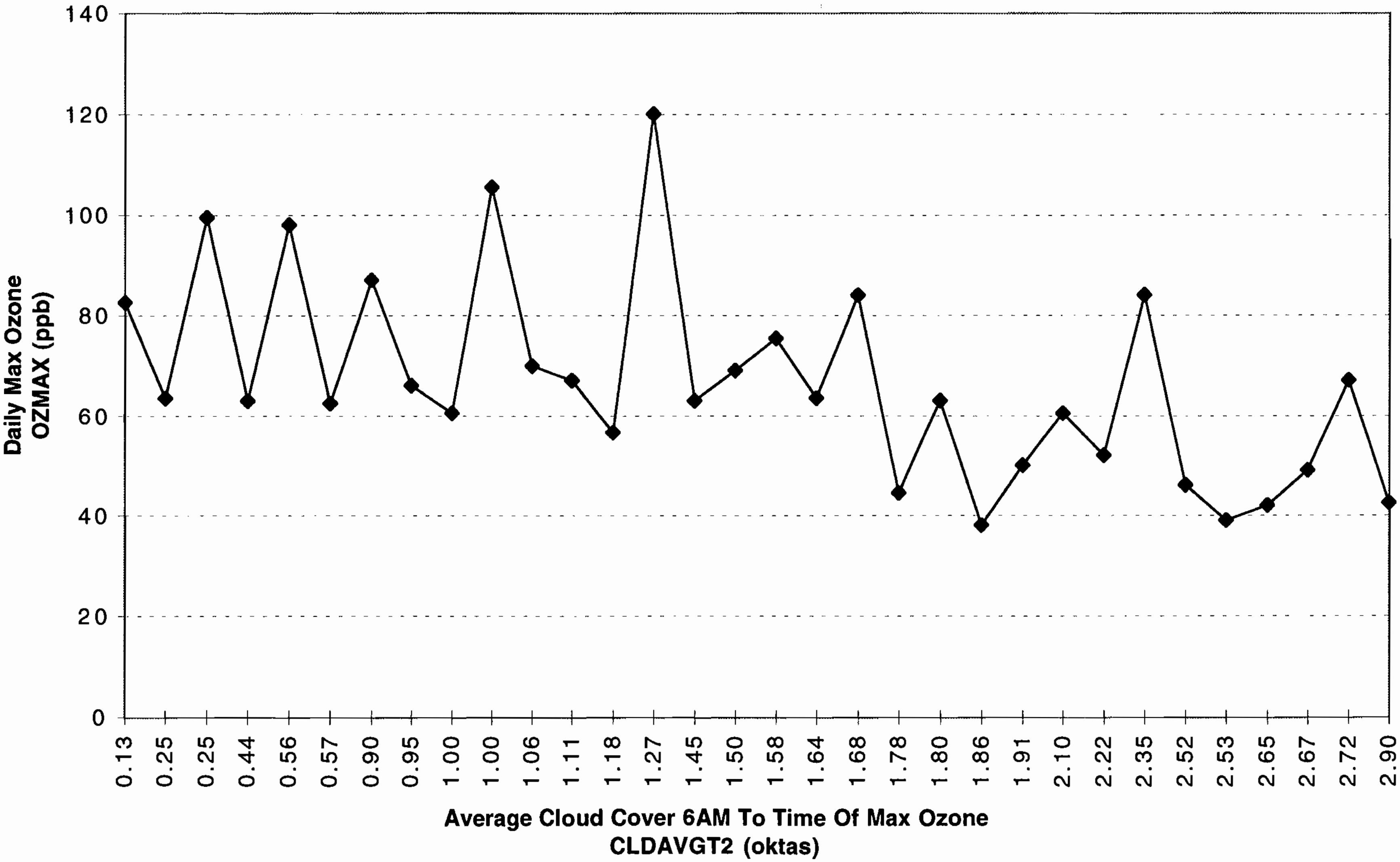


Figure 115. SAN ANTONIO APR'96-SEP'96 MODEL T20
DATA CONTROLLED FOR CLDAVGT2 LE 3 & DAYS OF OZONE EPISODES

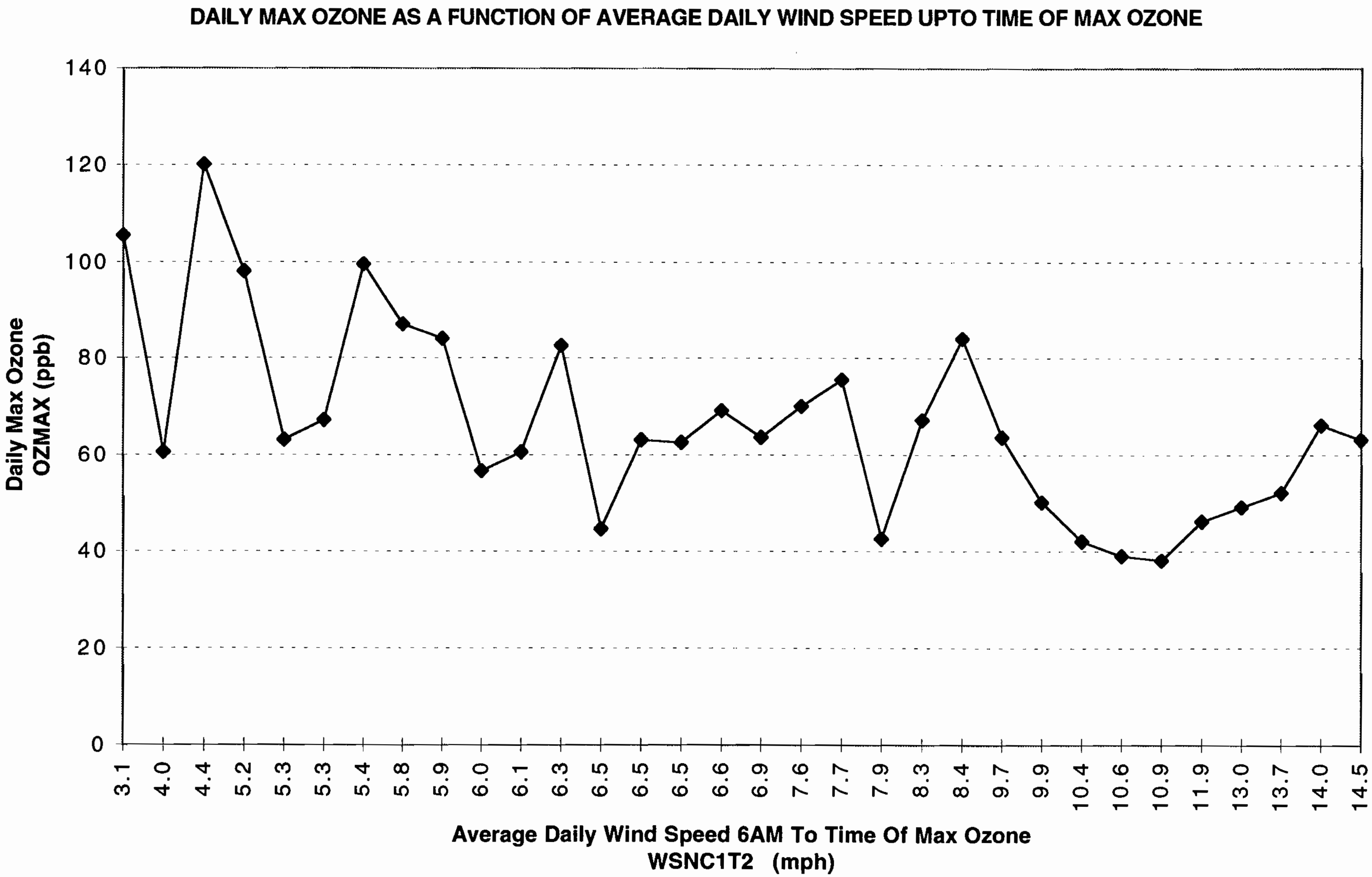


**Figure 116. SAN ANTONIO APR'96-SEP'96 MODEL T20**
**DATA CONTROLLED FOR CLDAVGT2 LE 3 & DAYS OF OZONE EPISODES**

**DAILY MAX OZONE AS A FUNCTION OF MAXIMUM DAILY TEMPERATURE**

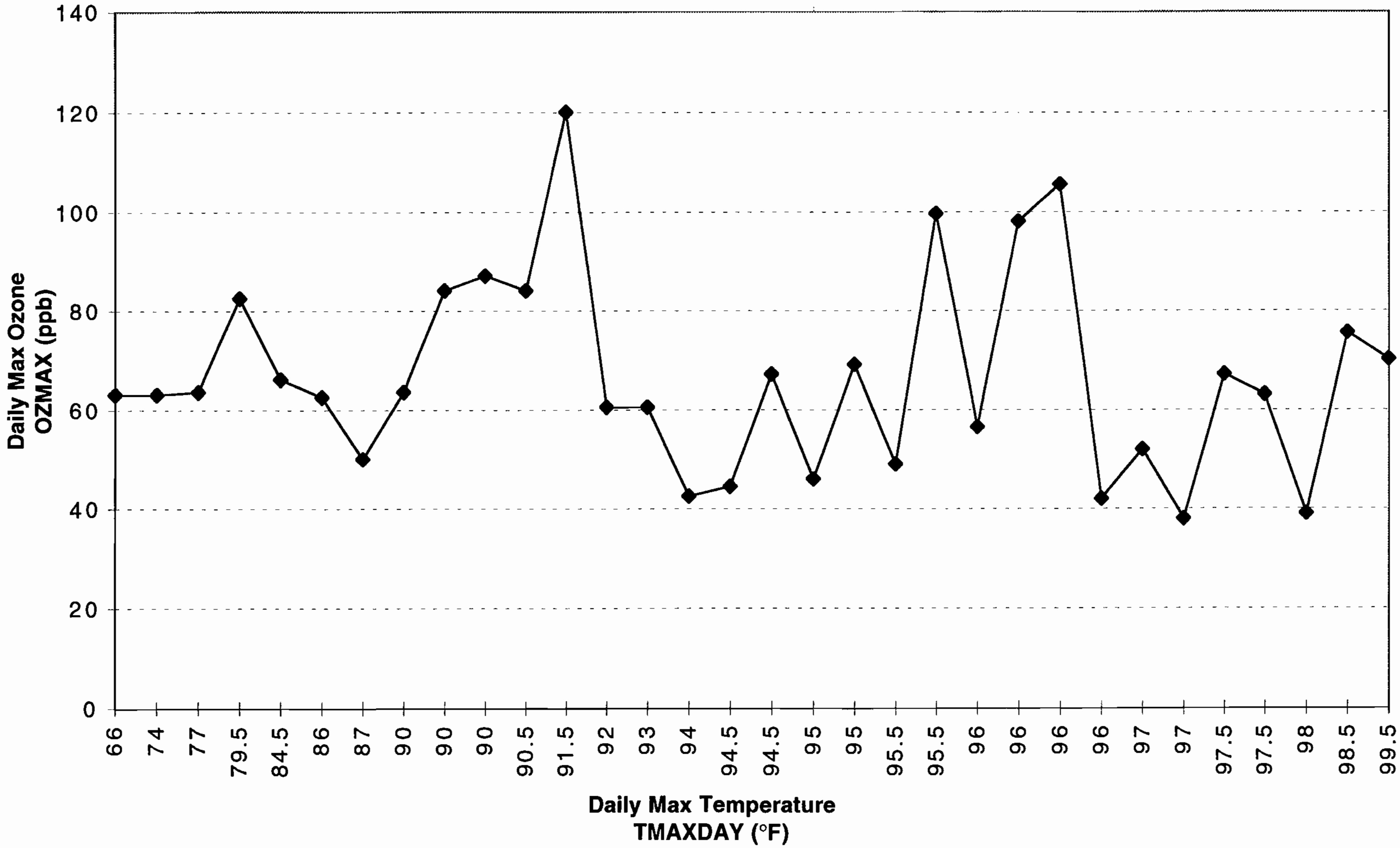


Figure 117. SAN ANTONIO APR'96-SEP'96 MODEL T20
DATA CONTROLLED FOR CLDAVGT2 LE 3 & DAYS OF OZONE EPISODES

DAILY MAX OZONE AS A FUNCTION OF AVERAGE DAILY WIND SPEED

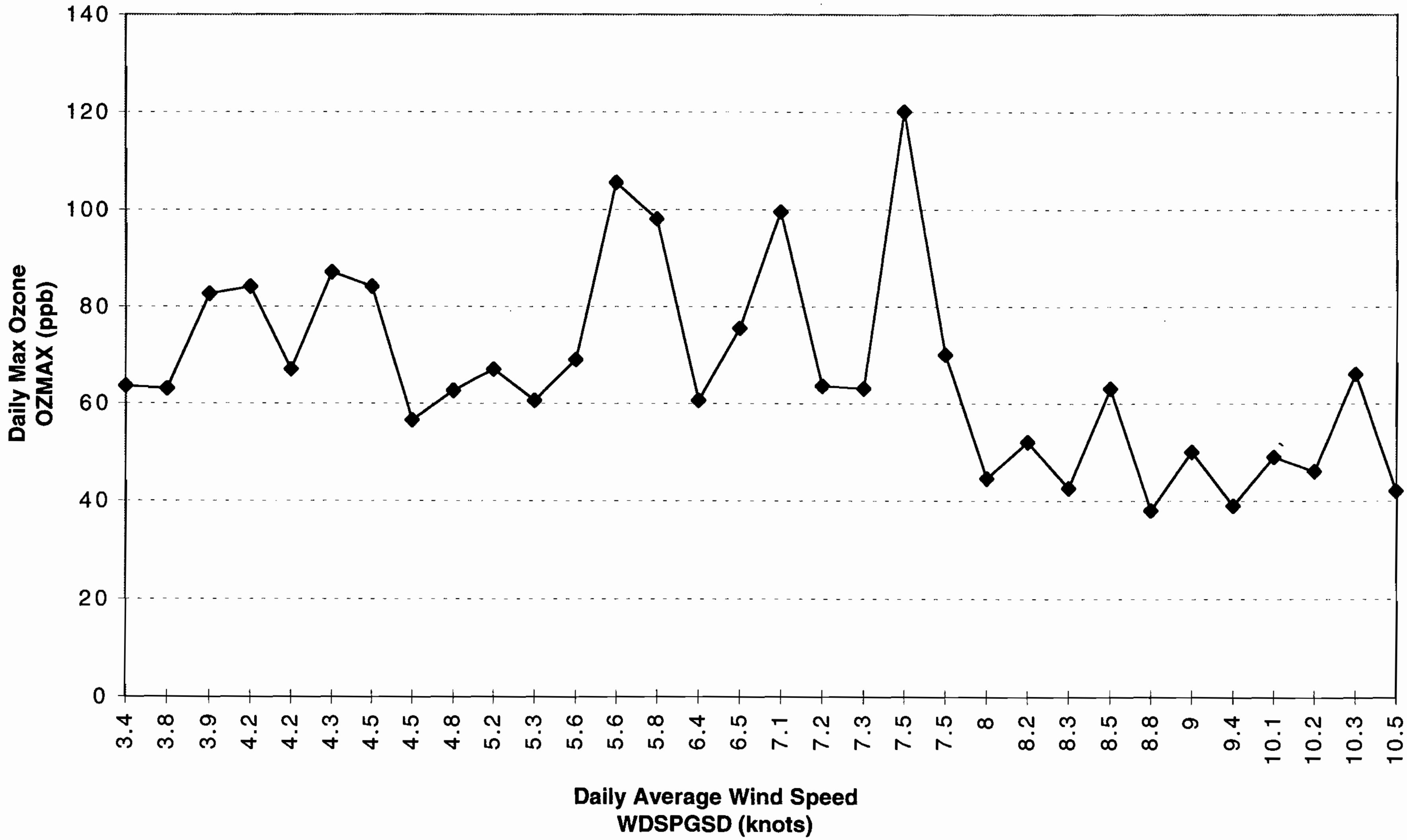


Figure 118. SAN ANTONIO APR'96-SEP'96 MODEL T20
DATA CONTROLLED FOR CLDAVGT2 LE 3 & DAYS OF OZONE EPISODES

DAILY MAX OZONE AS A FUNCTION OF MINIMUM DAILY TEMPERATURE

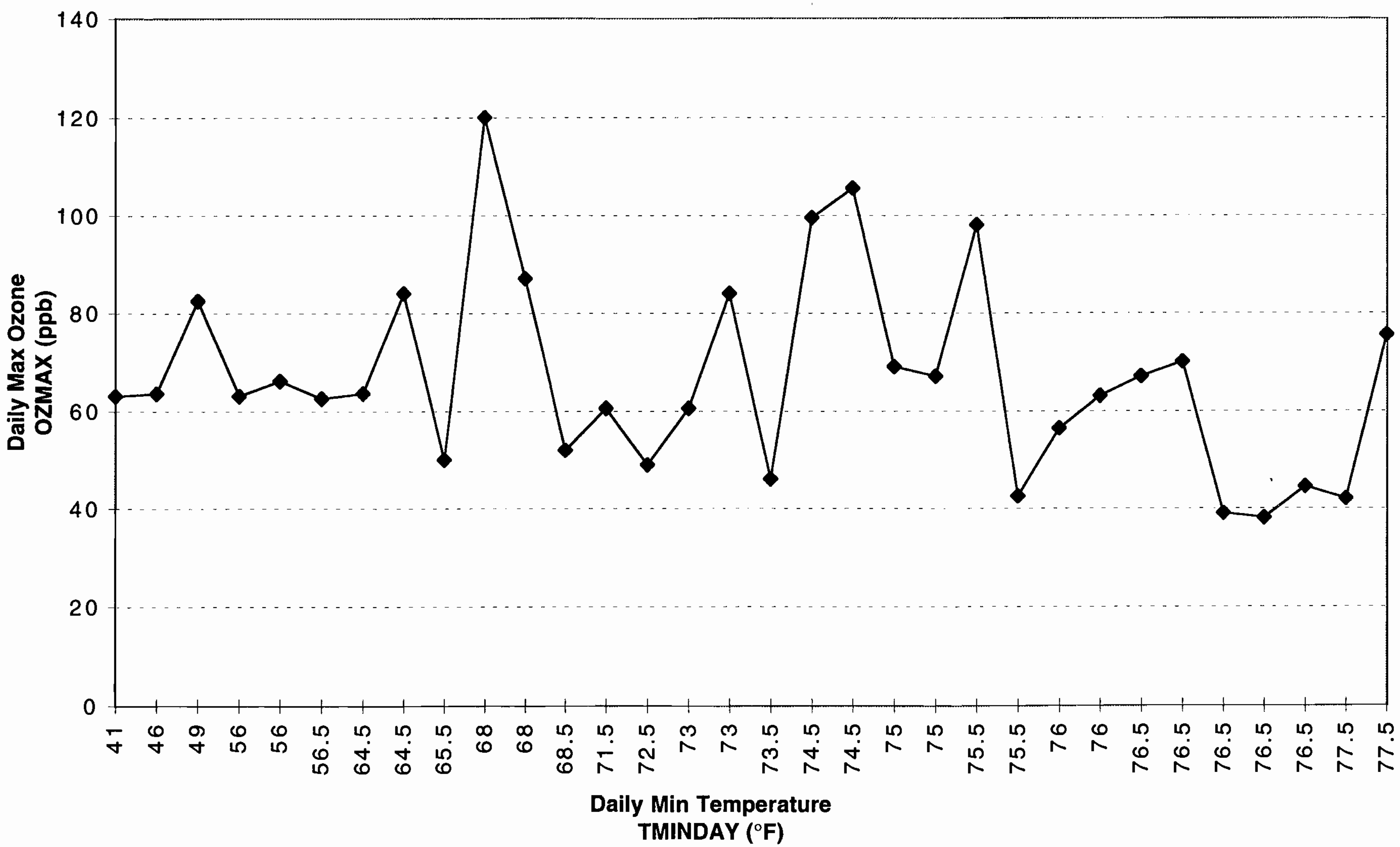
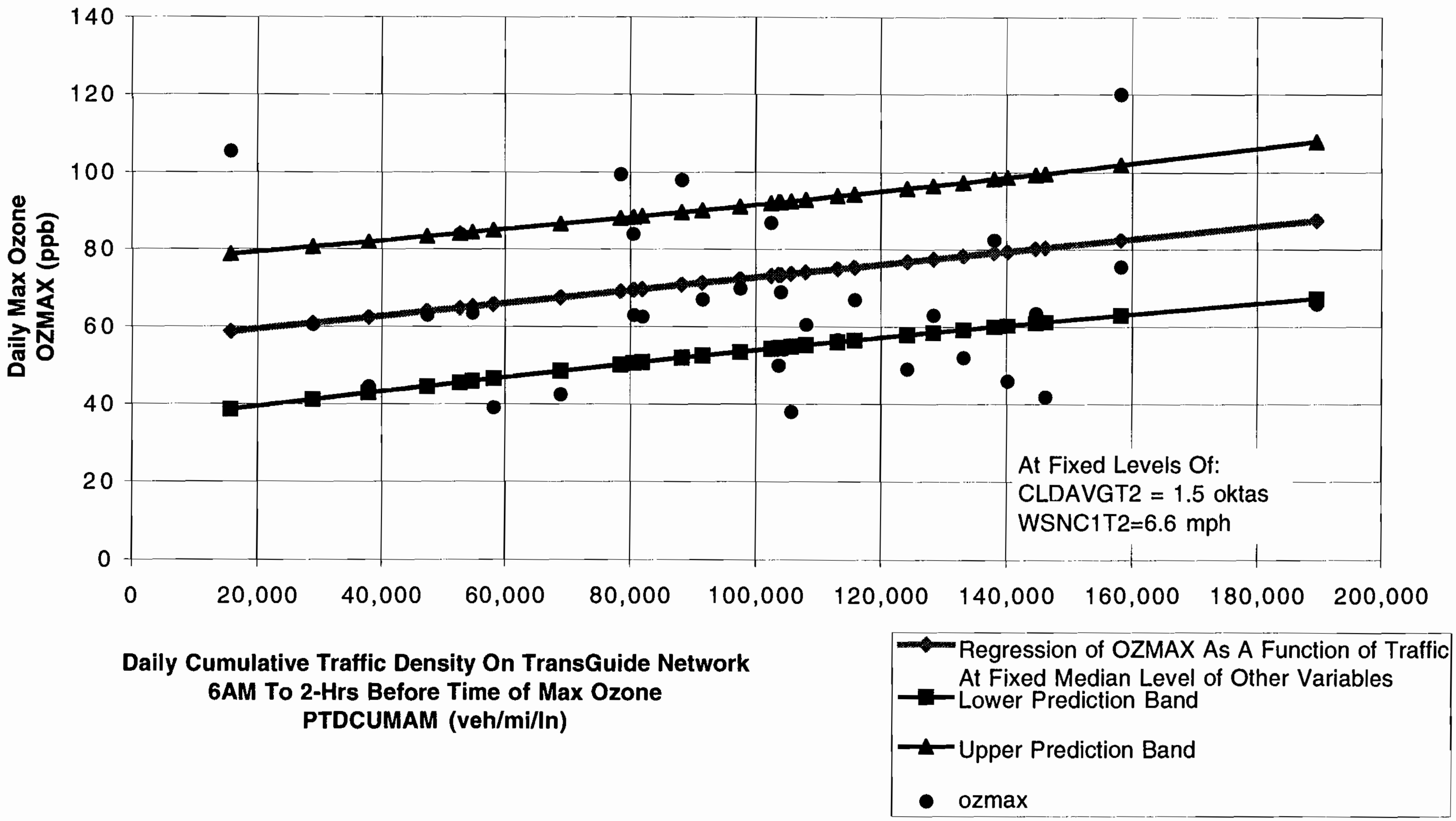


Figure 119. SAN ANTONIO APR'96-SEP'96 MODEL T20
DATA CONTROLLED FOR CLDAVGT2 LE 3 & DAYS OF OZONE EPISODES

80% CONFIDENCE PREDICTION BAND ON DAILY MAX OZONE AS A FUNCTION OF
TRANSGUIDE NETWORK CUMULATIVE TRAFFIC DENSITY
AT FIXED LEVELS OF OTHER INDEPENDENT VARIABLES (MEDIAN LEVELS)



## SCENARIO 13

In Scenario 13, we repeat the analysis of Scenario 11 of controlling for days that are a part of an ozone episode between the months of December 1995 through September 1996 and for the average "morning" cloud cover (CLDAVGT2) to be less than or equal to 3 oktas. In addition, we control for the level of traffic congestion on the TransGuide network as measured by the parameter PTDCUMAM where it is less than the median level (median level for all days between December 1995 and September 1996).

The results of the analysis do not reveal a significant (80 percent confidence level or higher) association between the daily traffic congestion parameter PTDCUMAM and the daily peak ozone concentration. The finding of a lack of significance of the traffic congestion parameter under this scenario does not prove that the parameter does not affect the daily peak ozone concentration. We can only conclude that under the conditions of this scenario, we are not able to detect any possible relationship that might exist at our minimum confidence level of 80 percent. Table 33 summarizes the results of the model and Table 34 summarizes the raw data for Scenario 13 sorted by date.

Figure 120 and Figure 121 plot the daily peak ozone (OZMAX) and the daily cumulative traffic congestion parameter (PTDCUMAM) over time. Figure 122 through Figure 128 graphically summarize the relationships between the response and predictor variables.

*Table 33. Scenario 13 Results*

| | | | RANGE OF VARIABLES |
|---|---|---|---|
| **DATA CONTROLS** | **1) DEC 1995 - SEP 1996**<br>**2) DAYS DURING OZONE EPISODES**<br>**3) LOW LEVEL OF TRAFFIC CONGESTION**<br>**4) AVG CLOUD COVER FROM 6AM TO TIME OF MAX OZONE LE 3 OKTAS** | | |
| **MODEL SIGNIFICANT PARAMETERS (units)** | **Y --- OZMAX (ppb)**<br>**XO --- INTERCEPT**<br>**X1 --- WSNC1T2 (mph)**<br>**X2 --- TMAXDAY (Deg F)** | | **27.5 to 105.5**<br><br>**3.1 to 19.0**<br>**40 to 98** |
| **SIGNIFICANT PARAMETER COEFFICIENT ESTIMATES AND BIVARIATE CORRELATIONS (r)** | **38.42916389 X0**<br>**-2.23727582 X1**<br>**0.47643884 X2** | <br>**-0.6500**<br>**0.6506** | |
| **TRAFFIC VARIABLE COEFFICIENT CONFIDENCE-LEVEL** | **NA** | | |
| **MODEL R-SQUARE** | **0.52** | | |
| **TRAFFIC VARIABLE PARTIAL R-SQUARE** | **NA** | | |
| **SAMPLE SIZE** | **30** | | |
| **1st ORDER AUTO-CORRELATION Durbin-Watson Statistic** | **1.525** | | |
| **P-VALUE SUPPORTING $H_O$: No Heteroskedasticity** | **0.0916** | | |

*Table 34. Scenario 13 Data*

| DATECST | OZMAX | PTDCUMAM | OZINT | CLDAVGT2 | WSNC1T2 | TMAXDAY | WDSPGSD | TMINDAY |
|---|---|---|---|---|---|---|---|---|
| 12/9/95 | 27.5 | 71,780 | 10 | 2.50 | 19.04 | 50 | 13.5 | 32.5 |
| 12/27/95 | 46 | 93,809 | 0 | 1.88 | 5.88 | 63 | 3.9 | 37 |
| 1/2/96 | 28.5 | 59,958 | 27.5 | 1.17 | 18.85 | 48.5 | 14.2 | 37.5 |
| 1/3/96 | 30.5 | 91,286 | 5.5 | 0.27 | 7.68 | 53 | 6.8 | 29.5 |
| 1/7/96 | 36 | 31,789 | 24.5 | 0.25 | 13.16 | 45 | 8.6 | 25 |
| 1/12/96 | 38 | 84,915 | 12 | 0.29 | 9.58 | 74 | 6 | 40 |
| 1/13/96 | 43 | 44,330 | 0 | 0.43 | 5.91 | 73 | 4.6 | 42 |
| 1/14/96 | 49.5 | 48,991 | 8 | 1.44 | 9.58 | 74.5 | 5.1 | 44 |
| 1/21/96 | 52 | 45,640 | 27 | 0.00 | 7.97 | 71 | 3.6 | 45 |
| 2/4/96 | 33 | 26,324 | 18.5 | 0.29 | 9.69 | 40 | 5.6 | 19.5 |

*Table 34. Scenario 13 Data (continued)*

| DATECST | OZMAX | PTDCUMAM | OZINT | CLDAVGT2 | WSNC1T2 | TMAXDAY | WDSPGSD | TMINDAY |
|---|---|---|---|---|---|---|---|---|
| 2/14/96 | 45 | 89,558 | 24.5 | 0.86 | 10.92 | 79.5 | 8.1 | 49 |
| 2/17/96 | 53 | 65,381 | 2 | 2.00 | 10.35 | 69 | 6.3 | 35 |
| 3/10/96 | 62 | 54,976 | 0 | 0.42 | 8.18 | 61 | 4.4 | 30 |
| 3/19/96 | 45 | 93,187 | 27.5 | 0.13 | 13.23 | 67 | 6.9 | 45 |
| 3/20/96 | 46.5 | 93,131 | 17.5 | 0.00 | 10.21 | 66 | 5.9 | 40.5 |
| 3/21/96 | 59 | 79,438 | 0 | 0.13 | 7.82 | 73 | 4.8 | 38.5 |
| 4/7/96 | 63 | 80,590 | 13 | 1.45 | 5.27 | 66 | 3.8 | 41 |
| 4/10/96 | 62.5 | 81,961 | 16 | 0.57 | 6.55 | 86 | 4.8 | 56.5 |
| 6/8/96 | 63.5 | 54,669 | 12 | 0.25 | 6.92 | 90 | 3.4 | 64.5 |
| 6/9/96 | 84 | 80,549 | 12.5 | 1.68 | 8.37 | 90.5 | 4.5 | 64.5 |
| 6/30/96 | 60.5 | 28,900 | 0 | 1.00 | 3.99 | 92 | 6.4 | 73 |
| 7/2/96 | 98 | 88,279 | 3 | 0.56 | 5.24 | 96 | 5.8 | 75.5 |
| 7/3/96 | 99.5 | 78,502 | 0.5 | 0.25 | 5.39 | 95.5 | 7.1 | 74.5 |
| 7/4/96 | 105.5 | 15,650 | 4.5 | 1.00 | 3.15 | 96 | 5.6 | 74.5 |
| 7/7/96 | 63 | 47,373 | 7 | 1.80 | 6.52 | 97.5 | 7.3 | 76 |
| 7/20/96 | 39 | 58,253 | 7.5 | 2.53 | 10.58 | 98 | 9.4 | 76.5 |
| 8/11/96 | 44.5 | 37,932 | 4 | 1.78 | 6.48 | 94.5 | 8 | 76.5 |
| 8/17/96 | 42.5 | 68,937 | 11.5 | 2.90 | 7.91 | 94 | 8.3 | 75.5 |
| 9/10/96 | 84 | 52,634 | 0 | 2.35 | 5.92 | 90 | 4.2 | 73 |
| 9/16/96 | 67 | 91,576 | 0.5 | 2.72 | 5.30 | 94.5 | 4.2 | 75 |

Figure 120. SAN ANTONIO DEC'95-SEP'96 MODEL T14.1
DATA CONTROLLED FOR DAYS WITH TRAFFIC CONGESTION PARAMETER LE 50th PERCENTILE
AND DAYS DURING OZONE EPISODES AND AVERAGE "MORNING" CLOUD COVER LE 3 OKTAS

DAILY MAXIMUM OZONE CONCENTRATION

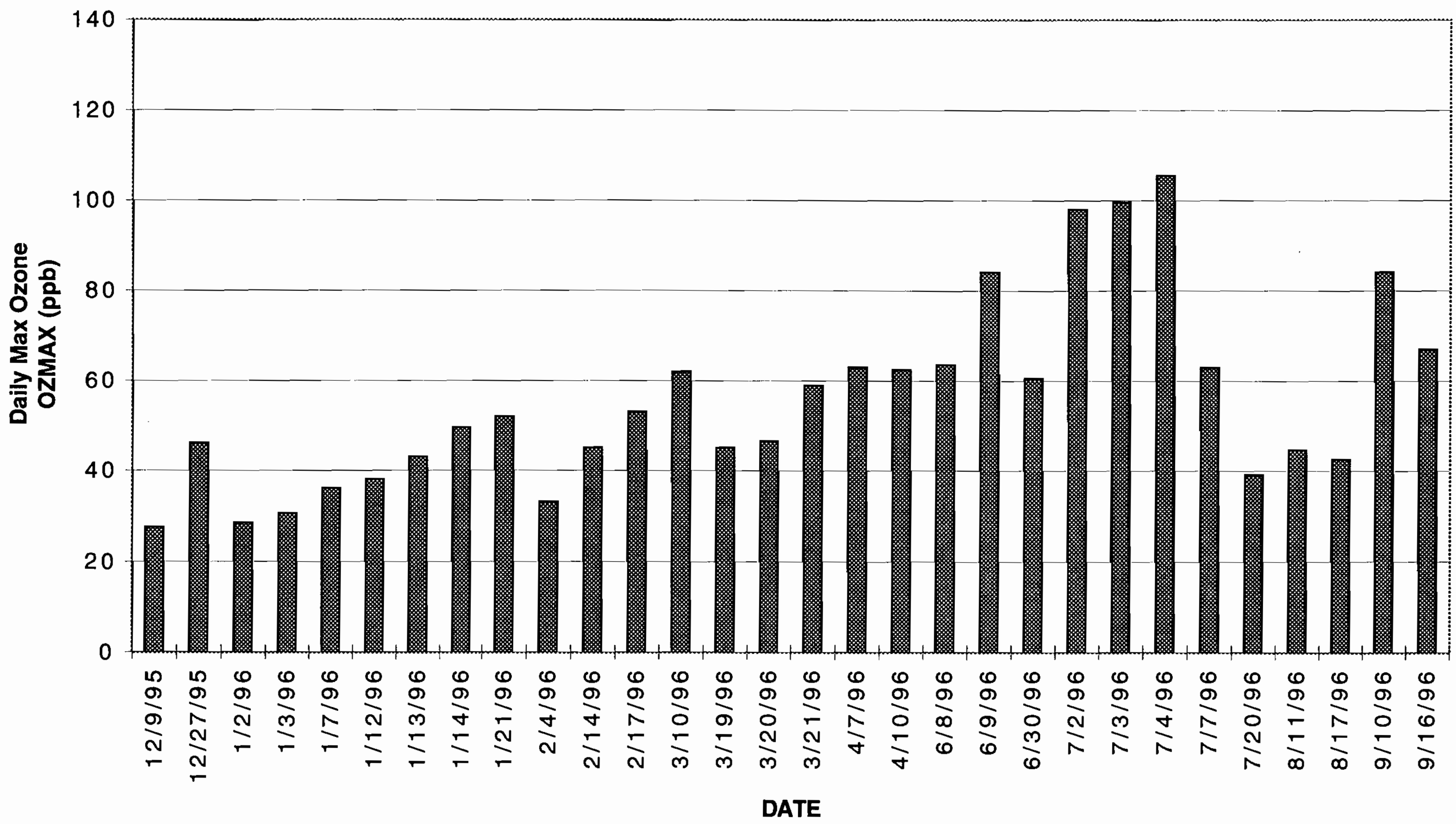


Figure 121. SAN ANTONIO DEC'95-SEP'96 MODEL T14.1
DATA CONTROLLED FOR DAYS WITH TRAFFIC CONGESTION PARAMETER LE 50th PERCENTILE
AND DAYS DURING OZONE EPISODES AND AVERAGE "MORNING" CLOUD COVER LE 3 OKTAS

DAILY CUMULATIVE TRANSGUIDE NETWORK TRAFFIC DENSITY
6AM to 2 HOURS BEFORE TIME of MAX OZONE

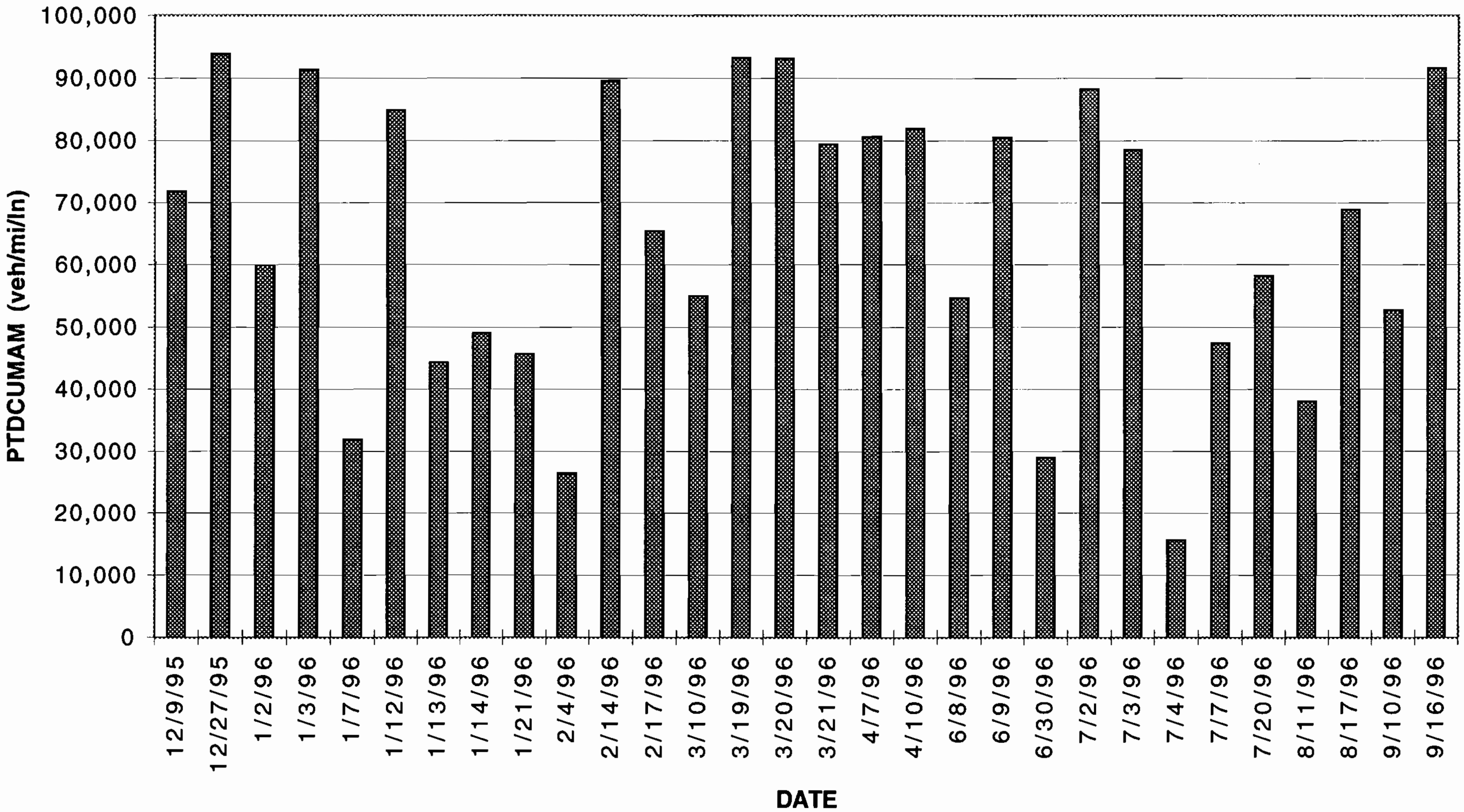


Figure 122. SAN ANTONIO DEC'95-SEP'96 MODEL T14.1
DATA CONTROLLED FOR DAYS WITH TRAFFIC CONGESTION PARAMETER LE 50th PERCENTILE
AND DAYS DURING OZONE EPISODES AND AVERAGE "MORNING" CLOUD COVER LE 3 OKTAS

DAILY MAX OZONE AS A FUNCTION OF DAILY CUMULATIVE TRAFFIC DENSITY ON TRANSGUIDE NETWORK

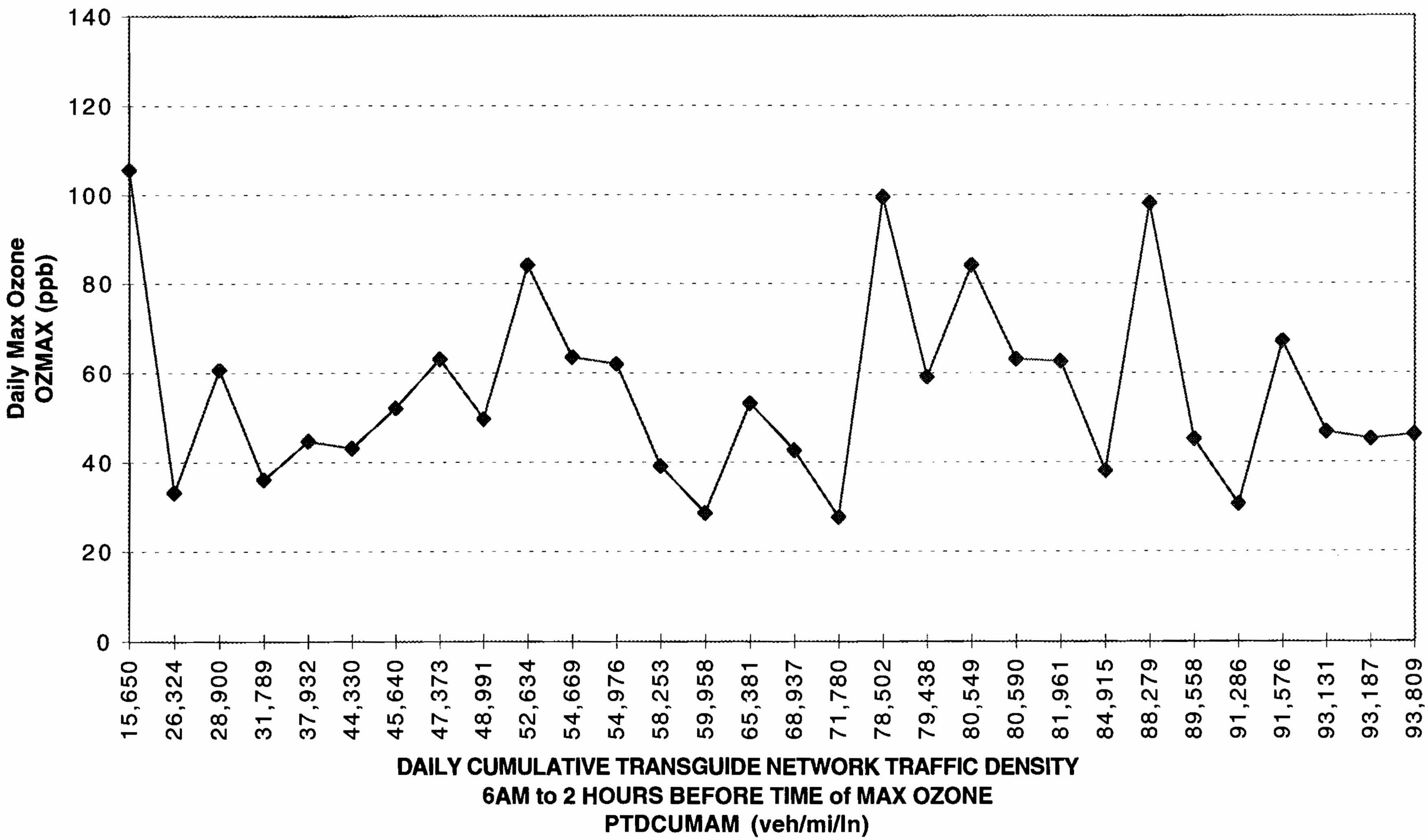


Figure 123. SAN ANTONIO DEC'95-SEP'96 MODEL T14.1
DATA CONTROLLED FOR DAYS WITH TRAFFIC CONGESTION PARAMETER LE 50th PERCENTILE
AND DAYS DURING OZONE EPISODES AND AVERAGE "MORNING" CLOUD COVER LE 3 OKTAS

DAILY MAX OZONE AS A FUNCTION OF DAILY INITIAL MORNING OZONE

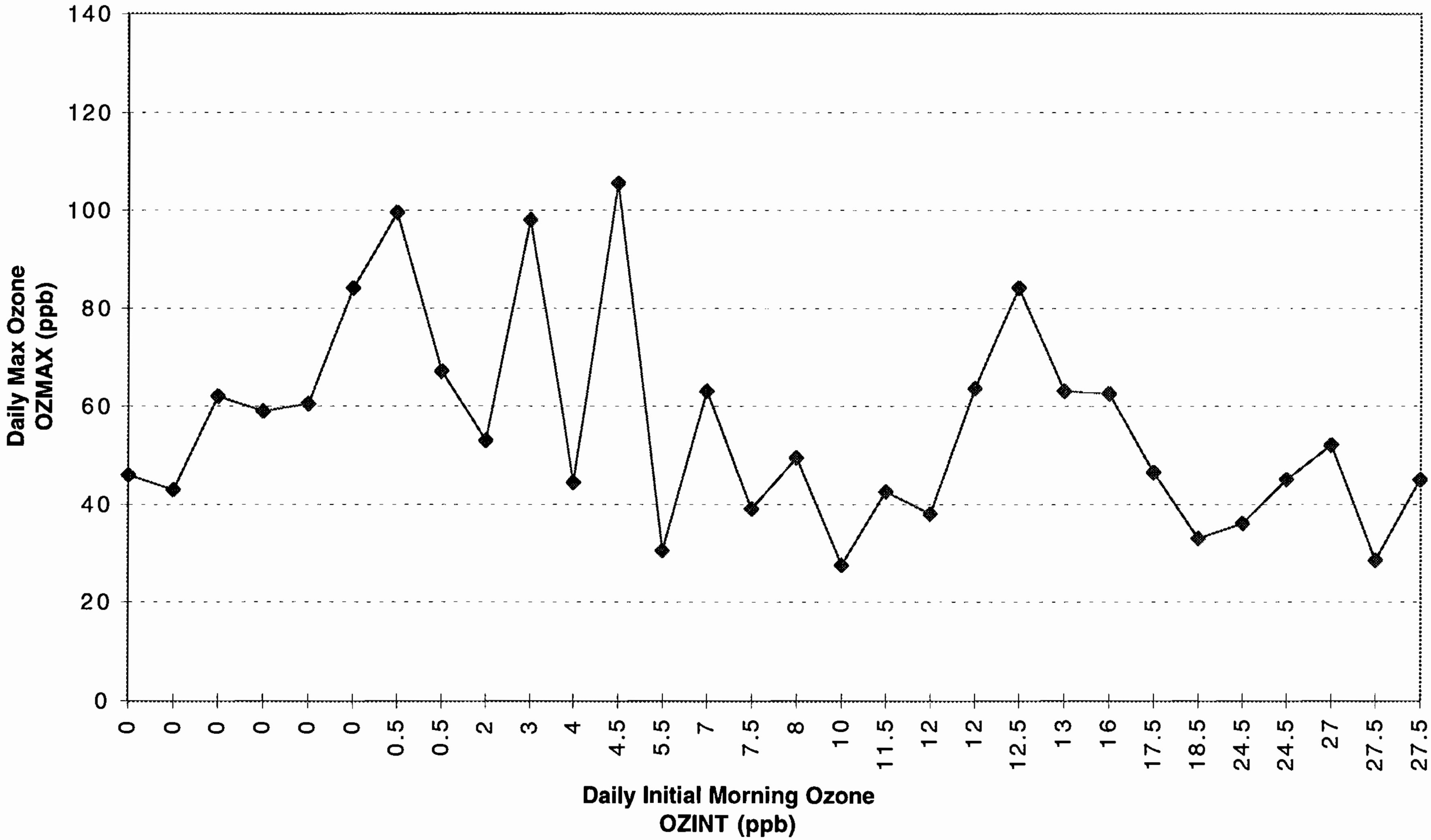


Figure 124. SAN ANTONIO DEC'95-SEP'96 MODEL T14.1
DATA CONTROLLED FOR DAYS WITH TRAFFIC CONGESTION PARAMETER LE 50th PERCENTILE
AND DAYS DURING OZONE EPISODES AND AVERAGE "MORNING" CLOUD COVER LE 3 OKTAS

DAILY MAX OZONE AS A FUNCTION OF AVERAGE DAILY CLOUD COVER UPTO TIME OF MAX OZONE

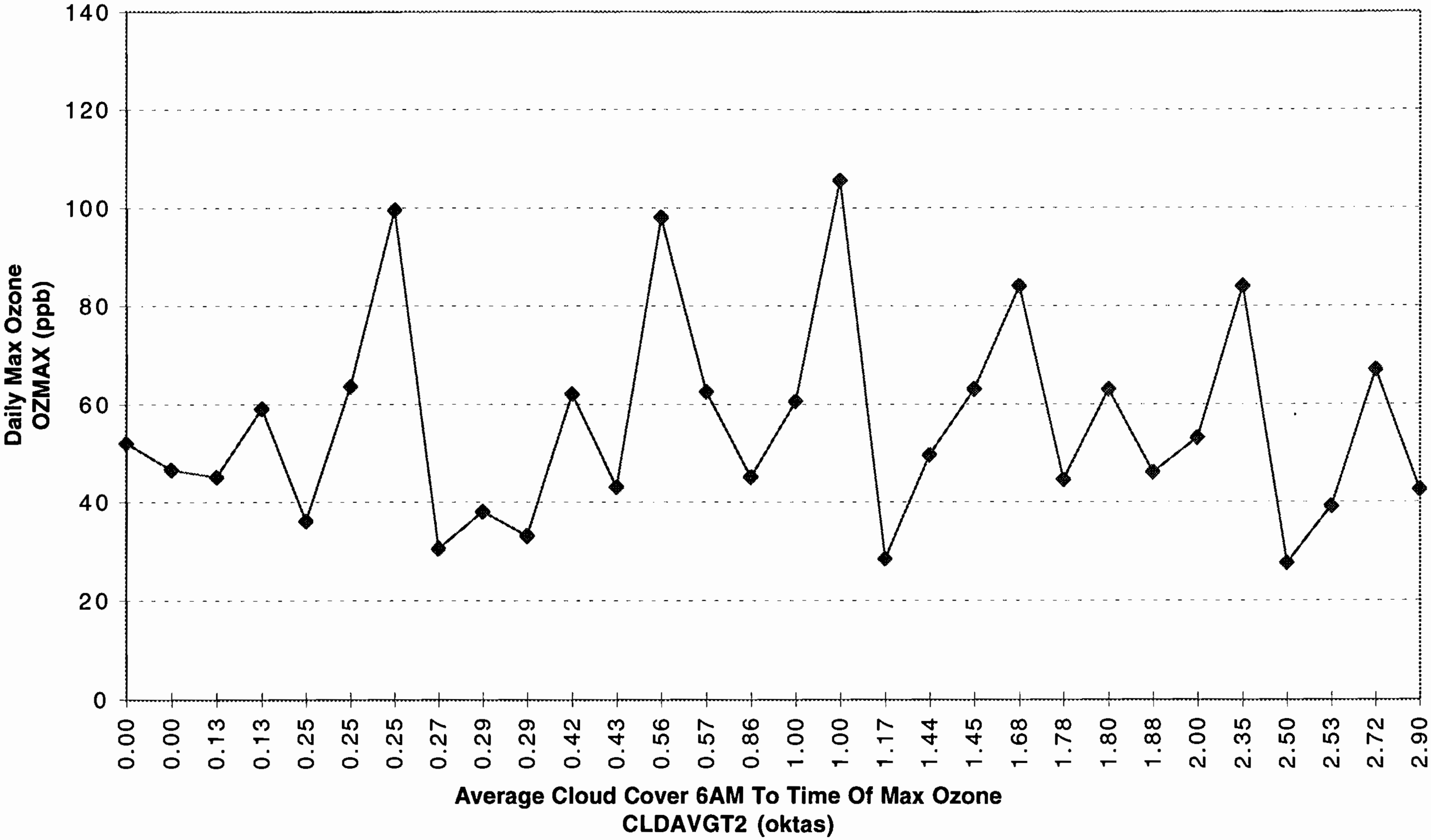


Figure 125. SAN ANTONIO DEC'95-SEP'96 MODEL T14.1
DATA CONTROLLED FOR DAYS WITH TRAFFIC CONGESTION PARAMETER LE 50th PERCENTILE
AND DAYS DURING OZONE EPISODES AND AVERAGE "MORNING" CLOUD COVER LE 3 OKTAS

DAILY MAX OZONE AS A FUNCTION OF AVERAGE DAILY WIND SPEED UPTO TIME OF MAX OZONE

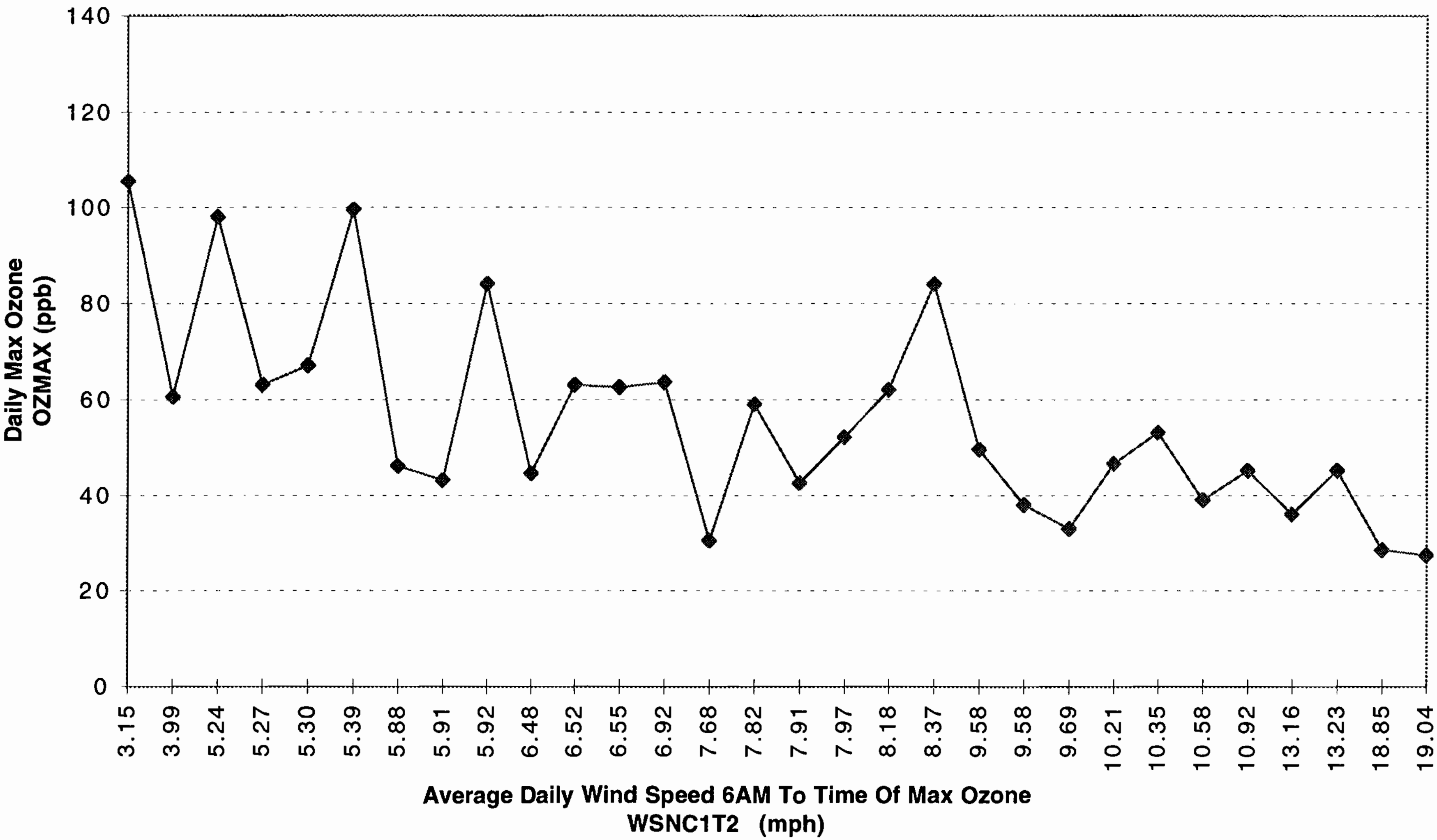


**Figure 126. SAN ANTONIO DEC'95-SEP'96 MODEL T14.1**
**DATA CONTROLLED FOR DAYS WITH TRAFFIC CONGESTION PARAMETER LE 50th PERCENTILE AND DAYS DURING OZONE EPISODES AND AVERAGE "MORNING" CLOUD COVER LE 3 OKTAS**

**DAILY MAX OZONE AS A FUNCTION OF MAXIMUM DAILY TEMPERATURE**

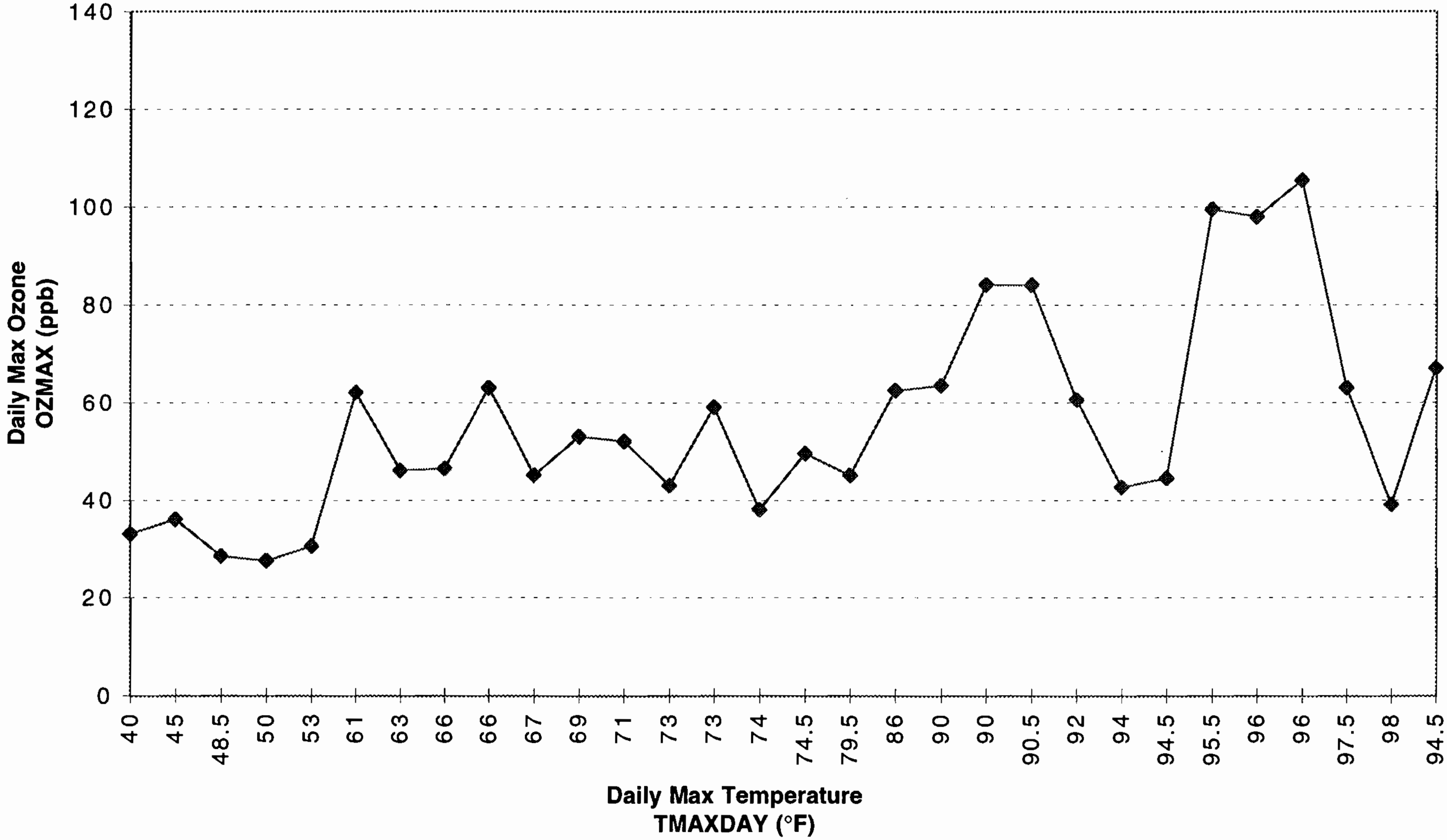


Figure 127. SAN ANTONIO DEC'95-SEP'96 MODEL T14.1
DATA CONTROLLED FOR DAYS WITH TRAFFIC CONGESTION PARAMETER LE 50th PERCENTILE
AND DAYS DURING OZONE EPISODES AND AVERAGE "MORNING" CLOUD COVER LE 3 OKTAS

DAILY MAX OZONE AS A FUNCTION OF AVERAGE DAILY WIND SPEED

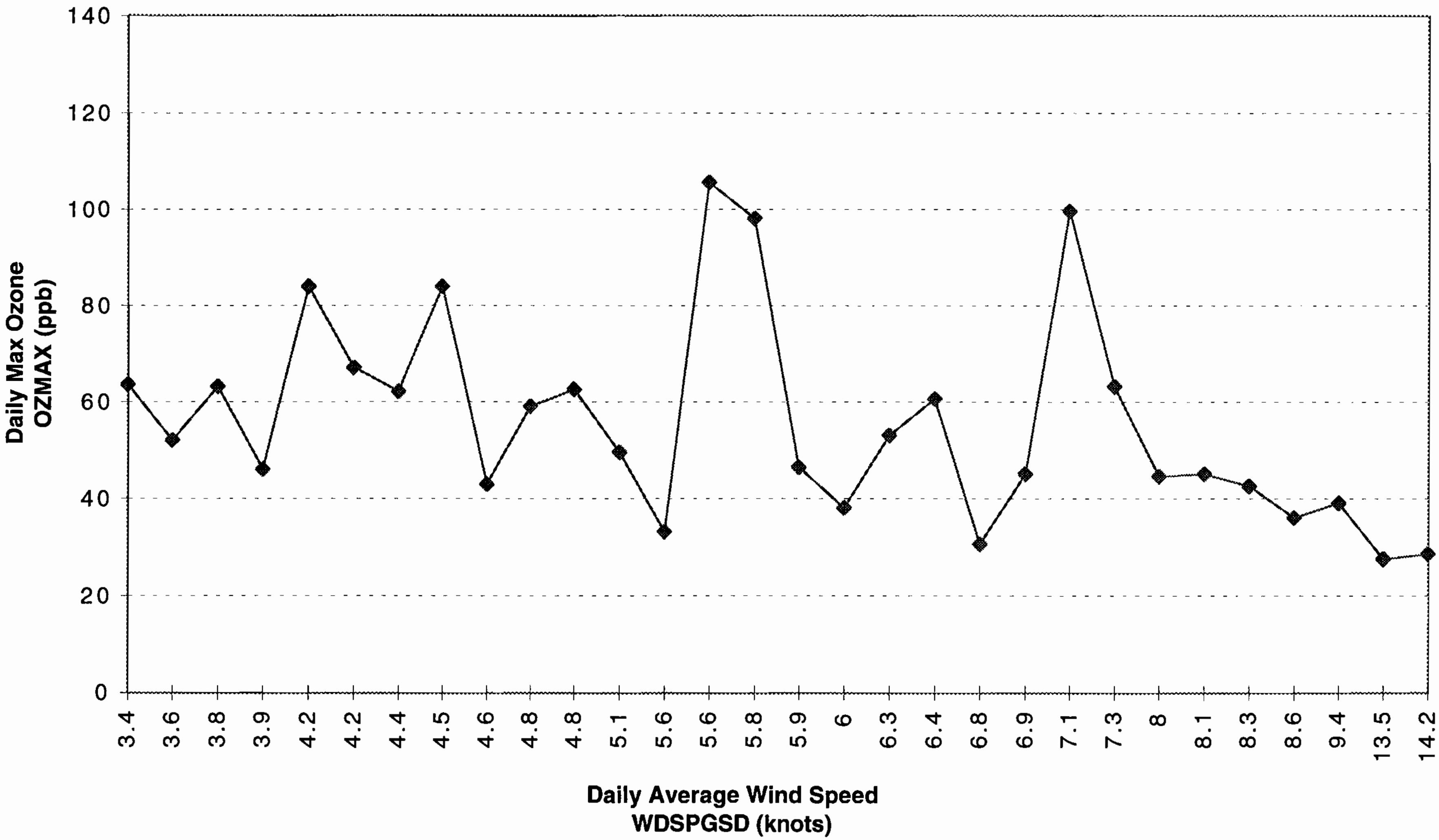
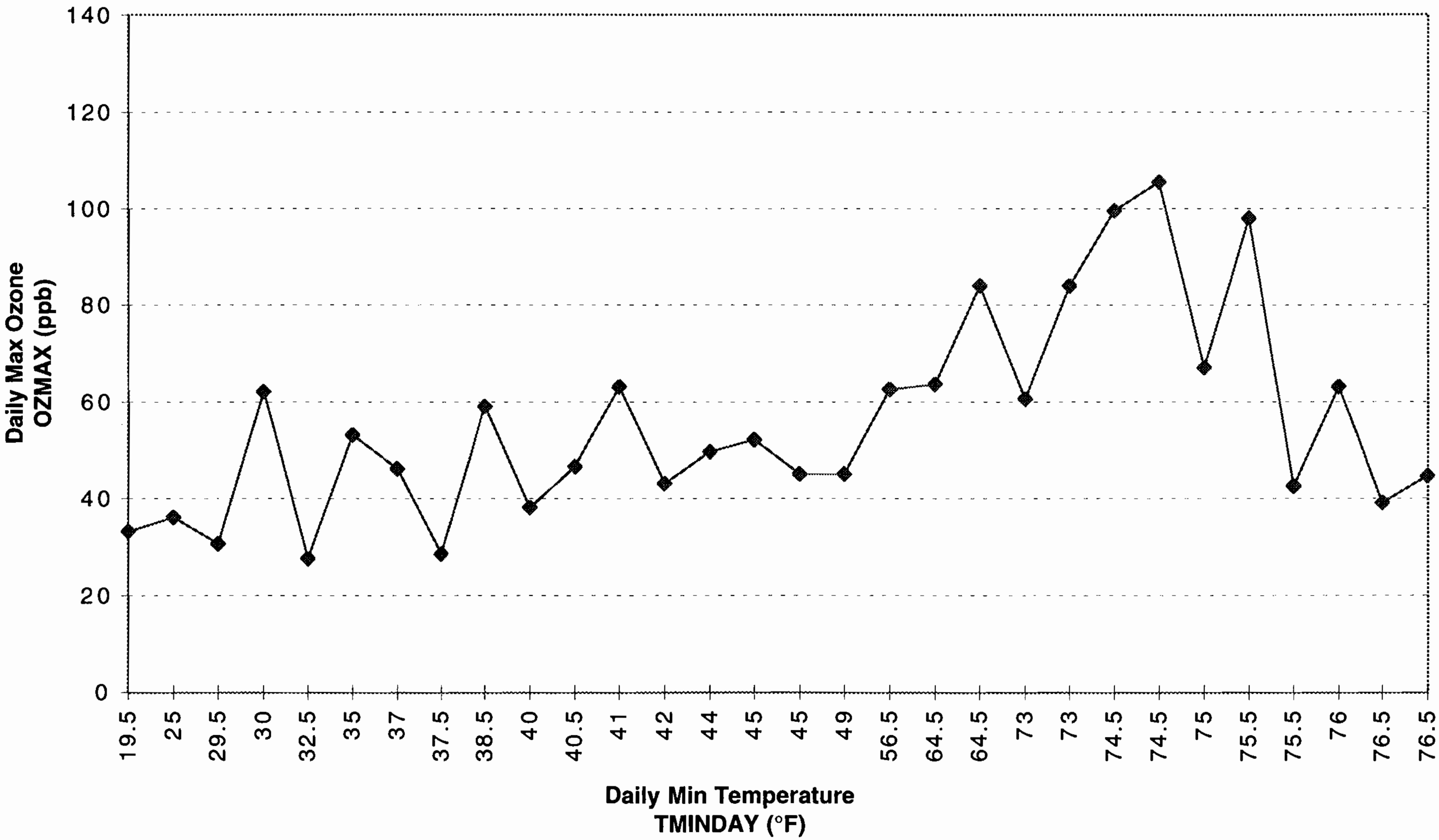


Figure 128. SAN ANTONIO DEC'95-SEP'96 MODEL T14.1
DATA CONTROLLED FOR DAYS WITH TRAFFIC CONGESTION PARAMETER LE 50th PERCENTILE
AND DAYS DURING OZONE EPISODES AND AVERAGE "MORNING" CLOUD COVER LE 3 OKTAS

DAILY MAX OZONE AS A FUNCTION OF MINIMUM DAILY TEMPERATURE



## SCENARIO 14

In Scenario 14, we repeat the analysis of Scenario 12 of controlling for days that are a part of an ozone episode between the months of April 1996 through September 1996 and for the average "morning" cloud cover (CLDAVGT2) to be less than or equal to 3 oktas. In addition, we control for the level of traffic congestion on the TransGuide network as measured by the parameter PTDCUMAM where it is less than the median level (median level for all days between April 1996 and September 1996).

The results of the analysis do not reveal a significant (80 percent confidence level or higher) association between the daily traffic congestion parameter PTDCUMAM and the daily peak ozone concentration. The finding of a lack of significance of the traffic congestion parameter under this scenario does not prove that the parameter does not affect the daily peak ozone concentration. We can only conclude that under the conditions of this scenario, we are not able to detect any possible relationship that might exist at our minimum confidence level of 80 percent. Table 35 summarizes the results of the model and Table 36 summarizes the raw data for Scenario 14 sorted by date.

Figure 129 and Figure 130 plot the daily peak ozone (OZMAX) and the daily cumulative traffic congestion parameter (PTDCUMAM) over time. Figure 131 through Figure 137 graphically summarize the relationships between the response and predictor variables.

*Table 35. Scenario 14 Results*

| | | | RANGE OF VARIABLES |
|---|---|---|---|
| DATA CONTROLS | 1) APR 1996 - SEP 1996<br>2) DAYS DURING OZONE EPISODES<br>3) LOW LEVEL OF TRAFFIC CONGESTION<br>4) AVG CLOUD COVER FROM 6AM TO TIME OF MAX OZONE LE 3 OKTAS | | |
| MODEL SIGNIFICANT PARAMETERS (units) | Y --- OZMAX (ppb)<br>XO --- INTERCEPT<br>X1 --- WSNC1T2 (mph) | | 27.5 to 105.5<br><br>3.1 to 19.0 |
| SIGNIFICANT PARAMETER COEFFICIENT ESTIMATES AND BIVARIATE CORRELATIONS (r) | 111.63243111 X0<br>-6.69400939 X1 | <br>-0.5818 | |
| TRAFFIC VARIABLE COEFFICIENT CONFIDENCE-LEVEL | NA | | |
| MODEL R-SQUARE | 0.34 | | |
| TRAFFIC VARIABLE PARTIAL R-SQUARE | NA | | |
| SAMPLE SIZE | 14 | | |
| 1st ORDER AUTO-CORRELATION Durbin-Watson Statistic | 2.064 | | |
| P-VALUE SUPPORTING $H_O$: No Heteroskedasticity | 0.8576 | | |

*Table 36. Scenario 14 Data*

| DATECST | OZMAX | PTDCUMAM | OZINT | CLDAVGT2 | WSNC1T2 | TMAXDAY | WDSPGSD | TMINDAY |
|---|---|---|---|---|---|---|---|---|
| 4/7/96 | 63 | 80,590 | 13 | 1.45 | 5.27 | 66 | 3.8 | 41 |
| 4/10/96 | 62.5 | 81,961 | 16 | 0.57 | 6.55 | 86 | 4.8 | 56.5 |
| 6/8/96 | 63.5 | 54,669 | 12 | 0.25 | 6.92 | 90 | 3.4 | 64.5 |
| 6/9/96 | 84 | 80,549 | 12.5 | 1.68 | 8.37 | 90.5 | 4.5 | 64.5 |
| 6/30/96 | 60.5 | 28,900 | 0 | 1.00 | 3.99 | 92 | 6.4 | 73 |
| 7/2/96 | 98 | 88,279 | 3 | 0.56 | 5.24 | 96 | 5.8 | 75.5 |
| 7/3/96 | 99.5 | 78,502 | 0.5 | 0.25 | 5.39 | 95.5 | 7.1 | 74.5 |
| 7/4/96 | 105.5 | 15,650 | 4.5 | 1.00 | 3.15 | 96 | 5.6 | 74.5 |
| 7/7/96 | 63 | 47,373 | 7 | 1.80 | 6.52 | 97.5 | 7.3 | 76 |
| 7/20/96 | 39 | 58,253 | 7.5 | 2.53 | 10.58 | 98 | 9.4 | 76.5 |
| 8/11/96 | 44.5 | 37,932 | 4 | 1.78 | 6.48 | 94.5 | 8 | 76.5 |
| 8/17/96 | 42.5 | 68,937 | 11.5 | 2.90 | 7.91 | 94 | 8.3 | 75.5 |
| 9/10/96 | 84 | 52,634 | 0 | 2.35 | 5.92 | 90 | 4.2 | 73 |
| 9/16/96 | 67 | 91,576 | 0.5 | 2.72 | 5.30 | 94.5 | 4.2 | 75 |

Figure 129. SAN ANTONIO APR'96-SEP'96 MODEL T13.1 .0
DATA CONTROLLED FOR DAYS WITH TRAFFIC CONGESTION PARAMETER LT 50th PERCENTILE
AND DAYS DURING OZONE EPISODES AND AVERAGE "MORNING" CLOUD COVER LE 3 OKTAS

DAILY MAXIMUM OZONE CONCENTRATION

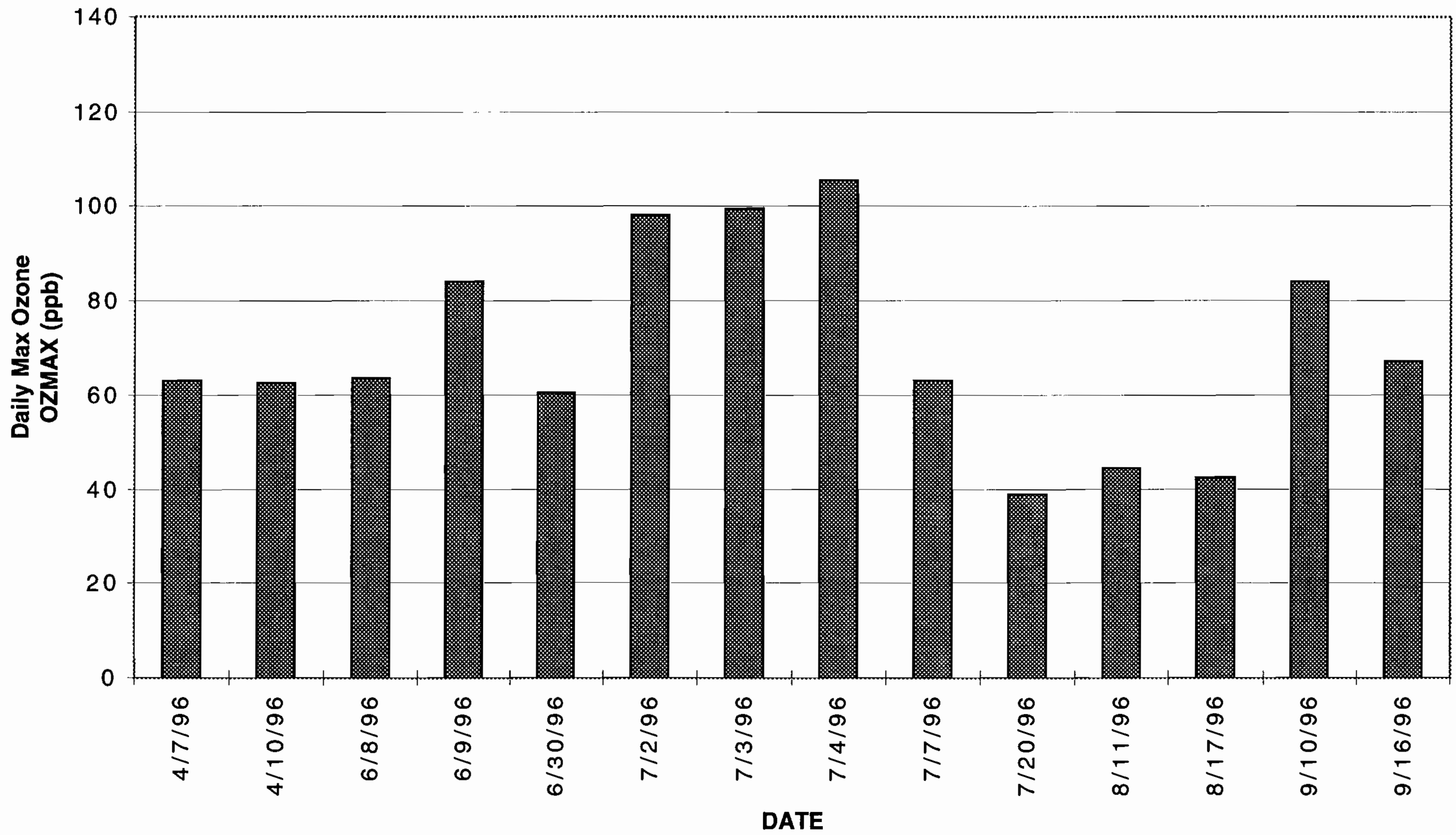


Figure 130. SAN ANTONIO APR'96-SEP'96 MODEL T13.1.0
DATA CONTROLLED FOR DAYS WITH TRAFFIC CONGESTION PARAMETER LT 50th PERCENTILE
AND DAYS DURING OZONE EPISODES AND AVERAGE "MORNING" CLOUD COVER LE 3 OKTAS

DAILY CUMULATIVE TRANSGUIDE NETWORK TRAFFIC DENSITY
6AM to 2 HOURS BEFORE TIME of MAX OZONE

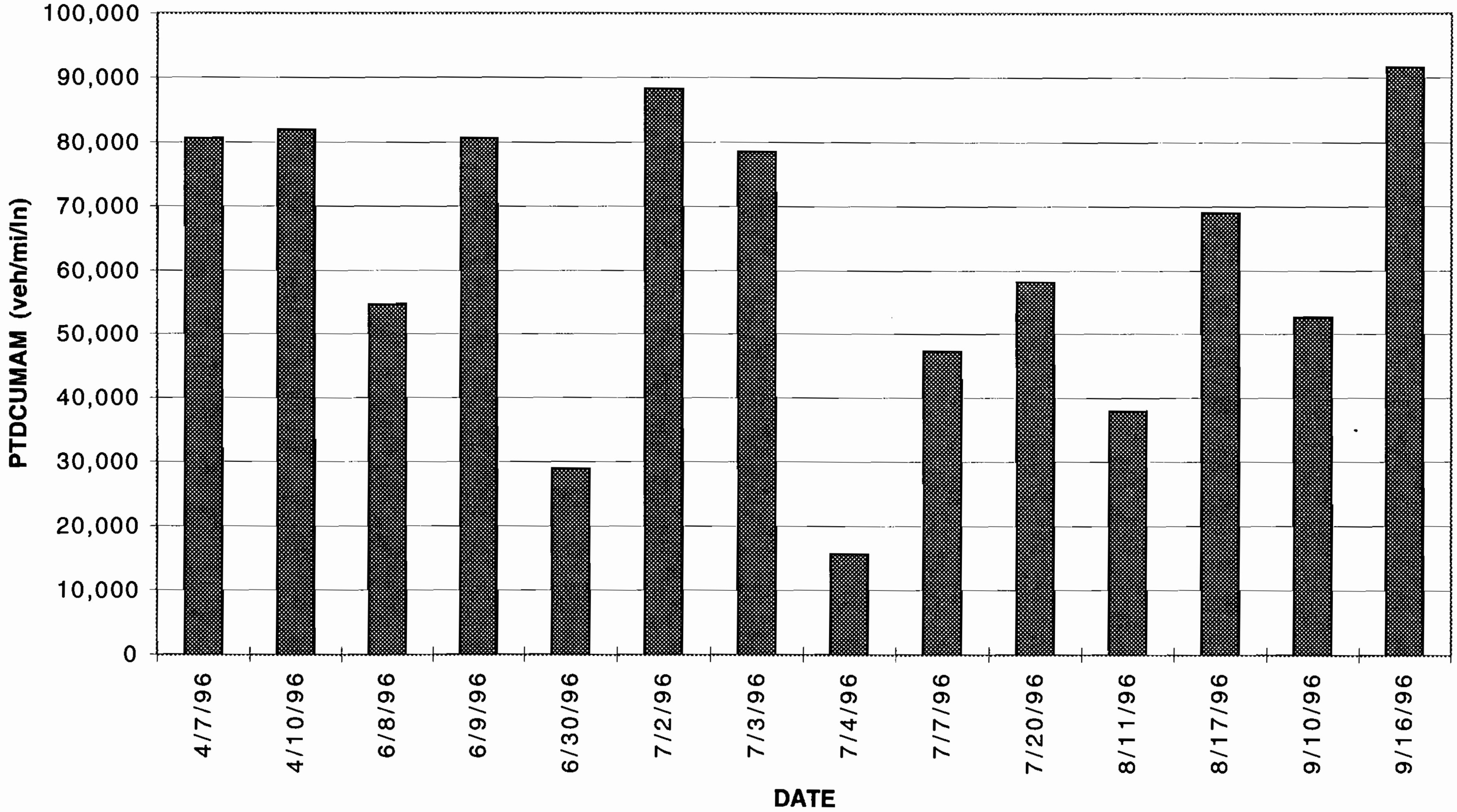


Figure 131. SAN ANTONIO APR'96-SEP'96 MODEL T13.1.0
DATA CONTROLLED FOR DAYS WITH TRAFFIC CONGESTION PARAMETER LT 50th PERCENTILE
AND DAYS DURING OZONE EPISODES AND AVERAGE "MORNING" CLOUD COVER LE 3 OKTAS

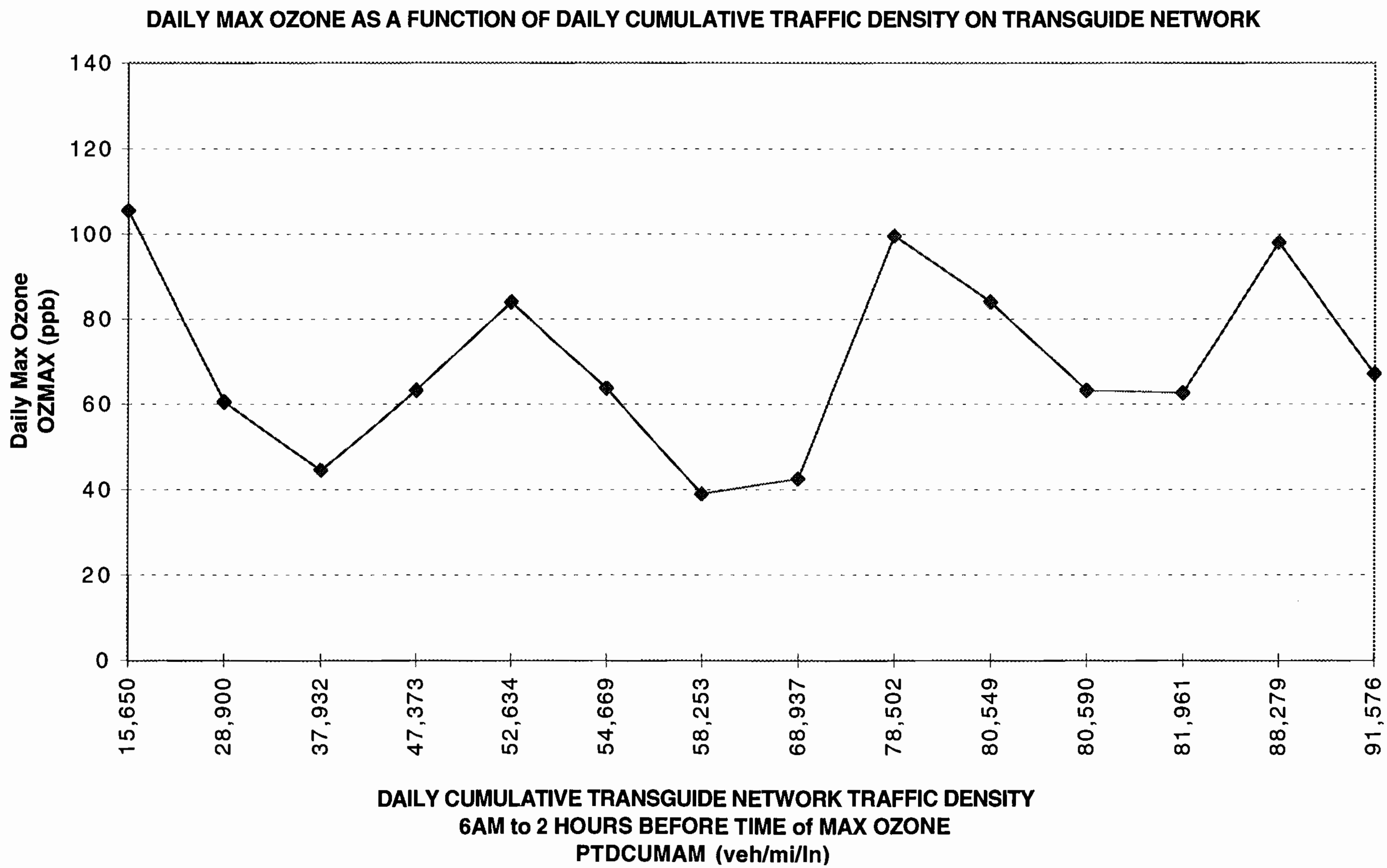


Figure 132. SAN ANTONIO APR'96-SEP'96 MODEL T13.1.0
DATA CONTROLLED FOR DAYS WITH TRAFFIC CONGESTION PARAMETER LT 50th PERCENTILE
AND DAYS DURING OZONE EPISODES AND AVERAGE "MORNING" CLOUD COVER LE 3 OKTAS

DAILY MAX OZONE AS A FUNCTION OF DAILY INITIAL MORNING OZONE

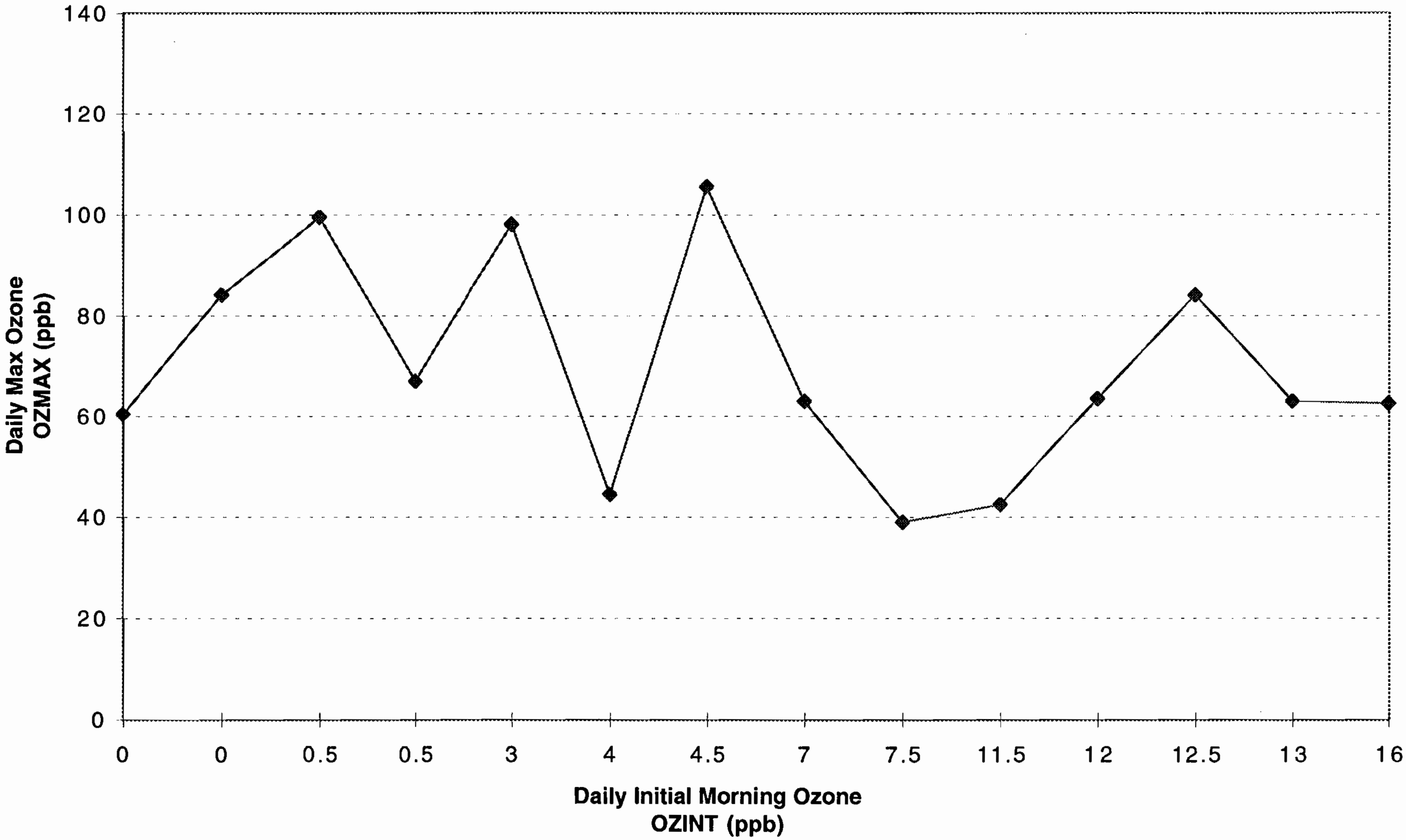


Figure 133. SAN ANTONIO APR'96-SEP'96 MODEL T13.1.0
DATA CONTROLLED FOR DAYS WITH TRAFFIC CONGESTION PARAMETER LT 50th PERCENTILE
AND DAYS DURING OZONE EPISODES AND AVERAGE "MORNING" CLOUD COVER LE 3 OKTAS

DAILY MAX OZONE AS A FUNCTION OF AVERAGE DAILY CLOUD COVER UPTO TIME OF MAX OZONE

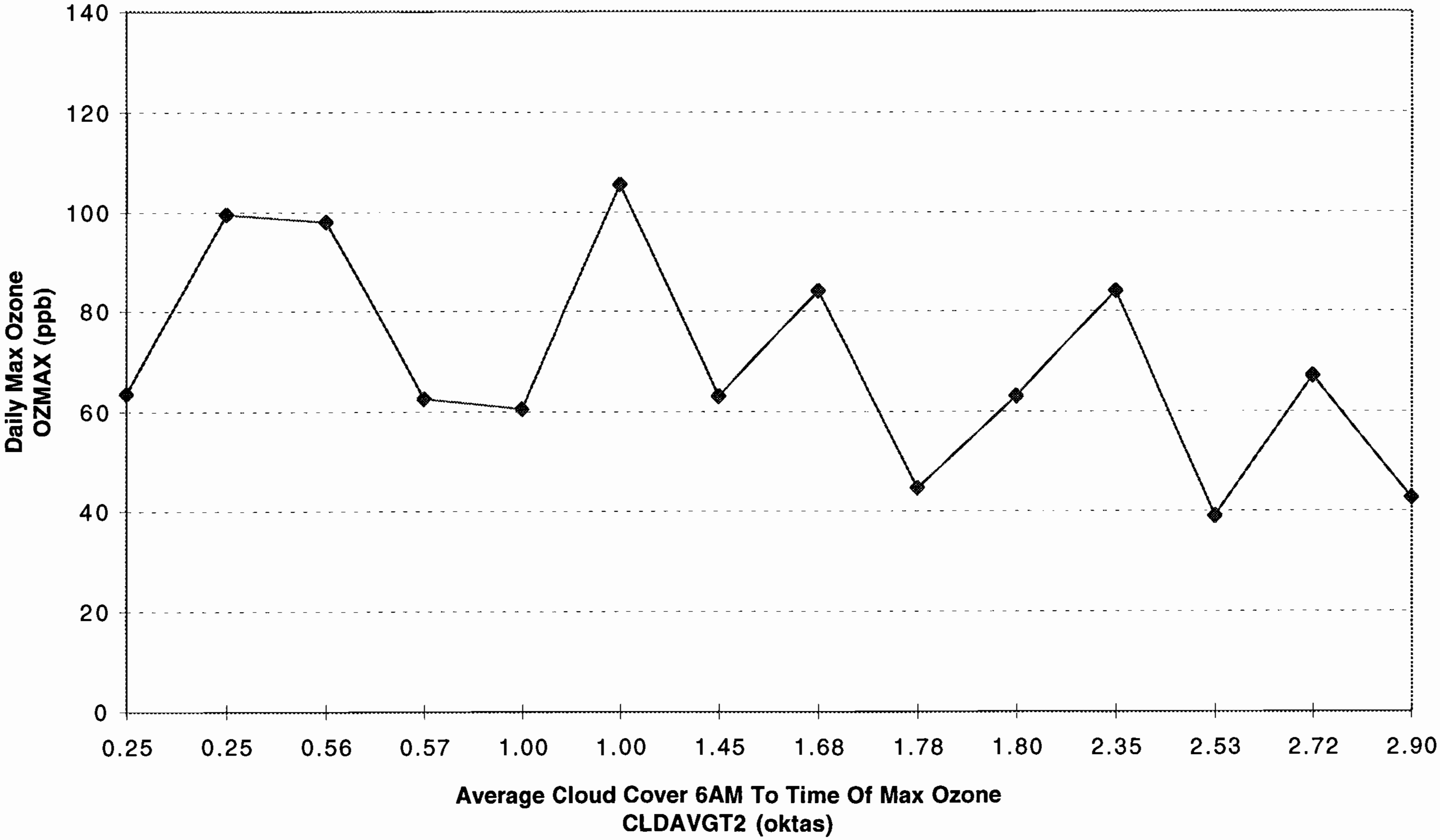


Figure 134. SAN ANTONIO APR'96-SEP'96 MODEL T13.1.0
DATA CONTROLLED FOR DAYS WITH TRAFFIC CONGESTION PARAMETER LT 50th PERCENTILE
AND DAYS DURING OZONE EPISODES AND AVERAGE "MORNING" CLOUD COVER LE 3 OKTAS

DAILY MAX OZONE AS A FUNCTION OF AVERAGE DAILY WIND SPEED UPTO TIME OF MAX OZONE

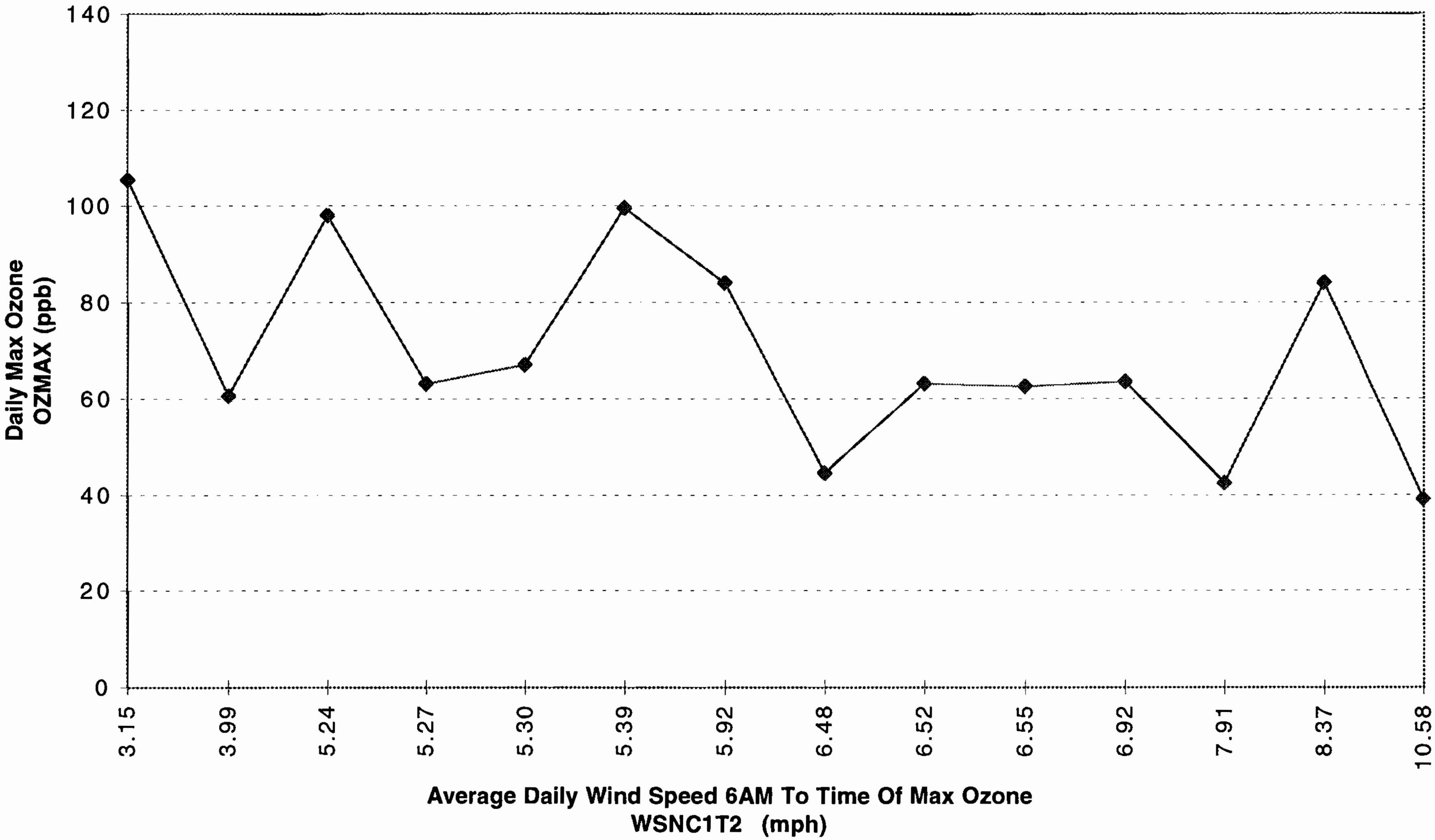
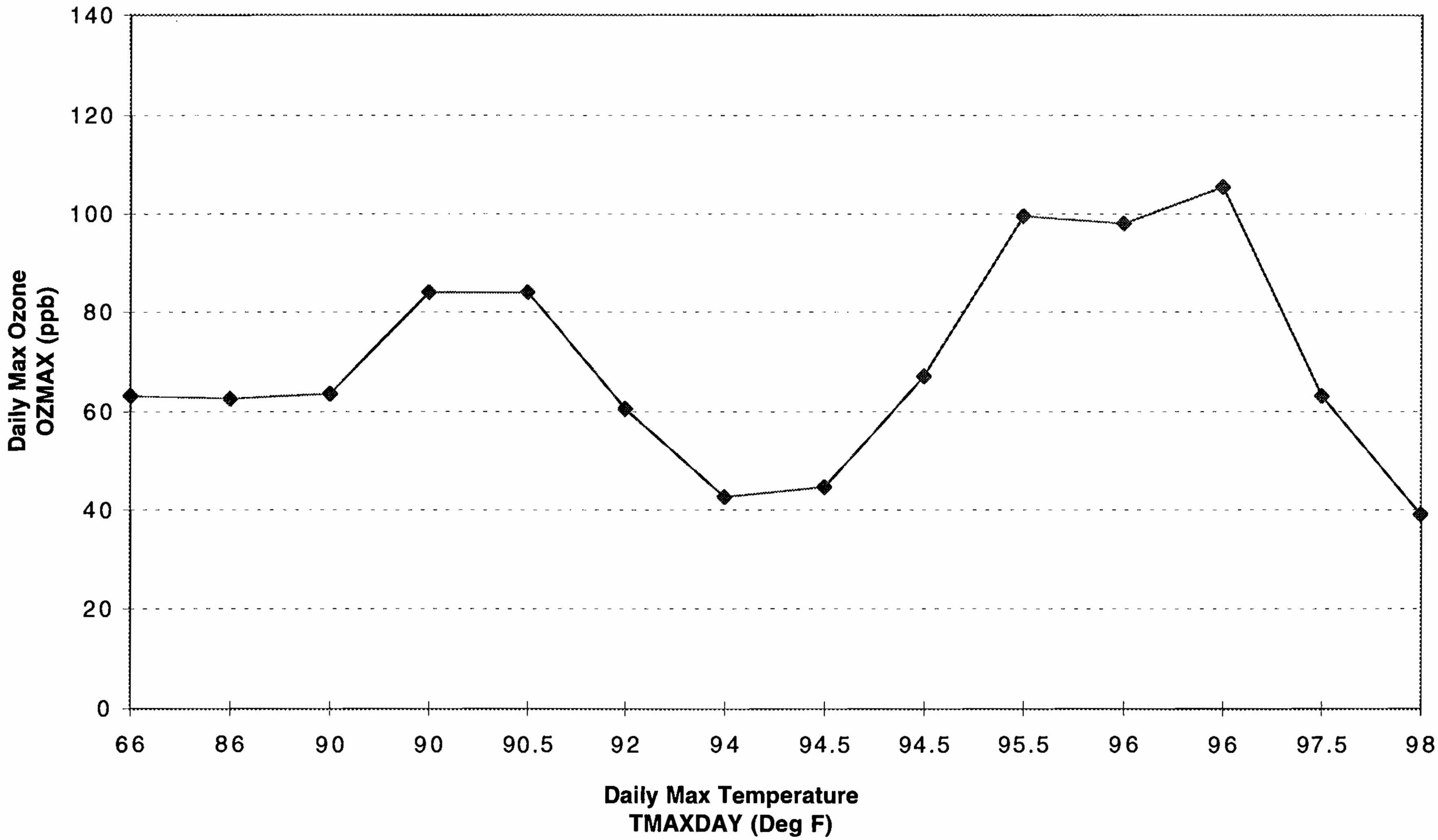


**Figure 135. SAN ANTONIO APR'96-SEP'96 MODEL T13.1.0**
**DATA CONTROLLED FOR DAYS WITH TRAFFIC CONGESTION PARAMETER LT 50th PERCENTILE AND DAYS DURING OZONE EPISODES AND AVERAGE "MORNING" CLOUD COVER LE 3 OKTAS**

**DAILY MAX OZONE AS A FUNCTION OF MAXIMUM DAILY TEMPERATURE**



## Figure 136. SAN ANTONIO APR'96-SEP'96 MODEL T13.1.0
## DATA CONTROLLED FOR DAYS WITH TRAFFIC CONGESTION PARAMETER LT 50th PERCENTILE AND DAYS DURING OZONE EPISODES AND AVERAGE "MORNING" CLOUD COVER LE 3 OKTAS

### DAILY MAX OZONE AS A FUNCTION OF AVERAGE DAILY WIND SPEED

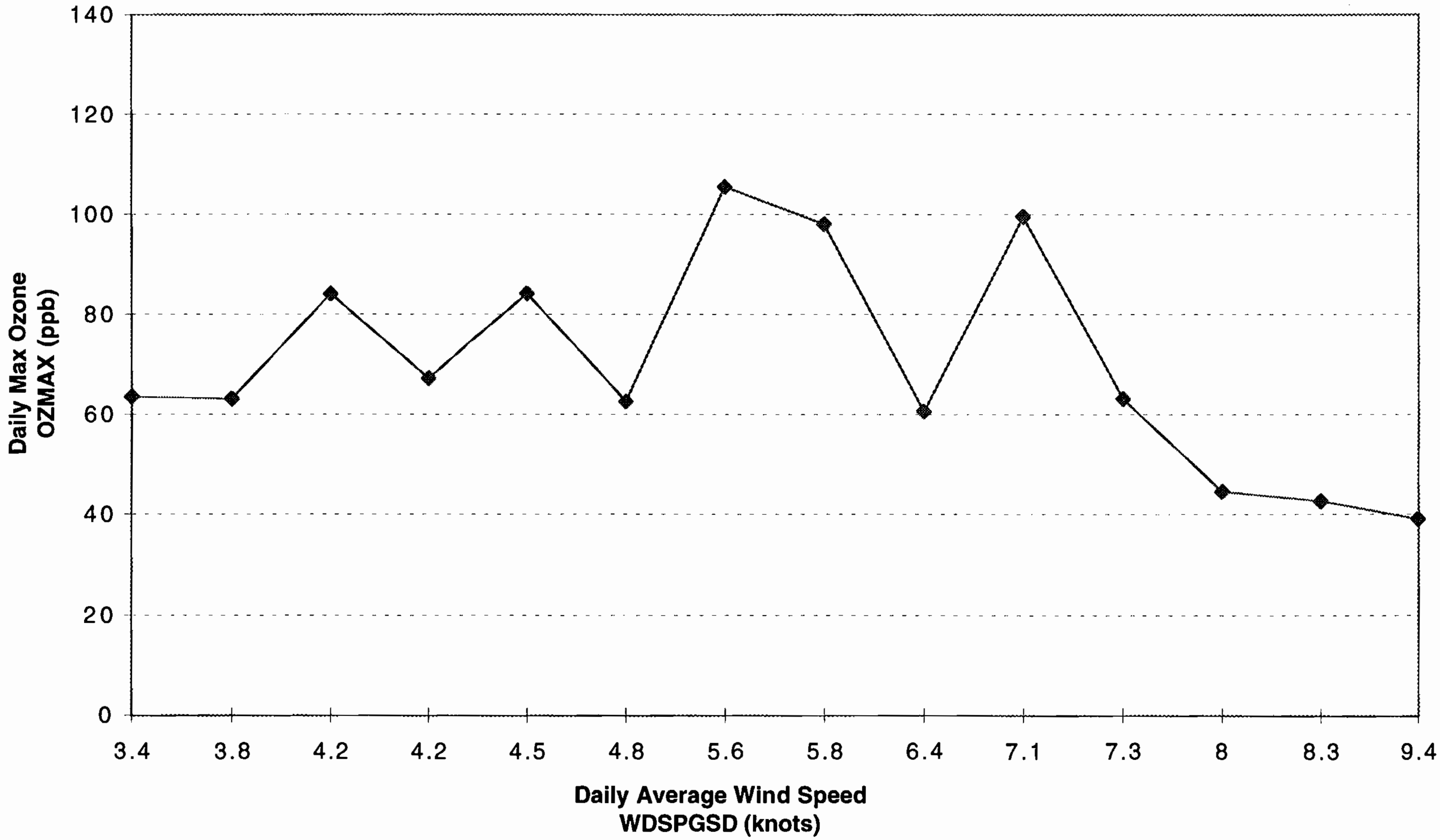
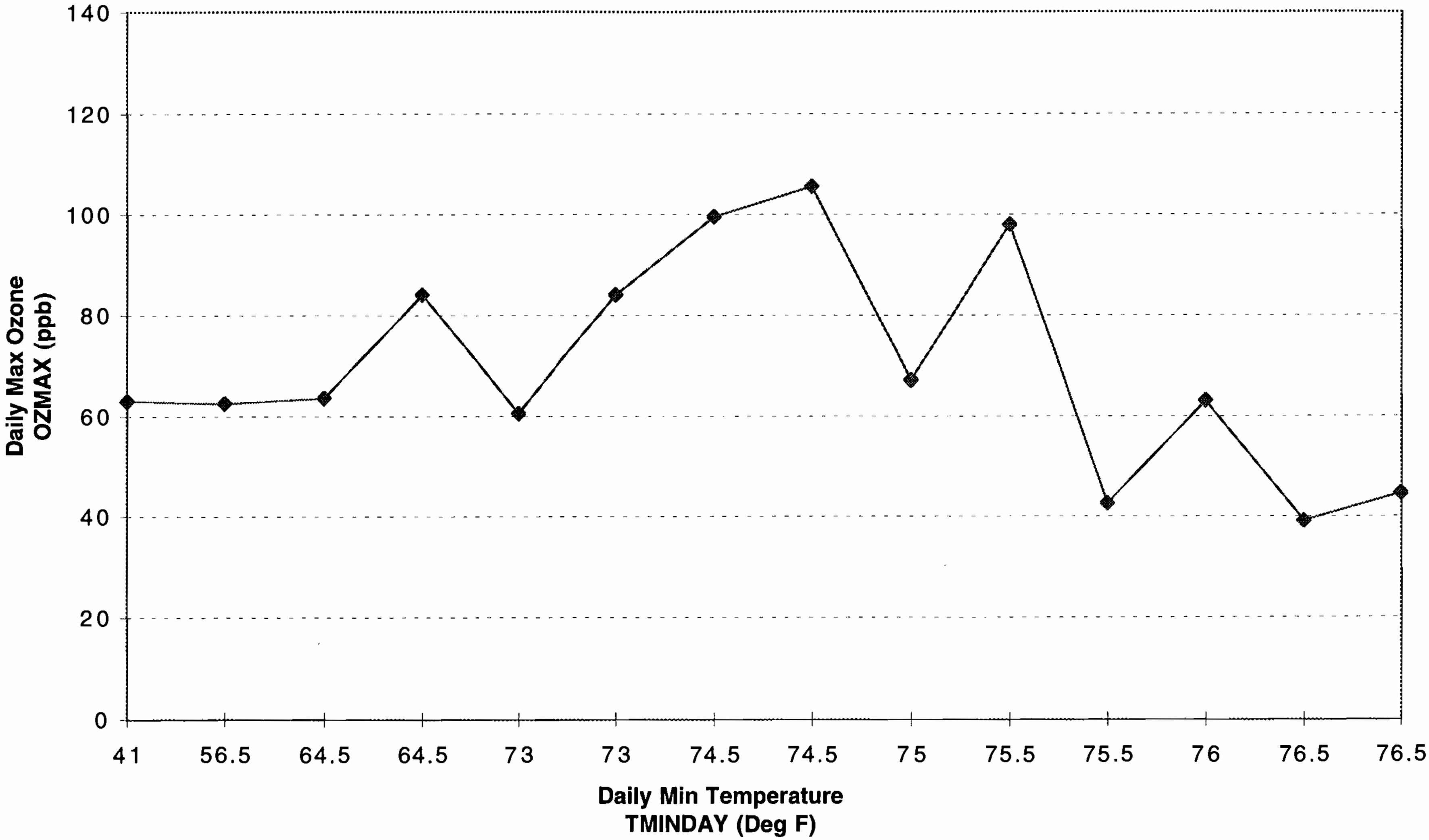


Figure 137. SAN ANTONIO APR'96-SEP'96 MODEL T13.1.0
DATA CONTROLLED FOR DAYS WITH TRAFFIC CONGESTION PARAMETER LT 50th PERCENTILE
AND DAYS DURING OZONE EPISODES AND AVERAGE "MORNING" CLOUD COVER LE 3 OKTAS

DAILY MAX OZONE AS A FUNCTION OF MINIMUM DAILY TEMPERATURE



## SCENARIO 15

In Scenario 15, we repeat the analysis of Scenario 13 of controlling for days that are a part of an ozone episode and controlling for the average "morning" cloud cover (CLDAVGT2) to be less than or equal to 3 oktas. However, rather than control for days where the traffic congestion parameter is less than the median value, in Scenario 15 we control for days where the traffic congestion parameter is greater than or equal to the median value.

The results of the analysis reveal an association between the daily traffic congestion parameter PTDCUMAM and the daily peak ozone concentration where such a relationship was not detected in Scenario 13. Table 37 summarizes the results of the model and Table 38 summarizes the strength of the traffic parameter's association with the daily peak ozone. Confidence intervals of the parameter's model coefficient per 10,000 units of PTDCUMAM are calculated at the 80, 90, and 95 percent confidence levels. Table 39 summarizes the raw data sorted by date for Scenario 15.

We can say that under this scenario at the 80 percent confidence level, the potential increase to the daily peak ozone in ppb per a 10,000 unit increase in the traffic congestion parameter PTDCUMAM has a range from about 2.6 to about 5.3 ppb. It is equally likely that the potential increase in the daily peak ozone would fall at any point within this range. The results presented in Table 38 also indicate that the traffic congestion parameter remains significant at the 95 percent confidence level.

Figure 138 and Figure 139 plot the daily peak ozone (OZMAX) and the daily cumulative traffic congestion parameter (PTDCUMAM) over time. Figure 140 through Figure 146 graphically summarize the relationships between the response and predictor variables. Figure 147 depicts an 80 percent confidence level prediction band of OZMAX as a function of PTDCUMAM while holding the other significant variables constant at their median levels.

We can say at an 80 percent confidence level that the daily peak ozone will fall somewhere within the band on Figure 147. As shown, the 80 percent confidence prediction band with this linear model under this scenario does not encompass two of the higher daily peak ozone concentrations at fixed median levels of the other significant variables.

*Table 37. Scenario 15 Results*

| | | | RANGE OF VARIABLES |
|---|---|---|---|
| **DATA CONTROLS** | 1) DEC 1995 - SEP 1996<br><br>2) DAYS DURING OZONE EPISODES<br><br>3) HIGH LEVEL OF TRAFFIC CONGESTION<br><br>4) AVG CLOUD COVER FROM 6AM TO TIME OF MAX OZONE LE 3 OKTAS | | |
| **MODEL SIGNIFICANT PARAMETERS (units)** | Y --- OZMAX (ppb)<br>XO --- INTERCEPT<br>X1 --- PTDCUMAM (veh/mi/ln)<br>X2 --- OZINT (ppb)<br>X3 --- CLDAVGT2 (oktas)<br>X4 --- WSNC1T2 (mph)<br>X5 --- TMINDAY (Deg F) | | 35.5 to 120<br><br>97,560 to 189,530<br>0 to 47<br>0 to 2.7<br>4.4 to 14.5<br>34 to 77.5 |
| **SIGNIFICANT PARAMETER COEFFICIENT ESTIMATES AND BIVARIATE CORRELATIONS (r)** | 24.44078158 X0<br>0.00039242 X1<br>0.37122009 X2<br>-6.27042433 X3<br>-4.31151650 X4<br>0.49715064 X5 | <br>0.3369<br>-0.0172<br>-0.2850<br>-0.4914<br>0.2330 | |
| **TRAFFIC VARIABLE COEFFICIENT CONFIDENCE-LEVEL** | 99% | | |
| **MODEL R-SQUARE** | 0.69 | | |
| **TRAFFIC VARIABLE PARTIAL R-SQUARE** | 0.2549 | | |
| **SAMPLE SIZE** | 27 | | |
| **1st ORDER AUTO-CORRELATION Durbin-Watson Statistic** | 1.950 | | |
| **P-VALUE SUPPORTING $H_O$: No Heteroskedasticity** | 0.7914 | | |

*Table 38. Scenario 15 Results (cont.)*

| | |
|---|---|
| **TRAFFIC PARAMETER ESTIMATE PER 10,000 PTDCUMAM** | **3.9242** |
| **TRAFFIC PARAMETER ESTIMATE STANDARD ERROR PER 10,000 PTDCUMAM** | **1.0242** |
| **n** | **27** |
| **k** | **5** |
| **df** | **21** |
| $t_{(.10)}$ | **1.323** |
| $t_{(.05)}$ | **1.721** |
| $t_{(.025)}$ | **2.080** |
| **80 PERCENT CONFIDENCE INTERVAL OF TRAFFIC PARAMETER ESTIMATE PER 10,000 UNITS OF PTDCUMAM** | **2.57 to 5.28** |
| **90 PERCENT CONFIDENCE INTERVAL OF TRAFFIC PARAMETER ESTIMATE PER 10,000 UNITS OF PTDCUMAM** | **2.16 to 5.69** |
| **95 PERCENT CONFIDENCE INTERVAL OF TRAFFIC PARAMETER ESTIMATE PER 10,000 UNITS OF PTDCUMAM** | **1.79 to 6.05** |

*Table 39. Scenario 15 Data*

| DATECST | OZMAX | PTDCUMAM | OZINT | CLDAVGT2 | WSNC1T2 | TMAXDAY | WDSPGSD | TMINDAY |
|---|---|---|---|---|---|---|---|---|
| 12/4/95 | 65.5 | 115,843 | 34 | 0.11 | 7.33 | 75 | 4.5 | 53 |
| 12/6/95 | 66 | 113,569 | 30.5 | 1.22 | 6.14 | 74 | 5.7 | 51 |
| 1/4/96 | 35.5 | 109,338 | 2.5 | 0.94 | 9.27 | 66 | 6.7 | 34 |
| 1/9/96 | 43.5 | 112,755 | 19 | 0.00 | 10.30 | 64 | 7.2 | 35 |
| 1/15/96 | 56 | 99,454 | 3 | 0.78 | 4.99 | 75 | 2.6 | 47.5 |
| 2/12/96 | 40 | 103,061 | 22 | 2.50 | 10.28 | 64 | 5.4 | 40 |
| 2/13/96 | 44.5 | 103,596 | 0 | 1.00 | 7.42 | 67 | 4.8 | 39 |
| 3/15/96 | 65 | 122,914 | 22 | 2.63 | 9.32 | 79.5 | 5.9 | 62 |
| 3/28/96 | 60.5 | 141,006 | 21 | 2.70 | 5.47 | 71 | 4 | 42.5 |
| 4/1/96 | 63 | 128,397 | 47 | 0.44 | 14.51 | 74 | 8.5 | 56 |
| 4/8/96 | 82.5 | 138,109 | 17 | 0.13 | 6.33 | 79.5 | 3.9 | 49 |
| 4/16/96 | 63.5 | 144,610 | 0 | 1.64 | 9.72 | 77 | 7.2 | 46 |
| 4/19/96 | 52 | 133,172 | 20.5 | 2.22 | 13.75 | 97 | 8.2 | 68.5 |
| 5/1/96 | 66 | 189,529 | 27 | 0.95 | 14.05 | 84.5 | 10.3 | 56 |
| 5/11/96 | 50 | 103,665 | 26 | 1.91 | 9.94 | 87 | 9 | 65.5 |
| 5/21/96 | 46 | 140,220 | 15 | 2.52 | 11.94 | 95 | 10.2 | 73.5 |
| 5/22/96 | 49 | 124,190 | 12 | 2.67 | 13.04 | 95.5 | 10.1 | 72.5 |
| 6/3/96 | 120 | 158,194 | 8 | 1.27 | 4.36 | 91.5 | 7.5 | 68 |
| 6/17/96 | 56.5 | 113,027 | 3 | 1.18 | 5.98 | 96 | 4.5 | 76 |
| 6/18/96 | 67 | 115,719 | 2.5 | 1.11 | 8.31 | 97.5 | 5.2 | 76.5 |
| 6/20/96 | 70 | 97,560 | 1.5 | 1.06 | 7.57 | 99.5 | 7.5 | 76.5 |
| 7/1/96 | 69 | 103,954 | 0 | 1.50 | 6.61 | 95 | 5.6 | 75 |
| 7/12/96 | 42 | 146,141 | 3.5 | 2.65 | 10.43 | 96 | 10.5 | 77.5 |
| 7/31/96 | 38 | 105,650 | 0.5 | 1.86 | 10.90 | 97 | 8.8 | 76.5 |
| 8/12/96 | 75.5 | 158,255 | 0.5 | 1.58 | 7.70 | 98.5 | 6.5 | 77.5 |
| 8/21/96 | 60.5 | 108,007 | 0 | 2.10 | 6.09 | 93 | 5.3 | 71.5 |
| 9/11/96 | 87 | 102,476 | 2 | 0.90 | 5.78 | 90 | 4.3 | 68 |

**Figure 138. SAN ANTONIO DEC'95-SEP'96 MODEL T14**

**DATA CONTROLLED FOR DAYS WITH TRAFFIC CONGESTION PARAMETER GE 50th PERCENTILE AND DAYS DURING OZONE EPISODES AND AVERAGE "MORNING" CLOUD COVER LE 3 OKTAS**

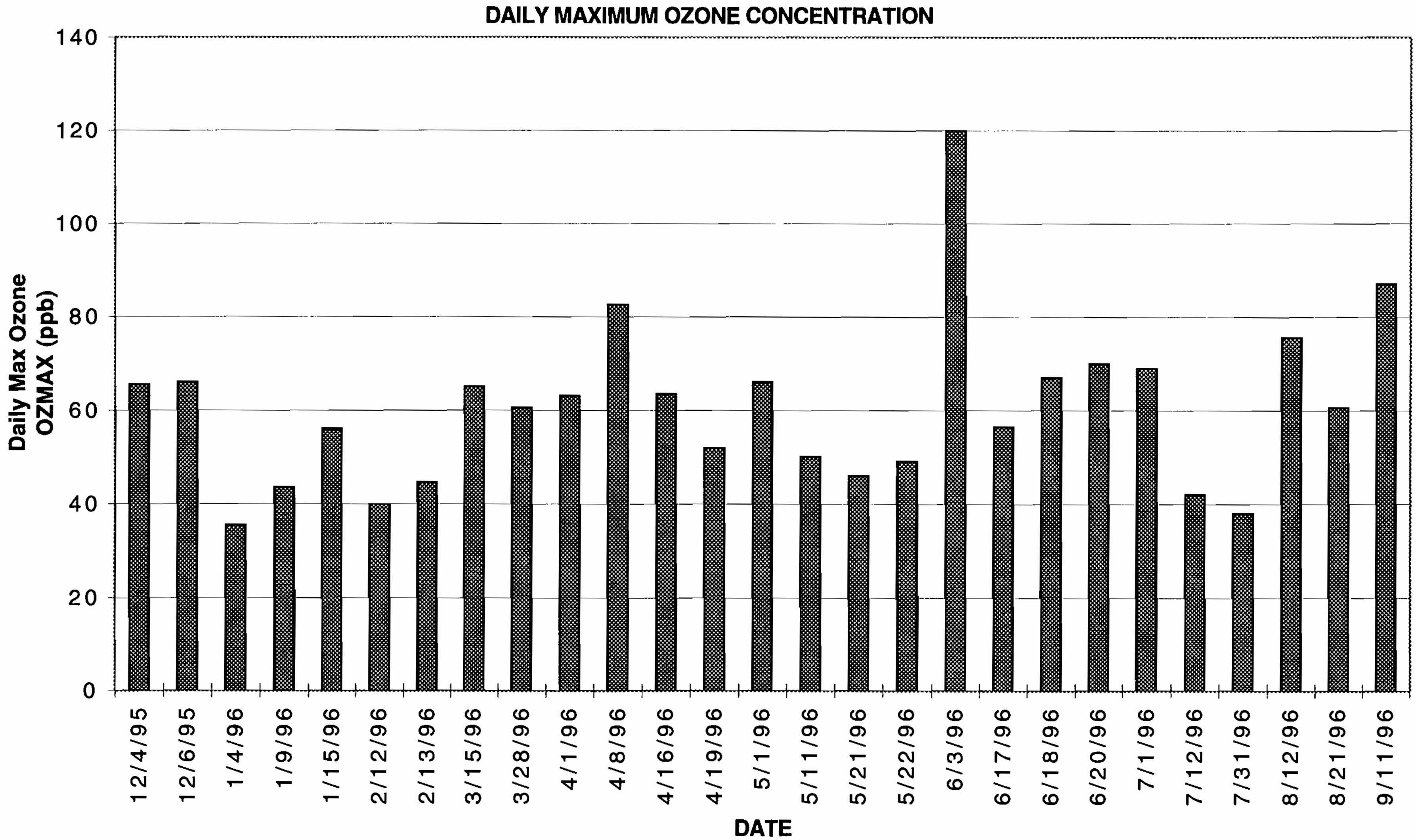


Figure 139. SAN ANTONIO DEC'95-SEP'96 MODEL T14
DATA CONTROLLED FOR DAYS WITH TRAFFIC CONGESTION PARAMETER GE 50th PERCENTILE
AND DAYS DURING OZONE EPISODES AND AVERAGE "MORNING" CLOUD COVER LE 3 OKTAS

DAILY CUMULATIVE TRANSGUIDE NETWORK TRAFFIC DENSITY
6AM to 2 HOURS BEFORE TIME of MAX OZONE

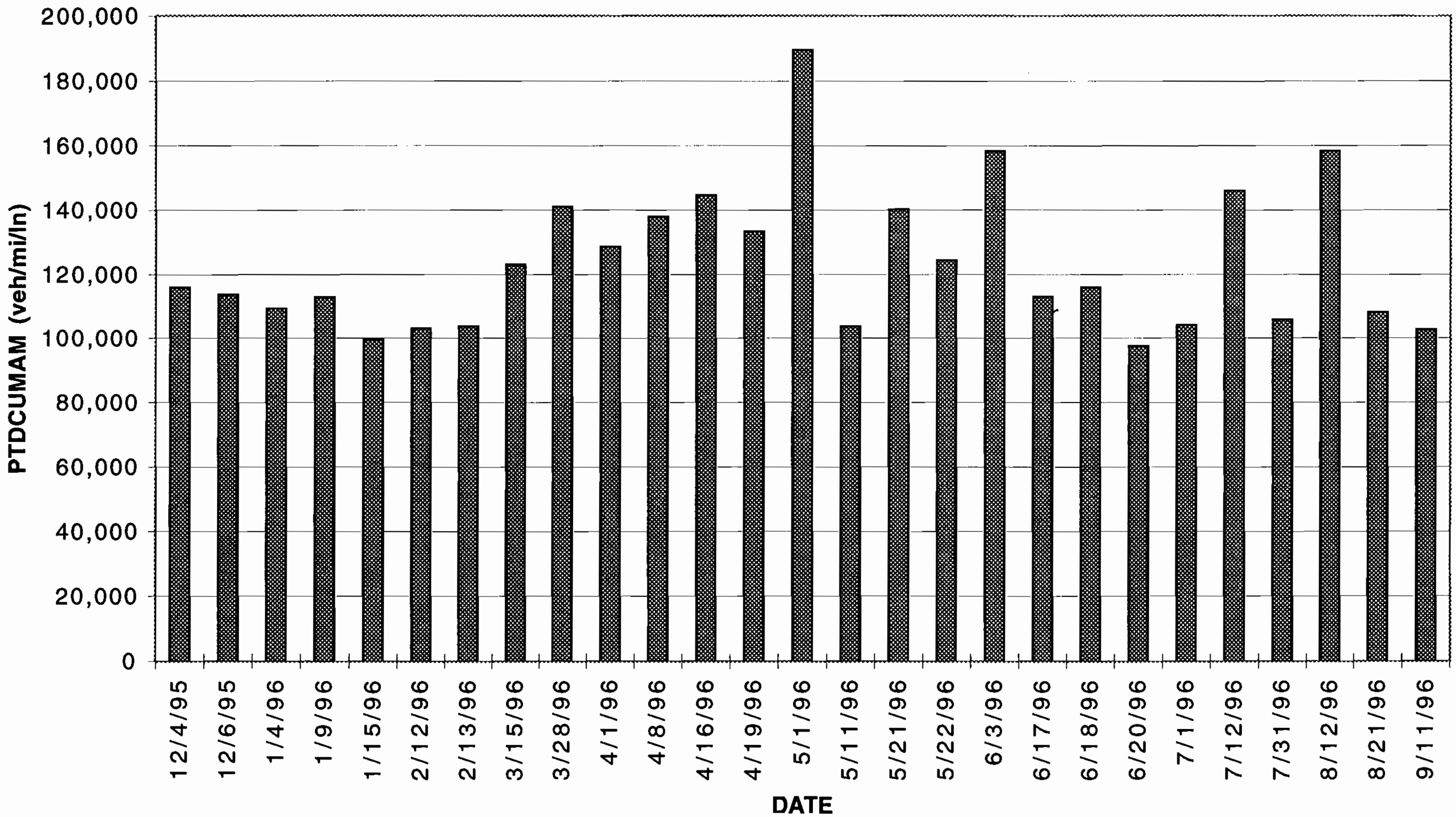
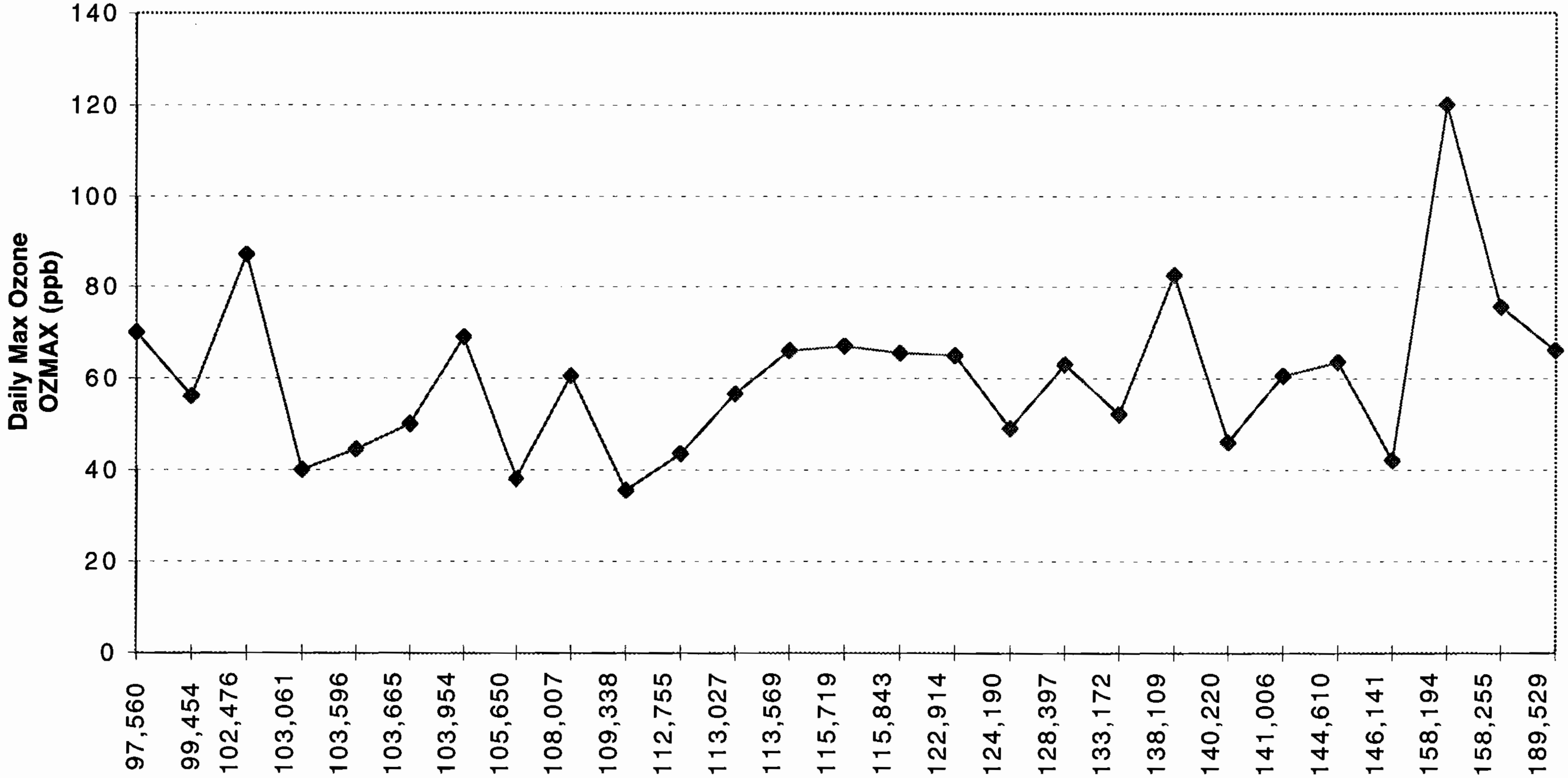


Figure 140. SAN ANTONIO DEC'95-SEP'96 MODEL T14
DATA CONTROLLED FOR DAYS WITH TRAFFIC CONGESTION PARAMETER GE 50th PERCENTILE
AND DAYS DURING OZONE EPISODES AND AVERAGE "MORNING" CLOUD COVER LE 3 OKTAS

DAILY MAX OZONE AS A FUNCTION OF DAILY CUMULATIVE TRAFFIC DENSITY ON TRANSGUIDE NETWORK




DAILY CUMULATIVE TRANSGUIDE NETWORK TRAFFIC DENSITY
6AM to 2 HOURS BEFORE TIME of MAX OZONE
PTDCUMAM (veh/mi/ln)

**Figure 141. SAN ANTONIO DEC'95-SEP'96 MODEL T14**

**DATA CONTROLLED FOR DAYS WITH TRAFFIC CONGESTION PARAMETER GE 50th PERCENTILE AND DAYS DURING OZONE EPISODES AND AVERAGE "MORNING" CLOUD COVER LE 3 OKTAS**

**DAILY MAX OZONE AS A FUNCTION OF DAILY INITIAL MORNING OZONE**

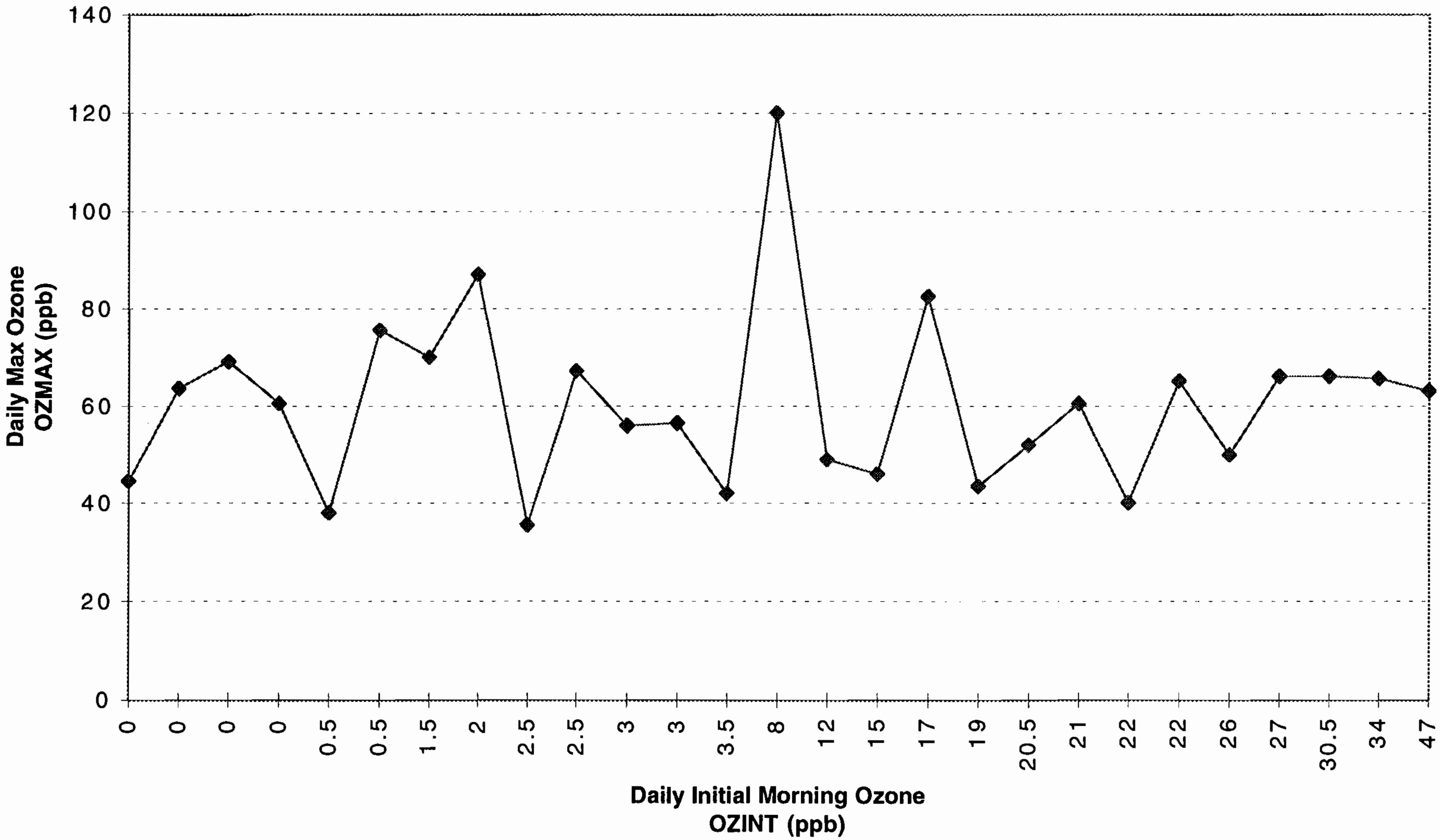
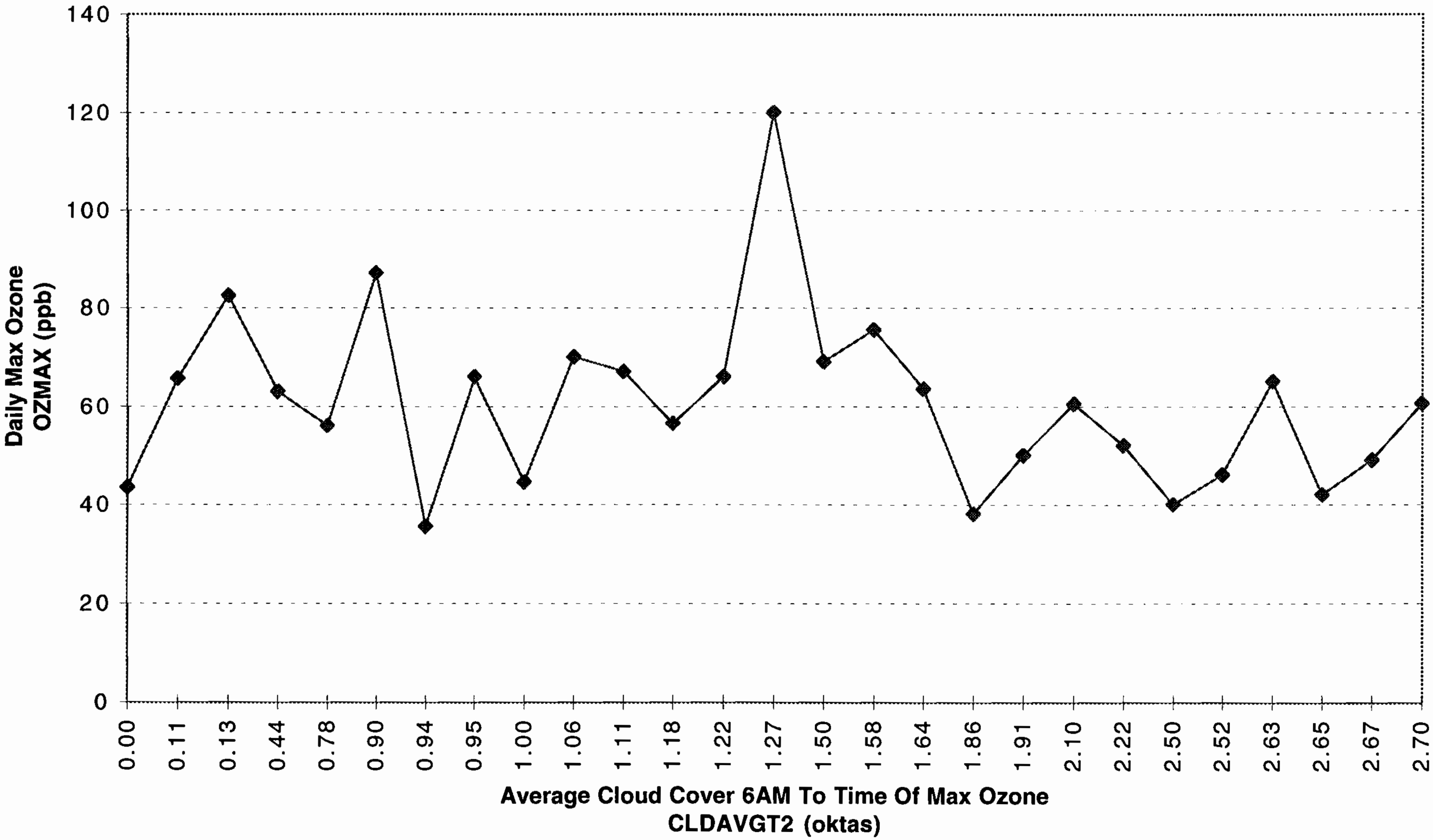


Figure 142. SAN ANTONIO DEC'95-SEP'96 MODEL T14
DATA CONTROLLED FOR DAYS WITH TRAFFIC CONGESTION PARAMETER GE 50th PERCENTILE
AND DAYS DURING OZONE EPISODES AND AVERAGE "MORNING" CLOUD COVER LE 3 OKTAS

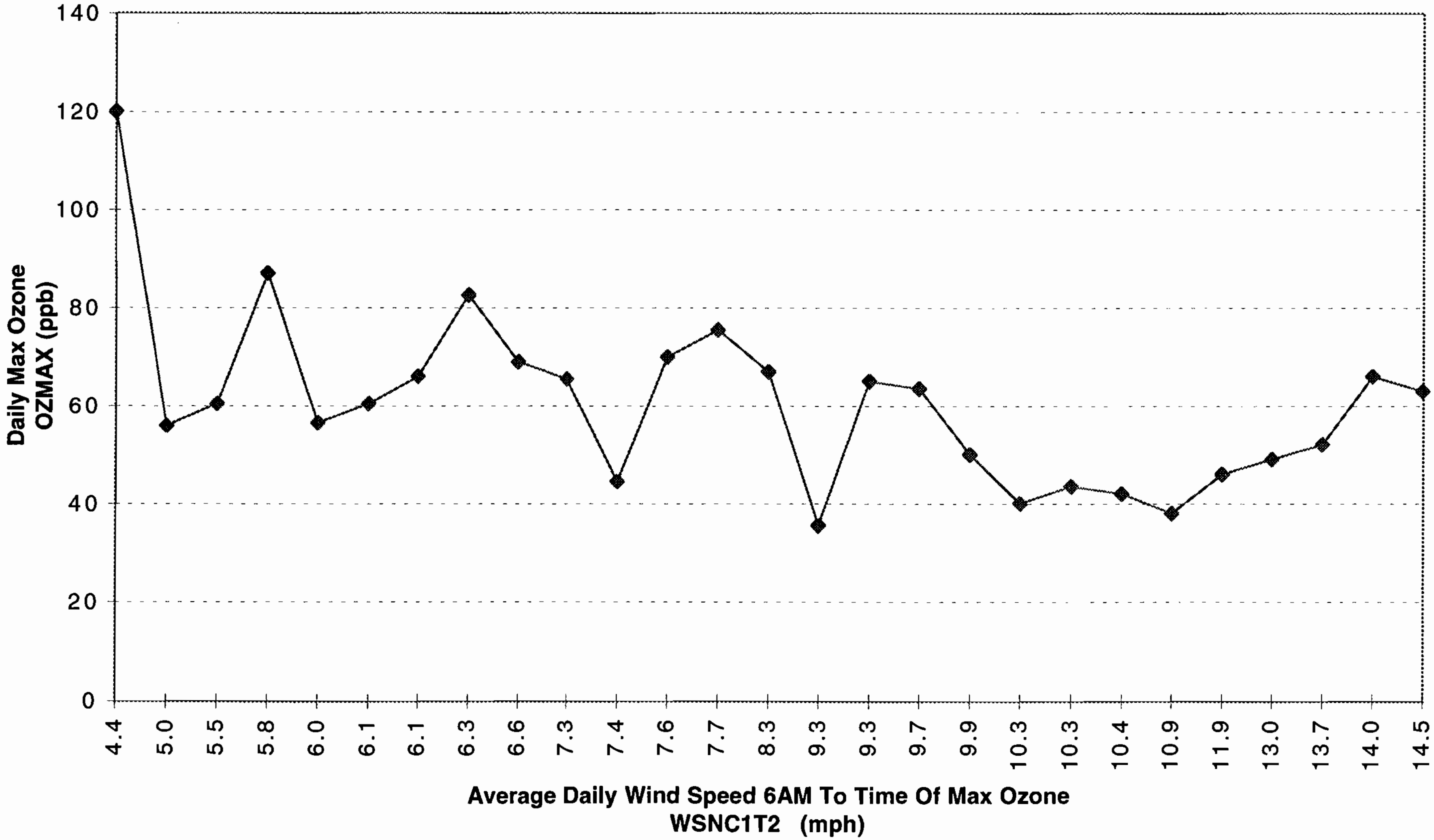
DAILY MAX OZONE AS A FUNCTION OF AVERAGE DAILY CLOUD COVER UPTO TIME OF MAX OZONE



## Figure 143. SAN ANTONIO DEC'95-SEP'96 MODEL T14

**DATA CONTROLLED FOR DAYS WITH TRAFFIC CONGESTION PARAMETER GE 50th PERCENTILE AND DAYS DURING OZONE EPISODES AND AVERAGE "MORNING" CLOUD COVER LE 3 OKTAS**

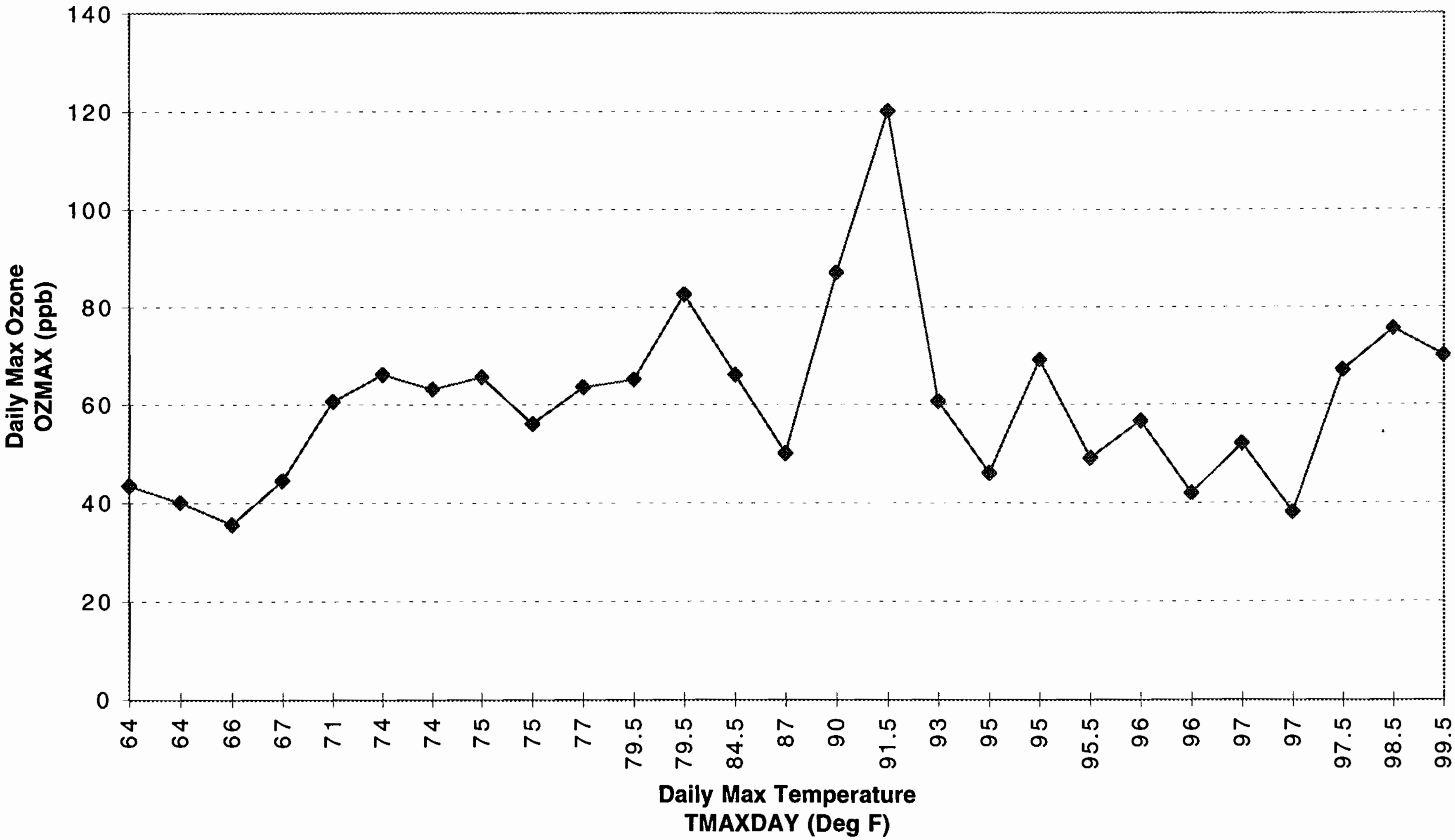
**DAILY MAX OZONE AS A FUNCTION OF AVERAGE DAILY WIND SPEED UPTO TIME OF MAX OZONE**



## Figure 144. SAN ANTONIO DEC'95-SEP'96 MODEL T14

**DATA CONTROLLED FOR DAYS WITH TRAFFIC CONGESTION PARAMETER GE 50th PERCENTILE AND DAYS DURING OZONE EPISODES AND AVERAGE "MORNING" CLOUD COVER LE 3 OKTAS**

**DAILY MAX OZONE AS A FUNCTION OF MAXIMUM DAILY TEMPERATURE**



## Figure 145. SAN ANTONIO DEC'95-SEP'96 MODEL T14

**DATA CONTROLLED FOR DAYS WITH TRAFFIC CONGESTION PARAMETER GE 50th PERCENTILE AND DAYS DURING OZONE EPISODES AND AVERAGE "MORNING" CLOUD COVER LE 3 OKTAS**

**DAILY MAX OZONE AS A FUNCTION OF AVERAGE DAILY WIND SPEED**

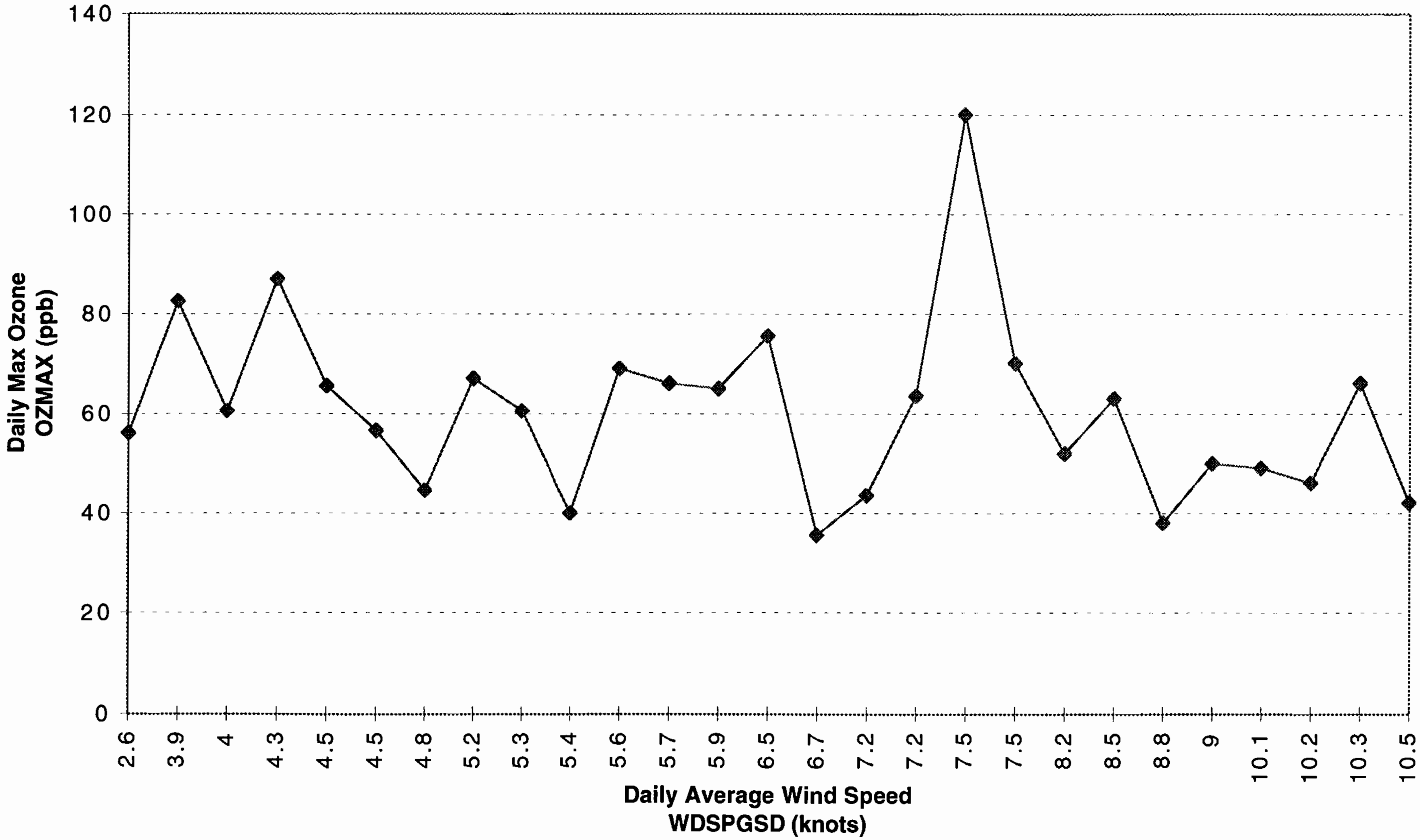


Figure 146. SAN ANTONIO DEC'95-SEP'96 MODEL T14
DATA CONTROLLED FOR DAYS WITH TRAFFIC CONGESTION PARAMETER GE 50th PERCENTILE
AND DAYS DURING OZONE EPISODES AND AVERAGE "MORNING" CLOUD COVER LE 3 OKTAS

DAILY MAX OZONE AS A FUNCTION OF MINIMUM DAILY TEMPERATURE

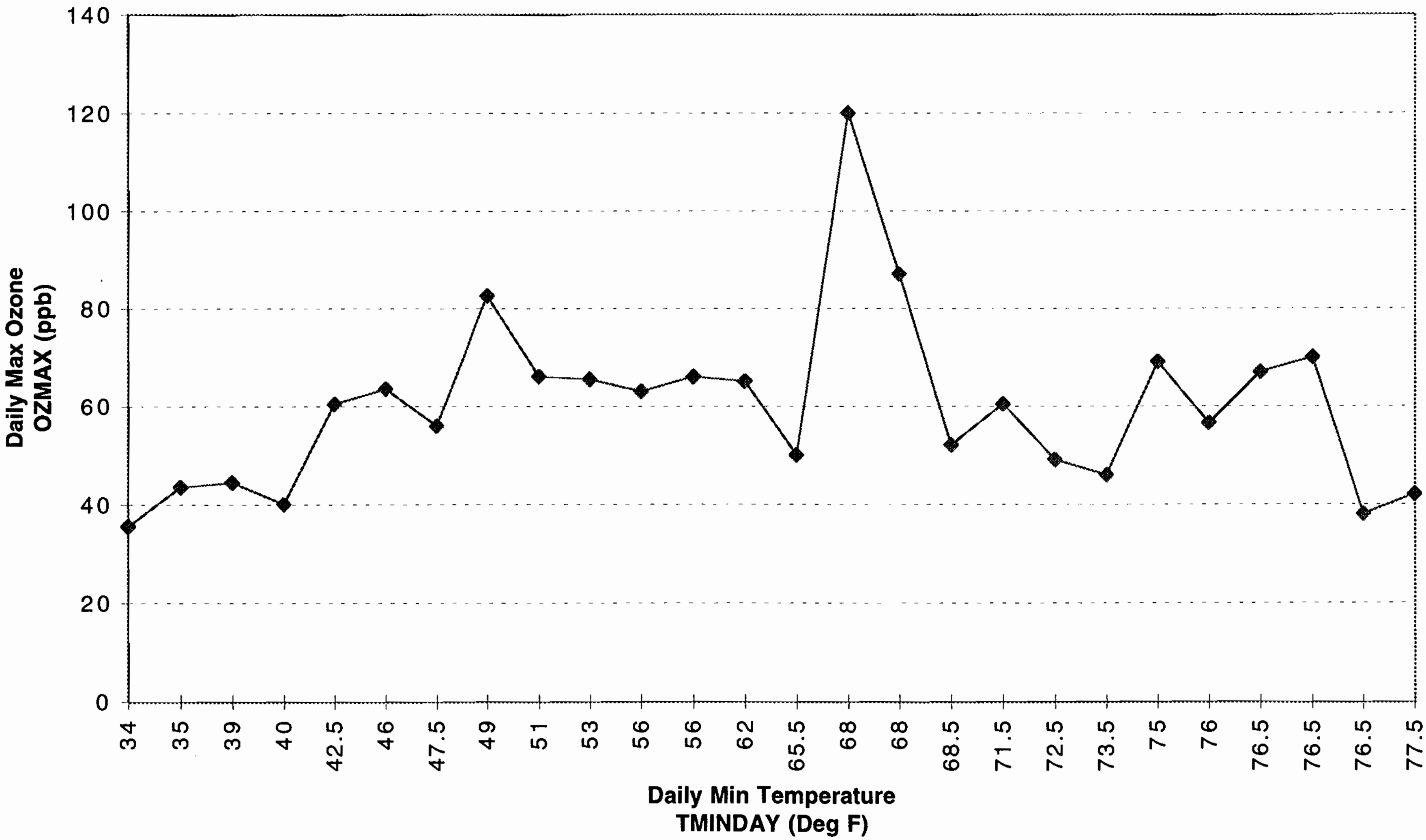
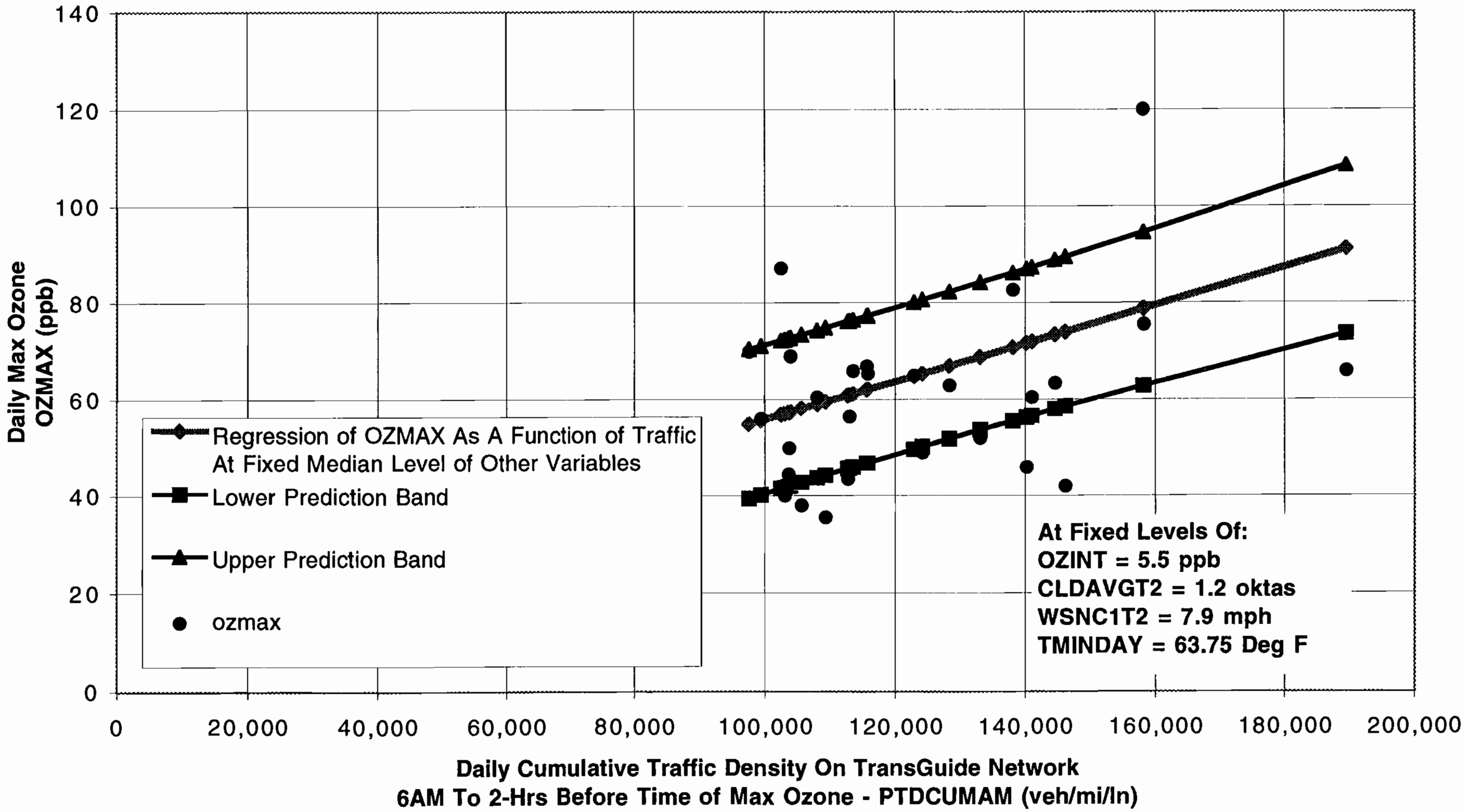


Figure 147. SAN ANTONIO DEC'95-SEP'96 MODEL T14
DATA CONTROLLED FOR DAYS WITH TRAFFIC CONGESTION PARAMETER GE 50th PERCENTILE
AND DAYS DURING OZONE EPISODES AND AVERAGE "MORNING" CLOUD COVER LE 3 OKTAS

80% CONFIDENCE PREDICTION BAND ON DAILY MAX OZONE AS A FUNCTION OF
TRANSGUIDE NETWORK CUMULATIVE TRAFFIC DENSITY AT FIXED LEVELS OF OTHER INDEPENDENT VARIABLES (MEDIAN LEVELS)



## SCENARIO 16

In Scenario 16, we repeat the analysis of Scenario 14 of controlling for months during the peak ozone season and for days that are a part of an ozone episode and controlling for the average "morning" cloud cover (CLDAVGT2) to be less than or equal to 3 oktas. However, rather than control for days where the traffic congestion parameter is less than the median value, in Scenario 16 we control for days where the traffic congestion parameter is greater than or equal to the median value.

The results of the analysis reveal an association between the daily traffic congestion parameter PTDCUMAM and the daily peak ozone concentration where such a relationship was not detected in Scenario 14. Table 40 summarizes the results of the model and Table 41 summarizes the strength of the traffic parameter's association with the daily peak ozone. Confidence intervals of the parameter's model coefficient per 10,000 units of PTDCUMAM are calculated at the 80, 90, and 95 percent confidence levels. Table 42 summarizes the raw data sorted by date for Scenario 16.

We can say that under this scenario at the 80 percent confidence level, the potential increase to the daily peak ozone in ppb per a 10,000 unit increase in the traffic congestion parameter PTDCUMAM has a range from about 1.6 to about 4.8 ppb. It is equally likely that the potential increase in the daily peak ozone would fall at any point within this range. The results presented in Table 41 also indicate that the traffic congestion parameter remains significant at the 95 percent confidence level.

The results of Scenario 16 also indicate a weaker association (as indicated by the traffic congestion parameter's confidence intervals) between the traffic congestion parameter PTDCUMAM and the daily peak ozone concentration (OZMAX) than in Scenario 15. We expected the opposite situation to occur due to the fact that we are controlling for the months during the peak ozone season in Scenario 16. A similar situation occurred when we compared the results between Scenario 5 and Scenario 6.

Figure 148 and Figure 149 plot the daily peak ozone (OZMAX) and the daily cumulative traffic congestion parameter (PTDCUMAM) over time. Figure 150 through Figure 156 graphically summarize the relationships between the response and predictor variables. Figure 157 depicts an 80 percent confidence level prediction band of OZMAX as a function of PTDCUMAM while holding the other significant variables constant at their median levels.

We can say at an 80 percent confidence level that the daily peak ozone will fall somewhere within the band on Figure 157. As shown, the 80 percent confidence prediction band with this linear model under this scenario does not encompass two of the higher daily peak ozone concentrations at fixed median levels of the other significant variables.

*Table 40. Scenario 16 Results*

| | | | RANGE OF VARIABLES |
|---|---|---|---|
| **DATA CONTROLS** | 1) APR 1996 - SEP 1996<br><br>2) DAYS DURING OZONE EPISODES<br><br>3) HIGH LEVEL OF TRAFFIC CONGESTION<br><br>4) AVG CLOUD COVER FROM 6AM TO TIME OF MAX OZONE LE 3 OKTAS | | |
| **MODEL SIGNIFICANT PARAMETERS (units)** | Y --- OZMAX (ppb)<br>XO --- INTERCEPT<br>X1 --- PTDCUMAM (veh/mi/ln)<br>X2 --- CLDAVGT2 (oktas)<br>X3 --- WSNC1T2 (mph) | | 38 to 120<br><br>97,560 to 189,530<br>0.1 to 2.7<br>4.4 to 14.5 |
| **SIGNIFICANT PARAMETER COEFFICIENT ESTIMATES AND BIVARIATE CORRELATIONS (r)** | 73.86398977 X0<br>0.00032000 X1<br>-10.12052644 X2<br>-3.78039611 X3 | <br>0.2316<br>-0.5832<br>-0.6165 | |
| **TRAFFIC VARIABLE COEFFICIENT CONFIDENCE-LEVEL** | 98% | | |
| **MODEL R-SQUARE** | 0.71 | | |
| **TRAFFIC VARIABLE PARTIAL R-SQUARE** | 0.1955 | | |
| **SAMPLE SIZE** | 18 | | |
| **1st ORDER AUTO-CORRELATION Durbin-Watson Statistic** | 2.125 | | |
| **P-VALUE SUPPORTING $H_O$: No Heteroskedasticity** | 0.1906 | | |

*Table 41. Scenario 16 Results (cont.)*

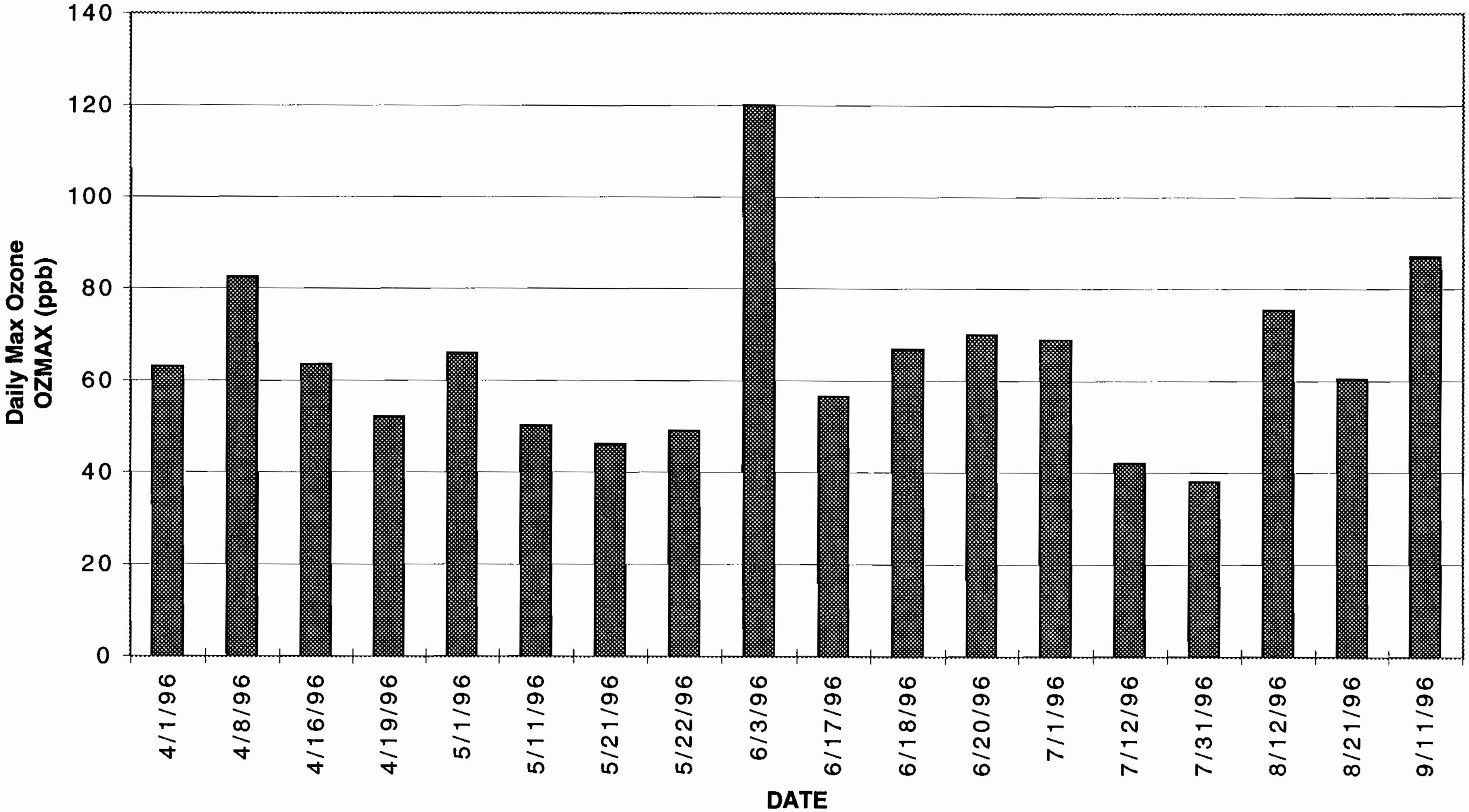
| | |
|---|---|
| **TRAFFIC PARAMETER ESTIMATE PER 10,000 PTDCUMAM** | **3.2000** |
| **TRAFFIC PARAMETER ESTIMATE STANDARD ERROR PER 10,000 PTDCUMAM** | **1.1889** |
| **n** | **18** |
| **k** | **3** |
| **df** | **14** |
| $t_{(.10)}$ | **1.345** |
| $t_{(.05)}$ | **1.761** |
| $t_{(.025)}$ | **2.145** |
| **80 PERCENT CONFIDENCE INTERVAL OF TRAFFIC PARAMETER ESTIMATE PER 10,000 UNITS OF PTDCUMAM** | **1.60 to 4.80** |
| **90 PERCENT CONFIDENCE INTERVAL OF TRAFFIC PARAMETER ESTIMATE PER 10,000 UNITS OF PTDCUMAM** | **1.11 to 5.29** |
| **95 PERCENT CONFIDENCE INTERVAL OF TRAFFIC PARAMETER ESTIMATE PER 10,000 UNITS OF PTDCUMAM** | **0.65 to 5.75** |

*Table 42. Scenario 16 Data*

| DATECST | OZMAX | PTDCUMAM | OZINT | CLDAVGT2 | WSNC1T2 | TMAXDAY | WDSPGSD | TMINDAY |
|---|---|---|---|---|---|---|---|---|
| 4/1/96 | 63 | 128,397 | 47 | 0.44 | 14.51 | 74 | 8.5 | 56 |
| 4/8/96 | 82.5 | 138,109 | 17 | 0.13 | 6.33 | 79.5 | 3.9 | 49 |
| 4/16/96 | 63.5 | 144,610 | 0 | 1.64 | 9.72 | 77 | 7.2 | 46 |
| 4/19/96 | 52 | 133,172 | 20.5 | 2.22 | 13.75 | 97 | 8.2 | 68.5 |
| 5/1/96 | 66 | 189,529 | 27 | 0.95 | 14.05 | 84.5 | 10.3 | 56 |
| 5/11/96 | 50 | 103,665 | 26 | 1.91 | 9.94 | 87 | 9 | 65.5 |
| 5/21/96 | 46 | 140,220 | 15 | 2.52 | 11.94 | 95 | 10.2 | 73.5 |
| 5/22/96 | 49 | 124,190 | 12 | 2.67 | 13.04 | 95.5 | 10.1 | 72.5 |
| 6/3/96 | 120 | 158,194 | 8 | 1.27 | 4.36 | 91.5 | 7.5 | 68 |
| 6/17/96 | 56.5 | 113,027 | 3 | 1.18 | 5.98 | 96 | 4.5 | 76 |
| 6/18/96 | 67 | 115,719 | 2.5 | 1.11 | 8.31 | 97.5 | 5.2 | 76.5 |
| 6/20/96 | 70 | 97,560 | 1.5 | 1.06 | 7.57 | 99.5 | 7.5 | 76.5 |
| 7/1/96 | 69 | 103,954 | 0 | 1.50 | 6.61 | 95 | 5.6 | 75 |
| 7/12/96 | 42 | 146,141 | 3.5 | 2.65 | 10.43 | 96 | 10.5 | 77.5 |
| 7/31/96 | 38 | 105,650 | 0.5 | 1.86 | 10.90 | 97 | 8.8 | 76.5 |
| 8/12/96 | 75.5 | 158,255 | 0.5 | 1.58 | 7.70 | 98.5 | 6.5 | 77.5 |
| 8/21/96 | 60.5 | 108,007 | 0 | 2.10 | 6.09 | 93 | 5.3 | 71.5 |
| 9/11/96 | 87 | 102,476 | 2 | 0.90 | 5.78 | 90 | 4.3 | 68 |

Figure 148. SAN ANTONIO APR'96-SEP'96 MODEL T13.1
DATA CONTROLLED FOR DAYS WITH TRAFFIC CONGESTION PARAMETER GE 50th PERCENTILE AND DAYS DURING OZONE EPISODES AND AVERAGE "MORNING" CLOUD COVER LE 3 OKTAS

DAILY MAXIMUM OZONE CONCENTRATION



## Figure 149. SAN ANTONIO APR'96-SEP'96 MODEL T13.1
## DATA CONTROLLED FOR DAYS WITH TRAFFIC CONGESTION PARAMETER GE 50th PERCENTILE AND DAYS DURING OZONE EPISODES AND AVERAGE "MORNING" CLOUD COVER LE 3 OKTAS

### DAILY CUMULATIVE TRANSGUIDE NETWORK TRAFFIC DENSITY
### 6AM to 2 HOURS BEFORE TIME of MAX OZONE

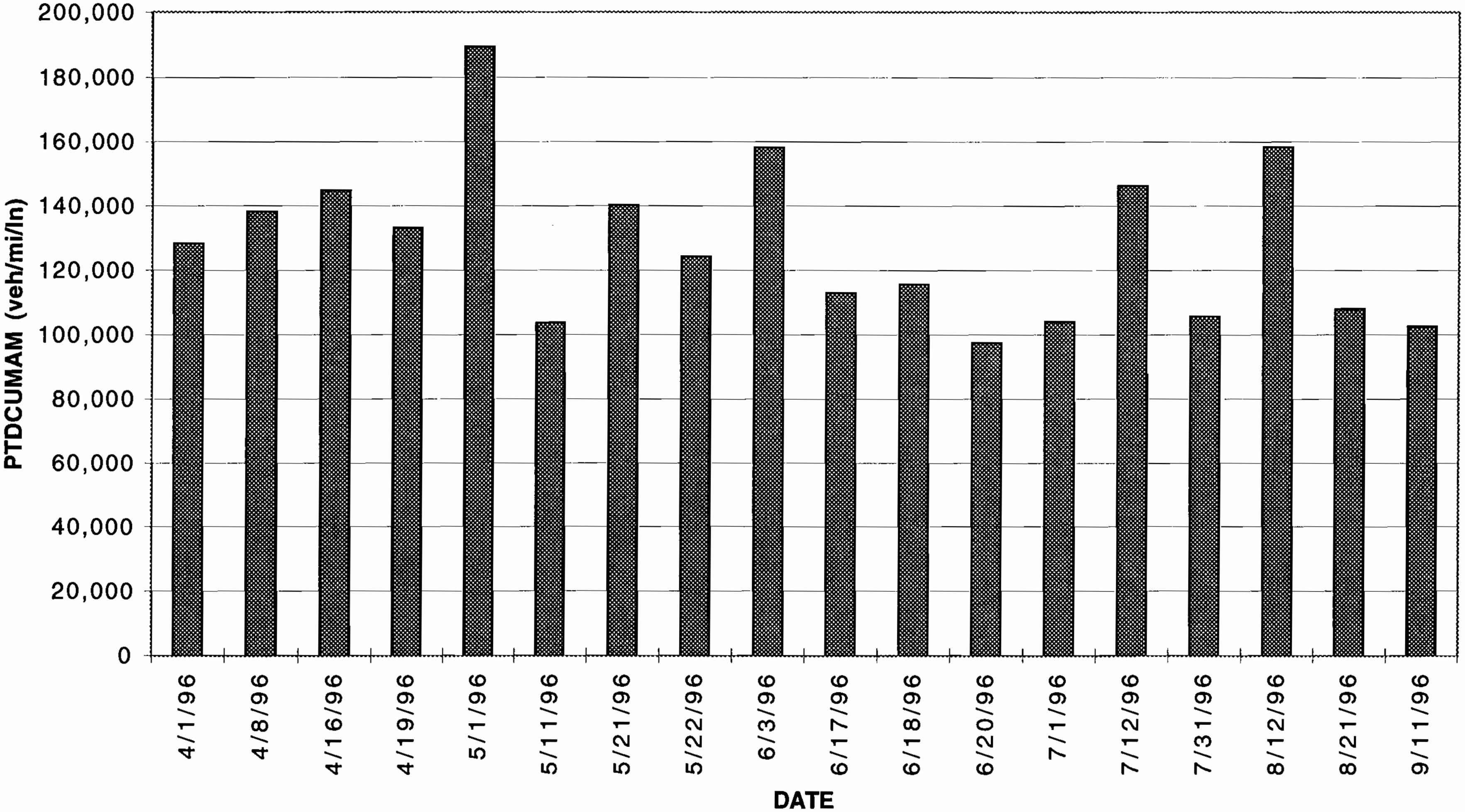


Figure 150. SAN ANTONIO APR'96-SEP'96 MODEL T13.1
DATA CONTROLLED FOR DAYS WITH TRAFFIC CONGESTION PARAMETER GE 50th PERCENTILE
AND DAYS DURING OZONE EPISODES AND AVERAGE "MORNING" CLOUD COVER LE 3 OKTAS

DAILY MAX OZONE AS A FUNCTION OF DAILY CUMULATIVE TRAFFIC DENSITY ON TRANSGUIDE NETWORK

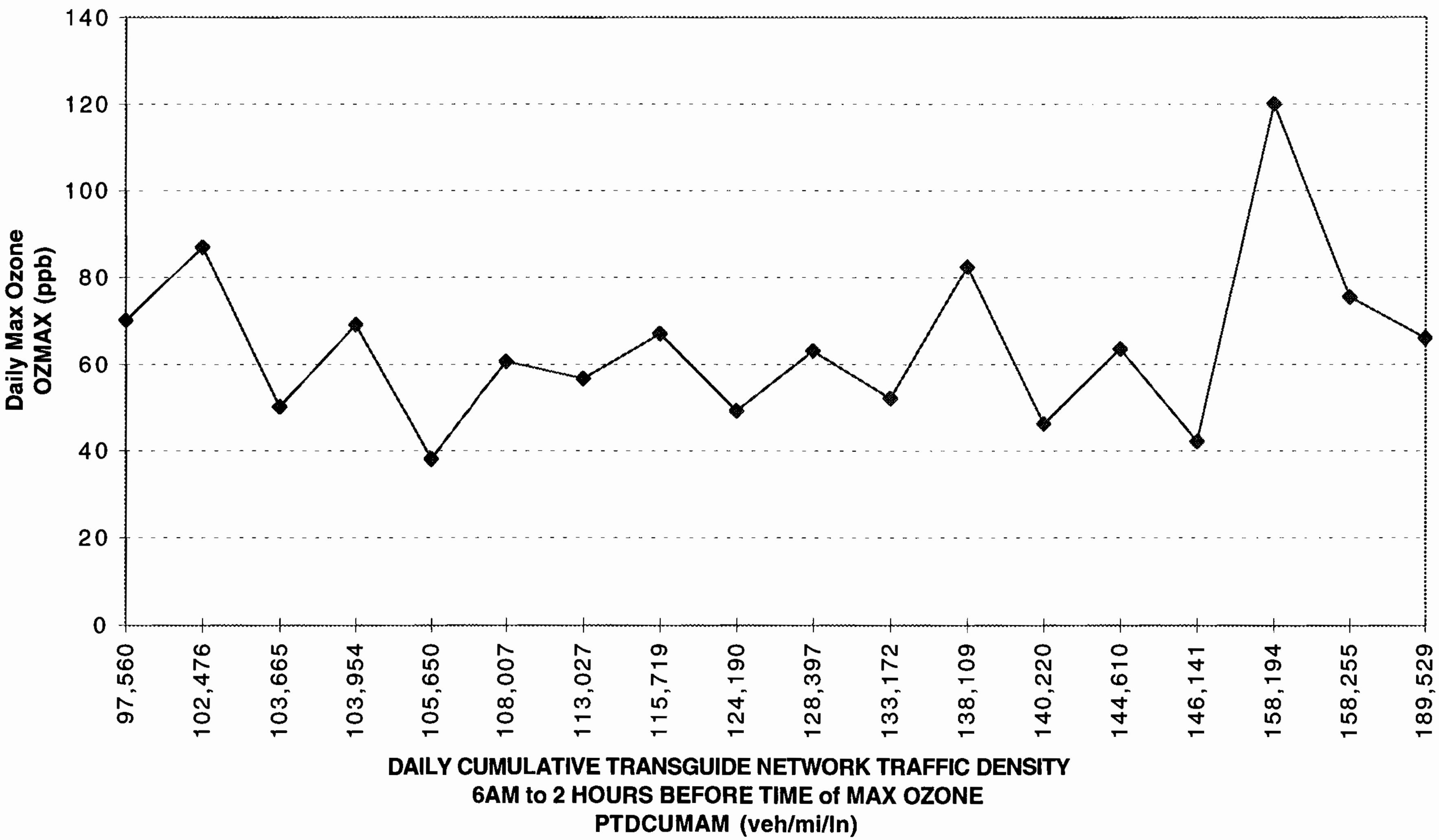


Figure 151. SAN ANTONIO APR'96-SEP'96 MODEL T13.1
DATA CONTROLLED FOR DAYS WITH TRAFFIC CONGESTION PARAMETER GE 50th PERCENTILE
AND DAYS DURING OZONE EPISODES AND AVERAGE "MORNING" CLOUD COVER LE 3 OKTAS

DAILY MAX OZONE AS A FUNCTION OF DAILY INITIAL MORNING OZONE

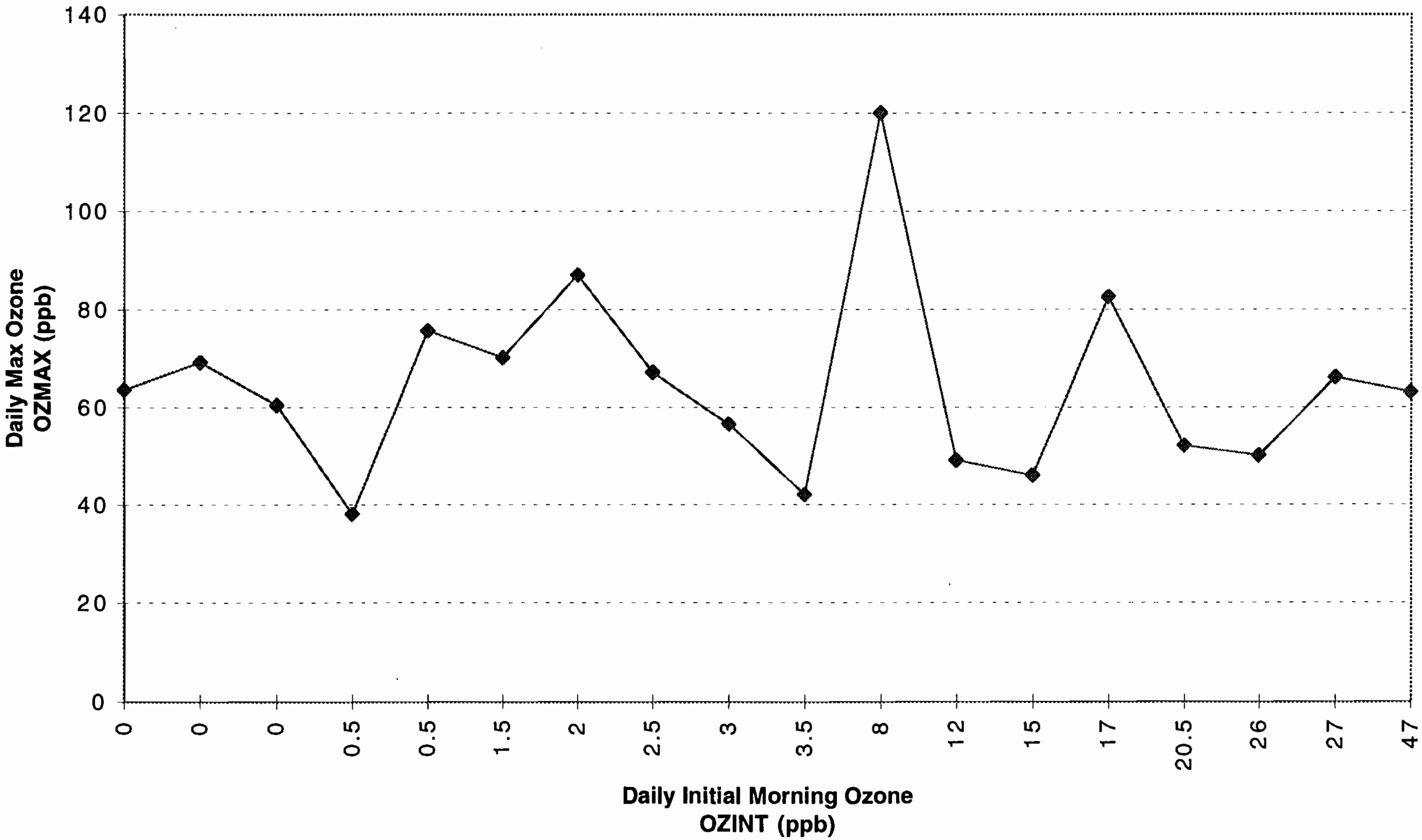


Figure 152. SAN ANTONIO APR'96-SEP'96 MODEL T13.1
DATA CONTROLLED FOR DAYS WITH TRAFFIC CONGESTION PARAMETER GE 50th PERCENTILE
AND DAYS DURING OZONE EPISODES AND AVERAGE "MORNING" CLOUD COVER LE 3 OKTAS

DAILY MAX OZONE AS A FUNCTION OF AVERAGE DAILY CLOUD COVER UPTO TIME OF MAX OZONE

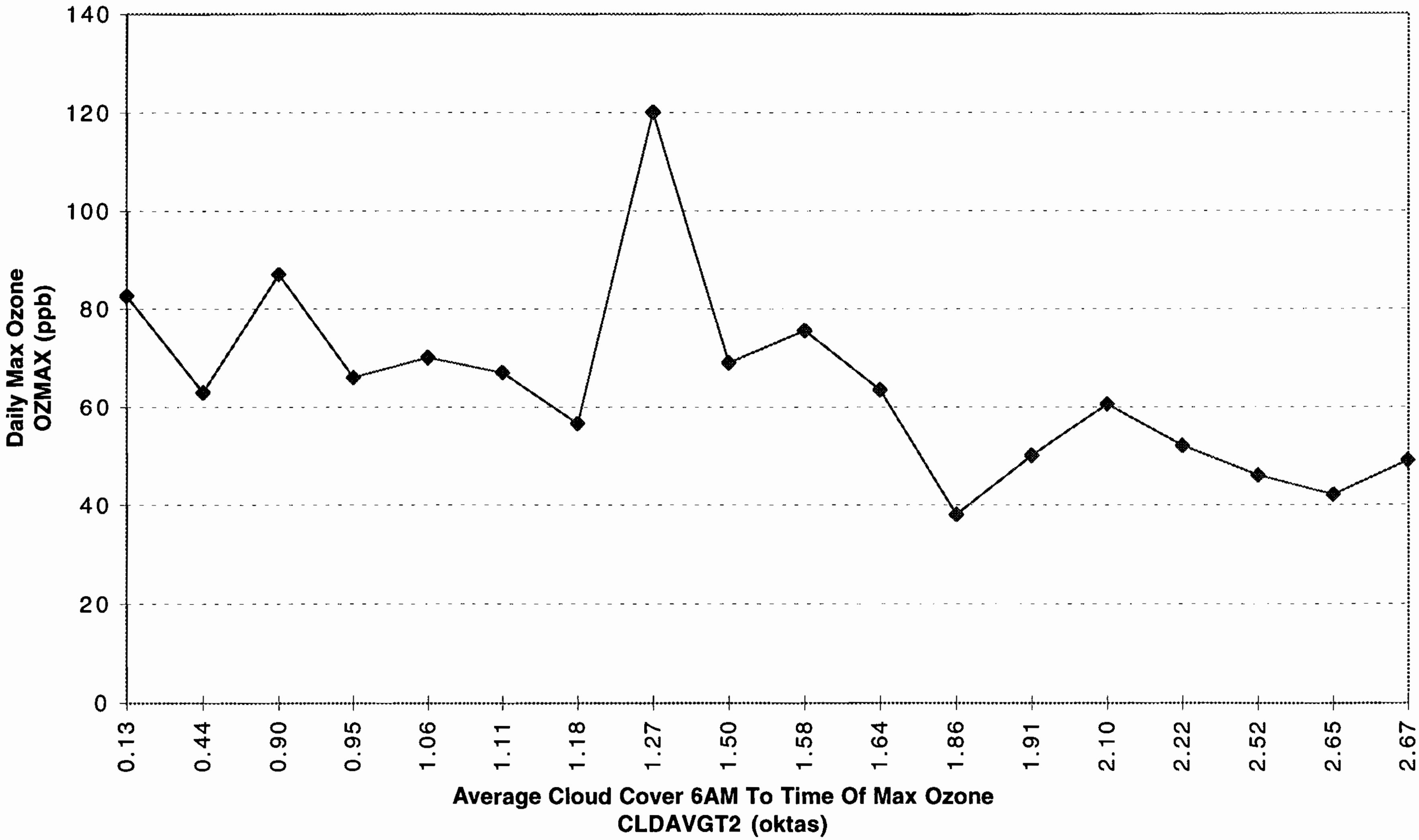


**Figure 153. SAN ANTONIO APR'96-SEP'96 MODEL T13.1**
**DATA CONTROLLED FOR DAYS WITH TRAFFIC CONGESTION PARAMETER GE 50th PERCENTILE AND DAYS DURING OZONE EPISODES AND AVERAGE "MORNING" CLOUD COVER LE 3 OKTAS**

**DAILY MAX OZONE AS A FUNCTION OF AVERAGE DAILY WIND SPEED UPTO TIME OF MAX OZONE**

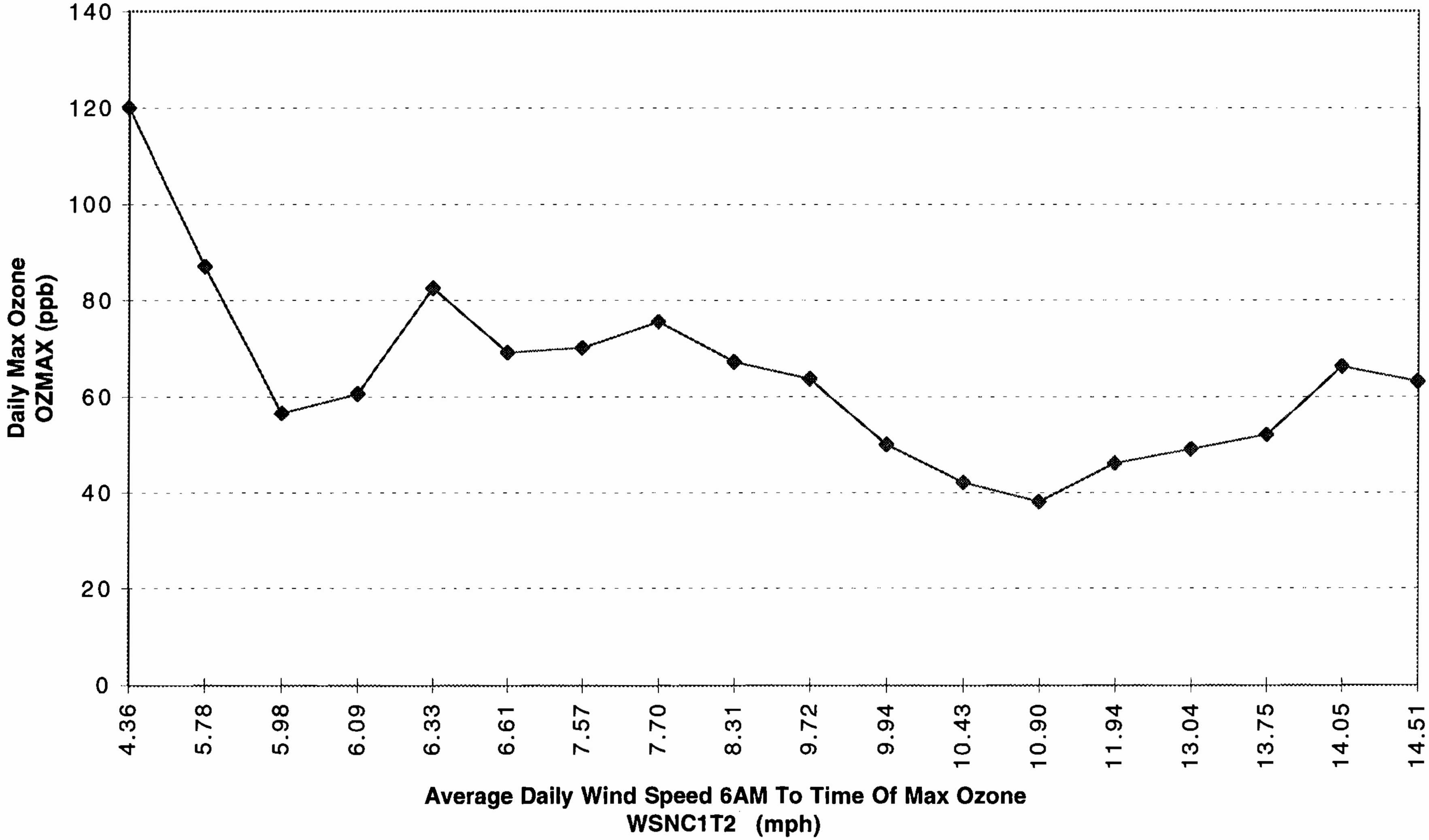


Figure 154. SAN ANTONIO APR'96-SEP'96 MODEL T13.1
DATA CONTROLLED FOR DAYS WITH TRAFFIC CONGESTION PARAMETER GE 50th PERCENTILE
AND DAYS DURING OZONE EPISODES AND AVERAGE "MORNING" CLOUD COVER LE 3 OKTAS

DAILY MAX OZONE AS A FUNCTION OF MAXIMUM DAILY TEMPERATURE

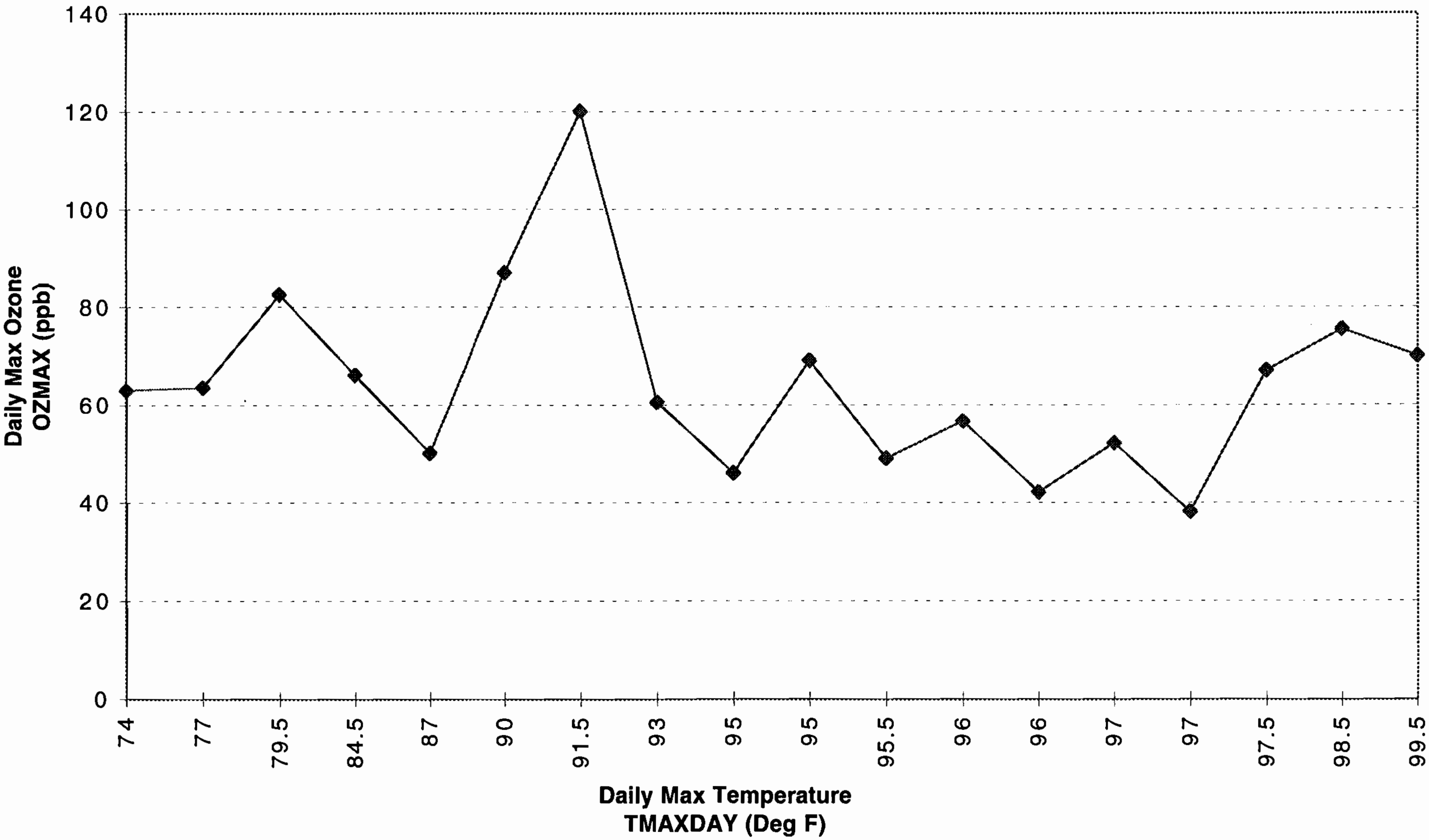


Figure 155. SAN ANTONIO APR'96-SEP'96 MODEL T13.1
DATA CONTROLLED FOR DAYS WITH TRAFFIC CONGESTION PARAMETER GE 50th PERCENTILE
AND DAYS DURING OZONE EPISODES AND AVERAGE "MORNING" CLOUD COVER LE 3 OKTAS

DAILY MAX OZONE AS A FUNCTION OF AVERAGE DAILY WIND SPEED

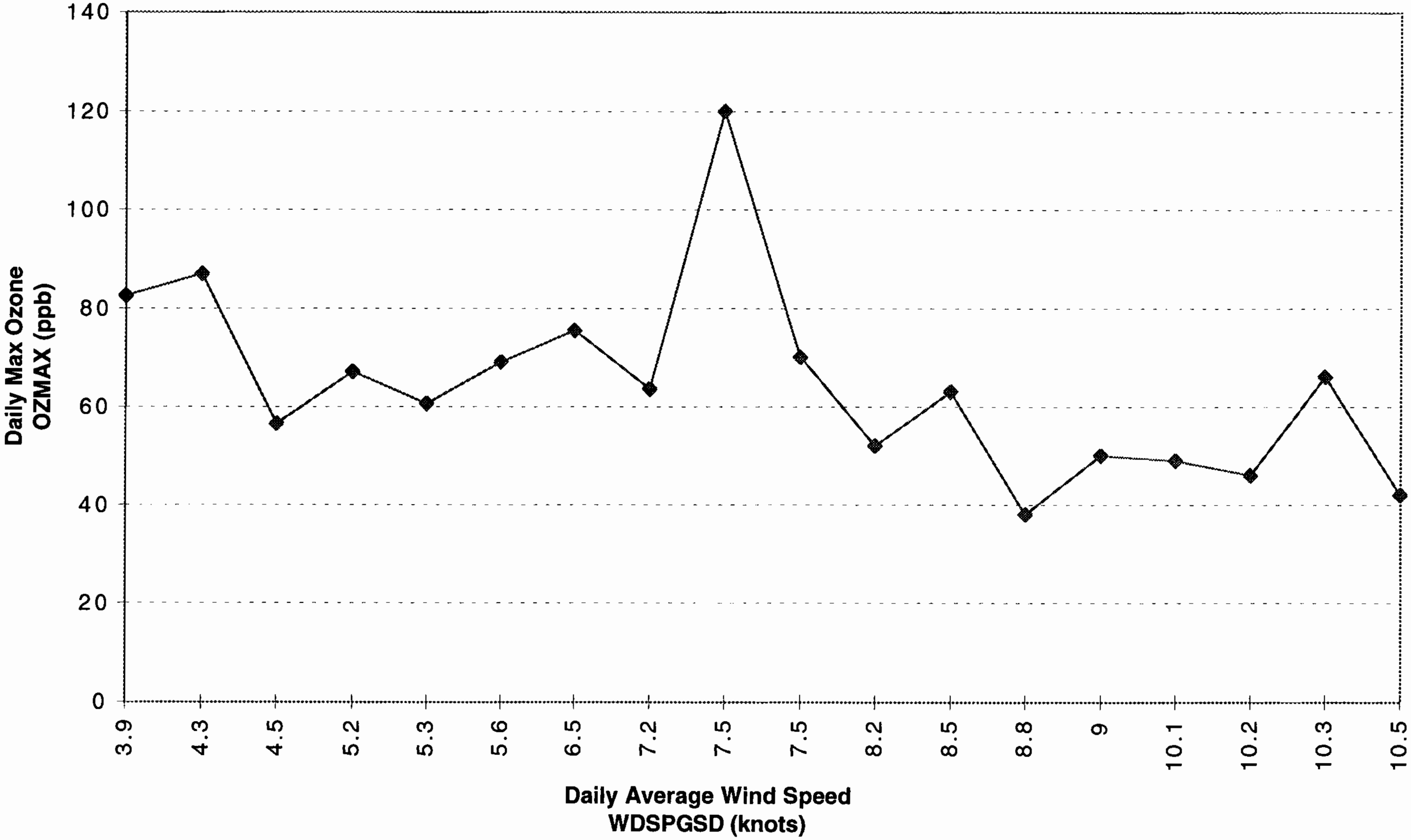


Figure 156. SAN ANTONIO APR'96-SEP'96 MODEL T13.1
DATA CONTROLLED FOR DAYS WITH TRAFFIC CONGESTION PARAMETER GE 50th PERCENTILE
AND DAYS DURING OZONE EPISODES AND AVERAGE "MORNING" CLOUD COVER LE 3 OKTAS

DAILY MAX OZONE AS A FUNCTION OF MINIMUM DAILY TEMPERATURE

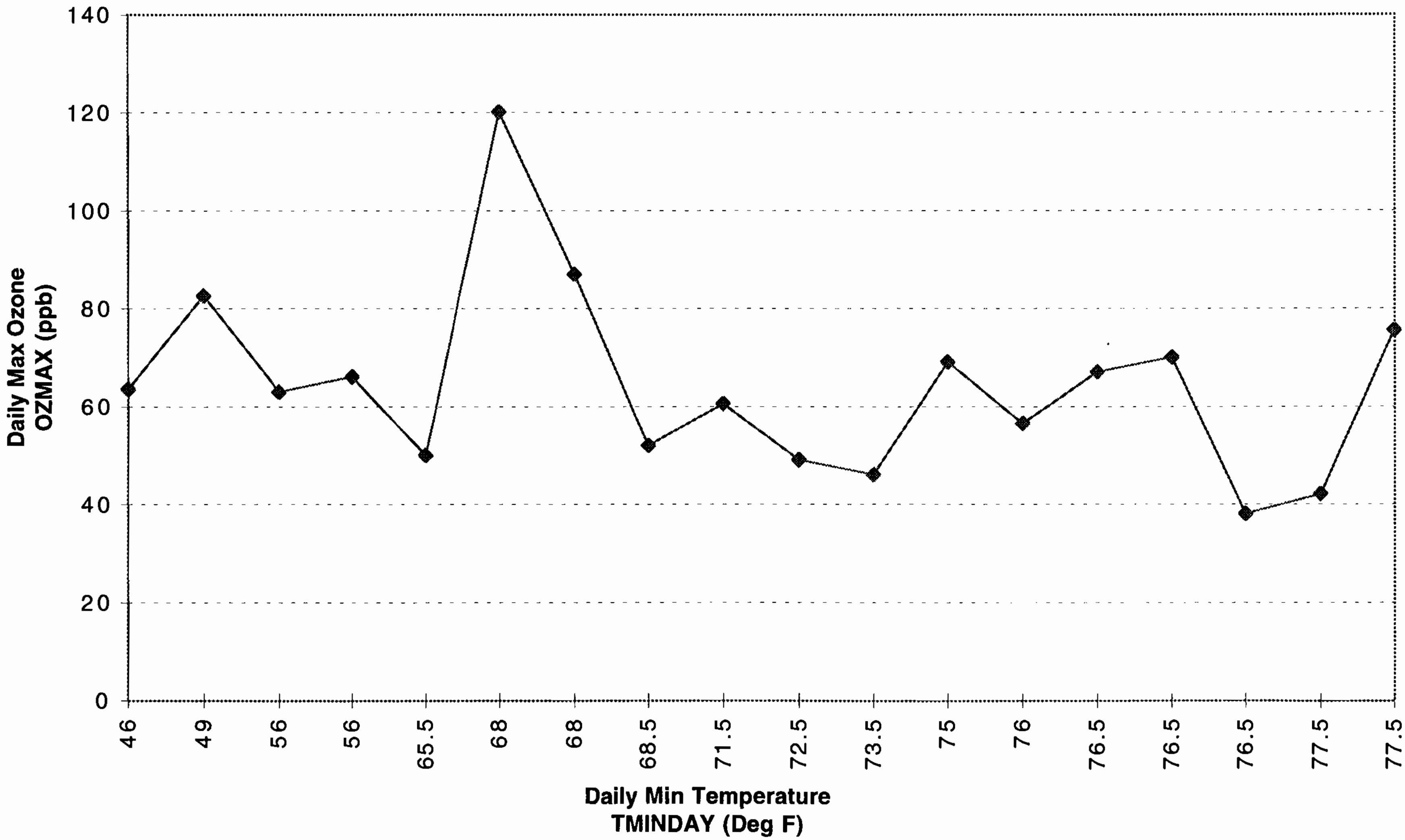
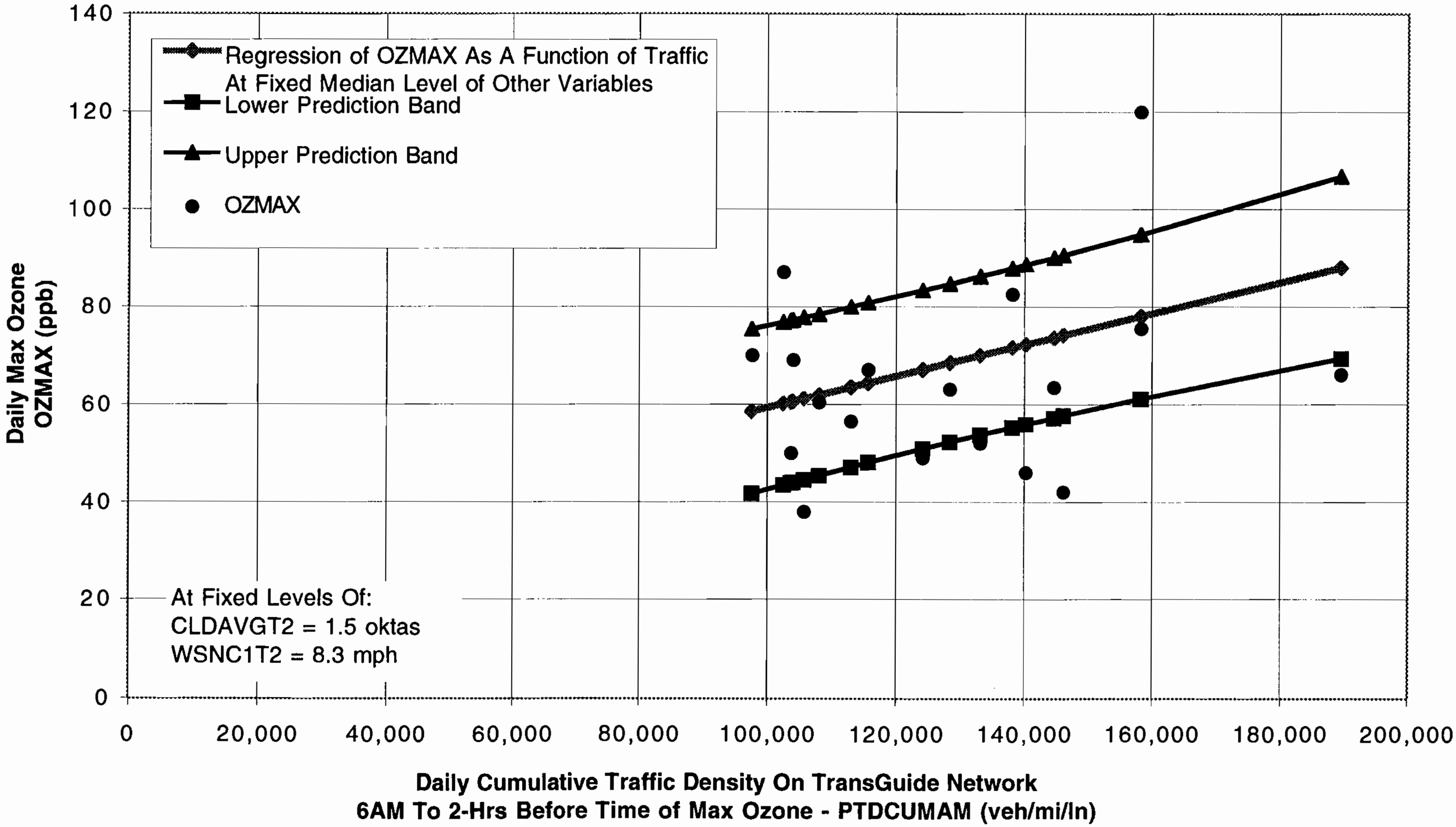


Figure 157. SAN ANTONIO APR'96-SEP'96 MODEL T13.1
DATA CONTROLLED FOR DAYS WITH TRAFFIC CONGESTION PARAMETER GE 50th PERCENTILE
AND DAYS DURING OZONE EPISODES AND AVERAGE "MORNING" CLOUD COVER LE 3 OKTAS

80% CONFIDENCE PREDICTION BAND ON DAILY MAX OZONE AS A FUNCTION OF
TRANSGUIDE NETWORK CUMULATIVE TRAFFIC DENSITY AT FIXED LEVELS OF OTHER INDEPENDENT VARIABLES (MEDIAN LEVELS)



## SCENARIO 17

In Scenario 17, we control for days that are a part of an ozone episode that is greater than a 1-day episode between the months of December 1995 through September 1996. In addition, we control for the level of traffic congestion on the TransGuide network as measured by the parameter PTDCUMAM where it is less than the median level (median level for all days between December 1995 and September 1996).

The results of the analysis do not reveal a significant (80 percent confidence level or higher) association between the daily traffic congestion parameter PTDCUMAM and the daily peak ozone concentration. The finding of a lack of significance of the traffic congestion parameter under this scenario does not prove that the parameter does not affect the daily peak ozone concentration. We can only conclude that under the conditions of this scenario, we are not able to detect any possible relationship that might exist at our minimum confidence level of 80 percent. Table 43 summarizes the results of the model and Table 44 summarizes the raw data for Scenario 17 sorted by date.

Figure 158 and Figure 159 plot the daily peak ozone (OZMAX) and the daily cumulative traffic congestion parameter (PTDCUMAM) over time. Figure 160 through Figure 166 graphically summarize the relationships between the response and predictor variables.

*Table 43. Scenario 17 Results*

| | | | RANGE OF VARIABLES |
|---|---|---|---|
| **DATA CONTROLS** | 1) DEC 1995 - SEP 1996<br>2) DAYS DURING OZONE EPISODES GREATER THAN 1-DAY EPISODES<br>3) LOW LEVEL OF TRAFFIC CONGESTION | | |
| **MODEL SIGNIFICANT PARAMETERS (units)** | Y --- OZMAX (ppb)<br>XO --- INTERCEPT<br>X1 --- OZINT (ppb)<br>X2 --- CLDAVGT2 (oktas)<br>X3 --- WSNC1T2 (mph)<br>X4 --- TMAXDAY (Deg F) | | 16.5 to 105.5<br><br>0 to 29<br>0 to 8<br>3.1 to 18.9<br>32 to 98 |
| **Significant parameter coefficient estimates and bivariate correlations (r)** | 30.78980824 X0<br>0.42140034 X1<br>-2.24215797 X2<br>-1.86060766 X3<br>0.48901496 X4 | <br>-0.2735<br>-0.3576<br>-0.4818<br>0.5824 | |
| **Traffic variable coefficient confidence-level** | NA | | |
| **MODEL R-SQUARE** | 0.50 | | |
| **Traffic variable partial R-Square** | NA | | |
| **Sample size** | 49 | | |
| **1st ORDER AUTO-CORRELATION Durbin-Watson Statistic** | 1.427 | | |
| **P-VALUE SUPPORTING $H_O$: No Heteroskedasticity** | 0.4340 | | |

*Table 44. Scenario 17 Data*

| DATECST | OZMAX | PTDCUMAM | OZINT | CLDAVGT2 | WSNC1T2 | TMAXDAY | WDSPGSD | TMINDAY |
|---|---|---|---|---|---|---|---|---|
| 12/2/95 | 42 | 61,250 | 17 | 6.70 | 12.08 | 76 | 7.2 | 65 |
| 12/3/95 | 42 | 30,470 | 13 | 5.41 | 8.64 | 79 | 5.9 | 62 |
| 12/22/95 | 16.5 | 44,209 | 5 | 5.33 | 9.34 | 48 | 7.2 | 39.5 |
| 12/23/95 | 25.5 | 67,993 | 20 | 4.59 | 8.11 | 47.5 | 6.4 | 36 |
| 1/2/96 | 28.5 | 59,958 | 27.5 | 1.17 | 18.85 | 48.5 | 14.2 | 37.5 |
| 1/3/96 | 30.5 | 91,286 | 5.5 | 0.27 | 7.68 | 53 | 6.8 | 29.5 |
| 1/6/96 | 24.5 | 69,798 | 18.5 | 7.08 | 18.00 | 44 | 12.9 | 30.5 |
| 1/7/96 | 36 | 31,789 | 24.5 | 0.25 | 13.16 | 45 | 8.6 | 25 |
| 1/12/96 | 38 | 84,915 | 12 | 0.29 | 9.58 | 74 | 6 | 40 |
| 1/13/96 | 43 | 44,330 | 0 | 0.43 | 5.91 | 73 | 4.6 | 42 |
| 1/14/96 | 49.5 | 48,991 | 8 | 1.44 | 9.58 | 74.5 | 5.1 | 44 |
| 1/20/96 | 46 | 46,348 | 12 | 3.75 | 8.08 | 66 | 6.3 | 32 |
| 1/21/96 | 52 | 45,640 | 27 | 0.00 | 7.97 | 71 | 3.6 | 45 |
| 2/2/96 | 23 | 1,899 | 13.5 | 8.00 | 15.14 | 32 | 11 | 27.5 |
| 2/3/96 | 31.5 | 55,581 | 24.5 | 7.05 | 13.21 | 33 | 8.7 | 27 |
| 2/4/96 | 33 | 26,324 | 18.5 | 0.29 | 9.69 | 40 | 5.6 | 19.5 |
| 2/5/96 | 34.5 | 88,084 | 28 | 8.00 | 10.04 | 51 | 7.5 | 31.5 |
| 2/14/96 | 45 | 89,558 | 24.5 | 0.86 | 10.92 | 79.5 | 8.1 | 49 |
| 3/19/96 | 45 | 93,187 | 27.5 | 0.13 | 13.23 | 67 | 6.9 | 45 |
| 3/20/96 | 46.5 | 93,131 | 17.5 | 0.00 | 10.21 | 66 | 5.9 | 40.5 |
| 3/21/96 | 59 | 79,438 | 0 | 0.13 | 7.82 | 73 | 4.8 | 38.5 |
| 4/6/96 | 50 | 50,850 | 28.5 | 3.63 | 13.86 | 62.5 | 11 | 40 |
| 4/7/96 | 63 | 80,590 | 13 | 1.45 | 5.27 | 66 | 3.8 | 41 |
| 4/13/96 | 59.5 | 52,465 | 7 | 6.00 | 7.22 | 91 | . | 58.5 |
| 5/4/96 | 55 | 88,226 | 29 | 5.71 | 13.45 | 87 | 12.6 | 70 |
| 5/12/96 | 68 | 51,761 | 15.5 | 7.48 | 6.76 | 86 | 5 | 65 |
| 5/16/96 | 50 | 79,096 | 14 | 3.50 | 14.36 | 93.5 | 12.5 | 71.5 |
| 5/19/96 | 36 | 75,940 | 19.5 | 3.05 | 16.77 | 93 | 13.7 | 73 |
| 6/2/96 | 52 | 75,557 | 1.5 | 4.61 | 5.65 | 92.5 | 6.8 | 69.5 |
| 6/8/96 | 63.5 | 54,669 | 12 | 0.25 | 6.92 | 90 | 3.4 | 64.5 |
| 6/9/96 | 84 | 80,549 | 12.5 | 1.68 | 8.37 | 90.5 | 4.5 | 64.5 |
| 6/23/96 | 40 | 28,486 | 20.5 | 5.13 | 7.32 | 89 | 8.3 | 76 |
| 6/24/96 | 52.5 | 90,962 | 6.5 | 3.78 | 7.86 | 92 | 9.6 | 76.5 |
| 6/29/96 | 40.5 | 72,845 | 1 | 5.00 | 7.65 | 92 | 5.9 | 75 |
| 6/30/96 | 60.5 | 28,900 | 0 | 1.00 | 3.99 | 92 | 6.4 | 73 |
| 7/2/96 | 98 | 88,279 | 3 | 0.56 | 5.24 | 96 | 5.8 | 75.5 |
| 7/3/96 | 99.5 | 78,502 | 0.5 | 0.25 | 5.39 | 95.5 | 7.1 | 74.5 |

*Table 44. Scenario 17 Data (continued)*

| DATECST | OZMAX | PTDCUMAM | OZINT | CLDAVGT2 | WSNC1T2 | TMAXDAY | WDSPGSD | TMINDAY |
|---|---|---|---|---|---|---|---|---|
| 7/4/96 | 105.5 | 15,650 | 4.5 | 1.00 | 3.15 | 96 | 5.6 | 74.5 |
| 7/20/96 | 39 | 58,253 | 7.5 | 2.53 | 10.58 | 98 | 9.4 | 76.5 |
| 8/11/96 | 44.5 | 37,932 | 4 | 1.78 | 6.48 | 94.5 | 8 | 76.5 |
| 8/26/96 | 25 | 79,692 | 0.5 | 6.90 | 5.96 | 83 | 4.5 | 72.5 |
| 8/27/96 | 30.5 | 79,922 | 2 | 7.40 | 5.03 | 88 | 4.9 | 76 |
| 8/28/96 | 39 | 82,387 | 1 | 5.26 | 5.75 | 91 | 7 | 76 |
| 8/31/96 | 54 | 79,018 | 1.5 | 7.12 | 4.28 | 85 | 4 | 74.5 |
| 9/1/96 | 62 | 34,060 | 18 | 3.05 | 6.24 | 86 | 4.7 | 75.5 |
| 9/8/96 | 49 | 55,875 | 6 | 6.40 | 5.30 | 86 | 3.5 | 74.5 |
| 9/9/96 | 58 | 75,180 | 0 | 6.35 | 3.53 | 88 | 3.6 | 74 |
| 9/10/96 | 84 | 52,634 | 0 | 2.35 | 5.92 | 90 | 4.2 | 73 |
| 9/21/96 | 42 | 50,868 | 0 | 5.22 | 5.63 | 87 | 6.1 | 74 |
| 9/22/96 | 52 | 23,721 | 19 | 7.07 | 7.50 | 88 | 6.3 | 76 |

Figure 158. SAN ANTONIO DEC'95-SEP'96 MODEL T10.3.1
DATA CONTROLLED FOR DAYS DURING OZONE EPISODES GT 1-DAY
AND DAYS WITH TRAFFIC CONGESTION PARAMETER LT 50th PERCENTILE

DAILY MAXIMUM OZONE CONCENTRATIONS

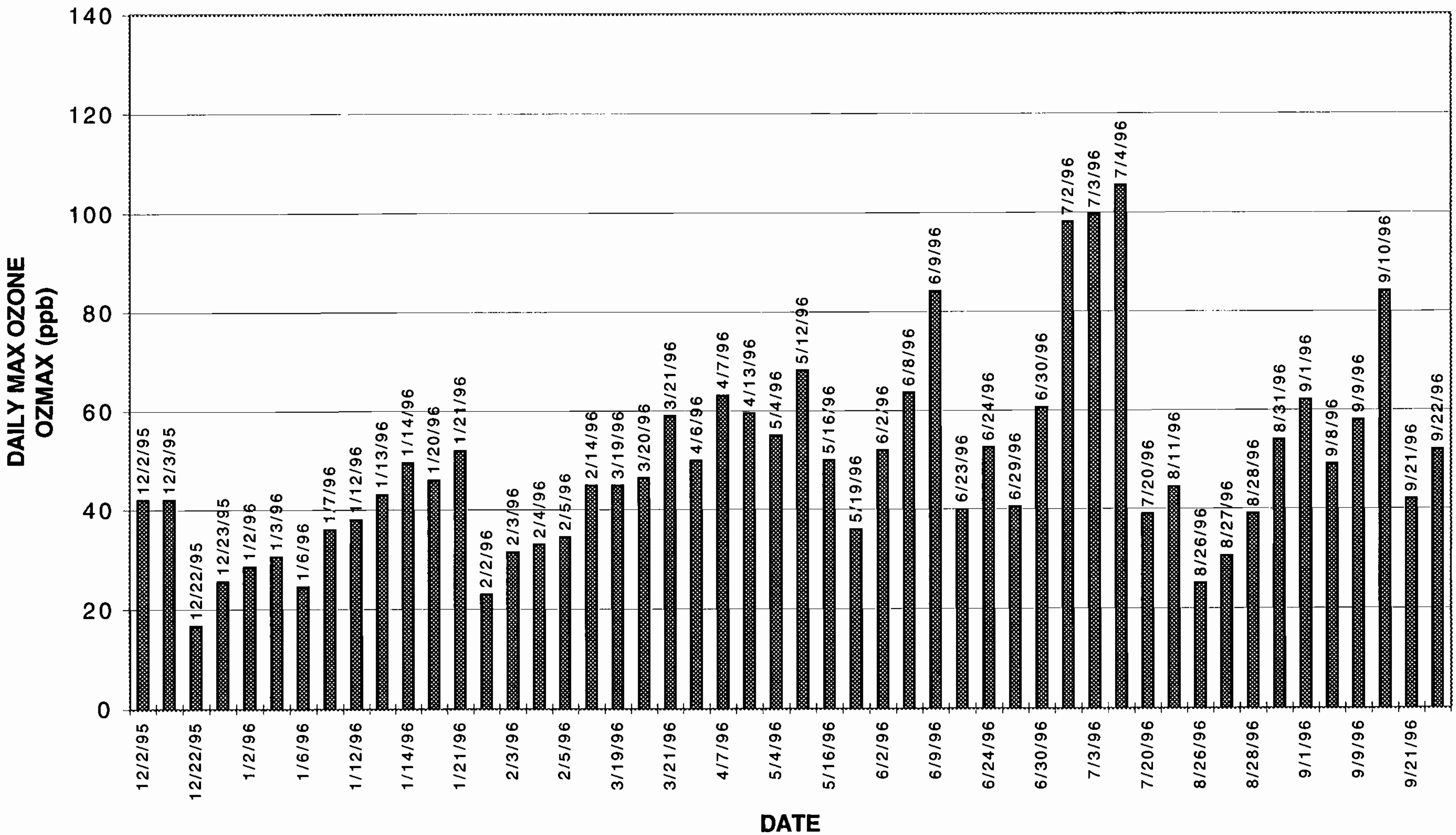
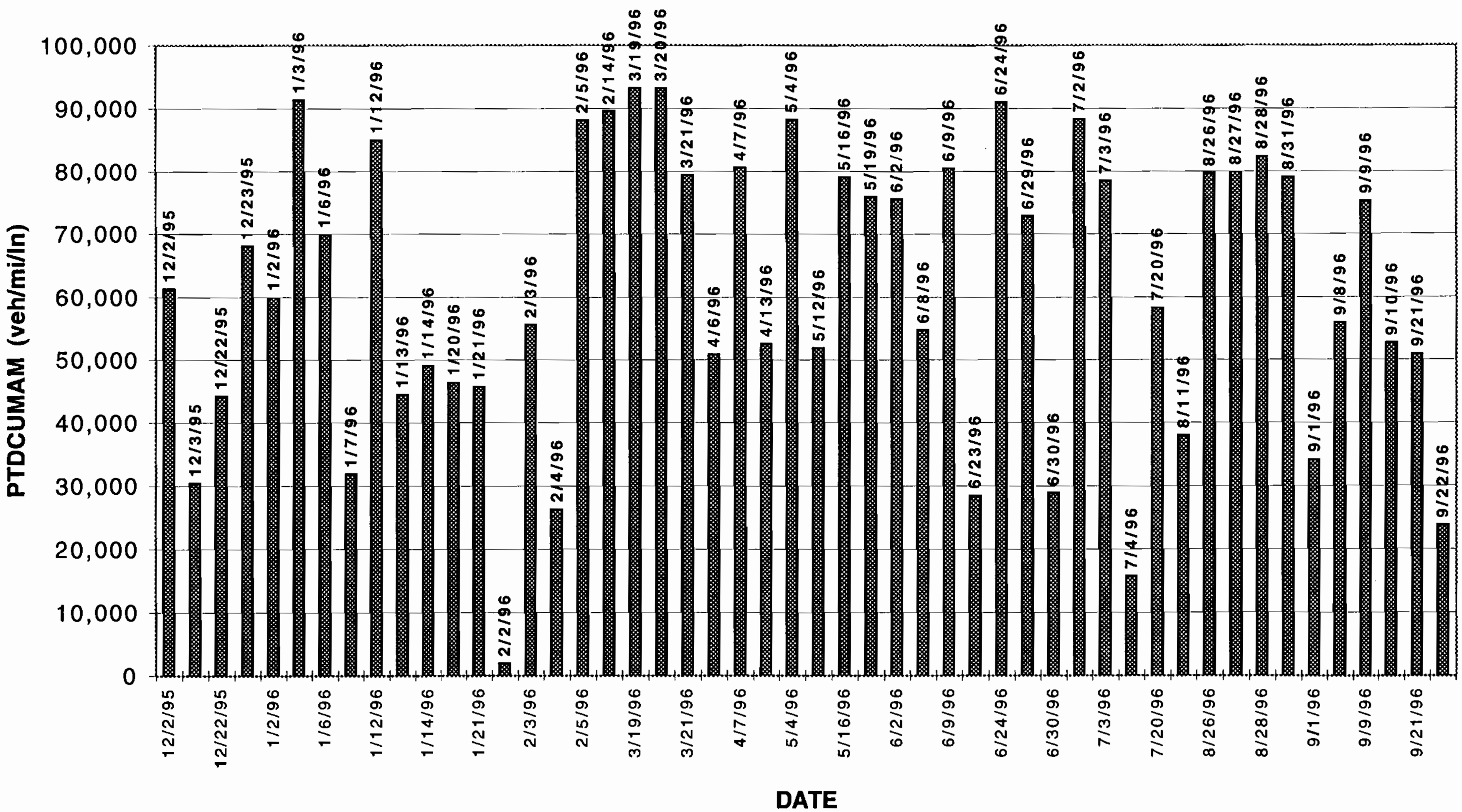


Figure 159. SAN ANTONIO DEC'95-SEP'96 MODEL T10.3.1
DATA CONTROLLED FOR DAYS DURING OZONE EPISODES GT 1-DAY
AND DAYS WITH TRAFFIC CONGESTION PARAMETER LT 50th PERCENTILE

DAILY CUMULATIVE TRANSGUIDE NETWORK TRAFFIC DENSITY
6AM to 2 HOURS BEFORE TIME of MAX OZONE




5/27/97

**Figure 160. SAN ANTONIO DEC'95-SEP'96 MODEL T10.3.1**
**DATA CONTROLLED FOR DAYS DURING OZONE EPISODES GT 1-DAY**
**AND DAYS WITH TRAFFIC CONGESTION PARAMETER LT 50th PERCENTILE**

**DAILY MAX OZONE AS A FUNCTION OF DAILY CUMULATIVE TRAFFIC DENSITY ON TRANSGUIDE NETWORK**
**FROM 6AM TO 2-HRS BEFORE TIME OF MAX OZONE**

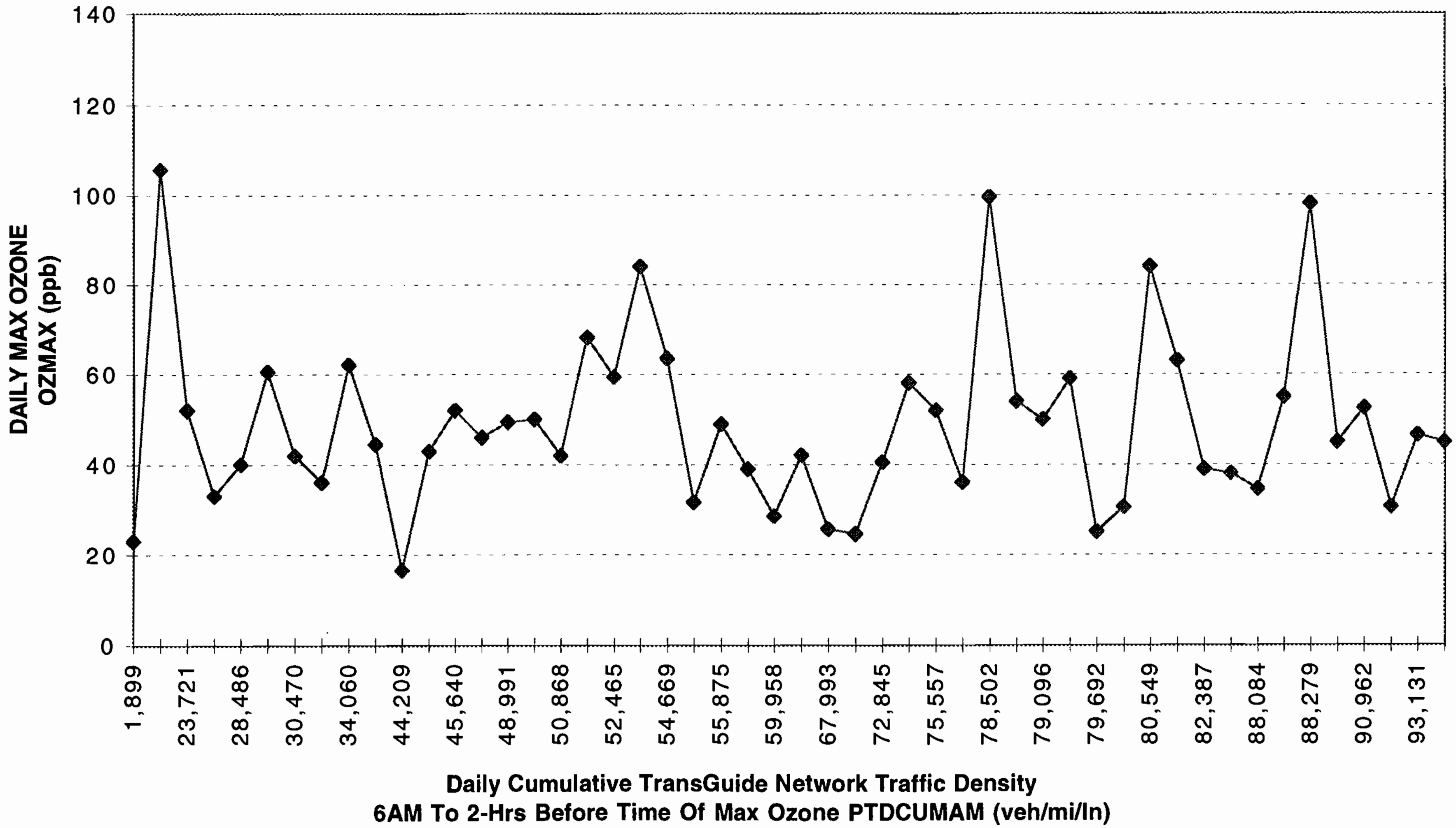


Figure 161. SAN ANTONIO DEC'95-SEP'96 MODEL T10.3.1
DATA CONTROLLED FOR DAYS DURING OZONE EPISODES GT 1-DAY
AND DAYS WITH TRAFFIC CONGESTION PARAMETER LT 50th PERCENTILE

DAILY MAX OZONE AS A FUNCTION OF AVERAGE DAILY CLOUD COVER FROM 6AM TO TIME OF MAX OZONE

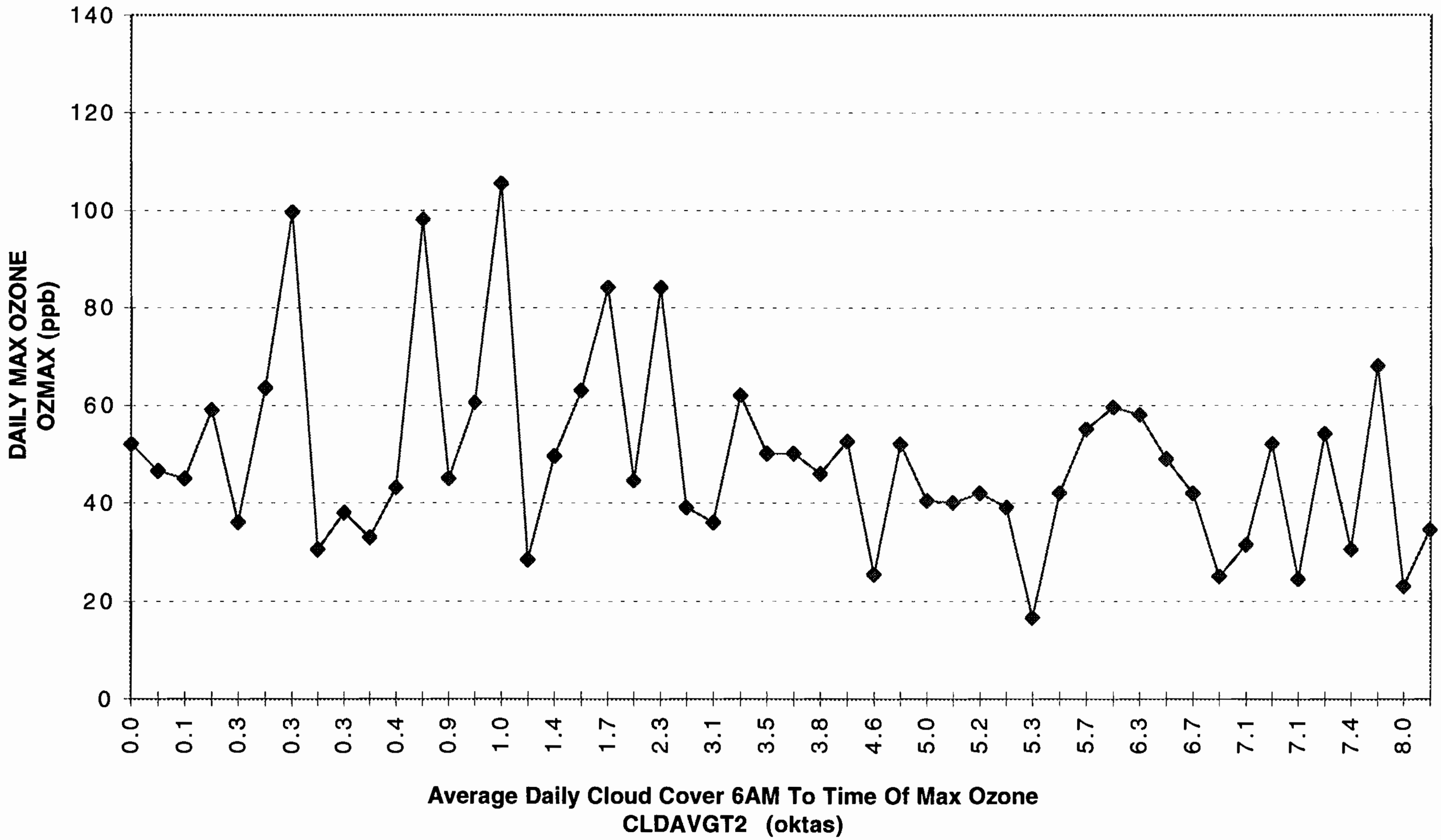


Figure 162. SAN ANTONIO DEC'95-SEP'96 MODEL T10.3.1
DATA CONTROLLED FOR DAYS DURING OZONE EPISODES GT 1-DAY
AND DAYS WITH TRAFFIC CONGESTION PARAMETER LT 50th PERCENTILE

DAILY MAX OZONE AS A FUNCTION OF AVERAGE DAILY CLOUD COVER FROM 6AM TO TIME OF MAX OZONE

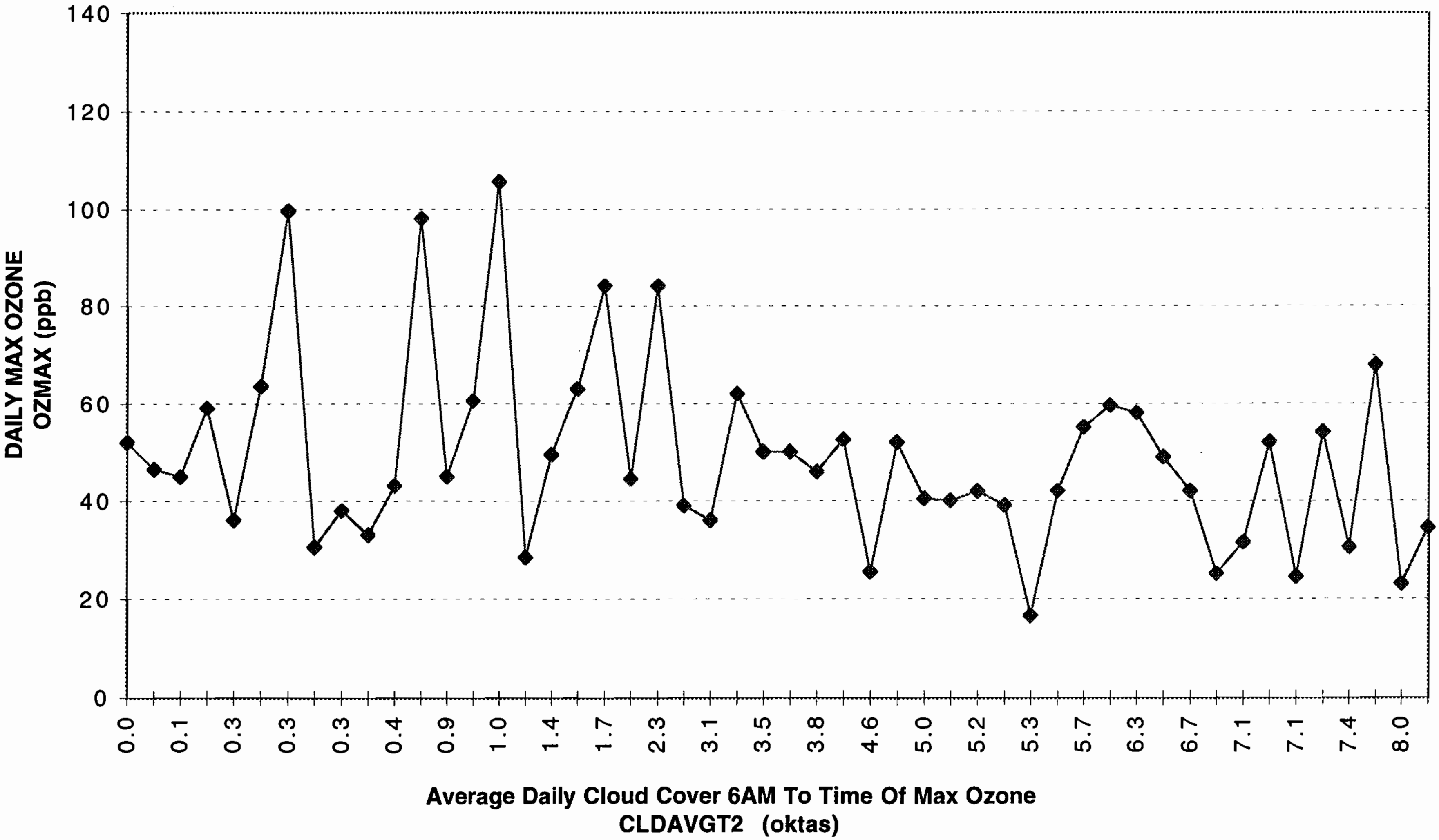


**Figure 163. SAN ANTONIO DEC'95-SEP'96 MODEL T10.3.1**
**DATA CONTROLLED FOR DAYS DURING OZONE EPISODES GT 1-DAY**
**AND DAYS WITH TRAFFIC CONGESTION PARAMETER LT 50th PERCENTILE**

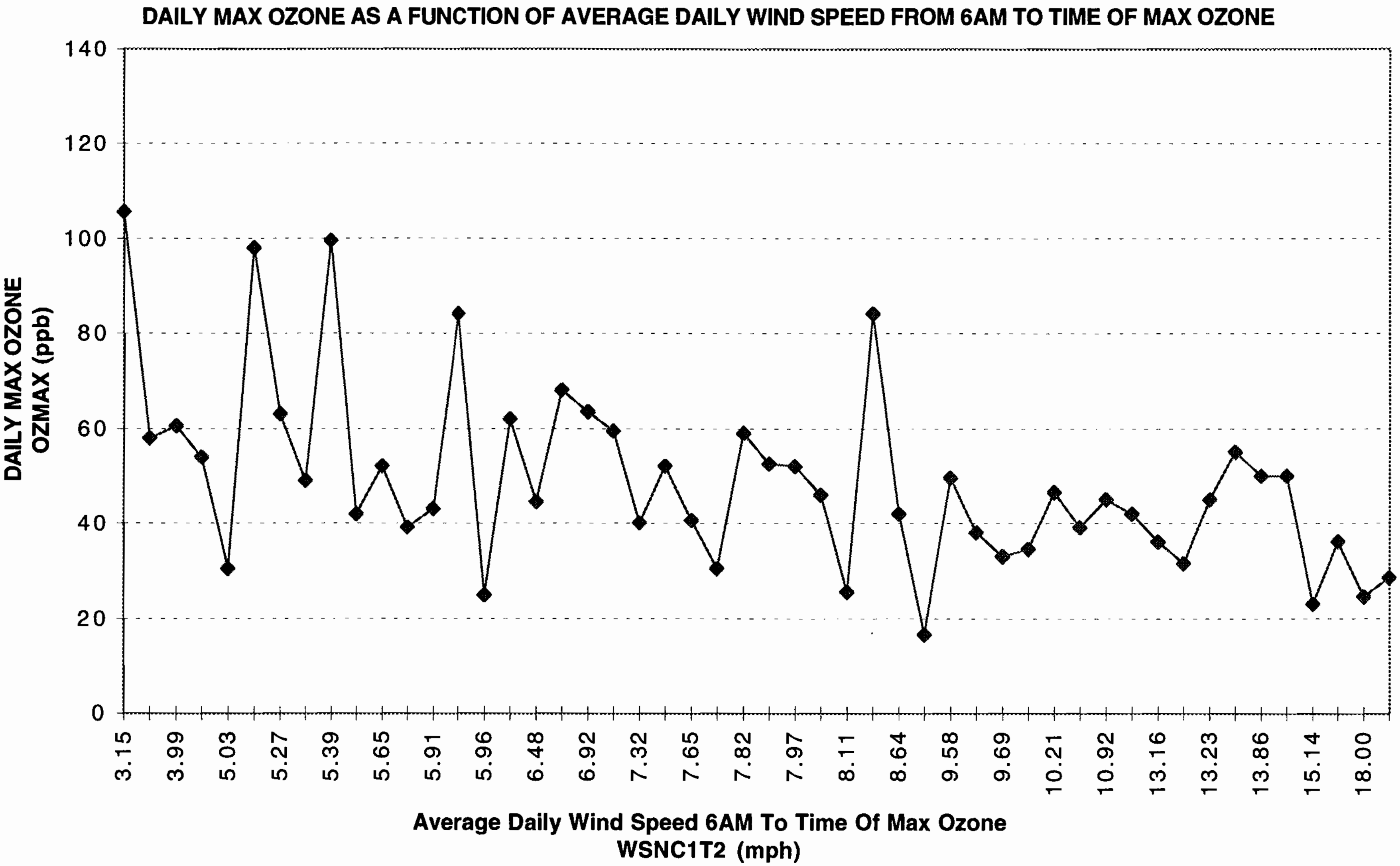


Figure 164. SAN ANTONIO DEC'95-SEP'96 MODEL T10.3.1
DATA CONTROLLED FOR DAYS DURING OZONE EPISODES GT 1-DAY
AND DAYS WITH TRAFFIC CONGESTION PARAMETER LT 50th PERCENTILE

DAILY MAX OZONE AS A FUNCTION OF MAXIMUM DAILY TEMPERATURE

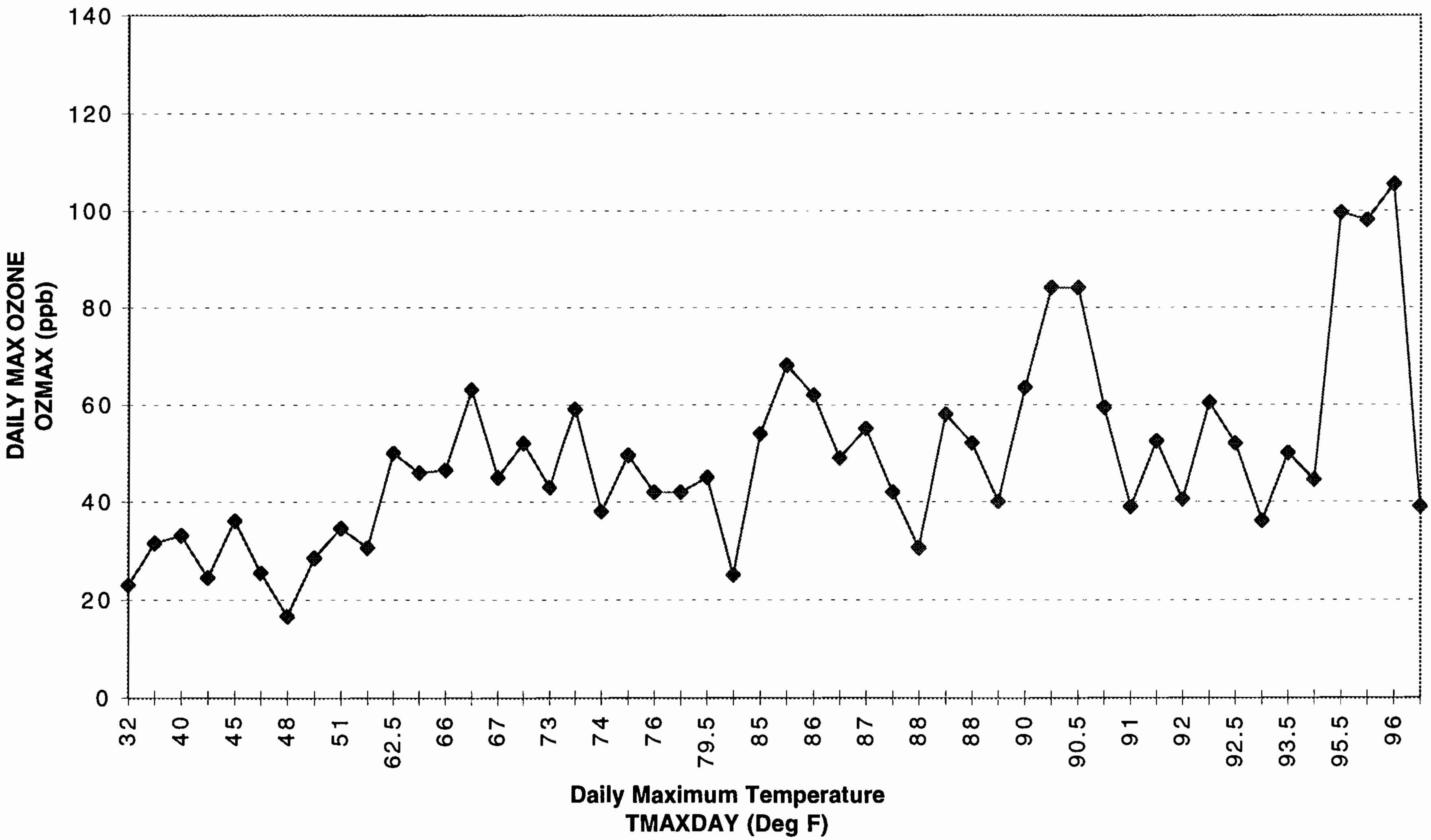


Figure 165. SAN ANTONIO DEC'95-SEP'96 MODEL T10.3.1
DATA CONTROLLED FOR DAYS DURING OZONE EPISODES GT 1-DAY
AND DAYS WITH TRAFFIC CONGESTION PARAMETER LT 50th PERCENTILE

DAILY MAX OZONE AS A FUNCTION OF AVERAGE DAILY WIND SPEED

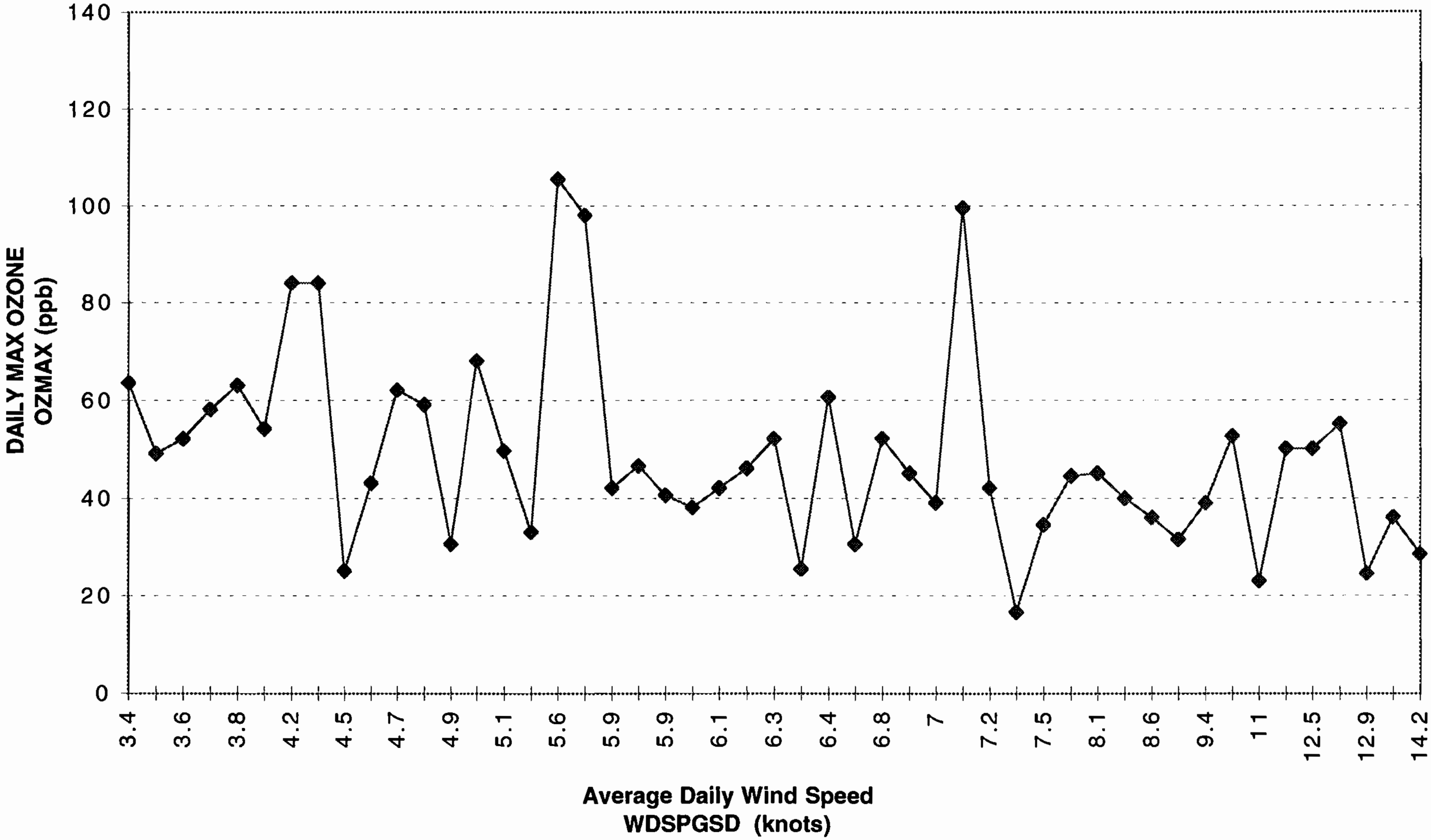
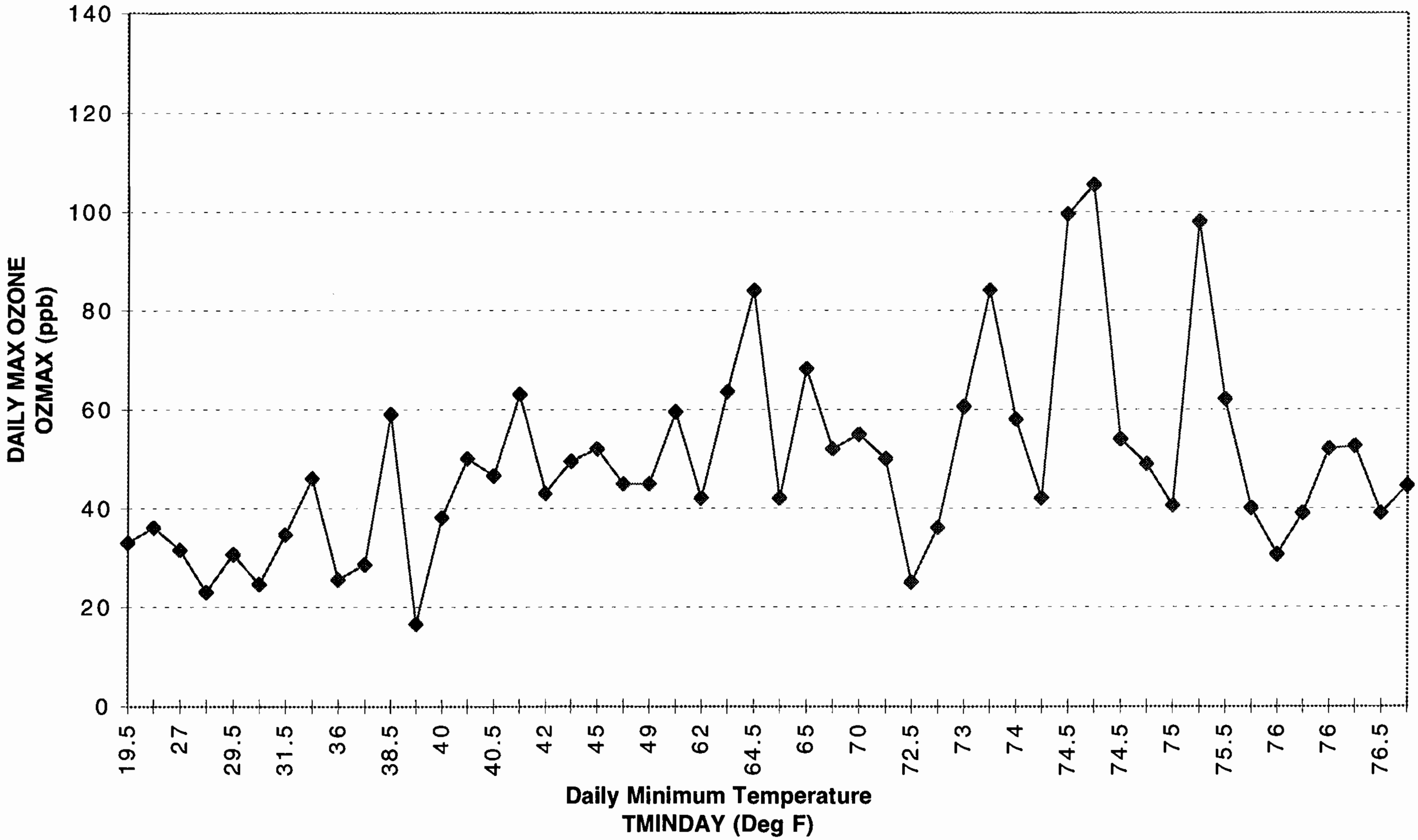


**Figure 166. SAN ANTONIO DEC'95-SEP'96 MODEL T10.3.1**
**DATA CONTROLLED FOR DAYS DURING OZONE EPISODES GT 1-DAY**
**AND DAYS WITH TRAFFIC CONGESTION PARAMETER LT 50th PERCENTILE**

**DAILY MAX OZONE AS A FUNCTION OF MINIMUM DAILY TEMPERATURE**



## SCENARIO 18

In Scenario 18, we repeat the analysis of Scenario 17 of controlling for days that are a part of an ozone episode that is lasts longer than a 1-day episode and controlling for the level of traffic congestion on the TransGuide network on days where it is less than the median value. In addition for Scenario 18, we also control for the months of data collected that occur within the peak ozone season from April 1996 through September 1996.

As for Scenario 17, the results of the analysis do not reveal a significant (80 percent confidence level or higher) association between the daily traffic congestion parameter PTDCUMAM and the daily peak ozone concentration. The finding of a lack of significance of the traffic congestion parameter under this scenario does not prove that the parameter does not affect the daily peak ozone concentration. We can only conclude that under the conditions of this scenario, we are not able to detect any possible relationship that might exist at our minimum confidence level of 80 percent. Table 45 summarizes the results of the model and Table 46 summarizes the raw data for Scenario 18 sorted by date.

Figure 167 and Figure 168 plot the daily peak ozone (OZMAX) and the daily cumulative traffic congestion parameter (PTDCUMAM) over time. Figure 169 through Figure 175 graphically summarize the relationships between the response and predictor variables.

*Table 45. Scenario 18 Results*

| | | | RANGE OF VARIABLES |
|---|---|---|---|
| **Data controls** | 1) APR 1996 - SEP 1996<br>2) DAYS DURING OZONE EPISODES GREATER THAN 1-DAY EPISODES<br>3) LOW LEVEL OF TRAFFIC CONGESTION | | |
| **Model significant parameters (units)** | Y --- OZMAX (ppb)<br>XO --- INTERCEPT<br>X1 --- CLDAVGT2 (oktas)<br>X2 --- WDSPGSD (knots) | | 25 to 105.5<br><br>0.3 to 7.5<br>3.1 to 13.7 |
| **Significant parameter coefficient estimates And bivariate correlations (r)** | 93.51909682 X0<br>-5.41782884 X1<br>-2.31213751 X2 | <br>-0.5875<br>-0.2744 | |
| **Traffic variable coefficient confidence-level** | NA | | |
| **MODEL R-SQUARE** | 0.45 | | |
| **TRAFFIC VARIABLE PARTIAL R-SQUARE** | NA | | |
| **SAMPLE SIZE** | 30 | | |
| **1st ORDER AUTO-CORRELATION Durbin-Watson Statistic** | 1.502 | | |
| **P-VALUE SUPPORTING $H_O$: No Heteroskedasticity** | 0.0603 | | |

*Table 46. Scenario 18 Data*

| DATECST | OZMAX | PTDCUMAM | OZINT | CLDAVGT2 | WSNC1T2 | TMAXDAY | WDSPGSD | TMINDAY |
|---|---|---|---|---|---|---|---|---|
| 4/6/96 | 50 | 50,850 | 28.5 | 3.63 | 13.86 | 62.5 | 11 | 40 |
| 4/7/96 | 63 | 80,590 | 13 | 1.45 | 5.27 | 66 | 3.8 | 41 |
| 4/13/96 | 59.5 | 52,465 | 7 | 6.00 | 7.22 | 91 | . | 58.5 |
| 5/4/96 | 55 | 88,226 | 29 | 5.71 | 13.45 | 87 | 12.6 | 70 |
| 5/12/96 | 68 | 51,761 | 15.5 | 7.48 | 6.76 | 86 | 5 | 65 |
| 5/16/96 | 50 | 79,096 | 14 | 3.50 | 14.36 | 93.5 | 12.5 | 71.5 |
| 5/19/96 | 36 | 75,940 | 19.5 | 3.05 | 16.77 | 93 | 13.7 | 73 |
| 6/2/96 | 52 | 75,557 | 1.5 | 4.61 | 5.65 | 92.5 | 6.8 | 69.5 |
| 6/8/96 | 63.5 | 54,669 | 12 | 0.25 | 6.92 | 90 | 3.4 | 64.5 |
| 6/9/96 | 84 | 80,549 | 12.5 | 1.68 | 8.37 | 90.5 | 4.5 | 64.5 |
| 6/23/96 | 40 | 28,486 | 20.5 | 5.13 | 7.32 | 89 | 8.3 | 76 |
| 6/24/96 | 52.5 | 90,962 | 6.5 | 3.78 | 7.86 | 92 | 9.6 | 76.5 |
| 6/29/96 | 40.5 | 72,845 | 1 | 5.00 | 7.65 | 92 | 5.9 | 75 |
| 6/30/96 | 60.5 | 28,900 | 0 | 1.00 | 3.99 | 92 | 6.4 | 73 |
| 7/2/96 | 98 | 88,279 | 3 | 0.56 | 5.24 | 96 | 5.8 | 75.5 |
| 7/3/96 | 99.5 | 78,502 | 0.5 | 0.25 | 5.39 | 95.5 | 7.1 | 74.5 |
| 7/4/96 | 105.5 | 15,650 | 4.5 | 1.00 | 3.15 | 96 | 5.6 | 74.5 |
| 7/20/96 | 39 | 58,253 | 7.5 | 2.53 | 10.58 | 98 | 9.4 | 76.5 |
| 8/11/96 | 44.5 | 37,932 | 4 | 1.78 | 6.48 | 94.5 | 8 | 76.5 |
| 8/26/96 | 25 | 79,692 | 0.5 | 6.90 | 5.96 | 83 | 4.5 | 72.5 |
| 8/27/96 | 30.5 | 79,922 | 2 | 7.40 | 5.03 | 88 | 4.9 | 76 |
| 8/28/96 | 39 | 82,387 | 1 | 5.26 | 5.75 | 91 | 7 | 76 |
| 8/31/96 | 54 | 79,018 | 1.5 | 7.12 | 4.28 | 85 | 4 | 74.5 |
| 9/1/96 | 62 | 34,060 | 18 | 3.05 | 6.24 | 86 | 4.7 | 75.5 |
| 9/5/96 | 64.5 | 96,327 | 0 | 5.11 | 4.53 | 87.5 | 3.1 | 74.5 |
| 9/8/96 | 49 | 55,875 | 6 | 6.40 | 5.30 | 86 | 3.5 | 74.5 |
| 9/9/96 | 58 | 75,180 | 0 | 6.35 | 3.53 | 88 | 3.6 | 74 |
| 9/10/96 | 84 | 52,634 | 0 | 2.35 | 5.92 | 90 | 4.2 | 73 |
| 9/20/96 | 41 | 96,181 | 13 | 4.42 | 6.32 | 87 | 6.9 | 71 |
| 9/21/96 | 42 | 50,868 | 0 | 5.22 | 5.63 | 87 | 6.1 | 74 |
| 9/22/96 | 52 | 23,721 | 19 | 7.07 | 7.50 | 88 | 6.3 | 76 |

Figure 167. SAN ANTONIO APR'96-SEP'96 MODEL T19.1.1
DATA CONTROLLED FOR DAYS DURING OZONE EPISODES GT 1-DAY
AND DAYS WITH TRAFFIC CONGESTION PARAMETER LT 50th PERCENTILE

DAILY MAXIMUM OZONE CONCENTRATIONS

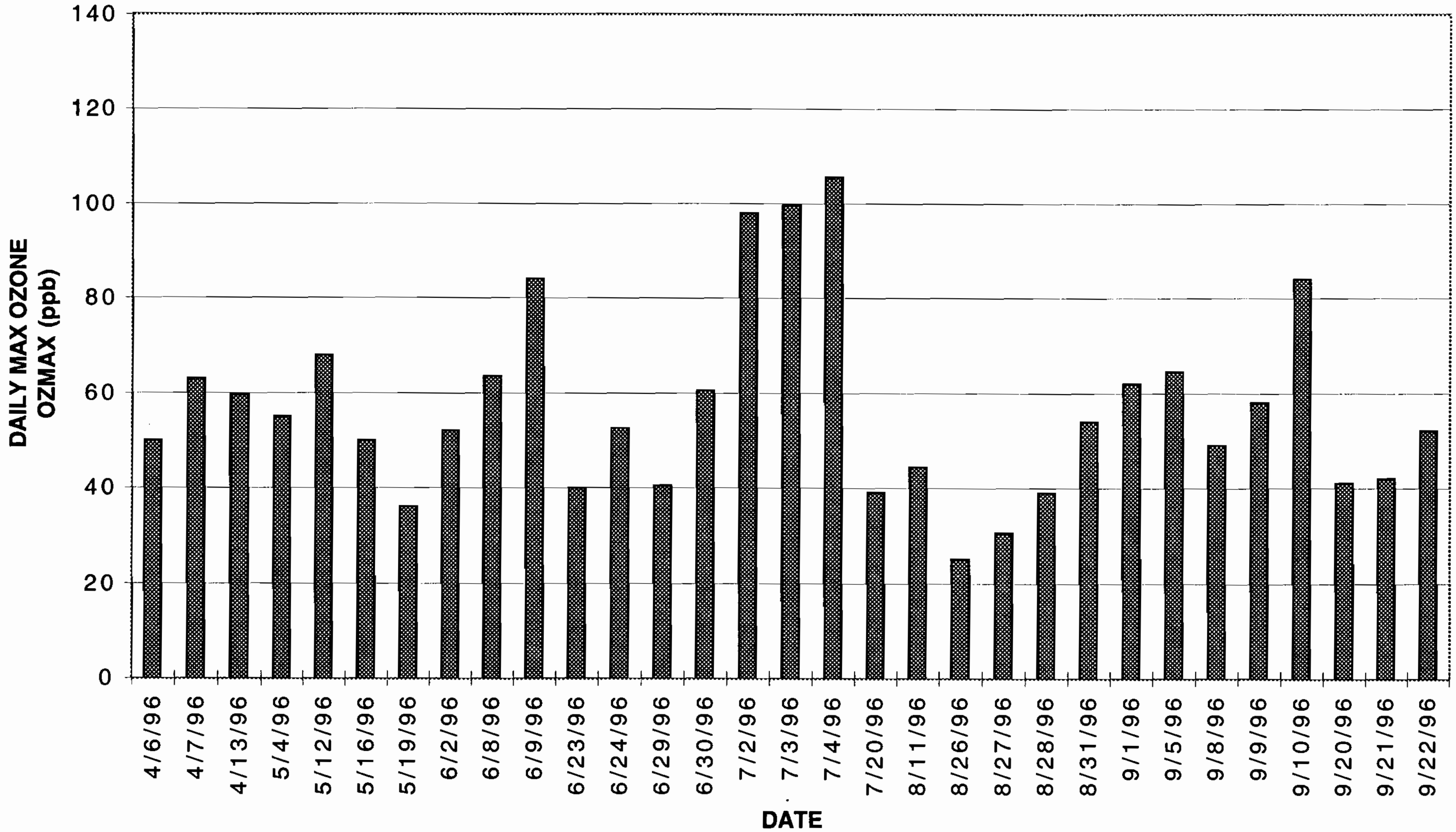


Figure 168. SAN ANTONIO APR'96-SEP'96 MODEL T19.1.1
DATA CONTROLLED FOR DAYS DURING OZONE EPISODES GT 1-DAY
AND DAYS WITH TRAFFIC CONGESTION PARAMETER LT 50th PERCENTILE

DAILY CUMULATIVE TRANSGUIDE NETWORK TRAFFIC DENSITY
6AM to 2 HOURS BEFORE TIME of MAX OZONE

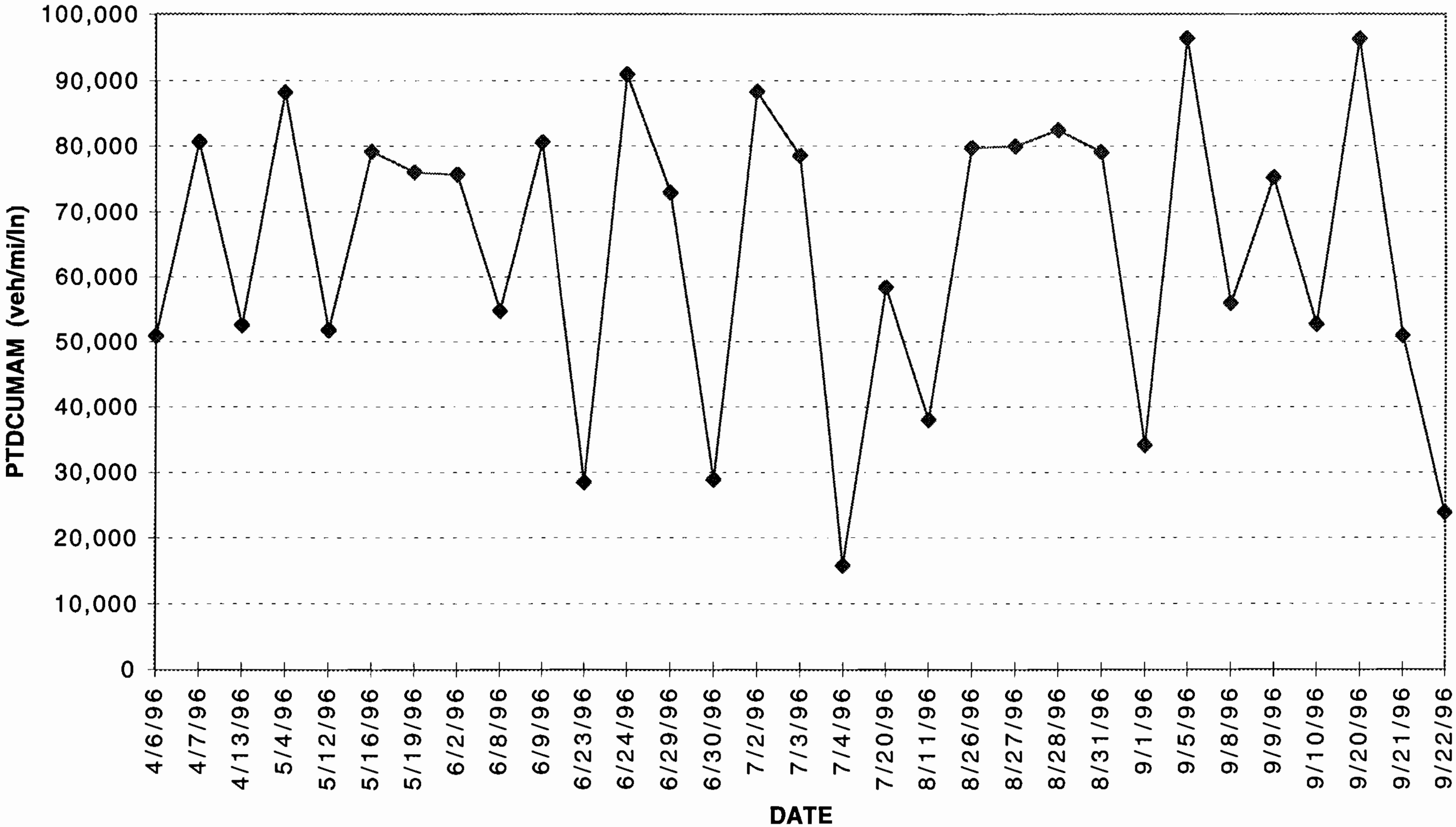


Figure 169. SAN ANTONIO APR'96-SEP'96 MODEL T19.1.1
DATA CONTROLLED FOR DAYS DURING OZONE EPISODES GT 1-DAY
AND DAYS WITH TRAFFIC CONGESTION PARAMETER LT 50th PERCENTILE

DAILY MAX OZONE AS A FUNCTION OF DAILY CUMULATIVE TRAFFIC DENSITY ON TRANSGUIDE NETWORK
FROM 6AM TO 2-HRS BEFORE TIME OF MAX OZONE

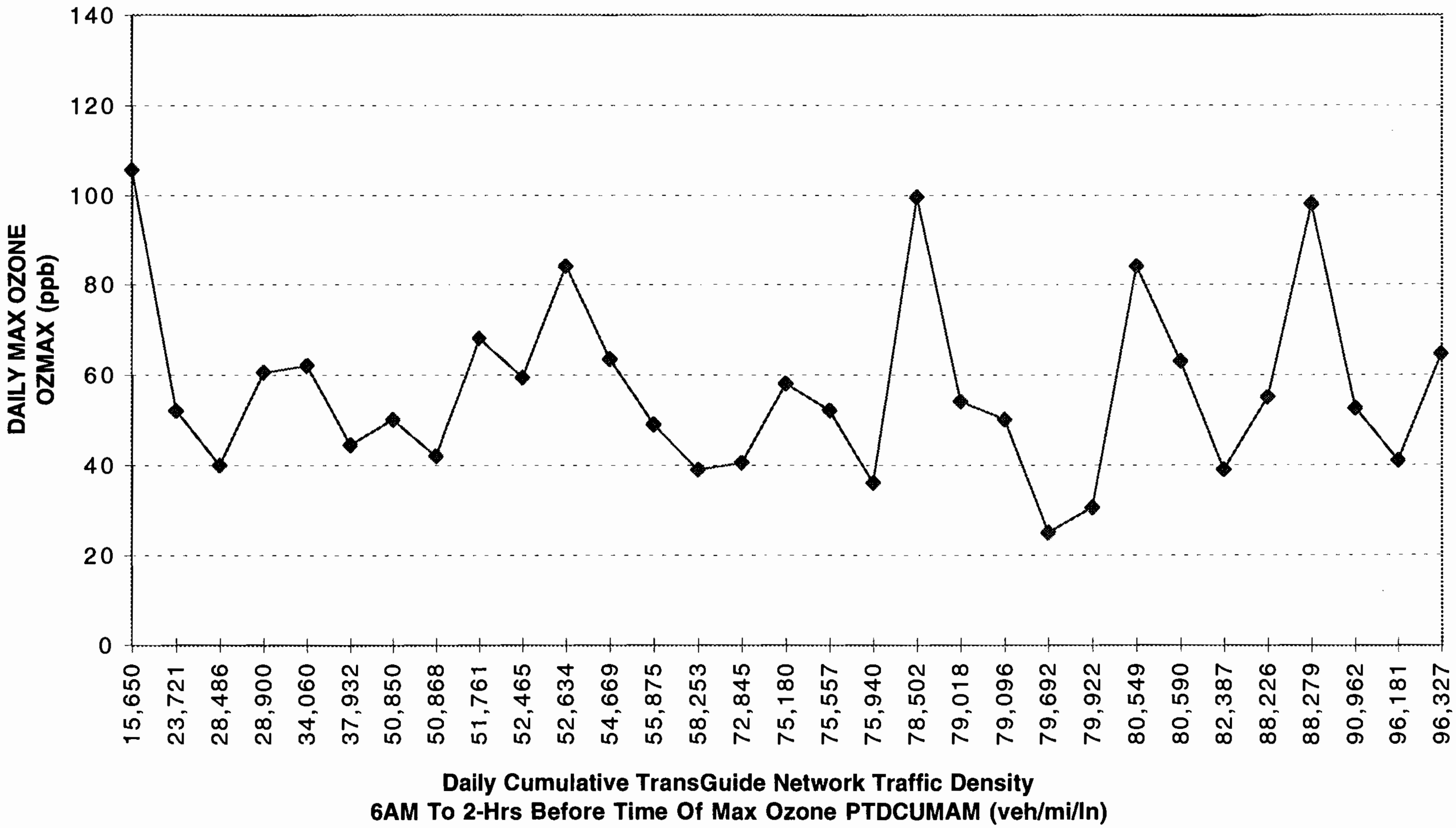


Figure 170. SAN ANTONIO APR'96-SEP'96 MODEL T19.1.1
DATA CONTROLLED FOR DAYS DURING OZONE EPISODES GT 1-DAY
AND DAYS WITH TRAFFIC CONGESTION PARAMETER LT 50th PERCENTILE

DAILY MAX OZONE AS A FUNCTION OF DAILY INITIAL MORNING OZONE

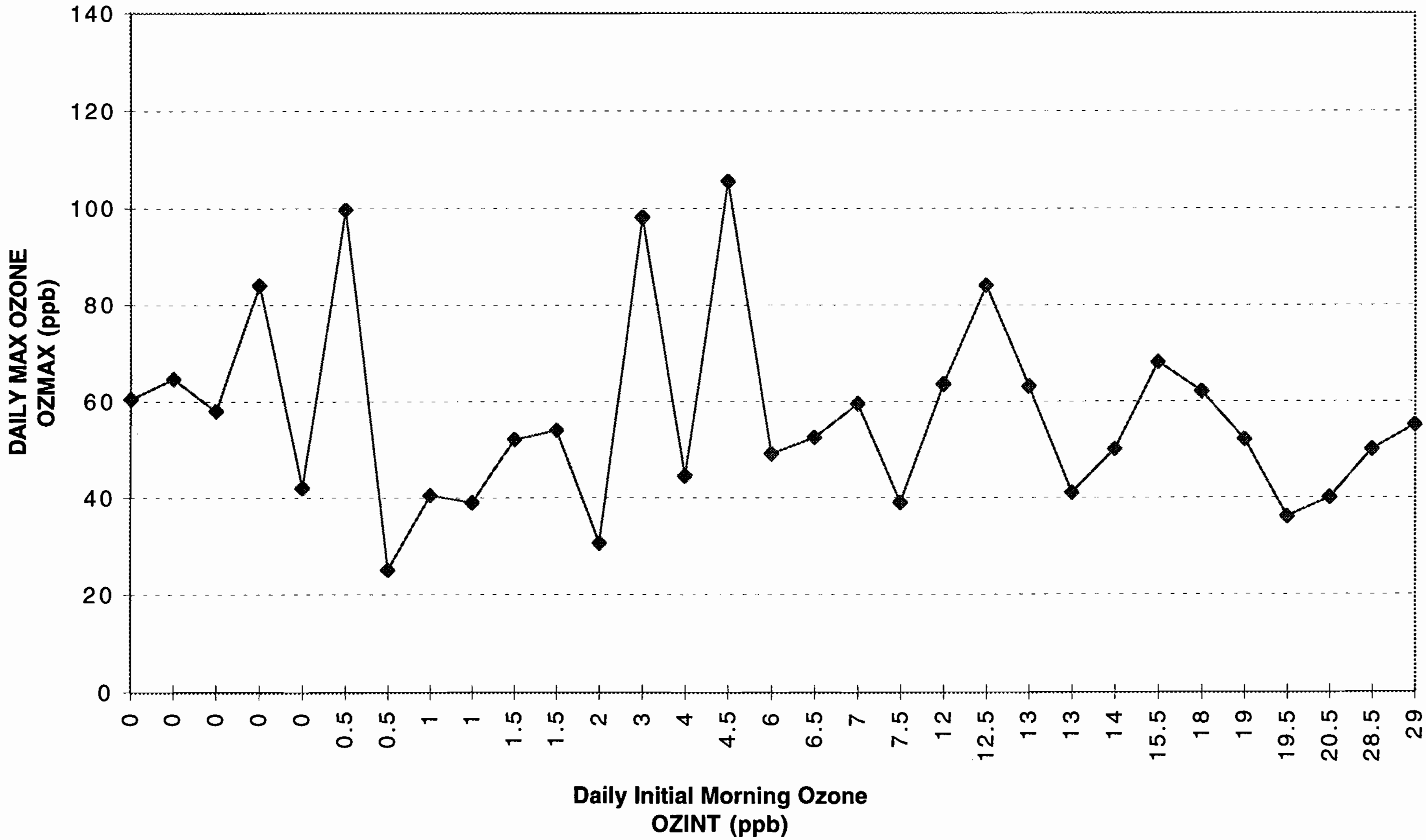


Figure 171. SAN ANTONIO APR'96-SEP'96 MODEL T19.1.1
DATA CONTROLLED FOR DAYS DURING OZONE EPISODES GT 1-DAY
AND DAYS WITH TRAFFIC CONGESTION PARAMETER LT 50th PERCENTILE

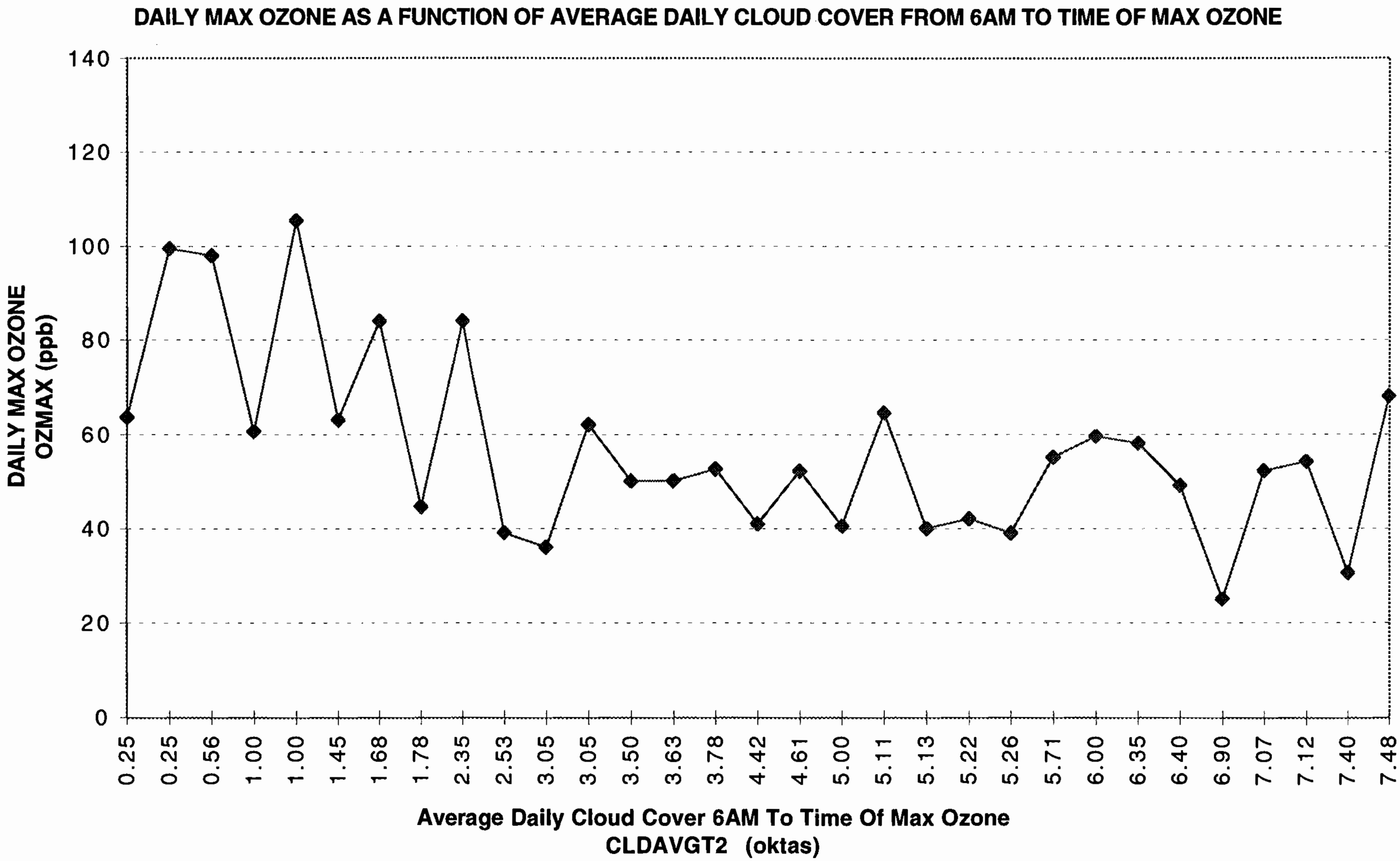
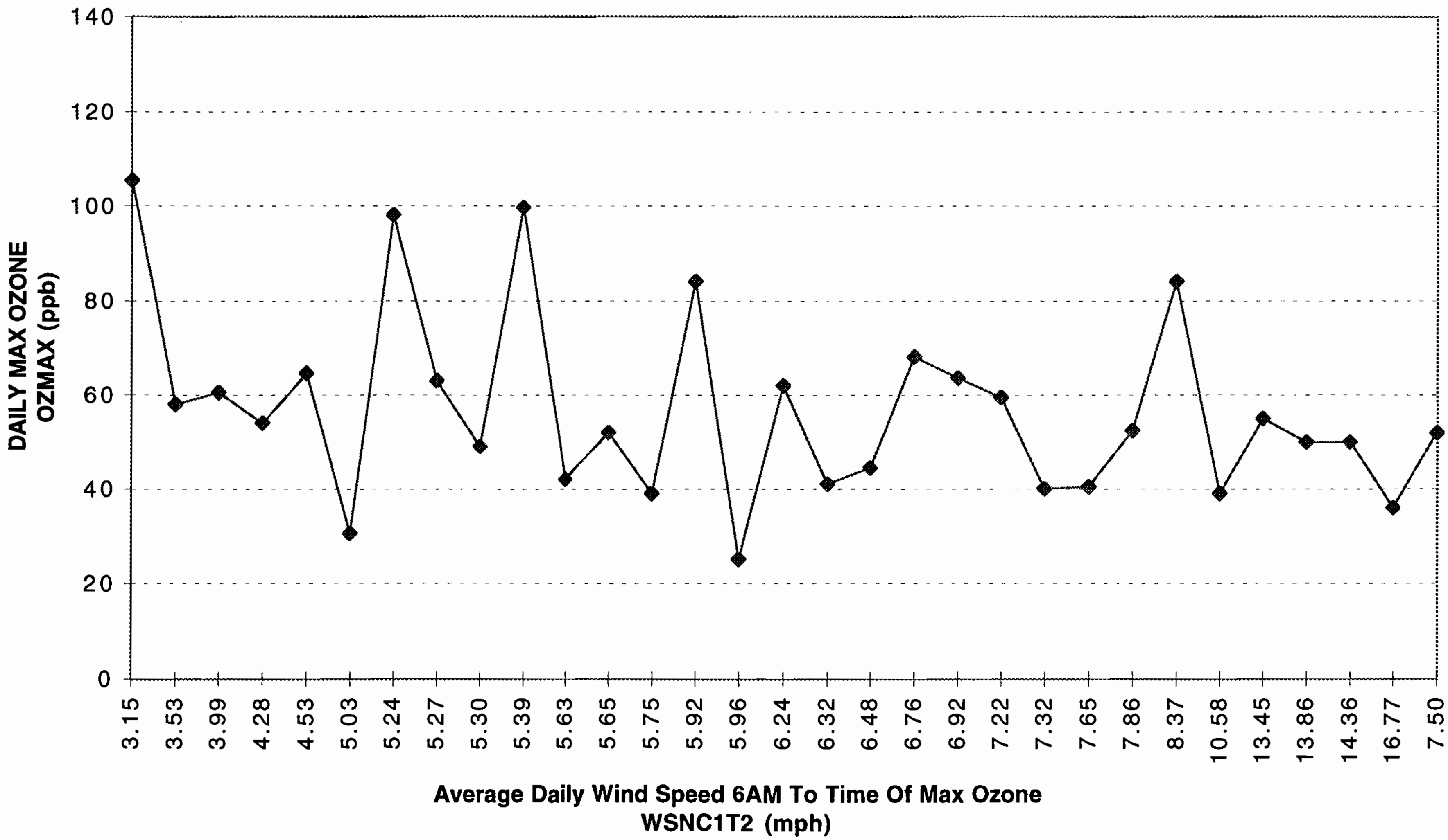


Figure 172. SAN ANTONIO APR'96-SEP'96 MODEL T19.1.1
DATA CONTROLLED FOR DAYS DURING OZONE EPISODES GT 1-DAY
AND DAYS WITH TRAFFIC CONGESTION PARAMETER LT 50th PERCENTILE

DAILY MAX OZONE AS A FUNCTION OF AVERAGE DAILY WIND SPEED FROM 6AM TO TIME OF MAX OZONE



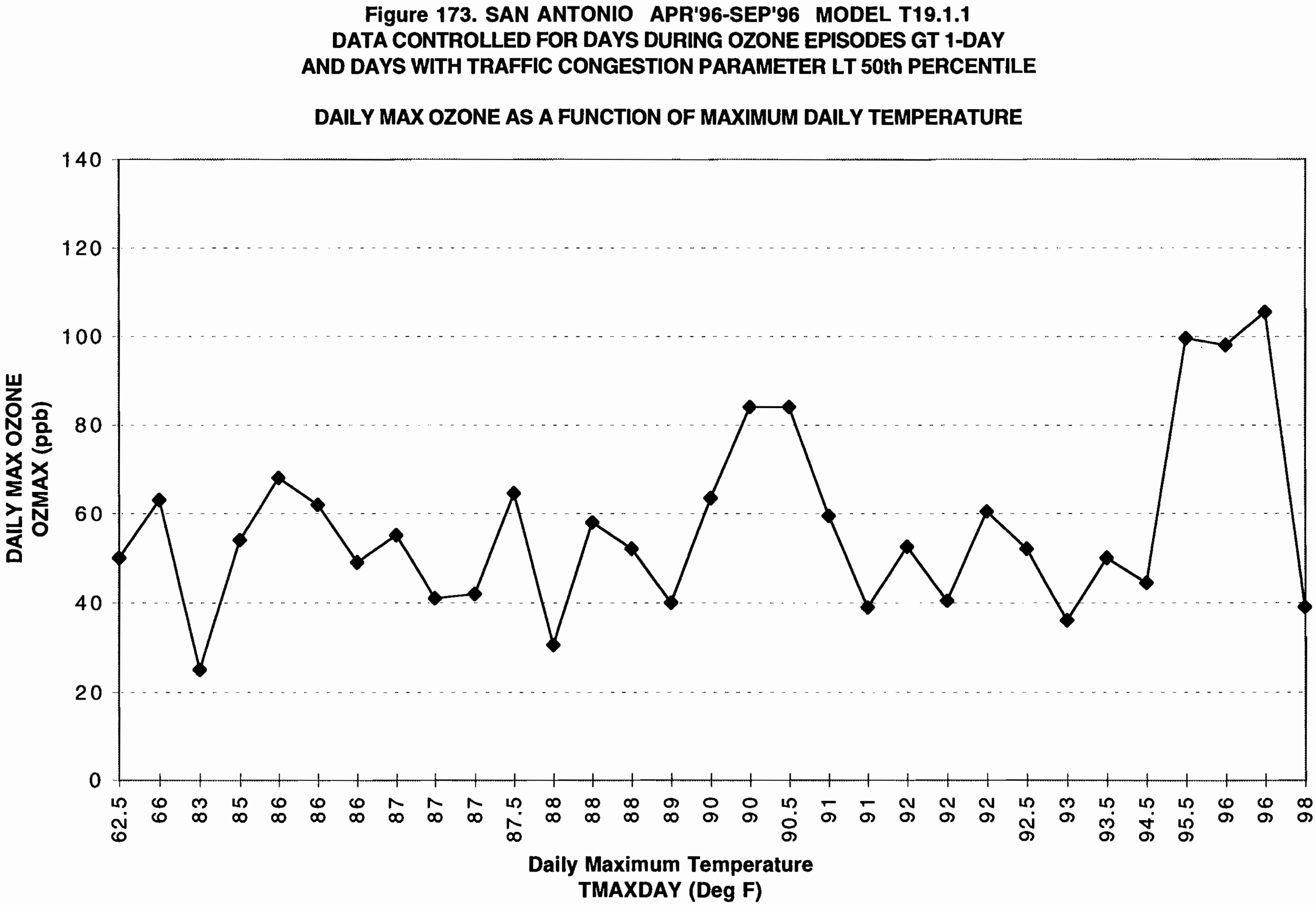


Figure 173. SAN ANTONIO APR'96-SEP'96 MODEL T19.1.1
DATA CONTROLLED FOR DAYS DURING OZONE EPISODES GT 1-DAY
AND DAYS WITH TRAFFIC CONGESTION PARAMETER LT 50th PERCENTILE
DAILY MAX OZONE AS A FUNCTION OF MAXIMUM DAILY TEMPERATURE
DAILY MAX OZONE
OZMAX (ppb)
140
120
100
80
60
40
20
0
62.5
66
83
85
86
86
86
87
87
87
87.5
88
88
88
89
90
90
90.5
91
91
92
92
92
92.5
93
93.5
94.5
95.5
96
96
98
Daily Maximum Temperature
TMAXDAY (Deg F)

**Figure 174. SAN ANTONIO APR'96-SEP'96 MODEL T19.1.1**
**DATA CONTROLLED FOR DAYS DURING OZONE EPISODES GT 1-DAY**
**AND DAYS WITH TRAFFIC CONGESTION PARAMETER LT 50th PERCENTILE**

**DAILY MAX OZONE AS A FUNCTION OF AVERAGE DAILY WIND SPEED**

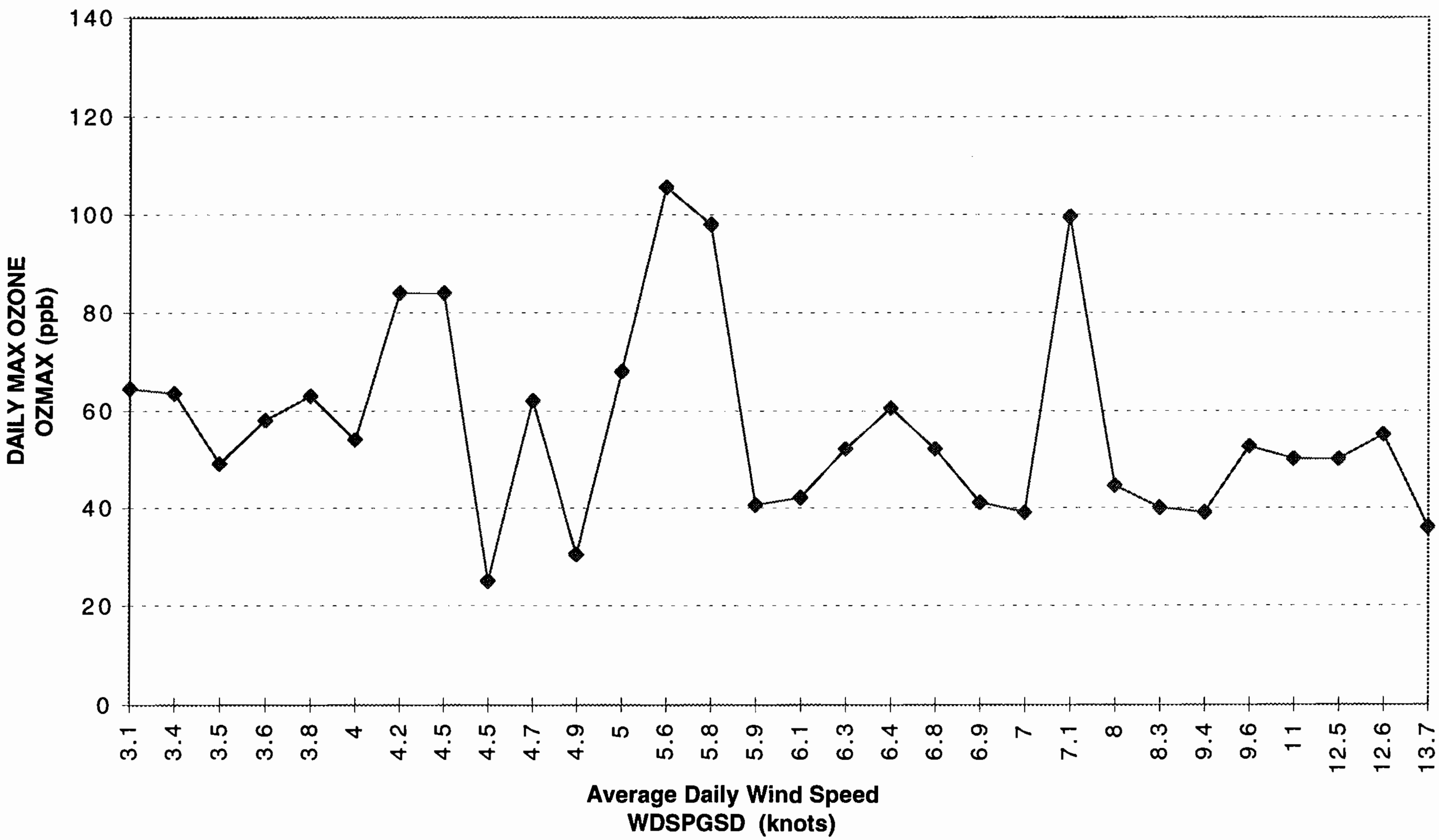
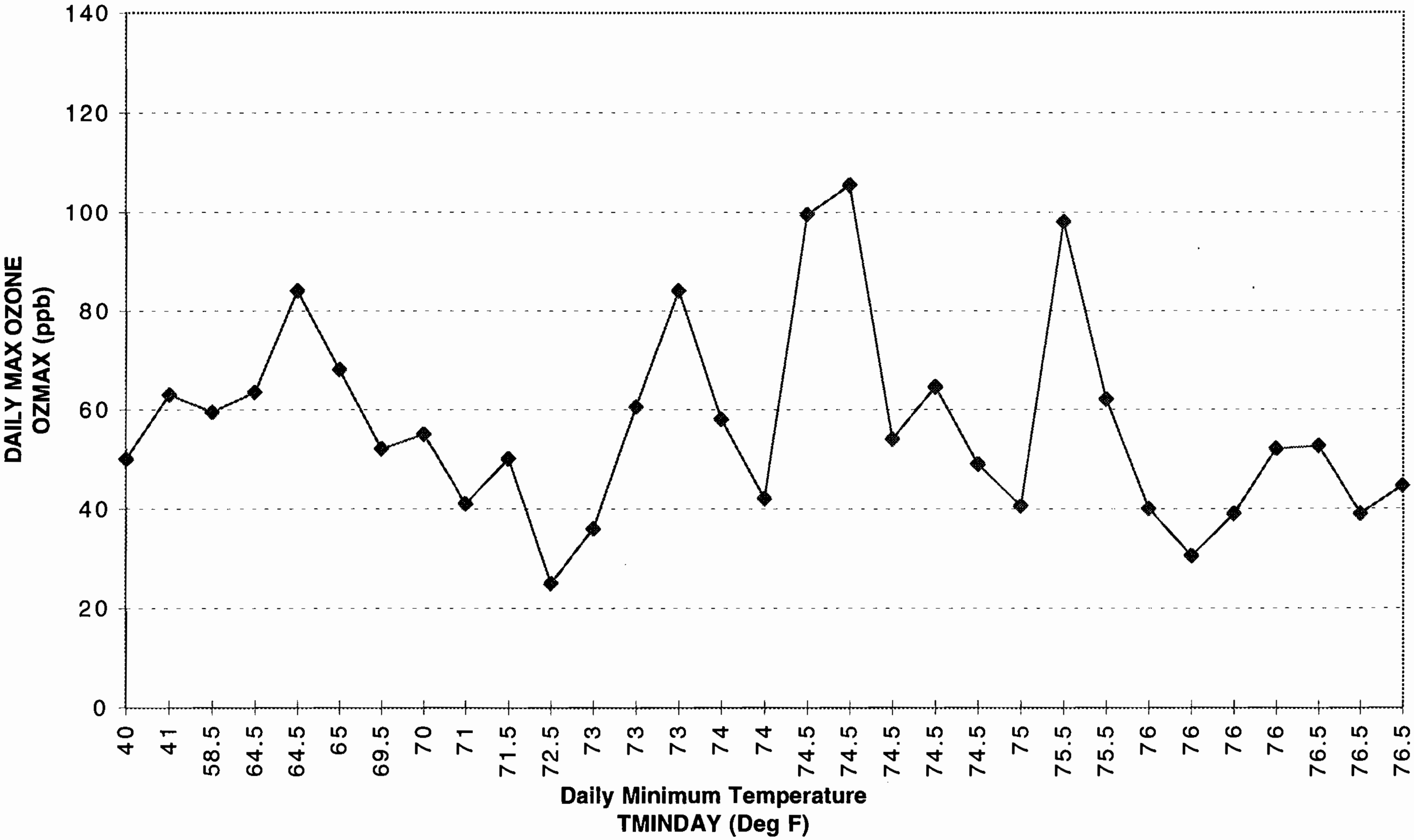


Figure 175. SAN ANTONIO APR'96-SEP'96 MODEL T19.1.1
DATA CONTROLLED FOR DAYS DURING OZONE EPISODES GT 1-DAY
AND DAYS WITH TRAFFIC CONGESTION PARAMETER LT 50th PERCENTILE

DAILY MAX OZONE AS A FUNCTION OF MINIMUM DAILY TEMPERATURE



**SCENARIO 19**

In Scenario 19, we repeat the analysis of Scenario 17 of controlling for days that are a part of an ozone episode greater than a 1-day episode. However, rather than control for days where the traffic congestion parameter is less than the median value, in Scenario 19 we control for days where the traffic congestion parameter is greater than or equal to the median value.

The results of the analysis reveal an association between the daily traffic congestion parameter PTDCUMAM and the daily peak ozone concentration where such a relationship was not detected in Scenario 17. Table 47 summarizes the results of the model and Table 48 summarizes the strength of the traffic parameter's association with the daily peak ozone. Confidence intervals of the parameter's model coefficient per 10,000 units of PTDCUMAM are calculated at the 80, 90, and 95 percent confidence levels. Table 49 summarizes the raw data sorted by date for Scenario 19.

We can say that under this scenario at the 80 percent confidence level, the potential increase to the daily peak ozone in ppb per a 10,000 unit increase in the traffic congestion parameter PTDCUMAM has a range from about 1.8 to about 5.5 ppb. It is equally likely that the potential increase in the daily peak ozone would fall at any point within this range. The results presented in Table 48 also indicate that the traffic congestion parameter remains significant at the 95 percent confidence level.

Figure 176 and Figure 177 plot the daily peak ozone (OZMAX) and the daily cumulative traffic congestion parameter (PTDCUMAM) over time. Figure 178 through Figure 184 graphically summarize the relationships between the response and predictor variables. Figure 185 depicts an 80 percent confidence level prediction band of OZMAX as a function of PTDCUMAM while holding the other significant variables constant at their median levels.

We can say at an 80 percent confidence level that the daily peak ozone will fall somewhere within the band on Figure 185. As shown, the 80 percent confidence prediction band with this linear model under this scenario does not encompass three of the higher daily peak ozone concentrations at fixed median levels of the other significant variables.

*Table 47. Scenario 19 Results*

| | | | RANGE OF VARIABLES |
|---|---|---|---|
| **DATA CONTROLS** | 1) DEC 1995 - SEP 1996<br><br>2) DAYS DURING OZONE EPISODES GREATER THAN 1-DAY EPISODES<br><br>3) HIGH LEVEL OF TRAFFIC CONGESTION | | |
| **MODEL SIGNIFICANT PARAMETERS (units)** | Y --- OZMAX (ppb)<br>XO --- INTERCEPT<br>X1 --- PTDCUMAM (veh/mi/ln)<br>X2 --- OZINT (ppb)<br>X3 --- CLDAVGT2 (oktas)<br>X4 --- WSNC1T2 (mph)<br>X5 --- WDSPGSD (knots)<br>X6 --- TMINDAY (Deg F) | | 31.5 to 126<br><br>94,250 to 189,530<br>0 to 34<br>0.1 to 7.3<br>2.8 to 16.7<br>2.6 to 13<br>34 to 78 |
| **SIGNIFICANT PARAMETER COEFFICIENT ESTIMATES AND BIVARIATE CORRELATIONS (r)** | 16.46224493 X0<br>0.00036681 X1<br>0.59137684 X2<br>-2.02589754 X3<br>-1.89808348 X4<br>-2.51666873 X5<br>0.47160340 X6 | <br>0.2937<br>0.0842<br>-0.4735<br>-0.4981<br>-0.4120<br>0.0533 | |
| **TRAFFIC VARIABLE COEFFICIENT CONFIDENCE-LEVEL** | 98% | | |
| **MODEL R-SQUARE** | 0.56 | | |
| **TRAFFIC VARIABLE PARTIAL R-SQUARE** | 0.1903 | | |
| **SAMPLE SIZE** | 46 | | |
| **1st ORDER AUTO-CORRELATION Durbin-Watson Statistic** | 1.833 | | |
| **P-VALUE SUPPORTING $H_O$: No Heteroskedasticity** | 0.9929 | | |

*Table 48. Scenario 19 Results (cont.)*

| | |
|---|---|
| **TRAFFIC PARAMETER ESTIMATE PER 10,000 PTDCUMAM** | **3.6681** |
| **TRAFFIC PARAMETER ESTIMATE STANDARD ERROR PER 10,000 PTDCUMAM** | **1.4239** |
| **n** | **46** |
| **k** | **6** |
| **df** | **39** |
| $t_{(.10)}$ | **1.282** |
| $t_{(.05)}$ | **1.645** |
| $t_{(.025)}$ | **1.960** |
| **80 PERCENT CONFIDENCE INTERVAL OF TRAFFIC PARAMETER ESTIMATE PER 10,000 UNITS OF PTDCUMAM** | **1.84 to 5.49** |
| **90 PERCENT CONFIDENCE INTERVAL OF TRAFFIC PARAMETER ESTIMATE PER 10,000 UNITS OF PTDCUMAM** | **1.33 to 6.01** |
| **95 PERCENT CONFIDENCE INTERVAL OF TRAFFIC PARAMETER ESTIMATE PER 10,000 UNITS OF PTDCUMAM** | **0.88 to 6.46** |

*Table 49. Scenario 19 Data*

| DATECST | OZMAX | PTDCUMAM | OZINT | CLDAVGT2 | WSNC1T2 | TMAXDAY | WDSPGSD | TMINDAY |
|---|---|---|---|---|---|---|---|---|
| 12/4/95 | 65.5 | 115,843 | 34 | 0.11 | 7.33 | 75 | 4.5 | 53 |
| 12/11/95 | 31.5 | 108,697 | 19.5 | 7.30 | 7.30 | 61 | 6.5 | 45 |
| 12/12/95 | 35.5 | 98,172 | 4.5 | 4.57 | 12.69 | 73 | 7.9 | 55 |
| 12/13/95 | 39 | 96,818 | 15.5 | 4.95 | 11.91 | 77 | 9 | 58.5 |
| 12/14/95 | 41 | 116,686 | 15 | 3.25 | 12.10 | 79 | 8.4 | 63.5 |
| 1/4/96 | 35.5 | 109,338 | 2.5 | 0.94 | 9.27 | 66 | 6.7 | 34 |
| 1/15/96 | 56 | 99,454 | 3 | 0.78 | 4.99 | 75 | 2.6 | 47.5 |
| 2/6/96 | 44 | 94,245 | 8 | 5.50 | 6.93 | 71 | 5 | 50 |
| 2/12/96 | 40 | 103,061 | 22 | 2.50 | 10.28 | 64 | 5.4 | 40 |
| 2/13/96 | 44.5 | 103,596 | 0 | 1.00 | 7.42 | 67 | 4.8 | 39 |
| 3/14/96 | 62 | 117,977 | 26.5 | 5.33 | 9.12 | 82 | 9.4 | 64 |
| 3/15/96 | 65 | 122,914 | 22 | 2.63 | 9.32 | 79.5 | 5.9 | 62 |
| 4/8/96 | 82.5 | 138,109 | 17 | 0.13 | 6.33 | 79.5 | 3.9 | 49 |
| 4/12/96 | 47.5 | 132,995 | 28 | 5.47 | 11.05 | 90 | 13 | 63.5 |
| 4/19/96 | 52 | 133,172 | 20.5 | 2.22 | 13.75 | 97 | 8.2 | 68.5 |
| 4/20/96 | 54.5 | 100,705 | 0 | 3.52 | 12.99 | 83 | 7.6 | 68 |
| 4/22/96 | 44.5 | 171,288 | 18 | 6.68 | 12.13 | 78.5 | . | 61 |
| 5/1/96 | 66 | 189,529 | 27 | 0.95 | 14.05 | 84.5 | 10.3 | 56 |
| 5/3/96 | 48.5 | 131,880 | 22 | 6.85 | 15.18 | 86.5 | 12.6 | 70 |
| 5/7/96 | 35.5 | 125,392 | 9 | 6.46 | 14.33 | 84.5 | 11.3 | 72 |
| 5/8/96 | 35.5 | 98,806 | 21.5 | 6.63 | 16.21 | 83 | 11.4 | 71 |
| 5/9/96 | 37 | 98,731 | 13 | 5.85 | 16.66 | 87 | 7.8 | 72 |
| 5/11/96 | 50 | 103,665 | 26 | 1.91 | 9.94 | 87 | 9 | 65.5 |
| 5/14/96 | 44 | 110,364 | 22 | 5.24 | 15.60 | 88.5 | 12 | 70 |
| 5/15/96 | 44 | 142,712 | 9.5 | 3.47 | 16.04 | 91.5 | 12.8 | 72 |
| 5/20/96 | 39 | 159,670 | 16.5 | 3.52 | 15.05 | 95.5 | 12.6 | 73 |
| 5/21/96 | 46 | 140,220 | 15 | 2.52 | 11.94 | 95 | 10.2 | 73.5 |
| 5/22/96 | 49 | 124,190 | 12 | 2.67 | 13.04 | 95.5 | 10.1 | 72.5 |
| 6/1/96 | 46.5 | 98,585 | 10.5 | 3.48 | 12.32 | 89.5 | . | 72.5 |
| 6/3/96 | 120 | 158,194 | 8 | 1.27 | 4.36 | 91.5 | 7.5 | 68 |
| 6/17/96 | 56.5 | 113,027 | 3 | 1.18 | 5.98 | 96 | 4.5 | 76 |
| 6/18/96 | 67 | 115,719 | 2.5 | 1.11 | 8.31 | 97.5 | 5.2 | 76.5 |
| 7/1/96 | 69 | 103,954 | 0 | 1.50 | 6.61 | 95 | 5.6 | 75 |
| 7/19/96 | 32.5 | 105,349 | 7 | 5.18 | 12.41 | 97 | 10.5 | 78 |
| 7/25/96 | 42.5 | 119,147 | 3.5 | 4.78 | 10.25 | 96 | 8.1 | 73.5 |
| 7/26/96 | 46 | 122,801 | 0.5 | 3.77 | 6.32 | 93.5 | 6.2 | 73 |
| 7/31/96 | 38 | 105,650 | 0.5 | 1.86 | 10.90 | 97 | 8.8 | 76.5 |
| 8/12/96 | 75.5 | 158,255 | 0.5 | 1.58 | 7.70 | 98.5 | 6.5 | 77.5 |
| 8/20/96 | 40 | 103,438 | 19.5 | 3.48 | 5.08 | 94 | 5.4 | 77 |
| 8/21/96 | 60.5 | 108,007 | 0 | 2.10 | 6.09 | 93 | 5.3 | 71.5 |
| 9/3/96 | 45 | 99,919 | 3 | 4.23 | 6.11 | 91 | 6.4 | 72 |
| 9/4/96 | 47 | 107,909 | 0 | 6.13 | 3.60 | 89 | 5.2 | 73 |
| 9/5/96 | 64.5 | 96,327 | 0 | 5.11 | 4.53 | 87.5 | 3.1 | 74.5 |
| 9/11/96 | 87 | 102,476 | 2 | 0.90 | 5.78 | 90 | 4.3 | 68 |
| 9/12/96 | 126 | 105,346 | 25 | 3.58 | 2.85 | 87 | 3.4 | 69 |
| 9/18/96 | 32 | 106,072 | 1 | 5.66 | 8.77 | 90 | 9 | 76 |
| 9/19/96 | 40 | 105,998 | 0 | 5.21 | 8.81 | 90 | 7 | 76 |
| 9/20/96 | 41 | 96,181 | 13 | 4.42 | 6.32 | 87 | 6.9 | 71 |

**Figure 176. SAN ANTONIO DEC'95-SEP'96 MODEL T10.3**
**DATA CONTROLLED FOR DAYS DURING OZONE EPISODES GT 1-DAY**
**AND DAYS WITH TRAFFIC CONGESTION PARAMETER GE 50th PERCENTILE**

**DAILY MAXIMUM OZONE CONCENTRATIONS**

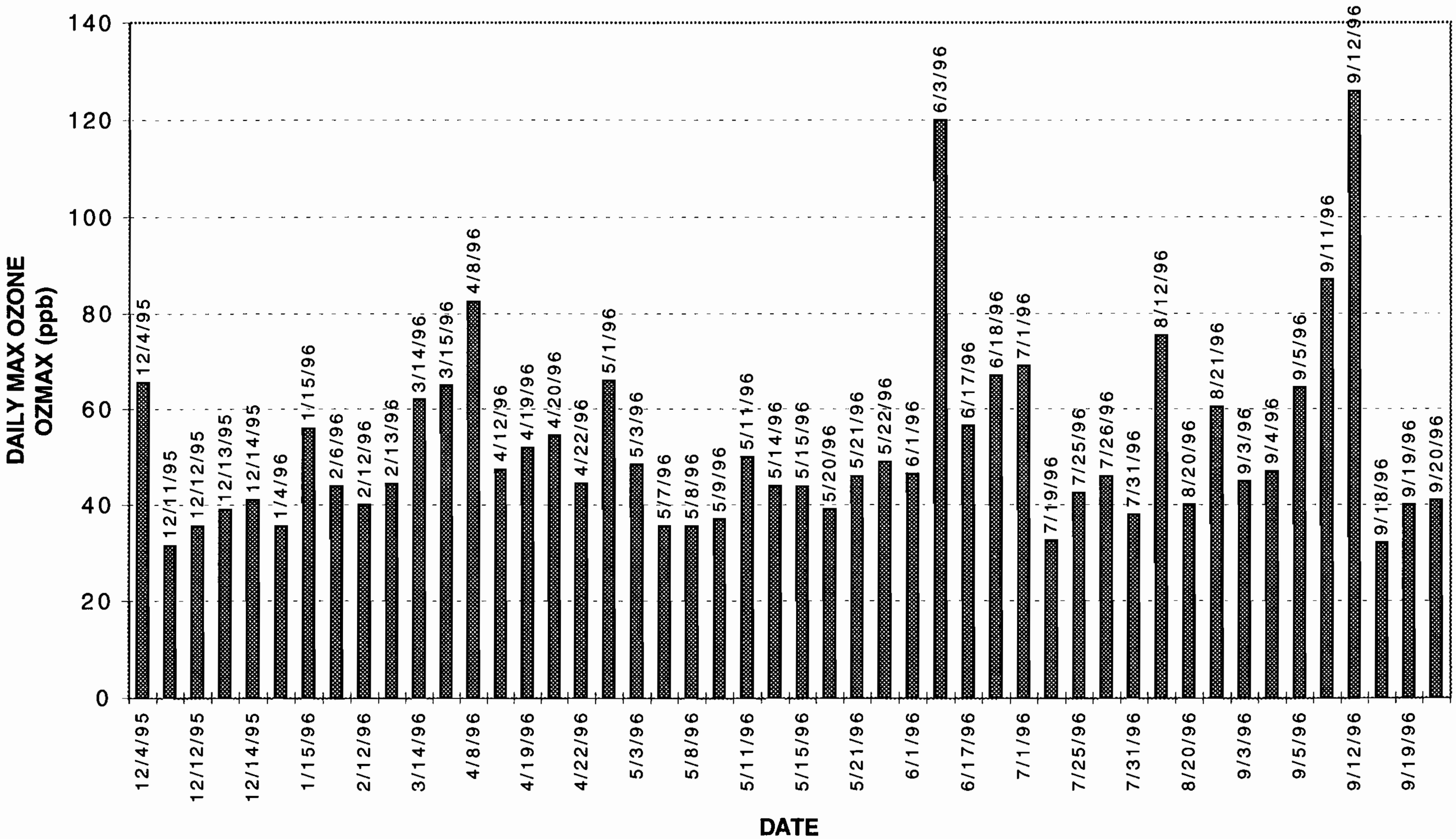


Figure 177. SAN ANTONIO DEC'95-SEP'96 MODEL T10.3
DATA CONTROLLED FOR DAYS DURING OZONE EPISODES GT 1-DAY
AND DAYS WITH TRAFFIC CONGESTION PARAMETER GE 50th PERCENTILE

DAILY CUMULATIVE TRANSGUIDE NETWORK TRAFFIC DENSITY
6AM to 2 HOURS BEFORE TIME of MAX OZONE

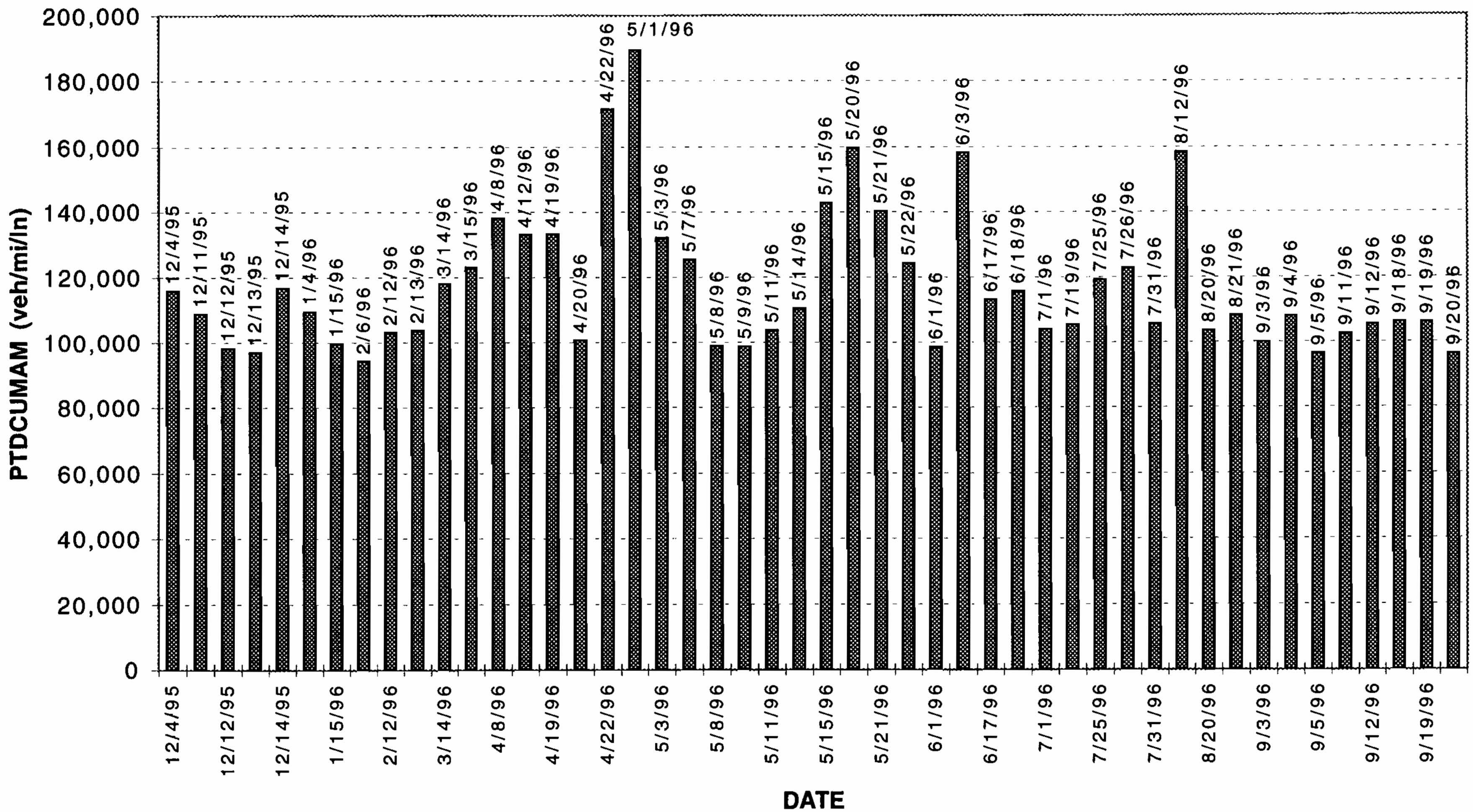


Figure 178. SAN ANTONIO DEC'95-SEP'96 MODEL T10.3
DATA CONTROLLED FOR DAYS DURING OZONE EPISODES GT 1-DAY
AND DAYS WITH TRAFFIC CONGESTION PARAMETER GE 50th PERCENTILE

DAILY MAX OZONE AS A FUNCTION OF DAILY CUMULATIVE TRAFFIC DENSITY ON TRANSGUIDE NETWORK
FROM 6AM TO 2-HRS BEFORE TIME OF MAX OZONE

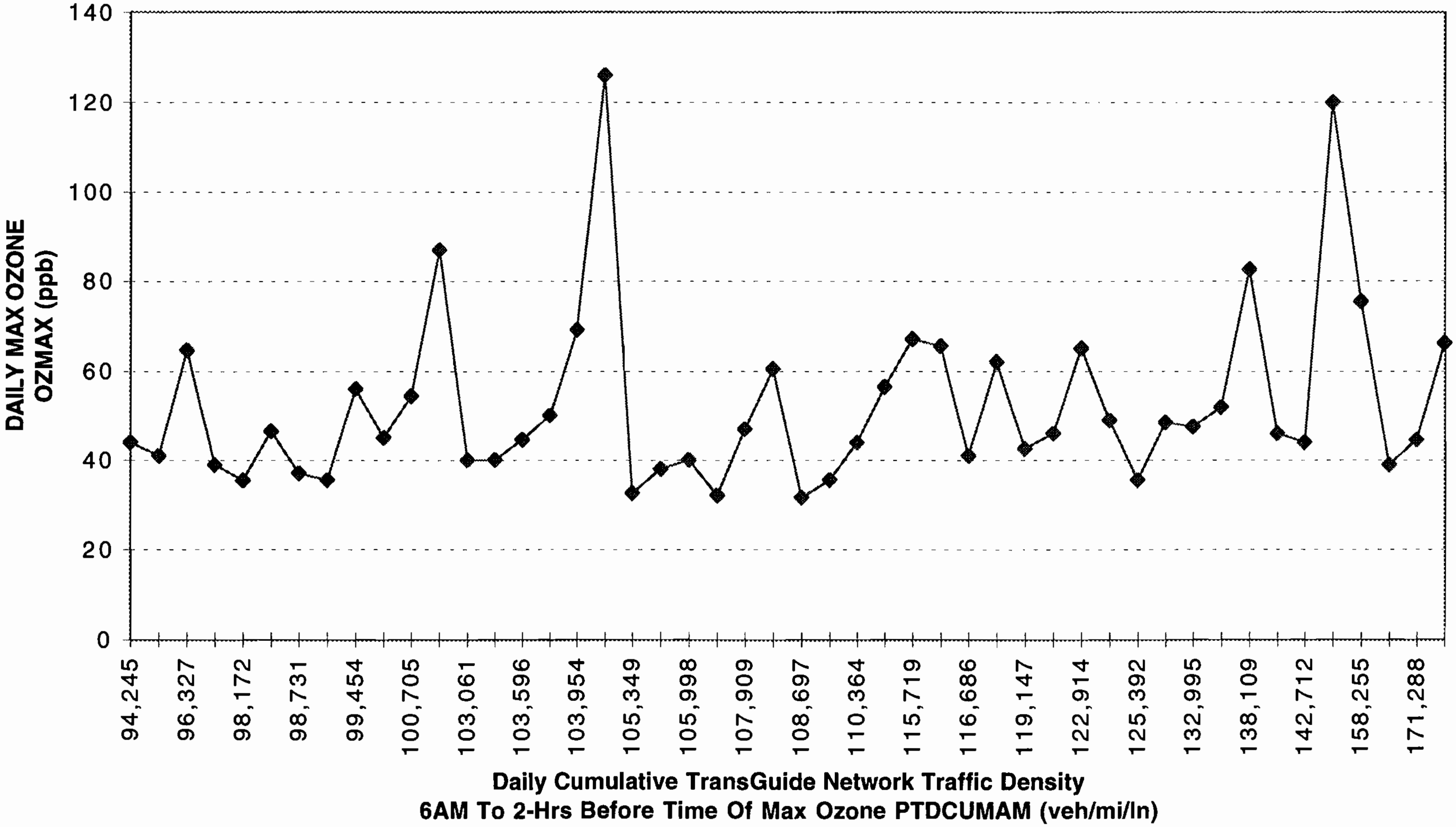


Figure 179. SAN ANTONIO DEC'95-SEP'96 MODEL T10.3
DATA CONTROLLED FOR DAYS DURING OZONE EPISODES GT 1-DAY
AND DAYS WITH TRAFFIC CONGESTION PARAMETER GE 50th PERCENTILE

DAILY MAX OZONE AS A FUNCTION OF DAILY INITIAL MORNING OZONE

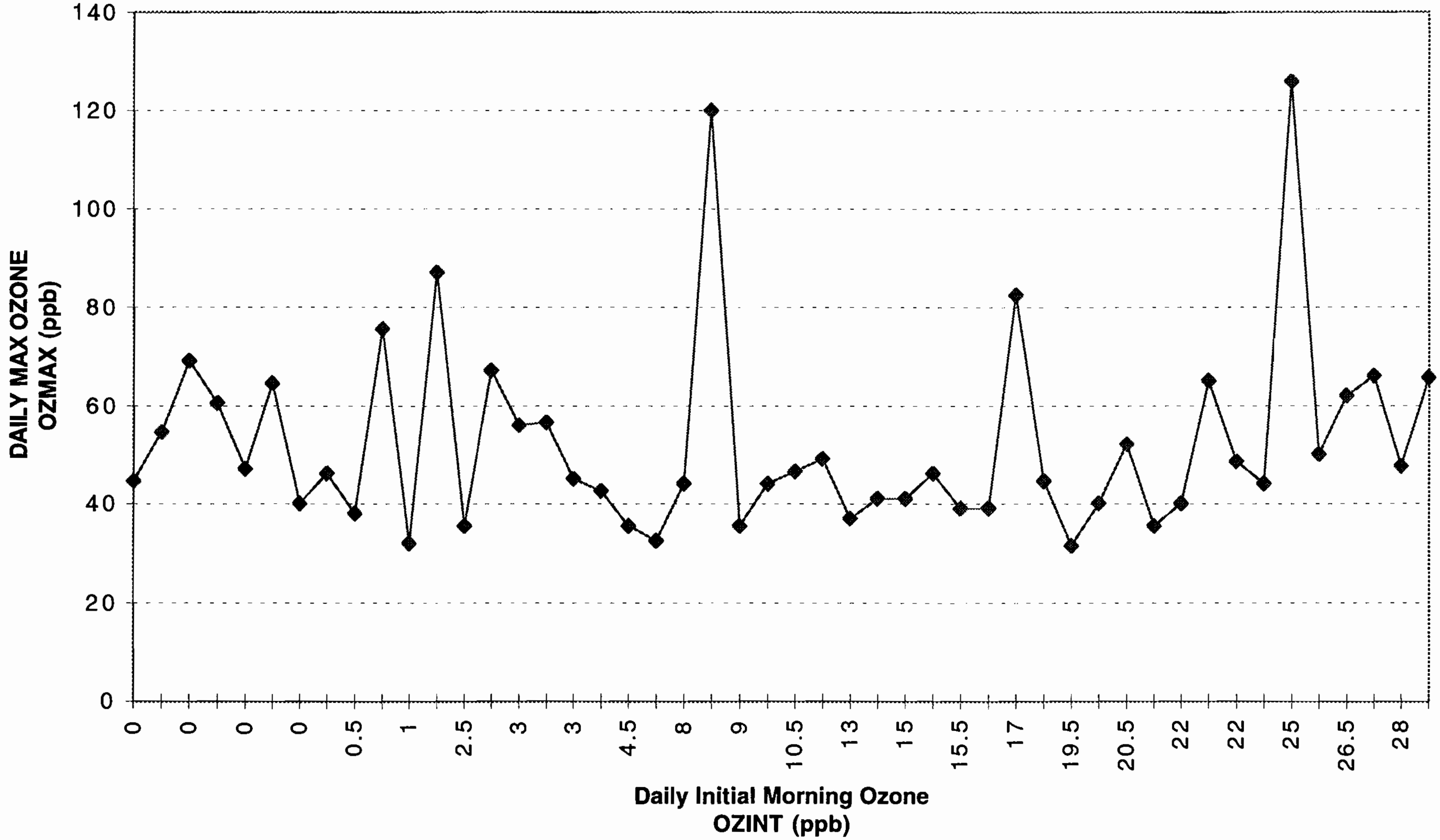


**Figure 180. SAN ANTONIO DEC'95-SEP'96 MODEL T10.3**
**DATA CONTROLLED FOR DAYS DURING OZONE EPISODES GT 1-DAY**
**AND DAYS WITH TRAFFIC CONGESTION PARAMETER GE 50th PERCENTILE**

**DAILY MAX OZONE AS A FUNCTION OF AVERAGE DAILY CLOUD COVER FROM 6AM TO TIME OF MAX OZONE**

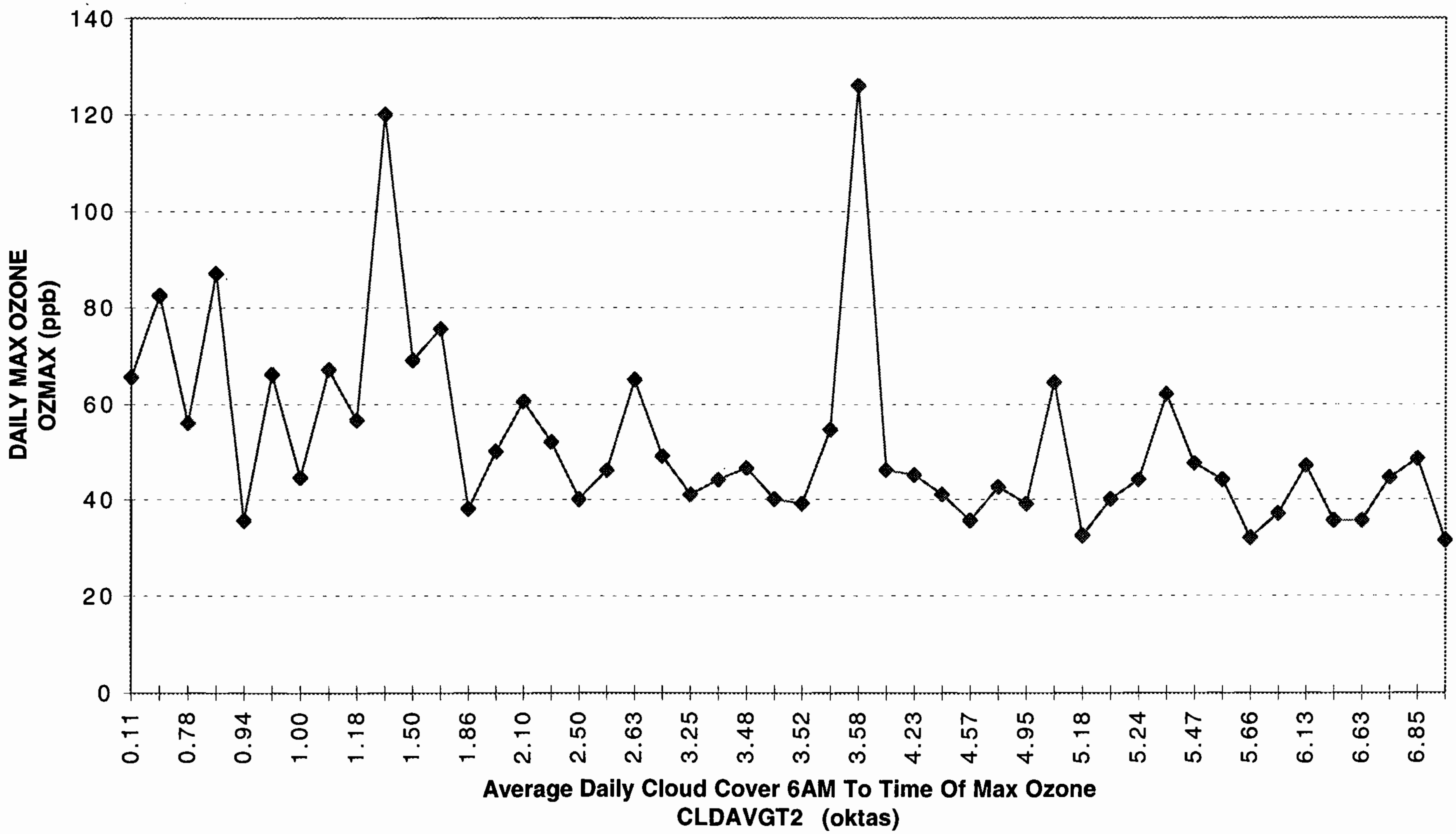


**Figure 181. SAN ANTONIO DEC'95-SEP'96 MODEL T10.3**
**DATA CONTROLLED FOR DAYS DURING OZONE EPISODES GT 1-DAY**
**AND DAYS WITH TRAFFIC CONGESTION PARAMETER GE 50th PERCENTILE**

**DAILY MAX OZONE AS A FUNCTION OF AVERAGE DAILY WIND SPEED FROM 6AM TO TIME OF MAX OZONE**

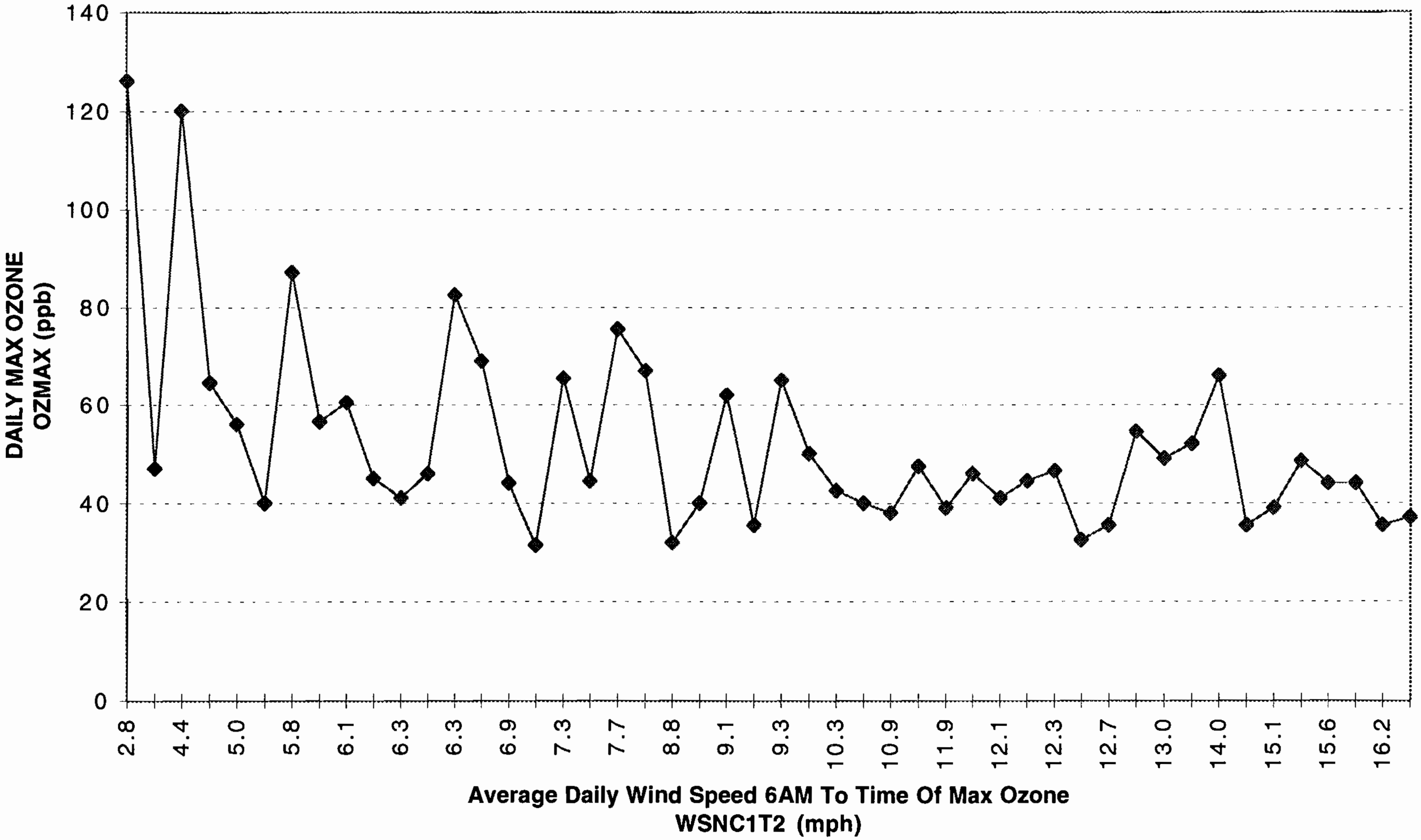


**Figure 182. SAN ANTONIO DEC'95-SEP'96 MODEL T10.3**
**DATA CONTROLLED FOR DAYS DURING OZONE EPISODES GT 1-DAY**
**AND DAYS WITH TRAFFIC CONGESTION PARAMETER GE 50th PERCENTILE**

**DAILY MAX OZONE AS A FUNCTION OF MAXIMUM DAILY TEMPERATURE**

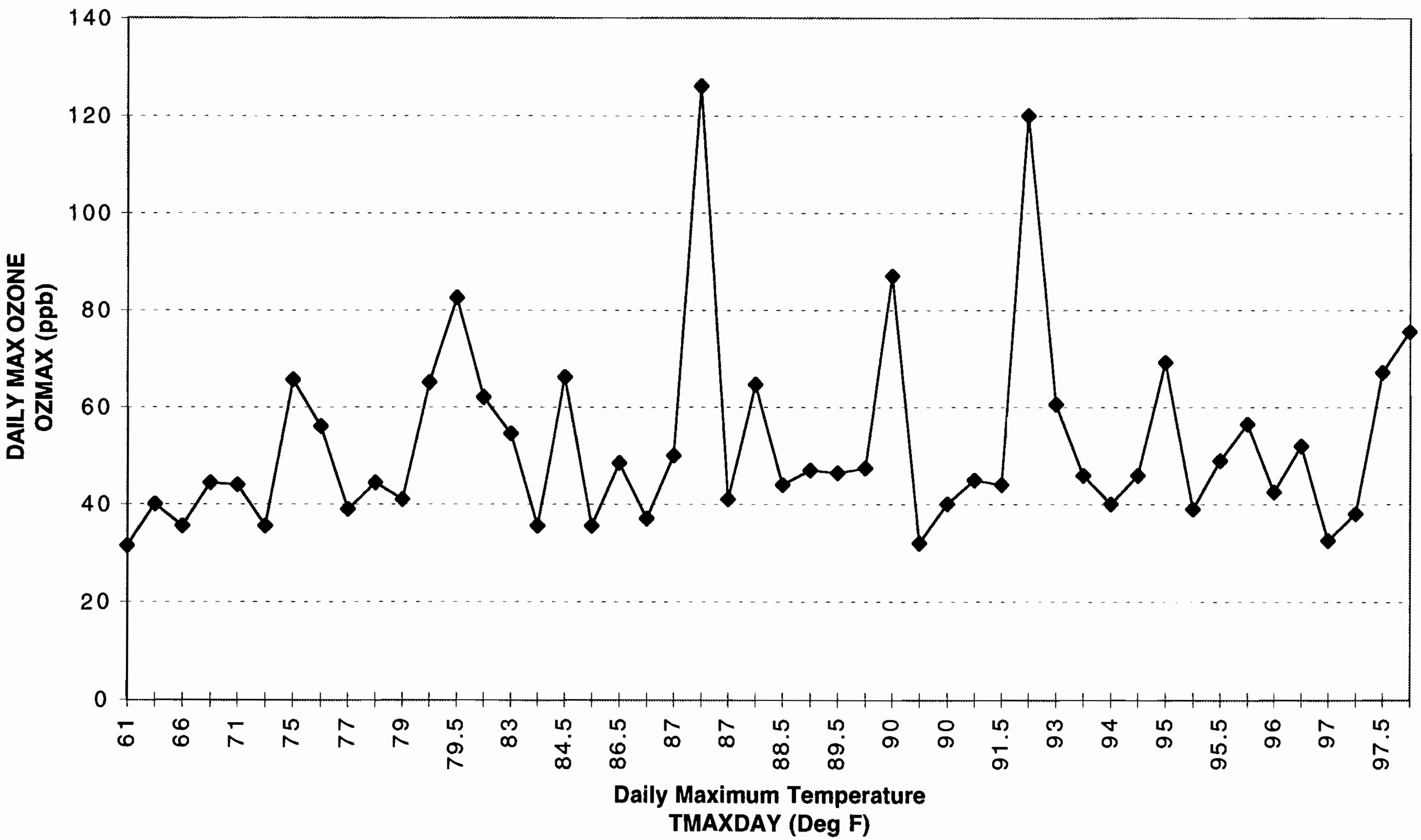


**Figure 183. SAN ANTONIO DEC'95-SEP'96 MODEL T10.3**
**DATA CONTROLLED FOR DAYS DURING OZONE EPISODES GT 1-DAY**
**AND DAYS WITH TRAFFIC CONGESTION PARAMETER GE 50th PERCENTILE**

**DAILY MAX OZONE AS A FUNCTION OF AVERAGE DAILY WIND SPEED**

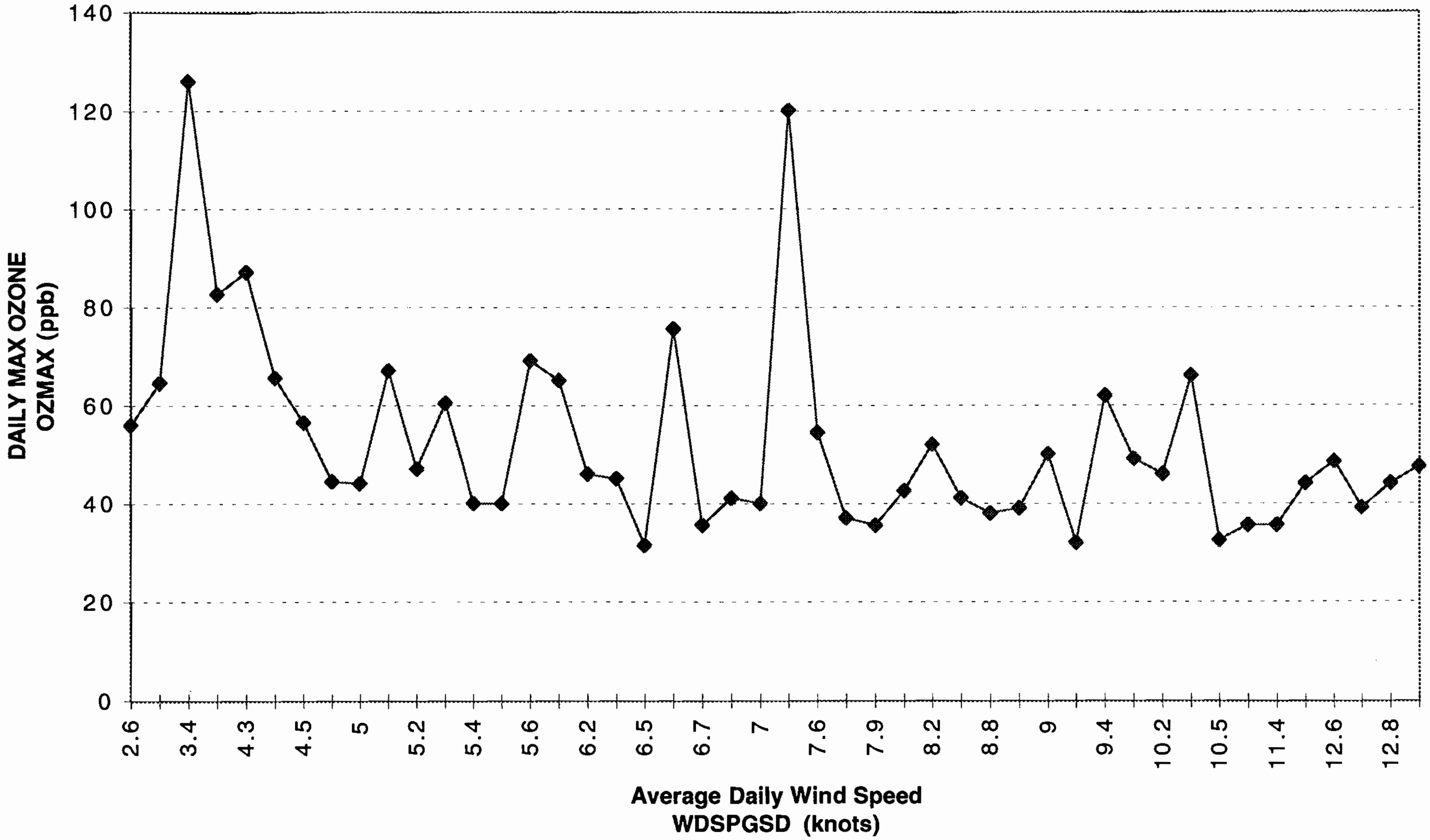


Figure 184. SAN ANTONIO DEC'95-SEP'96 MODEL T10.3
DATA CONTROLLED FOR DAYS DURING OZONE EPISODES GT 1-DAY
AND DAYS WITH TRAFFIC CONGESTION PARAMETER GE 50th PERCENTILE

DAILY MAX OZONE AS A FUNCTION OF MINIMUM DAILY TEMPERATURE

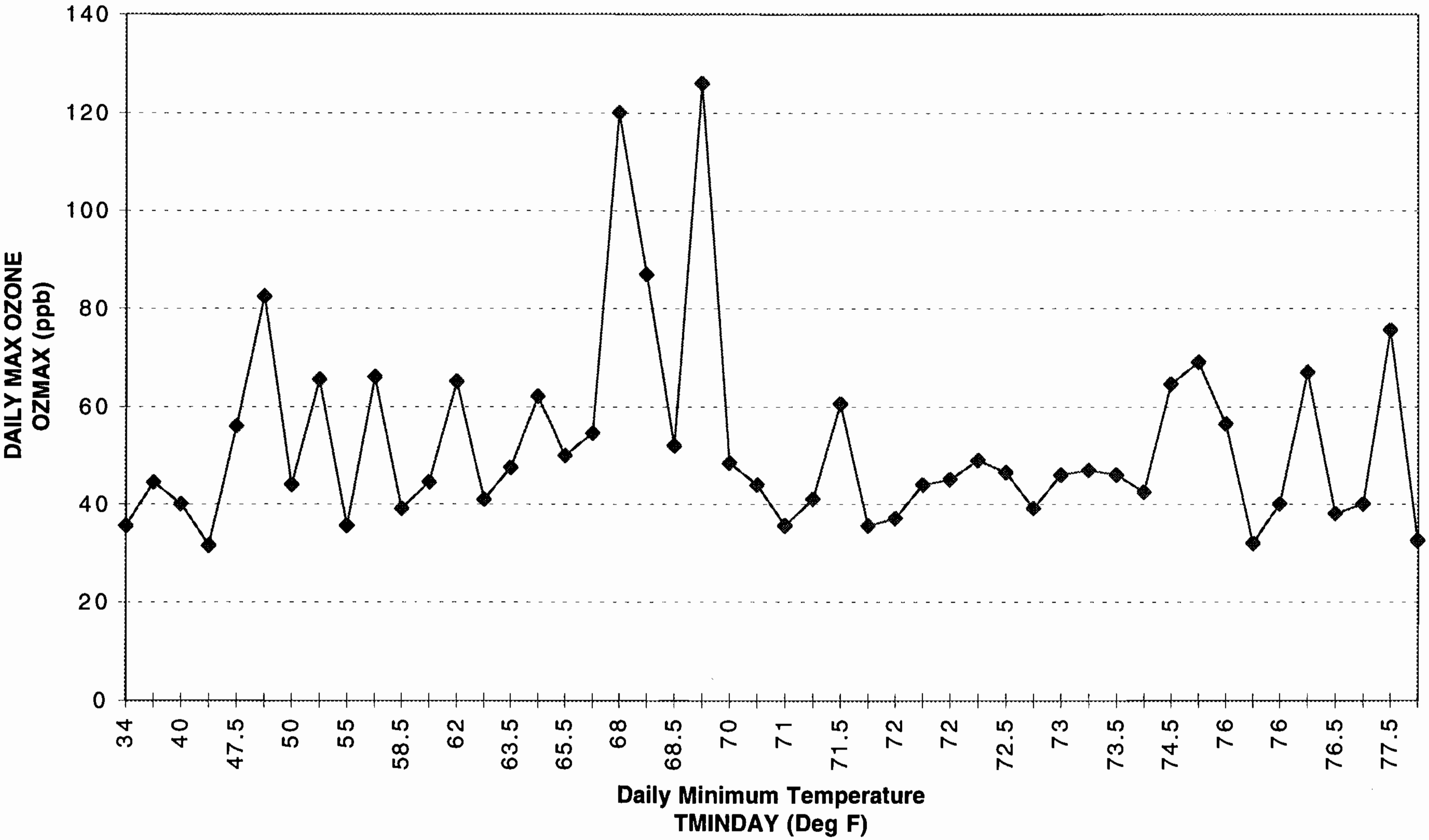
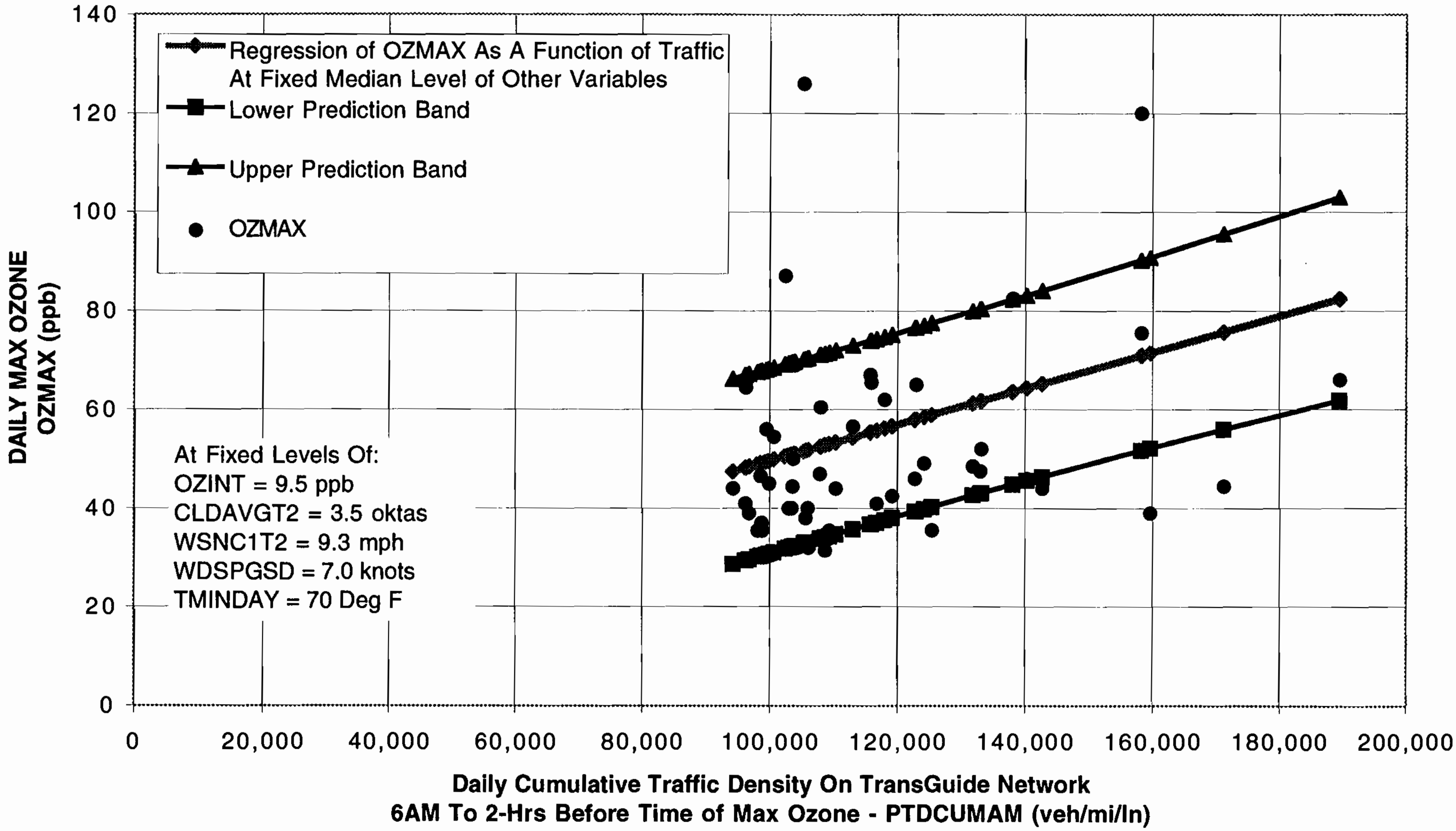


**Figure 185. SAN ANTONIO DEC'95-SEP'96 MODEL T10.3**
**DATA CONTROLLED FOR DAYS DURING OZONE EPISODES GT 1-DAY**
**AND DAYS WITH TRAFFIC CONGESTION PARAMETER GE 50th PERCENTILE**

**80% CONFIDENCE PREDICTION BAND ON DAILY MAX OZONE AS A FUNCTION OF TRANSGUIDE NETWORK CUMULATIVE TRAFFIC DENSITY AT FIXED LEVELS OF OTHER INDEPENDENT VARIABLES (MEDIAN LEVELS)**



## SCENARIO 20

In Scenario 20, we repeat the analysis of Scenario 18 of controlling for days that are a part of an ozone episode greater than a 1-day episode and controlling for the months of data collected that occur during the peak ozone season. However, rather than control for days where the traffic congestion parameter is less than the median value, in Scenario 20 we control for days where the traffic congestion parameter is greater than or equal to the median value.

The results of the analysis reveal an association between the daily traffic congestion parameter PTDCUMAM and the daily peak ozone concentration where such a relationship was not detected in Scenario 18. Table 50 summarizes the results of the model and Table 51 summarizes the strength of the traffic parameter's association with the daily peak ozone. Confidence intervals of the parameter's model coefficient per 10,000 units of PTDCUMAM are calculated at the 80, 90 and 95 percent confidence levels. Table 52 summarizes the raw data sorted by date for Scenario 20.

When comparing the results of Scenario 20 with Scenario 19, we encounter the same outcome as when we compare the results of Scenario 6 to Scenario 5 and Scenario 16 to Scenario 15. Unexpectedly, when the data was controlled for the months during the peak ozone season, the strength of association between the daily traffic congestion parameter and the daily peak ozone concentration decreased as evidenced by the traffic parameter's coefficient and by the bivariate correlation. Also, in all three cases the scenarios controlled for the traffic congestion parameter to be greater than or equal to the median value.

It might be the case that when controlling for the months of the peak ozone season and high traffic congestion levels, the traffic congestion parameter becomes less of an explanatory variable due to the fact that we are controlling for high levels of the parameter and thus there is less variation in the daily peak ozone concentration for the traffic parameter to explain. This would be similar to what happens when controlling for low levels of cloud cover.

We can say that under this scenario at the 80 percent confidence level, the potential increase to the daily peak ozone in ppb per a 10,000 unit increase in the traffic congestion parameter PTDCUMAM has a range from about 0.7 to about 4.5 ppb. It is equally likely that the potential increase in the daily peak ozone would fall at any point within this range. The results presented in Table 51 also indicate that the traffic congestion parameter remains significant at the 90 percent confidence level but not at the 95 percent confidence level.

Figure 186 and Figure 187 plot the daily peak ozone (OZMAX) and the daily cumulative traffic congestion parameter (PTDCUMAM) over time. Figure 188 through Figure 194 graphically summarize the relationships between the response and predictor variables. Figure 195 depicts an 80 percent confidence level prediction band of OZMAX as a function of PTDCUMAM while holding the other significant variables constant at their median levels.

We can say at an 80 percent confidence level that the daily peak ozone will fall somewhere within the band on Figure 195. As shown, the 80 percent confidence prediction band with this linear model under this scenario does not encompass two of the higher daily peak ozone concentrations at fixed median levels of the other significant variables.

*Table 50. Scenario 20 Results*

| | | | RANGE OF VARIABLES |
|---|---|---|---|
| **DATA CONTROLS** | 1) APR 1996 - SEP 1996<br><br>2) DAYS DURING OZONE EPISODES GREATER THAN 1-DAY EPISODES<br><br>3) HIGH LEVEL OF TRAFFIC CONGESTION | | |
| **MODEL SIGNIFICANT PARAMETERS (units)** | Y --- OZMAX (ppb)<br>XO --- INTERCEPT<br>X1 --- PTDCUMAM (veh/mi/ln)<br>X2 --- CLDAVGT2 (oktas)<br>X3 --- WSNC1T2 (mph)<br>X4 --- TMAXDAY (Deg F) | | 32 to 126<br><br>98,590 to 189,530<br>0.1 to 6.8<br>2.8 to 16.7<br>78.5 to 98.5 |
| **SIGNIFICANT PARAMETER COEFFICIENT ESTIMATES AND BIVARIATE CORRELATIONS (r)** | 192.70240157 X0<br>0.00025648 X1<br>-4.01386110 X2<br>-2.86596740 X3<br>-1.38489181 X4 | <br>0.2426<br>-0.5573<br>-0.5638<br>-0.1117 | |
| **TRAFFIC VARIABLE COEFFICIENT CONFIDENCE-LEVEL** | 91% | | |
| **MODEL R-SQUARE** | 0.59 | | |
| **TRAFFIC VARIABLE PARTIAL R-SQUARE** | 0.0299 | | |
| **SAMPLE SIZE** | 32 | | |
| **1st ORDER AUTO-CORRELATION Durbin-Watson Statistic** | 2.118 | | |
| **P-VALUE SUPPORTING $H_O$: No Heteroskedasticity** | 0.0552 | | |

*Table 51. Scenario 20 Results (cont.)*

| | |
|---|---|
| **TRAFFIC PARAMETER ESTIMATE PER 10,000 PTDCUMAM** | **2.5648** |
| **TRAFFIC PARAMETER ESTIMATE STANDARD ERROR PER 10,000 PTDCUMAM** | **1.4433** |
| **n** | **32** |
| **k** | **4** |
| **df** | **27** |
| $t_{(.10)}$ | **1.314** |
| $t_{(.05)}$ | **1.703** |
| $t_{(.025)}$ | **2.052** |
| **80 PERCENT CONFIDENCE INTERVAL OF TRAFFIC PARAMETER ESTIMATE PER 10,000 UNITS OF PTDCUMAM** | **0.67 to 4.46** |
| **90 PERCENT CONFIDENCE INTERVAL OF TRAFFIC PARAMETER ESTIMATE PER 10,000 UNITS OF PTDCUMAM** | **0.11 to 5.02** |
| **95 PERCENT CONFIDENCE INTERVAL OF TRAFFIC PARAMETER ESTIMATE PER 10,000 UNITS OF PTDCUMAM** | **-0.40 to 5.53** |

*Table 52. Scenario 20 Data*

| DATECST | OZMAX | PTDCUMAM | OZINT | CLDAVGT2 | WSNC1T2 | TMAXDAY | WDSPGSD | TMINDAY |
|---|---|---|---|---|---|---|---|---|
| 4/8/96 | 82.5 | 138,109 | 17 | 0.13 | 6.33 | 79.5 | 3.9 | 49 |
| 4/12/96 | 47.5 | 132,995 | 28 | 5.47 | 11.05 | 90 | 13 | 63.5 |
| 4/19/96 | 52 | 133,172 | 20.5 | 2.22 | 13.75 | 97 | 8.2 | 68.5 |
| 4/20/96 | 54.5 | 100,705 | 0 | 3.52 | 12.99 | 83 | 7.6 | 68 |
| 4/22/96 | 44.5 | 171,288 | 18 | 6.68 | 12.13 | 78.5 | . | 61 |
| 5/1/96 | 66 | 189,529 | 27 | 0.95 | 14.05 | 84.5 | 10.3 | 56 |
| 5/3/96 | 48.5 | 131,880 | 22 | 6.85 | 15.18 | 86.5 | 12.6 | 70 |
| 5/7/96 | 35.5 | 125,392 | 9 | 6.46 | 14.33 | 84.5 | 11.3 | 72 |
| 5/8/96 | 35.5 | 98,806 | 21.5 | 6.63 | 16.21 | 83 | 11.4 | 71 |
| 5/9/96 | 37 | 98,731 | 13 | 5.85 | 16.66 | 87 | 7.8 | 72 |
| 5/11/96 | 50 | 103,665 | 26 | 1.91 | 9.94 | 87 | 9 | 65.5 |
| 5/14/96 | 44 | 110,364 | 22 | 5.24 | 15.60 | 88.5 | 12 | 70 |
| 5/15/96 | 44 | 142,712 | 9.5 | 3.47 | 16.04 | 91.5 | 12.8 | 72 |
| 5/20/96 | 39 | 159,670 | 16.5 | 3.52 | 15.05 | 95.5 | 12.6 | 73 |
| 5/21/96 | 46 | 140,220 | 15 | 2.52 | 11.94 | 95 | 10.2 | 73.5 |
| 5/22/96 | 49 | 124,190 | 12 | 2.67 | 13.04 | 95.5 | 10.1 | 72.5 |
| 6/1/96 | 46.5 | 98,585 | 10.5 | 3.48 | 12.32 | 89.5 | . | 72.5 |
| 6/3/96 | 120 | 158,194 | 8 | 1.27 | 4.36 | 91.5 | 7.5 | 68 |
| 6/17/96 | 56.5 | 113,027 | 3 | 1.18 | 5.98 | 96 | 4.5 | 76 |
| 6/18/96 | 67 | 115,719 | 2.5 | 1.11 | 8.31 | 97.5 | 5.2 | 76.5 |
| 7/1/96 | 69 | 103,954 | 0 | 1.50 | 6.61 | 95 | 5.6 | 75 |
| 7/19/96 | 32.5 | 105,349 | 7 | 5.18 | 12.41 | 97 | 10.5 | 78 |
| 7/25/96 | 42.5 | 119,147 | 3.5 | 4.78 | 10.25 | 96 | 8.1 | 73.5 |
| 7/26/96 | 46 | 122,801 | 0.5 | 3.77 | 6.32 | 93.5 | 6.2 | 73 |
| 7/31/96 | 38 | 105,650 | 0.5 | 1.86 | 10.90 | 97 | 8.8 | 76.5 |
| 8/12/96 | 75.5 | 158,255 | 0.5 | 1.58 | 7.70 | 98.5 | 6.5 | 77.5 |
| 8/20/96 | 40 | 103,438 | 19.5 | 3.48 | 5.08 | 94 | 5.4 | 77 |
| 8/21/96 | 60.5 | 108,007 | 0 | 2.10 | 6.09 | 93 | 5.3 | 71.5 |
| 9/3/96 | 45 | 99,919 | 3 | 4.23 | 6.11 | 91 | 6.4 | 72 |
| 9/4/96 | 47 | 107,909 | 0 | 6.13 | 3.60 | 89 | 5.2 | 73 |
| 9/11/96 | 87 | 102,476 | 2 | 0.90 | 5.78 | 90 | 4.3 | 68 |
| 9/12/96 | 126 | 105,346 | 25 | 3.58 | 2.85 | 87 | 3.4 | 69 |
| 9/18/96 | 32 | 106,072 | 1 | 5.66 | 8.77 | 90 | 9 | 76 |
| 9/19/96 | 40 | 105,998 | 0 | 5.21 | 8.81 | 90 | 7 | 76 |

**Figure 186. SAN ANTONIO APR'96-SEP'96 MODEL T19.1**
**DATA CONTROLLED FOR DAYS DURING OZONE EPISODES GT 1-DAY**
**AND DAYS WITH TRAFFIC CONGESTION PARAMETER GE 50th PERCENTILE**

**DAILY MAXIMUM OZONE CONCENTRATIONS**

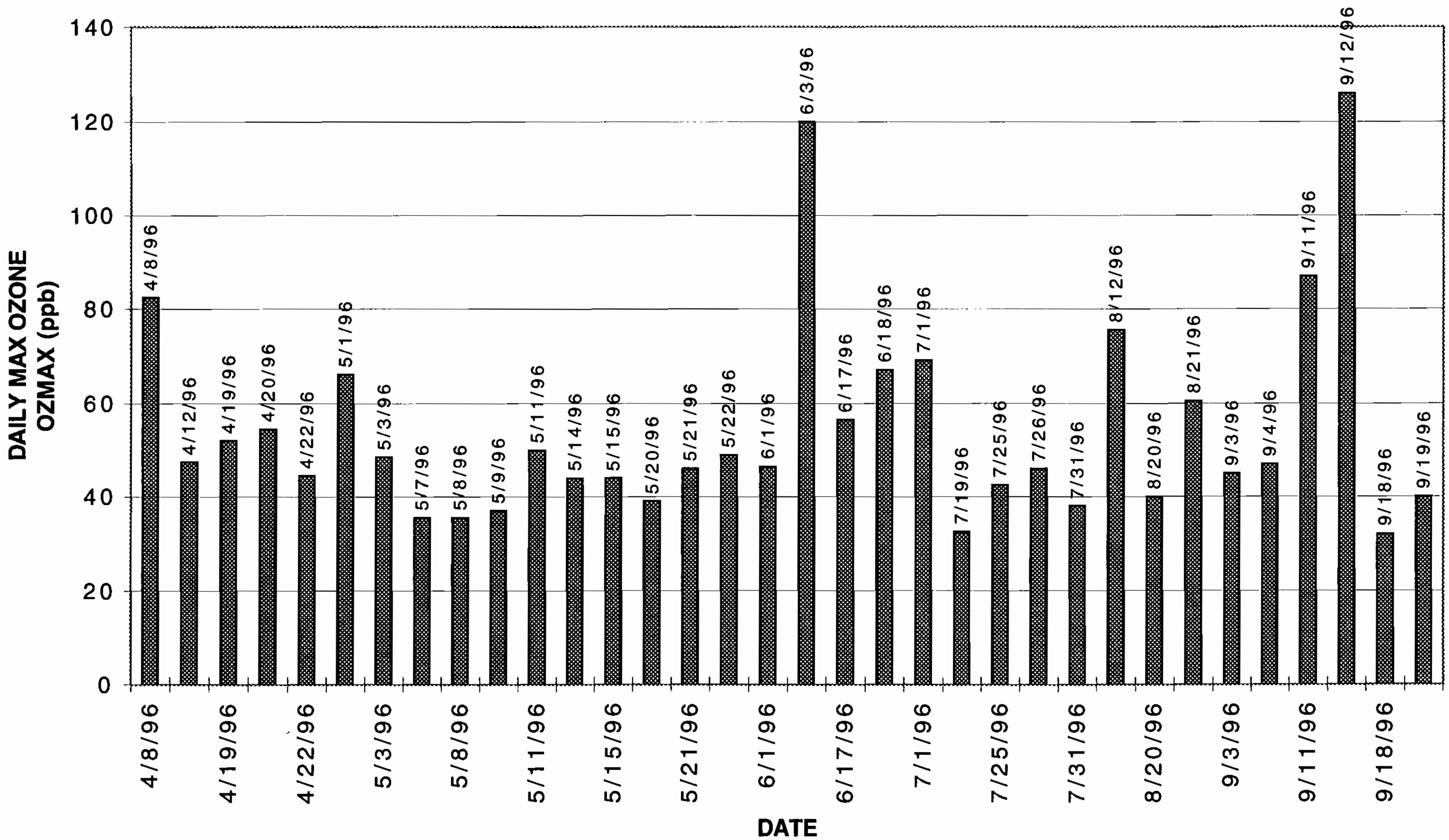


Figure 187. SAN ANTONIO APR'96-SEP'96 MODEL T19.1
DATA CONTROLLED FOR DAYS DURING OZONE EPISODES GT 1-DAY
AND DAYS WITH TRAFFIC CONGESTION PARAMETER GE 50th PERCENTILE

DAILY CUMULATIVE TRANSGUIDE NETWORK TRAFFIC DENSITY
6AM to 2 HOURS BEFORE TIME of MAX OZONE

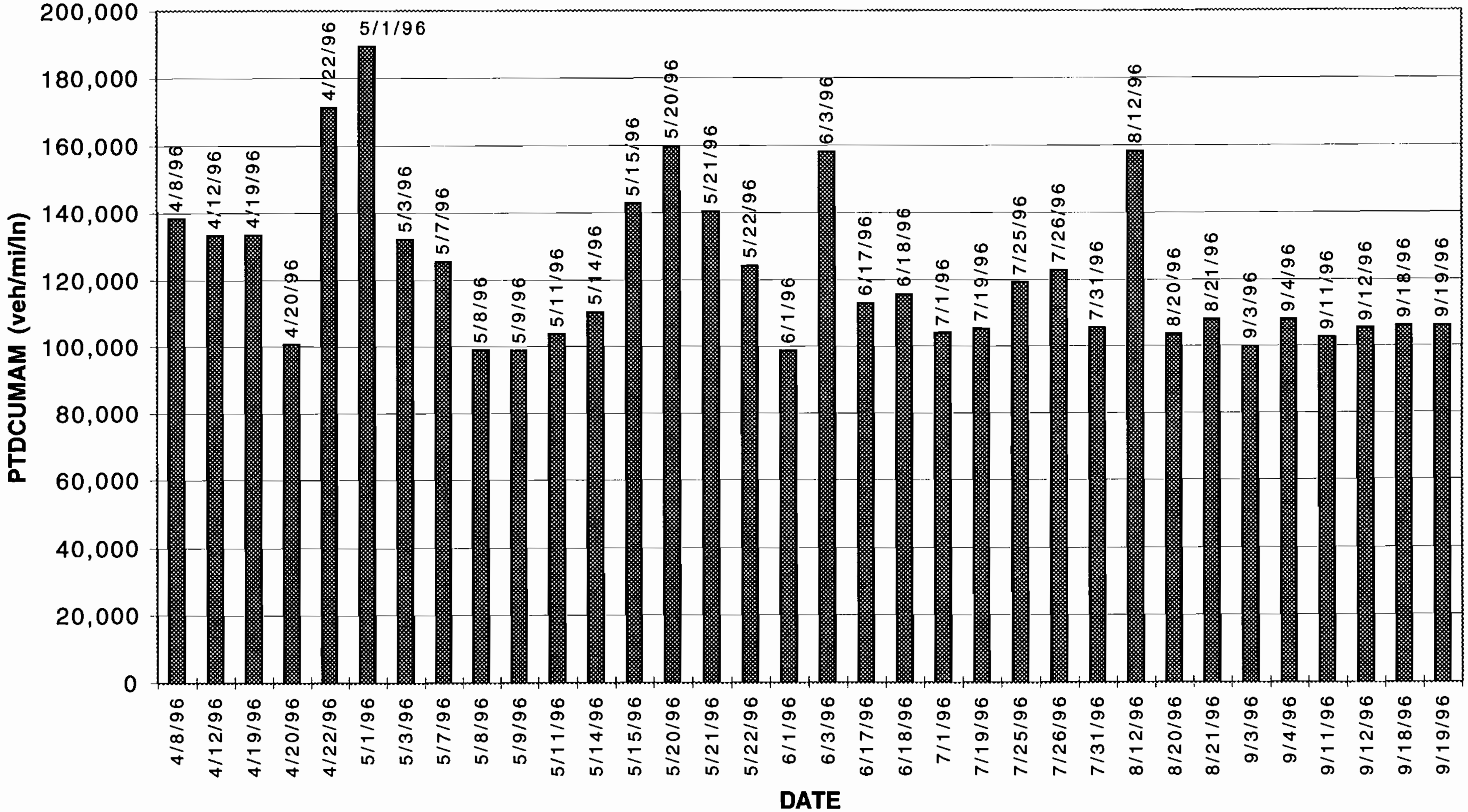


**Figure 188. SAN ANTONIO APR'96-SEP'96 MODEL T19.1**
**DATA CONTROLLED FOR DAYS DURING OZONE EPISODES GT 1-DAY**
**AND DAYS WITH TRAFFIC CONGESTION PARAMETER GE 50th PERCENTILE**

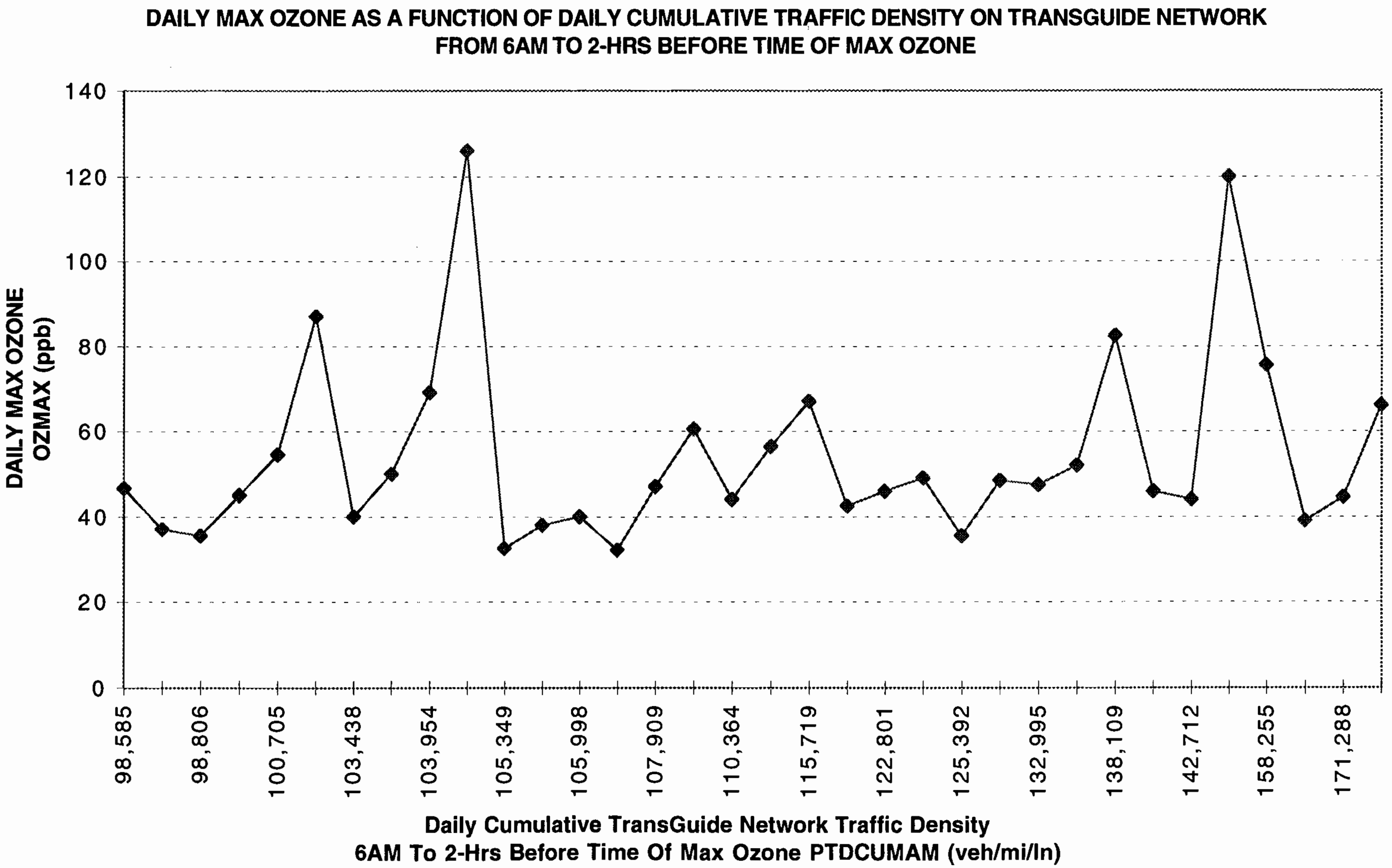


Figure 189. SAN ANTONIO APR'96-SEP'96 MODEL T19.1
DATA CONTROLLED FOR DAYS DURING OZONE EPISODES GT 1-DAY
AND DAYS WITH TRAFFIC CONGESTION PARAMETER GE 50th PERCENTILE

DAILY MAX OZONE AS A FUNCTION OF DAILY INITIAL MORNING OZONE

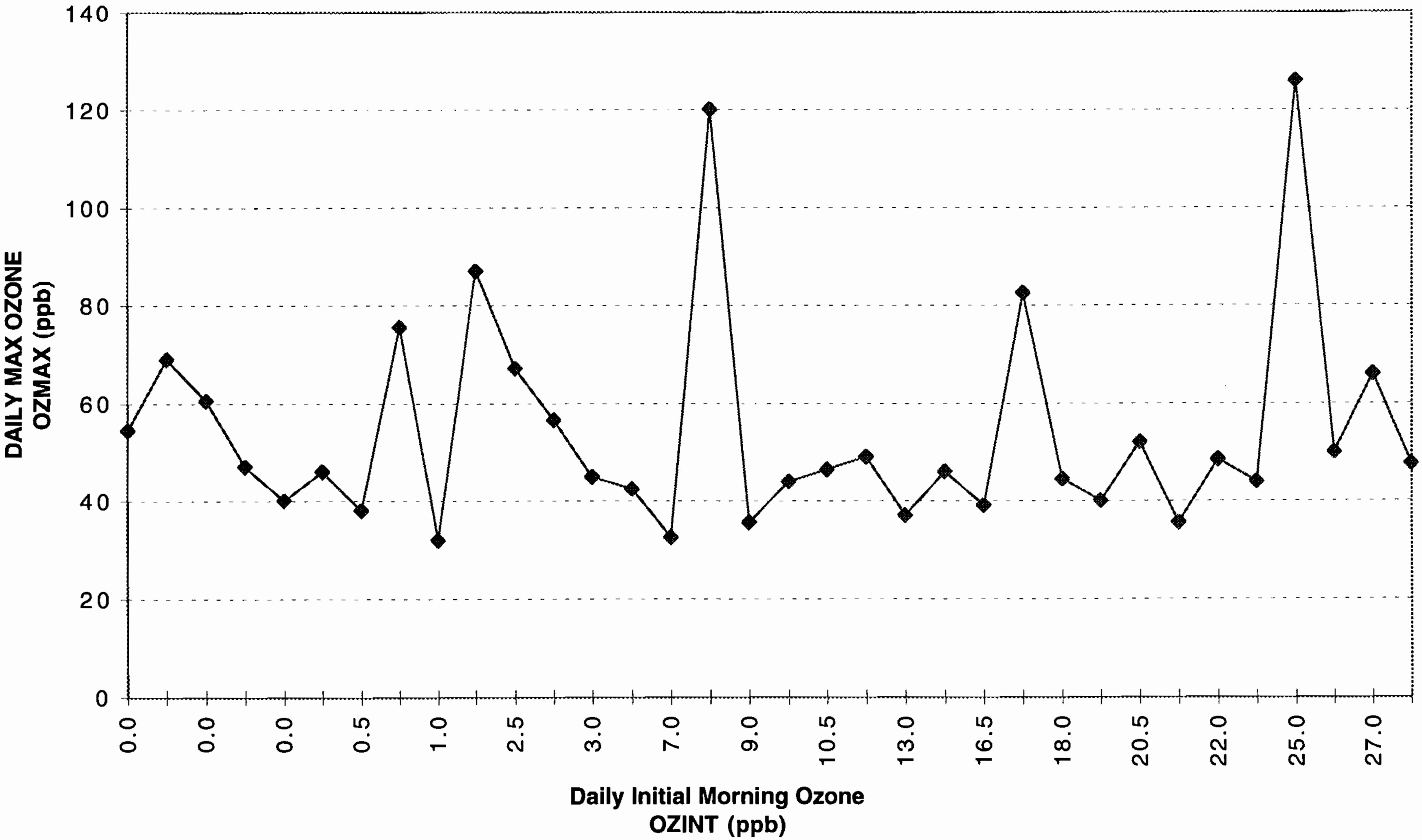


Figure 190. SAN ANTONIO APR'96-SEP'96 MODEL T19.1
DATA CONTROLLED FOR DAYS DURING OZONE EPISODES GT 1-DAY
AND DAYS WITH TRAFFIC CONGESTION PARAMETER GE 50th PERCENTILE

DAILY MAX OZONE AS A FUNCTION OF AVERAGE DAILY CLOUD COVER FROM 6AM TO TIME OF MAX OZONE

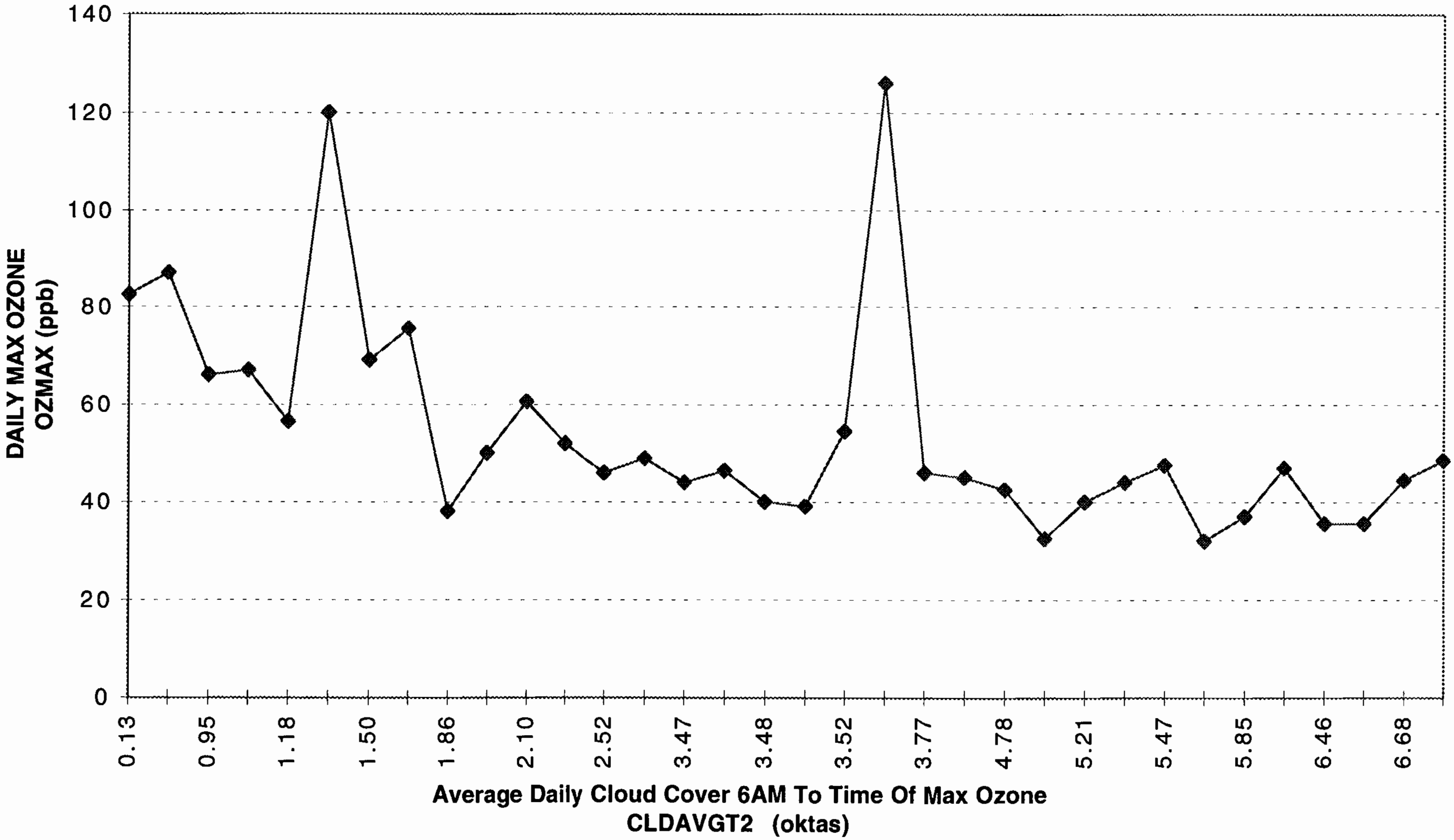


Figure 191. SAN ANTONIO APR'96-SEP'96 MODEL T19.1
DATA CONTROLLED FOR DAYS DURING OZONE EPISODES GT 1-DAY
AND DAYS WITH TRAFFIC CONGESTION PARAMETER GE 50th PERCENTILE

DAILY MAX OZONE AS A FUNCTION OF AVERAGE DAILY WIND SPEED FROM 6AM TO TIME OF MAX OZONE

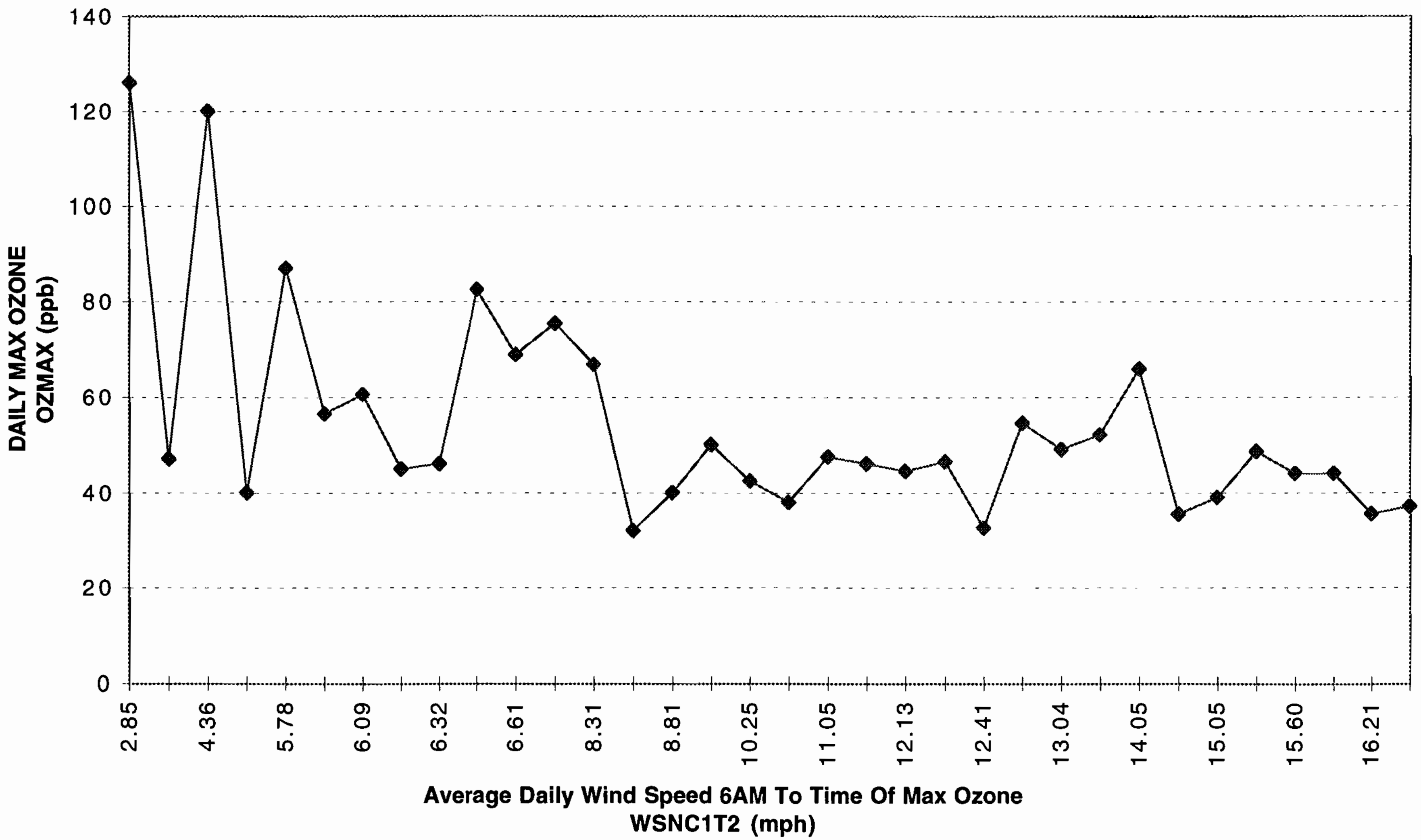


Figure 192. SAN ANTONIO APR'96-SEP'96 MODEL T19.1
DATA CONTROLLED FOR DAYS DURING OZONE EPISODES GT 1-DAY
AND DAYS WITH TRAFFIC CONGESTION PARAMETER GE 50th PERCENTILE

DAILY MAX OZONE AS A FUNCTION OF MAXIMUM DAILY TEMPERATURE

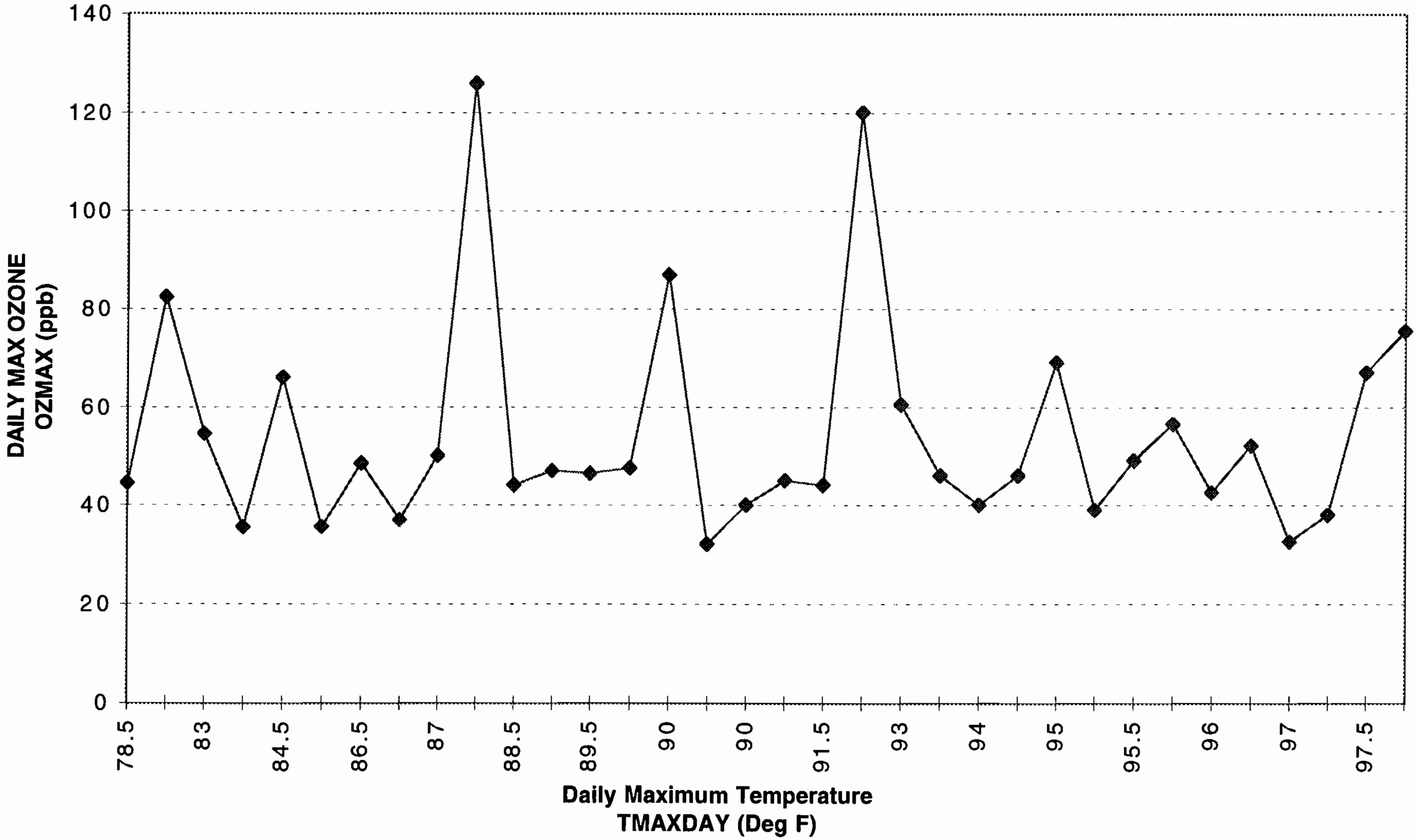


Figure 193. SAN ANTONIO APR'96-SEP'96 MODEL T19.1
DATA CONTROLLED FOR DAYS DURING OZONE EPISODES GT 1-DAY
AND DAYS WITH TRAFFIC CONGESTION PARAMETER GE 50th PERCENTILE

DAILY MAX OZONE AS A FUNCTION OF AVERAGE DAILY WIND SPEED

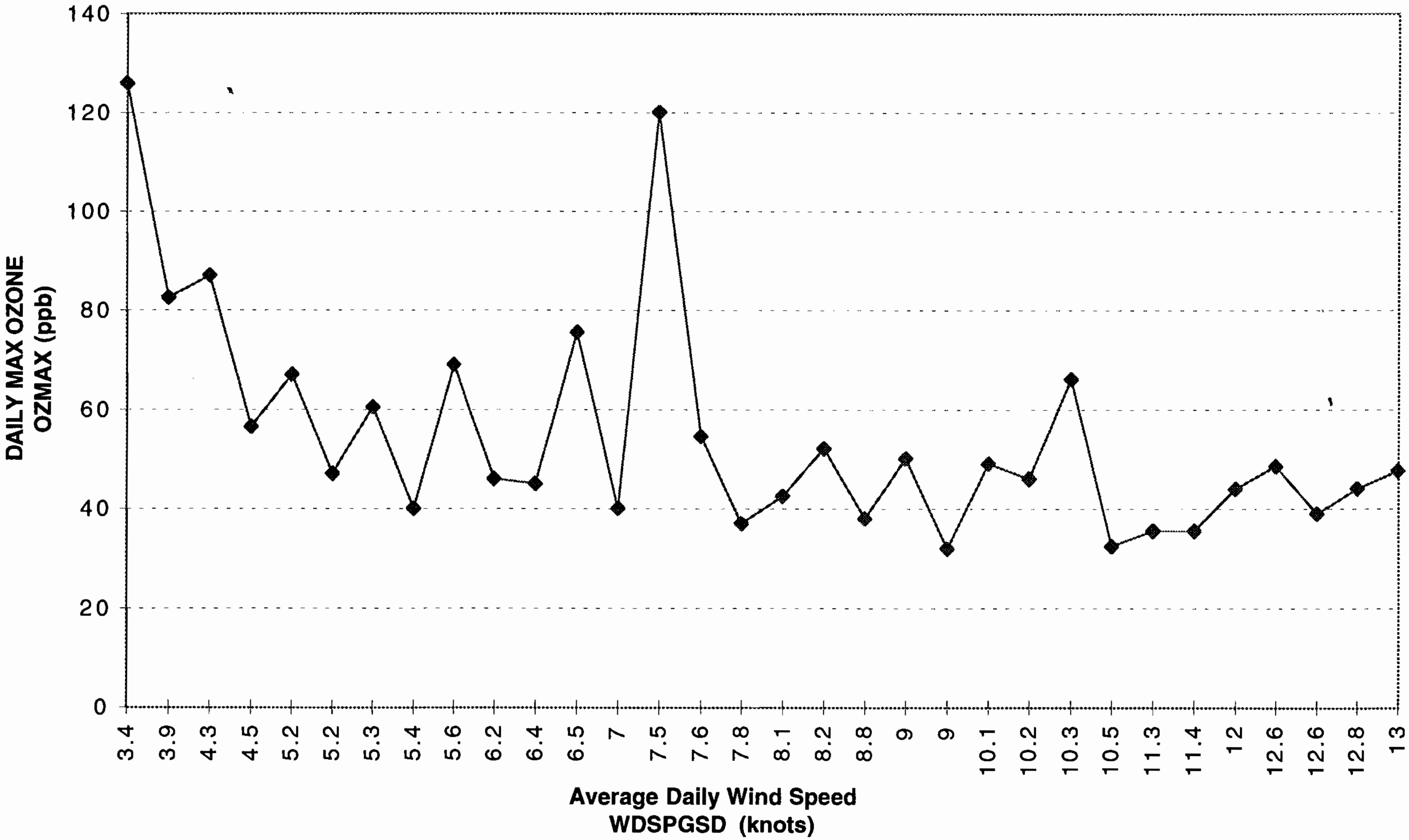


**Figure 194. SAN ANTONIO APR'96-SEP'96 MODEL T19.1**
**DATA CONTROLLED FOR DAYS DURING OZONE EPISODES GT 1-DAY**
**AND DAYS WITH TRAFFIC CONGESTION PARAMETER GE 50th PERCENTILE**

**DAILY MAX OZONE AS A FUNCTION OF MINIMUM DAILY TEMPERATURE**

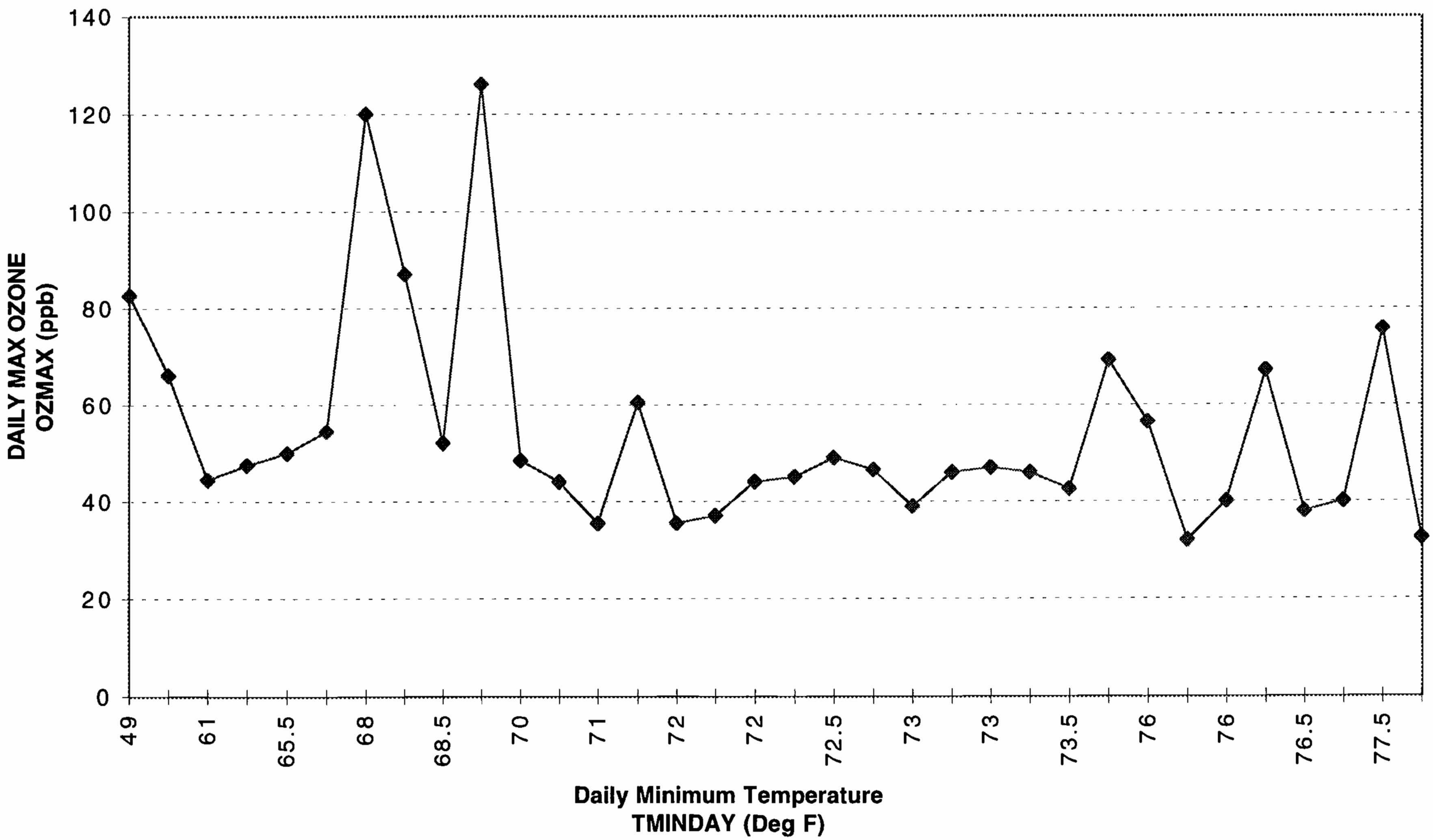
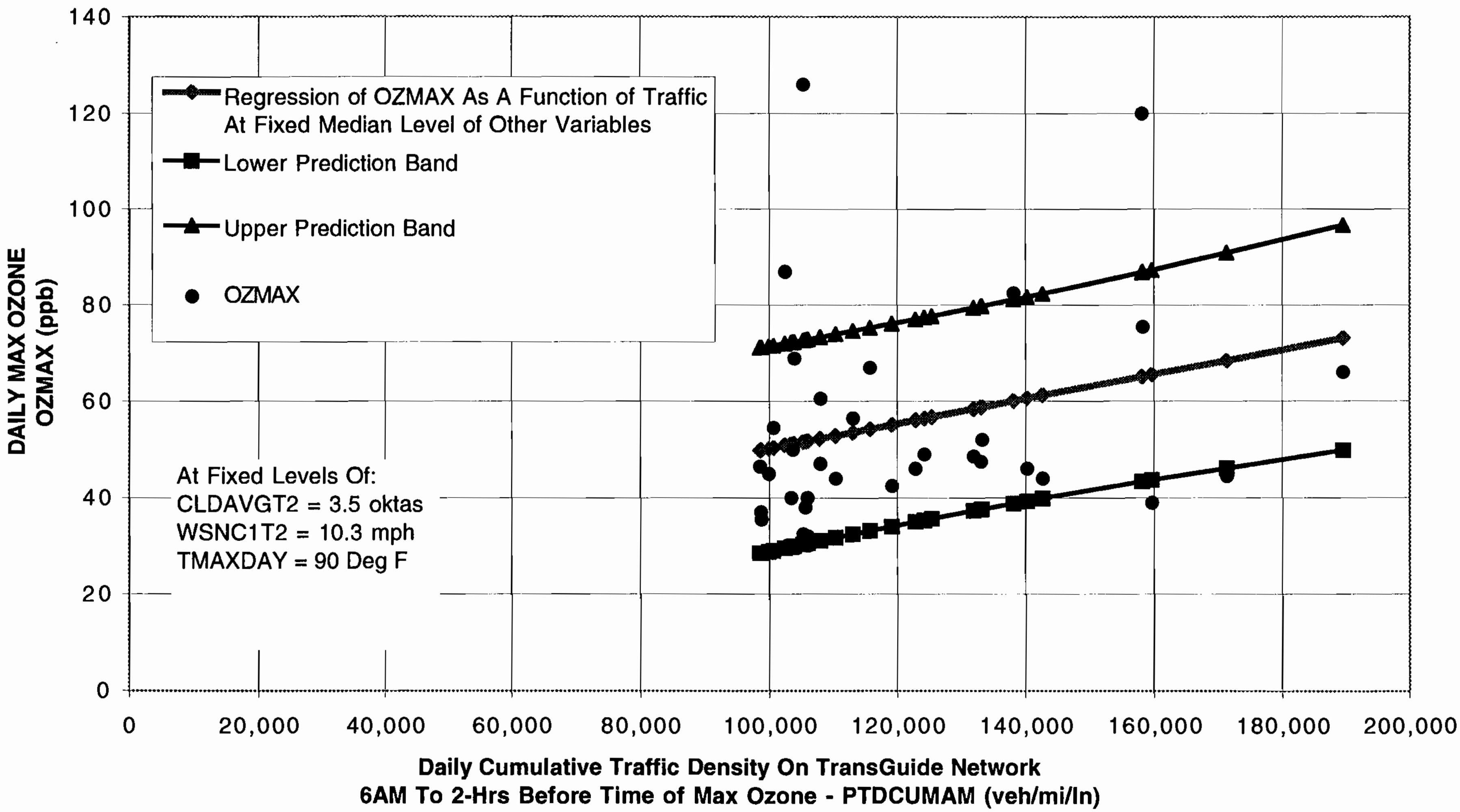


**Figure 195. SAN ANTONIO APR'96-SEP'96 MODEL T19.1**
**DATA CONTROLLED FOR DAYS DURING OZONE EPISODES GT 1-DAY**
**AND DAYS WITH TRAFFIC CONGESTION PARAMETER GE 50th PERCENTILE**

**80% CONFIDENCE PREDICTION BAND ON DAILY MAX OZONE AS A FUNCTION OF TRANSGUIDE NETWORK CUMULATIVE TRAFFIC DENSITY AT FIXED LEVELS OF OTHER INDEPENDENT VARIABLES (MEDIAN LEVELS)**



## CHAPTER 5. RESULTS OF SCENARIOS: PART IV

The last four scenarios assessed are controlled for ozone episodes except that each episode is summarized and used as one data observation as opposed to analyzing all days during episodes as was done in the previous twelve scenarios. Each episode is summarized by considering the following variables:

- The peak episodic ozone concentration (EMAXOZMX);
- The summation of the daily traffic congestion parameter PTDCUMAM over the length of the episode (EPSUMPTD);
- The remaining variables considered in the analyses, OZINT, CLDAVGT2, WSNC1T2, WDSPGSD, TMAXDAY and TMINDAY, occur on the last day of the episode.

Scenario 21 through Scenario 24 can be summarized as follows:

Scenario 21 Controls:

- All Ozone Episodes

Scenario 22 Controls:

- Controlled for Peak Ozone Season
- All Ozone Episodes

Scenario 23 Controls:

- All Ozone Episodes
- Average Episodic Cloud Cover Less Than or Equal to 4 Oktas

Scenario 24 Controls:

- Controlled for Peak Ozone Season
- All Ozone Episodes
- Average Episodic Cloud Cover Less Than or Equal to 4 Oktas

### SCENARIO 21

In Scenario 21, we analyze all months of data from December 1995 through September 1996 and control for the occurrence of ozone episodes. Table 53 summarizes the results of the model and Table 54 summarizes the strength of the cumulative episodic traffic parameter's association with the episodic peak ozone. Confidence intervals of the parameter's model coefficient per 10,000 units of EPSUMPTD are calculated at the 80, 90 and 95 percent confidence levels and are presented in Table 54. Table 55 summarizes the raw data sorted by date for Scenario 21.

We can say that under this scenario at the 80 percent confidence level, the potential increase to a peak episodic ozone level in ppb per a 10,000 unit increase in the traffic congestion parameter EPSUMPTD has a range from about 0.2 to about 0.6 ppb. It is equally likely that the potential increase in the episodic peak ozone would fall at any point within this range. The results presented in Table 54 also indicate that the traffic congestion parameter remains significant at the 95 percent confidence level. We should point out that, based on the data collected, ozone episodes last anywhere from one to six days. If a daily 10,000 unit increase in the traffic congestion parameter PTDCUMAM were to occur for each day over a 3-day episode, that would imply a 30,000 unit increase in EPSUMPTD and an increase in EMAXOZMX over a range from about 0.6 to 1.8 ppb at the 80% confidence level.

Figure 196 and Figure 197 plot the peak episodic ozone (EMAXOZMX) and the cumulative episodic traffic congestion parameter (EPSUMPTD) over time. Figure 198 through Figure 204 graphically summarize the relationships between the response and predictor variables. Figure 205 depicts an 80 percent confidence level prediction band of EMAXOZMX as a function of EPSUMPTD while holding the other significant variables constant at their median levels.

We can say at an 80 percent confidence level that the daily peak ozone will fall somewhere within the band on Figure 205. As shown, the 80 percent confidence prediction band with this linear model under this scenario does not encompass several of the higher peak episodic ozone concentrations at fixed median levels of the other significant variables.

*Table 53. Scenario 21 Results*

| | | | RANGE OF VARIABLES |
|---|---|---|---|
| **DATA CONTROLS** | 1) DEC 95-SEP 96<br><br>2) ALL OZONE EPISODES; ONE OBSERVATION OF DATA SUMMARIZED PER EPISODE | | |
| **MODEL SIGNIFICANT PARAMETERS (units)** | Y --- EMAXOZMX (ppb)<br>XO --- INTERCEPT<br>X1 --- EPSUMPTD (veh/mi/ln)<br>X2 --- OZINT (ppb)<br>X3 --- CLDAVGT2 (oktas)<br>X4 --- WSNC1T2 (mph)<br>X5 --- TMAXDAY (°F) | | 25.5 to 126<br><br>22,200 to 500,000<br>0 to 47<br>0 to 8<br>2.8 to 19.0<br>45 to 99.5 |
| **SIGNIFICANT PARAMETER COEFFICIENT ESTIMATES AND BIVARIATE CORRELATIONS (r)** | 36.56075948 X0<br>0.00003830 X1<br>0.58549827 X2<br>-2.47231244 X3<br>-2.54235116 X4<br>0.43271257 X5 | <br>0.3405<br>0.1027<br>-0.3085<br>-0.4394<br>0.3288 | |
| **TRAFFIC VARIABLE COEFFICIENT CONFIDENCE-LEVEL** | 98% | | |
| **MODEL R-SQUARE** | 0.53 | | |
| **TRAFFIC VARIABLE PARTIAL R-SQUARE** | 0.11 | | |
| **SAMPLE SIZE** | 67 | | |
| **1st ORDER AUTO-CORRELATION Durbin-Watson Statistic** | 1.692 | | |
| **P-VALUE SUPPORTING $H_O$: No Heteroskedasticity** | 0.6543 | | |

*Table 54. Scenario 21 Results (cont.)*

| | |
|---|---|
| **TRAFFIC PARAMETER ESTIMATE PER 10,000 EPSUMPTD** | **0.3830** |
| **TRAFFIC PARAMETER ESTIMATE STANDARD ERROR PER 10,000 EPSUMPTD** | **0.1577** |
| **n** | **67** |
| **k** | **5** |
| **df** | **61** |
| $t_{(.10)}$ | **1.282** |
| $t_{(.05)}$ | **1.645** |
| $t_{(.025)}$ | **1.960** |
| **80 PERCENT CONFIDENCE INTERVAL OF TRAFFIC PARAMETER ESTIMATE PER 10,000 UNITS OF EPSUMPTD** | **0.18 to 0.59** |
| **90 PERCENT CONFIDENCE INTERVAL OF TRAFFIC PARAMETER ESTIMATE PER 10,000 UNITS OF EPSUMPTD** | **0.12 to 0.64** |
| **95 PERCENT CONFIDENCE INTERVAL OF TRAFFIC PARAMETER ESTIMATE PER 10,000 UNITS OF EPSUMPTD** | **0.07 to 0.69** |

*Table 55. Scenario 21 Data*

| DATECST | EMAXOZMX | EPSUMPTD | OZINT | CLDAVGT2 | WSNC1T2 | TMAXDAY | WDSPGSD | TMINDAY |
|---|---|---|---|---|---|---|---|---|
| 12/4/95 | 65.5 | 207,563 | 34 | 0.11 | 7.33 | 75 | 4.5 | 53 |
| 12/6/95 | 66 | 113,569 | 30.5 | 1.22 | 6.14 | 74 | 5.7 | 51 |
| 12/9/95 | 27.5 | 71,780 | 10 | 2.50 | 19.04 | 50 | 13.5 | 32.5 |
| 12/14/95 | 41 | 420,373 | 15 | 3.25 | 12.10 | 79 | 8.4 | 63.5 |
| 12/23/95 | 25.5 | 112,202 | 20 | 4.59 | 8.11 | 47.5 | 6.4 | 36 |
| 12/25/95 | 37 | 33,500 | 6.5 | 5.68 | 5.78 | 59 | 3.5 | 44.5 |
| 12/27/95 | 46 | 93,809 | 0 | 1.88 | 5.88 | 63 | 3.9 | 37 |
| 1/4/96 | 35.5 | 260,582 | 2.5 | 0.94 | 9.27 | 66 | 6.7 | 34 |
| 1/7/96 | 36 | 101,587 | 24.5 | 0.25 | 13.16 | 45 | 8.6 | 25 |
| 1/9/96 | 43.5 | 112,755 | 19 | 0.00 | 10.30 | 64 | 7.2 | 35 |
| 1/15/96 | 56 | 277,690 | 3 | 0.78 | 4.99 | 75 | 2.6 | 47.5 |
| 1/21/96 | 52 | 91,988 | 27 | 0.00 | 7.97 | 71 | 3.6 | 45 |
| 1/25/96 | 44 | 115,551 | 0 | 4.32 | 9.55 | 67 | 5.5 | 38 |
| 1/29/96 | 41 | 81,415 | 0 | 5.46 | 3.90 | 75 | 2.3 | 55 |
| 2/6/96 | 44 | 266,135 | 8 | 5.50 | 6.93 | 71 | 5 | 50 |
| 2/9/96 | 42 | 102,967 | 0 | 6.42 | 4.12 | 75.5 | 3.7 | 51 |
| 2/14/96 | 45 | 296,215 | 24.5 | 0.86 | 10.92 | 79.5 | 8.1 | 49 |
| 2/17/96 | 53 | 65,381 | 2 | 2.00 | 10.35 | 69 | 6.3 | 35 |
| 3/8/96 | 37.5 | 116,633 | 28 | 3.10 | 13.96 | 48 | 9.6 | 30 |
| 3/10/96 | 62 | 54,976 | 0 | 0.42 | 8.18 | 61 | 4.4 | 30 |
| 3/15/96 | 65 | 240,890 | 22 | 2.63 | 9.32 | 79.5 | 5.9 | 62 |
| 3/21/96 | 59 | 265,756 | 0 | 0.13 | 7.82 | 73 | 4.8 | 38.5 |
| 3/23/96 | 48.5 | 22,214 | 46.5 | 8.00 | 15.54 | 66.5 | 14.3 | 61.5 |
| 3/28/96 | 60.5 | 141,006 | 21 | 2.70 | 5.47 | 71 | 4 | 42.5 |
| 3/30/96 | 63 | 48,388 | 18 | 3.78 | 8.17 | 86 | 8 | 64 |
| 4/1/96 | 63 | 128,397 | 47 | 0.44 | 14.51 | 74 | 8.5 | 56 |
| 4/4/96 | 54.5 | 71,110 | 24 | 7.27 | 7.87 | 81 | 9 | 60.5 |
| 4/8/96 | 82.5 | 269,548 | 17 | 0.13 | 6.33 | 79.5 | 3.9 | 49 |
| 4/10/96 | 62.5 | 81,961 | 16 | 0.57 | 6.55 | 86 | 4.8 | 56.5 |
| 4/13/96 | 59.5 | 185,460 | 7 | 6.00 | 7.22 | 91 | . | 58.5 |
| 4/16/96 | 63.5 | 144,610 | 0 | 1.64 | 9.72 | 77 | 7.2 | 46 |
| 4/20/96 | 54.5 | 233,877 | 0 | 3.52 | 12.99 | 83 | 7.6 | 68 |
| 5/1/96 | 66 | 189,529 | 27 | 0.95 | 14.05 | 84.5 | 10.3 | 56 |
| 5/4/96 | 55 | 220,106 | 29 | 5.71 | 13.45 | 87 | 12.6 | 70 |
| 5/9/96 | 37 | 322,929 | 13 | 5.85 | 16.66 | 87 | 7.8 | 72 |
| 5/12/96 | 68 | 155,426 | 15.5 | 7.48 | 6.76 | 86 | 5 | 65 |
| 5/16/96 | 50 | 332,172 | 14 | 3.50 | 14.36 | 93.5 | 12.5 | 71.5 |
| 5/22/96 | 49 | 500,020 | 12 | 2.67 | 13.04 | 95.5 | 10.1 | 72.5 |
| 5/24/96 | 48.5 | 129,182 | 19 | 5.68 | 16.73 | 89 | 14.2 | 75 |

*Table 55. Scenario 21 Data (continued)*

| DATECST | EMAXOZMX | EPSUMPTD | OZINT | CLDAVGT2 | WSNC1T2 | TMAXDAY | WDSPGSD | TMINDAY |
|---|---|---|---|---|---|---|---|---|
| 5/27/96 | 53 | 99,086 | 14.5 | 5.70 | 7.32 | 89 | 9.5 | 69.5 |
| 6/3/96 | 120 | 332,336 | 8 | 1.27 | 4.36 | 91.5 | 7.5 | 68 |
| 6/9/96 | 84 | 135,218 | 12.5 | 1.68 | 8.37 | 90.5 | 4.5 | 64.5 |
| 6/13/96 | 49 | 106,210 | 2.5 | 3.81 | 8.06 | 95 | 7 | 76 |
| 6/18/96 | 67 | 228,746 | 2.5 | 1.11 | 8.31 | 97.5 | 5.2 | 76.5 |
| 6/20/96 | 70 | 97,560 | 1.5 | 1.06 | 7.57 | 99.5 | 7.5 | 76.5 |
| 6/24/96 | 52.5 | 119,447 | 6.5 | 3.78 | 7.86 | 92 | 9.6 | 76.5 |
| 6/27/96 | 39 | 89,069 | 0 | 3.14 | 11.58 | 91 | 8.9 | 76.5 |
| 7/4/96 | 105.5 | 388,130 | 4.5 | 1.00 | 3.15 | 96 | 5.6 | 74.5 |
| 7/7/96 | 63 | 47,373 | 7 | 1.80 | 6.52 | 97.5 | 7.3 | 76 |
| 7/10/96 | 48.5 | 120,871 | 1 | 5.41 | 7.43 | 90 | 8.1 | 73.5 |
| 7/12/96 | 42 | 146,141 | 3.5 | 2.65 | 10.43 | 96 | 10.5 | 77.5 |
| 7/14/96 | 46.5 | 87,219 | 8.5 | 3.39 | 10.66 | 96.5 | 9.3 | 76.5 |
| 7/20/96 | 39 | 163,602 | 7.5 | 2.53 | 10.58 | 98 | 9.4 | 76.5 |
| 7/23/96 | 42 | 105,730 | 5 | 3.17 | 11.04 | 98.5 | 9.3 | 78 |
| 7/26/96 | 46 | 241,948 | 0.5 | 3.77 | 6.32 | 93.5 | 6.2 | 73 |
| 7/28/96 | 40.5 | 46,771 | 7 | 5.97 | 6.83 | 94.5 | 8.4 | 77 |
| 8/12/96 | 75.5 | 196,187 | 0.5 | 1.58 | 7.70 | 98.5 | 6.5 | 77.5 |
| 8/15/96 | 44 | 138,841 | 0 | 3.79 | 7.05 | 94 | 4.9 | 69.5 |
| 8/17/96 | 42.5 | 68,937 | 11.5 | 2.90 | 7.91 | 94 | 8.3 | 75.5 |
| 8/21/96 | 60.5 | 211,444 | 0 | 2.10 | 6.09 | 93 | 5.3 | 71.5 |
| 8/23/96 | 38.5 | 109,606 | 0.5 | 7.57 | 10.78 | 86 | 8.9 | 74 |
| 8/28/96 | 39 | 242,001 | 1 | 5.26 | 5.75 | 91 | 7 | 76 |
| 9/1/96 | 62 | 113,079 | 18 | 3.05 | 6.24 | 86 | 4.7 | 75.5 |
| 9/5/96 | 64.5 | 304,155 | 0 | 5.11 | 4.53 | 87.5 | 3.1 | 74.5 |
| 9/12/96 | 126 | 391,512 | 25 | 3.58 | 2.85 | 87 | 3.4 | 69 |
| 9/16/96 | 67 | 91,576 | 0.5 | 2.72 | 5.30 | 94.5 | 4.2 | 75 |
| 9/22/96 | 52 | 382,840 | 19 | 7.07 | 7.50 | 88 | 6.3 | 76 |
| 9/24/96 | 54 | 104,865 | 0 | 4.27 | 5.18 | 90 | 6.2 | 72 |

**Figure 196. SAN ANTONIO DECEMBER'95 - SEPTEMBER'96 MODEL T43.0**
**DATA CONTROLLED FOR OZONE EPISODES - ONE OBSERVATION OF DATA PER EPISODE**

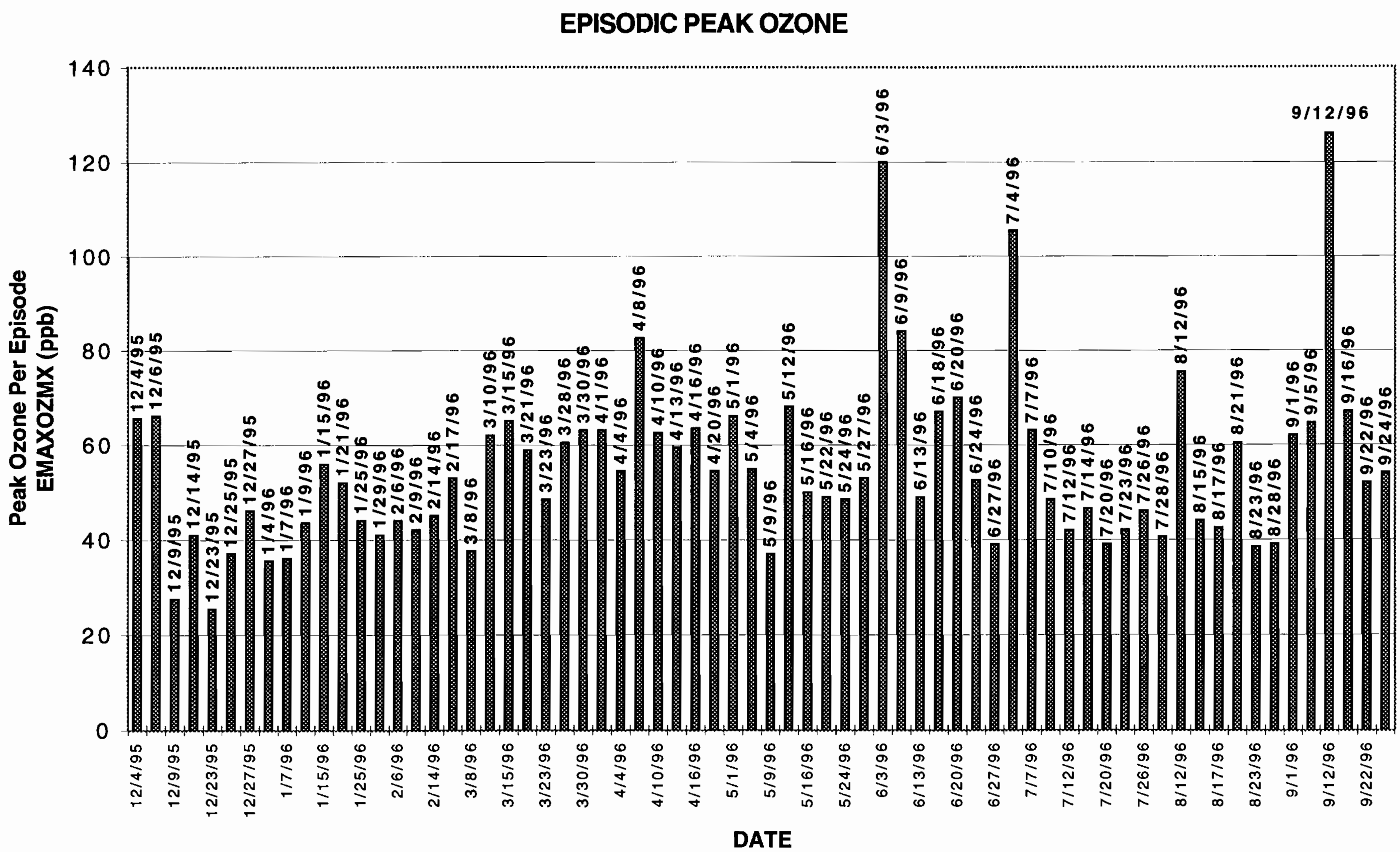


**Figure 197. SAN ANTONIO DECEMBER'95 - SEPTEMBER'96 MODEL T43.0**
**DATA CONTROLLED FOR OZONE EPISODES - ONE OBSERVATION OF DATA PER EPISODE**

**EPISODIC CUMULATIVE TRANSGUIDE NETWORK TRAFFIC DENSITY 6AM TO 2-HRS BEFORE TIME OF MAX OZONE**

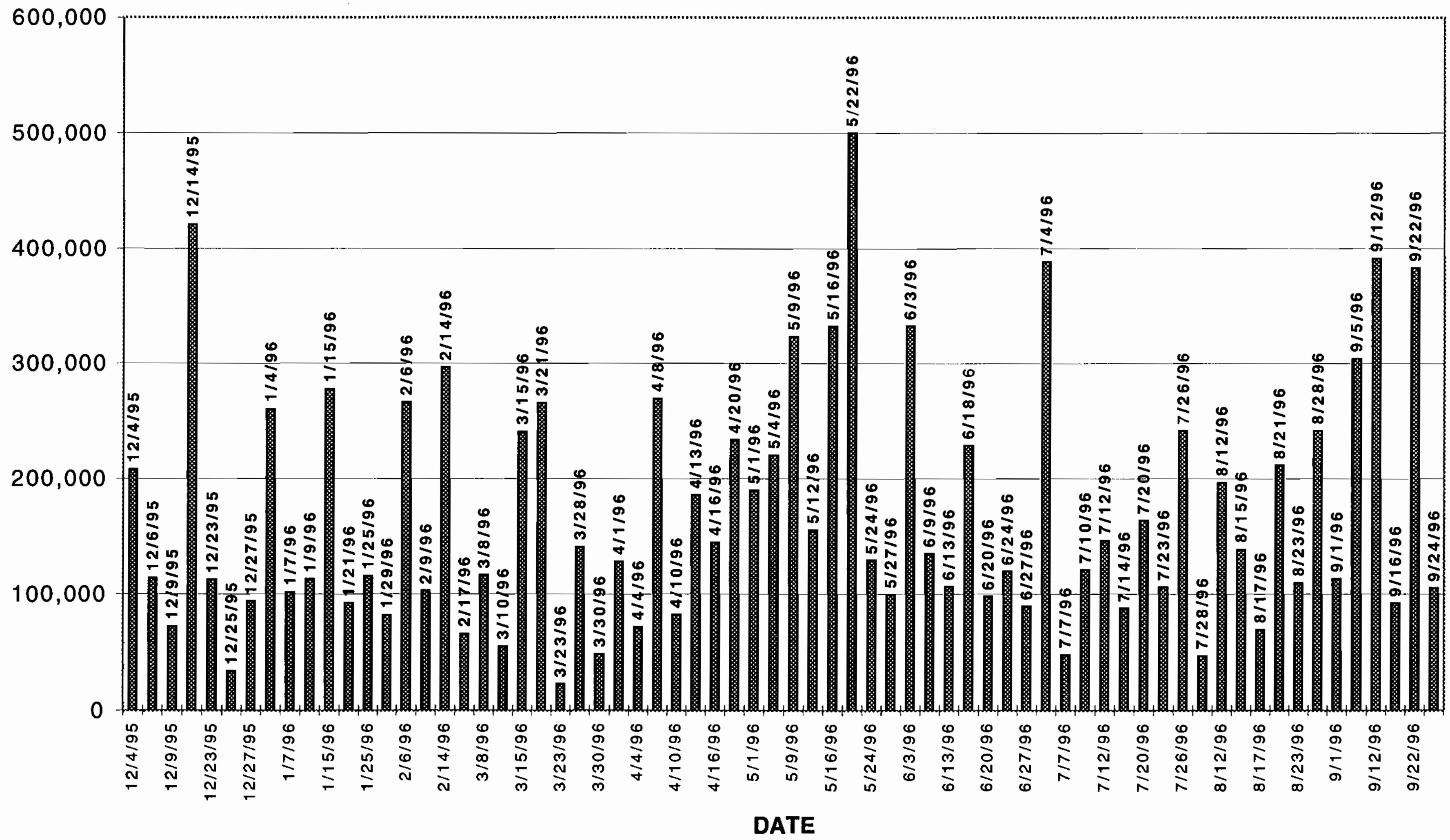


Figure 198. SAN ANTONIO DECEMBER'95 - SEPTEMBER'96 MODEL T43.0
DATA CONTROLLED FOR OZONE EPISODES - ONE OBSERVATION OF DATA PER EPISODE

EPISODIC PEAK OZONE AS A FUNCTION OF
EPISODIC CUMULATIVE TRANSGUIDE NETWORK TRAFFIC DENSITY 6AM TO 2-HRS BEFORE TIME OF MAX OZONE

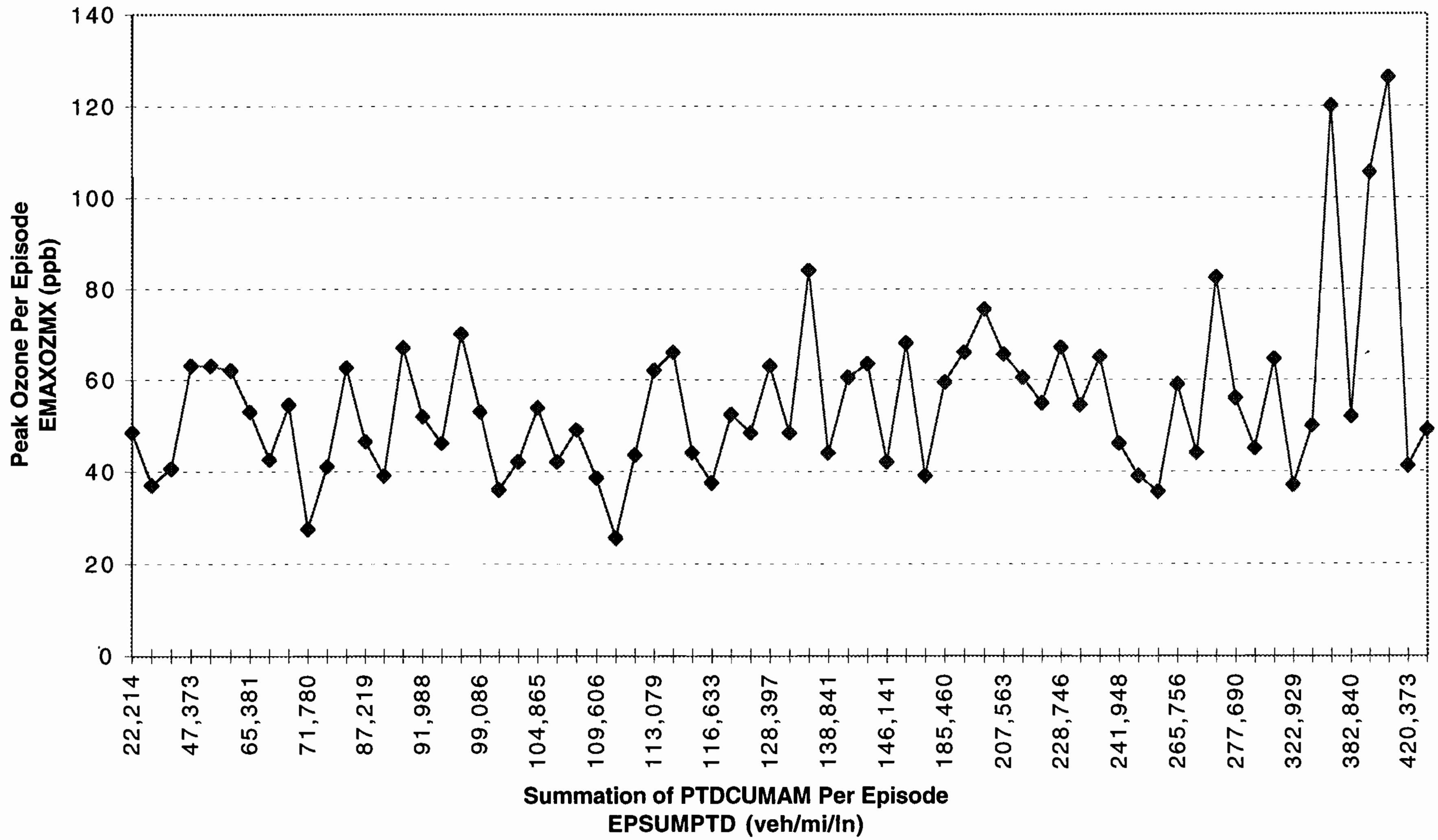


Figure 199. SAN ANTONIO DECEMBER'95 - SEPTEMBER'96 MODEL T43.0
DATA CONTROLLED FOR OZONE EPISODES - ONE OBSERVATION OF DATA PER EPISODE

EPISODIC PEAK OZONE AS A FUNCTION OF FINAL DAY OF EPISODE INITIAL MORNING OZONE

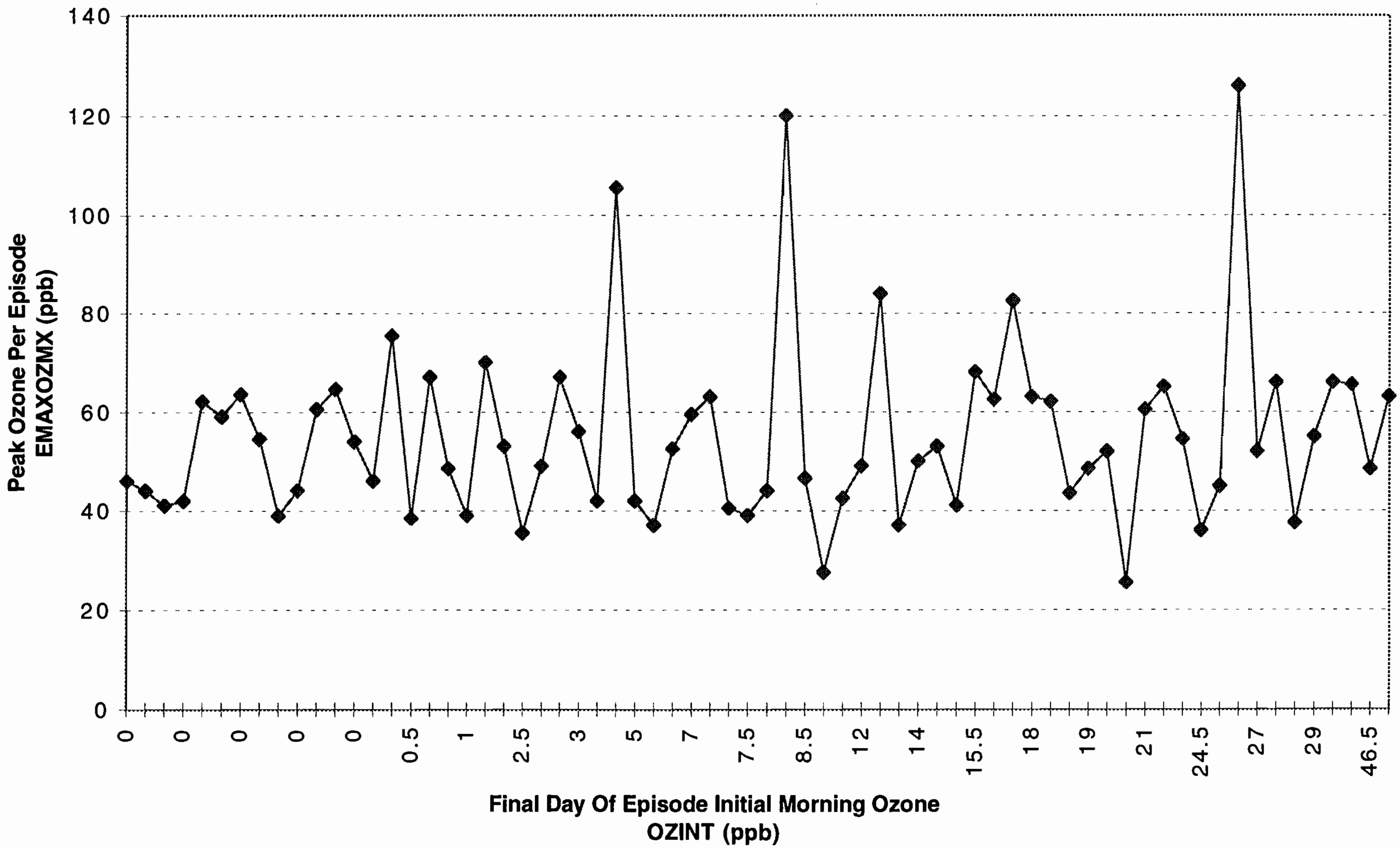


Figure 200. SAN ANTONIO DECEMBER'95 - SEPTEMBER'96 MODEL T43.0
DATA CONTROLLED FOR OZONE EPISODES - ONE OBSERVATION OF DATA PER EPISODE

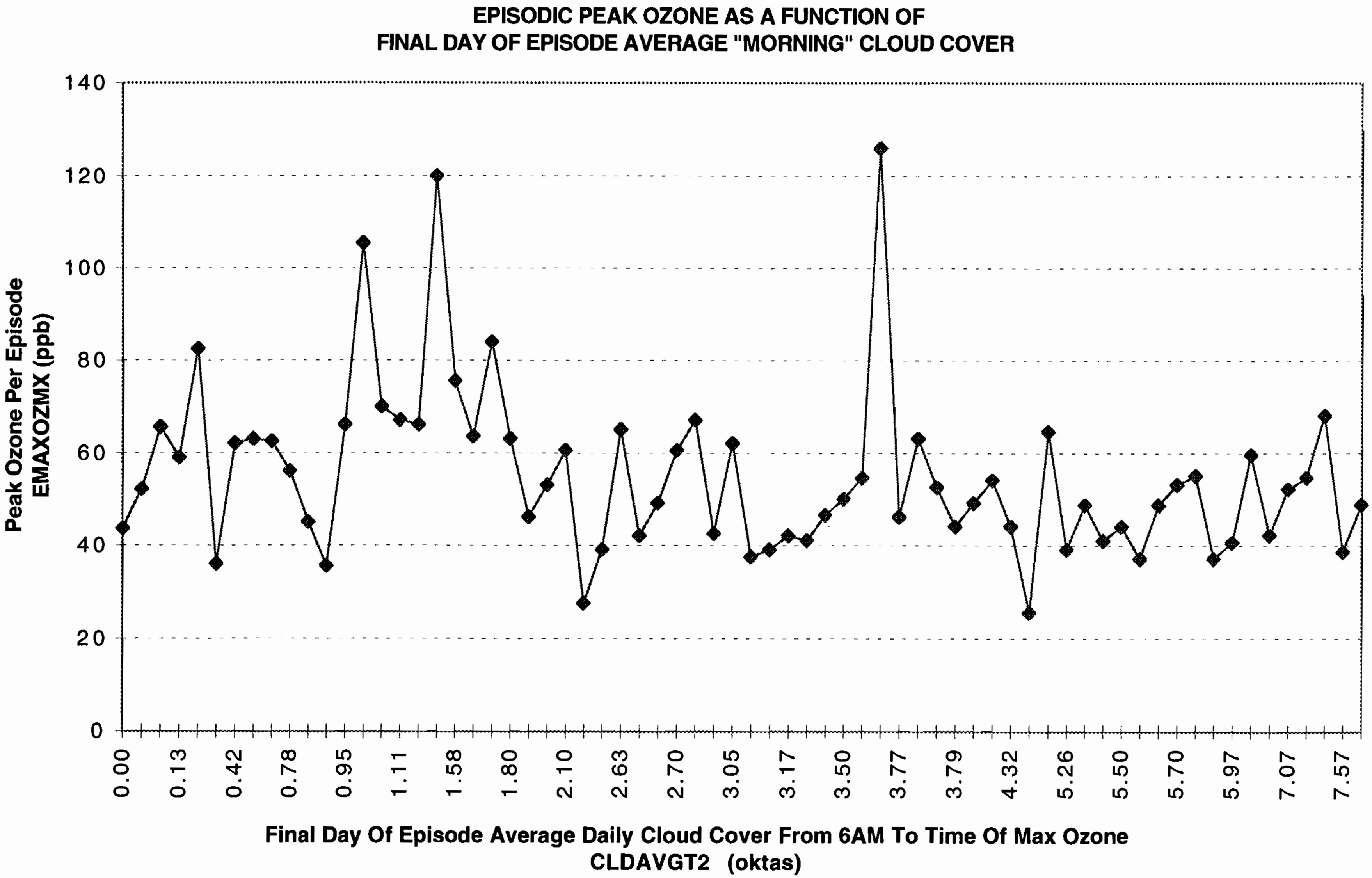


**Figure 201. SAN ANTONIO DECEMBER'95 - SEPTEMBER'96 MODEL T43.0**
**DATA CONTROLLED FOR OZONE EPISODES - ONE OBSERVATION OF DATA PER EPISODE**

**EPISODIC PEAK OZONE AS A FUNCTION OF**
**FINAL DAY OF EPISODE AVERAGE "MORNING" WIND SPEED**

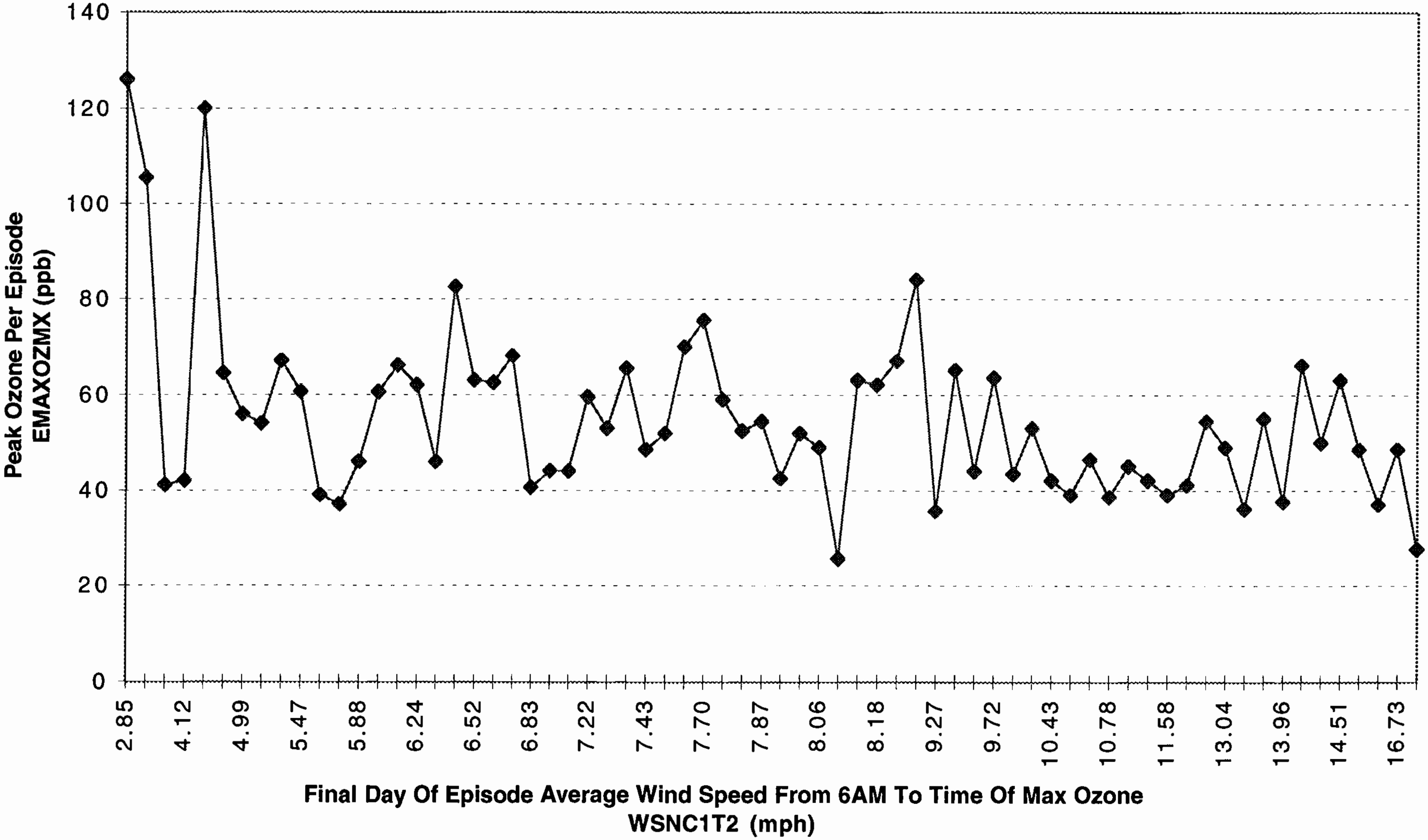


**Figure 202. SAN ANTONIO DECEMBER'95 - SEPTEMBER'96 MODEL T43.0**
**DATA CONTROLLED FOR OZONE EPISODES - ONE OBSERVATION OF DATA PER EPISODE**

**EPISODIC PEAK OZONE AS A FUNCTION OF**
**FINAL DAY OF EPISODE MAXIMUM TEMPERATURE**

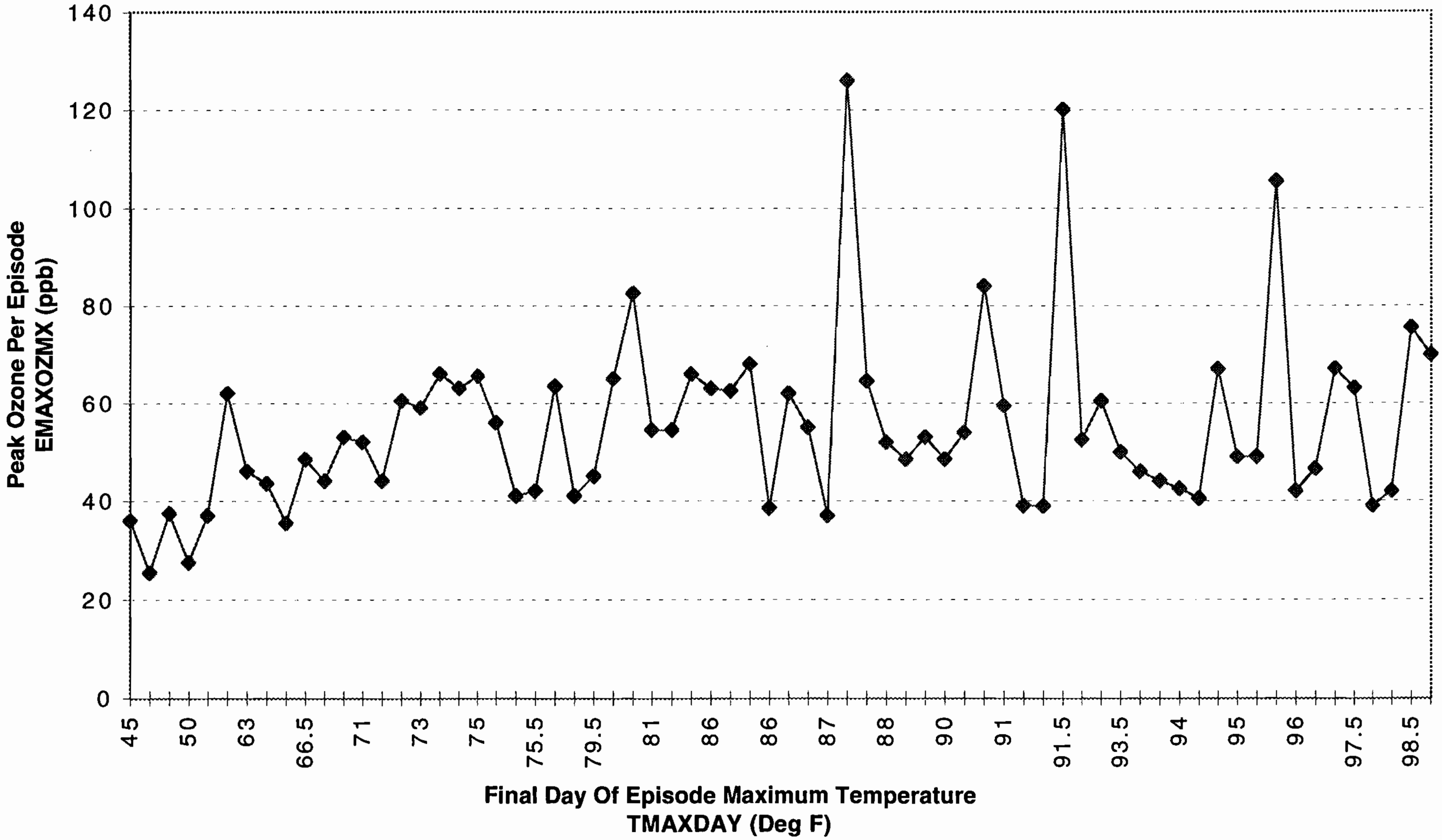


Figure 203. SAN ANTONIO DECEMBER'95 - SEPTEMBER'96 MODEL T43.0
DATA CONTROLLED FOR OZONE EPISODES - ONE OBSERVATION OF DATA PER EPISODE

EPISODIC PEAK OZONE AS A FUNCTION OF
FINAL DAY OF EPISODE AVERAGE WIND SPEED

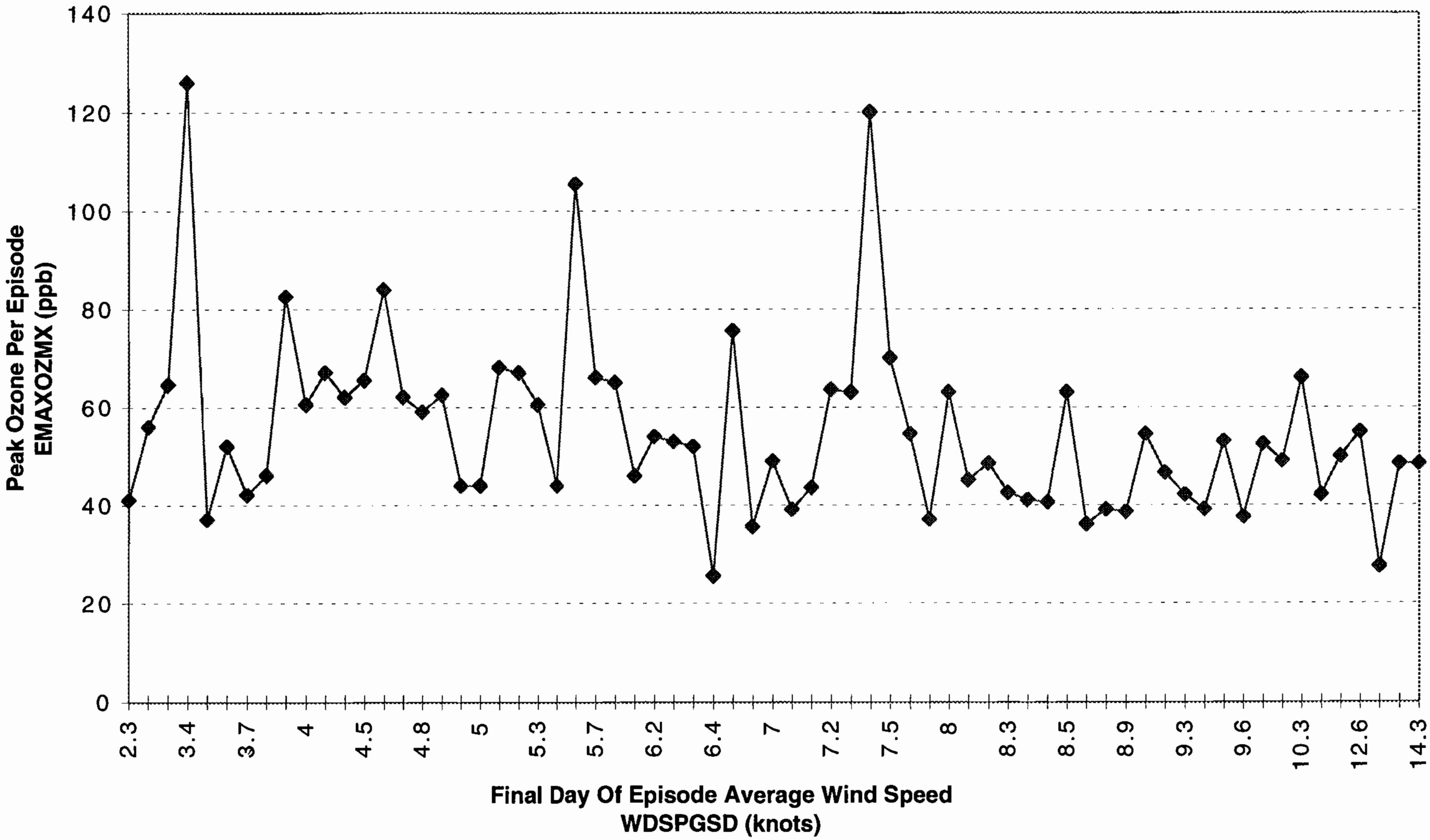


**Figure 204. SAN ANTONIO DECEMBER'95 - SEPTEMBER'96 MODEL T43.0**
**DATA CONTROLLED FOR OZONE EPISODES - ONE OBSERVATION OF DATA PER EPISODE**

**EPISODIC PEAK OZONE AS A FUNCTION OF FINAL DAY OF EPISODE MINIMUM TEMPERATURE**

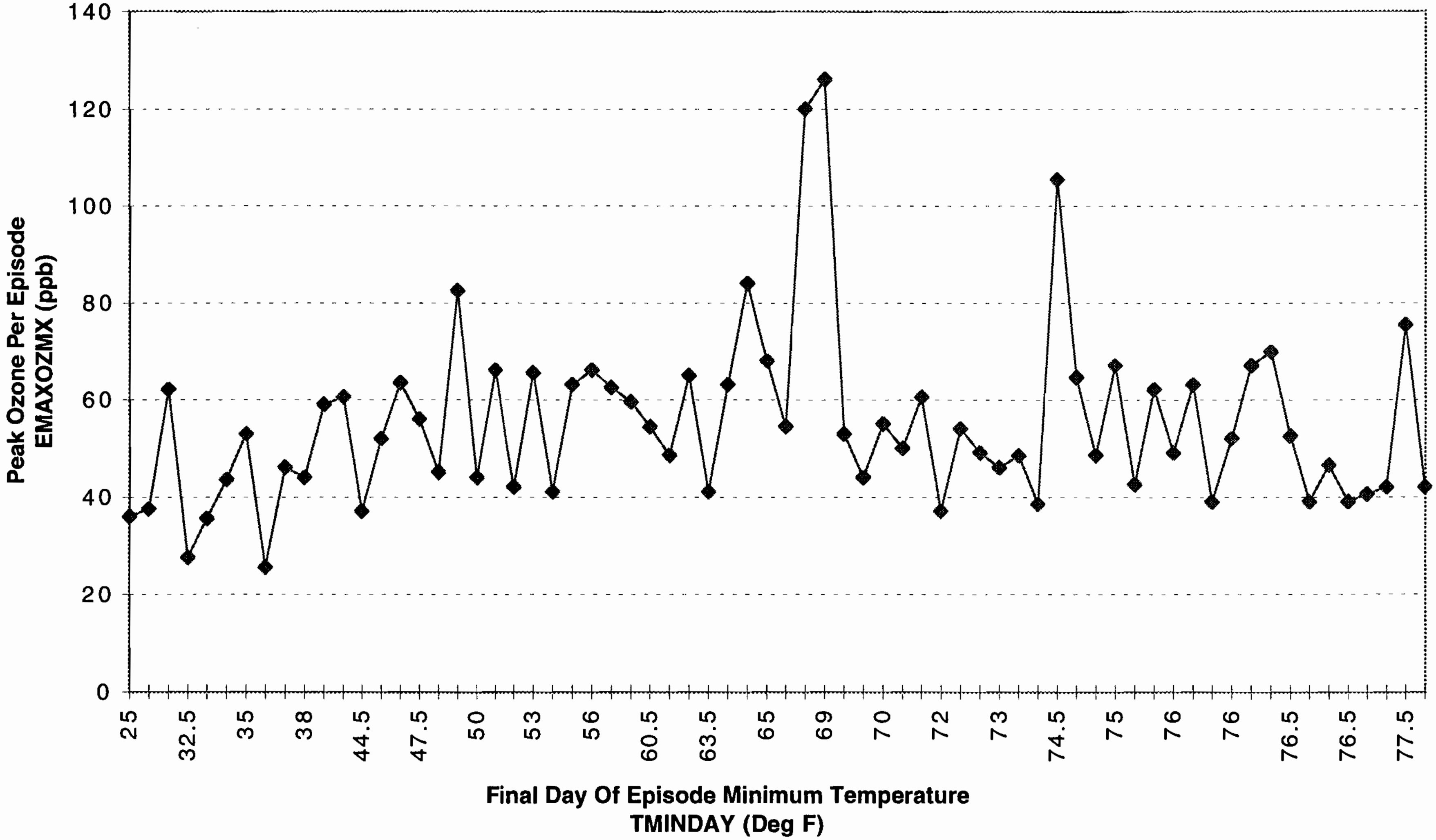
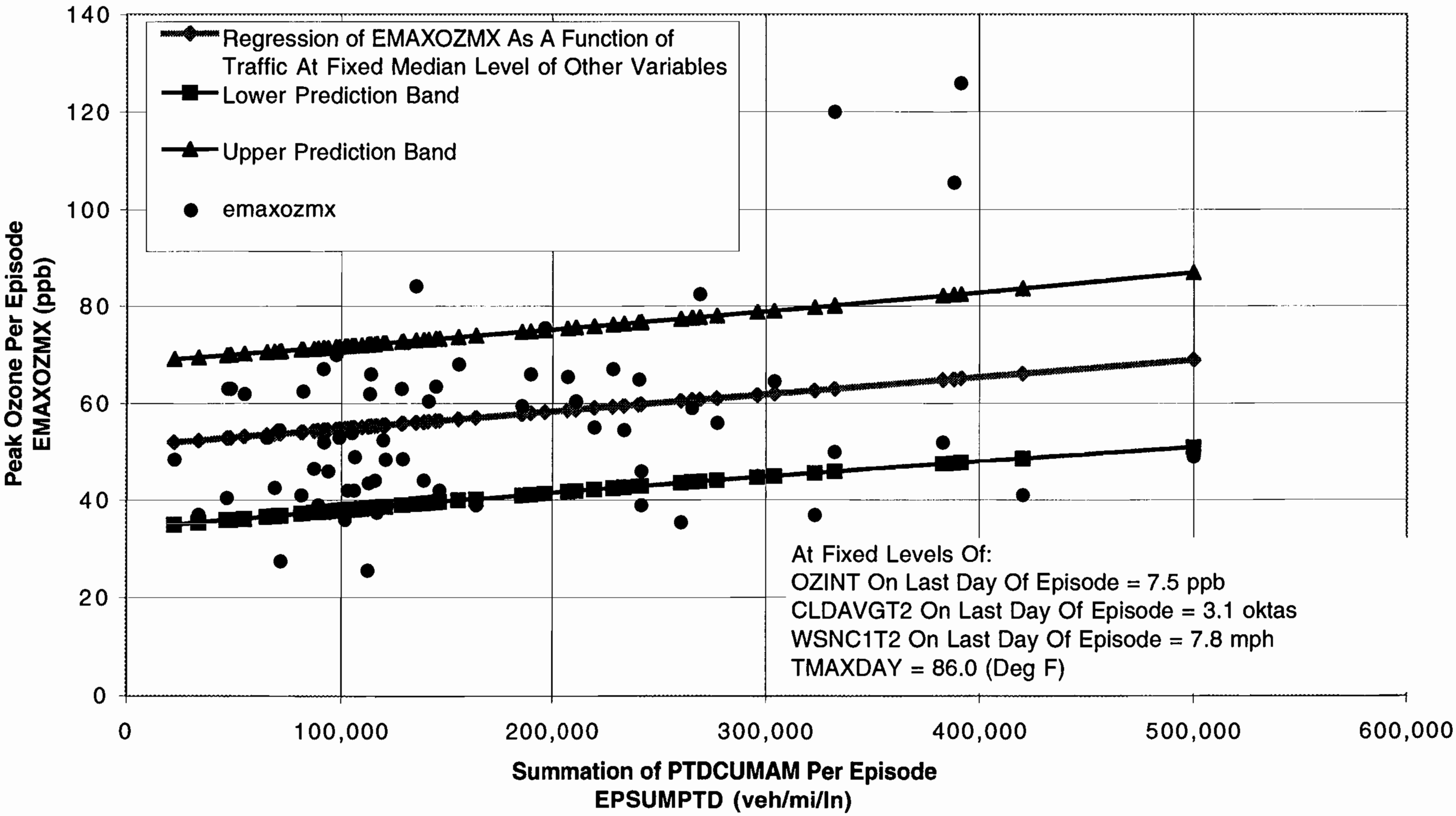


**Figure 205. SAN ANTONIO DECEMBER'95 - SEPTEMBER'96 MODEL T43.0**
**DATA CONTROLLED FOR OZONE EPISODES - ONE OBSERVATION OF DATA PER EPISODE**

**80% CONFIDENCE PREDICTION BAND ON EPISODIC MAX OZONE AS A FUNCTION OF EPISODIC CUMULATIVE TRANSGUIDE NETWORK TRAFFIC DENSITY 6AM TO 2-HRS BEFORE TIME OF MAX OZONE AT FIXED MEDIAN LEVEL OF OTHER SIGNIFICANT VARIABLES**



**SCENARIO 22**

In Scenario 22, we control the data used in Şcenario 21 for the months from April 1996 through September 1996. Table 56 summarizes the results of the model and Table 57 summarizes the strength of the traffic parameter's association with the daily peak ozone. Confidence intervals of the parameter's model coefficient per 10,000 units of EPSUMPTD are calculated at the 80, 90 and 95 percent confidence levels. Table 58 summarizes the raw data sorted by date for Scenario 22.

We can say that under this scenario at the 80 percent confidence level, the potential increase to a peak episodic ozone level in ppb per a 10,000 unit increase in the traffic congestion parameter EPSUMPTD has a range from about 0.4 to about 0.9 ppb. It is equally likely that the potential increase in the episodic peak ozone would fall at any point within this range. The results presented in Table 57 also indicate that the traffic congestion parameter remains significant at the 95 percent confidence level. We should point out that, based on the data collected, ozone episodes last anywhere from one to six days. If a daily 10,000 unit increase in the traffic congestion parameter PTDCUMAM were to occur for each day over a 3-day episode, that would imply a 30,000 unit increase in EPSUMPTD and an increase in EMAXOZMX over a range from about 1.2 to 2.7 ppb at the 80 percent confidence level.

Figure 206 and Figure 207 plot the peak episodic ozone (EMAXOZMX) and the cumulative episodic traffic congestion parameter (EPSUMPTD) over time. Figure 208 through Figure 214 graphically summarize the relationships between the response and predictor variables. Figure 215 depicts an 80 percent confidence level prediction band of EMAXOZMX as a function of EPSUMPTD while holding the other significant variables constant at their median levels.

We can say at an 80 percent confidence level that the daily peak ozone will fall somewhere within the band on Figure 215. As shown, the 80 percent confidence prediction band with this linear model under this scenario does not encompass several of the higher peak episodic ozone concentrations at fixed median levels of the other significant variables.

Controlling for the months from April through September though in Scenario 22 relative to Scenario 21 revealed a stronger association between the traffic congestion parameter (EPSUMPTD) and the peak episodic ozone level (EMAXOZMX). This is evidenced by the confidence intervals on the traffic congestion variable coefficient at all levels and by the bivariate Pearson correlations. The overall strength of the model to predict the peak episodic ozone level is improved as well, with the model's R-Square value improving to 0.65 under Scenario 22 versus 0.53 under Scenario 21.

*Table 56. Scenario 22 Results*

| | | | RANGE OF VARIABLES |
|---|---|---|---|
| **DATA CONTROLS** | 1) DEC 95-SEP 96<br><br>2) ALL OZONE EPISODES; ONE OBSERVATION OF DATA SUMMARIZED PER EPISODE | | |
| **MODEL SIGNIFICANT PARAMETERS (units)** | Y --- EMAXOZMX (ppb)<br>XO --- INTERCEPT<br>X1 --- EPSUMPTD (veh/mi/ln)<br>X2 --- OZINT (ppb)<br>X3 --- CLDAVGT2 (oktas)<br>X4 --- WSNC1T2 (mph) | | 37 to 126<br><br>46,800 to 500,000<br>0 to 47<br>0.1 to 7.6<br>2.8 to 16.7 |
| **SIGNIFICANT PARAMETER COEFFICIENT ESTIMATES AND BIVARIATE CORRELATIONS (r)** | 83.12460039 X0<br>0.00006230 X1<br>0.71216162 X2<br>-3.57617873 X3<br>-3.40911009 X4 | <br>0.3942<br>0.1968<br>-0.4343<br>-0.4962 | |
| **TRAFFIC VARIABLE COEFFICIENT CONFIDENCE-LEVEL** | 99% | | |
| **MODEL R-SQUARE** | 0.65 | | |
| **TRAFFIC VARIABLE PARTIAL R-SQUARE** | 0.15 | | |
| **SAMPLE SIZE** | 42 | | |
| **1st ORDER AUTO-CORRELATION Durbin-Watson Statistic** | 1.879 | | |
| **P-VALUE SUPPORTING $H_O$: No Heteroskedasticity** | 0.6981 | | |

*Table 57. Scenario 22*

| | |
|---|---|
| **TRAFFIC PARAMETER ESTIMATE PER 10,000 EPSUMPTD** | **0.6230** |
| **TRAFFIC PARAMETER ESTIMATE STANDARD ERROR PER 10,000 EPSUMPTD** | **0.1812** |
| **n** | **42** |
| **k** | **4** |
| **df** | **37** |
| $t_{(.10)}$ | **1.282** |
| $t_{(.05)}$ | **1.645** |
| $t_{(.025)}$ | **1.960** |
| **80 PERCENT CONFIDENCE INTERVAL OF TRAFFIC PARAMETER ESTIMATE PER 10,000 UNITS OF EPSUMPTD** | **0.39 to 0.86** |
| **90 PERCENT CONFIDENCE INTERVAL OF TRAFFIC PARAMETER ESTIMATE PER 10,000 UNITS OF EPSUMPTD** | **0.32 to 0.92** |
| **95 PERCENT CONFIDENCE INTERVAL OF TRAFFIC PARAMETER ESTIMATE PER 10,000 UNITS OF EPSUMPTD** | **0.27 to 0.98** |

*Table 58. Scenario 22*

| DATECST | EMAXOZMX | EPSUMPTD | OZINT | CLDAVGT2 | WSNC1T2 | TMAXDAY | WDSPGSD | TMINDAY |
|---|---|---|---|---|---|---|---|---|
| 4/1/96 | 63 | 128,397 | 47 | 0.44 | 14.51 | 74 | 8.5 | 56 |
| 4/4/96 | 54.5 | 71,110 | 24 | 7.27 | 7.87 | 81 | 9 | 60.5 |
| 4/8/96 | 82.5 | 269,548 | 17 | 0.13 | 6.33 | 79.5 | 3.9 | 49 |
| 4/10/96 | 62.5 | 81,961 | 16 | 0.57 | 6.55 | 86 | 4.8 | 56.5 |
| 4/13/96 | 59.5 | 185,460 | 7 | 6.00 | 7.22 | 91 | . | 58.5 |
| 4/16/96 | 63.5 | 144,610 | 0 | 1.64 | 9.72 | 77 | 7.2 | 46 |
| 4/20/96 | 54.5 | 233,877 | 0 | 3.52 | 12.99 | 83 | 7.6 | 68 |
| 5/1/96 | 66 | 189,529 | 27 | 0.95 | 14.05 | 84.5 | 10.3 | 56 |
| 5/4/96 | 55 | 220,106 | 29 | 5.71 | 13.45 | 87 | 12.6 | 70 |
| 5/9/96 | 37 | 322,929 | 13 | 5.85 | 16.66 | 87 | 7.8 | 72 |
| 5/12/96 | 68 | 155,426 | 15.5 | 7.48 | 6.76 | 86 | 5 | 65 |
| 5/16/96 | 50 | 332,172 | 14 | 3.50 | 14.36 | 93.5 | 12.5 | 71.5 |
| 5/22/96 | 49 | 500,020 | 12 | 2.67 | 13.04 | 95.5 | 10.1 | 72.5 |
| 5/24/96 | 48.5 | 129,182 | 19 | 5.68 | 16.73 | 89 | 14.2 | 75 |
| 5/27/96 | 53 | 99,086 | 14.5 | 5.70 | 7.32 | 89 | 9.5 | 69.5 |
| 6/3/96 | 120 | 332,336 | 8 | 1.27 | 4.36 | 91.5 | 7.5 | 68 |
| 6/9/96 | 84 | 135,218 | 12.5 | 1.68 | 8.37 | 90.5 | 4.5 | 64.5 |
| 6/13/96 | 49 | 106,210 | 2.5 | 3.81 | 8.06 | 95 | 7 | 76 |
| 6/18/96 | 67 | 228,746 | 2.5 | 1.11 | 8.31 | 97.5 | 5.2 | 76.5 |
| 6/20/96 | 70 | 97,560 | 1.5 | 1.06 | 7.57 | 99.5 | 7.5 | 76.5 |
| 6/24/96 | 52.5 | 119,447 | 6.5 | 3.78 | 7.86 | 92 | 9.6 | 76.5 |
| 6/27/96 | 39 | 89,069 | 0 | 3.14 | 11.58 | 91 | 8.9 | 76.5 |
| 7/4/96 | 105.5 | 388,130 | 4.5 | 1.00 | 3.15 | 96 | 5.6 | 74.5 |
| 7/7/96 | 63 | 47,373 | 7 | 1.80 | 6.52 | 97.5 | 7.3 | 76 |
| 7/10/96 | 48.5 | 120,871 | 1 | 5.41 | 7.43 | 90 | 8.1 | 73.5 |
| 7/12/96 | 42 | 146,141 | 3.5 | 2.65 | 10.43 | 96 | 10.5 | 77.5 |
| 7/14/96 | 46.5 | 87,219 | 8.5 | 3.39 | 10.66 | 96.5 | 9.3 | 76.5 |
| 7/20/96 | 39 | 163,602 | 7.5 | 2.53 | 10.58 | 98 | 9.4 | 76.5 |
| 7/23/96 | 42 | 105,730 | 5 | 3.17 | 11.04 | 98.5 | 9.3 | 78 |
| 7/26/96 | 46 | 241,948 | 0.5 | 3.77 | 6.32 | 93.5 | 6.2 | 73 |
| 7/28/96 | 40.5 | 46,771 | 7 | 5.97 | 6.83 | 94.5 | 8.4 | 77 |
| 8/12/96 | 75.5 | 196,187 | 0.5 | 1.58 | 7.70 | 98.5 | 6.5 | 77.5 |
| 8/15/96 | 44 | 138,841 | 0 | 3.79 | 7.05 | 94 | 4.9 | 69.5 |
| 8/17/96 | 42.5 | 68,937 | 11.5 | 2.90 | 7.91 | 94 | 8.3 | 75.5 |
| 8/21/96 | 60.5 | 211,444 | 0 | 2.10 | 6.09 | 93 | 5.3 | 71.5 |
| 8/23/96 | 38.5 | 109,606 | 0.5 | 7.57 | 10.78 | 86 | 8.9 | 74 |
| 8/28/96 | 39 | 242,001 | 1 | 5.26 | 5.75 | 91 | 7 | 76 |
| 9/1/96 | 62 | 113,079 | 18 | 3.05 | 6.24 | 86 | 4.7 | 75.5 |
| 9/5/96 | 64.5 | 304,155 | 0 | 5.11 | 4.53 | 87.5 | 3.1 | 74.5 |
| 9/12/96 | 126 | 391,512 | 25 | 3.58 | 2.85 | 87 | 3.4 | 69 |
| 9/16/96 | 67 | 91,576 | 0.5 | 2.72 | 5.30 | 94.5 | 4.2 | 75 |
| 9/22/96 | 52 | 382,840 | 19 | 7.07 | 7.50 | 88 | 6.3 | 76 |
| 9/24/96 | 54 | 104,865 | 0 | 4.27 | 5.18 | 90 | 6.2 | 72 |

Figure 206. SAN ANTONIO APR'96-SEP'96 MODEL T43
Episodic Max Ozone
Data Controlled For Ozone Episodes - One Observation Of Data Per Episode

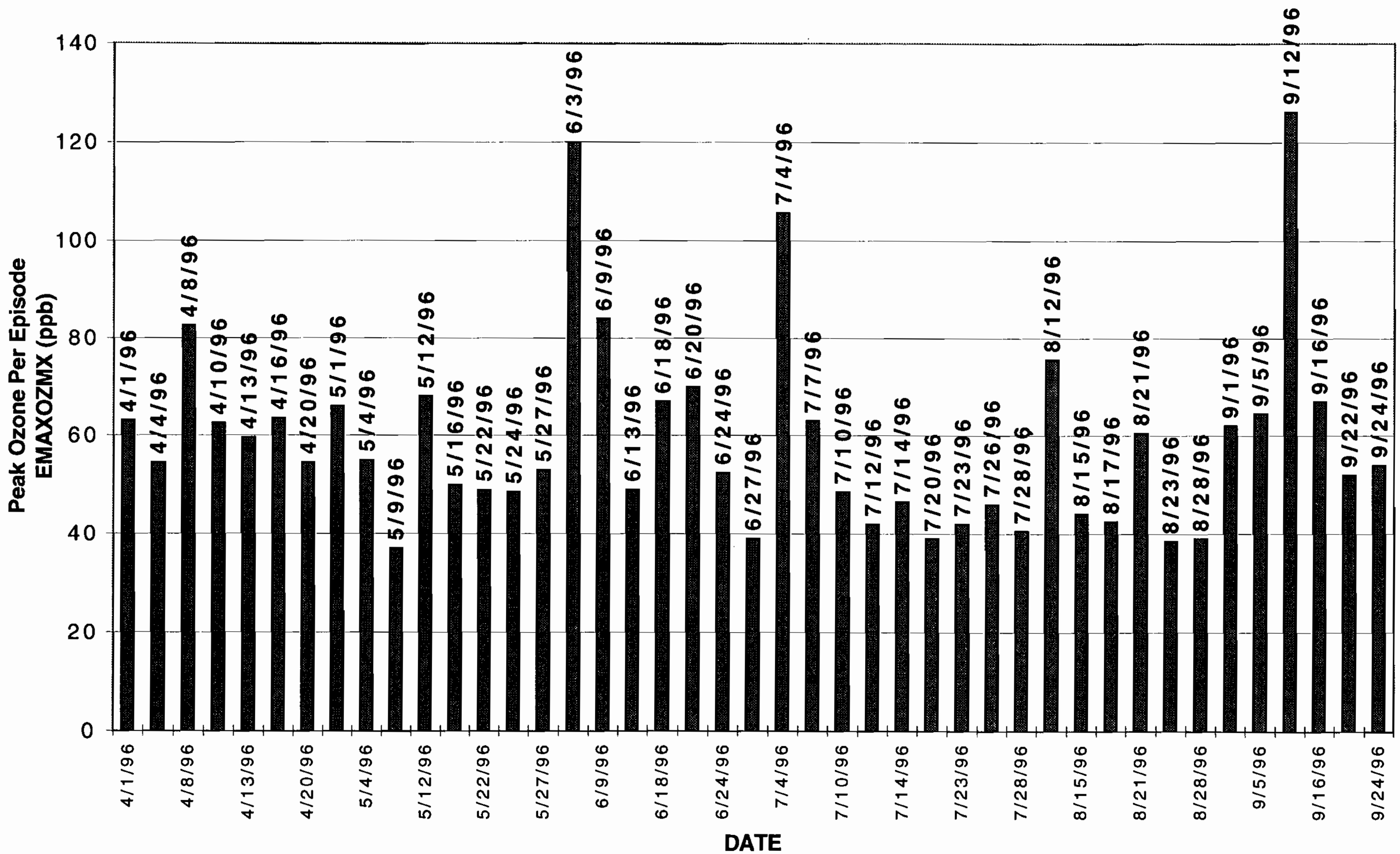


**Figure 207. SAN ANTONIO APR'96-SEP'96 MODEL T43**
**Episodic Cumulative TransGuide Network Traffic Density 6AM To 2-Hrs Before Time Of Max Ozone**
**Data Controlled For Ozone Episodes - One Observation Of Data Per Episode**

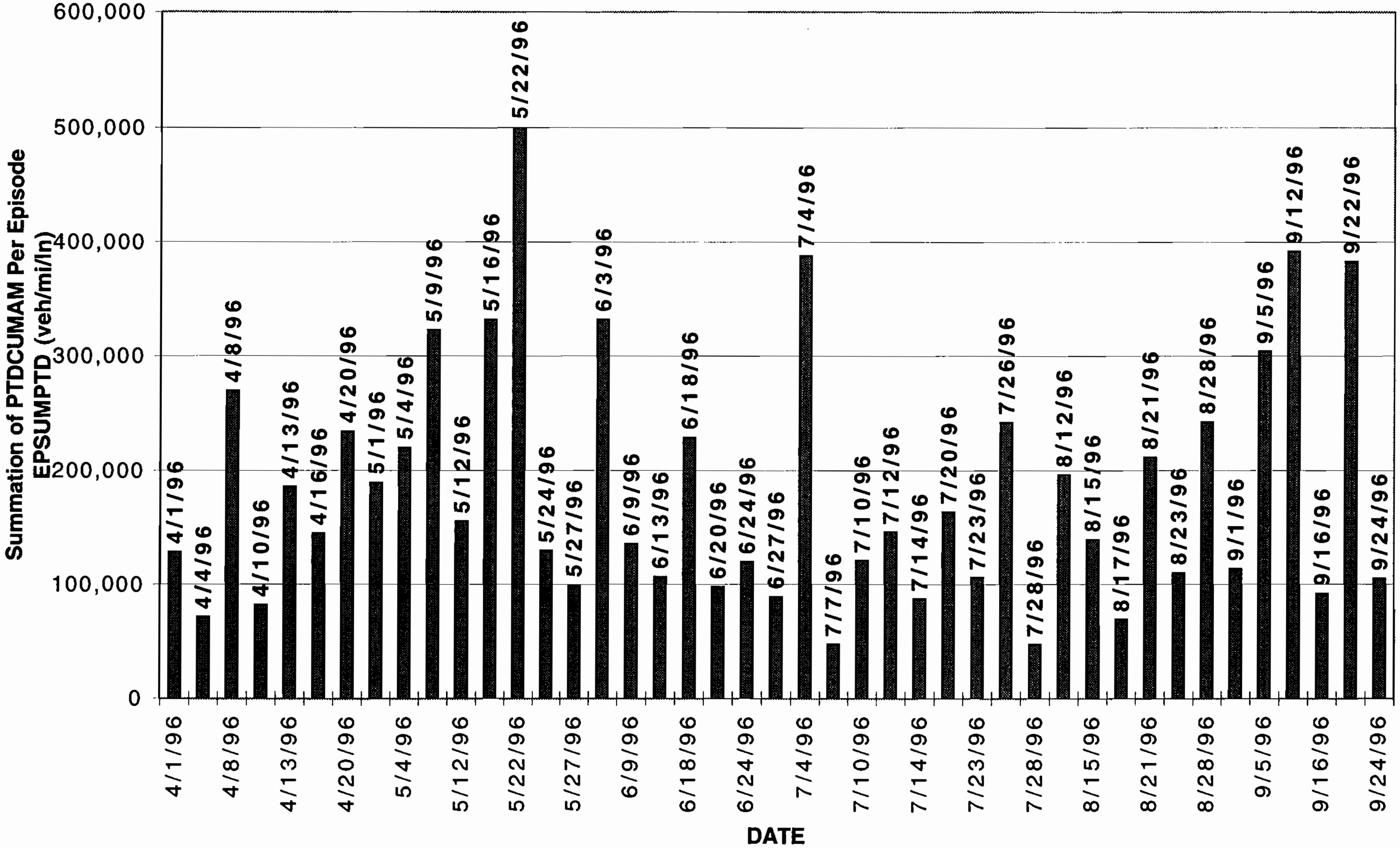


Figure 208. SAN ANTONIO APR'96-SEP'96 MODEL T43
Episodic Max Ozone As A Function Of Episodic Cumulative TransGuide Network Traffic Density
6AM To 2-Hrs Before Time Of Max Ozone
Data Controlled For Ozone Episodes - One Observation Of Data Per Episode

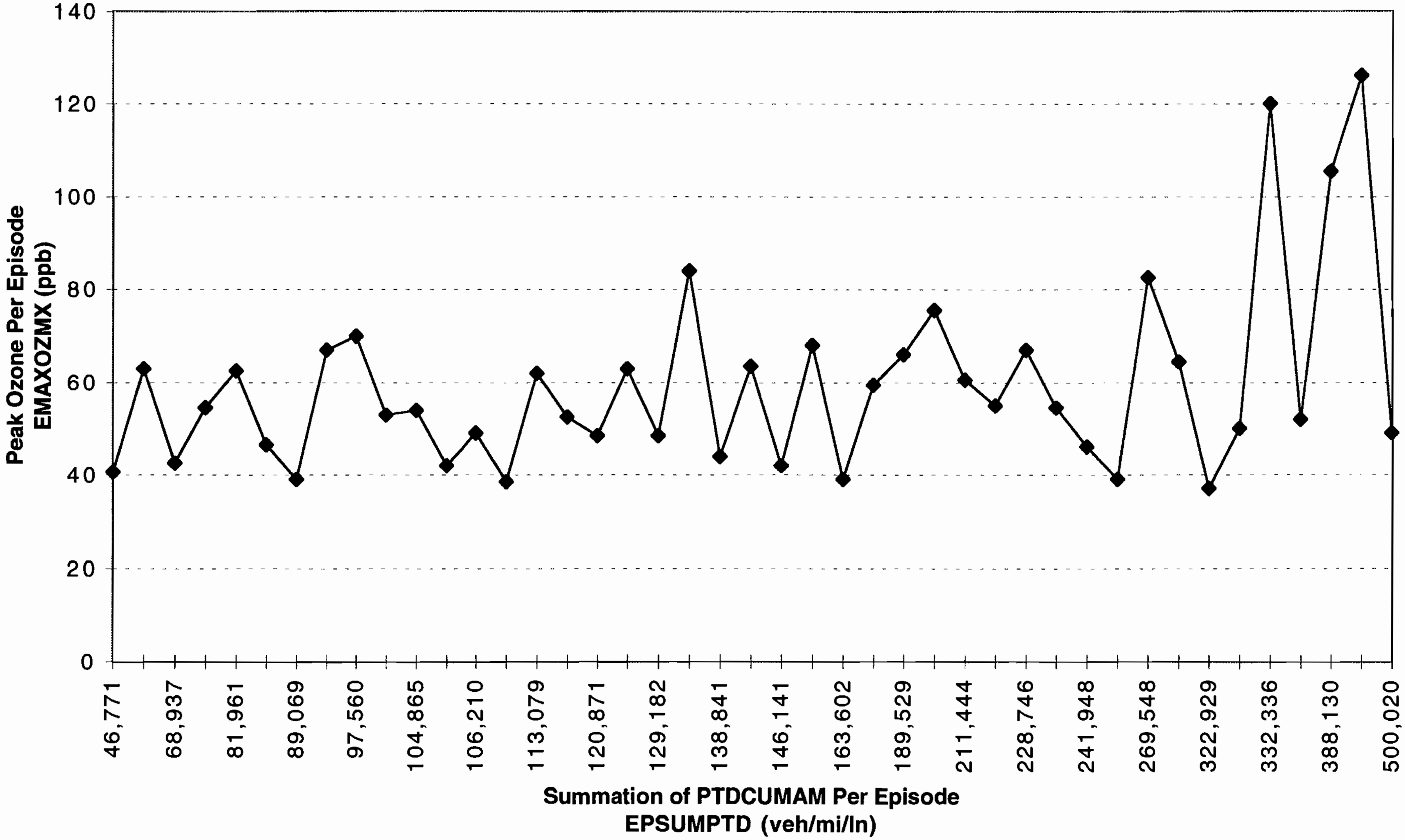


Figure 209. SAN ANTONIO APR'96-SEP'96 MODEL T43
Episodic Max Ozone As A Function Of
Final Day Of Episode Initial Morning Ozone
Data Controlled For Ozone Episodes - One Observation Of Data Per Episode

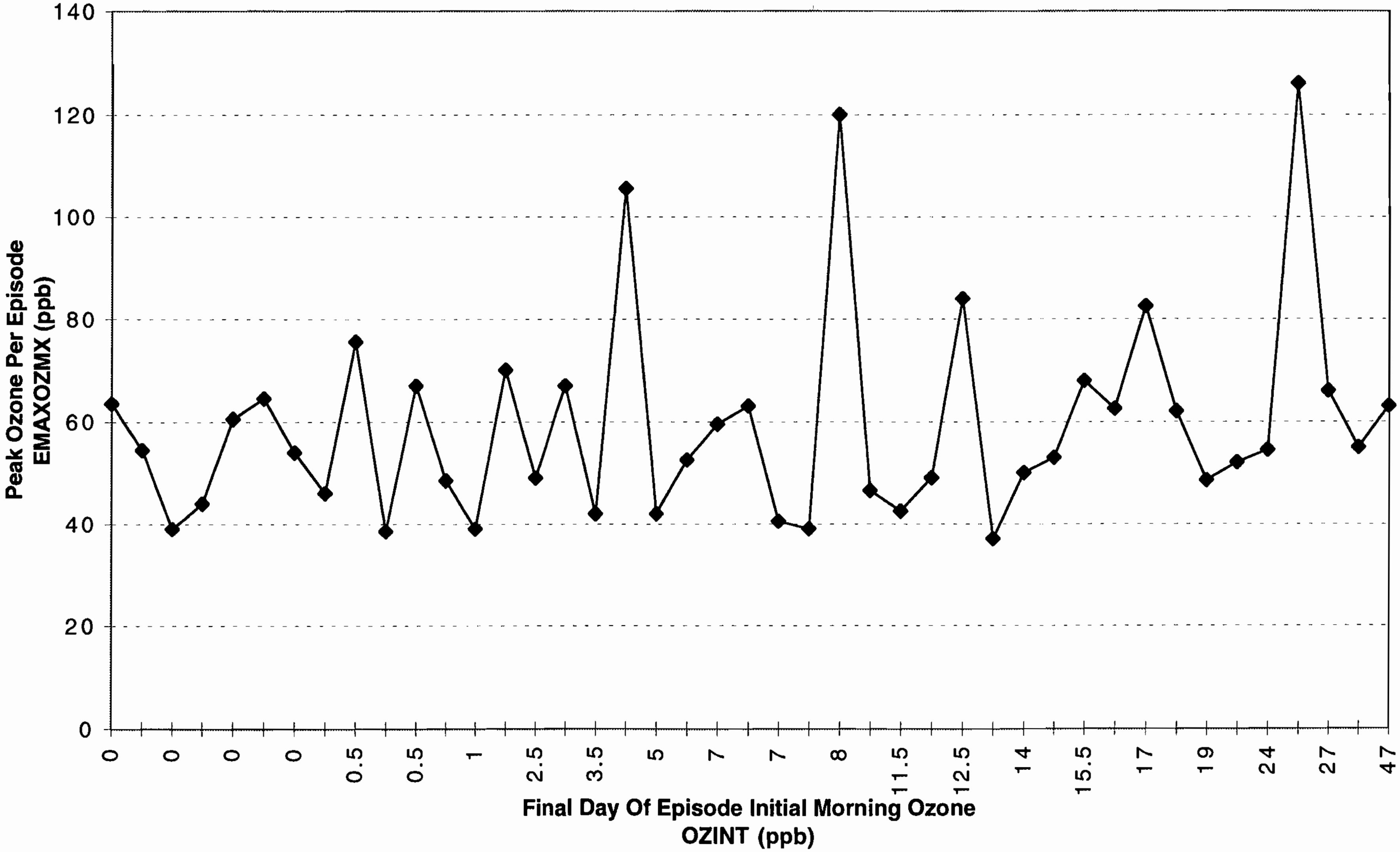


**Figure 210. SAN ANTONIO APR'96-SEP'96 MODEL T43**
**Episodic Max Ozone As A Function Of**
**Final Day Of Episode Average Daily Cloud Cover From 6AM To Time Of Max Ozone**
**Data Controlled For Ozone Episodes - One Observation Of Data Per Episode**

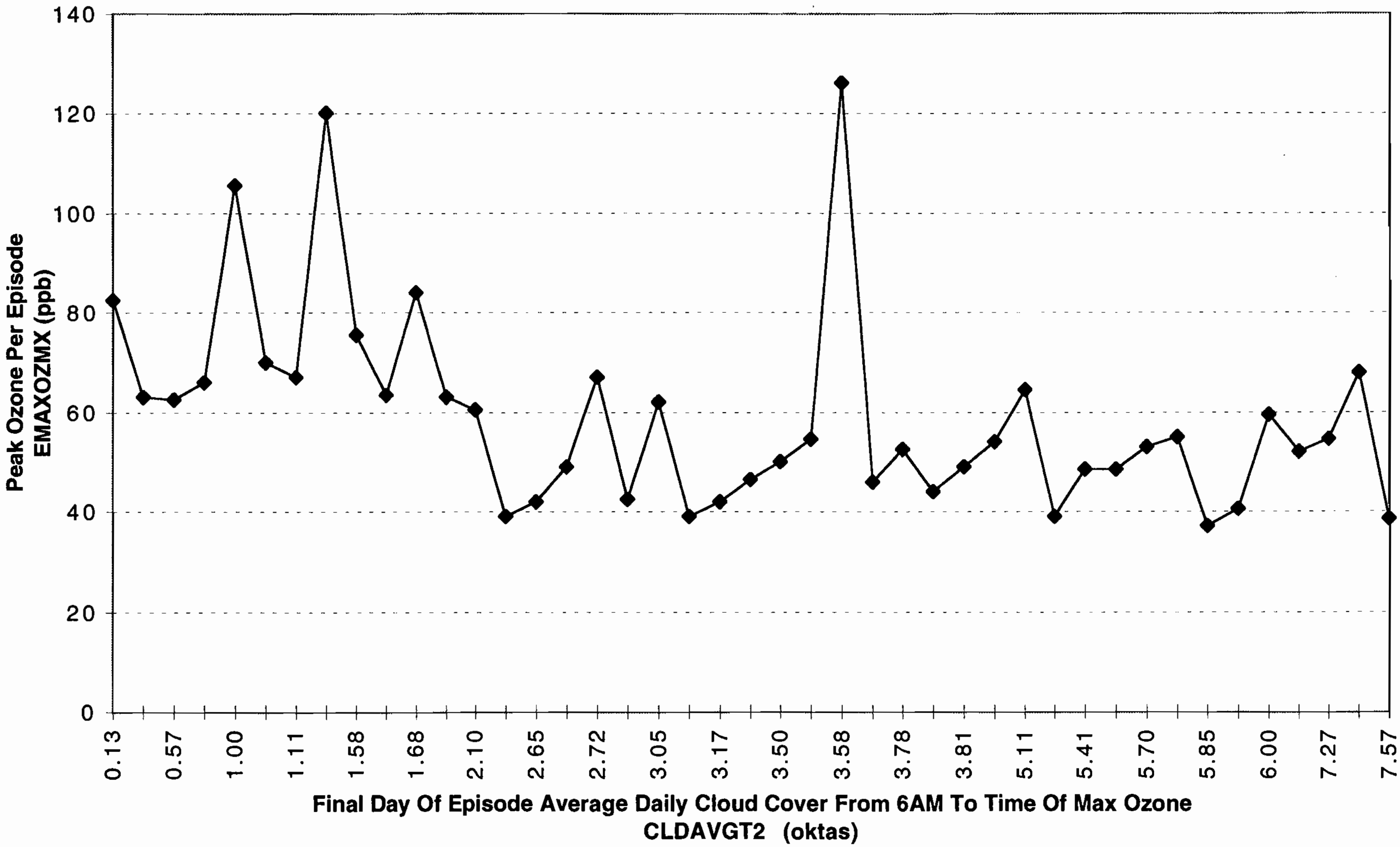


**Figure 211. SAN ANTONIO APR'96-SEP'96 MODEL T43**
**Episodic Max Ozone As A Function Of**
**Final Day Of Episode Average Wind Speed From 6AM To Time Of Max Ozone**
**Data Controlled For Ozone Episodes - One Observation Of Data Per Episode**

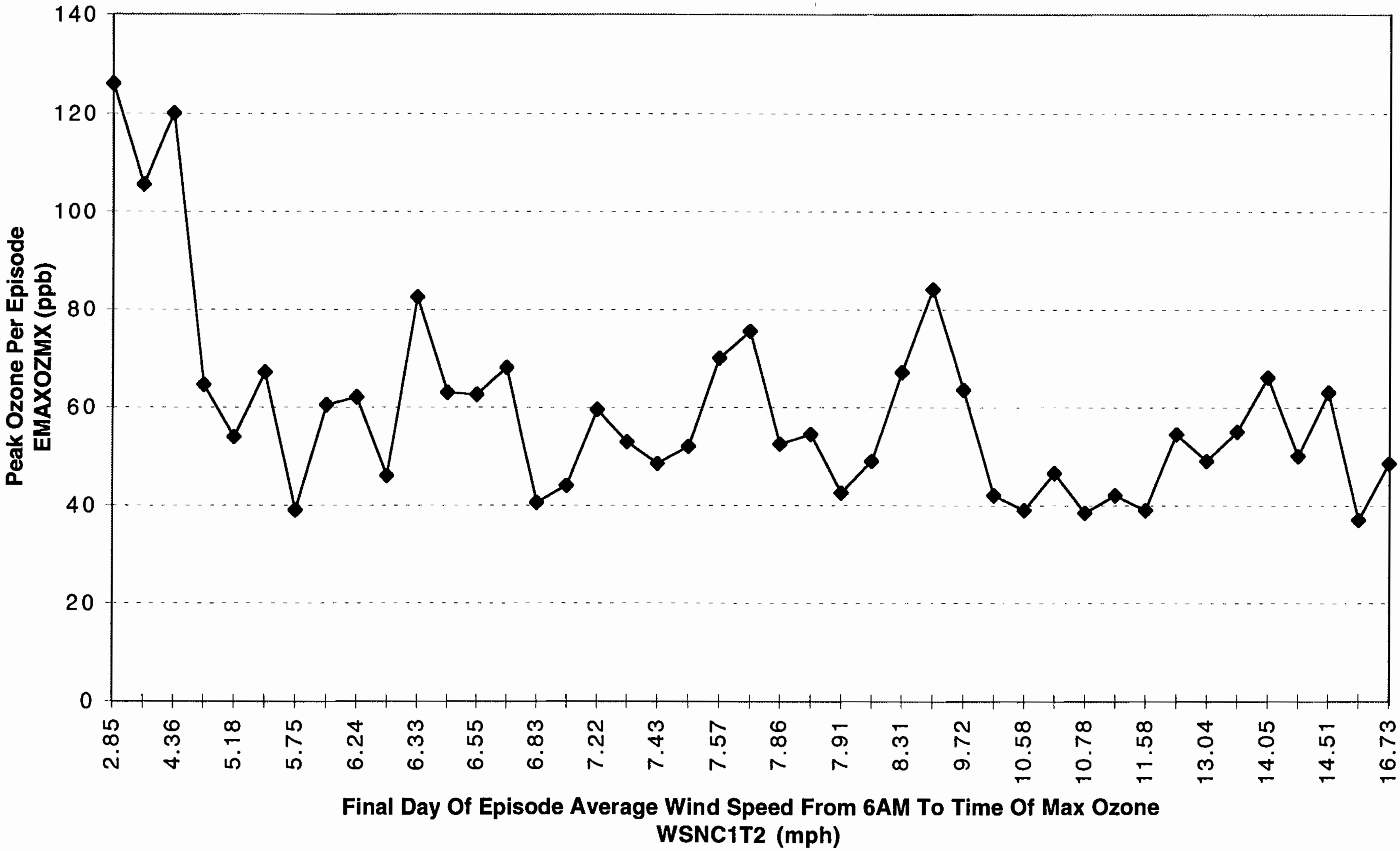


Figure 212. SAN ANTONIO APR'96-SEP'96 MODEL T43
Episodic Max Ozone As A Function Of
Final Day Of Episode Maximum Temperature
Data Controlled For Ozone Episodes - One Observation Of Data Per Episode

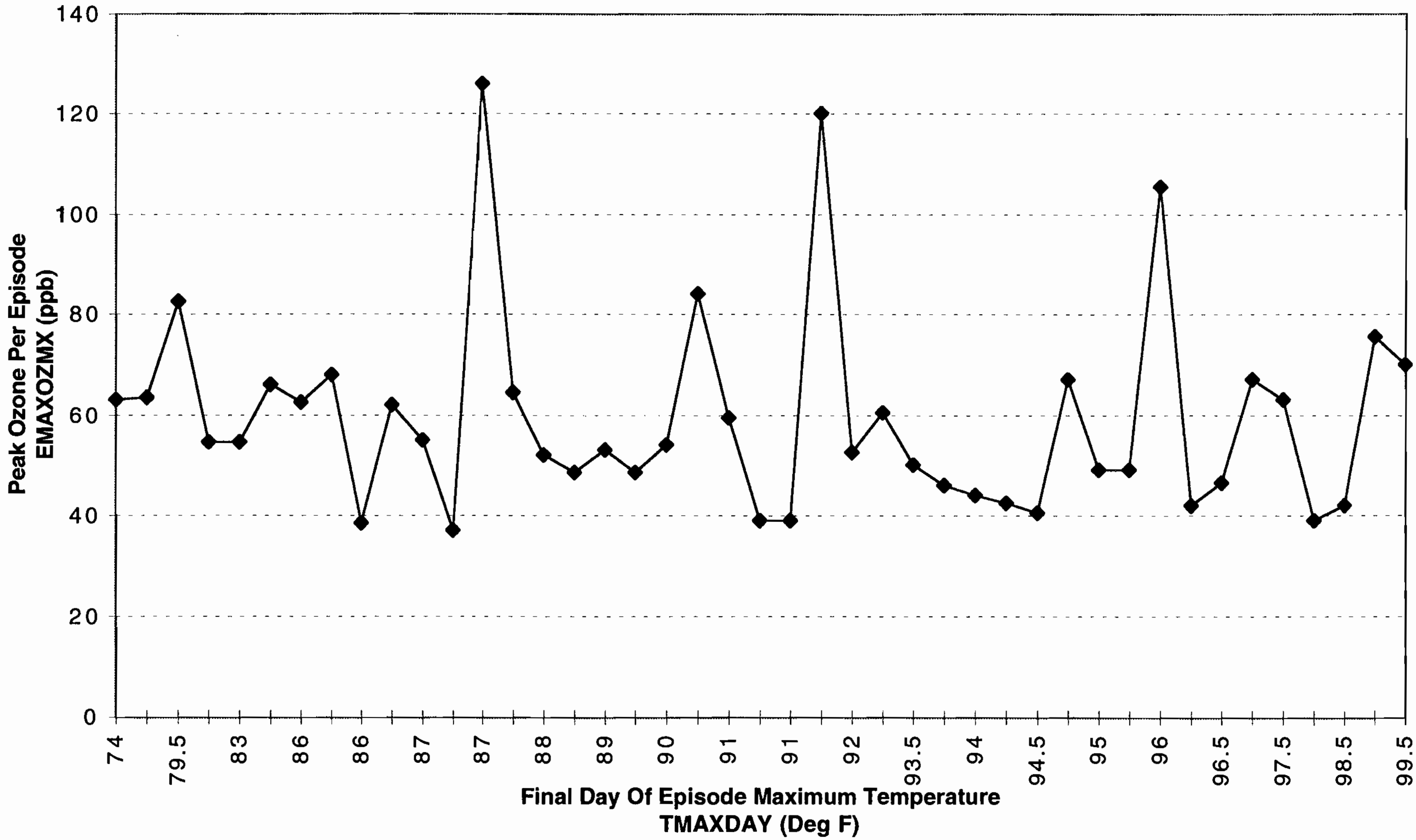


Figure 213. SAN ANTONIO APR'96-SEP'96 MODEL T43
Episodic Max Ozone As A Function Of
Final Day Of Episode Average Wind Speed
Data Controlled For Ozone Episodes - One Observation Of Data Per Episode

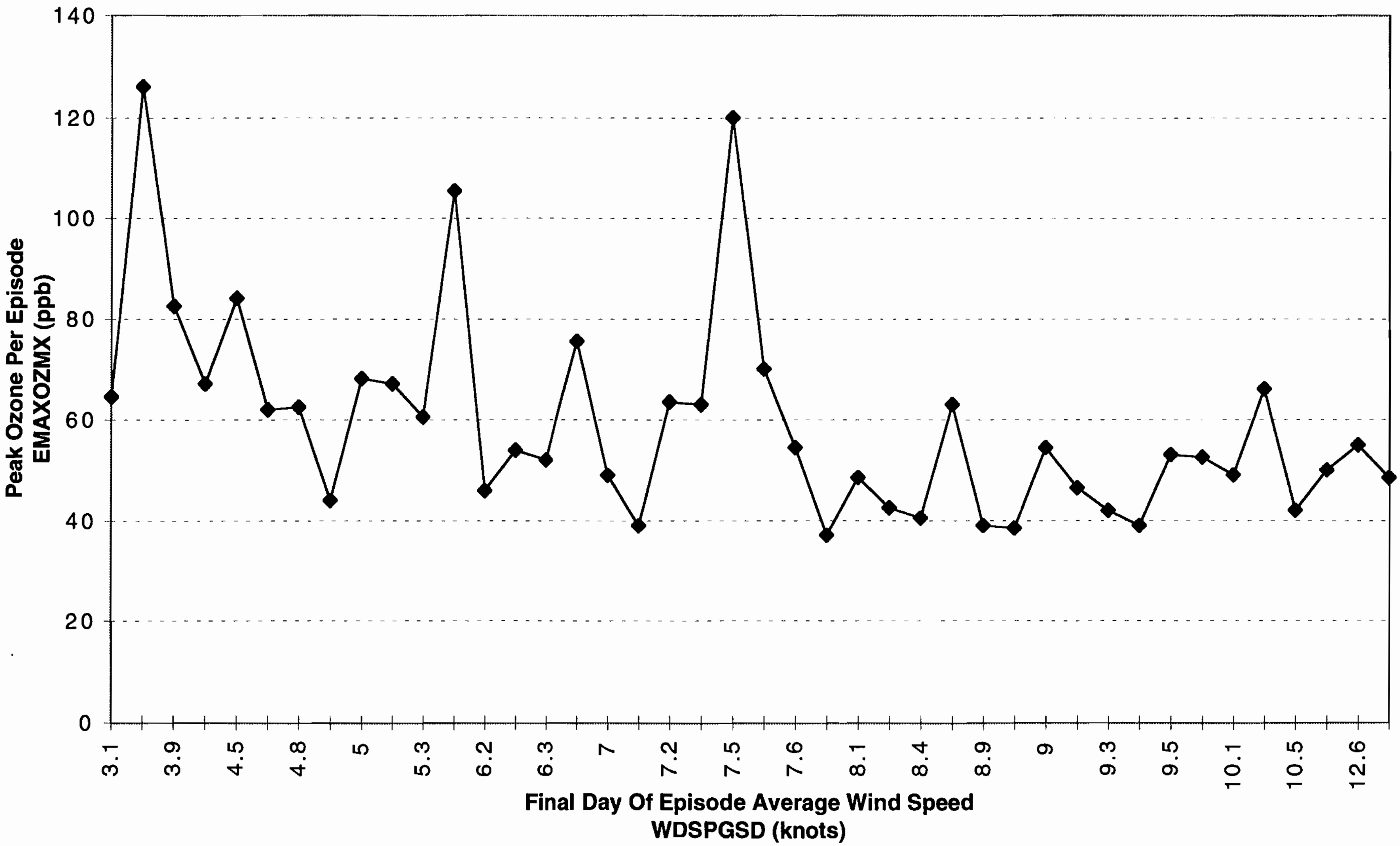
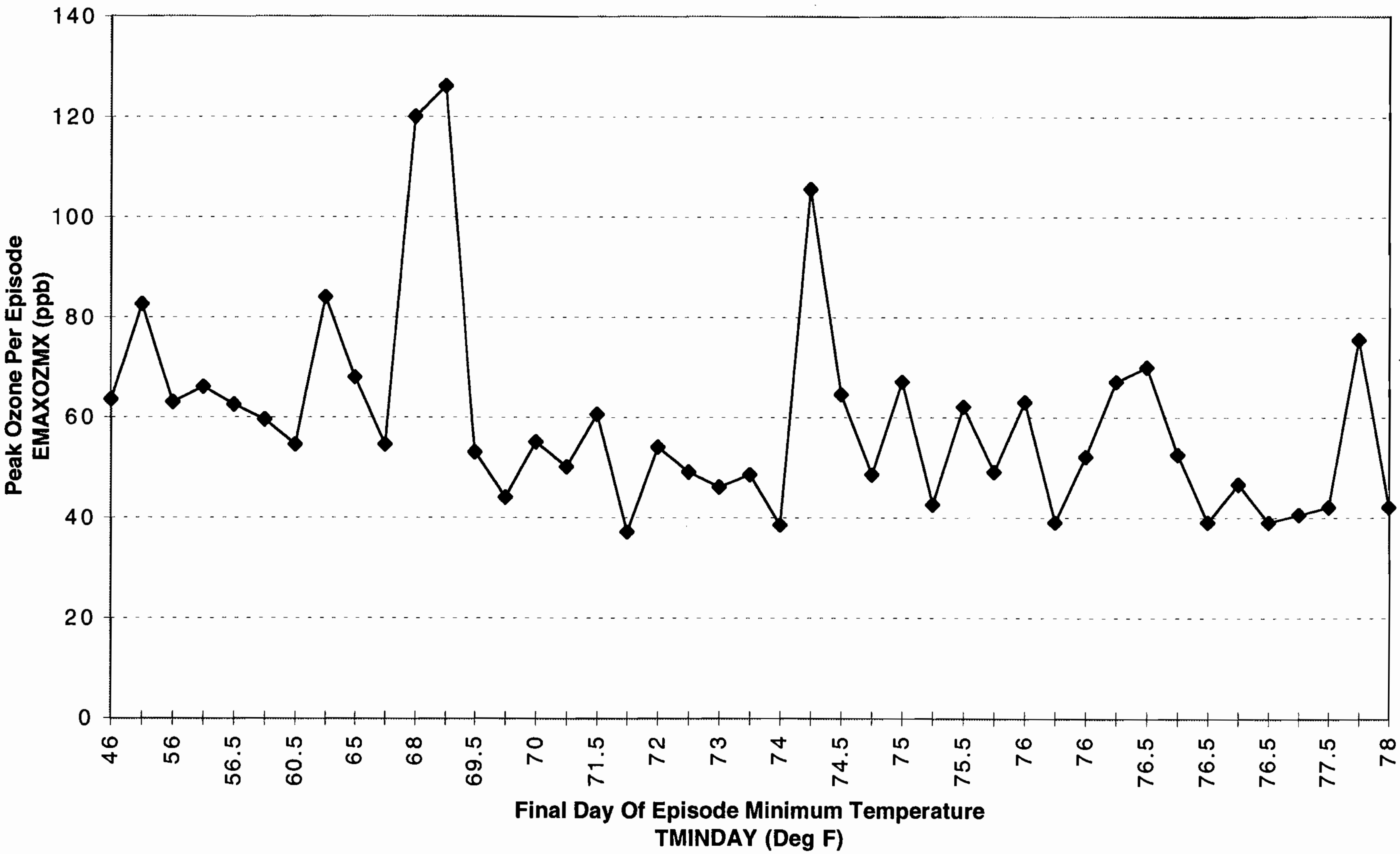
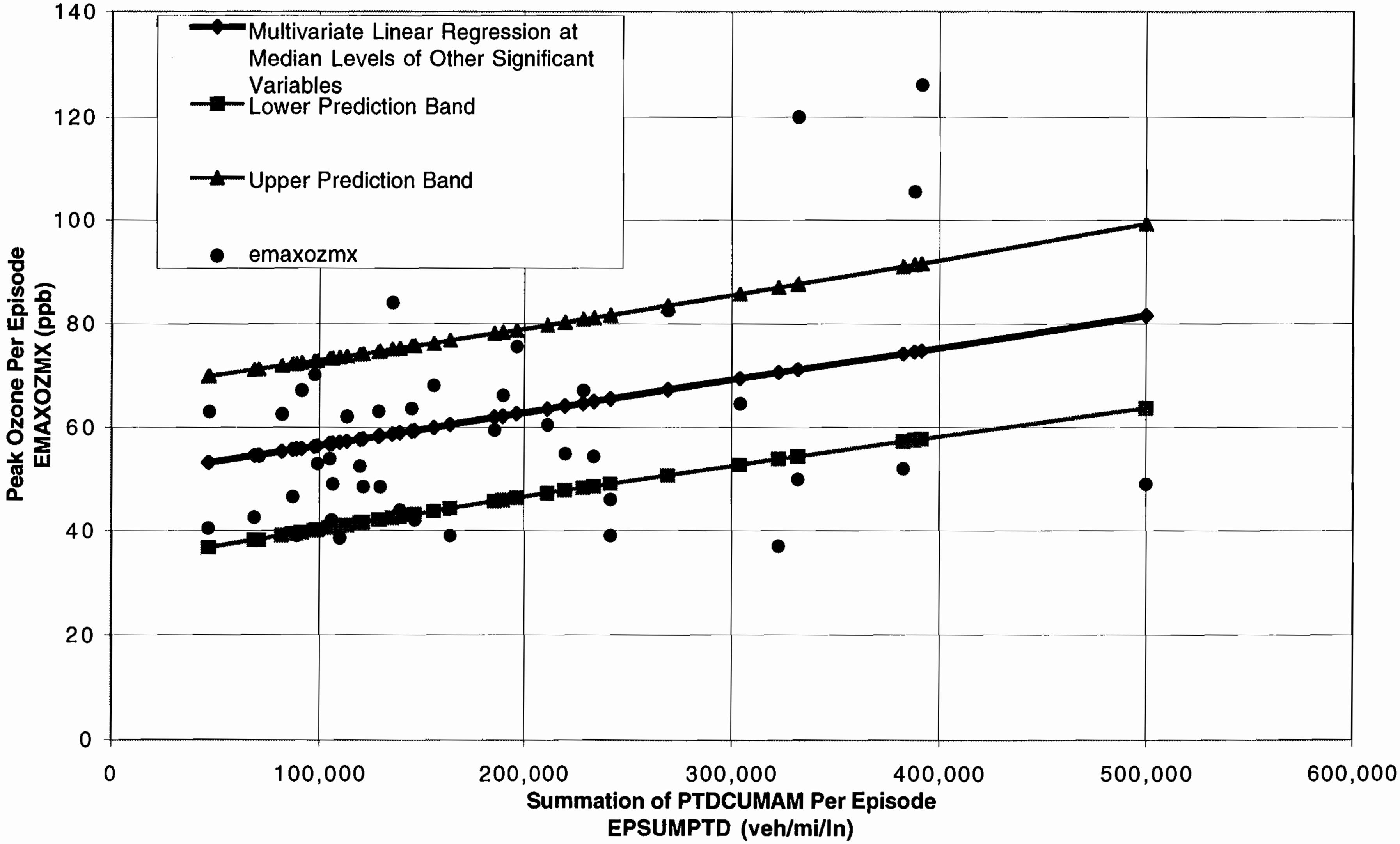


Figure 214. SAN ANTONIO APR'96-SEP'96 MODEL T43
Episodic Max Ozone As A Function Of
Final Day Of Episode Minimum Temperature
Data Controlled For Ozone Episodes - One Observation Of Data Per Episode



OZINT On Last Day Of Episode = 6.8 ppb
CLDAVGT2 On Last Day Of Episode = 3.3 oktas
WSNC1T2 On Last Day Of Episode = 7.6 mph

**Figure 215. SAN ANTONIO APR'96-SEP'96 MODEL T43**
**80% Confidence Prediction Band On Episodic Max Ozone As A Function Of Episodic Cumulative TransGuide Network Traffic Density**
**6AM To 2-Hrs Before Time Of Max Ozone**
**Data Controlled For Ozone Episodes - One Observation Of Data Per Episode**



## SCENARIO 23

In Scenario 23, we include all months of data collected from December 1995 through September 1996. As for Scenario 21, we control for ozone episodes, summarize each episode and predict the peak episodic ozone concentration instead of predicting each day's peak ozone. However, in addition, for Scenario 22 we control for the average episodic cloud cover (the average of CLDAVGT2 over an episode) to be less than or equal to 4 oktas.

Table 59 summarizes the results of the model and Table 60 summarizes the strength of the traffic parameter's association with the daily peak ozone. Confidence intervals of the parameter's model coefficient per 10,000 units of EPSUMPTD are calculated at the 80, 90 and 95 percent confidence levels. Table 61 summarizes the raw data sorted by date for Scenario 23.

We can say that under this scenario at the 80 percent confidence level, the potential increase to a peak episodic ozone level in ppb per a 10,000 unit increase in the traffic congestion parameter EPSUMPTD has a range from about 0.4 to about 0.9 ppb. It is equally likely that the potential increase in the episodic peak ozone would fall at any point within this range. The results presented in Table 60 also indicate that the traffic congestion parameter remains significant at the 95 percent confidence level. As stated previously, ozone episodes last anywhere from one to six days based on the data collected between December 1995 through September 1996. If a daily 10,000 unit increase in the traffic congestion parameter PTDCUMAM were to occur for each day over a 3-day episode, that would imply a 30,000 unit increase in EPSUMPTD and an increase in EMAXOZMX over a range from about 1.2 to 2.7 ppb at the 80% confidence level.

Figure 216 and Figure 217 plot the peak episodic ozone (EMAXOZMX) and the cumulative episodic traffic congestion parameter (EPSUMPTD) over time. Figure 218 through Figure 224 graphically summarize the relationships between the response and predictor variables. Figure 225 depicts an 80 percent confidence level prediction band of EMAXOZMX as a function of EPSUMPTD while holding the other significant variables constant at their median levels.

We can say at an 80 percent confidence level that the daily peak ozone will fall somewhere within the band on Figure 225. As shown, the 80 percent confidence prediction band with this linear model under this scenario does not encompass several of the higher peak episodic ozone concentrations at fixed median levels of the other significant variables, but the prediction band in this scenario (Scenario 23) where the average episodic cloud cover is being controlled for comes closer to encompassing the higher peak episodic ozone levels than when not controlling for this factor (Scenario 21).

Controlling for the average episodic cloud cover in Scenario 23 also reveals a stronger association between the traffic congestion parameter (EPSUMPTD) and the peak episodic ozone level (EMAXOZMX) relative to Scenario 21. This is evidenced by the confidence intervals on the traffic congestion variable coefficient at all confidence levels and by the bivariate Pearson correlations. At the 80 percent confidence level interval of EPSUMPTD in Scenario 23, the interval ranges from 0.4 to 0.9 ppb per 10,000 EPSUMPTD while for Scenario 21 the interval ranges from 0.2 to 0.6 ppb per 10,000 EPSUMPTD. The overall strength of the model to predict the peak episodic ozone level is improved as well, with the model's R-Square value improving to 0.59 under Scenario 23 versus 0.53 under Scenario 21.

*Table 59. Scenario 23 Results*

| | | | RANGE OF VARIABLES |
|---|---|---|---|
| **DATA CONTROLS** | 1) DEC 95-SEP 96<br><br>2) ALL OZONE EPISODES; ONE OBSERVATION OF DATA SUMMARIZED PER EPISODE<br><br>3) AVERAGE EPISODIC CLOUD COVER (AVG OF CLDAVGT2) LE 4 OKTAS | | |
| **MODEL SIGNIFICANT PARAMETERS (units)** | Y --- EMAXOZMX (ppb)<br>XO --- INTERCEPT<br>X1 --- EPSUMPTD (veh/mi/ln)<br>X2 --- OZINT (ppb)<br>X3 --- WSNC1T2 (mph)<br>X4 --- TMINDAY (°F) | | 27.5 to 126<br><br>47,400 to 500,000<br>0 to 47<br>2.8 to 19.0<br>25 to 78 |
| **SIGNIFICANT PARAMETER COEFFICIENT ESTIMATES AND BIVARIATE CORRELATIONS (r)** | 65.23744353 X0<br>0.00006403 X1<br>0.49309366 X2<br>-3.71183783 X3<br>0.18665712 X4 | <br>0.4729<br>0.0816<br>-0.6324<br>0.2771 | |
| **TRAFFIC VARIABLE COEFFICIENT CONFIDENCE-LEVEL** | 99% | | |
| **MODEL R-SQUARE** | 0.59 | | |
| **TRAFFIC VARIABLE PARTIAL R-SQUARE** | 0.12 | | |
| **SAMPLE SIZE** | 41 | | |
| **1st ORDER AUTO-CORRELATION Durbin-Watson Statistic** | 1.941 | | |
| **P-VALUE SUPPORTING $H_O$: No Heteroskedasticity** | 0.2693 | | |

*Table 60. Scenario 23 Results (cont.)*

| | |
|---|---|
| **TRAFFIC PARAMETER ESTIMATE PER 10,000 EPSUMPTD** | **0.6403** |
| **TRAFFIC PARAMETER ESTIMATE STANDARD ERROR PER 10,000 EPSUMPTD** | **0.2194** |
| **n** | **41** |
| **k** | **4** |
| **df** | **36** |
| $t_{(.10)}$ | **1.282** |
| $t_{(.05)}$ | **1.645** |
| $t_{(.025)}$ | **1.960** |
| **80 PERCENT CONFIDENCE INTERVAL OF TRAFFIC PARAMETER ESTIMATE PER 10,000 UNITS OF EPSUMPTD** | **0.36 to 0.92** |
| **90 PERCENT CONFIDENCE INTERVAL OF TRAFFIC PARAMETER ESTIMATE PER 10,000 UNITS OF EPSUMPTD** | **0.28 to 1.00** |
| **95 PERCENT CONFIDENCE INTERVAL OF TRAFFIC PARAMETER ESTIMATE PER 10,000 UNITS OF EPSUMPTD** | **0.21 to 1.07** |

*Table 61. Scenario 23 Data*

| DATECST | EMAXOZMX | EPSUMPTD | OZINT | CLDAVGT2 | WSNC1T2 | TMAXDAY | WDSPGSD | TMINDAY |
|---|---|---|---|---|---|---|---|---|
| 12/6/95 | 66 | 113,569 | 30.5 | 1.22 | 6.14 | 74 | 5.7 | 51 |
| 12/9/95 | 27.5 | 71,780 | 10 | 2.50 | 19.04 | 50 | 13.5 | 32.5 |
| 12/27/95 | 46 | 93,809 | 0 | 1.88 | 5.88 | 63 | 3.9 | 37 |
| 1/4/96 | 35.5 | 260,582 | 2.5 | 0.94 | 9.27 | 66 | 6.7 | 34 |
| 1/7/96 | 36 | 101,587 | 24.5 | 0.25 | 13.16 | 45 | 8.6 | 25 |
| 1/9/96 | 43.5 | 112,755 | 19 | 0.00 | 10.30 | 64 | 7.2 | 35 |
| 1/15/96 | 56 | 277,690 | 3 | 0.78 | 4.99 | 75 | 2.6 | 47.5 |
| 1/21/96 | 52 | 91,988 | 27 | 0.00 | 7.97 | 71 | 3.6 | 45 |
| 2/14/96 | 45 | 296,215 | 24.5 | 0.86 | 10.92 | 79.5 | 8.1 | 49 |
| 2/17/96 | 53 | 65,381 | 2 | 2.00 | 10.35 | 69 | 6.3 | 35 |
| 3/8/96 | 37.5 | 116,633 | 28 | 3.10 | 13.96 | 48 | 9.6 | 30 |
| 3/10/96 | 62 | 54,976 | 0 | 0.42 | 8.18 | 61 | 4.4 | 30 |
| 3/15/96 | 65 | 240,890 | 22 | 2.63 | 9.32 | 79.5 | 5.9 | 62 |
| 3/21/96 | 59 | 265,756 | 0 | 0.13 | 7.82 | 73 | 4.8 | 38.5 |
| 3/28/96 | 60.5 | 141,006 | 21 | 2.70 | 5.47 | 71 | 4 | 42.5 |
| 3/30/96 | 63 | 48,388 | 18 | 3.78 | 8.17 | 86 | 8 | 64 |
| 4/1/96 | 63 | 128,397 | 47 | 0.44 | 14.51 | 74 | 8.5 | 56 |
| 4/8/96 | 82.5 | 269,548 | 17 | 0.13 | 6.33 | 79.5 | 3.9 | 49 |
| 4/10/96 | 62.5 | 81,961 | 16 | 0.57 | 6.55 | 86 | 4.8 | 56.5 |
| 4/16/96 | 63.5 | 144,610 | 0 | 1.64 | 9.72 | 77 | 7.2 | 46 |
| 4/20/96 | 54.5 | 233,877 | 0 | 3.52 | 12.99 | 83 | 7.6 | 68 |
| 5/1/96 | 66 | 189,529 | 27 | 0.95 | 14.05 | 84.5 | 10.3 | 56 |
| 5/22/96 | 49 | 500,020 | 12 | 2.67 | 13.04 | 95.5 | 10.1 | 72.5 |
| 6/3/96 | 120 | 332,336 | 8 | 1.27 | 4.36 | 91.5 | 7.5 | 68 |
| 6/9/96 | 84 | 135,218 | 12.5 | 1.68 | 8.37 | 90.5 | 4.5 | 64.5 |
| 6/13/96 | 49 | 106,210 | 2.5 | 3.81 | 8.06 | 95 | 7 | 76 |
| 6/18/96 | 67 | 228,746 | 2.5 | 1.11 | 8.31 | 97.5 | 5.2 | 76.5 |
| 6/20/96 | 70 | 97,560 | 1.5 | 1.06 | 7.57 | 99.5 | 7.5 | 76.5 |
| 6/27/96 | 39 | 89,069 | 0 | 3.14 | 11.58 | 91 | 8.9 | 76.5 |
| 7/4/96 | 105.5 | 388,130 | 4.5 | 1.00 | 3.15 | 96 | 5.6 | 74.5 |
| 7/7/96 | 63 | 47,373 | 7 | 1.80 | 6.52 | 97.5 | 7.3 | 76 |
| 7/12/96 | 42 | 146,141 | 3.5 | 2.65 | 10.43 | 96 | 10.5 | 77.5 |
| 7/14/96 | 46.5 | 87,219 | 8.5 | 3.39 | 10.66 | 96.5 | 9.3 | 76.5 |
| 7/20/96 | 39 | 163,602 | 7.5 | 2.53 | 10.58 | 98 | 9.4 | 76.5 |
| 7/23/96 | 42 | 105,730 | 5 | 3.17 | 11.04 | 98.5 | 9.3 | 78 |
| 8/12/96 | 75.5 | 196,187 | 0.5 | 1.58 | 7.70 | 98.5 | 6.5 | 77.5 |
| 8/15/96 | 44 | 138,841 | 0 | 3.79 | 7.05 | 94 | 4.9 | 69.5 |
| 8/17/96 | 42.5 | 68,937 | 11.5 | 2.90 | 7.91 | 94 | 8.3 | 75.5 |
| 8/21/96 | 60.5 | 211,444 | 0 | 2.10 | 6.09 | 93 | 5.3 | 71.5 |
| 9/12/96 | 126 | 391,512 | 25 | 3.58 | 2.85 | 87 | 3.4 | 69 |
| 9/16/96 | 67 | 91,576 | 0.5 | 2.72 | 5.30 | 94.5 | 4.2 | 75 |

Figure 216. SAN ANTONIO DEC'95-SEP'96 MODEL T51
DATA CONTROLLED FOR OZONE EPISODES - ONE OBSERVATION PER EPISODE
AND AVERAGE EPISODIC CLOUD COVER LE 4 OKTAS

PEAK EPISODIC OZONE CONCENTRATION

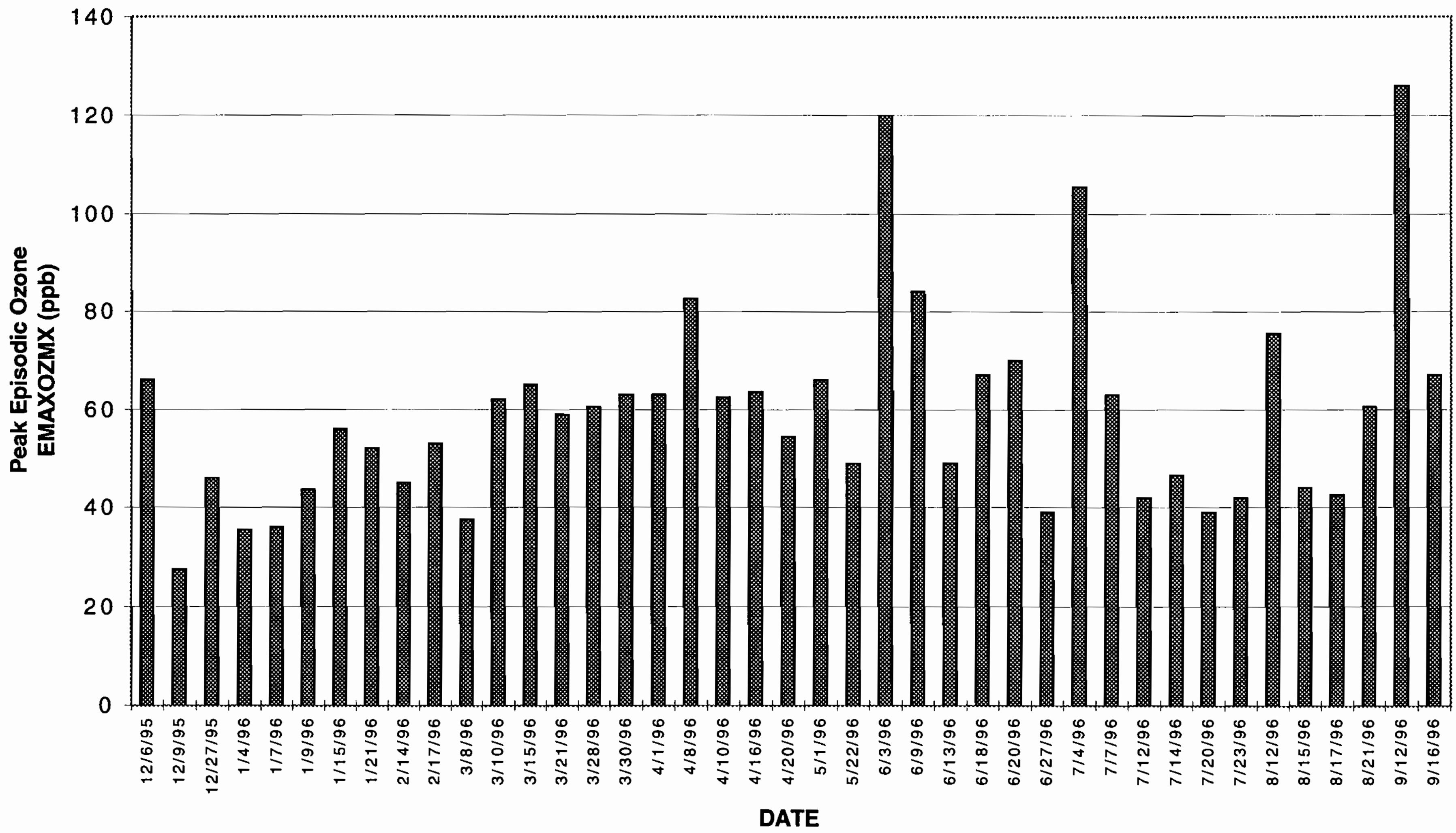


Figure 217. SAN ANTONIO DEC'95-SEP'96 MODEL T51
DATA CONTROLLED FOR OZONE EPISODES - ONE OBSERVATION PER EPISODE
AND AVERAGE EPISODIC CLOUD COVER LE 4 OKTAS

EPISODIC CUMULATIVE TRANSGUIDE NETWORK DAILY TRAFFIC DENSITY
6AM to 2 HOURS BEFORE TIME of MAX OZONE

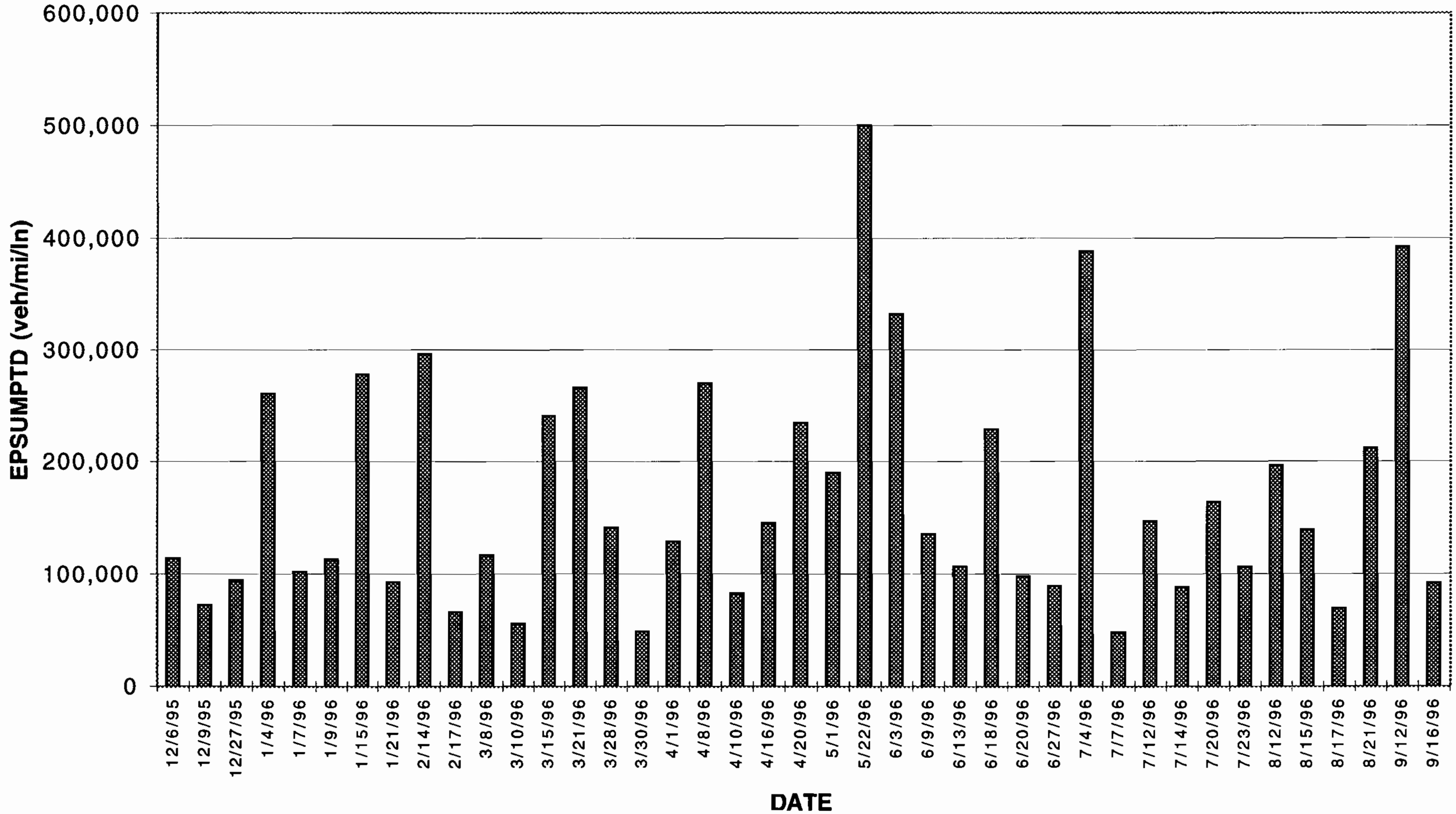


Figure 218. SAN ANTONIO DEC'95-SEP'96 MODEL T51
DATA CONTROLLED FOR OZONE EPISODES - ONE OBSERVATION PER EPISODE
AND AVERAGE EPISODIC CLOUD COVER LE 4 OKTAS

PEAK EPISODIC OZONE AS A FUNCTION OF EPISODIC CUMULATIVE TRANSGUIDE NETWORK DAILY TRAFFIC DENSITY
6AM to 2 HOURS BEFORE TIME of MAX OZONE

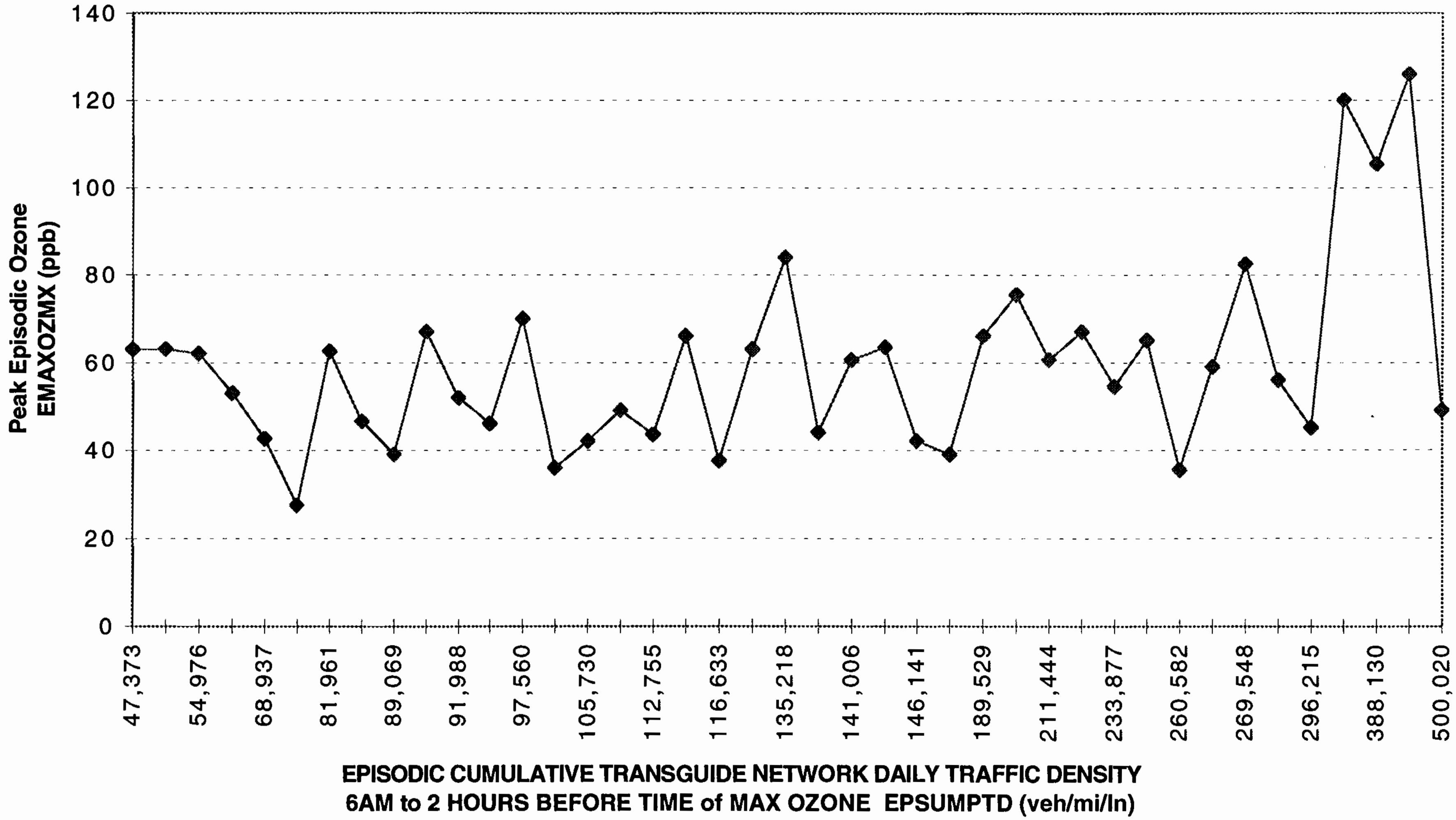


**Figure 219. SAN ANTONIO DEC'95-SEP'96 MODEL T51**
**DATA CONTROLLED FOR OZONE EPISODES - ONE OBSERVATION PER EPISODE**
**AND AVERAGE EPISODIC CLOUD COVER LE 4 OKTAS**

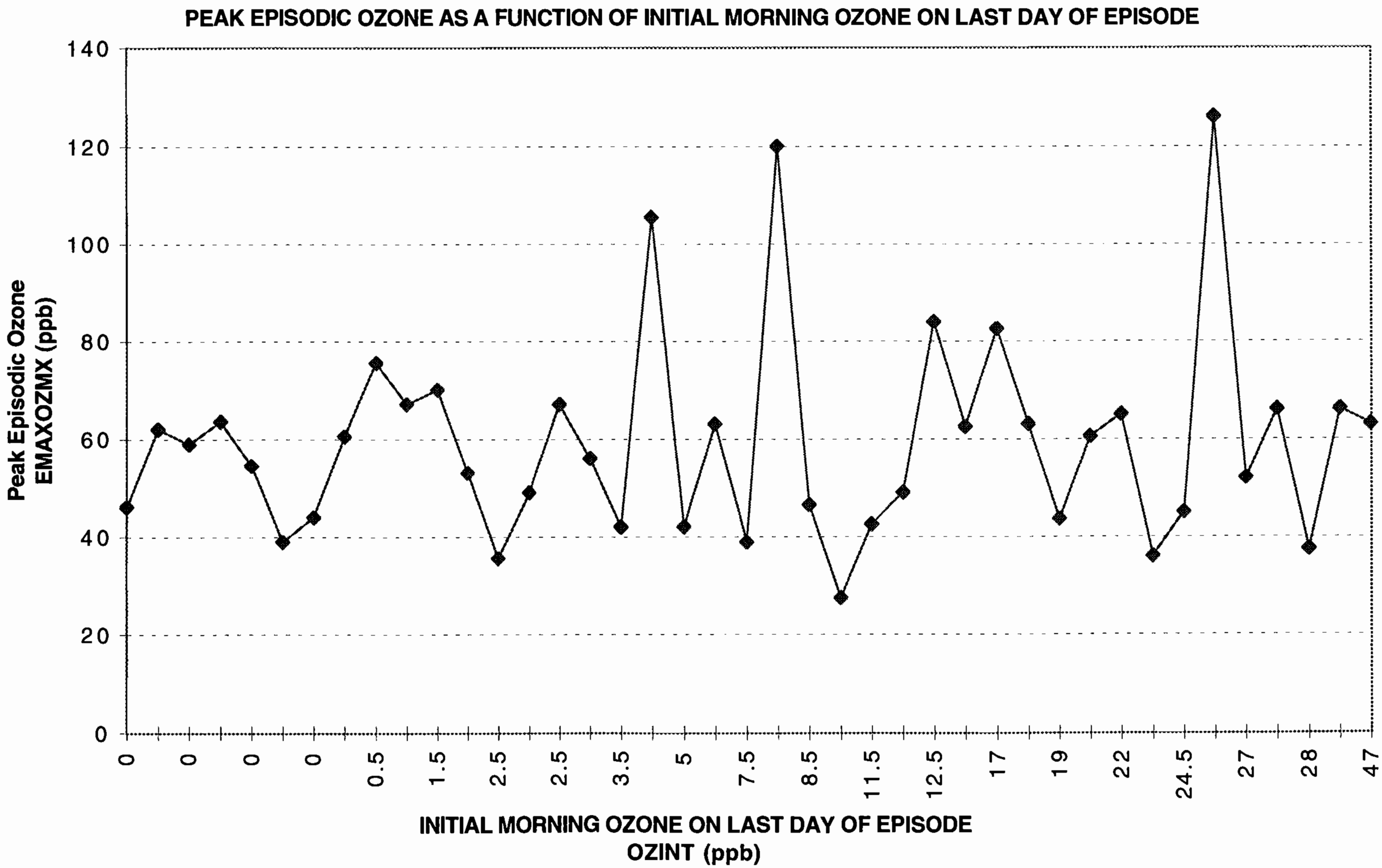


**Figure 220. SAN ANTONIO DEC'95-SEP'96 MODEL T51**
**DATA CONTROLLED FOR OZONE EPISODES - ONE OBSERVATION PER EPISODE**
**AND AVERAGE EPISODIC CLOUD COVER LE 4 OKTAS**

**PEAK EPISODIC OZONE AS A FUNCTION OF AVERAGE CLOUD COVER UPTO TIME OF MAX OZONE ON LAST DAY OF EPISODE**

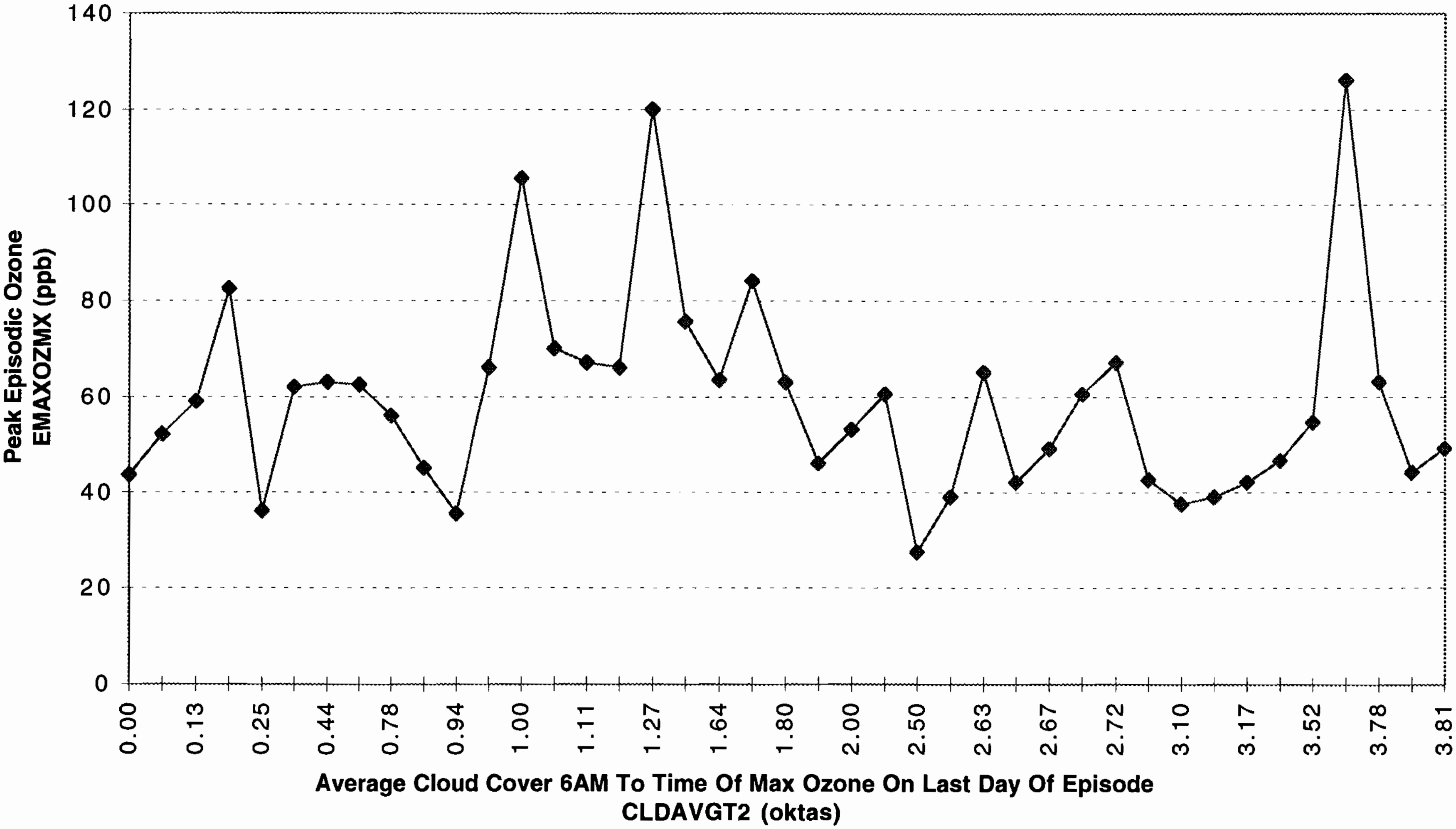


Figure 221. SAN ANTONIO DEC'95-SEP'96 MODEL T51
DATA CONTROLLED FOR OZONE EPISODES - ONE OBSERVATION PER EPISODE
AND AVERAGE EPISODIC CLOUD COVER LE 4 OKTAS

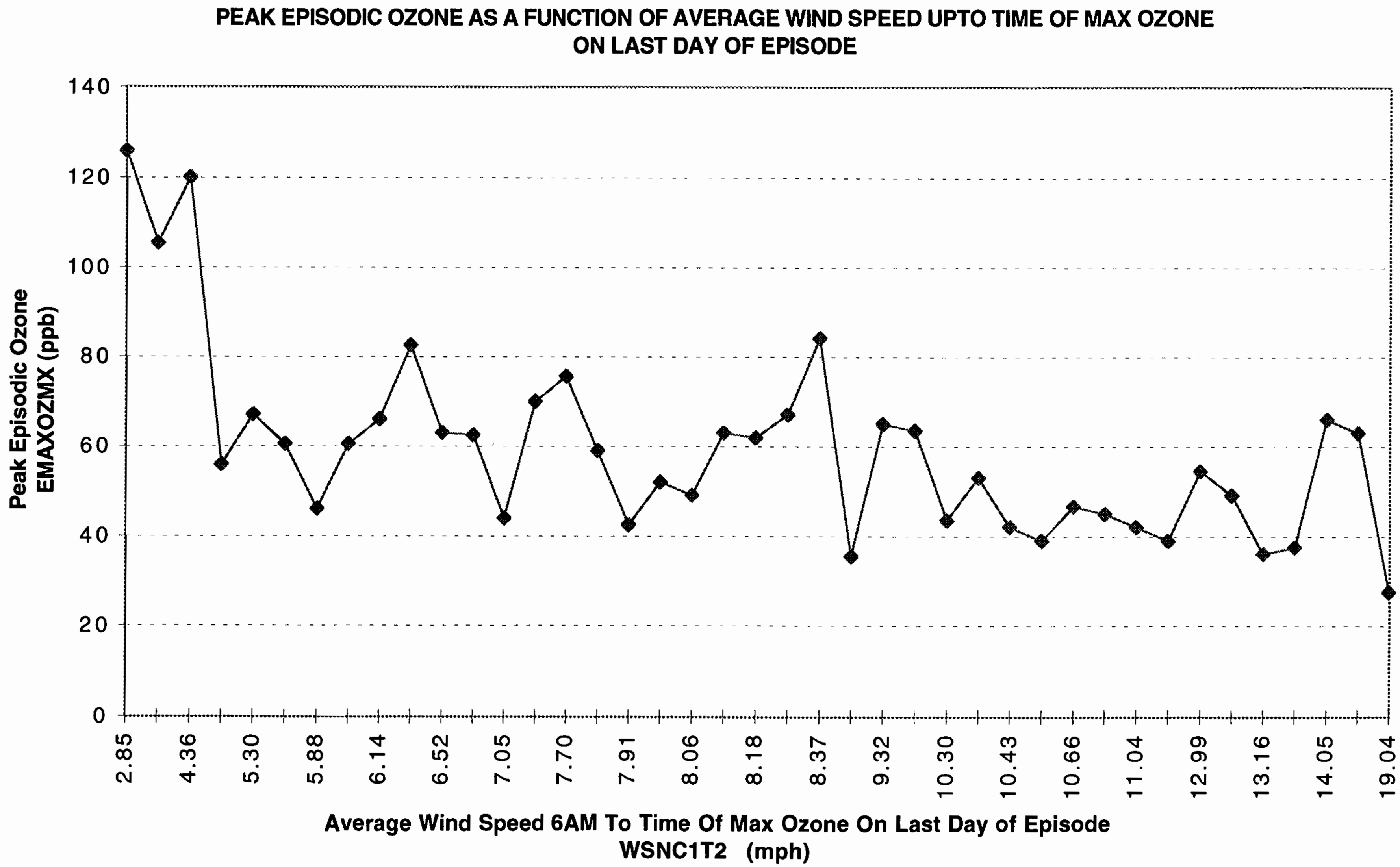


**Figure 222. SAN ANTONIO DEC'95-SEP'96 MODEL T51**
**DATA CONTROLLED FOR OZONE EPISODES - ONE OBSERVATION PER EPISODE**
**AND AVERAGE EPISODIC CLOUD COVER LE 4 OKTAS**

**PEAK EPISODIC OZONE AS A FUNCTION OF MAXIMUM TEMPERATURE ON LAST DAY OF EPISODE**

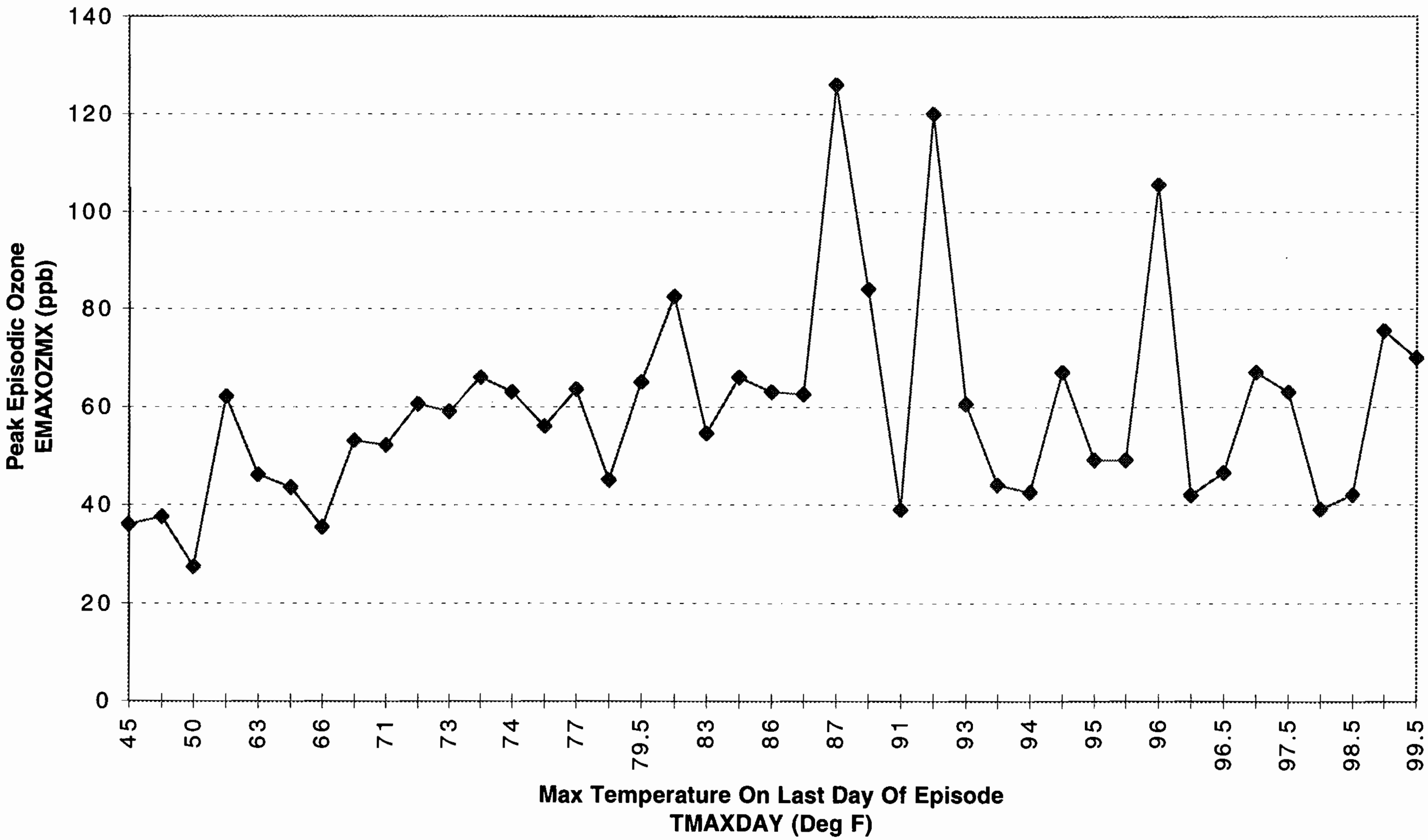


Figure 223. SAN ANTONIO DEC'95-SEP'96 MODEL T51
DATA CONTROLLED FOR OZONE EPISODES - ONE OBSERVATION PER EPISODE
AND AVERAGE EPISODIC CLOUD COVER LE 4 OKTAS

PEAK EPISODIC OZONE AS A FUNCTION OF AVERAGE DAILY WIND SPEED ON LAST DAY OF EPISODE

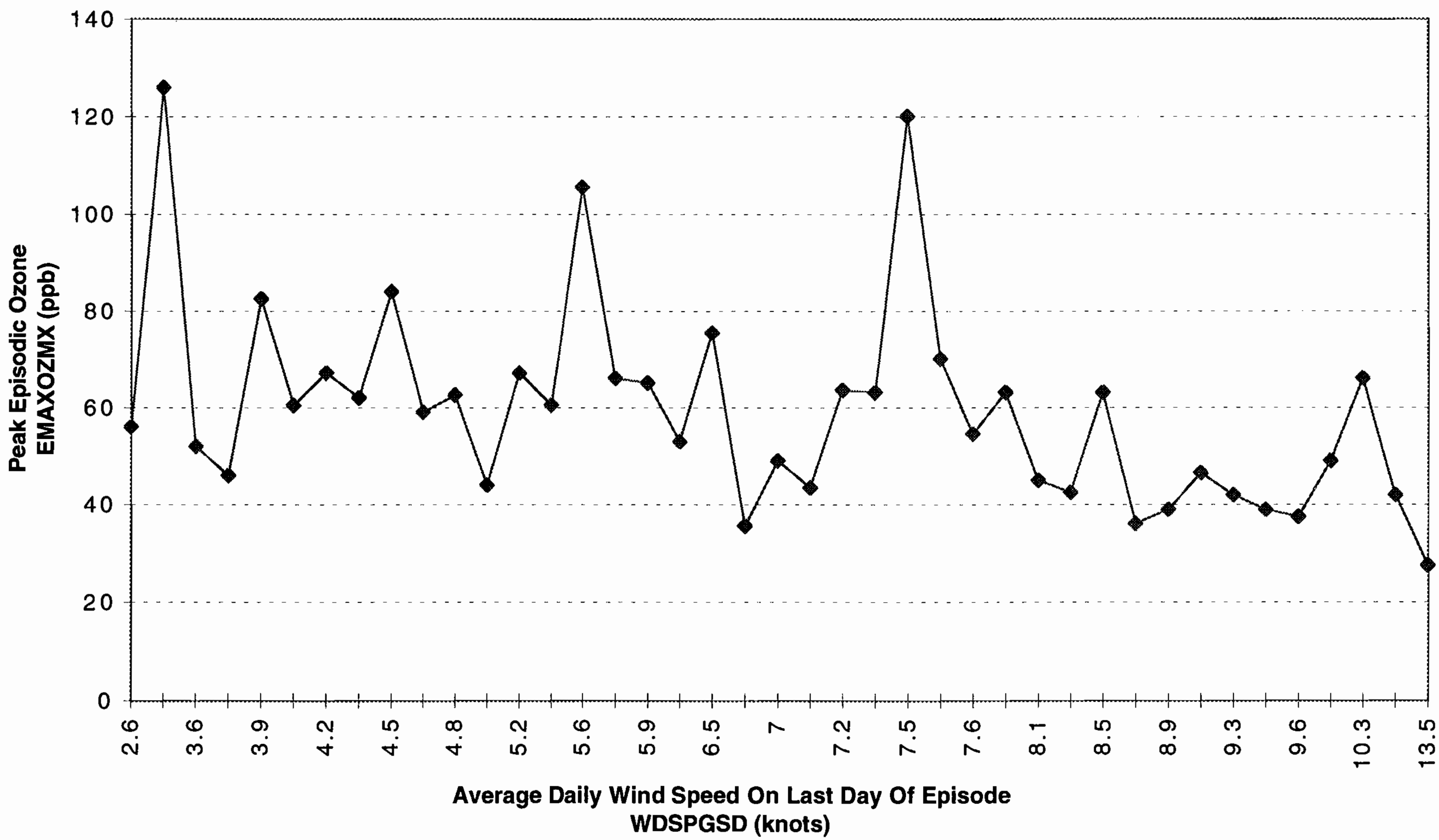


Figure 224. SAN ANTONIO DEC'95-SEP'96 MODEL T51
DATA CONTROLLED FOR OZONE EPISODES - ONE OBSERVATION PER EPISODE
AND AVERAGE EPISODIC CLOUD COVER LE 4 OKTAS

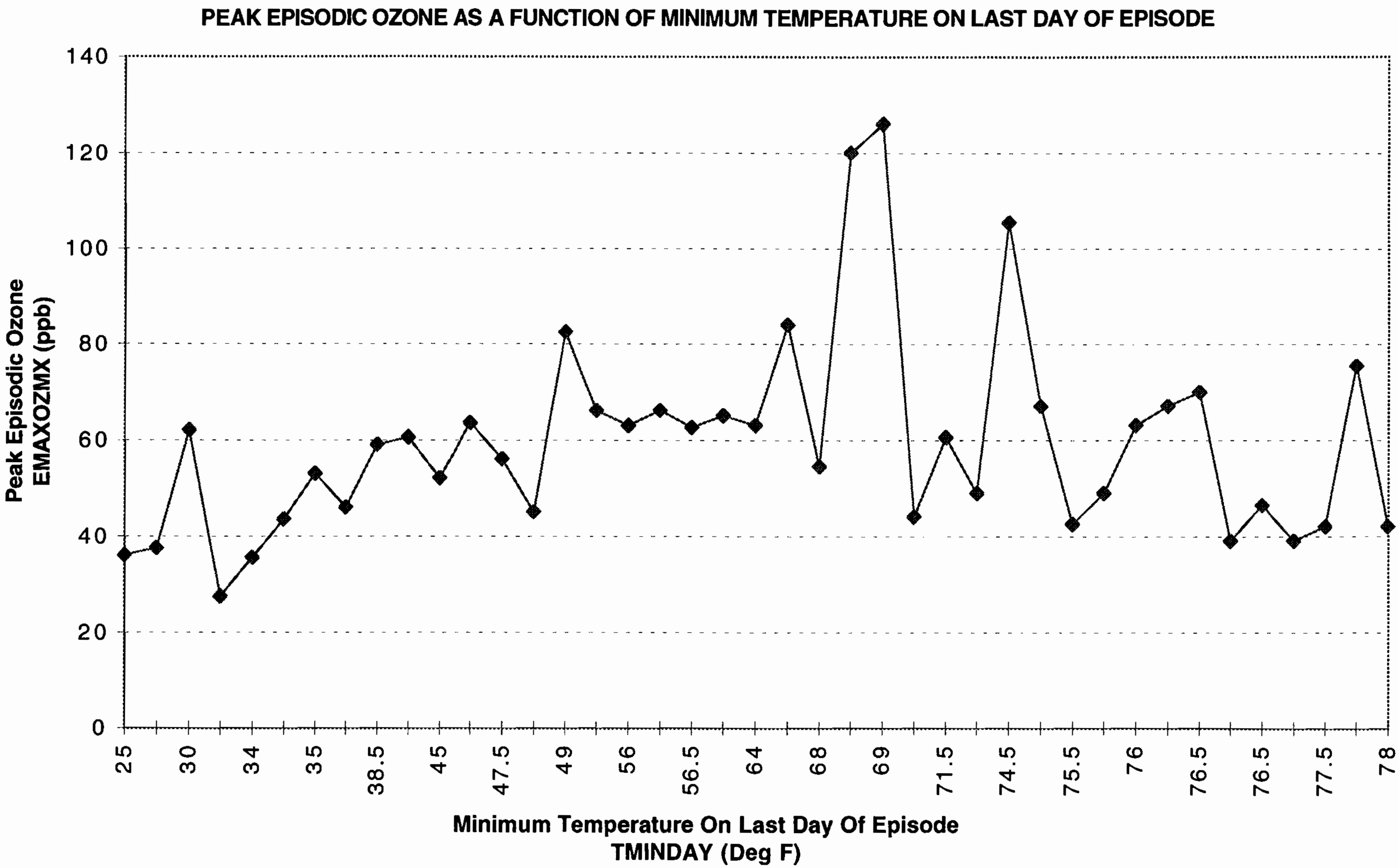
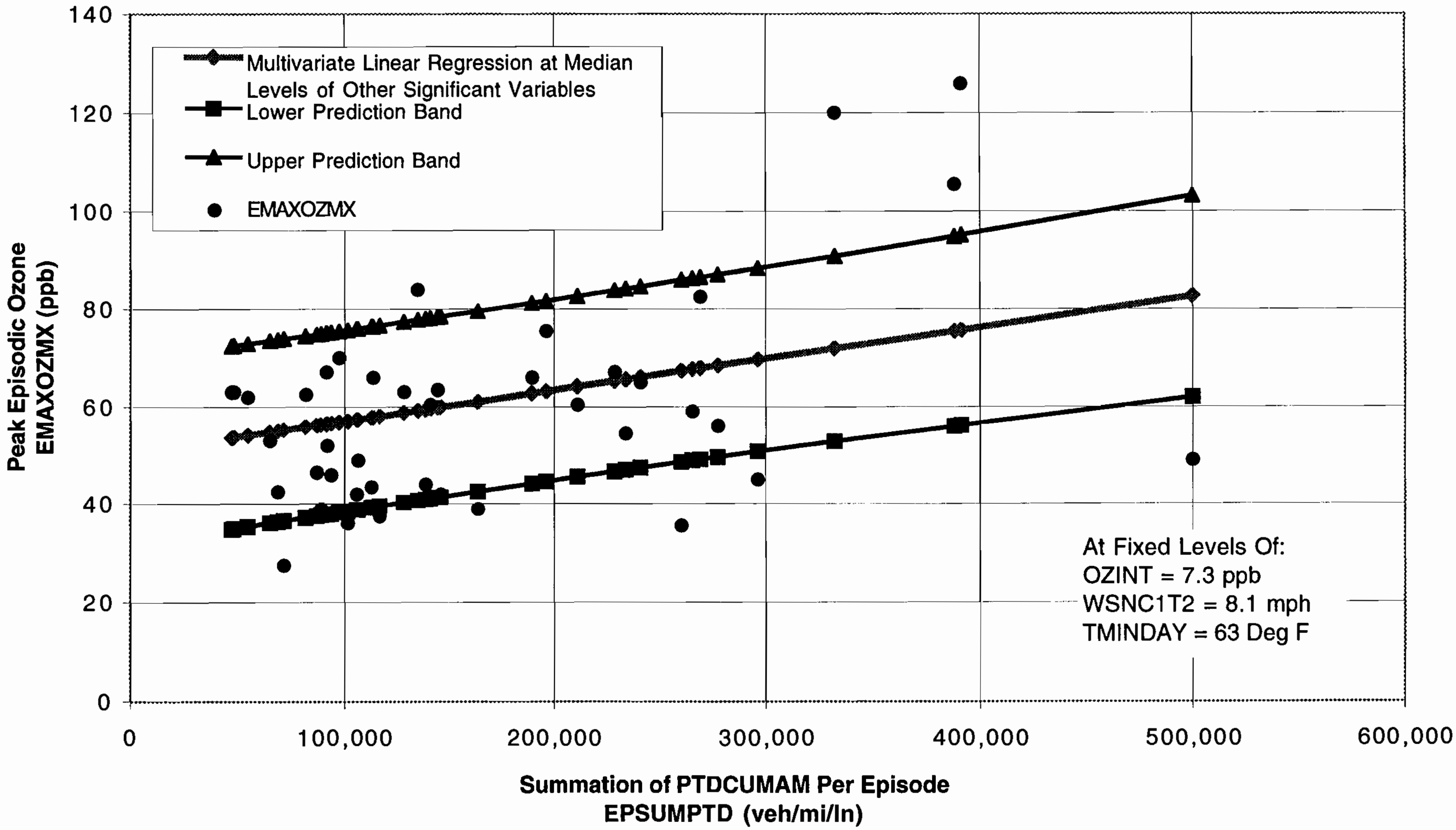


**Figure 225. SAN ANTONIO DEC'95-SEP'96 MODEL T51**
**DATA CONTROLLED FOR OZONE EPISODES - ONE OBSERVATION PER EPISODE AND AVERAGE EPISODIC CLOUD COVER LE 4 OKTAS**

**80% CONFIDENCE PREDICTION BAND ON MAX EPISODIC OZONE AS A FUNCTION OF TRANSGUIDE NETWORK CUMULATIVE EPISODIC TRAFFIC DENSITY AT FIXED LEVELS OF OTHER INDEPENDENT VARIABLES (MEDIAN LEVELS)**



**SCENARIO 24**

In Scenario 24, we repeat the analysis of Scenario 23 except that we control for the months of data collected from April 1996 through September 1996. As in Scenario 23, we control for ozone episodes, summarize each episode and predict the peak episodic ozone concentration instead of predicting each day's peak ozone. Likewise, we control for the average episodic cloud cover (the average of CLDAVGT2 over an episode) to be less than or equal to 4 oktas.

Table 62 summarizes the results of the model and Table 63 summarizes the strength of the traffic parameter's association with the daily peak ozone. Confidence intervals of the parameter's model coefficient per 10,000 units of EPSUMPTD are calculated at the 80, 90, and 95 percent confidence levels. Table 64 summarizes the raw data sorted by date for Scenario 24.

We can say that under this scenario at the 80 percent confidence level, the potential increase to a peak episodic ozone level in ppb per a 10,000 unit increase in the traffic congestion parameter EPSUMPTD has a range from about 0.5 to about 1.1 ppb. It is equally likely that the potential increase in the episodic peak ozone would fall at any point within this range. The results presented in Table 63 also indicate that the traffic congestion parameter remains significant at the 95 percent confidence level. As before, we should point out that ozone episodes last anywhere from one to six days based on the data collected. If a daily 10,000 unit increase in the traffic congestion parameter PTDCUMAM were to occur for each day over a 3-day episode, that would imply a 30,000 unit increase in EPSUMPTD and an increase in EMAXOZMX over a range from about 1.5 to 3.3 ppb at the 80 percent confidence level.

Figure 226 and Figure 227 plot the peak episodic ozone (EMAXOZMX) and the cumulative episodic traffic congestion parameter (EPSUMPTD) over time. Figure 228 through Figure 234 graphically summarize the relationships between the response and predictor variables. Figure 235 depicts an 80 percent confidence level prediction band of EMAXOZMX as a function of EPSUMPTD while holding the other significant variables constant at their median levels.

We can say at an 80 percent confidence level that the daily peak ozone will fall somewhere within the band on Figure 235. As shown, the 80 percent confidence prediction band with this linear model under this scenario does not encompass several of the higher peak episodic ozone concentrations at fixed median levels of the other significant variables, but the prediction band in this scenario (Scenario 24), where the months of the peak ozone season are being controlled for, comes closer to encompassing the higher peak episodic ozone levels than when not controlling for this factor (Scenario 23).

Controlling for the average episodic cloud cover in Scenario 24 relative to Scenario 22 also reveals a slightly stronger association between the traffic congestion parameter (EPSUMPTD) and the peak episodic ozone level (EMAXOZMX). This is evidenced by the confidence intervals on the traffic congestion variable coefficient at all levels and by the bivariate Pearson correlations.

At the 80 percent confidence level interval of EPSUMPTD in Scenario 24, the interval ranges from 0.5 to 1.1 ppb per 10,000 EPSUMPTD while for Scenario 22 the interval ranges from 0.4 to 0.9 ppb per 10,000 EPSUMPTD. The overall strength of the model to predict the peak episodic ozone level is improved as well, with the model's R-Square value improving to 0.77 under Scenario 24 versus 0.65 under Scenario 22. However, it should be pointed out that the size of the population of data points under Scenario 24 is only twenty-five compared to a forty-two under Scenario 22.

*Table 62. Scenario 24 Results*

| | | | RANGE OF VARIABLES |
|---|---|---|---|
| **DATA CONTROLS** | 1) APR 96-SEP 96<br><br>2) ALL OZONE EPISODES; ONE OBSERVATION OF DATA SUMMARIZED PER EPISODE<br><br>3) AVERAGE EPISODIC CLOUD COVER (AVG OF CLDAVGT2) LE 4 OKTAS | | |
| **MODEL SIGNIFICANT PARAMETERS (units)** | Y --- EMAXOZMX (ppb)<br>XO --- INTERCEPT<br>X1 --- EPSUMPTD (veh/mi/ln)<br>X2 --- OZINT (ppb)<br>X3 --- CLDAVGT2 (oktas)<br>X4 --- WSNC1T2 (mph) | | 39 to 126<br><br>47,400 to 500,000<br>0 to 47<br>0.1 to 3.8<br>2.8 to 14.5 |
| **SIGNIFICANT PARAMETER COEFFICIENT ESTIMATES AND BIVARIATE CORRELATIONS (r)** | 93.70879399 X0<br>0.00007862 X1<br>0.63427860 X2<br>-3.84437252 X3<br>-4.72024958 X4 | <br>0.5549<br>0.2468<br>-0.3885<br>-0.6457 | |
| **TRAFFIC VARIABLE COEFFICIENT CONFIDENCE-LEVEL** | 99% | | |
| **MODEL R-SQUARE** | 0.77 | | |
| **TRAFFIC VARIABLE PARTIAL R-SQUARE** | 0.20 | | |
| **SAMPLE SIZE** | 25 | | |
| **1st ORDER AUTO-CORRELATION Durbin-Watson Statistic** | 1.875 | | |
| **P-VALUE SUPPORTING $H_O$: No Heteroskedasticity** | 0.2759 | | |

*Table 63. Scenario 24 Results (cont.)*

| | |
|---|---|
| **TRAFFIC PARAMETER ESTIMATE PER 10,000 EPSUMPTD** | **0.7862** |
| **TRAFFIC PARAMETER ESTIMATE STANDARD ERROR PER 10,000 EPSUMPTD** | **0.2302** |
| **n** | **25** |
| **k** | **4** |
| **df** | **20** |
| $t_{(.10)}$ | **1.325** |
| $t_{(.05)}$ | **1.725** |
| $t_{(.025)}$ | **2.086** |
| **80 PERCENT CONFIDENCE INTERVAL OF TRAFFIC PARAMETER ESTIMATE PER 10,000 UNITS OF EPSUMPTD** | **0.48 to 1.09** |
| **90 PERCENT CONFIDENCE INTERVAL OF TRAFFIC PARAMETER ESTIMATE PER 10,000 UNITS OF EPSUMPTD** | **0.39 to 1.18** |
| **95 PERCENT CONFIDENCE INTERVAL OF TRAFFIC PARAMETER ESTIMATE PER 10,000 UNITS OF EPSUMPTD** | **0.31 to 1.27** |

*Table 64. Scenario 24 Data*

| DATECST | EMAXOZMX | EPSUMPTD | OZINT | CLDAVGT2 | WSNC1T2 | TMAXDAY | WDSPGSD | TMINDAY |
|---|---|---|---|---|---|---|---|---|
| 4/1/96 | 63 | 128,397 | 47 | 0.44 | 14.51 | 74.0 | 8.50 | 56.0 |
| 4/8/96 | 83 | 269,548 | 17 | 0.13 | 6.33 | 79.5 | 3.90 | 49.0 |
| 4/10/96 | 63 | 81,961 | 16 | 0.57 | 6.55 | 86.0 | 4.80 | 56.5 |
| 4/16/96 | 64 | 144,610 | 0 | 1.64 | 9.72 | 77.0 | 7.20 | 46.0 |
| 4/20/96 | 55 | 233,877 | 0 | 3.52 | 12.99 | 83.0 | 7.60 | 68.0 |
| 5/1/96 | 66 | 189,529 | 27 | 0.95 | 14.05 | 84.5 | 10.30 | 56.0 |
| 5/12/96 | 68 | 155,426 | 15.5 | 7.48 | 6.76 | 86.0 | 5.00 | 65.0 |
| 5/16/96 | 50 | 332,172 | 14 | 3.50 | 14.36 | 93.5 | 12.50 | 71.5 |
| 5/22/96 | 49 | 500,020 | 12 | 2.67 | 13.04 | 95.5 | 10.10 | 72.5 |
| 6/3/96 | 120 | 332,336 | 8 | 1.27 | 4.36 | 91.5 | 7.50 | 68.0 |
| 6/9/96 | 84 | 135,218 | 12.5 | 1.68 | 8.37 | 90.5 | 4.50 | 64.5 |
| 6/13/96 | 49 | 106,210 | 2.5 | 3.81 | 8.06 | 95.0 | 7.00 | 76.0 |
| 6/18/96 | 67 | 228,746 | 2.5 | 1.11 | 8.31 | 97.5 | 5.20 | 76.5 |
| 6/20/96 | 70 | 97,560 | 1.5 | 1.06 | 7.57 | 99.5 | 7.50 | 76.5 |
| 6/24/96 | 53 | 119,447 | 6.5 | 3.78 | 7.86 | 92.0 | 9.60 | 76.5 |
| 6/27/96 | 39 | 89,069 | 0 | 3.14 | 11.58 | 91.0 | 8.90 | 76.5 |
| 7/4/96 | 106 | 388,130 | 4.5 | 1.00 | 3.15 | 96.0 | 5.60 | 74.5 |
| 7/7/96 | 63 | 47,373 | 7 | 1.80 | 6.52 | 97.5 | 7.30 | 76.0 |
| 7/12/96 | 42 | 146,141 | 3.5 | 2.65 | 10.43 | 96.0 | 10.50 | 77.5 |
| 7/14/96 | 47 | 87,219 | 8.5 | 3.39 | 10.66 | 96.5 | 9.30 | 76.5 |
| 7/20/96 | 39 | 163,602 | 7.5 | 2.53 | 10.58 | 98.0 | 9.40 | 76.5 |
| 7/23/96 | 42 | 105,730 | 5 | 3.17 | 11.04 | 98.5 | 9.30 | 78.0 |
| 7/26/96 | 46 | 241,948 | 0.5 | 3.77 | 6.32 | 93.5 | 6.20 | 73.0 |
| 8/12/96 | 76 | 196,187 | 0.5 | 1.58 | 7.70 | 98.5 | 6.50 | 77.5 |
| 8/15/96 | 44 | 138,841 | 0 | 3.79 | 7.05 | 94.0 | 4.90 | 69.5 |
| 8/17/96 | 43 | 68,937 | 11.5 | 2.90 | 7.91 | 94.0 | 8.30 | 75.5 |
| 8/21/96 | 61 | 211,444 | 0 | 2.10 | 6.09 | 93.0 | 5.30 | 71.5 |
| 9/12/96 | 126 | 391,512 | 25 | 3.58 | 2.85 | 87.0 | 3.40 | 69.0 |
| 9/16/96 | 67 | 91,577 | 0.5 | 2.72 | 5.30 | 94.5 | 4.20 | 75.0 |
| 9/24/96 | 54 | 104,865 | 0 | 4.27 | 5.18 | 90.0 | 6.20 | 72.0 |

Figure 226. SAN ANTONIO APR'96-SEP'96 MODEL T44
Episodic Max Ozone
Data Controlled For Ozone Episodes - One Observation Of Data Per Episode
And Average Episodic Cloud Cover From 6AM To Time Of Max Ozone LE 4 Oktas

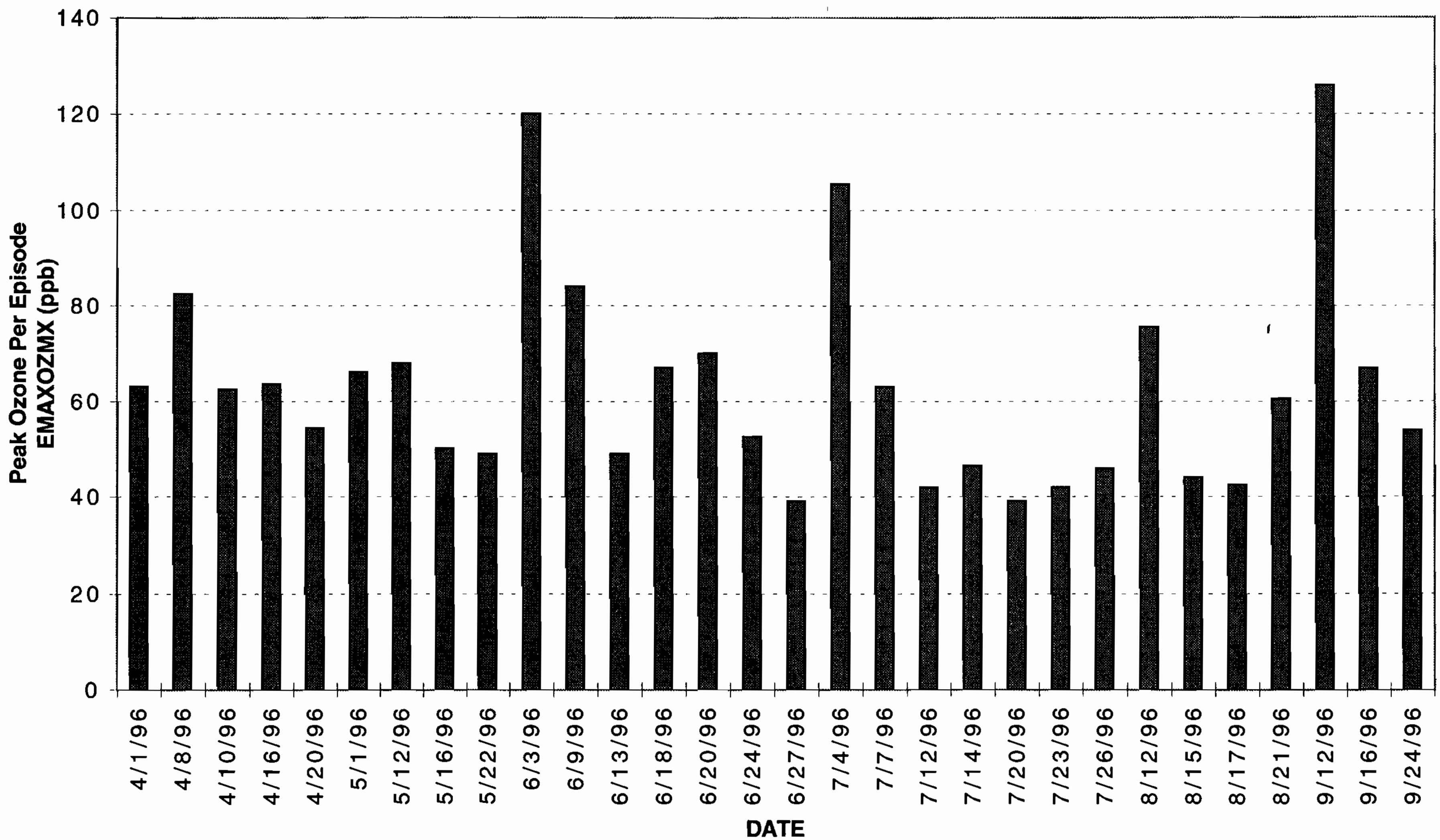


Figure 227. SAN ANTONIO APR'96-SEP'96 MODEL T44
Episodic Cumulative TransGuide Network Traffic Density 6AM To 2-Hrs Before Time Of Max Ozone
Data Controlled For Ozone Episodes - One Observation Of Data Per Episode
And Average Episodic Cloud Cover From 6AM To Time Of Max Ozone LE 4 Oktas

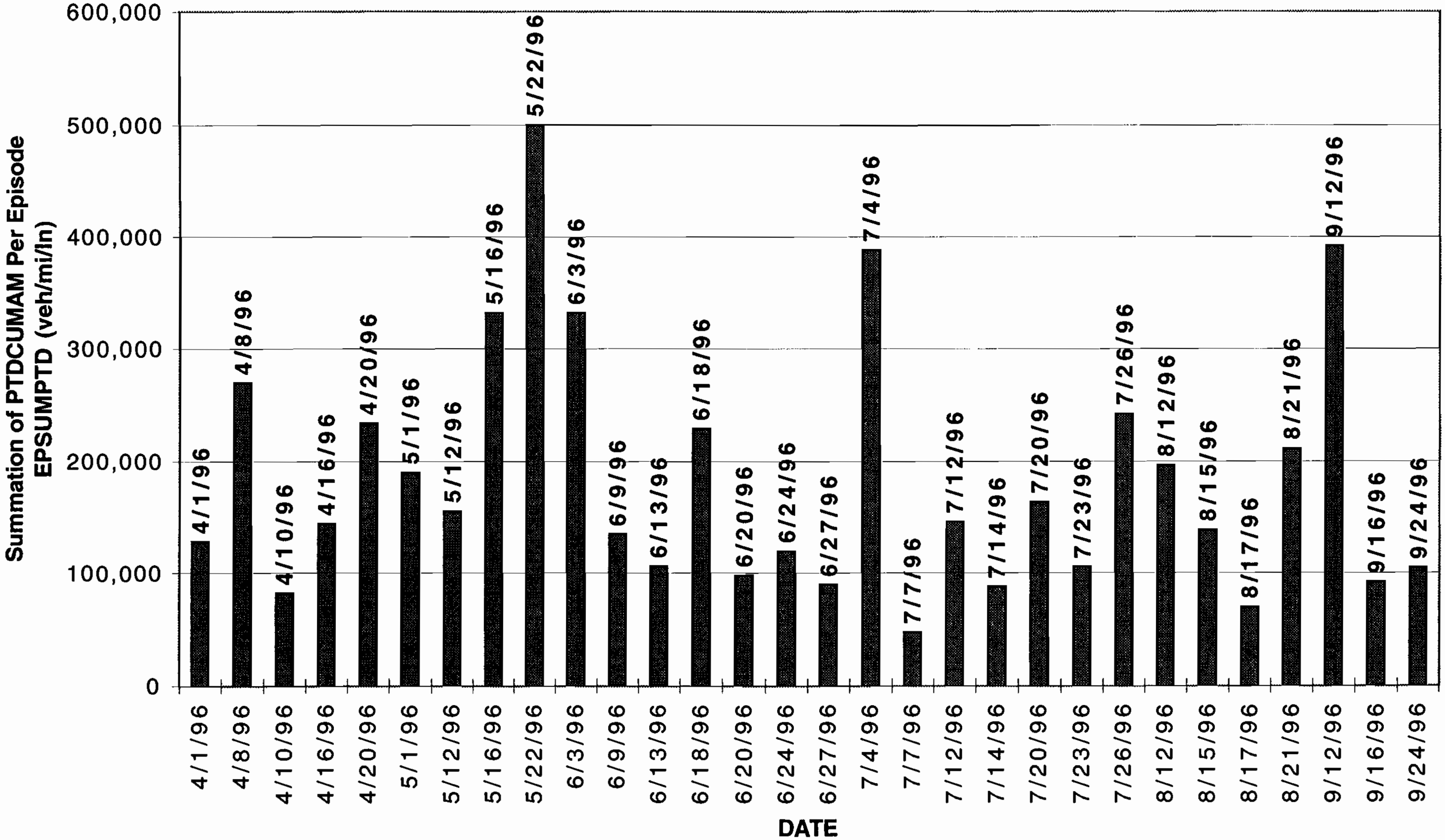


Figure 228. SAN ANTONIO APR'96-SEP'96 MODEL T44
Episodic Max Ozone As A Function Of
Episodic Cumulative TransGuide Network Traffic Density 6AM To 2-Hrs Before Time Of Max Ozone
Data Controlled For Ozone Episodes - One Observation Of Data Per Episode
And Average Episodic Cloud Cover From 6AM To Time Of Max Ozone LE 4 Oktas

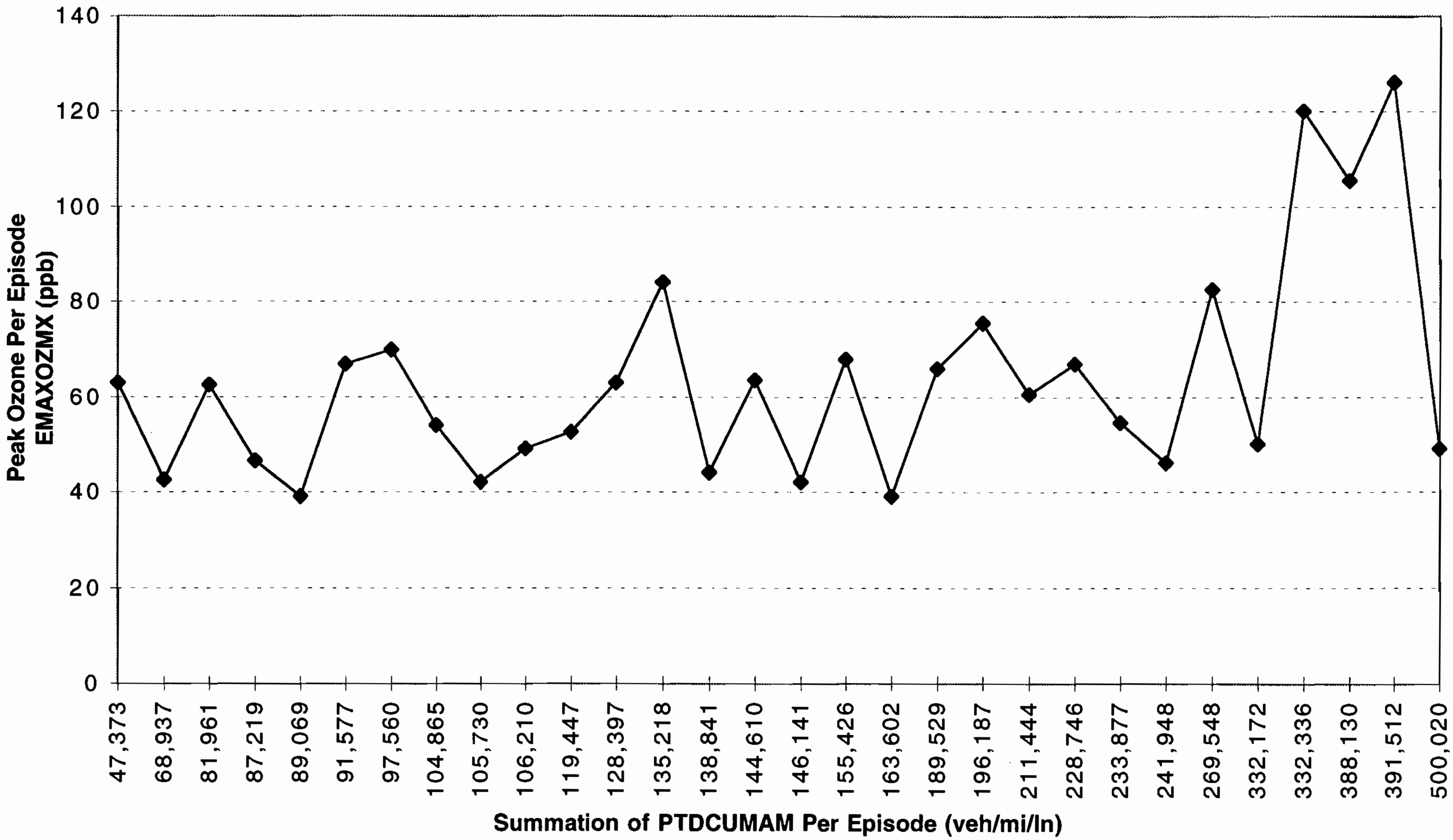


Figure 229. SAN ANTONIO APR'96-SEP'96 MODEL T44
Episodic Max Ozone As A Function Of Final Day Of Episode Initial Morning Ozone
Data Controlled For Ozone Episodes - One Observation Of Data Per Episode
And Average Episodic Cloud Cover From 6AM To Time Of Max Ozone LE 4 Oktas

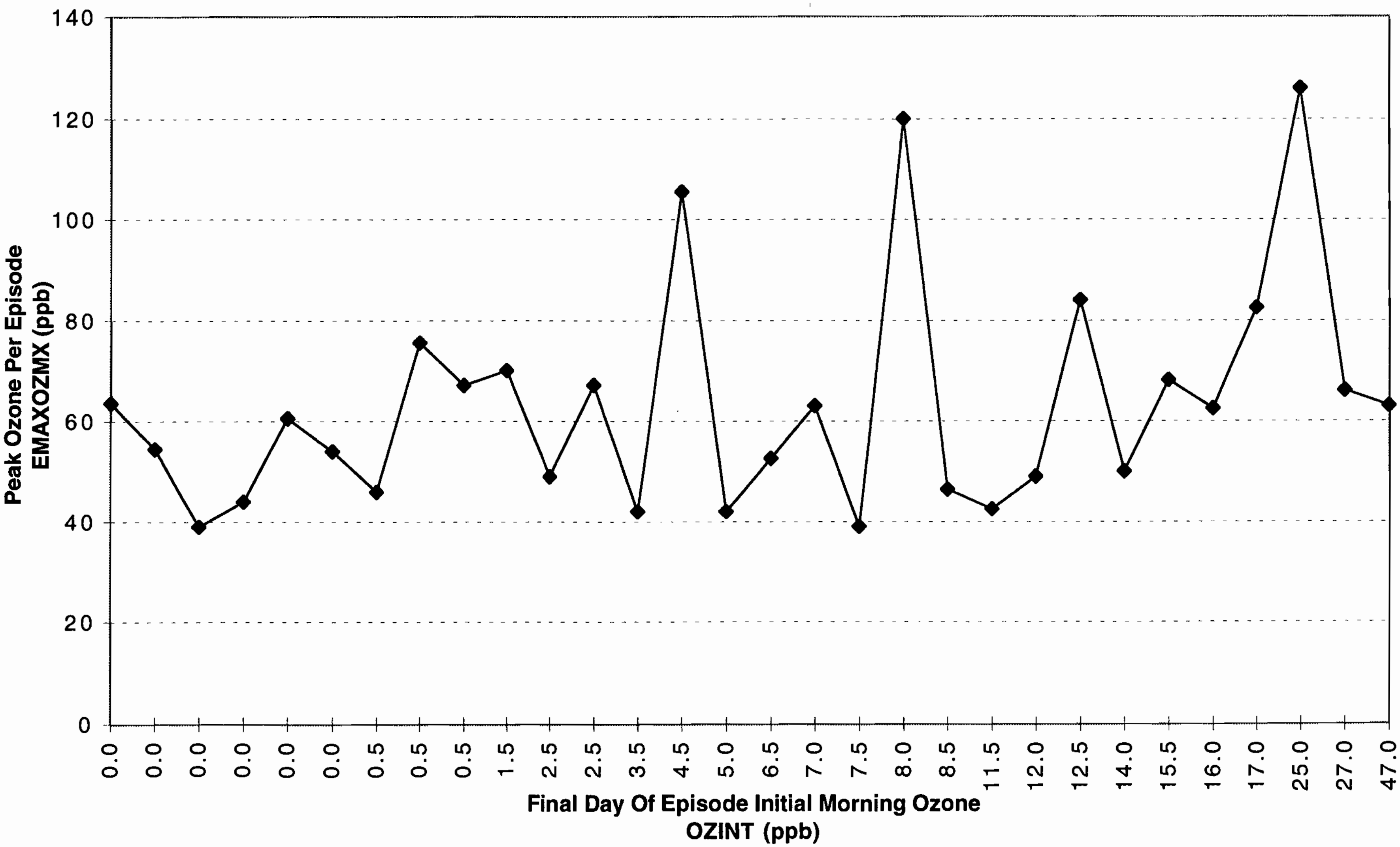


**Figure 230. SAN ANTONIO APR'96-SEP'96 MODEL T44**
**Episodic Max Ozone As A Function Of Final Day Of Episode Average Cloud Cover From 6AM To Time Of Max Ozone**
**Data Controlled For Ozone Episodes - One Observation Of Data Per Episode**
**And Average Episodic Cloud Cover From 6AM To Time Of Max Ozone LE 4 Oktas**

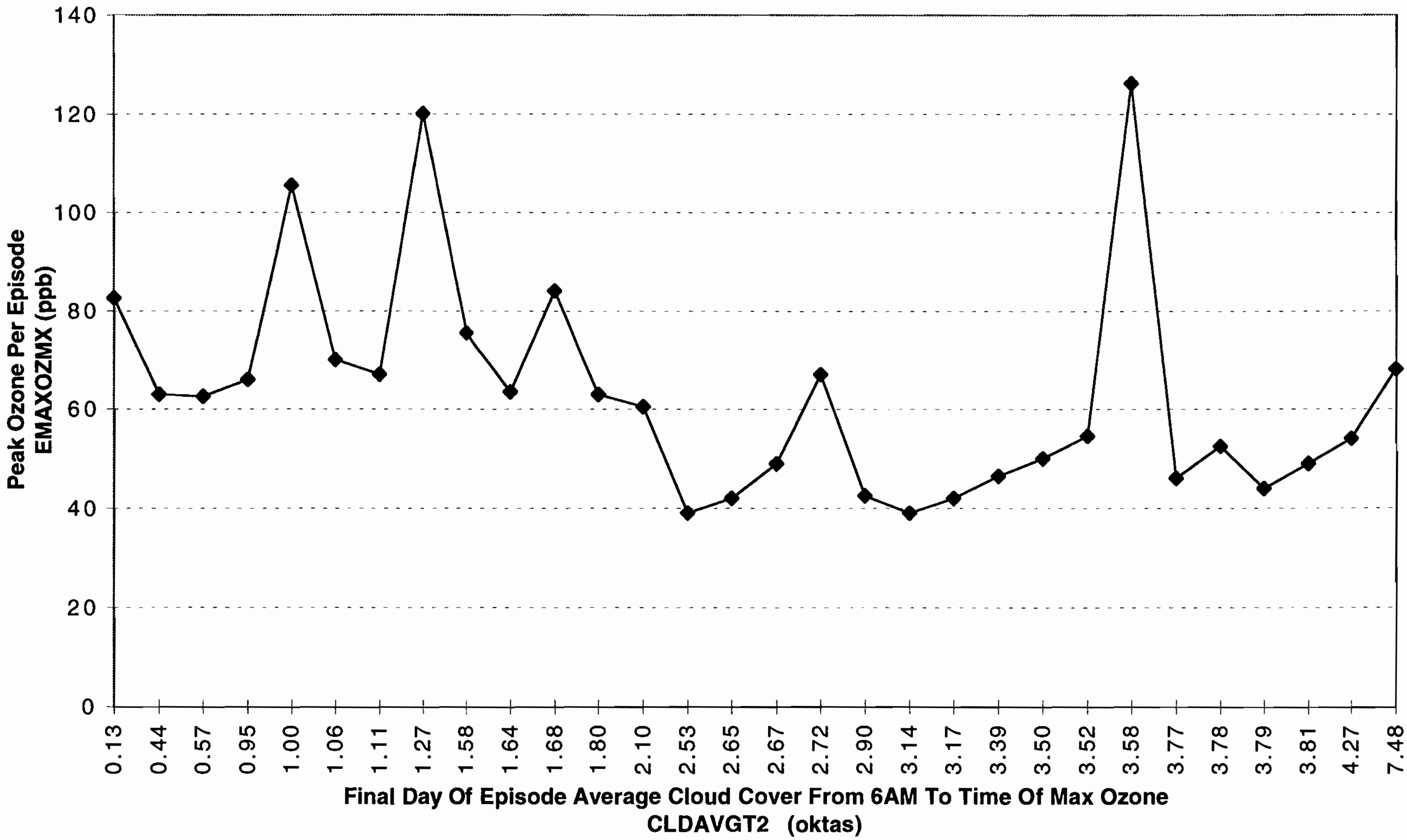


Figure 231. SAN ANTONIO APR'96-SEP'96 MODEL T44
Episodic Max Ozone As A Function Of
Final Day Of Episode Average Wind Speed From 6AM To Time Of Max Ozone
Data Controlled For Ozone Episodes - One Observation Of Data Per Episode
And Average Episodic Cloud Cover From 6AM To Time Of Max Ozone LE 4 Oktas

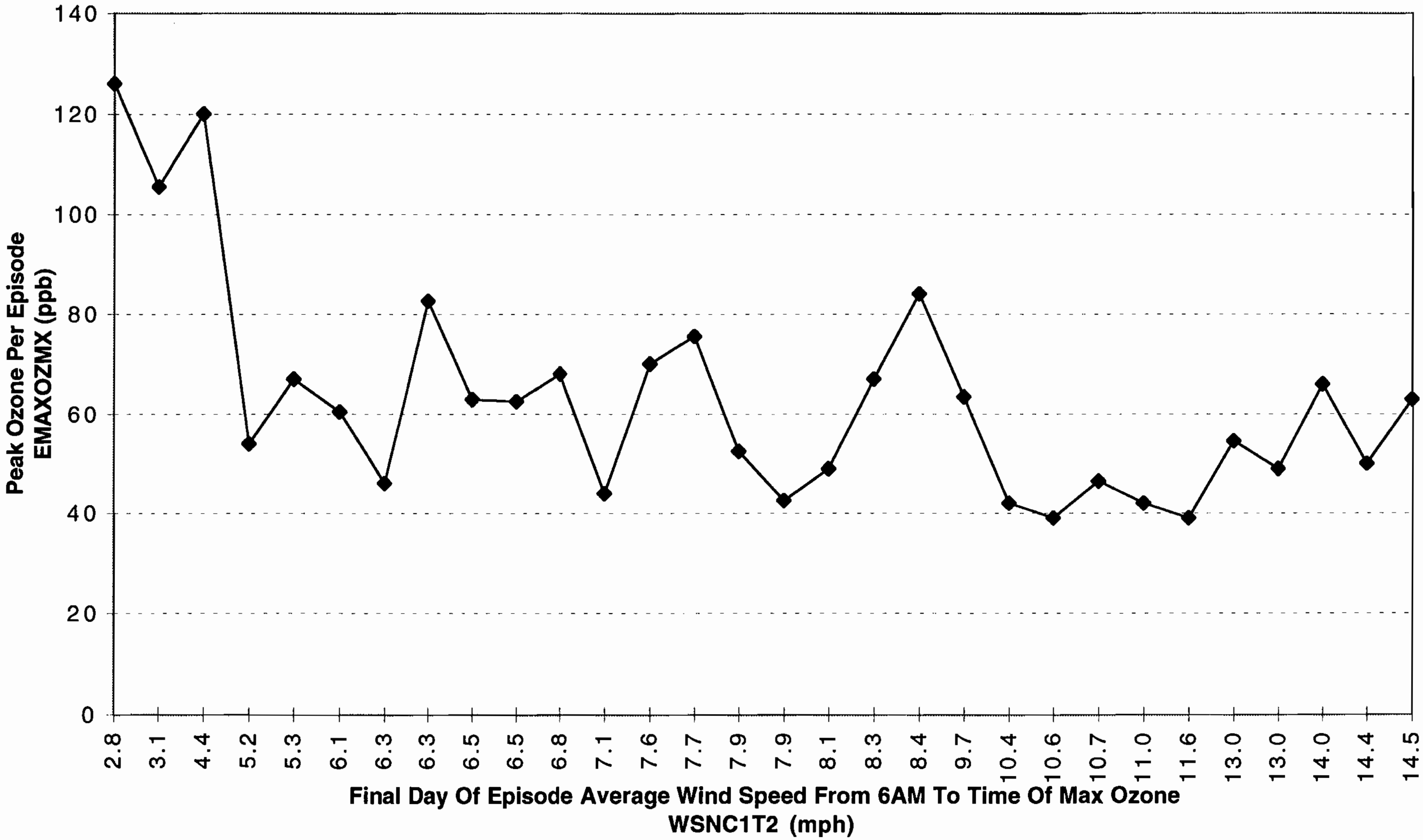


Figure 232. SAN ANTONIO APR'96-SEP'96 MODEL T44
Episodic Max Ozone As A Function Of Final Day Of Episode Maximum Temperature
Data Controlled For Ozone Episodes - One Observation Of Data Per Episode
And Average Episodic Cloud Cover From 6AM To Time Of Max Ozone LE 4 Oktas

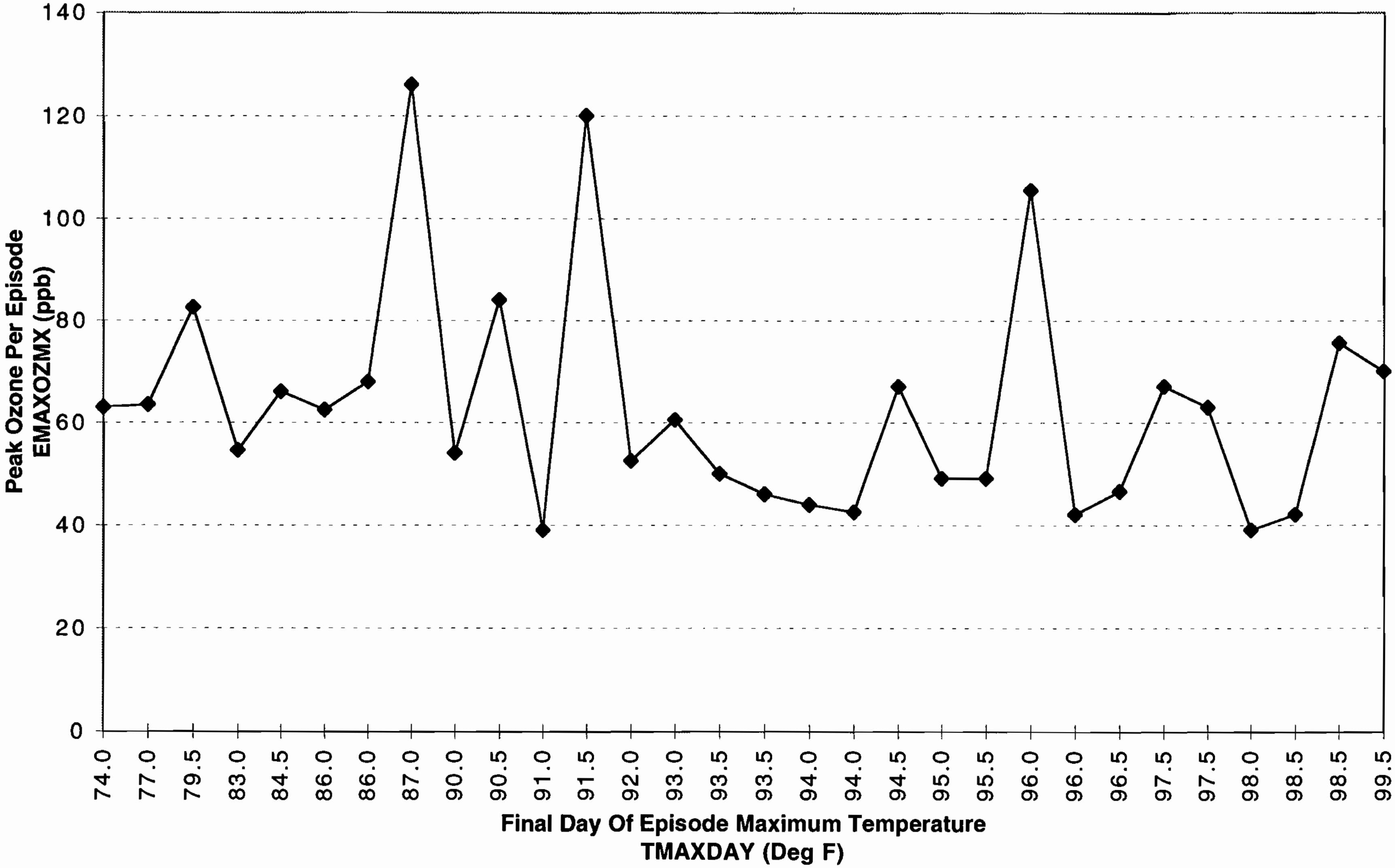


**Figure 233. SAN ANTONIO APR'96-SEP'96 MODEL T44**
**Episodic Max Ozone As A Function Of Final Day Of Episode Average Wind Speed**
**Data Controlled For Ozone Episodes - One Observation Of Data Per Episode**
**And Average Episodic Cloud Cover From 6AM To Time Of Max Ozone LE 4 Oktas**

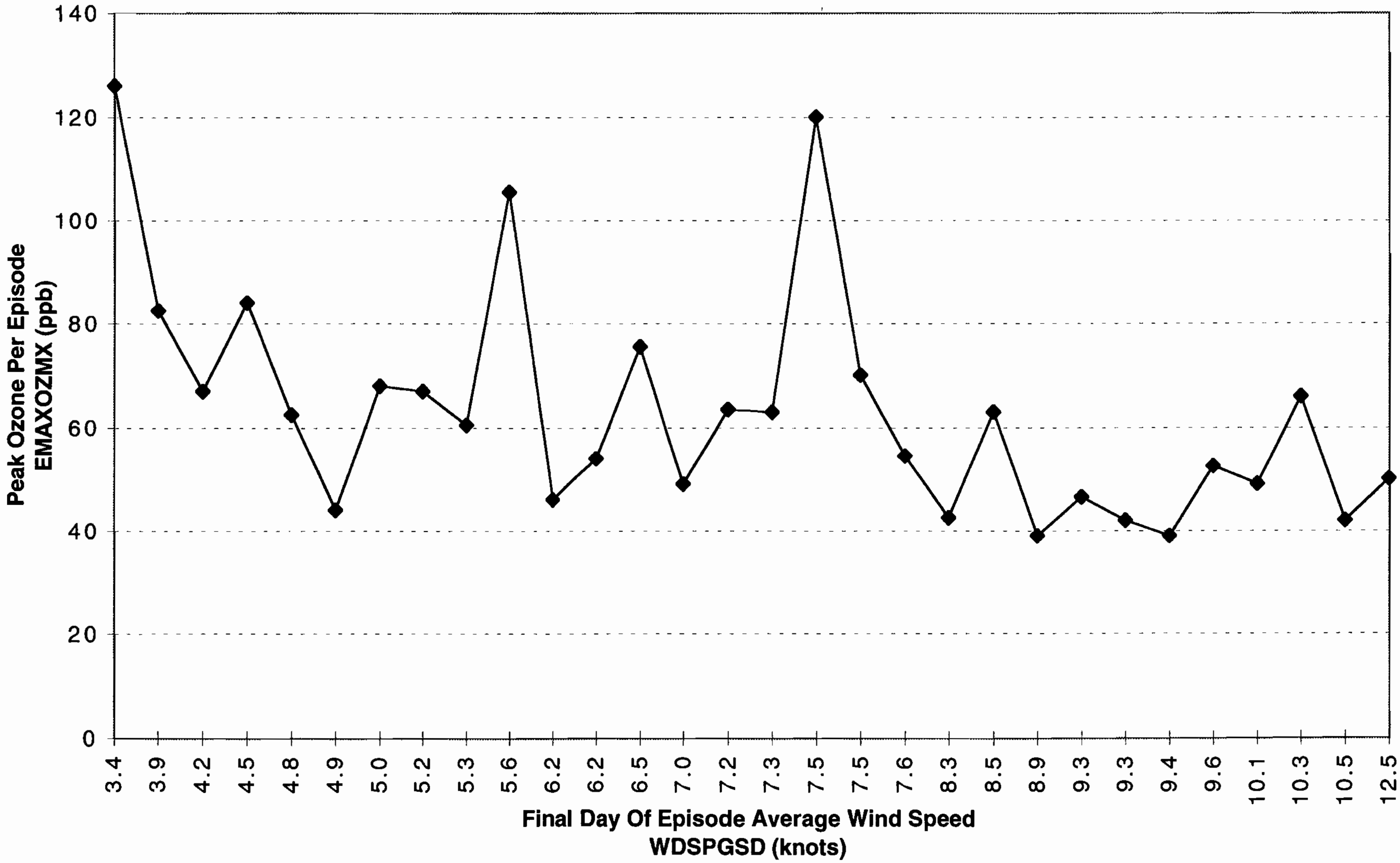
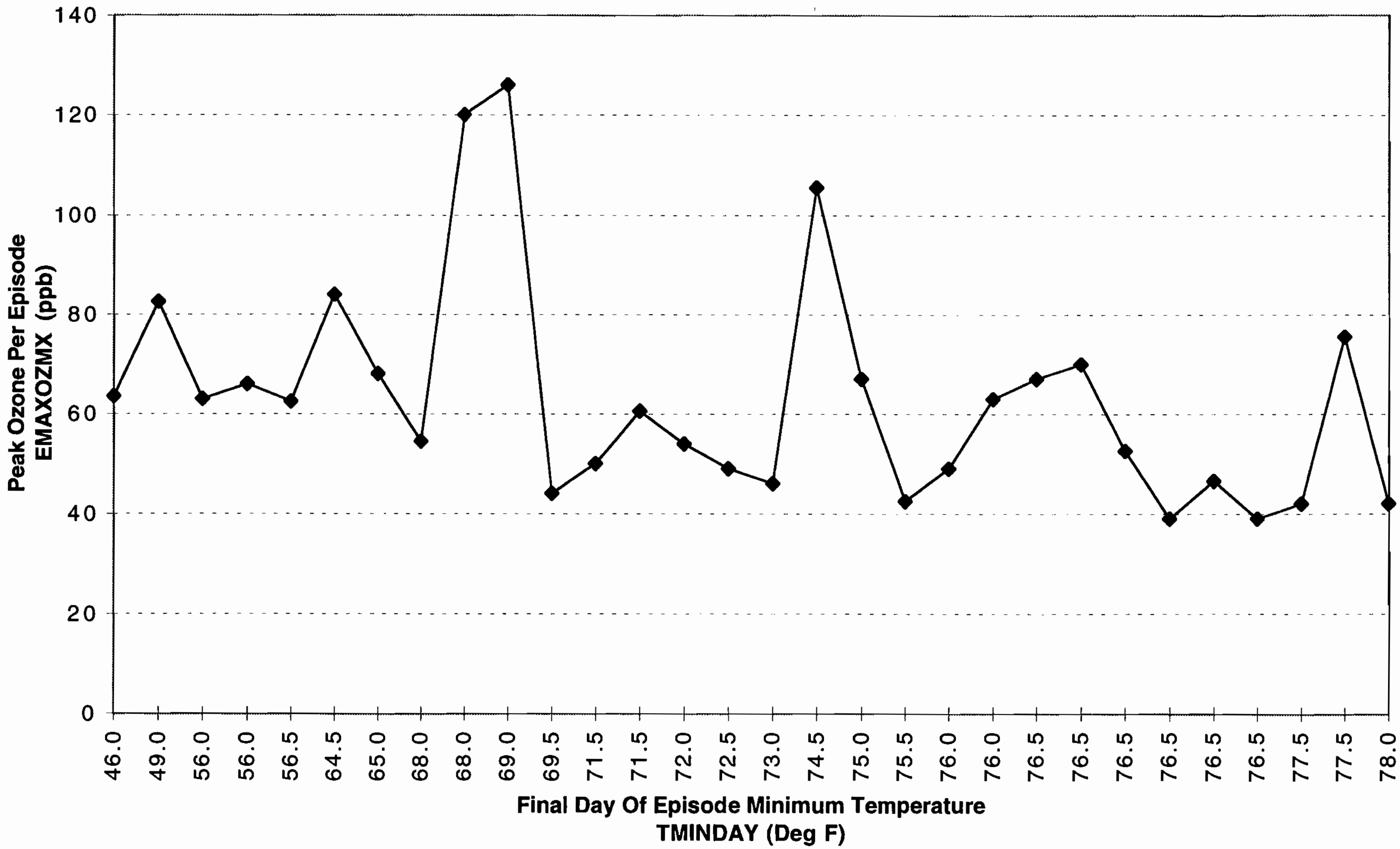
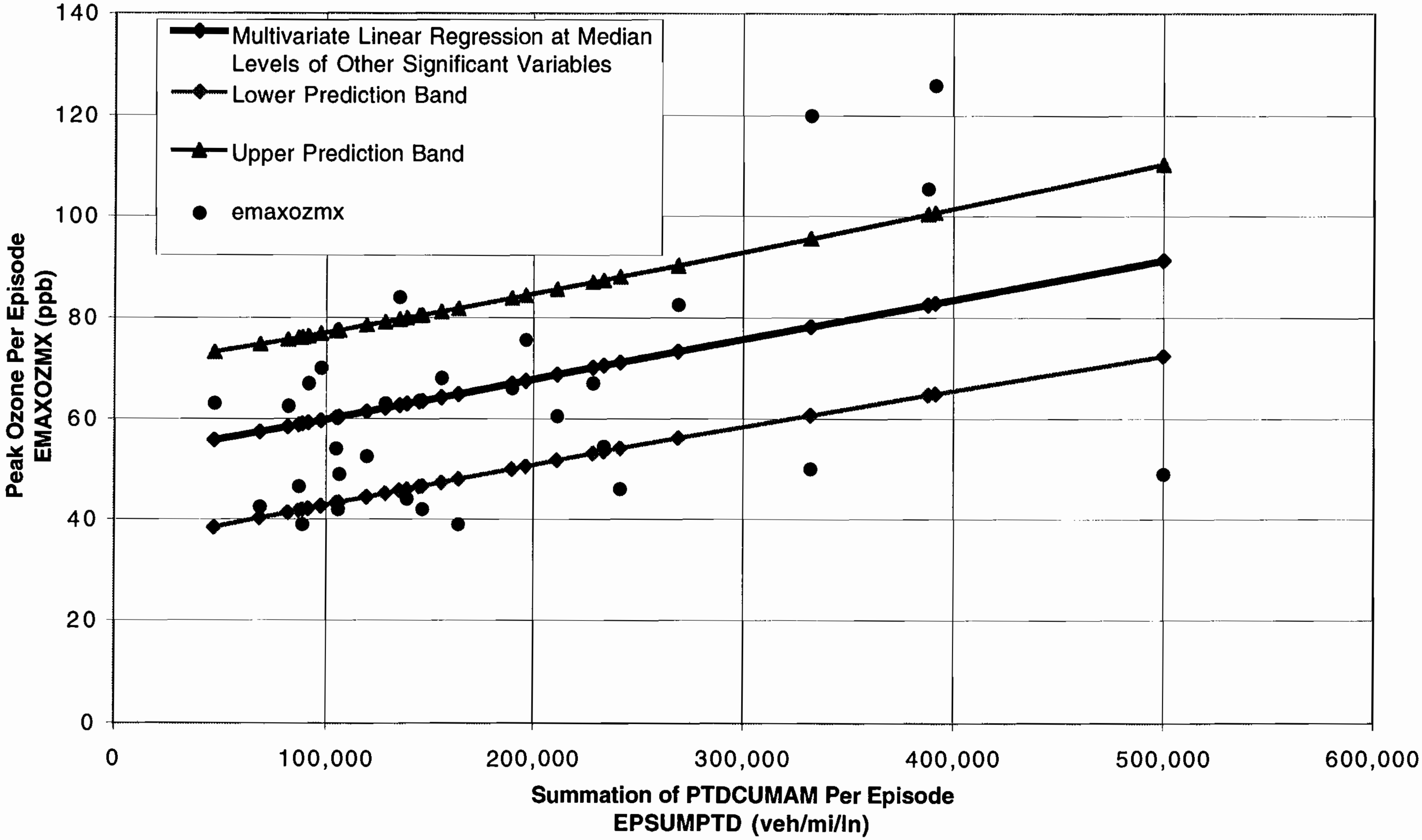


**Figure 234. SAN ANTONIO APR'96-SEP'96 MODEL T44**
**Episodic Max Ozone As A Function Of Final Day Of Episode Minimum Temperature**
**Data Controlled For Ozone Episodes - One Observation Of Data Per Episode**
**And Average Episodic Cloud Cover From 6AM To Time Of Max Ozone LE 4 Oktas**



OZINT On Last Day Of Episode = 4.8 ppb
CLDAVGT2 On Last Day Of Episode = 1.95 oktas
WSNC1T2 On Last Day Of Episode = 7.9 mph

**Figure 235. SAN ANTONIO APR'96-SEP'96 MODEL T44**
**80% Confidence Prediction Band On Episodic Max Ozone As A Function Of Episodic Cumulative TransGuide Network Traffic Density**
**6AM To 2-Hrs Before Time Of Max Ozone**
**Data Controlled For Ozone Episodes - One Observation Of Data Per Episode**
**And Average Episodic Cloud Cover From 6AM To Time Of Max Ozone LE 4 Oktas**



# CHAPTER 6. HYPOTHETICAL WORK ZONE

This section of the report describes the macroscopic analysis of a hypothetical work zone with a lane closure under three traffic demand scenarios. The purpose of the exercise is to obtain a rough estimate of the impact on point density (veh/mi/ln) that a highway construction work zone could have, and then relate these results to the statistical analyses discussed in the previous sections. The estimate of the impact of the hypothetical work zone on the traffic congestion parameter point density will be based on a comparison of the level of traffic congestion with the presence of the work zone to the level of traffic congestion without the presence of the work zone.

The calculation of the traffic congestion parameter PTDCUMAM in the statistical analyses described in the previous sections was based on the calculation of cumulative point density, vehicle flow divided by speed (veh/mi/ln) at a particular point or loop detector, from 6AM to 2 hours before the time of the peak ozone reading for all loops on the TransGuide network. The estimate of the impact of the hypothetical work zone on this traffic congestion parameter will be based on the assumptions that work zone lane closures will not begin until 9AM, and that the typical amount of time to elapse from 9AM to 2 hours before the time of the peak ozone reading is 3 hours. In other words, the work zone lane closure impact will last for 3 hours in this analysis. Work zone impacts that continue after this time period are not considered in the analysis.

The hypothetical work zone and its area of impact on traffic congestion consists of two sections of a highway in one direction only. The area of impact of a work zone on a roadway network is potentially much greater, and it should be pointed out that we are simplifying the problem of estimating work zone impacts in this exercise.

The first section, Section 1, is the section of highway upstream from the work zone. It consists of three lanes each with a capacity of 2,000 veh/hr. The section length varies according to the length of queue upstream from the work zone. If under a particular demand scenario no queue exists in Section 1, then it is assumed that there is no difference in point density in Section 1 with or without the presence of a work zone. A queue is formed in Section 1 only when the vehicle demand exceeds the capacity of the work zone section, Section 2.

Section 2 is the work zone section itself. It consists of three lanes also; however, when the work zone is present, one lane is assumed to be closed for a length of 3.22 km (2 miles). This reduces the capacity of Section 2 from 6,000 vehicles per hour to 4,000 vehicles per hour. Other assumptions and estimations made in order to conduct the work zone analysis are:

- The spacing of loop detectors on the TransGuide network is, on average, 0.97 km (0.604 mi) per loop per lane.
- The length of roadway that an individual vehicle occupies in a queue is assumed to be 9.14 m (30 feet).
- The 3-hour period of analysis is divided into twelve, 15-minute time increments. Vehicle queues in one time slice are carried over into the next time slice.

- The vehicle speed at capacity (volume-to-capacity ratio equal to 1.0) is 30 mph; other estimations of the vehicle speed/flow relationship are found in the work zone scenario tables below.

Three hypothetical demand scenarios are evaluated, dubbed low, medium, and high demand work zone scenarios. Scenario WZ-1 is the low-demand scenario where the traffic demand never exceeds the capacity of the work zone with lane closure. Scenario WZ-2 is the medium-demand scenario where demand (5,000 vehicles per hour) exceeds capacity of the work zone (4,000 vehicles per hour) for four 15-minute time slices. The queue that accumulates upstream from the work zone dissipates at the end of time slice 9. Scenario WZ-3 is the high-demand scenario where demand exceeds capacity of the work zone for four time slices by 2,000 vehicles per hour and a fifth time slice by 1,000 vehicles per hour. Under Scenario WZ-3, the queue has not dissipated by the end of the 3-hour period. The following tables summarize the steps of the macroscopic demand/supply analysis conducted for each demand scenario.

*Table 65. Scenario WZ-1 Work Zone Analysis — Low Demand*

| 15-MINUTE TIME SLICE | EQUIVALENT HOURLY RATES SECTION 1 | WITHOUT WORK | WITH WORK | EQUIVALENT HOURLY RATES SECTION 2 WORK ZONE | WITHOUT WORK | WITH WORK |
|---|---|---|---|---|---|---|
| 1 | DEMAND | 4000 | 4000 | DEMAND | 4000 | 4000 |
| | FLOWRATE | 4000 | 4000 | FLOWRATE | 4000 | 4000 |
| | CAPACITY | 6000 | 6000 | CAPACITY | 6000 | 4000 |
| | V/C | 0.67 | 0.67 | V/C | 0.67 | 1.00 |
| | SPEED | 55 | 55 | SPEED | 55 | 30 |
| ALL LANES | STORED VEHICLES AT END | 0 | 0 | STORED VEHICLES | 0 | 0 |
| PER LANE | MOVING QUEUE LENGTH | 0.0 | 0.0 | LENGTH OF WZ | 2.0 | 2.0 |
| PER LANE | POINT DENSITY | 24 | 24 | POINT DENSITY | 24 | 67 |
| PER LANE | #LOOPS IN DISTANCE OF | 0.000 | 0.000 | #LOOPS IN | 3.311 | 3.311 |
| ALL LANES | CUMULATIVE POINT | 0 | 0 | CUMULATIVE | 241 | 442 |
| ALL LANES | CHANGE IN POINT DENSITY | | 0 | CHANGE IN POINT DENSITY | | 201 |

| 15-MINUTE TIME SLICE | EQUIVALENT HOURLY RATES SECTION 1 | WITHOUT WORK | WITH WORK | EQUIVALENT HOURLY RATES SECTION 2 WORK ZONE | WITHOUT WORK | WITH WORK |
|---|---|---|---|---|---|---|
| 2 | DEMAND | 4000 | 4000 | DEMAND | 4000 | 4000 |
| | FLOWRATE | 4000 | 4000 | FLOWRATE | 4000 | 4000 |
| | CAPACITY | 6000 | 6000 | CAPACITY | 6000 | 4000 |
| | V/C | 0.67 | 0.67 | V/C | 0.67 | 1.00 |
| | SPEED | 55 | 55 | SPEED | 55 | 30 |
| ALL LANES | STORED VEHICLES AT | 0 | 0 | STORED VEHICLES | 0 | 0 |
| PER LANE | MOVING QUEUE LENGTH | 0.0 | 0.0 | LENGTH OF WZ | 2.0 | 2.0 |
| PER LANE | POINT DENSITY | 24 | 24 | POINT DENSITY | 24 | 67 |
| PER LANE | #LOOPS IN DISTANCE OF | 0.000 | 0.000 | #LOOPS IN | 3.311 | 3.311 |
| ALL LANES | CUMULATIVE POINT | 0 | 0 | CUMULATIVE | 241 | 442 |
| ALL LANES | CHANGE IN POINT DENSITY | | 0 | CHANGE IN POINT DENSITY | | 201 |

*Table 65. Scenario WZ-1 (cont.) Work Zone Analysis — Low Demand*

| 15-MINUTE TIME SLICE | EQUIVALENT HOURLY RATES SECTION 1 | WITHOUT WORK ZONE | WITH WORK ZONE | EQUIVALENT HOURLY RATES SECTION 2 WORK ZONE | WITHOUT WORK ZONE | WITH WORK ZONE |
|---|---|---|---|---|---|---|
| 3 | DEMAND | 4000 | 4000 | DEMAND | 4000 | 4000 |
| | FLOWRATE | 4000 | 4000 | FLOWRATE | 4000 | 4000 |
| | CAPACITY | 6000 | 6000 | CAPACITY | 6000 | 4000 |
| | V/C | 0.67 | 0.67 | V/C | 0.67 | 1.00 |
| | SPEED | 55 | 55 | SPEED | 55 | 30 |
| ALL LANES | STORED VEHICLES AT END OF TIME SLICE | 0 | 0 | STORED VEHICLES AT END OF TIME SLICE | 0 | 0 |
| PER LANE | MOVING QUEUE LENGTH WITH WZ(mi) | 0.0 | 0.0 | LENGTH OF WZ (mi) | 2.0 | 2.0 |
| PER LANE | POINT DENSITY | 24 | 24 | POINT DENSITY | 24 | 67 |
| PER LANE | #LOOPS IN DISTANCE OF QUEUE WITH WZ | 0.000 | 0.000 | #LOOPS IN DISTANCE OF WZ | 3.311 | 3.311 |
| ALL LANES | CUMULATIVE POINT DENSITY OVER LENGTH OF QUEUE | 0 | 0 | CUMULATIVE POINT DENSITY OVER LENGTH OF WZ (mi) | 241 | 442 |
| ALL LANES | CHANGE IN POINT DENSITY | | 0 | CHANGE IN POINT DENSITY | | 201 |

| 15-MINUTE TIME SLICE | EQUIVALENT HOURLY RATES SECTION 1 | WITHOUT WORK ZONE | WITH WORK ZONE | EQUIVALENT HOURLY RATES SECTION 2 WORK ZONE | WITHOUT WORK ZONE | WITH WORK ZONE |
|---|---|---|---|---|---|---|
| 4 | DEMAND | 4000 | 4000 | DEMAND | 4000 | 4000 |
| | FLOWRATE | 4000 | 4000 | FLOWRATE | 4000 | 4000 |
| | CAPACITY | 6000 | 6000 | CAPACITY | 6000 | 4000 |
| | V/C | 0.67 | 0.67 | V/C | 0.67 | 1.00 |
| | SPEED | 55 | 55 | SPEED | 55 | 30 |
| ALL LANES | STORED VEHICLES AT END OF TIME SLICE | 0 | 0 | STORED VEHICLES AT END OF TIME SLICE | 0 | 0 |
| PER LANE | MOVING QUEUE LENGTH WITH WZ(mi) | 0.0 | 0.0 | LENGTH OF WZ (mi) | 2.0 | 2.0 |
| PER LANE | POINT DENSITY | 24 | 24 | POINT DENSITY | 24 | 67 |
| PER LANE | #LOOPS IN DISTANCE OF QUEUE WITH WZ | 0.000 | 0.000 | #LOOPS IN DISTANCE OF WZ | 3.311 | 3.311 |
| ALL LANES | CUMULATIVE POINT DENSITY OVER LENGTH OF QUEUE | 0 | 0 | CUMULATIVE POINT DENSITY OVER LENGTH OF WZ (mi) | 241 | 442 |
| ALL LANES | CHANGE IN POINT DENSITY | | 0 | CHANGE IN POINT DENSITY | | 201 |

*Table 65. Scenario WZ-1 (cont.) Work Zone Analysis — Low Demand*

| 15-MINUTE TIME SLICE | EQUIVALENT HOURLY RATES SECTION 1 | WITHOUT WORK ZONE | WITH WORK ZONE | EQUIVALENT HOURLY RATES SECTION 2 WORK ZONE | WITHOUT WORK ZONE | WITH WORK ZONE |
|---|---|---|---|---|---|---|
| 5 | DEMAND | 3000 | 3000 | DEMAND | 3000 | 3000 |
| | FLOWRATE | 3000 | 3000 | FLOWRATE | 3000 | 3000 |
| | CAPACITY | 6000 | 6000 | CAPACITY | 6000 | 4000 |
| | V/C | 0.50 | 0.50 | V/C | 0.50 | 0.75 |
| | SPEED | 60 | 60 | SPEED | 60 | 50 |
| ALL LANES | STORED VEHICLES AT END OF TIME SLICE | 0 | 0 | STORED VEHICLES AT END OF TIME SLICE | 0 | 0 |
| PER LANE | MOVING QUEUE LENGTH WITH WZ(mi) | 0.0 | 0.0 | LENGTH OF WZ (mi) | 2.0 | 2.0 |
| PER LANE | POINT DENSITY | 17 | 17 | POINT DENSITY | 17 | 30 |
| PER LANE | #LOOPS IN DISTANCE OF QUEUE WITH WZ | 0.000 | 0.000 | #LOOPS IN DISTANCE OF WZ | 3.311 | 3.311 |
| ALL LANES | CUMULATIVE POINT DENSITY OVER LENGTH OF QUEUE | 0 | 0 | CUMULATIVE POINT DENSITY OVER LENGTH OF WZ (mi) | 166 | 199 |
| ALL LANES | CHANGE IN POINT DENSITY | | 0 | CHANGE IN POINT DENSITY | | 33 |

| 15-MINUTE TIME SLICE | EQUIVALENT HOURLY RATES SECTION 1 | WITHOUT WORK ZONE | WITH WORK ZONE | EQUIVALENT HOURLY RATES SECTION 2 WORK ZONE | WITHOUT WORK ZONE | WITH WORK ZONE |
|---|---|---|---|---|---|---|
| 6 | DEMAND | 3000 | 3000 | DEMAND | 3000 | 3000 |
| | FLOWRATE | 3000 | 3000 | FLOWRATE | 3000 | 3000 |
| | CAPACITY | 6000 | 6000 | CAPACITY | 6000 | 4000 |
| | V/C | 0.50 | 0.50 | V/C | 0.50 | 0.75 |
| | SPEED | 60 | 60 | SPEED | 60 | 50 |
| ALL LANES | STORED VEHICLES AT END OF TIME SLICE | 0 | 0 | STORED VEHICLES AT END OF TIME SLICE | 0 | 0 |
| PER LANE | MOVING QUEUE LENGTH WITH WZ(mi) | 0.0 | 0.0 | LENGTH OF WZ (mi) | 2.0 | 2.0 |
| PER LANE | POINT DENSITY | 17 | 17 | POINT DENSITY | 17 | 30 |
| PER LANE | #LOOPS IN DISTANCE OF QUEUE WITH WZ | 0.000 | 0.000 | #LOOPS IN DISTANCE OF WZ | 3.311 | 3.311 |
| ALL LANES | CUMULATIVE POINT DENSITY OVER LENGTH OF QUEUE | 0 | 0 | CUMULATIVE POINT DENSITY OVER LENGTH OF WZ (mi) | 166 | 199 |
| ALL LANES | CHANGE IN POINT DENSITY | | 0 | CHANGE IN POINT DENSITY | | 33 |

*Table 65. Scenario WZ-1 (cont.) Work Zone Analysis — Low Demand*

| 15-MINUTE TIME SLICE | EQUIVALENT HOURLY RATES SECTION 1 | WITHOUT WORK ZONE | WITH WORK ZONE | EQUIVALENT HOURLY RATES SECTION 2 WORK ZONE | WITHOUT WORK ZONE | WITH WORK ZONE |
|---|---|---|---|---|---|---|
| 7 | DEMAND | 3000 | 3000 | DEMAND | 3000 | 3000 |
| | FLOWRATE | 3000 | 3000 | FLOWRATE | 3000 | 3000 |
| | CAPACITY | 6000 | 6000 | CAPACITY | 6000 | 4000 |
| | V/C | 0.50 | 0.50 | V/C | 0.50 | 0.75 |
| | SPEED | 60 | 60 | SPEED | 60 | 50 |
| ALL LANES | STORED VEHICLES AT END OF TIME SLICE | 0 | 0 | STORED VEHICLES AT END OF TIME SLICE | 0 | 0 |
| PER LANE | MOVING QUEUE LENGTH WITH WZ(mi) | 0.0 | 0.0 | LENGTH OF WZ (mi) | 2.0 | 2.0 |
| PER LANE | POINT DENSITY | 17 | 17 | POINT DENSITY | 17 | 30 |
| PER LANE | #LOOPS IN DISTANCE OF QUEUE WITH WZ | 0.000 | 0.000 | #LOOPS IN DISTANCE OF WZ | 3.311 | 3.311 |
| ALL LANES | CUMULATIVE POINT DENSITY OVER LENGTH OF QUEUE | 0 | 0 | CUMULATIVE POINT DENSITY OVER LENGTH OF WZ (mi) | 166 | 199 |
| ALL LANES | CHANGE IN POINT DENSITY | | 0 | CHANGE IN POINT DENSITY | | 33 |

| 15-MINUTE TIME SLICE | EQUIVALENT HOURLY RATES SECTION 1 | WITHOUT WORK ZONE | WITH WORK ZONE | EQUIVALENT HOURLY RATES SECTION 2 WORK ZONE | WITHOUT WORK ZONE | WITH WORK ZONE |
|---|---|---|---|---|---|---|
| 8 | DEMAND | 3000 | 3000 | DEMAND | 3000 | 3000 |
| | FLOWRATE | 3000 | 3000 | FLOWRATE | 3000 | 3000 |
| | CAPACITY | 6000 | 6000 | CAPACITY | 6000 | 4000 |
| | V/C | 0.50 | 0.50 | V/C | 0.50 | 0.75 |
| | SPEED | 60 | 60 | SPEED | 60 | 50 |
| ALL LANES | STORED VEHICLES AT END OF TIME SLICE | 0 | 0 | STORED VEHICLES AT END OF TIME SLICE | 0 | 0 |
| PER LANE | MOVING QUEUE LENGTH WITH WZ(mi) | 0.0 | 0.0 | LENGTH OF WZ (mi) | 2.0 | 2.0 |
| PER LANE | POINT DENSITY | 17 | 17 | POINT DENSITY | 17 | 30 |
| PER LANE | #LOOPS IN DISTANCE OF QUEUE WITH WZ | 0.000 | 0.000 | #LOOPS IN DISTANCE OF WZ | 3.311 | 3.311 |
| ALL LANES | CUMULATIVE POINT DENSITY OVER LENGTH OF QUEUE | 0 | 0 | CUMULATIVE POINT DENSITY OVER LENGTH OF WZ (mi) | 166 | 199 |
| ALL LANES | CHANGE IN POINT DENSITY | | 0 | CHANGE IN POINT DENSITY | | 33 |

*Table 65. Scenario WZ-1 (cont.) Work Zone Analysis — Low Demand*

| 15-MINUTE TIME SLICE | EQUIVALENT HOURLY RATES SECTION 1 | WITHOUT WORK ZONE | WITH WORK ZONE | EQUIVALENT HOURLY RATES SECTION 2 WORK ZONE | WITHOUT WORK ZONE | WITH WORK ZONE |
|---|---|---|---|---|---|---|
| 9 | DEMAND | 3000 | 3000 | DEMAND | 3000 | 3000 |
| | FLOWRATE | 3000 | 3000 | FLOWRATE | 3000 | 3000 |
| | CAPACITY | 6000 | 6000 | CAPACITY | 6000 | 4000 |
| | V/C | 0.50 | 0.50 | V/C | 0.50 | 0.75 |
| | SPEED | 60 | 60 | SPEED | 60 | 50 |
| ALL LANES | STORED VEHICLES AT END OF TIME SLICE | 0 | 0 | STORED VEHICLES AT END OF TIME SLICE | 0 | 0 |
| PER LANE | MOVING QUEUE LENGTH WITH WZ(mi) | 0.0 | 0.0 | LENGTH OF WZ (mi) | 2.0 | 2.0 |
| PER LANE | POINT DENSITY | 17 | 17 | POINT DENSITY | 17 | 30 |
| PER LANE | #LOOPS IN DISTANCE OF QUEUE WITH WZ | 0.000 | 0.000 | #LOOPS IN DISTANCE OF WZ | 3.311 | 3.311 |
| ALL LANES | CUMULATIVE POINT DENSITY OVER LENGTH OF QUEUE | 0 | 0 | CUMULATIVE POINT DENSITY OVER LENGTH OF WZ (mi) | 166 | 199 |
| ALL LANES | CHANGE IN POINT DENSITY | | 0 | CHANGE IN POINT DENSITY | | 33 |

| 15-MINUTE TIME SLICE | EQUIVALENT HOURLY RATES SECTION 1 | WITHOUT WORK ZONE | WITH WORK ZONE | EQUIVALENT HOURLY RATES SECTION 2 WORK ZONE | WITHOUT WORK ZONE | WITH WORK ZONE |
|---|---|---|---|---|---|---|
| 10 | DEMAND | 3000 | 3000 | DEMAND | 3000 | 3000 |
| | FLOWRATE | 3000 | 3000 | FLOWRATE | 3000 | 3000 |
| | CAPACITY | 6000 | 6000 | CAPACITY | 6000 | 4000 |
| | V/C | 0.50 | 0.50 | V/C | 0.50 | 0.75 |
| | SPEED | 60 | 60 | SPEED | 60 | 50 |
| ALL LANES | STORED VEHICLES AT END OF TIME SLICE | 0 | 0 | STORED VEHICLES AT END OF TIME SLICE | 0 | 0 |
| PER LANE | MOVING QUEUE LENGTH WITH WZ(mi) | 0.0 | 0.0 | LENGTH OF WZ (mi) | 2.0 | 2.0 |
| PER LANE | POINT DENSITY | 17 | 17 | POINT DENSITY | 17 | 30 |
| PER LANE | #LOOPS IN DISTANCE OF QUEUE WITH WZ | 0.000 | 0.000 | #LOOPS IN DISTANCE OF WZ | 3.311 | 3.311 |
| ALL LANES | CUMULATIVE POINT DENSITY OVER LENGTH OF QUEUE | 0 | 0 | CUMULATIVE POINT DENSITY OVER LENGTH OF WZ (mi) | 166 | 199 |
| ALL LANES | CHANGE IN POINT DENSITY | | 0 | CHANGE IN POINT DENSITY | | 33 |

*Table 65. Scenario WZ-1 (cont.) Work Zone Analysis — Low Demand*

| **15-MINUTE TIME SLICE** | **EQUIVALENT HOURLY RATES SECTION 1** | **WITHOUT WORK ZONE** | **WITH WORK ZONE** | **EQUIVALENT HOURLY RATES SECTION 2 WORK ZONE** | **WITHOUT WORK ZONE** | **WITH WORK ZONE** |
|---|---|---|---|---|---|---|
| 11 | DEMAND | 3000 | 3000 | DEMAND | 3000 | 3000 |
| | FLOWRATE | 3000 | 3000 | FLOWRATE | 3000 | 3000 |
| | CAPACITY | 6000 | 6000 | CAPACITY | 6000 | 4000 |
| | V/C | 0.50 | 0.50 | V/C | 0.50 | 0.75 |
| | SPEED | 60 | 60 | SPEED | 60 | 50 |
| ALL LANES | STORED VEHICLES AT END OF TIME SLICE | 0 | 0 | STORED VEHICLES AT END OF TIME SLICE | 0 | 0 |
| PER LANE | MOVING QUEUE LENGTH WITH WZ(mi) | 0.0 | 0.0 | LENGTH OF WZ (mi) | 2.0 | 2.0 |
| PER LANE | POINT DENSITY | 17 | 17 | POINT DENSITY | 17 | 30 |
| PER LANE | #LOOPS IN DISTANCE OF QUEUE WITH WZ | 0.000 | 0.000 | #LOOPS IN DISTANCE OF WZ | 3.311 | 3.311 |
| ALL LANES | CUMULATIVE POINT DENSITY OVER LENGTH OF QUEUE | 0 | 0 | CUMULATIVE POINT DENSITY OVER LENGTH OF WZ (mi) | 166 | 199 |
| ALL LANES | CHANGE IN POINT DENSITY | | 0 | CHANGE IN POINT DENSITY | | 33 |

| **15-MINUTE TIME SLICE** | **EQUIVALENT HOURLY RATES SECTION 1** | **WITHOUT WORK ZONE** | **WITH WORK ZONE** | **EQUIVALENT HOURLY RATES SECTION 2 WORK ZONE** | **WITHOUT WORK ZONE** | **WITH WORK ZONE** |
|---|---|---|---|---|---|---|
| 12 | DEMAND | 3000 | 3000 | DEMAND | 3000 | 3000 |
| | FLOWRATE | 3000 | 3000 | FLOWRATE | 3000 | 3000 |
| | CAPACITY | 6000 | 6000 | CAPACITY | 6000 | 4000 |
| | V/C | 0.50 | 0.50 | V/C | 0.50 | 0.75 |
| | SPEED | 60 | 60 | SPEED | 60 | 50 |
| ALL LANES | STORED VEHICLES AT END OF TIME SLICE | 0 | 0 | STORED VEHICLES AT END OF TIME SLICE | 0 | 0 |
| PER LANE | MOVING QUEUE LENGTH WITH WZ(mi) | 0.0 | 0.0 | LENGTH OF WZ (mi) | 2.0 | 2.0 |
| PER LANE | POINT DENSITY | 17 | 17 | POINT DENSITY | 17 | 30 |
| PER LANE | #LOOPS IN DISTANCE OF QUEUE WITH WZ | 0.000 | 0.000 | #LOOPS IN DISTANCE OF WZ | 3.311 | 3.311 |
| ALL LANES | CUMULATIVE POINT DENSITY OVER LENGTH OF QUEUE | 0 | 0 | CUMULATIVE POINT DENSITY OVER LENGTH OF WZ (mi) | 166 | 199 |
| ALL LANES | CHANGE IN POINT DENSITY | | 0 | CHANGE IN POINT DENSITY | | 33 |

| | |
|---|---|
| **CUMULATIVE CHANGE IN POINT DENSITY (veh/hr/ln) OVER 3-HOUR PERIOD =** | **1,068** |

*Table 66. Scenario WZ-2 Work Zone Analysis — Medium Demand*

| 15-MINUTE TIME SLICE | EQUIVALENT HOURLY RATES SECTION 1 | WITHOUT WORK ZONE | WITH WORK ZONE | EQUIVALENT HOURLY RATES SECTION 2 WORK ZONE | WITHOUT WORK ZONE | WITH WORK ZONE |
|---|---|---|---|---|---|---|
| 1 | DEMAND | 5000 | 5000 | DEMAND | 5000 | 4000 |
| | FLOWRATE | 5000 | 4000 | FLOWRATE | 5000 | 4000 |
| | CAPACITY | 6000 | 6000 | CAPACITY | 6000 | 4000 |
| | V/C | 0.83 | -0.67 | V/C | 0.83 | 1.00 |
| | SPEED | 50 | 15 | SPEED | 50 | 30 |
| ALL LANES | STORED VEHICLES AT END OF TIME SLICE | 0 | 1000 | STORED VEHICLES AT END OF TIME SLICE | 0 | 0 |
| PER LANE | MOVING QUEUE LENGTH WITH WZ(mi) | 1.9 | 1.9 | LENGTH OF WZ (mi) | 2.0 | 2.0 |
| PER LANE | POINT DENSITY | 33 | 89 | POINT DENSITY | 33 | 67 |
| PER LANE | #LOOPS IN DISTANCE OF QUEUE WITH WZ | 3.136 | 3.136 | #LOOPS IN DISTANCE OF WZ | 3.311 | 3.311 |
| ALL LANES | CUMULATIVE POINT DENSITY OVER LENGTH OF QUEUE | 314 | 836 | CUMULATIVE POINT DENSITY OVER LENGTH OF WZ (mi) | 331 | 442 |
| ALL LANES | CHANGE IN POINT DENSITY | | 523 | CHANGE IN POINT DENSITY | | 110 |

| 15-MINUTE TIME SLICE | EQUIVALENT HOURLY RATES SECTION 1 | WITHOUT WORK ZONE | WITH WORK ZONE | EQUIVALENT HOURLY RATES SECTION 2 WORK ZONE | WITHOUT WORK ZONE | WITH WORK ZONE |
|---|---|---|---|---|---|---|
| 2 | DEMAND | 5000 | 6000 | DEMAND | 5000 | 4000 |
| | FLOWRATE | 5000 | 4000 | FLOWRATE | 5000 | 4000 |
| | CAPACITY | 6000 | 6000 | CAPACITY | 6000 | 4000 |
| | V/C | 0.83 | -0.67 | V/C | 0.83 | 1.00 |
| | SPEED | 50 | 15 | SPEED | 50 | 30 |
| ALL LANES | STORED VEHICLES AT END OF TIME SLICE | 0 | 2000 | STORED VEHICLES AT END OF TIME SLICE | 0 | 0 |
| PER LANE | MOVING QUEUE LENGTH WITH WZ(mi) | 3.8 | 3.8 | LENGTH OF WZ (mi) | 2.0 | 2.0 |
| PER LANE | POINT DENSITY | 33 | 89 | POINT DENSITY | 33 | 67 |
| PER LANE | #LOOPS IN DISTANCE OF QUEUE WITH WZ | 6.271 | 6.271 | #LOOPS IN DISTANCE OF WZ | 3.311 | 3.311 |
| ALL LANES | CUMULATIVE POINT DENSITY OVER LENGTH OF QUEUE | 627 | 1,672 | CUMULATIVE POINT DENSITY OVER LENGTH OF WZ (mi) | 331 | 442 |
| ALL LANES | CHANGE IN POINT DENSITY | | 1,045 | CHANGE IN POINT DENSITY | | 110 |

*Table 66. Scenario WZ-2 (cont.) Work Zone Analysis — Medium Demand*

| 15-MINUTE TIME SLICE | EQUIVALENT HOURLY RATES SECTION 1 | WITHOUT WORK ZONE | WITH WORK ZONE | EQUIVALENT HOURLY RATES SECTION 2 WORK ZONE | WITHOUT WORK ZONE | WITH WORK ZONE |
|---|---|---|---|---|---|---|
| 3 | DEMAND | 5000 | 7000 | DEMAND | 5000 | 4000 |
| | FLOWRATE | 5000 | 4000 | FLOWRATE | 5000 | 4000 |
| | CAPACITY | 6000 | 6000 | CAPACITY | 6000 | 4000 |
| | V/C | 0.83 | -0.67 | V/C | 0.83 | 1.00 |
| | SPEED | 50 | 15 | SPEED | 50 | 30 |
| ALL LANES | STORED VEHICLES AT END OF TIME SLICE | 0 | 3000 | STORED VEHICLES AT END OF TIME SLICE | 0 | 0 |
| PER LANE | MOVING QUEUE LENGTH WITH WZ(mi) | 5.7 | 5.7 | LENGTH OF WZ (mi) | 2.0 | 2.0 |
| PER LANE | POINT DENSITY | 33 | 89 | POINT DENSITY | 33 | 67 |
| PER LANE | #LOOPS IN DISTANCE OF QUEUE WITH WZ | 9.407 | 9.407 | #LOOPS IN DISTANCE OF WZ | 3.311 | 3.311 |
| ALL LANES | CUMULATIVE POINT DENSITY OVER LENGTH OF QUEUE | 941 | 2,509 | CUMULATIVE POINT DENSITY OVER LENGTH OF WZ (mi) | 331 | 442 |
| ALL LANES | CHANGE IN POINT DENSITY | | 1,568 | CHANGE IN POINT DENSITY | | 110 |

| 15-MINUTE TIME SLICE | EQUIVALENT HOURLY RATES SECTION 1 | WITHOUT WORK ZONE | WITH WORK ZONE | EQUIVALENT HOURLY RATES SECTION 2 WORK ZONE | WITHOUT WORK ZONE | WITH WORK ZONE |
|---|---|---|---|---|---|---|
| 4 | DEMAND | 5000 | 8000 | DEMAND | 5000 | 4000 |
| | FLOWRATE | 5000 | 4000 | FLOWRATE | 5000 | 4000 |
| | CAPACITY | 6000 | 6000 | CAPACITY | 6000 | 4000 |
| | V/C | 0.83 | -0.67 | V/C | 0.83 | 1.00 |
| | SPEED | 50 | 15 | SPEED | 50 | 30 |
| ALL LANES | STORED VEHICLES AT END OF TIME SLICE | 0 | 4000 | STORED VEHICLES AT END OF TIME SLICE | 0 | 0 |
| PER LANE | MOVING QUEUE LENGTH WITH WZ(mi) | 7.6 | 7.6 | LENGTH OF WZ (mi) | 2.0 | 2.0 |
| PER LANE | POINT DENSITY | 33 | 89 | POINT DENSITY | 33 | 67 |
| PER LANE | #LOOPS IN DISTANCE OF QUEUE WITH WZ | 12.543 | 12.543 | #LOOPS IN DISTANCE OF WZ | 3.311 | 3.311 |
| ALL LANES | CUMULATIVE POINT DENSITY OVER LENGTH OF QUEUE | 1,254 | 3,345 | CUMULATIVE POINT DENSITY OVER LENGTH OF WZ (mi) | 331 | 442 |
| ALL LANES | CHANGE IN POINT DENSITY | | 2,090 | CHANGE IN POINT DENSITY | | 110 |

*Table 66. Scenario WZ-2 (cont.) Work Zone Analysis — Medium Demand*

| 15-MINUTE TIME SLICE | EQUIVALENT HOURLY RATES SECTION 1 | WITHOUT WORK ZONE | WITH WORK ZONE | EQUIVALENT HOURLY RATES SECTION 2 WORK ZONE | WITHOUT WORK ZONE | WITH WORK ZONE |
|---|---|---|---|---|---|---|
| 5 | DEMAND | 4000 | 8000 | DEMAND | 4000 | 4000 |
| | FLOWRATE | 4000 | 4000 | FLOWRATE | 4000 | 4000 |
| | CAPACITY | 6000 | 6000 | CAPACITY | 6000 | 4000 |
| | V/C | 0.67 | -0.67 | V/C | 0.67 | 1.00 |
| | SPEED | 55 | 15 | SPEED | 55 | 30 |
| ALL LANES | STORED VEHICLES AT END OF TIME SLICE | 0 | 4000 | STORED VEHICLES AT END OF TIME SLICE | 0 | 0 |
| PER LANE | MOVING QUEUE LENGTH WITH WZ(mi) | 7.6 | 7.6 | LENGTH OF WZ (mi) | 2.0 | 2.0 |
| PER LANE | POINT DENSITY | 24 | 89 | POINT DENSITY | 24 | 67 |
| PER LANE | #LOOPS IN DISTANCE OF QUEUE WITH WZ | 12.543 | 12.543 | #LOOPS IN DISTANCE OF WZ | 3.311 | 3.311 |
| ALL LANES | CUMULATIVE POINT DENSITY OVER LENGTH OF QUEUE | 912 | 3,345 | CUMULATIVE POINT DENSITY OVER LENGTH OF WZ (mi) | 241 | 442 |
| ALL LANES | CHANGE IN POINT DENSITY | | 2,433 | CHANGE IN POINT DENSITY | | 201 |

| 15-MINUTE TIME SLICE | EQUIVALENT HOURLY RATES SECTION 1 | WITHOUT WORK ZONE | WITH WORK ZONE | EQUIVALENT HOURLY RATES SECTION 2 WORK ZONE | WITHOUT WORK ZONE | WITH WORK ZONE |
|---|---|---|---|---|---|---|
| 6 | DEMAND | 3000 | 7000 | DEMAND | 3000 | 4000 |
| | FLOWRATE | 3000 | 4000 | FLOWRATE | 3000 | 4000 |
| | CAPACITY | 6000 | 6000 | CAPACITY | 6000 | 4000 |
| | V/C | 0.50 | -0.67 | V/C | 0.50 | 1.00 |
| | SPEED | 60 | 15 | SPEED | 60 | 30 |
| ALL LANES | STORED VEHICLES AT END OF TIME SLICE | 0 | 3000 | STORED VEHICLES AT END OF TIME SLICE | 0 | 0 |
| PER LANE | MOVING QUEUE LENGTH WITH WZ(mi) | 5.7 | 5.7 | LENGTH OF WZ (mi) | 2.0 | 2.0 |
| PER LANE | POINT DENSITY | 17 | 89 | POINT DENSITY | 17 | 67 |
| PER LANE | #LOOPS IN DISTANCE OF QUEUE WITH WZ | 9.407 | 9.407 | #LOOPS IN DISTANCE OF WZ | 3.311 | 3.311 |
| ALL LANES | CUMULATIVE POINT DENSITY OVER LENGTH OF QUEUE | 470 | 2,509 | CUMULATIVE POINT DENSITY OVER LENGTH OF WZ (mi) | 166 | 442 |
| ALL LANES | CHANGE IN POINT DENSITY | | 2,038 | CHANGE IN POINT DENSITY | | 276 |

*Table 66. Scenario WZ-2 (cont.) Work Zone Analysis — Medium Demand*

| 15-MINUTE TIME SLICE | EQUIVALENT HOURLY RATES SECTION 1 | WITHOUT WORK ZONE | WITH WORK ZONE | EQUIVALENT HOURLY RATES SECTION 2 WORK ZONE | WITHOUT WORK ZONE | WITH WORK ZONE |
|---|---|---|---|---|---|---|
| 7 | DEMAND | 3000 | 6000 | DEMAND | 3000 | 4000 |
| | FLOWRATE | 3000 | 4000 | FLOWRATE | 3000 | 4000 |
| | CAPACITY | 6000 | 6000 | CAPACITY | 6000 | 4000 |
| | V/C | 0.50 | -0.67 | V/C | 0.50 | 1.00 |
| | SPEED | 60 | 15 | SPEED | 60 | 30 |
| ALL LANES | STORED VEHICLES AT END OF TIME SLICE | 0 | 2000 | STORED VEHICLES AT END OF TIME SLICE | 0 | 0 |
| PER LANE | MOVING QUEUE LENGTH WITH WZ(mi) | 3.8 | 3.8 | LENGTH OF WZ (mi) | 2.0 | 2.0 |
| PER LANE | POINT DENSITY | 17 | 89 | POINT DENSITY | 17 | 67 |
| PER LANE | #LOOPS IN DISTANCE OF QUEUE WITH WZ | 6.271 | 6.271 | #LOOPS IN DISTANCE OF WZ | 3.311 | 3.311 |
| ALL LANES | CUMULATIVE POINT DENSITY OVER LENGTH OF QUEUE | 314 | 1,672 | CUMULATIVE POINT DENSITY OVER LENGTH OF WZ (mi) | 166 | 442 |
| ALL LANES | CHANGE IN POINT DENSITY | | 1,359 | CHANGE IN POINT DENSITY | | 276 |

| 15-MINUTE TIME SLICE | EQUIVALENT HOURLY RATES SECTION 1 | WITHOUT WORK ZONE | WITH WORK ZONE | EQUIVALENT HOURLY RATES SECTION 2 WORK ZONE | WITHOUT WORK ZONE | WITH WORK ZONE |
|---|---|---|---|---|---|---|
| 8 | DEMAND | 3000 | 5000 | DEMAND | 3000 | 4000 |
| | FLOWRATE | 3000 | 4000 | FLOWRATE | 3000 | 4000 |
| | CAPACITY | 6000 | 6000 | CAPACITY | 6000 | 4000 |
| | V/C | 0.50 | -0.67 | V/C | 0.50 | 1.00 |
| | SPEED | 60 | 15 | SPEED | 60 | 30 |
| ALL LANES | STORED VEHICLES AT END OF TIME SLICE | 0 | 1000 | STORED VEHICLES AT END OF TIME SLICE | 0 | 0 |
| PER LANE | MOVING QUEUE LENGTH WITH WZ(mi) | 1.9 | 1.9 | LENGTH OF WZ (mi) | 2.0 | 2.0 |
| PER LANE | POINT DENSITY | 17 | 89 | POINT DENSITY | 17 | 67 |
| PER LANE | #LOOPS IN DISTANCE OF QUEUE WITH WZ | 3.136 | 3.136 | #LOOPS IN DISTANCE OF WZ | 3.311 | 3.311 |
| ALL LANES | CUMULATIVE POINT DENSITY OVER LENGTH OF QUEUE | 157 | 836 | CUMULATIVE POINT DENSITY OVER LENGTH OF WZ (mi) | 166 | 442 |
| ALL LANES | CHANGE IN POINT DENSITY | | 679 | CHANGE IN POINT DENSITY | | 276 |

*Table 66. Scenario WZ-2 (cont.) Work Zone Analysis — Medium Demand*

| 15-MINUTE TIME SLICE | EQUIVALENT HOURLY RATES SECTION 1 | WITHOUT WORK ZONE | WITH WORK ZONE | EQUIVALENT HOURLY RATES SECTION 2 WORK ZONE | WITHOUT WORK ZONE | WITH WORK ZONE |
|---|---|---|---|---|---|---|
| 9 | DEMAND | 3000 | 4000 | DEMAND | 3000 | 4000 |
| | FLOWRATE | 3000 | 4000 | FLOWRATE | 3000 | 4000 |
| | CAPACITY | 6000 | 6000 | CAPACITY | 6000 | 4000 |
| | V/C | 0.50 | -0.67 | V/C | 0.50 | 1.00 |
| | SPEED | 60 | 15 | SPEED | 60 | 30 |
| ALL LANES | STORED VEHICLES AT END OF TIME SLICE | 0 | 0 | STORED VEHICLES AT END OF TIME SLICE | 0 | 0 |
| PER LANE | MOVING QUEUE LENGTH WITH WZ(mi) | 0.0 | 0.0 | LENGTH OF WZ (mi) | 2.0 | 2.0 |
| PER LANE | POINT DENSITY | 17 | 89 | POINT DENSITY | 17 | 67 |
| PER LANE | #LOOPS IN DISTANCE OF QUEUE WITH WZ | 0.000 | 0.000 | #LOOPS IN DISTANCE OF WZ | 3.311 | 3.311 |
| ALL LANES | CUMULATIVE POINT DENSITY OVER LENGTH OF QUEUE | 0 | 0 | CUMULATIVE POINT DENSITY OVER LENGTH OF WZ (mi) | 166 | 442 |
| ALL LANES | CHANGE IN POINT DENSITY | | 0 | CHANGE IN POINT DENSITY | | 276 |

| 15-MINUTE TIME SLICE | EQUIVALENT HOURLY RATES SECTION 1 | WITHOUT WORK ZONE | WITH WORK ZONE | EQUIVALENT HOURLY RATES SECTION 2 WORK ZONE | WITHOUT WORK ZONE | WITH WORK ZONE |
|---|---|---|---|---|---|---|
| 10 | DEMAND | 3000 | 3000 | DEMAND | 3000 | 3000 |
| | FLOWRATE | 3000 | 3000 | FLOWRATE | 3000 | 3000 |
| | CAPACITY | 6000 | 6000 | CAPACITY | 6000 | 4000 |
| | V/C | 0.50 | 0.50 | V/C | 0.50 | 0.75 |
| | SPEED | 60 | 60 | SPEED | 60 | 50 |
| ALL LANES | STORED VEHICLES AT END OF TIME SLICE | 0 | 0 | STORED VEHICLES AT END OF TIME SLICE | 0 | 0 |
| PER LANE | MOVING QUEUE LENGTH WITH WZ(mi) | 0.0 | 0.0 | LENGTH OF WZ (mi) | 2.0 | 2.0 |
| PER LANE | POINT DENSITY | 17 | 17 | POINT DENSITY | 17 | 30 |
| PER LANE | #LOOPS IN DISTANCE OF QUEUE WITH WZ | 0.000 | 0.000 | #LOOPS IN DISTANCE OF WZ | 3.311 | 3.311 |
| ALL LANES | CUMULATIVE POINT DENSITY OVER LENGTH OF QUEUE | 0 | 0 | CUMULATIVE POINT DENSITY OVER LENGTH OF WZ (mi) | 166 | 199 |
| ALL LANES | CHANGE IN POINT DENSITY | | 0 | CHANGE IN POINT DENSITY | | 33 |

*Table 66. Scenario WZ-2 (cont.) Work Zone Analysis — Medium Demand*

| 15-MINUTE TIME SLICE | EQUIVALENT HOURLY RATES SECTION 1 | WITHOUT WORK ZONE | WITH WORK ZONE | EQUIVALENT HOURLY RATES SECTION 2 WORK ZONE | WITHOUT WORK ZONE | WITH WORK ZONE |
|---|---|---|---|---|---|---|
| 11 | DEMAND | 3000 | 3000 | DEMAND | 3000 | 3000 |
| | FLOWRATE | 3000 | 3000 | FLOWRATE | 3000 | 3000 |
| | CAPACITY | 6000 | 6000 | CAPACITY | 6000 | 4000 |
| | V/C | 0.50 | 0.50 | V/C | 0.50 | 0.75 |
| | SPEED | 60 | 60 | SPEED | 60 | 50 |
| ALL LANES | STORED VEHICLES AT END OF TIME SLICE | 0 | 0 | STORED VEHICLES AT END OF TIME SLICE | 0 | 0 |
| PER LANE | MOVING QUEUE LENGTH WITH WZ(mi) | 0.0 | 0.0 | LENGTH OF WZ (mi) | 2.0 | 2.0 |
| PER LANE | POINT DENSITY | 17 | 17 | POINT DENSITY | 17 | 30 |
| PER LANE | #LOOPS IN DISTANCE OF QUEUE WITH WZ | 0.000 | 0.000 | #LOOPS IN DISTANCE OF WZ | 3.311 | 3.311 |
| ALL LANES | CUMULATIVE POINT DENSITY OVER LENGTH OF QUEUE | 0 | 0 | CUMULATIVE POINT DENSITY OVER LENGTH OF WZ (mi) | 166 | 199 |
| ALL LANES | CHANGE IN POINT DENSITY | | 0 | CHANGE IN POINT DENSITY | | 33 |

| 15-MINUTE TIME SLICE | EQUIVALENT HOURLY RATES SECTION 1 | WITHOUT WORK ZONE | WITH WORK ZONE | EQUIVALENT HOURLY RATES SECTION 2 WORK ZONE | WITHOUT WORK ZONE | WITH WORK ZONE |
|---|---|---|---|---|---|---|
| 12 | DEMAND | 3000 | 3000 | DEMAND | 3000 | 3000 |
| | FLOWRATE | 3000 | 3000 | FLOWRATE | 3000 | 3000 |
| | CAPACITY | 6000 | 6000 | CAPACITY | 6000 | 4000 |
| | V/C | 0.50 | 0.50 | V/C | 0.50 | 0.75 |
| | SPEED | 60 | 60 | SPEED | 60 | 50 |
| ALL LANES | STORED VEHICLES AT END OF TIME SLICE | 0 | 0 | STORED VEHICLES AT END OF TIME SLICE | 0 | 0 |
| PER LANE | MOVING QUEUE LENGTH WITH WZ(mi) | 0.0 | 0.0 | LENGTH OF WZ (mi) | 2.0 | 2.0 |
| PER LANE | POINT DENSITY | 17 | 17 | POINT DENSITY | 17 | 30 |
| PER LANE | #LOOPS IN DISTANCE OF QUEUE WITH WZ | 0.000 | 0.000 | #LOOPS IN DISTANCE OF WZ | 3.311 | 3.311 |
| ALL LANES | CUMULATIVE POINT DENSITY OVER LENGTH OF QUEUE | 0 | 0 | CUMULATIVE POINT DENSITY OVER LENGTH OF WZ (mi) | 166 | 199 |
| ALL LANES | CHANGE IN POINT DENSITY | | 0 | CHANGE IN POINT DENSITY | | 33 |

| CUMULATIVE CHANGE IN POINT DENSITY (veh/mi/ln) OVER 3-HOUR PERIOD = | 13,580 |
|---|---|

*Table 67. Scenario WZ-3 Work Zone Analysis — High Demand*

| **15-MINUTE TIME SLICE** | **EQUIVALENT HOURLY RATES SECTION 1** | **WITHOUT WORK ZONE** | **WITH WORK ZONE** | **EQUIVALENT HOURLY RATES SECTION 2 WORK ZONE** | **WITHOUT WORK ZONE** | **WITH WORK ZONE** |
|---|---|---|---|---|---|---|
| 1 | DEMAND | 6000 | 6000 | DEMAND | 6000 | 4000 |
| | FLOWRATE | 6000 | 4000 | FLOWRATE | 6000 | 4000 |
| | CAPACITY | 6000 | 6000 | CAPACITY | 6000 | 4000 |
| | V/C | 1.00 | -0.67 | V/C | 1.00 | 1.00 |
| | SPEED | 30 | 15 | SPEED | 30 | 30 |
| ALL LANES | STORED VEHICLES AT END OF TIME SLICE | 0 | 2000 | STORED VEHICLES AT END OF TIME SLICE | 0 | 0 |
| PER LANE | MOVING QUEUE LENGTH WITH WZ(mi) | 3.8 | 3.8 | LENGTH OF WZ (mi) | 2.0 | 2.0 |
| PER LANE | POINT DENSITY | 67 | 89 | POINT DENSITY | 67 | 67 |
| PER LANE | #LOOPS IN DISTANCE OF QUEUE WITH WZ | 6.271 | 6.271 | #LOOPS IN DISTANCE OF WZ | 3.311 | 3.311 |
| ALL LANES | CUMULATIVE POINT DENSITY OVER LENGTH OF QUEUE | 1,254 | 1,672 | CUMULATIVE POINT DENSITY OVER LENGTH OF WZ (mi) | 662 | 442 |
| ALL LANES | CHANGE IN POINT DENSITY | | 418 | CHANGE IN POINT DENSITY | | -221 |

| **15-MINUTE TIME SLICE** | **EQUIVALENT HOURLY RATES SECTION 1** | **WITHOUT WORK ZONE** | **WITH WORK ZONE** | **EQUIVALENT HOURLY RATES SECTION 2 WORK ZONE** | **WITHOUT WORK ZONE** | **WITH WORK ZONE** |
|---|---|---|---|---|---|---|
| 2 | DEMAND | 6000 | 8000 | DEMAND | 6000 | 4000 |
| | FLOWRATE | 6000 | 4000 | FLOWRATE | 6000 | 4000 |
| | CAPACITY | 6000 | 6000 | CAPACITY | 6000 | 4000 |
| | V/C | 1.00 | -0.67 | V/C | 1.00 | 1.00 |
| | SPEED | 30 | 15 | SPEED | 30 | 30 |
| ALL LANES | STORED VEHICLES AT END OF TIME SLICE | 0 | 4000 | STORED VEHICLES AT END OF TIME SLICE | 0 | 0 |
| PER LANE | MOVING QUEUE LENGTH WITH WZ(mi) | 7.6 | 7.6 | LENGTH OF WZ (mi) | 2.0 | 2.0 |
| PER LANE | POINT DENSITY | 67 | 89 | POINT DENSITY | 67 | 67 |
| PER LANE | #LOOPS IN DISTANCE OF QUEUE WITH WZ | 12.543 | 12.543 | #LOOPS IN DISTANCE OF WZ | 3.311 | 3.311 |
| ALL LANES | CUMULATIVE POINT DENSITY OVER LENGTH OF QUEUE | 2,509 | 3,345 | CUMULATIVE POINT DENSITY OVER LENGTH OF WZ (mi) | 662 | 442 |
| ALL LANES | CHANGE IN POINT DENSITY | | 836 | CHANGE IN POINT DENSITY | | -221 |

*Table 67. Scenario WZ-3 (cont.) Work Zone Analysis — High Demand*

| **15-MINUTE TIME SLICE** | **EQUIVALENT HOURLY RATES** | | | **EQUIVALENT HOURLY RATES** | | |
|---|---|---|---|---|---|---|
| | **SECTION 1** | **WITHOUT WORK ZONE** | **WITH WORK ZONE** | **SECTION 2 WORK ZONE** | **WITHOUT WORK ZONE** | **WITH WORK ZONE** |
| 3 | DEMAND | 6000 | 10000 | DEMAND | 6000 | 4000 |
| | FLOWRATE | 6000 | 4000 | FLOWRATE | 6000 | 4000 |
| | CAPACITY | 6000 | 6000 | CAPACITY | 6000 | 4000 |
| | V/C | 1.00 | -0.67 | V/C | 1.00 | 1.00 |
| | SPEED | 30 | 15 | SPEED | 30 | 30 |
| ALL LANES | STORED VEHICLES AT END OF TIME SLICE | 0 | 6000 | STORED VEHICLES AT END OF TIME SLICE | 0 | 0 |
| PER LANE | MOVING QUEUE LENGTH WITH WZ(mi) | 11.4 | 11.4 | LENGTH OF WZ (mi) | 2.0 | 2.0 |
| PER LANE | POINT DENSITY | 67 | 89 | POINT DENSITY | 67 | 67 |
| PER LANE | #LOOPS IN DISTANCE OF QUEUE WITH WZ | 18.814 | 18.814 | #LOOPS IN DISTANCE OF WZ | 3.311 | 3.311 |
| ALL LANES | CUMULATIVE POINT DENSITY OVER LENGTH OF QUEUE | 3,763 | 5,017 | CUMULATIVE POINT DENSITY OVER LENGTH OF WZ (mi) | 662 | 442 |
| ALL LANES | CHANGE IN POINT DENSITY | | 1,254 | CHANGE IN POINT DENSITY | | -221 |

| **15-MINUTE TIME SLICE** | **EQUIVALENT HOURLY RATES** | | | **EQUIVALENT HOURLY RATES** | | |
|---|---|---|---|---|---|---|
| | **SECTION 1** | **WITHOUT WORK ZONE** | **WITH WORK ZONE** | **SECTION 2 WORK ZONE** | **WITHOUT WORK ZONE** | **WITH WORK ZONE** |
| 4 | DEMAND | 6000 | 12000 | DEMAND | 6000 | 4000 |
| | FLOWRATE | 6000 | 4000 | FLOWRATE | 6000 | 4000 |
| | CAPACITY | 6000 | 6000 | CAPACITY | 6000 | 4000 |
| | V/C | 1.00 | -0.67 | V/C | 1.00 | 1.00 |
| | SPEED | 30 | 15 | SPEED | 30 | 30 |
| ALL LANES | STORED VEHICLES AT END OF TIME SLICE | 0 | 8000 | STORED VEHICLES AT END OF TIME SLICE | 0 | 0 |
| PER LANE | MOVING QUEUE LENGTH WITH WZ(mi) | 15.2 | 15.2 | LENGTH OF WZ (mi) | 2.0 | 2.0 |
| PER LANE | POINT DENSITY | 67 | 89 | POINT DENSITY | 67 | 67 |
| PER LANE | #LOOPS IN DISTANCE OF QUEUE WITH WZ | 25.085 | 25.085 | #LOOPS IN DISTANCE OF WZ | 3.311 | 3.311 |
| ALL LANES | CUMULATIVE POINT DENSITY OVER LENGTH OF QUEUE | 5,017 | 6,689 | CUMULATIVE POINT DENSITY OVER LENGTH OF WZ (mi) | 662 | 442 |
| ALL LANES | CHANGE IN POINT DENSITY | | 1,672 | CHANGE IN POINT DENSITY | | -221 |

*Table 67. Scenario WZ-3 (cont.) Work Zone Analysis — High Demand*

| **15-MINUTE TIME SLICE** | **EQUIVALENT HOURLY RATES** | | | **EQUIVALENT HOURLY RATES** | | |
|---|---|---|---|---|---|---|
| | **SECTION 1** | **WITHOUT WORK ZONE** | **WITH WORK ZONE** | **SECTION 2 WORK ZONE** | **WITHOUT WORK ZONE** | **WITH WORK ZONE** |
| 5 | DEMAND | 5000 | 13000 | DEMAND | 5000 | 4000 |
| | FLOWRATE | 5000 | 4000 | FLOWRATE | 5000 | 4000 |
| | CAPACITY | 6000 | 6000 | CAPACITY | 6000 | 4000 |
| | V/C | 0.83 | -0.67 | V/C | 0.83 | 1.00 |
| | SPEED | 50 | 15 | SPEED | 50 | 30 |
| ALL LANES | STORED VEHICLES AT END OF TIME SLICE | 0 | 9000 | STORED VEHICLES AT END OF TIME SLICE | 0 | 0 |
| PER LANE | MOVING QUEUE LENGTH WITH WZ(mi) | 17.0 | 17.0 | LENGTH OF WZ (mi) | 2.0 | 2.0 |
| PER LANE | POINT DENSITY | 33 | 89 | POINT DENSITY | 33 | 67 |
| PER LANE | #LOOPS IN DISTANCE OF QUEUE WITH WZ | 28.221 | 28.221 | #LOOPS IN DISTANCE OF WZ | 3.311 | 3.311 |
| ALL LANES | CUMULATIVE POINT DENSITY OVER LENGTH OF QUEUE | 2,822 | 7,526 | CUMULATIVE POINT DENSITY OVER LENGTH OF WZ (mi) | 331 | 442 |
| ALL LANES | CHANGE IN POINT DENSITY | | 4,703 | CHANGE IN POINT DENSITY | | 110 |

| **15-MINUTE TIME SLICE** | **EQUIVALENT HOURLY RATES** | | | **EQUIVALENT HOURLY RATES** | | |
|---|---|---|---|---|---|---|
| | **SECTION 1** | **WITHOUT WORK ZONE** | **WITH WORK ZONE** | **SECTION 2 WORK ZONE** | **WITHOUT WORK ZONE** | **WITH WORK ZONE** |
| 6 | DEMAND | 4000 | 13000 | DEMAND | 4000 | 4000 |
| | FLOWRATE | 4000 | 4000 | FLOWRATE | 4000 | 4000 |
| | CAPACITY | 6000 | 6000 | CAPACITY | 6000 | 4000 |
| | V/C | 0.67 | -0.67 | V/C | 0.67 | 1.00 |
| | SPEED | 55 | 15 | SPEED | 55 | 30 |
| ALL LANES | STORED VEHICLES AT END OF TIME SLICE | 0 | 9000 | STORED VEHICLES AT END OF TIME SLICE | 0 | 0 |
| PER LANE | MOVING QUEUE LENGTH WITH WZ(mi) | 17.0 | 17.0 | LENGTH OF WZ (mi) | 2.0 | 2.0 |
| PER LANE | POINT DENSITY | 24 | 89 | POINT DENSITY | 24 | 67 |
| PER LANE | #LOOPS IN DISTANCE OF QUEUE WITH WZ | 28.221 | 28.221 | #LOOPS IN DISTANCE OF WZ | 3.311 | 3.311 |
| ALL LANES | CUMULATIVE POINT DENSITY OVER LENGTH OF QUEUE | 2,052 | 7,526 | CUMULATIVE POINT DENSITY OVER LENGTH OF WZ (mi) | 241 | 442 |
| ALL LANES | CHANGE IN POINT DENSITY | | 5,473 | CHANGE IN POINT DENSITY | | 201 |

*Table 67. Scenario WZ-3 (cont.) Work Zone Analysis — High Demand*

| 15-MINUTE TIME SLICE | EQUIVALENT HOURLY RATES SECTION 1 | WITHOUT WORK ZONE | WITH WORK ZONE | EQUIVALENT HOURLY RATES SECTION 2 WORK ZONE | WITHOUT WORK ZONE | WITH WORK ZONE |
|---|---|---|---|---|---|---|
| 7 | DEMAND | 3000 | 12000 | DEMAND | 3000 | 4000 |
| | FLOWRATE | 3000 | 4000 | FLOWRATE | 3000 | 4000 |
| | CAPACITY | 6000 | 6000 | CAPACITY | 6000 | 4000 |
| | V/C | 0.50 | -0.67 | V/C | 0.50 | 1.00 |
| | SPEED | 60 | 15 | SPEED | 60 | 30 |
| ALL LANES | STORED VEHICLES AT END OF TIME SLICE | 0 | 8000 | STORED VEHICLES AT END OF TIME SLICE | 0 | 0 |
| PER LANE | MOVING QUEUE LENGTH WITH WZ(mi) | 15.2 | 15.2 | LENGTH OF WZ (mi) | 2.0 | 2.0 |
| PER LANE | POINT DENSITY | 17 | 89 | POINT DENSITY | 17 | 67 |
| PER LANE | #LOOPS IN DISTANCE OF QUEUE WITH WZ | 25.085 | 25.085 | #LOOPS IN DISTANCE OF WZ | 3.311 | 3.311 |
| ALL LANES | CUMULATIVE POINT DENSITY OVER LENGTH OF QUEUE | 1,254 | 6,689 | CUMULATIVE POINT DENSITY OVER LENGTH OF WZ (mi) | 166 | 442 |
| ALL LANES | CHANGE IN POINT DENSITY | | 5,435 | CHANGE IN POINT DENSITY | | 276 |

| 15-MINUTE TIME SLICE | EQUIVALENT HOURLY RATES SECTION 1 | WITHOUT WORK ZONE | WITH WORK ZONE | EQUIVALENT HOURLY RATES SECTION 2 WORK ZONE | WITHOUT WORK ZONE | WITH WORK ZONE |
|---|---|---|---|---|---|---|
| 8 | DEMAND | 3000 | 11000 | DEMAND | 3000 | 4000 |
| | FLOWRATE | 3000 | 4000 | FLOWRATE | 3000 | 4000 |
| | CAPACITY | 6000 | 6000 | CAPACITY | 6000 | 4000 |
| | V/C | 0.50 | -0.67 | V/C | 0.50 | 1.00 |
| | SPEED | 60 | 15 | SPEED | 60 | 30 |
| ALL LANES | STORED VEHICLES AT END OF TIME SLICE | 0 | 7000 | STORED VEHICLES AT END OF TIME SLICE | 0 | 0 |
| PER LANE | MOVING QUEUE LENGTH WITH WZ(mi) | 13.3 | 13.3 | LENGTH OF WZ (mi) | 2.0 | 2.0 |
| PER LANE | POINT DENSITY | 17 | 89 | POINT DENSITY | 17 | 67 |
| PER LANE | #LOOPS IN DISTANCE OF QUEUE WITH WZ | 21.950 | 21.950 | #LOOPS IN DISTANCE OF WZ | 3.311 | 3.311 |
| ALL LANES | CUMULATIVE POINT DENSITY OVER LENGTH OF QUEUE | 1,097 | 5,853 | CUMULATIVE POINT DENSITY OVER LENGTH OF WZ (mi) | 166 | 442 |
| ALL LANES | CHANGE IN POINT DENSITY | | 4,756 | CHANGE IN POINT DENSITY | | 276 |

*Table 67. Scenario WZ-3 (cont.) Work Zone Analysis — High Demand*

| 15-MINUTE TIME SLICE | EQUIVALENT HOURLY RATES SECTION 1 | WITHOUT WORK ZONE | WITH WORK ZONE | EQUIVALENT HOURLY RATES SECTION 2 WORK ZONE | WITHOUT WORK ZONE | WITH WORK ZONE |
|---|---|---|---|---|---|---|
| 9 | DEMAND | 3000 | 10000 | DEMAND | 3000 | 4000 |
| | FLOWRATE | 3000 | 4000 | FLOWRATE | 3000 | 4000 |
| | CAPACITY | 6000 | 6000 | CAPACITY | 6000 | 4000 |
| | V/C | 0.50 | -0.67 | V/C | 0.50 | 1.00 |
| | SPEED | 60 | 15 | SPEED | 60 | 30 |
| ALL LANES | STORED VEHICLES AT END OF TIME SLICE | 0 | 6000 | STORED VEHICLES AT END OF TIME SLICE | 0 | 0 |
| PER LANE | MOVING QUEUE LENGTH WITH WZ(mi) | 11.4 | 11.4 | LENGTH OF WZ (mi) | 2.0 | 2.0 |
| PER LANE | POINT DENSITY | 17 | 89 | POINT DENSITY | 17 | 67 |
| PER LANE | #LOOPS IN DISTANCE OF QUEUE WITH WZ | 18.814 | 18.814 | #LOOPS IN DISTANCE OF WZ | 3.311 | 3.311 |
| ALL LANES | CUMULATIVE POINT DENSITY OVER LENGTH OF QUEUE | 941 | 5,017 | CUMULATIVE POINT DENSITY OVER LENGTH OF WZ (mi) | 166 | 442 |
| ALL LANES | CHANGE IN POINT DENSITY | | 4,076 | CHANGE IN POINT DENSITY | | 276 |

| 15-MINUTE TIME SLICE | EQUIVALENT HOURLY RATES SECTION 1 | WITHOUT WORK ZONE | WITH WORK ZONE | EQUIVALENT HOURLY RATES SECTION 2 WORK ZONE | WITHOUT WORK ZONE | WITH WORK ZONE |
|---|---|---|---|---|---|---|
| 10 | DEMAND | 3000 | 9000 | DEMAND | 3000 | 4000 |
| | FLOWRATE | 3000 | 4000 | FLOWRATE | 3000 | 4000 |
| | CAPACITY | 6000 | 6000 | CAPACITY | 6000 | 4000 |
| | V/C | 0.50 | -0.67 | V/C | 0.50 | 1.00 |
| | SPEED | 60 | 15 | SPEED | 60 | 30 |
| ALL LANES | STORED VEHICLES AT END OF TIME SLICE | 0 | 5000 | STORED VEHICLES AT END OF TIME SLICE | 0 | 0 |
| PER LANE | MOVING QUEUE LENGTH WITH WZ(mi) | 9.5 | 9.5 | LENGTH OF WZ (mi) | 2.0 | 2.0 |
| PER LANE | POINT DENSITY | 17 | 89 | POINT DENSITY | 17 | 67 |
| PER LANE | #LOOPS IN DISTANCE OF QUEUE WITH WZ | 15.678 | 15.678 | #LOOPS IN DISTANCE OF WZ | 3.311 | 3.311 |
| ALL LANES | CUMULATIVE POINT DENSITY OVER LENGTH OF QUEUE | 784 | 4,181 | CUMULATIVE POINT DENSITY OVER LENGTH OF WZ (mi) | 166 | 442 |
| ALL LANES | CHANGE IN POINT DENSITY | | 3,397 | CHANGE IN POINT DENSITY | | 276 |

*Table 67. Scenario WZ-3 (cont.) Work Zone Analysis — High Demand*

| 15-MINUTE TIME SLICE | EQUIVALENT HOURLY RATES SECTION 1 | WITHOUT WORK ZONE | WITH WORK ZONE | EQUIVALENT HOURLY RATES SECTION 2 WORK ZONE | WITHOUT WORK ZONE | WITH WORK ZONE |
|---|---|---|---|---|---|---|
| 11 | DEMAND | 3000 | 8000 | DEMAND | 3000 | 4000 |
| | FLOWRATE | 3000 | 4000 | FLOWRATE | 3000 | 4000 |
| | CAPACITY | 6000 | 6000 | CAPACITY | 6000 | 4000 |
| | V/C | 0.50 | -0.67 | V/C | 0.50 | 1.00 |
| | SPEED | 60 | 15 | SPEED | 60 | 30 |
| ALL LANES | STORED VEHICLES AT END OF TIME SLICE | 0 | 4000 | STORED VEHICLES AT END OF TIME SLICE | 0 | 0 |
| PER LANE | MOVING QUEUE LENGTH WITH WZ(mi) | 7.6 | 7.6 | LENGTH OF WZ (mi) | 2.0 | 2.0 |
| PER LANE | POINT DENSITY | 17 | 89 | POINT DENSITY | 17 | 67 |
| PER LANE | #LOOPS IN DISTANCE OF QUEUE WITH WZ | 12.543 | 12.543 | #LOOPS IN DISTANCE OF WZ | 3.311 | 3.311 |
| ALL LANES | CUMULATIVE POINT DENSITY OVER LENGTH OF QUEUE | 627 | 3,345 | CUMULATIVE POINT DENSITY OVER LENGTH OF WZ (mi) | 166 | 442 |
| ALL LANES | CHANGE IN POINT DENSITY | | 2,718 | CHANGE IN POINT DENSITY | | 276 |

| 15-MINUTE TIME SLICE | EQUIVALENT HOURLY RATES SECTION 1 | WITHOUT WORK ZONE | WITH WORK ZONE | EQUIVALENT HOURLY RATES SECTION 2 WORK ZONE | WITHOUT WORK ZONE | WITH WORK ZONE |
|---|---|---|---|---|---|---|
| 12 | DEMAND | 3000 | 7000 | DEMAND | 3000 | 4000 |
| | FLOWRATE | 3000 | 4000 | FLOWRATE | 3000 | 4000 |
| | CAPACITY | 6000 | 6000 | CAPACITY | 6000 | 4000 |
| | V/C | 0.50 | -0.67 | V/C | 0.50 | 1.00 |
| | SPEED | 60 | 15 | SPEED | 60 | 30 |
| ALL LANES | STORED VEHICLES AT END OF TIME SLICE | 0 | 3000 | STORED VEHICLES AT END OF TIME SLICE | 0 | 0 |
| PER LANE | MOVING QUEUE LENGTH WITH WZ(mi) | 5.7 | 5.7 | LENGTH OF WZ (mi) | 2.0 | 2.0 |
| PER LANE | POINT DENSITY | 17 | 89 | POINT DENSITY | 17 | 67 |
| PER LANE | #LOOPS IN DISTANCE OF QUEUE WITH WZ | 9.407 | 9.407 | #LOOPS IN DISTANCE OF WZ | 3.311 | 3.311 |
| ALL LANES | CUMULATIVE POINT DENSITY OVER LENGTH OF QUEUE | 470 | 2,509 | CUMULATIVE POINT DENSITY OVER LENGTH OF WZ (mi) | 166 | 442 |
| ALL LANES | CHANGE IN POINT DENSITY | | 2,038 | CHANGE IN POINT DENSITY | | 276 |

| | |
|---|---|
| **CUMULATIVE CHANGE IN POINT DENSITY (veh/mi/ln) OVER 3-HOUR PERIOD =** | **37,861** |

# CHAPTER 7. CONCLUSIONS

Table 68 summarizes the results of the 24 scenarios evaluated in this report. The results in Table 68 are sorted by the low end of the 80 percent confidence interval of the traffic parameter's coefficient estimate in ascending order. The confidence intervals are in terms of per 10,000 units of PTDCUMAM for all scenarios except Scenario 21 through Scenario 24, where the confidence intervals are in terms of per 30,000 units of EPSUMPTD (this is equivalent to a 3-day episode at 10,000 PTDCUMAM units per day). Data controls employed for each scenario are demarcated. "NS" represents "Not Significant" at the 0.20 alpha-level or 80 percent confidence level. The results indicate the following:

- The scenario that revealed the highest 80 percent confidence interval for the traffic congestion parameter's coefficient estimate is Scenario 15, where all data from December 1995 through September 1996 is assessed and controlled for days with traffic congestion on the TransGuide network from 6AM to 2-hours before the time of the peak ozone concentration greater than the median level and on days that occurred during an ozone episode and on days where the average cloud cover from 6AM to the time of the peak ozone is less than or equal to 3 oktas.
- All scenarios that included controlling for traffic congestion conditions higher than the median level as one of its' data controls are found to have a significant traffic congestion coefficient at the 80 percent confidence level;
- Conversely, all scenarios that included controlling for traffic congestion conditions lower than the median level as one of its data controls are not found to have a significant traffic congestion coefficient at the 80 percent confidence level, even when controlling for additional variables such as cloud cover and ozone episodic days;
- All scenarios that included controlling for the peak ozone season are found to have a significant traffic congestion coefficient at the 80 percent confidence level except when low traffic congestion conditions are also controlled for; The same can be said for all scenarios that included controlling for low cloud cover as well.

Combining the results from the statistical analysis with the results from the hypothetical work zone impacts, Table 69 and Table 70 present the potential impacts on the daily peak ozone or peak episodic ozone concentration of the hypothetical work zones. Table 69 contains the results of a 3-day episode for Scenario 21 through Scenario 24 while Table 70 contains the results for a 6-day episode for these scenarios. We can summarize these results as follows:

- Under the "low" demand work zone scenario, Scenario WZ-1, the impact that the estimated additional traffic congestion could have on the daily peak ozone or peak episodic ozone concentration in San Antonio ranges from 0 ppb (low end of Scenario 2) to 1 ppb (high end of Scenario 15). This is based on applying the results of the scenarios in the statistical analysis where the traffic congestion parameter was found to be significant and the resultant additional daily traffic congestion (1,000 veh/mi/ln) under Scenario WZ-1. The results are rounded to the nearest whole ppb.

*Table 68. Summary of Results*

Sorted by low end of 80 percent confidence interval of traffic parameter
coefficient estimate per 10,000 units of PTDCUMAM
per 30,000 units of EPSUMPTD (Scenario 21 through Scenario 24)

| | **80 PERCENT CONFIDENCE INTERVAL** | | **DATA CONTROLS** | | | | | |
|---|---|---|---|---|---|---|---|---|
| SCENARIO | LOW END | HIGH END | HIGH TRAFFIC | EPISODE DAYS | LOW CLOUD COVER | OZONE SEASON | LOW WIND SPEED | LOW TRAFFIC |
| 2 | 0.07 | 0.81 | | | | ® | | |
| 10 | 0.24 | 1.42 | | ® | | ® | | |
| 3 | 0.24 | 1.84 | | | ® | | ® | |
| 4 | 0.42 | 2.52 | | | ® | ® | ® | |
| 11 | 0.46 | 1.75 | | ® | ® | | | |
| 21 | 0.54 | 1.77 | | ® | | | | |
| 6 | 0.55 | 3.44 | ® | | ® | ® | | |
| 20 | 0.67 | 4.46 | ® | ® | | ® | | |
| 12 | 0.68 | 2.65 | | ® | ® | ® | | |
| 23 | 1.08 | 2.76 | | ® | ® | | | |
| 22 | 1.17 | 2.57 | | ® | | ® | | |
| 24 | 1.44 | 3.27 | | ® | ® | ® | | |
| 16 | 1.60 | 4.80 | ® | ® | ® | ® | | |
| 5 | 1.78 | 4.22 | ® | | ® | | | |
| 19 | 1.84 | 5.49 | ® | ® | | | | |
| 15 | 2.57 | 5.28 | ® | ® | ® | | | |
| 1 | NS | NS | | | | | | |
| 7 | NS | NS | | | ® | | | ® |
| 8 | NS | NS | | | ® | ® | | ® |
| 9 | NS | NS | | ® | | | | |
| 13 | NS | NS | | ® | ® | | | ® |
| 14 | NS | NS | | ® | ® | ® | | ® |
| 17 | NS | NS | | ® | | | | ® |
| 18 | NS | NS | | ® | | ® | | ® |

- Under the "medium" demand work zone scenario, Scenario WZ-2, the impact that the estimated additional traffic congestion could have on the daily peak ozone or peak episodic ozone concentration in San Antonio ranges from 0 ppb (low end of Scenario 2) to 9 ppb (high end of Scenario 24, 6-day ozone episode length). This is based on applying the results of the scenarios in the statistical analysis where the traffic congestion parameter was found to be significant and the resultant additional daily traffic congestion (14,000 veh/mi/ln) under Scenario WZ-2. The results are rounded to the nearest whole ppb.
- Under the "high" demand work zone scenario, Scenario WZ-3, the impact that the estimated additional traffic congestion could have on the daily peak ozone or peak episodic ozone concentration in San Antonio ranges from 0 ppb (low end of Scenario 2) to 25 ppb (high end of Scenario 24, 6-day ozone episode length). This is based on applying the results of the scenarios in the statistical analysis where the traffic congestion parameter was found to be significant and the resultant additional daily

traffic congestion (38,000 veh/mi/ln) under Scenario WZ-3. The results are rounded to the nearest whole ppb.

*Table 69. Summary of Results (cont.)*

| | TRAFFIC PARAMETER COEFFICIENT ESTIMATE 80 PERCENT CONFIDENCE INTERVALS | | HYPOTHETICAL WORK ZONE IMPACTS ON DAILY PEAK OZONE (ppb) 'OR ON PEAK EPISODIC OZONE LEVEL (ppb) 3-DAY EPISODE | | | | | |
|---|---|---|---|---|---|---|---|---|
| SCENARIO | LOW END | HIGH END | WZ-1 LOW | WZ-1 HIGH | WZ-2 LOW | WZ-2 HIGH | WZ-3 LOW | WZ-3 HIGH |
| 2 | 0.07 | 0.81 | 0 | 0 | 0 | 1 | 0 | 3 |
| 10 | 0.24 | 1.42 | 0 | 0 | 0 | 2 | 1 | 5 |
| 3 | 0.24 | 1.84 | 0 | 0 | 0 | 3 | 1 | 7 |
| 4 | 0.42 | 2.52 | 0 | 0 | 1 | 4 | 2 | 10 |
| 11 | 0.46 | 1.75 | 0 | 0 | 1 | 2 | 2 | 7 |
| 21 | 0.54 | 1.77 | 0 | 0 | 1 | 2 | 2 | 7 |
| 6 | 0.55 | 3.44 | 0 | 0 | 1 | 5 | 2 | 13 |
| 20 | 0.67 | 4.46 | 0 | 0 | 1 | 6 | 3 | 17 |
| 12 | 0.68 | 2.65 | 0 | 0 | 1 | 4 | 3 | 10 |
| 23 | 1.08 | 2.76 | 0 | 0 | 2 | 4 | 4 | 10 |
| 22 | 1.17 | 2.57 | 0 | 0 | 2 | 4 | 4 | 10 |
| 24 | 1.44 | 3.27 | 0 | 0 | 2 | 5 | 5 | 12 |
| 16 | 1.6 | 4.8 | 0 | 0 | 2 | 7 | 6 | 18 |
| 5 | 1.78 | 4.22 | 0 | 0 | 2 | 6 | 7 | 16 |
| 19 | 1.84 | 5.49 | 0 | 1 | 3 | 8 | 7 | 21 |
| 15 | 2.57 | 5.28 | 0 | 1 | 4 | 7 | 10 | 20 |

*Table 70. Summary of Results (cont.)*

| | **TRAFFIC PARAMETER COEFFICIENT ESTIMATE 80 PERCENT CONFIDENCE INTERVALS** | | **HYPOTHETICAL WORK ZONE IMPACTS ON DAILY PEAK OZONE (ppb) OR ON PEAK EPISODIC OZONE LEVEL (ppb) 6-DAY EPISODE** | | | | | |
|---|---|---|---|---|---|---|---|---|
| **SCENARIO** | **LOW END** | **HIGH END** | **WZ-1 LOW** | **WZ-1 HIGH** | **WZ-2 LOW** | **WZ-2 HIGH** | **WZ-3 LOW** | **WZ-3 HIGH** |
| 2 | 0.07 | 0.81 | 0 | 0 | 0 | 1 | 0 | 3 |
| 10 | 0.24 | 1.42 | 0 | 0 | 0 | 2 | 1 | 5 |
| 3 | 0.24 | 1.84 | 0 | 0 | 0 | 3 | 1 | 7 |
| 4 | 0.42 | 2.52 | 0 | 0 | 1 | 4 | 2 | 10 |
| 11 | 0.46 | 1.75 | 0 | 0 | 1 | 2 | 2 | 7 |
| 21 | 0.54 | 1.77 | 0 | 0 | 2 | 5 | 4 | 13 |
| 6 | 0.55 | 3.44 | 0 | 0 | 1 | 5 | 2 | 13 |
| 20 | 0.67 | 4.46 | 0 | 0 | 1 | 6 | 3 | 17 |
| 12 | 0.68 | 2.65 | 0 | 0 | 1 | 4 | 3 | 10 |
| 23 | 1.08 | 2.76 | 0 | 1 | 3 | 8 | 8 | 21 |
| 22 | 1.17 | 2.57 | 0 | 1 | 3 | 7 | 9 | 20 |
| 24 | 1.44 | 3.27 | 0 | 1 | 4 | 9 | 11 | 25 |
| 16 | 1.6 | 4.8 | 0 | 0 | 2 | 7 | 6 | 18 |
| 5 | 1.78 | 4.22 | 0 | 0 | 2 | 6 | 7 | 16 |
| 19 | 1.84 | 5.49 | 0 | 1 | 3 | 8 | 7 | 21 |
| 15 | 2.57 | 5.28 | 0 | 1 | 4 | 7 | 10 | 20 |

## REFERENCES


1. Bullin, J. A. *Modeling and Measurement of Vehicle Emissions from Roadways-Vol I.* Research Report 283-3F, Texas Transportation Institute, Texas A&M University System, August 1987.
2. Wark, Kenneth, Warner, Cecil F. *Air Pollution — Its Origin and Control, 2nd Edition.* Purdue University, 1981.
3. National Research Council. *Rethinking the Ozone Problem in Urban and Regional Air Pollution.* 1991.
4. Neece, James D. *Public Presentation of Urban Airshed Modeling Results.* Texas Natural Resource Conservation Commission, Austin, TX. June 30, 1995 FAX.
5. National Academy of Engineering. *Keeping Pace with Science and Engineering - Case Studies in Environmental Regulation: Tropospheric Ozone,* Roth, Phillip M., et al. 1993.
6. Colbeck, I., and A. R. Mackenzie. *Air Quality Monographs-Vol I; Air Pollution by Photochemical Oxidants.* 1994.
7. Ott, Lyman. *An Introduction to Statistical Methods and Data Analysis,* 1977.
8. Agresti, Alan, and Barbara Finlay. *Statistical Methods for the Social Sciences,* 2nd Edition, 1986.
9. May, A. D. *Traffic Flow Fundamentals,* Proposed Textbook, Chapter 8, Demand-Supply Analysis, 4th Draft, July 20, 1987.