ASSESSING CONTROL STRATEGIES FOR GROUND LEVEL OZONE

by

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ABSTRACT

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Developing cost effective control strategies for ozone has been a challenge to air quality modelers. Conventionally, the control strategies are applied across-the board to the region. The main aim of this research was to develop a Decision-Making Framework (DMF) for evaluating and optimizing the selection of ozone control strategies. Conventional across-the-board reductions conduct emission reductions uniformly throughout the region and throughout the day. By contrast, this dissertation studied *targeted* reductions, in which emission sources of various types are reduced at various times and locations.

The proposed DMF comprised of four phases: (1) Initialization, (2) Mining, (3) Metamodeling, and (4) Optimization. This DMF was tested on a DFW 2009 future case episode which was based on a 10-day episode from August 13-22, 1999. 612

emission variables were identified in three source categories viz. point, area (includes non-road) and line (on-road). The emission control regions and time periods along with ozone monitoring regions and time periods were defined. The control strategy emission reductions and costs were also identified in this stage. Initially a Latin hypercube experimental design was setup to organize 30 sets of emission reduction scenarios to be modeled using the photochemical model CAMx. Data mining reduced the number of variables to a maximum of 126. A second Latin hypercube was setup to organize another 30 emission reduction scenarios for the significant variables identified by data mining. Metamodels were developed for ozone from the 60 CAMx runs using linear regression models constructed with the stepwise model selection method. Stepwise regression further reduced the number of variables. The metamodels were implemented in optimization as a surrogate for time-intensive CAMx modeling. Appropriate constraints were calculated for each metamodel to ensure that it satisfied EPA's MAT. The optimization was formulated to find the most cost effective combination of targeted control strategies that brings the region into attainment for the 8-hour ozone. Each day was optimized individually in sequence. In order to demonstrate applicability of the DMF 5 days (August 15, 16, 17, 18 and 19) of the episode were optimized. Although the optimization identified the key sources, time periods, and control strategies, the existing controls on these sources were not adequate to bring the region in attainment. Further reductions at these sources beyond the existing list of TCEQ/NCTCOG control strategies were required. Further modifications in the DMF for DFW were suggested to improve its performance.

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LIST OF ABBREVIATIONS

AQSM	Air Quality Simulation Model
CAA	Clean Air Act
CAMx	Comprehensive Air Quality Model with extensions
CART	Classification and Regression Trees
CB4	Carbon Bond IV
CMAQ	Community Multiscale Air Quality
DFW	Dallas Fort Worth
DMF	Decision Making Framework
DVB	Baseline Design Value
DVF	Estimated Future Design Value
EKMA	Empirical Kinetic Modeling Approach
ELC	Emission Least Cost
EPA	Environment Protection Agency
EPS	Emission Preprocessing System
FDR	False Discovery Rate
IP	Integer Programming
LP	Linear Programming
MARS	Multivariate Adaptive Regression Splines

MAT	Modeled Attainment Test
MIP	Mixed Integer Programming
MLR	Multiple Linear Regression
MNB	Mean Normalized Bias
MNGE	Mean Normalized Gross Error
NAAQS	National Ambient Air Quality Standard
NCT	North Central Texas
NCTCOG	North Central Texas Council of Governments
NO_x	Oxides of Nitrogen
NPV	Net Present Value
RRF	Relative Reduction Factor
SAS	Statistical Analysis Software
SDP	Stochastic Dynamic Programming
SIP	State Implementation Plan
TCEQ	Texas Commission on Environmental Quality
tpd	Tons per day
UAM	Urban Airshed Model
VOC	Volatile Organic Compounds

CHAPTER 1

INTRODUCTION

1.1 Background

Air is one of the most essential ingredients required for the existence of most life forms. In today's modern world, air in many cities in the US and around the world is being polluted by activities such as driving; burning coal, oil and other fossil fuels; and manufacturing chemicals (EPA, 2008**c**). These activities emit particulates and gases like carbon dioxide (CO_2), carbon monoxide (CO), sulfur dioxide ($S0_2$), oxides of nitrogen (NO_x), and volatile organic compounds (VOCs) into the atmosphere. When these gases and particulates accumulate in the air in high enough concentrations, they can be harmful to humans, plants, animals and property on both local and global scales (EPA, 2008**c**). This excess accumulation of gases in the air is known as air pollution.

In order to curb air pollution, in 1990 the Clean Air Act (CAA) required the U.S Environmental Protection Agency (EPA) to set standards in order to protect humans, plants, animals and properties. EPA has identified six "criteria" pollutants for which it has set standards on national level known as National Ambient Air Quality Standards (NAAQS). The six criteria pollutants are ozone (O_3), particulate matter (PM_{10} & $PM_{2.5}$), carbon monoxide (CO), sulfur dioxide (SO_2), nitrogen oxides (NO_x) and lead (Pb) (EPA, 2008**d**). The NAAQS include two types of standards for each criteria pollutant: a primary standard, which is aimed at protecting human health, and the secondary standard, which is aimed at protecting property. It is mandatory for each state to comply with the NAAQS for all the criteria pollutants in order to be in attainment status. Furthermore, the CAA requires states with areas that fail to meet the NAAQS for the criteria pollutants to develop a State Implementation Plan (SIP) for that area (NCTCOG, 2008**c**). The SIP describes how the state will reduce the emissions of the pollutants in a timely manner so as to bring the area in attainment to meet the NAAQS.

Ground-level ozone, also known as "bad" ozone, is one of the major air pollutants in the urban atmosphere. Nitrogen oxides (NO_x) and volatile organic compounds (VOCs) are the precursors for the formation of ozone, which, in short-hand form, is formed by the following reaction:

$$NO_x + VOC \xrightarrow{\text{sunlight}} Ozone \tag{1}$$

Major sources of the precursors in many urban areas include vehicular emissions, industrial emissions, utility emissions, emissions from chemical solvents and gasoline vapors. As sunlight is one of the main catalysts for ozone formation, ozone is also called the "summertime air pollutant" (EPA, 2008**a**). Ozone leads to a variety of health problems, including chest pain, coughing, throat irritation, and congestion. It can worsen bronchitis, emphysema, and asthma. Ground-level ozone also can reduce lung function and inflame the linings of the lungs. Repeated exposure may permanently scar lung tissue. Ground-level ozone also damages vegetation and ecosystems. In the United States alone, ozone is responsible for an estimated $500 million in reduced crop production each year (EPA, 2008**e**). The current ozone standard is 0.08 ppm or 85 ppb for an 8-hour averaging time for both the primary and secondary standard. EPA recently promulgated a more stringent 75 ppb 8-hour standard, which took effect on March 27, 2008

According to EPA's National Air Quality and Trends Report 2006, since 1980, there has been an average 49% decrease in the emissions of six principal pollutants (CO, NO_2, SO_2, VOC, PM_{10} and Pb), with a 33% decrease in the emission of NO_x. The report also found that most of the pollutants showed a smooth decreasing trend except for ozone and $PM_{2.5}$ which showed influence of weather on yearly basis (see Fig. 1.1).

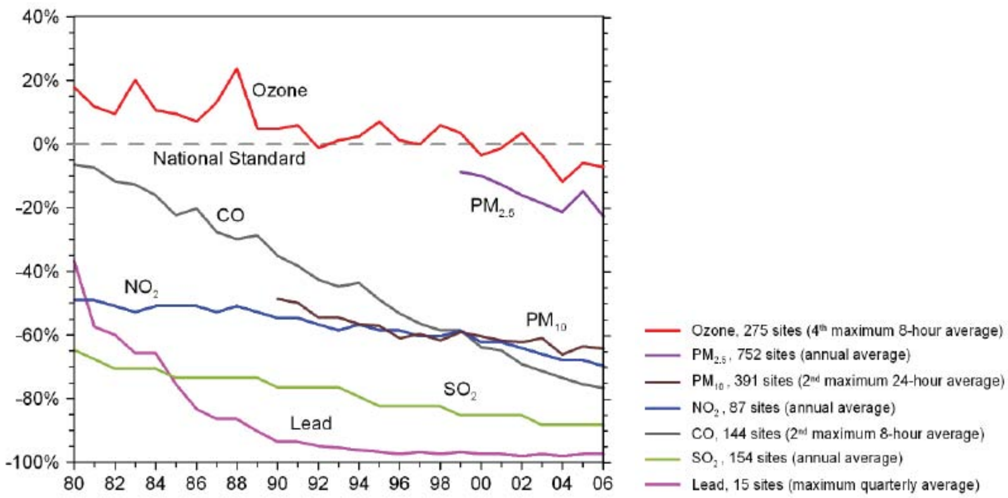

Figure 1.1 National trends of six criteria pollutants for 1980 – 2006 (EPA, 2008).

Ozone and $PM_{2.5}$ were the pollutants mainly responsible for unhealthy conditions in many counties. More than 100 million people live in counties where the ambient air quality standards exceeded for ozone and $PM_{2.5}$ in 2006 (EPA, 2008).

1.2 Need for Study

The U.S. EPA began implementing the 8-hour ozone standard on April 15th, 2004. This standard differed from the earlier 1-hour standard in several ways: first, the averaging time was increased from 1 hour to 8 hours; second, the standard threshold was strengthened from 125 ppb to 85 ppb and third, the method of averaging considers the fourth highest 8-hour daily maximum averaged over a period of 3 consecutive years. This

3-year period is called the *designated design value period,* and the fourth highest 8-hour daily maximum averaged over this period is called the *design value*.

In the North Central Texas (NCT) region during the implementation of the 1-hour standard, four counties (Dallas, Denton, Tarrant and Collin) were considered to be non-attainment for ozone. However, with the 8-hour ozone standards coming into effect, Ellis, Johnson, Kaufman, Parker and Rockwall were also added to this list, making a total of 9 counties in the NCT region that are non-attainment for ozone. Since DFW is designated as "moderate non-attainment," it has a period of 6 years to demonstrate attainment from its designation date, i.e., by June 15, 2010 (NCTCOG, 2008). The SIP measures to demonstrate attainment for the earlier 1-hour standard required sizeable emission reductions, including 88% reduction in NOx emissions from electric utilities and 90% NOx reduction from airport ground equipment (Sattler and Stuckey, 2001).

The Texas Commission on Environmental Quality (TCEQ) and the North Central Texas Council of Governments (NCTCOG) have developed a new SIP for the 8-hour ozone standard to demonstrate attainment by 2010 (NCTCOG, 2008**d**). The Comprehensive Air Quality Model with extensions (CAMx) sensitivity run conducted by TCEQ for future year 2009 inventory (a1) with 396 tons per day (tpd) of NO_x emissions and 333 tpd of VOC emissions indicated a required reduction of 42% (166.3 tpd) in NO_x emissions, or a combined reduction of 40% NO_x (158.4 tpd) and 50% VOC (166.5 tpd), to demonstrate attainment for the 8-hour ozone standard (Breitenbach, 2006). The purpose of this sensitivity run was to provide directional guidelines for focusing on type of control strategy, which indicated that DFW was sensitive to reduction in NO_x emissions. Later, the future year 2009 inventory was revised (a2) to 394 tpd of NO_x

emissions and 340 tpd of VOC emissions. According to the 8-hour DFW SIP, the proposed control measures are expected to reduce NO_x emissions by 49.26 tpd (TCEQ, 2007). The reductions calculated are for a conventional across-the-board strategy; however, it is well known that the effectiveness of a strategy depends on when and where reductions take place, i.e., time and location are critical.

1.3 Research Objective

The main aim of the research is to develop a Decision-Making Framework (DMF) for evaluating and optimizing the selection of ozone control strategies. Conventional across-the-board reductions apply emission reduction uniformly throughout the region and throughout the day. By contrast, this dissertation studies *targeted* reductions, in which emission sources of various types are reduced at various times and locations. The DMF will use methods from statistics, data mining, and optimization to comprehensively explore a database of potential control strategies, in order to identify a time-dynamic, source-focused, and cost-effective combination of control strategies for reducing ozone.

1.4 Research Scope

The latest baseline case, a 10-day August 1999 episode, for conducting CAMx runs was obtained from TCEQ. This research required photochemical modeling using CAMx for obtaining ozone concentrations in the nine (Collin, Dallas, Denton, Ellis, Johnson, Kaufman, Rockwall, Parker, & Tarrant) non-attainment counties. According to EPA's guidance on the use of models to ensure attainment, emission reductions must be implemented by the beginning of a complete ozone season preceding the attainment date of June 15, 2010. Therefore, emission reductions need to be implemented by the beginning of the 2009 ozone season. Attainment for 2010 was based on the air quality data collected over the 3-year design value period of 2007– 2009. The emissions from nine non-attainment counties only were controlled in order to simulate, test, and optimize control strategies or measures to bring DFW in attainment for 8-hour ozone standard. The list of control strategies, along with the emission reduction and cost for each control strategy was obtained from TCEQ and NCTCOG. SIP approved control measures along with supplemental targeted reductions as needed were tested in order to attain the future design value. EPA's guidance on the use of models was followed in order to maintain consistency with TCEQ's 8-hour ozone SIP modeling results.

1.5 Research Organization

This research report is organized in five chapters. Chapter 2 presents the literature review on ozone chemistry, EPA's modeling protocol, models used in this research, DMF, optimization and previous similar studies conducted. The methodology adopted for this research is described in detail in Chapter 3. The results obtained are presented in Chapter 4 followed by discussion of the results. Finally, Chapter 5 presents the conclusions and recommendations.

CHAPTER 2

LITERATURE REVIEW

2.1 Background on ground level ozone

Ground-level ozone, also known as “bad” ozone, is one of the major air pollutants in the urban atmosphere. It is a secondary pollutant, i.e. it is not directly emitted in the atmosphere but is formed due to reaction of two primary pollutants, or precursors, which are directly emitted into the atmosphere. Nitrogen oxides (NO_x) and volatile organic compounds (VOCs) are the precursors for the formation of ozone, which, in short-hand form, is formed by the following reaction:

$$NO_x + VOC \xrightarrow{\text{sunlight}} Ozone \qquad (1)$$

As sunlight is one of the main catalysts for the ozone formation, it is also called the “summertime air pollutant” (EPA, 2008a). The formation of ozone is due to hundreds of complex reactions; therefore, simple dispersion models do not contain enough information to predict ozone concentrations, since simple dispersion models do not take into account the interactions between the pollutants. It is well known that the troposphere is an oxidative medium, i.e. it has a tendency to move a species to a more oxidized state (Seinfeld and Pandis, 1998). Ozone is naturally formed by reaction between atomic oxygen and an oxygen molecule, as shown below.

$$O_2 + O \longrightarrow O_3 \qquad (2)$$

It is worth noting here that atomic oxygen can only be formed by sunlight of wavelength less than 290 nm; however, this wavelength is not present in troposphere. Therefore, there has to be another source for the atomic oxygen, which is nitrogen dioxide (NO_2). Though NO_2 is present in low concentrations on the order of ppm or less, it still plays an important role in formation of ozone. The formation of ozone is as follows: first, ozone is formed due to photolysis of NO_2 at wavelength less than 424 nm.

$$\mathrm{NO_2} + h\vartheta \longrightarrow \mathrm{NO} + \mathrm{O} \tag{3}$$

$$\mathrm{O} + \mathrm{O_2} + M \longrightarrow \mathrm{O_3} + M \tag{4}$$

There are no significant sources of ozone in the troposphere other than reaction 4, where *M* is a third molecule that absorbs the excess energy and stabilizes the O_3 molecule, generally N_2 or O_2 (Seinfeld and Pandis, 1998). The ozone formed from reaction 4 reacts with NO to regenerate NO_2 and the cycle continues.

$$\mathrm{O_3} + \mathrm{NO} \longrightarrow \mathrm{NO_2} + \mathrm{O_2} \tag{5}$$

The reactions 4 and 5 occur relatively faster than reaction 3. Therefore, reaction 3 acts a rate-limiting reaction for the nitrogen cycle (FRAQMD, 2008). In general, the steady-state O_3 concentration is proportional to the ratio of NO_2 concentration over NO concentration, which implies that ozone formation is governed by the concentration of NO_2 in the atmosphere. This relation is also known as *photostationary steady state* relation, given by equation 6.

$$[\mathrm{O_3}] = \frac{k_3}{k_5} \times \frac{[\mathrm{NO_2}]}{[\mathrm{NO}]} \tag{6}$$

where, k_3 and k_5 are reaction rate constant for reactions 3 and 5.

90 – 95% of NO_x is emitted from combustion sources as NO. To produce high levels of ozone, according to the *photostationary steady state* equation, another pathway is required which will convert NO to NO_2.

The additional pathway is provided by the reactions between hydroxyl radical (OH°) and VOCs (designated generically as RH). This reaction leads to formation of alkyl-peroxy radicals (RO_2°).

$$RH + OH^0 \longrightarrow R^0 + H_2O \qquad (7)$$

$$R^0 + O_2 + M \xrightarrow{fast} RO_2{}^0 + M \qquad (8)$$

The peroxy radicals formed in reaction 8 convert NO to NO_2 through reactions like those shown in (9) and (10).

$$RO_2{}^0 + NO \xrightarrow{fast} RO^0 + NO_2 \qquad (9)$$

$$RC(O)O_2{}^0 + NO \xrightarrow{fast} RC(O)O^0 + NO_2 \qquad (10)$$

The alkoxy radicals like methoxy (CH_3O°) generally react with oxygen to form hydro-peroxy radicals HO_2°(reaction 11).

$$CH_3O^0 + O_2 \longrightarrow HCHO + HO_2{}^0 \qquad (11)$$

The hydro-peroxy radicals react with NO to regenerate OH radicals. This marks the completion of the cycle.

$$HO_2{}^0 + NO \longrightarrow NO_2 + OH^0 \qquad (12)$$

Also, photolysis of other VOCs like formaldehyde and acetaldehyde form HO_2 radicals and eventually react with NO to form more NO_2 and OH radical.

The reactions 7 through 12 are propagation reactions which start with oxidation of hydrocarbons (RH), convert NO to NO_2 and finally regenerate OH radicals. Aldehydes, formed as intermediate products, undergo photolysis and form more HO_2 radicals; this actually initiates a build-up of NO_2 and OH radicals since their production is greater than consumption, leading to more ozone. There are also termination reactions for this process, which are as follows:

$$OH^{0} + NO_2 + M \longrightarrow HNO_3 + M \quad (13)$$

$$HO_2^{\ 0} + HO_2^{\ 0} \longrightarrow H_2O_2 + O_2 \quad (14)$$

$$RO_2^{\ 0} + HO_2^{\ 0} \longrightarrow ROOH + O_2 \quad (15)$$

$$RO_2^{\ 0} + NO + M \longrightarrow RONO_2 + M \quad (16)$$

Reaction 13 is known to be a key termination reaction for ozone formation, except for when concentrations of NO_2 are low. Next is reaction 16, which leads to formation of alkyl nitrate; this termination reaction removes both peroxy radical and NO molecule. Reactions 14 and 15 are significant only when the NO_x levels are low; therefore, they do not play a key role in urban areas, but are more representative for rural regions (Seinfeld and Pandis, 1998).

2.2 Background on ozone non-attainment in Dallas-Fort Worth

According to the Clean Air Act (CAA), 1990, EPA designated four counties (Collin, Dallas, Denton and Tarrant) in DFW as a “moderate” non-attainment area for the 1-hour ozone standard of 125 ppb. DFW was required to demonstrate attainment by November 15, 1996. A SIP was submitted with controls mainly focusing on VOCs. DFW failed to come into compliance with the 1-hour ozone standard with those controls

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Note: Reactions (2) to (16) are taken from Seinfeld, J.H., S. N. Pandis, “Atmospheric Chemistry and Physics: From Air Pollution to Climate Change”, John Wiley & Sons, Inc. 1998

(TCEQ, 2008a). Therefore, DFW was reclassified as “serious” non-attainment and was required to demonstrate attainment by November 15, 1999. The new 1-hour ozone SIP this time focused on reduction of local NO_x sources and also identified the importance of transport of ozone and its precursors from Houston-Galveston-Brazoria (HGB). Despite sizeable emission reductions, including 88% reduction in NO_x emissions from electric utilities and 90% NO_x reduction from airport ground equipment (Sattler and Stuckey, 2001), DFW failed to demonstrate attainment by the November 15, 1999 deadline.

By 2006, the control strategies in the 1-hour SIP had improved the air quality in the DFW area, with an 11.4 % decrease in the design value (TCEQ, 2007), and also the number of days of exceedances of the 1-hour ozone standard decreased to 3, the maximum number of allowable exceedances per monitor in 3 consecutive years. In 2006, the 1-hour design value for the DFW area was 124 ppb, which meant that DFW had come into attainment with the 1-hour standard (TCEQ, 2007). Figure 2.1 shows the historic trend of 1-hour ozone exceedance days.

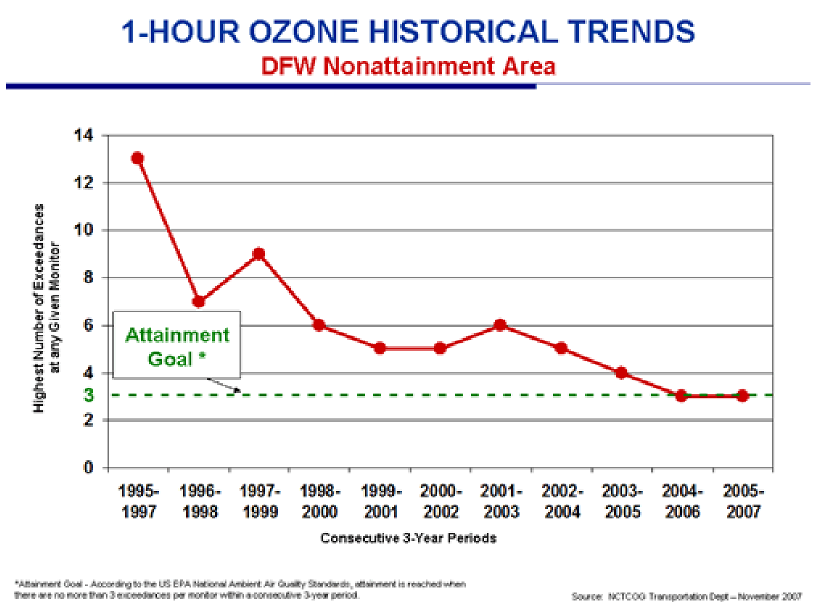
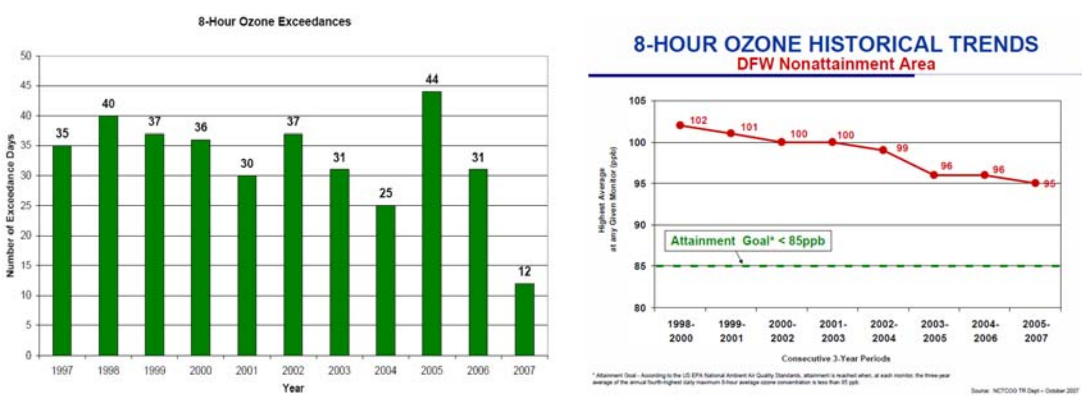


Figure 2.1 Historic trends of 1-hour ozone exceedance days (NCTCOG, 2008a)

On April 15, 2004, EPA began implementing the new 8-hour ozone standard of 85 ppb. This new standard brought an additional five North Central Texas (NCT) counties (Ellis, Johnson, Kaufman, Parker and Rockwall) into non-attainment, making a total of nine counties non-attainment for the 8-hour ozone standard. The control measures that were in place for the earlier 1-hour ozone SIP had helped decrease the number of 8-hour ozone exceedance days from 40 days in 1998 to 12 days in 2007, along with decreasing the design value for the 8-hour ozone standard. The design value had decreased from 102 ppb in 1999 to 95 ppb in 2006 (see Figure 2.2(b)). Another encouraging aspect was despite rapid population growth and economic development and increased vehicles miles travelled, the ozone precursor emissions showed a downward trend (TCEQ, 2007). According to TCEQ, the NO_x baseline emissions in the 9 non-attainment counties decreased from 746 tpd in 1999 to 394 tpd (projected) for 2009 (see Figure 2.3(a & b)). Similarly, the VOC baseline emissions decreased from 442 tpd for 1999 to 340 tpd (projected) for 2009 (see Figure 2.3(c & d)).



(a) (b)

Figure 2.2 (a) 8-hour ozone exceedance days from 1997 – 2007 and (b) highest monitor design value from 1997 - 2007 (NCTCOG, 2008b).

TCEQ had conducted a CAMx sensitivity analysis using the 2009 future case inventory and found that ozone reductions were more sensitive to NO_x reductions as opposed to VOC reductions, which means that it was more effective to reduce NO_x to reduce ozone than VOC.

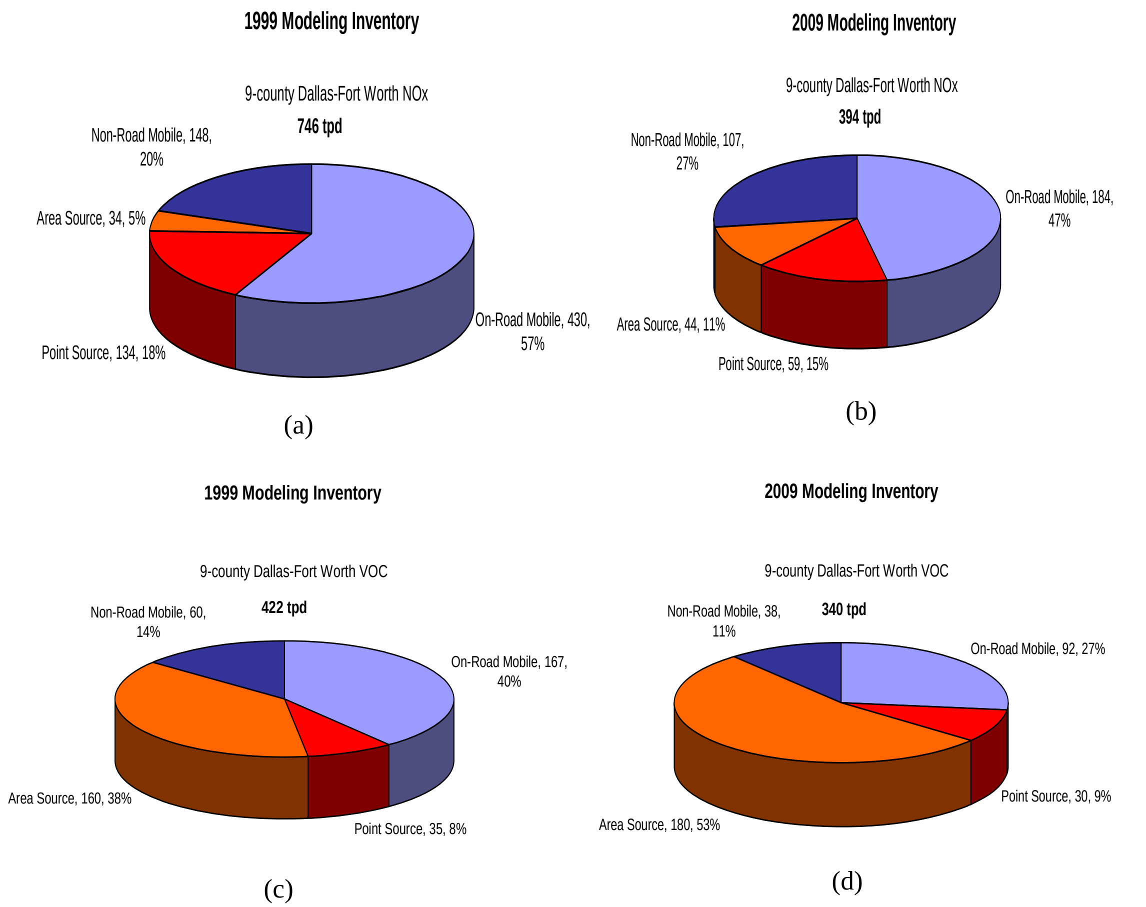


Figure 2.3 (a) NO_x baseline emissions in the 9-DFW non-attainment counties for 1999, (b) NO_x baseline emissions in the 9-DFW non-attainment counties for 2009, (c) VOC baseline emissions in the 9-DFW non-attainment counties for 1999, (d) VOC baseline emissions in the 9-DFW non-attainment counties for 2009 (TCEQ, 2007).

A 10 ppb reduction in design value was required by 2009 for DFW to come into attainment with the 8-hour standard. However, DFW has a unique NO_x distribution; point and area sources contribute 103 tpd, which is about 26 percent of total NO_x emissions from 2009 emission inventory. The remaining 74% is from the on-road mobile and non-road mobile sources, which are controlled largely through federal standards. Therefore, it is very difficult for DFW to demonstrate compliance without prompt implementation of federal programs over which TCEQ has no control (TCEQ, 2007).

2.3 EPA's Modeling Protocol

EPA recommends a "Modeled Attainment Test" (MAT) to demonstrate attainment by simulating current and future air quality by using air quality models (EPA, 2005). This test uses baseline and future design values for ozone. A *design value* based on the 8-hour ozone standard is calculated by taking the fourth highest 8-hour daily maximum in each year of the 3-year design value period, and then averaging over the 3 years. For the Modeled Attainment Test, the *baseline observed design value* (DVB) for a specific monitor is calculated as the average of that monitor's design values for the 3 design value periods that include the baseline year. For DFW, the baseline year is 1999, so the 3 design value periods are 1997–1999, 1998–2000, and 1999–2001, and the average of the design values from each these periods provides the baseline observed design value for each monitor. The *estimated future design value* (DVF) for a specific monitor is calculated via a *relative reduction factor* (RRF) for that monitor:

$$\text{RRF} = \frac{\text{mean (highest modeled 8 - hour daily maximum conc. for each episode day)}_{\text{future}}}{\text{mean (highest modeled 8 - hour daily maximum conc. for each episode day)}_{\text{baseline}}}, \quad (17)$$

where the means of the highest modeled 8-hour daily maximum are taken over all the days in the baseline episode duration, excluding ramp-up days. Then the future design value at a monitor is estimated by multiplying the relative reduction factor and the baseline observed design value:

$$\text{DVF} = \text{RRF} \times \text{DVB} \quad (18)$$

To demonstrate attainment, the future design values throughout the non-attainment region must be $\leq$ 84 ppb. The Modeled Attainment Test is a relative test because the relative reduction factor takes into consideration the ratio of the *modeled* future to baseline ozone concentration at the monitors, and then uses the baseline *observed* design value to obtain the estimated future design value.

Further, EPA has recommended guidelines for obtaining the 8-hour daily maximum ozone concentrations that emphasize the need to consider the "nearby" region around a monitor to obtain its 8-hour daily maximum. The number of grid cells to be considered depends on the minimum size of an individual grid cell. In this research, the minimum grid size of the grid is 4 km; thus, according to the EPA guidelines, the array of nearby grid cells must be 7×7 (EPA, 2005).

Table 2.1 shows the future design value (DVF) calculations without SIP controls, along with the average relative reduction factors (for detailed calculations refer Appendix A). DVF is calculated using Eq. 18.

Table 2.1. Baseline observed design values (DVB), future design value (DVF) without SIP controls, and average RRF (TCEQ, 2007).

Critical Monitoring Station	**DVB 1999**	**Average RRF**	**DVF without SIP Controls 2009**
Frisco C31	100.3	0.890	89.3
Hinton C60	92.0	0.936	86.1
Dallas N C63	93.0	0.917	85.3
Redbird C402	87.3	0.905	79.7
Denton C56	101.5	0.878	89.1
Midlothian C94	92.5	0.918	84.9
Arlington C57	95.0	0.909	82.2
FtW NW C13	98.3	0.884	86.9
FtW Keller C17	96.3	0.887	85.4
Johnson	87.6*	0.892	78.2
Parker	88.3*	0.871	76.9
Kaufman	75.6*	0.898	67.9
Rockwall	80.3*	0.898	72.1

* 2006 design value

2.4 Photochemical modeling process for ozone

Photochemical models are considered to be an important tool for demonstrating attainment in a region by evaluating effectiveness of control (EPA 2008**f**). There are two types of photochemical models: Lagrangian and Eulerian models. Lagrangian models employ a moving frame of reference, and Eulerian grid models employ a fixed frame of reference. Photochemical models are generally multiscale models which can be used on local, regional and national scales (EPA, 2008**f**). Photochemical models are mainly driven by 3 components: meteorological models, emissions data and chemical models. The meteorological models are used to simulate the wind blowing in the region carrying the pollutants. The emission model prepares the emissions data, includeing emission rates for different NO_x/VOC sources such as, automobiles, locomotives, and industries. The chemical model is used to simulate the chemistry or chain of reactions that form ozone. These models are called photochemical because they can simulate the reaction of pollutants with sunlight (TCEQ, 2008**b**).

Typically, a photochemical model simulates air quality over a region by dividing it into thousands of individual grid cells. The size of grid can vary from as large as 36 km × 36 km to as small as 1 km × 1 km depending on factors like requirement of prediction accuracy and availability of computational facilities. The vertical height of the grid cells also vary, typically thinner cells are near ground level while thicker cells at higher levels. The model simulates emissions of pollutants, chemical interaction between pollutants and meteorology at each grid cell and predicts the pollutant concentrations by simulating the physical processes like advection, dispersion and vertical diffusion among the grid cells (TCEQ, 2008**b**).

2.4.1 Phases of ozone modeling

The two main phases of ozone modeling are base case and future case modeling. The base case modeling evaluates the procedures and ensures the performance of model. The future case evaluates the effectiveness of control measures (TCEQ, 2007).

2.4.1.1 Base case modeling

The first step of base case modeling involves analyzing historical ozone episodes to determine factors contributing to ozone formation in the area. This is followed by a conceptual model to identify the contributing factors. A representative episode is selected to model and sent to EPA for approval, along with the modeling plan to evaluate ozone. Next emissions and meteorological data are developed and checked for quality assurance. The meteorological and emissions data is input into the model to obtain ozone concentrations.

The base case modeled ozone concentrations are then compared with real ozone measurements for validation. EPA recommends 3 statistical tests to evaluate the modeled output, mean normalized bias (MNB), mean normalized gross error (MNGE), and average peak prediction bias and error (APPBE). MNB averages the residual of model/observation, normalized by observation, paired in time for all monitoring regions and time. MNGE is absolute residual of model/observation, normalized by observation, paired in time for all monitoring regions and time. Finally, APPBE accesses model’s ability to predict peak values. APPBE calculates the same bias and error except uses the maximum model/observation (EPA, 2005). The model is used for future case modeling if the performance of the base case model is satisfactory (TCEQ, 2007).

2.4.1.2 Future case modeling

The main purpose of future case modeling is to find the amount of ozone formed in the future. The future case emission inventory is developed considering factors like economic growth, along with the reductions due to federal and state standards that will be in effect in the future. First, the future case emission inventory (with only existing control strategies) is run and ozone concentrations are determined for the future. If the ozone concentrations obtained are less than 0.08 ppm, then the existing controls are effective. However, if the 0.08 ppm standard is not satisfied, then additional controls will be required to bring the ozone within the standard. Next, additional controls or combinations of controls for future case inventory are tested to help bring the area in compliance to the standard (TCEQ, 2007).

2.5 Emission inventory for photochemical modeling

Emission inventory is an important part of photochemical modeling process. There four types of emission inventories that go in the photochemical modeling process:

i. base case inventory,

ii. baseline inventory,

iii. future-year inventory, and

iv. future-year control strategy inventory (TCEQ, 2007)

2.5.1 Base case inventory

The main purpose is to validate the meteorology data and emission development procedures. The base case inventory along with the meteorology data is run in the photochemical model. The results obtained are tested with various EPA recommended statistical tests in EPA's MAT described in Section 2.4.1.1. If the model performance is found to be acceptable, then the emission development procedure is accepted, and for the next three stages the meteorology data is held constant.

2.5.2 Baseline inventory

A generic baseline inventory is developed using the same procedures that will be used for developing the future-year inventory. This is done since the base case inventory is based on hourly emissions data and day-specific data, and to maintain comparability between the base case and future-year results based on RRF as per EPA's MAT requirement to predict future-year ozone. Photochemical modeling results obtained using the baseline case inventory is known as baseline case modeling. In this research, the 1999 baseline emission inventory is used to obtain 1999 baseline concentrations used to calculate RRF.

2.5.3 Future-year inventory

A future-year inventory is developed by estimating the future economic growth in the area. The inventory will also consider the federal controls that will be in effect in the future for the baseline inventory. It also considers any state measures already adopted that will take effect between the baseline and future years. The same procedures are adopted for the baseline as well as the future-year inventory in order to maintain comparability between the baseline and future-year inventories. This research uses the 2009 future-year baseline inventory developed by TCEQ for conducting CAMx runs.

2.5.4 Future-year control strategy inventory

This inventory is developed with additional controls over the controls already present in the future-year inventory to bring the region into compliance with the ozone standard. The effectiveness of these controls is tested by running the future-year control strategy inventory in a photochemical model to see if the area comes into attainment with the ozone standard. TCEQ has developed a future-year control strategy emission inventory as a part of the SIP demonstration. This inventory does not bring DFW in attainment; additional corroborative analysis known as weight of evidence (WoE) was used to demonstrate attainment for the DFW region.

2.6 Model description

2.6.1 Photochemical model

Photochemical modeling for this research was carried out using CAMx. It is an Eulerian photochemical grid model which can simulate gaseous and particulate air pollution integrated together. Eulerian grid models employ a fixed frame of reference. The input variables like emissions and meteorology are defined at each grid. The continuity equation (shown below) is used in CAMx to describe the pollutant concentration with respect to time within each grid cell volume as a sum of various physical and chemical processes operating on that grid cell. Therefore, CAMx basically simulates emissions, dispersion, chemical reactions, and removal of pollutants (Environ, 2006).

$$\frac{\partial c_l}{\partial t} = -\nabla_H \cdot V_H c_l + \left[\frac{\partial (c_l \eta)}{\partial z} - c_l \frac{\partial}{\partial z}\left(\frac{\partial h}{\partial t}\right)\right] + \nabla \cdot \rho K \nabla (c_l / \rho)$$

$$+ \left.\frac{\partial c_l}{\partial t}\right|_{Chemistry} + \left.\frac{\partial c_l}{\partial t}\right|_{Emission} + \left.\frac{\partial c_l}{\partial t}\right|_{Removal}$$

Where

C_l is average species concentration

V_H is the horizontal wind vector,

η is the net vertical "entrainment rate",

h is the layer interface height,

ρ is atmospheric density,

K is the turbulent exchange (or diffusion) coefficient.

Earlier a different CAMx configuration was used for DFW modeling (see Table 2.2); it was updated to a new configuration which was used for DFW 8-hour SIP modeling and in this research. First, the modeling domain for DFW was expanded towards the north into North Dakota and part of Canada and east into Atlantic Ocean (see Figure 2.4). This was done to reduce the influence of boundary conditions in DFW. Second, the vertical layers for the modeling domain werre increased from 4 km to about 15 km (TCEQ, 2007). The increase in the vertical layers increases the accuracy but also increases the computing time to run the model. The vertical layers are thinner at the surface to properly simulate pollutant concentrations and vertical gradient, and thicker at higher altitudes. Third, unlike the earlier version of CAMx, this version has a plume model. This model can represent the dispersion and chemistry of NO_x from major point sources at sub-grid scale. This model was used by TCEQ for point sources emitting NO_x greater than 2 tpd in DFW region. Fourth, the chemistry mechanism used was Carbon Bond IV Extended (CB4xi), which added 17 inorganic chemistry reactions which consider NO_x recycling (TCEQ, 2007). Finally, meteorology was predicted using Eta/Noah planetary boundary layer (PBL), which replaced the Pleim-Xiu Land Surface Model (LSM)/PBL scheme. Low bias with Eta/Noah PBL scheme was observed as it better predicted the vertical wind speed, temperature, and humidity. The old and new model configurations are summarized below in Table 2.2.

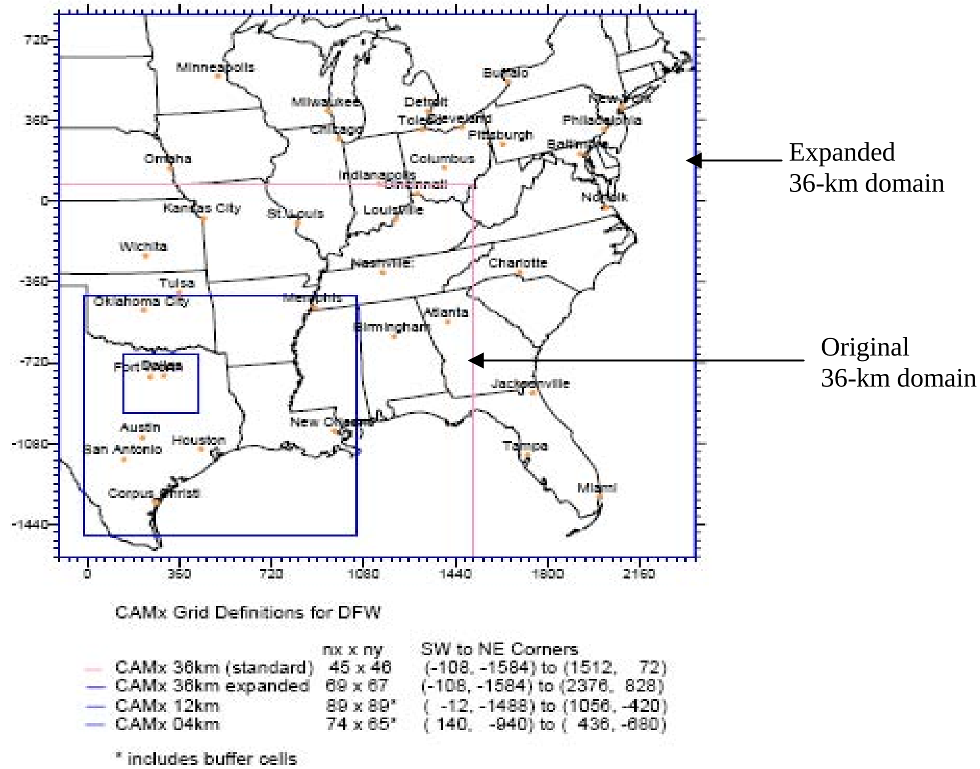


Figure 2.4 DFW modeling domain, original and expanded (TCEQ, 2007).

Table 2.2 Model configuration (TCEQ, 2007).

Model Input	**Old Configuration**	**New Configuration**
CAMx version	4.03	4.31
Domain	Original domain	Expanded domain
Vertical layer	4 km	15 km
Plume-in-Grid (PiG)	Not available	Full VOC/NO_x chemistry
Chemistry	CB4xi with NOx recycling	CB4xi with NO_x recycling
Meteorology	MM5	Updated MM5 using Noah/ETA PBL

2.6.2 Emission preprocessing system (EPS)

Photochemical models simulate hourly pollutant concentrations for every grid cell in the modeling domain. Therefore, the model expects the emissions data in a comparable resolution for processing. EPS provides features that can process the emissions data to meet these requirements. EPS does intensive data manipulations to incorporate spatial, temporal, and chemical resolution into an emission inventory used for photochemical modeling (EPA, 2008b). This research uses EPS version 3 (EPS3) for preparing "model-ready" emission files. EPS3, developed by ENVIRON Corporation, performs 4 main preprocessing tasks to make the emissions file "model-ready":

- chemical speciation, in which the criteria pollutants are speciated to model mechanism compounds,
- grow and control emissions, in which the base year emissions are grown to the future year and controls that may be applicable for the future year are applied,
- temporal allocation, in which the annual emission rates are converted to hourly emission rates, and
- gridding, in which emissions are allocated to grid cells in the modeling domain. (Environ, 2007)

2.7 Decision Making Framework

A decision making framework (DMF) is a framework used for evaluating and optimizing the selection of *targeted* control strategies. The DMF uses methods from statistics, data mining, and optimization to comprehensively explore a database of potential control strategies, so as to identify a time-dynamic, source-focused, and cost-effective combination of control strategies for reducing ozone. A DMF computer program runs through thousands of combinations of *targeted* control strategies and chooses the most cost-effective combination that will bring the region into attainment with the 8-hour ozone standards. The DMF gives us much more flexibility in testing "what if" scenarios and helps in gathering valuable information, like whether or not the various emission sources are critical and what type of control strategy would be most effective. The optimal combination of *targeted* control strategies could easily be overlooked by a “trial and error” approach that only considers conventional across-the-board control strategies. The DMF also helps the policy maker in better understanding the available options for control strategies.

The DMF is comprised of four phases: (1) Initialization, (2) Mining, (3) Metamodeling, and (4) Optimization. These phases are described in detail in the Methodology chapter. Figure 2.5 shows a flow diagram of the various phases of the decision-making framework.

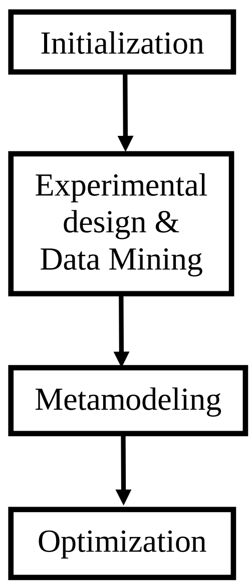


Figure 2.5 Flow diagram of Decision-Making Framework.

The initialization phase mainly focused on identifying the critical monitors and potential control strategies. The potential control strategies were further categorized according to emission types, time of emission and location. In the next phase, an experimental design was used to setup various modifications of NO_x and VOC emissions to provide a set of scenarios to be run in CAMx, and the results from CAMx were analyzed using data mining. The DMF utilized data mining (Benjamini and Hochberg, 1995 and Tsui et al., 2005), experimental design, and metamodeling methods from computer experiments (Chen et al., 2003, Chen et al., 2006, and Mason et al., 2003) to minimize the number of CAMx runs required to construct accurate metamodels. The purpose of data mining task was to reduce the number of predictor variables in the statistical metamodels. The total number of variables for a single day was 640. This was comparable to the previously-studied Atlanta case (Yang et al., 2009), which utilized data mining to reduce to 25 or fewer significant predictor variables for each time period. Since the metamodels are quick to evaluate, they provide a computationally efficient surrogate for CAMx in the optimization. In the last phase of the DMF, an integer program was set up to optimize selected control strategies that are *targeted* by time and location.

2.7.1 Application of Decision Making Framework

One important goal of the DMF is to efficiently organize the CAMx runs, which are very time consuming. The CAMx model requires a very high computational time for each run: to simulate 1 day takes about 1 – 1 ½ hours. The complete August 2009 episode takes about 10 – 12 hours, making it impractical to conduct CAMx runs for evaluating the potential control strategies alone or in various combinations.

Therefore, the DMF would help DFW in achieving attainment in the following ways:

- Identifying the effectiveness of *targeted* control strategies that are focused in certain regions and time periods. This means that lower emission reductions will likely be required, because reductions will only occur when and where they are needed.

- Providing an efficient, yet comprehensive, approach for identifying the most cost-effective combination of *targeted* control strategies that achieves attainment.
- Providing a solution that is more cost-effective than the across-the-board approach and more likely to be publicly acceptable because of its targeted nature.

2.7.2 Experimental design and Data Mining

2.7.2.1 Latin Hypercube Experimental Design

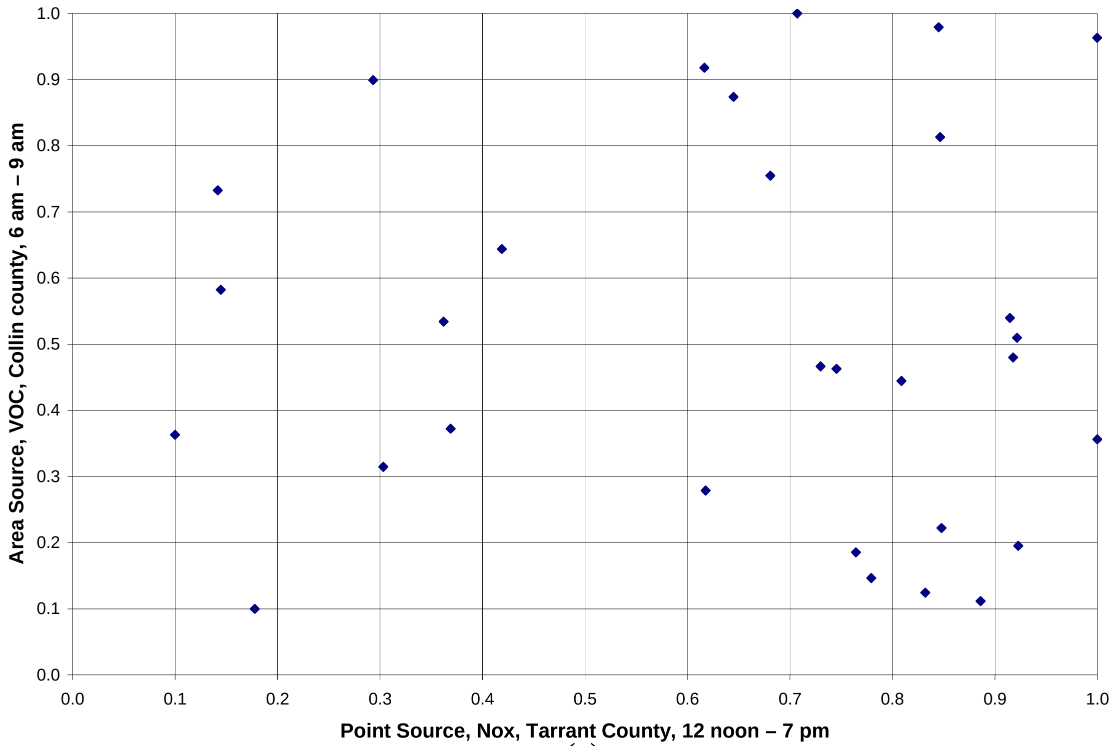
Experimental design is a process of planning experiments in a systematic manner to obtain useful data for further analysis. A good experimental design should identify a set of points that is spread across that design space. An obvious method is to simply randomly select a set of points; however, although randomness can result in a well-spread set of points, it is a matter of chance. The Latin hypercube experimental design method, which borrows concepts from the classical $q \times q$ Latin square, achieves balance in two dimensions such that each of q values occurs once in each row and column, resulting a set of $n = q^2$ points. A Latin hypercube with n points must have n distinct values in each dimension (Tsui et al., 2005). This does not satisfy Latin square properties, but does provide guidance to spread the points in the space. Considering the 612 emission variables for the NCT region which constitute 612 variables in a 612-dimensional space bounded by the control range of [0.1, 1], a potential scenario is any point in that bounded 612-dimensional space. Both designs, random and Latin hypercube, are generated using $n = 30$ points in a 612-dimensional space and then the points are projected onto a randomly selected pair of dimensions for illustration. For the Latin hypercube, the 30 points yield 30 distinct values with a better spread across each dimension. By contrast, the randomly generated design shows clusters of points toward the right with empty spaces toward the left and center.

For illustration purposes, consider the horizontal axis as point source NO_x emissions from Tarrant County between 12 noon – 7 pm, and the vertical axis as the reduction in VOC emissions for area sources in Collin County between 6 am – 9 am. For example, consider a point in Figure 2.6(b) which represents a scenario with coordinates [0.25, 0.60]. This scenario reduces NO_x emissions from point sources in Tarrant County between 12 noon – 7 pm to 0.25 times of the original emissions (i.e., reduces NO_x emissions by 75%) and reduces VOC emissions from area sources in Collin County between 6 am – 9 am to 0.60 times of the original emissions (i.e., reduce VOC emissions by 40%).

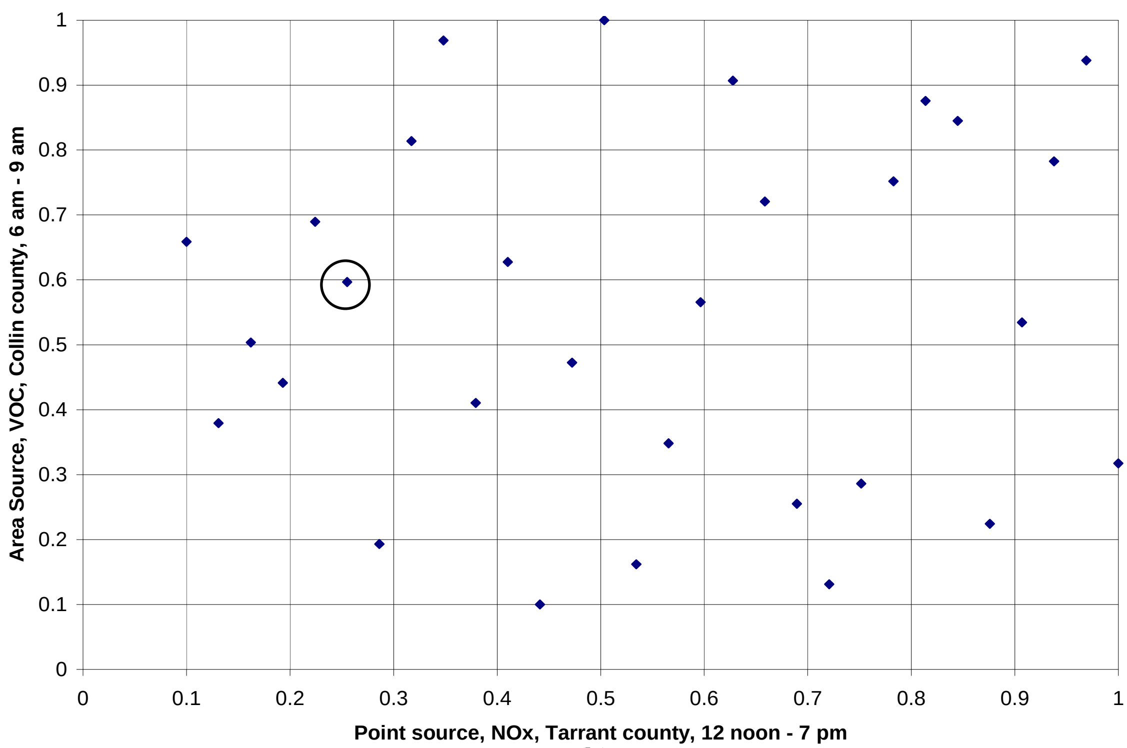
2.7.2.2 Data Mining

Data mining is a technique used to explore, extract, and identify useful information and trends from datasets. Data mining is based on methods from statistics and modeling, using general approaches and techniques to explore data. Data mining, unlike statistical methods does not identify the relationship between the variables. Instead, it tries to find significant variables or patterns which can be used for better prediction using statistical methods (StatSoft, Inc., 2007). Three methods were used for data mining in this research, namely:

- Classification and Regression Tree (CART),
- Multivariate Adaptive Regression Splines (MARS), and
- False Discovery Rate (FDR).



(a)



(b)

Figure 2.6 2-D projection of (a) randomly generated experimental design, and (b) Latin hypercube experimental design.

Classification and Regression Tree (CART)

A decision tree provides information about sets of decisions in a tree shaped pattern. The dataset is branched following the rules based on the sets of decisions. There are two types of decision trees, (1) classification decision trees and (2) regression decision trees. Classification decision trees are trees in which the predicted values are categorical variable (e.g., 1 or 0, male or female), while regression decision trees have predicted variables as continuous values. CART utilizes recursive partitioning evolved from the work of Morgan & Sonquis (1963) and Fielding (1997) to select a model. CART uses a forward stepwise procedure for adding basis functions and a backward procedure for pruning (Breiman et al. 1984, Chen et al., 2003).

Multivariate Adaptive Regression Splines (MARS)

MARS was developed by Friedman (1991) for multiple regression type problems, i.e., more than one predictor variable. The primary difference between multiple linear regression and MARS is that MARS does not make any assumptions about the relationship between predictor and response variables. MARS breaks down the data space into smaller regions having independent regression equations. Therefore, MARS is able to approximate the relationship between the variables where parametric models fail. This feature of MARS makes it one of the important tools for data mining (StatSoft, Inc., 2007). MARS is used for modeling data with high dimensions. Like CART, MARS uses forward and backward stepwise algorithms, except with truncated linear basis functions that enable a continuous approximation (Chen, V. C. P., et al., 2003). The final MARS model from is a linear combination of the basis functions, and the method is considered nonparametric because the basis functions are selected based the data (Friedman and Roosen, 1995).

Multiple Testing Procedure Based on False Discovery Rate (FDR)

Multiple testing procedures in statistics form the basis for determining the statistical significance of individual variables in variable selection via a family of hypothesis tests. There are several multiple testing methods (Kutner et al. 2005), most of which are based on controlling the family-wise error rate (typically denoted by α). However, one of the newer procedures is based on false discovery rate (Benjamini and Hochberg 1995). The false discovery rate is defined as the expected proportion of false positives (falsely rejected hypotheses) among all the hypotheses rejected. Studies have revealed that false discovery rate based procedures find as many significant hypotheses as possible while keeping a relatively small number of false positives (for example, Kim et al. 2006).

2.7.3 Optimization

Optimization is a process of finding an effective solution to a problem, subject to constraints. The effectiveness depends on the problems; most common optimization problems involve maximizing the profits or minimizing losses. There are two types of optimization, linear and non-linear. Linear optimization involves optimizing a linear objective function having equality or inequality constraints, while non-linear optimization involves optimizing an objective function which may be non-linear, having equality or inequality constraints.

Linear programming (LP) is extensively used in the fields of business and economics. Currently, linear programming is also used in engineering; some industries that use linear programming are transportation, energy, telecommunications and manufacturing (Wikipedia, 2008). A special case of linear programming is integer programming (IP), in which all the variables are discrete in nature (e.g., categorical). If the decision variables are a mix of discrete and continuous variables, then it is known as a mixed integer programming (MIP) problem. Many real life IP or MIP problems require very high computation. The most commonly used algorithm for solving an IP is branch and bound (B & B). B & B tries to solve a problem using the two step method of relaxation and separation. In the first step, the algorithm treats the problem as a regular LP problem. If the solution for the variables is as expected, i.e., discrete in the case of IP or a mix in the case of MIP, the algorithm stops the search for further solutions. However, if even a single constraint is not satisfied, then it goes to the next step of separation. For example, if one of the solutions is a fraction, the algorithm separates the fraction into nearest integers, thereby breaking it in two sub-problems and then follows the first step. This looks like a tree drawn upside down (Heipcke, 2002).

2.8 Previous studies

Previous studies have been conducted for optimizing the cost of control for achieving air quality goals. The studies involved use of non-linear optimization (Shih et al., 1997), stochastic dynamic programming (SDP) (Yang et al., 2007; Yang et al., 2009), and use of a control menu which is linked to ozone sensitivities to find optimized control strategies (Cohan et al., 2006).

A study similar to this one was conducted for Atlanta by *Yang et al.*, in which a DMF was developed for reducing ground level ozone. The DMF used a SDP formulation and atmospheric chemistry module that used the Urban Airshed Model (UAM), to represent changes in ozone concentrations. A 4-day episode was used, which included two ramp-up days. Only the third day was considered for study, with a premise that if third day cannot controlled, then fourth day cannot be controlled, either. UAM was used to calculate the ozone concentrations over a 160 × 160 km domain, and the study was focused on a 40 × 40 km domain. This domain was divided into 25 regions, each 8 × 8 km. The study considered 102 point sources and other sources in the 25 regions, and only NO_x controls were considered since Atlanta was a 'NOx-limited' region. Ozone was monitored for 15 hours a day in 5 time periods from 4 am – 7 pm over four monitoring stations in 25 regions. The maximum number of variables was reduced to 25 from 524 after the mining and metamodeling process.

The Atlanta study was different from the current DFW study in many aspects. First, the Atlanta study used UAM modeling and a non-linear SDP approach for finding the time periods and regions to target for emission reductions,. The Atlanta study did not study any actual potential control measures. The DFW study uses CAMx, an alternate, an advanced photochemical model, and uses an IP approach for optimization of the selection of specific control measures. Secondly, only one day was studied in the case of Atlanta and meteorology was kept constant; in the case of DFW, ten days were studied with a different meteorology for each day. Third, each of Atlanta's 25 regions had a grid size of 8 km x 8 km, while the finest grid size for DFW was 4 km x 4 km; it is known that as the grid size decreases, the prediction accuracy of ozone increases, along with the computing time. Finally, the Atlanta study focused mainly on the point sources in the region while, the DFW study focused on point, area-non-road, and on-road mobile sources.

Shih et al. (1997) developed an optimization model for photochemical air pollutants by incorporating the pollutant-precursor relationships. The optimization function minimized the net present value (NPV) of the control measures for the precursors (NO_x & VOC), subject to meeting air quality standards at different regions and over the planning time period. In this 2-stage approach, first a response surface or isopleths of ozone concentration were developed as a function of precursor emissions using an air quality simulation model (AQSM). Secondly, an approximate linear relationship was derived from the non-linear relations of ozone concentrations and its precursors, which was the main objective of the research. A mixed integer non-linear optimization was developed that incorporated decision making model for finding optimal control measures.

Cohan et al. (2006) developed a control measure menu which offered a potential reduction in the emission of ozone precursors by 20 – 35% for Macon, Georgia. The control menu was linked to ozone sensitivities to identify cost-optimized strategies for bringing the region into attainment for ozone in 2007. The control menu was developed using AirControlNET v 3.2, which estimated the emission reduction and cost of emission reduction for point and area sources. A separate analysis was used to find the emission reduction and cost for on-road and non-road mobile sources. Community multiscale air quality (CMAQ) v 4.3 was used to model two summer time ozone episodes (Aug. 1999, and Aug. 2000) in Georgia. The ozone sensitivity for 2007 emissions was analyzed using high order decoupled direct method in three dimensions (HDDM-3D) for both episodes. The study found that the marginal cost increased rapidly for reduction above 15 - 20 percent. The study also found that combined episodes (Aug. 1999, and Aug. 2000) required an average reduction of 2.7 ppb to demonstrate attainment. The optimized annual cost of control strategies for average reduction of 2.7 ppb was about $760,000. Further, the controls measures were mainly in Macon region and were focused on low-cost NO_x controls for industrial sources and local locomotives. However, the cost rapidly increased for reductions above 6 ppb, which was required for Aug. 1999 episode as local control options were exhausted.

Fu et al. (2006) presented an approach of conjunctive use of models to design cost effective control strategies. This study focused on use of a simple air quality model, Empirical Kinetic Modeling Approach (EKMA), in conjunction with a complex air quality model, UAM, to obtained cost effective control measures. First UAM was used to find the ozone concentration from different combinations of NO_x and VOC across-the-board reductions. EKMA was calibrated using a genetic algorithm to predict results similar to UAM. The cost of different control measures were quantified by using emission least cost (ELC) model. This MIP was solved to obtain cost isopleths for different NO_x and VOC reductions. Two heuristic methods were used to find the most cost effective control measures with a small number of EKMA runs. This research ignored the controls on smaller sources, which might have lead to higher optimized control costs. Also, the heuristic approach cannot guarantee an optimal solution in a finite number of iterations.

The DFW study presented here differs from previous studies. First, it used CAMx, an advanced three-dimensional photochemical model, instead of the EKMA or UAM. A 10-day episode was studied with different meteorology during the episode. Although previous studies applied linear or non-linear optimization (Shih et al., 1997, Fu et al., 2006, and Yang et al., 2009) techniques for control strategies, none of the studies considered *targeted* reductions for finding the optimized cost. Therefore, the main aim of the research is to develop a DMF for evaluating and optimizing the selection of control strategies. Conventional across-the-board reductions, where emission reduction is uniform throughout the region and throughout the day, were compared with *targeted* reductions, in which emission sources of various types are reduced at various times and locations.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction

The main aim of this research was to develop a DMF for evaluating and selecting cost effective targeted ozone control strategies. A latest 2009 baseline case was obtained from TCEQ for conducting CAMx runs. The implementation of a control strategy in CAMx required modification of the emission input files using Emission Preprocessing Systems (EPS), which was obtained from ENVIRON Corporation. The DMF used optimization based on an Integer Programming (IP) approach (Nemhauser and Wolsey, 1988). An optimized approach gave a more efficient and realistic solution. The main purpose of the IP was to select a combination of targeted control strategies that achieves the SIP requirements for attainment and reduces region-wide emissions at a minimum cost. The methodology adopted for the research is summarized in Figure 3.1 and consisted of following steps:

3.1.1 Initialization Phase: Identify critical monitoring stations, potential control strategies, emission source types, time periods, control regions, monitoring regions

A list of the critical monitoring stations in the DFW region was obtained from TCEQ. Also, a list of potential control strategies was obtained from TCEQ/NCTCOG, consisting of the 42 most important strategies along with the estimated costs and estimated emission reductions. Further description of how these were implemented in the optimization is discussed below in Phase 4 on optimization.

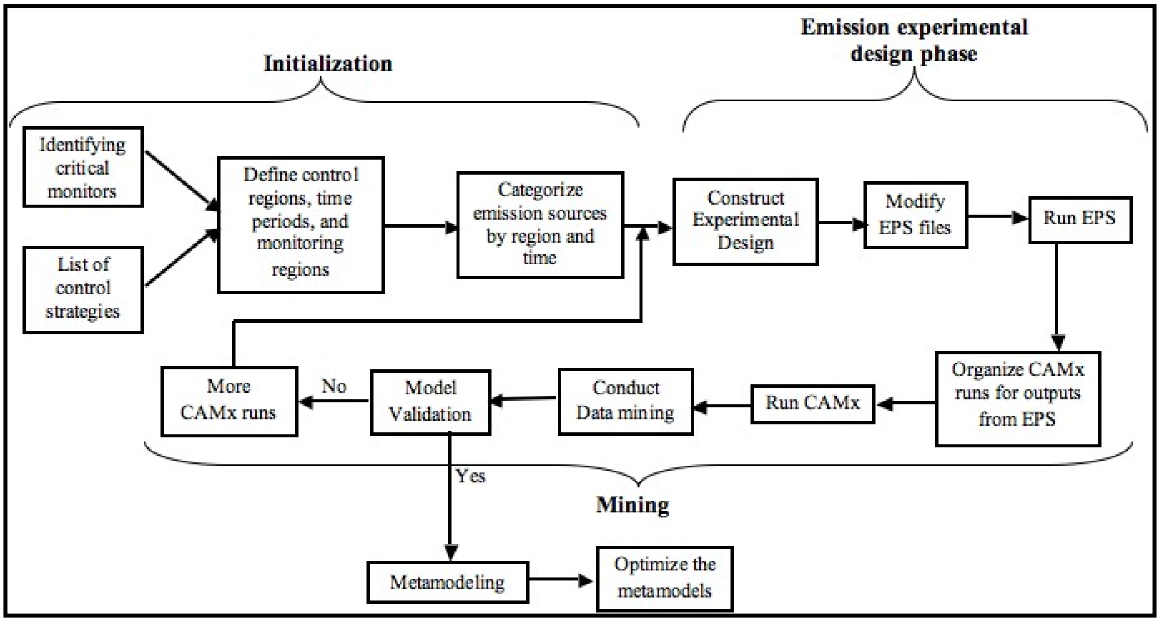


Figure 3.1 Flow diagram of the research methodology.

The emission sources were identified as point, area (including non-road), and line (on-road). These emission sources were categorized by "control region" and "control time periods," and emission controls varied for different regions and time periods. This enabled control strategies that are *targeted* by location and time.

The "monitoring regions" were based on the monitors, and were defined by the 7×7 grid cell regions around each monitor as per the EPA's Modeled Attainment Test (see Section 2.3). Maximum 8-hour ozone was observed over multiple "monitoring time periods" for each monitoring region. The monitoring regions, by county, are as follows: (1) Collin, (2) Dallas, (3) Denton, (4) Ellis, (5) Tarrant, (6) Kaufman and Rockwall, and (7) Johnson and Parker. The first 5 monitoring regions have at least one critical monitor and were constrained according to the appropriate design values (see Table 4.14). For each of these 7 regions, the 8-hour maximum ozone concentrations were monitored over 5 time periods: 12 mid – 6 am, 6 am – 12 noon, 12 noon – 3 pm, 3 pm – 7 pm, and 7 pm

– 12 mid. The 4-km CAMx modeling domain for DFW is shown in Figure 3.2. The ozone non-attainment region consists of Collin, Dallas, Denton, Ellis, Johnson, Kaufman, Parker, Rockwall, and Tarrant counties

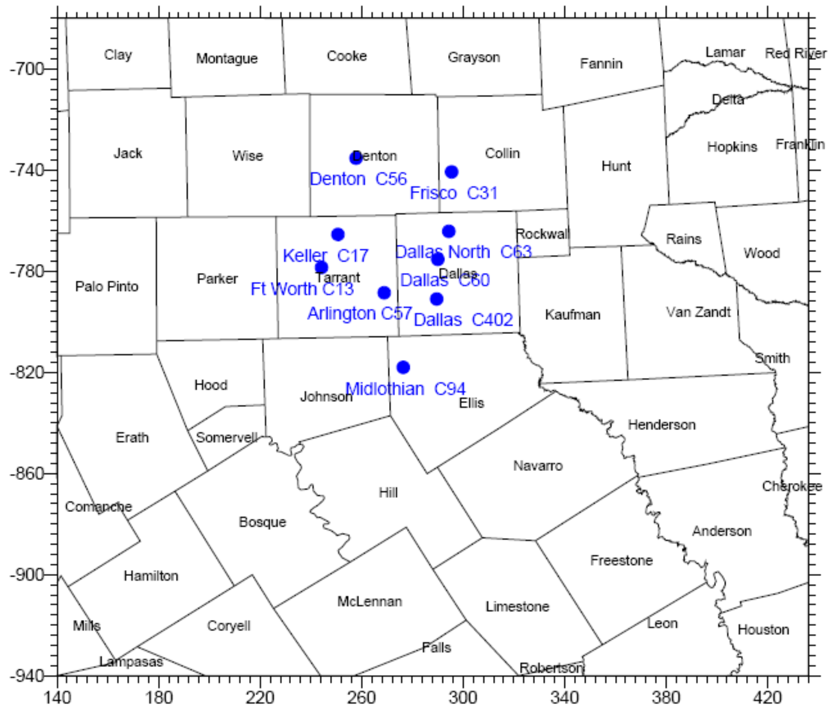


Figure 3.2. The 4km CAMx modeling domain for DFW (TCEQ, 2007).

Under the advisement of NCTCOG, control regions were selected as the counties, since emission controls are often implemented differently in different counties. “Control time periods” were selected as appropriate for the type of source as shown in Table 3.1. Point sources were controlled separately in 4 time periods: 12 mid – 6 am, 6 am – 12 noon, 12 noon – 7 pm, and 7 pm – 12 mid. In particular, the 12 mid – 6 am and 7 pm – 12 mid time periods were used to explore the impact of shifting 50% of day-time production from EGUs to these time periods. The points sources were additionally categorized into 7 types viz. brick kilns, EGUs, Industrial, Commercial and Institutional (ICI) boilers medium size (40-80 MMBtu/hr) and large size (> 100 MMBtu/hr), lime kilns, process heaters, and Midlothian cement kilns. These point source categories were selected since the control measures for most of them were listed in the final control strategy list. Area sources and line sources were controlled separately in 3 time periods: 6 am – 9 am (AM peak), 9 am – 3 pm, and 3 pm – 7 pm (PM peak), except for weekend line sources, which were controlled separately in 2 time periods: 6 am – 3 pm and 3 pm – 12 mid.

Table 3.1. Control time periods by type of source.

Source category	# of types	Control time periods
Point source (Mon – Sun)	7	12 mid – 6 am 6 am – 12 noon 12 noon – 7 pm 7 pm – 12 mid
Area (Mon – Sun)	1	6 am – 9 am 9 am – 3 pm 3 pm – 7 pm
Line (Mon – Thur)	1	6 am – 9 am 9 am – 3 pm 3 pm – 7 pm
Line (Friday)	1	6 am – 9 am 9 am – 5 pm 5 pm – 12 mid
Line (Sat – Sun)	1	6 am – 3 pm 3 pm – 12 mid

3.1.2 Mining Phase: Organize first set of CAMx runs, run CAMx, and conduct data mining to identify the significant predictor variables for 8-hour maximum ozone. Organize more CAMx runs, as needed

First, an experimental design was developed specifying various NO_x and VOC emission scenarios from different types of sources in various control regions and time periods. The experimental design was an efficient Latin hypercube to obtain various scenarios, specifying the control of emissions ranging from (1, 0.1), i.e., from no change (0% reduction), to 10% emissions (90% reduction) in specific control regions and control time periods (see Table 3.1). This large range not only facilitates obtaining various scenarios but also takes into consideration the non-linearity of the ozone chemistry, in which the response of reduction of ozone may increase with an increase in percent emission reduction. In the case of evening and overnight EGU point sources, increased emissions due to shifted production were considered. Initially, the 30-point Latin hypercube experimental design corresponding to 30 scenarios for CAMx runs was generated. A C-code was developed to implement each of these scenarios in the 2009 future case emission inventory for point, area and line sources before preprocessing files using EPS3 to create “CAMx-ready” files for each day. This output obtained from EPS3 was run in CAMx for each day of the 2009 future case to obtain the 8-hour maximums for each of the 7 monitoring regions and in each of 5 monitoring time periods (as defined in Initialization phase above).

Data mining was conducted to identify sensitive sources (by location and time) that affect 8-hour maximums. Three data mining techniques, multivariate adaptive regressions splines (MARS, Friedman 1991), decision trees (Breiman, et al., 1984, Huo, et al., 2005), and multiple testing based on false discovery rate (Benjamini and Hochberg, 1995), were utilized together to evaluate 612 emission sources in the different time periods and counties and 28 time-lagged 8-hour maximum ozone concentrations (4 time lags and 7 monitoring regions), for a total of 640 predictor variables. All three methods are applicable when there are more variables than data points, as was the case here. Decision trees are extremely popular and have proven to be very useful in engineering and business applications (Tsui, et al., 2006). Multiple testing based on false discovery rate is a newer procedure with the objective of identifying as many important variables as possible while maintaining a relatively small number of false positives. In particular, the approach has been applied to challenging bioinformatics problems (Kim et al., 2006).

MARS builds the model from a set of coefficients and basis function where the basis function and coefficients are determined by the data (Friedman and Roosen, 1995). Following data mining on the initial 30 CAMx runs, which identified the statistically significant variables, the need for any additional runs was determined. An additional 30 runs also used an efficient Latin hypercube experimental design to specify various NO_x and VOC emission scenarios, but this time the number of variables was reduced drastically to 126 from the original 640.

3.1.3 Metamodeling Phase: Build a metamodel to predict the maximum 8-hour ozone average in each time period for each monitoring region

Considering only the statistically significant variables from data mining, the set of 60 CAMx runs was used to construct metamodels that predict the 8-hour maximum ozone concentrations in each monitoring region for each time period. Although CAMx could, in theory, be used directly for this purpose, its high computational time made it impractical. The metamodels served as an efficient surrogate in the optimization. This is called a computer experiments approach and has been highly successful in engineering (Chen et al., 2003). The statistically significant predictor variables for the metamodels included emission sources from current and previous time period(s) and also 8-hour maximum ozone concentrations from previous time period(s). For simplicity, multiple linear regression metamodels (which can accommodate curvature) were constructed.

3.1.4 Optimization Phase: Set up an Integer Program to optimize the selection of targeted control strategies. The primary objective is the cost of control strategies, and the primary constraints ensure attainment

The metamodels developed were incorporated within an optimization program. Optimization was carried out with an Integer Programming (IP) approach that incorporated the metamodels, control strategies, and relative reduction factors (for the

Modeled Attainment Test). The main aim of the optimization was to identify the most cost-effective combination of targeted control strategies that would bring the region into attainment for 8-hour ozone standards.

Following the Metamodeling Phase, we have $S = 7$ monitoring regions (indexed by s), $J = 42$ control strategies (indexed by j), *and* Q experimental design variables (indexed by q). The experimental design variables are those that were studied under mining and metamodeling phases 2 and 3 to target controls by type of source (area, point, and line), time period, and control region. Let $\hat{f}_t^s$ denote the metamodel from mining phase 3 for the maximum 8-hour ozone concentration for monitoring region s in time period t, and let ε be a measure of uncertainty. (For simplicity, only one set of time periods is used here, although it is understood that the time periods are not identical for sources and monitoring regions.) Let M_q^{NOx} and M_q^{VOC} denote the maximum (nominal) emissions contributed by experimental design variable q (specifying source, time period and location), and let x_q^{NOx} and x_q^{VOC} denote reduced/altered emissions due to implementation of a set of control strategies. For the j-th control strategy, let c_j be its estimated cost, and let d_{jq}^{NOx} and d_{jq}^{VOC} be its emission reductions for experimental design variable q in time period t. Finally, the binary decision variable is u_j, where $u_j = 1$ if control strategy j is implemented, and $u_j = 0$ if it is not. The mathematical formulation for the integer program (IP) is:

$$
\begin{aligned}
& Min && \sum_{j=1}^{J} c_j u_j \\
& s.t. && \hat{f}_t^s + \varepsilon \le L_s \text{, for } s = 1,\ldots,S \text{ and } t = 1,\ldots,T, \\
& && x_q^{\mathrm{NOx}} = M_q^{\mathrm{NOx}} - \sum_{j=1}^{J} u_j d_{jq}^{\mathrm{NOx}} \text{, for } q = 1,\ldots,612
\end{aligned}
$$

$$x_q^{\text{VOC}} = M_q^{\text{VOC}} - \sum_{j=1}^{J} u_j d_{jq}^{\text{VOC}}, \text{ for } q = 1,\ldots,612$$
$$u_j \in \{0,1\}, \text{ for } j = 1,\ldots,J.$$

The decision variables u_j work like on-off switches to select various strategies. The first constraint guaranteed attainment of the 8-hour standard. This constraint was calculated and set separately for each monitoring region and monitoring time period. The calculation of constraint limits L_s is shown below. The second and third constraints appropriately reduced the emissions given the set of selected strategies. These constraints were modified to accommodate increases, due to shifted production of EGUs. The optimization searched through the various combinations to find the set that achieves compliance with minimal cost. In addition, if the given list of control strategies was not sufficient, supplemental decision variables were considered to provide further emission reductions and enable a feasible solution.

As described earlier for the Modeled Attainment Test (see Section 2.3), the estimated future design value (DVF) is calculated by Eq.17

$$\text{DVF} = \text{RRF} \times \text{DVB}$$

The relative reduction factor (RRF) is calculated by Eq. 18

$$\text{RRF} = \frac{\text{mean (highest modeled 8 - hour daily maximum conc. for each episode day)}_{\text{future}}}{\text{mean (highest modeled 8 - hour daily maximum conc. for each episode day)}_{\text{baseline}}}.$$

To demonstrate "modeled attainment," the estimated future design values for each monitor must be ≤ 84 ppb. Therefore, plugging in DVF = 84 and the values from Tables A-1 and A-3 in Appendix A for denominator in Equation 18 and for DVB in Equation 17, we can solve for the numerator of the RRF equation for each critical monitor. These values are used to derive the constraint limits L_s in the optimization formulation above.

Consider Aug 15, Frisco C31 monitor. We have:

$$84\,ppb = \frac{x}{81.3} \times 100.3\,ppb$$

x = 68.09 ppb

The calculated constraints for all the critical monitors are shown in the Table 4.14.

As a conservative approach for monitoring regions with multiple monitors, the smallest (most restrictive) limit was used.

CHAPTER 4

RESULTS AND DISCUSSIONS

4.1 Introduction

The aim of this research was to develop a DMF for evaluating and optimizing the selection of ozone control strategies. The developed DMF was applied to the DFW ozone non-attainment region to find the most cost effective *targeted* control strategies or group of strategies, and to demonstrate its applicability. The emission input files data and air quality model used for this research like CAMx and EPS3 were obtained from TCEQ and EPA's modeling protocol (refer to Section 2.3) was followed during the analysis. The results discussed in the following sections are described by the phases of the DMF.

4.2 Initialization Phase

In this phase the critical monitors in the DFW non-attainment region were identified. There were nine monitors that were identified as critical by TCEQ, since they violated the 8-hour ozone standard, are shown below in Table 4.1.

Table 4.1 Critical monitoring stations in DFW 9-county region.

Critical Monitoring Station
Frisco C31
Hinton C60
Dallas N C63
Redbird C402
Denton C56
Midlothian C94
Arlington C57
FtW NW C13
FtW Keller C17

Additionally, four more monitors were considered in this research, one in each of the following counties: Johnson, Kaufman, Parker, and Rockwall County. Since, the monitors in these counties were activated after 1999, EPA's MAT did not allow the future design values at these 4 monitors to be used in 8-hour SIP (TCEQ, 2007). However, TCEQ had calculated the 2006 design value for these monitors and RRF between 1999 and 2009 for the 4 monitors from the modeling data. This data was used in research since the 2006 design values were borderline with respect to ozone non-attainment. Table 4.2 shows the additional 4 monitors considered in this research.

Table 4.2 Additional monitoring locations and design value.

Monitoring Station	**2006 Design Value**
Cleburne, Johnson C77	87.6
Kaufman C71	88.3
Parker C76	75.6
Rockwall C69	80.3

A list of potential control measures was identified by TCEQ and NCTCOG. Initially, a master list of about 1000 control measures in all source categories (point, area, non-road, and on-road) was prepared by Environ for TCEQ. The master list of the control measures was later screened to select a list of control measures of high importance. The importance of the control measure was based on its practicality, acceptability, magnitude of emission reduction, and cost effectiveness (Environ, 2006). The control measures were mainly focused on NO_x reduction since the sensitivity test conducted by TCEQ suggested that DFW was 'NO_x-limited' region. A short list of 61 control measures was prepared and finally 42 control measures from all source categories were selected by TCEQ. These final 42 control measures were used for this research. Their magnitude of emission reduction, cost and county affected are listed in Table 4.3.

Table 4.3 Summary of control strategies, emission reductions and cost (Environ, 2006).

Control Strategy No.	Control Strategies	Emissions Affected	Amount of Emission Reduction (tons/day) and Cost ($/ton of emission reduction)			
			NO_x	Cost	VOC	Cost
Onroad Source						
1	Bicycle and Pedestrian Programs	9 counties	0.07	35,045		
2	Clean Fleet Vehicle Procurement Policy/Clean Fleet Program **(only weekdays)**	9 counties	5.0	7500		
3	Freeway and Arterial Bottleneck Program		0.25	582,691		
4	Higher Vehicle Occupancies	9 counties	0.27	95,097		
5	Idle Reduction Infrastructure	9 counties	0.06	8711		
6	Intelligent Transportation Systems	9 counties	4.87	1714		
7	Additional Taxi Fleet Emission Testing	9 counties	0.001	137,883		
8	Traffic Signal Improvement	9 counties	1.11	13,300		
9	Transit	9 counties	0.07	170,761		
10	Fare-Free Transit, System-Wide on Ozone Action Days	9 counties	0.71	839,662		
11	ETR-Vanpool Program+	9 counties	0.023	257,407		
12	ETR-Best Workplaces Program+	9 counties	0.104	2320		
13	ETR-Carpooling Programs+	9 counties	0.20	4158		
14	ETR-Transit Subsidy Programs+	9 counties	0.37	4158		
15	Bicycle and Pedestrian Programs	9 counties			0.04	55,096
16	Freeway and Arterial Bottleneck Program	9 counties			1.01	165,992
17	Higher Vehicle Occupancies	9 counties			0.28	93,724
18	Intelligent Transportation Systems	9 counties			1.99	4196
19	Traffic Signal Improvement	9 counties			3.07	4809
20	Transit	9 counties			0.07	170,761
21	Fare-Free Transit, System-Wide on Ozone Action Days	9 counties			0.72	834,965
22	ETR-Vanpool Program+	9 counties			0.026	227,706
23	ETR-Best Workplaces Program+	9 counties			0.107	2258
24	ETR-Carpooling Programs+	9 counties			0.02	4158
25	ETR-Transit Subsidy Programs+	9 counties			0.38	4048

+ Evaluation is based on data from other US cities and Dallas

Table 4.3 – Continued.

Control Strategy No.	Control Strategies	Emissions Affected	Amount of Emission Reduction (tons/day) and Cost ($/ton of emission reduction)			
			NO_x	Cost	VOC	Cost
	Area-NonRoad Source					
26	Freight Rail Infrastructure Improvement	9 counties	0.35	51,914		
27	Emission Reduction Contract Incentives with Public Funding	9 counties	1.1	13,000		
28	Limitation on Idling of Heavy Duty		0.5-1.0	22,000		
29	Rail Efficiency	9 counties	0.6-3.0	990		
30	Stationary IC Engines	9 counties	6.29	2644		
31	Lawn Mower Replacement Program	9 counties			0.422	6500
32	Architectural & Industrial Coatings	9 counties			6.7-12.5	13,200
33	Cold Cleaning Regulations	9 counties			0.71	1390
34	Commercial and Consumer Products Requirements	9 counties			11.1	4800
35	Fuel Hose Permeation	9 counties			0.063	15,000
36	Glycol Dehydrators	9 counties			0.42	425
	Point Sources					
37	Brick Kilns	Denton & Parker	0.13	1355		
38	ICI Boilers #7	Dallas, Denton, Ellis, Kaufman & Tarrant	0.81	3920		
39	ICI Boilers #9	Dallas, Kaufman & Tarrant	0.12	4195		
40	Lime Kilns	Johnson	2.2	3370		
41	Refinery Boilers and Heaters	Dallas & Tarrant	0.41	16,400		
42	EGU	All counties except Rockwall	5.97	6000		
43	Midlothian Cement Kilns	Ellis	17.40	4100		

The emissions were controlled individually in each of the nine non-attainment counties in DFW region, thereby making the nine counties as the control region. The control time periods differed by source type (e.g. point, line or area) and day of week (weekday and weekend). The point sources were controlled for 24 hours a day in 4 time periods, since it was assumed that point sources emit continuously throughout the day (e.g. emissions from brick kilns, cement kilns, or EGUs). The point sources were further categorized in 7 different types. Table 4.4 summarizes the point source types, the county in which they are located and NO_x emissions.

Table 4.4 Point source types and locations in DFW region.

S. No	Source Types	Source County	NO_x Emissions, tons
1	Brick Kilns	Denton and Parker	0.35
2	Lime Kilns	Johnson	4.07
3	ICI Boilers Medium	Dallas, Denton, Ellis, Kaufman, and Tarrant	1.39
4	ICI Boilers Large	Dallas, Kaufman, and Tarrant	0.65
5	Texas EGUs	Collin, Dallas, Denton, Ellis, Johnson, Kaufman, Parker, and Tarrant	11.95
6	Process Heaters	Dallas and Tarrant	0.029
7	Midlothian Cement Kilns	Ellis	26.77
		Total	**45.21**

The 7 types of point sources accounted for 45.4 tpd (76.7%) of total 2009 projected point source emission. The effect of shifting day-time emissions for EGU sources was decided to be tested. EGUs were selected for testing the effect of shifting day-time emissions, therefore 50% of day-time emissions were shifted to night-time for 7 pm – 12 midnight, and 12 midnight – 6 am time periods for all 7 days of the week. Further, area and non-road sources were controlled in 3 time periods for a period of 13 hours a day for all 7 days of the week. Line sources were controlled differently for Monday through Thursday, Friday, and Saturday- Sunday with different time periods as well. The categorization of days of week was done to take into account the travel patterns, since there is a different pattern on Friday than Monday through Thursday and a different pattern for Saturday and Sunday. To handle this, Monday through Thursday has 3 time periods accounting for morning and evening peak along with off-peak hours. Although, Friday has 3 time periods, emissions until midnight are considered, while Saturday and Sunday have only 2 time period periods until mid night. Table 4.5 shows the control time periods along with the number of emission variables for each source category.

Table 4.5 Time periods by type of source.

Source category	**# of types**	**Control time periods**	**# of emission variables**
Point source (Mon – Sun)	7	12 mid – 6 am 6 am – 12 noon 12 noon – 7 pm 7 pm – 12 mid	7 × 4 = 28
Area (Mon – Sun)	1	6 am – 9 am 9 am – 3 pm 3 pm – 7 pm	1 × 3 = 3
Line (Mon – Thur)	1	6 am – 9 am 9 am – 3 pm 3 pm – 7 pm	1 × 3 = 3
Line (Friday)	1	6 am – 9 am 9 am – 5 pm 5 pm – 12 mid	1 × 3 = 3
Line (Sat – Sun)	1	6 am – 3 pm 3 pm – 12 mid	1 × 2 = 2

On a typical weekday the total number of emission variables calculated from Table 4.5 are (28 point + 3 area + 3 line) × (2 pollutants) × (9 control regions) = 612, similarly for a weekend (Saturday-Sunday) it is (28 point + 3 area + 2 line) × (2 pollutants) × (9 control regions) = 594.

Finally, as discussed previously in Chapter 3, 7 monitoring regions were identified; each region had at least one critical ozone monitor. However, Kaufman, Rockwall, Johnson and Parker counties did not have any critical monitor as discussed earlier (see Table 4.2) therefore, Kaufman & Rockwall, and Johnson & Parker were combined together as two monitoring regions due to their geographical proximity and to ease computation. 5 monitoring time periods were identified, which included the time period from 12 noon to 7 pm divided in two smaller time periods of 12 noon – 3 pm and 3 pm – 7 pm in order to better model the ozone concentrations which are expected to peak in this period.

4.3 Mining Phase

In this phase the results are represented in two stages: stage I CAMx runs for 30 emission reduction scenarios applied to 612 emission variables, followed by data mining analysis, and stage 2 CAMx runs for an additional 30 emission reduction scenarios applied to 126 significant emission variables identified via data mining.

4.3.1 Stage I

A Latin hypercube experimental design was constructed for 30 scenarios and 612 variables, i.e. 30 set of emission reduction scenarios were created for 612 variables with design points varying from 0.1 to 1.0. The main purpose of using a Latin hypercube experimental design over a random selection method to organize CAMx runs was to ensure an even spread of points for 612 variables over the 612-dimensional control variable spaces (refer to Figure 3.2). The 50 percent shift of day-time emissions factor was applied to the EGU variables for 7 pm – 12 midnight, and 12 midnight – 6 am time periods.

A C-code was developed and used to implement each emission reduction scenario to the point, area, non-road, and line (on-road) input files obtained from TCEQ. The input files were then pre-processed through EPS3 and merged into ‘CAMx-ready’ files. Finally, CAMx was run for each of the 30 emission reduction scenarios. The output was post-processed to obtain the 8-hour average daily maximum ozone concentration at the 9 critical monitors along with 4 non-critical monitors each in Kaufman, Rockwall, Johnson and Parker. The 8-hour average daily maximum obtained was in accordance to EPA's MAT, which is based on 7 × 7 grid cell region surrounding each monitor. A tabulated output of 30 CAMx runs for August 17 for 7 monitoring regions and 5 monitoring time periods is shown in Table 4.7 (see next page). A complete set of stage I output for 10-day episode can be found in Appendix B.

It was observed from the results that every day had at least one monitoring region in which emission reductions did not impact ozone concentrations, i.e. the ozone concentration showed very little variation over the 30 emission reduction scenarios. This absence of variation of ozone concentration was attributed to the meteorology, particularly to the wind flow patterns during this entire episode. During the 10-day episode, no two consecutive days had wind blowing from the same direction except for August 15 and 16. Table 4.6 below summarizes the wind direction over 10-day episode period. The counties in the upwind direction showed no variation in the ozone concentration because the wind blew the emissions from the upwind counties out into the downwind counties, affecting the ozone concentrations downwind.

Table 4.6 Wind direction for August 13 – 22, 1999 (TCEQ, 2007).

Day	**Date**	**Wind Direction**
Friday	13	SW Winds – Ramp-up day
Saturday	14	NE Winds – Ramp-up day
Sunday	15	East Winds
Monday	16	East Winds
Tuesday	17	Light SW Winds
Wednesday	18	Light South Winds
Thursday	19	North Winds
Friday	20	NE Winds

Table 4.6 Continued.

Saturday	21	East Winds
Sunday	22	SE Winds

Table 4.7 Stage I 30 CAMx runs for August 17 by monitoring region and monitoring time period.

August 17th										
	Collin					**Dallas**				
RUN	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**
BL	63.33	101.87	98.87	75.00	47.18	58.11	103.48	100.26	75.43	53.19
1	63.13	96.49	93.32	71.27	46.67	57.48	95.73	92.59	72.02	53.09
2	63.10	93.96	91.18	70.77	46.86	56.77	90.79	87.73	70.77	53.11
3	63.14	96.24	93.43	71.99	46.83	57.41	95.79	92.95	72.76	53.05
4	63.14	95.60	92.60	71.14	46.83	56.98	92.58	89.57	71.17	53.09
5	63.20	96.54	93.64	71.54	46.90	56.90	94.04	91.03	71.72	53.07
6	63.12	95.68	92.64	71.10	46.84	57.64	94.17	90.93	71.77	53.11
7	63.20	98.78	95.44	72.58	46.73	57.91	98.80	95.44	73.30	53.07
8	63.23	98.64	95.66	72.56	46.95	57.94	98.04	94.86	73.22	53.11
9	63.17	96.91	94.00	72.05	46.81	58.63	96.47	93.43	72.74	53.09
10	63.17	97.12	94.26	72.32	47.01	57.59	96.80	93.83	73.13	53.10
11	63.24	97.07	94.03	71.45	46.80	57.21	95.64	92.59	72.12	53.03
12	63.10	97.78	94.47	72.14	46.74	57.85	97.78	94.47	72.96	53.10
13	63.17	96.68	93.70	71.44	46.85	57.48	95.02	91.90	71.94	53.07
14	63.15	96.91	93.98	72.00	46.80	57.58	96.69	93.65	72.82	53.05
15	63.14	97.00	94.23	72.31	47.02	57.09	96.24	93.25	72.95	53.12
16	63.14	96.02	92.96	71.20	46.80	57.15	94.45	91.42	71.81	53.10
17	63.13	96.81	93.89	72.12	46.97	58.03	96.71	93.73	72.93	53.11
18	63.12	95.83	92.97	71.50	46.87	57.20	93.94	91.05	72.04	53.09
19	63.16	96.58	93.48	71.15	46.70	56.71	94.67	91.46	71.68	53.08
20	63.26	98.11	95.09	72.31	46.86	57.59	97.60	94.47	73.04	53.07
21	63.21	97.38	94.33	71.82	46.85	57.46	96.41	93.29	72.48	53.08
22	63.15	97.01	94.04	72.21	46.87	57.70	97.01	94.04	72.94	53.08
23	63.23	98.14	95.07	72.32	46.88	57.77	97.79	94.63	73.02	53.14
24	63.11	97.23	94.31	72.09	46.92	57.42	96.89	93.70	72.84	53.13
25	63.22	99.02	95.89	73.03	46.93	57.75	99.15	95.89	73.64	53.12
26	63.18	97.49	94.68	72.63	47.09	57.70	97.41	94.44	73.46	53.15
27	63.18	95.78	92.85	71.36	46.87	57.05	92.85	89.84	71.42	53.11
28	63.12	95.70	92.74	71.36	46.78	57.11	94.64	91.75	72.15	53.08
29	63.07	99.53	96.47	73.62	46.92	58.89	101.28	97.95	74.19	53.13
30	63.09	95.27	92.63	71.87	46.95	57.18	93.75	91.12	72.39	53.07

Table 4.7 – Continued.

	August 17th									
	Denton					**Tarrant**				
RUN	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**
BL	54.97	108.01	107.75	90.81	51.36	54.47	104.42	104.28	84.92	57.15
1	54.91	102.11	101.33	84.76	48.88	54.40	98.21	97.12	78.88	56.39
2	54.82	97.34	96.06	80.20	47.19	54.94	92.61	91.50	77.31	56.54
3	54.87	101.50	100.99	84.90	49.48	54.67	97.42	96.90	79.43	56.71
4	54.85	98.93	97.91	81.70	47.00	53.87	94.41	93.56	76.02	56.54
5	54.85	99.81	98.94	82.65	47.87	54.54	94.93	94.15	76.77	56.27
6	54.86	100.50	99.49	83.24	48.00	54.34	96.53	95.31	77.60	56.41
7	54.88	104.86	104.06	87.25	49.88	53.94	100.70	99.93	81.40	56.06
8	54.90	103.90	103.20	86.54	49.69	53.37	99.64	98.84	80.40	56.49
9	54.86	102.71	101.83	85.46	48.99	55.52	98.53	97.60	79.46	56.07
10	54.90	102.38	101.87	85.62	49.39	54.45	98.45	97.94	79.97	56.37
11	54.92	101.39	100.71	84.11	48.33	52.51	96.79	95.94	77.82	56.39
12	54.88	104.13	103.21	86.45	49.31	54.49	100.35	99.32	80.63	56.49
13	54.92	101.25	100.41	84.00	48.04	53.22	97.32	96.25	78.07	56.76
14	54.86	102.62	101.98	85.64	49.16	54.65	98.67	97.95	79.74	56.72
15	54.89	101.86	101.30	85.16	49.25	53.45	98.20	97.53	79.76	56.80
16	54.94	100.61	99.87	83.60	48.61	53.11	96.97	95.99	78.16	56.33
17	54.87	102.68	102.03	85.81	49.69	55.43	98.70	98.15	80.30	56.30
18	54.85	100.04	99.21	82.91	48.05	52.90	95.68	94.66	76.96	56.51
19	54.89	100.69	99.69	83.21	47.73	52.92	96.36	95.18	77.32	56.35
20	54.88	102.99	102.56	86.10	49.18	54.43	98.63	98.23	80.17	56.55
21	54.86	102.09	101.65	85.39	49.30	53.18	97.92	97.45	79.64	56.47
22	54.87	102.98	102.35	86.05	49.34	54.87	98.88	98.34	80.18	56.42
23	54.86	103.65	103.01	86.50	50.01	53.97	99.00	98.29	80.39	56.62
24	54.92	103.16	102.23	85.74	48.91	53.29	99.55	98.47	79.81	56.41
25	54.88	104.83	104.19	87.59	50.39	53.99	100.61	99.99	81.73	56.39
26	54.87	102.94	102.41	86.19	49.53	54.06	99.08	98.71	80.83	56.53
27	54.87	99.02	97.88	81.73	47.90	53.65	94.30	93.15	76.88	56.38
28	54.86	100.30	99.73	83.61	48.34	54.09	96.28	95.60	77.98	56.38
29	54.85	105.55	105.16	88.56	51.01	55.91	101.94	101.68	83.38	56.53
30	54.83	99.74	99.12	83.23	48.15	53.95	95.88	95.27	77.73	56.30

Table 4.7 – Continued.

August 17th										
	Ellis					**Johnson and Parker**				
RUN	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**
BL	50.15	78.75	77.21	64.26	46.06	56.10	76.82	77.82	74.62	59.70
1	49.85	77.58	76.00	63.15	45.88	54.99	72.85	73.32	69.80	58.19
2	49.75	77.31	75.85	63.18	45.88	55.30	73.60	74.02	70.56	58.15
3	50.31	77.85	76.36	63.63	45.93	55.20	70.39	70.45	66.10	57.72
4	49.70	77.85	76.01	62.91	45.80	56.04	72.38	72.64	69.40	58.15
5	49.80	75.94	74.43	62.67	45.88	54.44	73.60	73.90	70.14	57.57
6	50.02	77.29	75.66	62.74	45.83	56.08	71.69	71.80	68.16	57.43
7	49.46	76.72	75.08	62.35	45.95	55.89	71.17	71.51	67.98	57.45
8	49.29	75.13	73.40	62.92	45.95	55.77	70.72	71.11	67.74	58.22
9	50.12	75.38	73.65	62.61	45.90	55.57	71.16	71.64	68.55	58.03
10	49.60	74.98	73.38	62.67	45.88	55.30	73.57	73.77	69.76	57.30
11	49.44	76.66	75.22	62.82	45.85	54.91	70.85	71.08	67.62	57.88
12	49.44	77.57	75.80	62.87	45.87	55.55	70.63	70.57	66.52	57.86
13	49.66	77.92	76.13	63.37	45.89	54.91	71.68	71.78	68.16	57.84
14	50.02	77.45	75.72	63.23	45.87	54.81	74.69	75.23	71.92	58.86
15	49.79	77.94	76.36	63.50	45.96	55.78	72.67	73.06	69.80	58.54
16	49.75	74.86	73.34	62.68	46.02	54.66	73.03	73.36	69.50	57.93
17	50.04	75.12	73.47	62.50	45.91	54.70	72.87	73.23	69.79	58.14
18	49.67	76.00	74.73	62.84	45.96	54.84	71.49	71.66	68.08	57.91
19	49.68	76.40	74.78	62.67	45.94	55.24	71.00	71.14	67.89	57.86
20	49.91	77.69	76.02	62.98	45.93	56.03	73.18	73.69	70.50	58.22
21	49.46	74.96	73.49	62.69	45.90	54.69	70.85	70.97	67.65	57.87
22	49.77	75.88	74.37	62.49	45.90	55.41	71.69	71.85	68.34	57.63
23	49.84	77.15	75.90	63.47	45.88	55.76	70.42	70.43	65.84	57.88
24	49.36	77.09	75.34	62.66	45.90	55.16	73.08	73.67	70.16	58.29
25	49.72	77.06	75.62	63.23	45.81	54.90	71.27	71.58	68.12	57.59
26	49.78	77.46	75.79	63.10	46.00	55.79	70.87	71.10	67.94	57.98
27	49.69	77.54	76.11	63.46	45.88	55.79	73.09	73.61	70.17	58.16
28	49.62	75.70	74.24	62.95	45.84	56.01	74.01	74.46	70.93	58.11
29	49.92	77.24	75.64	62.95	45.98	55.63	72.62	73.14	70.01	58.58
30	49.53	75.94	74.52	62.55	45.90	56.03	72.54	72.77	69.13	57.56

Table 4.7 – Continued.

August 17th					
	Kaufman and Rockwall				
RUN	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**
BL	61.05	78.04	72.00	63.07	53.60
1	60.04	76.37	70.31	62.88	53.61
2	59.79	75.44	69.75	62.97	53.61
3	59.92	75.90	70.06	62.91	53.61
4	60.24	76.54	70.56	62.92	53.61
5	60.59	76.52	70.31	62.94	53.62
6	59.69	75.61	69.97	62.97	53.62
7	60.36	76.79	70.67	62.87	53.61
8	60.49	77.00	70.88	62.96	53.62
9	59.83	75.99	70.18	62.90	53.61
10	60.17	76.58	70.76	62.96	53.61
11	60.69	77.01	70.77	62.89	53.62
12	60.02	76.27	70.33	62.90	53.61
13	60.14	75.99	70.13	62.93	53.62
14	60.08	76.04	70.06	62.88	53.62
15	60.25	76.54	70.76	62.93	53.61
16	60.16	76.69	70.75	62.94	53.61
17	59.84	75.92	70.22	63.00	53.62
18	60.23	76.40	70.49	62.91	53.62
19	60.60	76.65	70.39	62.86	53.62
20	60.66	76.72	70.38	62.88	53.61
21	60.50	76.46	70.21	62.95	53.61
22	60.04	75.92	70.01	62.94	53.62
23	60.58	77.11	70.98	63.00	53.61
24	60.10	76.53	70.86	63.03	53.62
25	60.65	76.93	70.82	63.03	53.62
26	60.22	76.08	70.29	63.01	53.61
27	60.36	76.43	70.42	62.95	53.61
28	60.16	76.56	70.59	62.97	53.61
29	59.60	75.38	69.73	62.98	53.61
30	59.75	75.86	70.17	62.94	53.61

The absence of sensitivity to emission reduction for each episode day is summarized below in Table 4.8. The table summarizes the monitoring region/s that is/are in the upwind direction for each day. The last column shows the monitoring regions that had no effect of emission reductions on ozone concentrations. Also, in general for all episode days and counties, lower sensitivity of ozone concentration was observed during night time (7 pm – 12 midnight and 12 midnight – 6 am). This is expected because of CAMx's limitation in predicating ozone during nighttime. Figure 4.1 shows the wind directions for 10-day ozone episode.

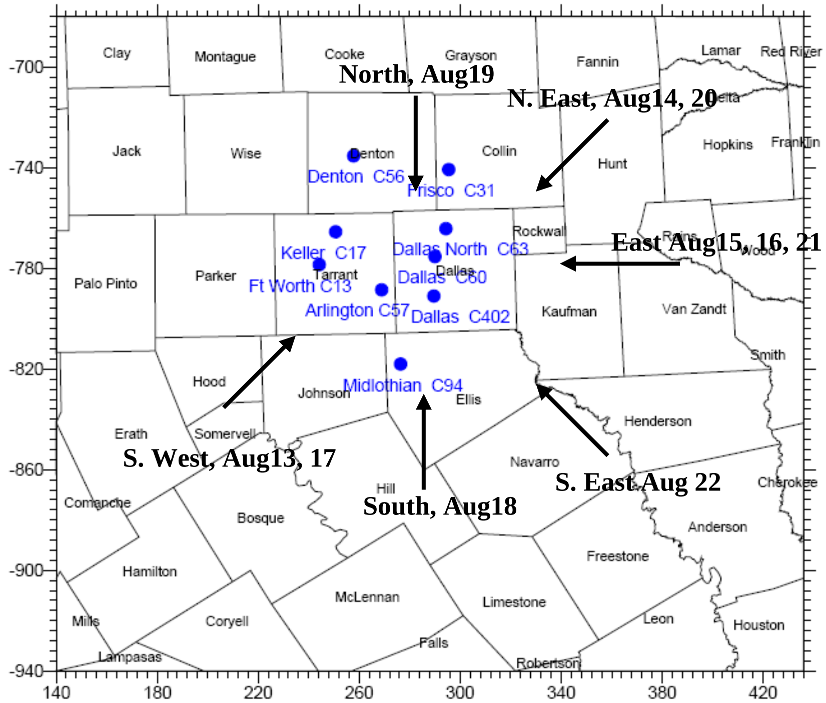


Figure 4.1 Wind directions for the 10-day DFW episode.

Table 4.8 Summary of monitoring regions with less sensitivity for emission reductions.

Day	**Date**	**Wind Direction**	**Upwind Monitoring Region**	**Monitoring Region Affected**
Friday	13	SW Winds – Ramp-up day	Johnson and Parker	Johnson and Parker
Saturday	14	NE Winds – Ramp-up day	Collin, Rockwall, and Kaufman	Collin, Denton, Rockwall, and Kaufman
Sunday	15	East Winds	Collin, Rockwall, and Kaufman	Collin, Rockwall, and Kaufman
Monday	16	East Winds	Collin, Rockwall, and Kaufman	Rockwall, and Kaufman
Tuesday	17	Light SW Winds	Johnson and Parker	Kaufman and Rockwall
Wednesday	18	Light South Winds	Ellis, Johnson, and Parker	Johnson and Parker
Thursday	19	North Winds	Collin and Denton	Collin and Denton

Table 4.8 – Continued.

Friday	20	NE Winds	Collin, Denton, Kaufman and Rockwall	Collin, Denton, Kaufman and Rockwall
Saturday	21	East Winds	Collin, Rockwall, and Kaufman	Collin, Rockwall, and Kaufman
Sunday	22	SE Winds	Ellis, Kaufman and Rockwall	Kaufman and Rockwall

4.3.2 Data Mining

The main purpose of this task was to identify sensitive emission sources by monitoring region and time periods for each day that potentially impact ozone concentrations in a monitoring region. The author acknowledges the critical help of Industrial Engineering doctoral students Subrat Sahu, Panaya Rattakorn, and Chingfeng Lin in conducting this important task (Lin, C., et al, 2008). Data mining was conducted on stage I CAMx outputs with three different methods,

- Multiple Adaptive Regression Splines (MARS)
- Classification and Regression Trees (CART)
- False Discovery Rate (FDR)

The ozone in a monitoring region at a particular time period was studied in relation to emissions from all sources within the 9 counties during that particular time period along with the ozone concentrations in the 7 monitoring regions in previous time period. All the three methods listed above use a different approach for selecting variables (refer to Section 2.7.2.2). The union of the variables selected as significant by each method was used in the next stage. Significant variables consisted of a mix of point, area, non-road, line and time-lagged 8-hour daily maximum ozone concentrations variables. The total number of variables for a typical weekday was reduced almost by five fold from 612 to a maximum of 126. The number varied from 82 to 126 variables. The daily total number, which was the union of the variables for each day and monitoring region is summarized in Table 4.9. The highest number of variables occurred for Kaufman and Rockwall the monitoring region on Friday, August 20.

Table 4.9 Number of significant variables for each day.

Day	**Collin**	**Dallas**	**Denton**	**Tarrant**	**Ellis**	**Johnson & Parker**	**Kaufman & Rockwall**	**Daily Total**
Fri 13	24	21	25	30	23	16	21	94
Sat 14	21	22	24	22	18	26	21	103
Sun 15	31	25	16	28	30	30	32	114
Mon 16	11	29	24	26	28	30	19	106
Tue 17	22	26	18	18	33	33	29	126
Wed 18	28	31	28	24	31	32	21	124
Thur 19	23	18	19	19	23	24	26	87
Fri 20	18	24	17	28	18	25	**38**	103
Sat 21	28	25	24	27	30	26	25	106
Sun 22	15	13	20	19	29	17	18	82

Additionally, it was observed that the emission variables for EGUs which accounted for the shift of day-time emissions (7 pm – 12 midnight and 12 midnight – 6 am) were not selected by any of the three data mining methods. This implied that the shift of day-time emissions to night time for EGUs did not significantly affect the ozone in the DFW region. Further, it was also observed that certain monitoring region/s in certain time period/s did not have any significant variables, implying that none of the emissions sources had significant impact for ozone formation in that monitoring region in those time periods. Table 4.10 summarizes the monitoring region/s, which had no significant variables along with the respective monitoring time period/s.

Table 4.10 Summary of monitoring regions with no significant variables.

Day	Date	Monitoring Region	Monitoring Time Period
Friday	13	Johnson and Parker	12 midnight – 6 am
Saturday	14	Kaufman and Rockwall Collin, Denton	12 midnight – 6 am 7 pm – 12 midnight
Sunday	15	N/A	N/A
Monday	16	Kaufman and Rockwall	7 pm – 12 midnight
Tuesday	17	N/A	N/A
Wednesday	18	N/A	N/A
Thursday	19	Collin	7 pm – 12 midnight
Friday	20	Collin, Denton Kaufman and Rockwall	3 pm – 7 pm, 7 pm – 12 midnight 7 pm – 12 midnight
Saturday	21	N/A	N/A
Sunday	22	Kaufman and Rockwall	6 am – 12 noon

N/A - All monitoring regions had at least one significant variable

A correlation was observed between the monitoring regions with no sensitivity (Table 4.8) and the monitoring regions that did not have any significant variables after data mining (Table 4.10). This was because, if a certain monitoring region lacked sensitivity to emission reductions, then it was unlikely that emission variables will significantly affect the ozone formation in that particular monitoring region. Moreover, it was also known that in general there was little change in ozone concentration during night time periods (7 pm -12 midnight and 12 midnight – 6 am). This was also observed with the monitoring regions with no significant variables since most of the time periods were during night time. Table 4.11 compares the monitoring regions with no sensitivity to regions to those with no significant variables.

Table 4.11 Comparison of monitoring regions with no sensitivity to regions to those with no significant variables versus those with no significant variables.

Day	**Date**	**Monitoring Region with No Significant Variables**	**Monitoring Time Period**	**Monitoring Region with No Sensitivity**
Friday	13	Johnson and Parker	12 midnight – 6 am	Johnson and Parker
Saturday	14	Kaufman and Rockwall Collin, Denton	12 midnight – 6 am 7 pm – 12 midnight	Collin, Denton, Rockwall, and Kaufman
Sunday	15	N/A	-	Collin, Rockwall, and Kaufman
Monday	16	Kaufman and Rockwall	7 pm – 12 midnight	Rockwall, and Kaufman
Tuesday	17	N/A	-	Kaufman and Rockwall
Wednesday	18	N/A	-	Johnson and Parker
Thursday	19	Collin	7 pm – 12 midnight	Collin and Denton
Friday	20	Collin, Denton Kaufman and Rockwall	3 pm – 7 pm, 7 pm – 12 midnight 7 pm – 12 midnight	Collin, Denton, Kaufman and Rockwall
Saturday	21	N/A	-	Collin, Rockwall, and Kaufman
Sunday	22	Kaufman and Rockwall	6 am – 12 noon	Kaufman and Rockwall

N/A - All monitoring regions have at least one significant variable

The data mining results for August 17 are tabulated below in Table 4.12 (see page 63). The results are shown for all 7 monitoring regions and 5 monitoring time periods. A complete tabulated result for 10 days can be found in Appendix C.

4.3.3. Stage II

After completing data mining, it was seen that the highest number of variables for a single monitoring region in one day was 38 (Kaufman & Rockwall on Friday, August 20). Hence, it was decided that an additional 30 CAMx runs would be necessary (at minimum) in order to conduct metamodeling of the next phase. A new Latin hypercube experimental design was constructed similar to that in stage I, for 30 scenarios that varied only the 126 significant variables. The same steps were followed as in stage I to obtain CAMx output for 30 additional runs which are called stage II CAMx outputs.

A sample stage II output for August 17 is summarized in Table 4.13. The overall trend of the stage II output was similar to that observed in stage I with respect to sensitivity of ozone to emission reductions. A complete tabulated result for 10 days can be found in Appendix D. The CAMx data for stage I and stage II was combined and used in the next phase of building metamodels to predict maximum ozone in each monitoring region and time period as a function of ozone from previous time periods and emission variables from current and previous time periods, where only the variables identified by the data mining would be candidates as predictor variables.

Two different notations were used to describe the emission and ozone variables. First, for the emission variables, the 3 types of emission variables were identified as: point (P), area-nonroad (A), and line (L). The point sources (P) were further categorized into 7 different types, numbered 1 to 7. The first two letters of the county were used to identify the location of the emission source, e.g. Dallas was written as "Da." The pollutant type was abbreviated as "N" for NO_x and "V" for VOC. Therefore, an emission source P3El12-6aV would mean VOC emissions from a point source of type 3 from Ellis County during 12 midnight to 6 am, and LDe6-9aN would mean NO_x emissions from a line source in Denton County during 6 am – 9 am. The ozone variables start with a location abbreviation, e.g. Dallas was written as "Da" and the previous day's ozone variables start with "PrevDay" followed by the location abbreviation. The Johnson & Parker and Kaufman & Rockwall monitoring regions are abbreviated as "JP" and "KR" respectively. This is followed by the monitoring time period. For example, Da12-6a

Table 4.12 Sample results of data mining for August 17.

12 mnight - 6am						
Collin	**Dallas**	**Denton**	**Tarrant**	**Ellis**	**Johnson & Parker**	**Kaufman & Rockwall**
P3EL12-06AN	P1DE12-06AN	P3DA12-06AN	P4DA12-06AN	P3EL12-06AN	P2Jo12-06aN	P1De12-06aV
P3TA12-06AN	P2JO12-06AN	P3DE12-06AV	PrevDayDE07-12M	P3EL12-06AV	P6DA12-06AN	P3DA12-06AN
P6DA12-06AV	P3PA12-06AV	P3EL12-06AN	PrevDayJP07-12M	P3KA12-06AN		P3DE12-06AV
P6TA12-06AV	P3TA12-06AV	P7EL12-06AN		P4DA12-06AV		P4DA12-06AN
P1De12-06aV	P4KA12-06AN	PrevDayJP7-12		P4KA12-06AV		P6DA12-06AV
PreDayDA07-12M	P3De12-06aN	P7El12-06aN		P7EL12-06AN		P3Ka12-06aN
PreDayDE07-12M		PreDayJP07-12M		PreDayDA07-12M		
PreDayEL07-12M		PreDayTA07-12M		PreDayTA07-12M		
6am - 12 noon						
Collin	**Dallas**	**Denton**	**Tarrant**	**Ellis**	**Johnson & Parker**	**Kaufman & Rockwall**
DA12-06A	AEL6-9AV	ACO6-9AV	AEL6-9AV	APA6-9AV	P1PA06-12NV	AEL6-9AN
DE12-06A	DA12-06A	AEL6-9AV	DA12-06A	JP12-06A	P4TA06-12NV	KR12-06A
KR12-06A	ADe6-9aV	ARO6-9AN	P4Da06-12nV	KR12-06A	APa6-9aN	LEL6-9LN
P4DA06-12NV	KR12-6	DA12-06A		P1DE12-06AV	P1De06-12nV	TA12-06A
P5DA06-12NN	LPa6-9LV	LRO6-9LV		P3Ta06-12nN		AJo6-9aN
TA12-06A	P2Jo06-12nN	P3DA06-12NV		P4TA06-12NV		P4Da06-12nV
P5Pa06-12nN	P6Da12-06aN	KR12-6		P6DA12-06AV		P5Ka06-12nN
P5Ta06-12nN				P7EL06-12NN		
				P7EL12-06AV		

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Table 4.12 – Continued.

12 noon - 3pm						
Collin	**Dallas**	**Denton**	**Tarrant**	**Ellis**	**Johnson & Parker**	**Kaufman & Rockwall**
CO06-12N	CO06-12N	AKA9-3PV	ADA9-3PN	ATA9-3PV	AJO6-9AV	DE12-06A
DA06-12N	DA06-12N	ATA6-9AV	CO06-12N	EL06-12N	ATA9-3PN	KR06-12N
DA12-06A	DA12-06A	CO06-12N	DA06-12N	LDA9-3PN	CO12-06A	KR12-06A
DE06-12N	DE06-12N	DA06-12N	DA12-06A	P3EL06-12NV	JP06-12N	P1DE12-06AV
DE12-06A	JP12-06A	DA12-06A	DE06-12N	P3TA06-12NN	LJO9-3PN	ADa6-9aV
KR06-12N	LEL9-3PN	DE06-12N	LEL9-3PN	P4KA12-06AV	P3DA06-12NV	APa9-3pN
LEl9-3pN	P1DE12-06AV	KR06-12N	P3EL12-06AN	P7EL12-06AV	P5EL06-12NV	LKa9-3pN
P2JO12-06AN	P2JO06-12NN	LEL9-3PN	TA06-12N	TA06-12N	P5PA06-12NV	P5Co06-12nV
P3TA12-06AN	P3KA06-12NN	P3EL12-06AN	AEl9-3pV	LKa6-9LV	P6DA12-06AN	P5Ka06-12nN
P4DA06-12NV	P4DA12-06AN	TA06-12N	De12-6	P1Pa06-12nN	APa6-9aV	Ta12-6
TA06-12N	TA06-12N	P3De12-06aV		P7El06-12nN	P5De06-12nV	
APa6-9aN	P4Ta12-06aN					
3pm - 7pm						
Collin	**Dallas**	**Denton**	**Tarrant**	**Ellis**	**Johnson & Parker**	**Kaufman & Rockwall**
DA06-12N	DA06-12N	CO06-12N	CO06-12N	ADE6-9AV	ACO6-9AV	AKa9-3pN
DA12-03P	DA12-03P	DA06-12N	DA06-12N	EL06-12N	AEL3-7PN	P3EL12-07PN
DE06-12N	DE06-12N	DA12-03P	DA12-03P	EL12-03P	AJO3-7PN	P4KA12-06AN
DE12-03P	DE12-03P	DE06-12N	DA12-06A	LDa9-3pN	EL12-03P	P5TA06-12NV
TA06-12N	LPA6-9LV	DE12-03P	DE06-12N	LEL9-3PV	JP06-12N	AKa3-7pN
TA12-03P	P4DA12-06AN	LJO3-7PV	DE12-03P	P1PA06-12NV	JP12-03P	LKa3-7pN
Co12-3	TA06-12N	TA06-12N	LJO3-7PV	P2Jo12-06aV	LTA3-7PV	LKa9-3pN
Co6-12	TA12-03P	TA12-03P	TA06-12N	P3DA12-06AN	P1PA06-12NV	P5Co12-07pV
Da12-6a	Co12-3	Co12-3	TA12-03P	P3DA12-06AV	P3DE06-12NN	

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Table 4.12 – Continued.

3pm - 7pm						
Collin	**Dallas**	**Denton**	**Tarrant**	**Ellis**	**Johnson & Parker**	**Kaufman & Rockwall**
De6-12	Co6-12	Da12-6	ADe9-3pV	P3EL06-12NV	P4DA12-07PV	
LEl9-3pN	LEl9-3pN	LEl9-3pN	Co12-3	P3TA06-12NV	P4TA06-12NN	
LKa9-3pN	P5Jo12-07pV	LTa9-3pV	LEl9-3pN	P4DA12-06AN	P5DE06-12NN	
P5Jo12-07pV		P5Jo12-07pV	P1Pa12-07pN	ACo9-3pN	El12-6a	
				P3De12-06aN		

7pm - 12 mnight						
Collin	**Dallas**	**Denton**	**Tarrant**	**Ellis**	**Johnson & Parker**	**Kaufman & Rockwall**
LKa9-3pN	AEl3-7pV	DA06-12N	ACO3-7PN	ARO9-3PN	ACO9-3PN	LKa3-7pN
P1DE12-06AN	CO03-07P	DE03-07P	AKA9-3PV	ATA9-3PV	ADE6-9AN	P3EL12-06AV
P2JO12-06AV	CO06-12N	DE06-12N	EL03-07P	JP12-06A	KR12-03P	ATa9-3pV
P2JO12-07PN	CO12-03P	DE12-03P	EL12-03P	P1PA12-07PN	LDE6-9LV	LEl9-3pV
P3DE12-06AV	JP03-07P	TA03-07P	JP12-03P	P4TA07-12MN	LTa9-3pN	LJo3-7pN
ADa6-9aV	KR03-07P	TA12-03P	LDA9-3PN	P5EL06-12NV	P1DE12-06AV	LRo5-12mnV
LKa3-7pN	P1DE07-12MN	AJo3-7pV	ADa9-3pV	P6DA12-06AV	ACo3-7pV	P5El12-07pN
P3Ka06-12nV	P1DE12-07PN	Da12-3	LKa6-9LV	P3De12-07pN	El3-7	P5Ta12-07pN
P5Pa12-07pN	P3KA12-07PV	El06-12	P1Pa07-12mN	P3El12-06aN	LCo9-5pV	
	P5DA06-12NN	El12-3	P3De12-07pN		LRo6-9LN	
	APa3-7pN	El3-7	P5De12-07pN		P2Jo12-07pV	
	LKa9-5pN	JP3-7			P3Ka12-06aV	
	LPa6-9LN	KR3-7			P6Ta12-07pN	
	P3De07-12mN	P3Da12-07pN				
	P6Ta07-12mN	P5Jo12-07pV				
		P7El07-12mN				
		Ta06-12				

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Table 4.13 Stage II 30 CAMx runs for August 17 by monitoring region and monitoring time period.

August 17th										
	Collin					**Dallas**				
RUN	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**
BL	63.33	101.87	98.87	75.00	47.18	58.11	103.48	100.26	75.43	53.19
1	63.22	97.19	94.15	71.66	46.80	57.28	96.33	93.24	72.32	53.10
2	63.24	95.79	92.82	71.39	46.84	57.33	93.06	90.04	71.53	53.12
3	63.15	97.33	94.17	72.16	46.75	57.65	97.33	94.17	72.97	53.11
4	63.17	95.97	93.11	71.80	46.79	58.34	95.68	92.91	72.63	53.06
5	63.29	99.28	96.28	73.55	46.96	57.69	99.28	96.82	74.03	53.12
6	63.12	96.26	93.51	72.13	47.05	57.79	95.87	92.93	72.87	53.18
7	63.17	96.34	93.39	71.41	46.91	57.24	94.76	91.67	72.05	53.14
8	63.14	98.25	95.20	72.98	46.82	57.73	98.64	95.37	73.66	53.04
9	63.22	98.00	94.94	72.75	46.93	57.82	98.00	94.92	73.45	53.09
10	63.21	97.47	94.65	72.53	46.98	57.58	97.27	94.25	73.32	53.12
11	63.09	94.69	92.06	71.60	47.00	56.96	92.98	90.42	72.12	53.15
12	63.24	97.06	94.07	71.67	46.91	57.12	94.92	91.71	72.12	53.15
13	63.24	98.75	95.66	72.95	46.76	57.36	98.94	95.66	73.61	53.05
14	63.18	97.16	94.15	72.12	46.75	57.80	97.08	93.97	72.89	53.05
15	63.24	97.75	94.67	72.09	46.87	58.03	97.35	94.08	72.89	53.12
16	63.22	99.74	96.64	73.45	46.97	58.09	99.74	97.45	74.00	53.14
17	63.14	95.88	93.20	72.17	47.12	57.36	95.23	92.42	72.89	53.17
18	63.20	96.00	93.11	71.67	46.90	58.39	95.21	92.35	72.35	53.15
19	63.23	95.53	92.50	71.14	46.79	57.15	92.30	89.12	71.14	53.07
20	63.21	98.01	95.07	72.92	46.85	57.48	98.26	95.08	73.55	53.07
21	63.26	96.85	93.67	71.21	46.74	57.27	94.81	91.60	71.79	53.11
22	63.21	96.31	93.22	71.01	46.84	57.42	93.86	90.54	71.37	53.12
23	63.19	95.17	92.21	71.03	46.75	57.41	93.55	90.75	71.67	53.08
24	63.29	98.10	95.07	72.15	46.85	57.59	97.00	93.87	72.83	53.08
25	63.16	97.50	94.58	72.49	46.90	57.52	97.47	94.48	73.27	53.12
26	63.13	94.97	91.99	70.91	46.81	57.21	93.16	90.22	71.55	53.13
27	63.15	95.29	92.51	71.68	46.99	57.31	93.83	91.09	72.36	53.12
28	63.20	95.55	92.65	71.26	47.00	57.25	92.65	89.60	71.29	53.15
29	63.11	94.52	91.62	71.05	46.96	56.97	92.25	89.27	71.46	53.18
30	63.26	97.36	94.31	71.68	46.88	57.32	96.15	93.06	72.31	53.12

Table 4.13 – Continued.

August 17th										
	Denton					**Tarrant**				
RUN	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**
BL	54.97	108.01	107.75	90.81	51.36	54.47	104.42	104.28	84.92	57.15
1	54.95	99.24	97.58	85.12	49.01	53.32	98.27	97.28	78.90	56.68
2	54.91	99.46	98.49	82.27	47.44	53.26	95.02	94.06	76.51	56.62
3	54.85	99.87	98.68	86.23	49.85	54.53	99.21	98.42	80.50	56.62
4	54.88	98.61	97.53	85.16	49.09	55.24	98.08	97.56	79.56	56.67
5	54.93	95.12	95.10	88.22	50.62	52.42	98.00	97.45	82.58	56.60
6	54.89	98.78	97.30	84.98	49.01	55.08	98.27	97.35	79.40	56.50
7	54.88	98.00	99.88	83.67	48.65	53.20	96.39	95.40	77.89	56.50
8	54.87	94.11	99.74	87.01	49.95	54.90	97.28	96.43	81.68	56.28
9	54.92	94.07	99.39	86.81	50.13	54.45	99.65	99.19	81.21	56.72
10	54.90	99.61	98.65	86.09	49.26	53.93	99.26	98.72	80.43	56.49
11	54.87	99.18	98.42	82.55	48.31	53.27	95.06	94.12	76.96	56.55
12	54.89	98.13	99.69	83.10	47.67	54.63	96.22	95.09	77.41	56.51
13	54.89	94.58	94.33	87.48	49.88	54.88	97.44	96.64	81.62	56.37
14	54.89	99.74	98.59	86.09	49.80	54.75	99.22	98.67	80.71	56.67
15	54.88	99.72	98.29	85.86	49.65	54.44	98.63	97.87	80.19	56.52
16	54.92	95.31	95.29	88.42	50.36	54.72	98.24	97.53	82.42	56.46
17	54.89	98.04	96.85	84.75	49.35	54.83	97.42	96.89	79.52	56.72
18	54.90	98.51	96.96	84.75	49.22	54.99	97.60	96.71	78.94	56.48
19	54.92	98.67	97.42	81.24	47.14	54.69	93.89	92.97	76.74	56.38
20	54.90	93.94	99.53	86.91	50.17	53.81	99.79	99.46	81.46	56.57
21	54.93	98.16	99.76	83.15	47.86	52.47	96.09	94.91	76.98	56.46
22	54.93	97.90	99.04	82.70	47.51	52.64	96.02	94.59	76.65	56.32
23	54.91	99.99	99.23	83.10	48.62	53.91	95.90	94.89	77.51	56.55
24	54.93	99.53	98.06	85.63	49.53	52.64	98.47	97.84	80.01	56.68
25	54.88	99.86	98.86	86.36	49.75	53.97	99.31	98.70	80.69	56.79
26	54.89	99.61	98.65	82.58	47.79	53.69	95.43	94.29	76.90	56.67
27	54.87	99.66	99.11	83.34	48.61	54.36	95.65	95.14	78.01	56.48
28	54.92	99.21	98.08	81.90	47.71	52.94	94.83	93.57	76.17	56.69
29	54.85	98.90	97.77	81.79	47.36	55.09	94.82	93.69	76.75	56.27
30	54.92	98.92	97.18	84.88	49.13	52.96	97.48	96.70	78.93	56.67

Table 4.13 – Continued.

August 17th										
	Ellis					**Johnson and Parker**				
RUN	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**
BL	50.15	78.75	77.21	64.26	46.06	56.10	76.82	77.82	74.62	59.70
1	49.57	76.40	75.03	62.97	45.91	55.69	73.54	73.85	70.26	58.29
2	50.29	76.93	75.29	63.14	45.96	54.82	71.39	71.54	68.06	57.90
3	49.66	77.13	75.61	63.28	46.03	55.86	70.60	70.85	67.73	58.02
4	50.38	76.99	75.33	62.85	45.90	55.24	74.88	75.27	71.55	58.32
5	49.46	77.20	75.61	63.16	45.88	55.91	70.60	70.33	66.71	58.17
6	49.71	75.36	73.80	62.88	45.93	55.75	72.00	72.22	68.77	58.23
7	49.44	76.70	74.90	63.17	45.90	55.76	71.33	71.44	67.87	57.56
8	49.73	75.57	73.81	62.59	45.93	56.22	75.29	75.77	72.01	58.04
9	50.13	77.84	76.16	63.65	45.98	55.44	71.94	72.37	69.33	58.34
10	49.80	76.70	75.17	63.03	45.90	54.74	74.26	74.62	70.90	57.79
11	49.54	76.38	75.18	63.13	45.94	54.89	70.48	70.73	67.34	57.85
12	49.71	76.85	75.13	62.51	45.96	55.90	73.54	74.07	70.63	58.46
13	49.86	77.33	75.51	62.85	45.85	55.84	74.23	74.86	71.66	58.39
14	49.78	78.57	76.93	63.89	45.89	54.98	73.91	74.22	70.75	58.12
15	49.71	77.25	75.78	63.09	45.84	54.80	69.94	69.88	65.20	57.43
16	49.41	76.88	75.34	62.80	45.88	55.35	70.26	70.19	66.14	57.79
17	49.99	76.53	74.98	63.62	45.97	55.73	71.28	71.56	68.63	58.32
18	50.19	76.74	75.20	63.22	45.90	55.21	71.20	71.50	68.29	57.98
19	49.39	74.44	72.80	62.73	45.85	54.85	74.87	75.37	71.57	58.18
20	49.51	77.13	75.66	63.20	45.95	55.94	71.61	71.76	68.28	57.78
21	49.70	76.97	75.37	62.69	45.90	54.71	71.23	71.42	67.78	57.90
22	49.44	76.12	74.43	62.53	45.93	56.00	70.47	70.36	66.92	58.18
23	49.85	76.19	74.92	62.98	45.93	55.36	72.19	72.50	68.97	57.85
24	49.75	77.66	76.20	63.60	45.93	55.60	71.18	71.17	68.16	58.27
25	49.93	77.88	76.51	63.83	45.92	55.31	71.39	71.53	68.16	57.55
26	49.74	76.89	75.49	63.20	46.00	54.75	70.32	70.45	66.94	57.90
27	49.93	74.06	72.75	63.14	45.91	55.12	72.90	73.32	70.17	58.26
28	50.06	78.19	76.57	63.52	45.94	54.69	71.54	71.78	68.44	58.05
29	49.83	74.78	73.12	62.84	45.94	56.07	73.96	74.61	71.12	58.20
30	49.67	78.10	76.56	63.78	45.91	54.90	71.47	71.69	68.33	57.93

Table 4.13 – Continued.

August 17th					
	Kaufman and Rockwall				
RUN	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**
BL	61.05	78.04	72.00	63.07	53.60
1	60.62	76.62	70.40	62.89	53.61
2	60.23	76.01	69.95	62.96	53.61
3	60.23	75.99	69.98	62.85	53.61
4	59.81	75.71	69.99	62.93	53.62
5	60.87	77.20	70.92	63.01	53.61
6	59.81	75.54	70.04	63.00	53.61
7	60.35	76.34	70.47	62.98	53.61
8	60.13	76.62	70.66	62.85	53.61
9	60.40	76.56	70.53	62.89	53.62
10	60.36	76.23	70.29	62.99	53.62
11	59.78	75.69	70.13	63.03	53.61
12	60.70	77.27	71.26	62.92	53.62
13	60.78	77.36	71.10	62.90	53.61
14	60.03	76.12	70.27	62.87	53.62
15	60.43	76.62	70.55	62.91	53.61
16	60.47	76.47	70.44	62.97	53.61
17	59.81	75.93	70.49	63.03	53.62
18	59.85	75.86	70.12	62.98	53.61
19	60.37	76.58	70.38	62.87	53.61
20	60.54	76.81	70.78	62.92	53.62
21	60.67	77.01	70.65	62.94	53.61
22	60.20	75.88	69.93	62.93	53.61
23	59.96	75.48	69.52	62.88	53.61
24	60.81	77.22	70.93	62.90	53.62
25	60.40	76.83	70.90	62.99	53.62
26	59.97	75.59	69.78	62.92	53.61
27	59.99	76.15	70.38	62.99	53.62
28	60.18	75.86	70.03	62.97	53.62
29	59.71	75.27	69.69	63.02	53.61
30	60.71	77.07	70.88	62.95	53.61

means ozone in the Dallas monitoring region during 12 midnight to 6 am, and PrevDayJP7-12mn means the previous day’s ozone in the Johnson & Parker monitoring region during 7 pm – 12 midnight.

4.4 Metamodeling Phase

The purpose of this phase was to construct a mathematical model to predict the maximum 8-hour average ozone concentration in each monitoring region and time period. The mathematical model acted as a surrogate to CAMx simulations, which took about 10-12 hours to run the entire DFW episode. The mathematical model was constructed using multiple linear regression (MLR) analysis using Statistical Analysis Software (SAS). There were monitoring time periods which did not have any significant variables after data mining (see Section 4.3.2), therefore no metamodels were built for those time periods. The author acknowledges the critical help of Industrial Engineering Master students Chintan Thakkar and Akshay Nawathe in conducting the important task.

First, the significant variables from data mining were used to build the regression metamodels for ozone. Next, a "stepwise" model selection method at significance level (α) of 0.10 for each monitoring region and time period was used to select best model. The stepwise regression not only further reduced the number of variables but also selected a model that contained variables having high impact on ozone formation. However, in some cases stepwise model selection method did not select a model. This was mostly observed during 7-12 midnight and 12- 6am time period. Since there is little or no sunlight during 7-12 midnight and 12- 6am time period, emission of ozone precursors do not significantly contribute towards formation of ozone. This was also observed from the coefficient of determination (R^2) value of the regression models for 7-12 midnight and 12-6am time periods (see Appendix G). A low coefficient of determination (R^2) value indicating most of the variability of ozone could not be explained by the candidate set of variables. Table 4.9 summarizes the variables used for building the metamodels.

The metamodels constructed were used in the optimization phase to evaluate cost effective control measures. A metamodel for Dallas County for Aug. 17 is shown below. The metamodels were functions of emissions and ozone from previous time periods (see below). The metamodels variables for each day by monitoring region and time period are summarized in Appendix E.

Monitoring region: Dallas

Day: Aug 17

Time period: 12 midnight – 6 am

-0.475 × (P4Ka12-6a N) + 57.77

Time period: 6am – 12 noon

1.350 × (AEl6-9a V) + 4.20 × (Da12-6a) + 3.37 × (KR12-6a) – 349.43

Time period: 12 noon – 3 pm

-0.215 × (Co6-12n) + 1.201 × (Da6-12n) – 0.125 × (Ta6-12n) – 0.192 × (P4Ta12-6a N) - 10.85

Time period: 3 pm – 7 pm

0.43 × (Da12n-3pm) – 0.031 × (De6-12n) + 0.028 × (De12n-3pm) + 1.17 × (Co12n-3pm) - 1.258 × (Co6-12n) - 44.94

Time period: 7 pm – 12 midnight

0.022 × (AEl3-7pV) + 0.488 × (KR3-7p) + 22.35

4.5 Optimization Phase

The main aim of this phase was to develop an optimization program to find the most cost effective combination of targeted control strategies that would bring the region into attainment for the 8-hour ozone standard. Optimization was carried out with an Integer Programming (IP) approach that incorporated the control strategies, relative reduction factors (for the Modeled Attainment Test), and metamodels. The following sections discuss how control strategies, relative reduction factors, and metamodels were implemented and then the results of the optimization are presented.

4.5.1 Implementation of control measures in optimization

The list of control measures (see Table 4.3) obtained from TCEQ/NCTCOG provided the percent and amount of emission reduction, along with the cost for each control measure by source category and pollutant type. The line (on-road) sources had quantified NO_x and VOC emission reductions and cost. The non-road mobile sources, categorized under area sources, had NO_x based controls, while the controls for area sources that were not non-road mobile sources were mainly based on VOC reductions. The point sources had NO_x based emission reductions. All the emission reductions calculated in the list were across-the-board reductions, i.e. they were applied in the nine non-attainment counties for 24 hours a day. Since this research was aimed at finding targeted control measures, the emission reductions were divided by region and emission control time periods (see Table 4.5). Therefore, the following assumptions were made for calculating the emission reductions by region, control time periods and cost of control measures:

- emission reductions were split over the 9 control regions for 24 hours,
- if a range of percent emission reduction was given, the average percent emission reduction was used, and
- if a range of cost was given for the control, an average cost was used.

For example, if a control measure reduced 1 ton per day of NO_x emissions from an area source across the 9 counties, and had a cost in the range of \$1000-\$2000, the emission reduction for an area source emitting for 3 hours in Dallas County, would be calculated as $\frac{1\,\text{ton}}{24\,\text{hr}} \times \frac{1}{9\,\text{regions}} \times 3\,\text{hr} = 0.014\,\text{ton / region}$ and the cost would be \$1500.

Further, the control strategy list had controls for 5 out of 7 types studied in this research. No controls for EGUs (type 5) and Cement Kilns (type 7) were in the list. Therefore, NO_x emission reductions and costs for EGUs and cement kilns were added to this list. For calculating the emission reductions and costs for EGU and cement kiln control measures the following assumptions were made. For EGUs, Selective Catalytic Reduction (SCR) technology was assumed which has an efficiency range of 70-90% and cost in the range of $ 1300- $ 9800; 50% reduction efficiency and a cost of $ 6000 was assumed. Similarly, for cement kilns, SCR was assumed, which had a removal efficiency of 40-85% and cost in the range of $ 1800- $ 6100; 65% reduction efficiency and a cost of $ 4100 was assumed (Jeavons and Francis, 2008). This reduction was over the existing emission reduction from cement kilns due to Selective Non-Catalytic Reduction (SCNR) control technology.

4.5.2 Implementation of relative reduction factors or constraints in optimization

The constraints for the metamodels were calculated by EPA's MAT described in Chapter 2. The DVF was estimated using the following equation

$$\text{DVF}=\frac{\text{mean(highest modeled 8-hour daily maximum conc. for each episode day)}_{\text{future}}}{\text{mean(highest modeled 8-hour daily maximum conc. for each episode day)}_{\text{baseline}}}\times \text{DVB} \quad (19)$$

According to MAT in order to demonstrate a modeled attainment for a region, the DVF value for ozone must be ≤ 84 ppb.

EPA recommends two methods for calculating RRF. The first method takes a ratio of future to baseline average daily ozone values over the episode days for each monitor. This method has a disadvantage; due to averaging of daily ozone, the method hides information about daily model performance. The second method first calculates the daily RRF and then RRFs are averaged over the episode period for each monitor. This method is better than the first as it provides information about the daily model performance and which days and locations respond to emission reduction (TCEQ, 2007). However, a disadvantage of this method is that averaging the RRFs smoothes the daily variations in RRF value. TCEQ adopted the second method for calculating the RRF. This research used a slightly modified approach from TCEQ, where the daily RRF were calculated but not averaged over the episode period. This kept intact the daily model performance and sensitivity of ozone to emission reductions. This also gave a better understanding in the variation of the RRF over the episode period. Therefore, plugging in DVF = 84, values for the denominator and DVB in Equation (19) from Appendix A Tables A-1 and A-3 respectively for each critical monitor, to solve for the numerator, the constraint limits L_s in the optimization formulation (see Section 3.1.4) was calculated. A sample calculation for August 15, Frisco C31 monitor is shown below. We have

$$84\,ppb = \frac{x}{81.3} \times 100.3\,ppb$$

x = 68.09 ppb.

Therefore, 68.09 ppb was the limiting value for ozone on Aug 15 in Collin County. Similarly constraints were calculated for all the critical monitors are shown in the Table 4.14.

Table 4.14 Summary of daily constraints by monitoring region.

Monitoring Region	**990815**	**990816**	**990817**	**990818**	**990819**	**990820**	**990821**	**990822**
Collin	68.09	89.61	85.93	91.45	72.02	58.54	72.95	74.96
Dallas	74.09	89.77	92.67	92.95	87.16	69.01	76.40	76.49
Denton	84.91	93.60	91.03	93.10	70.10	60.50	84.08	82.43
Ellis	71.10	78.19	78.01	69.20	103.52	80.64	68.74	69.65
Tarrant	76.22	87.01	88.60	84.18	80.60	68.45	72.42	76.66
J&P	71.07	76.06	79.62	66.75	76.06	65.23	74.38	75.10
K&R	66.54	75.93	82.77	82.45	95.86	72.29	78.09	73.69

4.5.3 Implementation of metamodels in optimization

The metamodels constructed in the metamodeling phase (see Section 4.4) were used in the optimization as a surrogate for CAMx for faster computation. The metamodels were constrained by an appropriate value calculated in the Section 4.5.1 for each monitoring region and day. If we recall, in phase 2 of the DMF that the emissions were varied between a factor of 0.1 – 1.0, which corresponded to the fraction of emissions remaining. However, in the list of control strategies the control measures were expressed as amount of emission reduced. Therefore, it was necessary to convert the emissions reduced to the fraction reduced and, subsequently, to the fraction remaining, (1- fraction reduced) before implementing the metamodels in the optimization. The fraction reduced was the ratio of emission reduction due to a control measure to the total emission from a source.

$$\text{Fraction reduced} = \frac{\text{emission reduced by control measure (i)}}{\text{total emission from a source}} \qquad (20)$$

Further, for implementing the metamodels in the optimization, the following assumptions were made:

1. An emission variable cannot be reduced. This was done in order to have a more conservative approach, since for a negative coefficient increasing emissions, would decrease ozone. Due to non-linearity of the ozone chemistry, an increase in NO_x emission can actually lead to decrease in ozone in certain situations, but meteorological forecasts are not reliable enough to predict these conditions in advance with sufficient confidence.

2. No more than 90% emission reduction was allowed by a control measure. This assumption was applicable if the emission reduction was greater than the total emissions, because a 100% reduction would mean removing the source entirely.
3. VOC for point sources was not controlled because no controls for point sources in the control strategy list were provided by TCEQ, therefore, it was assumed that no fraction was reduced

Available temporal profiles were applied to sources for calculating the emissions by time periods (see Appendix F). However, temporal profile information was not readily available for emissions from area sources. Therefore it was assumed that 85% emissions from area sources occurred during 6 am – 7 pm and 15% occurred during 7 pm – 6 am time period for emission calculations. Under these assumptions, the metamodel for each monitoring region and time period was re-formulated to be expressed in terms of coefficients of the control measures.

4.5.4 Optimization

The optimization was carried out for each episode day using an IP approach. The first two days of the 10-day episode were not controlled and optimized as they were the ramp-up days for the CAMx simulations. Therefore, Aug 15 was optimized first followed by subsequent days. After optimizing a day, the ozone was calculated for all monitoring regions. The ozone concentrations from the last monitoring time period (7 pm – 12 midnight) were used to link to the next day. The mathematical formulation for IP was (see Section 3.1.3 for details):

$$\begin{aligned} &Min \quad \sum_{j=1}^{J} c_j u_j \\ &s.t. \quad \hat{f}_t^{s} + \varepsilon \le L_s, \text{ for } s = 1,\ldots,S \text{ and } t = 1,\ldots,T, \end{aligned}$$

$$x_q^{\text{NOx}} = M_q^{\text{NOx}} - \sum_{j=1}^{J} u_j d_{jq}^{\text{NOx}}, \text{ for } q = 1,\ldots,126$$

$$x_q^{\text{VOC}} = M_q^{\text{VOC}} - \sum_{j=1}^{J} u_j d_{jq}^{\text{VOC}}, \text{ for } q = 1,\ldots,126$$

$$u_j \in \{0,1\}, \text{ for } j = 1,\ldots,J.$$

The optimization was carried out using Xpress-MP software (www. dashoptimization.com). The first 5 days (August 15, 16, 17, 18 and 19) of the episode were optimized in order to demonstrate the applicability of the DMF. "Supplemental control measures" were introduced into the optimization if the existing control measures failed to satisfy the constraints. Three types of supplemental controls were considered:

1. 90 % reduction of emission from the source

   In this option, the emission from the source was allowed to be further reduced by up to 90 % of original emissions.

2. 100% reduction of emission from the source

   This option considered reducing all emissions from a source.

3. Reducing previous day's ozone

   This option reduced the previous day's ozone in 7 pm – 12 midnight time period, provided the metamodel was a function a function of previous day's ozone. If this option was selected, then it was an indication that the previous day's ozone would need to be reduced further in order to achieve attainment for the current day.

The supplemental controls were tested individually and in combinations. However, if the above supplemental controls or its combinations did not satisfy the constraints then the constraint on the ozone metamodel was relaxed. Relaxing the constraint on ozone metamodel would mean that it was not possible to bring the ozone under the permissible limit even with the supplemental measures.

A cost higher than any in the list of control measures was allocated to the 90 % emission reduction supplemental controls, while highest cost was allocated to the 100 % emission reduction and for reducing previous day's ozone. This was to ensure that optimization would first try to look within the available set of controls before selecting the any "supplemental controls".

Table 4.15 below summarizes the optimization results for August 15; Johnson & Parker (J&P) and Tarrant monitoring region were not controlled with the existing control measures. Emissions from ICI Boilers (Medium) in Dallas, Denton, and Ellis and Process Heaters emissions from Dallas and Tarrant County during 12 midnight – 6 am were identified as critical sources for ozone formation in J&P. While the emission sources that contributed towards the ozone in the Tarrant County were from ICI Boilers (Medium) in Kaufman County and ICI Boilers (Large) in Dallas County during 12-6am. First, the possibility of supplemental control was explored by further reducing the emissions by 90% or 100%. The NO_x emissions were already controlled by 90% for J&P during 6 am – 12 noon. However, this reduction was sufficient to satisfy the ozone constraint. Further, J&P ozone was also a function of previous day's (August 14) ozone in Dallas during 7 pm – 12 midnight so it was formulated as a decision variable, and optimization was re-run. A 4.53 ppb of reduction in previous day's (August 14) ozone was calculated by optimization to satisfy the constraint and bring J&P region in attainment. J&P during 12 noon – 3 pm was also a function of previous day's (August 14) ozone in Dallas during 7 pm – 12 midnight. Therefore, the 4.53 ppb ozone reduction calculated for J&P 6 am – 12 noon satisfied the constraint for J&P during 12 noon – 3 pm. The emission reductions required by sources can be found in Table 4.12.

Similarly, Tarrant required 6.57 ppb reduction, in previous day's (August 14) ozone from Tarrant during 7 pm – 12 midnight, in addition to 0.132 tons of NO_x emission reduction from the ICI Boilers (Large) in Dallas during 12 midnight – 6 am (100% emission reduction) to satisfy the constraint for Tarrant during 6 am – 12 noon and 12 noon – 3 pm.

Table 4.15 Optimization results for August 15.

Monitoring Region	Time period	Controls Selected	Emission variables	Emission Reduction by Selected Control, tons	Total Emission Reduction, tons	Percent Reduction by Selected Control measure	Percent of Supplemental Emission Reduction	Total Percent Reduction	Reduction of Previous Day Ozone in 7PM – Midnight
J&P	6 am – 12 noon	ICI Boilers Medium	P3El 12-6a N	0.025	0.025	90	0	90	Dallas: 4.53 ppb. (47.90 ppb to 43.47 ppb)
		Process Heaters	P6Ta 12-6a N	0.0045	0.0045	90	0	90	
J&P	12noon – 3 pm	ICI Boilers Medium	P3Da 12-6a N	0.041	0.041	29.71	0	29.71	Dallas: 4.53 ppb. (47.90 ppb to 43.47 ppb)
			P3De 12-6a N	0.032	0.032	90	0	90	
			P3El 12-6a N	0.025	0.025	90	0	90	
		Process Heaters	P6Da 12-6a N	0.0045	0.0045	90	0	90	
			P6Ta 12-6a N	0.0045	0.0045	90	0	90	
			LKa 6-3pm V	0	0	0	0	0	
Tarrant	6 am – 12 noon	ICI Boilers Medium	P3Ka 12-6a N	0.021	0.021	90	0	90	Tarrant: 6.57 ppb (51.35 ppb to 44.61 ppb)
		ICI Boilers Large	P4Da 12-6a N	0.010	0.132	7.58	92.42	100	
Tarrant	12noon – 3 pm	ICI Boilers Medium	P3Ka 12-6a N	0.021	0.021	90	0	90	Tarrant: 6.57 ppb (51.35 ppb to 44.61 ppb)
		ICI Boilers Large	P4Da 12-6a N	0.010	0.132	7.58	92.42	100	

Table 4.16 summarizes the optimization result for August 16, Collin and Tarrant monitoring regions required supplemental controls. For Collin during 6 am – 12 noon, NO_x emissions from EGUs in Kaufman during 6 am – 12 noon was a critical source. For Collin during 12 noon – 3 pm, NO_x emissions from EGUs in Kaufman and line source emissions from Ellis during 12 non - 3 pm were critical. For Tarrant during the 6 am - 12 noon period, NO_x emissions from cement kilns in Ellis during 6 am - 12 noon were critical in contributing towards ozone formation. A similar approach was adopted for Aug 16; first the possibility of additional emission reduction by 90 % and 100 % from existing sources was explored. It was observed that by reducing 90 % NO_x emission from EGU in Kaufman and reducing previous day's ozone in Dallas during 7 pm – 12 pm by 3.33 ppb satisfied the constraint. This supplemental control along with previous day's (August 15) ozone satisfied the ozone constraint for Collin in both the monitoring time periods (6-12 n, and 12-3 pm).

Similarly, in case of Tarrant a 90% reduction of NO_x emissions from cement kilns along with 2.04 ppb of reduction of previous day's ozone from Denton during 7 pm – 12 midnight was required to satisfy the constraint.

Table 4.16 Optimization results for August 16.

Monitoring Region	**Time period**	**Controls Selected**	**Emission variables**	**Emission Reduction by Selected Control, tons**	**Total Emission Reduction, tons**	**Percent Reduction by Selected Control measure**	**Percent of Supplemental Emission Reduction**	**Total Percent Reduction**	**Reduction of Previous Day Ozone in 7PM – Midnight**
Collin	6 am – 12 noon	EGU	P5Ka 6-12nN	0.187	1.009	16.68	73.32	90	Dallas: 3.33 ppb. (50.94 ppb to 47.61 ppb)
Collin	12noon – 3 pm	EGU	P5Ka 6-12nN	0.187	1.009	16.68	73.32	90	Dallas: 3.33ppb. (50.94 ppb to 47.61 ppb)
		Clean Fleet Program	LEl 9-3pm N	0.139	0.139	5.2	0	5.2	
Tarrant	6 am – 12 noon	Cement Kilns	P7El 6-12n N	4.35	6.024	65.00	25.00	90	Denton: 2.04 ppb (42.21 ppb to 40.17 ppb)

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Table 4.17 summarizes the optimization results for August 17, Collin, Dallas, and Tarrant monitoring regions required supplemental controls to satisfy the constraints. For Collin during 12 noon – 3 pm, VOC emissions from area source in Ellis during 6 am - 9 am along with NO_x emissions from line source in Ellis during 9 am - 3 pm were critical for ozone formation. Emission reduction by 90 % and 100 % from both the emission sources was tested in optimization. The ozone in Collin was not a function of ozone from previous day. Therefore, to satisfy the metamodel constraint for Collin monitoring region it was increased from 85.93 to 89.25 (3.32 ppb) along with 100% emission reduction from line and area sources in Ellis.

For Dallas during 6 am – 12 noon, a 100% VOC emission reduction from area source in Ellis during 6 am - 9 am and an increase in the Dallas metamodel constraint from 92.67 to 93.29 (0.62 ppb) satisfied the ozone constraint.

Similarly for Tarrant during 12 noon – 3 pm, further VOC emission reduction by 100% from area source in Ellis during 6 am - 9 am along with increasing the Tarrant metamodel constraint from 88.60 to 90.98 (2.38 ppb) satisfied the ozone in Tarrant monitoring region.

Table 4.17 Optimization results for August 17.

Monitoring Region	Time period	Controls Selected	Emission variables	Emission Reduction by Selected Control, tons	Total Emission Reduction, tons	Percent Reduction by Selected Control measure	Percent of Supplemental Emission Reduction	Total Percent Reduction	Reduction of Previous Day Ozone in 7PM – Midnight	Relaxing Constraint on Ozone
Collin	6 am – 12 noon	Clean Fleet Program, ITS, Traffic Signal Improvement, Fare Free Transit on Ozone Action Days	LEl 9-3pmN	0.359	2.682	13.39	86.61	100	NA*	3.32 ppb (85.93 ppb to 89.25 ppb)
		Lawn mover replacement, Architectural & Industrial Coating, Cold Cleaning Regulations, Glycol Dehydrators	AEl 6-9aV	0.311	1.897	16.39	83.61	100		

Table 4.17 – Continued.

Monitoring Region	**Time period**	**Controls Selected**	**Emission variables**	**Emission Reduction by Selected Control, tons**	**Total Emission Reduction, tons**	**Percent Reduction by Selected Control measure**	**Percent of Supplemental Emission Reduction**	**Total Percent Reduction**	**Reduction of Previous Day Ozone in 7PM – Midnight**	**Relaxing Constraint on Ozone**
Dallas	6 am – 12 noon	Lawn mover replacement, Architectural & Industrial Coating, Cold Cleaning Regulations, Glycol Dehydrators	AEl 6-9aV	0.311	1.897	16.39	83.61	100	NA*	0.62 ppb (92.67 ppb to 93.29 ppb)
Tarrant	12 noon – 3 pm	Lawn mover replacement, Architectural & Industrial Coating, Cold Cleaning Regulations, Glycol Dehydrators	AEl 6-9aV	0.311	1.897	16.39	83.61	100	NA*	2.38 ppb (88.60 ppb to 90.98 ppb)

NA*- Metamodel is not a function of previous day’s ozone

Table 4.18 summarizes the optimization results for August 18. For August 18, 2 monitoring regions, Collin and Tarrant in time periods of 6 am – 12 noon and 12 noon – 3 pm did not satisfy the ozone constraints. The critical emission sources by monitoring region and time period are summarized in Table 4.15. For Collin during 6 am – 12 noon, the NO_x emission from line and point sources were tested with 90 % and 100 % reduction options. It was found that an emission reduction of 90 % along with 6.63 ppb reduction in previous day's ozone in Tarrant during 7 pm – 12 midnight was required to satisfy the ozone constraint.

Further for Collin during 12 noon – 3 pm in addition to the controls applied in the previous time period (6 am – 12 noon), a supplemental emission reduction of 18.1 % in VOC emission, from area source in Ellis during 6 am – 9 am, was required satisfy the ozone constraint.

In case of Tarrant for 6-12 noon and 12 noon – 3 pm, a supplemental emission reduction of 18.1 % reduction in VOC emission, from area source in Ellis during 6 am – 9 am, was required satisfy the ozone constraint.

Table 4.18 Optimization results for August 18.

Monitoring Region	**Time period**	**Controls Selected**	**Emission variables**	**Emission Reduction by Selected Control, tons**	**Total Emission Reduction, tons**	**Percent Reduction by Selected Control measure**	**Percent of Supplemental Emission Reduction**	**Total Percent Reduction**	**Reduction of Previous Day Ozone in 7PM – Midnight, ppb**
Collin	6 am – 12 noon	Clean Fleet Program, Freeway and Arterial Bottle Neck removal, Higher Vehicle occupancy, ITS, Traffic Signal Improvement, Fare Free Transit on Ozone Action Days, ETR-Transit Subsidy Program	LJo6-9aN	0.179	0.482	33.40	56.60	90	Tarrant: 6.63 ppb. (56.36 ppb to 49.73 ppb)
		ICI Boilers (Medium)	P3Ta 12-6aN	0.041	0.128	28.67	61.33	90	
Collin	12noon – 3 pm	Clean Fleet Program, Freeway and Arterial Bottle Neck removal, Higher Vehicle occupancy, ITS, Traffic Signal Improvement, Fare Free Transit on Ozone Action Days, ETR-Transit Subsidy Program	LJo6-9aN	0.179	0.482	33.40	56.60	90	

Table 4.18 – Continued.

Monitoring Region	**Time period**	**Controls Selected**	**Emission variables**	**Emission Reduction by Selected Control, tons**	**Total Emission Reduction, tons**	**Percent Reduction by Selected Control measure**	**Percent of Supplemental Emission Reduction**	**Total Percent Reduction**	**Reduction of Previous Day Ozone in 7PM – Midnight, ppb**
Collin	12noon – 3 pm	Brick Kiln	P1De 12-6aN	0.016	0.016	35.55	0	35.55	Dallas: 4.53 ppb (53.08 ppb to 48.55 ppb)
		ICI Boilers (Medium)	P3Ta 12-6aN	0.041	0.128	28.67	61.33	90	
			P3Ka 12-6aN	0.021	0.021	90	0	90	
		ICI Boilers (Large)	P4Ta 6-12nN	0.01	0.01	90	0	90	
		EGU	P5El 6-12nN	0.187	0.187	37.93	0	37.93	
		Architectural & Industrial Coatings, Commercial and Consumer Products Requirements	ADe6-9aV	0.311	1.557	4.52	18.13	22.65	
Tarrant	6 am – 12 noon	Architectural & Industrial Coatings, Commercial and Consumer Products Requirements	ADe6-9aV	0.311	1.557	4.52	18.13	22.65	None
		Brick Kiln	P1De 12-6aN	0.016	0.016	35.55	0	35.55	
		ICI Boilers (Medium)	P3Ta 12-6aN	0.041	0.041	28.67	0	28.67	
		ICI Boilers (Large)	P4Ta 6-12nN	0.01	0.01	90	0	90	

Table 4.18 – Continued.

Monitoring Region	Time period	Controls Selected	Emission variables	Emission Reduction by Selected Control, tons	Total Emission Reduction, tons	Percent Reduction by Selected Control measure	Percent of Supplemental Emission Reduction	Total Percent Reduction	Reduction of Previous Day Ozone in 7PM – Midnight, ppb
Tarrant	6 am – 12 noon	EGU	P5El 6-12nN	0.187	0.187	37.93	0	37.93	
Tarrant	12noon – 3 pm	Brick Kiln	P1De 12-6aN	0.016	0.016	35.55	0	0%	None
		ICI Boilers (Medium)	P3Ta 12-6aN	0.041	0.041	28.67	0	28.67	
			P3Ka 12-6aN	0.021	0.021	90	0	90	
		ICI Boilers (Large)	P4Ta 6-12nN	0.01	0.01	90	0	90	
		EGU	P5El 6-12nN	0.187	0.187	37.93	0	37.93	
		Architectural & Industrial Coatings, Commercial and Consumer Products Requirements	ADe6-9aV	0.311	1.557	4.52	18.13	22.65	

Table 4.19 summarizes the optimization results for August 19. Four counties, Collin, Dallas, J&P, and Tarrant, failed to satisfy the ozone constraint with the existing control measures. For Collin the ozone during 6 am – 12 noon was not a function of emission variables. However, the ozone was a function of previous day's ozone. In order to satisfy the ozone in Collin during 6 am – 12 noon a 1.04 ppb reduction in the previous day's (August 18) ozone in Denton during 7 pm – 12 midnight was required.

For Dallas, ozone during 6 am – 12 noon was neither a function of emission variables nor a function of previous day's ozone. Therefore, to satisfy the constraint on ozone for Dallas monitoring, it (ozone constraint) had to be relaxed by 4.49 ppb, i.e. by increasing the constraint from 87.16 to 91.65 ppb.

The ozone constraint for J&P was not satisfied in 3 time periods. For 6 am – 12 noon, the NO_x emissions from area source in Johnson County during 6 am – 9 am were critical for ozone formation. The NO_x emissions area sources were tested with 90 % and 100 % reduction options. It was found that an emission reduction of 100 %, along with 1.04 ppb and 3.49 ppb reduction in previous day's ozone in Denton and J&P during 7 pm – 12 midnight, respectively, was required to satisfy the ozone constraint. Similarly, for 12 noon – 3 pm, it was found that an emission reduction of 100 %, along with 1.04 ppb, 4.97 ppb and 3.49 ppb reduction in previous day's ozone in Denton, Ellis and J&P during 7 pm – 12 midnight, respectively, was required to satisfy the ozone constraint. The same controls were applied for 3 pm – 7 pm which satisfied the ozone constraint.

For Tarrant the ozone constraint was not satisfied in 2 time periods of 6 am – 12 noon and 12 noon – 3 pm. Similar to Collin, ozone in Tarrant was not a function of emission variables in both the time periods mentioned above. Therefore, 1.04 ppb, 4.97

ppb, 3.49 ppb, and 4.97 ppb reductions in previous day's ozone in Denton, Ellis, J&P, and Tarrant during 7 pm – 12 midnight, respectively, were required to satisfy the ozone constraint. The ozone in both time periods was a function of previous day's ozone in Denton, Ellis, J&P, and Tarrant monitoring regions.

Table 4.19 Optimization results for August 19.

Monitoring Region	Time period	Controls Selected	Emission variables	Emission Reduction by Selected Control, tons	Total Emission Reduction, tons	Percent Reduction by Selected Control measure	Percent of Supplemental Emission Reduction	Total Percent Reduction	Reduction of Previous Day Ozone in 7PM – Midnight, ppb	Relaxing Constraint on Ozone, ppb
Collin	6am – 12 noon	None	None	0	0	0	0	0	Denton = 1.04	
Dallas	6 am – 12 noon	None	None	0	0	0	0	0		4.49 (from 87.16 to 91.65)
J&P	6 am – 12 noon	Stationary IC Engines, Limitations on Idling of heavy duty, Rail efficiency, Emission reduction contract incentives	AJo6-9aN	0.187	1.185	15.78	84.22	100	Denton = 1.04 J&P = 3.49	
	12 noon – 3 pm	Stationary IC Engines, Limitations on Idling of heavy duty, Rail efficiency, Emission reduction contract incentives	AJo6-9aN	0.187	1.185	15.78	84.22	100	Denton = 1.04 J&P = 3.49 Ellis = 4.97	

Table 4.19 – Continued.

Monitoring Region	Time period	Controls Selected	Emission variables	Emission Reduction by Selected Control, tons	Total Emission Reduction, tons	Percent Reduction by Selected Control measure	Percent of Supplemental Emission Reduction	Total Percent Reduction	Reduction of Previous Day Ozone in 7PM – Midnight, ppb	Relaxing Constraint on Ozone, ppb
J&P	3 pm – 7 pm	Stationary IC Engines, Limitations on Idling of heavy duty, Rail efficiency, Emission reduction contract incentives	AJo6-9aN	0.187	1.185	15.78	84.22	100	Denton = 1.04 J&P = 3.49 Ellis = 4.97	
Tarrant	6 am – 12 noon	None	None	0	0	0	0	0	Denton = 1.04 J&P = 3.49 Ellis = 4.97 Tarrant = 4.97	
	12 noon – 3pm	None	None	0	0	0	0	0	Denton = 1.04 J&P = 3.49 Ellis = 4.97 Tarrant = 4.97	

4.6 Important Observations

The 6 am - 12 noon and 12 noon - 3 pm were the two main critical time period where the ozone exceeded the constraint. This makes sense because an 8-hour ozone average is running average which means that for 8-hour maximum ozone at 10 am would be the average of maximum for 10 am to 6 pm, for 11 am it would be 11 am to 7 pm and so on. It was known that ozone concentration peaks during 2 pm – 4 pm in the afternoon; therefore, it was more likely that the ozone would exceed during the monitoring periods of 6 am – 12 noon and 12 noon – 3 pm which encompassed the peak ozone time periods.

Although the ozone in the DFW region for the first five days optimized could not be reduced by applying existing controls, the DMF identified critical emission sources that affected the ozone in the DFW region. Additional emission reductions upto 90% or 100% over the existing controls were required. Despite these additional emission reductions, the ozone was not totally controlled (previous day's ozone had to be controlled, and constraints had to be raised). The probable reasons for these results are discussed below:

1. The DMF developed in this research used the list of control measures adopted by TCEQ for 8-hour DFW. The need for additional reduction of emissions emphasized the fact that there was need for more control measures and existing control measures were not sufficient to control the ozone in DFW region. This fact was also seen in the DFW SIP, which demonstrated the attainment of DFW region with Weight of Evidence (WoE).

2. The control strategy list had NO_x reduction strategies listed for 5 types of point sources. This was the basis of categorizing the point sources for this research. Apart from the 5 types of point sources listed in the control strategy list 2, additional categories (EGUs and Cement Kilns) were added in the research. These 7 categories of point sources accounted for 76.7 % (see Section 4.2) of total point source emissions which were controlled in this research. Since all the point sources were not controlled, this could have been another reason for need of additional controls.
3. Additionally, the research assumed a uniform emission reduction for all the 9 counties. This assumption flattened the emission reductions. This assumption might also have lead to need for additional controls, since in reality the controls may not be applied uniformly.

CHAPTER 5

CONCLUSIONS AND FUTURE RECOMMENDATIONS

5.1 Conclusions

Developing cost effective control strategies for ozone has been a challenge to air quality modelers. Conventionally, the control strategies are applied across-the board to the region. The main aim of this research was to develop a Decision-Making Framework (DMF) for evaluating and optimizing the selection of ozone control strategies. Conventional across-the-board reductions conduct emission reductions uniformly throughout the region and throughout the day. By contrast, this dissertation studied *targeted* reductions, in which emission sources of various types are reduced at various times and locations.

This DMF was tested on a DFW 2009 future case episode which was based on a 10-day episode from August 13-22, 1999. 612 emission variables were identified in three source categories viz. point, area (includes non-road) and line (on-road). The emission control regions and time periods along with ozone monitoring regions and time periods were defined. The control strategy emission reductions and costs were also identified in this stage. Initially a Latin hypercube experimental design was setup to organize 30 sets of emission reduction scenarios to be modeled using the photochemical model CAMx. Data mining reduced the number of variables to a maximum of 126. A second Latin hypercube was setup to organize another 30 emission reduction scenarios for the significant variables identified by data mining. Metamodels were developed for ozone from the 60 CAMx runs using linear regression models constructed with the stepwise model selection method. Stepwise regression further reduced the number of variables. The metamodels were implemented in the optimization as a surrogate for time-intensive CAMx modeling. Appropriate constraints were calculated for each metamodel to ensure that it satisfied EPA's MAT. The optimization was formulated to find the most cost effective combination of targeted control strategies that brings the region into attainment for the 8-hour ozone. Each day was optimized individually in sequence. In order to demonstrate applicability of the DMF, five days (August 15, 16, 17, 18 and 19) of the episode were optimized.

The following conclusions were made after optimizing five days:

1. Key sources and locations to be controlled:

   The optimization largely selected the NO_x emission controls for point sources in Dallas, Denton, Ellis, Kaufman and Tarrant for all point source types except lime kilns. The NOx emissions from line sources in Ellis and Johnson County were significant contributors. The VOC emissions from line sources in Kaufman County were also a significant source. In the area source category, VOC emissions from Denton and Ellis during the 6 am – 9 am were important.

2. Key emission time periods to be controlled:

   In the case of point sources, NO_x emissions from 12 midnight – 6 am and 6 am – 12 noon mainly contributed towards the formation of ozone. The line source emissions during the morning peak of 6 am – 9 am and off-peak period of 9 am – 3 pm were important. The key area sources were predominant during the 6 am – 9 am time period.

3. Although the DMF identified the key sources, time periods, and control strategies, the existing controls on these sources were not adequate to bring the region in attainment. Further reductions at these sources beyond the existing list of TCEQ/NCTCOG control strategies were required.

4. The existing controls in the DFW region are not sufficient to control the ozone and bring the region into attainment with the 8-hour standard.

5. The research demonstrated the applicability of the DMF in identifying key emission sources and *targeted* controls.

5.2 Future Recommendations

The DMF is a general framework which was implemented on the DFW 2009 future case to demonstrate its applicability. The phases of this framework can be applied to any other ozone non-attainment region. Based on the results of this research, improvements in the following areas can be made for the DFW 2009 future case to improve its performance

5.2.1 Additional source reductions

This research categorized and controlled 7 types of point sources which accounted for 76.7% of the total point source emissions. Further categorization of point sources can be done to account for 100% of emissions by point sources. This will give an opportunity to better control all point source emissions and also to study if this would help in eliminating the need for supplemental controls in the optimization. Controls for point, area, and line sources beyond those in the NCTCOG/Environ short list could also be considered. The optimization could be expanded to include feasibility of these controls.

5.2.2 Distribution of emission reductions

The emission reductions of the control measures in this research were split uniformly throughout the region. It will be interesting to distribute emissions reductions based on other criteria, such as the population of the county, vehicle miles traveled in a county and number of sources. If available, the temporal profile of the nominal emissions could be used to partition the emission reductions of the control measure.

5.2.3 Refinement of metamodel

This research used MLR and stepwise regression to develop metamodels. Future studies could focus on alternate regression models with various significance levels. For models with a low R^2 value, MARS could be used to build the metamodels.

5.2.4 Implementation of "margin of error"

The optimization formulation includes a margin of error quantity in the ozone constraint to account for uncertainty. An estimate for margin of error be taken from the metamodels based on the mean square for error (MSE). However, the margin of error was set to zero in this study since a positive error will require further reductions.

5.2.5 Confirming for attainment

Since the current research focused on the applicability of the DMF, the optimization results were not tested in a photochemical air quality model. Future studies could test the optimized results from the DMF in photochemical air quality model like CAMx to confirm attainment.

APPENDIX A

CALCULATION OF RELATIVE REDUCTION FACTOR

Table A-1 1999 Baseline 8-hour average maximum ozone concentration

1999 Baseline Case									
Site	**990815**	**990816**	**990817**	**990818**	**990819**	**990820**	**990821**	**990822**	**Average**
Frisco	81.3	107.0	102.6	109.2	86.0	**69.9**	87.1	89.5	**94.7***
Dallas C60	83.1	99.8	103.4	103.8	99.2	78.0	85.5	85.3	**92.3**
North Dallas C63	82.6	101.3	102.6	106.6	96.5	76.4	86.8	88.4	**92.7**
Dallas C402	77.0	93.3	98.5	96.6	107.4	83.7	79.4	79.5	**89.4**
Denton	102.6	113.1	110.0	112.5	84.7	73.1	101.6	99.6	**99.7**
Midlothian	78.3	86.1	85.9	76.2	114.0	88.8	75.7	76.7	**85.2**
Arlington	86.2	98.4	100.2	95.2	106.9	83.1	81.9	86.7	**92.3**
Fort Worth C13	93.8	105.5	104.3	106.0	96.0	80.1	89.8	92.0	**95.9**
Fort Worth C17	101.1	111.1	110.4	108.3	92.4	78.6	95.9	94.9	**99.1**
Johnson	74.1	79.3	83.0	69.6	106.8	96.7	77.6	79.9	**83.4**
Parker	101.4	80.6	91.7	75.5	80.0	68.6	96.0	78.9	**84.1**
Kaufman	68.6	68.3	74.5	74.2	96.1	65.1	73.2	66.3	**73.3**
Rockwall	63.6	77.3	87.0	99.9	91.6	69.4	74.6	71.1	**79.3**

* Average calculated excluding 69.9 for Aug 20.

Table A-2 2009 Baseline 8-hour average maximum ozone concentration

2009 Future Year									
Site	**990815**	**990816**	**990817**	**990818**	**990819**	**990820**	**990821**	**990822**	**Average**
Frisco	67.7	100.9	101.9	100.5	73.2	63.9	74.8	74.4	**82.2**
Dallas C60	73.1	93.0	103.5	97.8	91.4	80.7	78.0	74.0	**86.4**
North Dallas C63	71.0	95.6	101.9	99.7	84.4	77.4	76.2	74.1	**85.0**
Dallas C402	66.7	82.4	89.5	85.1	97.0	85.2	70.3	71.3	**80.9**
Denton	88.5	103.4	108.0	92.0	71.6	64.6	89.8	83.5	**87.7**
Midlothian	72.6	77.3	78.8	70.3	99.0	85.7	69.9	70.7	**78.0**
Arlington	75.0	89.2	90.6	81.8	95.5	85.2	73.1	79.6	**83.8**
Fort Worth C13	80.9	94.7	94.3	87.9	83.6	75.7	79.2	81.1	**84.7**
Fort Worth C17	89.3	99.1	104.4	90.3	79.2	70.6	88.1	82.2	**87.9**
Johnson	68.6	70.8	72.7	61.8	91.0	86.7	70.6	71.9	**74.3**
Parker	83.1	70.5	77.8	65.4	71.7	65.0	79.7	69.5	**72.9**
Kaufman	62.5	62.0	64.3	64.3	86.3	58.7	66.4	61.1	**65.7**
Rockwall	59.1	68.9	78.0	90.5	78.9	63.6	66.0	63.7	**71.1**

Table A-3 1999 Baseline case ozone design values at critical monitors in DFW

Site	1999 Baseline case design value, ppb
Frisco	100.3
Dallas C60	92.0
North Dallas C63	93.0
Dallas C402	88.0
Denton	101.5
Midlothian	92.5
Arlington	90.5
Fort Worth C13	98.3
Fort Worth C17	96.3
Johnson	87.6
Parker	88.3
Kaufman	75.6
Rockwall	80.3

Table A-4 Daily relative reduction factor

	Daily Average RRF								TCEQ Average RRF
Site	**990815**	**990816**	**990817**	**990818**	**990819**	**990820**	**990821**	**990822**	
Frisco	0.833	0.943	0.993	0.920	0.851		0.859	0.831	**0.890***
Dallas C60	0.880	0.932	1.001	0.942	0.921	1.035	0.912	0.868	**0.936**
North Dallas C63	0.860	0.944	0.993	0.935	0.875	1.013	0.878	0.838	**0.917**
Dallas C402	0.866	0.883	0.909	0.881	0.903	1.018	0.885	0.897	**0.905**
Denton	0.863	0.914	0.982	0.818	0.845	0.884	0.884	0.838	**0.878**
Midlothian	0.927	0.898	0.917	0.923	0.868	0.965	0.923	0.922	**0.918**
Arlington	0.870	0.907	0.904	0.859	0.893	1.025	0.893	0.918	**0.909**
Fort Worth C13	0.862	0.898	0.904	0.829	0.871	0.945	0.882	0.882	**0.884**
Fort Worth C17	0.883	0.892	0.946	0.834	0.857	0.898	0.919	0.866	**0.887**
Johnson	0.926	0.892	0.876	0.887	0.852	0.897	0.910	0.899	**0.892**
Parker	0.819	0.875	0.849	0.866	0.897	0.948	0.831	0.881	**0.871**
Kaufman	0.912	0.908	0.863	0.867	0.898	0.902	0.908	0.922	**0.898**
Rockwall	0.929	0.892	0.898	0.905	0.861	0.917	0.884	0.895	**0.898**

* Average calculated excluding Aug 20.

APPENDIX B

STAGE 1 CAMX RUNS FOR AUGUST 13 - 22

Table B-1 Stage 1 CAMx output for August 13

August 13th										
	Collin					Dallas				
RUN	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**
BL	41.88	63.05	60.31	52.41	46.33	47.93	78.99	75.60	58.72	46.73
1	42.48	62.97	59.89	52.18	46.37	48.45	77.37	74.87	59.11	47.86
2	42.72	62.76	59.50	52.03	46.10	47.55	74.83	72.21	56.03	47.26
3	43.01	63.00	59.67	52.14	46.12	48.47	76.46	73.56	56.22	46.17
4	41.94	62.61	59.47	52.06	46.01	47.41	74.87	72.15	55.36	46.58
5	41.93	62.74	59.54	52.12	46.05	47.21	75.07	72.15	55.32	46.21
6	42.69	62.83	59.71	52.12	46.53	48.19	76.28	74.22	58.15	47.40
7	42.09	62.90	59.82	52.19	46.58	48.17	77.25	75.13	59.54	47.36
8	41.92	62.92	59.91	52.22	46.32	48.09	77.30	74.39	57.54	46.66
9	43.16	62.81	59.75	52.13	46.48	48.31	76.72	74.47	58.59	47.22
10	42.26	62.72	59.62	52.14	46.08	47.91	76.57	73.40	56.16	46.09
11	41.89	62.79	59.71	52.16	46.12	47.57	76.40	73.32	55.72	46.16
12	41.90	62.92	60.01	52.23	46.72	48.34	77.98	75.87	60.37	47.67
13	42.26	62.82	59.83	52.16	46.31	48.07	76.53	73.88	57.55	47.27
14	42.35	62.86	59.80	52.18	46.33	48.10	76.89	74.28	57.29	46.58
15	41.93	62.71	59.75	52.16	46.19	47.71	76.22	73.62	57.17	47.00
16	41.84	62.61	59.74	52.13	46.12	47.62	76.33	73.40	56.64	46.99
17	42.76	62.80	59.64	52.15	46.15	48.14	76.40	73.76	57.23	46.73
18	41.92	62.93	59.75	52.15	46.17	48.15	76.48	73.45	55.91	46.19
19	41.94	62.77	59.75	52.14	46.34	47.54	76.08	73.66	57.45	47.11
20	41.96	62.63	59.59	52.15	46.12	47.24	75.71	73.17	56.30	46.37
21	41.97	62.92	59.55	52.16	46.02	47.67	75.49	72.41	55.03	45.65
22	42.89	62.95	59.68	52.14	46.16	48.34	76.60	74.02	57.91	47.08
23	42.20	62.93	59.75	52.17	46.39	47.97	76.49	74.17	57.62	46.66
24	42.01	62.91	59.99	52.22	46.59	48.17	77.67	75.22	59.09	47.69
25	41.93	62.80	59.88	52.22	46.41	47.82	77.31	74.86	59.11	47.33
26	42.35	62.75	59.66	52.15	46.13	47.97	76.45	73.63	56.51	46.25
27	41.95	62.84	59.67	52.11	46.20	47.88	75.85	73.10	55.92	46.80
28	41.98	62.68	59.63	52.10	46.08	47.82	76.37	73.41	56.20	46.44
29	42.63	62.71	59.75	52.18	46.28	48.21	77.11	74.72	58.59	46.94
30	42.62	62.81	59.50	52.09	45.98	48.20	75.86	72.52	54.98	45.81

Table B-1 *Continued*

August 13th										
	Denton					Tarrant				
RUN	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**
BL	42.59	59.03	58.69	53.46	48.49	47.46	78.99	75.54	62.50	46.65
1	42.60	58.91	58.61	53.51	48.71	47.39	77.37	74.87	60.38	47.86
2	42.71	58.89	58.51	53.13	48.49	45.91	74.30	72.21	60.30	47.26
3	42.67	58.89	58.50	53.12	48.41	46.95	76.46	73.56	60.41	46.56
4	42.68	58.91	58.47	52.95	48.34	45.98	74.72	72.15	61.15	46.78
5	42.67	58.95	58.54	52.99	48.37	45.82	74.91	72.15	60.52	46.21
6	42.69	58.96	58.67	53.60	48.79	46.75	76.28	74.22	61.33	47.40
7	42.73	58.92	58.64	53.64	48.80	46.85	77.25	75.13	60.70	47.36
8	42.65	58.93	58.62	53.44	48.62	46.99	77.30	74.39	59.83	46.66
9	42.71	58.89	58.62	53.55	48.77	47.06	76.72	74.47	60.67	47.22
10	42.66	58.91	58.49	52.95	48.36	46.89	76.57	73.40	61.48	46.63
11	42.61	58.95	58.58	53.16	48.47	46.47	76.40	73.32	59.68	46.16
12	42.62	58.96	58.70	53.84	48.94	47.37	77.98	75.87	62.26	47.67
13	42.62	58.95	58.63	53.47	48.65	46.88	76.53	73.88	61.08	47.27
14	42.65	58.91	58.59	53.43	48.64	46.94	76.89	74.28	62.92	47.96
15	42.68	58.94	58.58	53.30	48.51	46.45	76.22	73.62	61.13	47.00
16	42.59	58.92	58.54	53.09	48.43	46.79	76.33	73.40	60.17	46.99
17	42.64	58.98	58.59	53.18	48.45	46.84	76.40	73.76	61.88	47.46
18	42.64	58.99	58.64	53.27	48.55	46.80	76.48	73.45	60.12	46.19
19	42.66	58.92	58.60	53.42	48.65	46.24	76.08	73.66	61.42	47.19
20	42.73	58.95	58.57	53.15	48.40	45.95	75.71	73.17	60.52	46.37
21	42.72	58.95	58.48	52.81	48.27	45.98	75.49	72.41	60.24	46.03
22	42.72	58.89	58.51	53.16	48.45	46.88	76.60	74.02	61.44	47.08
23	42.71	58.96	58.65	53.50	48.68	46.42	76.49	74.17	60.40	46.66
24	42.63	58.98	58.70	53.69	48.83	47.20	77.67	75.22	60.73	47.69
25	42.66	58.89	58.56	53.47	48.68	46.81	77.31	74.86	60.50	47.33
26	42.73	58.95	58.57	53.16	48.39	46.68	76.45	73.63	59.97	46.25
27	42.69	58.98	58.65	53.34	48.57	46.50	75.78	73.10	59.91	46.80
28	42.69	58.91	58.52	53.08	48.39	46.74	76.37	73.41	61.86	46.72
29	42.70	59.00	58.64	53.42	48.57	47.06	77.11	74.72	62.03	47.31
30	42.69	58.93	58.47	52.77	48.24	46.77	75.86	72.52	60.53	45.81

Table B-1 *Continued*

August 13th										
	Ellis					Johnson and Parker				
RUN	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**
BL	42.98	63.76	62.54	54.31	48.46	41.75	57.37	59.10	55.36	48.63
1	42.60	60.76	59.69	53.28	48.06	40.93	57.37	58.76	54.69	48.93
2	42.47	59.24	58.12	52.26	47.70	40.93	57.37	58.83	54.81	48.47
3	42.96	60.22	59.31	52.30	47.41	40.93	57.37	58.56	54.26	48.89
4	42.45	59.78	58.74	52.45	47.60	40.93	57.37	58.78	54.74	48.23
5	42.19	58.34	57.52	51.71	47.46	40.93	57.37	58.80	54.76	48.03
6	42.21	59.83	59.00	52.82	47.81	40.93	57.37	58.74	54.66	48.40
7	42.48	61.26	60.30	53.10	47.99	40.93	57.37	58.67	54.55	48.36
8	42.46	59.95	58.87	52.67	47.85	40.93	57.37	58.68	54.56	48.52
9	42.76	60.34	59.29	52.53	47.76	40.93	57.37	58.71	54.61	48.71
10	42.38	58.52	57.45	51.70	47.36	40.93	57.37	58.79	54.75	48.46
11	42.36	59.23	58.32	51.89	47.51	40.93	57.37	58.68	54.55	48.52
12	42.70	61.50	60.55	53.64	48.13	40.93	57.37	58.58	54.39	48.18
13	42.60	60.35	59.45	53.03	47.82	40.93	57.37	58.67	54.55	48.85
14	42.50	59.97	59.11	52.76	47.96	40.93	57.37	58.96	55.07	48.63
15	42.19	60.21	59.32	53.06	47.94	40.93	57.37	58.83	54.81	48.80
16	42.42	59.18	57.99	52.26	47.79	40.93	57.37	58.79	54.74	48.91
17	42.75	59.76	58.57	52.22	47.59	40.93	57.37	58.80	54.76	48.79
18	42.03	58.78	58.06	51.71	47.58	40.93	57.37	58.69	54.59	48.06
19	42.44	59.48	58.56	52.50	47.73	40.93	57.37	58.68	54.58	48.29
20	42.61	60.52	59.45	52.60	47.68	40.93	57.37	58.82	54.80	48.80
21	42.05	58.35	57.22	51.68	47.30	40.93	57.37	58.65	54.51	48.10
22	42.17	59.10	58.37	52.28	47.84	40.93	57.37	58.74	54.67	48.76
23	42.55	59.60	58.81	52.37	47.58	40.93	57.37	58.56	54.25	48.25
24	42.51	60.30	59.39	53.14	48.09	40.93	57.37	58.84	54.82	48.71
25	42.57	59.77	59.00	52.84	47.91	40.93	57.37	58.68	54.55	48.52
26	42.66	61.19	60.02	52.74	47.73	40.93	57.37	58.65	54.50	48.78
27	42.51	59.68	58.73	52.46	47.70	40.93	57.37	58.85	54.84	48.62
28	42.41	59.23	58.31	52.27	47.67	40.93	57.37	58.92	54.96	48.85
29	42.46	61.78	60.68	53.39	48.10	40.93	57.37	58.84	54.83	49.09
30	42.28	58.97	58.10	51.49	47.31	40.93	57.37	58.79	54.75	47.98

Table B-1 *Continued*

August 13th					
	Kaufman and Rockwall				
RUN	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**
BL	47.54	74.53	70.40	54.46	47.11
1	47.59	73.77	69.21	53.24	46.28
2	46.94	72.18	67.72	52.28	46.19
3	47.53	73.42	68.71	52.76	46.32
4	46.72	72.50	67.99	52.41	46.08
5	46.53	72.65	68.25	52.52	46.24
6	47.56	73.05	68.53	52.90	46.33
7	47.48	73.80	69.37	53.42	46.40
8	47.60	74.09	69.54	53.44	46.64
9	48.08	73.84	69.10	53.06	46.30
10	47.41	73.23	68.61	52.98	46.27
11	46.89	73.22	68.81	52.91	46.26
12	47.57	73.65	69.46	53.56	46.47
13	47.44	73.64	69.10	53.25	46.49
14	47.61	73.53	68.92	53.09	46.50
15	46.64	72.79	68.59	53.03	46.52
16	46.76	72.81	68.56	53.04	46.43
17	47.72	73.43	68.70	53.03	46.33
18	47.33	73.45	68.87	52.88	46.39
19	46.30	72.72	68.75	52.96	46.37
20	46.92	73.02	68.58	53.00	46.42
21	47.05	73.44	68.72	52.91	46.34
22	47.70	73.69	68.94	52.95	46.32
23	47.57	74.00	69.36	53.45	46.46
24	47.17	73.46	69.34	53.46	46.61
25	47.39	73.59	69.39	53.64	46.54
26	47.14	73.12	68.69	53.16	46.55
27	46.96	72.87	68.41	52.60	46.14
28	46.80	72.50	68.19	52.74	46.16
29	47.66	73.40	68.95	53.38	46.52
30	47.52	73.01	68.25	52.36	46.11

Table B-2 Stage 1 CAMx output for August 14

August 14th										
	Collin					Dallas				
RUN	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**
BL	47.67	61.73	59.84	50.31	40.47	53.43	71.75	68.65	57.94	47.33
1	47.66	61.64	59.75	50.28	40.46	53.83	70.87	68.06	58.53	48.13
2	47.66	61.54	59.65	50.19	40.46	52.46	67.31	65.12	57.26	47.24
3	47.67	61.60	59.70	50.20	40.46	53.78	69.36	66.93	58.45	48.50
4	47.65	61.43	59.51	50.07	40.46	52.21	67.55	65.30	57.70	47.71
5	47.66	61.62	59.73	50.25	40.46	52.55	68.15	65.73	57.56	47.43
6	47.66	61.59	59.70	50.24	40.46	53.08	67.91	65.70	57.26	47.41
7	47.67	61.54	59.63	50.13	40.46	53.78	69.99	67.29	57.81	47.50
8	47.66	61.56	59.67	50.22	40.46	53.37	70.42	67.70	58.38	47.99
9	47.66	61.44	59.52	50.08	40.46	54.06	69.78	67.27	58.26	48.18
10	47.67	61.54	59.63	50.14	40.46	53.34	68.97	66.46	58.01	47.80
11	47.66	61.55	59.65	50.18	40.46	52.98	69.54	66.92	57.76	47.63
12	47.67	61.53	59.62	50.13	40.46	53.40	70.52	67.84	58.48	48.28
13	47.66	61.48	59.56	50.09	40.46	53.37	70.86	68.11	58.54	48.06
14	47.66	61.68	59.79	50.30	40.46	53.51	68.74	66.25	57.02	47.08
15	47.67	61.66	59.77	50.26	40.46	53.67	70.03	67.35	58.22	47.77
16	47.65	61.44	59.52	50.09	40.46	53.41	70.89	67.96	57.71	47.34
17	47.66	61.59	59.70	50.22	40.46	53.63	69.40	66.74	57.76	47.55
18	47.68	61.59	59.68	50.17	40.46	53.06	68.97	66.57	57.90	47.88
19	47.67	61.53	59.61	50.10	40.46	52.86	69.31	66.91	58.62	48.72
20	47.66	61.64	59.75	50.29	40.46	53.04	68.65	66.30	57.98	47.91
21	47.67	61.68	59.79	50.26	40.46	52.51	67.84	65.68	58.46	48.62
22	47.67	61.67	59.78	50.27	40.46	53.39	68.89	66.23	57.33	47.16
23	47.67	61.50	59.58	50.11	40.46	53.18	68.68	66.41	58.16	48.42
24	47.67	61.70	59.81	50.30	40.46	52.72	69.45	66.79	57.23	47.10
25	47.67	61.56	59.66	50.15	40.46	53.18	69.65	66.88	57.68	47.36
26	47.67	61.52	59.61	50.12	40.46	53.85	70.15	67.42	57.95	47.63
27	47.67	61.54	59.64	50.16	40.46	53.44	69.95	67.27	57.52	47.20
28	47.66	61.56	59.67	50.21	40.46	52.67	68.08	65.64	57.00	47.05
29	47.66	61.60	59.71	50.23	40.46	54.14	70.50	67.76	58.38	47.96
30	47.67	61.57	59.68	50.18	40.46	53.61	70.20	67.43	58.09	47.68

Table B-2 *Continued*

August 14th										
	Denton					Tarrant				
RUN	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**
BL	47.31	60.75	59.69	51.64	41.21	55.78	90.10	87.15	70.98	49.98
1	47.31	60.69	59.65	51.64	41.16	56.05	87.36	84.90	71.42	52.45
2	47.30	60.67	59.63	51.61	41.16	55.57	83.89	81.42	68.79	50.88
3	47.30	60.69	59.64	51.62	41.16	55.43	85.73	83.24	69.94	51.70
4	47.30	60.68	59.63	51.59	41.16	55.51	84.27	81.73	68.74	50.94
5	47.30	60.68	59.64	51.62	41.16	55.51	84.75	82.27	69.28	51.18
6	47.30	60.68	59.64	51.62	41.16	55.49	84.37	81.92	69.15	50.88
7	47.31	60.69	59.64	51.61	41.16	55.88	86.18	83.61	69.95	50.71
8	47.31	60.70	59.65	51.62	41.16	55.70	87.01	84.39	70.26	50.94
9	47.31	60.69	59.64	51.60	41.16	55.56	86.13	83.52	69.67	50.84
10	47.30	60.68	59.64	51.61	41.16	55.48	85.75	83.29	70.17	52.01
11	47.30	60.69	59.65	51.61	41.16	55.48	86.03	83.52	70.14	51.36
12	47.31	60.70	59.65	51.61	41.16	55.62	86.85	84.29	70.56	51.35
13	47.31	60.69	59.64	51.60	41.16	56.03	87.18	84.68	71.24	52.31
14	47.30	60.70	59.66	51.63	41.16	55.51	85.63	83.12	69.57	50.72
15	47.30	60.70	59.65	51.63	41.16	55.90	86.47	84.02	70.69	52.02
16	47.31	60.68	59.64	51.59	41.16	55.56	86.91	84.38	70.63	51.13
17	47.30	60.69	59.65	51.62	41.16	55.46	85.51	83.09	70.08	51.72
18	47.30	60.69	59.64	51.61	41.16	55.51	85.78	83.32	70.34	52.07
19	47.31	60.68	59.63	51.60	41.16	55.61	85.82	83.37	70.57	52.62
20	47.30	60.71	59.66	51.64	41.16	55.54	85.38	82.91	69.83	51.91
21	47.30	60.69	59.65	51.63	41.16	55.55	85.03	82.46	69.01	51.20
22	47.30	60.70	59.65	51.63	41.16	55.51	84.92	82.41	69.08	50.34
23	47.30	60.68	59.64	51.60	41.16	55.55	85.15	82.61	69.37	51.29
24	47.30	60.70	59.66	51.63	41.16	55.52	85.77	83.30	70.25	51.28
25	47.30	60.69	59.65	51.61	41.16	55.54	85.65	83.15	70.08	51.28
26	47.31	60.70	59.65	51.61	41.16	55.78	86.56	84.04	70.35	51.25
27	47.30	60.69	59.64	51.61	41.16	55.68	86.14	83.54	69.60	50.30
28	47.30	60.69	59.64	51.62	41.16	55.33	84.65	82.19	69.28	51.11
29	47.31	60.71	59.66	51.63	41.16	56.08	87.37	84.70	71.02	51.98
30	47.31	60.69	59.65	51.62	41.16	55.91	86.89	84.06	69.84	50.55

Table B-2 *Continued*

August 14th										
	Ellis					**Johnson and Parker**				
RUN	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**
BL	50.93	66.71	64.81	57.32	44.38	54.31	86.16	85.62	73.19	50.81
1	50.63	65.54	63.61	57.22	44.92	53.92	84.66	84.20	72.20	51.90
2	48.64	62.93	61.82	57.12	44.55	53.71	82.70	82.25	71.03	51.68
3	49.13	63.90	62.73	57.28	45.21	53.88	83.99	83.49	71.79	51.86
4	49.26	63.16	61.62	57.40	45.11	53.88	83.28	82.76	71.04	50.69
5	48.70	62.33	61.18	57.05	44.37	53.95	83.67	83.17	71.60	51.62
6	49.41	63.36	61.99	57.05	44.49	53.67	82.69	82.27	70.80	51.06
7	50.09	64.44	62.81	56.99	44.45	53.73	83.63	83.17	71.59	51.30
8	50.38	64.83	63.22	57.20	44.65	54.01	84.65	84.14	72.18	51.44
9	49.36	63.19	62.02	57.34	44.96	53.80	83.90	83.40	71.53	50.82
10	49.30	62.66	61.56	57.45	44.98	54.05	84.43	83.88	71.95	51.64
11	49.79	64.12	62.69	57.37	45.07	53.98	84.13	83.62	71.71	51.36
12	50.50	65.21	63.18	57.46	45.17	53.81	84.00	83.53	71.58	50.82
13	50.34	64.67	62.97	57.07	44.59	53.97	84.64	84.12	72.01	51.14
14	49.20	63.16	61.68	57.18	44.73	53.97	84.21	83.71	71.77	50.89
15	49.93	64.13	62.85	57.27	44.83	53.93	84.46	83.98	72.25	51.91
16	50.46	65.26	63.59	57.42	45.00	53.93	84.33	83.84	72.21	52.01
17	48.94	62.52	61.50	57.10	44.52	53.85	83.66	83.18	71.67	52.00
18	49.43	63.56	62.25	57.16	44.77	53.98	84.10	83.59	71.64	51.36
19	49.44	62.98	61.55	57.14	44.71	53.95	83.99	83.47	71.49	51.33
20	49.25	63.28	61.86	57.29	45.04	54.05	84.30	83.77	71.66	51.15
21	48.77	61.62	60.87	57.22	44.81	54.09	84.30	83.75	71.74	51.52
22	48.85	63.11	61.77	57.43	44.84	53.70	83.04	82.61	71.15	50.77
23	49.33	63.41	62.30	57.16	44.65	53.83	83.46	82.96	71.21	51.61
24	50.06	64.50	62.50	57.33	44.92	53.85	83.63	83.19	71.46	50.95
25	49.51	63.64	62.45	57.57	45.12	53.78	83.36	82.91	71.54	51.95
26	49.58	63.89	62.52	57.36	44.69	53.91	84.33	83.82	72.04	51.41
27	49.84	64.21	62.99	57.44	45.17	53.86	84.04	83.56	72.03	51.84
28	48.68	62.29	61.01	57.27	44.87	53.95	83.48	82.97	71.33	51.34
29	49.91	64.17	62.78	57.07	44.47	53.97	84.90	84.39	72.39	51.86
30	50.05	64.75	63.23	57.08	44.67	54.03	84.81	84.28	72.27	50.90

Table B-2 *Continued*

August 14th					
	Kaufman and Rockwall				
RUN	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**
BL	48.12	68.05	67.57	63.01	45.95
1	48.12	68.06	67.57	63.05	46.15
2	48.12	68.06	67.57	63.03	46.07
3	48.12	68.06	67.57	63.06	46.17
4	48.12	68.06	67.57	63.06	46.21
5	48.12	68.06	67.57	63.09	46.34
6	48.12	68.06	67.58	63.01	45.97
7	48.12	68.06	67.58	63.04	46.11
8	48.12	68.06	67.58	63.01	45.98
9	48.12	68.06	67.57	63.06	46.19
10	48.12	68.06	67.57	63.04	46.10
11	48.12	68.06	67.57	63.07	46.26
12	48.12	68.06	67.58	63.02	46.04
13	48.12	68.06	67.57	63.09	46.31
14	48.12	68.06	67.57	63.08	46.28
15	48.12	68.06	67.57	63.07	46.23
16	48.12	68.06	67.57	63.08	46.29
17	48.12	68.06	67.57	63.04	46.09
18	48.12	68.06	67.57	63.09	46.32
19	48.12	68.06	67.57	63.03	46.06
20	48.12	68.06	67.58	63.02	46.02
21	48.12	68.06	67.57	63.08	46.27
22	48.12	68.06	67.57	63.01	45.96
23	48.12	68.05	67.57	63.02	46.00
24	48.12	68.06	67.57	63.06	46.22
25	48.12	68.06	67.57	63.05	46.14
26	48.12	68.06	67.57	63.03	46.05
27	48.12	68.06	67.57	63.05	46.17
28	48.12	68.06	67.57	63.05	46.12
29	48.12	68.06	67.58	63.02	46.01
30	48.12	68.06	67.58	63.07	46.25

Table B-3 Stage 1 CAMx output for August 15

August 15th										
	Collin					Dallas				
RUN	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**
BL	52.36	67.74	63.88	53.79	42.20	54.90	73.12	69.18	58.82	50.47
1	52.26	67.19	63.33	53.65	42.14	54.33	71.01	67.10	58.50	51.23
2	51.47	66.54	63.16	53.76	42.13	51.47	67.32	64.38	58.33	50.65
3	51.76	66.65	63.10	53.83	42.14	51.88	67.64	65.27	58.84	51.35
4	51.79	66.76	63.18	53.70	42.14	51.79	67.58	64.38	58.25	50.95
5	51.50	66.51	63.10	53.79	42.13	51.50	67.38	64.43	58.65	50.82
6	51.83	66.78	63.17	53.61	42.13	51.87	67.60	64.57	58.09	50.72
7	51.99	67.21	63.53	53.84	42.13	53.07	69.56	66.57	58.52	50.81
8	52.15	67.38	63.62	53.96	42.14	53.92	70.78	67.47	59.00	51.15
9	52.06	67.29	63.58	53.95	42.14	52.62	68.86	66.17	58.99	51.25
10	52.02	67.06	63.35	53.75	42.14	52.44	68.36	65.63	58.25	50.99
11	51.89	66.68	63.03	53.56	42.14	52.93	68.74	65.70	58.01	50.90
12	52.14	67.10	63.33	53.77	42.14	54.11	70.78	67.18	58.68	51.29
13	51.85	66.92	63.33	53.97	42.14	53.73	70.42	67.07	58.74	51.21
14	51.88	66.73	63.09	53.44	42.13	52.05	68.06	65.55	58.15	50.57
15	51.98	67.09	63.42	53.85	42.13	53.08	69.99	67.06	58.92	51.04
16	52.26	67.22	63.36	53.48	42.13	54.25	71.12	67.24	58.20	50.72
17	51.89	66.87	63.23	53.63	42.13	51.91	67.60	64.97	58.10	50.83
18	51.94	66.90	63.25	53.72	42.14	52.45	68.19	65.55	58.45	51.09
19	51.74	66.80	63.28	54.04	42.14	52.29	67.86	65.34	58.86	51.41
20	51.59	66.51	63.05	53.79	42.13	51.59	67.21	64.20	58.54	51.09
21	51.67	66.61	63.10	53.91	42.14	51.67	67.32	64.21	58.47	51.39
22	51.70	66.70	63.19	53.65	42.13	51.70	67.49	64.93	58.13	50.56
23	51.93	67.00	63.34	53.86	42.14	51.97	67.68	64.43	58.27	51.30
24	52.04	66.95	63.22	53.50	42.13	53.04	69.53	66.51	58.22	50.58
25	51.84	66.90	63.30	53.70	42.13	52.37	68.19	65.45	58.10	50.72
26	51.65	66.54	63.04	53.72	42.13	52.79	68.91	66.11	58.57	50.89
27	51.91	67.07	63.43	53.75	42.13	52.91	69.58	66.67	58.46	50.63
28	51.88	66.72	63.06	53.37	42.13	51.90	67.48	64.12	57.57	50.51
29	51.92	66.96	63.32	53.83	42.14	53.23	69.72	66.60	58.59	51.11
30	52.14	67.30	63.54	53.79	42.13	53.36	70.40	67.30	58.88	50.98

Table B-3 *Continued*

August 15th										
	Denton					**Tarrant**				
RUN	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**
BL	56.81	88.51	83.31	64.44	41.77	58.84	89.30	83.62	65.31	49.09
1	55.96	86.60	81.05	62.69	42.29	58.17	87.46	81.51	64.36	51.49
2	53.84	78.70	74.72	60.14	41.85	55.21	78.61	73.95	62.91	50.53
3	54.00	81.84	77.43	61.18	42.62	56.19	82.43	77.25	63.10	51.38
4	54.53	80.44	75.65	60.44	42.06	56.07	80.28	75.01	62.76	49.59
5	54.32	80.28	75.91	60.71	41.99	56.02	80.34	75.31	61.88	50.14
6	54.11	80.90	76.27	60.57	41.92	56.01	80.96	75.72	64.03	49.93
7	55.09	84.19	79.31	62.07	42.06	57.28	84.68	79.11	63.24	49.97
8	56.20	86.13	80.52	62.75	42.48	58.17	86.58	80.31	63.02	50.30
9	54.39	83.04	78.44	61.64	42.55	56.69	83.43	78.03	61.65	50.11
10	54.77	82.78	77.93	61.42	42.16	56.77	83.10	77.77	62.13	50.85
11	55.75	84.29	78.68	61.53	41.97	57.55	84.96	78.96	64.07	50.46
12	56.14	86.50	80.72	62.59	42.51	58.18	87.23	80.88	63.26	50.04
13	56.11	86.19	80.61	62.64	42.39	58.14	87.21	81.00	63.45	50.52
14	54.28	82.16	77.75	61.37	41.66	56.36	82.67	77.65	62.00	49.47
15	55.05	84.46	79.83	62.63	42.31	57.18	85.11	79.75	63.06	50.84
16	56.17	86.71	81.27	62.85	41.68	58.17	87.51	81.76	63.99	51.02
17	54.13	81.67	77.33	61.08	41.96	56.29	81.93	77.01	61.70	51.05
18	55.22	83.20	77.85	61.28	42.24	57.05	83.61	77.70	62.64	50.39
19	55.34	83.21	77.68	61.22	42.71	57.12	83.75	77.59	62.00	50.91
20	54.28	80.55	75.83	60.39	42.33	56.17	80.60	75.21	63.56	50.52
21	54.53	80.65	75.55	60.21	42.52	56.20	80.78	75.11	61.52	50.53
22	54.00	81.21	77.14	61.20	41.71	56.04	81.68	77.04	62.26	49.59
23	54.62	81.47	76.06	60.14	42.47	56.54	81.58	75.74	63.05	50.98
24	55.88	84.66	79.24	62.10	41.71	57.52	85.08	79.22	63.97	49.88
25	55.22	83.15	78.14	61.50	41.85	57.13	83.68	78.24	62.74	50.83
26	54.70	83.59	79.09	62.02	42.12	57.00	84.58	79.43	62.71	50.44
27	55.26	84.30	79.47	62.28	41.83	57.28	84.99	79.52	62.87	50.31
28	54.38	80.77	76.07	60.41	41.52	56.11	80.56	75.47	61.70	50.10
29	54.80	84.50	79.82	62.32	42.36	57.18	85.45	80.05	63.00	50.98
30	55.36	84.96	80.21	62.76	42.20	57.44	85.41	79.95	63.75	49.60

Table B-3 *Continued*

August 15th										
	Ellis					Johnson and Parker				
RUN	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**
BL	50.25	72.58	68.24	55.58	46.21	56.82	83.12	82.31	73.40	54.68
1	50.42	70.73	67.51	55.59	46.30	54.56	76.52	75.90	69.68	54.05
2	49.53	69.04	66.57	55.28	46.28	53.46	73.78	73.57	67.83	53.60
3	49.96	69.14	66.70	55.64	46.34	54.30	76.17	75.66	68.96	53.65
4	49.65	69.84	66.25	55.46	46.44	54.63	76.22	75.59	68.97	53.52
5	49.20	68.01	65.74	55.32	46.21	54.25	75.69	74.86	67.96	53.14
6	50.28	71.74	67.92	55.23	46.23	54.86	76.51	76.22	69.56	54.04
7	50.03	70.83	67.05	55.20	46.21	54.78	76.34	75.92	69.29	53.83
8	49.13	67.15	64.41	55.51	46.31	55.50	77.52	76.47	67.45	52.84
9	49.57	67.00	64.47	55.52	46.43	54.00	74.57	73.89	66.80	52.92
10	49.43	67.24	64.67	55.54	46.43	54.94	77.53	76.40	67.84	52.84
11	49.88	70.01	67.48	55.51	46.45	54.12	76.43	75.58	69.53	54.01
12	49.84	70.01	66.17	55.58	46.49	55.07	75.25	74.72	68.31	53.49
13	49.93	69.06	65.25	55.40	46.27	55.46	77.26	76.27	68.39	53.10
14	49.14	67.65	65.01	55.16	46.34	54.24	76.65	75.88	68.16	53.12
15	49.61	69.18	65.58	55.42	46.38	55.15	77.69	76.81	69.03	53.29
16	49.54	67.66	64.64	55.43	46.44	55.50	76.79	75.82	67.11	52.86
17	49.77	68.03	65.41	55.30	46.26	54.89	75.58	74.47	67.53	52.97
18	48.91	67.91	65.99	55.34	46.36	53.80	75.19	74.18	67.74	53.29
19	49.45	68.56	65.58	55.63	46.25	54.85	75.59	74.58	67.71	53.03
20	50.31	70.39	66.82	55.42	46.44	55.03	79.09	78.41	70.59	53.67
21	49.19	67.76	65.21	55.48	46.37	55.25	78.49	77.41	68.72	53.00
22	49.48	68.29	66.10	55.47	46.37	52.93	72.40	72.42	67.17	53.48
23	49.38	68.83	67.00	55.72	46.22	53.53	73.90	73.56	68.12	53.66
24	50.32	71.32	67.34	55.39	46.41	55.53	76.57	76.16	69.54	54.06
25	49.53	68.51	66.21	55.66	46.48	53.73	72.88	72.20	66.98	53.50
26	50.14	69.91	66.33	55.53	46.31	55.49	78.29	77.31	69.54	53.46
27	49.50	68.85	66.30	55.52	46.48	53.61	75.66	75.13	68.51	53.72
28	49.22	67.41	65.36	55.41	46.42	54.53	74.94	73.87	67.27	53.02
29	49.76	69.34	65.84	55.48	46.22	55.41	78.81	77.92	69.62	53.37
30	49.70	69.87	67.38	55.24	46.30	53.25	77.58	76.92	70.25	54.05

Table B-3 *Continued*

August 15th					
	Kaufman and Rockwall				
RUN	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**
BL	46.97	62.55	62.23	58.14	47.41
1	46.81	62.53	62.17	58.09	47.38
2	46.14	62.53	62.11	58.07	47.38
3	46.37	62.54	62.21	58.12	47.39
4	46.46	62.53	62.16	58.08	47.39
5	46.12	62.53	62.23	58.15	47.38
6	46.48	62.52	62.06	57.98	47.38
7	46.64	62.52	62.06	58.00	47.38
8	46.85	62.52	62.06	58.03	47.38
9	46.83	62.53	62.17	58.10	47.39
10	46.71	62.54	62.23	58.12	47.39
11	46.28	62.52	62.11	58.07	47.39
12	46.62	62.52	62.07	58.01	47.38
13	46.08	62.51	62.10	58.09	47.39
14	46.44	62.52	62.15	58.10	47.39
15	46.53	62.52	62.15	58.08	47.38
16	46.80	62.52	62.16	58.12	47.39
17	46.57	62.53	62.08	58.03	47.39
18	46.44	62.52	62.12	58.11	47.38
19	46.12	62.53	62.11	58.07	47.38
20	46.21	62.51	62.06	57.98	47.38
21	46.18	62.52	62.08	58.07	47.39
22	46.22	62.54	62.18	58.09	47.39
23	46.66	62.55	62.22	58.12	47.39
24	46.60	62.53	62.12	58.06	47.38
25	46.38	62.55	62.26	58.14	47.39
26	46.01	62.55	62.21	58.11	47.38
27	46.36	62.53	62.09	58.04	47.39
28	46.64	62.52	62.07	58.03	47.38
29	46.33	62.53	62.07	58.02	47.39
30	46.77	62.51	62.06	58.04	47.37

Table B-4 Stage 1 CAMx output for August 16

August 16th										
	Collin					Dallas				
RUN	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**
BL	63.12	100.87	93.26	66.77	38.82	62.16	95.64	89.11	66.01	46.24
1	61.35	94.87	87.91	64.78	38.68	61.60	87.69	81.35	61.62	46.13
2	60.94	89.96	83.36	63.81	38.69	58.32	80.04	75.36	60.69	46.16
3	61.18	94.79	88.08	65.02	38.69	61.64	88.30	82.38	62.50	46.02
4	61.43	91.74	84.72	63.97	38.69	58.75	81.74	76.08	60.70	46.08
5	61.86	93.24	86.08	64.20	38.68	59.00	83.78	77.72	61.28	46.04
6	60.97	92.67	86.33	64.71	38.68	60.58	85.28	80.17	61.94	46.13
7	62.12	97.89	90.52	65.73	38.69	62.33	91.99	85.29	63.11	46.09
8	62.31	96.96	89.47	65.41	38.68	61.90	89.73	83.27	62.80	46.10
9	61.13	95.23	88.64	65.34	38.69	62.18	89.04	83.12	62.61	46.12
10	61.53	95.63	88.61	65.23	38.69	61.70	88.99	82.89	63.16	46.16
11	62.09	94.88	87.55	64.52	38.69	60.06	86.24	79.96	61.50	45.99
12	61.58	97.00	89.94	65.55	38.69	62.39	91.25	84.90	63.04	46.15
13	61.50	94.08	86.99	64.62	38.69	60.90	85.75	79.78	61.71	46.12
14	61.36	95.25	88.34	65.09	38.68	61.79	89.04	82.92	62.61	46.03
15	61.49	95.08	88.22	65.14	38.68	60.90	87.94	82.17	62.80	46.20
16	61.41	93.66	86.72	64.44	38.69	60.51	85.14	79.20	61.16	46.09
17	61.14	95.16	88.53	65.21	38.68	62.10	89.10	83.16	62.99	46.11
18	61.44	93.33	86.33	64.48	38.69	60.07	84.60	78.92	61.59	46.05
19	61.81	93.99	87.02	64.36	38.69	59.42	85.16	78.96	61.11	46.01
20	62.27	96.66	89.17	65.07	38.68	61.23	89.61	83.04	62.60	46.03
21	61.89	94.86	87.52	64.64	38.68	60.53	87.00	80.69	61.96	46.05
22	61.35	95.81	88.93	65.28	38.68	62.19	89.96	83.69	62.91	45.99
23	62.23	96.90	89.45	65.30	38.69	61.76	89.97	83.31	62.58	46.15
24	61.48	95.76	88.91	65.40	38.68	61.70	89.24	83.36	63.00	46.16
25	62.36	98.10	90.76	65.72	38.69	61.88	92.10	85.59	63.94	46.17
26	61.72	96.43	89.39	65.37	38.69	61.77	90.29	84.21	63.61	46.18
27	61.52	92.57	85.50	64.18	38.69	59.28	83.07	77.27	61.09	46.12
28	61.41	93.96	87.08	64.58	38.68	60.61	86.15	80.22	61.71	46.12
29	61.29	97.61	91.02	66.00	38.68	62.87	93.43	87.30	64.99	46.15
30	61.03	92.96	86.49	64.72	38.69	60.73	85.27	80.09	62.08	46.07

Table B-4 *Continued*

August 16th										
	Denton					**Tarrant**				
RUN	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**
BL	62.91	103.37	97.96	77.99	39.36	58.48	99.13	95.23	73.77	47.91
1	61.63	97.94	92.32	74.03	39.16	56.94	92.19	88.40	70.52	47.83
2	61.16	93.42	88.96	71.75	39.21	57.68	88.81	85.14	70.35	47.99
3	61.47	97.84	92.54	74.04	39.17	57.19	91.70	88.49	69.67	48.31
4	61.68	94.70	89.93	72.13	39.18	57.51	90.21	86.37	69.59	47.39
5	62.06	95.58	90.83	72.58	39.18	57.49	90.53	86.78	69.85	47.94
6	61.22	96.47	91.27	73.71	39.22	57.69	91.46	87.35	69.22	47.62
7	62.19	100.61	95.02	75.73	39.17	58.14	94.86	90.74	70.41	47.66
8	62.42	99.37	93.77	74.88	39.20	57.16	93.31	89.62	69.94	48.03
9	61.56	98.64	93.29	74.76	39.18	57.37	91.89	88.46	69.25	47.57
10	61.86	98.58	93.10	74.63	39.24	57.02	92.87	89.51	70.17	48.00
11	62.24	97.11	91.78	73.10	39.18	56.48	90.55	86.90	69.60	47.64
12	61.78	99.98	94.50	75.45	39.17	57.70	94.10	90.06	70.07	47.39
13	61.88	97.04	91.73	73.69	39.21	57.40	92.21	88.28	69.20	47.55
14	61.71	98.61	93.17	74.76	39.17	57.32	92.84	89.41	70.62	47.59
15	61.66	97.90	92.86	74.63	39.23	57.93	93.51	89.94	70.54	48.20
16	61.71	96.74	91.53	73.45	39.19	57.40	92.17	88.29	69.63	48.25
17	61.49	98.69	93.23	74.91	39.23	58.19	93.31	89.95	70.17	48.22
18	61.68	96.13	90.96	72.79	39.19	56.13	89.28	85.92	69.25	47.71
19	61.86	96.30	91.58	73.02	39.15	57.10	91.34	86.86	68.57	47.60
20	62.38	99.17	93.64	74.65	39.16	58.29	93.59	89.87	70.51	47.66
21	62.18	97.72	92.10	73.77	39.18	57.40	92.28	88.64	69.42	48.30
22	61.65	99.02	93.59	74.76	39.18	57.43	92.43	89.15	69.98	47.41
23	62.30	99.39	93.77	74.53	39.21	56.84	92.02	88.48	69.66	48.37
24	61.66	98.69	93.56	75.15	39.24	57.58	93.47	89.49	70.24	47.36
25	62.33	100.53	95.17	75.63	39.25	57.20	94.11	90.54	70.91	48.27
26	61.94	99.39	94.01	75.28	39.24	58.52	94.58	91.08	71.05	48.03
27	61.83	95.14	90.28	72.32	39.20	56.77	89.73	85.89	70.84	48.27
28	61.54	96.76	91.41	73.34	39.20	57.07	91.06	87.64	70.27	47.90
29	61.27	101.36	95.78	76.76	39.19	58.56	96.64	93.15	72.35	48.25
30	61.16	96.19	91.09	73.34	39.19	56.45	90.31	87.21	69.78	47.64

Table B-4 *Continued*

August 16th										
	Ellis					Johnson and Parker				
RUN	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**
BL	54.57	82.38	75.04	62.74	39.52	51.35	70.78	70.49	68.67	56.59
1	54.28	75.43	73.60	61.61	39.41	50.19	68.39	68.15	65.73	55.31
2	54.19	74.01	73.25	61.51	39.38	50.40	67.89	67.63	65.45	55.04
3	54.51	76.59	73.71	61.71	39.39	50.26	68.02	67.82	64.58	55.04
4	54.28	74.84	73.08	61.16	39.41	50.27	68.45	68.15	64.89	54.93
5	54.27	73.64	71.93	61.18	39.43	50.15	67.70	67.50	64.72	54.70
6	53.98	74.68	73.19	61.11	39.43	49.60	66.91	66.81	64.45	54.71
7	53.83	78.00	72.49	60.84	39.42	50.08	67.27	67.08	64.96	54.87
8	54.08	76.52	71.21	61.20	39.47	49.89	68.09	68.01	64.93	55.05
9	54.10	76.01	71.49	61.00	39.46	50.74	68.34	67.94	64.99	54.92
10	53.94	76.87	71.23	60.88	39.41	49.74	66.49	66.41	63.91	54.38
11	54.04	74.99	73.14	61.07	39.39	49.85	67.51	67.30	64.94	54.91
12	54.09	77.77	72.79	61.00	39.40	50.12	67.95	67.70	64.55	54.87
13	54.35	74.92	72.98	61.56	39.38	50.01	67.98	67.85	64.65	55.04
14	54.45	76.79	72.98	61.51	39.41	50.57	69.46	69.08	65.85	55.38
15	54.31	76.66	73.22	61.90	39.47	50.15	68.61	68.43	65.71	55.35
16	54.00	74.55	70.87	60.84	39.46	50.22	67.35	67.20	64.48	54.62
17	54.02	76.82	71.28	60.87	39.43	50.81	68.25	67.83	64.39	54.61
18	54.09	73.86	72.71	61.18	39.48	50.30	67.91	67.68	64.61	54.88
19	54.18	74.30	71.83	61.10	39.48	50.18	68.12	67.91	64.07	54.73
20	54.11	77.33	73.11	61.20	39.47	50.75	68.59	68.25	65.92	55.25
21	54.01	75.87	71.17	61.14	39.45	49.91	67.27	67.16	63.94	54.62
22	54.10	77.23	72.13	60.79	39.41	49.85	67.38	67.21	64.40	54.75
23	54.26	76.82	73.68	61.76	39.49	50.35	67.84	67.57	64.59	54.86
24	53.98	76.11	73.03	61.08	39.38	50.24	68.36	68.16	65.93	55.36
25	54.21	78.57	73.08	61.60	39.38	50.21	67.75	67.51	65.20	54.97
26	54.25	78.24	72.78	61.52	39.52	50.25	68.07	67.89	64.99	55.01
27	54.23	74.58	73.65	61.72	39.48	49.96	68.24	68.02	65.92	55.28
28	54.28	75.21	72.35	61.41	39.39	50.23	68.67	68.43	65.43	55.03
29	54.11	80.24	72.56	61.37	39.50	50.40	68.61	68.30	65.73	55.18
30	53.98	74.73	72.67	60.99	39.43	49.86	67.11	67.00	64.99	54.80

Table B-4 *Continued*

August 16th					
	Kaufman and Rockwall				
RUN	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**
BL	54.48	68.93	65.54	54.68	49.88
1	53.54	66.90	64.52	54.63	49.88
2	52.90	65.93	63.97	54.67	49.88
3	53.00	66.42	64.26	54.65	49.88
4	53.20	66.61	64.40	54.66	49.88
5	52.89	65.84	63.88	54.66	49.88
6	53.18	66.62	64.42	54.67	49.88
7	53.56	67.02	64.56	54.65	49.88
8	53.59	67.39	64.78	54.67	49.88
9	53.55	67.26	64.67	54.66	49.88
10	53.64	67.21	64.79	54.68	49.88
11	52.94	66.26	64.18	54.66	49.88
12	53.42	66.74	64.42	54.65	49.88
13	52.90	65.94	63.98	54.68	49.88
14	52.92	66.37	64.21	54.65	49.88
15	53.28	67.03	64.59	54.67	49.88
16	53.72	67.15	64.73	54.67	49.88
17	53.32	66.79	64.50	54.67	49.88
18	53.07	66.54	64.35	54.67	49.88
19	52.89	65.75	63.81	54.65	49.88
20	52.90	65.97	63.95	54.64	49.88
21	52.89	65.87	63.91	54.65	49.88
22	52.90	66.11	64.06	54.65	49.88
23	53.60	67.07	64.68	54.68	49.88
24	53.56	67.14	64.75	54.68	49.88
25	53.05	66.49	64.32	54.69	49.88
26	52.90	65.99	64.03	54.69	49.88
27	52.91	66.34	64.22	54.67	49.88
28	53.53	66.86	64.55	54.65	49.88
29	52.96	66.21	64.08	54.65	49.88
30	53.35	67.03	64.59	54.66	49.88

Table B-5 Stage 1 CAMx output for August 17

August 17th										
	Collin					Dallas				
RUN	12mn-6am	6am-12n	12n-3pm	3pm-7pm	7pm-12mn	12mn-6am	6am-12n	12n-3pm	3pm-7pm	7pm-12mn
BL	63.33	101.87	98.87	75.00	47.18	58.11	103.48	100.26	75.43	53.19
1	63.13	96.49	93.32	71.27	46.67	57.48	95.73	92.59	72.02	53.09
2	63.10	93.96	91.18	70.77	46.86	56.77	90.79	87.73	70.77	53.11
3	63.14	96.24	93.43	71.99	46.83	57.41	95.79	92.95	72.76	53.05
4	63.14	95.60	92.60	71.14	46.83	56.98	92.58	89.57	71.17	53.09
5	63.20	96.54	93.64	71.54	46.90	56.90	94.04	91.03	71.72	53.07
6	63.12	95.68	92.64	71.10	46.84	57.64	94.17	90.93	71.77	53.11
7	63.20	98.78	95.44	72.58	46.73	57.91	98.80	95.44	73.30	53.07
8	63.23	98.64	95.66	72.56	46.95	57.94	98.04	94.86	73.22	53.11
9	63.17	96.91	94.00	72.05	46.81	58.63	96.47	93.43	72.74	53.09
10	63.17	97.12	94.26	72.32	47.01	57.59	96.80	93.83	73.13	53.10
11	63.24	97.07	94.03	71.45	46.80	57.21	95.64	92.59	72.12	53.03
12	63.10	97.78	94.47	72.14	46.74	57.85	97.78	94.47	72.96	53.10
13	63.17	96.68	93.70	71.44	46.85	57.48	95.02	91.90	71.94	53.07
14	63.15	96.91	93.98	72.00	46.80	57.58	96.69	93.65	72.82	53.05
15	63.14	97.00	94.23	72.31	47.02	57.09	96.24	93.25	72.95	53.12
16	63.14	96.02	92.96	71.20	46.80	57.15	94.45	91.42	71.81	53.10
17	63.13	96.81	93.89	72.12	46.97	58.03	96.71	93.73	72.93	53.11
18	63.12	95.83	92.97	71.50	46.87	57.20	93.94	91.05	72.04	53.09
19	63.16	96.58	93.48	71.15	46.70	56.71	94.67	91.46	71.68	53.08
20	63.26	98.11	95.09	72.31	46.86	57.59	97.60	94.47	73.04	53.07
21	63.21	97.38	94.33	71.82	46.85	57.46	96.41	93.29	72.48	53.08
22	63.15	97.01	94.04	72.21	46.87	57.70	97.01	94.04	72.94	53.08
23	63.23	98.14	95.07	72.32	46.88	57.77	97.79	94.63	73.02	53.14
24	63.11	97.23	94.31	72.09	46.92	57.42	96.89	93.70	72.84	53.13
25	63.22	99.02	95.89	73.03	46.93	57.75	99.15	95.89	73.64	53.12
26	63.18	97.49	94.68	72.63	47.09	57.70	97.41	94.44	73.46	53.15
27	63.18	95.78	92.85	71.36	46.87	57.05	92.85	89.84	71.42	53.11
28	63.12	95.70	92.74	71.36	46.78	57.11	94.64	91.75	72.15	53.08
29	63.07	99.53	96.47	73.62	46.92	58.89	101.28	97.95	74.19	53.13
30	63.09	95.27	92.63	71.87	46.95	57.18	93.75	91.12	72.39	53.07

Table B-5 *Continued*

August 17th										
	Denton					Tarrant				
RUN	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**
BL	54.97	108.01	107.75	90.81	51.36	54.47	104.42	104.28	84.92	57.15
1	54.91	102.11	101.33	84.76	48.88	54.40	98.21	97.12	78.88	56.39
2	54.82	97.34	96.06	80.20	47.19	54.94	92.61	91.50	77.31	56.54
3	54.87	101.50	100.99	84.90	49.48	54.67	97.42	96.90	79.43	56.71
4	54.85	98.93	97.91	81.70	47.00	53.87	94.41	93.56	76.02	56.54
5	54.85	99.81	98.94	82.65	47.87	54.54	94.93	94.15	76.77	56.27
6	54.86	100.50	99.49	83.24	48.00	54.34	96.53	95.31	77.60	56.41
7	54.88	104.86	104.06	87.25	49.88	53.94	100.70	99.93	81.40	56.06
8	54.90	103.90	103.20	86.54	49.69	53.37	99.64	98.84	80.40	56.49
9	54.86	102.71	101.83	85.46	48.99	55.52	98.53	97.60	79.46	56.07
10	54.90	102.38	101.87	85.62	49.39	54.45	98.45	97.94	79.97	56.37
11	54.92	101.39	100.71	84.11	48.33	52.51	96.79	95.94	77.82	56.39
12	54.88	104.13	103.21	86.45	49.31	54.49	100.35	99.32	80.63	56.49
13	54.92	101.25	100.41	84.00	48.04	53.22	97.32	96.25	78.07	56.76
14	54.86	102.62	101.98	85.64	49.16	54.65	98.67	97.95	79.74	56.72
15	54.89	101.86	101.30	85.16	49.25	53.45	98.20	97.53	79.76	56.80
16	54.94	100.61	99.87	83.60	48.61	53.11	96.97	95.99	78.16	56.33
17	54.87	102.68	102.03	85.81	49.69	55.43	98.70	98.15	80.30	56.30
18	54.85	100.04	99.21	82.91	48.05	52.90	95.68	94.66	76.96	56.51
19	54.89	100.69	99.69	83.21	47.73	52.92	96.36	95.18	77.32	56.35
20	54.88	102.99	102.56	86.10	49.18	54.43	98.63	98.23	80.17	56.55
21	54.86	102.09	101.65	85.39	49.30	53.18	97.92	97.45	79.64	56.47
22	54.87	102.98	102.35	86.05	49.34	54.87	98.88	98.34	80.18	56.42
23	54.86	103.65	103.01	86.50	50.01	53.97	99.00	98.29	80.39	56.62
24	54.92	103.16	102.23	85.74	48.91	53.29	99.55	98.47	79.81	56.41
25	54.88	104.83	104.19	87.59	50.39	53.99	100.61	99.99	81.73	56.39
26	54.87	102.94	102.41	86.19	49.53	54.06	99.08	98.71	80.83	56.53
27	54.87	99.02	97.88	81.73	47.90	53.65	94.30	93.15	76.88	56.38
28	54.86	100.30	99.73	83.61	48.34	54.09	96.28	95.60	77.98	56.38
29	54.85	105.55	105.16	88.56	51.01	55.91	101.94	101.68	83.38	56.53
30	54.83	99.74	99.12	83.23	48.15	53.95	95.88	95.27	77.73	56.30

Table B-5 *Continued*

August 17th										
	Ellis					Johnson and Parker				
RUN	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**
BL	50.15	78.75	77.21	64.26	46.06	56.10	76.82	77.82	74.62	59.70
1	49.85	77.58	76.00	63.15	45.88	54.99	72.85	73.32	69.80	58.19
2	49.75	77.31	75.85	63.18	45.88	55.30	73.60	74.02	70.56	58.15
3	50.31	77.85	76.36	63.63	45.93	55.20	70.39	70.45	66.10	57.72
4	49.70	77.85	76.01	62.91	45.80	56.04	72.38	72.64	69.40	58.15
5	49.80	75.94	74.43	62.67	45.88	54.44	73.60	73.90	70.14	57.57
6	50.02	77.29	75.66	62.74	45.83	56.08	71.69	71.80	68.16	57.43
7	49.46	76.72	75.08	62.35	45.95	55.89	71.17	71.51	67.98	57.45
8	49.29	75.13	73.40	62.92	45.95	55.77	70.72	71.11	67.74	58.22
9	50.12	75.38	73.65	62.61	45.90	55.57	71.16	71.64	68.55	58.03
10	49.60	74.98	73.38	62.67	45.88	55.30	73.57	73.77	69.76	57.30
11	49.44	76.66	75.22	62.82	45.85	54.91	70.85	71.08	67.62	57.88
12	49.44	77.57	75.80	62.87	45.87	55.55	70.63	70.57	66.52	57.86
13	49.66	77.92	76.13	63.37	45.89	54.91	71.68	71.78	68.16	57.84
14	50.02	77.45	75.72	63.23	45.87	54.81	74.69	75.23	71.92	58.86
15	49.79	77.94	76.36	63.50	45.96	55.78	72.67	73.06	69.80	58.54
16	49.75	74.86	73.34	62.68	46.02	54.66	73.03	73.36	69.50	57.93
17	50.04	75.12	73.47	62.50	45.91	54.70	72.87	73.23	69.79	58.14
18	49.67	76.00	74.73	62.84	45.96	54.84	71.49	71.66	68.08	57.91
19	49.68	76.40	74.78	62.67	45.94	55.24	71.00	71.14	67.89	57.86
20	49.91	77.69	76.02	62.98	45.93	56.03	73.18	73.69	70.50	58.22
21	49.46	74.96	73.49	62.69	45.90	54.69	70.85	70.97	67.65	57.87
22	49.77	75.88	74.37	62.49	45.90	55.41	71.69	71.85	68.34	57.63
23	49.84	77.15	75.90	63.47	45.88	55.76	70.42	70.43	65.84	57.88
24	49.36	77.09	75.34	62.66	45.90	55.16	73.08	73.67	70.16	58.29
25	49.72	77.06	75.62	63.23	45.81	54.90	71.27	71.58	68.12	57.59
26	49.78	77.46	75.79	63.10	46.00	55.79	70.87	71.10	67.94	57.98
27	49.69	77.54	76.11	63.46	45.88	55.79	73.09	73.61	70.17	58.16
28	49.62	75.70	74.24	62.95	45.84	56.01	74.01	74.46	70.93	58.11
29	49.92	77.24	75.64	62.95	45.98	55.63	72.62	73.14	70.01	58.58
30	49.53	75.94	74.52	62.55	45.90	56.03	72.54	72.77	69.13	57.56

Table B-5 *Continued*

August 17th					
	Kaufman and Rockwall				
RUN	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**
BL	61.05	78.04	72.00	63.07	53.60
1	60.04	76.37	70.31	62.88	53.61
2	59.79	75.44	69.75	62.97	53.61
3	59.92	75.90	70.06	62.91	53.61
4	60.24	76.54	70.56	62.92	53.61
5	60.59	76.52	70.31	62.94	53.62
6	59.69	75.61	69.97	62.97	53.62
7	60.36	76.79	70.67	62.87	53.61
8	60.49	77.00	70.88	62.96	53.62
9	59.83	75.99	70.18	62.90	53.61
10	60.17	76.58	70.76	62.96	53.61
11	60.69	77.01	70.77	62.89	53.62
12	60.02	76.27	70.33	62.90	53.61
13	60.14	75.99	70.13	62.93	53.62
14	60.08	76.04	70.06	62.88	53.62
15	60.25	76.54	70.76	62.93	53.61
16	60.16	76.69	70.75	62.94	53.61
17	59.84	75.92	70.22	63.00	53.62
18	60.23	76.40	70.49	62.91	53.62
19	60.60	76.65	70.39	62.86	53.62
20	60.66	76.72	70.38	62.88	53.61
21	60.50	76.46	70.21	62.95	53.61
22	60.04	75.92	70.01	62.94	53.62
23	60.58	77.11	70.98	63.00	53.61
24	60.10	76.53	70.86	63.03	53.62
25	60.65	76.93	70.82	63.03	53.62
26	60.22	76.08	70.29	63.01	53.61
27	60.36	76.43	70.42	62.95	53.61
28	60.16	76.56	70.59	62.97	53.61
29	59.60	75.38	69.73	62.98	53.61
30	59.75	75.86	70.17	62.94	53.61

Table B-6 Stage 1 CAMx output for August 18

August 18th										
	Collin					Dallas				
RUN	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**
BL	59.96	99.14	100.52	83.96	49.51	54.77	99.74	97.32	81.73	50.68
1	60.59	97.13	97.95	81.26	47.98	55.72	91.56	88.91	75.64	49.82
2	60.24	95.81	96.60	80.63	47.92	53.63	89.09	88.15	71.41	49.84
3	60.53	95.55	95.99	79.87	47.93	55.79	90.68	88.29	75.58	50.00
4	59.94	95.61	96.31	80.29	47.22	52.88	88.65	87.64	71.66	49.54
5	59.98	96.06	96.91	80.80	47.69	52.52	89.36	88.41	72.20	49.51
6	60.12	96.13	96.86	80.65	47.44	55.27	89.16	88.12	73.75	49.47
7	60.11	96.06	96.80	80.65	47.62	54.54	94.50	91.76	77.58	49.28
8	60.11	96.54	97.21	80.84	48.14	54.01	92.54	89.73	76.25	49.87
9	60.41	95.95	96.66	80.64	47.52	57.22	92.27	89.55	76.23	49.60
10	60.32	96.73	97.74	81.51	48.03	54.84	91.21	89.35	76.01	49.77
11	60.42	96.48	97.14	80.55	47.38	52.92	88.99	87.88	73.57	49.47
12	60.00	96.61	97.25	80.73	47.47	55.12	94.47	91.83	77.47	49.52
13	60.54	96.64	97.35	80.93	47.74	54.98	89.60	88.28	74.41	50.04
14	60.12	97.19	98.25	81.89	48.11	55.17	91.35	90.02	76.04	49.92
15	60.24	96.22	97.07	81.10	48.42	53.71	90.21	88.51	75.59	50.17
16	60.42	97.21	98.22	81.58	48.26	54.16	90.17	89.40	74.10	49.71
17	60.28	95.99	96.82	80.89	48.07	56.33	92.30	89.80	76.64	49.76
18	59.99	96.86	97.57	80.93	47.76	53.81	89.50	88.39	73.00	49.68
19	60.05	96.19	96.79	80.38	47.39	52.34	88.78	87.63	73.05	49.46
20	60.35	95.28	96.09	80.47	47.66	53.57	91.36	88.83	75.99	49.70
21	60.00	95.46	95.98	79.97	47.82	52.73	89.07	87.06	74.25	49.64
22	60.39	96.23	97.05	80.87	47.54	55.72	92.06	89.50	76.27	49.73
23	60.24	95.28	95.73	79.86	48.07	53.64	91.87	89.14	76.12	49.97
24	60.56	97.49	98.48	81.83	47.91	55.07	91.95	89.67	76.20	49.93
25	60.25	96.52	97.38	81.27	48.13	53.76	94.32	91.73	77.70	49.65
26	60.37	95.59	96.23	80.56	48.17	54.78	92.63	90.27	77.07	50.14
27	60.17	96.64	97.44	80.93	47.87	53.53	89.58	88.55	71.95	49.44
28	60.26	97.09	98.15	81.77	47.94	54.14	90.61	89.85	74.47	49.73
29	60.21	95.85	96.76	81.05	48.37	57.13	96.58	94.13	79.50	49.85
30	60.11	96.43	97.29	81.01	47.47	55.21	89.63	88.69	73.99	49.41

Table B-6 *Continued*

August 18th										
	Denton					Tarrant				
RUN	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**
BL	64.37	91.86	92.02	86.12	56.83	64.17	90.32	90.26	81.72	51.70
1	64.12	90.33	90.29	83.83	55.02	63.63	86.54	86.15	77.30	49.75
2	62.79	87.59	87.48	82.13	54.86	61.96	85.34	85.80	78.26	50.10
3	63.41	88.21	87.87	81.38	53.71	62.53	82.13	81.66	74.12	49.05
4	63.10	88.22	88.06	82.20	54.08	62.39	84.91	85.01	76.89	49.32
5	63.10	88.46	88.39	82.77	54.78	62.42	86.11	86.37	78.20	49.48
6	63.41	88.86	88.71	82.53	54.19	62.75	85.01	84.94	76.67	48.98
7	63.22	88.21	87.99	81.97	54.15	62.43	83.89	83.91	76.32	49.32
8	63.96	89.86	89.68	83.09	54.42	63.38	84.69	84.22	75.83	49.54
9	63.41	88.71	88.50	82.27	54.04	62.70	84.12	83.95	75.91	49.20
10	63.70	89.61	89.60	83.68	54.97	63.18	86.94	86.89	78.13	49.52
11	63.95	89.89	89.72	83.03	54.09	63.32	84.84	84.37	75.80	48.99
12	64.04	90.04	89.79	82.97	53.74	63.44	83.91	83.12	74.68	48.46
13	63.89	89.96	89.83	83.30	54.36	63.33	85.45	85.06	76.24	48.92
14	63.59	89.61	89.64	83.97	55.44	63.13	87.79	87.91	79.45	50.40
15	63.41	88.96	88.85	82.88	55.00	62.75	85.66	85.69	77.56	50.08
16	64.27	90.71	90.70	84.19	55.30	63.73	87.23	86.87	77.83	50.13
17	63.36	88.73	88.60	82.68	54.74	62.65	85.47	85.53	77.40	49.74
18	63.93	90.05	89.92	83.34	54.41	63.39	85.38	84.93	76.13	49.08
19	63.62	89.22	89.04	82.60	53.99	62.99	84.51	84.17	75.57	48.61
20	62.82	87.81	87.65	82.15	54.49	62.06	85.11	85.49	77.89	49.96
21	63.08	87.94	87.69	81.68	54.14	62.24	83.60	83.59	75.58	49.24
22	63.18	88.36	88.19	82.25	54.16	62.47	84.69	84.77	76.81	49.03
23	63.17	87.81	87.49	81.10	53.70	62.23	81.69	81.41	74.15	49.15
24	64.17	90.73	90.72	84.25	54.90	63.75	87.05	86.70	77.88	49.93
25	63.68	89.21	89.03	82.78	54.62	62.98	84.75	84.54	76.53	49.53
26	63.12	88.03	87.77	81.77	54.19	62.28	83.50	83.53	76.02	49.47
27	63.61	89.34	89.27	83.18	54.94	63.02	86.22	86.16	77.93	50.04
28	63.68	89.70	89.71	83.79	55.17	63.20	87.35	87.37	78.95	50.00
29	63.22	88.50	88.37	82.62	55.01	62.49	85.24	85.42	77.64	50.17
30	63.38	88.90	88.81	82.89	54.46	62.78	85.70	85.73	77.49	49.46

Table B-6 *Continued*

August 18th										
	Ellis					Johnson and Parker				
RUN	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**
BL	50.66	70.34	69.05	57.20	38.02	54.74	65.41	65.03	61.91	52.43
1	50.10	69.13	67.54	55.49	36.93	54.75	65.34	64.64	61.22	51.55
2	50.29	69.51	68.02	55.45	37.10	54.74	65.35	64.76	61.06	51.32
3	50.99	69.75	68.21	56.01	37.24	54.73	65.31	64.59	60.74	51.10
4	50.13	69.67	68.07	55.18	36.75	54.74	65.29	64.59	61.03	51.53
5	49.97	67.51	66.19	54.89	36.40	54.73	65.30	64.75	61.17	51.40
6	49.60	69.01	67.45	54.74	36.50	54.74	65.34	64.64	60.92	51.35
7	49.82	68.89	67.33	54.55	36.44	54.74	65.30	64.58	60.86	51.24
8	49.65	66.30	64.79	54.99	37.36	54.75	65.30	64.58	60.89	51.38
9	50.49	67.64	66.11	54.74	36.34	54.74	65.28	64.57	60.92	51.35
10	50.24	66.56	65.08	54.29	36.70	54.74	65.31	64.66	60.91	51.13
11	50.18	69.10	67.70	54.76	36.67	54.74	65.32	64.60	60.97	51.50
12	49.78	69.50	67.85	54.94	36.87	54.74	65.32	64.60	60.96	51.35
13	49.79	69.02	67.48	55.31	37.30	54.74	65.31	64.64	60.92	51.30
14	50.11	69.36	67.99	55.62	37.16	54.74	65.35	64.81	61.16	51.78
15	49.79	69.28	67.80	56.05	37.36	54.74	65.32	64.61	61.16	51.56
16	49.67	66.01	64.55	55.03	36.93	54.75	65.34	64.69	61.00	51.37
17	50.29	67.38	65.68	55.30	36.78	54.74	65.33	64.65	60.82	51.27
18	49.97	68.94	67.78	55.00	37.16	54.74	65.36	64.66	61.05	51.46
19	49.82	68.32	66.81	54.83	36.60	54.73	65.30	64.55	60.63	51.23
20	50.28	69.48	67.89	55.42	36.77	54.74	65.34	64.66	61.12	51.68
21	49.45	66.09	64.68	55.19	37.18	54.74	65.33	64.62	60.81	51.21
22	50.43	68.50	67.19	54.50	36.79	54.73	65.29	64.57	60.72	51.06
23	50.20	69.27	67.88	55.78	37.14	54.75	65.31	64.60	60.92	51.47
24	49.87	69.51	67.96	55.25	37.01	54.73	65.30	64.63	61.27	51.73
25	49.92	68.57	67.16	55.50	36.34	54.74	65.34	64.63	61.00	51.50
26	49.84	68.83	67.29	55.37	37.10	54.74	65.33	64.62	60.91	51.21
27	50.02	69.66	68.19	55.77	36.47	54.74	65.31	64.71	61.22	51.70
28	50.19	68.24	66.92	55.22	36.41	54.74	65.34	64.75	61.15	51.58
29	49.71	68.95	67.36	55.90	36.98	54.74	65.34	64.66	61.06	51.62
30	50.40	68.00	66.71	54.80	36.33	54.75	65.33	64.61	60.96	51.47

Table B-6 *Continued*

August 18th					
	Kaufman and Rockwall				
RUN	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**
BL	56.26	90.46	87.53	69.38	54.19
1	55.93	85.13	81.70	65.16	53.79
2	55.38	81.82	78.57	64.02	53.83
3	55.61	84.73	81.67	65.49	53.89
4	55.54	83.21	80.07	64.20	53.69
5	55.58	83.66	80.65	64.52	53.79
6	55.84	84.89	81.56	65.41	53.59
7	56.04	87.91	84.68	66.93	53.56
8	55.99	86.89	83.67	66.34	53.80
9	55.76	85.28	82.02	65.76	53.61
10	55.86	85.80	82.69	66.11	53.72
11	55.78	84.49	81.24	64.53	53.56
12	55.73	87.14	84.02	66.73	53.62
13	56.16	85.35	82.03	65.54	53.86
14	55.61	85.41	82.34	65.77	53.89
15	55.84	85.75	82.90	66.38	53.97
16	55.86	84.47	81.21	64.89	53.66
17	55.86	85.83	82.62	66.16	53.74
18	55.27	83.02	80.03	64.18	53.84
19	55.73	84.54	81.59	64.87	53.71
20	56.18	86.60	83.40	66.08	53.61
21	55.84	85.81	82.65	65.61	53.70
22	55.60	85.38	82.23	65.68	53.69
23	55.77	86.00	82.86	65.90	53.84
24	56.04	86.50	83.56	66.58	53.85
25	55.83	87.34	84.31	66.96	53.73
26	56.10	86.77	83.77	66.95	53.94
27	55.53	82.87	79.75	64.20	53.60
28	55.42	83.87	80.78	64.76	53.82
29	56.04	88.17	85.12	67.81	53.69
30	55.14	82.85	79.81	64.46	53.61

Table B-7 Stage 1 CAMx output for August 19

August 19th										
	Collin					Dallas				
RUN	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**
BL	52.79	73.23	71.21	64.15	51.83	52.72	97.01	94.93	79.87	57.06
1	52.13	72.51	70.74	64.06	51.81	53.77	91.94	90.31	77.56	57.19
2	52.04	72.41	70.67	64.03	51.81	53.89	87.54	86.77	76.41	57.21
3	51.75	72.21	70.55	64.03	51.81	54.04	92.09	90.31	77.70	57.08
4	52.05	72.39	70.66	64.04	51.81	53.08	88.17	87.10	76.62	57.16
5	51.99	72.41	70.68	64.04	51.81	52.24	88.85	87.65	76.92	57.11
6	51.97	72.39	70.65	64.03	51.81	54.38	90.23	88.73	77.09	57.34
7	52.00	72.42	70.68	64.04	51.81	53.72	94.04	92.29	78.44	57.24
8	52.08	72.50	70.73	64.05	51.81	53.33	92.65	90.93	77.88	57.12
9	51.95	72.39	70.65	64.03	51.81	54.75	92.52	90.85	77.68	57.23
10	51.87	72.39	70.67	64.05	51.81	53.61	92.36	90.59	78.03	57.14
11	52.01	72.43	70.69	64.04	51.81	52.23	90.58	88.91	77.17	57.10
12	51.83	72.28	70.60	64.05	51.81	53.99	93.67	91.97	78.21	57.32
13	52.01	72.43	70.69	64.05	51.81	53.47	90.44	88.96	77.26	57.22
14	52.37	72.72	70.87	64.07	51.81	53.83	92.63	90.90	77.95	57.24
15	52.08	72.45	70.70	64.05	51.81	53.11	91.72	90.05	77.78	57.18
16	52.07	72.47	70.71	64.05	51.81	53.12	90.29	88.68	77.14	57.13
17	52.00	72.39	70.65	64.04	51.81	54.45	92.71	90.95	78.02	57.19
18	51.97	72.41	70.68	64.05	51.81	53.11	89.80	88.29	76.99	57.18
19	51.93	72.36	70.63	64.03	51.81	52.09	89.65	88.35	77.04	57.29
20	52.23	72.59	70.78	64.05	51.81	53.02	92.64	90.84	77.95	57.10
21	51.87	72.32	70.62	64.04	51.81	52.98	91.14	89.48	77.63	57.03
22	51.88	72.31	70.61	64.04	51.81	54.20	93.09	91.32	78.15	57.20
23	51.95	72.32	70.62	64.03	51.81	53.29	92.68	90.95	77.82	57.19
24	52.18	72.62	70.81	64.07	51.81	53.61	92.48	90.84	77.76	57.27
25	52.09	72.53	70.75	64.05	51.81	52.98	94.17	92.38	78.50	57.17
26	51.89	72.30	70.61	64.04	51.81	53.82	93.11	91.26	78.06	57.02
27	52.20	72.58	70.77	64.05	51.81	52.85	88.81	87.58	76.73	57.16
28	52.14	72.53	70.74	64.05	51.81	53.37	90.96	89.29	77.48	57.14
29	52.24	72.62	70.80	64.05	51.81	55.09	95.87	93.94	79.29	57.16
30	52.08	72.46	70.70	64.05	51.81	54.30	90.79	89.11	77.37	57.05

Table B-7 *Continued*

August 19th										
	Denton					Tarrant				
RUN	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**
BL	55.33	71.60	69.95	63.67	53.61	56.40	95.53	94.50	79.66	57.06
1	54.54	71.12	69.59	63.55	53.61	55.82	90.65	90.01	77.56	57.19
2	54.53	71.06	69.58	63.54	53.61	57.30	90.03	89.06	77.11	57.21
3	54.04	70.93	69.51	63.53	53.61	55.91	90.83	90.13	77.70	57.08
4	54.41	71.07	69.56	63.54	53.61	56.76	90.08	89.03	77.33	57.16
5	54.47	71.16	69.67	63.59	53.61	57.14	90.26	89.24	77.32	57.11
6	54.32	71.11	69.62	63.57	53.61	56.21	90.43	89.47	77.49	57.34
7	54.34	71.07	69.57	63.55	53.61	56.41	92.73	92.04	78.31	57.24
8	54.35	71.13	69.62	63.58	53.61	55.64	91.39	90.70	77.88	57.12
9	54.34	71.03	69.58	63.55	53.61	56.21	91.23	90.60	77.66	57.23
10	54.38	71.04	69.55	63.54	53.61	56.36	91.30	90.59	78.03	57.14
11	54.31	71.14	69.64	63.58	53.61	55.55	90.20	89.22	77.38	57.10
12	54.16	71.05	69.59	63.57	53.61	55.38	92.32	91.66	78.11	57.32
13	54.30	71.14	69.65	63.58	53.61	55.79	90.21	89.26	77.45	57.22
14	54.81	71.22	69.67	63.57	53.61	56.83	91.49	90.59	77.95	57.24
15	54.54	71.17	69.67	63.59	53.61	56.60	90.73	90.05	77.78	57.18
16	54.48	71.10	69.58	63.55	53.61	55.47	90.56	89.47	77.39	57.13
17	54.42	71.10	69.62	63.56	53.61	56.62	91.48	90.81	78.02	57.19
18	54.32	71.18	69.67	63.59	53.61	55.68	90.08	89.12	77.38	57.18
19	54.20	71.06	69.57	63.56	53.61	56.13	89.95	89.05	77.43	57.29
20	54.60	71.22	69.70	63.58	53.60	57.27	91.40	90.65	77.95	57.10
21	54.21	71.04	69.57	63.55	53.61	56.67	90.20	89.48	77.63	57.03
22	54.28	71.01	69.57	63.56	53.61	56.52	91.92	91.21	78.15	57.20
23	54.09	71.11	69.64	63.58	53.61	56.10	91.31	90.66	77.82	57.19
24	54.62	71.23	69.70	63.59	53.61	55.56	91.09	90.45	77.76	57.27
25	54.37	71.11	69.63	63.56	53.61	55.92	92.96	92.22	78.47	57.17
26	54.28	71.04	69.59	63.56	53.61	56.32	91.98	91.19	78.06	57.02
27	54.63	71.23	69.68	63.57	53.61	56.41	90.20	89.08	77.15	57.16
28	54.67	71.14	69.64	63.57	53.61	56.51	91.06	89.95	77.67	57.14
29	54.60	71.23	69.71	63.59	53.61	56.86	94.46	93.63	79.15	57.16
30	54.46	71.09	69.59	63.57	53.61	56.64	90.55	89.53	77.54	57.05

Table B-7 *Continued*

August 19th										
	Ellis					Johnson and Parker				
RUN	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**
BL	52.90	97.91	99.05	93.00	61.48	55.82	87.32	91.00	88.17	65.63
1	52.33	93.37	93.74	87.51	59.54	55.60	83.74	86.95	84.12	62.99
2	52.25	89.03	89.05	84.20	59.30	55.54	82.96	85.87	83.25	62.06
3	52.44	93.01	93.38	87.19	59.66	55.49	80.56	84.58	82.91	62.68
4	52.16	89.34	89.71	84.30	59.40	55.56	82.27	85.43	83.07	62.36
5	52.41	89.22	89.63	85.07	59.81	55.56	83.20	86.24	84.02	62.92
6	52.27	91.17	92.10	85.94	59.37	55.55	82.37	85.63	83.26	62.39
7	52.52	95.08	95.58	89.51	60.14	55.56	82.35	86.45	84.83	63.71
8	52.23	92.38	92.64	87.53	60.20	55.57	82.86	86.71	84.38	63.76
9	52.55	92.56	92.96	87.23	59.79	55.53	82.19	85.93	83.59	62.73
10	52.27	92.15	92.57	87.06	59.81	55.52	83.41	86.58	84.18	62.90
11	52.12	91.73	92.22	86.51	59.67	55.58	82.65	86.26	83.85	63.10
12	52.01	94.95	95.18	88.83	59.84	55.52	82.01	86.01	83.61	63.19
13	52.14	91.68	91.79	85.94	59.62	55.56	82.49	85.68	83.38	62.89
14	52.49	92.89	93.28	87.20	59.88	55.64	84.67	87.82	84.80	62.99
15	52.19	92.47	92.84	87.06	60.03	55.57	83.02	86.59	84.28	63.41
16	51.91	90.27	90.69	85.79	59.45	55.55	83.99	86.98	84.02	62.99
17	52.16	92.44	92.91	87.32	59.68	55.53	82.78	86.38	83.89	62.70
18	52.33	90.94	91.20	85.33	59.58	55.56	82.57	85.75	83.21	62.53
19	52.08	90.42	90.60	85.39	59.71	55.53	81.80	85.23	83.05	62.85
20	52.12	93.05	93.71	88.27	60.09	55.64	82.95	86.69	84.77	63.61
21	52.18	90.75	90.92	86.09	59.76	55.51	81.33	85.06	83.46	63.05
22	52.60	93.56	94.15	87.99	59.73	55.51	82.57	86.33	84.17	62.84
23	51.95	93.33	93.89	88.07	59.84	55.56	80.40	84.70	83.44	63.24
24	52.47	93.59	94.43	87.92	59.92	55.63	84.50	87.96	84.96	63.58
25	52.21	94.93	95.38	89.49	60.20	55.61	82.88	87.02	85.13	63.94
26	52.30	93.80	94.25	88.33	59.96	55.52	81.86	85.92	84.27	63.49
27	52.50	90.18	90.52	85.11	59.72	55.61	83.60	86.65	84.02	62.77
28	52.48	90.91	91.34	85.96	59.52	55.58	84.21	87.26	84.37	62.74
29	52.29	96.18	96.79	90.37	60.24	55.62	83.16	87.24	84.86	63.55
30	52.41	91.75	92.32	86.46	59.74	55.55	82.87	86.01	83.49	62.28

Table B-7 *Continued*

August 19th					
	Kaufman and Rockwall				
RUN	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**
BL	55.85	86.33	84.14	71.98	56.80
1	53.99	82.96	81.25	71.10	56.45
2	53.47	82.10	80.58	70.91	56.35
3	53.69	82.66	80.87	70.74	56.32
4	54.29	82.79	81.02	70.89	56.36
5	54.74	83.62	81.61	71.00	56.42
6	53.58	82.42	80.69	70.88	56.37
7	54.64	83.74	81.92	71.04	56.42
8	54.83	84.05	82.09	71.09	56.46
9	53.61	83.14	81.21	70.97	56.39
10	54.15	83.07	81.35	71.02	56.44
11	54.78	83.78	81.71	70.98	56.42
12	54.01	83.08	81.30	70.91	56.41
13	54.25	82.77	81.02	71.01	56.44
14	54.12	83.35	81.53	71.29	56.52
15	54.40	83.31	81.57	71.03	56.42
16	54.15	82.67	81.04	71.02	56.43
17	53.72	82.70	80.96	70.92	56.39
18	53.96	82.92	81.18	71.00	56.44
19	54.67	83.43	81.43	70.89	56.37
20	55.06	84.19	82.13	71.10	56.43
21	54.75	83.45	81.50	70.88	56.36
22	53.72	82.78	80.98	70.95	56.41
23	54.66	83.74	81.75	70.79	56.33
24	54.14	83.31	81.58	71.25	56.52
25	54.84	84.14	82.13	71.10	56.45
26	54.38	83.10	81.37	70.91	56.38
27	54.35	83.24	81.44	71.07	56.42
28	53.94	82.86	81.23	71.08	56.43
29	53.57	83.01	81.12	71.12	56.44
30	53.41	82.90	81.11	71.04	56.43

Table B-8 Stage 1 CAMx output for August 20

August 20th										
	Collin					**Dallas**				
RUN	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**
BL	50.23	63.97	60.96	53.68	37.43	57.58	85.22	82.03	61.21	44.68
1	50.23	63.97	60.96	53.67	37.42	58.10	81.94	79.53	63.27	45.88
2	50.23	63.96	60.95	53.67	37.42	56.82	78.24	76.32	62.70	45.73
3	50.23	63.96	60.95	53.67	37.42	58.18	81.83	79.13	61.24	44.47
4	50.23	63.97	60.95	53.67	37.42	56.42	78.35	76.36	61.91	45.22
5	50.23	63.96	60.94	53.67	37.42	56.01	79.24	77.05	61.68	44.93
6	50.22	63.96	60.95	53.67	37.42	58.15	80.73	78.62	63.18	45.85
7	50.23	63.96	60.96	53.67	37.42	58.27	83.79	81.07	63.09	45.58
8	50.23	63.97	60.96	53.67	37.42	57.80	82.71	79.87	62.07	44.89
9	50.23	63.97	60.96	53.67	37.42	58.95	82.73	80.18	62.87	45.39
10	50.22	63.96	60.95	53.67	37.42	57.98	82.11	79.31	61.40	44.73
11	50.23	63.96	60.95	53.67	37.42	56.47	80.59	78.06	61.42	44.67
12	50.23	63.96	60.96	53.67	37.42	58.46	83.37	80.84	63.67	45.94
13	50.23	63.97	60.96	53.67	37.42	57.54	80.88	78.53	62.55	45.35
14	50.23	63.96	60.95	53.67	37.42	58.28	82.17	79.52	61.72	44.71
15	50.23	63.96	60.95	53.67	37.42	57.34	81.66	79.13	62.11	45.08
16	50.23	63.97	60.95	53.67	37.42	57.19	80.37	78.10	62.32	45.29
17	50.23	63.97	60.96	53.67	37.42	58.70	82.52	79.83	62.16	45.09
18	50.23	63.96	60.95	53.67	37.42	57.10	79.98	77.77	61.83	44.87
19	50.23	63.96	60.95	53.67	37.42	56.02	80.25	78.07	62.82	45.63
20	50.23	63.96	60.95	53.67	37.42	57.23	82.24	79.37	61.27	44.53
21	50.23	63.96	60.95	53.67	37.42	57.13	81.25	78.40	61.00	44.42
22	50.23	63.96	60.95	53.67	37.42	58.56	82.99	80.21	62.33	45.33
23	50.23	63.97	60.96	53.67	37.42	57.76	82.95	80.09	62.35	45.07
24	50.23	63.96	60.95	53.67	37.42	57.74	82.51	80.02	63.12	45.66
25	50.23	63.96	60.96	53.67	37.42	57.58	83.74	80.91	62.80	45.48
26	50.23	63.96	60.96	53.67	37.42	58.01	82.50	79.68	61.16	44.40
27	50.23	63.96	60.94	53.67	37.42	56.57	79.10	77.00	62.11	45.15
28	50.22	63.95	60.94	53.67	37.42	57.16	80.59	78.19	61.53	44.82
29	50.23	63.97	60.96	53.67	37.42	59.37	84.64	81.74	62.02	44.83
30	50.23	63.96	60.95	53.67	37.42	58.03	80.62	78.18	61.09	44.52

Table B-8 *Continued*

August 20th										
	Denton					Tarrant				
RUN	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**
BL	50.80	64.59	64.10	56.02	42.05	57.58	85.22	82.03	61.74	42.42
1	50.78	64.47	63.99	56.02	42.03	58.10	81.94	79.53	62.90	44.40
2	50.79	64.44	63.97	56.02	42.03	57.96	80.15	76.32	62.41	44.68
3	50.80	64.45	63.97	56.02	42.03	58.18	81.83	79.13	62.43	44.35
4	50.78	64.46	63.99	56.02	42.03	57.46	80.46	76.79	62.89	44.97
5	50.78	64.47	64.00	56.02	42.03	57.41	80.70	77.05	62.53	44.16
6	50.78	64.50	64.02	56.02	42.03	58.15	81.09	78.62	62.94	45.45
7	50.78	64.47	63.99	56.02	42.03	58.27	83.79	81.07	63.05	44.00
8	50.78	64.48	64.00	56.02	42.03	57.80	82.71	79.87	61.68	43.21
9	50.79	64.45	63.97	56.02	42.03	58.95	82.73	80.18	62.51	44.51
10	50.79	64.47	64.00	56.02	42.03	57.98	82.11	79.31	62.99	44.86
11	50.78	64.49	64.01	56.02	42.03	56.55	81.11	78.06	62.13	43.74
12	50.79	64.51	64.03	56.02	42.03	58.46	83.37	80.84	63.48	44.97
13	50.78	64.49	64.01	56.02	42.03	57.54	81.40	78.53	62.70	45.12
14	50.79	64.47	63.99	56.02	42.03	58.28	82.18	79.52	63.20	44.96
15	50.79	64.49	64.01	56.02	42.03	57.34	81.66	79.13	62.75	44.79
16	50.78	64.47	64.00	56.02	42.03	57.19	81.13	78.10	62.19	44.19
17	50.78	64.51	64.04	56.02	42.03	58.70	82.52	79.83	63.22	45.49
18	50.79	64.54	64.05	56.02	42.03	57.10	80.98	77.77	62.33	43.94
19	50.77	64.46	63.98	56.02	42.03	57.15	80.64	78.07	63.04	45.62
20	50.80	64.51	64.03	56.02	42.03	57.56	82.24	79.37	62.26	43.78
21	50.80	64.51	64.03	56.02	42.03	57.67	81.42	78.40	62.70	44.26
22	50.79	64.45	63.97	56.02	42.03	58.56	82.99	80.21	63.00	45.36
23	50.79	64.50	64.02	56.02	42.03	57.78	82.95	80.09	62.07	44.07
24	50.79	64.53	64.05	56.02	42.03	57.74	82.51	80.02	62.97	44.42
25	50.79	64.44	63.96	56.02	42.03	57.58	83.74	80.91	62.80	43.97
26	50.80	64.51	64.03	56.02	42.03	58.01	82.50	79.68	61.85	43.22
27	50.79	64.54	64.06	56.02	42.03	57.01	80.54	77.00	62.10	43.85
28	50.79	64.47	63.98	56.02	42.03	57.16	81.12	78.19	62.66	44.31
29	50.79	64.53	64.06	56.02	42.03	59.37	84.64	81.74	62.85	44.76
30	50.78	64.46	63.99	56.02	42.03	58.03	81.20	78.18	62.36	43.84

Table B-8 *Continued*

August 20th										
	Ellis					**Johnson and Parker**				
RUN	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**
BL	55.72	85.76	84.27	65.71	38.27	59.77	86.72	83.82	67.17	45.69
1	56.03	82.06	80.38	63.67	39.52	58.58	81.45	79.19	65.54	46.34
2	54.90	80.12	76.77	62.04	39.42	57.54	81.73	79.32	66.07	46.48
3	56.47	81.58	79.88	63.61	38.34	57.92	78.97	76.63	64.33	46.60
4	54.74	80.52	77.40	62.24	38.92	58.24	81.98	79.66	65.81	46.12
5	54.88	81.03	77.77	62.74	38.71	58.32	83.08	80.78	66.25	46.35
6	56.11	81.17	79.10	63.23	39.49	57.55	80.69	78.19	65.63	46.39
7	56.52	83.49	82.03	64.87	39.27	58.37	81.50	79.23	65.30	46.27
8	55.73	82.65	80.61	64.15	38.69	58.90	82.11	79.59	65.35	46.22
9	56.90	82.32	80.48	64.04	39.17	58.20	80.36	78.14	65.40	46.17
10	56.27	82.31	79.99	63.86	38.47	58.06	81.89	79.46	65.87	46.43
11	55.16	81.55	79.18	63.26	38.43	59.23	82.49	79.99	65.22	46.20
12	56.26	83.20	81.57	64.56	39.60	58.00	80.19	77.75	64.39	46.16
13	55.34	81.53	79.21	63.07	39.09	58.90	81.14	78.89	65.41	46.12
14	56.60	82.50	80.11	64.11	38.52	58.35	83.10	80.82	66.73	46.22
15	55.71	81.85	80.05	63.86	38.84	58.81	82.27	79.99	66.17	46.45
16	55.15	81.50	78.86	63.24	38.96	58.93	82.21	79.92	66.16	46.53
17	56.67	82.40	80.53	64.02	38.78	58.11	81.15	79.02	65.75	46.73
18	55.20	81.17	78.22	63.00	38.62	58.15	81.24	78.96	65.45	46.19
19	54.43	80.98	78.59	62.82	39.31	58.96	82.46	79.56	64.90	46.37
20	55.65	82.52	80.71	63.79	38.35	59.27	83.06	80.61	65.77	46.04
21	55.34	81.64	79.00	63.45	38.23	58.42	81.45	79.02	64.84	46.55
22	56.66	82.62	80.89	64.60	39.03	57.96	81.29	79.03	65.90	46.17
23	55.99	82.52	80.87	63.94	38.73	58.14	80.43	77.90	63.98	46.57
24	55.44	82.35	80.85	64.04	39.38	59.42	82.87	80.48	66.16	45.97
25	55.84	83.66	81.83	64.79	39.20	58.69	82.28	79.94	65.53	46.46
26	56.29	82.53	80.92	64.30	38.28	58.60	80.83	78.68	65.27	46.09
27	55.19	80.78	77.80	62.46	38.88	58.45	82.95	80.65	66.41	46.57
28	55.31	81.61	78.81	63.29	38.52	58.27	82.81	80.62	66.63	46.27
29	57.42	84.55	82.87	65.60	38.60	58.00	80.99	78.90	65.86	46.54
30	55.73	81.32	79.14	63.13	38.38	57.41	81.12	78.53	65.61	46.03

Table B-8 *Continued*

August 20th					
	Kaufman and Rockwall				
RUN	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**
BL	51.19	63.62	62.23	54.68	45.27
1	51.19	63.62	62.23	54.69	45.18
2	51.20	63.61	62.23	54.68	45.18
3	51.20	63.62	62.24	54.68	45.18
4	51.20	63.61	62.23	54.68	45.18
5	51.21	63.63	62.24	54.68	45.18
6	51.21	63.63	62.24	54.68	45.18
7	51.19	63.61	62.22	54.67	45.18
8	51.20	63.62	62.23	54.68	45.18
9	51.19	63.61	62.22	54.68	45.18
10	51.20	63.61	62.22	54.68	45.18
11	51.20	63.61	62.23	54.68	45.18
12	51.19	63.61	62.22	54.67	45.18
13	51.19	63.60	62.22	54.68	45.18
14	51.20	63.63	62.24	54.68	45.18
15	51.20	63.62	62.23	54.68	45.18
16	51.19	63.61	62.22	54.68	45.18
17	51.19	63.62	62.23	54.68	45.18
18	51.19	63.61	62.22	54.68	45.18
19	51.19	63.60	62.22	54.68	45.18
20	51.20	63.63	62.24	54.68	45.18
21	51.20	63.62	62.23	54.68	45.18
22	51.19	63.62	62.23	54.68	45.18
23	51.19	63.60	62.22	54.68	45.18
24	51.21	63.63	62.24	54.69	45.18
25	51.19	63.60	62.22	54.68	45.18
26	51.19	63.61	62.22	54.67	45.18
27	51.19	63.61	62.22	54.68	45.18
28	51.21	63.62	62.23	54.68	45.18
29	51.19	63.61	62.23	54.68	45.18
30	51.19	63.61	62.22	54.68	45.18

Table B-9 Stage 1 CAMx output for August 21

August 21st										
	Collin					**Dallas**				
RUN	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**
BL	54.01	74.83	71.51	60.99	54.17	56.55	77.99	73.92	65.60	59.41
1	54.00	73.97	70.47	60.80	54.10	57.05	76.22	72.36	65.34	59.90
2	54.02	74.01	70.63	60.88	54.09	55.47	74.01	70.63	65.08	59.33
3	54.02	73.81	70.45	60.83	54.09	56.27	74.04	70.59	65.89	60.02
4	54.02	73.81	70.38	60.84	54.09	55.67	73.81	70.38	65.20	59.64
5	54.02	73.97	70.64	60.87	54.08	55.46	73.97	70.64	65.42	59.47
6	54.02	73.74	70.31	60.84	54.09	55.85	73.82	70.31	65.02	59.43
7	54.01	74.18	70.79	60.88	54.09	56.77	74.85	71.26	65.35	59.50
8	54.00	74.43	71.09	60.88	54.08	56.47	75.91	72.22	65.90	59.82
9	54.01	74.29	70.94	60.87	54.08	57.08	74.67	71.16	65.91	59.92
10	54.02	73.89	70.43	60.84	54.09	56.18	74.16	70.55	65.26	59.70
11	54.01	73.66	70.19	60.81	54.09	55.89	74.26	70.67	65.06	59.58
12	54.00	74.14	70.75	60.82	54.09	56.31	75.92	72.22	65.77	59.95
13	54.00	74.08	70.68	60.88	54.09	55.95	75.61	71.90	65.68	59.87
14	54.02	73.83	70.43	60.81	54.09	56.03	74.18	70.63	65.03	59.24
15	54.01	74.25	70.91	60.86	54.08	56.50	75.28	71.76	65.80	59.70
16	54.00	73.98	70.49	60.81	54.10	56.45	76.32	72.36	64.84	59.39
17	54.02	73.73	70.28	60.83	54.09	56.25	73.91	70.32	65.08	59.53
18	54.02	73.93	70.51	60.83	54.09	55.98	74.25	70.69	65.44	59.75
19	54.02	73.90	70.52	60.87	54.09	55.73	74.11	70.61	65.83	60.08
20	54.02	73.78	70.40	60.84	54.09	55.66	73.78	70.40	65.47	59.76
21	54.02	73.68	70.23	60.85	54.09	55.56	73.68	70.23	65.48	60.06
22	54.02	73.77	70.35	60.86	54.09	55.81	73.82	70.35	64.98	59.28
23	54.02	73.76	70.29	60.84	54.10	56.02	73.79	70.29	65.35	59.99
24	54.01	74.02	70.62	60.83	54.09	55.96	74.83	71.20	65.11	59.25
25	54.02	73.82	70.38	60.86	54.09	55.93	74.03	70.43	65.02	59.40
26	54.01	73.82	70.46	60.85	54.09	56.35	74.60	71.15	65.52	59.57
27	54.01	74.17	70.79	60.88	54.09	56.11	74.87	71.27	65.27	59.31
28	54.02	73.54	70.08	60.80	54.10	55.86	73.54	70.04	64.52	59.20
29	54.01	74.02	70.61	60.85	54.09	56.93	75.19	71.62	65.60	59.80
30	54.01	74.37	71.02	60.86	54.08	56.62	75.68	72.03	65.73	59.63

Table B-9 *Continued*

August 21st										
	Denton					Tarrant				
RUN	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**
BL	58.05	89.81	84.94	64.15	50.18	59.69	88.12	82.84	64.49	54.07
1	57.77	88.19	83.00	63.62	50.08	59.46	86.54	80.98	64.20	55.79
2	56.50	81.81	77.99	63.94	50.10	57.83	79.10	74.34	63.11	54.54
3	56.95	84.16	79.82	63.89	50.10	58.42	82.47	77.32	64.16	56.21
4	56.78	82.92	78.76	63.78	50.09	58.26	80.45	75.43	63.56	55.18
5	56.74	82.90	78.97	63.97	50.11	58.33	80.67	75.67	63.33	54.79
6	56.82	83.25	79.03	63.73	50.09	58.39	81.03	75.74	63.07	54.78
7	57.36	86.20	81.24	63.95	50.10	59.10	84.44	78.92	63.34	54.97
8	57.73	87.86	82.30	64.02	50.11	59.51	85.95	80.11	63.92	55.72
9	57.15	85.22	80.68	64.07	50.11	58.83	83.57	78.13	63.94	55.97
10	57.11	84.74	80.15	63.81	50.09	58.77	83.00	77.80	63.88	55.39
11	57.48	86.20	80.83	63.68	50.08	59.07	84.17	78.62	63.49	55.07
12	57.76	87.94	82.34	63.79	50.09	59.25	85.98	80.21	64.02	56.00
13	57.76	87.87	82.40	63.92	50.10	59.34	85.95	80.26	63.93	55.73
14	57.01	84.33	80.00	63.81	50.09	58.55	82.58	77.46	63.04	54.23
15	57.36	86.32	81.52	64.01	50.10	58.88	84.61	79.39	63.87	55.46
16	57.78	88.13	83.18	63.61	50.08	59.22	86.34	81.12	63.59	54.57
17	56.93	83.99	79.76	63.74	50.09	58.54	82.38	77.37	63.38	54.95
18	57.26	85.14	80.23	63.76	50.09	58.87	83.09	77.50	63.59	55.48
19	57.28	85.12	80.15	63.91	50.10	58.73	82.94	77.36	64.20	56.35
20	56.81	83.09	78.89	63.80	50.09	58.54	81.01	75.60	63.47	55.56
21	56.86	83.07	78.68	63.75	50.09	58.43	80.69	75.33	63.96	56.24
22	56.86	83.56	79.61	63.83	50.10	58.35	81.93	77.17	63.34	54.39
23	56.98	83.71	79.07	63.74	50.09	58.74	81.76	76.15	64.03	56.10
24	57.51	86.39	81.21	63.82	50.09	58.90	84.24	78.90	63.37	54.29
25	57.26	85.40	80.51	63.84	50.09	59.01	83.63	78.38	63.56	54.69
26	57.26	85.90	81.18	63.88	50.10	58.91	84.36	79.16	63.77	55.05
27	57.39	86.21	81.30	64.00	50.10	58.97	84.37	79.05	63.23	54.47
28	56.80	83.08	78.93	63.55	50.08	58.30	80.92	75.95	62.86	54.19
29	57.39	86.53	81.65	63.88	50.09	58.98	85.02	79.69	63.93	55.63
30	57.45	86.74	81.89	63.99	50.10	59.03	84.99	79.69	63.61	55.25

Table B-9 *Continued*

August 21st										
	Ellis					**Johnson and Parker**				
RUN	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**
BL	49.75	69.90	68.24	61.01	46.45	55.64	79.73	78.57	71.56	55.55
1	50.61	69.05	67.88	61.02	46.67	53.71	73.99	73.33	68.79	55.73
2	50.28	68.29	67.44	60.98	46.61	52.38	71.28	70.84	67.05	55.50
3	50.49	68.40	67.58	61.11	46.74	53.09	74.04	72.40	68.06	55.56
4	50.00	68.42	67.57	61.30	46.99	53.54	73.68	72.92	67.82	54.99
5	49.97	68.43	67.61	60.84	46.49	53.15	73.28	71.83	67.06	55.16
6	50.27	69.54	68.10	60.92	46.55	53.80	73.95	73.23	68.38	55.49
7	50.03	68.95	67.62	60.88	46.52	53.77	73.94	73.21	68.19	55.40
8	49.32	68.29	67.49	61.02	46.66	54.49	75.48	73.01	66.70	54.88
9	50.15	68.30	67.55	61.22	46.91	52.69	72.40	70.57	66.19	54.73
10	50.02	68.39	67.62	61.25	46.91	54.02	75.77	73.05	67.16	54.99
11	50.69	68.95	67.86	61.27	46.99	53.08	74.80	72.45	68.32	55.51
12	50.01	68.53	67.54	61.32	47.05	53.71	73.25	72.41	67.35	54.96
13	49.61	68.21	67.38	60.93	46.65	54.70	74.64	73.30	67.52	54.87
14	50.13	68.20	67.42	61.06	46.76	53.13	74.49	72.36	67.24	54.81
15	49.63	68.29	67.50	61.14	46.82	54.45	74.92	73.89	68.05	55.25
16	49.49	68.28	67.54	61.24	46.93	54.52	74.67	72.14	66.38	55.11
17	50.13	68.34	67.52	60.95	46.58	53.69	72.85	71.65	66.74	55.24
18	49.81	68.22	67.41	61.06	46.78	52.54	74.11	70.92	66.96	55.16
19	49.77	68.35	67.51	60.92	46.56	53.80	73.17	72.09	67.01	55.04
20	50.29	68.78	67.43	61.22	46.95	54.24	75.82	75.00	69.27	55.22
21	49.41	68.34	67.57	61.13	46.80	54.45	75.65	74.16	67.68	55.13
22	50.45	68.51	67.69	61.22	46.82	51.55	70.04	69.44	66.32	55.00
23	50.22	68.48	67.76	60.92	46.48	52.22	71.90	70.76	67.32	55.62
24	49.82	69.19	67.57	61.21	46.88	54.62	74.33	73.48	68.27	55.31
25	50.18	68.42	67.70	61.37	47.01	52.48	71.02	69.75	66.39	55.50
26	49.93	68.64	67.78	61.13	46.69	54.45	75.27	74.17	68.42	55.22
27	50.40	68.18	67.50	61.33	47.04	52.51	73.05	71.72	67.57	55.49
28	49.91	68.35	67.58	61.21	46.87	53.30	73.44	70.97	66.38	55.02
29	49.68	68.27	67.47	60.89	46.51	54.58	75.75	74.74	68.65	55.33
30	50.48	68.70	67.53	60.98	46.69	52.21	75.47	73.22	69.01	55.25

Table B-9 *Continued*

August 21st					
	Kaufman and Rockwall				
RUN	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**
BL	50.12	66.16	66.43	66.28	59.66
1	49.99	66.03	66.43	66.29	59.66
2	49.59	66.02	66.41	66.28	59.66
3	49.59	66.05	66.44	66.29	59.66
4	49.71	66.02	66.45	66.29	59.66
5	49.59	66.03	66.48	66.30	59.66
6	49.63	65.99	66.39	66.28	59.66
7	49.81	65.98	66.42	66.29	59.66
8	49.89	66.01	66.39	66.28	59.66
9	50.02	66.02	66.44	66.29	59.66
10	49.81	66.09	66.42	66.29	59.66
11	49.59	66.00	66.46	66.29	59.66
12	49.88	66.00	66.40	66.28	59.66
13	49.59	66.00	66.48	66.30	59.66
14	49.66	66.01	66.47	66.29	59.66
15	49.74	66.01	66.45	66.29	59.66
16	50.00	66.02	66.47	66.29	59.66
17	49.83	66.01	66.42	66.29	59.66
18	49.78	66.00	66.48	66.30	59.66
19	49.59	66.02	66.41	66.28	59.66
20	49.59	65.98	66.40	66.28	59.66
21	49.59	66.00	66.46	66.29	59.66
22	49.59	66.07	66.42	66.28	59.66
23	49.87	66.12	66.42	66.28	59.66
24	49.71	66.02	66.45	66.29	59.66
25	49.68	66.13	66.43	66.29	59.66
26	49.59	66.09	66.42	66.28	59.66
27	49.69	66.01	66.44	66.29	59.66
28	49.74	66.00	66.42	66.29	59.66
29	49.72	66.01	66.40	66.28	59.66
30	50.00	65.98	66.46	66.29	59.65

Table B-10 Stage 1 CAMx output for August 22

August 22nd										
	Collin					Dallas				
RUN	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**
BL	58.85	74.40	71.68	69.02	-	58.42	74.11	70.58	60.62	-
1	58.27	73.13	70.66	68.05	-	57.72	72.36	68.87	60.19	-
2	56.37	70.47	68.63	63.76	-	55.16	68.81	65.96	59.56	-
3	56.68	71.36	69.48	65.78	-	55.51	68.92	66.15	59.83	-
4	56.74	71.18	69.10	64.28	-	55.61	69.00	66.11	59.41	-
5	56.54	71.05	69.05	64.47	-	55.38	68.63	66.15	59.82	-
6	56.64	71.05	69.05	64.97	-	55.52	70.20	66.98	59.31	-
7	57.36	72.03	69.87	66.66	-	56.50	70.00	67.25	59.68	-
8	58.09	73.01	70.54	67.41	-	57.41	71.59	68.28	60.16	-
9	56.89	71.80	69.84	66.22	-	55.80	69.05	66.72	59.89	-
10	57.07	71.93	69.81	65.93	-	55.90	68.46	66.20	59.68	-
11	57.74	72.30	69.89	66.68	-	56.71	70.06	67.07	59.63	-
12	58.32	73.05	70.52	67.98	-	57.74	72.33	68.80	60.20	-
13	58.39	73.23	70.69	68.07	-	57.82	72.57	69.02	60.29	-
14	56.86	71.52	69.52	65.81	-	55.65	68.27	66.06	59.55	-
15	57.49	72.57	70.37	67.13	-	56.52	70.53	67.81	60.15	-
16	58.31	73.07	70.54	67.94	-	57.66	72.20	68.92	59.84	-
17	56.63	71.08	69.13	65.32	-	55.56	68.73	66.15	59.33	-
18	57.35	72.02	69.79	66.15	-	56.10	69.00	66.47	59.68	-
19	57.44	72.03	69.76	66.23	-	56.27	69.33	66.64	59.90	-
20	56.54	70.71	68.74	64.55	-	55.34	69.69	66.53	59.36	-
21	56.72	71.03	68.94	64.68	-	55.47	68.60	66.12	59.51	-
22	56.65	71.26	69.31	65.36	-	55.49	68.98	66.43	59.60	-
23	56.76	71.36	69.32	64.98	-	55.69	68.91	66.30	59.45	-
24	57.77	72.58	70.12	66.64	-	56.52	69.98	67.09	59.66	-
25	57.29	71.91	69.72	65.97	-	56.12	68.99	66.41	59.62	-
26	57.34	72.07	70.00	66.92	-	56.55	70.34	67.58	59.93	-
27	57.55	72.42	70.16	66.97	-	56.59	70.38	67.59	59.84	-
28	56.72	70.89	68.85	64.34	-	55.57	68.65	66.18	59.01	-
29	57.49	72.13	70.01	67.35	-	56.80	70.94	68.00	60.02	-
30	57.57	72.47	70.19	67.07	-	56.71	70.57	67.69	60.04	-

Table B-10 *Continued*

August 22nd										
	Denton					**Tarrant**				
RUN	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**
BL	60.48	83.52	81.22	69.02	-	58.34	82.18	79.19	67.85	-
1	59.66	81.99	79.70	68.05	-	58.15	80.45	76.93	65.40	-
2	57.49	74.76	72.97	63.76	-	56.20	74.46	72.95	64.23	-
3	57.78	77.42	75.83	65.78	-	56.72	76.12	73.94	65.10	-
4	58.45	76.28	74.04	64.28	-	56.57	76.02	74.11	64.53	-
5	58.35	76.26	74.19	64.47	-	56.50	75.48	73.57	64.46	-
6	57.81	76.66	74.81	64.97	-	56.68	77.04	74.89	65.04	-
7	58.79	79.38	77.34	66.66	-	57.18	78.07	75.40	64.63	-
8	59.92	80.93	78.60	67.41	-	57.74	79.27	75.63	63.70	-
9	57.98	78.10	76.46	66.22	-	56.96	76.73	73.61	63.50	-
10	58.50	78.15	76.24	65.93	-	57.12	77.04	74.44	64.15	-
11	59.71	80.07	77.61	66.68	-	57.88	78.73	75.11	65.42	-
12	59.93	82.00	79.65	67.98	-	57.96	80.33	76.46	64.53	-
13	60.18	82.11	79.73	68.07	-	58.30	80.49	76.77	64.30	-
14	58.03	77.81	75.97	65.81	-	56.86	76.70	73.76	64.62	-
15	58.83	79.91	77.97	67.13	-	57.48	78.70	76.03	64.69	-
16	59.96	82.09	79.65	67.94	-	58.17	80.67	77.26	64.52	-
17	57.89	77.07	75.27	65.32	-	56.70	76.32	74.15	64.13	-
18	59.07	78.96	76.78	66.15	-	57.36	77.57	74.00	64.46	-
19	59.42	79.21	76.96	66.23	-	57.35	77.68	74.32	64.12	-
20	58.27	76.38	74.32	64.55	-	57.18	77.40	75.15	65.72	-
21	58.53	76.87	74.92	64.68	-	57.32	77.31	74.76	64.34	-
22	57.88	77.04	75.28	65.36	-	56.85	76.33	73.75	64.26	-
23	58.36	76.98	74.96	64.98	-	56.79	75.49	72.88	64.53	-
24	59.85	79.95	77.57	66.64	-	57.81	78.66	75.39	65.21	-
25	59.14	78.61	76.44	65.97	-	57.31	77.38	74.27	64.05	-
26	58.73	79.53	77.67	66.92	-	57.60	78.60	76.27	64.98	-
27	59.12	79.89	77.81	66.97	-	57.50	78.63	75.44	64.43	-
28	58.18	76.24	74.08	64.34	-	56.60	75.15	73.19	64.42	-
29	58.67	80.36	78.43	67.35	-	57.64	78.99	76.38	64.79	-
30	59.07	80.14	78.07	67.07	-	57.59	78.91	75.80	65.77	-

Table B-10 *Continued*

August 22nd										
	Ellis					**Johnson and Parker**				
RUN	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**
BL	51.45	70.69	66.87	54.69	-	57.05	71.88	69.31	64.14	-
1	51.21	69.73	66.33	55.07	-	56.70	70.48	67.20	62.50	-
2	51.12	69.12	65.89	54.94	-	56.70	70.19	66.98	62.09	-
3	51.16	69.21	66.06	55.41	-	56.74	70.02	66.90	62.25	-
4	51.09	69.30	65.70	53.88	-	56.53	69.64	66.53	61.56	-
5	51.28	68.46	65.26	54.46	-	56.79	70.33	67.39	62.55	-
6	51.25	70.40	66.72	54.68	-	56.47	69.58	66.52	61.63	-
7	51.17	69.76	66.19	54.78	-	56.57	70.06	66.81	62.10	-
8	51.16	67.43	64.17	54.32	-	56.59	70.11	67.12	62.29	-
9	51.05	67.72	64.43	54.08	-	56.63	70.10	67.04	62.05	-
10	51.08	67.70	64.38	54.19	-	56.59	69.62	66.54	61.85	-
11	51.18	69.78	66.48	54.81	-	56.45	69.71	66.62	61.92	-
12	51.21	69.37	65.76	54.37	-	56.44	69.64	66.67	61.58	-
13	51.13	68.58	65.00	53.92	-	56.81	70.61	67.36	62.43	-
14	51.15	68.35	65.04	53.89	-	56.73	70.52	67.77	62.75	-
15	51.16	68.84	65.35	54.57	-	56.65	70.13	67.08	62.40	-
16	51.08	67.66	64.28	54.67	-	56.53	70.06	66.93	62.13	-
17	51.23	68.30	64.92	54.78	-	56.76	70.55	67.53	62.67	-
18	51.07	68.58	65.48	54.13	-	56.68	70.31	67.11	62.31	-
19	51.25	68.66	65.21	54.34	-	56.64	69.98	66.82	61.96	-
20	51.23	69.76	66.11	54.31	-	56.73	70.54	67.60	62.66	-
21	51.29	68.17	64.79	54.83	-	56.53	70.07	67.14	62.44	-
22	51.17	68.84	65.65	54.11	-	56.51	69.40	66.37	61.38	-
23	51.18	69.13	66.20	55.62	-	56.71	70.52	67.38	62.65	-
24	51.21	70.13	66.44	54.12	-	56.75	70.36	67.17	62.06	-
25	51.10	68.68	65.62	55.14	-	56.74	70.21	66.97	62.17	-
26	51.35	69.42	65.94	54.71	-	56.67	70.03	67.07	62.25	-
27	51.05	68.78	65.69	55.30	-	56.53	69.84	66.75	61.98	-
28	51.22	68.44	65.19	54.26	-	56.81	70.55	67.56	62.68	-
29	51.19	68.83	65.40	54.86	-	56.56	70.26	67.30	62.61	-
30	51.21	69.50	66.14	54.08	-	56.64	70.03	66.96	62.05	-

Table B-10 *Continued*

August 22nd					
	Kaufman and Rockwall				
RUN	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**
BL	54.23	63.67	62.58	58.72	-
1	53.98	63.02	62.26	58.74	-
2	53.50	63.02	62.26	58.74	-
3	53.55	63.02	62.26	58.74	-
4	53.60	63.02	62.26	58.74	-
5	53.50	63.02	62.26	58.74	-
6	53.51	63.02	62.26	58.74	-
7	53.59	63.02	62.25	58.74	-
8	53.96	63.02	62.25	58.74	-
9	53.88	63.08	62.26	58.74	-
10	53.94	63.02	62.26	58.74	-
11	53.50	63.02	62.26	58.74	-
12	53.61	63.02	62.25	58.74	-
13	53.50	63.02	62.26	58.74	-
14	53.53	63.02	62.25	58.74	-
15	53.65	63.02	62.25	58.74	-
16	53.89	63.02	62.26	58.74	-
17	53.57	63.02	62.25	58.74	-
18	53.50	63.02	62.25	58.74	-
19	53.50	63.02	62.26	58.74	-
20	53.50	63.02	62.26	58.74	-
21	53.50	63.02	62.26	58.74	-
22	53.50	63.02	62.26	58.74	-
23	53.78	63.02	62.26	58.74	-
24	53.74	63.02	62.25	58.74	-
25	53.54	63.02	62.26	58.74	-
26	53.50	63.02	62.26	58.74	-
27	53.50	63.02	62.26	58.74	-
28	53.72	63.02	62.25	58.74	-
29	53.50	63.02	62.26	58.74	-
30	53.68	63.02	62.25	58.74	-

APPENDIX C

SUMMARY OF DATA MINING RESULTS

Table C-1 Summary of variables selected by data mining for Aug 13.

12 mnight - 6am						
Collin	**Dallas**	**Denton**	**Tarrant**	**Ellis**	**J&P**	**K&R**
P1DE12-06AN	P1DE12-06AN	P1DE12-06AN	P3DE12-06AN	P1DE12-06AN		P1DE12-06AV
P3DA12-06AV	P2JO12-06AN	P2JO12-06AN	P4DA12-06AV	P3DE12-06AV		P3DE12-06AN
P6DA12-06AN	P3DA12-06AN	P3DA12-06AN	P3El12-06aV	P4TA12-06AV		P3KA12-06AV
P1De12-06aV	P3EL12-06AV	P3KA12-06AV		P7EL12-06AN		P3TA12-06AV
P2Jo12-06aN	P6DA12-06AN	P4DA12-06AV		P7EL12-06AV		P4DA12-06AV
	P1De12-06aV			P4Da12-06aN		P3Ta12-06aN
				P4Ka12-06aV		

6am - 12 noon						
Collin	**Dallas**	**Denton**	**Tarrant**	**Ellis**	**J&P**	**K&R**
ADA6-9AN	DA12-06A	CO12-06A	DA12-06A	ACO6-9AV	De12-6	AEL6-9AV
AJO6-9AV	LEl6-9LN	EL12-06A	LJO6-9LN	EL12-06A	KR12-6	DA12-06A
DA12-06A	LJO6-9LN	P1DE06-12NN	TA12-06A	KR12-06A		KR12-06A
P2JO12-06AV	TA12-06A	P3TA06-12NN	AEl6-9aV	LTA6-9LV		TA12-06A
P3TA06-12NN	AJo6-9aN	P4DA12-06AV	AJo6-9aN	P1De06-12nN		Co12-6
AEl6-9aN	De12-6	P4TA12-06AN	De12-6	P3El12-06aV		P1De06-12nV
KR12-6	El12-6	P5DA06-12NV	El12-6	P7El06-12nN		P3Ta06-12nV
LJo6-9LV	KR12-6	P6DA12-06AN	KR12-6			P4Da06-12nN
	P3De12-06aN	P6DA12-06AV	LEl6-9LN			P7El12-06aV
	P5Ka06-12nV	P7EL12-06AN	P4Ka06-12nN			
		P5De06-12nN	P5Jo06-12nN			
			P5Ka06-12nV			
			P7El06-12nV			

12 noon - 3pm						
Collin	**Dallas**	**Denton**	**Tarrant**	**Ellis**	**J&P**	**K&R**
ADA6-9AN	ADA6-9AV	AKA9-3PN	ADA6-9AV	AJO9-3PN	EL06-12N	CO06-12N
DA06-12N	DA06-12N	APA6-9AN	DA06-12N	ARO9-3PV	LJO6-9LV	DA06-12N
DA12-06A	KR06-12N	CO12-06A	KR06-12N	EL06-12N	LTA6-9LN	KR06-12N
LKA6-9LN	TA06-12N	DE06-12N	TA06-12N	EL12-06A	P1DE12-06AV	KR12-06A
P1DE12-06AN	TA12-06A	EL06-12N	TA12-06A	P2JO12-06AV	P3DA12-06AV	TA06-12N
P4KA12-06AV	AEl9-3pV	LDE6-9LV	AEl9-3pV	P3DA06-12NV	P1De06-12nV	TA12-06A
TA06-12N	Da12-06	P4DA12-06AV	Da12-06	TA12-06A		AEl9-3pV
TA12-06A	El6-12	P4KA12-06AN	El6-12	Da06-12		ATa9-3pN
AEl6-9aN	KR12-06	Da6-12	KR12-06	El06-12		
ARo6-9aN	P4Ta12-06aN	P4Ta06-12nV	P4Ta12-06aN	LPa6-9LN		
El6-12	P6Ta06-12nN	P4Ta12-06aV	P6Ta06-12nN	Ta06-12		
P1De06-12nN	P6Ta12-06aN		P6Ta12-06aN			
P3Jo06-12nN						

Table C-1 – Continued.

3pm - 7pm						
Collin	**Dallas**	**Denton**	**Tarrant**	**Ellis**	**J&P**	**K&R**
CO12-03P	DA06-12N	DA06-12N	ADA6-9AN	DA12-03P	ATA9-3PN	CO12-03P
DA06-12N	DA12-03P	DA12-03P	KR12-06A	EL06-12N	DA12-06A	DA06-12N
DA12-03P	DE12-03P	KR06-12N	LTA9-5PN	EL12-03P	DE12-03P	DA12-03P
KR06-12N	EL06-12N	KR12-03P	P2JO12-06AV	TA12-03P	JP12-03P	KR06-12N
KR12-03P	EL12-03P	TA06-12N	P3DA12-06AV	Co12-3	KR12-03P	KR12-03P
TA06-12N	KR12-03P	TA12-03P	P3EL12-07PN	Da06-12	LJO9-5PN	TA12-03P
TA12-03P	TA06-12N	AEl3-7pN	P3KA12-07PN	De12-3	P3TA12-06AN	AEl3-7pV
AKa6-9aN	AEl3-7pN	Co12-3	P4DA12-06AV	El06-12	P4KA12-06AN	AEl9-3pN
KR12-6	AEl9-3pV	De12-3	P7El12-07pN	KR12-3	P4TA06-12NN	Co6-12
LDa9-5pV	ARo9-3pV	De6-12	ADe6-9aN	P4Da12-06aV	P5DA12-07PN	El06-12
LTa9-5pV	Co12-3	El06-12	LEl6-9LN	P5El12-07pN	P5DE06-12NN	El12-3
P3Ka12-07pN	Da12-06	El12-3	LRo6-9LV	P7El06-12nN	P5PA06-12NV	P5Da06-12nV
	KR06-12		P1De12-06aV	Ta06-12	P6DA06-12NV	Ta06-12
	KR12-06		P4Ta12-07pN		JP12-3	Ta12-06
	P5Da12-07pN					
	TA12-03P					
	Ta12-06					

7pm - 12 mnight						
Collin	**Dallas**	**Denton**	**Tarrant**	**Ellis**	**J&P**	**K&R**
AKA6-9AV	DA03-07P	ACO9-3PV	CO12-03P	CO03-07P	P7EL12-06AN	AEL6-9AV
CO12-03P	DE03-07P	AKA6-9AV	DA12-03P	CO12-03P		CO03-07P
DA03-07P	LEL5-12MNN	CO12-03P	DE03-07P	DA12-03P		CO12-03P
DA12-03P	P5KA06-12NV	DA03-07P	KR03-07P	EL03-07P		DA03-07P
DE03-07P	AEl3-7pN	DA12-03P	TA12-03P	EL12-03P		EL03-07P
DE12-03P	El3-7	DE03-07P	DA03-07P	KR03-07P		EL12-03P
KR03-07P	P7El12-06aN	DE12-03P	Da3-7	Da06-12		KR03-07P
LDE6-9LV		LDA9-5PN	El3-7	Da3-7		KR12-03P
P3Ta06-12nN		P1DE12-06AN	JP12-3	De3-7		LCO6-9LN
TA12-03P		P2JO12-07PN	LEl5-12mnN	KR12-3		P3EL12-07PN
AEl3-7pN		P5JO12-07PN	P1De07-12mN	LEl5-12mnN		P5PA06-12NN
Co3-7		TA12-03P	P3Da12-07pN	P3Ka12-07pV		P6TA12-06AV
Da06-12		AEl3-7pN		P5Ka06-12nV		P4Ka06-12nN
El06-12		Co3-7		P5Pa12-07pV		
El12-3		Da06-12		Ta06-12		
El3-7		El12-3		Ta12-06		
KR12-3		El3-7		Ta12-3		
LEl5-12mnN		KR06-12				
P5Da12-07pN		KR12-3				
Ta06-12		KR3-7				
		LCo9-5pV				
		P5De06-12nN				
		Ta06-12				

Table C-2 Summary of variables selected by data mining for Aug 14.

12 mnight - 6am						
Collin	Dallas	Denton	Tarrant	Ellis	J&P	K&R
P1DE12-06AN	P4KA12-06AV	P3DA12-06AN	P1PA12-06AV	P1PA12-06AV	P3DE12-06AN	
P3KA12-06AV	PrevDayEL07-12M	P3DA12-06AV	P3KA12-06AN	P3TA12-06AN	P4DA12-06AN	
P6TA12-06AV	PrevDayKR07-12M	P3EL12-06AV	P3TA12-06AV	P6DA12-06AN	P6DA12-06AV	
PrevDayCO07-12M	PrevDayTA07-12M	P4DA12-06AN	P4DA12-06AV	PrevDayCO07-12M	PrevDayCO07-12M	
PrevDayKR07-12M	P1Pa12-06aN	P4TA12-06AV	P4KA12-06AN	PrevDayDA07-12M	PrevDayDA07-12M	
P4Da12-06aV	P3El12-06aV	PrevDayCO07-12M	P4TA12-06AN	PrevDayEL07-12M	PrevDayDE07-12M	
	P7El12-06aV	PrevDayDA07-12M	P6DA12-06AV	PrevDayKR07-12M	PrevDayTA07-12M	
		PrevDayDE07-12M	PrevDayDA07-12M	PrevDayTA07-12M		
		PrevDayEL07-12M	PrevDayEL07-12M			
		PrevDayKR07-12M	PrevDayJP07-12M			
		PrevDayTA07-12M	PrevDayKR07-12M			
		P3De12-06aN	PrevDayTA07-12M			
		P4Da12-06aV				

6am - 12 noon						
Collin	Dallas	Denton	Tarrant	Ellis	J&P	K&R
AJO6-9AV	DE12-06A	P3EL06-12NV	DE12-06A	DE12-06A	EL12-06A	AKa6-9aV
CO12-06A	EL12-06A	P3KA06-12NV	EL12-06A	TA12-06A	P4DA06-12NN	P1Pa06-12nV
P2JO06-12NV	TA12-06A	P3KA12-06AN	TA12-06A	AKa6-9aN	P4DA12-06AN	P3El12-06aV
P3DE12-06AN	AEl6-9aN	P3TA12-06AN	AEl6-9aN	EL12-06A	P4EL06-12NV	
P6TA06-12NV	Da12-6	P6DA12-06AN	Da12-6	P4Ka12-06aN	P4KA06-12NN	
AKa6-9aV	P4Ta06-12nV	ADa6-9aN	JP12-6		P6DA12-06AN	
		P3El06-12nN			P6TA06-12NN	
					Da12-6	
					JP12-6	
					JP12-06A	
					Ta12-6	

Table C-2 – Continued.

12 noon - 3pm						
Collin	**Dallas**	**Denton**	**Tarrant**	**Ellis**	**J&P**	**K&R**
ADE6-9AV	AEL9-3PN	ADE9-3PV	ACO6-9AN	APA9-3PN	AKA9-3PN	ADA9-3PN
ARO6-9AN	DA06-12N	ARO9-3PV	DA06-12N	DA06-12N	ARO6-9AN	JP06-12N
ATA6-9AV	EL06-12N	JP06-12N	DA12-06A	EL06-12N	EL12-06A	LPA6-3PN
CO06-12N	EL12-06A	P5EL06-12NN	EL06-12N	EL12-06A	JP06-12N	P3KA12-06AN
CO12-06A	LEL6-3PV	ADa6-9aN	EL12-06A	LRO6-3PN	JP12-06A	P4TA06-12NV
LDE6-3PV	LTA6-3PN	DE06-12N	JP06-12N	TA06-12N	P1DE12-06AV	ACo6-9aN
LTA6-3PV	P3EL12-06AN	LEl6-3pV	P7EL06-12NV	AEl9-3pN	P1PA06-12NV	P5El06-12nN
P1DE12-06AN	P3TA12-06AV		TA06-12N	LDe6-3pV	P3DE12-06AV	P5Pa06-12nV
P2JO12-06AV	TA06-12N		TA12-06A	LRo6-3pV	P5JO06-12NN	
P3KA12-06AV	TA12-06A		AEl9-3pN	P6Ta12-06aN	P6DA06-12NV	
P6DA06-12NV	AEl9-3pN		De12-6	Ta12-6	P7EL06-12NV	
Co6-12	Da12-6		LRo6-3pN		TA06-12N	
P3Da12-06aN	De12-6		P5Da06-12nN		TA12-06A	
P5Co06-12nN	JP6-12					
	LRo6-3pN					
	P3El12-06aV					

3pm - 7pm						
Collin	**Dallas**	**Denton**	**Tarrant**	**Ellis**	**J&P**	**K&R**
ADA6-9AV	ACO9-3PN	ARO6-9AN	DA06-12N	JP12-06A	EL12-03P	JP06-12N
ADE6-9AN	DA06-12N	CO06-12N	DA12-03P	P3DA12-06AN	JP06-12N	JP12-06A
ATA6-9AV	DA12-03P	CO12-03P	EL06-12N	P4TA12-06AV	JP12-03P	LEL6-3PV
CO06-12N	LJO6-3PN	EL12-03P	EL12-03P		JP12-06A	P2JO06-12NN
CO12-03P	P3EL12-07PV	JP06-12N	TA06-12N		LRO6-3PN	P3EL12-07PV
EL12-06A	P5JO12-07PV	JP12-03P	TA12-03P			P4DA06-12NN
LDE6-3PV	P7EL12-06AV	P3KA12-06AN	El12-6			P4KA12-07PN
P5CO12-07PN	TA06-12N	P5CO12-07PN	LRo6-3pN			P4TA12-06AN
	TA12-03P	TA06-12N	P3Ta12-06aN			P6TA12-07PN
	AJo3-7pV	TA12-06A	P5Pa06-12nV			ADa6-9aN
	APa9-3pN	P2Jo12-07pN	P7El06-12nV			
	JP12-3	P3De06-12nV				
	JP6-12	P3El12-07pN				
		P3Ta12-07pV				
		P7El12-07pV				

Table C-2 – Continued.

7pm - 12 mnight						
Collin	**Dallas**	**Denton**	**Tarrant**	**Ellis**	**J&P**	**K&R**
	DA03-07P		AJO9-3PN	EL03-07P	AEL3-7PV	ADE6-9AV
	LRo3-12mnN		ARO9-3PV	LDa3-12mnN	LCO6-3PN	ARO6-9AV
	LTA3-12MNN		LCO6-3PV	P1DE12-06AN	P2JO12-06AN	JP12-06A
	P1DE12-06AN		LKa3-12mnN	P7EL12-06AV	P3DE12-07PN	KR03-07P
	Da3-7		P4TA06-12NV	P2Jo12-07pV	P3TA06-12NV	LPa3-12mnN
			P5KA12-07PV	P5Co12-07pV	P5CO06-12NV	P5JO06-12NV
	P5Co06-12nN		TA03-07P		P7EL07-12MN	KR3-7
	Ta3-7		LRo3-12mnN		LKa3-12mnN	
					LPa3-12mnV	
					P3El06-12nV	
					P7El07-12mN	

Table C-3 Summary of variables selected by data mining for Aug 15.

12 mnight - 6am						
Collin	Dallas	Denton	Tarrant	Ellis	J&P	K&R
P2JO12-06AN	P3KA12-06AN	P4KA12-06AN	P3DE12-06AV	P3DA12-06AN	P3EL12-06AN	P4DA12-06AV
P3DA12-06AN	P3KA12-06AV	P4TA12-06AN	P3KA12-06AN	P3TA12-06AV	P3El12-06aV	P2Jo12-06aV
P3DE12-06AN	P4DA12-06AV	P6DA12-06AN	P6DA12-06AN	P4DA12-06AN	P6TA12-06AN	P6Da12-06aN
P4DA12-06AV	P4TA12-06AV	PreDayTA07-12M	P6DA12-06AV	P7EL12-06AV	PreDayDA07-12M	
P6DA12-06AN	PrevDayKR07-12M		PreDayTA07-12M	P7El12-06aN		
	P4Da12-06aN					
	P6Ta12-06aN					

6am - 12 noon						
Collin	Dallas	Denton	Tarrant	Ellis	J&P	K&R
CO12-06A	CO12-06A	CO12-06A	DA12-06A	EL12-06A	JP12-06A	ADE6-9AN
DA12-06A	DA12-06A	DA12-06A	DE12-06A	P5KA06-12NV	P3DE12-06AV	P1DE06-12NN
DE12-06A	DE12-06A	DE12-06A	P3DE06-12NV	P6DA06-12NN	P3KA06-12NV	P2JO12-06AV
KR12-06A	KR12-06A	P4TA06-12NV	P4DA12-06AV	P3De06-12nN	P4DA12-06AN	P3DE12-06AV
P5Ka06-12nN	P2TA12-06AN	TA12-06A	TA12-06A	P5Co06-12nV	P5CO06-12NV	P3EL12-06AN
TA12-06A	P4TA12-06AV	AEl6-9aN	P4Ka06-12nN	P7El12-06aN	P5DE06-12NN	P4DA12-06AN
P3Ta12-06aV	P6Da06-12nN		P5Ka06-12nN		P5KA06-12NV	P4TA12-06AN
P4Ta12-06aV	TA12-06A		P7El06-12nV		P5PA06-12NN	P5TA06-12NV
	P3Ka06-12nV				P7EL06-12NN	P6DA12-06AN
					P4Ka12-06aN	P6DA12-06AV
					P5Ta06-12nV	P6Ta12-06aN
					P7El12-06aN	

12 noon - 3pm						
Collin	Dallas	Denton	Tarrant	Ellis	J&P	K&R
CO06-12N	CO06-12N	CO06-12N	DA06-12N	EL06-12N	AJO6-9AN	LDA6-3PN
CO12-06A	DA06-12N	CO12-06A	DA12-06A	EL12-06A	CO06-12N	LDA6-3PV
DA12-06A	DA12-06A	DA06-12N	DE06-12N	P3TA06-12NN	CO12-06A	LPA6-3PN
DE06-12N	DE06-12N	DA12-06A	DE12-06A	LDa6-3pN	EL06-12N	P1DE06-12NN
TA06-12N	LTA6-3PV	DE06-12N	LTA6-3PV	P1De06-12nN	JP06-12N	P2JO12-06AV
TA12-06A	P7EL06-12NV	LTA6-3PV	TA06-12N	P3El12-06aN	JP12-06A	P3TA12-06AN
AEl9-3pN	TA06-12N	P7EL06-12NV	TA12-06A	P5El06-12nV	P3DE06-12NN	P5CO06-12NV
Da6-12	TA12-06A	TA06-12N	ACo9-3pN	P6Ta06-12nN	P4DA06-12NN	LRo6-3pV
De12-6	AEl6-9aN	TA12-06A	AEl9-3pN	P7El06-12nN	P5DA06-12NN	LTa6-3pV
	AEl9-3pN	AEl9-3pN	Co12-6		P6DA06-12NV	P4Da06-12nN
	Co12-6	De12-6	Co6-12		P6TA06-12NN	P4Da12-06aN

Table C-3 – Continued.

12 noon - 3pm						
Collin	**Dallas**	**Denton**	**Tarrant**	**Ellis**	**J&P**	**K&R**
	De12-6	LRo6-3pN	LRo6-3pN		LKa6-3pV	
	LRo6-3pN	LRo6-3pV	LRo6-3pV		P7El06-12nN	
	P3Ka06-12nV	P3Da12-06aV				
	P3Ta12-06aV					

3pm - 7pm						
Collin	**Dallas**	**Denton**	**Tarrant**	**Ellis**	**J&P**	**K&R**
AKA9-3PV	CO06-12N	DA06-12N	EL06-12N	ARO9-3PN	EL06-12N	ADA6-9AN
EL06-12N	CO12-03P	DA12-03P	EL12-03P	LDE6-3PN	EL12-03P	ATA6-9AV
EL12-03P	P3DE12-06AV	DE06-12N	EL12-06A	LKA6-3PN	EL12-06A	KR12-03P
P2JO06-12NN	P3KA12-06AV	DE12-03P	KR06-12N	P2JO12-07PV	P3TA12-07PV	LPA6-3PN
P4DA12-06AN	P3TA12-07PN	LTA6-3PV	P3DE12-07PN	P4KA06-12NN	P6DA12-07PV	P2JO12-06AN
P4KA12-06AV	P4TA12-06AN	TA06-12N	P3KA12-06AN	P5JO12-07PV	APa3-7pV	P4TA06-12NV
P5DA06-12NV	P5Ka12-07pN	TA12-03P	P5CO06-12NV	P5TA12-07PN	JP12-3	P1Pa12-07pN
P5Da12-07pN		AEl9-3pN	P5TA06-12NN	ATa3-7pV	JP6-12	P4Da06-12nN
P5PA12-07PV		Co12-3	P7EL12-06AV	P4Ka12-07pV	P3El12-07pN	P6Da12-06aV
P6TA12-07PN		Co12-6	P7El12-07pN	P6Ta12-07pV	P4Da12-06aN	
ADa9-3pV		Co6-12	Ta12-3		P7El12-07pN	
ATa9-3pN		Da12-6				
P4Da12-07pN		De12-6				
P6Da06-12nN		LRo6-3pN				
		LRo6-3pV				
		P5De06-12nN				
		Ta12-6				

7pm - 12 mnight						
Collin	**Dallas**	**Denton**	**Tarrant**	**Ellis**	**J&P**	**K&R**
DA03-07P	CO03-07P	CO03-07P	AEL3-7PN	LDa3-12mnN	AJO9-3PN	ADA6-9AN
LRo3-12mnN	DA03-07P	DA03-07P	LJO6-3PV	P1DE12-06AV	EL06-12N	ARo6-9aV
P1Pa06-12nV	JP12-03P	LRo3-12mnN	P5DA12-07PV	P3KA12-06AN	EL12-03P	ATA9-3PV
P3DA07-12MV	LRo3-12mnN	P4DA06-12NN	P7El07-12mN	LEl3-12mnN	P3TA06-12NV	DE03-07P
P3EL06-12NV	P3DA07-12MN	LPa3-12mnN	LKa3-12mnN		P4DA06-12NN	JP03-07P
P3EL12-07PV	P4DA06-12NN	P5Ka12-07pN	LKa6-3pV		P4KA12-07PV	JP12-06A
P4KA12-07PN	P5DE06-12NV		LRo3-12mnN		P7El12-07pN	KR06-12N
P5TA06-12NV	P6DA12-06AV		P5Ka12-07pN		TA03-07P	LKA6-3PN
AEl6-9aN	LPa3-12mnN		P7El12-06aN		AJo3-7pN	P1PA12-06AN
LJo6-3pN						P5TA12-07PV
P6Da06-12nV						ADe9-3pN
						P6Ta12-06aN
						P7El12-06aV

Table C-4 Summary of variables selected by data mining for Aug 16.

12 mnight - 6am						
Collin	**Dallas**	**Denton**	**Tarrant**	**Ellis**	**J&P**	**K&R**
P6DA12-06AV	P2JO12-06AV	P1DE12-06AN	P3KA12-06AN	P1DE12-06AN	P1DE12-06AN	P4DA12-06AV
PrevDayKR07-12M	P4DA12-06AN	P1DE12-06AV	P3TA12-06AV	P2JO12-06AN	P1DE12-06AV	PrevDayJP07-12M
P3Ka12-06aV	P4DA12-06AV	P3DA12-06AN	P4DA12-06AN	P3EL12-06AN	P2JO12-06AN	P4Ta12-06aV
P4Da12-06aV	P4TA12-06AV	P3DA12-06AV	P6DA12-06AV	P3EL12-06AV	P3Da12-06aN	
PrevDayDA07-12M	P6DA12-06AV	P3Ta12-06aN	P7EL12-06AV	P4Ta12-06aN	P4KA12-06AN	
		P6DA12-06AV	PrevDayDE07-12M		P4Ka12-06aV	
		PrevDayEL07-12M			P6TA12-06AN	
		P3Ka12-06aV				

6am - 12 noon						
Collin	**Dallas**	**Denton**	**Tarrant**	**Ellis**	**J&P**	**K&R**
DA12-06A	DA12-06A	DA12-06A	AEL6-9AV	DA12-06A	EL12-06A	ADA6-9AV
P4TA06-12NN	P3DE12-06AV	P3DE12-06AV	DA12-06A	P4TA06-12NN	JP12-06A	KR12-06A
P5KA06-12NV	P4TA06-12NN	P4TA06-12NN	P5KA06-12NV	P5KA06-12NV	LDE6-9LN	P1DE12-06AV
Co12-6	P5KA06-12NV	P5KA06-12NV	LJo6-9LN	LKa6-9LN	P2JO12-06AN	P1Pa12-06aV
De12-6	AEl6-9aV	Co12-6	P2Jo12-06aN	P3Ta12-06aV	P3DE06-12NN	P5Ka06-12nN
P4Da12-06aV	LDa6-9LN	P1De06-12nN	P7El06-12nN	P6Da12-06aV	P3TA12-06AN	ADa6-9aV
P5Ka06-12nN	LEl6-9LN				P6DA12-06AN	P5El06-12nV
	P3De06-12nV				AKa6-9aN	P5Jo06-12nN
					LTa6-9LN	

12 noon - 3pm						
Collin	**Dallas**	**Denton**	**Tarrant**	**Ellis**	**J&P**	**K&R**
AUG1DA06-12N	AKA9-3PV	ADE9-3PV	AEl6-9aN	ADA9-3PN	ADE6-9AN	ADE6-9AN
CO06-12N	AUG1DA06-12N	AUG1DA06-12N	ATA6-9AV	ADE9-3PN	JP06-12N	KR06-12N
DA12-06A	CO06-12N	CO06-12N	AUG1DA06-12N	DE06-12N	JP12-06A	KR12-06A
DE06-12N	DA12-06A	DA12-06A	CO06-12N	EL12-06A	LRO9-3PV	P1DE12-06AV
EL06-12N	DE06-12N	DE06-12N	DA12-06A	KR12-06A	LTA9-3PN	P1PA12-06AV
TA06-12N	EL06-12N	EL06-12N	DE06-12N	P3Ta06-12nN	P1DE06-12NV	P4DA06-12NN
Da6-12	P2TA12-06AN	LCO9-3PV	DE12-06A	P4TA06-12NV	P3TA12-06AN	P5JO06-12NN
De12-6	P3DE12-06AV	TA06-12N	EL06-12N	P6DA12-06AV	ARo9-3pN	P5Ka06-12nN
LEl9-3pN	P3EL12-06AN	Co6-12	P3KA06-12NN	TA06-12N	LDa9-3pV	ADa6-9aV
	TA06-12N	Da6-12	P7EL12-06AV	ARo6-9aN		ADa9-3pN

Table C-4 – Continued.

12 noon - 3pm						
Collin	**Dallas**	**Denton**	**Tarrant**	**Ellis**	**J&P**	**K&R**
	Da6-12	LEl9-3pN	TA06-12N	JP12-6		
	LEl9-3pN		Da6-12	LDa9-3pN		
	LKa9-3pN		LEl9-3pN			
			P4Ka12-06aN			
			P7El06-12nN			
			Ta12-6			

3pm - 7pm						
Collin	**Dallas**	**Denton**	**Tarrant**	**Ellis**	**J&P**	**K&R**
AUG1DA06-12N	AUG1DA06-12N	AKA3-7PV	ADE3-7PV	ACO6-9AN	ARO3-7PV	LKA9-3PN
CO06-12N	CO06-12N	AUG1DA06-12N	ARO9-3PV	EL12-06A	JP06-12N	P3Da12-06aV
CO12-03P	CO12-03P	CO06-12N	CO12-03P	LDa9-3pN	JP12-03P	AKa9-3pN
DA12-03P	DA12-03P	CO12-03P	DA12-03P	LKA3-7PV	LJo3-7pN	LKa9-3pN
DA12-06A	DA12-06A	DA12-03P	DE12-03P	P2JO12-06AN	LKA3-7PN	P3Da12-06aN
DE06-12N	DE12-03P	DE06-12N	EL06-12N	P6TA12-06AN	JP12-3	P3De06-12nV
DE12-03P	EL06-12N	DE12-03P	El12-6	El12-6		P5Co12-07pN
EL06-12N	LPA6-9LV	TA06-12N	JP06-12N	LEl3-7pV		P5Jo12-07pV
Da6-12	P4DA12-06AN	TA12-03P	JP12-03P	P4Ta12-06aV		
KR6-12	TA12-03P	Da12-6	P1DE12-06AN	P5De06-12nN		
LEl9-3pN	ADa6-9aV	Da6-12	P3DA12-06AV	P5Pa06-12nN		
P5Jo12-07pV	Da6-12	El6-12	TA12-03P			
P5Ka06-12nN	De6-12	LEl9-3pN	LJo9-3pN			
Ta12-3	LEl9-3pN	P5Jo12-07pV	P5Jo06-12nN			
Ta6-12	LKa9-3pN	P5Ka12-07pV				
	P5Jo12-07pV	P7El06-12nN				
	P7El12-07pV					
	Ta6-12					

7pm - 12 mnight						
Collin	**Dallas**	**Denton**	**Tarrant**	**Ellis**	**J&P**	**K&R**
LJO6-9LV	ADA3-7PN	KR03-07P	EL03-07P	APA9-3PN	JP03-07P	
P5Co12-07pN	ADA6-9AV	LKa9-3pN	P3EL12-06AN	LPa5-12mnV	JP06-12N	
ACo9-3pN	AEL9-3PN	P1DE12-06AN	P7El07-12mN	LRo3-7pN	JP12-03P	
P5Da06-12nN	CO06-12N	P4DA06-12NN	ACo9-3pN	LRO9-3PN	LJO3-7PN	
	P1DE07-12MV	AKa9-3pN	LEl3-7pN	P3Da12-07pN	P1DE12-07PN	
	P2JO12-06AN	ARo3-7pV	P4Ta12-07pN	P3De12-07pV	P5JO06-12NV	
	P5EL06-12NV	LDe9-3pV			TA03-07P	
	AEl3-7pV	LTa6-9LV			ACo9-3pN	
	P1Pa07-12mN				ADe3-7pV	
	P7El06-12nV				AKa3-7pN	

Table C-4 – Continued.

7pm - 12 mnight						
Collin	**Dallas**	**Denton**	**Tarrant**	**Ellis**	**J&P**	**K&R**
					KR06-12	
					KR12-3	
					LCo6-9LV	
					LDe9-3pV	
					P1Pa06-12nV	
					JP12-6a	

Table C-5 Summary of variables selected by data mining for Aug 17.

12 mnight - 6am						
Collin	**Dallas**	**Denton**	**Tarrant**	**Ellis**	**J&P**	**K&R**
P3EL12-06AN	P1DE12-06AN	P3DA12-06AN	P4DA12-06AN	P3EL12-06AN	P2Jo12-06aN	P1De12-06aV
P3TA12-06AN	P2JO12-06AN	P3DE12-06AV	PrevDayDE07-12M	P3EL12-06AV	P6DA12-06AN	P3DA12-06AN
P6DA12-06AV	P3PA12-06AV	P3EL12-06AN	PrevDayJP07-12M	P3KA12-06AN		P3DE12-06AV
P6TA12-06AV	P3TA12-06AV	P7EL12-06AN		P4DA12-06AV		P4DA12-06AN
P1De12-06aV	P4KA12-06AN	JPPrevDay7-12		P4KA12-06AV		P6DA12-06AV
PreDayDA07-12M	P3De12-06aN	P7El12-06aN		P7EL12-06AN		P3Ka12-06aN
PreDayDE07-12M		PreDayJP07-12M		PreDayDA07-12M		
PreDayEL07-12M		PreDayTA07-12M		PreDayTA07-12M		

6am - 12 noon						
Collin	**Dallas**	**Denton**	**Tarrant**	**Ellis**	**J&P**	**K&R**
DA12-06A	AEL6-9AV	ACO6-9AV	AEL6-9AV	APA6-9AV	P1PA06-12NV	AEL6-9AN
DE12-06A	DA12-06A	AEL6-9AV	DA12-06A	JP12-06A	P4TA06-12NV	KR12-06A
KR12-06A	ADe6-9aV	ARO6-9AN	P4Da06-12nV	KR12-06A	APa6-9aN	LEL6-9LN
P4DA06-12NV	KR12-6	DA12-06A		P1DE12-06AV	P1De06-12nV	TA12-06A
P5DA06-12NN	LPa6-9LV	LRO6-9LV		P3Ta06-12nN		AJo6-9aN
TA12-06A	P2Jo06-12nN	P3DA06-12NV		P4TA06-12NV		P4Da06-12nV
P5Pa06-12nN	P6Da12-06aN	KR12-6		P6DA12-06AV		P5Ka06-12nN
P5Ta06-12nN				P7EL06-12NN		
				P7EL12-06AV		

12 noon - 3pm						
Collin	**Dallas**	**Denton**	**Tarrant**	**Ellis**	**J&P**	**K&R**
CO06-12N	CO06-12N	AKA9-3PV	ADA9-3PN	ATA9-3PV	AJO6-9AV	DE12-06A
DA06-12N	DA06-12N	ATA6-9AV	CO06-12N	EL06-12N	ATA9-3PN	KR06-12N
DA12-06A	DA12-06A	CO06-12N	DA06-12N	LDA9-3PN	CO12-06A	KR12-06A
DE06-12N	DE06-12N	DA06-12N	DA12-06A	P3EL06-12NV	JP06-12N	P1DE12-06AV
DE12-06A	JP12-06A	DA12-06A	DE06-12N	P3TA06-12NN	LJO9-3PN	ADa6-9aV
KR06-12N	LEL9-3PN	DE06-12N	LEL9-3PN	P4KA12-06AV	P3DA06-12NV	APa9-3pN
LEl9-3pN	P1DE12-06AV	KR06-12N	P3EL12-06AN	P7EL12-06AV	P5EL06-12NV	LKa9-3pN
P2JO12-06AN	P2JO06-12NN	LEL9-3PN	TA06-12N	TA06-12N	P5PA06-12NV	P5Co06-12nV
P3TA12-06AN	P3KA06-12NN	P3EL12-06AN	AEl9-3pV	LKa6-9LV	P6DA12-06AN	P5Ka06-12nN
P4DA06-12NV	P4DA12-06AN	TA06-12N	De12-6	P1Pa06-12nN	APa6-9aV	Ta12-6
TA06-12N	TA06-12N	P3De12-06aV		P7El06-12nN	P5De06-12nV	

Table C-5 – Continued.

12 noon - 3pm						
Collin	**Dallas**	**Denton**	**Tarrant**	**Ellis**	**J&P**	**K&R**
APa6-9aN	P4Ta12-06aN					

3pm - 7pm						
Collin	**Dallas**	**Denton**	**Tarrant**	**Ellis**	**J&P**	**K&R**
DA06-12N	DA06-12N	CO06-12N	CO06-12N	ADE6-9AV	ACO6-9AV	AKa9-3pN
DA12-03P	DA12-03P	DA06-12N	DA06-12N	EL06-12N	AEL3-7PN	P3EL12-07PN
DE06-12N	DE06-12N	DA12-03P	DA12-03P	EL12-03P	AJO3-7PN	P4KA12-06AN
DE12-03P	DE12-03P	DE06-12N	DA12-06A	LDa9-3pN	EL12-03P	P5TA06-12NV
TA06-12N	LPA6-9LV	DE12-03P	DE06-12N	LEL9-3PV	JP06-12N	AKa3-7pN
TA12-03P	P4DA12-06AN	LJO3-7PV	DE12-03P	P1PA06-12NV	JP12-03P	LKa3-7pN
Co12-3	TA06-12N	TA06-12N	LJO3-7PV	P2Jo12-06aV	LTA3-7PV	LKa9-3pN
Co6-12	TA12-03P	TA12-03P	TA06-12N	P3DA12-06AN	P1PA06-12NV	P5Co12-07pV
Da12-6a	Co12-3	Co12-3	TA12-03P	P3DA12-06AV	P3DE06-12NN	
De6-12	Co6-12	Da12-6	ADe9-3pV	P3EL06-12NV	P4DA12-07PV	
LEl9-3pN	LEl9-3pN	LEl9-3pN	Co12-3	P3TA06-12NV	P4TA06-12NN	
LKa9-3pN	P5Jo12-07pV	LTa9-3pV	LEl9-3pN	P4DA12-06AN	P5DE06-12NN	
P5Jo12-07pV		P5Jo12-07pV	P1Pa12-07pN	ACo9-3pN	El12-6a	
				P3De12-06aN		

7pm - 12 mnight						
Collin	**Dallas**	**Denton**	**Tarrant**	**Ellis**	**J&P**	**K&R**
LKa9-3pN	AEl3-7pV	DA06-12N	ACO3-7PN	ARO9-3PN	ACO9-3PN	LKa3-7pN
P1DE12-06AN	CO03-07P	DE03-07P	AKA9-3PV	ATA9-3PV	ADE6-9AN	P3EL12-06AV
P2JO12-06AV	CO06-12N	DE06-12N	EL03-07P	JP12-06A	KR12-03P	ATa9-3pV
P2JO12-07PN	CO12-03P	DE12-03P	EL12-03P	P1PA12-07PN	LDE6-9LV	LEl9-3pV
P3DE12-06AV	JP03-07P	TA03-07P	JP12-03P	P4TA07-12MN	LTa9-3pN	LJo3-7pN
ADa6-9aV	KR03-07P	TA12-03P	LDA9-3PN	P5EL06-12NV	P1DE12-06AV	LRo5-12mnV
LKa3-7pN	P1DE07-12MN	AJo3-7pV	ADa9-3pV	P6DA12-06AV	ACo3-7pV	P5El12-07pN
P3Ka06-12nV	P1DE12-07PN	Da12-3	LKa6-9LV	P3De12-07pN	El3-7	P5Ta12-07pN
P5Pa12-07pN	P3KA12-07PV	El06-12	P1Pa07-12mN	P3El12-06aN	LCo9-5pV	
	P5DA06-12NN	El12-3	P3De12-07pN		LRo6-9LN	
	APa3-7pN	El3-7	P5De12-07pN		P2Jo12-07pV	
	LKa9-5pN	JP3-7			P3Ka12-06aV	
	LPa6-9LN	Ka3-7			P6Ta12-07pN	
	P3De07-12mN	P3Da12-07pN				
	P6Ta07-12mN	P5Jo12-07pV				
		P7El07-12mN				
		Ta06-12				

Table C-6 Summary of variables selected by data mining for Aug 18.

12 mnight - 6am						
Collin	**Dallas**	**Denton**	**Tarrant**	**Ellis**	**J&P**	**K&R**
P3DA12-06AN	P2Jo12-06aN	P3KA12-06AN	P3KA12-06AV	P3DA12-06AN	P4DA12-06AV	P3DE12-06AV
P3EL12-06AN	P3DE12-06AV	P4DA12-06AV	P3Ta12-06aN	P3EL12-06AV	P6DA12-06AN	P6DA12-06AN
P3TA12-06AN	P6DA12-06AN	P4TA12-06AN	P4Da12-06aN	P3TA12-06AN	P6TA12-06AV	P3Ka12-06aN
P7El12-06aN	PreDayDE07-12M	P3Ta12-06aN	P6Ta12-06aN	P4DA12-06AN	PreDayDA07-12M	PreDayDE07-12M
P7EL12-06AV		P4Da12-06aN	PreDayCO07-12M	P4KA12-06AV	PreDayJP07-12M	PreDayJP07-12M
P4Da12-06aN		P6Ta12-06aN	PreDayDE07-12M	P7El12-06aN	PreDayTA07-12M	
TaPrevDay7-12		PreDayDE07-12M	PreDayJP07-12M	PreDayJP07-12M		
			PreDayTA07-12M			

6am - 12 noon						
Collin	**Dallas**	**Denton**	**Tarrant**	**Ellis**	**J&P**	**K&R**
DE12-06A	ADa6-9aN	AJO6-9AN	ADE6-9AV	ADE6-9AV	KR12-6	CO12-06A
LJo6-9LN	DA12-06A	APA6-9AV	EL12-06A	EL12-06A	LPa6-9LN	KR12-06A
TA12-06A	LJO6-9LV	DE12-06A	KR12-06A	P3DE06-12NN	P1Pa06-12nN	P6DA12-06AV
AJo6-9aN	LRO6-9LV	LJO6-9LN	P1DE12-06AN	P3EL12-06AV	P4Da06-12nN	ADa6-9aN
P4Ta06-12nN	LTA6-9LV	LRO6-9LN	P2JO12-06AN	P3TA06-12NV		P3Da06-12nV
P7El06-12nN	P3DA12-06AV	P3DA12-06AV	P2JO12-06AV	ADe6-9aN		
	P4DA12-06AV	P3KA12-06AV	P5EL06-12NN	LRo6-9LN		
	P5DA06-12NV	P6DA12-06AV	P4Ta06-12nN	P5Ka06-12nN		
	P6DA12-06AN	TA12-06A				
	P6DA12-06AV	AJo6-9aN				
	P5El06-12nN					

12 noon - 3pm						
Collin	**Dallas**	**Denton**	**Tarrant**	**Ellis**	**J&P**	**K&R**
AKA6-9AN	ADA9-3PN	APA6-9AV	AJO9-3PN	ACO9-3PN	KR06-12N	AJO6-9AN
ATA6-9AN	ARO9-3PV	CO06-12N	APA6-9AN	EL06-12N	LEL9-3PV	DA06-12N
CO06-12N	DA06-12N	DA12-06A	CO06-12N	P1DE12-06AN	P1DE12-06AV	DA12-06A
DE06-12N	DA12-06A	DE06-12N	DE06-12N	P2JO12-06AV	P3DE06-12NV	KR06-12N
DE12-06A	KR06-12N	DE12-06A	DE12-06A	P3Ta06-12nN	P3TA12-06AN	KR12-06A
LCO6-9LN	LJO6-9LV	LCO9-3PN	LJO9-3PN	P5CO06-12NV	P4TA12-06AV	LEL9-3PN
LJO6-9LN	P5DA06-12NV	LJO6-9LN	P1CO12-06AN	P5DE06-12NN	TA06-12N	P3KA12-06AN
P1DE12-06AV	El6-12	LRO6-9LN	P3DA06-12NN	P3De06-12nN	AKa6-9aN	P4DA12-06AN
P2JO12-06AV	P3Ka12-06aN	P5EL06-12NV	P3EL12-06AV	P7El06-12nN	P3Da12-06aV	P4KA12-06AN
TA06-12N	P5Ka06-12nV	TA12-06A	P5DE06-12NV		P3Ta06-12nV	P5Co06-12nN

Table C-6 – Continued.

12 noon – 3pm						
Collin	**Dallas**	**Denton**	**Tarrant**	**Ellis**	**J&P**	**K&R**
TA12-06A	P6Ta06-12nV	Ajo6-9aN	TA06-12N		Ta12-6	P6Da06-12nN
Da6-12	Ta6-12	Ta6-12	TA12-06A			

3pm – 7pm						
Collin	**Dallas**	**Denton**	**Tarrant**	**Ellis**	**J&P**	**K&R**
CO06-12N	ADA9-3PN	ARO6-9AV	ATA9-3PN	EL12-03P	APA6-9AV	DA06-12N
CO12-03P	AKA9-3PV	CO06-12N	EL06-12N	LDA9-3PN	JP12-03P	DA12-03P
DE06-12N	ARO3-7PV	CO12-03P	EL12-03P	LEL9-3PV	JP12-06A	KR06-12N
TA06-12N	DA06-12N	DE06-12N	JP12-03P	P2JO06-12NV	KR12-03P	KR12-03P
TA12-03P	DA12-03P	DE12-03P	LJO9-3PN	P3EL06-12NV	LDA9-3PN	KR12-06A
Ael3-7pV	DA12-06A	DE12-06A	P4TA06-12NN	P3TA06-12NV	LDE3-7PV	P4DA12-06AN
Lro9-3pN	EL06-12N	LTA3-7PV	P5PA06-12NV	P4DA12-06AV	LJO9-3PN	Ael6-9aN
P5El06-12nN	EL12-03P	P3EL06-12NV	TA06-12N	Lel6-9LN	P5EL12-07PN	Lel9-3pN
	JP12-03P	TA06-12N	TA12-03P	Lro3-7pN	TA06-12N	Lka9-3pN
	KR06-12N	TA12-03P	Da12-3	P5Da06-12nN	TA12-03P	P4Ta12-06aV
	KR12-03P	TA12-06A	De12-3	P5Jo12-07pV	Lpa9-3pN	P5Da12-07pN
	KR12-06A	Ajo9-3pN	JP12-3		P3El06-12nN	P6Da12-06aN
	LEL9-3PN	Da12-3	Lel9-3pV		P4Ka12-07pV	
	P3DE12-06AV	Ljo6-9LN	P2Jo12-07pV			
	P3EL12-06AN	Ljo9-3pN				
	P5CO12-07PV					
	P6DA12-07PV					
	Ael6-9aN					
	P5Jo12-07pV					

7pm – 12 mnight						
Collin	**Dallas**	**Denton**	**Tarrant**	**Ellis**	**J&P**	**K&R**
ADA9-3PN	ACO9-3PN	AJO9-3PV	CO03-07P	ACO9-3PN	AEL6-9AV	ACO6-9AN
AEL3-7PV	ARO6-9AN	CO03-07P	JP03-07P	EL03-07P	ATA3-7PN	LEL6-9LV
LDE9-3PN	CO12-06A	CO06-12N	JP12-03P	P3DA06-12NN	JP03-07P	P3TA07-12MV
LJO9-3PV	DA06-12N	CO12-03P	TA03-07P	Ada9-3pV	LDE3-7PV	Aco9-3pN
P1PA06-12NN	EL03-07P	DE03-07P	TA06-12N	P1De12-06aV	LEL9-3PV	Ada6-9aV
P3TA06-12NV	P1DE12-07PV	DE06-12N	TA12-03P	P3Co07-12mV	P1DE06-12NV	
P7EL07-12MN	P3DA06-12NN	DE12-03P	El06-12		P2JO12-07PV	
Aco9-3pN	P4TA06-12NV	JP03-07P	El12-3		P3EL07-12MN	
P3De12-06aV	P7EL12-06AN	JP12-03P	KR12-3		P5CO06-12NN	
P5Ta12-07pV		LKA9-3PV	KR3-7		P6DA12-06AV	
P6Ta12-07pN		P3TA06-12NN	P3El07-12mV		TA03-07P	
		P6DA12-06AV	P3Ka12-07pV		TA06-12N	
		TA03-07P			TA12-03P	

Table C-6 – Continued.

7pm – 12 mnight						
Collin	**Dallas**	**Denton**	**Tarrant**	**Ellis**	**J&P**	**K&R**
		TA06-12N			AJo3-7pN	
		TA12-03P			P2Jo12-07pN	
		El06-12			P4Ta07-12mV	
		El12-3			P6Ta12-06aV	
		KR12-3			P7El07-12mV	
		KR3-7				
		LCo3-7pV				
		LDe9-3pV				
		P1De07-12mV				
		P7El07-12mN				

Table C-7 Summary of variables selected by data mining for Aug 19.

12 mnight - 6am						
Collin	**Dallas**	**Denton**	**Tarrant**	**Ellis**	**J&P**	**K&R**
P3DA12-06AN	P4DA12-06AN	P3DE12-06AN	P1PA12-06AN	P2JO12-06AN	P1DE12-06AN	P3DA12-06AN
P3DE12-06AV	P6DA12-06AV	P3EL12-06AV	P4DA12-06AN	P3DE12-06AV	P1DE12-06AV	P3DE12-06AV
DePrevDay7-12	P1De12-06aV	DePrevDay7-12	P7EL12-06AN	P3EL12-06AV	P3DA12-06AN	P4TA12-06AN
JPPrevDay7-12		ElPrevDay7-12	P4Ta12-06aN	P4KA12-06AN	P3EL12-06AV	P6DA12-06AN
P4Ka12-06aN		JPPrevDay7-12	PreDayDE07-12M	DePrevDay7-12	P4KA12-06AN	P6DA12-06AV
PreDayDE07-12M		P2Jo12-06aN	PreDayJP07-12M	P3Ka12-06aV	JPPrevDay7-12	P1De12-06aV
PreDayJP07-12M		P3Da12-06aV	PreDayTA07-12M	P7El12-06aV	PreDayDE07-12M	P3El12-06aV
PreDayTA07-12M		PreDayDE07-12M			PreDayJP07-12M	PreDayKR07-12M
		PreDayJP07-12M			PreDayTA07-12M	
		PreDayTA07-12M				

6am - 12 noon						
Collin	**Dallas**	**Denton**	**Tarrant**	**Ellis**	**J&P**	**K&R**
ATA6-9AN	ACO6-9AN	ADA6-9AN	ADA6-9AN	P1DE06-12NV	CO12-06A	DA12-06A
CO12-06A	DA12-06A	CO12-06A	DA12-06A	P1DE12-06AV	DE12-06A	KR12-06A
DE12-06A	LJO6-9LV	DE12-06A	EL12-06A	P3DA06-12NV	AJo6-9aN	LEL6-9LN
JP12-06A	P3EL12-06AN	JP12-06A	JP12-06A	P3EL12-06AN	APa6-9aV	P1DE12-06AV
P7El06-12nV	P4DA06-12NV	P4DA06-12NV	LDA6-9LN	P6DA12-06AN	JP12-6	P6DA12-06AV
	P4DA12-06AN	LKa6-9LN	P1DE12-06AN		LDa6-9LV	ARo6-9aV
	ADa6-9aN	P1De12-06aN	P2JO12-06AV		P2Jo06-12nN	P4Da06-12nV
	LEl6-9LN	P3De12-06aV	P3DE12-06AV			
			P6TA12-06AN			
			P7EL12-06AV			
			P3Da06-12nV			
			P3El12-06aN			

Table C-7 – Continued.

12 noon - 3pm						
Collin	**Dallas**	**Denton**	**Tarrant**	**Ellis**	**J&P**	**K&R**
APA9-3PN	ADA9-3PN	CO12-06A	CO06-12N	ADA9-3PN	CO06-12N	DA12-06A
ARO9-3PV	DA06-12N	DE06-12N	DA06-12N	DA06-12N	CO12-06A	KR06-12N
CO06-12N	EL06-12N	DE12-06A	EL06-12N	EL06-12N	DE06-12N	KR12-06A
CO12-06A	LEL9-3PN	P3DE06-12NN	LEL9-3PN	LEL9-3PN	DE12-06A	LEL6-9LN
DE06-12N	P3DE12-06AV	ADe9-3pN	TA06-12N	P6DA06-12NN	JP06-12N	AJo6-9aN
DE12-06A	P3EL12-06AN	JP12-6	LJo9-3pN	P7EL06-12NV	JP12-06A	APa9-3pN
JP06-12N	TA06-12N	P4Ta06-12nN		TA06-12N	LJO9-3PN	Da12-6
JP12-06A	TA12-06A	P5Co06-12nV		P6Da12-06aN	P3EL12-06AN	
LCO6-9LN					P4KA12-06AV	
LDE6-9LV					P6DA12-06AV	
ATa9-3pN					P6TA12-06AV	
					AJo6-9aN	
					Da12-6	
					Da6-12	
					KR6-12	
					LJo6-9LV	
					P4Da06-12nN	

3pm - 7pm						
Collin	**Dallas**	**Denton**	**Tarrant**	**Ellis**	**J&P**	**K&R**
CO06-12N	DA06-12N	DE06-12N	DA06-12N	DA06-12N	CO06-12N	CO06-12N
CO12-03P	DA12-03P	DE12-03P	DA12-03P	DA12-03P	CO12-03P	CO12-03P
CO12-06A	EL06-12N	JP12-06A	DE06-12N	EL06-12N	CO12-06A	CO12-06A
JP06-12N	EL12-03P	P2JO12-07PN	DE12-03P	EL12-03P	DE12-06A	DE06-12N
JP12-03P	LJO3-7PV	P5DE12-07PN	DE12-06A	TA06-12N	EL06-12N	DE12-06A
JP12-06A	P3DA12-07PV	ATa3-7pN	EL06-12N	TA12-03P	EL12-03P	JP06-12N
AJo3-7pN	P4DA12-07PN	LCo6-9LV	EL12-03P	AEl9-3pN	JP06-12N	JP12-03P
APa6-9aV	TA06-12N	P3Da06-12nV	LJO3-7PV	KR12-6	JP12-03P	JP12-06A
ARo9-3pV	TA12-03P	P4Da12-07pV	TA06-12N	P4Ta12-06aV	P5JO12-07PV	LJO3-7PV
LJo6-9LN	AEl3-7pN		TA12-03P	P5Jo12-07pV	AJo6-9aN	P2JO06-12NV
LKa6-9LN	LEl9-3pN		LEl9-3pN		ATa6-9aN	P3EL12-06AV
P3Da06-12nN	P4Ta12-06aV				Da12-3	P4KA12-06AV
P3Da06-12nV					Da6-12	P5DA06-12NV
P3Ta12-06aN					LEl6-9LN	LDa6-9LN
P4Ka12-06aN					LEl9-3pN	LDa9-3pN
P5Co12-07pN					P4Ka12-07pN	P7El12-06aN
P5Da06-12nV					P6Da12-06aN	
P5Da12-07pN					Ta12-3	
P5El12-07pN						
P6Ta12-07pN						

Table C-7 – Continued.

7pm - 12 mnight						
Collin	**Dallas**	**Denton**	**Tarrant**	**Ellis**	**J&P**	**K&R**
	LEL3-7PN	AEl6-9aV	LEL3-7PN	KR06-12N	DA06-12N	CO03-07P
	AEl3-7pN	Ta12-6	AEl3-7pN	KR12-03P	DA12-03P	CO06-12N
	JP12-3		JP12-3	KR12-06A	EL03-07P	CO12-03P
	LJo3-7pN		LJo3-7pN	LEL6-9LN	EL06-12N	EL03-07P
				P1PA06-12NN	EL12-03P	JP03-07P
				P4KA12-06AV	TA12-03P	JP06-12N
				AJo3-7pV	Co12-3	JP12-03P
				Co12-3	Da3-7	JP12-06A
				Da3-7	De06-12	KR03-07P
				De06-12	De12-3	P4KA12-06AV
				De12-3	JP06-12	TA03-07P
				El12-3	JP12-3	AJo3-7pN
				El3-7	KR12-3	Da06-12
				KR3-7	KR12-6	Da12-3
				P3Da12-06aN	P4Da07-12mV	KR06-12
				P5Ka12-07pN	P4Ka12-07pV	KR12-3
						P1De06-12nN
						P1De06-12nV
						P2Jo12-07pV
						P3De12-07pN
						P6Da12-07pN
						P7El12-07pV
						Ta12-6

Table C-8 Summary of variables selected by data mining for Aug 20.

12 mnight - 6am						
Collin	**Dallas**	**Denton**	**Tarrant**	**Ellis**	**J&P**	**K&R**
P2JO12-06AV	P3DE12-06AN	P1DA12-06AV	P1DE12-06AN	P3DA12-06AN	P3DA12-06AN	P3DE12-06AN
P3EL12-06AN	P3DE12-06AV	P1DE12-06AN	P3DE12-06AN	P4DA12-06AV	P3EL12-06AV	P3TA12-06AN
P3Da12-06aN	P4DA12-06AN	P1DE12-06AV	P4DA12-06AN	P4TA12-06AV	P6DA12-06AN	P4DA12-06AV
P7El12-06aN	P4KA12-06AN	P2JO12-06AV	P6DA12-06AV	P6TA12-06AN	JPPrevDay7-12	P4KA12-06AV
PreDayTA07-12M	P1De12-06aV	P3DE12-06AN	P6TA12-06AN	P7EL12-06AN	P4Ka12-06aV	P6Da12-06aV
PrvDayDA07-12M	P3El12-06aV	P3Ta12-06aV	PreDayEL07-12M	P7EL12-06AV	P7Pa12-06aV	PreDayKR07-12M
		P7El12-06aV		P3El12-06aV	PreDayEL07-12M	
		PreDayDA07-12M		PreDayEL07-12M	PreDayJP07-12M	
		PreDayTA07-12M				

6am - 12 noon						
Collin	**Dallas**	**Denton**	**Tarrant**	**Ellis**	**J&P**	**K&R**
LEL6-9LN	DA12-06A	LDE6-9LV	DA12-06A	DA12-06A	APA6-9AV	KR12-06A
P3KA12-06AN	EL12-06A	P1DE06-12NN	EL12-06A	EL12-06A	JP12-06A	P1DE12-06AN
P4DA12-06AV	TA12-06A	P1DE12-06AV	TA12-06A	TA12-06A	P3EL12-06AV	P3DE12-06AN
P7EL12-06AV	ADe6-9aN	P2JO06-12NV	AEl6-9aN	AEl6-9aN	P3KA06-12NN	P5DA06-12NN
ADe6-9aV	AEl6-9aN	P3DE12-06AN	AEl6-9aV	P4Ka06-12nN	TA12-06A	P4Ka06-12nV
LJo6-9LN	AKa6-9aN	P3TA06-12NV	LDa6-9LV	P6Da12-06aV	ADa6-9aN	P5Da06-12nN
P3El06-12nN	P1De06-12nN	P5DA06-12NV	P4Ka06-12nN		Da12-6	P5Da06-12nV
P4Ta06-12nV	P7De12-06aV	ADe6-9aN	P5El06-12nV		P4Ta06-12nN	
P5Co06-12nN		P5De06-12nN				
P6Da12-06aN						

12 noon - 3pm						
Collin	**Dallas**	**Denton**	**Tarrant**	**Ellis**	**J&P**	**K&R**
AEL9-3PN	ADA9-3PN	DE06-12N	ADA9-3PN	ADA9-3PN	DA12-06A	KR06-12N
DA06-12N	AEL9-3PV	LDE6-9LV	AEL9-3PV	DA06-12N	EL12-06A	P5DA06-12NN
EL06-12N	DA06-12N	LJO6-9LN	DA06-12N	DA12-06A	JP06-12N	Co12-3
TA06-12N	DA12-06A	P1DE06-12NN	DA12-06A	EL06-12N	JP12-06A	P5Da06-12nV
AEl9-3pN	EL06-12N	P1DE12-06AV	EL06-12N	EL12-06A	KR06-12N	P6Ta06-12nN
AEl9-3pV	EL12-06A	P3KA06-12NV	EL12-06A	TA06-12N	P3EL12-06AV	
Co06-12	P3DE12-06AV	P5DA06-12NV	P3DE12-06AV	TA12-06A	P4DA12-06AN	
JP6-12	P3EL06-12NV	P5DE06-12NN	P3EL06-12NV	Co12-06	P4DA12-06AV	
P4Da06-12nV	P5KA06-12NV	P6DA06-12NV	P5KA06-12NV	De12-06	P6DA06-12NV	
P5Co06-12nV	TA06-12N	P3Da12-06aV	TA06-12N	P3Ka12-06aN	TA12-06A	
	TA12-06A		TA12-06A		Co12-06	
	Co12-06		Co12-06		De12-06	
	De12-06		De12-06		P3Ta06-12nV	

Table C-8 – Continued.

12 noon - 3pm						
Collin	**Dallas**	**Denton**	**Tarrant**	**Ellis**	**J&P**	**K&R**
			LCo6-9LN			
			LJo6-9LN			
			P5Pa06-12nV			

3pm - 7pm						
Collin	**Dallas**	**Denton**	**Tarrant**	**Ellis**	**J&P**	**K&R**
	APA9-3PN		LKA6-9LV	DA06-12N	JP12-03P	ADA9-3PN
	KR06-12N		P1DE12-06AV	DA12-03P	LJO9-5PN	ARo6-9aN
	KR12-06A		P3DE12-06AN	EL06-12N	ACo9-3pV	LRO6-9LN
	LJO6-9LV		P3EL06-12NV	EL12-03P	AJo9-3pN	P3DA12-06AV
	P3DA12-06AV		P3KA12-06AV	TA06-12N	LJo9-5pN	P3DA12-07PV
	P5DA06-12NN		P5CO06-12NV	TA12-03P	LJo9-5pV	P3DE12-06AV
	P7EL12-07PV		P5EL06-12NN	AEl6-9aV	P4Ka12-07pV	P3TA12-07PN
	P5Da06-12nV		P5PA12-07PN	ATa6-9aN	P5Ta06-12nN	P4DA12-06AN
	P5Ta06-12nV		P3Ka06-12nN	Co12-06		ADa3-7pV
				De12-3		AJo3-7pN
				JP12-3		AJo3-7pV
				LEl9-5pV		APa9-3pN
				LJo9-5pN		APa9-3pV
						LCo9-5pV
						LJo6-9LV
						P1De12-07pV
						P1Pa12-07pN
						P3El06-12nV
						P3Ta12-07pV
						P4Da12-07pN
						P4Ta12-06aV
						P4Ta12-07pV
						P5Co12-07pV
						P5De12-07pN
						P5El12-07pN
						P5El12-07pV
						P7El12-06aV
						P7El12-07pV

7pm - 12 mnight						
Collin	**Dallas**	**Denton**	**Tarrant**	**Ellis**	**J&P**	**K&R**
	DA03-07P		LJO5-12MNN	DA03-07P	P2JO07-12MV	
	LEL5-12MNN		P4KA12-06AN	LDe5-12mnV	P6TA07-12MV	
	LDe5-12mnV		TA03-07P	LEl5-12mnN	Da3-7	
	P5Ka12-07pN		ADa3-7pV		LJo5-12mnN	
			AKa9-3pV		P6Ta12-06aN	
			De3-7		P7El07-12mN	
			P4Ta12-06aV			

Table C-9 Summary of variables selected by data mining for Aug 21.

12 mnight - 6am						
Collin	**Dallas**	**Denton**	**Tarrant**	**Ellis**	**J&P**	**K&R**
P2JO12-06AN	P1DE12-06AN	P3DE12-06AN	P1DE12-06AV	P1DE12-06AV	P3DA12-06AV	P3KA12-06AN
P4TA12-06AN	P3DE12-06AN	P3DE12-06AV	P3DE12-06AV	P3DA12-06AV	P3EL12-06AV	P3De12-06aV
P7EL12-06AV	P3EL12-06AN	P3KA12-06AN	P3EL12-06AN	P3EL12-06AV	P4KA12-06AV	P4Ta12-06aV
P4Ta12-06aV	P3TA12-06AV	P6DA12-06AN	P6DA12-06AN	P6DA12-06AN	P6DA12-06AN	
PreDayDA07-12M	P4TA12-06AN	P6DA12-06AV	P4Ka12-06aN	P6DA12-06AV	P4Da12-06aV	
PreDayEL07-12M	P7EL12-06AV	P3El12-06aV	P6Ta12-06aV	ElPrevDay7-12	PreDayJP07-12M	
PreDayTA07-12M	P3El12-06aV	P4Ka12-06aN	PreDayEL07-12M	P3Da12-06aN		
	PreDayDA07-12M		PreDayJP07-12M			
	PreDayEL07-12M		PreDayTA07-12M			

6am - 12 noon						
Collin	**Dallas**	**Denton**	**Tarrant**	**Ellis**	**J&P**	**K&R**
APA6-9AV	CO12-06A	CO12-06A	ARO6-9AV	EL12-06A	AJO6-9AN	JP12-06A
CO12-06A	DA12-06A	DA12-06A	CO12-06A	P1DE12-06AN	JP12-06A	P1DE12-06AN
DA12-06A	DE12-06A	DE12-06A	DA12-06A	P1PA06-12NV	P3DA12-06AN	P3DE12-06AV
DE12-06A	TA12-06A	KR12-06A	DE12-06A	P3EL06-12NV	P3DA12-06AV	P4DA12-06AN
KR12-06A	P5Pa06-12nN	P4DA12-06AV	P4DA12-06AV	P3TA12-06AV	P4TA06-12NV	P6DA12-06AN
P3DA06-12NN		P7EL06-12NV	P7EL06-12NV	P4KA06-12NN	P6DA12-06AN	P6DA12-06AV
P7EL06-12NV		TA12-06A	TA12-06A	P4KA12-06AV	P2Jo06-12nN	
TA12-06A		AEl6-9aN	AEl6-9aN	P5TA06-12NV	P3Ka12-06aN	
			P3El06-12nN	ADe6-9aV		
			P4Ka12-06aV	P5Da06-12nN		

12 noon - 3pm						
Collin	**Dallas**	**Denton**	**Tarrant**	**Ellis**	**J&P**	**K&R**
CO06-12N	CO06-12N	CO12-06A	CO12-06A	AJO9-3PN	DA06-12N	ADE6-9AV
CO12-06A	CO12-06A	DA06-12N	DA06-12N	EL06-12N	JP06-12N	LDA6-3PN
DA06-12N	DA06-12N	DE06-12N	DE06-12N	JP06-12N	P3KA06-12NN	P3EL12-06AV
DE06-12N	DA12-06A	DE12-06A	DE12-06A	P1DE06-12NN	P3KA12-06AN	P3TA06-12NV
KR12-06A	DE06-12N	LTA6-3PV	LTA6-3PV	P3KA06-12NN	P3TA12-06AV	AEl6-9aV
LPA6-3PN	DE12-06A	TA06-12N	P4DA06-12NN	P3KA06-12NV	P6TA06-12NN	P1Pa12-06aN
P2EL12-06AN	TA06-12N	TA12-06A	TA06-12N	P4DA06-12NN	TA06-12N	P2Jo06-12nN
P3KA06-12NV	TA12-06A	AEl9-3pN	TA12-06A	P4TA12-06AV	El6-12	P2Jo12-06aV
P3KA12-06AN	AEl9-3pN	Co6-12	AEl9-3pN	KR6-12	JP12-6	P3De06-12nV
P4DA12-06AV	AJo6-9aN	Da12-6	Co6-12	P5Ka06-12nV	P3Ta06-12nN	

Table C-9 – Continued.

12 noon - 3pm						
Collin	**Dallas**	**Denton**	**Tarrant**	**Ellis**	**J&P**	**K&R**
P5TA06-12NN	LRo6-3pN	LRo6-3pN	Da12-6		P4Da12-06aV	
TA06-12N	P6Ta06-12nN	LRo6-3pV	LRo6-3pN		P7El06-12nN	
			LRo6-3pV			

3pm - 7pm						
Collin	**Dallas**	**Denton**	**Tarrant**	**Ellis**	**J&P**	**K&R**
ARO6-9AN	ACO9-3PV	CO06-12N	ADA3-7PV	APA6-9AV	ADE6-9AV	ADE6-9AV
LCO6-3PN	CO06-12N	CO12-03P	APA6-9AV	P3DA12-06AN	EL06-12N	ARO6-9AV
P1DE06-12NV	CO12-03P	DA06-12N	ARO9-3PV	P3KA12-06AV	JP12-03P	KR12-03P
P3TA12-06AV	P3EL12-06AV	DA12-03P	LTA6-3PN	P3TA12-06AV	P7EL06-12NN	P2JO06-12NN
P5DA12-07PN	P3Ka06-12nN	DE12-03P	P1DE12-07PN	P4TA12-06AV	P7El12-07pN	AJo3-7pV
P5DA12-07PV	P5De12-07pN	DE12-06A	P5DA12-07PN	P5EL12-07PV	El12-6	LEl6-3pN
P5EL12-07PV	P5JO06-12NN	ADe9-3pN	P6DA12-06AN	P5De12-07pN	JP6-12	LEl6-3pV
P5PA12-07PV	P5KA12-07PN	P3Da12-06aN	P6TA12-06AV	P6Da06-12nV	LCo6-3pV	P1De12-06aN
AJo9-3pN	P5PA06-12NN	P3El12-07pV				P3El12-06aV
P5Ka12-07pN	P5PA12-07PV	P4Da06-12nV				P3Ta06-12nV
	P2Jo12-07pN	P5Da12-07pN				P5El06-12nN
	P3Da06-12nN	Ta12-3				P5El06-12nV
						P5Pa12-07pN
						P6Ta12-07pN

7pm - 12 mnight						
Collin	**Dallas**	**Denton**	**Tarrant**	**Ellis**	**J&P**	**K&R**
CO06-12N	DA03-07P	CO03-07P	DA03-07P	DE03-07P	ACO3-7PV	KR6-12
CO12-03P	EL12-03P	CO12-03P	LRO3-12MNN	EL03-07P	EL12-06A	P1De12-07pN
DA03-07P	JP06-12N	DE03-07P	P1DE12-06AN	LDA3-12MNN	JP03-07P	
DA12-03P	LRO3-12MNN	P3KA12-06AV	P3EL12-06AV	LJO6-3PN	P3EL06-12NV	
DE03-07P	P1DE12-06AN	P5DA12-07PN	TA03-07P	LTa3-12mnN	P3EL12-06AV	
P2JO07-12MN	P3DA07-12MN	P5PA12-07PV	P4Da07-12mN		P4TA06-12NN	
P5KA12-07PN	P3EL12-06AV	P7EL12-07PN			LEl3-12mnN	
LKa6-3pN	P5DE06-12NN	AKa3-7pV			P4Da12-07pV	
P5Da06-12nN	P6DA12-06AV	P5Ka12-07pN			P4Ta12-06aN	
P5Da06-12nV	TA03-07P				P5Jo12-07pN	
P5Ka06-12nN	LRo3-12mnN				P5Pa12-07pN	
P5Ka06-12nV						

Table C-10 Summary of variables selected by data mining for Aug 22.

12 mnight - 6am						
Collin	**Dallas**	**Denton**	**Tarrant**	**Ellis**	**J&P**	**K&R**
P3DE12-06AV	P4TA12-06AN	P1DE12-06AV	P1DE12-06AV	P3TA12-06AN	P2JO12-06AN	P1DE12-06AN
P4DA12-06AV	P7EL12-06AV	P2JO12-06AN	P2JO12-06AN	P4TA12-06AN	P3DA12-06AV	P3De12-06aV
P6DA12-06AN	P3El12-06aV	P3TA12-06AV	P3TA12-06AV	P6DA12-06AN	P4DA12-06AV	P4Ta12-06aV
P6DA12-06AV	PrevDayEL07-12M	P4DA12-06AN	P4DA12-06AV	P6DA12-06AV		PreDayCO07-12M
P4Ta12-06aV	PrevDayJP07-12M	P4DA12-06AV	P6DA12-06AN	P3Da12-06aN		PreDayEL07-12M
PreDayJP07-12M		P6DA12-06AN	PreDayDA07-12M	PreDayEL07-12M		PreDayJP07-12M
		P6DA12-06AV	PreDayTA07-12M			
		P3El12-06aV	P4Ka12-06aN			
		P4Ka12-06aN	P6Ta12-06aV			
		PreDayEL07-12M				

6am - 12 noon						
Collin	**Dallas**	**Denton**	**Tarrant**	**Ellis**	**J&P**	**K&R**
CO12-06A	CO12-06A	CO12-06A	CO12-06A	KR12-06A	ACO6-9AN	
DA12-06A	DA12-06A	DA12-06A	DA12-06A	P3DA12-06AN	JP12-06A	
DE12-06A	DE12-06A	DE12-06A	DE12-06A	P3EL12-06AV	P2JO12-06AN	
TA12-06A	P4TA06-12NV	TA12-06A	TA12-06A	P4DA06-12NN	P6TA06-12NV	
	P4TA12-06AN	AEl6-9aN	AEl6-9aN	P4DA12-06AV	P3Ka12-06aN	
	TA12-06A		P3El06-12nN	P4TA12-06AV		
	P5Pa06-12nN		P4Ka12-06aV	P5JO06-12NN		
				P5KA06-12NN		
				ADe6-9aV		
				P5Da06-12nN		

12 noon - 3pm						
Collin	**Dallas**	**Denton**	**Tarrant**	**Ellis**	**J&P**	**K&R l**
CO06-12N	CO06-12N	CO06-12N	CO06-12N	DA06-12N	JP06-12N	ADA6-9AN
CO12-06A	CO12-06A	CO12-06A	DA06-12N	EL06-12N	JP12-06A	AKA9-3PN
DA06-12N	DA06-12N	DA06-12N	DA12-06A	JP12-06A	LEL6-3PN	ATA6-9AN
DA12-06A	DA12-06A	DA12-06A	DE06-12N	KR12-06A	P1PA06-12NV	DA06-12N
DE06-12N	DE06-12N	DE06-12N	TA06-12N	P3DA06-12NN	P3DA12-06AN	LJO6-3PV
DE12-06A	EL06-12N	DE12-06A	TA12-06A	P3DA12-06AN	P3DA12-06AV	P2Jo12-06aV
TA06-12N	TA06-12N	LTa6-3pV	ARo9-3pV	P3TA06-12NN	El6-12	P3DA12-06AN
TA12-06A	TA12-06A	P6TA12-06AV	Co12-6	P3TA06-12NV	JP6-12	P3DA12-06AV
ADe9-3pV	AJo6-9aN	TA06-12N	Co6-12	P4DA06-12NN	P3Ta06-12nN	P3KA12-06AN
KR12-6	ARo9-3pV	LKa6-3pV	Da12-6	P5DE06-12NN	P4Da12-06aV	AEl6-9aV
LKa6-3pV	De12-6	Ta12-6	Da6-12	P5KA06-12NN	P7El06-12nN	P1Pa12-06aN
P3Ka06-12nN	LKa6-3pV		De12-6	P6TA12-06AV		P2Jo06-12nN

Table C-10 – Continued.

12 noon - 3pm						
Collin	**Dallas**	**Denton**	**Tarrant**	**Ellis**	**J&P**	**K&R**
	P6Ta06-12nN		De6-12	El6-12		P3De06-12nV
			LKa6-3pV	KR6-12		
				P5Ka06-12nV		

3pm - 7pm						
Collin	**Dallas**	**Denton**	**Tarrant**	**Ellis**	**J&P**	**K&R**
ADA9-3PV	CO06-12N	ADA9-3PV	AEL6-9AV	ACO3-7PN	JP06-12N	ADe6-9aV
CO06-12N	CO12-03P	CO06-12N	AEL9-3PV	ACO6-9AV	JP12-03P	AJo3-7pV
CO12-03P	DA06-12N	CO12-03P	AJO9-3PN	AEL3-7PV	JP12-06A	KR12-3
CO12-06A	DA12-03P	CO12-06A	APA6-9AV	ATA6-9AV	LEL6-3PN	P6Ta12-07pN
DA06-12N	DE12-03P	DA06-12N	EL06-12N	EL12-03P	P4KA12-06AN	
DA12-03P	P3Ka06-12nN	DA12-03P	EL12-03P	EL12-06A	P5CO06-12NN	
DA12-06A	P5De12-07pN	DA12-06A	KR12-06A	P1DE06-12NN	P5DE12-07PN	
DE06-12N	TA12-03P	DE06-12N	P3DE12-07PN	P3DE12-06AV	El12-3	
DE12-03P	ADe9-3pV	DE12-03P	P4KA12-06AN	P5KA12-07PV	El12-6	
LTA6-3PV	Da12-6	LTA6-3PV	P6TA06-12NV	P5TA06-12NN	LCo6-3pV	
P7EL06-12NV	De6-12	P3El12-07pV	P7EL12-07PN	P5De12-07pN	P5Co12-07pV	
TA06-12N	KR6-12	P4Da06-12nV	Ta12-3	P6Da06-12nV	P7El12-07pN	
TA12-03P	P2Jo12-07pN	P7EL06-12NV				
ADe9-3pV		TA06-12N				
AJo9-3pN		TA12-03P				
ARo6-9aN		ADe9-3pN				
De12-6		ADe9-3pV				
KR6-12		De12-6				
LKa6-3pV		KR6-12				
P5Da12-07pN		LKa6-3pV				
P5Ka12-07pN		P3Da12-06aN				
Ta12-6		Ta12-6				

APPENDIX D

STAGE 2 CAMX RUNS FOR AUGUST 13 - 22

Table D-1 Stage 2 CAMx output for August 13

August 13th										
	Collin					**Dallas**				
RUN	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**
BL	41.88	63.05	60.31	52.41	46.33	47.93	78.99	75.60	58.72	46.73
1	41.97	62.84	60.05	52.28	46.70	47.94	78.22	75.98	60.68	48.09
2	42.39	62.90	59.86	52.21	46.20	48.14	76.95	73.96	57.64	47.00
3	42.05	62.77	59.83	52.20	46.33	48.09	77.00	74.42	58.14	46.52
4	42.77	62.75	59.87	52.21	46.63	47.97	76.80	74.96	59.87	47.84
5	42.25	62.92	59.76	52.22	46.22	47.99	76.85	74.46	58.36	46.73
6	42.18	62.67	59.87	52.19	46.24	47.96	77.29	74.55	58.35	46.90
7	41.92	62.81	59.96	52.22	46.66	48.12	77.34	75.14	59.51	47.55
8	41.98	62.79	59.88	52.22	46.24	48.19	77.89	75.01	58.62	46.94
9	42.94	62.81	59.81	52.17	46.48	48.19	76.83	74.81	59.70	48.03
10	42.69	62.89	59.79	52.17	46.17	48.38	76.94	73.80	56.64	46.10
11	42.07	62.73	59.92	52.22	46.41	48.03	77.47	74.95	59.09	47.24
12	42.01	62.93	59.80	52.19	46.19	48.34	77.45	74.27	57.23	46.33
13	41.96	62.86	59.98	52.27	46.72	47.95	77.96	75.76	60.23	47.65
14	42.14	62.86	59.82	52.21	46.24	48.13	77.43	74.61	57.99	46.79
15	42.17	62.91	59.75	52.18	46.29	47.85	76.13	73.98	58.36	47.11
16	42.28	62.86	59.99	52.25	46.72	48.24	78.08	75.98	60.75	48.05
17	42.59	62.80	59.78	52.16	46.19	48.13	76.51	73.90	57.95	47.18
18	43.14	62.80	59.85	52.20	46.25	48.39	77.19	74.70	59.44	47.38
19	42.25	62.91	59.69	52.18	46.11	48.05	76.40	73.33	56.32	46.16
20	41.95	62.95	59.99	52.25	46.42	48.19	78.10	75.38	59.34	47.42
21	42.06	62.88	59.80	52.20	46.32	47.87	76.57	74.14	57.64	46.54
22	42.14	62.80	59.82	52.21	46.49	47.93	76.72	74.51	58.50	46.91
23	42.22	62.73	59.93	52.21	46.44	47.91	77.41	75.05	60.01	48.06
24	41.89	62.81	59.98	52.25	46.48	47.92	77.61	74.96	58.43	46.96
25	42.20	62.93	59.69	52.20	46.12	48.09	76.81	73.96	57.33	46.13
26	42.40	62.89	59.81	52.18	46.30	48.17	76.89	74.30	57.83	46.82
27	42.21	62.56	59.58	52.11	46.03	47.79	75.94	72.92	56.01	45.99
28	42.01	62.78	59.88	52.23	46.35	47.87	76.75	74.33	58.26	46.77
29	42.35	62.82	59.74	52.13	46.50	48.09	76.13	74.17	58.28	47.01
30	42.28	62.85	59.96	52.25	46.62	48.12	77.45	75.43	60.43	48.09

Table D-1 *Continued*

August 13th										
	Denton					Tarrant				
RUN	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**
BL	42.59	59.03	58.69	53.46	48.49	47.46	78.99	75.54	62.50	46.65
1	42.70	58.95	58.68	53.79	48.89	47.12	78.22	75.98	62.91	48.09
2	42.65	58.86	58.46	53.16	48.46	47.07	76.95	73.96	60.17	47.00
3	42.66	58.95	58.59	53.39	48.59	46.96	77.00	74.42	60.34	46.52
4	42.68	58.89	58.59	53.64	48.81	46.80	76.80	74.96	62.48	47.84
5	42.73	58.92	58.53	53.27	48.46	46.52	76.85	74.46	61.71	46.95
6	42.62	58.92	58.56	53.31	48.53	47.31	77.29	74.55	62.38	47.86
7	42.65	58.94	58.67	53.75	48.89	47.00	77.34	75.14	61.37	47.55
8	42.67	58.91	58.53	53.24	48.48	47.48	77.89	75.01	61.55	46.94
9	42.71	58.92	58.59	53.50	48.69	46.91	76.83	74.81	62.37	48.03
10	42.64	58.96	58.56	53.15	48.46	47.25	76.94	73.80	59.87	46.10
11	42.64	58.93	58.59	53.47	48.69	47.23	77.47	74.95	62.16	47.31
12	42.72	58.90	58.53	53.19	48.49	47.18	77.45	74.27	62.10	46.93
13	42.70	58.92	58.67	53.79	48.91	46.98	77.96	75.76	62.34	47.65
14	42.67	58.93	58.59	53.35	48.52	46.99	77.43	74.61	60.54	46.79
15	42.70	58.98	58.60	53.37	48.60	46.20	76.13	73.98	59.94	47.11
16	42.70	58.92	58.66	53.78	48.93	47.26	78.08	75.98	63.40	48.53
17	42.70	58.99	58.58	53.23	48.47	46.78	76.51	73.90	60.14	47.18
18	42.66	58.95	58.56	53.30	48.53	47.44	77.19	74.70	60.59	47.38
19	42.68	58.97	58.53	53.03	48.34	46.59	76.40	73.33	59.77	46.16
20	42.66	58.97	58.65	53.54	48.72	47.32	78.10	75.38	61.84	47.42
21	42.68	58.95	58.60	53.41	48.58	46.38	76.57	74.14	61.15	46.54
22	42.69	58.99	58.68	53.57	48.74	46.49	76.72	74.51	61.78	47.08
23	42.65	58.93	58.60	53.49	48.70	47.18	77.41	75.05	61.10	48.06
24	42.62	58.92	58.61	53.57	48.72	47.12	77.61	74.96	61.56	46.96
25	42.75	58.94	58.52	53.05	48.32	46.62	76.81	73.96	61.41	46.74
26	42.68	58.90	58.55	53.36	48.57	46.77	76.89	74.30	60.53	46.82
27	42.65	58.92	58.46	52.92	48.27	46.54	75.94	72.92	60.16	46.28
28	42.66	58.89	58.53	53.41	48.63	46.69	76.75	74.33	61.71	46.91
29	42.74	58.94	58.62	53.56	48.73	46.36	76.13	74.17	61.36	47.01
30	42.65	58.97	58.68	53.73	48.84	47.03	77.45	75.43	60.98	48.09

Table D-1 *Continued*

August 13th										
	Ellis					**Johnson and Parker**				
RUN	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**
BL	42.98	63.76	62.54	54.31	48.46	41.75	57.37	59.10	55.36	48.63
1	42.54	61.65	60.76	53.64	48.45	40.93	57.37	58.87	54.88	49.26
2	42.24	59.34	58.40	52.77	47.85	40.93	57.37	58.79	54.74	48.60
3	42.73	60.19	59.31	52.70	47.74	40.93	57.37	58.59	54.42	48.31
4	42.73	60.65	59.84	53.25	48.12	40.93	57.37	58.65	54.53	48.78
5	42.48	62.07	61.00	53.34	47.88	40.99	57.37	58.63	54.48	48.97
6	42.44	59.77	58.80	52.78	47.93	40.93	57.37	58.86	54.88	48.51
7	42.38	59.61	58.77	53.22	48.10	40.93	57.37	58.71	54.61	48.69
8	42.78	61.51	60.26	52.95	47.95	40.93	57.37	58.88	54.90	48.60
9	42.49	60.13	59.26	53.25	48.31	40.93	57.37	58.96	55.04	49.22
10	42.07	59.11	58.25	51.90	47.46	40.93	57.37	58.63	54.48	48.21
11	42.48	60.32	59.50	52.84	47.99	40.93	57.37	58.64	54.50	48.60
12	42.42	60.73	59.71	52.80	47.89	40.93	57.37	58.92	54.97	48.46
13	42.63	61.58	60.58	53.34	48.23	40.93	57.37	58.91	54.96	48.76
14	42.40	60.84	59.81	52.86	47.78	40.93	57.37	58.79	54.75	49.02
15	42.35	59.78	58.80	52.78	47.85	40.93	57.37	58.63	54.48	48.13
16	42.64	61.68	60.79	53.48	48.34	40.93	57.37	58.82	54.79	49.14
17	42.25	58.75	57.80	52.79	47.87	40.93	57.37	58.68	54.57	49.03
18	42.81	60.05	59.11	52.74	48.00	40.93	57.37	58.67	54.54	48.90
19	42.36	58.99	57.94	52.27	47.59	40.93	57.37	58.72	54.62	48.57
20	42.80	61.02	60.10	53.16	48.07	40.93	57.37	58.74	54.66	48.92
21	42.47	60.46	59.40	52.86	47.74	40.93	57.37	58.56	54.32	48.55
22	42.22	60.28	59.40	52.90	47.86	41.03	57.37	58.67	54.54	48.70
23	42.58	59.99	59.19	52.94	48.22	40.93	57.37	58.79	54.75	49.13
24	42.37	61.18	60.14	53.47	47.95	40.93	57.37	58.72	54.63	48.87
25	42.61	60.52	59.56	52.60	47.71	40.93	57.37	58.76	54.70	48.39
26	42.52	59.66	58.83	52.93	47.97	40.93	57.37	58.82	54.80	48.68
27	41.81	57.33	56.70	51.99	47.49	40.93	57.37	58.69	54.58	48.64
28	42.72	60.90	59.89	53.28	47.83	40.93	57.37	58.60	54.43	48.34
29	42.23	59.17	58.08	52.88	47.84	41.03	57.37	58.64	54.49	48.31
30	42.42	60.72	59.90	53.66	48.32	40.93	57.37	58.81	54.78	48.89

Table D-1 *Continued*

August 13th					
	Kaufman and Rockwall				
RUN	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**
BL	47.54	74.53	70.40	54.46	47.11
1	47.29	73.63	69.85	54.20	46.85
2	47.66	73.94	69.26	53.47	46.61
3	47.44	73.39	69.01	53.35	46.55
4	47.74	73.56	69.15	53.78	46.66
5	47.41	73.83	69.41	53.91	46.73
6	47.76	73.31	68.90	53.39	46.61
7	47.41	73.55	69.30	53.71	46.66
8	47.25	73.07	69.01	53.48	46.57
9	47.92	73.69	69.11	53.52	46.61
10	47.78	73.62	68.96	53.27	46.45
11	47.50	73.38	69.16	53.61	46.66
12	47.32	73.59	69.17	53.52	46.66
13	47.26	73.68	69.74	54.02	46.68
14	47.19	73.58	69.28	53.70	46.56
15	47.54	73.67	69.11	53.51	46.53
16	47.85	74.14	69.85	54.10	46.69
17	47.42	73.35	68.87	53.38	46.60
18	48.26	73.94	69.27	53.61	46.58
19	47.22	73.46	68.91	53.40	46.56
20	47.20	73.51	69.55	53.91	46.68
21	47.34	73.76	69.29	53.72	46.67
22	47.37	73.59	69.22	53.59	46.67
23	47.63	73.67	69.35	53.76	46.57
24	47.51	73.56	69.33	53.85	46.64
25	47.39	73.63	69.16	53.54	46.57
26	47.42	73.60	69.14	53.61	46.68
27	47.30	72.71	68.25	53.08	46.43
28	47.50	73.57	69.14	53.58	46.67
29	47.27	73.05	68.68	53.36	46.53
30	47.58	73.66	69.42	53.93	46.70

Table D-2 Stage 2 CAMx output for August 14

August 14th										
	Collin					Dallas				
RUN	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**
BL	47.67	61.73	59.84	50.31	40.47	53.43	71.75	68.65	57.94	47.33
1	47.66	61.59	59.70	50.22	40.47	53.22	69.62	66.92	58.35	48.29
2	47.67	61.60	59.70	50.20	40.47	53.26	69.84	67.06	58.28	48.21
3	47.67	61.69	59.80	50.29	40.47	53.29	69.91	67.00	57.69	47.67
4	47.67	61.69	59.80	50.28	40.47	53.08	70.12	67.29	57.67	47.65
5	47.68	61.52	59.60	50.09	40.47	54.16	70.41	67.63	58.90	48.80
6	47.66	61.54	59.65	50.21	40.47	52.59	67.22	65.16	58.04	48.33
7	47.67	61.60	59.71	50.21	40.47	54.20	70.44	67.57	58.29	48.13
8	47.66	61.62	59.73	50.26	40.46	53.53	69.84	66.95	57.24	46.98
9	47.67	61.52	59.60	50.11	40.47	53.80	69.64	67.04	58.73	48.69
10	47.66	61.53	59.62	50.16	40.47	53.84	70.36	67.58	58.44	48.30
11	47.67	61.63	59.74	50.25	40.47	53.33	68.99	66.50	58.50	48.50
12	47.66	61.50	59.59	50.12	40.47	53.01	69.54	66.78	58.01	47.99
13	47.66	61.60	59.71	50.25	40.47	53.06	69.17	66.69	58.63	48.54
14	47.67	61.51	59.59	50.11	40.47	53.28	69.07	66.47	57.77	47.90
15	47.66	61.52	59.62	50.17	40.47	52.47	68.19	65.71	57.55	47.77
16	47.67	61.52	59.61	50.13	40.47	53.55	70.21	67.48	58.80	48.64
17	47.67	61.56	59.65	50.15	40.47	52.97	69.71	66.98	58.22	48.18
18	47.66	61.66	59.77	50.31	40.47	53.55	69.66	66.74	57.40	47.47
19	47.67	61.55	59.64	50.14	40.47	53.14	69.53	66.85	57.57	47.60
20	47.66	61.63	59.74	50.28	40.47	53.24	69.83	67.12	58.14	48.11
21	47.66	61.45	59.53	50.10	40.47	53.84	70.30	67.52	58.57	48.45
22	47.68	61.65	59.75	50.24	40.47	53.27	68.59	65.93	57.42	47.49
23	47.66	61.57	59.68	50.23	40.47	53.74	69.96	67.14	58.20	48.09
24	47.67	61.56	59.67	50.18	40.47	53.88	71.20	68.19	57.90	47.67
25	47.66	61.52	59.61	50.16	40.47	53.30	69.80	67.16	58.74	48.66
26	47.67	61.58	59.68	50.19	40.47	53.15	69.00	66.47	58.43	48.49
27	47.66	61.46	59.53	50.07	40.47	53.58	71.40	68.33	57.67	47.44
28	47.66	61.67	59.78	50.30	40.47	52.14	67.86	65.51	57.69	47.92
29	47.67	61.47	59.55	50.08	40.47	54.03	70.23	67.27	57.88	47.84
30	47.66	61.64	59.75	50.27	40.47	53.22	68.23	65.87	57.68	47.89

Table D-2 *Continued*

August 14th										
	Denton					Tarrant				
RUN	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**
BL	47.31	60.75	59.69	51.64	41.21	55.78	90.10	87.15	70.98	49.98
1	47.30	60.70	59.65	51.62	41.21	55.62	86.11	83.55	69.85	51.25
2	47.31	60.70	59.65	51.62	41.21	55.64	86.11	83.52	69.92	51.17
3	47.31	60.70	59.66	51.63	41.21	55.53	86.19	83.66	70.00	51.00
4	47.30	60.68	59.65	51.63	41.21	55.89	85.92	83.44	70.37	51.42
5	47.31	60.69	59.65	51.61	41.20	56.38	86.94	84.28	70.03	50.99
6	47.30	60.70	59.65	51.62	41.21	55.53	83.68	81.30	69.40	52.22
7	47.31	60.70	59.65	51.62	41.21	56.20	87.13	84.54	70.73	51.61
8	47.31	60.70	59.66	51.63	41.16	55.98	86.29	83.75	70.10	50.89
9	47.30	60.68	59.64	51.60	41.20	55.75	85.90	83.32	69.87	51.43
10	47.30	60.70	59.65	51.61	41.21	55.50	86.42	83.82	69.96	50.98
11	47.30	60.69	59.65	51.63	41.21	55.66	85.12	82.68	70.07	52.05
12	47.31	60.71	59.66	51.61	41.20	55.73	85.74	83.11	69.33	50.67
13	47.30	60.69	59.65	51.63	41.21	55.73	85.84	83.24	69.43	50.99
14	47.30	60.69	59.64	51.60	41.20	55.46	85.79	83.31	70.26	52.06
15	47.30	60.69	59.64	51.61	41.21	55.38	84.86	82.31	69.16	51.09
16	47.30	60.70	59.65	51.61	41.20	55.64	86.53	83.99	70.50	51.91
17	47.31	60.70	59.65	51.61	41.21	55.46	86.27	83.79	70.65	52.29
18	47.30	60.69	59.65	51.64	41.21	55.49	85.82	83.35	70.11	51.30
19	47.30	60.70	59.65	51.60	41.21	55.95	85.88	83.30	69.66	50.79
20	47.31	60.70	59.65	51.63	41.21	55.81	86.21	83.62	69.78	50.91
21	47.31	60.70	59.65	51.60	41.20	55.80	86.55	83.92	69.92	50.81
22	47.30	60.70	59.65	51.62	41.21	55.44	84.98	82.55	69.74	51.47
23	47.31	60.70	59.65	51.62	41.21	55.39	86.13	83.65	70.27	51.62
24	47.31	60.70	59.65	51.61	41.21	56.11	87.94	85.08	70.59	50.58
25	47.31	60.71	59.66	51.62	41.21	55.63	85.98	83.42	70.01	51.65
26	47.30	60.69	59.65	51.62	41.21	55.46	85.50	83.03	70.09	52.21
27	47.31	60.69	59.65	51.59	41.20	55.98	88.09	85.42	71.50	51.61
28	47.30	60.69	59.65	51.63	41.21	55.58	84.44	81.95	69.29	51.33
29	47.31	60.69	59.64	51.59	41.20	55.83	86.27	83.80	70.67	51.82
30	47.30	60.69	59.65	51.63	41.21	55.40	85.29	82.73	69.00	50.57

Table D-2 *Continued*

August 14th										
	Ellis					**Johnson and Parker**				
RUN	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**
BL	50.93	66.71	64.81	57.32	44.38	54.31	86.16	85.62	73.19	50.81
1	49.33	63.92	62.69	57.29	44.49	53.98	84.32	83.81	71.91	51.37
2	49.72	63.71	62.14	57.46	44.97	53.90	84.06	83.57	71.73	50.87
3	49.41	63.79	62.52	57.34	44.64	53.96	84.20	83.72	72.10	51.71
4	50.02	64.34	62.64	57.23	44.40	53.77	83.52	83.11	71.48	51.20
5	50.23	64.81	63.18	57.62	45.25	53.90	84.68	84.16	72.14	51.41
6	48.13	61.66	60.90	57.42	45.02	53.64	82.36	81.93	70.69	51.37
7	49.67	63.90	62.77	57.54	44.92	53.94	84.77	84.28	72.49	52.05
8	49.89	64.15	62.93	57.25	44.65	53.91	84.22	83.75	72.12	51.53
9	49.69	63.64	62.33	57.19	44.79	53.81	83.82	83.34	71.75	51.62
10	49.84	64.11	62.80	57.28	44.51	53.90	84.21	83.72	71.88	50.91
11	49.34	63.67	62.42	57.34	44.81	53.66	83.02	82.60	71.24	51.61
12	49.83	63.88	62.20	57.48	45.08	53.93	83.98	83.47	71.58	50.67
13	49.68	63.25	61.81	57.55	45.15	54.03	84.38	83.86	71.85	51.02
14	49.58	63.81	62.61	57.58	45.16	54.03	84.32	83.79	72.16	52.25
15	49.30	63.50	62.28	57.28	44.71	54.04	83.84	83.31	71.70	51.82
16	50.00	64.42	62.68	57.48	45.00	53.89	84.19	83.70	71.71	51.09
17	49.60	63.53	62.40	57.50	44.86	54.09	84.54	84.00	72.21	52.03
18	49.22	63.29	62.08	57.43	44.82	53.88	83.78	83.33	71.91	52.02
19	49.82	63.34	62.13	57.17	44.44	53.96	84.22	83.72	71.96	51.26
20	49.89	64.19	62.82	57.60	45.19	53.98	84.36	83.87	72.00	51.53
21	50.23	64.85	62.93	57.41	44.92	53.88	84.24	83.73	71.79	50.97
22	48.61	62.65	61.34	57.41	44.77	53.80	83.36	82.91	71.50	51.40
23	49.12	64.02	62.94	57.21	44.70	53.90	83.97	83.49	71.91	52.01
24	50.50	65.17	63.66	57.59	45.10	54.04	85.18	84.67	72.84	52.01
25	49.83	64.11	62.60	57.24	44.67	53.86	83.90	83.41	71.58	51.26
26	48.96	63.18	61.82	57.53	45.05	53.97	83.99	83.47	71.49	51.07
27	50.74	65.90	64.17	57.35	44.57	54.00	84.95	84.45	72.61	51.84
28	49.33	63.42	62.14	57.36	44.67	53.80	83.05	82.61	71.24	51.63
29	49.52	63.51	62.37	57.34	44.75	53.72	83.66	83.20	71.60	51.15
30	49.12	63.49	62.34	57.35	44.60	54.06	84.31	83.78	72.05	51.80

Table D-2 *Continued*

August 14th					
	Kaufman and Rockwall				
RUN	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**
BL	48.12	68.05	67.57	63.01	45.95
1	48.12	68.05	67.57	63.02	46.00
2	48.12	68.06	67.57	63.09	46.33
3	48.12	68.05	67.57	63.03	46.06
4	48.12	68.05	67.57	63.02	46.03
5	48.12	68.06	67.57	63.06	46.20
6	48.12	68.06	67.57	63.07	46.26
7	48.12	68.05	67.57	63.03	46.04
8	48.12	68.06	67.57	63.08	46.28
9	48.12	68.06	67.57	63.03	46.07
10	48.12	68.05	67.57	63.01	45.95
11	48.12	68.06	67.57	63.08	46.29
12	48.12	68.06	67.57	63.05	46.16
13	48.12	68.06	67.57	63.07	46.24
14	48.12	68.06	67.57	63.04	46.11
15	48.12	68.06	67.57	63.05	46.12
16	48.12	68.06	67.57	63.08	46.30
17	48.12	68.05	67.57	63.01	45.99
18	48.12	68.05	67.57	63.01	45.97
19	48.12	68.06	67.57	63.06	46.19
20	48.12	68.06	67.57	63.05	46.15
21	48.12	68.06	67.57	63.09	46.32
22	48.12	68.05	67.57	63.02	46.02
23	48.12	68.06	67.57	63.06	46.21
24	48.12	68.06	67.57	63.07	46.22
25	48.12	68.06	67.57	63.06	46.17
26	48.12	68.06	67.57	63.05	46.14
27	48.12	68.06	67.57	63.01	45.98
28	48.12	68.06	67.57	63.04	46.08
29	48.12	68.06	67.57	63.07	46.25
30	48.12	68.05	67.57	63.04	46.10

Table D-3 Stage 2 CAMx output for August 15

August 15th										
	Collin					**Dallas**				
RUN	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**
BL	52.36	67.74	63.88	53.79	42.20	54.90	73.12	69.18	58.82	50.47
1	51.74	66.73	63.20	53.88	42.20	52.25	67.86	65.30	58.52	51.08
2	51.85	66.89	63.29	53.84	42.20	52.76	69.19	66.40	58.83	51.10
3	51.60	66.43	62.96	53.59	42.20	51.60	67.26	64.62	58.52	50.72
4	52.02	67.10	63.40	53.68	42.20	52.61	68.95	66.05	57.99	50.65
5	51.98	66.75	63.06	53.76	42.21	53.73	69.60	65.90	58.22	51.44
6	51.67	66.59	63.09	53.82	42.20	51.77	67.33	64.80	58.80	51.19
7	51.77	66.65	63.07	53.74	42.20	53.15	68.95	65.94	58.35	50.99
8	52.08	67.03	63.27	53.44	42.12	52.93	69.57	66.61	58.28	50.54
9	52.07	67.08	63.35	53.86	42.21	53.65	70.04	66.82	58.82	51.39
10	52.02	67.05	63.36	53.85	42.20	54.04	70.99	67.57	58.81	51.11
11	51.94	67.04	63.39	53.94	42.21	52.49	68.26	65.71	58.82	51.28
12	51.90	67.13	63.51	53.87	42.20	51.91	68.11	64.92	58.69	50.91
13	52.10	67.32	63.58	54.02	42.21	53.25	69.76	66.79	58.93	51.30
14	51.97	66.87	63.19	53.59	42.20	52.15	67.80	65.31	58.23	50.85
15	51.80	66.82	63.25	53.68	42.20	51.80	67.68	64.49	58.29	50.76
16	51.84	66.78	63.18	53.90	42.21	53.28	69.20	66.07	58.48	51.35
17	52.07	67.02	63.28	53.71	42.20	53.86	70.57	67.14	58.60	51.00
18	51.97	66.89	63.20	53.47	42.20	52.10	67.74	65.11	58.05	50.55
19	52.16	67.45	63.69	53.78	42.20	52.60	69.05	66.32	58.27	50.65
20	51.95	66.93	63.26	53.77	42.20	53.77	70.25	66.79	58.32	50.97
21	52.06	67.10	63.38	53.80	42.21	52.31	67.96	65.04	58.37	51.22
22	51.62	66.70	63.24	53.79	42.19	52.13	68.02	65.61	58.55	50.60
23	51.57	66.57	63.13	53.85	42.20	51.57	67.26	64.25	58.20	50.96
24	52.18	67.36	63.59	53.76	42.20	54.34	71.48	67.79	58.36	50.72
25	51.91	66.95	63.32	53.94	42.21	52.09	67.78	65.19	58.71	51.36
26	51.62	66.58	63.12	53.90	42.21	51.62	67.15	64.12	58.35	51.23
27	52.17	67.24	63.44	53.56	42.20	53.10	69.70	66.58	57.95	50.51
28	51.58	66.44	62.98	53.69	42.20	51.58	67.31	64.69	58.65	50.87
29	51.78	66.62	63.05	53.59	42.20	51.81	67.33	64.39	58.06	50.82
30	51.95	66.88	63.21	53.63	42.20	52.87	68.72	65.74	58.04	50.83

Table D-3 *Continued*

August 15th										
	Denton					Tarrant				
RUN	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**
BL	56.81	88.51	83.31	64.44	41.77	58.84	89.30	83.62	65.31	49.09
1	55.18	82.92	77.82	61.38	42.34	57.10	83.55	77.92	63.60	50.53
2	54.64	83.56	79.19	62.22	42.32	56.96	84.33	79.28	62.68	49.98
3	54.39	80.87	76.53	61.05	41.96	56.23	81.19	76.27	62.61	50.18
4	54.71	83.35	78.79	61.98	41.78	56.80	84.14	79.09	64.63	50.31
5	56.05	85.54	79.31	61.54	42.55	58.05	86.48	79.92	64.41	50.79
6	54.89	81.95	76.84	60.88	42.46	56.74	82.37	76.66	61.37	50.57
7	55.21	84.20	79.00	61.74	42.24	57.47	85.17	79.45	62.57	50.89
8	54.93	83.88	79.35	62.25	41.66	57.08	84.38	79.31	62.75	49.98
9	55.14	85.16	80.00	62.31	42.67	57.50	86.09	80.30	63.09	50.92
10	55.38	86.17	81.18	63.03	42.43	57.81	87.33	81.66	63.95	49.97
11	55.21	83.10	77.79	61.36	42.54	57.06	83.34	77.44	63.26	50.72
12	54.11	80.59	76.49	61.07	42.16	55.92	80.39	75.64	62.83	49.59
13	55.31	84.47	79.37	62.23	42.59	57.35	84.91	79.20	62.58	50.10
14	54.47	82.13	77.45	61.26	42.04	56.43	82.54	77.35	63.47	51.94
15	54.72	80.49	75.73	60.57	41.93	56.26	80.18	74.98	64.15	50.49
16	55.59	84.74	79.25	61.85	42.52	57.68	85.66	79.70	64.08	50.60
17	56.00	85.94	80.67	62.83	42.28	58.04	86.69	80.97	63.73	51.50
18	54.97	82.26	77.44	61.26	41.76	56.85	82.40	77.17	62.00	50.97
19	54.64	82.95	78.55	61.97	41.81	56.60	83.26	78.28	62.42	49.95
20	55.91	85.84	80.43	62.50	42.12	58.00	86.85	81.01	63.77	50.66
21	54.72	82.02	76.93	60.84	42.36	56.63	82.05	76.48	63.50	50.04
22	54.55	82.37	77.97	61.59	41.93	56.72	83.01	77.95	61.92	50.18
23	54.32	80.03	75.12	60.00	42.14	56.04	80.21	74.83	62.97	51.38
24	56.49	87.11	81.54	63.17	41.90	58.45	87.92	81.96	64.21	50.55
25	54.68	82.09	77.17	61.10	42.60	56.65	82.28	76.78	63.68	50.41
26	54.43	81.10	76.15	60.40	42.41	56.37	81.54	76.07	63.42	50.62
27	54.92	83.95	79.38	62.28	41.67	57.08	84.49	79.46	63.03	50.45
28	54.05	80.60	76.48	61.11	42.12	55.93	80.93	76.18	64.39	50.38
29	55.09	81.73	76.46	60.60	41.95	56.80	81.99	76.31	60.98	50.04
30	54.88	83.59	78.56	61.48	41.97	57.04	84.26	78.79	63.60	50.84

Table D-3 *Continued*

August 15th										
	Ellis					Johnson and Parker				
RUN	12mn-6am	6am-12n	12n-3pm	3pm-7pm	7pm-12mn	12mn-6am	6am-12n	12n-3pm	3pm-7pm	7pm-12mn
BL	50.25	72.58	68.24	55.58	46.21	56.82	83.12	82.31	73.40	54.68
1	49.82	69.60	67.50	55.63	46.28	53.46	75.69	74.99	69.13	54.00
2	50.19	69.76	66.19	55.62	46.45	55.00	76.59	75.80	68.93	53.48
3	49.30	68.61	66.24	55.42	46.32	54.42	75.76	74.98	68.43	53.47
4	50.30	70.82	68.14	55.53	46.23	52.94	73.90	74.25	68.78	54.33
5	50.60	72.04	68.05	55.81	46.53	54.93	79.17	78.60	71.30	54.39
6	49.20	67.33	64.98	55.60	46.46	53.38	71.84	71.38	65.89	52.85
7	49.67	68.41	65.70	55.57	46.43	54.31	77.12	76.29	68.55	53.20
8	49.24	67.30	64.35	55.28	46.32	54.85	76.39	75.63	67.43	52.84
9	49.84	68.93	65.94	55.82	46.24	54.46	75.75	75.07	67.98	53.39
10	48.76	68.62	66.06	55.73	46.27	55.77	77.42	76.55	68.20	53.47
11	49.43	68.84	66.90	55.60	46.39	52.66	71.98	72.19	67.17	53.70
12	49.82	70.36	66.45	55.55	46.46	55.01	77.26	76.53	69.59	53.67
13	49.46	68.23	64.94	55.67	46.51	54.93	77.64	76.90	68.57	53.19
14	50.05	69.93	66.66	55.69	46.51	56.11	79.04	77.85	69.96	53.64
15	49.70	70.52	67.63	55.75	46.36	55.44	78.41	77.48	70.33	54.05
16	50.28	70.61	67.47	55.72	46.46	54.21	75.65	75.53	69.46	54.11
17	49.99	68.25	65.64	55.65	46.40	55.20	78.04	76.87	68.32	53.17
18	49.31	67.36	65.30	55.48	46.39	54.05	74.88	73.97	67.14	53.18
19	49.24	66.94	64.52	55.43	46.23	54.19	75.84	75.10	66.94	52.72
20	50.09	70.08	67.22	55.70	46.53	54.07	77.39	76.75	69.90	54.08
21	50.10	70.60	67.43	55.64	46.41	54.58	76.47	76.11	69.70	53.97
22	49.43	68.86	65.20	55.41	46.37	55.73	76.43	75.19	68.05	53.09
23	49.43	68.40	66.57	55.53	46.28	54.33	74.83	74.07	68.02	53.58
24	49.93	70.33	66.75	55.69	46.47	55.70	79.69	78.84	70.38	53.80
25	49.83	69.96	67.42	55.68	46.27	53.64	74.83	74.78	68.94	53.95
26	49.78	69.43	66.93	55.64	46.47	54.18	75.87	75.28	69.07	53.66
27	49.15	67.04	65.12	55.41	46.28	53.45	75.08	74.35	66.46	52.85
28	50.32	71.52	68.19	55.68	46.34	54.43	76.30	76.10	69.67	54.21
29	49.21	67.71	64.75	55.41	46.37	54.61	73.92	72.93	66.40	52.68
30	50.21	70.27	67.53	55.86	46.31	55.10	79.10	78.45	70.68	54.03

Table D-3 *Continued*

August 15th					
	Kaufman and Rockwall				
RUN	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**
BL	46.97	62.55	62.23	58.14	47.41
1	46.17	62.54	62.20	58.12	47.42
2	46.43	62.54	62.31	58.19	47.42
3	46.11	62.54	62.20	58.12	47.42
4	46.50	62.54	62.23	58.14	47.42
5	46.41	62.55	62.28	58.16	47.42
6	46.23	62.54	62.28	58.16	47.42
7	46.22	62.54	62.21	58.12	47.42
8	46.80	62.53	62.24	58.14	47.37
9	46.59	62.55	62.25	58.15	47.42
10	46.39	62.54	62.21	58.12	47.42
11	46.60	62.53	62.25	58.15	47.42
12	46.77	62.54	62.25	58.14	47.42
13	46.79	62.54	62.26	58.15	47.42
14	46.53	62.54	62.25	58.14	47.42
15	46.59	62.55	62.27	58.15	47.42
16	46.25	62.54	62.29	58.17	47.42
17	46.64	62.54	62.21	58.12	47.42
18	46.70	62.55	62.24	58.14	47.42
19	46.86	62.54	62.26	58.15	47.42
20	46.35	62.54	62.22	58.13	47.42
21	46.83	62.54	62.30	58.18	47.43
22	46.18	62.54	62.22	58.13	47.42
23	46.12	62.54	62.28	58.16	47.42
24	46.70	62.54	62.28	58.16	47.42
25	46.66	62.54	62.24	58.14	47.42
26	46.09	62.54	62.24	58.13	47.42
27	46.86	62.54	62.19	58.11	47.42
28	46.15	62.54	62.24	58.14	47.42
29	46.32	62.53	62.25	58.14	47.42
30	46.54	62.54	62.23	58.13	47.42

Table D-4 Stage 2 CAMx output for August 16

August 16th										
	Collin					Dallas				
RUN	12mn-6am	6am-12n	12n-3pm	3pm-7pm	7pm-12mn	12mn-6am	6am-12n	12n-3pm	3pm-7pm	7pm-12mn
BL	63.12	100.87	93.26	66.77	38.82	62.16	95.64	89.11	66.01	46.24
1	61.98	95.74	88.61	64.88	38.83	60.87	88.01	81.63	61.79	46.05
2	61.33	91.86	84.90	64.19	38.83	59.25	82.56	77.06	61.21	46.08
3	61.54	96.38	89.41	65.39	38.82	62.14	90.62	84.29	62.87	46.04
4	61.02	94.32	87.90	65.05	38.83	61.81	88.20	82.36	62.50	46.01
5	62.54	98.58	91.22	65.71	38.84	61.38	92.65	86.13	64.52	46.16
6	61.03	94.76	88.33	65.31	38.83	61.88	88.69	83.20	63.05	46.21
7	61.57	93.81	86.81	64.60	38.83	60.30	85.27	79.51	61.82	46.22
8	61.63	97.28	90.23	65.67	38.68	62.15	91.71	85.40	63.80	46.04
9	61.84	96.59	89.41	65.44	38.84	62.03	90.57	84.17	63.36	46.01
10	61.63	95.70	88.67	65.26	38.83	61.52	89.35	83.31	63.18	46.11
11	60.96	92.42	86.16	64.68	38.83	60.35	84.53	79.36	61.90	46.16
12	61.92	94.36	87.23	64.76	38.84	59.73	85.41	79.42	61.77	46.17
13	62.21	97.84	90.72	65.71	38.83	61.29	91.57	85.12	63.25	46.04
14	61.34	95.64	88.75	65.22	38.84	62.19	89.60	83.40	62.72	45.95
15	61.96	96.40	89.08	65.33	38.83	61.97	89.88	83.51	62.91	46.22
16	62.40	98.74	91.28	65.91	38.84	62.67	93.34	86.64	64.55	46.20
17	61.06	93.76	87.34	65.10	38.84	61.23	87.09	81.83	62.73	46.13
18	61.07	93.95	87.50	64.96	38.82	61.56	87.20	81.51	62.09	46.15
19	61.46	91.46	84.34	63.86	38.83	58.62	81.08	75.45	60.44	46.07
20	61.94	97.30	90.25	65.58	38.83	61.60	91.30	84.98	63.73	46.02
21	61.95	94.07	86.72	64.40	38.84	59.81	84.89	78.63	61.17	46.12
22	61.38	93.00	86.01	64.45	38.83	60.22	84.25	78.40	61.35	46.13
23	61.10	92.97	86.26	64.41	38.83	60.81	85.03	79.31	61.29	46.06
24	62.24	95.99	88.54	64.99	38.83	60.72	88.01	81.65	62.16	46.05
25	61.80	96.82	89.78	65.53	38.83	61.72	90.46	84.20	63.20	46.06
26	61.11	92.67	86.00	64.41	38.83	60.42	84.42	78.89	61.28	46.10
27	61.17	92.82	86.18	64.62	38.84	60.35	84.85	79.56	61.87	46.07
28	61.28	91.86	84.99	64.19	38.83	59.45	82.62	77.14	61.16	46.12
29	60.84	90.92	84.74	64.25	38.84	59.39	82.41	77.86	61.57	46.30
30	62.06	95.30	88.03	64.76	38.83	60.51	87.00	80.68	61.72	46.11

Table D-4 *Continued*

August 16th										
	Denton					Tarrant				
RUN	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**
BL	62.91	103.37	97.96	77.99	39.36	58.48	99.13	95.23	73.77	47.91
1	62.02	98.01	92.84	74.04	39.26	56.71	91.66	87.84	69.89	47.86
2	61.75	95.24	90.14	72.46	39.26	57.02	90.05	86.43	69.16	47.62
3	61.75	99.33	94.03	74.99	39.24	57.34	92.61	89.01	69.63	48.05
4	61.31	98.05	92.65	74.50	39.29	57.53	92.56	89.32	70.73	47.57
5	62.49	96.76	95.61	75.92	39.33	57.90	95.92	92.13	71.83	48.30
6	61.28	98.11	93.01	74.72	39.33	57.18	91.99	88.76	69.64	47.88
7	61.80	96.51	91.39	73.36	39.32	57.10	91.02	87.15	69.17	48.32
8	61.80	99.10	94.91	75.97	39.15	58.48	95.77	92.04	71.30	47.85
9	62.05	99.55	94.07	75.14	39.27	57.34	93.85	90.36	70.62	48.33
10	61.95	98.90	93.56	75.00	39.32	57.64	93.34	89.82	70.20	47.80
11	60.97	95.46	90.55	72.97	39.33	56.55	89.21	86.27	69.67	48.03
12	62.16	96.69	91.76	73.46	39.30	57.88	91.88	87.50	69.91	47.40
13	62.18	99.45	95.19	75.81	39.26	58.78	95.36	91.45	70.93	47.69
14	61.72	99.07	93.50	75.06	39.25	58.55	94.40	90.75	70.83	48.37
15	62.23	99.31	93.65	74.65	39.30	57.35	92.60	88.91	69.73	48.18
16	62.22	99.97	95.65	76.02	39.33	57.70	94.72	91.20	71.45	47.76
17	61.27	97.28	92.16	74.28	39.35	57.40	92.09	88.90	69.95	48.39
18	61.46	97.53	92.16	74.14	39.30	57.23	91.48	88.25	69.99	48.23
19	61.83	94.34	89.55	71.80	39.25	57.74	89.91	86.08	69.96	47.79
20	61.95	99.76	94.61	75.31	39.28	57.36	94.22	90.67	70.93	48.14
21	62.22	96.54	91.24	72.83	39.27	56.80	90.59	86.38	69.16	47.65
22	61.84	96.06	91.01	73.08	39.28	57.33	90.92	86.28	68.52	47.46
23	61.43	96.30	90.83	72.99	39.26	56.54	89.87	86.61	69.72	48.22
24	62.51	98.47	92.96	74.32	39.27	57.80	93.62	89.73	70.23	48.51
25	61.85	99.25	94.09	75.00	39.30	57.07	93.35	89.86	70.47	48.01
26	61.32	95.92	90.60	72.79	39.28	56.25	89.31	85.69	68.99	47.62
27	61.40	96.14	90.89	73.20	39.32	56.57	90.46	87.30	69.82	48.21
28	61.70	95.12	90.28	72.60	39.30	56.91	90.19	86.31	69.88	48.06
29	61.07	94.87	90.18	72.95	39.36	58.03	90.31	86.55	69.62	47.59
30	62.23	97.66	92.28	73.76	39.29	57.34	92.07	88.30	70.12	48.38

Table D-4 *Continued*

August 16th										
	Ellis					Johnson and Parker				
RUN	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**
BL	54.57	82.38	75.04	62.74	39.52	51.35	70.78	70.49	68.67	56.59
1	54.12	75.38	72.94	61.36	39.44	50.26	68.21	67.96	64.98	54.98
2	54.16	73.74	72.42	61.67	39.44	50.01	68.18	68.06	64.62	55.10
3	54.12	77.12	72.91	61.61	39.49	50.30	68.19	68.00	65.16	55.16
4	54.63	76.88	73.19	61.06	39.36	50.07	67.83	67.59	65.38	55.01
5	53.98	79.66	73.43	61.56	39.42	50.26	68.00	67.73	65.40	55.14
6	54.13	76.28	71.64	61.47	39.45	50.26	68.14	67.87	64.42	54.81
7	54.18	74.20	72.43	61.72	39.42	49.40	67.12	67.14	64.20	54.81
8	54.00	78.87	71.13	60.89	39.41	50.43	67.86	67.60	65.03	54.69
9	54.22	78.01	73.17	62.11	39.48	50.01	68.41	68.28	65.53	55.42
10	54.11	77.10	72.70	61.43	39.44	50.36	67.41	67.14	65.02	54.94
11	54.15	74.09	73.18	61.76	39.45	49.83	67.54	67.45	65.03	55.17
12	54.01	74.13	72.38	61.15	39.46	50.57	68.52	68.18	65.55	55.16
13	54.30	78.61	72.53	61.46	39.37	50.22	68.83	68.51	65.92	55.28
14	54.44	77.72	73.85	61.96	39.38	50.10	68.47	68.22	65.31	55.16
15	54.11	77.03	73.37	61.68	39.41	50.25	67.62	67.37	64.14	54.86
16	53.97	78.99	73.21	61.39	39.43	49.98	67.89	67.69	65.09	55.11
17	54.40	76.29	72.62	62.05	39.46	50.55	68.89	68.60	65.09	55.26
18	54.44	75.41	72.75	61.89	39.44	50.03	68.45	68.23	65.11	55.19
19	54.17	72.56	70.94	61.40	39.42	50.07	67.91	67.70	65.13	54.90
20	54.11	78.62	73.34	61.59	39.39	50.05	67.74	67.60	65.02	55.02
21	53.87	73.77	72.74	61.07	39.42	50.21	67.55	67.32	64.66	54.84
22	53.97	73.08	71.60	61.00	39.40	49.90	68.00	67.81	64.60	54.92
23	54.14	74.13	72.69	61.40	39.42	50.09	67.37	67.24	64.77	54.96
24	54.30	76.77	73.20	61.96	39.45	50.57	69.15	68.87	65.43	55.38
25	54.27	77.83	73.83	61.98	39.41	49.99	67.87	67.76	65.32	55.29
26	54.25	74.03	73.23	61.74	39.48	50.05	67.79	67.68	64.61	55.11
27	54.21	74.91	71.38	61.57	39.46	50.78	68.98	68.58	65.00	55.00
28	54.21	75.28	73.83	61.92	39.46	50.70	68.24	67.88	65.14	55.19
29	53.93	72.84	70.86	61.25	39.46	50.27	67.98	67.78	65.31	55.00
30	54.24	75.64	73.70	61.92	39.43	49.85	67.68	67.57	64.89	55.15

Table D-4 *Continued*

August 16th					
	Kaufman and Rockwall				
RUN	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**
BL	54.48	68.93	65.54	54.68	49.88
1	52.89	65.86	63.89	54.63	49.88
2	52.90	66.24	64.12	54.64	49.88
3	52.88	65.85	63.87	54.62	49.88
4	53.35	66.60	64.37	54.64	49.88
5	53.10	66.42	64.28	54.66	49.88
6	52.91	66.42	64.26	54.67	49.88
7	52.92	66.22	64.18	54.66	49.88
8	53.75	67.22	64.73	54.63	49.88
9	53.43	66.78	64.47	54.65	49.88
10	52.89	66.37	64.22	54.67	49.88
11	53.20	66.81	64.52	54.66	49.88
12	53.73	67.43	64.85	54.67	49.88
13	53.63	67.15	64.64	54.63	49.88
14	53.40	66.65	64.39	54.64	49.88
15	53.43	66.82	64.49	54.65	49.88
16	52.89	66.17	64.12	54.66	49.88
17	53.52	67.14	64.76	54.68	49.88
18	53.52	66.94	64.57	54.64	49.88
19	53.41	66.89	64.52	54.63	49.88
20	53.24	66.51	64.33	54.64	49.88
21	53.43	66.86	64.51	54.64	49.88
22	52.88	65.95	63.96	54.64	49.88
23	52.89	65.63	63.76	54.63	49.88
24	53.48	66.88	64.52	54.64	49.88
25	53.58	67.12	64.71	54.66	49.88
26	52.89	65.75	63.86	54.64	49.88
27	53.55	67.10	64.70	54.67	49.88
28	52.90	66.02	64.04	54.66	49.88
29	52.89	66.10	64.09	54.67	49.88
30	53.31	66.67	64.43	54.64	49.88

Table D-5 Stage 2 CAMx output for August 17

August 17th										
	Collin					**Dallas**				
RUN	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**
BL	63.33	101.87	98.87	75.00	47.18	58.11	103.48	100.26	75.43	53.19
1	63.22	97.19	94.15	71.66	46.80	57.28	96.33	93.24	72.32	53.10
2	63.24	95.79	92.82	71.39	46.84	57.33	93.06	90.04	71.53	53.12
3	63.15	97.33	94.17	72.16	46.75	57.65	97.33	94.17	72.97	53.11
4	63.17	95.97	93.11	71.80	46.79	58.34	95.68	92.91	72.63	53.06
5	63.29	99.28	96.28	73.55	46.96	57.69	99.28	96.82	74.03	53.12
6	63.12	96.26	93.51	72.13	47.05	57.79	95.87	92.93	72.87	53.18
7	63.17	96.34	93.39	71.41	46.91	57.24	94.76	91.67	72.05	53.14
8	63.14	98.25	95.20	72.98	46.82	57.73	98.64	95.37	73.66	53.04
9	63.22	98.00	94.94	72.75	46.93	57.82	98.00	94.92	73.45	53.09
10	63.21	97.47	94.65	72.53	46.98	57.58	97.27	94.25	73.32	53.12
11	63.09	94.69	92.06	71.60	47.00	56.96	92.98	90.42	72.12	53.15
12	63.24	97.06	94.07	71.67	46.91	57.12	94.92	91.71	72.12	53.15
13	63.24	98.75	95.66	72.95	46.76	57.36	98.94	95.66	73.61	53.05
14	63.18	97.16	94.15	72.12	46.75	57.80	97.08	93.97	72.89	53.05
15	63.24	97.75	94.67	72.09	46.87	58.03	97.35	94.08	72.89	53.12
16	63.22	99.74	96.64	73.45	46.97	58.09	99.74	97.45	74.00	53.14
17	63.14	95.88	93.20	72.17	47.12	57.36	95.23	92.42	72.89	53.17
18	63.20	96.00	93.11	71.67	46.90	58.39	95.21	92.35	72.35	53.15
19	63.23	95.53	92.50	71.14	46.79	57.15	92.30	89.12	71.14	53.07
20	63.21	98.01	95.07	72.92	46.85	57.48	98.26	95.08	73.55	53.07
21	63.26	96.85	93.67	71.21	46.74	57.27	94.81	91.60	71.79	53.11
22	63.21	96.31	93.22	71.01	46.84	57.42	93.86	90.54	71.37	53.12
23	63.19	95.17	92.21	71.03	46.75	57.41	93.55	90.75	71.67	53.08
24	63.29	98.10	95.07	72.15	46.85	57.59	97.00	93.87	72.83	53.08
25	63.16	97.50	94.58	72.49	46.90	57.52	97.47	94.48	73.27	53.12
26	63.13	94.97	91.99	70.91	46.81	57.21	93.16	90.22	71.55	53.13
27	63.15	95.29	92.51	71.68	46.99	57.31	93.83	91.09	72.36	53.12
28	63.20	95.55	92.65	71.26	47.00	57.25	92.65	89.60	71.29	53.15
29	63.11	94.52	91.62	71.05	46.96	56.97	92.25	89.27	71.46	53.18
30	63.26	97.36	94.31	71.68	46.88	57.32	96.15	93.06	72.31	53.12

Table D-5 *Continued*

August 17th										
	Denton					Tarrant				
RUN	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**
BL	54.97	108.01	107.75	90.81	51.36	54.47	104.42	104.28	84.92	57.15
1	54.95	99.24	97.58	85.12	49.01	53.32	98.27	97.28	78.90	56.68
2	54.91	99.46	98.49	82.27	47.44	53.26	95.02	94.06	76.51	56.62
3	54.85	99.87	98.68	86.23	49.85	54.53	99.21	98.42	80.50	56.62
4	54.88	98.61	97.53	85.16	49.09	55.24	98.08	97.56	79.56	56.67
5	54.93	95.12	95.10	88.22	50.62	52.42	98.00	97.45	82.58	56.60
6	54.89	98.78	97.30	84.98	49.01	55.08	98.27	97.35	79.40	56.50
7	54.88	98.00	99.88	83.67	48.65	53.20	96.39	95.40	77.89	56.50
8	54.87	94.11	99.74	87.01	49.95	54.90	97.28	96.43	81.68	56.28
9	54.92	94.07	99.39	86.81	50.13	54.45	99.65	99.19	81.21	56.72
10	54.90	99.61	98.65	86.09	49.26	53.93	99.26	98.72	80.43	56.49
11	54.87	99.18	98.42	82.55	48.31	53.27	95.06	94.12	76.96	56.55
12	54.89	98.13	99.69	83.10	47.67	54.63	96.22	95.09	77.41	56.51
13	54.89	94.58	94.33	87.48	49.88	54.88	97.44	96.64	81.62	56.37
14	54.89	99.74	98.59	86.09	49.80	54.75	99.22	98.67	80.71	56.67
15	54.88	99.72	98.29	85.86	49.65	54.44	98.63	97.87	80.19	56.52
16	54.92	95.31	95.29	88.42	50.36	54.72	98.24	97.53	82.42	56.46
17	54.89	98.04	96.85	84.75	49.35	54.83	97.42	96.89	79.52	56.72
18	54.90	98.51	96.96	84.75	49.22	54.99	97.60	96.71	78.94	56.48
19	54.92	98.67	97.42	81.24	47.14	54.69	93.89	92.97	76.74	56.38
20	54.90	93.94	99.53	86.91	50.17	53.81	99.79	99.46	81.46	56.57
21	54.93	98.16	99.76	83.15	47.86	52.47	96.09	94.91	76.98	56.46
22	54.93	97.90	99.04	82.70	47.51	52.64	96.02	94.59	76.65	56.32
23	54.91	99.99	99.23	83.10	48.62	53.91	95.90	94.89	77.51	56.55
24	54.93	99.53	98.06	85.63	49.53	52.64	98.47	97.84	80.01	56.68
25	54.88	99.86	98.86	86.36	49.75	53.97	99.31	98.70	80.69	56.79
26	54.89	99.61	98.65	82.58	47.79	53.69	95.43	94.29	76.90	56.67
27	54.87	99.66	99.11	83.34	48.61	54.36	95.65	95.14	78.01	56.48
28	54.92	99.21	98.08	81.90	47.71	52.94	94.83	93.57	76.17	56.69
29	54.85	98.90	97.77	81.79	47.36	55.09	94.82	93.69	76.75	56.27
30	54.92	98.92	97.18	84.88	49.13	52.96	97.48	96.70	78.93	56.67

Table D-5 *Continued*

August 17th										
	Ellis					**Johnson and Parker**				
RUN	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**
BL	50.15	78.75	77.21	64.26	46.06	56.10	76.82	77.82	74.62	59.70
1	49.57	76.40	75.03	62.97	45.91	55.69	73.54	73.85	70.26	58.29
2	50.29	76.93	75.29	63.14	45.96	54.82	71.39	71.54	68.06	57.90
3	49.66	77.13	75.61	63.28	46.03	55.86	70.60	70.85	67.73	58.02
4	50.38	76.99	75.33	62.85	45.90	55.24	74.88	75.27	71.55	58.32
5	49.46	77.20	75.61	63.16	45.88	55.91	70.60	70.33	66.71	58.17
6	49.71	75.36	73.80	62.88	45.93	55.75	72.00	72.22	68.77	58.23
7	49.44	76.70	74.90	63.17	45.90	55.76	71.33	71.44	67.87	57.56
8	49.73	75.57	73.81	62.59	45.93	56.22	75.29	75.77	72.01	58.04
9	50.13	77.84	76.16	63.65	45.98	55.44	71.94	72.37	69.33	58.34
10	49.80	76.70	75.17	63.03	45.90	54.74	74.26	74.62	70.90	57.79
11	49.54	76.38	75.18	63.13	45.94	54.89	70.48	70.73	67.34	57.85
12	49.71	76.85	75.13	62.51	45.96	55.90	73.54	74.07	70.63	58.46
13	49.86	77.33	75.51	62.85	45.85	55.84	74.23	74.86	71.66	58.39
14	49.78	78.57	76.93	63.89	45.89	54.98	73.91	74.22	70.75	58.12
15	49.71	77.25	75.78	63.09	45.84	54.80	69.94	69.88	65.20	57.43
16	49.41	76.88	75.34	62.80	45.88	55.35	70.26	70.19	66.14	57.79
17	49.99	76.53	74.98	63.62	45.97	55.73	71.28	71.56	68.63	58.32
18	50.19	76.74	75.20	63.22	45.90	55.21	71.20	71.50	68.29	57.98
19	49.39	74.44	72.80	62.73	45.85	54.85	74.87	75.37	71.57	58.18
20	49.51	77.13	75.66	63.20	45.95	55.94	71.61	71.76	68.28	57.78
21	49.70	76.97	75.37	62.69	45.90	54.71	71.23	71.42	67.78	57.90
22	49.44	76.12	74.43	62.53	45.93	56.00	70.47	70.36	66.92	58.18
23	49.85	76.19	74.92	62.98	45.93	55.36	72.19	72.50	68.97	57.85
24	49.75	77.66	76.20	63.60	45.93	55.60	71.18	71.17	68.16	58.27
25	49.93	77.88	76.51	63.83	45.92	55.31	71.39	71.53	68.16	57.55
26	49.74	76.89	75.49	63.20	46.00	54.75	70.32	70.45	66.94	57.90
27	49.93	74.06	72.75	63.14	45.91	55.12	72.90	73.32	70.17	58.26
28	50.06	78.19	76.57	63.52	45.94	54.69	71.54	71.78	68.44	58.05
29	49.83	74.78	73.12	62.84	45.94	56.07	73.96	74.61	71.12	58.20
30	49.67	78.10	76.56	63.78	45.91	54.90	71.47	71.69	68.33	57.93

Table D-5 *Continued*

August 17th					
	Kaufman and Rockwall				
RUN	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**
BL	61.05	78.04	72.00	63.07	53.60
1	60.62	76.62	70.40	62.89	53.61
2	60.23	76.01	69.95	62.96	53.61
3	60.23	75.99	69.98	62.85	53.61
4	59.81	75.71	69.99	62.93	53.62
5	60.87	77.20	70.92	63.01	53.61
6	59.81	75.54	70.04	63.00	53.61
7	60.35	76.34	70.47	62.98	53.61
8	60.13	76.62	70.66	62.85	53.61
9	60.40	76.56	70.53	62.89	53.62
10	60.36	76.23	70.29	62.99	53.62
11	59.78	75.69	70.13	63.03	53.61
12	60.70	77.27	71.26	62.92	53.62
13	60.78	77.36	71.10	62.90	53.61
14	60.03	76.12	70.27	62.87	53.62
15	60.43	76.62	70.55	62.91	53.61
16	60.47	76.47	70.44	62.97	53.61
17	59.81	75.93	70.49	63.03	53.62
18	59.85	75.86	70.12	62.98	53.61
19	60.37	76.58	70.38	62.87	53.61
20	60.54	76.81	70.78	62.92	53.62
21	60.67	77.01	70.65	62.94	53.61
22	60.20	75.88	69.93	62.93	53.61
23	59.96	75.48	69.52	62.88	53.61
24	60.81	77.22	70.93	62.90	53.62
25	60.40	76.83	70.90	62.99	53.62
26	59.97	75.59	69.78	62.92	53.61
27	59.99	76.15	70.38	62.99	53.62
28	60.18	75.86	70.03	62.97	53.62
29	59.71	75.27	69.69	63.02	53.61
30	60.71	77.07	70.88	62.95	53.61

Table D-6 Stage 2 CAMx output for August 18

August 18th										
	Collin					**Dallas**				
RUN	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**
BL	59.96	99.14	100.52	83.96	49.51	54.77	99.74	97.32	81.73	50.68
1	60.47	97.28	98.34	81.67	48.24	53.64	91.62	89.68	75.50	50.06
2	60.46	96.33	97.02	80.65	47.57	54.22	89.06	87.98	72.14	49.95
3	59.94	95.64	96.35	80.44	47.97	54.27	92.66	90.09	76.65	49.68
4	60.49	97.04	98.08	81.76	48.13	57.03	91.62	89.96	76.12	50.03
5	60.39	95.34	95.87	80.08	48.01	53.26	95.03	92.68	78.41	49.89
6	60.06	96.77	97.63	81.35	48.03	56.09	91.63	89.13	76.00	49.88
7	60.07	95.84	96.41	80.34	47.90	53.18	88.63	87.48	73.50	49.68
8	60.16	97.68	98.86	82.44	48.24	55.31	94.86	92.48	78.26	49.49
9	60.42	96.00	96.73	80.71	48.12	54.95	92.71	90.17	76.81	49.81
10	60.28	97.10	98.18	81.80	47.79	54.73	91.47	89.80	76.03	49.45
11	60.20	96.07	96.68	80.49	47.87	55.20	88.67	87.56	73.55	49.91
12	60.08	96.38	97.20	80.94	47.83	52.84	89.58	88.57	73.37	49.89
13	60.11	96.11	97.08	81.30	47.90	52.87	93.68	91.22	77.47	49.58
14	60.59	97.00	97.94	81.61	48.32	56.11	92.33	89.86	76.65	49.83
15	60.02	94.73	95.10	79.36	47.64	54.05	91.21	88.47	75.77	49.68
16	60.53	95.71	96.29	80.34	47.63	55.52	95.64	92.96	78.44	49.80
17	60.51	96.18	96.82	80.77	48.20	55.68	89.36	87.97	75.13	50.07
18	60.35	96.34	97.07	80.90	48.11	57.07	90.84	88.27	75.43	49.92
19	60.33	97.63	98.61	81.70	47.84	54.09	90.80	89.90	72.27	49.66
20	60.44	96.39	97.24	81.08	48.17	53.90	93.61	91.24	77.38	49.85
21	60.28	96.51	97.18	80.61	47.51	53.23	89.07	87.99	72.94	49.58
22	60.27	95.68	96.18	79.81	47.36	54.03	87.96	86.70	72.63	49.77
23	60.55	96.51	97.20	80.72	47.88	56.01	89.24	88.21	73.84	49.62
24	60.19	96.15	96.79	80.65	48.20	53.11	90.57	88.04	75.46	49.83
25	60.14	96.38	97.11	80.95	47.84	53.79	92.61	90.17	76.66	49.60
26	60.32	95.56	96.05	79.80	47.50	54.41	87.98	86.70	73.05	49.99
27	60.09	95.91	96.75	80.82	47.89	54.10	89.31	88.39	73.68	49.69
28	60.08	96.26	96.95	80.62	47.71	54.19	88.80	87.81	72.42	49.68
29	59.94	96.58	97.42	81.27	47.74	54.38	89.97	89.04	72.78	49.64
30	60.38	96.09	96.80	80.67	48.03	52.99	89.65	88.00	74.66	49.76

Table D-6 *Continued*

August 18th										
	Denton					Tarrant				
RUN	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**
BL	64.37	91.86	92.02	86.12	56.83	64.17	90.32	90.26	81.72	51.70
1	64.07	90.46	90.48	84.21	55.35	63.63	87.41	87.18	78.35	50.17
2	63.61	89.13	88.97	82.64	54.16	62.98	84.91	84.68	76.16	49.03
3	63.25	88.20	87.94	81.80	54.17	62.41	83.33	83.26	75.63	49.41
4	63.44	89.24	89.28	83.84	55.42	62.94	87.79	88.05	79.68	50.26
5	63.28	87.98	87.67	81.40	53.79	62.38	82.15	81.92	74.67	49.28
6	64.21	90.64	90.55	83.94	54.72	63.70	86.13	85.66	76.61	49.20
7	63.48	88.84	88.65	82.37	54.40	62.78	84.53	84.35	76.03	49.36
8	63.63	89.73	89.84	84.40	55.79	63.23	88.46	88.68	80.35	50.46
9	63.51	88.85	88.71	82.60	54.66	62.82	84.86	84.75	76.62	49.71
10	63.88	90.15	90.18	84.18	55.13	63.45	87.73	87.65	78.83	49.56
11	63.71	89.18	88.96	82.46	54.15	63.01	84.00	83.62	75.41	49.09
12	63.16	88.52	88.46	82.85	54.81	62.59	86.07	86.28	78.18	50.06
13	62.73	87.76	87.72	82.70	55.12	62.01	86.24	86.88	79.40	50.36
14	63.50	89.23	89.23	83.56	55.48	62.97	87.01	87.14	78.89	50.32
15	62.90	87.10	86.79	80.34	53.14	61.79	80.46	80.20	73.25	48.50
16	63.46	88.54	88.22	81.83	53.60	62.69	82.65	82.28	74.66	48.71
17	63.58	89.10	88.91	82.63	54.57	62.91	84.62	84.39	76.23	49.54
18	63.72	89.25	89.10	82.75	54.56	63.02	84.75	84.51	76.36	49.58
19	63.75	90.00	90.07	84.26	55.32	63.35	88.10	88.12	79.38	50.06
20	63.44	88.82	88.66	82.58	54.77	62.75	84.82	84.78	76.97	49.95
21	63.90	89.79	89.62	83.01	54.18	63.26	85.01	84.60	75.97	49.08
22	63.66	89.12	88.85	82.18	53.62	62.95	83.48	82.99	74.69	49.08
23	63.94	89.84	89.73	83.26	54.74	63.36	85.74	85.41	76.73	49.60
24	63.68	89.06	88.85	82.46	54.48	62.97	84.14	83.84	75.94	49.72
25	63.45	88.95	88.78	82.67	54.42	62.80	84.78	84.67	76.51	49.16
26	63.37	88.39	88.11	81.72	53.61	62.61	83.14	82.86	74.71	48.51
27	63.16	88.39	88.27	82.52	54.69	62.44	85.36	85.54	77.54	49.56
28	64.07	90.01	89.85	83.16	54.38	63.43	85.25	84.77	76.02	49.07
29	62.85	88.03	87.99	82.68	54.76	62.17	86.02	86.48	78.79	50.29
30	63.58	89.06	88.88	82.60	54.60	62.84	84.72	84.55	76.37	49.59

Table D-6 *Continued*

August 18th										
	Ellis					**Johnson and Parker**				
RUN	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**
BL	50.66	70.34	69.05	57.20	38.02	54.74	65.41	65.03	61.91	52.43
1	50.44	68.86	67.53	55.17	37.43	54.74	65.31	64.57	60.76	51.40
2	49.93	68.63	67.25	55.18	37.00	54.74	65.31	64.62	61.00	51.39
3	50.22	69.44	67.95	55.63	37.06	54.73	65.31	64.60	60.98	51.47
4	51.12	68.67	67.21	55.17	37.47	54.74	65.32	64.76	61.25	51.59
5	50.05	68.79	67.29	55.19	37.06	54.75	65.30	64.57	60.76	51.42
6	50.06	67.46	65.97	55.08	37.04	54.73	65.33	64.62	60.84	51.36
7	49.99	67.62	66.14	55.52	36.86	54.73	65.31	64.66	60.97	51.24
8	50.09	67.10	65.46	54.53	36.54	54.75	65.35	64.78	61.05	51.57
9	50.12	69.27	67.75	56.01	36.89	54.74	65.32	64.59	60.92	51.42
10	49.29	69.02	67.66	54.91	36.47	54.74	65.34	64.81	61.26	51.61
11	50.59	68.74	67.48	55.11	36.97	54.74	65.32	64.59	60.85	51.28
12	49.91	69.27	67.68	55.00	37.53	54.75	65.33	64.74	61.06	51.52
13	49.69	68.96	67.36	55.18	36.68	54.74	65.32	64.72	61.26	51.81
14	49.64	69.72	68.15	55.94	36.79	54.74	65.33	64.75	61.04	51.55
15	50.32	69.23	67.69	55.06	36.81	54.73	65.34	64.62	60.63	51.08
16	50.14	68.65	67.11	55.08	36.65	54.74	65.36	64.67	61.18	51.63
17	50.23	67.72	66.35	55.87	37.09	54.75	65.35	64.63	60.88	51.36
18	50.49	67.95	66.52	55.91	36.80	54.75	65.34	64.62	60.94	51.33
19	49.95	65.62	64.18	54.66	36.95	54.74	65.34	64.78	61.09	51.42
20	50.22	68.98	67.48	55.15	37.01	54.74	65.37	64.70	61.17	51.67
21	50.29	69.35	67.86	54.73	36.92	54.74	65.32	64.65	61.07	51.69
22	49.58	68.53	66.94	54.95	37.16	54.74	65.30	64.57	60.93	51.44
23	50.98	68.88	67.50	55.54	36.75	54.74	65.32	64.61	61.04	51.49
24	49.85	69.48	67.88	56.47	37.00	54.75	65.34	64.62	61.02	51.66
25	49.99	68.79	67.48	55.68	36.58	54.74	65.31	64.60	61.06	51.52
26	50.62	69.29	68.03	55.51	37.25	54.75	65.35	64.63	60.91	51.37
27	50.05	66.20	65.02	55.02	36.70	54.74	65.34	64.66	61.18	51.68
28	50.36	69.86	68.26	55.62	36.76	54.74	65.29	64.57	60.78	51.26
29	50.22	66.94	65.45	54.78	36.72	54.74	65.32	64.78	61.33	51.78
30	50.16	69.46	67.91	55.80	36.83	54.74	65.33	64.63	60.86	51.30

Table D-6 *Continued*

August 18th					
	Kaufman and Rockwall				
RUN	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**
BL	56.26	90.46	87.53	69.38	54.19
1	55.66	84.78	81.71	65.00	53.89
2	55.97	83.73	80.24	64.49	53.88
3	55.57	86.05	83.01	66.13	53.75
4	55.57	84.58	81.29	65.43	53.90
5	56.25	88.35	85.31	67.57	53.69
6	55.44	85.06	82.16	66.13	53.86
7	55.61	84.43	81.47	65.26	53.73
8	55.90	87.23	84.15	66.87	53.63
9	56.09	86.72	83.59	66.50	53.66
10	55.96	86.43	83.41	66.54	53.51
11	55.04	82.10	79.19	64.41	53.87
12	55.87	84.96	81.99	65.43	53.92
13	55.95	87.54	84.56	66.99	53.73
14	56.21	86.56	83.30	66.35	53.82
15	55.81	86.63	83.45	66.47	53.74
16	56.10	87.83	84.73	67.25	53.59
17	55.66	84.66	81.69	65.88	53.81
18	55.58	84.17	80.80	65.13	53.87
19	55.78	82.98	79.45	63.86	53.65
20	55.78	86.56	83.59	66.52	53.84
21	55.80	84.40	81.12	64.62	53.60
22	55.95	84.67	81.38	65.10	53.76
23	55.42	83.26	79.76	64.26	53.59
24	56.11	86.61	83.47	66.27	53.84
25	55.51	85.91	82.98	66.26	53.60
26	55.40	83.22	79.98	64.38	53.85
27	55.25	83.39	80.29	64.80	53.70
28	55.62	83.30	80.15	64.68	53.65
29	55.51	83.30	80.16	64.86	53.71
30	55.88	85.05	81.98	65.33	53.71

Table D-7 Stage 2 CAMx output for August 19

August 19th										
	Collin					**Dallas**				
RUN	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**
BL	52.79	73.23	71.21	64.15	51.83	52.72	97.01	94.93	79.87	57.06
1	52.19	72.59	70.78	64.06	51.81	52.73	91.94	90.29	77.77	57.32
2	52.01	72.36	70.65	64.04	51.81	53.34	88.74	87.55	76.85	57.20
3	52.01	72.42	70.68	64.04	51.81	53.82	93.30	91.59	78.09	57.30
4	52.19	72.58	70.79	64.06	51.81	54.63	92.64	90.88	78.04	57.21
5	52.05	72.42	70.68	64.04	51.81	52.70	94.80	92.84	78.64	57.08
6	52.01	72.46	70.70	64.05	51.81	54.16	92.31	90.66	77.91	57.33
7	51.95	72.33	70.63	64.04	51.81	53.18	89.95	88.39	77.03	57.25
8	52.30	72.70	70.85	64.07	51.82	54.06	94.38	92.52	78.69	57.20
9	52.08	72.48	70.72	64.05	51.81	53.69	93.43	91.57	78.18	57.10
10	52.10	72.56	70.78	64.06	51.81	53.46	92.63	90.84	78.09	57.15
11	52.00	72.39	70.66	64.04	51.81	54.03	90.25	88.68	77.13	57.15
12	52.23	72.55	70.76	64.06	51.81	52.60	89.85	88.52	77.06	57.27
13	52.34	72.73	70.87	64.06	51.81	52.88	94.07	92.26	78.52	57.20
14	52.22	72.61	70.79	64.05	51.81	54.48	93.05	91.24	78.15	57.21
15	51.76	72.20	70.55	64.02	51.81	53.69	92.48	90.78	77.95	57.28
16	51.97	72.40	70.68	64.05	51.81	53.76	95.09	93.21	78.90	57.20
17	52.00	72.42	70.68	64.04	51.81	54.56	91.63	89.88	77.69	57.13
18	52.02	72.41	70.67	64.05	51.81	54.59	91.77	90.11	77.53	57.19
19	52.20	72.63	70.81	64.06	51.81	53.05	88.07	87.23	76.76	57.12
20	52.12	72.53	70.75	64.05	51.81	53.22	94.07	92.21	78.57	57.16
21	52.15	72.50	70.73	64.05	51.81	52.36	89.64	88.12	76.93	57.25
22	51.99	72.32	70.62	64.03	51.81	53.43	89.22	87.74	76.64	57.31
23	52.06	72.43	70.68	64.04	51.81	53.96	90.51	89.09	77.40	57.23
24	52.15	72.52	70.74	64.05	51.81	52.71	91.77	90.10	77.74	57.12
25	52.03	72.48	70.73	64.05	51.81	53.30	93.30	91.53	78.25	57.21
26	51.98	72.32	70.63	64.03	51.81	53.87	89.86	88.50	76.98	57.28
27	52.13	72.49	70.72	64.05	51.81	54.08	90.45	88.99	77.42	57.08
28	51.93	72.31	70.61	64.04	51.81	53.12	88.43	86.92	76.53	57.30
29	52.28	72.64	70.81	64.05	51.81	54.48	89.18	87.82	76.74	57.25
30	52.04	72.46	70.71	64.04	51.81	52.59	91.10	89.44	77.46	57.20

Table D-7 *Continued*

August 19th										
	Denton					**Tarrant**				
RUN	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**
BL	55.33	71.60	69.95	63.67	53.61	56.40	95.53	94.50	79.66	57.06
1	54.55	71.15	69.65	63.58	53.61	55.90	91.10	90.13	77.84	57.32
2	54.34	71.03	69.56	63.55	53.61	55.99	90.07	89.05	77.38	57.20
3	54.33	71.12	69.60	63.56	53.61	56.28	91.87	91.21	78.04	57.30
4	54.70	71.16	69.62	63.56	53.61	57.09	91.43	90.72	78.04	57.21
5	54.24	71.06	69.57	63.56	53.60	56.15	93.30	92.46	78.64	57.08
6	54.40	71.12	69.63	63.58	53.61	55.51	91.19	90.57	77.91	57.33
7	54.30	71.10	69.64	63.58	53.61	56.29	89.97	89.03	77.33	57.25
8	54.78	71.20	69.63	63.56	53.61	57.01	93.10	92.30	78.69	57.20
9	54.44	71.08	69.58	63.56	53.61	56.39	92.19	91.40	78.18	57.10
10	54.60	71.20	69.66	63.57	53.61	56.19	91.56	90.83	78.09	57.15
11	54.24	71.07	69.58	63.56	53.61	55.77	89.98	88.95	77.21	57.15
12	54.63	71.13	69.64	63.56	53.61	57.06	90.46	89.36	77.33	57.27
13	54.77	71.23	69.70	63.58	53.61	57.69	92.76	92.00	78.41	57.20
14	54.62	71.20	69.69	63.59	53.61	57.08	91.78	91.06	78.15	57.21
15	53.94	71.05	69.60	63.58	53.60	56.21	91.38	90.76	77.95	57.28
16	54.27	71.09	69.62	63.56	53.61	55.95	93.48	92.69	78.64	57.20
17	54.35	71.17	69.65	63.57	53.61	56.18	90.58	89.88	77.69	57.13
18	54.38	71.08	69.61	63.56	53.61	55.83	90.61	89.85	77.53	57.19
19	54.68	71.22	69.68	63.58	53.61	56.82	90.43	89.50	77.29	57.12
20	54.45	71.24	69.69	63.59	53.61	56.37	92.80	92.02	78.57	57.16
21	54.39	71.19	69.67	63.58	53.60	55.71	90.14	89.15	77.34	57.25
22	54.26	71.10	69.62	63.57	53.60	55.77	89.51	88.56	76.99	57.31
23	54.42	71.11	69.63	63.57	53.61	55.81	90.26	89.30	77.48	57.23
24	54.41	71.15	69.61	63.56	53.61	55.88	90.80	90.10	77.74	57.12
25	54.34	71.19	69.69	63.59	53.61	56.45	92.04	91.31	78.25	57.21
26	54.16	71.04	69.55	63.54	53.60	56.10	89.67	88.78	77.21	57.28
27	54.54	71.15	69.66	63.59	53.61	56.97	90.54	89.50	77.55	57.08
28	54.28	71.00	69.53	63.54	53.61	55.36	89.98	88.97	77.31	57.30
29	54.73	71.25	69.71	63.59	53.61	57.40	90.58	89.49	77.29	57.25
30	54.35	71.16	69.67	63.59	53.61	56.18	90.44	89.46	77.57	57.20

Table D-7 *Continued*

August 19th										
	Ellis					Johnson and Parker				
RUN	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**
BL	52.90	97.91	99.05	93.00	61.48	55.82	87.32	91.00	88.17	65.63
1	52.48	93.46	93.69	87.89	59.98	55.60	84.15	87.34	84.45	63.04
2	52.20	89.78	89.97	84.58	59.63	55.56	82.24	85.42	83.00	62.44
3	52.03	93.68	94.18	88.45	60.05	55.59	81.69	85.75	83.90	63.18
4	52.61	93.32	94.19	88.09	59.74	55.61	84.39	87.40	84.47	62.61
5	52.05	95.40	96.35	90.73	60.43	55.59	81.24	85.99	84.70	64.29
6	51.67	92.56	92.85	87.22	59.87	55.55	83.08	86.34	83.29	62.58
7	52.21	90.02	90.33	85.37	59.66	55.56	81.98	85.33	83.38	62.87
8	52.72	94.39	94.77	89.09	60.19	55.64	84.99	88.29	85.49	63.44
9	52.10	93.74	94.15	88.41	60.18	55.58	82.75	86.54	84.38	63.51
10	52.48	93.09	93.51	87.77	60.14	55.60	84.37	87.58	84.90	63.36
11	52.04	91.54	91.84	86.04	59.63	55.56	82.10	85.53	83.18	62.44
12	52.90	91.08	91.41	86.26	60.06	55.60	83.48	86.68	84.46	63.34
13	52.64	94.11	94.74	89.45	60.52	55.68	84.23	87.96	85.98	64.16
14	52.78	93.94	94.26	88.25	60.03	55.61	83.83	87.06	84.48	63.05
15	51.64	93.03	93.81	88.34	60.00	55.51	79.51	83.98	82.99	63.04
16	52.03	95.84	96.64	90.63	60.23	55.60	81.50	86.08	84.27	63.74
17	52.29	91.23	91.62	86.31	59.75	55.56	82.39	85.97	83.52	62.77
18	52.25	92.30	92.58	86.84	59.72	55.56	82.75	86.25	83.83	62.69
19	52.76	89.79	89.48	84.75	59.69	55.58	84.60	87.04	84.05	62.54
20	52.56	94.91	95.38	89.68	60.29	55.63	82.70	86.68	84.77	63.57
21	52.16	91.06	91.55	85.97	59.76	55.62	82.54	85.90	83.57	62.94
22	51.90	90.04	90.18	84.89	59.64	55.54	81.71	85.19	82.93	62.72
23	52.18	91.85	92.12	86.17	59.57	55.58	82.91	86.02	83.20	62.29
24	52.11	92.53	92.85	87.50	60.19	55.63	82.48	86.50	84.42	63.79
25	52.45	94.43	94.87	89.08	60.11	55.62	82.43	86.27	84.31	63.48
26	51.97	90.87	91.21	85.57	59.35	55.58	81.10	84.62	82.65	62.39
27	52.30	89.96	89.94	85.76	59.65	55.60	82.80	86.08	83.60	62.47
28	51.69	90.05	90.80	84.75	59.55	55.51	82.59	85.66	82.88	62.40
29	52.92	89.71	89.48	84.78	59.44	55.64	83.77	86.77	84.00	62.54
30	51.97	92.20	92.52	87.11	59.90	55.57	82.33	86.05	83.97	63.27

Table D-7 *Continued*

August 19th					
	Kaufman and Rockwall				
RUN	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**
BL	55.85	86.33	84.14	71.98	56.80
1	54.42	83.65	81.70	71.14	56.48
2	54.24	82.91	81.14	70.93	56.39
3	54.02	83.15	81.40	70.97	56.39
4	53.50	82.70	80.97	71.18	56.49
5	55.28	84.46	82.34	70.97	56.39
6	53.38	82.69	80.82	71.03	56.45
7	54.28	82.93	81.17	70.87	56.35
8	54.21	83.63	81.83	71.27	56.52
9	54.49	83.57	81.76	71.08	56.45
10	54.48	83.35	81.58	71.19	56.51
11	53.26	82.40	80.77	70.93	56.38
12	54.87	83.95	81.98	71.14	56.45
13	55.00	84.55	82.52	71.28	56.49
14	53.93	83.04	81.22	71.13	56.47
15	54.50	83.29	81.48	70.68	56.28
16	54.47	83.60	81.74	70.97	56.40
17	53.44	82.68	80.97	70.95	56.40
18	53.63	82.92	81.08	70.99	56.40
19	54.37	83.16	81.52	71.21	56.48
20	54.48	83.53	81.63	71.05	56.44
21	54.84	83.71	81.72	70.98	56.40
22	54.17	82.80	81.05	70.88	56.36
23	53.53	82.27	80.63	70.94	56.38
24	55.18	84.24	82.15	71.02	56.41
25	54.28	83.40	81.57	71.05	56.45
26	53.43	82.07	80.49	70.81	56.33
27	53.58	82.66	81.09	71.02	56.41
28	54.13	82.65	80.89	70.88	56.38
29	53.43	82.32	80.86	71.13	56.42
30	54.82	83.80	81.78	70.97	56.40

Table D-8 Stage 2 CAMx output for August 20

August 20th										
	Collin					Dallas				
RUN	12mn-6am	6am-12n	12n-3pm	3pm-7pm	7pm-12mn	12mn-6am	6am-12n	12n-3pm	3pm-7pm	7pm-12mn
BL	50.23	63.97	60.96	53.68	37.43	57.58	85.22	82.03	61.21	44.68
1	50.23	63.97	60.96	53.68	37.43	57.25	84.81	81.94	63.33	46.11
2	50.23	63.96	60.95	53.68	37.43	58.01	82.20	79.37	61.90	45.43
3	50.23	63.96	60.95	53.68	37.43	58.61	83.39	80.55	61.99	45.16
4	50.23	63.96	60.96	53.68	37.43	58.71	83.76	81.09	63.39	46.25
5	50.23	63.96	60.96	53.68	37.43	57.98	84.07	81.08	61.58	45.04
6	50.22	63.95	60.95	53.68	37.43	58.80	83.09	80.36	62.01	45.40
7	50.23	63.96	60.95	53.68	37.43	58.27	83.09	80.47	63.20	46.03
8	50.23	63.96	60.96	53.67	37.42	58.22	83.82	81.00	62.07	44.99
9	50.23	63.96	60.95	53.68	37.43	59.06	83.28	80.66	63.39	46.23
10	50.22	63.96	60.95	53.68	37.43	58.72	82.24	79.57	61.48	44.91
11	50.23	63.96	60.96	53.68	37.43	58.34	83.88	81.13	62.70	45.64
12	50.22	63.95	60.95	53.68	37.43	58.08	82.89	80.02	61.36	44.87
13	50.23	63.96	60.96	53.68	37.43	57.72	84.58	81.77	63.20	45.95
14	50.23	63.96	60.95	53.68	37.43	57.70	83.30	80.41	61.74	45.09
15	50.22	63.96	60.95	53.68	37.43	57.98	82.58	79.92	62.62	45.85
16	50.23	63.97	60.96	53.68	37.43	58.38	84.86	81.97	63.54	46.20
17	50.23	63.96	60.95	53.68	37.43	58.20	82.35	79.60	62.10	45.52
18	50.23	63.96	60.96	53.68	37.43	59.64	84.29	81.49	62.73	45.77
19	50.22	63.95	60.95	53.68	37.43	57.76	82.42	79.55	61.27	44.88
20	50.23	63.96	60.96	53.68	37.43	57.47	84.08	81.23	62.61	45.62
21	50.23	63.96	60.95	53.68	37.43	57.66	82.97	80.07	61.79	45.08
22	50.23	63.96	60.95	53.68	37.43	58.41	83.93	81.03	62.45	45.35
23	50.23	63.96	60.96	53.68	37.43	58.10	83.85	81.14	63.57	46.42
24	50.22	63.95	60.95	53.68	37.43	58.27	83.19	80.46	62.13	45.27
25	50.23	63.96	60.96	53.68	37.43	57.98	83.89	80.88	61.07	44.76
26	50.23	63.96	60.95	53.68	37.43	58.11	83.11	80.25	61.93	45.20
27	50.22	63.95	60.94	53.68	37.43	58.14	81.84	79.06	61.16	44.83
28	50.23	63.96	60.95	53.68	37.43	58.36	83.33	80.43	62.04	45.26
29	50.22	63.95	60.94	53.68	37.43	58.12	81.52	79.23	62.69	45.76
30	50.23	63.96	60.96	53.68	37.43	58.49	83.97	81.23	63.57	46.36

Table D-8 *Continued*

August 20th										
	Denton					Tarrant				
RUN	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**
BL	50.80	64.59	64.10	56.02	42.05	57.58	85.22	82.03	61.74	42.42
1	50.80	64.51	64.03	56.02	42.05	57.25	84.81	81.94	63.33	45.44
2	50.79	64.42	63.94	56.02	42.05	58.01	82.20	79.37	62.09	43.98
3	50.79	64.51	64.03	56.02	42.05	58.61	83.39	80.55	61.90	43.50
4	50.78	64.44	63.96	56.02	42.05	58.71	83.76	81.09	63.32	45.93
5	50.78	64.46	63.99	56.02	42.05	58.05	84.07	81.08	62.59	44.61
6	50.79	64.48	64.00	56.02	42.05	58.80	83.09	80.36	63.15	45.26
7	50.79	64.48	64.00	56.02	42.05	58.27	83.09	80.47	63.00	44.72
8	50.79	64.48	64.00	56.02	42.03	58.22	83.82	81.00	62.36	44.04
9	50.78	64.46	63.99	56.02	42.05	59.06	83.28	80.66	63.23	45.45
10	50.80	64.52	64.04	56.02	42.05	58.72	82.24	79.57	62.02	43.53
11	50.79	64.48	64.00	56.02	42.05	58.34	83.88	81.13	63.04	45.48
12	50.80	64.46	63.98	56.02	42.05	58.08	82.89	80.02	62.64	44.03
13	50.78	64.46	63.98	56.02	42.05	57.72	84.58	81.77	63.20	44.88
14	50.79	64.48	64.00	56.02	42.05	57.70	83.30	80.41	61.99	43.75
15	50.78	64.51	64.03	56.02	42.05	57.98	82.58	79.92	62.48	44.05
16	50.80	64.48	64.00	56.02	42.05	58.38	84.86	81.97	63.54	46.12
17	50.80	64.56	64.07	56.03	42.05	58.20	82.35	79.60	61.87	43.86
18	50.78	64.50	64.02	56.02	42.05	59.64	84.29	81.49	62.73	44.04
19	50.78	64.52	64.04	56.02	42.05	57.76	82.42	79.55	62.04	43.53
20	50.78	64.52	64.04	56.02	42.05	57.47	84.08	81.23	62.61	44.78
21	50.79	64.50	64.02	56.02	42.05	57.66	82.97	80.07	62.33	44.23
22	50.78	64.53	64.05	56.02	42.05	58.41	83.93	81.03	62.83	45.00
23	50.79	64.48	64.00	56.02	42.05	58.10	83.85	81.14	63.44	44.93
24	50.78	64.49	64.01	56.02	42.05	58.27	83.19	80.46	62.44	44.28
25	50.79	64.49	64.01	56.02	42.05	57.98	83.89	80.88	62.78	44.28
26	50.78	64.45	63.98	56.02	42.05	58.11	83.11	80.25	62.05	43.59
27	50.78	64.45	63.98	56.02	42.05	58.14	81.84	79.06	62.22	43.78
28	50.78	64.45	63.97	56.02	42.05	58.36	83.33	80.43	62.87	44.97
29	50.77	64.47	63.99	56.02	42.05	58.12	81.58	79.23	62.73	45.00
30	50.79	64.51	64.03	56.02	42.05	58.49	83.97	81.23	63.42	44.84

Table D-8 *Continued*

August 20th										
	Ellis					Johnson and Parker				
RUN	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**
BL	55.72	85.76	84.27	65.71	38.27	59.77	86.72	83.82	67.17	45.69
1	55.67	84.88	83.34	65.29	39.37	59.29	84.05	81.51	66.15	46.44
2	56.51	82.63	80.34	64.09	38.86	58.60	82.72	80.23	66.18	45.92
3	56.70	82.99	81.40	64.47	38.62	57.61	79.70	77.45	64.20	46.28
4	57.13	83.52	82.06	64.63	39.47	57.91	80.76	78.13	65.01	46.30
5	56.08	84.19	82.73	64.90	38.44	59.46	81.98	79.42	64.57	46.52
6	56.96	82.96	81.08	64.53	38.81	57.60	81.82	79.34	65.85	46.32
7	56.00	82.61	80.55	64.24	39.32	57.86	81.11	78.85	65.14	46.61
8	56.59	83.85	82.26	64.89	38.75	58.21	82.56	80.15	66.24	46.22
9	56.96	83.10	81.27	64.59	39.54	58.11	82.93	80.51	66.62	46.57
10	56.63	81.78	79.91	63.90	38.41	58.06	79.82	77.28	64.64	45.96
11	56.81	83.62	82.21	64.81	39.03	58.45	80.75	78.42	64.75	46.50
12	56.06	82.93	81.36	64.43	38.36	58.44	83.50	81.14	66.62	45.98
13	55.71	84.52	82.79	65.14	39.27	59.27	84.23	81.62	66.21	46.26
14	55.99	83.26	81.76	64.50	38.53	59.51	83.01	80.52	65.73	46.45
15	56.20	82.63	80.87	64.13	39.20	57.93	81.26	79.00	64.91	46.40
16	56.45	84.73	83.27	65.27	39.42	59.23	83.00	80.52	65.60	46.35
17	56.25	82.22	80.13	64.06	38.92	58.42	80.70	78.46	64.85	46.29
18	57.56	84.27	82.39	65.08	39.14	57.76	79.84	77.47	64.87	46.40
19	56.11	82.29	80.22	64.07	38.32	58.71	81.72	79.29	65.06	46.10
20	55.71	83.92	82.43	64.92	38.97	59.01	82.50	79.95	65.25	46.46
21	55.98	82.78	81.20	64.11	38.48	59.00	81.11	78.43	63.96	46.21
22	56.33	83.64	81.61	64.65	38.73	58.79	81.25	78.89	64.71	46.26
23	56.64	83.77	82.04	64.85	39.64	58.75	82.56	80.21	65.80	46.53
24	56.17	82.99	81.46	64.48	38.64	58.90	81.98	79.36	65.08	46.65
25	56.25	84.07	82.58	64.97	38.25	57.87	82.00	79.78	65.68	46.26
26	56.21	82.87	81.06	64.39	38.54	58.45	82.50	80.25	66.07	45.94
27	55.97	81.71	79.32	63.77	38.28	57.79	80.31	78.11	64.81	46.28
28	56.60	82.89	81.51	64.42	38.70	58.09	80.54	78.27	64.68	46.49
29	56.32	81.48	79.16	63.46	39.09	57.79	80.00	77.67	64.35	46.16
30	56.36	83.82	82.27	64.91	39.59	58.30	82.50	80.31	66.20	46.53

Table D-8 *Continued*

August 20th					
	Kaufman and Rockwall				
RUN	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**
BL	51.19	63.62	62.23	54.68	45.27
1	51.19	63.61	62.23	54.68	45.27
2	51.20	63.61	62.23	54.68	45.27
3	51.20	63.62	62.24	54.68	45.27
4	51.19	63.61	62.22	54.69	45.27
5	51.20	63.61	62.22	54.67	45.27
6	51.20	63.61	62.23	54.68	45.27
7	51.21	63.62	62.23	54.68	45.27
8	51.20	63.63	62.24	54.68	45.18
9	51.19	63.61	62.22	54.67	45.27
10	51.19	63.61	62.22	54.67	45.27
11	51.20	63.62	62.23	54.68	45.27
12	51.19	63.61	62.22	54.67	45.27
13	51.20	63.62	62.23	54.68	45.27
14	51.20	63.61	62.22	54.67	45.27
15	51.20	63.61	62.22	54.68	45.27
16	51.20	63.61	62.22	54.68	45.27
17	51.20	63.61	62.22	54.67	45.27
18	51.20	63.63	62.24	54.69	45.27
19	51.19	63.60	62.21	54.67	45.27
20	51.20	63.62	62.24	54.69	45.27
21	51.20	63.61	62.22	54.67	45.27
22	51.20	63.62	62.23	54.68	45.27
23	51.20	63.61	62.23	54.68	45.27
24	51.19	63.61	62.22	54.68	45.27
25	51.21	63.62	62.23	54.67	45.27
26	51.19	63.60	62.22	54.68	45.27
27	51.20	63.61	62.22	54.68	45.27
28	51.21	63.63	62.24	54.68	45.27
29	51.20	63.61	62.22	54.68	45.27
30	51.20	63.62	62.24	54.68	45.27

Table D-9 Stage 2 CAMx output for August 21

August 21st										
	Collin					Dallas				
RUN	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**
BL	54.01	74.83	71.51	60.99	54.17	56.55	77.99	73.92	65.60	59.41
1	54.02	73.79	70.38	60.96	54.17	55.80	73.99	70.45	65.59	60.03
2	54.02	74.02	70.67	60.96	54.17	55.95	74.41	70.98	65.82	59.99
3	54.02	73.82	70.48	60.92	54.17	55.78	74.13	70.75	65.51	59.64
4	54.02	73.96	70.49	60.95	54.18	56.04	74.92	71.20	65.00	59.60
5	54.01	73.69	70.21	60.90	54.18	57.11	75.15	71.54	65.62	60.35
6	54.03	74.00	70.66	60.94	54.17	55.54	74.00	70.66	65.83	60.08
7	54.01	73.77	70.37	60.93	54.17	56.93	75.07	71.53	65.53	59.92
8	54.01	74.08	70.71	60.81	54.08	56.57	75.37	71.70	65.15	59.19
9	54.02	74.08	70.69	60.93	54.17	56.59	74.69	71.29	66.03	60.29
10	54.01	74.15	70.78	60.95	54.17	56.63	75.51	71.96	65.90	60.01
11	54.02	74.05	70.67	60.96	54.17	56.02	74.35	70.84	65.90	60.17
12	54.03	74.14	70.77	60.97	54.17	56.04	74.40	70.89	65.61	59.83
13	54.02	74.25	70.87	60.97	54.17	56.09	74.64	71.09	65.96	60.21
14	54.02	73.86	70.43	60.91	54.17	56.04	74.22	70.63	65.35	59.77
15	54.03	73.93	70.53	60.94	54.17	55.79	73.93	70.53	65.23	59.70
16	54.01	73.77	70.33	60.94	54.18	56.23	74.71	71.17	65.68	60.27
17	54.02	73.97	70.57	60.92	54.17	56.05	74.80	71.30	65.64	59.94
18	54.02	73.84	70.43	60.91	54.17	56.37	74.17	70.67	65.09	59.50
19	54.02	74.29	70.86	60.97	54.17	56.22	74.73	71.10	65.17	59.59
20	54.01	73.83	70.38	60.95	54.18	55.94	74.52	70.95	65.34	59.90
21	54.01	73.99	70.55	60.94	54.18	57.04	75.33	71.68	65.59	60.14
22	54.02	74.03	70.71	60.98	54.16	55.61	74.03	70.71	65.38	59.54
23	54.02	73.72	70.29	60.97	54.17	56.17	73.83	70.33	65.28	59.89
24	54.01	74.33	70.93	60.97	54.17	56.95	76.62	72.70	65.34	59.64
25	54.02	73.92	70.53	60.95	54.17	56.15	74.21	70.82	65.86	60.26
26	54.03	73.69	70.26	60.96	54.18	55.68	73.69	70.24	65.47	60.15
27	54.00	74.17	70.72	60.94	54.18	56.67	77.03	72.99	65.01	59.48
28	54.02	73.87	70.53	60.94	54.17	55.42	73.87	70.53	65.60	59.80
29	54.02	73.71	70.28	60.92	54.17	56.75	74.60	71.03	65.20	59.74
30	54.02	73.72	70.27	60.92	54.18	55.94	73.90	70.32	65.16	59.76

Table D-9 *Continued*

August 21st										
	Denton					Tarrant				
RUN	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**
BL	58.05	89.81	84.94	64.15	50.18	59.69	88.12	82.84	64.49	54.07
1	57.20	85.13	80.34	63.89	50.16	58.75	83.35	78.24	64.12	55.58
2	57.31	85.86	80.97	64.00	50.17	59.06	84.09	78.80	63.99	55.46
3	57.20	85.39	80.85	63.87	50.16	58.80	83.72	78.75	63.66	54.69
4	57.54	86.72	81.76	63.82	50.15	59.16	84.84	79.62	63.77	54.52
5	57.46	86.78	81.88	63.63	50.15	59.15	85.33	79.98	64.53	56.32
6	56.51	81.82	77.98	63.96	50.16	57.86	79.23	74.45	63.85	55.72
7	57.31	86.31	81.85	63.85	50.16	58.97	85.00	79.98	64.13	55.37
8	57.36	86.44	81.87	63.86	50.10	59.09	84.86	79.78	63.51	54.24
9	57.27	85.77	80.93	63.90	50.16	58.99	84.17	78.86	64.48	56.24
10	57.47	86.85	82.03	63.99	50.16	59.17	85.29	80.00	64.26	55.57
11	57.05	84.54	80.17	64.03	50.16	58.63	82.78	77.66	64.13	55.93
12	57.16	84.98	80.47	64.10	50.17	58.89	83.16	77.99	63.71	55.05
13	57.28	85.51	80.77	64.03	50.17	58.85	83.60	78.33	64.34	56.07
14	57.15	84.91	80.38	63.75	50.15	58.69	83.20	78.20	64.05	54.92
15	56.83	83.13	79.11	63.90	50.16	58.54	81.03	75.99	63.41	54.72
16	57.43	86.47	81.50	63.84	50.15	59.01	84.78	79.50	64.44	56.15
17	57.43	86.23	81.30	63.90	50.16	58.93	84.33	79.15	64.10	55.42
18	57.09	84.98	80.61	63.81	50.16	58.83	83.48	78.58	63.72	54.31
19	57.37	85.95	81.15	63.97	50.16	59.12	84.12	78.90	63.45	54.47
20	57.42	86.20	81.24	63.85	50.15	59.07	84.41	79.13	63.96	55.25
21	57.43	86.73	81.90	63.81	50.15	59.21	85.22	79.90	64.20	55.78
22	56.63	82.80	79.21	64.02	50.17	57.99	80.91	76.44	63.43	54.47
23	57.10	84.94	80.46	63.85	50.16	58.62	83.39	78.50	63.91	55.22
24	57.71	88.11	83.41	63.98	50.16	59.27	86.58	81.44	63.97	54.63
25	57.27	85.62	80.66	63.90	50.16	58.94	83.85	78.55	64.35	56.13
26	56.90	83.39	79.15	63.85	50.15	58.42	81.64	76.60	64.07	55.84
27	57.88	88.89	84.09	63.82	50.16	59.45	87.26	82.08	64.36	54.25
28	56.87	83.17	79.12	63.94	50.17	58.46	81.02	75.97	63.65	55.03
29	57.23	85.79	81.35	63.76	50.15	58.96	84.43	79.42	63.69	54.82
30	56.85	83.43	79.47	63.77	50.15	58.32	81.73	76.96	63.65	54.88

Table D-9 *Continued*

August 21st										
	Ellis					**Johnson and Parker**				
RUN	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**
BL	49.75	69.90	68.24	61.01	46.45	55.64	79.73	78.57	71.56	55.55
1	50.65	68.96	67.98	61.00	46.55	52.55	73.99	71.95	68.21	55.60
2	49.96	68.55	67.73	61.27	46.91	54.22	74.16	73.23	67.86	55.05
3	50.10	68.46	67.62	61.08	46.66	53.33	74.31	72.65	67.92	55.45
4	50.94	69.40	68.12	60.91	46.47	51.98	71.57	71.42	67.85	55.64
5	50.45	69.49	68.19	61.40	47.08	54.10	75.97	75.29	69.84	55.78
6	50.02	68.40	67.63	61.28	46.93	51.70	69.21	68.95	65.07	54.96
7	50.33	68.59	67.77	61.29	46.85	53.32	74.44	73.05	68.02	55.51
8	49.39	68.29	67.47	61.04	46.70	54.00	73.73	72.32	66.56	54.87
9	50.15	68.48	67.61	60.95	46.49	53.60	72.41	71.61	67.09	55.39
10	49.49	68.48	67.60	61.00	46.56	54.51	74.62	73.03	67.22	55.08
11	50.27	68.43	67.62	61.17	46.79	51.50	69.49	69.49	66.56	55.54
12	49.66	68.61	67.61	61.31	46.96	54.13	75.27	74.43	68.68	55.08
13	49.62	68.49	67.74	61.40	47.03	54.18	74.68	73.31	67.49	54.99
14	49.70	68.54	67.68	61.38	47.03	55.33	76.28	74.91	68.81	55.70
15	50.06	68.97	67.91	61.11	46.72	54.60	75.70	74.60	69.24	55.80
16	50.58	68.89	67.65	61.29	46.92	53.32	73.18	72.64	68.38	55.50
17	49.95	68.61	67.78	61.27	46.80	54.51	76.27	73.32	67.47	55.37
18	50.01	68.46	67.66	61.23	46.78	53.13	73.30	71.14	66.65	55.37
19	49.64	68.36	67.51	60.91	46.51	53.46	73.90	71.73	66.25	54.81
20	50.48	68.77	67.73	61.41	47.05	53.20	74.49	72.90	68.48	55.64
21	50.64	69.08	67.73	61.20	46.86	53.31	74.25	73.61	68.88	55.44
22	49.33	68.50	67.68	61.20	46.75	54.49	73.91	72.55	67.12	55.09
23	50.25	68.43	67.56	61.01	46.59	53.32	74.08	71.75	67.59	55.65
24	49.81	68.77	67.77	61.35	46.98	54.78	76.35	75.35	69.15	55.61
25	50.56	69.01	67.88	60.99	46.59	52.23	72.48	72.05	68.19	55.54
26	50.46	68.73	67.75	61.33	46.95	53.01	73.97	72.33	68.07	55.32
27	50.05	68.53	67.73	61.05	46.60	52.52	75.27	72.39	66.68	55.19
28	50.27	69.67	68.37	61.12	46.69	53.39	73.75	73.07	68.47	55.80
29	49.83	68.45	67.63	61.13	46.75	53.23	71.96	71.08	66.28	54.86
30	50.45	69.18	68.16	61.09	46.63	54.44	75.80	74.45	69.22	55.81

Table D-9 *Continued*

August 21st					
	Kaufman and Rockwall				
RUN	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**
BL	50.12	66.16	66.43	66.28	59.66
1	49.59	66.15	66.42	66.28	59.66
2	49.65	66.11	66.48	66.30	59.66
3	49.59	66.13	66.42	66.28	59.66
4	49.80	66.11	66.42	66.28	59.66
5	49.59	66.07	66.45	66.29	59.66
6	49.59	66.07	66.46	66.29	59.66
7	49.59	66.14	66.42	66.28	59.66
8	49.88	66.06	66.46	66.29	59.66
9	49.86	66.12	66.42	66.29	59.66
10	49.69	66.12	66.42	66.28	59.66
11	49.74	66.08	66.47	66.30	59.66
12	49.92	66.06	66.43	66.29	59.66
13	49.84	66.14	66.46	66.29	59.66
14	49.80	66.10	66.42	66.29	59.66
15	49.84	66.07	66.43	66.29	59.66
16	49.59	66.15	66.47	66.30	59.66
17	49.81	66.13	66.42	66.28	59.66
18	49.91	66.14	66.42	66.28	59.66
19	50.02	66.07	66.44	66.29	59.66
20	49.59	66.09	66.43	66.29	59.66
21	49.86	66.09	66.48	66.30	59.66
22	49.59	66.15	66.43	66.28	59.66
23	49.59	66.10	66.45	66.29	59.66
24	49.90	66.07	66.45	66.29	59.66
25	49.71	66.10	66.44	66.29	59.66
26	49.59	66.10	66.43	66.29	59.66
27	49.94	66.09	66.41	66.28	59.66
28	49.59	66.13	66.42	66.29	59.66
29	49.64	66.08	66.46	66.29	59.66
30	49.71	66.13	66.42	66.29	59.66

Table D-10 Stage 2 CAMx output for August 22

August 22nd										
	Collin					Dallas				
RUN	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**
BL	58.85	74.40	71.68	69.02	-	58.42	74.11	70.58	60.62	-
1	57.37	71.96	69.76	66.12	-	56.17	69.63	66.89	59.86	-
2	57.20	72.11	70.10	66.70	-	56.26	69.94	67.37	60.16	-
3	56.73	71.25	69.24	64.98	-	55.59	68.78	66.16	59.79	-
4	57.29	72.23	70.12	66.66	-	56.13	69.98	67.15	59.78	-
5	58.18	72.93	70.46	67.56	-	57.45	71.66	68.28	60.15	-
6	57.05	71.57	69.49	65.45	-	55.75	68.32	66.05	59.91	-
7	57.61	72.28	70.09	67.04	-	56.88	70.66	67.68	59.90	-
8	57.26	72.24	70.13	66.51	-	56.14	69.57	67.03	59.74	-
9	57.79	72.86	70.65	67.74	-	57.09	71.62	68.58	60.40	-
10	58.17	73.42	71.10	68.49	-	57.66	72.92	69.55	60.54	-
11	57.31	72.15	69.97	66.04	-	56.07	69.22	66.56	59.95	-
12	56.72	71.29	69.38	64.57	-	55.73	69.30	66.35	59.91	-
13	57.57	72.71	70.47	66.93	-	56.51	70.30	67.59	60.27	-
14	56.98	71.82	69.76	65.85	-	55.94	69.25	66.40	59.68	-
15	56.79	71.29	69.22	64.18	-	55.75	69.44	66.55	59.69	-
16	57.87	72.64	70.31	67.26	-	57.09	71.07	67.97	60.21	-
17	58.14	73.04	70.60	67.66	-	57.47	71.79	68.43	60.25	-
18	56.99	71.67	69.57	65.27	-	55.92	68.14	65.86	59.64	-
19	57.05	72.18	70.11	66.23	-	56.10	68.66	66.56	59.91	-
20	58.21	73.00	70.55	67.79	-	57.54	72.01	68.61	60.13	-
21	56.93	71.79	69.70	65.37	-	55.99	69.68	66.80	59.71	-
22	57.01	71.64	69.68	65.95	-	55.87	68.88	66.52	60.05	-
23	56.61	71.11	69.11	64.53	-	55.56	68.63	66.04	59.65	-
24	58.58	73.74	71.12	68.38	-	57.95	72.97	69.37	60.25	-
25	56.91	71.67	69.61	65.47	-	55.87	69.54	66.75	59.85	-
26	56.83	71.23	69.22	65.24	-	55.61	69.66	66.87	59.59	-
27	57.34	72.34	70.22	66.72	-	56.26	69.61	67.14	59.70	-
28	56.58	71.21	69.27	64.98	-	55.56	70.36	67.27	59.87	-
29	57.08	71.54	69.38	65.14	-	55.86	68.31	65.96	59.54	-
30	57.35	72.13	70.00	66.65	-	56.29	69.89	67.10	59.68	-

Table D-10 *Continued*

August 22nd										
	Denton					**Tarrant**				
RUN	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**
BL	60.48	83.52	81.22	69.02	-	58.34	82.18	79.19	67.85	-
1	59.23	78.86	76.70	66.12	-	57.52	77.59	74.31	65.58	-
2	58.46	79.03	77.25	66.70	-	57.17	77.89	75.30	64.79	-
3	58.35	76.84	74.86	64.98	-	56.67	75.72	73.74	64.67	-
4	58.54	79.45	77.37	66.66	-	57.64	78.72	75.76	65.73	-
5	59.93	81.31	78.87	67.56	-	57.97	79.58	76.22	65.69	-
6	58.91	77.81	75.69	65.45	-	56.91	76.17	72.82	63.65	-
7	59.08	79.95	77.88	67.04	-	57.34	78.48	75.21	64.45	-
8	58.56	78.90	77.01	66.51	-	57.10	77.75	74.97	63.65	-
9	58.91	80.83	78.96	67.74	-	57.64	79.29	75.80	64.17	-
10	59.23	82.08	80.18	68.49	-	57.85	80.47	77.09	64.84	-
11	59.00	78.56	76.52	66.04	-	57.27	77.12	73.67	64.54	-
12	57.66	75.77	74.20	64.57	-	56.95	76.77	74.80	65.06	-
13	58.98	79.64	77.69	66.93	-	57.35	78.31	75.11	64.45	-
14	58.31	78.03	76.11	65.85	-	57.65	77.75	75.45	65.48	-
15	58.64	76.22	73.86	64.18	-	56.55	76.79	74.91	65.72	-
16	59.55	80.50	78.29	67.26	-	57.83	78.97	75.46	65.26	-
17	59.89	81.23	79.01	67.66	-	58.01	79.77	76.48	64.73	-
18	58.77	77.53	75.39	65.27	-	56.99	76.01	73.12	64.25	-
19	58.17	78.41	76.58	66.23	-	57.15	77.72	74.90	63.47	-
20	59.82	81.50	79.23	67.79	-	58.02	80.05	76.63	65.75	-
21	58.34	77.37	75.44	65.37	-	56.91	76.38	74.49	65.03	-
22	58.50	77.96	76.19	65.95	-	57.14	76.98	74.72	63.94	-
23	58.38	76.41	74.31	64.53	-	56.89	75.17	72.97	64.48	-
24	60.27	82.59	80.23	68.38	-	58.22	81.18	77.75	65.36	-
25	58.37	77.47	75.57	65.47	-	56.82	76.23	73.61	64.99	-
26	58.45	77.29	75.30	65.24	-	56.96	76.15	74.06	65.48	-
27	58.47	79.42	77.37	66.72	-	57.40	78.55	75.67	63.90	-
28	57.96	76.51	74.73	64.98	-	56.52	76.64	74.90	65.42	-
29	59.05	77.73	75.35	65.14	-	57.05	76.36	73.67	63.23	-
30	58.67	79.23	77.24	66.65	-	57.28	78.02	75.75	65.85	-

Table D-10 *Continued*

August 22nd										
	Ellis					Johnson and Parker				
RUN	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**
BL	51.45	70.69	66.87	54.69	-	57.05	71.88	69.31	64.14	-
1	51.39	69.82	66.69	55.00	-	56.80	70.72	67.84	63.06	-
2	51.31	69.25	65.76	54.31	-	56.70	70.47	67.58	62.71	-
3	51.17	68.83	65.67	54.71	-	56.65	70.28	67.11	62.42	-
4	51.30	70.10	66.76	54.37	-	56.74	70.37	67.32	62.26	-
5	51.28	70.30	66.82	55.63	-	56.49	69.92	66.86	62.26	-
6	51.25	68.08	64.89	54.37	-	56.69	70.21	67.12	62.09	-
7	51.26	68.49	65.31	55.22	-	56.60	69.98	66.87	62.24	-
8	51.06	67.38	64.06	53.95	-	56.54	69.60	66.54	61.82	-
9	51.13	68.56	65.37	54.93	-	56.47	69.48	66.51	61.54	-
10	51.08	68.61	65.47	54.33	-	56.42	69.29	66.14	61.33	-
11	51.23	69.34	66.25	54.89	-	56.65	70.51	67.36	62.51	-
12	51.24	69.62	65.98	54.04	-	56.70	70.50	67.34	62.52	-
13	51.11	68.16	64.78	54.19	-	56.79	70.52	67.58	62.57	-
14	51.26	69.34	65.99	55.45	-	56.90	70.99	68.13	63.24	-
15	51.21	69.71	66.45	55.35	-	56.67	70.12	66.96	62.33	-
16	51.16	69.62	66.22	54.42	-	56.56	70.06	66.90	62.09	-
17	51.24	68.52	65.19	54.64	-	56.73	70.47	67.28	62.64	-
18	51.14	68.10	65.08	54.81	-	56.68	69.77	66.55	61.93	-
19	51.19	67.39	64.13	54.05	-	56.61	70.32	67.12	62.37	-
20	51.26	69.68	66.43	55.21	-	56.74	70.69	67.91	63.04	-
21	51.16	69.81	66.41	54.76	-	56.58	70.36	67.16	62.39	-
22	51.14	68.55	65.10	54.19	-	56.54	70.14	67.07	62.16	-
23	51.17	68.83	65.86	55.24	-	56.64	70.47	67.52	62.68	-
24	51.43	69.58	66.22	55.76	-	56.78	70.24	67.41	62.71	-
25	51.22	69.58	66.30	54.72	-	56.60	69.95	66.75	62.02	-
26	51.30	69.67	66.37	54.53	-	56.74	70.88	67.75	62.91	-
27	51.22	67.66	64.60	54.32	-	56.63	69.86	66.64	61.87	-
28	51.30	70.34	66.86	55.21	-	56.66	70.42	67.19	62.41	-
29	51.23	67.99	64.54	54.06	-	56.60	70.01	66.81	61.85	-
30	51.30	69.71	66.53	55.79	-	56.59	69.65	67.01	62.15	-

Table D-10 *Continued*

August 22nd					
	Kaufman and Rockwall				
RUN	**12mn-6am**	**6am-12n**	**12n-3pm**	**3pm-7pm**	**7pm-12mn**
BL	54.23	63.67	62.58	58.72	-
1	53.50	63.02	62.26	58.72	-
2	53.63	63.02	62.26	58.72	-
3	53.50	63.02	62.26	58.72	-
4	53.62	63.02	62.26	58.72	-
5	53.70	63.02	62.26	58.72	-
6	53.50	63.02	62.26	58.72	-
7	53.50	63.02	62.26	58.72	-
8	54.03	63.02	62.26	58.74	-
9	53.73	63.02	62.26	58.72	-
10	53.53	63.02	62.26	58.72	-
11	53.79	63.02	62.26	58.72	-
12	53.89	63.10	62.26	58.72	-
13	53.99	63.13	62.26	58.72	-
14	53.68	63.02	62.26	58.72	-
15	53.76	63.02	62.26	58.72	-
16	53.50	63.02	62.26	58.72	-
17	53.83	63.02	62.26	58.72	-
18	53.88	63.02	62.26	58.72	-
19	54.01	63.04	62.26	58.72	-
20	53.56	63.02	62.26	58.72	-
21	54.09	63.02	62.26	58.72	-
22	53.50	63.02	62.26	58.72	-
23	53.50	63.02	62.26	58.72	-
24	53.87	63.05	62.26	58.72	-
25	53.91	63.02	62.26	58.72	-
26	53.51	63.02	62.26	58.72	-
27	54.05	63.02	62.26	58.72	-
28	53.50	63.02	62.26	58.72	-
29	53.50	63.02	62.26	58.72	-
30	53.74	63.02	62.26	58.72	-

APPENDIX E

SUMMARY OF SIGNIFICANT VARIABLES FROM STEPWISE REGRESSION AND METAMODELS FOR AUGUST 15 - 22

Table E-1 Summary of significant variables from stepwise regression for August 15

August 15							
	Collins	**Dallas**	**Denton**	**Ellis**	**Johnson and Parker**	**Kaufman and Rockwall**	**Tarrant**
12mn to 6am	No model	No model	No model	No model	No model	No model	No model
6 am to 12 n	O_3Co12-6a O_3KR12-6a P4Ta12-6aV	O_3Da12-6a O_3Ta12-6a	O_3Co12-6a O_3Da12-6a O_3De12-6a O_3Ta12-6a	O_3El12-6a	O_3JP12-6a	No model	O_3Da12-6a O_3De12-6a O_3Ta12-6a
12 n to 3 pm	O_3Co6-12n O_3Co12-6a O_3Ta6-12n O_3Da6-12n	O_3Co6-12n O_3Da6-12n O_3Da12-6a P7E16-12nV O_3Ta6-12n O_3Ta12-6a	O_3Co6-12n O_3Da6-12n O_3Da12-6a O_3De6-12n O_3De12-6a	O_3El6-12n P3Ta6-12nN P1De6-12nN	O_3Co6-12n O_3El6-12n O_3JP6-12n O_3JP12-6a LKa6-3pV	No model	O_3Da6-12n O_3Da12-6a O_3De12-6a LTa6-3pV O_3Ta6-12n
3 pm to 7 pm	P2Jo6-12nN P4Da12-7pN P6Da6-12nN	O_3Co6-12n O_3Co12-3p P5Ka12-7pN	O_3Da12-3p O_3De6-12n O_3De12-3p O_3Da12-6a O_3Da12-6a	P2Jo12-7pV	O_3El6-12n O_3El12-3p O_3JP12-3p	O_3KR12-3p	O_3El12-3p P7El12-7pN O_3Ta12-3p
7 pm to 12 mn	No model	O_3Co3-7p	O_3Co3-7p O_3Da3-7p	P1De12-6aV	O_3El6-12m O_3El12-3p O_3Ta3-7p	O_3KR6-12n	P7El7-12mN P5Ka12-7pN

Table E-2 Summary of significant variables from stepwise regression for August 16

August 16							
	Collins	**Dallas**	**Denton**	**Ellis**	**Johnson and Parker**	**Kaufman and Rockwall**	**Tarrant**
12mn to 6am	PrevdayO3Da7-12m	No model	P3Ka12-6aV	No model	P3Da12-6aN	No model	PrevdayO_3De7-12m
6 am to 12 n	O_3Da12-6a P4Ta6-12nN O_3Co12-6a O_3De12-6a P4Da12-6aV P5Ka6-12nN	O_3Da12-6a P4Ta6-12nN	O_3Da12-6a O_3Co12-6a	O_3Da12-6a P4Ta6-12nN	O_3El12-6a O_3JP12-6a	O_3KR12-6a	O_3Da12-6a LJo6-9aN P2Jo12-6aN P7El6-12nN
12 n to 3 pm	O_3Da6-12n O_3Co6-12n O_3Da12-6a O_3El6-12n O_3De12-6a LEl9-3pN	O_3Da6-12n O_3Co6-12n O_3Da12-6a P3El12-6aN	ADe9-3pVOC	O_3El12-6a P3Ta6-12nN	O_3JP12-6n O_3JP12-6a	O_3KR6-12n P1De12-6aV ADa9-3pN	O_3Da12-6a O_3De12-6a O_3El6-12n O_3Ta6-12n
3 pm to 7 pm	O_3Da6-12n O_3Co6-12n O_3Da12-3p O_3Da12-6a O_3De12-3p P5Ka6-12nN O_3Ta6-12n	O_3Da6-12n O_3Da12-3p O_3Da12-6a O_3El6-12n P7El12-7pV	O_3Da6-12n O_3Da12-3p O_3De12-3p O_3Ta6-12n O_3Da12-6a O_3El6-12n P5Jo12-7pV	O_3El12-6a P6Ta12-6aN	O_3JP12-3p	P3De6-12nVOC P5Co12-7pN	O_3Da12-3p O_3El6-12n O_3Ta12-3p
7 pm to 12 mn	No model	P2Jo12-6aN	No model	No model	O_3JP3-7p O_3JP6-12n O_3JP12-3p LCo6-9aV	No model	O_3El3-7p P7El7-12mN

Table E-3 Summary of significant variables from stepwise regression for August 17

August 17							
	Collins	**Dallas**	**Denton**	**Ellis**	**Johnson and Parker**	**Kaufman and Rockwall**	**Tarrant**
12mn to 6am	PrevdayO_3Da7-12m PrevdayO_3De7-12m	P4Ka12-6aN	No model	P3El12-6aN	P2Jo12-6aN	P3Ka12-6aN	No Model
6 am to 12 n	O_3Da12-6a O_3KR12-6a	AEl6-9aV O_3Da12-6a O_3KR12-6a	AEl6-9aV O_3Da12-6a	O_3KR12-6a P1De12-6aV P7El12-6aV	No model	O_3KR12-6a AJo6-9aN P4Da6-12nV P5Ka6-12nN	O_3Da12-6a P4Da6-12nV
12 n to 3 pm	O_3Co6-12n O_3Da6-12n LEl9-3pN O_3Ta6-12n	O_3Co6-12n O_3Da6-12n O_3Ta6-12n P4Ta12-6aN	O_3De6-12n O_3Ta6-12n	O_3El6-12n P3El6-12nV	O_3JP6-12n LJo9-3pN	O_3KR6-12n O_3KR12-6a	O_3Co6-12n O_3Da6-12n O_3Ta6-12n O_3De12-6a
3 pm to 7 pm	O_3Da12-3o O_3Ta6-12n O_3Ta12-3p	O_3Da12-3p O_3De6-12n O_3De12-3p O_3Co12-3p O_3Co6-12n	O_3Da12-3p O_3De12-3p O_3Ta6-12n O_3Co12-3p	O_3El12-3p P1Pa6-12nV ACo9-3pN	O_3JP6-12n O_3JP12-3p	Aka9-3pN	O_3Co6-12n O_3Da6-12n O_3De12-3p O_3Co12-3p P1Pa12-7pN
7 pm to 12 mn	No models	AEl3-7pV O_3KR3-7p	O_3De6-12n O_3Ta12-3p AJo3-7pV O_3Da12-3p O_3El6-12n P3Da12-7pN P5Jo12-7pV	P5El6-12nV	LTa9-3pN	P5El12-7pN	AKa9-3pV O_3El3-7p LKa6-9aV

Table E-4 Summary of significant variables from stepwise regression for August 18

August 18							
	Collins	**Dallas**	**Denton**	**Ellis**	**Johnson and Parker**	**Kaufman and Rockwall**	**Tarrant**
12mn to 6am	P7El12-6aN P4Da12-6aN	Prevday$O_3$7-12m	No model	P3Ta12-6aN	PrevdayO_3JP7-12m	PrevdayO_3De7-12m	No model
6 am to 12 n	O_3De12-6a LJo6-9aN O_3Ta12-6a	O_3Da12-6a	O_3De12-6a	P3De6-12nN Ade6-9aN LRo6-9aN	P1Pa6-12nN	O_3Co12-6a O_3KR12-6a	No model
12 n to 3 pm	O_3Co6-12n O_3De12-6a O_3Ta6-12n O_3Ta12-6a O_3Da6-12n	O_3Da6-12n O_3Da12-6a O_3KR6-12n O_3Ta6-12n	APa6-9aV O_3Co6-12n O_3-De6-12n O_3Ta6-12n	O_3El6-12n P3De6-12nN P7El6-12nN	O_3Ta6-12n O_3Ta12-6a	O_3Da12-6a O_3KR6-12n O_3KR12-6a LEl9-3pN	O_3De6-12n O_3Ta6-12n O_3Ta12-6a
3 pm to 7 pm	O_3Co6-12n O_3Co12-3p O_3De6-12n O_3Ta6-12n O_3Ta12-3p	O_3Da6-12n O_3Da12-6a O_3KR12-3p O_3KR12-6a LEl9-3pN	O_3Co12-3p O_3De12-3p O_3Ta12-3p O_3Da12-3p LJo9-3pN	O_3El6-12n LDa9-3pN	O_3JP12-3p	O_3Da6-12n O_3KR12-3p O_3KR12-6a LEl9-3pN P5Da12-7pN	O_3El6-12n O_3JP12-3p P4Ta6-12nN O_3Ta6-12n O_3Ta12-3p O_3Da12-3p
7 pm to 12 mn	ADa9-3pN ACo9-3pN P3De12-6aV P6Ta12-7pN	O_3Co12-6a O_3El13-7p	O_3Ta3-7p O_3KR3-7p P7El7-12mN	No model	O_3JP3-7p	No model	O_3Co3-7p O_3JP12-3p O_3Ta3-7p O_3Ta6-12n O_3Ta12-3p

Table E-5 Summary of significant variables from stepwise regression for August 19

August 19							
	Collins	**Dallas**	**Denton**	**Ellis**	**Johnson and Parker**	**Kaufman and Rockwall**	**Tarrant**
12mn to 6am	PrevdayO_3De7-12m PrevdayO_3JP7-12m PrevdayO_3Ta7-12m	No model	PrevdayO_3De7-12m PrevdayO_3El7-12m PrevdayO_3JP7-12m PrevdayO_3Ta7-12m	PrevdayO_3De7-12m P_3De12-6aV	PrevdayO_3JP7-12m PrevdayO3Ta7-12m	No model	PrevdayO_3De7-12m PrevdayO_3JP7-12m PrevdayO_3Ta7-12m
6 am to 12 n	O_3Co12-6a O_3De12-6a O_3JP12-6a	O_3Da6-12a	O_3De12-6a O_3JP12-6a LKa6-9aN	No model	O_3Co12-6a O_3De12-6a AJo6-9aN	O_3Da12-6a O_3KR12-6a	O_3Da12-6a O_3JP12-6a
12 n to 3 pm	O_3Co6-12n O_3Co12-6a O_3De6-12n O_3De12-6a LCo6-9aN	O_3Da6-12n O_3Ta6-12n	O_3Co12-6a O_3De6-12n P4Ta6-12nN P5Co6-12nV	O_3El6-12n	O_3JP6-12n O_3JP12-6a O_3Da6-12n O_3KR6-12n	O_3KR6-12n	O_3Co6-12n O_3Da6-12n O_3Ta6-12n
3 pm to 7 pm	O_3JP12-6a P_3Ta12-6aN P_4Ka12-6aN	O_3Da12-3p O_3El6-12n O_3Ta6-12n	No model	O_3Da12-3p O_3El12-3p O_3Ta6-12n O_3KR12-6a	O_3De12-6a O_3JP6-12n O_3JP12-3p LEl6-9aN	O_3Co6-12n O_3Co12-3p O_3JP12-3p O_3JP12-6a	O_3Da6-12n O_3Da12-3p O_3Ta12-3p
7 pm to 12 mn	No model	No model	No model	O_3KR12-3p O_3Da3-7p	O_3Da6-12n O_3Ta12-3p O_3Da3-7p O_3De6-12n O_3KR12-6a	O_3Co6-12n O_3KR3-7p O_3Ta12-6a	No model

Table E-6 Summary of significant variables from stepwise regression for August 20

August 20							
	Collins	**Dallas**	**Denton**	**Ellis**	**Johnson and Parker**	**Kaufman and Rockwall**	**Tarrant**
12mn to 6am	Prevday12-6aN	P4Ka12-6aN	P3De12-6aN	PrevdayO_3El7-12	P3Da12-6aN PrevdayO_3JO7-12m	No model	No model
6 am to 12 n	P3Ka12-6aN P6Da12-6aN	O_3Da12-6a O_3El12-6a O_3Ta12-6a AEl6-9aN	LDe6-9aV P1De6-12nN P3De12-6aN	O_3El12-6a O_3Ta12-6a AEl6-9aN	O_3JP12-6a P3Ka6-12nN O_3Da12-6a	O_3KR12-6a P5Da6-12nV	O_3El12-6a AEl6-9aN
12 n to 3 pm	O_3El6-12n O_3Co6-12n O_3JP6-12n	O_3Da6-12n O_3Da12-6a O_3Ta6-12n O_3De12-6a	O_3De6-12n	O_3Da6-12n O_3El6-12n O_3Ta12-6a P3Ka12-6aN	O_3JP12-6a O_3JP6-12n	O_3KR6-12n	O_3Da6-12n O_3El6-12n O_3Ta6-12n O_3De12-6a LCo6-9aN LJo6-9aN P5Pa6-12nV
3 pm to 7 pm	No model	No model	No model	O_3Da6-12n O_3El6-12n	O_3JP12-3p	AJo3-7pN	No model
7 pm to 12 mn	No model	O_3Da3-7p	No model	O_3Da3-7p	O_3Da3-7p P6Ta12-6aN P7El7-12mN	No model	O_3Ta3-7p

Table E-7 Summary of significant variables from stepwise regression for August 21

August 21							
	Collins	**Dallas**	**Denton**	**Ellis**	**Johnson and Parker**	**Kaufman and Rockwall**	**Tarrant**
12mn to 6am	No model	No model	P4Ka12-6aN	PrevdayO_3El7-12m	No model	No model	P4Ka12-6aN PrevdayO_3Ta7-12m
6 am to 12 n	O_3De12-6a O_3KR12-6a P3Da6-12nN P7El6-12nV O_3Ta12-6a	O_3Co12-6a O_3Da12-6a O_3De12-6a O_3Ta12-6a	O_3Da12-6a O_3De12-6a P4Da12-6aV O_3Ta12-6a	O_3El12-6a	O_3JP12-6a P4Ta6-12nV	No model	O_3Da12-6a O_3De12-6a P7El6-12nV P4Ka12-6aV
12 n to 3 pm	O_3Co6-12n O_3Da6-12n O_3KR12-6a	O_3Co6-12n O_3Da6-12n O_3De6-12n O_3De12-6a O_3Ta6-12n LRo6-3pN	O_3Da6-12n O_3De12-6a O_3Ta6-12n O_3Co6-12n O_3Da12-6a	AJo9-3pN P3Ka6-12nN O_3El6-12n O_3KR6-12n	O_3JP6-12n	P3Ta6-12nV P1Pa12-6aN	O_3Co12-6a O_3Da6-12n O_3De12-6a O_3Ta6-12n O_3Ta12-6a O_3Co6-12n O_3Da12-6a
3 pm to 7 pm	P5Da12-7pN	O_3Co6-12n O_3Co12-3p	O_3Co6-12n O_3Co12-3p O_3Da6-12n O_3De12-6a P5Da12-7pN O_3Ta12-3p	P6Da6-12nV	O_3JP12-3p O_3El12-6a O_3JP6-12n	O_3KR12-3p P2Jo6-12nN	No model
7 pm to 12 mn	No model	O_3Da3-7p O_3El12-3p O_3Ta3-7p	O_3Co3-7p O_3De3-7p P5Ka12S-7pN	O_3El3-7p	O_3El12-6a O_3JP3-7p P3El6-12nV	No model	O_3Da3-7p O_3Ta3-7p

Table E-8 Summary of significant variables from stepwise regression for August 22

August 22							
	Collins	**Dallas**	**Denton**	**Ellis**	**Johnson and Parker**	**Kaufman and Rockwall**	**Tarrant**
12mn to 6am	No model	No model	PrevdayO3El7-12m	No model	No model	No model	PrevdayO_3Ta7-12m
6 am to 12 n	O_3Co12-6a O_3Da12-6a O_3De12-6a	O_3Co12-6a O_3Da12-6a	O_3Co12-6a O_3De12-6a O_3Ta12-6a	O_3KR12-6a	O_3JP12-6a	No model	O_3Da12-6a O_3De12-6a O_3Ta12-6a
12 n to 3 pm	O_3Co6-12n O_3Co12-6a O_3De12-6a O_3KR12-6a	O_3Da6-12n O_3De6-12n O_3El6-12n O_3Ta12-6a O_3De12-6a	O_3Co6-12n O_3De6-12n O_3De12-6a	O_3El6-12p O_3KR12-6a P5Ka6-12nN O_3KR6-12n	O_3JP6-12n	No model	O_3Da6-12n O_3Ta6-12n O_3Co12-6a
3 pm to 7 pm	O_3Ta6-12n O_3Ta12-3p Ade9-3pN O_3KR6-12n O_3Ta12-6a	O_3Co6-12n O_3Co12-3p O_3Da6-12n O_3Ta12-3p	ADa9-3pV O_3Co6-12n O_3Co12-3p O_3De12-3p P7El6-12nV O_3Ta12-6a	O_3El12-3p P_5De12-7pN	O_3JP12-3p	O_3KR12-3p	O_3El12-3p O_3Ta12-3p
7 pm to 12 mn	No model	No model	No model	No model	No model	No model	No models

Metamodels

Collin
August 15
Ls = 68.09

12 midnight – 6 am
-0.008×(P2Jo12-6aN) + 0.162×(P3Da12-6aN) + 0.015×(P3De12-6aN) – 0.0013×(P4Da12-6aV) + 0.102×(P6Da12-6aN) + 51.75 ≤ 68.09

6 am – 12 noon
0.877×(Co12-6a) + 0.296×(KR12-6a) + 0.091×(P4Ta12-6aV) + 7.56 ≤ 68.09

12 noon – 3 pm
-0.197×(P2Jo6-12n) – 0.706×(Co12-6a) + 0.005×(Ta6-12n) – 0.007×(Da6-12n) + 26.13 ≤68.09

3 pm – 7 pm
-0.197×(P2Jo6-12nN) + 0.407×(P4Da12-7pN) – 0.187×(P6Da6-12nN) + 53.73 ≤ 68.09

7 pm – 12 midnight
0.008×(Da3-7p)+0.0021×(Lro3013mnN) - 0.014×(P1Pa6-12nV) + 0.002×(P3Da7-12mV) – 0.0004×(P3El6-12nV) – 0.006×(P3El12-7pV) – 0.005×(P4Ka12-7pN) + 0.002×(P5Ta6-12nV) – 0.004×(AEl6-9aN) – 0.003×(LJo6-3pN) – 0.01×(P6Da6-12nV) + 41.74 ≤ 68.09

Dallas
August 15
Ls = 74.09

12 midnight – 6 am
0.532×(P3Ka12-6aN) – 0.422×(P3Ka12-6aV) – 0.242×(P4Da12-6aV) – 0.102×(P4Ta12-6aV) + 0.433×(PrevdayKR7-12mn) + 0.083×(P4Da12-6aV) – 0.460×(P6Ta12-6aN) + 32.86 ≤ 74.09

6 am – 12 noon
1.90×(Da12-6a) – 0.539×(Ta12-6a) – 0.553 ≤ 74.09

12 noon – 3 pm
0.557×(Co6-12n) + 0.834×(Da6-12n) – 0.947×(Da12-6a) – 0.167×(P7El6-12nV) + 0.431×(Ta6-12n) – 0.433×(Ta12-6a) + 9.79 ≤ 74.09

3 pm – 7 pm
-1.272×(Co6-12n) + 2.462×(Co12-3p) + 0.326×(P5Ka12-7pN) – 12.40 ≤ 74.09

7 pm – 12 midnight
1.369×(Co3-7p) – 22.63 ≤ 74.09

Denton
August 15
Ls = 84.19

12 midnight – 6 am
-0.464×(P4Ka12-6aN) – 0.118×(P4Ta12-6aN) – 0.091×(P6Da12-6aN) + 0.178×(PrevdayTa7-12mn) +46.21 ≤ 84.91

6 am – 12 noon
0.505×(Co12-6a) + 0.849×(Da12-6a) – 1.018×(De12-6a) + 2.579×(Ta12-6a) + 78.66 ≤ 84.91

12 noon – 3 pm
-0.221×(Co6-12n) + 0.702×(Da6-12n) – 1.017×(Da12-6a) + 1.094×(De6-12n) – 0.782×(De12-6a) + 50.25 ≤ 84.91

3 pm – 7 pm
0.253×(Da12-3p) – 0.534×(De6-12n) +0.869×(De12-3p) – 0.143×(Da12-6a) + 0.389×(De12-6a) ≤ 84.91

7 pm – 12 midnight
1.279×(Co3-7p) + 0.272×(Da3-7p) – 42.44 ≤ 84.91

Ellis
August 15
Ls = 71.10

12 midnight – 6 am
-0.217×(P3Da12-6aN) + 0.171×(P3Ta12-6aV) – 0.162×(P4Da12-6aN) + 0.197×(P7El12-6aV) – 0.302×(P7El12-6aN) + 49.86 ≤ 71.10

6 am – 12 noon
2.678×(El12-6a) – 63.98 ≤ 71.10

12 noon – 3 pm
0.673×(El6-12n) – 0.427×(P3Ta6-12nN) – 0.497×(P1De6-12nN) + 20.22 ≤ 71.10

3 pm – 7 pm
0.152×(P2Jo12-7pV) + 55.44 ≤ 71.10

7 pm – 12 midnight
-0.089×(P1De12-6aV) + 46.41 ≤ 71.10

J&P
August 15
Ls = 71.07

12 midnight – 6 am
0.379×(P3El12-6aN) + 0.45×(P3El12-6aV) + 0.753×(P6Ta12-6aN) + 0.111×(Prev.dayDa7-12mn) + 48.33 ≤ 71.07

6 am – 12 noon
1.694×(JP12-6a) – 16.12 ≤ 71.07

12 noon – 3 pm
0.191×(Co6-12n) + 0.172×(El6-12n) + 0.925×(JP6-12n) – 0.208×(JP12-6a) + 0.159×(LKa6-3pV) – 8.44 ≤ 71.07

3 pm – 7 pm
0.164×(El6-12n) + 0.487×(El12-3p) + 0.445×(JP12-3p) – 8.68 ≤ 71.07

7 pm – 12 midnight
-0.089×(P1De12-6aV) + 46.41 ≤ 71.07

K&R
August 15
Ls = 66.54

12 midnight – 6 am
0.060×(P4Da12-6aV) – 0.073×(P2Jo12-6aV) + 0.131×(P6Da12-6aN) + 46.40 ≤ 66.54

6 am – 12 noon
0.007×(Ade6-9aN) – 0.006×(P1De6-12nN) + 0.0004×(P2Jo12-6aV) – 0.007×(P3De12-6aV) – 0.001×(P3el12-6aN) – 0.00006×(P4Da12-6aN) + 0.0018×(P4Ta12-6aN) + 0.003×(P5Ta6-12nV) + 0.003×(P6Da12-6aN) + 0.018×(P6Da12-6aV) + 0.009×(P6Ta12-6aN) + 62.52 ≤ 66.54

12 noon – 3 pm
-0.017×(Lda6-3pN) – 0.178×(lDa6-3pV) + 0.01×(P1De6-12nN) + 0.015×(P2Jo12-6aV) – 0.02×(P3Ta12-6aN) – 0.016×(P5Co6-12nV) – 0.008×(Lro6-3pV) + 0.015×(LTa6-3pV) – 0.013×(P4Da6-12nN) – 0.007×(P4Da12-6aN) + 62.22 ≤ 66.54

3 pm – 7 pm
0.635×(KR12-3p) + 18.62 ≤ 66.54

7 pm – 12 midnight
1.146×(KR6-12n) – 24.28 ≤ 66.54

Tarrant
August 15
Ls = 76.22

12 midnight – 6 am
0.19×(P3De12-6aV) + 0.455×(P3Ka12-6aN) – 0.16×(P6Da12-6aN) + 0.033×(P6Da12-6aV) + 0.127×(PrevdayTa7-12m) + 50.15 ≤ 76.22

6 am – 12 noon
0.892×(Da12-6a) – 1.84×(De12-6a) + 3.691×(Ta12-6a) – 72.38 ≤ 76.22

12 noon – 3 pm
0.493×(Da6-12n) – 0.717×(Da12-6a) – 0.610×(De12-6a) – 0.180×(LTa6-3pV) + 1.035×(Ta6-12n) +29.11 ≤ 76.22

3 pm – 7 pm
0.554×(El12-3p) + 0.533×(P7El12-7pN) + 0.188×(Ta12-3p) +11.38 ≤ 76.22

7 pm – 12 midnight
-0.64×(P7El7-12mN) – 0.493×(P5Ka12-7pN) + 51.09 ≤ 76.22

Collin
Aug 16
Ls = 89.61

12-6a
- 0.503(P3KA12-6aV) + 0.377(PrevdayO3Da7-12m) + 42.634 ≤ 89.61

6-12n
1.305 (O3Da12-6a) – 0.358(P4Ta6-12m) + 3.623(O3Co12-6a) – 1.353 (O3De12-6a) – 0.296 (P4Da12-6aV) + 0.383 (P5Ka6-12nN) – 124.116 ≤ 89.61

12-3p
0.251 (O3Da6-12n) + 0.705 (O3Co6-12n) – 0.161(O3Da12-6n) – 0.057 (O3El6012n) – 0.580 (O3De12-6a) + 0.072 (LEl9-3pN) + 48.97 ≤ 89.61

3-7p
- 0.429 (O3Da6-12n) + 0.139 (O3Co6-12n) + 0.399 (O3Da12-3p) + 0.129 (O3Da12-6a) + 0.274 (O3De12-3p) + 0.132 (P5Ka6-12nN) – 0.060 (O3Ta 6-12n) + 29.02 ≤ 89.61

7-12m
0.01 (LJo6-9aV) – 0.0164 (P5Co12-7pN) – 0.0136 (ACo9-3pN) + 0.005 (P5Da6-12nN) + 38.76 ≤ 89.61

Dallas
Aug 16
Ls = 89.77

12-6a
- 0.19 (P2Jo12-6aV) – 0.422 (P4Da12-6aN) + 0.316 (P4Da12-6aV) + 0.039 (P4Ta12-6aV) + 61.11 ≤ 89.77

6-12m
2.788 (O3Da12-6a) – 1.861 (P4Ta6-12nN) – 81.497 ≤ 89.77

12-3p
1.397 (O3Da6-12n) + 0.693 (O3Co6-12n) – 0.271 (O3Da12-6aP + 0.163(P3El12-6aN) + 41.470 ≤ 89.77

3-7p93.60
-0.534(O3Da6-12n) + 0.983 (O3Da12-3p) – 0.322 (O3Da12-6a) + 0.098 (O3El6-12n) – 0.215(P7El12-7pV) + 41.374 ≤ 89.77

7-12m
- 0.070 (P2Jo12-6aN) + 46.140 ≤ 89.77

Denton
Aug 16
Ls = 93.60

12-6a
- 0.382 (P3Ka12-67aV) + 61.99 ≤ 93.60
6-12n
1.368 (O3Da12-6a) + 1.18(O3Co12-6a) – 58.45 ≤ 93.60

12-3p
0.532(O3Da6-12n) – 0.272(O3Da12-6a) + 0.137 (O3Ta6-12n) + 50.03 ≤ 93.60

3-7p
-0.422 (O3Da6-12n) + 0.477 (O3Da12-3p) + 0.40 (O3De12-3p) + 0.185 (O3Ta6-12n) + 0.208 (O3Da12-6a) – 0.033 (O3El6-12n) – 0.058 (P5Jo 12-7pV) + 7.987 ≤ 93.60

7-12m
- 0.086 (O3KR3-7p) + 0.020 (LKa9-3pN) – 0.015 (P1De12-6aN) – 0.021 (P4Da6-12nN) + 0.035 (Aka9-3pN) + 0.013 (ARo3-7pV) + 0.053 (LDe9-3pV) + 0.020 (LTa6-9aV) + 43.89 ≤ 93.60

Ellis
Aug 16
Ls = 78.19

12-6a
0.115 (P1De12-6aN) + 0.105 (P2Jo12-6aN) – 0.022 (P3El12-6aN) – 0.07 (P3El12-6aV) – 0.161 (P4Ta12-6aN) + 54.18 ≤ 78.19

6-12n
1.42 (O3Da12-6a) – 1.621 (P4Ta6-12nN) – 9.672 ≤ 78.19

12-3p
2.229 (O3El12-6a) – 0.890 (P3Ta6-12nN) – 47.596 ≤ 78.19

3-7p
1.351 (O3El12-6a) + 0.248 (P6Ta12-6aN) – 11.904 ≤ 78.19

7-12m
39.42 + 0.016(APa9-3pN) + 0.014 (LRo3-7pN) – 0.005 (LRo9-3pN) – 0.019 (P3Da12-7pN) + 0.003 (P3De12-7pV) ≤ 78.19

J&P
Aug 16
Ls = 76.06

12-6 a
- 0.310 (P3Da12-6aN) + 50.353 ≤ 76.06

6-12n
1.441 (O3El12-6a) + 1.167(O3JP12-6a) – 68.654 ≤ 76.06

12-3p
0.979 (O3JP6-12n) – 0.252 (O3JP 12-6a) + 13.874 ≤ 76.06

3-7 p
0.646 (O3JP12-3p) + 21.196 ≤ 76.06

7-12m
0.275 (O3JP3-7p) – 0.801 (O3JP6-12n) + 1.034 (O3JP12-3p) – 0.080 (LCo6-9aV) + 21.613 ≤ 76.06

K&R
Aug 16
Ls = 75.93

12-6a
0.044(P4Da12-6aV) – 0.043 (Prevday O3JP7-12m) – 0.107(P4Ta12-aV) + 55.53 ≤ 75.93

6-12n
1.522(O3Ka12-6a) – 14.440 ≤ 75.93

12-3p
0.60 (O3KR6-12n) – 0.047 (P1De12-6aV) – 0.036 (ADa9-3pN) + 24.387 ≤ 75.93

3-7p
0.014 (P3De6-12nV) – 0.014 (P5Co12-7pN) + 54.656 ≤ 75.93

7-12 m
No significant variables from data mining

Tarrant
Aug 16
Ls = 87.01

12-6a
0.538 (PrevdayO3De7-12m) + 34.264 ≤ 87.01

6-12n
1.223 (O3Da12-6a) – 0.952 (LJo6-9aN) – 1.190 (P2Jo12-6aN) + 1.806 (P7El6-12nN) + 17.818 ≤ 87.01

12-3p
0.119 (O3Da12-6a) – 0.284 (O3De12-6a) + 0.227 (O3El6-12n) + 0.756 (O3Ta6-12n) + 11.909 ≤ 87.01

3-7p
-0.235 (O3Da12-3p) + 0.408(O3El6-12n) + 0.265 (O3Ta12-3p) + 34.679 ≤ 87.01

7-12m
0.479 (O3El3-7p) – 0.228 (P7El7-12mN) + 18.64 ≤ 87.01

Collin
Aug 17
Ls = 85.93

6-12 n
2.105(O3 Da 12-6 a) + 2.698(O3KR 12-6 a) – 186.717 ≤ 85.93

12-3 p
0.8(O3Co 6-12 n) + 0.129(O3 Da 6-12 n) + 0.121(LE19-3 pN) -0.0552(O3Ta 6-12 n) + 9.335 ≤ 85.93

3-7 P
0.35(O3 Da 12-3 p) – 0.606(O3 Ta 6-12 n) + 0.485(O3 Ta 12-3 p) + 51.371 ≤ 85.93

7-12 mid
0.068(LKa 9-3 PN) – 0.006(P1De 12-6 a N) – 0.066(P2Jo 12-6 a V) – 0.016(P2Jo 12-7 pN) – 0.003(P3De 12-6 a V) + 0.047(ADa 6-9 a V) + 0.024(LKa 3-7 p N) + 0.008(P3Ka 6-12 n V) + 0.049(Ps – Pa 12-7 pN) + 46.93 ≤ 85.93

Dallas
Aug 17
Ls = 92.67

12-6 a
-0.475(PaKa 12-6 aN) + 57.77 ≤ 92.67

6-12 n
1.350(AE16-9 aV) + 4.20(O3Da 12-6 n) – 0.125(O3Ta 6-12 n) – 0.193(PaTa 12-6 a N) + 10.851 ≤ 92.67

3-7 p
0.43(O3Dda 12-3 p) -0.031(O3De 6-12 n) + 0.028(O3De 12-3 p) + 1.17(O3Co 12-3 p) – 1.258(O3Co 6-12 n) + 44.935 ≤ 92.67

7-12 Mid
0.022(AE 13-7 pV) + 0.488(O3KR3 3-7 p) + 22.346 ≤ 92.67

Denton
Aug 17
Ls = 91.03

12-6 a
0.027(P3Da 12-6 aV) + 0.016(P3De 12-6 av) – 0.011(p3e1 12-6 A N) + 0.024(O3JP 7-12) – 0.029(P7 E1 12-6 a N) + 0.006(O3Ta 7-12 n a) + 53.29 ≤ 91.03

6-12 Noon
-2.884(AE 16-9 a V) + 0.595(O3Da 12-6 a) + 65.33 ≤ 91.03
3-7 p
0.923(O3Da 12-3 p) – 0.042(o3 De 12-3 p) + 0.157(O3 Ta 6-12 n) – 0.258(O3Co 12-3 p) + 12.076 ≤ 91.03

7-12 mid
0.292(O3 De 6-12 n) + 0.159(O3 Ta 12-3 p) – 0.784(A Jo 3-7 p V) + 0.682(O3 Da 12-3 p) + 0.397(O3 E 16-12 n) – 0.190(P3 Da 12-7 p N) + 0.047(Ps-Jo 12-7 p V) – 9.589 ≤ 91.03

Ellis
Aug 17
Ls = 78.01

12-6 a
-0.271(P3 E1 12-6 a N) + 49.901 ≤ 78.01

6-12 n
0.661(O3 KR 12-6 a) + 1.178(P1 De 12-6 a V) + 0.832(P7 E1 12-6 a V) + 35.774 ≤ 78.01

12-3 p
0.986(O3 E1 12-3 p) – 0.285(P1Pa 6-12 n V) – 0.446(A Co 9-3 p N) + 47.191 ≤ 78.01

7-12 mid
0.042(P5-E1 6-12 n V) + 45.889 ≤ 78.01

J & P
Aug 17
Ls = 79.62

12-6 a
-0.655(P2 Jo 12-6 a N) + 55.737 ≤ 79.62

6-12 n
72.12 + 0.282(P1 Pa 6-12 n V) + 0.306(P4 Ta 6-12 n V) + 0.075(A Pa 6-9 a N) – 0.648(P1 De 6-12 n V)

12-3 p
1.099(O3 J P 6-12 n) – 0.111(L Jo 9-3 p N) – 6.815 ≤ 79.62

3-7 p
-1.346(O3 J P 6-12 n) + 2.239(O3 J P 12-3 p) + 3.812 ≤ 79.62

7-12 mid
0.303(L Ta 9-3 p N) + 57.833 ≤ 79.62

K & R
Aug 17
Ls = 82.77

12-6 a
0.318(P3 Ka 12-6 a N) + 60.407 ≤ 82.77

6-12
1.399(O3 KR 12-6 a) + 0.215(A Jo 6-9 a N) + 0.210(Pa Da 6-12 n V) + 0.380(Ps-Ka 6-12 n V) – 8.366 ≤ 82.77

12-3 p
1.044(O3 KR 6-12 n) – 0.653(O3 KR 12-6 a) + 30.088 ≤ 82.77

3-7 p
0.043(A Ka 9-3 p N) + 62.917 ≤ 82.77

7-12 mid
-0.005(Ps E1 12-7 p N) + 53.616 ≤ 82.77

Tarrant
Aug 17
Ls = 88.60

12-6 a
0.075(Pa Da 12-6 a N) – 0.672(Prev day O3 De 7-12) – 0.032(Prev Day O3 J P 7-12) + 82.15 ≤ 88.60

6-12 n
3.245(O3 Da 12-6 a) + 1.156(P4 Da 6-122 n) + 0.977(O3 Ta 6-12 n) – 1.713(O3 De 12-6 a) + 93.3935 ≤ 88.60

3-7 p
-1.418(O3 Co 6-12 n) + 1.169(O3 Da 6-12 n) – 0.072(O3 De 12-3 p) + 0.860(O3 Co 12-3) – 0.520(P1 Pa 12-7 p N) + 31.123 ≤ 88.60

7-12 Mid
-0.109(A Ka 9-3 p V) + 0.336(O3 E1 3-7 p) – 0.083(L Ka 6-9 a V) + 35.432 ≤ 88.60

Collin
Aug 18
Ls=91.45

12 - 6a
-0.267(P7E112-6aN) + 0.241(Prev.dayO3Ta 7-12) + 46.758 ≤ 91.45

6 - 12n
-3.882(O3De 12-6a) + 0.168(LJo6-9aN) + 4(O3Ta12-6a) + 91.146 ≤ 91.45

12 - 3p
1.019 (O3 Co 6-12n) + 0.423(O3De12-6a) + 0.129(O3Ta6-12n) – 0.431(O3Ta12-6a) + 0.024(O3Da6-12n) – 13.950 ≤ 91.45

3 – 7p
-1.459(O3Co6-12n) + 2.047(O3Co12-3p) + 0.365(O3De6-12n) – 1.371(O3Ta6-12n) + 1.133(O3Ta12-3p) + 14.017 ≤ 91.45

7 – 12Mid
0.320(ADa9-3pN) – 0.496(ACo9-3pN) + 0.232(P3De12-6aV) – 0.250(P6Ta12-7pN) + 47.977 ≤ 91.45

Dallas
Aug 18
Ls=92.95

12 – 6a
0.378(PrevdayDe7-12m) + 35.979 ≤ 92.95

6 – 12n
0.565(O3Da12-6a) + 60.268 ≤ 92.95

12 – 3p
0.90(O3Da6-12n) – 0.124(O3Da12-6a) – 0.217(O3KR6-12n) + 0.115(O3Ta6-12n) + 22.743 ≤ 92.95

3 – 7p
0.223(O3Da6-12n) + 0.419(O3Da12-6a) + (O3KR12-3p) – 1.545(O3KR12-6a) – 0.335(LE19-3pN) + 36.151 ≤ 92.95

7 – 12Mid
0.416(O3Co12-6a) + 0.173(O3E13-7p) + 15.119 ≤ 92.95

Denton
Aug 18
Ls = 93.10

12 – 6a
0.262(P3Ka12-6aN) + 0.030(P4Da12-6aV) + 0.124(P4Ta12-6aN) + 0.084(P3Ta12-6aN) – 0.194(P4Da12-6aN) – 0.156(P6Ta12-6aN) – 0.037(Prev.dayO3De7-12m) + 65.24 ≤ 93.10

6 – 12n
-0.80(O3De12-6a) + 2.396(O3Ta12-6a) – 0.104(AJ06-9aN) – 10.69 ≤ 93.10

12 – 3p
-0.019(APa6-9aV) + 0.037(O3Co6-12n) + 0.974(O3De6-12n) + 0.06(O3Ta6-12n) – 6.423 ≤ 93.10

3 – 7p
0.102(O3Co12-3p) + 0.526(O3De12-3p) + 0.226(O3Ta12-3p) + 0.022(O3Da12-3p) + 0.056(LJ09-3pN) + 4.919 ≤ 93.10

7 – 12Mid
0.316(O3Ta3-7p) + 0.089(O3KR3-7p) – 0.273(P7E17-12mN) + 21.994 ≤ 93.10

Ellis
Aug 18
Ls = 69.20

12 – 6a
-0.334(P3Ta12-6aN) + 50.277 ≤ 69.20

6 – 12n
0.931(P3De6-12nN) + 1.188(ADe6-9aN) + 1.031(LR06-9aN) + 66.808 ≤ 69.20

12 – 3p
0.967(O3E16-12N) + 0.098(P3DeO6-12nN) – 0.105(P7E16-12nN) + 0.733 ≤ 69.20

3 – 7p
0.208(O3EL12-3p) – 0.394(LDa9-3pN) + 41.550 ≤ 69.20

7 – 12Mid
-0.098(AC09-3pN) + 0.05(O3E13-7p) – 0.03(P3Da6-12nN) + 0.158(ADa9-3PV) – 0.170(P1De12-6aV) + 33.33 ≤ 69.20

J & P
Aug 18
Ls = 66.75

12 – 6a
0.005(PrevdayO3JP7-12m) + 54.47 ≤ 66.75

6 – 12n
0.035(P1Pa6-12nN) + 65.305 ≤ 66.75

12 – 3p
0.037(O3Ta6-12n) – 0.068(O3Ta12-6a) + 65.736 ≤ 66.75

3 – 7p
1.622(O3JP12-3p) – 43.839 ≤ 66.75

7 – 12Mid
0.939(O3JP3-7p) – 5.812 ≤ 66.75

K & R
Aug 18
Ls = 82.45

12 – 6a
0.123(PrevdayO3De7-12m) + 49.720 ≤ 82.45

6 – 12noon
-1.546(O3C012-6a) + 4.862(O3KR12-6a) – 92.706 ≤ 82.45

12 – 3p
-0.056(O3Da12-6a) + 1.093(O3KR6-12n) – 0.529(O3KR12-6a) + 0.114(LE19-3pN) + 21.129 ≤ 82.45

3 -7p
0.063(O3Da6-12n) + 0.551(O3KR12-3p) – 0.336(O3KR12-6a) + 0.298(LE19-3pN) – 0.207(P5Da12-7pN) + 33.306 ≤ 82.45

7 – 12Mid
0.031(ACo6-9aN) + 0.022(LE16-9LV) – 0.058(P3Ta7-12mV) – 0.028(ACo9-3pN) – 0.021(ADa6-9aV) + 53.77 ≤ 82.45

Tarrant
Aug 18
Ls = 84.18

12 -6a
-0.245(P3Ka12-6aV) + 0.205(P3Ta12-6aN) – 0.343(P4Da12-6aN) – 0.171(P6Ta12-6aN) – 0.164(PrevdayO3Co7-12) – 0.109(PrevdayO3De7-12m) + 0.115(PrevdayO3JP7-12) + 0.284(PrevdayO3Ta7-12m) + 53.53 ≤ 84.18

6 – 12n
0.160(ADe6-9aV) – 1.044(O3E112-6a) – 0.967(O3KR12-6a) + 0.688(P1De12-6aN) – 0.290(P2J012-6aN) -1.281(P2J012-6aV) + 0.868(p5E16-12nN) + 0.644(P4Ta6-12nN) + 190.93 ≤ 84.18

12 – 3p
-0.142(O3De6-12n) + 1.171(O3Ta6-12n) -0.406(O3Ta12-6a) +23.475 ≤ 84.18

3 – 7p
0.036(O3E16-12n) + 0.949(O3JP12-3p) + 0.114(P4Ta6-12nN) – 1.394(O3Ta6-12n) + 2.105(O3Ta12-3p) + 0.063(O3Da12-3p) – 52.992 ≤ 84.18

7 – 12mid
-0.374(O3C03-7p) – 1.323(O3JP12-3p) + 1.653(O3Ta3-7p) + 1.821(O3Ta6-12n) – 2.715(O3Ta12-3p) + 111.846 ≤ 84.18

Collin
Aug 19
Ls = 72.02

12-6a
0.044(PrevdayO3De7-12m) + 0.406 (PrevdayJP7-12m) + 0.089(PrevdayO3Ta7-12m) + 24.41 ≤ 72.02

6-12n
0.360(O3Co12-6a) + 0.240(O3De12-6a) + 0.730(O3JP12-6a) + 0.153 ≤ 72.02

12-3p
0.596(O3Co6-12n) – 0.068(O3Co12-6a) + 0.003(O3De6-12n) + 0.208(O3De12-6a) – 0.005(LCo6-9aN) + 19.229 ≤ 72.02

3-7p
0.17 (O3JP12-6a) + 0.017 (P3Ta12-6aN) + 0.015 (P4Ka12-6aN) + 54.106 ≤ 72.02

7-12m
No significant variables from data mining

Dallas
Aug 19
Ls = 72.02

12-6a
- 0.014(P4Da12-6aN) + 0.171 (P1De12-6aV) + 53.45 ≤ 87.16

6-12n
0.855 (O3Da12-6a) + 45.802 ≤ 87.16

12-3p
0.814 (O3Da6-12n) + 0.15 (O3Ta6-12n) + 1.79 ≤ 87.16

3-7p
0.373 (O3Da12-3p) – 0.054 (O3El6-12n) + 0.087 (O3Ta6-12n) + 41.056 ≤ 87.16

7-12m
- 0.013 (LEl3-7pN) + 0.0287 (AEl3-7pN) – 0.005 (O3JP12-3p) + 0.001(LJo3-7pN) + 57.57 ≤ 87.16

Denton
Aug 19
Ls = 70.10

12-6a
0.166(PrevdayDe7-12m) – 0.047 (PrevdayEl7-12m) + 0.334 (PrevdayJP7-12m) + 0.102(PrevdayTa7-12m) + 24.930 ≤ 70.10

6-12n
0.105(O3De12-6a) + 1.059(O3JP12-6a) – 0.035(LKa6-9aN) + 6.610 ≤ 70.10

12-3p
-0.103(O3Co12-6a) + 0.791(O3De6-12n) – 0.015(P4Ta6-12nN) – 0.016(P5Co6-12nV) + 18.719 ≤ 70.10

3-7p
No significant variables from data mining

7-12p
0.002(AEl6-9aV) + 0.002(O3Ta12-6a) + 53.59 ≤ 70.10

Ellis
Aug 19
Ls = 103.52

12-6a
- 0.214 (P3De12-6aV) + 0.287 (PrevdayO37-12m) + 36.74 ≤ 103.52

6-12n
0.567 (P1De6-12nV) + 1.067 (P1De12-6aV) – 0.124 (P3Da6-12nV) + 0.148 (P3El12-6aN) – 0.894 (P6Da12-6aN) + 91.86 ≤ 103.52

12-3p
1.068(O3El6-12n) – 5.846 ≤ 103.52

3-7p
0.355(O3Da12-3p) + 0.434 (O3El12-3p) + 0.170(O3Ta6-12n) + 0.316 (O3KR12-6a) – 17.628 ≤ 103.52

7-12m
0.347(O3KR12-3p) + 0.233(O3Da3-7p) + 13.533 ≤ 103.52

J&P
Aug 19
Ls = 76.06

12-6a
0.181(PrevdayO3JP7-12m) + 0.013(PrevdayO3ta7-12m) + 45.620 ≤ 76.06

6-12n
-2.588(O3Co12-6a) + 6.968 (O3De12-6a) + 0.451 (AJo6-9aN) – 161.961 ≤ 76.06

12-3p
0.709 (O3JP6-12n) + 1.129(O3JP12-6a) + 0.135 (O3Da6-12n) + 0.167 (O3KR6-12n) – 61.464 ≤ 76.06

3-7p
1.169(O3De12-6a) – 0.872 (O3JP6-12n) + 1.488 (O3JP12-3p) + 0.192 (LEl6-9aN) – 35.978 ≤ 76.06

7-12m
0.263(O3Da6-12n) + 0.102 (O3Ta12-3p) – 0.483 (O3Da3-7p) + 0.983 (O3De6-12n) + 0.578 (O3KR12-6a) – 30.793 ≤ 76.06

K&R
Aug 19
Ls = 95.86

12-6a
- 0.016(P3Da12-6aN) – 0.134 (P3De12-6aV) + 0.174 (P4Ta12-6aN) – 0.175 (P612-6aN) + 0.043(P1De12-6aV) + 0.182 (P2El12-6aV) – 0.545 (PrevdayKR7-12m) + 83.44 ≤ 95.86

6-12n
0.309 (O3Da12-6a) + 1.309 (O3KR12-6a) – 4.353 ≤ 95.86

12-3p
0.782(O3KR6-12n) + 16.297 ≤ 95.86

3-7p
- 1(O3Co6-12n) + 2.986 (O3Co12-3p) + 0.060 (O3JP12-3p) – 0.655 (O3JP12-6a) – 35.777 ≤ 95.86

7-12m
- 0.161 (O3Co6-12n) + 0.541 (O3KR3-7p) – 0.012(O3Ta12-6a) + 30.437 ≤ 95.86

Tarrant
Aug 19
Ls = 80.60

12-6a
0.177(PrevdayO3De7-12m) + 0.349(PrevdayO3J7-12m) + 0.086 (PrevdayO3Ta7-12m) + 22.578 ≤ 80.60

6-12n
0.469 (O3Da12-6a)n+ 9.889 (O3JP12-6a) – 483.56 ≤ 80.60

12-3p
- 0.217(O3Co6-12n) + 0.106 (O3Da6-12n) + 0.904(O3Ta6-12n) + 13.880 ≤ 80.60

3-7p
0.27(O3Da6-12n) – 0.287 (O3Da12-3p) + 0.371 (O3Ta12-3p) + 45.332 ≤ 80.60

7-12m
- 0.014(LEl3-7pN) + 0.029 (AEl3-7pN) – 0.005(O3JP12-3p) + 0.002(JJo3-7pN) + 57.56 ≤ 80.60

Collin
Aug 20
Ls = 58.54

12-6a
- 0.0066 (P7El12-6aN) + 50.232 ≤ 58.54

6-12n
0.005(P3Ka12-6aN) + 0.0033 (P6Da12-6aN) + 63.954 ≤ 58.54

12-3p
0.0036(O3El6-12n) + 0.5440(O3Co6-12n) – 0.0008(O3JP6-12n) + 25.931 ≤ 58.54

3-7p
No significant variables from data mining

7-12m
No significant variables from data mining

Dallas
Aug 20
Ls = 69.01

12-6a
- 0.622 (P4Ka12-6aN) + 58.266 ≤ 69.01

6-12m
1.362(O3Da12-6a) + 1.567 (O3El12-6a) – 1.696(O3Ta12-6a) + 1.136(AEl6-9aN) + 13.445 ≤ 69.01

12-3p
0.690(O3Da6-12n) + 0.060 (O3Da12-6a) + 0.203 (O3Ta6-12n) – 5.781 (O3De12-6a) + 296.197 ≤ 69.01

3-7p
-0.595(APa9-3pN) – 18.12(KR12-6a) + 8.82(KR6-12n) – 0.219(Ljo6-9aV) + 0.134(P3Da12-6aV) – 0.293(P5Da6-12nN) – 0.082(P7El12-7pV) – 0.681(p5Da6-12nV) – 0.593(p5Ta6-12nV) + 430.09 ≤ 69.01

7-12m
0.651(O3Da3-7p) + 4.791 ≤ 69.01

Denton
Aug 20
Ls = 60.50

12-6a
- 0.0063(P3De12-6aN) + 50.783 ≤ 60.50

6-12n
0.0277(LDe6-9aV) – 0.0311(P1De6-12nN) + 0.031(P3De12-6aN) + 64.470 ≤ 60.50

12-3p
0.942(O3De6-12n) + 3.278 ≤ 60.50

3-7p
No significant variables from data mining

7-12m
No significant variables from data mining

Ellis
Aug 20
Ls = 80.64

12-6a
0.514(PrevdayO3El7-12m) + 25.321 ≤ 80.64

6-12n
1.616(O3El12-6a) – 0.753(O3Ta12-6a) – 1.009(AEl6-9aN) + 35.15 ≤ 80.64

12-3p
0.523(O3Da6-12n) + 0.654(O3El6-12n) – 0.11(O3Ta12-6a) + 0.304(P3Ka12-6aN) – 10.363 ≤ 80.64

3-7p
0.332(O3Da6-12n) + 0.237(O3El6-12n) + 17.101 ≤ 80.64

7-12p
0.534(O3Da3-7p) + 5.620 ≤ 80.64

J&P
Aug 20
Ls = 65.23

12-6a
- 0.452(P3Da12-6aN) + 0.597(PrevdayO3JP7-12m) + 21.055 ≤ 65.23

6-12n
1.078(O3JP12-6a) + 0.805(P3Ka6-12nN) – 0.348(O3Da12-6a) + 38.451 ≤ 65.23

12-3p
- 0.091 (O3JP12-6a) + 0.997(O3JP6-12n) + 3.15 ≤ 65.23

3-7p
0.508(O3JP12-3p) + 25.125 ≤ 65.23

7-12m
0.065(O3Da3-7p) + 0.183(P6Ta12-6aN) – 0.255(P7El7-12mN) + 42.322 ≤ 65.23

K&R
Aug 20
Ls = 72.29

12-6a
0.004(P3De12-6aN) + 0.0009(P3Ta12-6aN) + 0.002(P4Da12-6aV) + 0.0002(P4Ka12-6aV) – 0.004(P6Da12-6aV) – 0.014(PrevdaKR7-12mn) + 52.01 ≤ 72.29

6-12n
0.8(O3KR12-6a) + 0.0065(P5Da6-12nV) + 22.640 ≤ 72.29

12-3p
0.804(O3KR6-12n) + 11.068 ≤ 72.29

3-7p
- 0.0047 (AJo3-7pN) + 54.681 ≤ 72.29

7-12m
No significant variables from data mining

Tarrant
Aug 20
Ls = 68.45

12-6a
0.028(P1De12-6aN) – 0.152(P3De12-6aN) – 0.225(P4Da12-6aN) – 0.622(P6Ta12-6aN) + 0.254(PrevdayEl7-12m) + 0.147(Ta12-6a) + 50.10 ≤ 68.45

6-12n
1.228(O3El12-6a) + 0.983(AEl6-9aN) + 13.312 ≤ 68.45

12-3p
0.626(O3Da6-12n) – 0.191(O3El6-12n) + 0.461(O3Ta6-12n) – 6.438(O3De12-6a) + 0.107(LCo6-9aN) + 0.115(LJo6-9aN) + 0.274(P5Pa6-12nV) + 332.589 ≤ 68.95

3-7p
-0.037(LKa6-9aV) + 0.047(P1De12-6aV) – 0.106(P3De12-6aN) – 0.136(P3El6-12nV) – 0.448(P3Ka12-6aV) – 0.35(P5Co6-12nV) – 0.137(P5El6-12nN) +0.259(P5Pa12-7pN) + 0.220(P3Ka6-12nN) + 63.03 ≤ 68.45

7-12m
1.231(O3Ta3-7p) – 33.660 ≤ 68.45

Collin
Aug 21
Ls = 74.96

12-6a
0.0003(P2Jo12-6aN) + 0.00009(P4Ta12-6aN) + 0.003(P7El12-6aV) + 0.002(P4Ta12-6aV) + 0.012(PrevdayDa7-12m) – 0.017(Prev.dayEl7-12m) + 0.002(Prev.dayTa7-12m) + 54.05 ≤ 74.96

6-12n
0.493(O3De12-6a) + 0.820(O3KR12-6a) – 0.256(P3Da6-12nN) – 0.190(P7El6-12nV) – 0.315(O3Ta12-6a) + 23.73 ≤ 72.95

12-3p
1.247(O3Co6-12n) – 0.026(O3Da6-12n) – 0.180(O3KR12-6a) – 10.81 ≤ 72.95

3-7 p
0.057(P5Da12-7pN) + 60.86 ≤ 72.95

7-12m
0.411(Co6-12n) – 0.634(C012-3p) + 0.019(Da3-7p) + 0.036(Da12-3p) + 0.44(De3-7p) + 0.005(P2Jo7-12mN) + 0.008(P5Ka12-7pN) + 0.0004(LKa6-3pN) + 0.019(P5Da6-12nN) + 0.018(P5Da6-12nN) – 0.002(P5Ka6-12nN) – 0.011(P5Ka6-12nV) + 36.51 ≤ 72.95

Dallas
Aug 21
Ls = 76.40

12-6a
0.285(P1De12-6aN) + 0.03(P3De12-6aN) + 0.186(P3El12-6aN) + 0.107(P3Ta12-6aV) – 0.196(P4Ta12-6aN) + 0.299(P7El12-6aV) + 0.261(P3El12-6aV) + 0.129(Prev.dayDa7-12m) – 0.137(PrevdayEl7-12m) + 55.13 ≤ 76.40

6-12n
- 26.665 (O3Co12-6a) + 0.524(O3Da12-6a) + 2.438 (O3De12-6a) – 1.178 (O3Ta12-6a) + 1415.208 ≤ 76.40

12-3p
0.208(O3Co6-12n) + 0.789(O3Da6-12n) + 0.344(O3De6-12n) – 1.041(O3De12-6a) – 0.124(O3Ta6-12n) – 0.081(LRo6-3pN) + 37.47 ≤ 76.40

3-7p
- 3.231(O3Co6-12n) + 3.535(O3Co12-3p) + 54.98 ≤ 76.40

7-12m
6.389(O3Da3-7p) + 0.210(O3El12-3p) + 0.418(O3Ta3-7p) – 6.59 ≤ 76.40

Denton
Aug 21
Ls = 84.08

12-6a
- 0.266(P4Ka12-6aN) + 57.36 ≤ 84.08

6-12n
0.575(O3Da12-6a) + 4.713(O3De12-6a) – 0.386(P4Da12-6aV) – 0.143(O3Ta12-6a) – 197.39 ≤ 84.08

12-3p
0.535(O3Da6-12n) – 1.003(O3De12-6a) + 0.738(O3Ta6-12n) – 0.192(O3Co6-12n) – 0.256(O3Da12-6a) + 65.05 ≤ 84.08

3-7p
- 0.771(O3Co6-12n) + 1.186(O3Co12-3p) – 0.082(O3Da6-12n) – 0.131(O3De12-6a) + 0.083(P5Da12-7pN) + 0.041(O3Ta12-3p) + 47.55 ≤ 84.08

7-12m
0.626(O3Co3-7p) – 0.045(O3De3-7p) + 0.013(P5Ka12-7pN) + 14.865 ≤ 84.08

Ellis
Aug 21
Ls = 68.74

12-6a
0.197(PrevdayO3El7-12a) + 42.399 ≤ 68.74

6-12n
0.504(O3El12-6a) + 43.38 ≤ 68.74

12-3p
- 0.072(AJo-3pN) + 0.093(P3Ka6-12nN) + 0.460(O3El6-12n) + 1.082 (O3KR6-12n) – 35.33 ≤ 68.74

3-7p
0.160(P6Da6-12nV) + 61.04 ≤ 68.74

7-12m
1.080 (O3El3-7p) – 19.244 ≤ 68.74

J&P
Aug 21
Ls = 74.38

12-6a
0.202(P3Da12-6aV) + 0.228(P3El12-6aV) + 0.115(P4Ka12-6aV) + 0.0003(P6Da12-6aN) – 0.217(P4Da12-6aV) – 0.248(Prev.dayJP7-12m) + 64.82 ≤ 74.38

6-12n
1.319(O3JP12-6a) – 1.187(P4Ta6-12nV) + 4 ≤ 74.38

12-3p
0.734(O3JP12-3p) + 1.237(O3El12-6a) – 0.126(O3JP6-12n) – 38.281 ≤ 74.38

3-7p
0.734(O3JP12-3p) + 1.237(O3El12-6a) – 0.126(O3JP6-12n) – 38.281 ≤ 74.38

7-12m
0.292(O3El12-6a) + 0.159(O3JP3-7p) + 0.188(P3El6-12nV) + 29.843 ≤ 74.38

K&R
Aug 21
Ls = 78.09

12-6a
0.038(P3Ka12-6aN) + 0.023(P3De12-6aV) – 0.012(P4Ta12-6aV) + 49.71 ≤ 78.09

6-12n
-0.006(JP12-6a) + 0.007(P1De12-6aN) – 0.002(P3De12-6aV) – 0.002(P4Da12-6aN) – 0.023(P6Da12-6aN) + 66.38 ≤ 78.09

12-3p
0.022(P3Ta6-12nV) – 0.021(P1Pa12-6aN) + 66.43 ≤ 78.09

3-7p
0.216(O3KR12-3p) – 0.004(P2Jo6-12nN) + 51.94 ≤ 78.09

7-12m
0.005(KR6-12n) – 0.0002(P1De12-7pN) + 59.32 ≤ 78.09

Tarrant
Aug 21
Ls = 72.42

12-6a
- 0.358 (P3Ka12-6aN) – 0.156(PrevdayO3Ta7-12mid) + 65.95 ≤ 72.42

6-12n
0.981(O3Da12-6a) + 4.753(O3De12-6a) – 0.412(P7El6-12nV) + 0.248(P4Ka12-6aV) – 243.487 ≤ 72.42

12-3p
14.759(O3Co12-6a) + 0.234(O3Da6-12n) – 1.967(O3De12-6a) + 1.422(O3Ta6-12n) – 0.671(O3Ta12-6a) – 0.232(O3Co6-12n) – 0.323(O3Da12-6A) – 667.72 ≤ 72.42

3-7p
0.146(ADa3-7pV) + 0.131(APa6-9aV) + 0.246(ARo9-3pV) + 0.106(LTa6-3pN) + 0.089(P1De12-7pN) – 0.092(P5Da12-7pN) + 0.04(P6Da12-6aN) – 0.029(P6Ta12-6aV) +63.44 ≤ 72.42

7-12m
1.046(O3Da3-7p) + 0.633(O3Ta3-7p) – 53.58 ≤ 72.42

Collin
Aug 22
Ls = 74.96

12 midnight – 6 am
0.153(P3De12-6aV) – 0.109(P4Da12-6aV) – 0.014(P6Da12-6aN) + 0.29(P4Ta12-6aV) + 0.05(Prev.dayJP7-12m) + 54.37 ≤ 74.96

6-12 noon
2.217(O3Co12-6a) – 0.349(O3Da12-6a) –0.452(O3De12-6a) – 8.781 ≤ 74.96

3-7 pm
0.291(O3Ta6-12n) – 0.087 (O3Ta12-3p) + 0.205(Ade9-3pV)+ 0.190 (O3KR6-12n) – 0.117 (O3Ta12-6a) +29.92 ≤ 74.96

12-3 p
1.066(O3Co6-12n) – 0.206(O3Co12-6a) – 0.166 (O3De12-6a) – 0.107(O3KR12-6a) + 20.428 ≤ 74.96

Dallas
Aug 22
Ls = 76.49

12-6 a
No significant variables from data mining

6-12n
-2.277(O3Co12-6a) + 3.268 (O3Da12-6a) +16.44 ≤ 76.49

12-3 p
0.642(O3Da6-12n) + 0.171(O3De6-12n) – 0.063 (O3El6-12n) – 0.154 (O3Ta12-6a) – 0.143(O3De12-6a) + 30.277 ≤ 76.49

3-7 p
– 0.670(O3Co6-12n) +1.172 (O3Co12-3p) + 0.136 (O3Da6-12n) – 0.094(O3Ta12-3p)+23.695 ≤ 76.49

Denton
Aug 22
Ls =82.43

12-6 a
1.068(PrevdayO3El7-12m) + 8.84 ≤ 82.43

6-12n
3.513(O3Co12-6a) – 0.770(O3De12-6a) + 0.762 (O3Ta12-6a) – 120.794 ≤ 82.43
12-3p
0.140(O3Co6-12n) + 1.035 (O3De6-12n) – 0.473 (O3De12-6a) + 12.92 ≤ 82.43

3-7 p
0.056(ADa9-3pV) – 0.667 (O3Co6-12n) + 0.833(O3Co 12-3 p) + 0.686(O3De12-3p) – 0.046(P7El6-12nV) – 0.09(O3Ta12-6a) + 8.66 ≤ 82.43

Ellis
Aug 22
Ls = 69.65

12-6 a
0.025(P3Ta12-6aN) + 0.0009(P4Ta12-6aN) – 0.009(P6Da12-6aN) – 0.034(P3Da12-6aN) – 0.031(Prev.dayEl7-12m) + 52.64 ≤ 69.65

6-12 n
-1.91(O3KR12-6a) +132.90 ≤ 69.65

12-3p
0.929(O3El6-12n) + 0.363(O3KR12-6a) – 0.412(P5Ka6-12nV) – 1.921(O3KR6-12n) +103.39 ≤ 69.65

3-7 p
0.377(O3El12-3p) +0.419(P5De12-7pN) +29.701 ≤ 69.95

Johnson and Parker
Aug 22
Ls=75.10

12-6a
0.046(P2Jo12-6aN) + 0.057(P3Da12-6aV) – 0.021(P4Da12-6aV) + 56.60 ≤ 75.10

6-12n
2.836(O3JP12-6a) – 90.48 ≤ 75.10

12-3p
1.035(O3JP6-12n) – 5.56 ≤ 75.10

3-7 p
0.953(O3JP12-3p) – 1.64 ≤ 75.10

Kaufman and Rockwall
Aug 22
Ls =73.69

12-6a
0.022(P1De12-6aN) + 0.096(P3De12-6aV) – 0.069(P4Ta12-6aV) + 1.017(Prev.dayC07-12m) + 0.048(Prev.dayEl7-12m) – 0.113(Prev.dayJP7-12m) – 2.24 ≤ 73.69

6-12n
No significant variables from data mining

12-3p
-0.0005(ADa6-9aN) – 0.00002(Aka9-3pN) – 0.0018(Ata6-9aN) + 0.00019(Da6-12n) – 0.0025(LJo6-3V) + 0.0013(P2Jo12-6aV) – 0.001(P3Da12-6aN) – 0.002(P3Da12-6aV) – 0.001(P3Ka12-6aN) + 0.002(AEl6-9aV) + 0.0003(P1Pa12-6aN) – 0.002(P2Jo6-12nN) – 0.0011(P3De6-12nV) + 62.25 ≤ 73.69

3-7p
-1.16(O3KR12-3p) +130.95 ≤ 73.69

Tarrant
Aug 22
Ls = 76.66

12-6 a
0.170(prevdayO3Ta7-12m) + 47.91 ≤ 76.66

6-12n
1.293(O3Da12-6a) -0.59 (O3De12-6a) +1.90(O3Ta12-6a) – 69.10 ≤ 76.66

12-3 p
0.307(O3Da6-12n) +0.948(O3Ta6-12n) -1.3418(O3Co12-6a) +57.01 ≤ 76.66

3-7 p
0.71(O3El12-3p) +0.16(O3Ta12-3p) +6.10 ≤ 76.66

APPENDIX F

EMISSIONS FROM SOURCES FOR WEEKDAYS AND WEEKENDS

Table F-1 Emissions by sources for a weekday (Monday – Thursday)

Variables	Emission, tons	Variables	Emissions, tons
P1De06-12nN	0.0445	P3El06-12nV	0.0070
P1De06-12nV	0.0022	P3El07-12mN	0.0230
P1De07-12mN	0.0370	P3El07-12mV	0.0058
P1De07-12mV	0.0018	P3El12-06aN	0.0276
P1De12-06aN	0.0445	P3El12-06aV	0.0070
P1De12-06aV	0.0022	P3El12-07pN	0.0322
P1De12-07pN	0.0519	P3El12-07pV	0.0082
P1De12-07pV	0.0025	P3Ka06-12nN	0.0227
P1Pa06-12nN	0.0427	P3Ka06-12nV	0.0006
P1Pa06-12nV	0.0638	P3Ka07-12mN	0.0189
P1Pa07-12mN	0.0292	P3Ka07-12mV	0.0005
P1Pa07-12mV	0.0528	P3Ka12-06aN	0.0227
P1Pa12-06aN	0.0579	P3Ka12-06aV	0.0006
P1Pa12-06aV	0.0646	P3Ka12-07pN	0.0265
P1Pa12-07pN	0.0409	P3Ka12-07pV	0.0006
P1Pa12-07pV	0.0739	P3Ta06-12nN	0.1427
P2Jo06-12nN	1.0181	P3Ta06-12nV	0.0101
P2Jo06-12nV	0.0041	P3Ta07-12mN	0.1182
P2Jo07-12mN	0.8484	P3Ta07-12mV	0.0084
P2Jo07-12mV	0.0034	P3Ta12-06aN	0.1427
P2Jo12-06aN	1.0181	P3Ta12-06aV	0.0101
P2Jo12-06aV	0.0041	P3Ta12-07pN	0.1665
P2Jo12-07pN	1.1877	P3Ta12-07pV	0.0117
P2Jo12-07pV	0.0047	P4Da06-12nN	0.1321
P3Da06-12nN	0.1380	P4Da06-12nV	0.0018
P3Da06-12nV	0.0081	P4Da07-12mN	0.1101
P3Da07-12mN	0.1150	P4Da07-12mV	0.0015
P3Da07-12mV	0.0067	P4Da12-06aN	0.1321
P3Da12-06aN	0.1380	P4Da12-06aV	0.0018
P3Da12-06aV	0.0081	P4Da12-07pN	0.1541
P3Da12-07pN	0.1610	P4Da12-07pV	0.0020
P3Da12-07pV	0.0094	P4Ka06-12nN	0.0196
P3De06-12nN	0.0161	P4Ka06-12nV	0.0004
P3De06-12nV	0.0010	P4Ka07-12mN	0.0163
P3De07-12mN	0.0055	P4Ka07-12mV	0.0003
P3De07-12mV	0.0003	P4Ka12-06aN	0.0196
P3De12-06aN	0.0350	P4Ka12-06aV	0.0004
P3De12-06aV	0.0023	P4Ka12-07pN	0.0228
P3De12-07pN	0.0078	P4Ka12-07pV	0.0005
P3De12-07pV	0.0004	P4Ta06-12nN	0.0113
P3El06-12nN	0.0276	P4Ta06-12nV	0.0004

Table F-1 *Continued*

Variables	Emission, tons	Variables	Emissions, tons
P4Ta07-12mN	0.0094	P5Jo07-12mV	0.0219
P4Ta07-12mV	0.0004	P5Jo12-06aN	0.1683
P4Ta12-06aN	0.0113	P5Jo12-06aV	0.0252
P4Ta12-06aV	0.0004	P5Jo12-07pN	0.2086
P4Ta12-07pN	0.0131	P5Jo12-07pV	0.0313
P4Ta12-07pV	0.0005	P5Ka06-12nN	1.1212
P5Co06-12nN	0.2880	P5Ka06-12nV	0.0022
P5Co06-12nV	0.0448	P5Ka07-12mN	0.8015
P5Co07-12mN	0.2400	P5Ka07-12mV	0.0016
P5Co07-12mV	0.0373	P5Ka12-06aN	0.4434
P5Co12-06aN	0.2880	P5Ka12-06aV	0.0009
P5Co12-06aV	0.0448	P5Ka12-07pN	1.4128
P5Co12-07pN	0.3360	P5Ka12-07pV	0.0028
P5Co12-07pV	0.0523	P5Pa06-12nN	0.0779
P5Da06-12nN	0.9416	P5Pa06-12nV	0.0034
P5Da06-12nV	0.1368	P5Pa07-12mN	0.0649
P5Da07-12mN	0.7846	P5Pa07-12mV	0.0029
P5Da07-12mV	0.1140	P5Pa12-06aN	0.0779
P5Da12-06aN	0.9416	P5Pa12-06aV	0.0034
P5Da12-06aV	0.1368	P5Pa12-07pN	0.0909
P5Da12-07pN	1.0985	P5Pa12-07pV	0.0040
P5Da12-07pV	0.1595	P5Ta06-12nN	0.1048
P5De06-12nN	0.0413	P5Ta06-12nV	0.0218
P5De06-12nV	0.0053	P5Ta07-12mN	0.0874
P5De07-12mN	0.0344	P5Ta07-12mV	0.0181
P5De07-12mV	0.0044	P5Ta12-06aN	0.1048
P5De12-06aN	0.0413	P5Ta12-06aV	0.0218
P5De12-06aV	0.0053	P5Ta12-07pN	0.1223
P5De12-07pN	0.0482	P5Ta12-07pV	0.0254
P5De12-07pV	0.0062	P6Da06-12nN	0.0045
P5El06-12nN	0.4393	P6Da06-12nV	0.0002
P5El06-12nV	0.0223	P6Da07-12mN	0.0037
P5El07-12mN	0.3584	P6Da07-12mV	0.0001
P5El07-12mV	0.0180	P6Da12-06aN	0.0045
P5El12-06aN	0.3549	P6Da12-06aV	0.0002
P5El12-06aV	0.0181	P6Da12-07pN	0.0052
P5El12-07pN	0.5102	P6Da12-07pV	0.0002
P5El12-07pV	0.0254	P6Ta06-12nN	0.0028
P5Jo06-12nN	0.1705	P6Ta06-12nV	0.0001
P5Jo06-12nV	0.0256	P6Ta07-12mN	0.0007
P5Jo07-12mN	0.1457	P6Ta07-12mV	0.0001

Table F-1 *Continued*

Variables	Emission, tons	Variables	Emissions, tons
P6Ta12-06aN	0.0053	AJo3-7pV	2.2126
P6Ta12-06aV	0.0002	AKa6-9aN	0.4741
P6Ta12-07pN	0.0022	AKa9-3pN	0.9483
P6Ta12-07pV	0.0001	AKa3-7pN	0.6322
P7El06-12nN	6.6932	AKa6-9aV	1.8965
P7El06-12nV	0.4993	AKa9-3pV	3.7930
P7El07-12mN	5.5776	AKa3-7pV	2.5287
P7El07-12mV	0.4160	ARo6-9aN	0.2371
P7El12-06aN	6.6932	ARo9-3pN	0.4741
P7El12-06aV	0.4993	ARo3-7pN	0.3161
P7El12-07pN	7.8087	ARo6-9aV	0.7112
P7El12-07pV	0.5825	ARo9-3pV	1.4224
ACo6-9aN	2.1336	ARo3-7pV	0.9483
ACo9-3pN	4.2671	APa6-9aN	0.7112
ACo3-7pN	2.8448	APa9-3pN	1.4224
ACo6-9aV	3.5559	APa3-7pN	0.9483
ACo9-3pV	7.1119	APa6-9aV	1.4224
ACo3-7pV	4.7413	APa9-3pV	2.8448
ADa6-9aN	14.9350	APa3-7pV	1.8965
ADa9-3pN	29.8699	ATa6-9aN	9.0084
ADa3-7pN	19.9133	ATa9-3pN	18.0168
ADa6-9aV	21.0986	ATa3-7pN	12.0112
ADa9-3pV	42.1972	ATa6-9aV	14.9350
ADa3-7pV	28.1315	ATa9-3pV	29.8699
ADe6-9aN	4.9783	ATa3-7pV	19.9133
ADe9-3pN	9.9566	LCo6-9LN	2.4623
ADe3-7pN	6.6378	LCo9-3pN	5.4132
ADe6-9aV	6.8748	LCo3-7pN	4.5414
ADe9-3pV	13.7497	LCo6-9LV	1.2513
ADe3-7pV	9.1664	LCo9-3pV	2.8105
AEl6-9aN	1.4224	LCo3-7pV	2.5820
AEl9-3pN	2.8448	LDa6-9LN	10.7673
AEl3-7pN	1.8965	LDa9-3pN	24.7044
AEl6-9aV	1.8965	LDa3-7pN	19.8826
AEl9-3pV	3.7930	LDa6-9LV	6.0458
AEl3-7pV	2.5287	LDa9-3pV	14.3513
AJo6-9aN	1.1853	LDa3-7pV	13.3701
AJo9-3pN	2.3706	LDe6-9LN	2.4456
AJo3-7pN	1.5804	LDe9-3pN	5.4174
AJo6-9aV	1.6594	LDe3-7pN	4.4333
AJo9-3pV	3.3189	LDe6-9LV	1.1629

Table F-1 *Continued*

Variables	Emission, tons
LDe9-3pV	2.6737
LDe3-7pV	2.4948
LEl6-9LN	0.9293
LEl9-3pN	2.6815
LEl3-7pN	2.1394
LEl6-9LV	0.2600
LEl9-3pV	0.7800
LEl3-7pV	0.6800
LJo6-9LN	0.5361
LJo9-3pN	1.5800
LJo3-7pN	1.2226
LJo6-9LV	0.2277
LJo9-3pV	0.6634
LJo3-7pV	0.5743
LKa6-9LN	0.6861
LKa9-3pN	1.9406
LKa3-7pN	1.5094
LKa6-9LV	0.2577
LKa9-3pV	0.7633
LKa3-7pV	0.6543
LRo6-9LN	0.5144
LRo9-3pN	1.0871
LRo3-7pN	0.8444
LRo6-9LV	0.1684
LRo9-3pV	0.3467
LRo3-7pV	0.3070
LPa6-9LN	0.6077
LPa9-3pN	1.7534
LPa3-7pN	1.3748
LPa6-9LV	0.1989
LPa9-3pV	0.5767
LPa3-7pV	0.5071
LTa6-9LN	7.0124
LTa9-3pN	16.4041
LTa3-7pN	12.9898
LTa6-9LV	3.7432
LTa9-3pV	9.1049
LTa3-7pV	8.3404

Table F-2 Emissions by sources for a weekend (Friday)

Variables	Emission, tons	Variables	Emissions, tons
P1De06-12nN	0.0445	P3El06-12nV	0.0070
P1De06-12nV	0.0022	P3El07-12mN	0.0230
P1De07-12mN	0.0370	P3El07-12mV	0.0058
P1De07-12mV	0.0018	P3El12-06aN	0.0276
P1De12-06aN	0.0445	P3El12-06aV	0.0070
P1De12-06aV	0.0022	P3El12-07pN	0.0322
P1De12-07pN	0.0519	P3El12-07pV	0.0082
P1De12-07pV	0.0025	P3Ka06-12nN	0.0227
P1Pa06-12nN	0.0427	P3Ka06-12nV	0.0006
P1Pa06-12nV	0.0638	P3Ka07-12mN	0.0189
P1Pa07-12mN	0.0292	P3Ka07-12mV	0.0005
P1Pa07-12mV	0.0528	P3Ka12-06aN	0.0227
P1Pa12-06aN	0.0579	P3Ka12-06aV	0.0006
P1Pa12-06aV	0.0646	P3Ka12-07pN	0.0265
P1Pa12-07pN	0.0409	P3Ka12-07pV	0.0006
P1Pa12-07pV	0.0739	P3Ta06-12nN	0.1427
P2Jo06-12nN	1.0181	P3Ta06-12nV	0.0101
P2Jo06-12nV	0.0041	P3Ta07-12mN	0.1182
P2Jo07-12mN	0.8484	P3Ta07-12mV	0.0084
P2Jo07-12mV	0.0034	P3Ta12-06aN	0.1427
P2Jo12-06aN	1.0181	P3Ta12-06aV	0.0101
P2Jo12-06aV	0.0041	P3Ta12-07pN	0.1665
P2Jo12-07pN	1.1877	P3Ta12-07pV	0.0117
P2Jo12-07pV	0.0047	P4Da06-12nN	0.1321
P3Da06-12nN	0.1380	P4Da06-12nV	0.0018
P3Da06-12nV	0.0081	P4Da07-12mN	0.1101
P3Da07-12mN	0.1150	P4Da07-12mV	0.0015
P3Da07-12mV	0.0067	P4Da12-06aN	0.1321
P3Da12-06aN	0.1380	P4Da12-06aV	0.0018
P3Da12-06aV	0.0081	P4Da12-07pN	0.1541
P3Da12-07pN	0.1610	P4Da12-07pV	0.0020
P3Da12-07pV	0.0094	P4Ka06-12nN	0.0196
P3De06-12nN	0.0161	P4Ka06-12nV	0.0004
P3De06-12nV	0.0010	P4Ka07-12mN	0.0163
P3De07-12mN	0.0055	P4Ka07-12mV	0.0003
P3De07-12mV	0.0003	P4Ka12-06aN	0.0196
P3De12-06aN	0.0350	P4Ka12-06aV	0.0004
P3De12-06aV	0.0023	P4Ka12-07pN	0.0228
P3De12-07pN	0.0078	P4Ka12-07pV	0.0005
P3De12-07pV	0.0004	P4Ta06-12nN	0.0113
P3El06-12nN	0.0276	P4Ta06-12nV	0.0004

Table F-2 *Continued*

Variables	Emission, tons	Variables	Emissions, tons
P4Ta07-12mN	0.0094	P5Jo07-12mV	0.0219
P4Ta07-12mV	0.0004	P5Jo12-06aN	0.1683
P4Ta12-06aN	0.0113	P5Jo12-06aV	0.0252
P4Ta12-06aV	0.0004	P5Jo12-07pN	0.2086
P4Ta12-07pN	0.0131	P5Jo12-07pV	0.0313
P4Ta12-07pV	0.0005	P5Ka06-12nN	1.1212
P5Co06-12nN	0.2880	P5Ka06-12nV	0.0022
P5Co06-12nV	0.0448	P5Ka07-12mN	0.8015
P5Co07-12mN	0.2400	P5Ka07-12mV	0.0016
P5Co07-12mV	0.0373	P5Ka12-06aN	0.4434
P5Co12-06aN	0.2880	P5Ka12-06aV	0.0009
P5Co12-06aV	0.0448	P5Ka12-07pN	1.4128
P5Co12-07pN	0.3360	P5Ka12-07pV	0.0028
P5Co12-07pV	0.0523	P5Pa06-12nN	0.0779
P5Da06-12nN	0.9416	P5Pa06-12nV	0.0034
P5Da06-12nV	0.1368	P5Pa07-12mN	0.0649
P5Da07-12mN	0.7846	P5Pa07-12mV	0.0029
P5Da07-12mV	0.1140	P5Pa12-06aN	0.0779
P5Da12-06aN	0.9416	P5Pa12-06aV	0.0034
P5Da12-06aV	0.1368	P5Pa12-07pN	0.0909
P5Da12-07pN	1.0985	P5Pa12-07pV	0.0040
P5Da12-07pV	0.1595	P5Ta06-12nN	0.1048
P5De06-12nN	0.0413	P5Ta06-12nV	0.0218
P5De06-12nV	0.0053	P5Ta07-12mN	0.0874
P5De07-12mN	0.0344	P5Ta07-12mV	0.0181
P5De07-12mV	0.0044	P5Ta12-06aN	0.1048
P5De12-06aN	0.0413	P5Ta12-06aV	0.0218
P5De12-06aV	0.0053	P5Ta12-07pN	0.1223
P5De12-07pN	0.0482	P5Ta12-07pV	0.0254
P5De12-07pV	0.0062	P6Da06-12nN	0.0045
P5El06-12nN	0.4393	P6Da06-12nV	0.0002
P5El06-12nV	0.0223	P6Da07-12mN	0.0037
P5El07-12mN	0.3584	P6Da07-12mV	0.0001
P5El07-12mV	0.0180	P6Da12-06aN	0.0045
P5El12-06aN	0.3549	P6Da12-06aV	0.0002
P5El12-06aV	0.0181	P6Da12-07pN	0.0052
P5El12-07pN	0.5102	P6Da12-07pV	0.0002
P5El12-07pV	0.0254	P6Ta06-12nN	0.0028
P5Jo06-12nN	0.1705	P6Ta06-12nV	0.0001
P5Jo06-12nV	0.0256	P6Ta07-12mN	0.0007
P5Jo07-12mN	0.1457	P6Ta07-12mV	0.0001

Table F-2 *Continued*

Variables	Emission, tons	Variables	Emissions, tons
P6Ta12-06aN	0.0053	AJo3-7pV	2.2126
P6Ta12-06aV	0.0002	AKa6-9aN	0.4741
P6Ta12-07pN	0.0022	AKa9-3pN	0.9483
P6Ta12-07pV	0.0001	AKa3-7pN	0.6322
P7El06-12nN	6.6932	AKa6-9aV	1.8965
P7El06-12nV	0.4993	AKa9-3pV	3.7930
P7El07-12mN	5.5776	AKa3-7pV	2.5287
P7El07-12mV	0.4160	ARo6-9aN	0.2371
P7El12-06aN	6.6932	ARo9-3pN	0.4741
P7El12-06aV	0.4993	ARo3-7pN	0.3161
P7El12-07pN	7.8087	ARo6-9aV	0.7112
P7El12-07pV	0.5825	ARo9-3pV	1.4224
ACo6-9aN	2.1336	ARo3-7pV	0.9483
ACo9-3pN	4.2671	APa6-9aN	0.7112
ACo3-7pN	2.8448	APa9-3pN	1.4224
ACo6-9aV	3.5559	APa3-7pN	0.9483
ACo9-3pV	7.1119	APa6-9aV	1.4224
ACo3-7pV	4.7413	APa9-3pV	2.8448
ADa6-9aN	14.9350	APa3-7pV	1.8965
ADa9-3pN	29.8699	ATa6-9aN	9.0084
ADa3-7pN	19.9133	ATa9-3pN	18.0168
ADa6-9aV	21.0986	ATa3-7pN	12.0112
ADa9-3pV	42.1972	ATa6-9aV	14.9350
ADa3-7pV	28.1315	ATa9-3pV	29.8699
ADe6-9aN	4.9783	ATa3-7pV	19.9133
ADe9-3pN	9.9566	LCo6-9LN	2.1979
ADe3-7pN	6.6378	LCo9-5pN	7.5191
ADe6-9aV	6.8748	LCo5-12mnN	6.6129
ADe9-3pV	13.7497	LCo6-9LV	1.1525
ADe3-7pV	9.1664	LCo9-5pV	4.1230
AEl6-9aN	1.4224	LCo5-12mnV	3.2388
AEl9-3pN	2.8448	LDa6-9LN	9.5217
AEl3-7pN	1.8965	LDa9-5pN	33.9398
AEl6-9aV	1.8965	LDa5-12mnN	29.4151
AEl9-3pV	3.7930	LDa6-9LV	5.8552
AEl3-7pV	2.5287	LDa9-5pV	21.4723
AJo6-9aN	1.1853	LDa5-12mnV	16.6897
AJo9-3pN	2.3706	LDe6-9LN	2.1319
AJo3-7pN	1.5804	LDe9-5pN	7.2833
AJo6-9aV	1.6594	LDe5-12mnN	6.4826
AJo9-3pV	3.3189	LDe6-9LV	1.1038

Table F-2 *Continued*

Variables	Emission, tons
LDe9-5pV	3.8834
LDe5-12mnV	3.1308
LEl6-9LN	0.8451
LEl9-5pN	4.2612
LEl5-12mnN	4.0121
LEl6-9LV	0.3170
LEl9-5pV	1.4462
LEl5-12mnV	1.1193
LJo6-9LN	0.5389
LJo9-5pN	2.6471
LJo5-12mnN	2.5242
LJo6-9LV	0.2680
LJo9-5pV	1.2507
LJo5-12mnV	0.9529
LKa6-9LN	0.6287
LKa9-5pN	3.1723
LKa5-12mnN	3.0008
LKa6-9LV	0.2931
LKa9-5pV	1.3874
LKa5-12mnV	1.0552
LRo6-9LN	0.4595
LRo9-5pN	1.4443
LRo5-12mnN	1.2755
LRo6-9LV	0.1800
LRo9-5pV	0.5000
LRo5-12mnV	0.3800
LPa6-9LN	0.5778
LPa9-5pN	2.8793
LPa5-12mnN	2.7814
LPa6-9LV	0.2400
LPa9-5pV	1.0500
LPa5-12mnV	0.8400
LTa6-9LN	6.4082
LTa9-5pN	22.6942
LTa5-12mnN	19.8931
LTa6-9LV	3.6927
LTa9-5pV	13.5067
LTa5-12mnV	10.4411

Table F-3 Emissions by sources for a weekend (Saturday - Sunday)

Variables	Emission, tons	Variables	Emissions, tons
P1De06-12nN	0.0445	P3El06-12nV	0.0070
P1De06-12nV	0.0022	P3El07-12mN	0.0230
P1De07-12mN	0.0370	P3El07-12mV	0.0058
P1De07-12mV	0.0018	P3El12-06aN	0.0276
P1De12-06aN	0.0445	P3El12-06aV	0.0070
P1De12-06aV	0.0022	P3El12-07pN	0.0322
P1De12-07pN	0.0519	P3El12-07pV	0.0082
P1De12-07pV	0.0025	P3Ka06-12nN	0.0227
P1Pa06-12nN	0.0427	P3Ka06-12nV	0.0006
P1Pa06-12nV	0.0638	P3Ka07-12mN	0.0189
P1Pa07-12mN	0.0292	P3Ka07-12mV	0.0005
P1Pa07-12mV	0.0528	P3Ka12-06aN	0.0227
P1Pa12-06aN	0.0579	P3Ka12-06aV	0.0006
P1Pa12-06aV	0.0646	P3Ka12-07pN	0.0265
P1Pa12-07pN	0.0409	P3Ka12-07pV	0.0006
P1Pa12-07pV	0.0739	P3Ta06-12nN	0.1427
P2Jo06-12nN	1.0181	P3Ta06-12nV	0.0101
P2Jo06-12nV	0.0041	P3Ta07-12mN	0.1182
P2Jo07-12mN	0.8484	P3Ta07-12mV	0.0084
P2Jo07-12mV	0.0034	P3Ta12-06aN	0.1427
P2Jo12-06aN	1.0181	P3Ta12-06aV	0.0101
P2Jo12-06aV	0.0041	P3Ta12-07pN	0.1665
P2Jo12-07pN	1.1877	P3Ta12-07pV	0.0117
P2Jo12-07pV	0.0047	P4Da06-12nN	0.1321
P3Da06-12nN	0.1380	P4Da06-12nV	0.0018
P3Da06-12nV	0.0081	P4Da07-12mN	0.1101
P3Da07-12mN	0.1150	P4Da07-12mV	0.0015
P3Da07-12mV	0.0067	P4Da12-06aN	0.1321
P3Da12-06aN	0.1380	P4Da12-06aV	0.0018
P3Da12-06aV	0.0081	P4Da12-07pN	0.1541
P3Da12-07pN	0.1610	P4Da12-07pV	0.0020
P3Da12-07pV	0.0094	P4Ka06-12nN	0.0196
P3De06-12nN	0.0161	P4Ka06-12nV	0.0004
P3De06-12nV	0.0010	P4Ka07-12mN	0.0163
P3De07-12mN	0.0055	P4Ka07-12mV	0.0003
P3De07-12mV	0.0003	P4Ka12-06aN	0.0196
P3De12-06aN	0.0350	P4Ka12-06aV	0.0004
P3De12-06aV	0.0023	P4Ka12-07pN	0.0228
P3De12-07pN	0.0078	P4Ka12-07pV	0.0005
P3De12-07pV	0.0004	P4Ta06-12nN	0.0113
P3El06-12nN	0.0276	P4Ta06-12nV	0.0004

Table F-3 *Continued*

Variables	Emission, tons	Variables	Emissions, tons
P4Ta07-12mN	0.0094	P5Jo07-12mV	0.0219
P4Ta07-12mV	0.0004	P5Jo12-06aN	0.1683
P4Ta12-06aN	0.0113	P5Jo12-06aV	0.0252
P4Ta12-06aV	0.0004	P5Jo12-07pN	0.2086
P4Ta12-07pN	0.0131	P5Jo12-07pV	0.0313
P4Ta12-07pV	0.0005	P5Ka06-12nN	1.1212
P5Co06-12nN	0.2880	P5Ka06-12nV	0.0022
P5Co06-12nV	0.0448	P5Ka07-12mN	0.8015
P5Co07-12mN	0.2400	P5Ka07-12mV	0.0016
P5Co07-12mV	0.0373	P5Ka12-06aN	0.4434
P5Co12-06aN	0.2880	P5Ka12-06aV	0.0009
P5Co12-06aV	0.0448	P5Ka12-07pN	1.4128
P5Co12-07pN	0.3360	P5Ka12-07pV	0.0028
P5Co12-07pV	0.0523	P5Pa06-12nN	0.0779
P5Da06-12nN	0.9416	P5Pa06-12nV	0.0034
P5Da06-12nV	0.1368	P5Pa07-12mN	0.0649
P5Da07-12mN	0.7846	P5Pa07-12mV	0.0029
P5Da07-12mV	0.1140	P5Pa12-06aN	0.0779
P5Da12-06aN	0.9416	P5Pa12-06aV	0.0034
P5Da12-06aV	0.1368	P5Pa12-07pN	0.0909
P5Da12-07pN	1.0985	P5Pa12-07pV	0.0040
P5Da12-07pV	0.1595	P5Ta06-12nN	0.1048
P5De06-12nN	0.0413	P5Ta06-12nV	0.0218
P5De06-12nV	0.0053	P5Ta07-12mN	0.0874
P5De07-12mN	0.0344	P5Ta07-12mV	0.0181
P5De07-12mV	0.0044	P5Ta12-06aN	0.1048
P5De12-06aN	0.0413	P5Ta12-06aV	0.0218
P5De12-06aV	0.0053	P5Ta12-07pN	0.1223
P5De12-07pN	0.0482	P5Ta12-07pV	0.0254
P5De12-07pV	0.0062	P6Da06-12nN	0.0045
P5El06-12nN	0.4393	P6Da06-12nV	0.0002
P5El06-12nV	0.0223	P6Da07-12mN	0.0037
P5El07-12mN	0.3584	P6Da07-12mV	0.0001
P5El07-12mV	0.0180	P6Da12-06aN	0.0045
P5El12-06aN	0.3549	P6Da12-06aV	0.0002
P5El12-06aV	0.0181	P6Da12-07pN	0.0052
P5El12-07pN	0.5102	P6Da12-07pV	0.0002
P5El12-07pV	0.0254	P6Ta06-12nN	0.0028
P5Jo06-12nN	0.1705	P6Ta06-12nV	0.0001
P5Jo06-12nV	0.0256	P6Ta07-12mN	0.0007
P5Jo07-12mN	0.1457	P6Ta07-12mV	0.0001

Table F-3 *Continued*

Variables	Emission, tons	Variables	Emissions, tons
P6Ta12-06aN	0.0053	AJo3-7pV	2.2126
P6Ta12-06aV	0.0002	AKa6-9aN	0.4741
P6Ta12-07pN	0.0022	AKa9-3pN	0.9483
P6Ta12-07pV	0.0001	AKa3-7pN	0.6322
P7El06-12nN	6.6932	AKa6-9aV	1.8965
P7El06-12nV	0.4993	AKa9-3pV	3.7930
P7El07-12mN	5.5776	AKa3-7pV	2.5287
P7El07-12mV	0.4160	ARo6-9aN	0.2371
P7El12-06aN	6.6932	ARo9-3pN	0.4741
P7El12-06aV	0.4993	ARo3-7pN	0.3161
P7El12-07pN	7.8087	ARo6-9aV	0.7112
P7El12-07pV	0.5825	ARo9-3pV	1.4224
ACo6-9aN	2.1336	ARo3-7pV	0.9483
ACo9-3pN	4.2671	APa6-9aN	0.7112
ACo3-7pN	2.8448	APa9-3pN	1.4224
ACo6-9aV	3.5559	APa3-7pN	0.9483
ACo9-3pV	7.1119	APa6-9aV	1.4224
ACo3-7pV	4.7413	APa9-3pV	2.8448
ADa6-9aN	14.9350	APa3-7pV	1.8965
ADa9-3pN	29.8699	ATa6-9aN	9.0084
ADa3-7pN	19.9133	ATa9-3pN	18.0168
ADa6-9aV	21.0986	ATa3-7pN	12.0112
ADa9-3pV	42.1972	ATa6-9aV	14.9350
ADa3-7pV	28.1315	ATa9-3pV	29.8699
ADe6-9aN	4.9783	ATa3-7pV	19.9133
ADe9-3pN	9.9566	LCo6-3pN	4.4058
ADe3-7pN	6.6378	LCo3-12mnN	5.5024
ADe6-9aV	6.8748	LCo6-3pV	2.7481
ADe9-3pV	13.7497	LCo3-12mnV	3.0819
ADe3-7pV	9.1664	LDa6-3pN	20.6786
AEl6-9aN	1.4224	LDa3-12mnN	26.1136
AEl9-3pN	2.8448	LDa6-3pV	13.9599
AEl3-7pN	1.8965	LDa3-12mnV	16.0417
AEl6-9aV	1.8965	LDe6-3pN	4.2693
AEl9-3pV	3.7930	LDe3-12mnN	5.2560
AEl3-7pV	2.5287	LDe6-3pV	2.6595
AJo6-9aN	1.1853	LDe3-12mnV	2.9128
AJo9-3pN	2.3706	LEl6-3pN	3.0437
AJo3-7pN	1.5804	LEl3-12mnN	3.2203
AJo6-9aV	1.6594	LEl6-3pV	1.1556
AJo9-3pV	3.3189	LEl3-12mnV	1.2230

Table F-3 *Continued*

Variables	Emission, tons
LJo6-3pN	1.9480
LJo3-12mnN	2.0723
LJo6-3pV	0.9899
LJo3-12mnV	1.0283
LKa6-3pN	2.2616
LKa3-12mnN	2.4068
LKa6-3pV	1.1387
LKa3-12mnV	1.1387
LRo6-3pN	0.8524
LRo3-12mnN	1.0418
LRo6-3pV	0.3200
LRo3-12mnV	0.3900
LPa6-3pN	2.0191
LPa3-12mnN	2.1354
LPa6-3pV	0.8720
LPa3-12mnV	0.9014
LTa6-3pN	13.4269
LTa3-12mnN	16.9079
LTa6-3pV	8.8819
LTa3-12mnV	10.0629

APPENDIX G

R^2 VALUES

Table G-1 R^2 values from stepwise August 15

Monitoring Region	Time period	Stepwise Model R^2 Value
Collin	12 midnight – 6 am	
	6 am – 12 noon	0.8396
	12 noon – 3 pm	0.9981
	3 pm – 7 pm	0.5168
	7 pm – 12 midnight	
Dallas	12 midnight – 6 am	
	6 am – 12 noon	0.9637
	12 noon – 3 pm	0.9788
	3 pm – 7 pm	0.3223
	7 pm – 12 midnight	0.5672
Denton	12 midnight – 6 am	
	6 am – 12 noon	0.9883
	12 noon – 3 pm	0.9921
	3 pm – 7 pm	0.9954
	7 pm – 12 midnight	0.7160
Ellis	12 midnight – 6 am	
	6 am – 12 noon	0.7113
	12 noon – 3 pm	0.8158
	3 pm – 7 pm	0.0652
	7 pm – 12 midnight	0.0677
Johnson & Parker	12 midnight – 6 am	
	6 am – 12 noon	0.5709
	12 noon – 3 pm	0.9903
	3 pm – 7 pm	0.9599
	7 pm – 12 midnight	0.9600
Kaufman & Rockwall	12 midnight – 6 am	
	6 am – 12 noon	
	12 noon – 3 pm	
	3 pm – 7 pm	0.9074
	7 pm – 12 midnight	0.4301
Tarrant	12 midnight – 6 am	
	6 am – 12 noon	0.9820
	12 noon – 3 pm	0.9916
	3 pm – 7 pm	0.7782
	7 pm – 12 midnight	0.1687

Table G-2 R^2 values from stepwise August 16

Monitoring Region	**Time period**	**Stepwise Model R^2 Value**
Collin	12 midnight – 6 am	0.1744
	6 am – 12 noon	0.9782
	12 noon – 3 pm	0.9985
	3 pm – 7 pm	0.9912
	7 pm – 12 midnight	
Dallas	12 midnight – 6 am	
	6 am – 12 noon	0.8672
	12 noon – 3 pm	0.9972
	3 pm – 7 pm	0.9593
	7 pm – 12 midnight	0.0775
Denton	12 midnight – 6 am	0.0739
	6 am – 12 noon	0.9146
	12 noon – 3 pm	0.9943
	3 pm – 7 pm	0.9977
	7 pm – 12 midnight	
Ellis	12 midnight – 6 am	
	6 am – 12 noon	0.7224
	12 noon – 3 pm	0.2620
	3 pm – 7 pm	0.3891
	7 pm – 12 midnight	
Johnson & Parker	12 midnight – 6 am	0.0862
	6 am – 12 noon	0.5922
	12 noon – 3 pm	0.9936
	3 pm – 7 pm	0.4035
	7 pm – 12 midnight	0.8314
Kaufman & Rockwall	12 midnight – 6 am	
	6 am – 12 noon	0.8712
	12 noon – 3 pm	0.9910
	3 pm – 7 pm	0.1018
	7 pm – 12 midnight	
Tarrant	12 midnight – 6 am	0.0525
	6 am – 12 noon	0.6919
	12 noon – 3 pm	0.9870
	3 pm – 7 pm	0.6903
	7 pm – 12 midnight	0.3957

Table G-3 R^2 values from stepwise August 17

Monitoring Region	**Time period**	**Stepwise Model R^2 Value**
Collin	12 midnight – 6 am	0.1296
	6 am – 12 noon	0.7733
	12 noon – 3 pm	0.9925
	3 pm – 7 pm	0.9075
	7 pm – 12 midnight	
Dallas	12 midnight – 6 am	0.0907
	6 am – 12 noon	0.7051
	12 noon – 3 pm	0.9937
	3 pm – 7 pm	0.9785
	7 pm – 12 midnight	0.5471
Denton	12 midnight – 6 am	
	6 am – 12 noon	0.1505
	12 noon – 3 pm	0.7345
	3 pm – 7 pm	0.9918
	7 pm – 12 midnight	0.9734
Ellis	12 midnight – 6 am	0.0899
	6 am – 12 noon	0.1637
	12 noon – 3 pm	0.9816
	3 pm – 7 pm	0.5772
	7 pm – 12 midnight	0.0555
Johnson & Parker	12 midnight – 6 am	0.1317
	6 am – 12 noon	
	12 noon – 3 pm	0.9928
	3 pm – 7 pm	0.9668
	7 pm – 12 midnight	0.0691
Kaufman & Rockwall	12 midnight – 6 am	0.0688
	6 am – 12 noon	0.8600
	12 noon – 3 pm	0.9283
	3 pm – 7 pm	0.0552
	7 pm – 12 midnight	0.0653
Tarrant	12 midnight – 6 am	
	6 am – 12 noon	0.5403
	12 noon – 3 pm	0.9913
	3 pm – 7 pm	0.9494
	7 pm – 12 midnight	0.6427

Table G-4 R^2 values from stepwise August 18

Monitoring Region	Time period	Stepwise Model R^2 Value
Collin	12 midnight – 6 am	0.1971
	6 am – 12 noon	0.8952
	12 noon – 3 pm	0.9972
	3 pm – 7 pm	0.9766
	7 pm – 12 midnight	0.3104
Dallas	12 midnight – 6 am	0.0887
	6 am – 12 noon	0.1137
	12 noon – 3 pm	0.9515
	3 pm – 7 pm	0.9656
	7 pm – 12 midnight	0.3787
Denton	12 midnight – 6 am	
	6 am – 12 noon	0.9909
	12 noon – 3 pm	0.9996
	3 pm – 7 pm	0.9979
	7 pm – 12 midnight	0.9115
Ellis	12 midnight – 6 am	0.0648
	6 am – 12 noon	0.2161
	12 noon – 3 pm	0.9894
	3 pm – 7 pm	0.2562
	7 pm – 12 midnight	
Johnson & Parker	12 midnight – 6 am	0.0570
	6 am – 12 noon	0.2255
	12 noon – 3 pm	0.5614
	3 pm – 7 pm	0.4665
	7 pm – 12 midnight	0.7032
Kaufman & Rockwall	12 midnight – 6 am	0.1932
	6 am – 12 noon	0.6038
	12 noon – 3 pm	0.9955
	3 pm – 7 pm	0.9570
	7 pm – 12 midnight	
Tarrant	12 midnight – 6 am	
	6 am – 12 noon	
	12 noon – 3 pm	0.9996
	3 pm – 7 pm	0.9949
	7 pm – 12 midnight	0.8355

Table G-5 R^2 values from stepwise August 19

Monitoring Region	Time period	Stepwise Model R^2 Value
Collin	12 midnight – 6 am	0.8773
	6 am – 12 noon	0.9432
	12 noon – 3 pm	0.9956
	3 pm – 7 pm	0.3052
	7 pm – 12 midnight	
Dallas	12 midnight – 6 am	
	6 am – 12 noon	0.0928
	12 noon – 3 pm	0.9970
	3 pm – 7 pm	0.9791
	7 pm – 12 midnight	
Denton	12 midnight – 6 am	0.9217
	6 am – 12 noon	0.7351
	12 noon – 3 pm	0.9079
	3 pm – 7 pm	
	7 pm – 12 midnight	
Ellis	12 midnight – 6 am	0.3573
	6 am – 12 noon	
	12 noon – 3 pm	0.9886
	3 pm – 7 pm	0.9861
	7 pm – 12 midnight	0.8830
Johnson & Parker	12 midnight – 6 am	0.8144
	6 am – 12 noon	0.8835
	12 noon – 3 pm	0.9857
	3 pm – 7 pm	0.9274
	7 pm – 12 midnight	0.9274
Kaufman & Rockwall	12 midnight – 6 am	
	6 am – 12 noon	0.8419
	12 noon – 3 pm	0.9714
	3 pm – 7 pm	0.9641
	7 pm – 12 midnight	0.9591
Tarrant	12 midnight – 6 am	0.9164
	6 am – 12 noon	0.2067
	12 noon – 3 pm	0.9932
	3 pm – 7 pm	0.9627
	7 pm – 12 midnight	

Table G-6 R^2 values from stepwise August 20

Monitoring Region	Time period	Stepwise Model R^2 Value
Collin	12 midnight – 6 am	0.2119
	6 am – 12 noon	0.1722
	12 noon – 3 pm	0.6766
	3 pm – 7 pm	
	7 pm – 12 midnight	
Dallas	12 midnight – 6 am	0.0516
	6 am – 12 noon	0.6073
	12 noon – 3 pm	0.9919
	3 pm – 7 pm	
	7 pm – 12 midnight	0.8833
Denton	12 midnight – 6 am	0.0487
	6 am – 12 noon	0.1670
	12 noon – 3 pm	0.9749
	3 pm – 7 pm	
	7 pm – 12 midnight	
Ellis	12 midnight – 6 am	0.0485
	6 am – 12 noon	0.4632
	12 noon – 3 pm	0.9831
	3 pm – 7 pm	0.9765
	7 pm – 12 midnight	0.9371
Johnson & Parker	12 midnight – 6 am	0.3067
	6 am – 12 noon	0.4537
	12 noon – 3 pm	0.9828
	3 pm – 7 pm	0.6380
	7 pm – 12 midnight	0.2074
Kaufman & Rockwall	12 midnight – 6 am	
	6 am – 12 noon	0.4506
	12 noon – 3 pm	0.7238
	3 pm – 7 pm	0.0590
	7 pm – 12 midnight	
Tarrant	12 midnight – 6 am	
	6 am – 12 noon	0.4815
	12 noon – 3 pm	0.9934
	3 pm – 7 pm	
	7 pm – 12 midnight	0.7201

Table G-7 R^2 values from stepwise August 21

Monitoring Region	Time period	Stepwise Model R^2 Value
Collin	12 midnight – 6 am	
	6 am – 12 noon	0.5337
	12 noon – 3 pm	0.9872
	3 pm – 7 pm	0.0789
	7 pm – 12 midnight	
Dallas	12 midnight – 6 am	
	6 am – 12 noon	0.8350
	12 noon – 3 pm	0.9915
	3 pm – 7 pm	0.3417
	7 pm – 12 midnight	0.8212
Denton	12 midnight – 6 am	0.0486
	6 am – 12 noon	0.9913
	12 noon – 3 pm	0.9945
	3 pm – 7 pm	0.8733
	7 pm – 12 midnight	0.9160
Ellis	12 midnight – 6 am	0.0468
	6 am – 12 noon	0.2889
	12 noon – 3 pm	0.8353
	3 pm – 7 pm	0.0740
	7 pm – 12 midnight	0.9127
Johnson & Parker	12 midnight – 6 am	
	6 am – 12 noon	0.6175
	12 noon – 3 pm	0.7883
	3 pm – 7 pm	0.9223
	7 pm – 12 midnight	0.5758
Kaufman & Rockwall	12 midnight – 6 am	
	6 am – 12 noon	
	12 noon – 3 pm	0.1062
	3 pm – 7 pm	0.6948
	7 pm – 12 midnight	
Tarrant	12 midnight – 6 am	0.1399
	6 am – 12 noon	0.9784
	12 noon – 3 pm	0.9964
	3 pm – 7 pm	
	7 pm – 12 midnight	0.7079

Table G-8 R^2 values from stepwise August 22

Monitoring Region	Time period	Stepwise Model R^2 Value
Collin	12 midnight – 6 am	
	6 am – 12 noon	0.9541
	12 noon – 3 pm	0.9965
	3 pm – 7 pm	0.9344
	7 pm – 12 midnight	-
Dallas	12 midnight – 6 am	
	6 am – 12 noon	0.8674
	12 noon – 3 pm	0.9920
	3 pm – 7 pm	0.7587
	7 pm – 12 midnight	-
Denton	12 midnight – 6 am	0.0733
	6 am – 12 noon	0.9686
	12 noon – 3 pm	0.9976
	3 pm – 7 pm	0.9986
	7 pm – 12 midnight	-
Ellis	12 midnight – 6 am	
	6 am – 12 noon	0.0770
	12 noon – 3 pm	0.9677
	3 pm – 7 pm	0.3130
	7 pm – 12 midnight	-
Johnson & Parker	12 midnight – 6 am	
	6 am – 12 noon	0.6586
	12 noon – 3 pm	0.8888
	3 pm – 7 pm	0.9073
	7 pm – 12 midnight	-
Kaufman & Rockwall	12 midnight – 6 am	
	6 am – 12 noon	
	12 noon – 3 pm	
	3 pm – 7 pm	0.1871
	7 pm – 12 midnight	-
Tarrant	12 midnight – 6 am	0.0473
	6 am – 12 noon	0.9355
	12 noon – 3 pm	0.9452
	3 pm – 7 pm	0.7960
	7 pm – 12 midnight	-

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