APPENDIX B: EMISSIONS MODELING FOR THE DFW ATTAINMENT DEMONSTRATION SIP REVISION FOR THE 1997 EIGHT-HOUR OZONE STANDARD

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1. GENERAL MODELING EMISSIONS DEVELOPMENT

The EPA's Guidance on the Use of Models and Other Analyses for Demonstrating Attainment of Air Quality Goals for Ozone, PM2.5, and Regional Haze (EPA, 2007) specifies a procedure for demonstrating attainment through modeling. Instead of using the model results in an absolute sense, the eight-hour ozone procedure uses the modeling results in a relative sense. This relative approach is based on how the model responds to the reduction in emissions between a baseline and a future year. Therefore, the photochemical modeling process for attainment demonstration requires four modeling emissions data sets:

- base case emissions
- baseline emissions
- future year emissions
- future year control strategy emissions

1.1 Base Case Modeling Emissions

In order for the photochemical model to be used in the attainment demonstration, the model needs to be capable of adequately replicating historical episodes (base cases) for which high daily eight-hour ozone was measured. To maximize model performance, base case emission inputs are estimated as accurately as possible. In the development of the base case modeling emissions, a number of quality assurance techniques are used to evaluate the reasonableness of the emission magnitudes, along with their spatial distribution and temporal profile. Using the quality assured episode-specific emissions along with other modeling inputs (e.g., meteorology), the photochemical model is run and the simulated concentrations of both ozone and ozone precursors (e.g., NO_X, VOC) are compared to the measured concentrations to evaluate the adequacy of the photochemical model in replicating the base case. If the evaluation indicates that the base case is not adequately replicated, then diagnostics are conducted to determine which modeling inputs are insufficient. When the emissions are implicated, the modeling emissions are reviewed and pertinent revisions are made as appropriate. If the evaluation implicated other inputs or once the photochemical model adequately replicates the base case, then the modeling emissions are considered to be sufficiently representative of the episode.

A summary of the primary data sources for the development of the base case modeling emissions is provided in Table 1: Summary of Base Case Point Source Emission Data Sources, Table 2: Summary of Base Case On-road Mobile Source Emission Data Sources, and Table 3: Summary of Base Case Non-road Mobile, Area, Oil and Gas, and Biogenic Source Emission Data Sources.

Table 1: Summary of Base Case Point Source Emission Data Sources

Region	Data Source
Texas	2006 State of Texas Air Reporting System (STARS)
LA, AR, OK	2004, 2005 individual NEIs
Other (Regional)	2002 CenRAP/RPOs EI
All States	2006 EPA hourly Acid Rain data
Texas	2006 hourly Special Inventory surveys
Harris County	2006 hourly Harris County Tank Landing Loss surveys
HGB	2006 HGB HRVOC reconciliation
Offshore	2005 MMS GWEI platforms of western Gulf of Mexico
Mexico	1999 Phase III Mexico National Emissions Inventory (NEI)
Canada	1995 from EPA's Clean Air Interstate Rule (CAIR) 2001 base modeling

Table 2: Summary of Base Case On-road Mobile Source Emission Data Sources

Region	Data Source
DFW	2006 based on MOVES2010a and local travel demand model (TDM) for vehicle miles traveled (VMT)
Other Texas	2006 based on MOVES2010a and Highway Performance Monitoring System (HPMS) for VMT
Outside Texas	2006 based on MOVES2010a and EPA's National Mobile Inventory Model (NMIM)

Table 3: Summary of Base Case Non-road Mobile, Area, Oil and Gas, and Biogenic Source Emission Data Sources

Region	Non-road Mobile Sources	Area Sources	Oil and Gas Sources	Biogenics
Texas	2005 TexAER, Texas NONROAD (TexN) model	2005 TexAER	2008 TexAER, 2006 Texas Railroad Commission, Baker Hughes, RigData.com	GloBEIS3.1 with TAMU LULC data
Outside Texas	2006 NMIM	2002 EPA NEI	2002 EPA NEI	GloBEIS3.1 with BELD3 LULC data

Emissions were developed for the ozone precursors of NO_X, VOC, and CO. The emission inventories (EIs) are prepared for photochemical modeling input using Version 3 of the Emissions Processing System (EPS3).

1.2 Baseline Modeling Emissions

The EPA procedure for demonstrating attainment requires the development of modeling emissions for a baseline year to be used with similarly developed future year emissions. In order to keep the baseline and future year modeling emissions commensurate, more generic nonepisodic ozone season day (OSD) emissions are developed for the baseline year. The OSD modeling emissions for the baseline and future years are developed using the same averaging and estimating procedures, which provides an appropriate basis for assessing the photochemical model response to emission reductions.

The major difference between the base case and baseline modeling emissions is the treatment of the hourly-specific emissions for elevated point sources, such as electric generating units (EGUs). Emissions for the other source categories are identical between the base cases and baseline modeling emissions. 2006 was chosen as the baseline year and Section 2.2describes the averaging processes used in the development of the baseline inventory.

1.3 Future Year Modeling Emissions

With a classification of severe, the eight-hour ozone attainment date for DFW is June 15, 2013. The modeling attainment year is 2012 because it is the full ozone season prior to the attainment date. Modeling emissions for the 2012 future year were estimated by applying growth projections and control measures to the 2006 baseline modeling emissions. The 2012 modeling emissions include the benefits of the Federal Motor Vehicle Control Program (FMVCP), Mass Emissions Cap and Trade (MECT) Program, the Highly Reactive VOC Emission Cap and Trade (HECT) Program in the Houston-Galveston-Brazoria (HGB) area, and Phase One of the Clean Air Interstate Rule (CAIR).

2 POINT SOURCE MODELING EMISSIONS DEVELOPMENT

Much of the point source emissions development began with the March 2010 HGB SIP Revision as a starting point, because the first half of the 2006 base case was developed for the recent HGB SIP modeling. Some of the descriptions of this DFW work will refer to the March *2010 Appendix B: Emissions Modeling for the HGB Attainment Demonstration SIP Revision for the 1997 Eight-Hour Ozone Standard*, hereafter referred to as the "March 2010 HGB Appendix B," especially for descriptions of HGB-specific emissions development.

The various data sources that went into the development of the point source modeling emissions are summarized in Table 4: Sources of Point Source Emissions Data. The TCEQ compiled and formatted the data to generate modeling datasets for the base case, the baseline, and the future case studies as detailed in the following sections.

Table 4: Sources of Point Source Emissions Data

Sources of Data	Calendar Year(s) Used
TCEQ State of Texas Air Reporting System (STARS)	2006
TCEQ Hourly Floating Roof Tank Landing Loss (TLL) Surveys	2006
TCEQ-derived Highly Reactive VOC (HRVOC) Reconciliation using Potential Source Contribution Factor (PSCF) Methodology	2006
EPA Clean Air Markets Division (CAMD) Acid Rain Program Continuous Emission Monitors (CEMs) for all states	2006, 2008
EPA/TCEQ Clean Air Interstate Rule (CAIR) allocations for entire modeling domain	2010
Electric Reliability Council of Texas	2010
Louisiana Department of Environmental Quality(LDEQ)	2004
Oklahoma Department of Environmental Quality(ODEQ)	2005
Arkansas Department of Environmental Quality(ADEQ)	2005
U.S. Department of the Interior Minerals Management Service (MMS) Gulf-Wide Emissions Inventory (GWEI) of Offshore Platforms	2005
Central States Regional Air / Regional Planning Organizations (CenRAP/RPO) regional emissions inventory	2002, 2018
Canada from the EPA's CAIR 2001 base case	1995
Mexico from Mexican NEI Phase III	1999

2.1 2006 Base Case Point Source Modeling Emissions Development

The following subsections describe development of the base case point source modeling emissions for all portions of the domain used for this June 2006 DFW modeling episode.

2.1.1 Texas Point Sources

For Texas point sources, OSD emissions data from State of Texas Air Reporting System (STARS) and hourly emissions data from the EPA's acid rain database (ARD) provided the basis for modeling the 2006 base case episode. Additionally, a supplemental "extra olefins" file was developed to account for reconciled HRVOC emissions in the HGB area. HRVOC include ethylene, propylene, 1,3-butadiene, and all isomers of butene. Episode-specific survey results of HGB floating roof tank landing losses (TLL) were averaged and used to develop files of hourly emissions for the 2006 episode. The following subsections describe the development of modeling emissions for each of these components.

2.1.1.1 State of Texas Air Reporting System (STARS)

Point source emissions and industrial process operating data are collected annually from sites that meet the reporting requirements of 30 Texas Administrative Code (TAC) §101.10. To collect data, the TCEQ mails annual emissions inventory questionnaires (EIQs) to all sources identified as meeting the reporting requirements. Subject entities are required to report levels of emissions subject to regulation from all emissions-generating units and emissions points, and also must provide representative samples of calculations used to estimate the emissions. Descriptive information is also required on process equipment, including operating schedules, emission control devices, abatement device control efficiencies, and emission point discharge parameters such as location, height, diameter, temperature, and exhaust gas flow rate. All data submitted in the EIQ are subjected to quality assurance (QA) procedures. The data are then stored in the STARS database. The TCEQ reports point source emissions data to the EPA for inclusion in the National Emissions Inventory (NEI).

Annually, the TCEQ collects emissions information from approximately 2000 major point sources. In nonattainment areas, major point sources are defined for inventory reporting purposes as industrial, commercial, or institutional sources that emit actual levels of criteria pollutants at or above the following amounts: 10 tons per year (tpy) of VOC; 25 tpy of NO_X; or 100 tpy of any of the other criteria pollutants including CO, SO_2, PM_{10}, or lead. For the attainment areas of the state, any company that emits a minimum of 100 tpy of any criteria pollutant must submit an inventory. Additionally, any source that either generates or has the potential to generate at least 10 tpy of any single Hazardous Air Pollutant (HAP) or 25 tpy of aggregate HAPs is required to report emissions to the TCEQ. The reporting requirements, guidance documents, trends, and summaries of the most recently quality assured year of reported data can be found at http://www.tceq.state.tx.us/implementation/air/industei/psei/psei.html.

Development of the Texas point source emission modeling files began with queries of the quality-assured data of the STARS database. Updated modeling query reports are typically run when significant STARS updates are completed. The STARS modeling extract report ("STARS extract") is a snapshot of Texas emissions since emissions from previous years can be updated by the regulated entities.

SAS computer programming code was written, updated, and/or modified to parse the STARS extract, perform various logical checks and comparisons, assign defaults for missing data, apply rule effectiveness to VOC paths with control devices, and format the data into an AIRS Facility Subsystem (AFS) file that can be processed with the modules of Version 3 of the Emissions Processor System (EPS3).

The STARS extract contains all four types of emission rates, annual, OSD, emission events (EE), and scheduled maintenance startup and shutdown (SMSS). Typical modeled ozone season day emissions include the OSD emission rate, which is representative of average daily emissions during the summer, as well as prorated EE and SMSS emissions. The TCEQ defines the ozone season for EI reporting purposes as June through August. This is generally the time of the year that monitored ozone concentrations are highest. The annual emission rate is used when OSD rates are not reported. An example of STARS extract data is available in the March 2010 HGB Appendix B, Section 2.1.1.

2.1.1.2 Rule Effectiveness (RE)

RE is applied to the STARS VOC emissions where appropriate to account for the reality that not all facilities covered by a rule are in compliance with the rule 100 percent of the time. RE also accounts for the fact that control equipment does not always operate at its assumed control efficiency. Additional details about rule effectiveness and how it is applied by the TCEQ are in the March 2010 HGB Appendix B, Section 2.1.1.

2.1.1.3 Preparation of AFS File for EPS3 Input

The resultant AFS file is in a format ready for input to EPS3. The STARS-derived AFS file for all criteria pollutants typically has more than 200,000 records. Each point source emissions path contains references for the TCEQ account (RN), equipment (FIN), and exhaust point (EPN). For ozone modeling purposes, values for the ozone precursors of NO_X, VOC, and CO are retained in the AFS file for EPS3 input. An example AFS record with explanations, specific QA steps, and file naming conventions can be found in the March 2010 HGB Appendix B, Section 2.1.1. The AFS file format used by the TCEQ for this modeling, including field descriptions and options, can be found on the TCEQ FTP modeling site, ftp://amdaftp.tceq.texas.gov/pub/HGB8H2/ei/point/AFS-EPS3-v3.doc.

2.1.1.4 Preparation of Photochemical Model-Ready Files with EPS3

EPS3 is used to process the emissions in the AFS file into a format ready for photochemical model input. Photochemical model inputs require that the emissions be, in EPS3 order performed by the TCEQ:

- chemically speciated into groups of compounds with similar reactivity for the formation of ozone;
- temporally allocated by hour of day, day of week, etc.; and
- spatially allocated to grid cells or assigned to fixed points.

The *EPS3 User's Guide* provides additional details for processing the point source emissions for photochemical model input and can be found at ftp://amdaftp.tceq.texas.gov/pub/HGB8H2/ei/EPS3_manual/EPS3UG_UserGuide_200908.pdf. The remainder of this section discusses some of the specific point source emissions processing procedures. Excerpts of the data, which provide a better understanding of the processes, can be found in the March 2010 HGB Appendix B, Section 2.1.1.

2.1.1.4.1 Chemical Speciation with EPS3

VOC emissions in STARS can be reported as individual compounds, mixtures, classes of compounds, total VOC, and unclassified VOC. The VOC values that are included in the AFS file are speciated into carbon bond groups of similar ozone reactivity that will be recognized by the specific chemical mechanism of the photochemical model. For operational efficiency, most photochemical modeling studies are not based on separate algorithms for each individual reaction. Instead, groups of compounds with similar reactivity for the formation of ozone are grouped together and input into the photochemical model. The TCEQ used the Carbon Bond 2005 (CB05) chemical mechanism.

The majority of TCEQ EIQ responses include constituent VOC emission rates, which are used to develop point-specific speciation profiles. When the composition of the VOC reported for a specific source is unknown or not fully-speciated, the default speciation profile is applied based on the source classification code (SCC). More detail on the TCEQ source-specific speciation approach is available in the March 2010 HGB Appendix B, Section 2.1.1.5 and in a paper and presentation given at the 17th Annual International Emission Inventory Conference (Portland, Oregon, 2008). The paper is titled *Emissions Modeling of Specific Highly Reactive Volatile Organic Compounds (HRVOC) in the Houston-Galveston-Brazoria Ozone Nonattainment Area*, and is available at http://www.epa.gov/ttn/chief/conference/ei17/session6/thomas.pdf.

2.1.1.4.2 Temporal Allocation with EPS3

Even though OSD is typically used for processing of photochemical modeling emissions, EPS3 can temporally distribute emissions by month, week, day, and hour of a specific episode when sufficient detail is provided in the EIQ. March 2010 HGB Appendix B, Section 2.1.1.5 provides detail about temporal allocation, along with examples of the cross reference and profile records.

2.1.1.4.3 Spatial Allocation with EPS3

Photochemical models generally rely on a three-dimensional Eulerian system where emissions are allocated to individual grid cells. Emissions occur at the surface for most source categories such as area, biogenic, on-road, and non-road, and are classified as low-level. Numerous point sources also fall into the low-level surface category, but large combustion sources such as power plants are categorized as elevated because their hot exhaust gases can rise several hundred meters into the atmosphere.

Low-level point sources are allocated to grid cells and merged with the other source categories prior to photochemical model input. Elevated point sources are kept at their reported X-Y locations and assumed to emit from the calculated effective plume height of Z to better simulate physical mixing in the elevated layers of the photochemical model. As with other advanced emissions processors, EPS3 processing of point source emissions is divided into low-level and elevated streams, which provides better simulation of how elevated emissions are distributed prior to mixing and reacting with surface emissions. The drawbacks are more complicated EPS3 processing and longer photochemical model run times.

The photochemical model inputs for point sources consist of a single low-level gridded merged file and a single file of elevated sources. A plume cutoff height of 30 meters was chosen to divide the point sources into low-level and elevated categories. The emissions from elevated sources can be individually tracked, and NO_X reaction chemistry can be enhanced by treating these plumes as Lagrangian puffs by use of the optional Plume-in-Grid (PiG) treatment. The TCEQ uses the Greatly Reduced Execution and Simplified Dynamics (GREASD) PiG option in CAMx, which is most applicable to large NO_X plumes. More detail on the GREASD PiG approach is provided below in Section 2.1.3.

2.1.1.5 Hourly Acid Rain Program Database (ARPDB)

NO_X emission estimates for EGUs, or large power plants, were obtained from EPA's Clean Air Markets Division (CAMD) ARPDB. EPA's Acid Rain Program applies to both new and existing EGUs with an output capacity of greater than 25 megawatts and more than one-third of their output sent to the electrical grid. Under the Acid Rain Program, each unit must continuously measure and record its emissions of sulfur dioxide (SO_2), NO_X, and carbon dioxide (CO_2). In most cases, a continuous emission monitoring (CEM) system must be used. EGUs report hourly emissions data to the EPA on a quarterly basis. These data are stored in the Emissions Tracking System which serves as a repository of data for the utility industry. The EPA quality assures the raw hourly data and provides both datasets and a query wizard on the CAMD website for downloading the data. Missing or invalid hourly data that arise from CEM equipment problems are provided by the EPA using specific substitution criteria. Thus, EGU-reported data does not always match that from EPA's CAMD. The data can be downloaded by ORISPL (site) and Unit ID (point) for any state for any quarter. The user has several dataset options, as well as output options within some datasets. The website for these data is http://camddataandmaps.epa.gov/gdm/index.cfm?fuseaction=emissions.wizard.

Hourly data were downloaded from CAMD for Texas and all other states within the modeling domain for the 2006 episode for both the second and third calendar quarters, since the model uses a few days immediately before and after the episode. These are hereafter referred to as ARD (Acid Rain data) sources.

ARD emissions greatly improve the temporal resolution of the point source inventory because the ARD distinguishes between EGUs that operate throughout the day as baseload units and EGUs that operate more intermittently as peaking units. March 2010 HGB Appendix B, Section 2.1.6 describes in more detail, with examples, how the ARD are converted to hourly AFS emissions records.

Figure 1: Tileplot of DFW ARD NOX Emissions for 06 June 2006 is a tileplot of ARD NO_X emissions of the nine-county DFW area for a specific day modeled in the 2006 episode. The tileplot is used to graphically QA the modeled emissions. Reported on the tile plots are the emissions totals by county in the lower left hand corner and the corresponding diurnal profile of the sources in the lower right corner of the graphic. The colored/shaded tiles represent the quantity of emissions within that grid cell. A colored/shaded tile represents the ARD EGU NO_X tons for a modeled day's 4 km-by4 km grid cell within the DFW nine-county area.

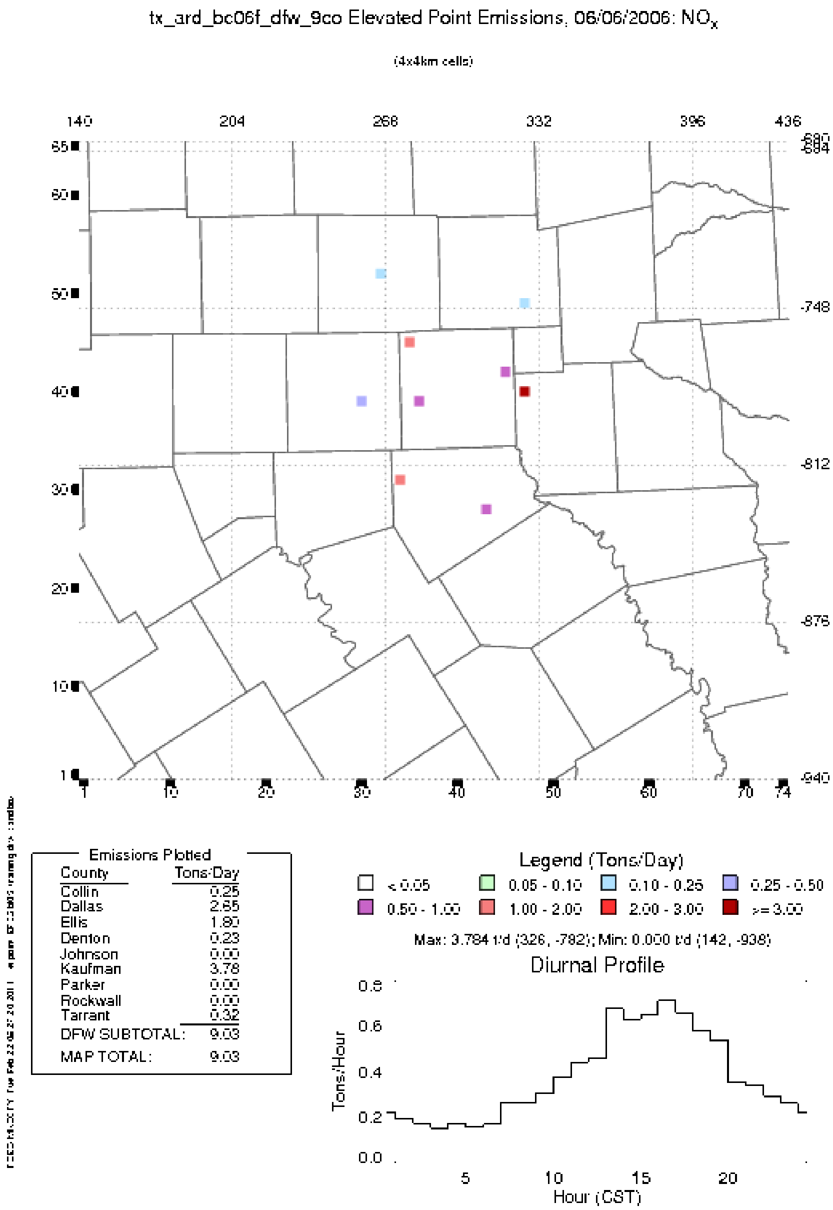

Figure 1: Tileplot of DFW ARD NO_X Emissions for 06 June 2006

2.1.1.6 2006 Tank Landing Loss (TLL) Survey in HGB

As a result of a Texas Air Quality Study II (TexAQS II) remote sensing VOC project in July 2005, large storage tanks in specific service (e.g., tanks-for-hire at terminal facilities and crude oil breakout stations) in the Houston Ship Channel (HSC) area were found to be landing their floating roofs (internal and external) on the tank legs and not reporting those vapor space losses. As a result, a TCEQ Chapter 115 rule was written that limits the number of permissible convenience roof landings. Additional details about the under-reported VOC emissions and data development for modeling are in the March 2010 HGB Appendix B, Section 2.1.1.7.

For this SIP revision, the baseline average hourly TLL VOC emissions used are the same as those modeled and described in March 2010 HGB Appendix B, Sections 2.2.1.2.

2.1.1.7 Emissions Inventory Reconciliation in HGB (aka, HRVOC Reconciliation, Extra Olefins)

EI Reconciliation is the process by which the reported EI is adjusted so that modeled emissions more closely match the VOC concentrations measured during the episodes. TexAQS II confirmed the need for this, as TexAQS 2000 first affirmed. VOC, and especially HRVOC, continue to be under-reported in the annual EIQs, according to monitors and aircraft measurements.

In previous SIP revisions, the TCEQ generated an "extra olefins" file to add to the modeling EI to account for the under-reporting. The details of this Potential Source Contribution Function (PSCF) technique are provided in March 2010 HGB Appendix B, Attachment 1: *Reconciling Reported VOC Emissions with Ambient Measurements*. The reconciled extra emissions were placed at a single pseudo point in each affected modeling cell, in modeling cells that contain point sources, and assigned an emission rate for each HRVOC to best offset the difference between modeled and calculated concentrations. A new VOC AFS record was created for each pseudo point source. The pseudo point source was placed in the middle of each affected cell and assigned default stack parameters (e.g., 5.0 meter stack height). Since these reconciled points do not exist in the STARS database, unique plant, stack and point identifiers were assigned to new speciation cross reference and profile files. The profiles were individually determined during the PSCF procedure, and EPS3 processing was performed for these data separately. The PSCF version 3 file used in the March 2010 HGB SIP was used in this modeling.

2.1.2 <u>Regional (Outside of Texas) Point Sources</u>

This section and its subsections discuss the point source modeling emissions development for all areas outside of Texas within the modeled CAMx domain. The modeled Regional area includes the following parts:

- Oklahoma, Arkansas, and Louisiana (three adjacent states within the modeling domain);
- Remaining U.S. (within the modeling domain);
- Offshore (Gulf of Mexico);
- Mexico; and
- Canada.

The level of detail applied to the development of the modeling emissions decreases with distance from Texas, in general. Each region was modeled using a different source of EI data.

2.1.2.1 States Adjacent to Texas

The states adjacent to Texas within the modeling domain include Oklahoma, Arkansas, and Louisiana. The TCEQ contacted each to obtain point source emissions data files representative of June 2006.

Emissions data from other states are generally reported as annual emissions, whereas the Texas STARS emissions can be extracted as average OSD. Ozone season data were used, if provided. When only annual data were provided, daily emission records were generated from the annual data, to be consistent with other datasets.

For this SIP revision, the TCEQ used the same adjacent states point source files that were used for the March 2010 HGB SIP: Louisiana Department of Environmental Quality (LDEQ) 2004 point source annual emissions inventory, and Oklahoma of Environmental Quality (ODEQ) and Arkansas Department of Environmental Quality (ADEQ) 2005 point source annual emission inventories. The March 2010 HGB Appendix B, Section 2.1.2.1, describes the data and processes used.

2.1.2.1.1 Hourly Acid Rain Substitution

The TCEQ replaced the original emission records with hourly records for all the Acid Rain EGUs in the adjacent states, as well as the nation by matching the ARD identifiers, ORISPL and Unit ID. The AFS records that the LDEQ supplied did not have the acid rain identifiers, so the 2002 NEI was used as the cross reference.

The TCEQ downloaded all of the hourly acid rain data from EPA's CAMD query website. Because the 2002 NEI was used for EGU identifiers for Louisiana, the 2006 CAMD queries included some new EGUs (i.e., post 2002). For these new units, the TCEQ was able to manually match some of the new EGUs by site name. For the remainder, the TCEQ created AFS records and assigned new EGUs with default stack parameters to the nearest town. The corresponding hourly VOC and CO records for matched EGUs were generated using their VOC-to-NO_X and CO-to-NO_X ratios. For unmatched points in each state, the TCEQ used VOC and CO ratios larger than roughly two-thirds of the ratios across the state to calculate hourly VOC and CO records.

This procedure resulted in a daily OSD AFS file for each state and an hourly ARD AFS file for each state. The TCEQ compared AFS emission totals to the ARD for each state, making sure all emissions for each were assigned to points within each state. Next, the TCEQ compared AFS and ARD emissions for each day of the episode to make sure that all of the emissions were distributed over the entire episode

ARD NO_X emissions for the adjacent states for a specific episode day modeled in 2006 are shown in:

- Figure 2: Tileplot of Louisiana ARD NO_X Emissions for 14 June 2006,
- Figure 3: Tileplot of Arkansas ARD NO_X Emissions for 14 June 2006, and
- Figure 4: Tileplot of Oklahoma ARD NO_X Emissions for 14 June 2006.

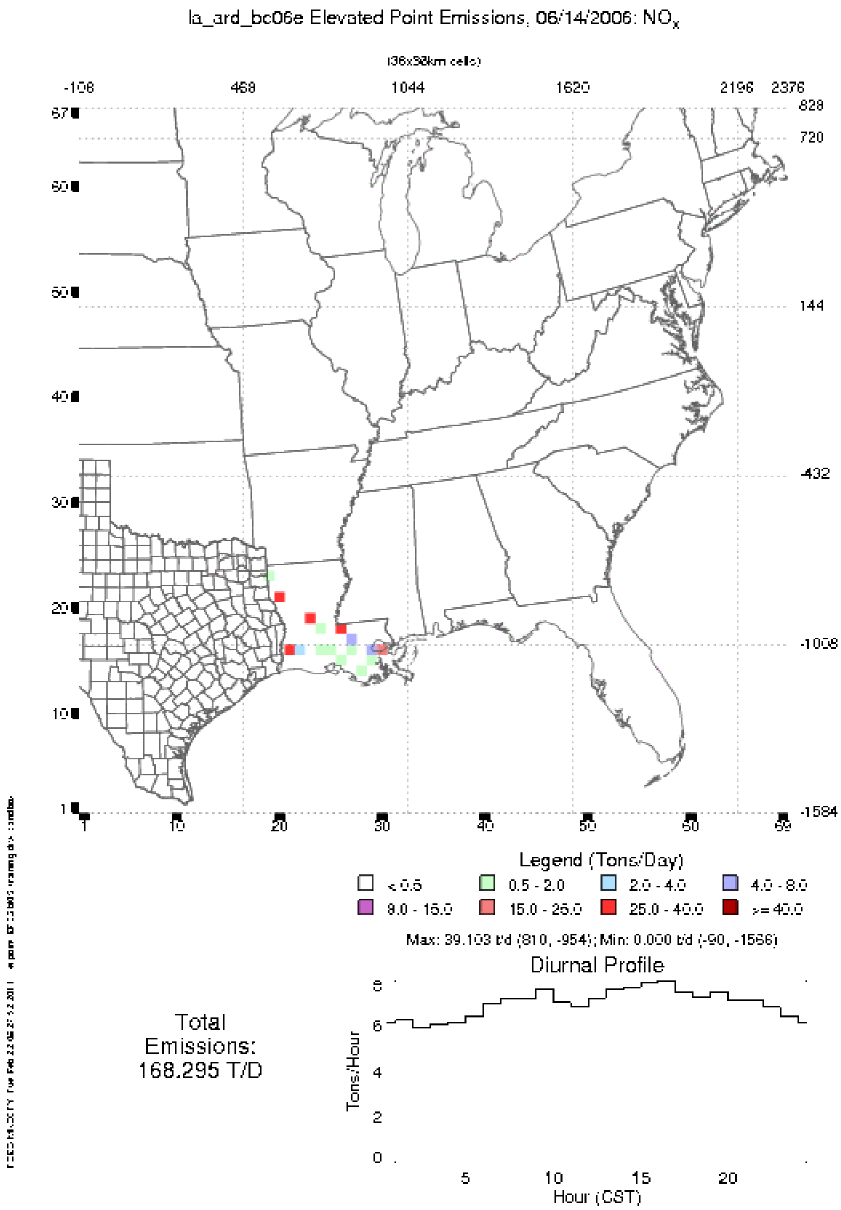

Figure 2: Tileplot of Louisiana ARD NO_X Emissions for 14 June 2006

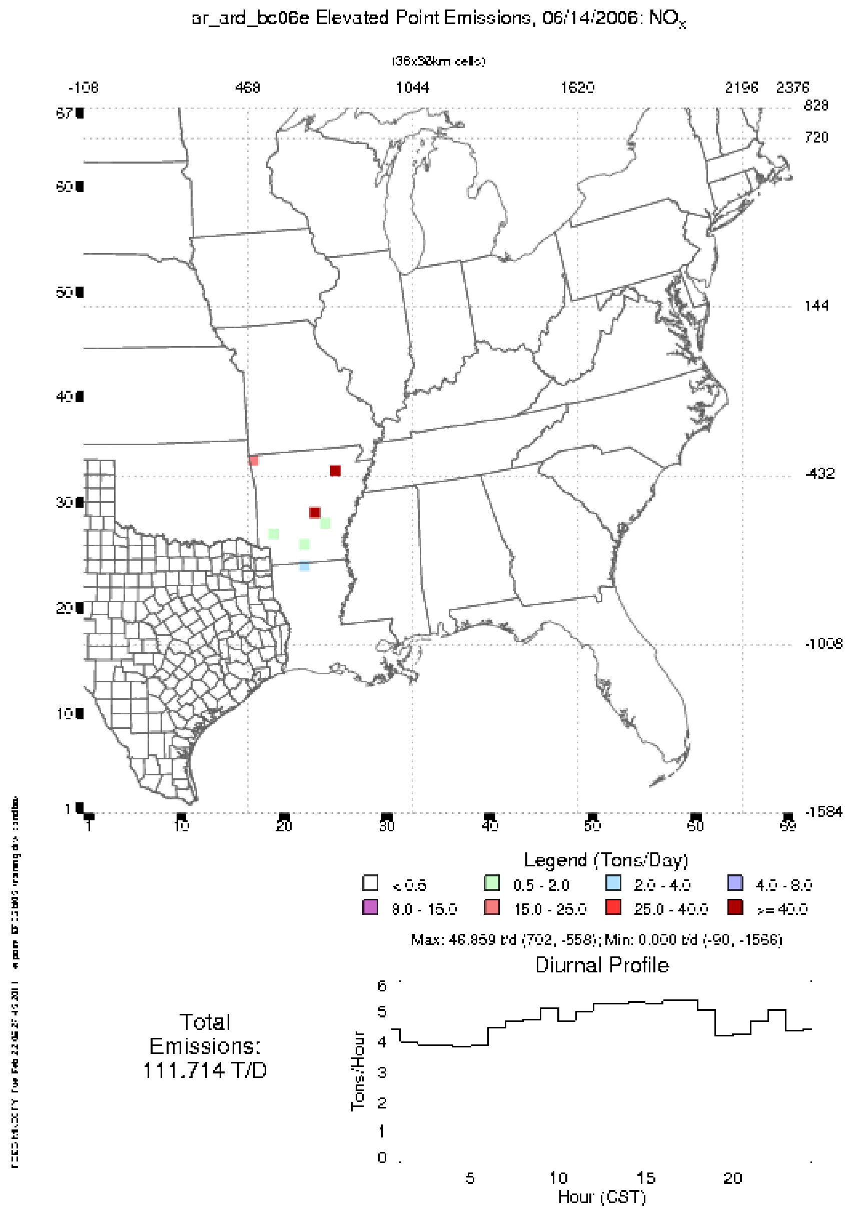

Figure 3: Tileplot of Arkansas ARD NO_X Emissions for 14 June 2006

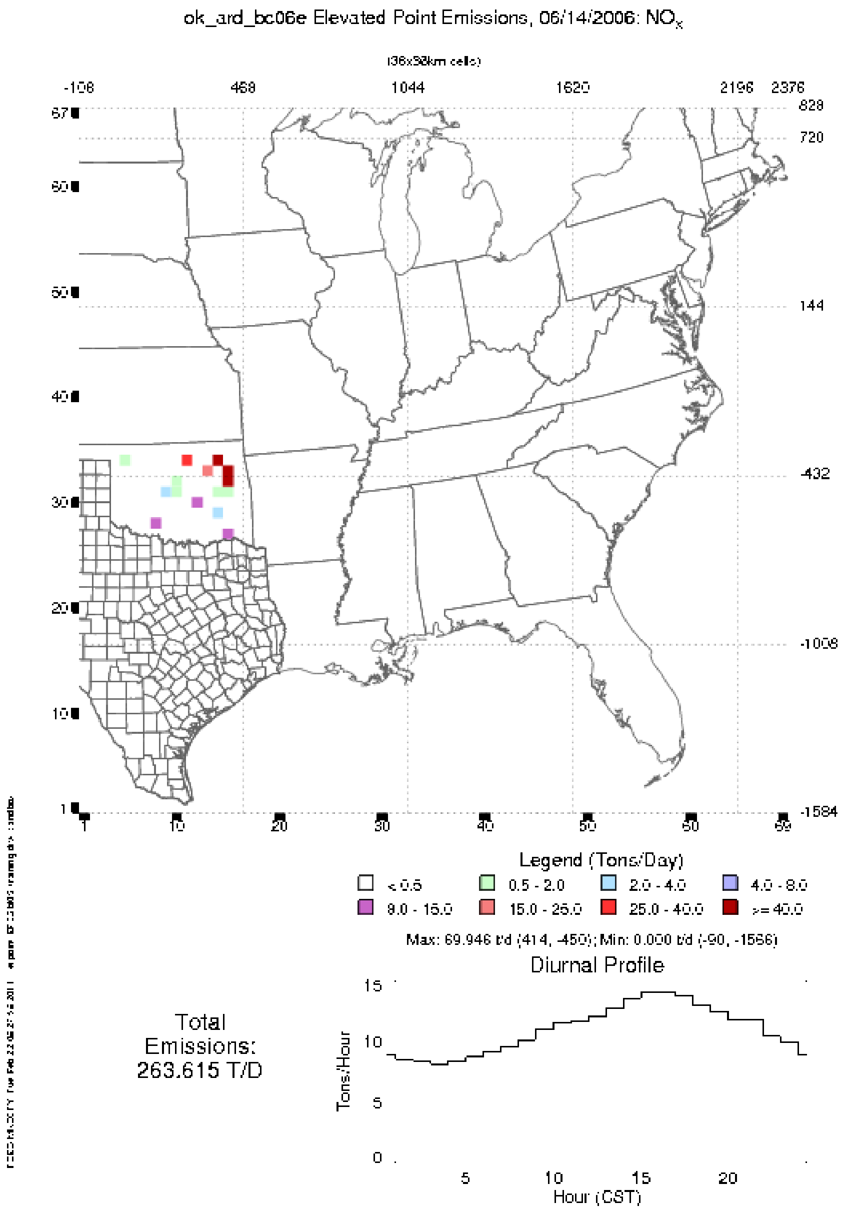

Figure 4: Tileplot of Oklahoma ARD NO_X Emissions for 14 June 2006

2.1.2.2 Remaining States in Modeling Domain

The 2006 EI for the remaining states within the modeling domain were developed from 2002 data files provided by the CenRAP and included all of the RPOs data for the nation, as used for Regional Haze SIP modeling. The TCEQ received the inventory data from CenRAP on a hard drive in Inventory Data Analyzer (IDA) format, a format suitable for Sparse Matrix Operator Kernel Emissions (SMOKE) processing. The TCEQ extracted the “final 2002 Base g Typical (typ02f)” annual emissions data. Emissions were reported as typical for 2002 and were grown to 2006. The TCEQ used EPA’s EGAS5 growth factors with a FIPS SCC configuration as was performed for the adjacent states. An AFS-formatted file including all necessary and relevant modeling parameters was produced for EPS3 processing. Resulting ARD NO_X emissions for the remaining states for a specific episode day modeled in 2006 are shown in Figure 5: Tileplot of Remaining States ARD NO_X Emissions for 14 June 2006.

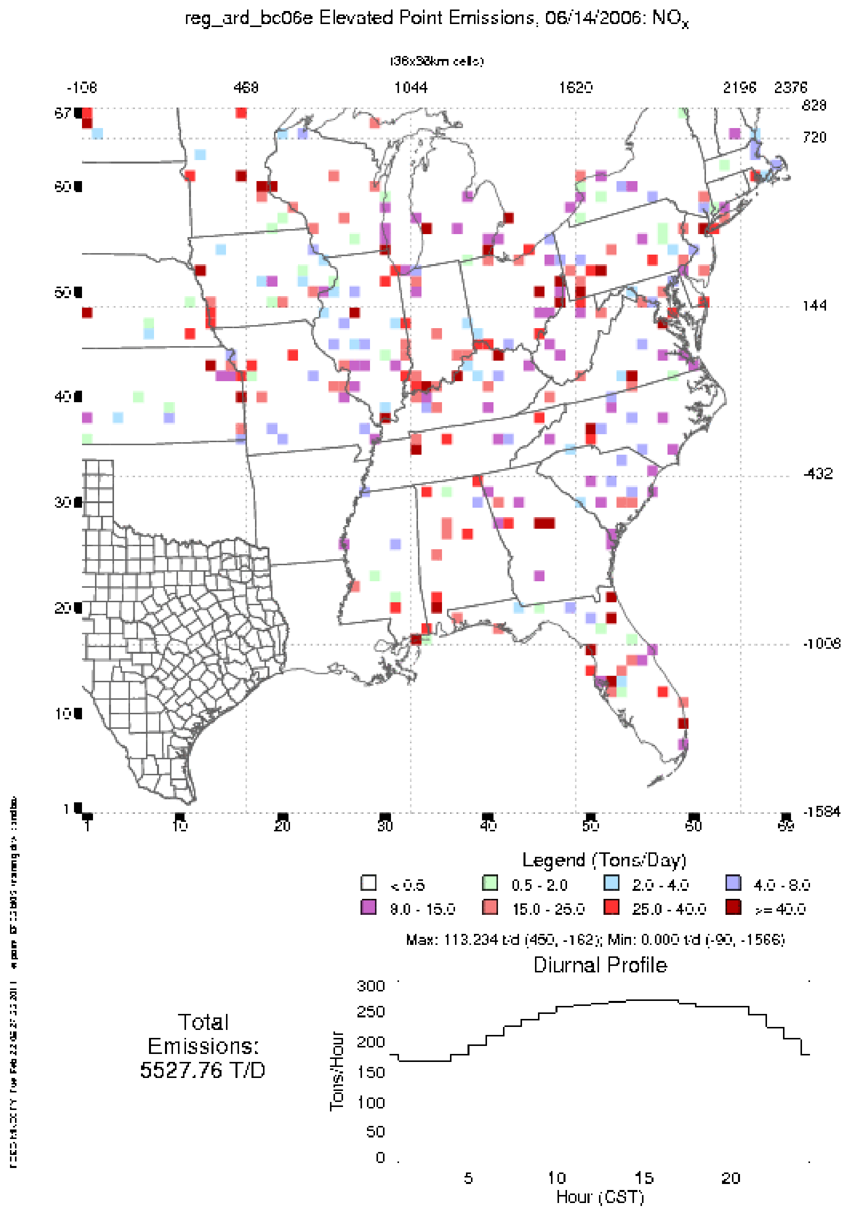

Figure 5: Tileplot of Remaining States ARD NO_X Emissions for 14 June 2006

Details on AFS file creation from the RPO files, including QA, Acid Rain substitution, speciation and temporal allocation, are available in the March 2010 HGB Appendix B, Section 2.1.2.2.

2.1.2.3 Offshore Point Sources

The TCEQ obtained the 2005 GWEI, developed by Eastern Research Group (ERG) under contract to the Minerals Management Service (MMS). This was a significant update to the 2000 GWEI modeled in previous SIP revisions. The report and data are divided into two parts, oil and gas exploration and production platform (point) sources and non-platform (area) sources. The TCEQ obtained the 2005 GWEI data and documentation from MMS in Microsoft Access (zipped) and PDF format, respectively. These can be downloaded from the MMS webpage, http://www.gomr.mms.gov/homepg/regulate/environ/airquality/gulfwide_emission_inventory/2005GulfwideEmissionInventory.html. The offshore emissions are illustrated in Figure 6:

Tileplot of Offshore NO_X for a representative June day and Figure 7: Tileplot of Offshore VOC for a representative June day.

The March 2010 HGB Appendix B, Section 2.1.2.3 discusses the formatting of the data, QA, justification for using June 2005 as representative data, and creation of temporal profiles.

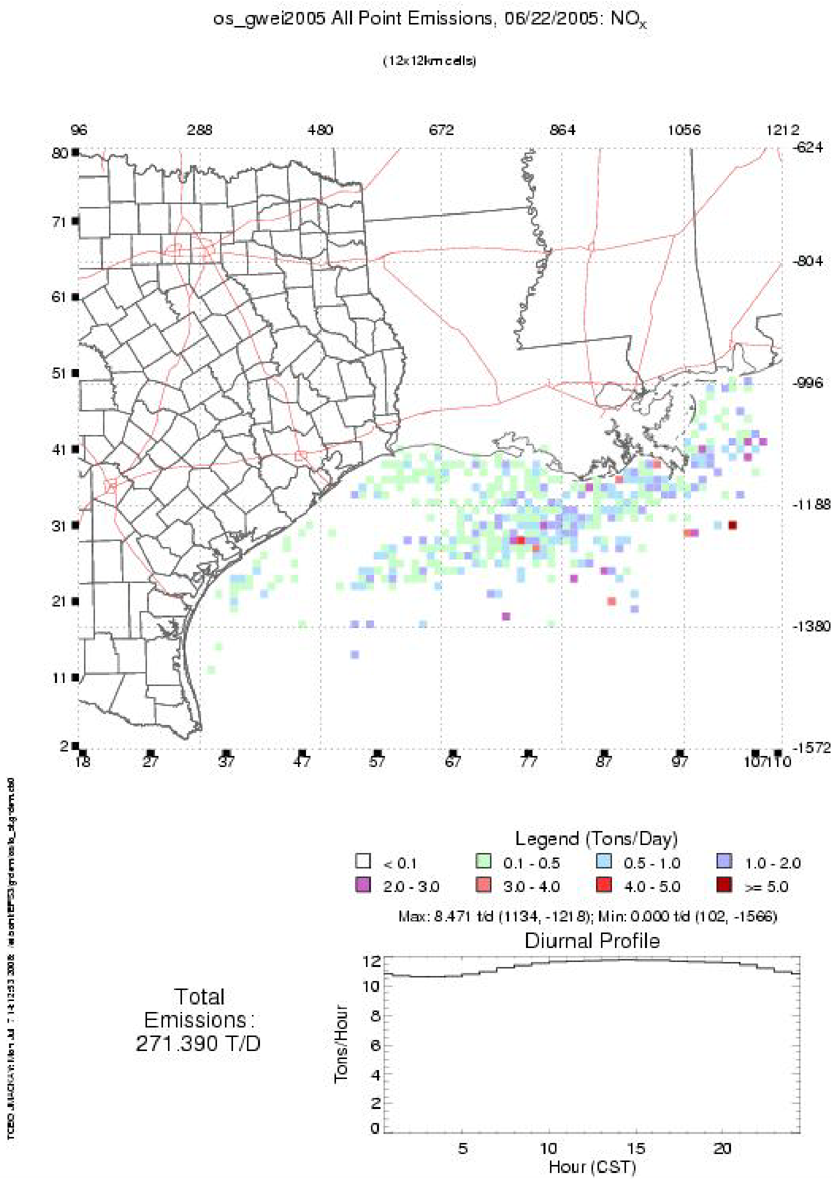

Figure 6: Tileplot of Offshore NO_X for a representative June day

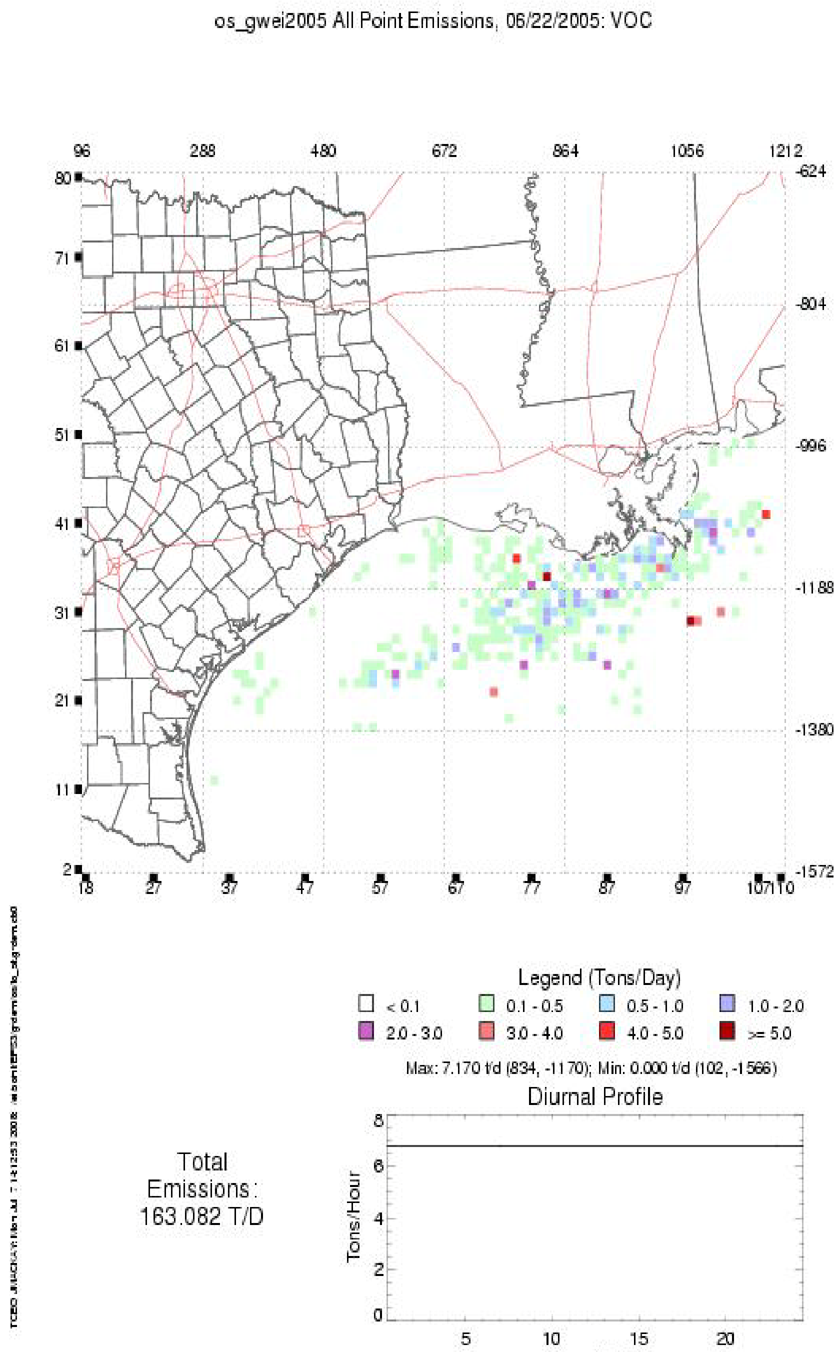

Figure 7: Tileplot of Offshore VOC for a representative June day

2.1.2.4 Mexican Point Sources

The TCEQ used the data from Phase III of the 1999 Mexico NEI, which is the most current data used by EPA and the RPOs. The TCEQ downloaded the NIF format versions of the files from http://www.epa.gov/ttn/chief/net/mexico.html and parsed the files into AFS files.

The 1999 data were used for the 2006 episode without growth because there is no information on growth and controls for Mexican point sources. No temporal allocation or speciation data were available, so defaults were used.

Figure 8: Tileplot of representative Mexican OSD NO_X and Figure 9: Tileplot of representative Mexican OSD VOC are tileplots of Phase III of the 1999 Mexico NEI for a representative OSD.

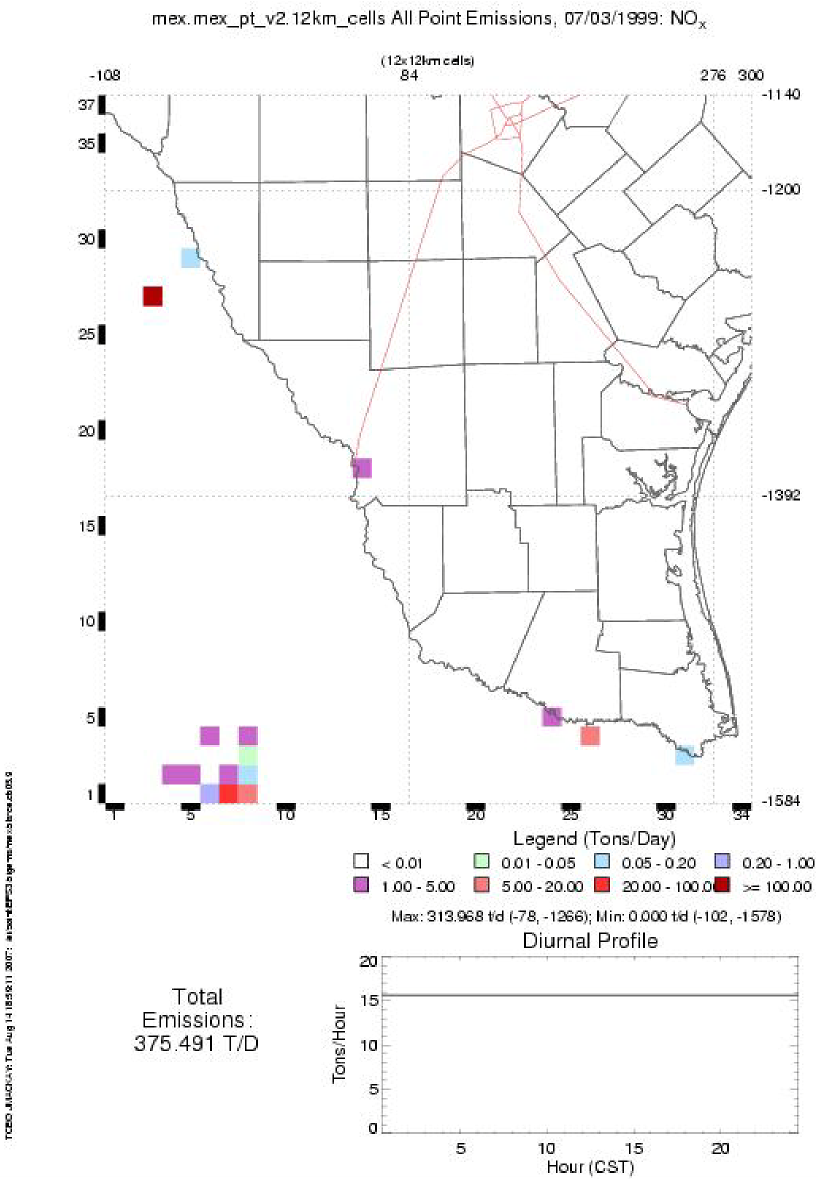

Figure 8: Tileplot of representative Mexican OSD NO_X

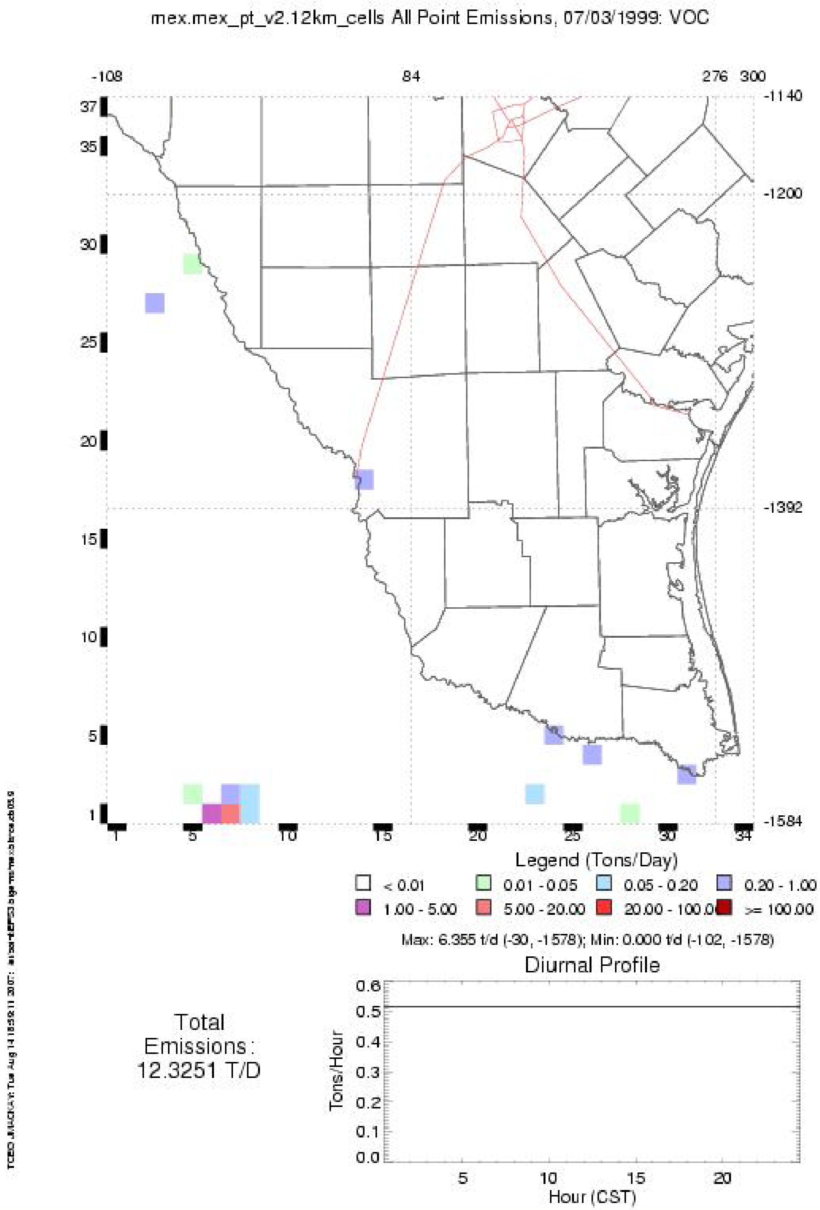

Figure 9: Tileplot of representative Mexican OSD VOC

2.1.2.5 Canadian Point Sources

In the CAIR 2001 base case modeling, the EPA used a Canadian point source dataset based on a 1995 Canadian EI. These are the most recent Canadian emissions data available. The TCEQ extracted these data from EPA's IDA-formatted SMOKE data files and converted them to AFS records for further processing with EPS3. The only part of Canada within the modeling domain is the southern part of Ontario province.

The TCEQ used these data for the 2006 episode without adjustment for growth or controls. No temporal allocation or speciation data were available, so defaults were used. This is the same Canadian dataset used for modeling in the March 2010 HGB Appendix B, Section 2.1.2.5.

2.1.3 Plume-in-Grid (PiG) Source Selection

CAMx provides the option to model selected point sources with a PiG algorithm. NO_X reaction chemistry is enhanced by treating these selected point source plumes as Lagrangian puffs. The TCEQ uses the GREASD PiG option in CAMx, which is most applicable to large NO_X plumes. The GREASD PiG option was used for all point sources that met the criteria in Table 5: Summary of PiG Thresholds Chosen.

Table 5: Summary of PiG Thresholds Chosen

Modeled Area	NO_X Threshold (tpd)
Texas	5.0
Adjacent States (LA, AR, OK) & Mexico	7.5
Next ring of States (MS, etc)	10.0
Next distant ring of States (AL, etc)	15.0
Other States, Canada & Offshore	25.0

The NO_X threshold of 5.0 tons per day (tpd) in Texas denotes that any individual stack or co-located group of nearby stacks that totaled 5.0 or more tpd of NO_X emissions on an episode day were tracked as a PiG source. If multiple stacks were close enough together for their plumes to merge (within 200 meters of each other), and the aggregate NO_X emission rate for the cluster exceeded the threshold value, a new source was created with the combined NO_X emission rate of the cluster, and this source was flagged for PiG treatment. The stack parameters of the new source became an average of the stack parameters of all of the sources in the cluster. The TCEQ modeled both individual PiGs and combined PiGs within each of the modeled areas of Table 5. The EPS3 module, PiGEMS, provides a summary of the PiG treatment. There were a total of 255 PiG sources chosen for the entire domain, 212 of which are co-located combined new stacks.

2.1.4 Summary of June 2006 Base Case Point Sources

Snapshots of the point source emission files processed with EPS3 for CAMx in each episode are presented in Table 6: Base Case AFS File for the DFW June 2006 Episode. The version number on each dataset indicates a change from the previous version (e.g., “v8”). The regional AFS file for the GWEI contains monthly emissions for June only and the regional AFS file for Canadian emissions contains annual emissions. The FTP download site for these files (or their successors) is ftp://amdaftp.tceq.texas.gov/pub/DFW8H2/ei/basecase/point/.

Table 6: Base Case AFS File for the DFW June 2006 Episode

Area	AFS Point Source Emissions File	Hourly	Daily	Special
Texas	afs.osd_2006_STARS_extract_for_31May_ard_episode.v4		X	
Texas	afs.ard_31May_to_02Jul06_TX_episode_v5	X		
Texas	afs.aggVOC_extra_alkenes_for_2006_v3		X	
Texas	afs.landing_losses_3Q06_aver_day_episode_v1		X	
Regional	USA_osd_2006_for_3Q06_generic_from_2006CENRAP.v2		X	
Regional	afs.USA_regional_ard_sansTX_31May_to_02Jul06_episode_v2	X		
Regional	afs.gwei2005.May_Oct_edit.3pol.lcp			Monthly
Regional	afs.Mexico_from_updated_1999_NEI.lcp_3pols_v1		X	
Regional	afs.CAIRCanada.2001.v1a.latlong.lcp			Annual

The TCEQ chose the second Wednesday of the June 2006 episode as a representative day for reporting base case emissions totals. Table 7: 2006 DFW Base Case Episode Day (June 14, 2006) Emissions Summary summarizes emissions for that day.

Table 7: 2006 DFW Base Case Episode Day (June 14, 2006) Emissions Summary

Emissions Source	DFW NO_X (tpd)	DFW VOC (tpd)	TX minus DFW NOX (tpd)	TX minus DFW VOC (tpd)	U.S. minus TX NO_X (tpd)	U.S. minus TX VOC (tpd)
Non-EGUs (OSD)	41.6	40.0	703.1	562.3	7645	3331
EGUs (ARD)	7.6	0.7	516.7	32.7	6156	46
Tank Landing Losses				6.6		
HRVOC Reconciliation				19.3		

2.2 2006 Baseline Point Source Modeling Emissions Development

The 2006 point source emissions used in the base case are specific to individual days and hours, for the Acid Rain EGU portion of the EI. For the baseline case, the TCEQ created files that represent a typical ozone season (summer) day in 2006. The subsections that follow discuss how the baseline emissions differ from the base case.

2.2.1 Texas Point Sources

2.2.1.1 Ozone Season Daily (OSD)

The OSD point source emissions for the typical 2006 baseline day are the same as the 2006 base case OSD emissions, as these are the average OSD emissions extracted from STARS.

Table 8: 2006 Baseline OSD Emissions in Texas shows the modeled ozone precursor 2006 baseline totals for point sources in the DFW nine-county nonattainment area (NAA), HGB, and the rest of Texas.

Table 8: 2006 Baseline OSD Emissions in Texas

Area	NO_X #points	NO_X tpd	VOC #points	VOC tpd
DFW	1,535	41.61	4,810	39.95
HGB	5,194	125.39	26,343	196.28
Rest of TX	10,168	577.75	30,380	365.97

Some points in Texas are outside the modeling domain, for example, points in west Texas. The "#points" entry in Table 8 is the total number of point sources in that area. Emissions were summed within the area to give the area emissions total. The TCEQ typically eliminates zero emissions records, and the EPS3 processor drops VOC records with zero emissions because they do not have a speciation cross reference.

2.2.1.2 Hourly Acid Rain Data (ARD) Point Sources

To develop an Acid Rain EGU baseline, the TCEQ averaged the Acid Rain NO_X for each hour of the day for each unit for the third quarter of 2006 (July 1 through September 30). These data records represent the typical ozone season day that maintains the temporal profile of the individual units. Corresponding hourly average CO and VOC emissions were calculated from STARS OSD, stack-specific emissions by multiplying $CO:NO_X$ and $VOC:NO_X$ ratios by the hourly

NO_X rate for each acid rain unit. The approach is consistent with what was modeled for the EGU baseline for the March 2010 HGB SIP revision. A summary of the ARD emissions for the state is presented in Table 9: 2006 Baseline Hourly Texas Acid Rain EGU Emissions. The tabulated hourly emissions values are the sum of emissions for all point sources in each NAA and the remainder of the state, although some of the point sources in the attainment areas of Texas are outside of the modeling domain. All hourly values were rounded to two decimal places.

Table 9: 2006 Baseline Hourly Texas Acid Rain EGU Emissions

Hour	DFW NO_X tph	DFW VOC tph	DFW CO tph	HGB NO_X tph	HGB VOC tph	HGB CO tph	Rest of TX NO_X tph	Rest of TX VOC tph	Rest of TX CO tph
1	0.24	0.02	0.11	1.51	0.10	1.13	17.34	0.88	32.13
2	0.22	0.02	0.10	1.47	0.10	1.12	16.63	0.84	31.62
3	0.21	0.02	0.10	1.45	0.10	1.10	16.28	0.82	31.29
4	0.21	0.02	0.09	1.45	0.10	1.11	16.31	0.82	31.36
5	0.23	0.02	0.10	1.58	0.11	1.25	17.07	0.89	31.56
6	0.21	0.02	0.10	1.56	0.10	1.19	16.84	0.90	31.26
7	0.21	0.02	0.10	1.59	0.11	1.19	18.77	1.07	32.75
8	0.25	0.02	0.12	1.59	0.11	1.20	18.12	0.98	32.89
9	0.33	0.02	0.15	1.69	0.11	1.25	19.00	1.05	33.71
10	0.36	0.03	0.17	1.84	0.12	1.35	19.94	1.10	34.42
11	0.40	0.04	0.20	2.07	0.14	1.54	20.86	1.13	34.96
12	0.45	0.05	0.25	2.32	0.15	1.77	22.01	1.17	35.38
13	0.53	0.06	0.31	2.60	0.17	2.04	23.30	1.20	35.73
14	0.58	0.06	0.34	2.74	0.18	2.17	24.52	1.24	36.01
15	0.63	0.07	0.37	2.83	0.18	2.25	25.52	1.28	36.44
16	0.63	0.07	0.38	2.81	0.18	2.23	25.97	1.30	36.65
17	0.61	0.06	0.36	2.75	0.18	2.13	25.34	1.27	36.43
18	0.55	0.06	0.32	2.59	0.16	1.91	24.12	1.23	36.02
19	0.49	0.05	0.29	2.39	0.15	1.74	22.75	1.19	35.56
20	0.45	0.05	0.27	2.26	0.15	1.69	21.98	1.15	35.23
21	0.41	0.04	0.23	2.09	0.14	1.57	21.14	1.12	34.88
22	0.37	0.03	0.19	1.80	0.12	1.36	20.30	1.08	34.56
23	0.30	0.03	0.15	1.64	0.11	1.24	19.11	1.02	33.83
24	0.27	0.02	0.13	1.56	0.11	1.19	18.12	0.96	32.98
TOTALS	9.14	0.88	4.93	48.20	3.18	36.70	491.34	25.71	817.65
#points	49	74	248	49	74	248	49	74	248

2.2.1.3 Tank Landing Loss (TLL) Survey

The 2006 baseline for floating roof TLL surveys was calculated as the average of the hourly emissions for each tank point source of the survey for all of the modeled episode days of 2006. This average was used for both the base case and baseline modeling. Details about these sources are available in the March 2010 HGB Appendix B, Section 2.2.1.4.

2.2.1.4 Emissions Inventory Reconciliation in HGB (aka, HRVOC Reconciliation, Extra Olefins)

The 2006 HRVOC Reconciliation emissions remain unchanged from the 2006 base case.

2.2.1.5 2006 Baseline Tileplots for Texas

Following are tileplots of 2006 baseline modeling emissions. Included are:

- Figure 10: DFW Elevated NO_X
- Figure 11: DFW Elevated VOC
- Figure 12: DFW Low-level NO_X
- Figure 13: DFW Low-level VOC
- Figure 14: HGB HRVOC Reconciliation
- Figure 15: HGB Tank Landing Losses VOC

The elevated and low-level tileplots show the DFW nine-county area, whereas the HGB-BPA gulf area can be seen in the TLL and HRVOC plots.

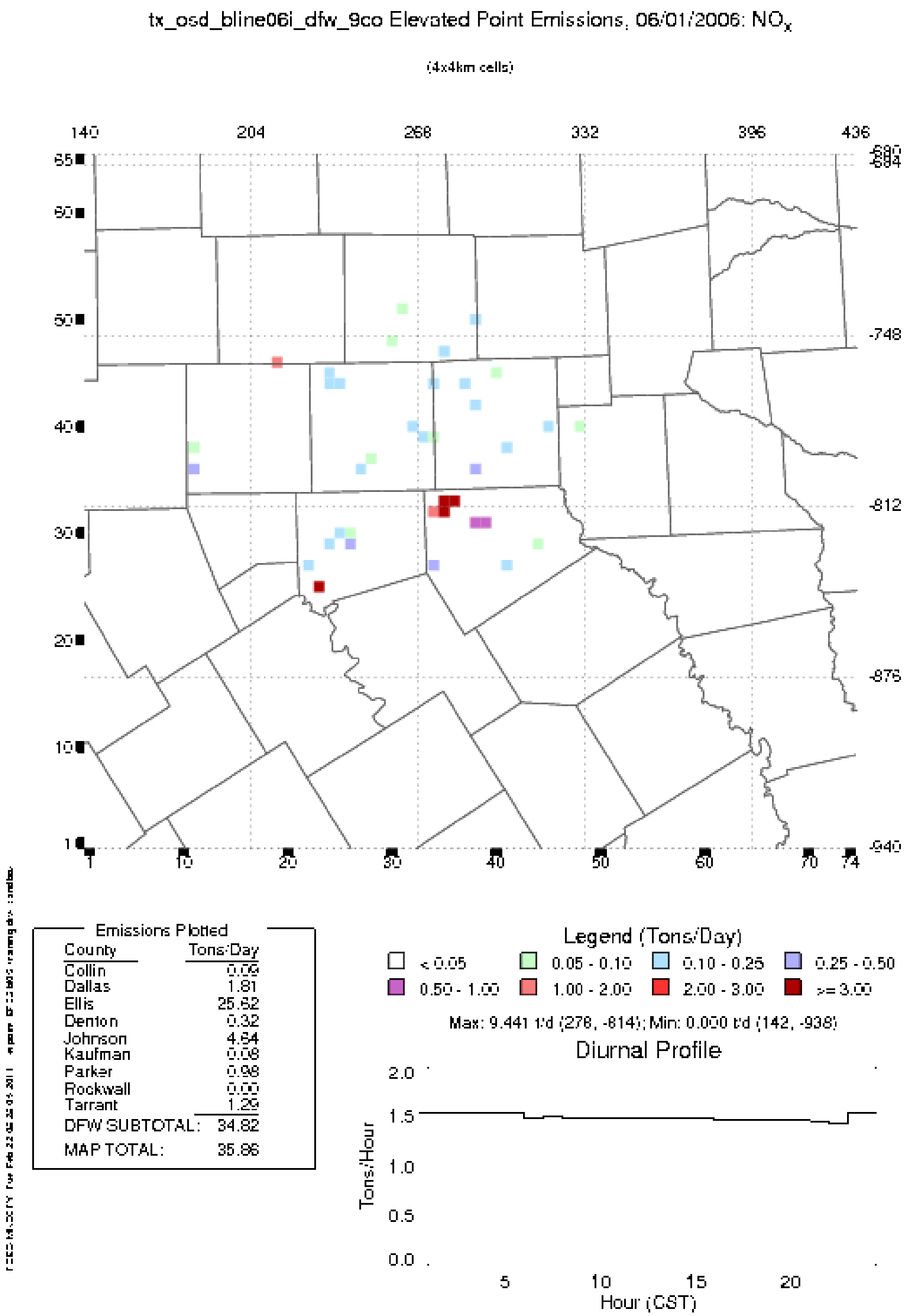

Figure 10: DFW Elevated NOx

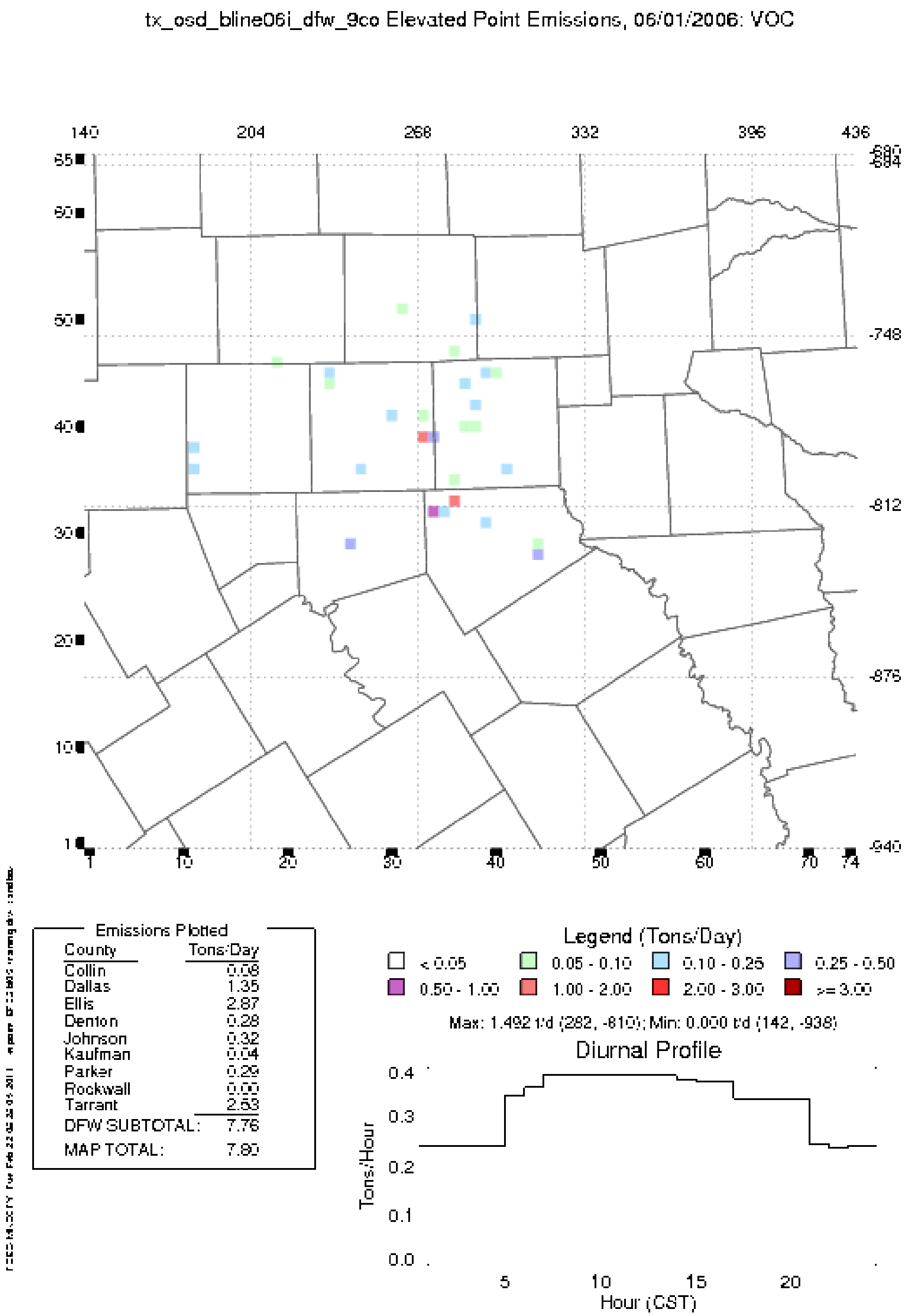

Figure 11: DFW Elevated VOC

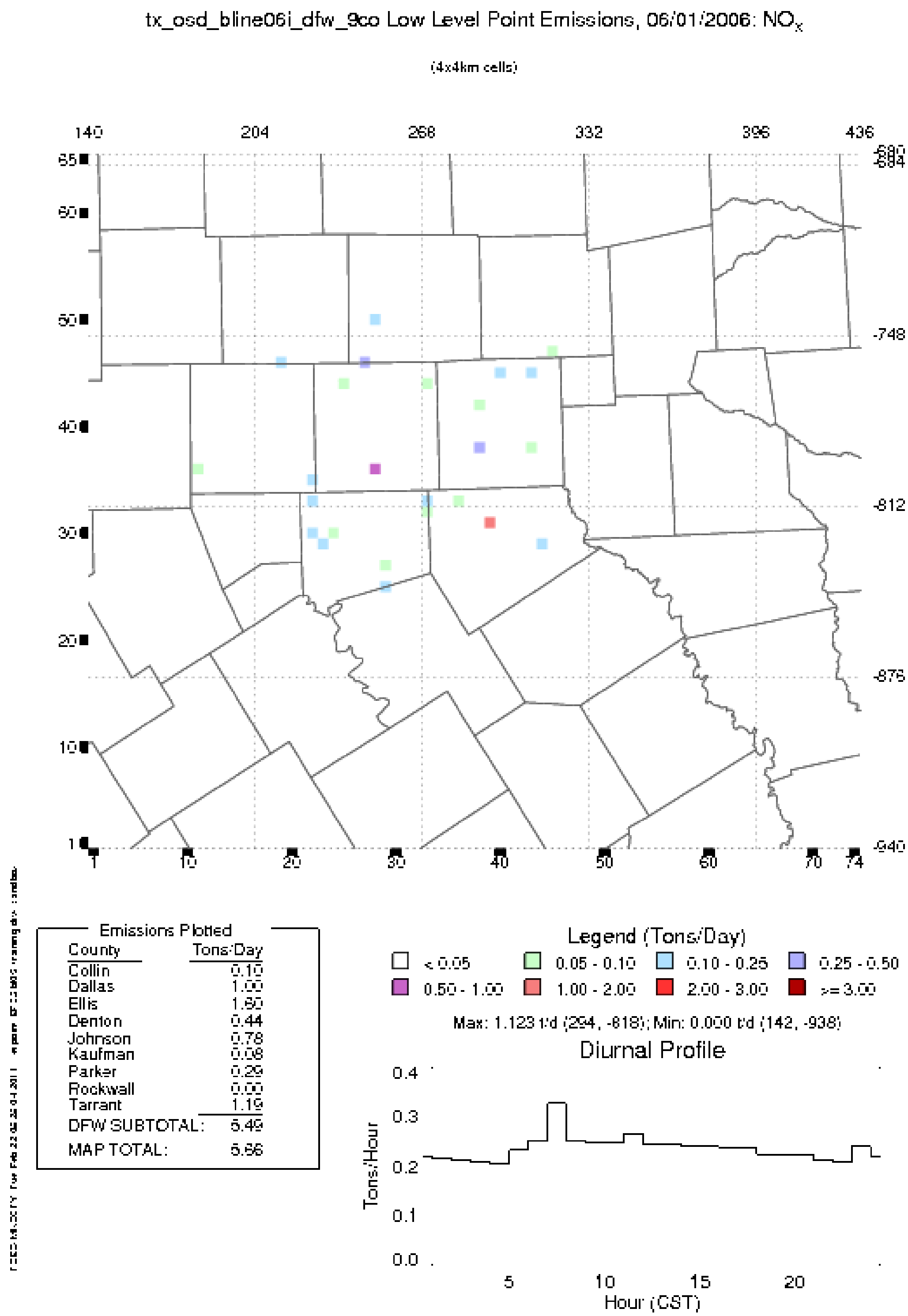

Figure 12: DFW Low-level NO_X

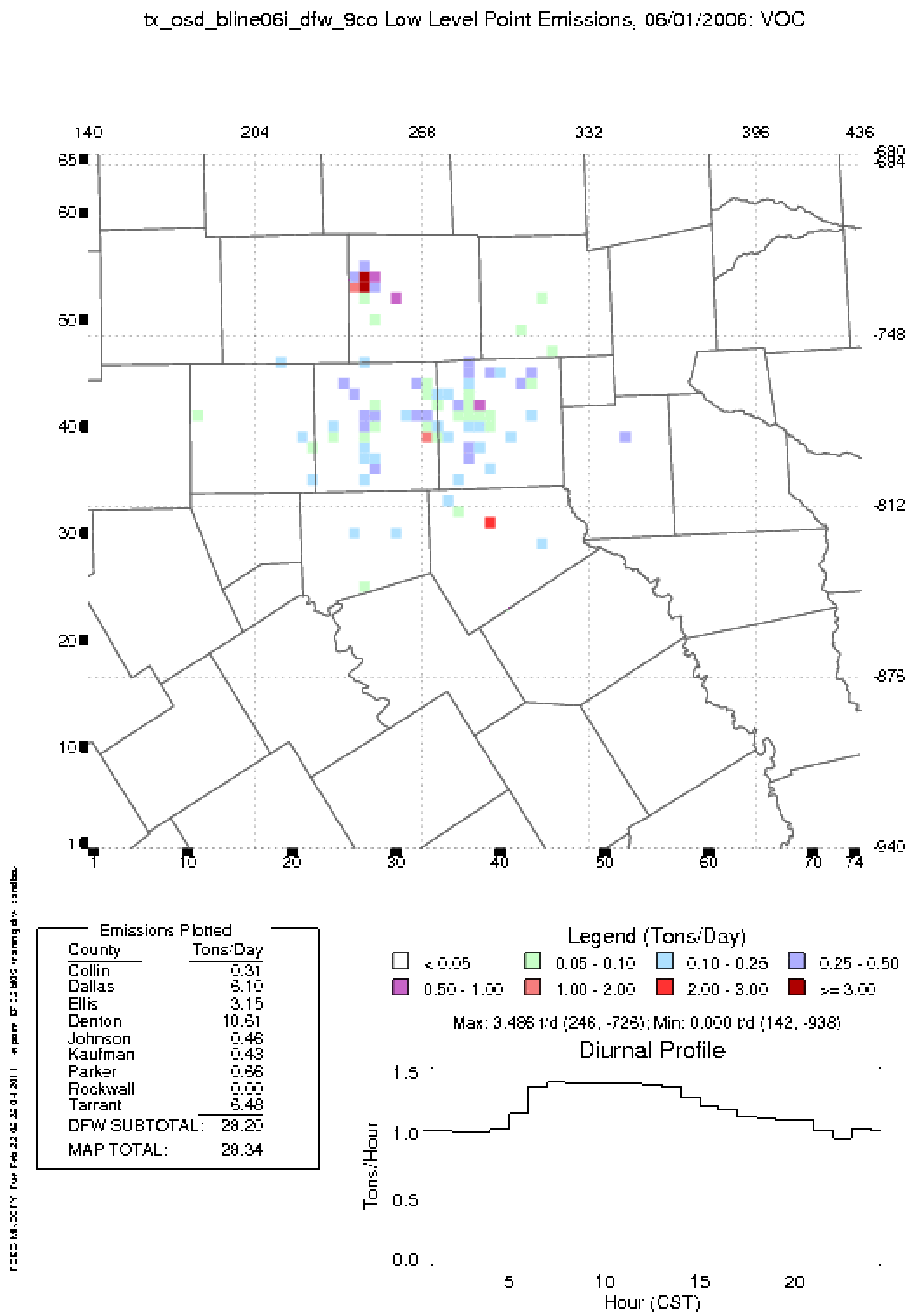

Figure 13: DFW Low-level VOC

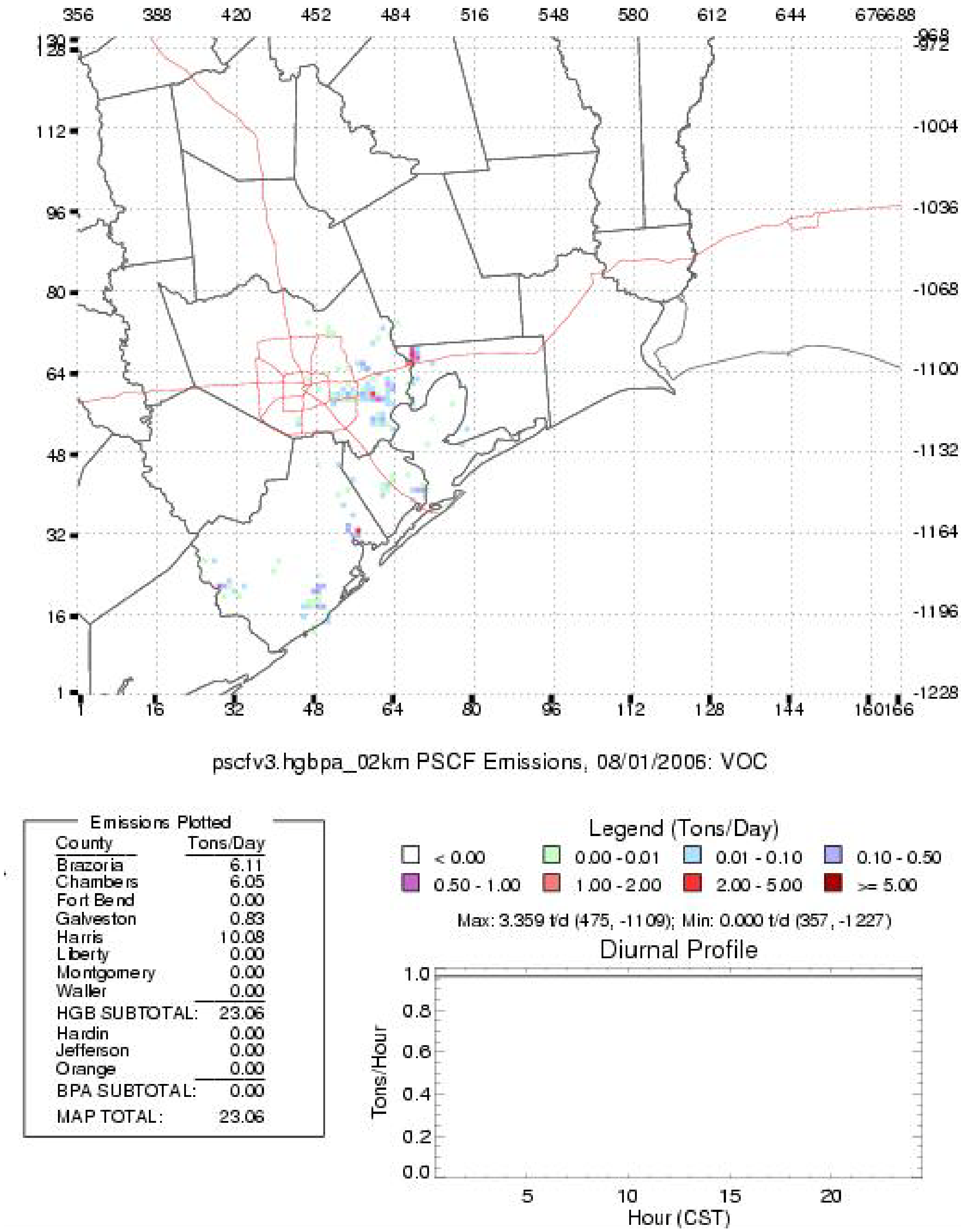

Figure 14: HGB HRVOC Reconciliation

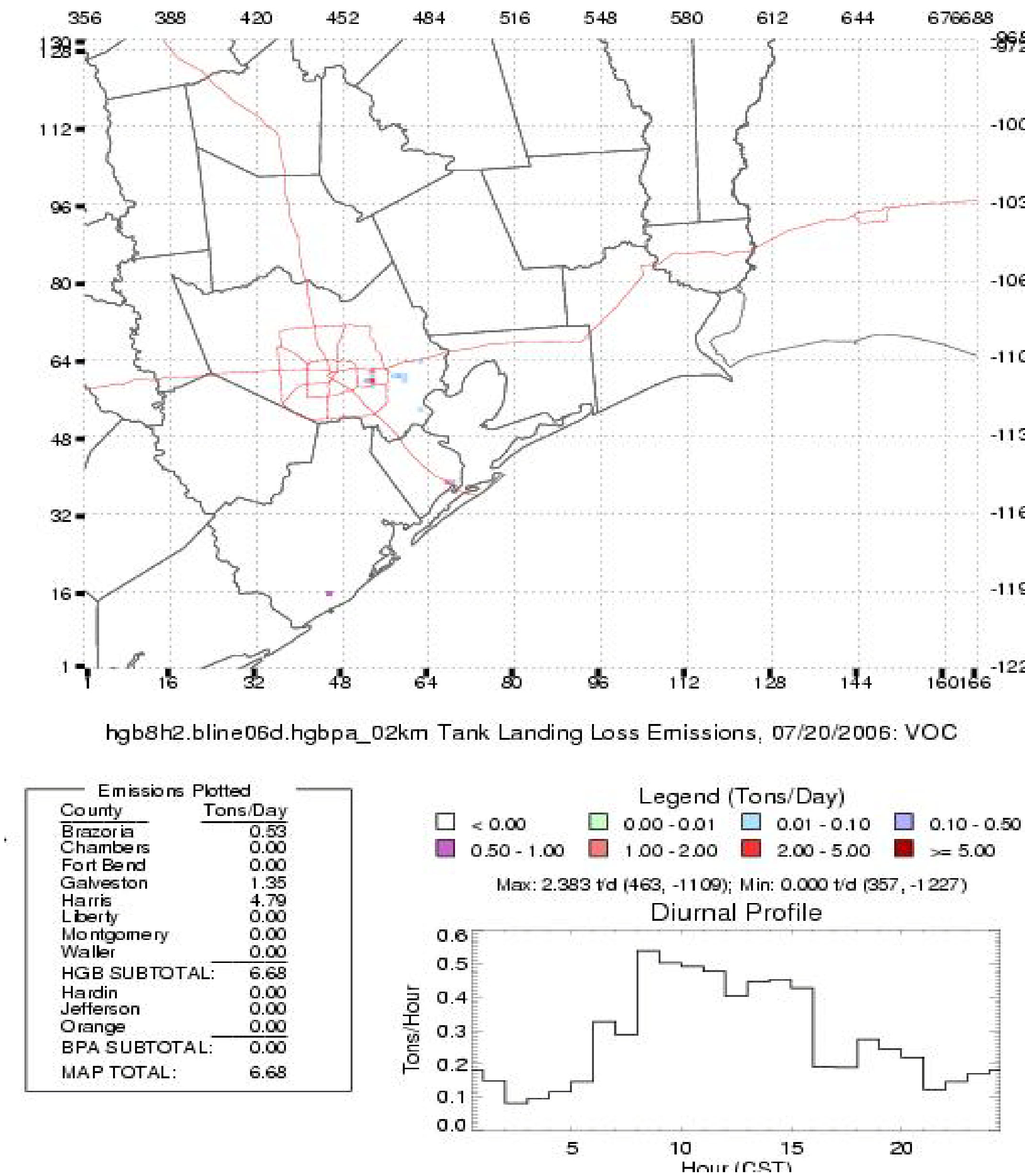

Figure 15: HGB Tank Landing Losses VOC

2.2.2 Outside Texas

2.2.2.1 Adjacent States and Regional States Non-Acid Rain

The TCEQ used the 2006 OSD (or calculated average day if only annual emissions were provided) base case records for the non-ARD 2006 baseline for states outside of Texas. For the three adjacent states, these data were from the 2006 base case with the Acid Rain units removed. For the regional states, the 2006 baseline was the base data (2002 CENRAP/RPO) grown to 2006 with the Acid Rain units removed.

Table 10: 2006 Baseline Emissions Summary for Non-ARD Points Outside of Texas summarizes the non-Acid Rain emissions for the 2006 baseline. The photochemical model may not use all of the records in the non-Acid Rain 2006 base case, since some states have a fraction of their area

outside of the modeling domain (e.g., the Oklahoma panhandle). EPS3 processing drops these from the modeling EI.

Table 10: 2006 Baseline Emissions Summary for Non-ARD Points Outside of Texas

STATE	# NO_X Points	NO_X tpd	# VOC Points	VOC tpd
Arkansas	1,036	82.14	2,063	101.00
Louisiana	4,090	658.30	7,538	234.24
Oklahoma	2,338	216.33	5,425	107.46
Other States, outside Texas	78,431	6687.87	159,614	2888.52

2.2.2.2 Adjacent States and Regional States Hourly Acid Rain

The 2006 baseline for the ARD sources of the other states is a calculated typical summer day with hourly emissions that are the average for each Acid Rain point source during the third quarter (July 1 through September 30) of 2006. VOC and CO emissions for each hour of the typical summer day come from the hourly NO_X emissions and the VOC:NO_X and CO:NO_X ratios, computed from the daily emissions data for each Acid Rain point.

Table 11: 2006 Baseline Hourly Emissions Summary for ARD Points Outside of Texas summarizes the 2006 baseline Acid Rain emissions within the TCEQ regional modeling domain outside of Texas. The peak hours of emissions, coinciding with peak electrical demand, for the Acid Rain EGUs are between hours 14 and 16. Only a fraction of the point source emissions in some states is modeled if part of that state is outside the modeling domain, e.g., parts of western Kansas.

Table 11: 2006 Baseline Hourly Emissions Summary for ARD Points Outside of Texas

Hour	AR NO_X tph	LA NO_X tph	OK NO_X tph	Rest of U.S. NO_X tph	AR VOC tph	LA VOC tph	OK VOC tph	Rest of U.S. VOC tph
1	4.60	6.16	9.16	212.40	0.06	0.12	0.11	1.33
2	4.31	5.99	8.82	203.02	0.05	0.12	0.11	1.27
3	4.04	5.91	8.63	196.78	0.05	0.11	0.10	1.22
4	3.98	5.90	8.55	195.59	0.05	0.11	0.10	1.21
5	4.09	6.04	8.79	202.39	0.05	0.12	0.11	1.26
6	4.23	6.38	8.97	214.08	0.05	0.12	0.11	1.35
7	4.40	6.44	9.18	223.93	0.06	0.12	0.12	1.42
8	4.88	6.54	9.48	236.27	0.07	0.13	0.12	1.51
9	5.15	6.69	9.96	249.91	0.07	0.13	0.13	1.62
10	5.24	6.88	10.67	261.96	0.07	0.13	0.13	1.71
11	5.14	7.37	11.46	270.53	0.07	0.14	0.15	1.79
12	5.19	7.78	12.22	276.32	0.07	0.15	0.16	1.85
13	5.19	8.30	12.90	280.17	0.07	0.17	0.16	1.89
14	5.24	8.60	13.42	282.40	0.07	0.17	0.17	1.92
15	5.25	8.71	13.62	283.57	0.07	0.18	0.17	1.94
16	5.21	8.63	13.85	283.84	0.07	0.17	0.18	1.93

Hour	AR NO_X tph	LA NO_X tph	OK NO_X tph	Rest of U.S. NO_X tph	AR VOC tph	LA VOC tph	OK VOC tph	Rest of U.S. VOC tph
17	5.14	8.30	13.60	282.80	0.07	0.17	0.17	1.91
18	5.08	7.88	13.10	279.06	0.07	0.16	0.17	1.87
19	4.95	7.53	12.45	275.43	0.06	0.15	0.16	1.82
20	5.00	7.30	12.09	274.55	0.07	0.15	0.15	1.80
21	4.85	6.95	11.66	269.02	0.06	0.14	0.15	1.74
22	4.69	6.67	10.95	256.44	0.06	0.13	0.14	1.64
23	4.68	6.50	10.31	240.88	0.06	0.12	0.13	1.53
24	4.71	6.39	9.70	224.86	0.06	0.12	0.12	1.42
TOTALS	115.23	169.84	263.54	5976.20	1.51	3.33	3.30	38.94
#points	43	96	75	1,351	43	96	75	1,351

2.2.2.3 Offshore, Mexico, and Canada

The Offshore 2005 GWEI, the 1999 Mexican NEI, and the 1995 Canadian baseline point source files are the same as the base case files, since they are already being modeled as an average day.

2.2.3 Summary of 2006 Baseline Point Sources

The point source emission files that were processed with EPS3 for CAMx for the baseline (typical summer day) are presented in Table 12: AFS Files for the 2006 Baseline. The regional AFS file for the GWEI contains monthly emissions for June only and the regional AFS file for Canadian emissions contains annual emissions. The version number on each dataset indicates a change from the previous version (e.g., "v2"). The FTP download site for the point source files or their successors is ftp://amdaftp.tceq.texas.gov/pub/DFW8H2/ei/baseline/point

Table 12: AFS Files for the 2006 Baseline

Area	AFS Point Source Emissions File	Hourly	Daily	Special
TEXAS	afs.ard_generic_episode_3Q06_aver_day.vDFW1	X		
TEXAS	afs.osd_2006_STARS_extract_for_31May_ard_episode.v4		X	
TEXAS	afs.landing_losses_3Q06_aver_day_episode_v1	X		
TEXAS	afs.aggVOC_extra_alkenes_for_2006_v3		X	
REGIONAL	afs.USA_mTX_ard_3Q06_aver_day.vDFW1	X		
REGIONAL	USA_osd_2006_for_3Q06_generic_from_2006CENRAP.v2		X	
REGIONAL	afs.gwei2005.May_Oct_edit.3pol.lcp			Monthly
REGIONAL	afs.Mexico_from_updated_1999_NEI.lcp_3pols_v1		X	
REGIONAL	afs.CAIRCanada.2001.v1a.latlong.lcp			Annual

Table 13: 2006 Baseline Point Source Emissions Summary summarizes the baseline emissions. These tabulated emissions are AFS totals input to EPS3. CAMx input values may differ. The TX minus DFW column includes some points in Texas outside the modeling domain. The U.S. minus TX column includes some points outside the modeling domain.

Table 13: 2006 Baseline Point Source Emissions Summary

Emission Source	DFW NO_X (tpd)	DFW VOC (tpd)	TX minus DFW NO_X (tpd)	TX minus DFW VOC (tpd)	U.S. minus TX NO_X (tpd)	U.S. minus TX VOC (tpd)
NEGUs (OSD)	41.6	40.0	703.1	562.2	7645	3331
EGUs (ARD)	9.1	0.9	539.6	28.9	6525	47
Tank Landing Losses				6.5		
HRVOC Reconciliation				19.3		

2.3 2012 Future Year Point Source Modeling Emissions Development

This section describes the development of the 2012 future year point source EI. The eight-hour ozone attainment date for an area classified as Serious is June 15, 2013. The modeled attainment year is 2012, the ozone season prior to the attainment date.

The baseline emissions are projected, i.e. they are grown to the attainment year and on-the-books controls (those that will be in place after the baseline year and prior to the attainment year) are applied. The on-the-books controls are controls for which enforceable emissions reductions rules have been written already; they are not additional proposed rules that result from this SIP revision. Proposed rules would be modeled in a 2012 control strategy EI or as part of Reasonably Available Control Measure (RACM) analyses. The 2012 future base EI provides the basis to determine if attainment has been reached and is the starting point for any 2012 control strategy testing, if required.

This future year baseline point source EI has been projected from the 2006 point source baseline EI, with the exception of the Texas EI.

2.3.1 Attainment Areas of Texas

The attainment areas of Texas include all of Texas except DFW and HGB. The subsections below address growth and controls separately.

2.3.1.1 Attainment Area 2012 Growth Projections

Different growth projection techniques were applied to the EGUs that have Acid Rain data (ARD) versus the non-EGUs (NEGUs). The techniques used are similar to EPA and RPO projection methods for modeling future cases.

2.3.1.1.1 EGUs

To develop the Acid Rain EGU 2008 baseline, the TCEQ averaged the Acid Rain NO_X for each hour of the day for each unit for the third quarter of 2008 (3Q2008). The TCEQ chose this dataset from which to project because it is newer and contains more of the actual emissions growth from newer units. Not all EGUs are Acid Rain sources and not all NO_X point sources at EGU facilities are Acid Rain sources. The non-Acid Rain EGUs were modeled at their 2008 emissions along with the NEGU point sources.

The complete set of 2012 EGUs consists of the 3Q2008 ARD EGUs, the 2008 non-Acid Rain EGUs, and post-2008 EGUs that have approved TCEQ permits. As with previous SIP revisions, the TCEQ assumes that the EGU growth in the state comes from the TCEQ newly-permitted EGUs.

2.3.1.1.2 Newly-Permitted EGUs

Growth in EGUs in Texas is accomplished with the addition of all newly-permitted EGUs since the baseline, all within the constraint of the EPA's Clean Air Interstate Rule (CAIR), described in the controls subsection below. This subsection describes the procedures for developing the newly-permitted EGU EI.

Texas EGU emissions for 2012 were developed by researching and compiling data from various sources. These sources include:

- Electric Reliability Council of Texas (ERCOT): http://www.ercot.com/;
- TCEQ air permitting projects with combustion turbines, http://www.tceq.state.tx.us/assets/public/permitting/air/memos/turbine_lst.pdf; and
- TCEQ New Source Review Permits Information Management System (NSRP IMS) internal document server for newly-permitted EGU data.

Information from these sources includes individual units' disposition (i.e., operating status), new units coming online, units to be mothballed, units to be shut down and retired, and units that are proposed to be operational by the end of ozone season in 2012 because they applied for, and were granted, a TCEQ air permit. The TCEQ assumed that by ozone season 2012, all current mothballed and reliability-must-run (RMR) units would be retired. For new units planned to come online, a distinction is made between those that have received a permit and those that have pending permits. All data sources were reconciled to ensure all units were accounted for, and that their status as of December 2010 was modeled. As the most recent EGU emissions data for modeling is from 3Q2008 Acid Rain, new EGUs are based on additions and changes subsequent to 2008. For the two years between December 2010 and December 2012, there is ample generation proposed from the newly permitted units to meet the projected demand in electricity.

For the newly-permitted EGUs, emissions were calculated based on the permit Maximum Allowable Emission Rates Table (MAERT). Pollutants acquired from the permits were NO_X, VOC, and CO. The method of determining the allowable emissions differs based on the type of unit and its primary purpose for being constructed. For example, coal plants may have a 30-day rolling average emission rate, while gas turbines may have a short term allowable emission rate in pounds per hour (pph) and/or a long term allowable emission rate in tons per year (tpy). In some cases, a unit may have a combination of the above, in addition to maintenance, startup and shutdown (MSS) emission limits.

When available, the 30-day pph emissions limitation was used. These were most often available for solid fuel-fired units. This time frame represents a good compromise between the standard short-term allowable, which sometimes includes MSS, and the standard long-term permit allowable. The short term allowable in pph, when converted to tpd, is often substantially more than a unit would realistically emit in any day; the long-term allowable in tpy, when converted to tpd, may under-represent what a unit could emit during any one day, especially during a summer day during the ozone season.

MSS permitting has been phasing in for several years. These activities help provide a more realistic operating scenario than the maximum of the short-term or long-term emission rates. This is especially important for those units that have many MSS events during a typical summer, such as the peaking units, which operate only during the peak demand times. MSS limits vary between permits on how they are represented. Examples of permitted MSS and how they are modeled are available in the March 2010 HGB Appendix B, Section 2.3.1.1.1.

The emission rates calculated represent worst case for some units, but for most, they represent a typical summer day during the ozone season, corresponding to some of the highest days of electricity demand. In developing a future EI, the TCEQ has historically modeled only those units that (1) have been issued a permit, and (2) are expected to be operational prior to the attainment date. The complete list of newly-permitted EGUs added as the EGU growth in the state sorted by area is provided as Table 14: Newly Permitted EGUs (post 2008) in Texas as of December 2010.

Table 14: Newly Permitted EGUs (post 2008) in Texas as of December 2010

Area	Sitename	County	Permit NO_X (tpd)	Permit VOC (tpd)	Permit CO (tpd)	Modeled CAIR NO_X (tpd)	Operating in 2008
BPA	Hardin Facility	Hardin	0.430	0.118	0.804	0.057	Y
BPA	Hardin Facility	Hardin	0.430	0.118	0.804	0.725	Y
CC	Barney M Davis	Nueces	1.251	0.466	6.094	0.090	Y
CC	Barney M Davis	Nueces	1.251	0.466	6.094	0.090	Y
ELP	Newman Unit 6	El Paso	1.422	0.216	5.064	0.091	Y
ELP	Newman Unit 6	El Paso	1.422	0.216	5.064	0.091	Y
ELP	Global Alternative	El Paso	0.683	0.186	0.419	0.091	Y
ETX	Lufkin Generating Pl	Angelina	0.624	0.084	0.624	0.066	
ETX	Panda Temple Power	Bell	0.454	0.599	5.782	0.048	
ETX	Panda Temple Power	Bell	0.454	0.599	5.782	0.048	
ETX	Panda Temple Power	Bell	0.454	0.599	5.782	0.048	
ETX	Panda Temple Power	Bell	0.454	0.599	5.782	0.048	
ETX	Dansby Power Plant	Brazos	0.298	0.032	1.027	0.031	
ETX	E.S. Joslin Power St	Calhoun	2.232	0.156	4.776	0.235	
ETX	Formosa Pt.Comfort	Calhoun	1.260	0.096	1.980	0.133	
ETX	Formosa Pt.Comfort	Calhoun	1.260	0.096	1.980	0.133	
ETX	Pattillo Branch	Fannin	0.865	0.333	3.870	0.044	Y
ETX	Pattillo Branch	Fannin	0.865	0.333	3.870	0.044	Y
ETX	Pattillo Branch	Fannin	0.865	0.333	3.870	0.034	Y
ETX	Pattillo Branch	Fannin	0.865	0.333	3.870	0.034	Y
ETX	Winchester PowerPark	Fayette	0.109	0.045	0.499	0.078	Y
ETX	Winchester PowerPark	Fayette	0.109	0.045	0.499	0.192	Y
ETX	Winchester PowerPark	Fayette	0.109	0.045	0.499	0.192	Y
ETX	Winchester PowerPark	Fayette	0.109	0.045	0.499	0.057	Y
ETX	Lamar Power Partners	Lamar	0.545	0.101	0.894	0.324	Y
ETX	Lamar Power Partners	Lamar	0.545	0.101	0.894	0.132	Y
ETX	Madison Bell Partner	Madison	1.000	0.129	2.096	0.132	Y
ETX	Madison Bell Partner	Madison	1.000	0.129	2.096	0.132	Y
ETX	Madison Bell Partner	Madison	1.000	0.129	2.096	0.078	Y

Area	Sitename	County	Permit NO_X (tpd)	Permit VOC (tpd)	Permit CO (tpd)	Modeled CAIR NO_X (tpd)	Operating in 2008
ETX	Madison Bell Partner	Madison	1.000	0.129	2.096	0.908	Y
ETX	Sandy Creek	McLennan	6.876	0.348	29.472	0.132	Y
ETX	Sandow 5	Milam	3.552	0.180	3.552	0.031	Y
ETX	Sandow 5	Milam	3.552	0.180	3.552	0.031	Y
ETX	Nacogdoches Power	Nacogdoches	1.649	0.240	2.724	0.090	Y
ETX	Nacogdoches Power	Nacogdoches	3.072	0.336	2.628	0.090	Y
HGB	Green Power Unit 1	Brazoria	0.137	0.074	0.802	0.014	
HGB	Green Power Unit 1	Brazoria	0.137	0.074	0.802	0.014	
HGB	Dow Chemical Cogen	Brazoria	0.658	0.657	4.316	0.069	
HGB	NRG Cedar Bayou	Chambers	0.570	0.198	6.217	0.013	Y
HGB	NRG Cedar Bayou	Chambers	0.570	0.198	6.217	0.013	Y
HGB	Cedar Bayou	Chambers	0.692	0.151	6.503	0.073	
HGB	Cedar Bayou	Chambers	0.766	0.151	6.503	0.081	
HGB	Deer Park Energy Center	Harris	0.417	0.872	6.679	0.105	Y
HGB	Deer Park Energy Center	Harris	0.417	0.872	6.679	0.105	Y
HGB	TECO Central Plant	Harris	0.321	0.104	1.630	0.105	Y
HGB	TECO Central Plant	Harris	0.321	0.104	1.630	0.105	Y
HGB	Lewis Creek	Montgomery	0.271	0.087	1.066	0.015	Y
HGB	Lewis Creek	Montgomery	0.271	0.087	1.066	0.015	Y
SAN	J K Spruce Unit 2	Bexar	6.624	0.348	53.760	0.699	
SAN	VH Braunig 5	Bexar	0.321	0.042	1.432	0.034	
SAN	VH Braunig 6	Bexar	0.321	0.042	1.432	0.034	
SAN	VH Braunig 7	Bexar	0.321	0.042	1.432	0.034	
SAN	VH Braunig 8	Bexar	0.321	0.042	1.432	0.034	
WTX	La Palma Power Sta	Cameron	0.741	0.189	4.823	0.078	
WTX	Quail Run Energy Center	Ector	0.127	0.042	0.559	0.072	Y
WTX	Quail Run Energy Center	Ector	0.127	0.042	0.559	0.091	Y
WTX	J L Bates Power Sta	Hidalgo	0.737	0.190	5.387	0.029	Y
WTX	Jack Co Gen Facility	Jack	1.824	0.532	7.672	0.029	Y
WTX	Jack Co Gen Facility	Jack	1.824	0.532	7.672	0.174	Y

Table 14 includes (1) the calculated NO_X, VOC and CO emissions from permit applications and MAERTs, representing realistic (not absolute worst-case and not absolute best-case) average day emissions, and (2) the NO_X emission rates after incorporating the existing rules that apply to ARDs (CAIR Phase I for the whole state and MECT in HGB). The TCEQ assumed NO_X controls, offsets, or credit purchases will be used to meet these NO_X emissions rates. VOC and CO rates are modeled at their permitted levels and represent the worst case.

The 2010 CAIR allocations assigned by the TCEQ were applied to all EGUs, including the newly-permitted EGUs, which received their share of the 9.5 percent set-aside. Some of these newly-permitted EGUs had already begun operation and had been assigned CAIR allocations, and where the cap existed, the new EGU was modeled at its cap. This allocation of the CAIR set-aside for new EGUs provided a smaller pool of CAIR allowances for newly-permitted EGUs that had not begun operation. The remaining cap was proportionally allocated to the new EGUs based on their permitted emission rates. Only about 10 percent of the newly-permitted emissions could be covered by the remaining cap, but the allocation did not affect statewide NO_X emissions, since the overall CAIR cap for the state was modeled.

As represented in the inventory, these newly-permitted units will operate at the modeling-restricted capacity, but in reality, they will likely operate at a higher capacity than modeled via trading, purchasing credits, or providing other offsets.

Pending permits (permit applications under TCEQ review, but not yet granted permits) were not included in this CAIR scenario for several reasons, including:

- The future operation of these units is more speculative.
- Adding more units under CAIR does not affect the total modeled EGU emissions, just where the emissions occur.
- Additional units would have been fit under the CAIR Phase I 9.5% set-aside, along with all the other post-2000 EGUs.
- The EGUs with approved permits have enough capacity to cover the 2012 future case power demand.

The temporal distributions of the newly-permitted EGU emissions are based on those of existing units of similar equipment type or SCCs. For each SCC included in the newly-permitted EGU list, an average temporal distribution was calculated, based on diurnal profiles of existing units within the state. For some units on the new EGU list, a corresponding SCC did not exist for existing units. In these cases, the default flat profile was assigned. An example of the profile used for a natural gas turbine is available in the March 2010 HGB Appendix B, Section 2.3.1.1.1.

2.3.1.1.3 Non-EGUs (NEGUs)

When the Acid Rain units are removed from the point source EI for hourly treatment, the remainder is OSD. The TCEQ refers to these remaining units as NEGUs. The basis for future growth for NEGUs in the Texas attainment areas was the 2006 OSD emissions, already an average OSD from STARS.

Emissions from NEGUs in the attainment areas of the state were projected to 2012 using a combination of projection factors. Projection factors derived from the Dallas Federal Reserve Bank's Texas Industrial Production Index (TIPI) exist for growth from 2006 to 2018 and are based on an industry's Standard Industrial Classification (SIC). For SICs not covered by TIPI, projection factors from EPA's Economic Growth Analysis System version 5.0 (EGAS5) with a Texas-specific version of the Regional Economic Models, Inc (REMI) update were used. This version of EGAS with Texas-specific REMI is hereafter referred to as REMI-EGAS which, like the TIPI growth factors exists for growth from 2006 to 2018. No individual new permits were modeled as growth for NEGUs. The TCEQ modeled 2008 to 2012 by interpolating the 2006-2018 data, using one third of the growth for the shorter time span.

While the use of either TIPI or REMI-EGAS could be argued, TIPI provided unexpectedly low emission rates for some point sources. The TCEQ chose to use the index that provided the most growth for each point source. Although there is not a TIPI factor available for all sources (only select SICs), there is a REMI-EGAS factor for each source (every SCC). For the SICs with missing TIPI factors, a value of 1.067, the average of the non-missing factors, was assigned. Examples of TIPI and REMI-EGAS growth factors are provided in the March 2010 HGB Appendix B, Section 2.3.1.1.2.

Projection factors were assigned individually to each NEGU path that does not have a recent rule applied to it based on its SIC-SCC combination. No factor was applied to a path that must comply with a recent rule, since the rule provides an emission limit on that path. The larger of either TIPI or REMI-EGAS was applied to all three modeled pollutants. A summary of the EGU and NEGU growth in the Texas attainment areas is provided as Table 15: Summary of Texas Attainment Area Growth Projections to 2012. In Table 15, a Growth Method of 1 indicates TIPI or REMI-EGAS was applied to points that do not have recent existing rule limitations; and a Growth Method of 2 indicates the addition of post-2006 point sources and CAIR applied to all points.

Table 15: Summary of Texas Attainment Area Growth Projections to 2012

EI	Future Case Baseline Data	Future Case Baseline # points	Future Case Baseline NO_X (tpd)	Growth Method	2012 Future Case #points	2012 Projected NO_X (tpd)	Baseline to 2012 Growth
NEGUs	2008 STARS	8939	436	1	8939	488	12%
EGUs	2008 STARS/ARD	209	456	2	282	427	-6%

The TCEQ accounts for EGU growth by adding new facilities at locations where the facilities are permitted. The net reduction in EGU NO_X emissions reflects the Best Available Control Technology (BACT) implemented in the New Source Review (NSR) permitting program of the TCEQ. CAIR Phase I limitations may further reduce NO_X emissions from some EGUs.

Any source that had an existing rule applied to it was capped at that rule level for the future, so only the remaining sources had growth factors applied to them. Controls are discussed in the next subsection.

2.3.1.1.4 Known Refinery Expansions in BPA

Three refineries in BPA have proposed increasing daily production levels, according to permit actions in the last few years. Motiva Enterprises, LLC (Motiva) is doubling the capacity at its Port Arthur refinery to 600,000 barrels per day, the Premcor Refining Group (Valero) is expanding its capacity to 420,000 from 300,000 barrels per day, and Total Petrochemicals USA Incorporated (Total) is increasing the capacity of its Port Arthur refinery by 50,000 barrels per day. Details and a summary of the emissions added via growth factor are available in the March 2010 HGB Appendix B, Section 2.3.2.2.1.

2.3.1.2 Texas Attainment Areas 2012 Existing Controls

Existing on-the-books controls are incorporated into the 2012 future base. For the EGUs of the state, the control modeled was the EPA's CAIR program. For the NEGUs in the attainment areas of the state, several existing controls were modeled, as described in following subsections.

2.3.1.2.1 EGUs

EPA has proposed the Clean Air Transport Rule (CATR), which is ultimately intended to replace CAIR. CATR was not modeled as it is not yet finalized.

Under CAIR, 28 eastern states and the District of Columbia are required to comply with a cap on sulfur dioxide (SO_2) and NO_X EGU emissions. The definition of an EGU for the CAIR program is approximately the same definition as that for a Federal Clean Air Act Title IV Acid Rain unit, i.e., larger than 25 MW and more than one-third of its generation going to the public grid for sale. CAIR is a cap-and-trade program, with each of the CAIR-applicable states given calculated NO_X and SO_2 budgets by the EPA. EPA determined by modeling that Texas significantly contributed to the nonattainment of the particulate matter of 2.5 microns and less ($PM_{2.5}$) standard of two counties in Illinois. Texas was not included for eight-hour ozone contribution. Thus, Texas is not part of the CAIR ozone season (May through September) NO_X budget, only the annual NO_X budget program. For more details on CAIR are available on EPA's CAIR Texas webpage, http://www.epa.gov/cair/tx.html. Arkansas and Louisiana have ozone season NO_X caps, and Oklahoma is not a CAIR state.

CAIR is implemented in two phases. For NO_X, Phase I covers the years 2009-2014 and Phase II covers the years 2015 and later; for SO_2, Phase I covers the years 2010-2014 and Phase II covers the years 2015 and later. Because 2012 is the DFW ozone attainment year, this SIP revision incorporates CAIR Phase I, which provides for a Texas state-wide NO_X budget of 181,014 tons per year, or 496 tons per day. The CAIR allocations and past transactions for all relevant states can be found from the CAMD Allowances data query wizard website, http://camddataandmaps.epa.gov/gdm/index.cfm?fuseaction=allowances.wizard.

For implementing EPA's CAIR program in Texas, the State Legislature mandated that the TCEQ allocate 90.5 percent of the CAIR budget to the EGUs that were operating on or before January 1, 2001 (call these "existing" units in the "general pool"). Each existing EGU was apportioned its allowance of the budget based on fuel type and historical heat input. The remaining 9.5 percent of the state CAIR budget cap was set aside for new (post-2000) EGUs, in the "new unit pool." The newly-permitted EGUs obtain allowances from the new unit pool until these units have the appropriate actual emissions baseline used for the allocation of CAIR NO_X allowances from the general pool.

For existing Acid Rain EGUs, the TCEQ distributed the assigned allowance cap for each unit in the general pool to the hourly average day 3Q2008 data file. More details regarding the application of the CAIR program in Texas are available in the March 2010 HGB Appendix B, Section 2.3.1.2.1.

The TCEQ devised a method to apply the annual CAIR cap to ozone season emissions. Typically, NO_X emissions are higher during ozone season, and since CAIR is an annual cap, a larger fraction of the cap will be expended during the summer. A straightforward seasonal adjustment, e.g., reallocating the cap based on historical ozone season-to-annual NO_X emissions, resulted in NO_X caps that were unreasonably high in the DFW and Corpus Christi (CC) areas. This effect was likely caused by CAIR allocations that were based on outdated emissions data, and the high percentage of peaking units in these particular areas. As an alternative, the TCEQ modeled ozone season emissions using the annual cap instead of a seasonally adjusted value. This action was justified by comparing the results to the proposed CATR emission caps that would apply to ozone season for Texas. The statewide ozone season CATR and annual CAIR caps are nearly identical. Furthermore, the DFW and CC CATR allocations approximate 2008 emissions for the same point sources which are reasonable since 2012 is only four years removed from 2008.

For modeling purposes, the 9.5 percent set-aside cap for the new EGUs was applied to all post-2000 point sources that began operation in the 2001-2008 time period (as evidenced by their Acid Rain emissions) and to post-2008 EGUs that have been permitted by TCEQ. Some of the new post-2000 units are currently operating and were given a CAIR allowance; the TCEQ modeled these points at their assigned cap. Some new units were not operating when caps were assigned, but were reporting emissions to CAMD. In those situations, the new points were modeled using their 2008 ARD emissions, and those emissions were taken from the CAIR (9.5 percent) new pool allocation.

A small amount of new unit pool CAIR allowance remained after the 2001-2008 new unit distribution. The TCEQ spread the remaining allowance among all the newly-permitted (post-2008) EGU permits based on the modeling permitted rates but compressed to fit within the new unit pool. The modeling of this program is only an estimate and does not account for emissions trades that could occur. This modeling of the CAIR Phase I cap is even more complicated because of the MECT program in HGB, discussed in a later subsection. Attachment 1: Texas 2010 CAIR NOX Allocations to this appendix contains a list of CAIR Phase I allocations by site for 2010 sorted by ORIS. The table is a snapshot of CAIR allotments. Some of the facilities in the general pool may have shutdown or may be scheduled for shutdown, freeing their allotment for other facilities including new or proposed facilities. The table also shows that, at the time of this snapshot, not all of the new pool had been assigned to existing facilities, and this allocation is also available for other facilities.

A summary of the distribution of the general and new CAIR pools to areas of Texas is provided as Table 16: Distribution of NO_X CAIR Allowances in Texas.

Table 16: Distribution of NO_X CAIR Allowances in Texas

Area	Emissions Basis	Modeled Allowance for 2008 Units, tpd	Modeled Allowance for Post-2008 Units, tpd
DFW	CAIR ARD	18.95	
HGB	CAIR OSD		0.61
HGB	MECT ARD	36.09	
Attainment	CAIR OSD	0.11	7.70
Attainment	CAIR ARD	423.45	9.17

The EGU portions of the HGB MECT program also count against the CAIR budget. MECT is more restrictive than CAIR, i.e., lower controlled allowable emission rate, ignoring trading, so the difference between CAIR and MECT was also modeled as a redistribution addition to statewide CAIR EGUs. Also, the CAIR units operating in 2008 were predominantly ARD units.

2.3.1.2.2 NEGUs

Several existing control programs are expecting further reductions between the baseline and 2012 in the attainment areas of the state, including the East Texas Combustion Rule, specific Agreed Orders in East Texas, Chapter 117 NO_X rules in BPA, and the Refinery Initiative.

2.3.1.2.2.1 East Texas Combustion Rule

The East Texas Combustion rule was applied to rich-burn stationary gas-fired point source and area source engines in 33 identified attainment counties of East Texas. This Chapter 117 NO_X rule was shown to benefit DFW in the May 2007 DFW SIP revision. Almost three-quarters of the reductions came from point sources. Its full compliance date was March 2009; therefore, it qualifies as an existing rule with a future (post-baseline) compliance date. If a rule has a complete (all applicable sources) compliance date of 2006 or earlier, then compliance with the rule is assumed to have been incorporated in the baseline. This was modeled as a cap on the applicable sources at the 2009 rule emissions levels.

2.3.1.2.2.2 East Texas Agreed Orders

Federally-enforceable emissions reductions due to agreed orders and/or consent decrees were incorporated into the 2012 point source EI. These included the Eastman and ALCOA agreed orders as were modeled in previous SIP revisions. These appear to already be reporting zero emissions in the 2008 STARS EI, but were specifically shutdown in the modeling files, regardless.

2.3.1.2.2.3 BPA Chapter 117 Rules

The TCEQ applied Chapter 117 NO_X emissions limits to BPA point sources over 25 tpy, as specified in the most recent BPA Attainment Demonstration with rules package.

2.3.1.2.2.4 Refinery Initiative

Since the late 1990s, petroleum refineries have been the focus of an EPA enforcement initiative. This initiative alleges that, in general, petroleum refineries violated and/or continue to violate one or more of the following regulatory Clean Air Act provisions, or parts thereof:

- Prevention of Significant Deterioration (PSD) requirements, 40 CFR 51-52;
- New Source Performance Standards (NSPS) requirements, 40 CFR 60;
- Leak Detection and Repair (LDAR) requirements, 40 CFR 60,61,63; or,
- National Emission Standards for Hazardous Air Pollutants (NESHAP) for Benzene Waste Operation, 40 CFR 61, Subpart FF.

In the interest of settling these allegations, without admitting to the alleged violations, many petroleum refiners have entered into consent decrees with EPA. Since March 2000, the EPA has entered into settlements with petroleum refiners that, collectively, represent nearly 80percent of U.S. petroleum refining capacity. According to the EPA, these settlements, covering 86 refineries in 25 states, will result in a reduction of approximately 80,000 tons per year of nitrogen oxides (NO_X) and 235,000 tons per year of sulfur dioxide (SO_2) upon full implementation. See EPA's webpage at http://www.epa.gov/compliance/resources/cases/civil/caa/oil/index.html for this and more details.

The TCEQ has not modeled any reductions for these consent decrees, because most of the agreements do not require NO_X reductions, and most of them lack enforceable requirements of quantified reductions. The TCEQ can verify that several refineries (some in HGB and BPA) have modified permits to comply with their consent decrees, but permit reductions do not always result in actual reported emission reductions.

2.3.2 Nonattainment Areas (NAAs) of Texas

This section describes the specific growth and controls applied to the two ozone NAA, DFW and HGB. The NAAs were modeled similarly, although HGB is more complex due to the number of

TCEQ programs that apply to it. The growth projections to 2012 and any existing controls that will affect the areas between the baseline and 2012 are described below.

2.3.2.1 2012 Growth Projections

Growth projections were applied to the 2008 future base EI to obtain a 2012 grown EI. Different techniques were applied to the EGUs and the NEGUs.

2.3.2.1.1 EGU Projections

As with the attainment areas of the state, the future base for EGUs in the NAAs of the state is the typical summer Acid Rain day having hourly emissions that are the average of all days in the third quarter of 2008 (3Q2008). Not all EGUs are Acid Rain units. The non-Acid Rain EGUs were modeled at their 2008 OSD emissions, as if they were NEGUs.

The complete set of 2012 EGUs consists of the 3Q2008 Acid Rain EGUs, the 2008 non-Acid Rain EGUs, and post-2008 EGUs that have approved TCEQ permits. As with previous SIP revisions, the TCEQ assumes that the EGU growth in the state comes from the TCEQ newly-permitted EGUs. This is similar to an assumption that the Integrated Planning Model (IPM) would make, which the EPA has used in all of its recent regional modeling studies, e.g., CAIR. The growth is spatially allocated based on permit applications.

2.3.2.1.1.1 Newly-Permitted EGUs in Nonattainment Areas (NAAs)

Table 14 lists all of the newly-permitted EGUs in each area of the state. There are no new planned units in DFW and 13 newly-permitted units in HGB. CAIR limitations are superseded by more stringent nonattainment NO_X rules (30 TAC Chapter 117), although all EGU emissions must fit under the CAIR cap and absorb a share of the CAIR cap.

In HGB, adding newly-permitted EGUs is more complex, since all EGUs (and almost all combustion sources) must comply with the HGB Chapter 117 MECT program for NO_X. For modeling purposes, new MECT sources are added under the cap and the cap is reallocated. In reality, the MECT cap is not reallocated for every new source, but as some sources shut down or reduce emissions; their part of the MECT cap is made available for use. There is no easy way to predict or model how that occurs. Instead, the TCEQ has assumed it is more important to place the new sources at the correct location with approximately the correct emissions, rather than not include them in the model at all. To maintain the integrity of the cap and model the MECT cap, the TCEQ reallocated the cap slightly to make room for the new sources.

The newly-permitted post-2008 EGUs in HGB are all MECT sources, as well as CAIR sources (the EGU must meet all applicable rules), and emissions from these points are reconciled with the MECT. MECT is a control program and will be addressed in more detail in the controls subsection, but it constrains the growth in HGB and is thus relevant here. The modeled HGB NO_X emissions of Table 16 are within both the MECT and CAIR caps.

2.3.2.1.2 NEGU Projections

The basis for future growth for NEGUs in the Texas NAAs was the 2008 OSD emissions. No individual new permits were modeled as growth for NEGUs, except in BPA. Emissions from NEGUs in the NAAs of the state were projected to 2012 using the lesser of the TIPI-REMI-EGAS factors or the emission credits in the bank, described in the following paragraphs, except for HGB NO_X, which is subject to the MECT program.

NAAs cannot grow in major sources of emissions of ozone precursors, NO_X and VOC, except by purchasing from the bank to obtain emissions offsets during New Source Review of permit applications or by sitewide contemporaneous period reductions, or to meet other TCEQ rules. The TCEQ has assumed that the emissions in the TCEQ Emissions Banking and Trading (EBT) Registry (bank) are available to come back into the airshed in the future, but are limited by the projected growth of point sources within the NAA. In other words, sources will only purchase from the bank what they actually need, and that need is projected by TCEQ with TIPI-REMI-EGAS. Conversely, sources in need of large emissions growth in the future (predicted by TIPI-REMI-EGAS), can only purchase as much credit as exists in the bank. For this 2012 projection analysis only the former case is true, because there is the need to only project emissions from 2008 to 2012 with TIPI-REMI-EGAS, and there are plenty of banked emissions, i.e., there existed a growth-limited projection for each NAA, rather than a bank-limited condition.

The procedure for potentially incorporating the banked emissions in the future case begins with extracting the banked emissions from the TCEQ's EBT Emission Reduction Credit (ERC) and Discrete Emission Reduction Credit (DERC) Registries, which can be found on EBT's Registry webpage: http://www5.tceq.state.tx.us/airperm/index.cfm?fuseaction=registry.registry.

ERC and DERC totals for each of the NAAs, as of July 1, 2010 were extracted, tabulated, and summarized. According to 30 TAC §101.378, DERCs generated from shutdown strategies prior to September 30, 2002 are no longer available after September 8, 2010. These retiring DERCs were removed from the HGB modelable total for 2012. Table 17: Banked Emissions as of July 2010 summarizes these results. Modelable emissions in Table 17 refers to the maximum amount of emissions that could be added as growth to the area from banked emissions, with the exception of HGB as noted below.

Table 17: Banked Emissions as of July 2010

NAA	NO_X ERCs (tpy)	VOC ERCs (tpy)	NO_X DERCs (tons)	VOC DERCs (tons)	CO DERCs (tons)	Total Model-able NO_X Bank (tpd)	Total Model-able VOC Bank (tpd)	Total Model-able CO Bank (tpd)
HGB Registry	37.9	66.2	42323.4	1060.0	1488.4			
HGB Model	33.0	57.6	1000.0	954.0	1339.6	2.8	2.8	3.7
BPA Registry	1078.1	79.3	2759.4	0	2591.8			
BPA Model	980.1	72.1	2483.5	0.0	2332.6	9.5	0.2	6.4
DFW Registry	386.4	316.6	9624.0	5.0	0			
DFW Model	336.0	275.3	8661.6	4.5	0.0	6.8	0.8	0.0

Chapter 101 of 30 TAC requires that an ERC must be surplus to any federal, state or local rule. Also, the Chapter 101 MECT program DERC-use restrictions for HGB were incorporated in the NO_X total. 30 TAC Chapter 101.379, DFW DERC Flow Control Rule, did not offer a limitation on the growth for this SIP revision, for the reasons stated below, and because there were only four years of growth to apply, limiting the amount of banked emissions that are predicted to be purchased.

The flow control calculation for 2012 would limit the DFW DERC usage to 5.93 tpd, based on the equation in 30 TAC §101.379(c)(2)(A) using MOBILE6.2 fleet turnover. This flow control calculation may be updated in the future to use MOVES2010a fleet turnover. Adding the modelable DFW NO_X ERCs to the 5.93 tpd of DFW NO_X DERCs brings the total modelable NO_X

bank for DFW to 6.8 tpd, as shown in Table 17. However, that maximum bank was not included in the final model run as the TIPI-REMI-EGAS projection limited the DFW growth to only 0.2 tpd (Table 18: *Texas NEGU "No-Rules" Growth Summary*). A 2012 model sensitivity was completed using the ERC registry and the flow control calculated DERCs of 5.93 tpd (the total of 6.8 tpd, as shown in Table 17), and the maximum future design value was unchanged. Additional details on the modeling sensitivity of the ERC registry and the DERC flow control limit are in Attachment 3 of this Appendix. These changes indicate the use of the ERC registry and the DERC flow control limit would not impact the determination of attainment in 2012.

As a worst case, the totals indicated in Table 17 incorporate the originally-designated eight-hour ozone offset ratios for each of the NAAs (and even BPA, for which a bank is maintained even though it is in attainment now), where an offset ratio of 1.15:1 for moderate areas indicates that the purchaser of ERCs must buy 11.5 ton per year of credits for each 10 tons per year of increase proposed. Additionally, the modelable bank took into account the requirement of Chapter 101 to retire 10 percent of the DERCs, as an environmental contribution, upon DERC usage

2.3.2.1.2.1 HGB NO_X Mass Emissions Cap and Trade (MECT)

The HGB MECT program limits the amount of NO_X from all applicable sources with a cap. The application of this program and its limits are discussed in the March 2010 HGB Appendix B, Section 2.3.2.1.1.

Table 18 shows the growth projected in each of the NAAs from each of the indices. Again, the growth was only applied to the sources that were not already limited by existing TCEQ SIP rules.

Table 18: Texas NEGU "No-Rules" Growth Summary

Area	Projection Index	2008 STARS NO_X, tpd	NO_X Growth, tpd	2012 NO_X, tpd	2008 STARS VOC, tpd	VOC Growth, tpd	2012 VOC, tpd
DFW	from EGAS	0.94	0.13	1.07	30.71	0.59	31.30
DFW	from TIPI	0.63	0.08	0.71	7.11	0.21	7.32
HGB	from EGAS	13.5	1.3	14.8	78.5	7.3	85.8
HGB	from TIPI	12.0	-1.2	10.8	55.3	8.6	63.9
Attainment	from EGAS	365.3	41.2	406.5	207.6	18.4	226.0
Attainment	from TIPI	97.3	15.7	113.0	87.8	12.1	99.9

The bank and the TIPI-REMI-EGAS were compared on a path-by-path basis, automated with SAS programming. The bank growth in each NAA was the bank divided by the total emissions in the NAA. A path's share of the bank was based on its fractional emissions of the total, and was added to that path. Only the paths not already limited by rules were allowed to grow via the bank or TIPI-REMI-EGAS.

2.3.2.1.2.2 HGB HRVOC Emissions Cap and Trade (HECT)

The other cap-and-trade program within HGB that applies to NEGUs is the HRVOC Emissions Cap and Trade (HECT) program. The compounds specifically regulated by HECT are the four HRVOC species, ethylene, propylene, 1,3-butadiene, and butenes, where butenes includes all isomers of butene. The background and speciation procedure for the HRVOC and the HECT cap have been provided in a presentation that was given at the 17th Annual International EI Conference, in Portland, Oregon, in 2008. The presentation can be found at the conference web page, http://www.epa.gov/ttn/chief/conference/ei17/session6/thomas_pres.pdf, and the detailed paper from the conference proceedings can be found at http://www.epa.gov/ttn/chief/conference/ei17/session6/thomas.pdf.

HECT-applicable units are flares, process vent stacks, or cooling towers in Harris County that have the potential to emit more than ten tpy HRVOC. Smaller sites in Harris County may opt-in to the HECT program. These are all primary sources, not secondary, of HRVOC emissions. HECT allowances were allocated to applicable sites in proportion to the site's level of activity, determined from each site's selection of a twelve-consecutive-month baseline from 2000 through 2004. HECT sites were given the greater of 5.0 tons of HECT allowances or the allocation from the site, determined from using the equation listed in 30 TAC §101.394(a)(1).

With the March 2010 HGB SIP Revision, HECT was reduced to 75 percent of its overall cap and reallocated. The TCEQ modeled the most current version of the HECT allocations. Since this is a trading program, HECT-applicable sites may bank or trade HRVOC between other HECT sites, as long as the account is reconciled at or below its allowance level before the end of the HECT reconciliation period each year. Additional details of this Harris County control program are in the March 2010 HGB Appendix B, Sections 2.3 and 2.4.

2.3.2.1.2.3 2012 Tank Landing Losses (TLL)

The emissions used for the HGB TLL for the 2012 future base are the same as the baseline.

It is likely that by the compliance date of January 1, 2009, further VOC reductions will be actualized from the Chapter 115 rules, which limit convenience floating roof tank landings, since reported emissions decreased between 2004 and 2007. However, it is difficult to quantify the future emissions reductions expected. The TCEQ decided to take no credit for any future convenience landing reductions.

2.3.2.1.2.4 2012 Emission Inventory Reconciliation in HGB (aka, HRVOC Reconciliation, Extra Olefins)

2006 was the first full year for reporting of monitored HRVOC, as required by 30 TAC Chapter 115. Additionally, 2006 was the year of the HECT survey. Table 7 shows a total of 19.3 tpd of HRVOC were added to grid cells in HGB as the reconciled HRVOC. Additional details of the HGB 2018 Reconciled HRVOC emissions are in the March 2010 HGB Appendix B, Section 2.3.2.1.2.

2.3.2.1.3 DFW Existing (2012 Future Base) Controls

This section describes several existing NO_X rules for DFW, most notably Chapter 117 Major Source NO_X rules, which were previously implemented via SIP rules. Additionally, there is a Chapter 117 Cement Kiln cap to apply for DFW discussed below. The most recent DFW attainment demonstration SIP revision was adopted by the Commission in May 2007. These control programs are on-the-books rules with final compliance dates after the 2006 baseline year and prior to 2012.

2.3.2.1.3.1 DFW 5% IOP Rules

The DFW 5% Increment of Progress (IOP) SIP revision identified required emissions reductions in the added five counties for the DFW eight-hour ozone NAA. These included VOC reductions from the DFW Surface Coating rule. There were also NO_X reductions from ICI (Industrial, Commercial, Institutional) reciprocating gas-fired engines in the nine-county area, but the NO_X rules were generally made more strict by the Major Source Rule (see next paragraph). Thus, only the VOC controls were specifically modeled in this control packet, as was done for the May

2007 DFW SIP revision. These rules were adopted by the Commission in April 2005 and were assumed after the 2006 reported EI.

2.3.2.1.3.2 DFW 2009 Ch. 117 Major Source Rule

The DFW major source rule controls ICI (Industrial, Commercial, Institutional) NEGU point sources. It approximates the Chapter 117 NO_X Emission Standards for Attainment Demonstration (ESADs) that are in place in HGB, and adds some ESADs for source categories that did not exist or were otherwise not regulated in HGB. The compliance dates for these were March 2009. The paths affected by these rules are those modeled for the May 2007 DFW SIP revision.

2.3.2.1.3.3 DFW 2009 Midlothian Cement Kiln Cap

The level of controls applied to the Midlothian, Ellis County, cement kilns is that which resulted from the May 2007 DFW SIP revision. Site-wide (by account) alternative NO_X caps were modeled based on this rule, as modified by baseline changes reported by the sites. These updated ozone season (March 1 through October 1) caps, totaling 17.6 tpd for the ten kilns at the three sites, have been modeled as shown in Table 19: Ellis County Cement Kiln NO_X Caps, below. TXI has applied for a permit alteration to cease operation of its four wet kilns (future emissions of 0.00 tpd) in exchange for increasing clinker production in its newer dry kiln process.

Table 19: Ellis County Cement Kiln NO_X Caps

Sitename	FIN	EPN	NO_X Emissions (tpd)
Ash Grove Midlothian Plant	2-1	2	1.43
Ash Grove Midlothian Plant	2-2	6	1.51
Ash Grove Midlothian Plant	2-3	12	1.45
Holcim Midlothian Plant	62*	62*	2.10
Holcim Midlothian Plant	07*	07*	3.20
TXI Operations Midlothian Plant	E-2-2	E2-2	0.00
TXI Operations Midlothian Plant	E-2-4	E2-4	0.00
TXI Operations Midlothian Plant	E-2-6	E2-6	0.00
TXI Operations Midlothian Plant	E-2-8	E2-8	0.00
TXI Operations Midlothian Plant	E2-22	E2-22	7.90

2.3.2.1.3.4 DFW 2012 EI Summary

The future case EI is composed of two datasets, hourly average 3Q2008 for the ARD sources and 2008 OSD for the remainder of the point sources. The 2012 future base is built upon these datasets by incorporating the changes expected due to growth, emission caps, and on-the-books controls. Table 20: Detailed NO_X 2012 Emissions Summary by Region provides a 2012 emissions summary.

Table 20: Detailed NO_X 2012 Emissions Summary by Region

Region	Projection	Affected Sources	2008 STARS NO_X, tpd	2008 ARD NO_X, tpd	2012 NO_X Projection, tpd
DFW	CAIR	Points in general pool		2.94	15.86
DFW	CAIR	Points in new pool		3.98	3.09
DFW	Controls	DFW major NO_X	18.38		12.67
DFW	Controls	Midlothian Kilns	18.37		17.60
DFW	Growth	EGAS	0.94		1.07
DFW	Growth	TIPI	0.63		0.71
HGB	CAIR	Points in new pool	0.00		0.14
HGB	CAIR	MECT points in new pool	0.00		0.46
HGB	MECT	OSD point sources	55.68		77.09
HGB	MECT	Growth under the cap	0.00		9.08
HGB	MECT	ARD point sources		0.20	0.10
HGB	MECT	MECT in general CAIR pool		24.17	27.49
HGB	MECT	MECT in new CAIR pool		7.62	8.50
HGB	MECT exempt	EGAS	13.47		18.92
HGB	MECT exempt	TIPI	12.02		13.81
Rest of TX	CAIR	OSDs in general pool	0.00		0.32
Rest of TX	CAIR	OSDs in new pool	0.00		7.49
Rest of TX	CAIR	ARDs in general pool		418.50	405.22
Rest of TX	CAIR	ARDs in new pool		31.07	27.40
Rest of TX	Controls	BPA NO_X controls	13.84		19.42
Rest of TX	Controls	DFW major NO_X	2.14		1.62
Rest of TX	Controls	ETX combustion	3.73		0.89
Rest of TX	Controls	ETX agreed orders	0.00		0.00
Rest of TX	Growth	EGAS	365.34		406.50
Rest of TX	Growth	TIPI	97.27		113.01
Rest of TX	Growth	Refinery expansion	5.35		5.39

2.3.3 Regional (Outside of Texas) Point Sources

Regional emissions include states outside of Texas within the modeling domain, Gulf of Mexico offshore, and the parts of Mexico and Canada within the modeling domain. The same procedure was used to model 2012 adjacent states as the remainder of the states beyond Texas. Any differences will be specifically noted.

2.3.3.1 States Outside of Texas

2.3.3.1.1 EGUs

The TCEQ distinguishes between EGUs and Acid Rain units. Not all EGUs (SIC 4911 and 4939) are Acid Rain units, e.g., true cogeneration units are not Acid Rain units, but large cogeneration units that supply more than one-third of their electricity to the public electrical grid are Acid Rain units. Non-Acid Rain EGUs are treated as NEGUs. This is the same definition that the EPA applies to EGUs for CAIR purposes, i.e., an EGU, as defined by CAIR, is an Acid Rain EGU.

The TCEQ built future case 2012 emission records for Acid Rain EGUs using the 2008 third quarter (3Q2008) hourly data downloaded from the EPA's CAMD website. A single 2008 typical summer acid rain day having average hourly emissions for each Acid Rain EGU was built to represent the future base for the EGUs. Existing controls were applied to generate the future case 2012.

The TCEQ applied existing controls to the 3Q2008 emissions dataset to complete the projection to 2012. The controls assumed are the CAIR Phase I NO_X budgets for each state as defined by EPA's Notice of Data Availability (NODA) allocations spreadsheet, obtained from EPA's website http://www.epa.gov/airmarkt/progsregs/cair/noda.html.

If a state had an ozone season budget, it was the assumed budget; otherwise, the annual budget was converted to a ton per day limit. States not having a CAIR limitation were modeled at their 2008 emissions.

Table 21: Modeled CAIR Phase I NO_X Allocations for States in the Modeling Domain gives the CAIR cap emissions for each state in the modeling domain. An empty cell indicates no CAIR cap for that state.

Table 21: Modeled CAIR Phase I NO_X Allocations for States in the Modeling Domain

State	Ozone Season CAIR Cap, tpd	Annual CAIR Cap, tpd	Modeled CAIR Cap, tpd	2008 ARD Emissions, tpd
AL	199.82	179.64	199.82	229.56
AR	71.50		71.50	113.51
CT	15.89		15.89	8.33
DC	0.69	0.38	0.69	0.41
DE	13.82	10.84	13.82	20.34
FL	297.49	258.83	297.49	466.96
GA		172.62	172.62	211.62
IA	88.56	85.09	88.56	129.07
IL	190.63	198.41	190.63	222.94
IN	285.32	283.53	285.32	381.48
KS				153.56
KY	223.81	216.56	223.81	252.48
LA	106.08	92.43	106.08	149.40
MA	46.88		46.88	18.37
MD	79.69	72.16	79.69	61.73
MD	79.69	72.16	79.69	61.73
ME				0.43
MI	179.88	169.97	179.88	240.19
MN		81.84		166.29
MO	165.65	155.83	165.65	237.08
MS	54.10	46.35	54.10	129.06
NC	176.29	161.85	176.29	142.80

State	Ozone Season CAIR Cap, tpd	Annual CAIR Cap, tpd	Modeled CAIR Cap, tpd	2008 ARD Emissions, tpd
ND				185.19
NE				117.90
NH				12.84
NJ	41.31	32.98	41.31	29.76
NY	128.10	118.73	128.10	86.77
OH	283.54	282.83	283.54	341.13
OK				247.44
PA	261.84	257.80	261.84	329.69
RI				0.36
SC	94.69	85.01	94.69	88.91
SD				35.26
TN	141.83	132.67	141.83	115.60
VA	99.31	93.89	99.31	84.25
VT				0.78
WI	111.69	106.08	111.69	132.52
WV	166.77	193.18	166.77	164.16

Table 22: Modeled 2012 Typical Day Acid Rain EGU Emissions for Regional States summarizes the Acid Rain EGU emissions data for point sources outside Texas. The Rest of U.S. column totals are for all states in the modeling domain, excluding Texas, Arkansas, Louisiana and Oklahoma, although parts of some states may extend outside the modeling domain. Thus, CAMx inputs would be expected to be less than the totals in Table 22.

Table 22: Modeled 2012 Typical Day Acid Rain EGU Emissions for Regional States

Hour	AR NO_X tph	LA NO_X tph	OK NO_X tph	Rest of U.S. NO_X tph
1	2.89	3.96	8.68	146.43
2	2.80	3.85	8.46	141.44
3	2.68	3.79	8.30	138.72
4	2.64	3.80	8.24	139.35
5	2.71	3.86	8.43	145.45
6	2.73	3.89	8.57	153.51
7	2.83	3.93	8.86	160.44
8	2.92	4.03	9.02	168.63
9	3.00	4.14	9.46	176.29
10	3.03	4.28	10.26	183.88
11	3.06	4.44	11.06	188.96
12	3.12	4.66	11.67	193.71

Hour	AR NO_X tph	LA NO_X tph	OK NO_X tph	Rest of U.S. NO_X tph
13	3.19	4.96	12.18	197.60
14	3.20	5.19	12.51	200.23
15	3.22	5.32	12.64	201.14
16	3.21	5.34	12.76	201.12
17	3.18	5.20	12.55	199.30
18	3.13	4.96	12.14	194.78
19	3.13	4.75	11.50	190.79
20	3.09	4.62	11.11	189.10
21	2.94	4.47	10.64	184.03
22	2.94	4.34	10.09	174.97
23	2.92	4.18	9.36	163.98
24	2.94	4.09	8.95	154.24
TOTALS	71.51	106.08	247.44	4188.06
#points	16	52	73	1,202

2.3.3.1.2 NEGUs

The 2012 NEGU emissions for states beyond Texas were interpolated from the 2018 CenRAP/RPO file after the EGUs were removed. Growing 2006 emissions to 2012 would not have captured the controls that were built into the regional modeling files. Table 23: 2012 Regional States NEGU Emissions represents the NEGU emissions for states beyond Texas, but within the modeling domain. CAMx inputs would be expected to be less than the totals tabulated.

Table 23: 2012 Regional States NEGU Emissions

State	Number of NO_X points	NO_X Emissions, tpy	Number of VOC points	VOC Emissions, tpy	Number of CO Points	CO Emissions, tpy
AL	1,805	89,549	3,192	55,554	1,817	204,191
AR	1,075	34,796	2,106	39,377	1,101	63,619
CN	854	8,914	1,203	4,897	832	7,549
DC	44	894	61	83	43	448
DE	386	4,833	1,009	3,589	383	9,263
FL	1,766	84,034	3,154	44,876	1,611	121,506
GA	1,749	62,045	2,509	40,394	1,651	174,871
IL	6,175	106,244	15,080	75,666	5,898	96,457
IN	3,154	115,841	7,674	71,503	3,059	446,859
IO	2,907	49,362	6,683	40,499	2,744	45,479
KS	2,698	89,809	4,391	33,438	2,610	103,991
KY	2,812	43,829	8,320	53,485	2,717	141,081

State	Number of NO_X points	NO_X Emissions, tpy	Number of VOC points	VOC Emissions, tpy	Number of CO Points	CO Emissions, tpy
LA	4,073	234,256	7,489	96,982	3,748	161,639
MA	5,551	26,916	8,596	10,474	4,502	19,188
ME	1,522	51,070	2,443	12,853	1,472	157,350
MI	3,439	135,140	8,935	45,784	2,866	97,045
MN	4,847	75,916	8,593	42,241	4,604	58,071
MO	4,152	54,660	8,384	41,942	3,878	161,984
MS	1,458	65,878	2,437	47,906	1,441	70,147
NC	2,619	58,759	4,992	73,350	2,630	65,713
ND	126	93,680	96	2,381	130	17,880
NE	911	20,515	1,172	9,133	852	8,225
NH	207	1,688	233	1,287	206	1,291
NJ	5,120	28,000	10,508	17,098	4,650	15,542
NY	2,092	57,427	2,644	7,805	2,074	86,454
OH	2,067	237,518	3,244	34,410	1,871	292,475
OK	2,379	88,660	5,475	43,666	2,385	76,014
PA	6,990	128,263	11,807	43,481	6,716	148,313
RI	139	2,452	259	2,269	140	2,830
SC	2,729	51,743	4,541	43,892	2,676	74,327
SD	79	15,857	88	3,203	67	6,076
TN	1,744	71,102	4,901	97,269	1,661	136,731
VA	2,248	75,957	3,898	51,628	2,106	80,414
VT	89	922	73	1,613	85	786
WI	4,373	80,270	9,666	41,226	4,097	47,110
WV	1,167	51,046	2,728	16,631	1,206	107,463

Table 24: 2012 Regional States Emissions Summary provides an overall summary of the 2012 emissions for all the states within the modeling domain, outside of Texas. As parts of some states may extend outside the modeling domain, CAMx inputs would be expected to be less than the totals tabulated.

Table 24: 2012 Regional States Emissions Summary

Model Year	Source Category	NO_X Emissions, tpd	VOC Emissions, tpd	CO Emissions, tpd
2006 Baseline	EGU	6525	47	1720
2012 Future Case	EGU	4613	41	1364
2006 Baseline	NEGU	7645	3331	8213
2012 Future Case	NEGU	6569	3430	9064

2.3.4 Offshore, Mexico, and Canada

The GWEI 2005 report mentioned declines in the number of platforms between 2000 and 2005, and platforms have been tending to be located farther offshore in deeper water, so the impact to onshore areas may be decreasing. However, MMS has not provided projections for the offshore EI. For lack of projections data, the 2012 EIs for the Gulf of Mexico offshore area, Mexico, and Canada were the same as those used in the 2006 baseline and the base case, as described in previous sections.

2.3.5 Summary of Future Case Point Source Data Files

The point source emission files that were processed with EPS3 for CAMx are presented in Table 25: AFS Files for the 2012 Future Case Episode. The regional AFS file for the GWEI contains monthly emissions for June only and the regional AFS file for Canadian emissions contains annual emissions. The version number on each dataset indicates a change from the previous version (e.g., "v8"). The FTP download site for these files is ftp://amdaftp.tceq.texas.gov/pub/DFW8H2/ei/2012/point.

Table 25: AFS Files for the 2012 Future Case Episode

Area	AFS Point Source Emissions Dataset	Hourly	Daily	Special
Texas	afs.ard_MECT_with_season_adjustment_v5	X		
Texas	afs.ard_2008_not_in_MECT_or_HECT_v3	X		1
Texas	afs.ard_CAIR_DFW_with_season_adjustment_v5	X		
Texas	afs.osd_MECT_for_DFW_NOx_pts_v3		X	
Texas	afs.osd_MECT_exempt_growth_to_2012_DFW.v1		X	
Texas	afs.osd_growth_under_MECT_v3		X	
Texas	afs.2012_HECT_HarrisCo_2008_basis_all_pts_v1		X	
Texas	afs.osd_CAIR_DFW_with_pathway_allowances_v4		X	
Texas	afs.osd_2008_DFW_controls_v2		X	
Texas	afs.osd_no_rules_growth_to_2012_w_TLL_adjustment.v2		X	
Texas	afs.landing_losses_3Q06_aver_day_episode_vDFW1	X		
Texas	afs.aggVOC_extra_alkenes_for_2006_vDFW1		X	
Regional	afs.ard_USAmTX_generic_CAIR_based_on_pt_caps.v1	X		
Regional	afs.osd_2012_USA_NEGUS_interpolated_from_CENRAP		X	
Regional	afs.gwei2005.May_Oct_edit.3pol.lcp			Monthly
Regional	afs.Mexico_from_updated_1999_NEI.lcp_3pols_v1		X	
Regional	afs.CAIRCanada.2001.v1a.latlong.lcp			Annual

Table 26: 2012 Future Case Point Source Emissions Summary summarizes the future case emissions. These tabulated emissions are AFS totals input to EPS3. CAMx input values may differ. The U.S. minus Texas column includes some points outside the modeling domain. The TX minus DFW column includes some points in Texas outside the modeling domain.

Table 26: 2012 Future Case Point Source Emissions Summary

Emission Source	DFW NO_X (tpd)	DFW VOC (tpd)	TX minus DFW NO_X (tpd)	TX minus DFW VOC (tpd)	U.S. minus TX NO_X (tpd)	U.S. minus TX VOC (tpd)
NEGUs (OSD)	32.0	38.6	674.2	526.4	6569.4	3429.8
EGUs (ARD)	18.9	0.8	468.8	15.7	4613.1	41.1
Tank Landing Losses				6.5		
HRVOC Reconciliation				19.3		

3 ON-ROAD MOBILE SOURCE MODELING EMISSIONS DEVELOPMENT

3.1 On-Road Mobile Source Emissions Inventories for Nine-County DFW

The purpose of this section is to provide a brief overview of the nine-county DFW area on-road mobile source emissions inventory files that were input into the photochemical model for the 2006 base case, the 2006 baseline case, and the 2012 future case. These inventory data sets were developed under contract by the North Central Texas Council of Governments (NCTCOG) based on travel demand model (TDM) output for the DFW area. For each of the nine DFW counties, NCTCOG combined MOVES2010a emissions rate output with vehicle miles traveled (VMT) estimates from the local TDM. The net result is referred to as a link-based inventory because both hourly VMT and emissions estimates are developed for each roadway segment or link in the network. For each year, summer season on-road emission inventories were developed for the five day types of weekday (i.e., Tuesday-Thursday average), Friday, Saturday, Sunday, and Monday. Since these days types are based on a summer season, development of separate baseline OSD emissions was not needed. For the on-road category, base case and baseline emissions are the same.

Table 27: VMT, NO_X, VOC, and CO Summary for 2006 DFW On-Road Inventory and Table 28: VMT, NO_X, VOC, and CO Summary for 2012 DFW On-Road Inventory provide summaries of the total VMT, NO_X, VOC, and CO emissions for the entire nine-county DFW area for each day type for the 2006 case and 2012 future case, respectively. As shown, Fridays have the highest total VMT of the week, while Saturdays and Sundays have the lowest total daily VMT. While overall VMT increases with future growth, total emissions decrease from 2006 to 2012 as a result of more stringent emissions standards for newer vehicles entering the fleet, combined with the simultaneous attrition of older, higher-emitting vehicles. Consistent with current federal and state rules, the on-road inventories from NCTCOG include the benefits of:

- reformulated gasoline (RFG) in Collin, Dallas, Denton, and Tarrant Counties;
- low Reid vapor pressure (RVP) gasoline in Ellis, Johnson, Kaufman, Parker, and Rockwall Counties;
- the inspection and maintenance (I/M) Program in all nine counties; and
- Texas low emission diesel (TxLED) fuel for all nine counties.

Table 27: VMT, NO_X, VOC, and CO Summary for 2006 DFW On-Road Inventory

Day Type	Vehicle Miles Traveled	NO_X (tpd)	VOC (tpd)	CO (tpd)
Weekday	151,358,205	259.11	111.02	1,209.12
Friday	167,642,908	263.85	114.42	1,304.22
Saturday	136,773,126	189.78	103.22	1,130.87
Sunday	112,618,220	169.77	96.89	995.36
Monday	148,101,765	252.59	109.15	1,187.58

Table 28: VMT, NO_X, VOC, and CO Summary for 2012 DFW On-Road Inventory

Day Type	Vehicle Miles Traveled	NO_X (tpd)	VOC (tpd)	CO (tpd)
Weekday	186,388,044	181.40	80.48	955.75
Friday	200,764,362	181.90	81.75	1,010.32
Saturday	163,286,714	136.50	74.77	879.39

Day Type	Vehicle Miles Traveled	NO_X (tpd)	VOC (tpd)	CO (tpd)
Sunday	139,048,881	125.47	71.55	789.76
Monday	180,038,229	175.34	78.97	930.51

Even though all of the day type on-road inventory data sets were used for photochemical model input, only the summer weekday emissions will be detailed here. For the 2006 base case and 2012 future case, Table 29: Summary of 2006 DFW Summer Weekday On-Road Inventory by County and Table 30: Summary of 2012 DFW Summer Weekday On-Road Inventory by County present respective summaries of the VMT, NO_X, VOC, and CO emissions for each of the nine counties in the DFW area.

Table 29: Summary of 2006 DFW Summer Weekday On-Road Inventory by County

DFW Area County	Vehicle Miles Traveled	NO_X (tpd)	VOC (tpd)	CO (tpd)
Collin	15,622,536	23.94	10.69	108.65
Dallas	62,826,353	104.83	46.41	510.76
Denton	13,205,166	22.50	9.33	93.29
Ellis	5,503,696	12.43	3.68	46.63
Johnson	4,448,585	9.35	3.72	44.95
Kaufman	4,460,300	9.48	2.60	36.24
Parker	3,723,312	8.81	2.71	34.02
Rockwall	1,891,799	3.71	1.32	15.59
Tarrant	39,676,458	64.05	30.58	318.99
Total	151,358,205	259.11	111.02	1,209.12

Table 30: Summary of 2012 DFW Summer Weekday On-Road Inventory by County

DFW Area County	Vehicle Miles Traveled	NO_X (tpd)	VOC (tpd)	CO (tpd)
Collin	21,232,596	17.56	8.36	95.47
Dallas	72,976,845	70.15	32.00	390.93
Denton	17,746,832	16.18	7.13	80.02
Ellis	7,580,609	9.59	2.79	34.08
Johnson	5,829,182	7.00	2.67	30.42
Kaufman	6,170,056	7.15	1.98	26.52
Parker	5,027,970	6.47	1.98	23.55
Rockwall	2,422,684	2.59	1.02	11.03
Tarrant	47,401,269	44.71	22.55	263.72
Total	186,388,044	181.40	80.48	955.75

Table 31: Summary of 2006 DFW Summer Weekday On-Road Inventory by Vehicle Type and Table 32: Summary of 2012 DFW Summer Weekday On-Road Inventory by Vehicle Type

present respective summaries for 2006 and 2012 of the VMT, NO_X, VOC, and CO emissions for each of the gasoline and diesel fuel source use type (SUT) combinations from the MOVES2010a model.

Table 31: Summary of 2006 DFW Summer Weekday On-Road Inventory by Vehicle Type

Fuel and Source Use Type Combination	Vehicle Miles Traveled	NO_X (tpd)	VOC (tpd)	CO (tpd)
Gasoline - Motorcycle	113,799	0.09	1.62	2.24
Gasoline - Passenger Car	113,307,791	92.59	65.36	697.43
Gasoline - Passenger Truck	22,109,764	38.66	26.34	330.99
Gasoline - Light Commercial Truck	5,822,205	11.05	7.47	95.40
Gasoline - Transit Bus	382	0.00	0.00	0.03
Gasoline - School Bus	11,945	0.07	0.05	0.78
Gasoline - Refuse Truck	3,746	0.02	0.01	0.18
Gasoline - Single Unit Short-Haul Truck	969,735	3.76	1.36	33.61
Gasoline - Single Unit Long-Haul Truck	133,521	0.50	0.18	4.12
Gasoline - Motor Home	119,033	0.51	0.18	4.17
Gasoline - Combination Short-Haul Truck	794	0.01	0.00	0.07
Diesel - Passenger Car	377,430	0.70	0.05	0.21
Diesel - Passenger Truck	74,595	0.40	0.06	0.35
Diesel - Light Commercial Truck	1,128,486	6.06	0.84	5.17
Diesel - Intercity Bus	139,191	2.89	0.12	0.86
Diesel - Transit Bus	38,787	0.65	0.04	0.24
Diesel - School Bus	144,680	1.46	0.12	0.57
Diesel - Refuse Truck	89,914	0.99	0.06	0.32
Diesel - Single Unit Short-Haul Truck	2,145,902	14.57	1.55	6.48
Diesel - Single Unit Long-Haul Truck	300,394	1.98	0.22	0.87
Diesel - Motor Home	69,313	0.53	0.06	0.19
Diesel - Combination Short-Haul Truck	1,755,263	28.79	1.31	8.39
Diesel - Combination Long-Haul Truck	2,501,535	52.83	4.04	16.44
Total	151,358,205	259.11	111.02	1,209.12

Table 32: Summary of 2012 DFW Summer Weekday On-Road Inventory by Vehicle Type

Fuel and Source Use Type Combination	Vehicle Miles Traveled	NO_X (tpd)	VOC (tpd)	CO (tpd)
Gasoline - Motorcycle	137,736	0.09	2.13	1.70
Gasoline - Passenger Car	137,141,621	58.79	44.63	536.70
Gasoline - Passenger Truck	26,162,921	29.16	18.04	241.36
Gasoline - Light Commercial Truck	9,965,919	12.66	7.54	102.76
Gasoline - Transit Bus	441	0.00	0.00	0.01

Fuel and Source Use Type Combination	Vehicle Miles Traveled	NO_X (tpd)	VOC (tpd)	CO (tpd)
Gasoline - School Bus	13,800	0.07	0.05	0.79
Gasoline - Refuse Truck	5,107	0.02	0.01	0.14
Gasoline - Single Unit Short-Haul Truck	1,321,812	4.33	1.33	32.15
Gasoline - Single Unit Long-Haul Truck	181,998	0.57	0.17	3.88
Gasoline - Motor Home	162,250	0.57	0.16	3.50
Gasoline - Combination Short-Haul Truck	913	0.01	0.00	0.05
Diesel - Passenger Car	456,821	0.16	0.02	0.54
Diesel - Passenger Truck	88,270	0.36	0.05	0.31
Diesel - Light Commercial Truck	1,931,639	6.90	0.85	5.63
Diesel - Intercity Bus	160,803	2.16	0.10	0.72
Diesel - Transit Bus	44,809	0.46	0.03	0.21
Diesel - School Bus	167,144	0.98	0.09	0.47
Diesel - Refuse Truck	122,559	0.57	0.03	0.21
Diesel - Single Unit Short-Haul Truck	2,925,006	9.16	0.90	5.34
Diesel - Single Unit Long-Haul Truck	409,457	1.30	0.14	0.72
Diesel - Motor Home	94,478	0.40	0.05	0.17
Diesel - Combination Short-Haul Truck	2,017,408	14.94	0.67	4.69
Diesel - Combination Long-Haul Truck	2,875,135	37.74	3.48	13.67
Total	186,388,044	181.40	80.48	955.75

The MOVES2010a run specification files used to develop these inventories, along with detailed reports and tab-delimited summary output data, can be found on the following FTP sites for 2006 and 2012, respectively:

- ftp://amdaftp.tceq.texas.gov/pub/Mobile_EI/DFW/mvs/2006/
- ftp://amdaftp.tceq.texas.gov/pub/Mobile_EI/DFW/mvs/2012/

3.2 On-Road Mobile Source Emissions Processing

The on-road emissions inventory data provided by NCTCOG were prepared for input into the photochemical model using EPS3. When input into EPS3, the inventory data are in a readable text-based format. However, once within EPS3, the emissions data are maintained in a binary format. Table 33: EPS3 Modules Used to Process Nine-County DFW On-Road Emissions Data summarizes the EPS3 modules that were used to process the nine-county DFW on-road inventories.

Table 33: EPS3 Modules Used to Process Nine-County DFW On-Road Emissions Data

EPS3 Module	Description
LBASE	Spatially allocate link-based emissions among grid cells.
PREAM	Prepare non-link “roadway type” emissions for further processing.
PREPNT	Prepare stationary extended idling emissions for further processing.

EPS3 Module	Description
CNTLEM	Apply controls to model strategies, apply adjustments, etc.
TMPRL	Apply temporal profiles to extended idling emissions.
CHMSPL	Chemically speciate emissions into NO, NO_2, olefins, parrafins, etc.
GRDEM	Sum emissions by grid cell for photochemical model input.
MRGUAM	Merge and adjust multiple gridded files for photochemical model input.

The MOVES2010a model only estimates extended idling emissions for the diesel fuel combination long-haul truck category. Using a combination of SAS and LINUX code, these extended idling emissions were aggregated into a nine-county total and spatially assigned to known truck stop locations. The extended idling emissions were then processed through EPS3 as if they were stationary low-level point sources. The summer weekday extended idling emissions by county are presented below in Table 34: 2006 Diesel Fuel Combination Long-Haul Truck Extended Idling Emissions for Nine-County DFW and Table 35: 2012 Diesel Fuel Combination Long-Haul Truck Extended Idling Emissions for Nine-County DFW. Greater detail on heavy-duty vehicle idling activity specific to Texas metropolitan areas can be found in reports located on the following web site:
http://www.tceq.texas.gov/airquality/airmod/project/pj_report_mob.html.

Table 34: 2006 Diesel Fuel Combination Long-Haul Truck Extended Idling Emissions for Nine-County DFW

DFW Area County	NO_X (tpd)	VOC (tpd)	CO (tpd)
Collin	0.60	0.18	0.26
Dallas	2.00	0.59	0.88
Denton	0.59	0.17	0.26
Ellis	0.55	0.16	0.24
Johnson	0.05	0.01	0.02
Kaufman	1.15	0.34	0.51
Parker	1.11	0.33	0.49
Rockwall	0.44	0.13	0.19
Tarrant	0.80	0.24	0.35
Total	7.29	2.15	3.21

Table 35: 2012 Diesel Fuel Combination Long-Haul Truck Extended Idling Emissions for Nine-County DFW

DFW Area County	NO_X (tpd)	VOC (tpd)	CO (tpd)
Collin	1.04	0.20	0.49
Dallas	3.47	0.66	1.62
Denton	1.02	0.19	0.47
Ellis	0.96	0.18	0.45

DFW Area County	NO_X (tpd)	VOC (tpd)	CO (tpd)
Johnson	0.08	0.02	0.04
Kaufman	1.99	0.38	0.93
Parker	1.91	0.37	0.89
Rockwall	0.76	0.15	0.36
Tarrant	1.38	0.26	0.65
Total	12.62	2.41	5.89

3.2.1 Texas Low Emission Diesel Fuel Benefits

Based on an EPA memorandum entitled *Texas Low Emission Diesel (LED) Fuel Benefits*, September 27, 2001, a 4.8% NO_X TxLED reduction should be claimed for 2002-and-newer diesel vehicles and a 6.2% NO_X TxLED reduction should be claimed for 2001-and-older diesel vehicles. In order to determine the specific TxLED adjustment factors that should apply to each of the twelve diesel fuel source use types, MOVES2010a runs were performed to determine NO_X emissions rates by model year. By using these data, the 4.8% and 6.2% reduction factors were weighted according to NO_X emission model year contributions for each diesel fuel source use type. The FTP site at ftp://amdaftp.tceq.texas.gov/pub/Mobile_EI/Statewide/mvs/txled/ contains more detail on this analysis. The resulting TxLED adjustment factors and benefits for both 2006 and 2012 are summarized in Table 36: Summary of 2006 Summer Weekday TxLED Benefits by Vehicle Type and Table 37: Summary of 2012 Summer Weekday TxLED Benefits by Vehicle Type, respectively. The TxLED adjustment factors were incorporated by NCTCOG into the on-road inventories by post-processing the MOVES2010a diesel fuel source use type NO_X emission rates.

Table 36: Summary of 2006 Summer Weekday TxLED Benefits by Vehicle Type

Diesel Fuel Source Use Type	NO_X Reduction	Adjustment Factor	NO_X Benefit (tpd)
Passenger Car	5.06%	0.9494	0.04
Passenger Truck	5.68%	0.9432	0.02
Light Commercial Truck	5.56%	0.9444	0.36
Intercity Bus	5.97%	0.9403	0.18
Transit Bus	5.94%	0.9406	0.04
School Bus	5.92%	0.9408	0.09
Refuse Truck	5.85%	0.9415	0.06
Single Unit Short-Haul Truck	5.31%	0.9469	0.82
Single Unit Long-Haul Truck	5.35%	0.9465	0.11
Motor Home	5.77%	0.9423	0.03
Combination Short-Haul Truck	5.82%	0.9418	1.78
Combination Long-Haul Truck	5.83%	0.9417	3.27
Total			6.81

Table 37: Summary of 2012 Summer Weekday TxLED Benefits by Vehicle Type

Diesel Fuel Source Use Type	NO_X Reduction	Adjustment Factor	NO_X Benefit (tpd)
Passenger Car	5.02%	0.9498	0.01
Passenger Truck	5.32%	0.9468	0.02
Light Commercial Truck	5.29%	0.9471	0.39
Intercity Bus	5.80%	0.9420	0.13
Transit Bus	5.77%	0.9423	0.03
School Bus	5.76%	0.9424	0.06
Refuse Truck	5.69%	0.9431	0.03
Single Unit Short-Haul Truck	5.04%	0.9496	0.49
Single Unit Long-Haul Truck	5.08%	0.9492	0.07
Motor Home	5.53%	0.9447	0.02
Combination Short-Haul Truck	5.47%	0.9453	0.86
Combination Long-Haul Truck	5.45%	0.9455	2.18
Total			4.29

3.3 Nine-County DFW Photochemical Modeling Input

The summer weekday on-road emissions by county that were input into the photochemical model are summarized below in Table 38: 2006 Summer Weekday On-Road Mobile Source Inventory by County and Table 39: 2012 Summer Weekday On-Road Mobile Source Inventory by County. These on-road inventory summaries are a combination of running exhaust, evaporative, off-network, and extended idling emissions. Differences by individual counties between these figures and those referenced above in Table 29 and Table 30 are due to the spatial reallocation of extended idling emissions presented above in Table 34 and Table 35. However, the nine-county total on-road emission estimates do not differ.

Table 38: 2006 Summer Weekday On-Road Mobile Source Inventory by County

DFW Area County	NO_X (tpd)	VOC (tpd)	CO (tpd)
Collin	23.92	10.68	108.63
Dallas	104.06	46.18	510.42
Denton	22.37	9.29	93.23
Ellis	12.50	3.70	46.66
Johnson	9.10	3.65	44.84
Kaufman	10.29	2.83	36.59
Parker	9.60	2.94	34.37
Rockwall	4.04	1.42	15.73
Tarrant	63.23	30.33	318.63
Total	259.11	111.02	1,209.12

Table 39: 2012 Summer Weekday On-Road Mobile Source Inventory by County

DFW Area County	NO_X (tpd)	VOC (tpd)	CO (tpd)
Collin	17.74	8.39	95.55
Dallas	69.27	31.83	390.53
Denton	16.18	7.14	80.03
Ellis	9.42	2.75	34.00
Johnson	6.41	2.56	30.15
Kaufman	8.32	2.20	27.06
Parker	7.76	2.23	24.16
Rockwall	3.00	1.10	11.21
Tarrant	43.30	22.28	263.06
Total	181.40	80.48	955.75

The total nine-county DFW on-road emissions input to the photochemical model by day type are summarized below in Table 40: 2006 On-Road Mobile Source Inventory by Day Type and Table 41: 2012 On-Road Mobile Source Inventory by Day Type. Slight differences by day type between these figures and those presented in Table 27 and Table 28 are due to how these on-road emission inventories are developed in Central Daylight Time (CDT), but must be processed for photochemical model input in Central Standard Time (CST). For example, the 11 PM – 12 AM CST emissions on a Friday evening are based on 12-1 AM CDT emissions from a Saturday.

Table 40: 2006 On-Road Mobile Source Inventory by Day Type

Day Type	NO_X (tpd)	VOC (tpd)	CO (tpd)
Weekday	259.11	111.02	1,209.12
Friday	264.31	114.61	1,308.99
Saturday	189.98	103.25	1,131.33
Sunday	168.95	96.60	988.74
Monday	252.43	109.12	1,186.90

Table 41: 2012 On-Road Mobile Source Inventory by Day Type

Day Type	NO_X (tpd)	VOC (tpd)	CO (tpd)
Weekday	181.40	80.48	955.75
Friday	182.24	81.87	1,013.94
Saturday	136.68	74.80	880.20
Sunday	124.84	71.37	784.28
Monday	175.33	78.97	930.45

For the on-road mobile inventory portion of the DFW subdomain, the EPS3 message files along with the gridded files input into the photochemical model for 2006 and 2012 are available on the following FTP sites, respectively:

- ftp://amdaftp.tceq.texas.gov/pub/Mobile_EI/DFW/eps3/2006/
- ftp://amdaftp.tceq.texas.gov/pub/Mobile_EI/DFW/eps3/2012/

Similar on-road mobile EPS3 message and gridded files for the Texas-only portion of the larger 12 km modeling domain are available for 2006 and 2012, respectively, on the following FTP sites:

- ftp://amdaftp.tceq.texas.gov/pub/Mobile_EI/Statewide/eps3/2006/
- ftp://amdaftp.tceq.texas.gov/pub/Mobile_EI/Statewide/eps3/2012/

Similar on-road mobile EPS3 message and gridded files for both the Texas and non-Texas portions of the larger 12 km modeling domain are available for 2006 and 2012, respectively, on the following FTP sites:

- ftp://amdaftp.tceq.texas.gov/pub/Mobile_EI/USA/eps3/2006/
- ftp://amdaftp.tceq.texas.gov/pub/Mobile_EI/USA/eps3/2012/

3.4 Attainment Demonstration Motor Vehicle Emissions Budget

By definition, the future case on-road NO_X and VOC emission estimates input into the final attainment demonstration photochemical modeling run should establish the motor vehicle emissions budget (MVEB). The 2012 summer weekday on-road emissions are the most representative day type for this purpose, and are presented below in Table 42: 2012 Attainment Demonstration MVEB for the Nine-County DFW Area. As shown, these 2012 figures match those provided by NCTCOG as summarized above in Table 28, Table 30, and Table 32. No emission reduction credits were taken for local transportation control measures (TCMs) and voluntary mobile source emission reduction program (VMEP) strategies.

Table 42: 2012 Attainment Demonstration MVEB for the Nine-County DFW Area

Nine-County DFW Area On-Road Emissions	NO_X (tpd)	VOC (tpd)
2012 On-Road Inventory From NCTCOG (Table 28) Includes RFG, Low RVP, I/M, and TxLED	181.40	80.48

The following pages contain graphical plots of the 2006 and 2012 on-road summer weekday NO_X and VOC emissions for the greater DFW area. These plots are respectively entitled

- Figure 16: 2006 DFW Summer Weekday NOX Emissions;
- Figure 17: 2006 DFW Summer Weekday VOC Emissions;
- Figure 18: 2012 DFW Summer Weekday NOX Emissions; and
- Figure 19: 2012 DFW Summer Weekday VOC Emissions.

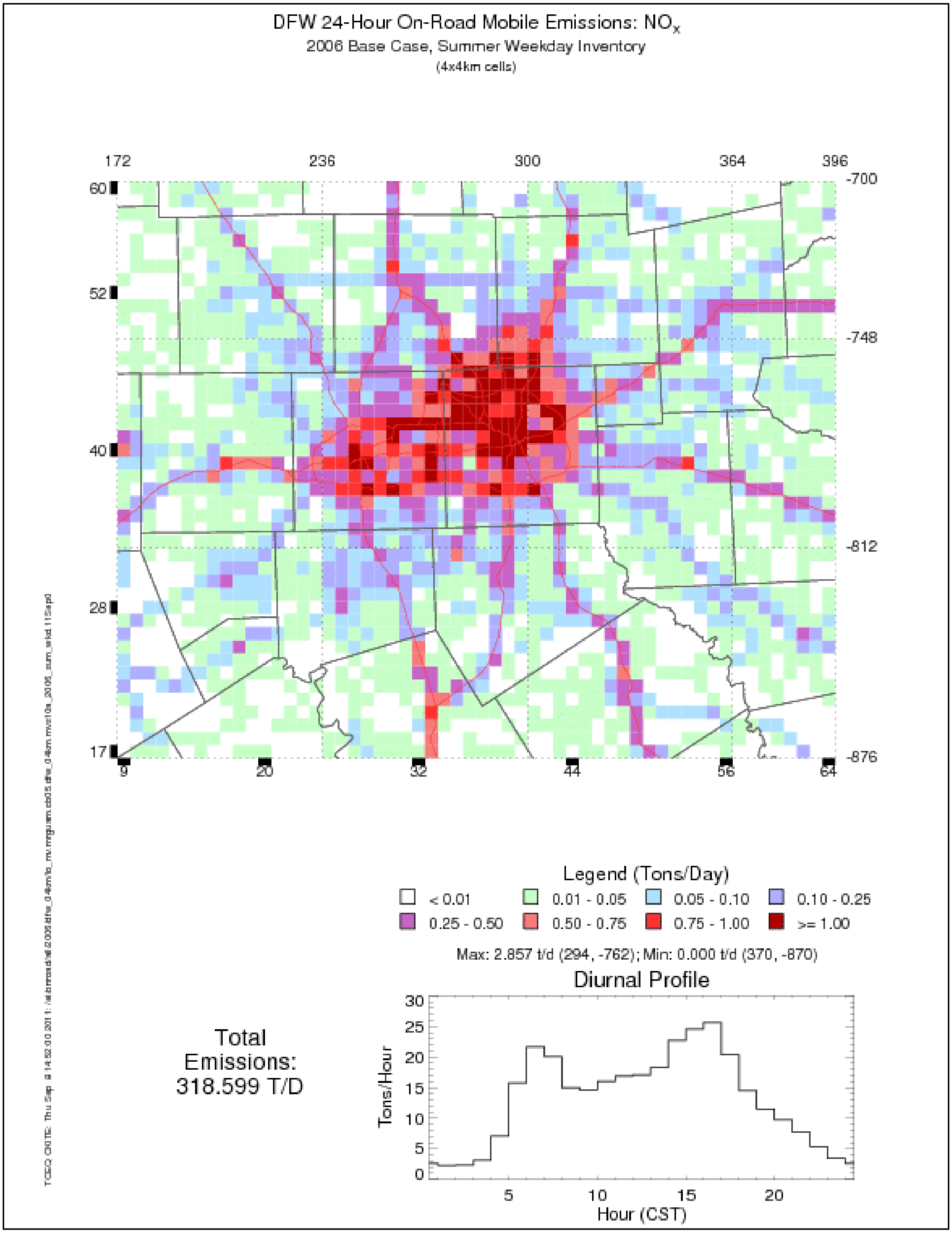

Figure 16: 2006 DFW Summer Weekday NO_X Emissions

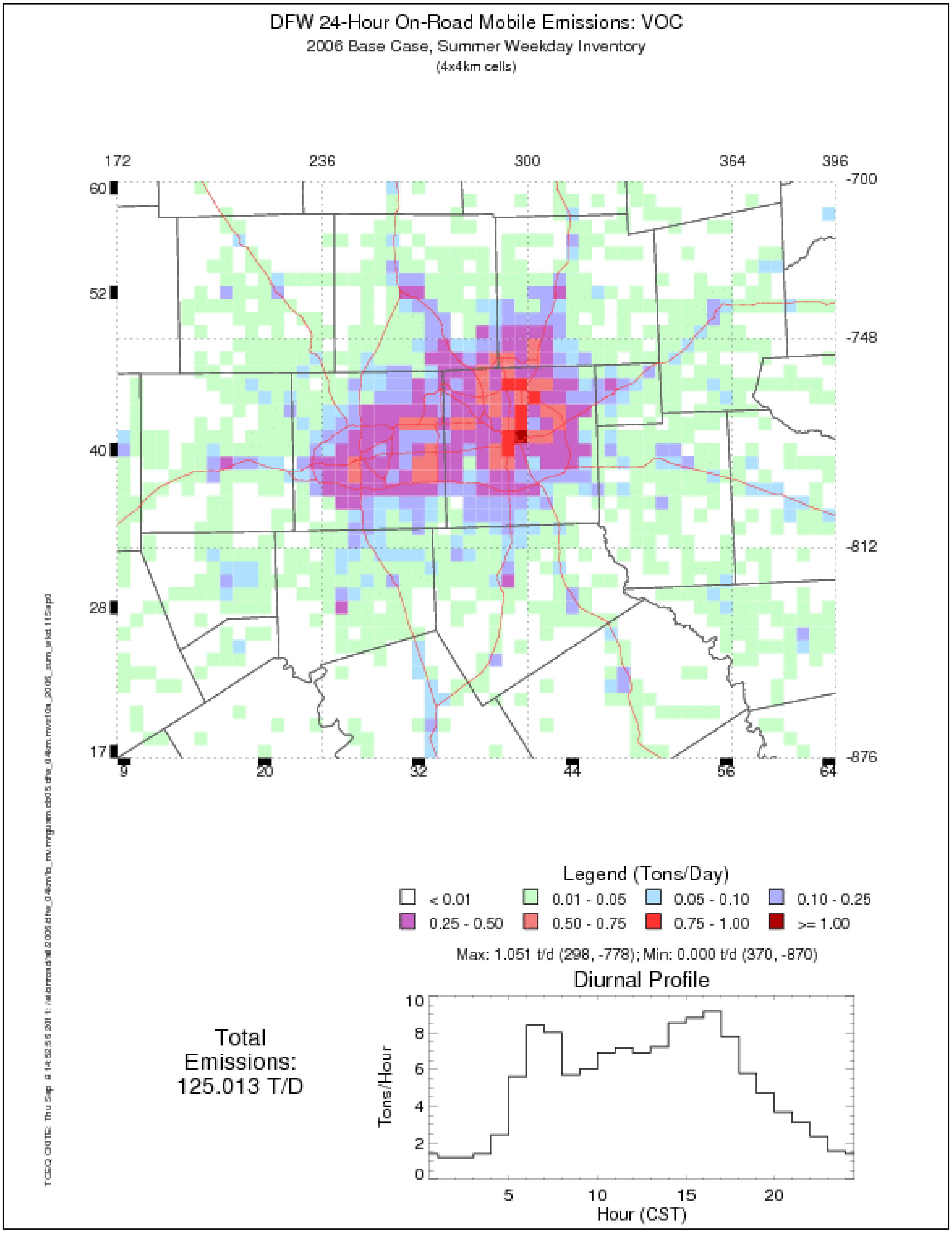

Figure 17: 2006 DFW Summer Weekday VOC Emissions

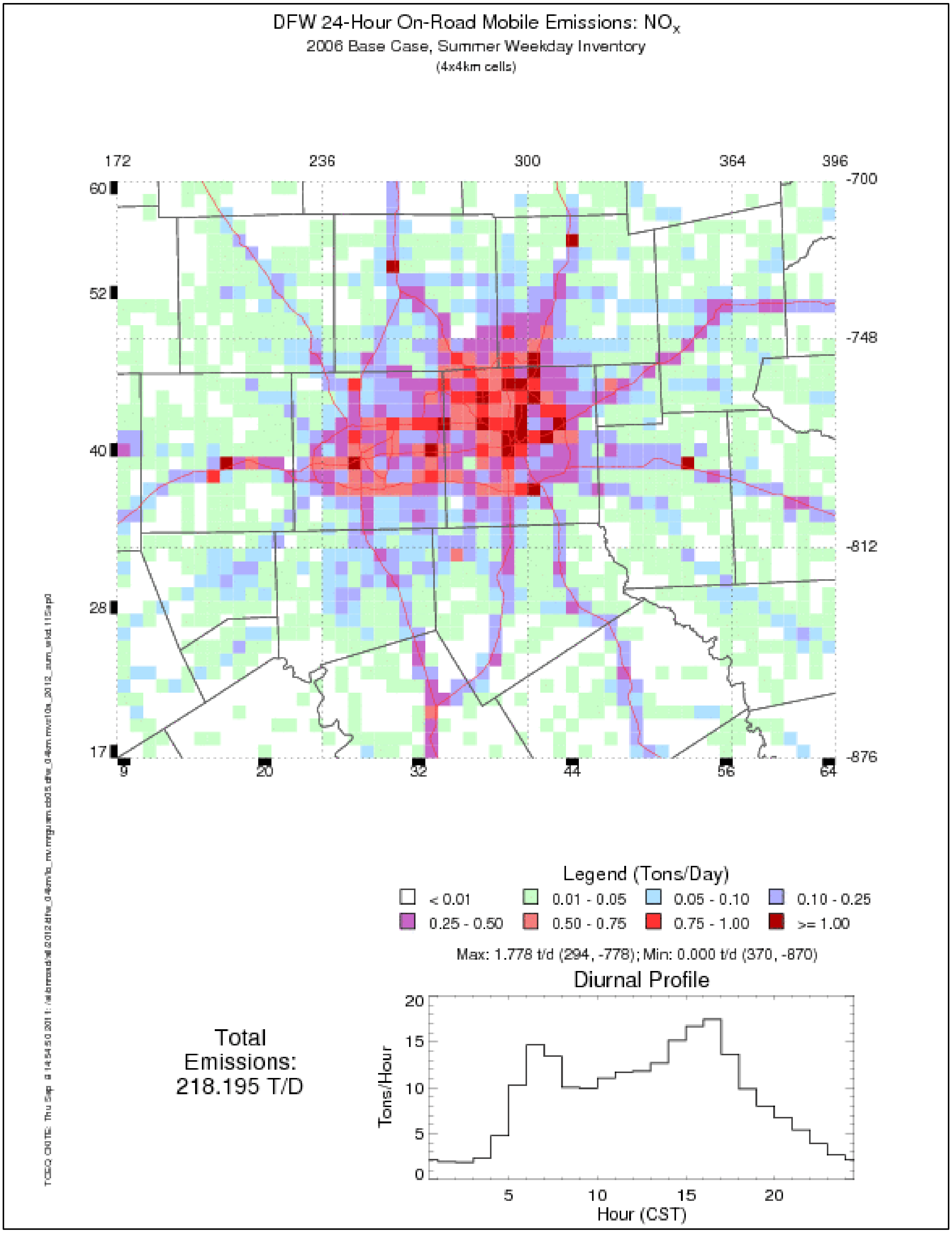

Figure 18: 2012 DFW Summer Weekday NO_X Emissions

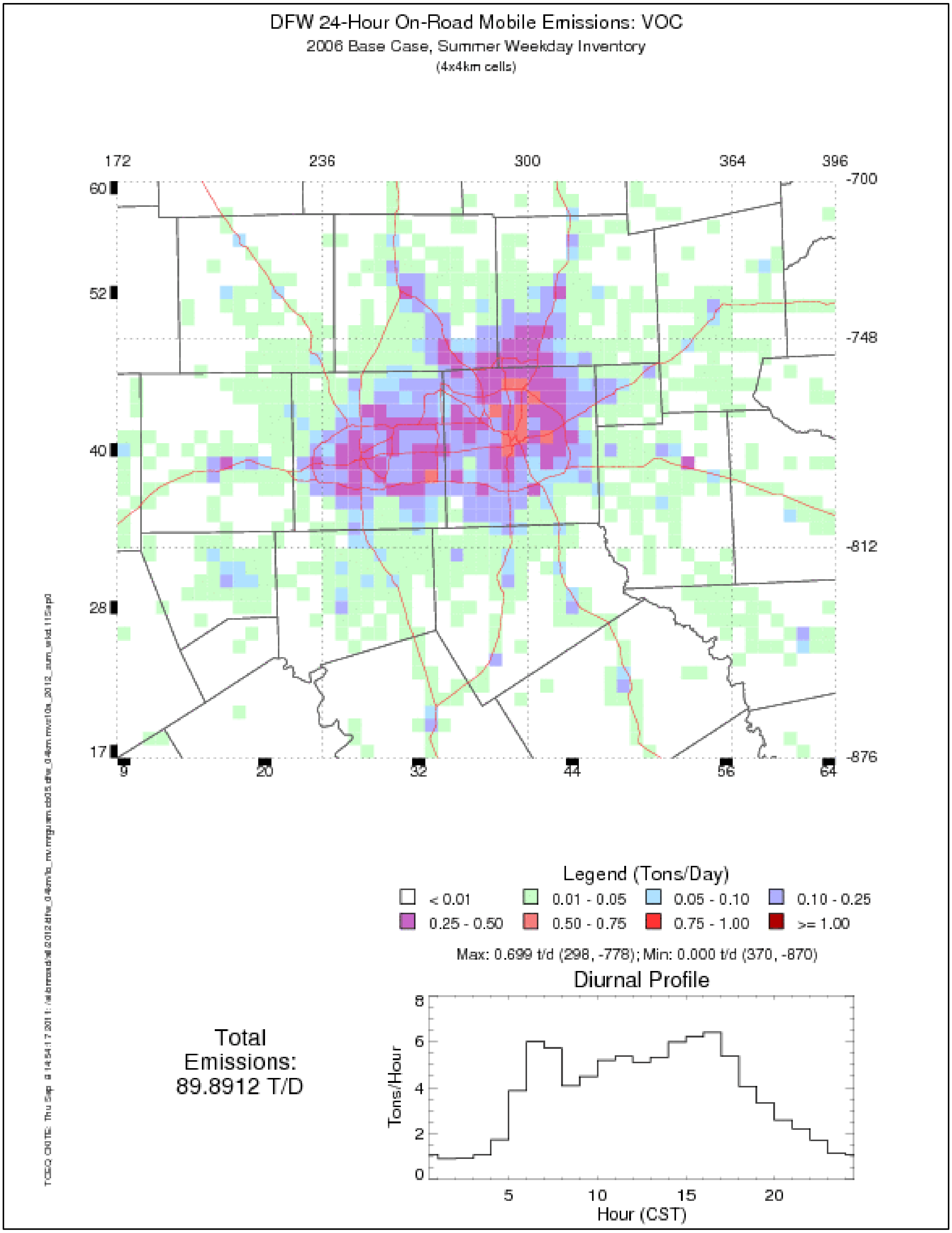

Figure 19: 2012 DFW Summer Weekday VOC Emissions

3.5 On-Road Mobile Source Emissions Inventories for Non-DFW Areas

On-road emission inventories for 2006 and 2012 were also developed for portions of the modeling domain outside of the nine-county DFW area. For the three counties of Hood, Hunt, and Wise, a similar link-based inventory development approach was taken by NCTCOG based on local TDM output. Similar to the nine-county DFW area, on-road emissions were developed for the five day types of weekday, Friday, Saturday, Sunday, and Monday. More detail on the development of these Hood, Hunt, and Wise inventories is available on the following FTP sites:

- ftp://amdaftp.tceq.texas.gov/pub/Mobile_EI/DFW/mvs/2006/
- ftp://amdaftp.tceq.texas.gov/pub/Mobile_EI/DFW/mvs/2012/

For the Texas counties outside of the DFW area, on-road emissions were developed by the Texas Transportation Institute (TTI) using Highway Performance Monitoring System (HPMS) data as the basis for VMT estimates. Summer season emission estimates were developed for the four day types of weekday, Friday, Saturday, and Sunday. Hourly emission rates from MOVES2010a were coupled with county-level VMT estimates by roadway type for 2006 and 2012. More detail on the development of these HPMS-based on-road inventories is available on the following FTP sites:

- ftp://amdaftp.tceq.texas.gov/pub/Mobile_EI/Statewide/mvs/2006/
- ftp://amdaftp.tceq.texas.gov/pub/Mobile_EI/Statewide/mvs/2012/

On-road emission estimates for non-Texas states within the photochemical modeling domain were developed for 2006 and 2012 using default runs from the MOVES2010a model, which is available at http://www.epa.gov/otaq/models/moves/index.htm. For both 2006 and 2012, default on-road emissions were estimated for the July weekday and weekend day type options available with MOVES2010a. More detail on the development of these default MOVES2010a on-road inventories is available on the following FTP sites:

- ftp://amdaftp.tceq.texas.gov/pub/Mobile_EI/USA/mvs/2006/
- ftp://amdaftp.tceq.texas.gov/pub/Mobile_EI/USA/mvs/2012/

More detail on this analysis is documented in a presentation entitled *Using the MOVES Model in Inventory Mode to Develop Regional On-Road Emission Inputs for Air Quality Modeling Applications*, which was presented at an EPA workshop in June of 2011 and is available at http://www.epa.gov/otaq/models/moves/conference2011/inventory-regional-moves-2011.pdf. A summary of the different on-road emission estimation approaches by geographic area taken for this DFW SIP revision is provided in Table 43: On-Road Inventory Development by Area Within the Modeling Domain.

Table 43: On-Road Inventory Development by Area Within the Modeling Domain

On-Road Inventory Development Parameter	DFW Area	Non-DFW Texas Counties	Non-Texas States and Counties
VMT Source	Travel Demand Model (TDM)	Highway Performance Monitoring System	MOVES2010a Defaults
VMT Resolution	Roadway Links From TDM	19 Roadway Types	12 Roadway Types
Day Types	Weekday, Friday, Saturday, Sunday, and Monday	Weekday, Friday, Saturday, and Sunday	Weekday and Weekend

On-Road Inventory Development Parameter	DFW Area	Non-DFW Texas Counties	Non-Texas States and Counties
Hourly Variation in VMT?	Yes	Yes	Yes
Roadway Speed Distribution	Varies by Hour and Link	Varies by Hour and Roadway Type	MOVES2010a Defaults
Spatial Resolution	Excellent	Very Good	Good
Temporal Resolution	Excellent	Very Good	Good
MOVES2010a Fuel and Source Use Types	Gasoline and Diesel 13 Source Use Types	Gasoline and Diesel 13 Source Use Types	Gasoline and Diesel 13 Source Use Types

4 NON-ROAD, OFF-ROAD, AND AREA SOURCE MODELING EMISSIONS

4.1 Texas Oil and Gas Production Emission Inventory Development

The area source oil and gas production EI was developed using a contractor-developed calculator that provided county-level emissions based on Texas Railroad Commission data for production values of oil, condensate and natural gas (ERG, 2010). Non-Texas oil and gas production data is in the area source inventory (Section 4.7). Data from 2006 was provided for use in the base case and June 2010 data was provided as the latest available complete dataset for 2012 future year development. Sources like compressors, condensate storage, heaters, and pneumatic devices dominated the emissions as illustrated in Table 44: 2006 Oil and Gas Production EI breakout.

Table 44: 2006 Oil and Gas Production EI breakout

area06_b2_oilgasp_9co		(tpd)	
Category	**NOx**	**VOC**	**CO**
2-Cycle Lean Burn Compressor	1.29	0.04	0.36
4-Cycle Lean Burn Compressor	0.75	0.15	1.27
4-Cycle Rich Burn Compressor	46.18	0.97	8.55
4-Cycle Rich Burn Compressor w/ Catalyst	0.61	0.13	1.17
Condensate Tanks	0	40.57	0
Condensate Loading	0	0.33	0
Gas Heaters	1.15	0.06	0.96
Dehydrators	0	1.26	0
Gas Fugitives (grouped)	0	2.53	0
Gas Well Blowdowns	0	0.65	0
Gas Well Completions	0	2.96	0
Pumpjacks	0.07	0	0.03
Crude Tanks	0	0.22	0
Produced Water	0	0.45	0
Oil Well Blowdowns	0	0.06	0
Oil Fugitives (grouped)	0	0.04	0
Oil Well Completions	0	0.1	0
Oil Heaters	0.02	0	0.01
Oil Loading	0	0.02	0
Pneumatic Devices	0	21.54	0
Total (tpd)	**50.07**	**72.1**	**12.36**

The oil and gas production EI was projected from 2010 to 2012 using the simple assumption of 10% growth for the 23 Barnett shale counties, 10% growth for the 10 Haynesville shale counties and 20% growth for the 45 Eagle Ford counties. 10% growth was also assigned to the remainder of the Texas counties in the domain. No additional controls were assumed between 2010 and 2012.

From 2006 to 2012 NO_X emissions are projected to decline significantly primarily because of compressor engine NO_X controls implemented in 2010 (Table 45: 2012 Oil and Gas Production

EI breakout). VOC emissions increase from 2006 to 2012, mainly due to an increase in pneumatic devices that follow the number or active wells.

Table 45: 2012 Oil and Gas Production EI breakout

area12_b2_oilgasp_9co

Category	**NOx**(tpd)	**VOC**	**CO**
2-Cycle Lean Burn Compressor	0.25	0.13	1.07
4-Cycle Lean Burn Compressor	0.54	0.27	2.35
4-Cycle Rich Burn Compressor	1.16	0.05	1.11
4-Cycle Rich Burn Compressor w/ Catalyst	4.6	3.2	27.98
Condensate Tanks	0	33.51	0
Condensate Loading	0	0.27	0
Gas Heaters	3.04	0.17	2.56
Dehydrators	0	3.63	0
Gas Fugitives (grouped)	0	6.72	0
Gas Well Blowdowns	0	1.72	0
Gas Well Completions	0	3.31	0
Pumpjacks	0.1	0	0.05
Crude Tanks	0	0.38	0
Produced Water	0	2.2	0
Oil Well Blowdowns	0	0.09	0
Oil Fugitives (grouped)	0	0.06	0
Oil Well Completions	0	0.11	0
Oil Heaters	0.02	0	0.02
Oil Loading	0	0.04	0
Pneumatic Devices	0	57.2	0
Total (tpd)	**9.71**	**113.07**	**35.14**

The spatial distribution within counties for oil and gas production was built from Texas Railroad Commission data for active wellhead density. The number of active wells in a given model grid cell over the total number of active wells in the county assigned the proportionate amount of the county's total emissions to that cell. Active wells for year-end 2006 were used for the base case (Figure 20: 2006 Oil and Gas Production NO_X for the DFW 4 km Domain and Figure 21: 2006 Oil and Gas Production cb05 VOC for the DFW 4 km Domain). Year-end 2010 wellhead densities were used to distribute the 2012 future case emissions (Figure 22: 2012 Oil and Gas Production NOX for the DFW 4 km Domain and Figure 23: 2012 Oil and Gas Production cb05 VOC for the DFW 4 km Domain). Oil and gas production and drilling rigs were the only area or non- or off-road category where spatial surrogates were different for the base and future cases.

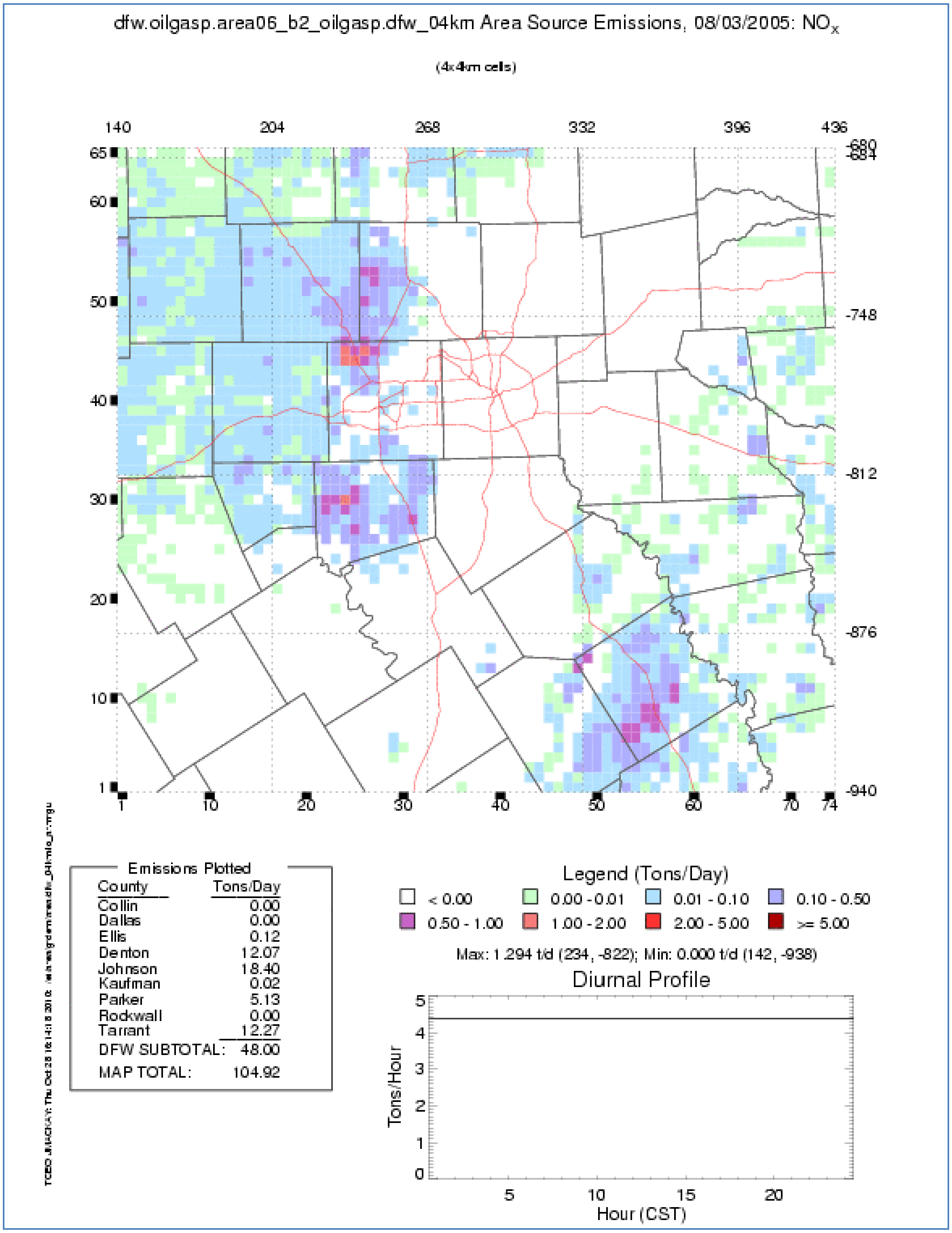

Figure 20: 2006 Oil and Gas Production NO_X for the DFW 4 km Domain

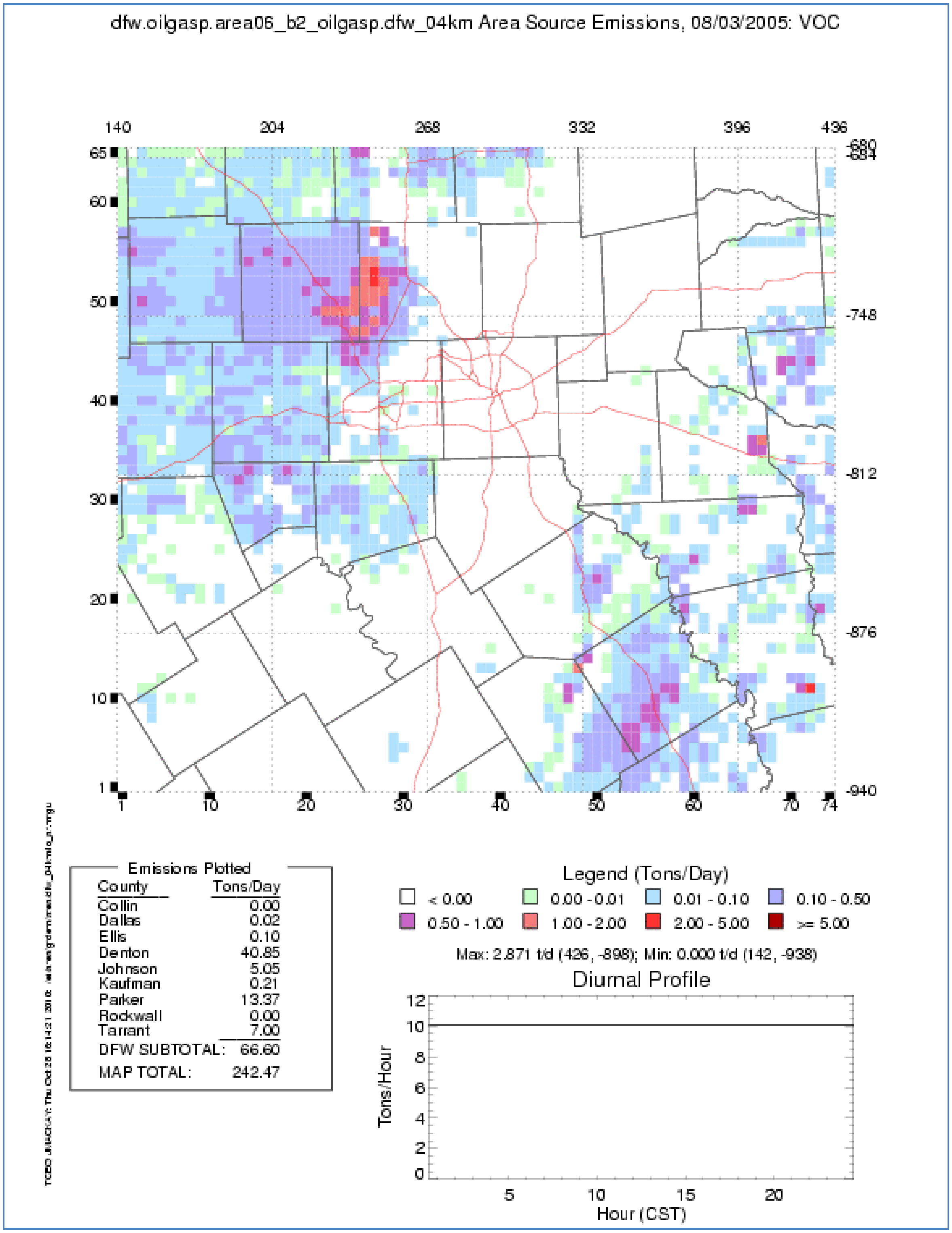

Figure 21: 2006 Oil and Gas Production cb05 VOC for the DFW 4 km Domain

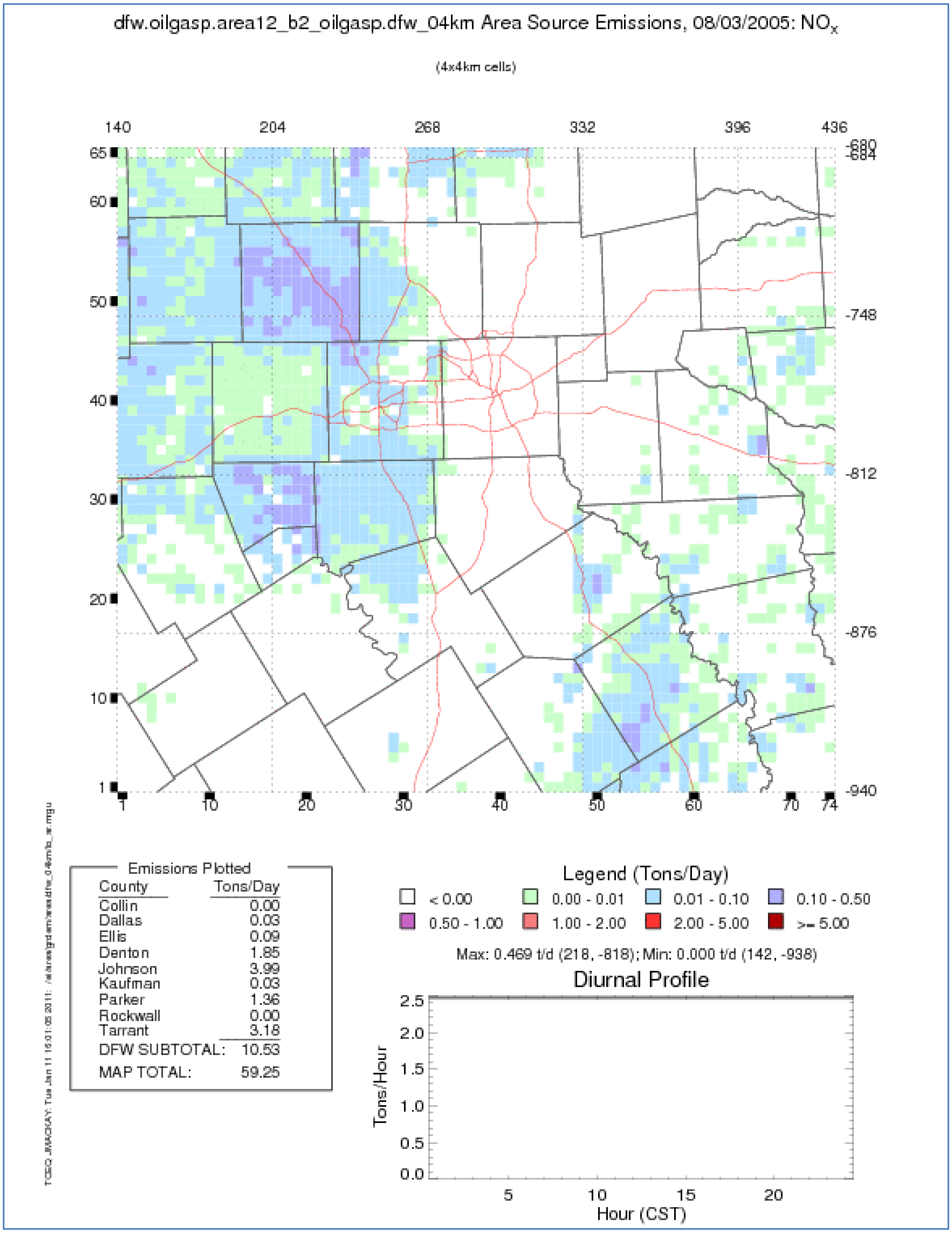

Figure 22: 2012 Oil and Gas Production NOX for the DFW 4 km Domain

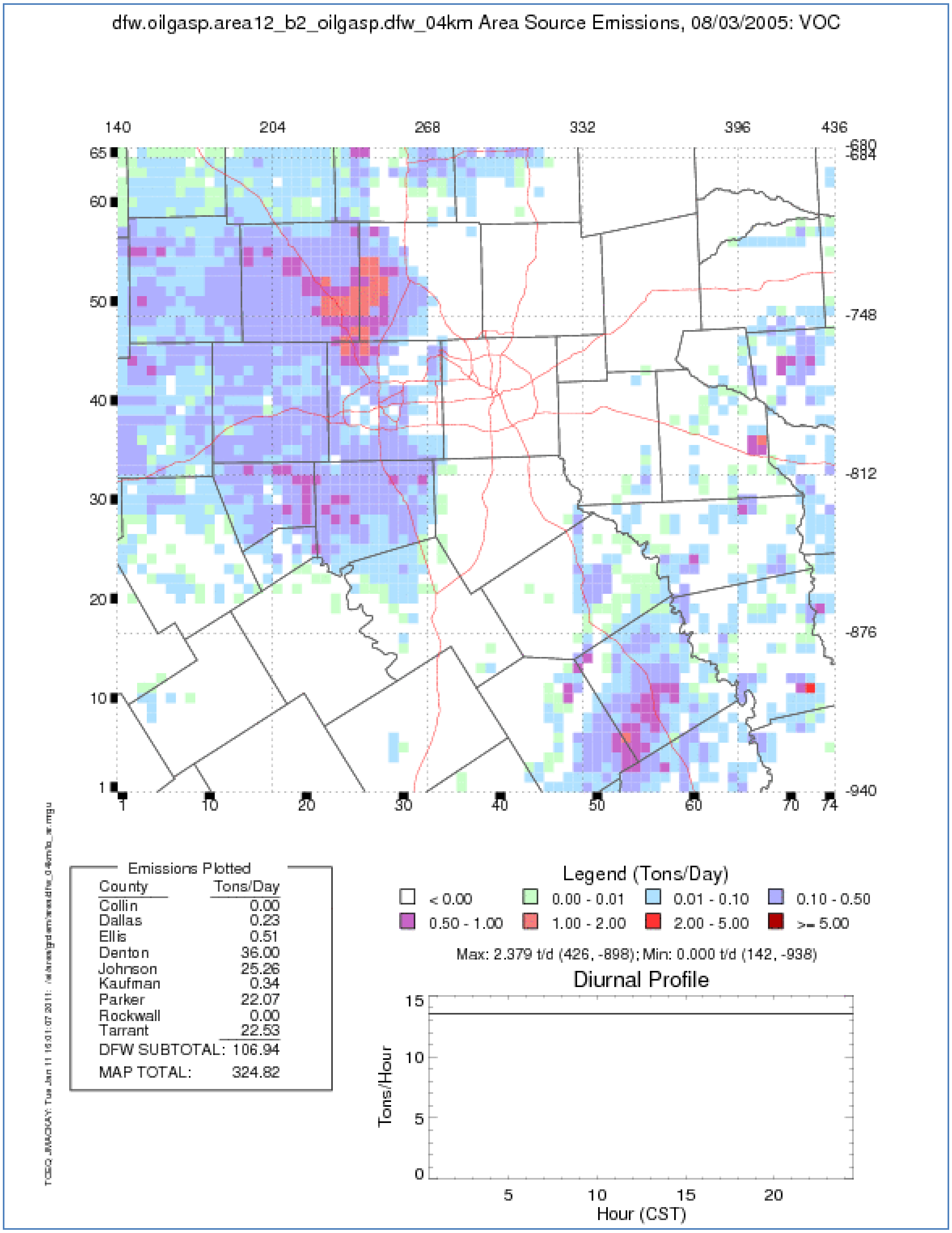

Figure 23: 2012 Oil and Gas Production cb05 VOC for the DFW 4 km Domain

4.2 Texas Drilling Rigs Emission Inventory Development

ERG (2009) developed a detailed Drilling Rig EI for every Texas County for the year 2008 that served as the basis for the 2006 and 2012 modeling EIs. Non-Texas oil and gas drilling is incorporated in the Non-road inventory (Section 4.6).

For the non-Barnett shale counties, the 2008 county-level drilling rig emissions were adjusted to 2006 according to the ratio of active drill rig counts in June 2006 and June 2008 from Baker Hughes (Baker Hughes, 2010). The 2006 and 2008 drill rig counts and the adjustment ratio in each of the Texas Railroad Commission (TRRC) districts is illustrated in Table 46: 2006 Baker-Hughes Rig Counts for TRRC Districts and Table 47: 2008 Baker-Hughes Rig Counts for TRRC Districts. TRRC districts 5, 7B, and 9 comprise the Barnett Shale. The TRRC districts are shown in Figure 24: TRRC Districts.

Table 46: 2006 Baker-Hughes Rig Counts for TRRC Districts

2006 - MONTHLY AVERAGES	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	AVG
DISTRICT 1	22	22	23	21	21	24	21	17	17	20
DISTRICT 2	21	26	24	25	25	27	29	25	24	26
DISTRICT 3	69	67	65	65	60	58	52	59	63	61
DISTRICT 4	78	82	77	74	87	94	96	95	93	84
DISTRICT 5	131	133	131	135	146	141	133	137	143	133
DISTRICT 6	104	103	111	109	113	113	120	121	124	110
DISTRICT 7B	39	41	43	45	47	45	48	41	37	40
DISTRICT 7C	36	37	38	40	41	38	41	43	47	40
DISTRICT 8	81	84	91	96	103	96	96	102	101	90
DISTRICT 8A	29	27	30	29	23	26	26	25	26	28
DISTRICT 9	30	31	35	36	31	37	44	38	37	34
DISTRICT 10	68	70	66	70	76	78	75	64	56	68
ONSHORE			734							732

Table 47: 2008 Baker-Hughes Rig Counts for TRRC Districts

2008 - MONTHLY AVERAGES	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	AVG	June 2006 to 2008 Adj. Factor
DISTRICT 1	25	29	25	19	22	27	27	27	20	24	1.087
DISTRICT 2	37	34	31	32	37	36	35	33	35	35	1.2917
DISTRICT 3	55	65	65	61	63	62	64	65	60	62	1
DISTRICT 4	92	92	97	92	93	91	88	92	81	91	1.2597
DISTRICT 5	186	180	182	185	185	187	185	169	160	181	1.3893
DISTRICT 6	121	120	122	124	126	132	134	127	130	125	1.0991
DISTRICT 7B	32	31	30	31	28	31	28	28	27	30	0.6977
DISTRICT 7C	71	69	70	70	72	71	62	67	59	64	1.8421
DISTRICT 8	128	132	136	140	137	132	127	126	108	128	1.4945

2008 - MONTHLY AVERAGES	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	AVG	June 2006 to 2008 Adj. Factor
DISTRICT 8A	23	26	28	28	32	27	28	29	30	26	0.9333
DISTRICT 9	35	38	42	44	41	42	41	45	45	42	1.2
DISTRICT 10	74	78	83	87	91	99	97	84	66	82	1.2576
ONSHORE			911							889	1.2411

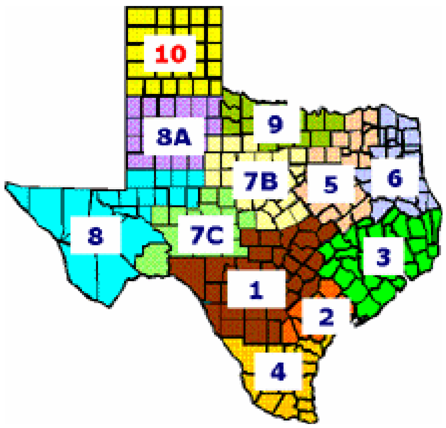

Figure 24: TRRC Districts

For the 23 Barnett Shale counties, the annual average of weekly drill rig counts were used from RigData.com to adjust 2008 drill rig EI to 2006 as shown in Table 48: RigData.com data for Barnett Shale Rig Counts (RigData, 2009). The monthly averages are shown for reference.

Table 48: RigData.com data for Barnett Shale Rig Counts

RigData.com Average of Weekly Rig Counts	2006	2007	2008	2008 to 2006 Adj. Factor
January	125	157	181	0.6906
February	131	162	180	0.7278
March	127	174	177	0.7175
April	133	174	183	0.7268
May	137	174	186	0.7366
June	141	174	190	0.7421
July	146	180	186	0.7849
August	150	182	187	0.8021
September	155	172	192	0.8073
October	150	185	190	0.7895
November	154	179	170	0.9059
December	156	182	162	0.9630
Annual	142	175	182	0.7802

Projecting the 2008 data to 2006 (and to 2012) also required accounting for drill rig fleet turnover. The NONROAD model was run for drill rigs with flat equipment population to get emission ratios to account for federal rules on non-road engines. Table 49: 2006 DFW 9-county Drilling Rig EI shows the final 2006 drilling rig EI (tpd) for the DFW 9-county nonattainment area.

Table 49: 2006 DFW 9-county Drilling Rig EI

NONROAD_06_b11d_Drill_Rigs_9co	(tpd)		
Category	NO_X	VOC	CO
Drilling Rigs	18.1	1.27	17.4

Projecting drilling rig activity to 2012 had three steps. Baker-Hughes data similar to the 2008-to-2006 projection was used to project to 2010 from 2008 by TRRC District (Table 50: Baker-Hughes 2008 to 2010 Rig Count Ratios by TRRC District). The rig count averages from September 2010 were the latest activity figures available at the time of EI development.

Table 50: Baker-Hughes 2008 to 2010 Rig Count Ratios by TRRC District

MONTHLY AVERAGES	Sep-10	Jun-08	Jun 2008 to Sep 2010 Adj. Factor
DISTRICT 1	62	25	2.47
DISTRICT 2	38	31	1.21
DISTRICT 3	48	65	0.74
DISTRICT 4	44	97	0.46
DISTRICT 5	82	182	0.45
DISTRICT 6	65	122	0.53
DISTRICT 7B	9	30	0.30
DISTRICT 7C	65	70	0.93
DISTRICT 8	168	136	1.24
DISTRICT 8A	30	28	1.07
DISTRICT 9	42	42	1.00
DISTRICT 10	68	83	0.82
ONSHORE	720	911	0.79

Due to the Barnett Shale's proximity to the DFW nonattainment area, rig counts were downloaded for each of the 23 Barnett Shale counties (Baker-Hughes, 2010). Weekly rig counts were available into September 2010. The average of the last 10 weeks of rig counts for 2010 were divided by the average of 2008 rig counts to project the 2008 EI to 2010. The county variation of rig activity within the Barnett Shale is notable as well the general decline in rig activity from 2008 (Table 51: Baker-Hughes Rig Counts for Barnett Shale Counties for 2008 and late 2010).

Table 51: Baker-Hughes Rig Counts for Barnett Shale Counties for 2008 and late 2010

Barnett Shale County Rig Counts	Average 2008	Late 2010	Late 2010 w/ min. rig fix	2008 to 2010 Adj. Factor
Johnson	49	13.7	13.7	0.2796
Tarrant	46	33.1	33.1	0.7196
Wise	17	13.5	13.5	0.7941
Denton	16	9.8	9.8	0.6125
Parker	12	1.7	1.7	0.1417
Hill	11	0.1	1	0.0909
Hood	9	0.9	1	0.1111
Montague	5	13.7	13.7	2.7400
Palo Pinto	4	**0**	**1**	0.2500
Cooke	2	4.1	4.1	2.0500
Erath	3	**0**	**1**	0.3333
Jack	2	**0**	**1**	0.5000
Ellis	3	0.3	1	0.3333
Somervell	2	**0**	**1**	0.5000
Dallas	1.0	1.40	1.40	1.4000
Shackelford	0.3	0.40	0.40	1.3333
Stephens	1.3	**0.1**	**1**	0.7692
Other Counties (6)	3			
Total	184.0	92.8	99.4	

The second step in projecting drill rig emissions to 2012 from 2008 was to account for fleet turnover and federal controls on diesel engines for those four years. Lastly, mirroring the oil and gas production projection from 2010 to 2012, drilling rig activity growth was also assumed to be 10% for the Barnett shale counties, 10% for the Haynesville shale counties, 20% for the Eagle Ford counties, and 10% for the remainder of Texas. The decrease in drilling activity and the cleaner drill rig fleet account for the lower emissions in 2012 (Table 52: 2012 DFW 9-county Drilling Rig EI).

Table 52: 2012 DFW 9-county Drilling Rig EI

NONROAD_12_b11h_Drill_Rigs_9co		(tpd)	
Category	NO_X	**VOC**	**CO**
Drilling Rigs	8.71	0.62	15.87

Spatial surrogates for drilling rig activity were developed by mapping new wells in the TRRC data. Using GIS, the active wells at year-end 2005 were subtracted from the active wells at year-end 2006 to realize the geographic distribution of new wells for 2006. Figure 25: 2006 Drilling Rig NOX for the DFW 4 km Domain exhibits the spatial distribution of the drilling rig NO_X emissions for the June 2006 base case and baseline inventories. The new wells for 2010 were the latest available and used as the surrogate for the 2012 future case (Figure 26: 2012 Drilling

Rig NOX for the DFW 4 km Domain). From 2006 to 2012 the location of drilling changed, including the eastward march of drilling in Tarrant County as shown in Figure 27: 2006 (left) and 2012 (right) Drilling Rig NOX for the DFW 4 km Domain. As Table 49 and Table 52 show, drilling rigs do not emit a significant amount of VOCs so they are not geographically plotted.

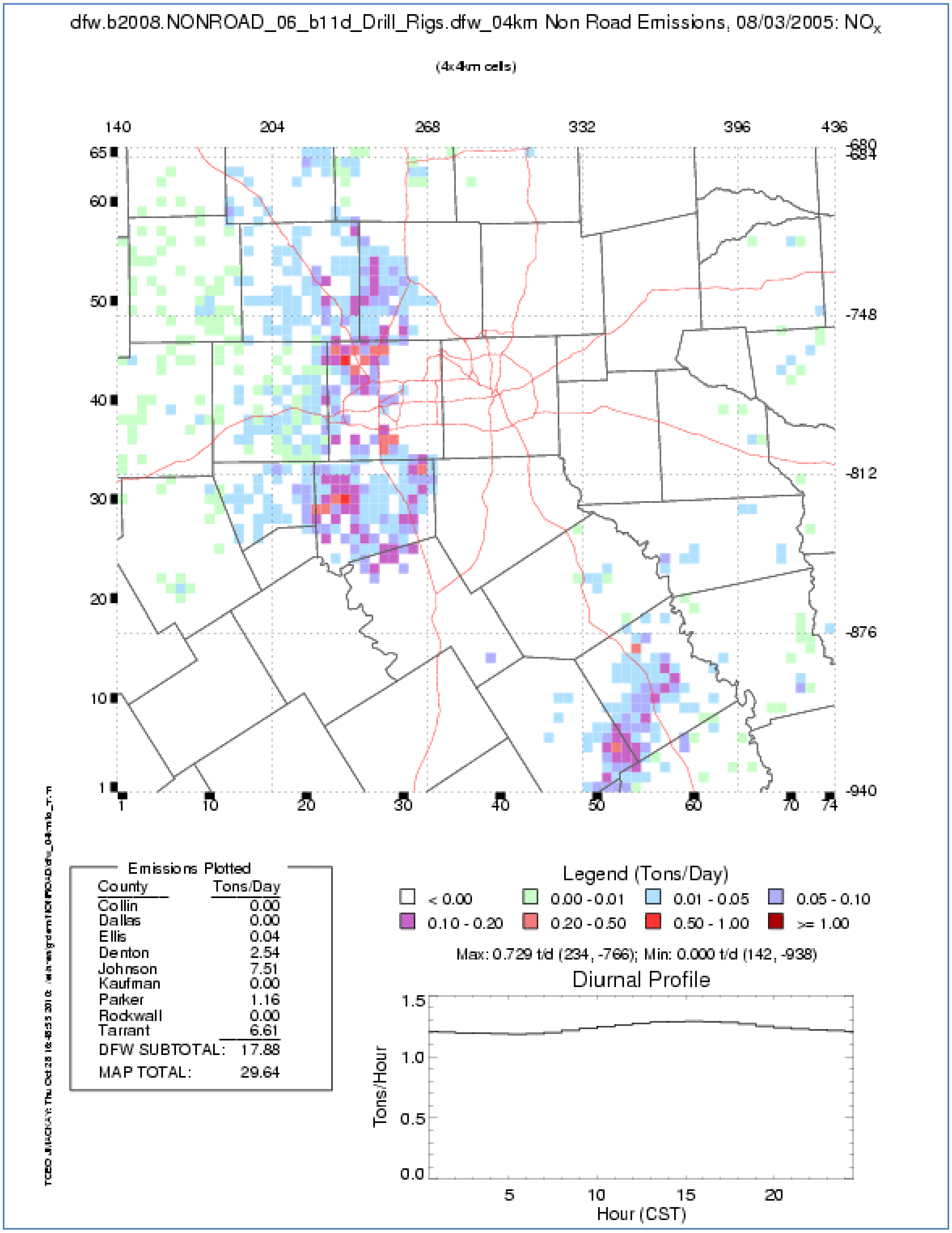

Figure 25: 2006 Drilling Rig NOX for the DFW 4 km Domain

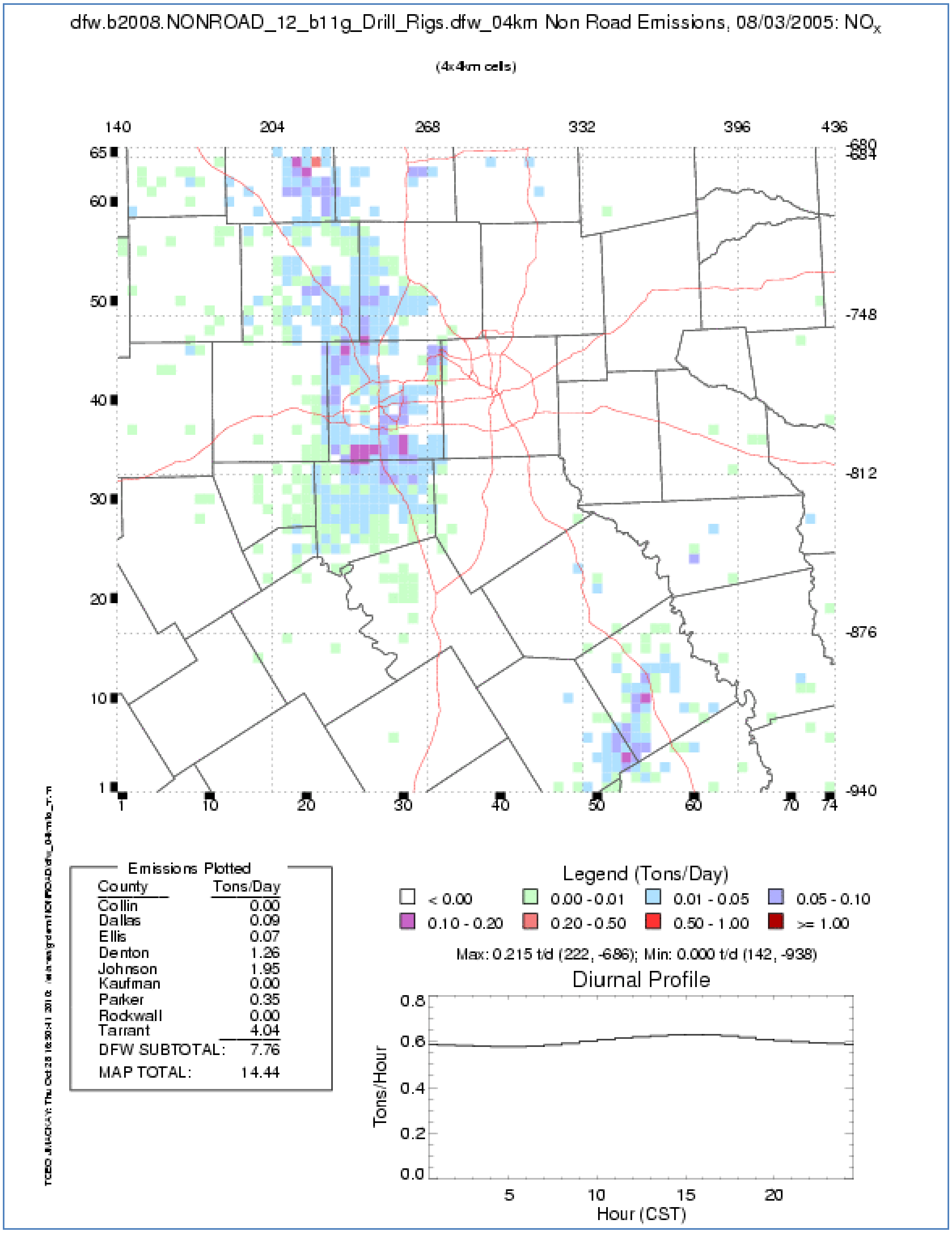

Figure 26: 2012 Drilling Rig NO_X for the DFW 4 km Domain

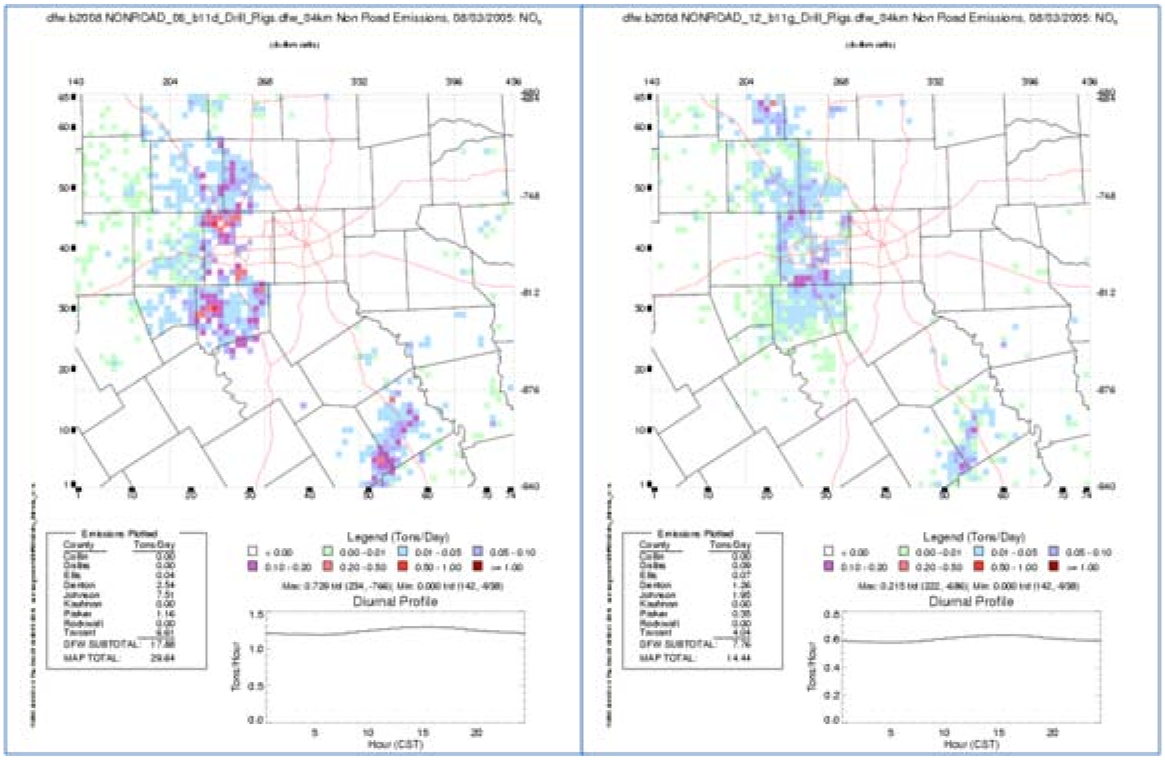

Figure 27: 2006 (left) and 2012 (right) Drilling Rig NO_X for the DFW 4 km Domain

4.3 Louisiana Haynesville Shale Oil and Gas

As the Haynesville shale extends past the Texas border into Louisiana, TCEQ was able to use work by Environ for the Northeast Texas area to add oil and gas activity to the Louisiana EI (Environ, 2008). These emissions (Figure 28: *2012 Louisiana Haynesville Shale Drill Rig NOX EI* and Figure 29: *2012 Additional Haynesville Oil and Gas Production cb05 VOC*) depict additional emission for 2012 for a high level of development scenario developed by Environ. The emissions are in addition to the emissions in the regular Louisiana area and non-road EIs. The regular Louisiana EI was based on a 2005 National Emissions Inventory (NEI) and had no drill rig emissions, so the additional emissions for this category were more significant.

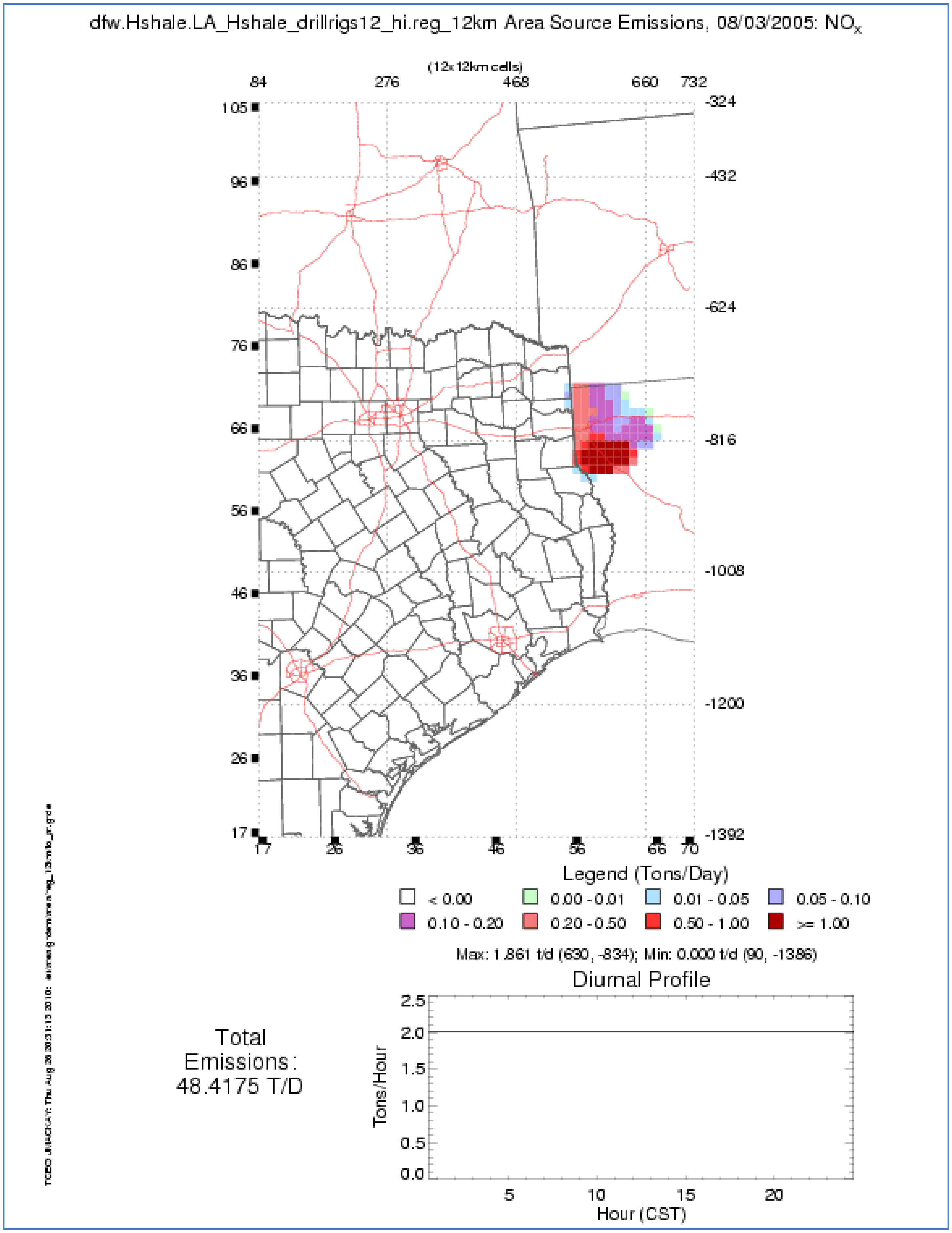

Figure 28: 2012 Louisiana Haynesville Shale Drill Rig NO_X EI

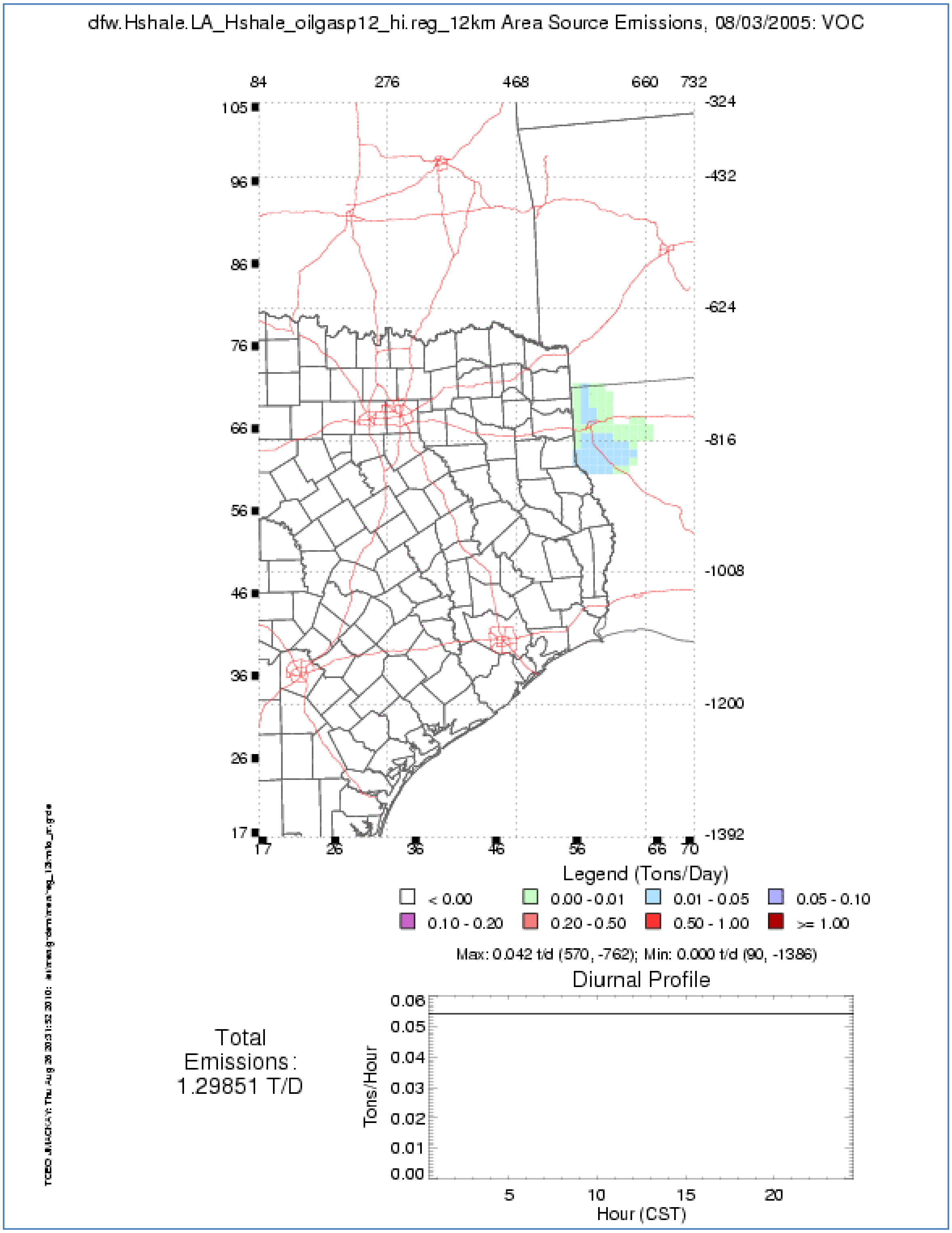

Figure 29: 2012 Additional Haynesville Oil and Gas Production cb05 VOC

4.4 Airports

The emissions for the airports in the nine-county area were provided by NCTCOG. The EIs include ground support equipment (GSE). Emissions were provided for 2006 and 2012 by airport (Table 53: *2006 DFW 9-county Airport EI* and Table 54: *2012 DFW 9-county Airport EI*). The TCEQ developed airport-specific surrogates so each airport's emissions were distributed to the respective areal extent of the airport. Figure 30: *2006 DFW9-county airport-specific NOX EI* and Figure 31: *2012 DFW 9-county airport-specific NOX EI* illustrate the 2006 and 2012 airport NO_X EIs.

Airports outside of the nine-counties were developed at the county level and were drawn from TexAER for most of Texas. The Houston-Galveston-Brazoria (HGB) eight-county area is also airport-specific. The surrogates developed by TCEQ for the non-airport-specific area were landing and take-off (LTO)-area weighted. This weighting covers the areal extent of each airport, but assigns busier airports proportionately more of the total county emissions.

Table 53: 2006 DFW 9-county Airport EI

DFWairports06_9co			
Category	**NOx**	**VOC**	**CO**
Ground Support Equipment	1.85	0.57	16.25
Aircraft	9.15	4.52	26.83
Airport Total (tpd)	**11**	**5.08**	**43.08**

Table 54: 2012 DFW 9-county Airport EI

DFWairports12a_9co			
Category	**NOx**	**VOC**	**CO**
Ground Support Equipment	0.89	0.28	8.28
Aircraft	9.23	4.06	25.47
Airport Total (tpd)	**10.12**	**4.34**	**33.75**

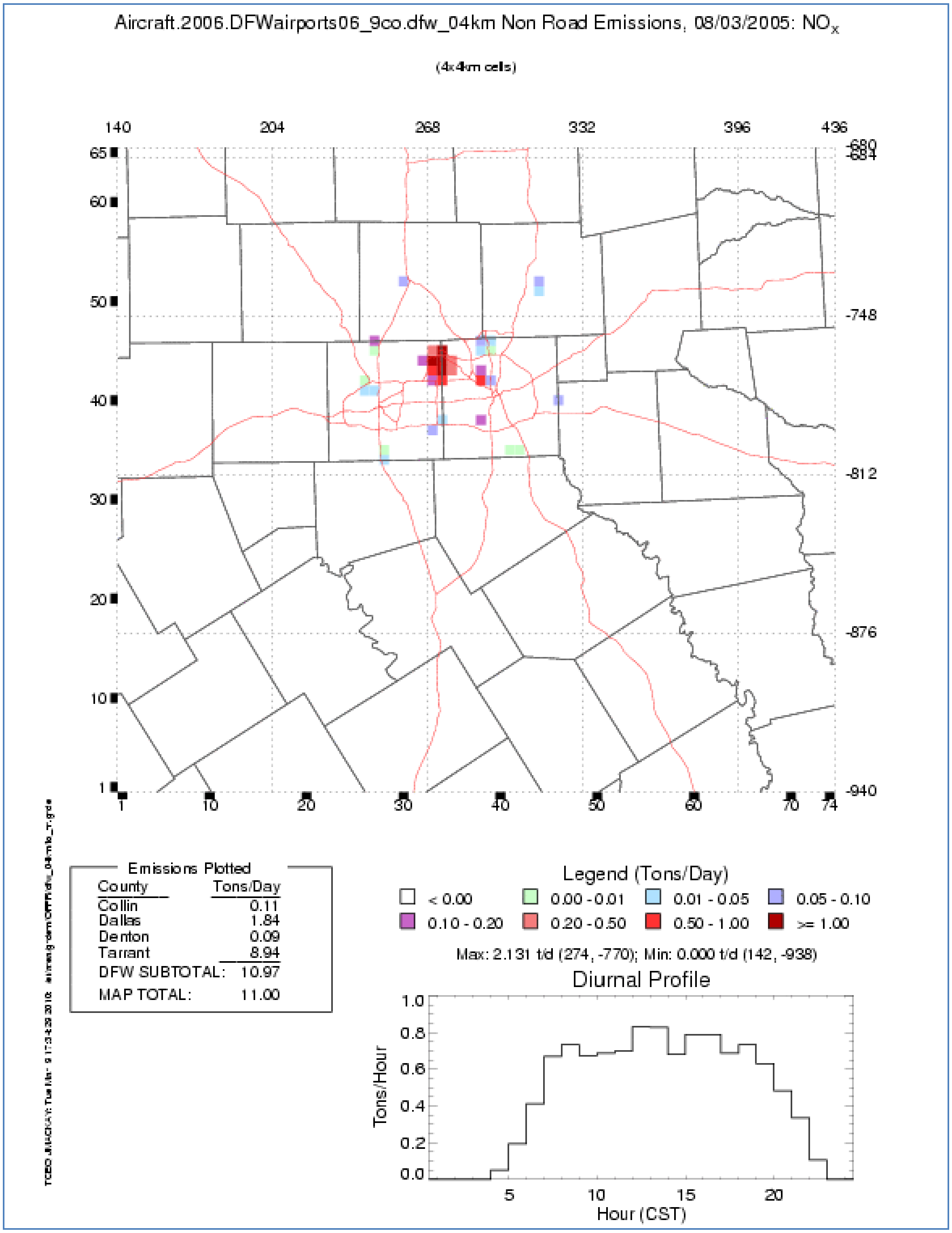

Figure 30: 2006 DFW9-county airport-specific NO_X EI

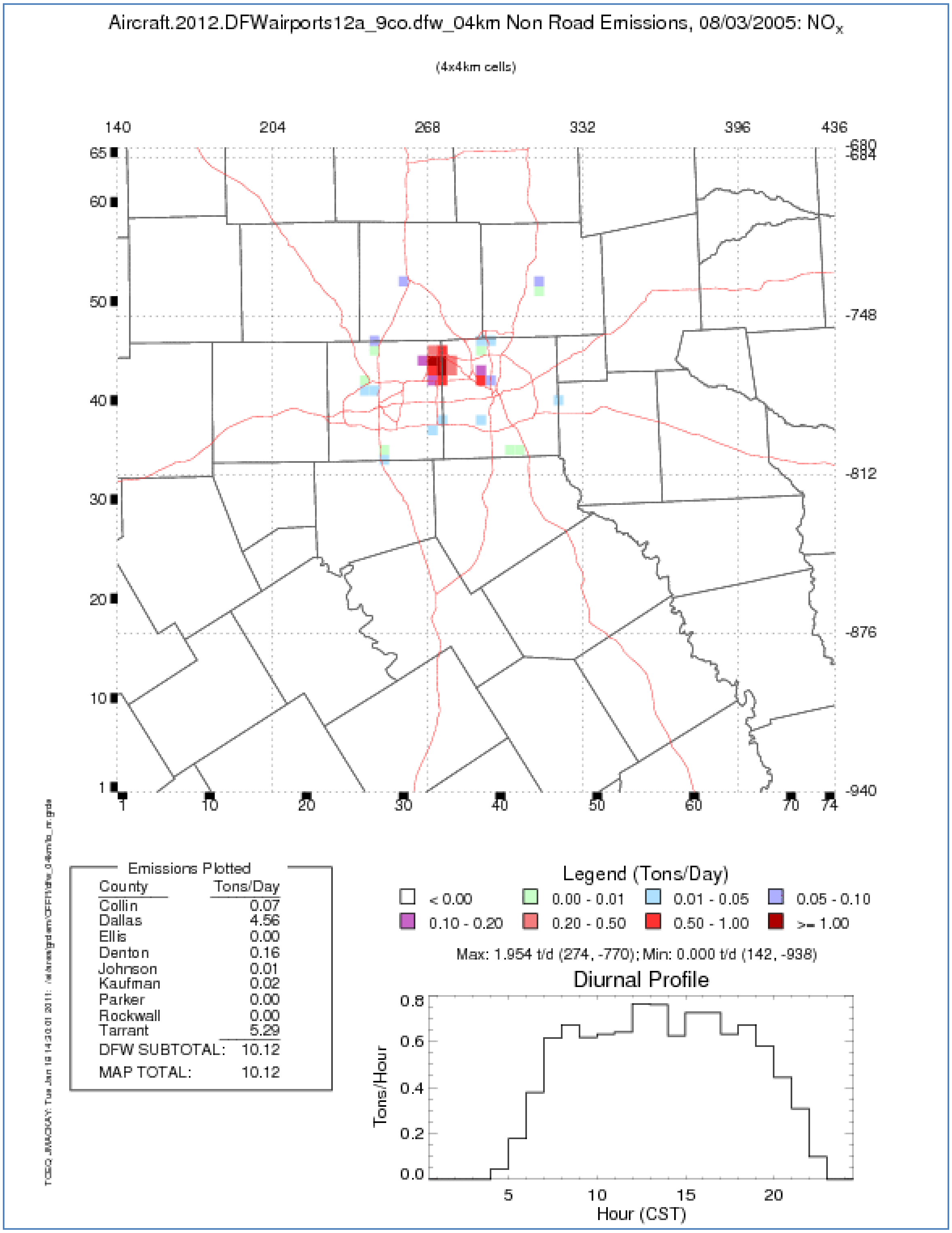

Figure 31: 2012 DFW 9-county airport-specific NO_X EI

4.5 Locomotives

Locomotive emissions were separated into line-haul and switchers to allow different spatial allocation. Switcher emissions were allocated to railyards and line-haul emissions were based on a Gross Ton Miles (GTM) distribution. The DFW nonattainment area county-level line-haul emissions were from the Texas Railroad Emission Inventory Model (TREIM) model (ERG, 2009) and were allocated based on GTM distribution from work by Environ (2009). The GTM allocation properly allocates more emissions along the more heavily traveled rail lines in a way analogous to VMT distribution of automotive emissions. The non-DFW locomotive emissions were based on a 2005 TexAER inventory. The TCEQ created county-level surrogates of railyards to best allocate switcher locomotives spatially. Like all non-road diesel categories county-specific NO_X-humidity corrections were applied, as was TxLED. Temporal allocation was flat activity-wise; the variation seen in the figures depicting the locomotive emissions illustrate the hourly NO_X-humidity factors that increase NO_X with higher temperature and decrease them at higher specific humidity conditions. The 2006 and 2012 DFW locomotive emissions are detailed in Table 55: *2006 DFW 9-county Locomotive EI* and Table 56: *2012 DFW 9-county Locomotive EI*. The 2006 and 2012 spatial distribution of the line-haul and switcher locomotive NO_X emissions are displayed in Figure 32: *2006 DFW 9-county Line-haul Locomotive NOX EI*, Figure 33: *2006 DFW 9-county Switcher Locomotive NOX EI*, Figure 34: *2012 DFW 9-county Line-haul Locomotive NOX EI*, and Figure 35: *2012 DFW 9-county Switcher Locomotive NOX EI*.

Table 55: 2006 DFW 9-county Locomotive EI

OFFR06_b7e_linehaul_switcher_9co		(tpd)	
Category	NOx	VOC	CO
Line-haul Locomotives	14.93	0.74	2.07
Switcher Locomotives	13.72	0.93	1.85

Table 56: 2012 DFW 9-county Locomotive EI

OFFR12_b7e_linehaul_switcher_9co		(tpd)	
Category	NOx	VOC	CO
Line-haul Locomotives	12.83	0.73	2.17
Switcher Locomotives	13.98	1	2.19

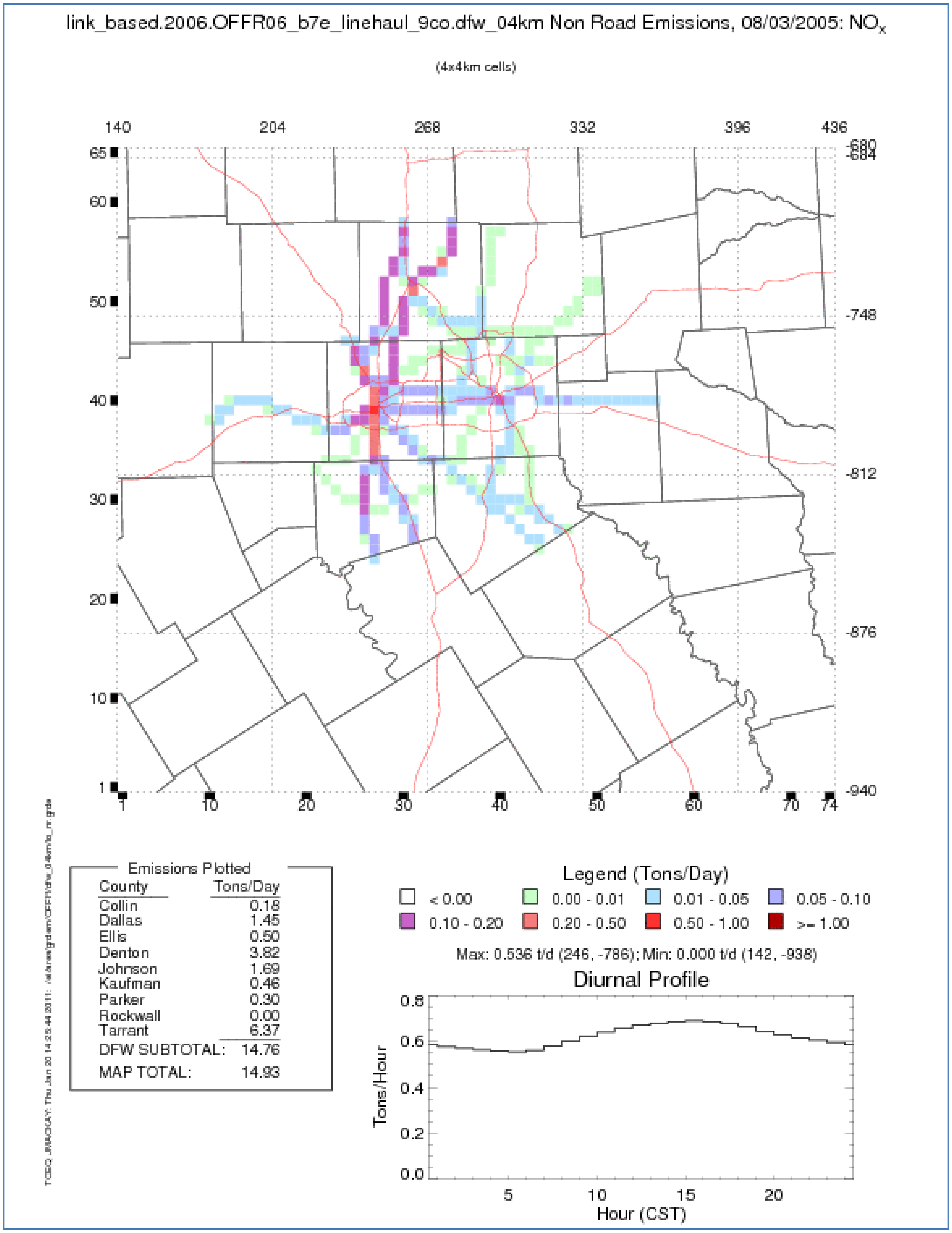

Figure 32: 2006 DFW 9-county Line-haul Locomotive NO_X EI

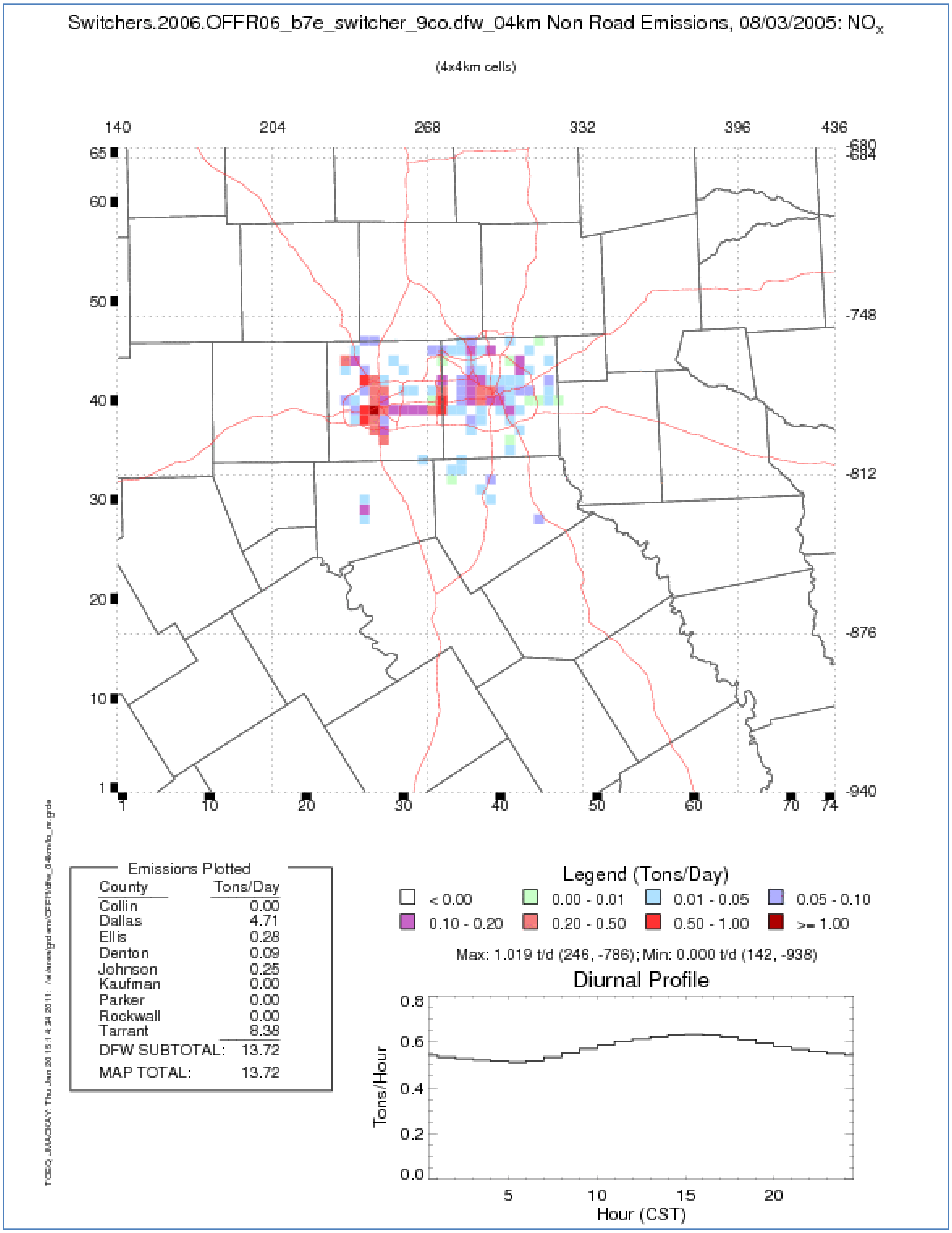

Figure 33: 2006 DFW 9-county Switcher Locomotive NO_X EI

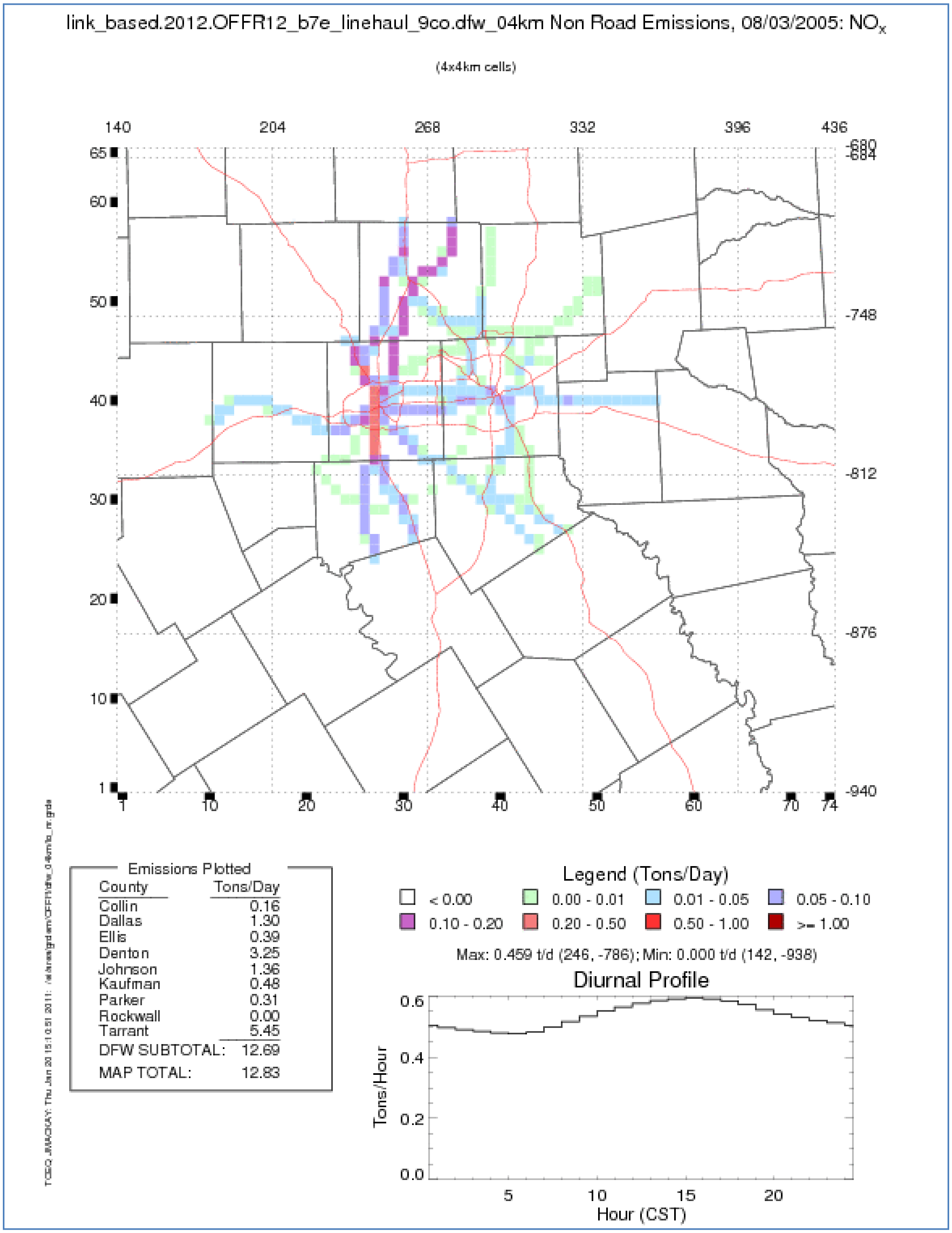

Figure 34: 2012 DFW 9-county Line-haul Locomotive NO_X EI

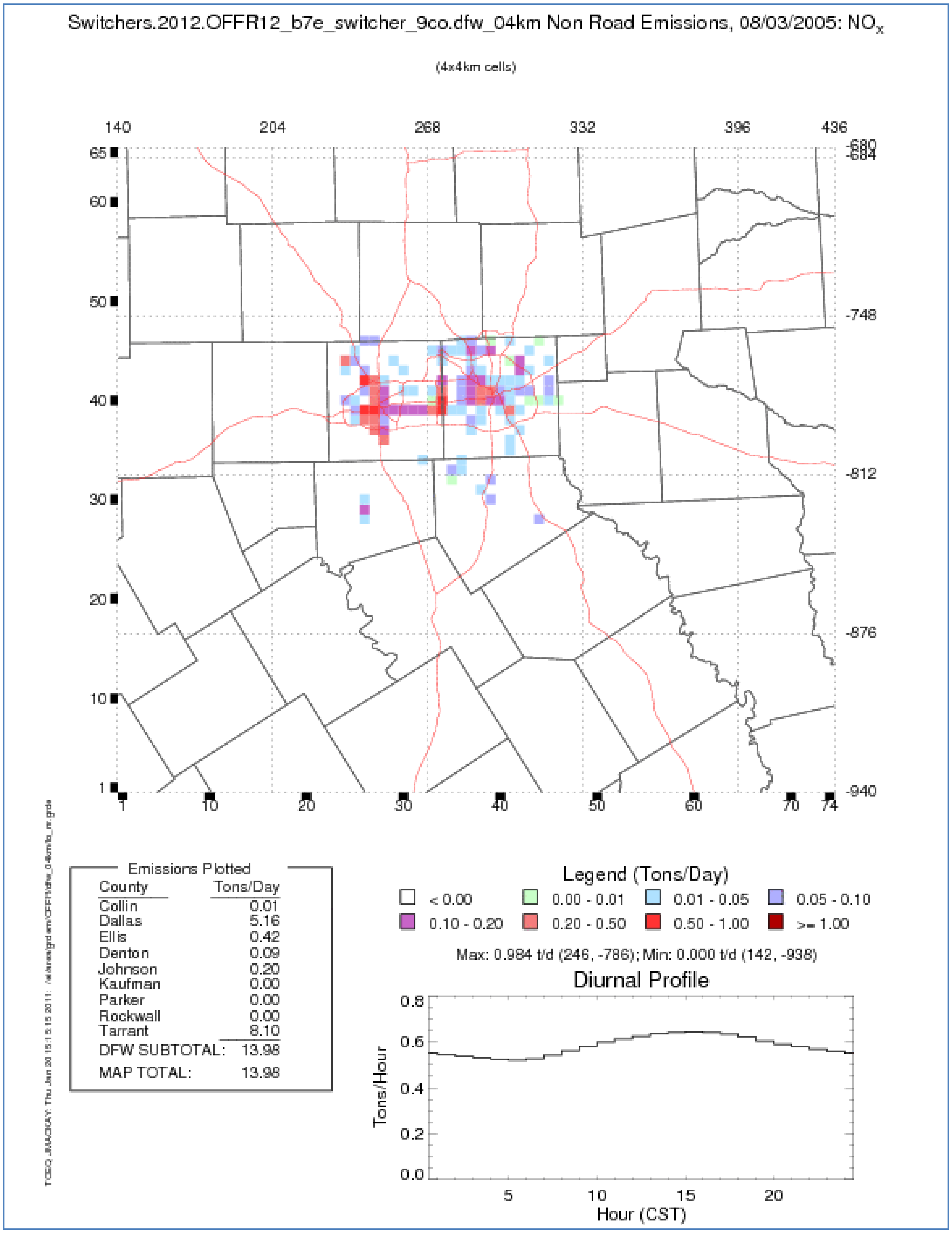

Figure 35: 2012 DFW 9-county Switcher Locomotive NO_X EI

4.6 Non-road/TexN

The non-road EI for Texas was calculated using the Texas-specific data for a version of the NONROAD model called TexN developed by ERG. The data developed includes updates to equipment populations for many major categories. This allows for a county-specific hourly NO_X-humidity correction. TxLED factors were applied for the 110 counties of East Texas (ETx). Table 57: *2006 NONROAD DFW 9-county EI breakout* and Table 58: *2012 NONROAD DFW 9-county EI breakout* detail the non-road EI for 2006 and 2012. The geographic distribution of the non-road NO_X and VOC emissions are shown in Figure 36: *2006 DFW 9-county Non-road NOX EI*, Figure 37: *2006 DFW 9-county Non-road VOC EI*, Figure 38: *2012 DFW 9-county Non-road NOX EI*, and Figure 39: *2012 DFW 9-county Non-road VOC EI*.

Table 57: 2006 NONROAD DFW 9-county EI breakout

NONROAD_06_b11a_9co		(tpd)	
Category	**NOx**	**VOC**	**CO**
Recreational Equipment	0.23	5.58	21.78
Construction Equipment	32.06	7.11	61.27
Industrial Equipment	30.55	7.9	119.51
Commercial Lawn and Garden	1.78	9.04	74.63
Residential Lawn and Garden	1.27	12.02	136.75
Agricultural Equipment	10.16	1.21	17.62
Commercial Equipment	8.75	12.94	240.72
Recreational Boating	0.31	4.07	9.67
Railroad Maintenance	0.07	0.01	0.06
Total	**85.18**	**59.88**	**682**

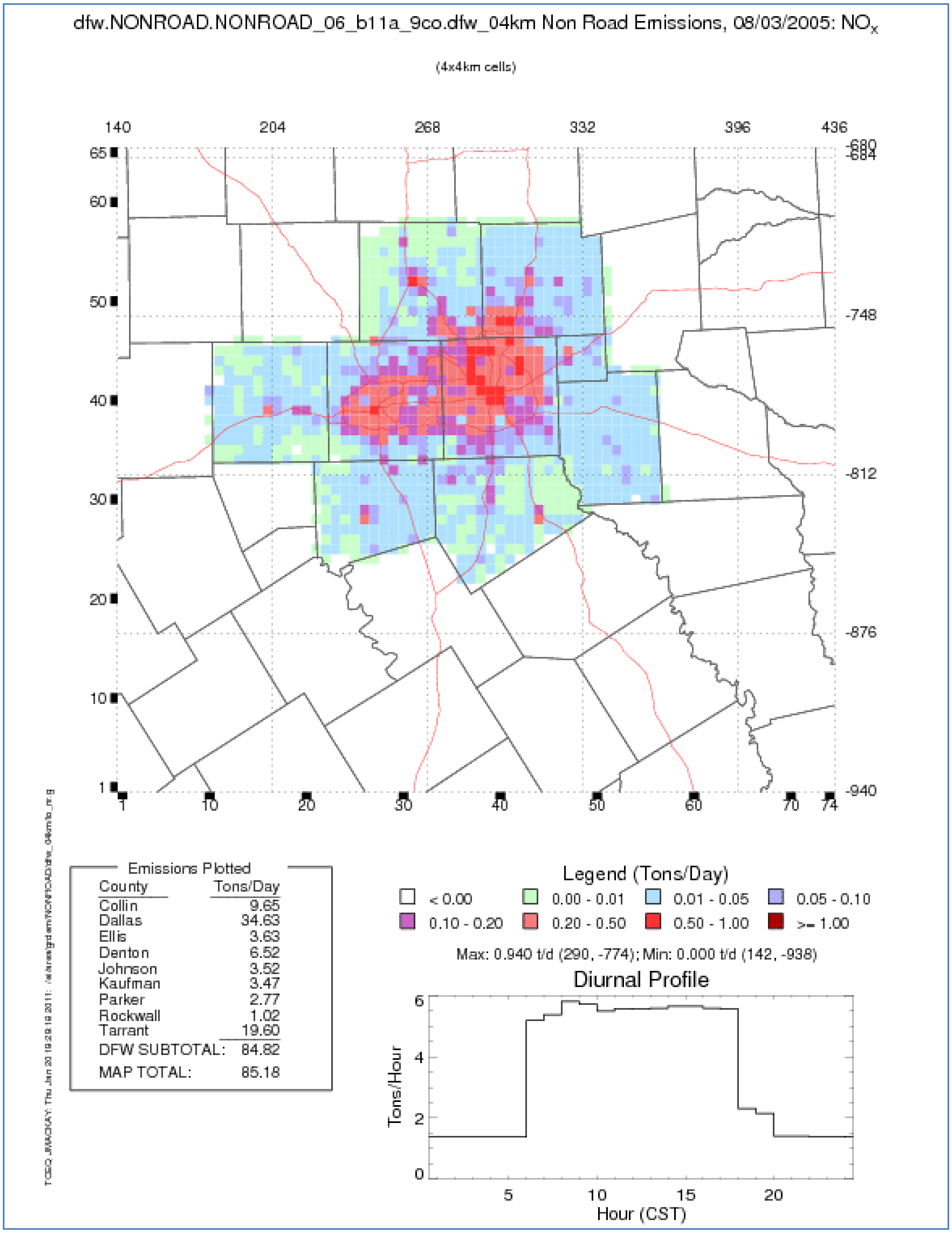

Figure 36: 2006 DFW 9-county Non-road NO_X EI

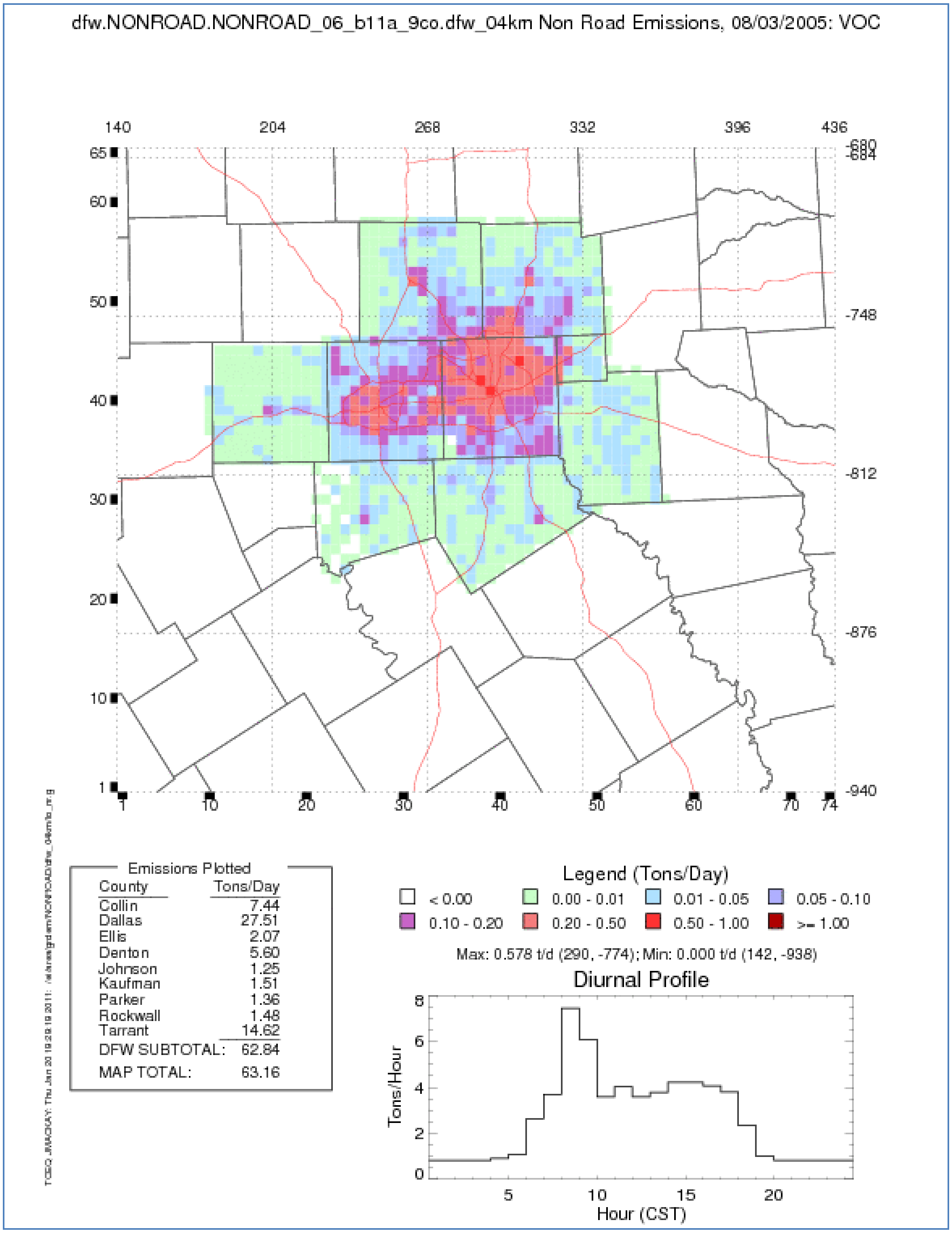

Figure 37: 2006 DFW 9-county Non-road VOC EI

Table 58: 2012 NONROAD DFW 9-county EI breakout

NONROAD_12_b11b_9co		(tpd)	
Category	**NOx**	**VOC**	**CO**
Recreational Equipment	0.19	5.22	25.83
Construction Equipment	25.97	5.02	51.43
Industrial Equipment	20.29	4.01	73.9
Commercial Lawn and Garden	1.43	6.6	65.19
Residential Lawn and Garden	0.93	8.54	119.01
Agricultural Equipment	7.28	0.75	6.96
Commercial Equipment	7.35	9.45	213.53
Recreational Boating	0.33	3.03	9.3
Railroad Maintenance	0.06	0.01	0.05
Total	**63.85**	**42.63**	**565.2**

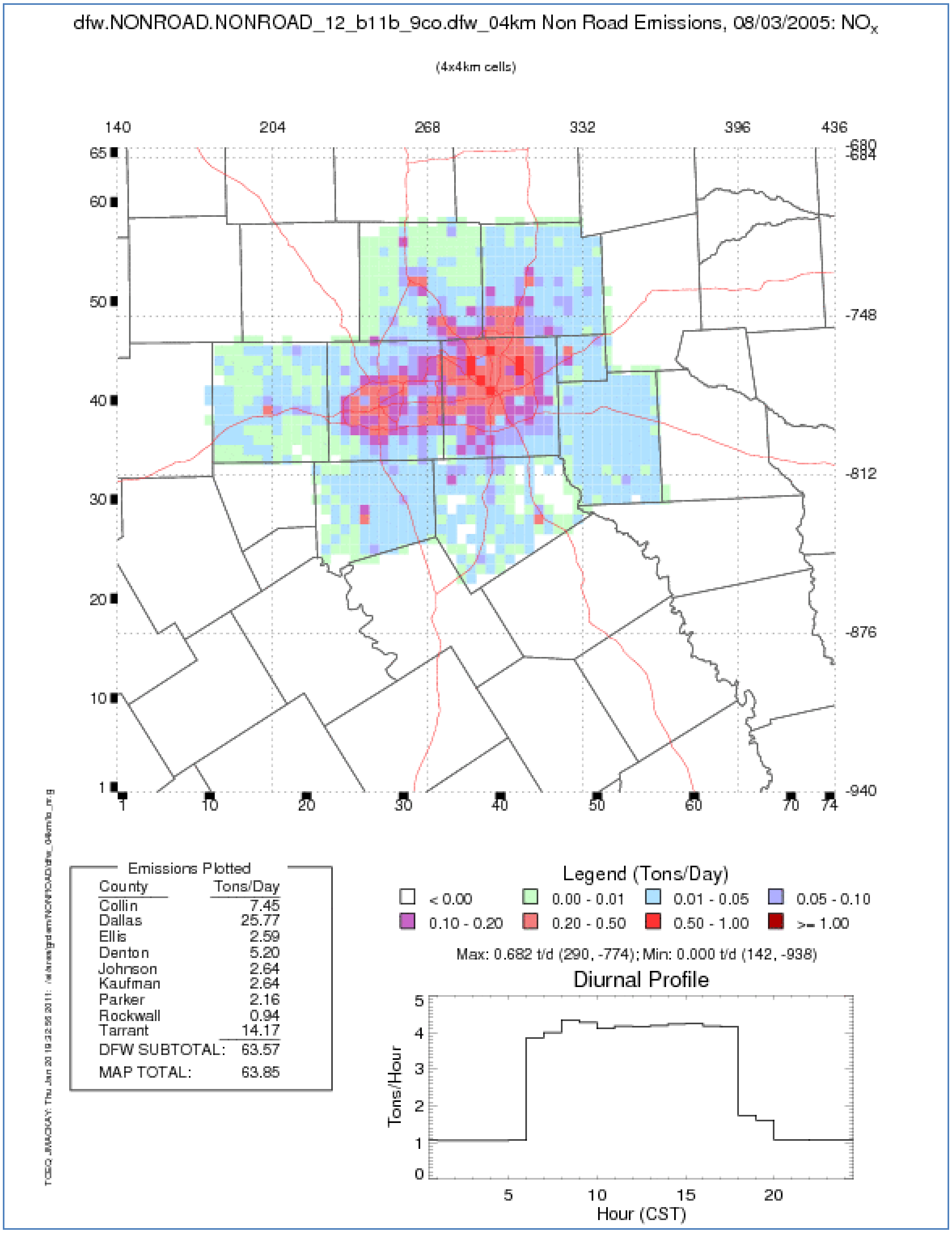

Figure 38: 2012 DFW 9-county Non-road NO_X EI

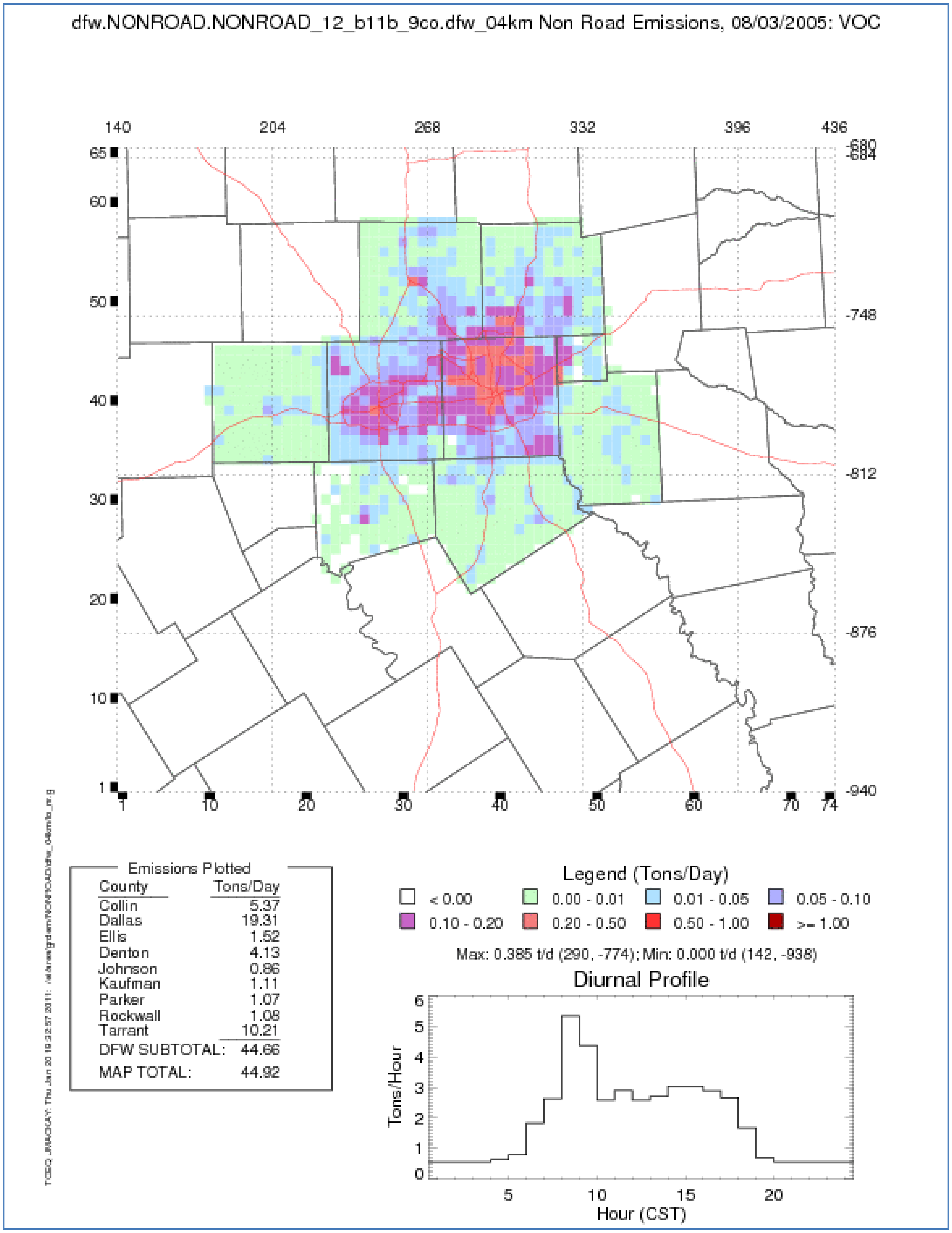

Figure 39: 2012 DFW 9-county Non-road VOC EI

4.7 Area Sources

The area source EI is based on a 2005 TexAER EI projected to 2006 and 2012 with REMI-EGAS. The area source emissions are detailed by category in Table 59: 2006 *Area Source DFW 9-county EI breakout* and Table 60: *2012 Area Source DFW 9-county EI breakout*. The geographic distribution of the 2006 and 2012 area source EIs are shown in Figure 40: *2006 DFW 9-county Area Source NOx EI*, Figure 41: *2006 DFW 9-county Area Source cb05 VOC EI*, Figure 42: *2012 DFW 9-county Area Source NOX EI*, and Figure 43: *2012 DFW 9-county Area Source cb05 VOC EI*.

Table 59: 2006 Area Source DFW 9-county EI breakout

area06_b8a_9co		(tpd)	
Category	**NO_X**	**VOC**	**CO**
Petroleum Products	0	42.89	0
Architectural Coating	0	34.36	0
Solvent Use	0	57.46	0
Surface Cleaning	0	1.03	0
Industrial Fuel Use	13.54	0.5	7.73
Residential Fuel Use	2.24	0.13	0.91
Auto Refinishing	0	3.87	0
Waste Treatment	0	10.14	0
Graphic Arts	0	1.38	0
Pesticide Use	0	0.01	0
Leaking Underground Storage Tanks	0	3.02	0
TRAFMAR	0	0.47	0
Surface Coating	0	49.72	0
Open Burning	0.47	2.85	42.09
Dry Cleaning	0	3.78	0
Asphalt Paving	0	0.65	0
Bakeries and Breweries	0	0.91	0
Total	**16.25**	**213.18**	**50.73**

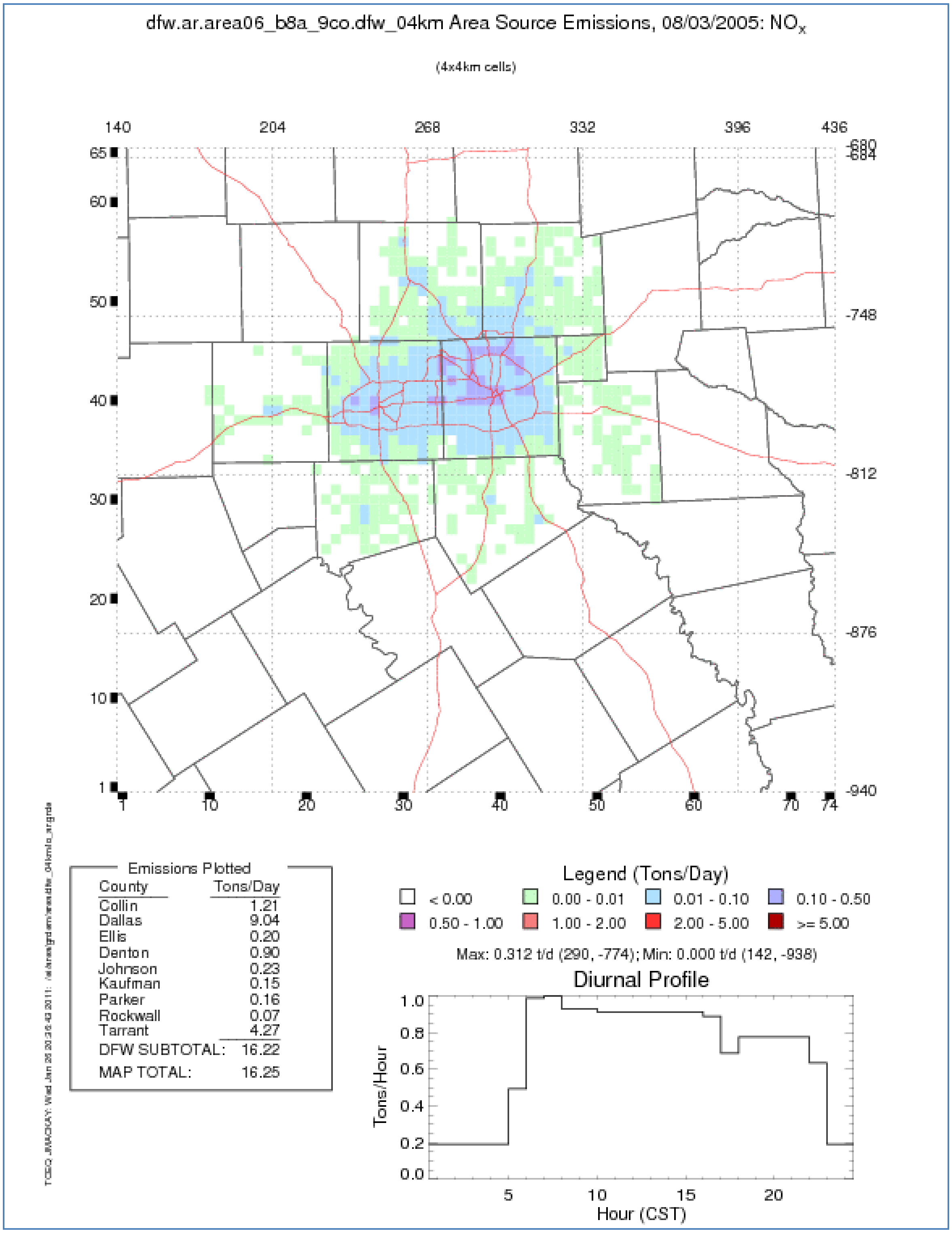

Figure 40: 2006 DFW 9-county Area Source NOx EI

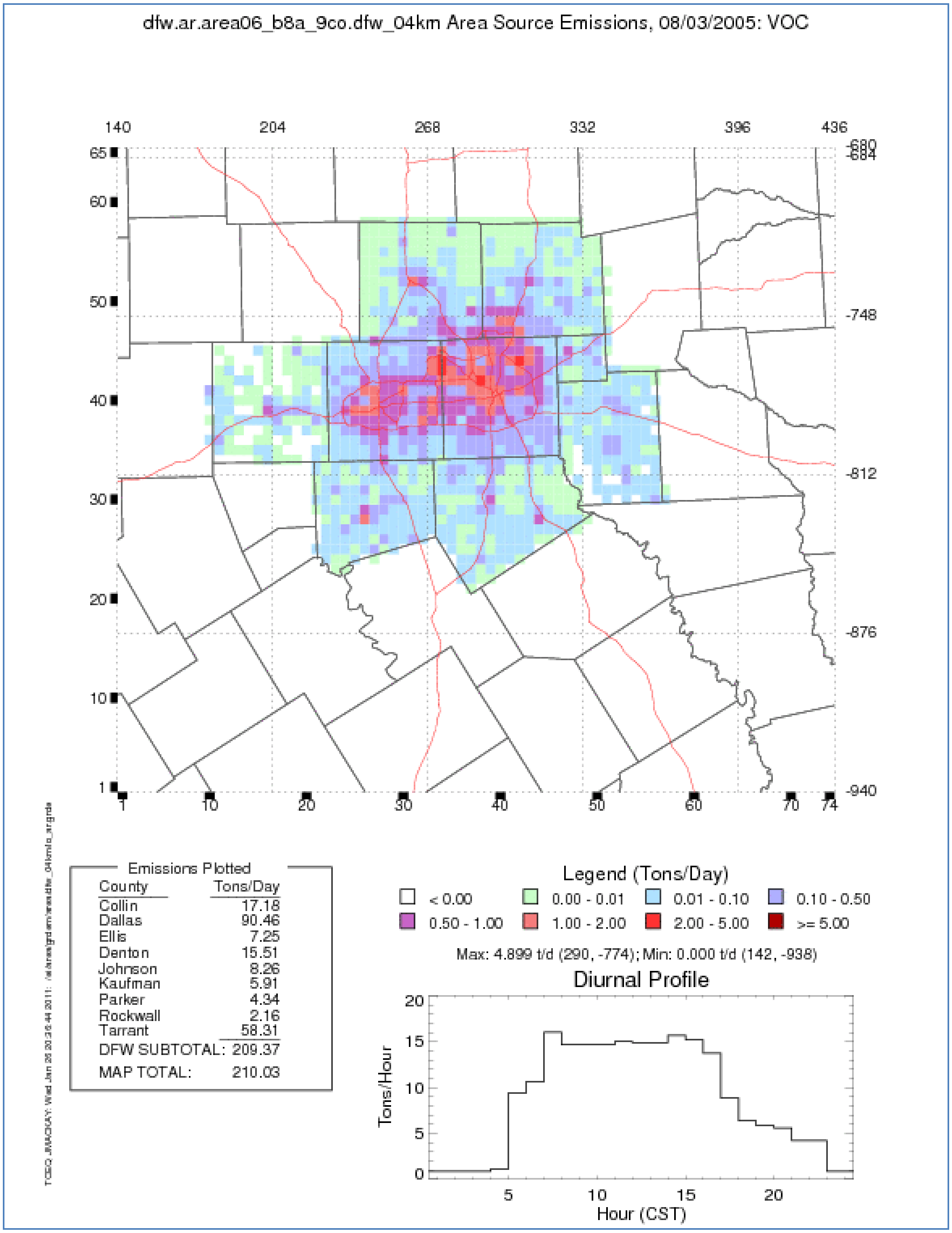

Figure 41: 2006 DFW 9-county Area Source cb05 VOC EI

Table 60: 2012 Area Source DFW 9-county EI breakout

area12_b8a_9co		(tpd)	
Category	**NOx**	**VOC**	**CO**
Petroleum Products	0	45.02	0
Architectural Coating	0	40.46	0
Solvent Use	0	64.11	0
Surface Cleaning	0	1.26	0
Industrial Fuel Use	15.27	0.57	8.83
Residential Fuel Use	2.36	0.13	0.95
Auto Refinishing	0	4.64	0
Waste Treatment	0	11.24	0
Graphic Arts	0	1.47	0
Pesticide Use	0	0.01	0
Leaking Underground Storage Tanks	0	3.13	0
TRAFMAR	0	0.49	0
Surface Coating	0	58.5	0
Open Burning	0.53	3.15	46.48
Dry Cleaning	0	4.06	0
Asphalt Paving	0	0.79	0
Bakeries and Breweries	0	0.97	0
Total	**18.17**	**240.03**	**56.26**

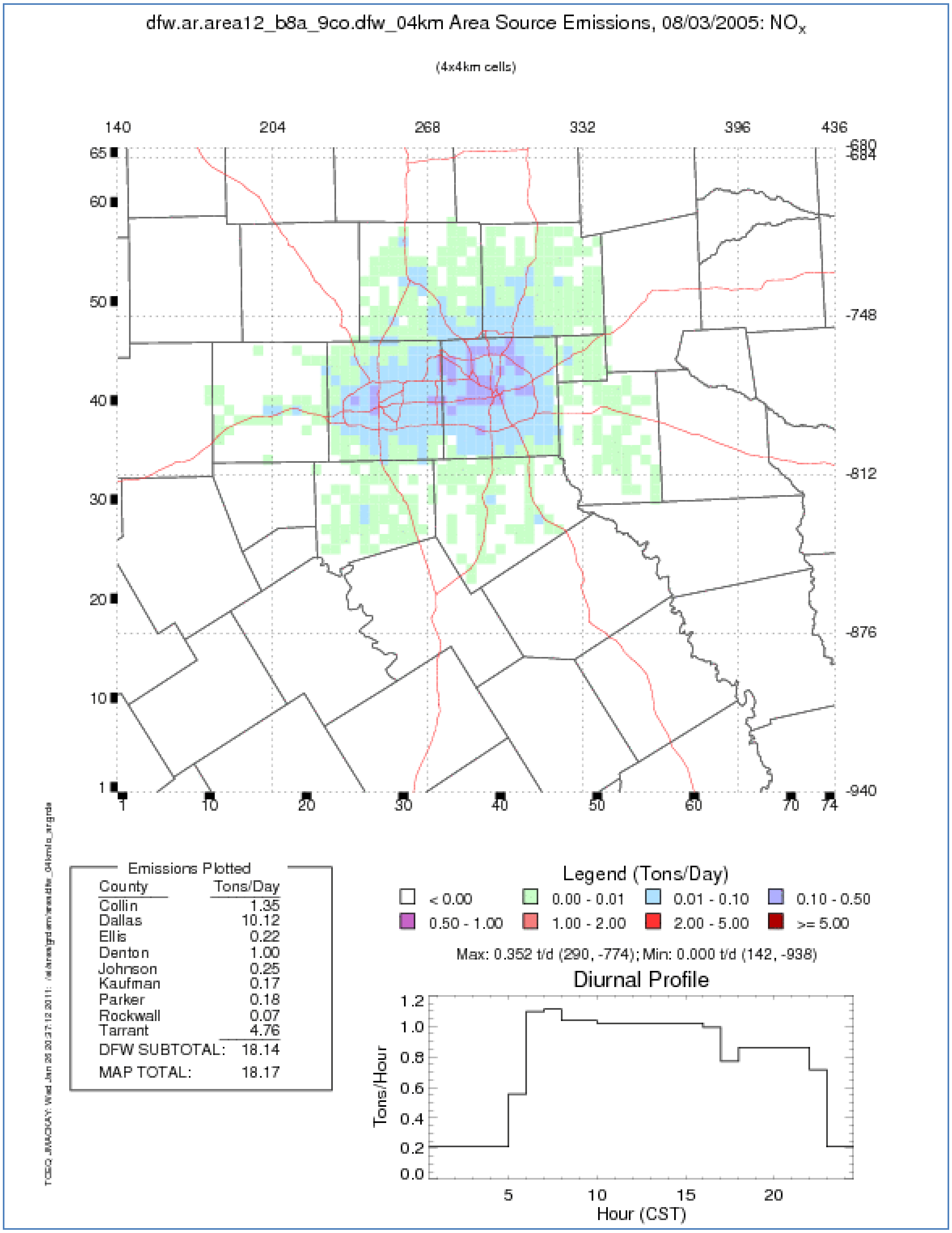

Figure 42: 2012 DFW 9-county Area Source NO_X EI

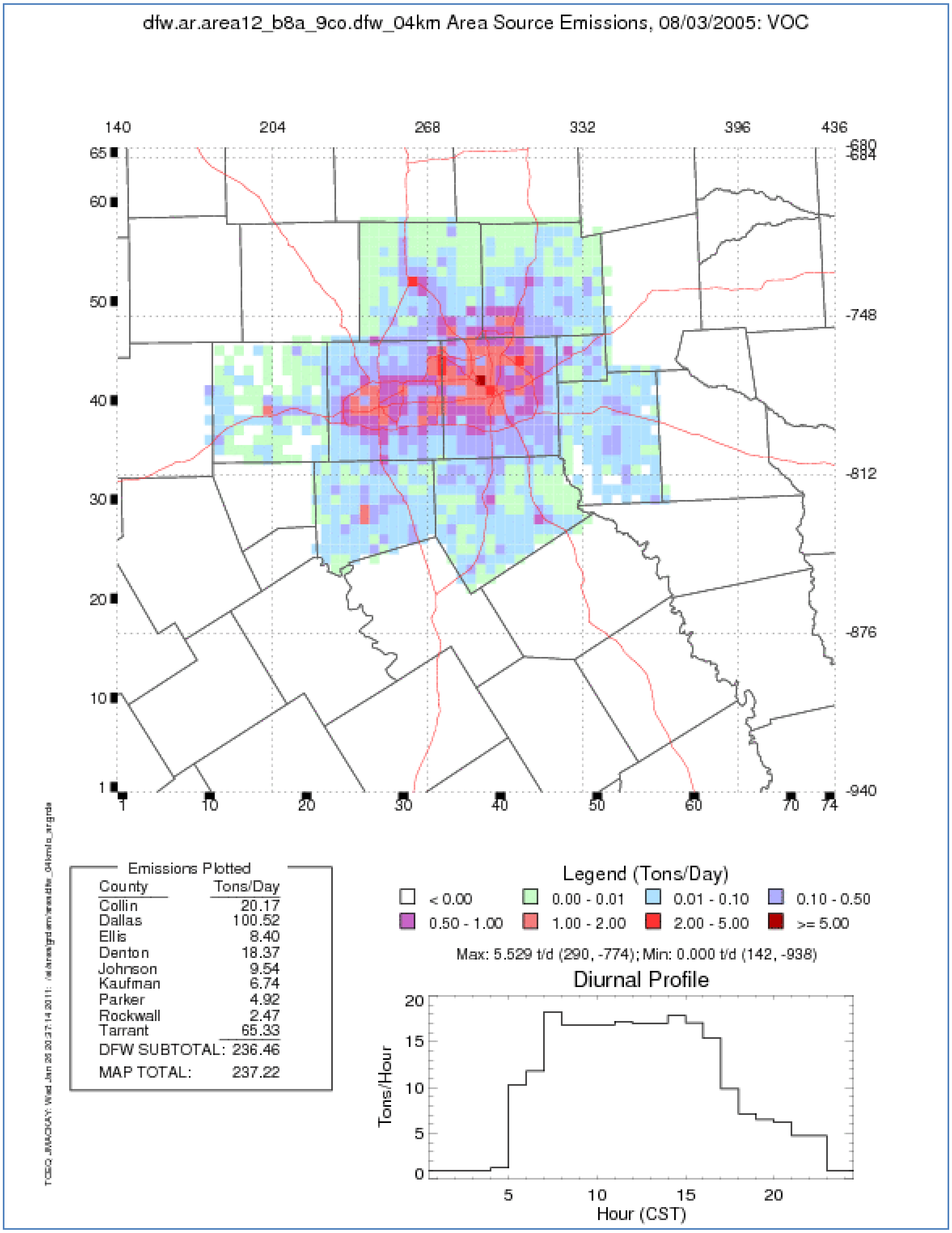

Figure 43: 2012 DFW 9-county Area Source cb05 VOC EI

4.8 Ship Emissions

Contract work by Environ and data from the Port of Houston were integrated to update the HGB shipping EI to 2007 ship movements. Environ work also allowed improved emissions treatment for the Gulf of Mexico and the Atlantic Ocean in the modeling domains to be based on actual ship location data and ship traffic data rather than simple shipping lanes. EPA near-port data was used near shore to pick-up where the Ship Traffic, Energy and Environment Model (STEEM) data ended to improve near-shore ship modeling. No commercial shipping exists in the DFW 4 km domain as shown in Figure 44: *2006 STEEM Ship Emissions for Gulf of Mexico for 12 km Domain*.

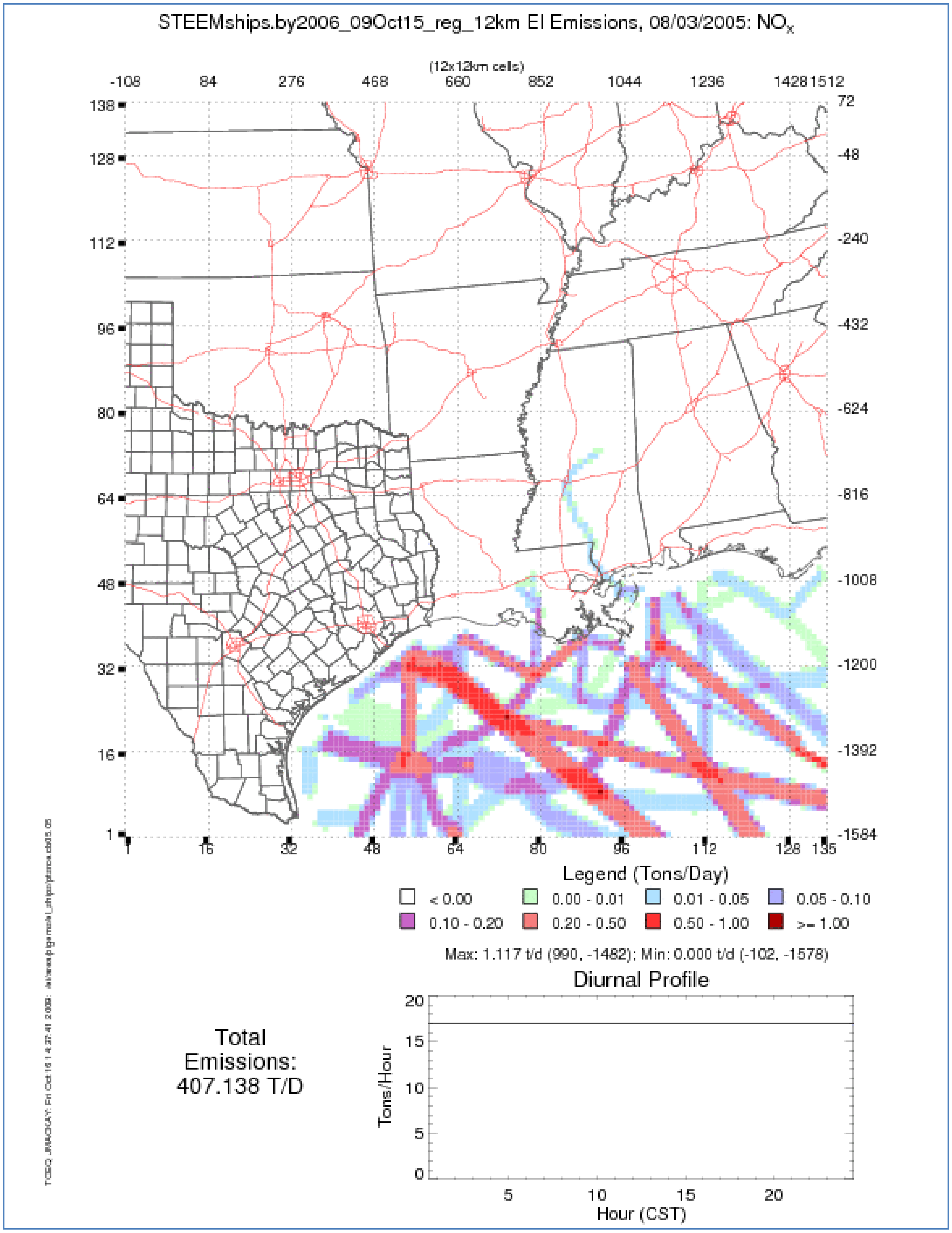

Figure 44: 2006 STEEM Ship Emissions for Gulf of Mexico for 12 km Domain

5 BIOGENIC MODELING EMISSIONS

For development of the biogenic emissions, the TCEQ used version 3.1 of the Global Biosphere Emissions and Interactions System (GloBEIS3.1), available at http://www.globeis.com/. GloBEIS3.1 incorporates detailed locality-specific land-use data to generate the mix and density of vegetative species. GloBEIS tables were appended to include species and leaf mass densities specific to the 30-meter resolved land cover generated by Texas A&M University under funding from the TCEQ (Popescu, 2010). In addition, solar radiation data from Geostationary Operational Environmental Satellite (GOES) satellite imagery, which is used to generate the photosynthetically-active solar radiation (PAR), was input to the GloBEIS3.1 model. Further, the GloBEIS3.1 model used hourly temperature data generated from weather station data.

Land cover data for the 4 km DFW modeling domain is a subset of land cover generated from a project funded by the TCEQ and executed by the Texas A&M Spatial Sciences Laboratory (Popescu, 2010). This land cover was created from Landscape Fire and Resource Management Planning Tools Project (LANDFIRE) data hosted by the United States Geological Survey (USGS). The data were reclassified into Texas Land Classification System classes, and refined using ancillary data such as classified Landsat Thematic Mapper (TM) imagery and Common Land Unit (CLU) data provided by the United States Department of Agriculture (USDA). Figure 45: TCEQ Land Cover for the 4 km DFW CAMx Domain illustrates the land cover used for the 4 km DFW domain.

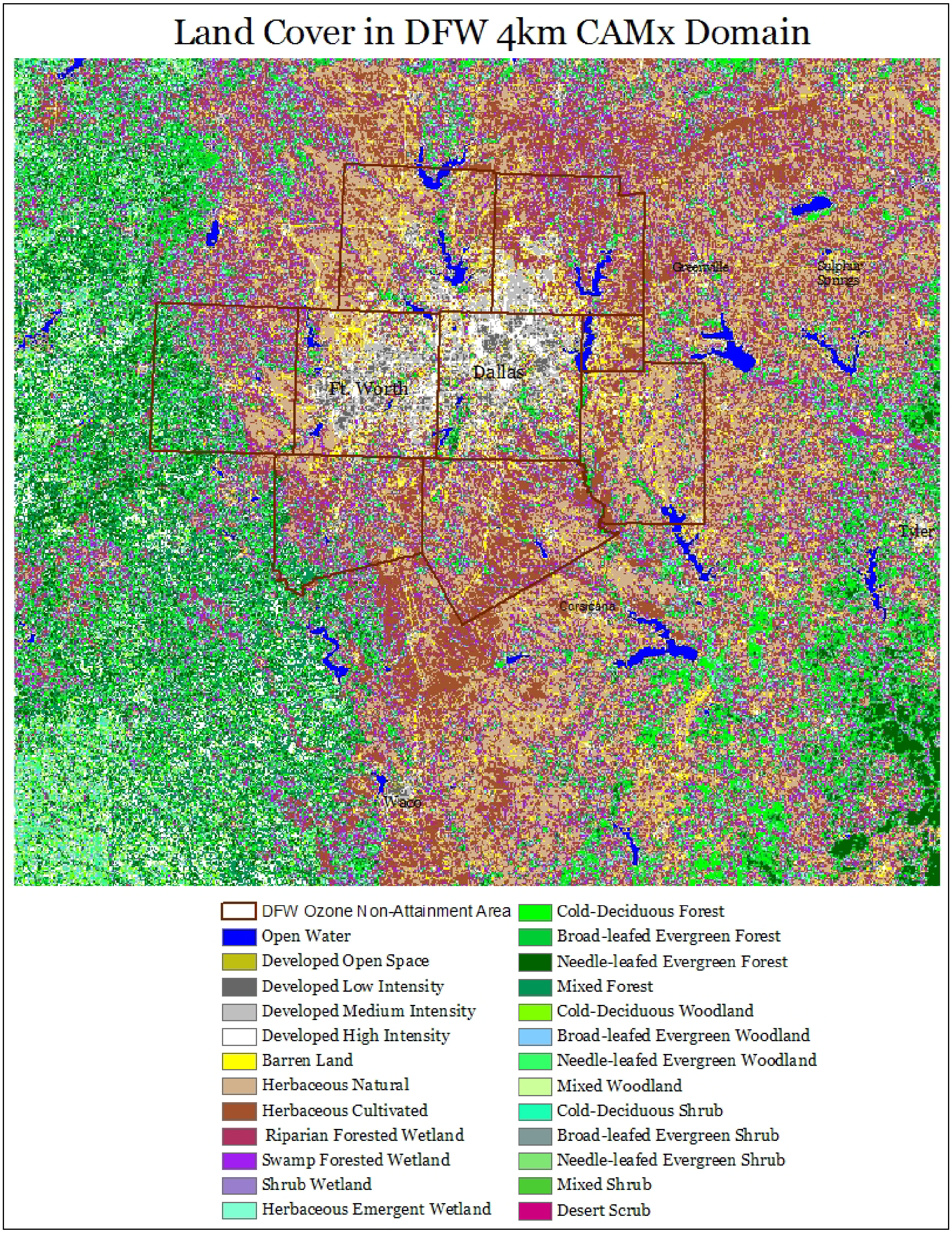

Figure 45: TCEQ Land Cover for the 4 km DFW CAMx Domain

The 12 km and 36 km non-Texas portions of the modeling domain were obtained from Version 3 of the Biogenic Emissions Landuse Data (BELD3; Kinnee et al., 1997), which is a vegetation database for the entire North American continent prepared specifically for creating biogenic emission inventories. Land-use data for the Mexico portion of the 12 km modeling domain were obtained from a joint effort between the University of Monterrey and Georgia Tech (Mendoza-Dominguez et al., 2000). Land-use data for the Texas portion of the 12 km domain were obtained from the Texas vegetation database (Wiedinmyer et al., 2001), which was derived from:

- Texas Parks and Wildlife vegetation data;
- agricultural statistics from the National Agricultural Statistics Survey; and
- field surveys carried out in 1999.

The episode-specific PAR data input to GloBEIS3.1 were obtained from the website (http://metosrv2.umd.edu/~srb/gcip/cgi-bin/historic.cgi) operated by the Global Energy and Water Cycle Experiment (GEWEX) Continental International Project (GCIP) and GEWEX Americas Prediction Project (GAPP). These data were available at half-degree resolution and were reprocessed to spatially match the grid structure of the modeling domain. These data are derived from hourly GOES satellite imagery of cloud cover, which have been processed with a solar irradiation model (Pinker and Laszlo, 1992).

The episode-specific temperature data were obtained from weather stations throughout the U.S., including data from the National Weather Service (NWS), the EPA Aerometric Information Retrieval System (AIRS) air quality database, the National Buoy Data Center, the Texas A&M Crop Weather Program, the Louisiana Agricultural Information Service, and the Texas Coastal Oceanographic Observation Network. The organizations providing these meteorological data sets typically run thorough quality assurance checks, but the TCEQ further reviewed them for possible anomalies. Kriging algorithms were used with Statistical Analysis Software (SAS) to prepare the hourly temperature fields. The estimated hourly values were interpolated with a variogram that appropriately fits the inherent degree of variation.

The GloBEIS3.1 model was run for each of the ozone episode days, from May 31 through July 2, 2006. Within the 4 km DFW modeling domain, during this period, there were 17 days exceeding the 1997 ozone standard.

For quality assurance purposes, an emissions summary file was created showing the hourly domain-wide total emissions of NO_X, CO, isoprene, monoterpenes, and other VOCs to allow quick comparisons over different episode days. An example of the hourly emissions file is shown in Table 61: Example GloBEIS3.1 Hourly Biogenic Emissions Report for June 2, 2006. An additional quality assurance step involved review of the model configuration file which lists the various GloBEIS3.1 input settings. Since biogenic emissions are dependent upon the meteorological conditions on a given day, the same episode-specific emissions for the 2006 baseline were used in the 2012 future case modeling scenarios. The summary of biogenic emissions, by day, is shown in Table 62: Daily Summary of Biogenic Emissions for the 2006 DFW Ozone Episode..

Table 61: Example GloBEIS3.1 Hourly Biogenic Emissions Report for June 2, 2006

year	day	hour	Isoprene (tons)	Monoterpenes (tons)	Other VOCs (tons)	Nitrogen Oxides (tons)
2006	183	0	0	7.06	13.16	1.68
2006	183	1	0	6.99	12.89	1.67
2006	183	2	0	6.89	12.73	1.66
2006	183	3	0	6.84	12.56	1.64
2006	183	4	0	6.87	12.57	1.63
2006	183	5	6.16	6.9	12.59	1.64
2006	183	6	31.25	7.5	13.62	1.73
2006	183	7	48.55	8.52	15.38	1.88
2006	183	8	68.72	9.67	17.65	2.04
2006	183	9	94.13	10.78	19.76	2.19
2006	183	10	121.08	12.32	22.86	2.39
2006	183	11	141.72	13.79	25.5	2.58
2006	183	12	156.37	14.78	27.56	2.72
2006	183	13	168.6	15.64	29.39	2.85
2006	183	14	171.53	16.47	30.58	2.95
2006	183	15	161.75	16.47	30.77	2.96
2006	183	16	119.71	14.46	27.64	2.77
2006	183	17	99.05	13.82	26.38	2.66
2006	183	18	61.76	11.87	22.85	2.4
2006	183	19	6.57	10.4	19.86	2.18
2006	183	20	0	9.42	17.7	2.06
2006	183	21	0	8.91	16.62	1.98
2006	183	22	0	8.48	15.86	1.9
2006	183	23	0	7.99	14.94	1.84
		Daily Total:	1,456.95	252.84	471.42	52

Table 62: Daily Summary of Biogenic Emissions for the 2006 DFW Ozone Episode.

Ozone Episode Day	Isoprene (tons/day)	Monoterpenes (tons/day)	Other VOC (tons/day)	Nitrogen Oxides (tons/day)
5/31/2006	674.74	182.89	377.16	45.78
6/1/2006	768.64	190.12	389.02	45.91
6/2/2006	1070.42	219.21	448.10	49.88
6/3/2006	1127.65	221.98	458.90	50.05
6/4/2006	1373.30	260.53	563.99	55.96
6/5/2006	1318.99	255.75	575.43	55.58
6/6/2006	1507.36	285.68	621.49	59.49
6/7/2006	1397.51	267.31	567.70	56.23
6/8/2006	1447.72	277.47	576.81	58.02
6/9/2006	1581.51	300.30	631.53	61.12
6/10/2006	1677.70	318.11	671.59	63.94
6/11/2006	1511.27	292.92	627.17	60.60
6/12/2006	1581.42	306.15	640.00	61.84
6/13/2006	1467.57	283.35	614.74	58.89
6/14/2006	1253.64	243.76	517.91	53.36
6/15/2006	1447.18	282.03	595.70	58.57
6/16/2006	1165.28	244.81	544.78	55.00
6/17/2006	881.47	216.68	465.57	50.46
6/18/2006	1051.34	221.03	475.37	51.98
6/19/2006	1182.95	233.17	504.02	53.26
6/20/2006	1000.41	227.04	460.39	51.94
6/21/2006	1237.81	261.11	537.05	56.81
6/22/2006	1162.76	262.76	537.36	57.64
6/23/2006	1023.72	242.51	493.36	53.66
6/24/2006	964.14	232.38	489.65	53.30
6/25/2006	1406.54	273.72	561.85	58.01
6/26/2006	967.87	210.55	423.98	48.93
6/27/2006	1081.67	211.93	434.98	49.07
6/28/2006	1285.15	238.95	494.50	53.22
6/29/2006	1300.00	251.14	515.37	55.05
6/30/2006	1344.04	264.98	546.21	56.98
7/1/2006	1208.53	245.35	518.47	55.02
7/2/2006	1000.67	223.06	467.54	51.98

5.1 Future Improvements

Future improvements to the biogenics modeling for DFW include improved land cover. The TCEQ funded Texas A&M to produce a seamless 30 m resolution land cover base map for the TCEQ 12 km meteorological domain. The 12 km photochemical model domain is a subset of the larger meteorological domain, and so this land cover will be used for future 12 km and 4 km biogenic emission modeling for DFW. The U.S. portion of the new land cover is founded on data from the U.S. Government's LANDFIRE program, and Landsat 5 data for the Mexican portion of the land cover. The resulting seamless dataset is illustrated in Figure 46: New TCEQ land cover produced by Texas A&M University for the 12 km meteorological modeling domain.

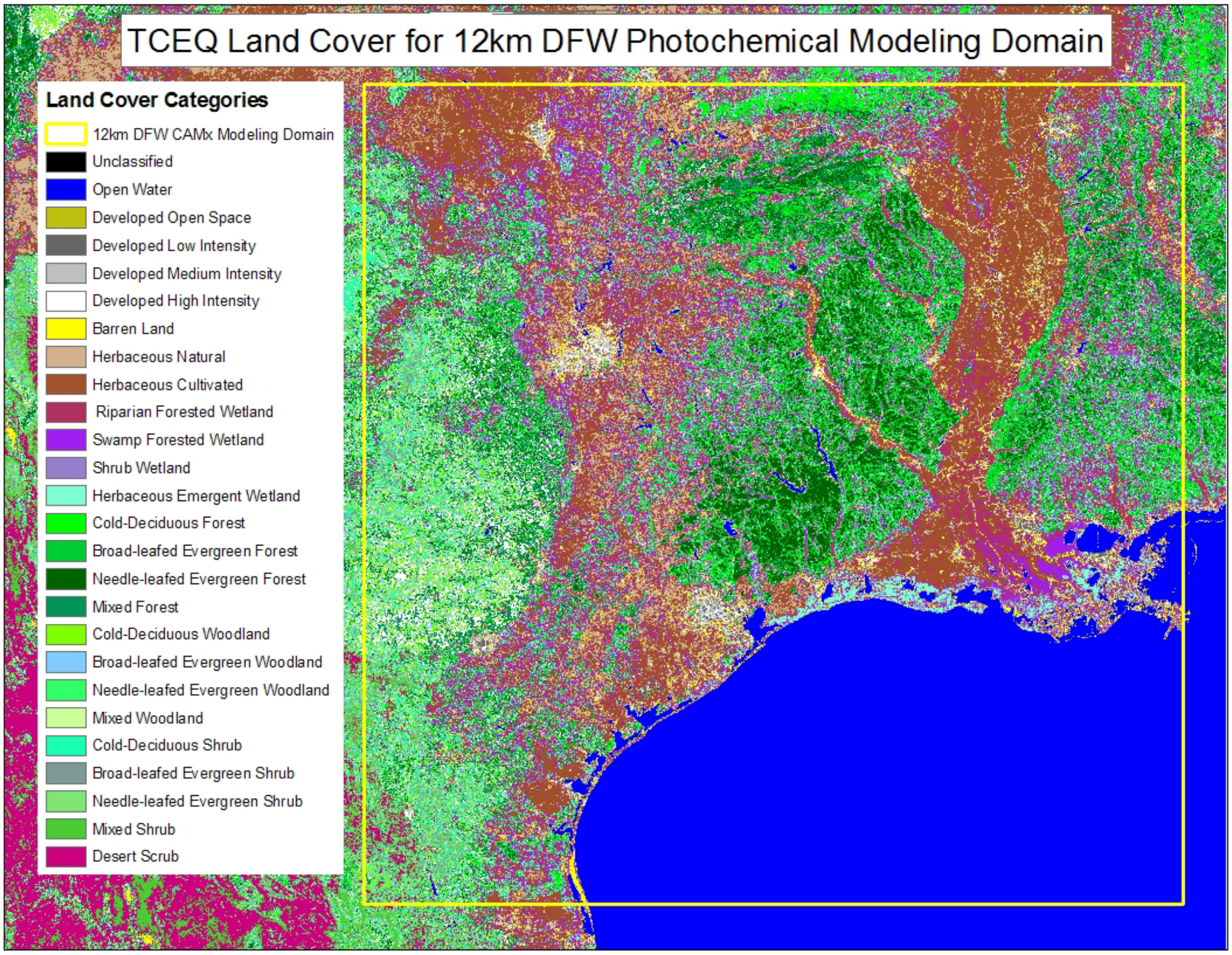

Figure 46: New TCEQ land cover produced by Texas A&M University for the 12 km meteorological modeling domain

In 2011, the TCEQ plans to append GloBEIS vegetation data tables to include data from the United States Department of Agriculture (USDA) Forest Service Forest Inventory Analysis (FIA) data. Using GIS, FIA tree and plot-level forestry data will be spatially merged with mapped categories in the new land cover dataset. Analysis of this merged data will reveal a realistic species composition within each forested class and provide data useful for calculating average leaf mass density for each species using allometric equations published by the US Forest Service.

The TCEQ has funded another project to map the urban forest in Texas' major urban areas. This will be accomplished using high resolution aerial imagery and, where necessary and available, light detection and ranging data (Lidar). The resulting urban classes will reflect the presence and composition of forested areas in mapping classes currently described as "Developed Open Space," "Developed Low Intensity," "Developed Medium Intensity," or "Developed High Intensity." While the urban areas are relatively small in comparison to the rest of the state, the urban forest they contain is likely to play an important role in the photochemistry and meteorology of these areas.

The GloBEIS model was enhanced in mid-2010 by Environ (Yarwood, 2010). The new model, GloBEIS 3.5, has additional functionality, which includes:

- Reporting of sesquiterpenes in the native emissions output;
- Capability to model multiple contiguous days in a given model run; and
- Automatic generation of logs reporting input parameters for each day within the model run

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ATTACHMENT 1: TEXAS 2010 CAIR NO_X ALLOCATIONS

Table 63, Att. 1: Texas 2010 CAIR NO_X Allocations

TCEQ Regulated Entity Number	CAMD Facility Name	CAMD ORISPL ID	CAMD UNIT ID	CAIR Allocation from General Pool, tpd	CAIR Allocation from New Pool, tpd
RN100215490	Copper Station	9	1	0.123	
RN101062255	Oklaunion Power Station	127	1	9.292	
RN100542927	Limestone	298	LIM1	12.137	
RN100542927	Limestone	298	LIM2	10.975	
RN100226638	E S Joslin	3436	1	0.506	
RN102565843	J L Bates	3438	1	0.385	
RN102565843	J L Bates	3438	2	0.361	
RN100213909	Laredo	3439	1	0.118	
RN100213909	Laredo	3439	2	0.115	
RN100213909	Laredo	3439	3	0.631	
RN100213909	Laredo	3439	4		0.030
RN100213909	Laredo	3439	5		0.030
RN100215979	Lon C Hill	3440	1	0.060	
RN100215979	Lon C Hill	3440	2	0.153	
RN100215979	Lon C Hill	3440	3	0.353	
RN100215979	Lon C Hill	3440	4	0.667	
RN100552181	Nueces Bay	3441	5	0.016	
RN100552181	Nueces Bay	3441	6	0.383	
RN100552181	Nueces Bay	3441	7	1.476	
RN102560687	La Palma	3442	6	0.831	
RN102560687	La Palma	3442	7	0.044	
RN100214980	Victoria Power Station	3443	6	0.049	
RN100214980	Victoria Power Station	3443	7	0.161	
RN100214980	Victoria Power Station	3443	8	0.547	
RN100214980	Victoria Power Station	3443	9		0.066
RN100673490	Lake Hubbard	3452	1	0.757	
RN100673490	Lake Hubbard	3452	2	1.757	
RN101559235	Mountain Creek Gen	3453	2	0.046	
RN101559235	Mountain Creek Gen	3453	3A	0.057	
RN101559235	Mountain Creek Gen	3453	3B	0.036	
RN101559235	Mountain Creek Gen	3453	6	0.224	
RN101559235	Mountain Creek Gen	3453	7	0.281	
RN101559235	Mountain Creek Gen	3453	8	1.372	
RN101559854	North Lake	3454	1	0.402	
RN101559854	North Lake	3454	2	0.448	
RN101559854	North Lake	3454	3	0.943	
RN100804301	Parkdale	3455	1	0.112	
RN100804301	Parkdale	3455	2	0.172	

TCEQ Regulated Entity Number	CAMD Facility Name	CAMD ORISPL ID	CAMD UNIT ID	CAIR Allocation from General Pool, tpd	CAIR Allocation from New Pool, tpd
RN100804301	Parkdale	3455	3	0.219	
RN100211309	NEWMAN	3456	4	0.000	
RN100211309	NEWMAN	3456	5	0.000	
RN100211309	Newman	3456	1	0.372	
RN100211309	Newman	3456	2	0.396	
RN100211309	Newman	3456	3	0.525	
RN100211309	Newman	3456	**4		0.518
RN100211309	Newman	3456	**5		0.611
RN100211309	Newman	3456	GT-6A		0.052
RN100211309	Newman	3456	GT-6B		0.049
RN100226877	Lewis Creek	3457	1	1.484	
RN100226877	Lewis Creek	3457	2	1.443	
RN102513041	Sabine	3459	1	1.175	
RN102513041	Sabine	3459	2	1.200	
RN102513041	Sabine	3459	3	1.924	
RN102513041	Sabine	3459	4	2.451	
RN102513041	Sabine	3459	5	2.091	
RN100825371	Cedar Bayou	3460	CBY1	1.801	
RN100825371	Cedar Bayou	3460	CBY2	1.938	
RN100825371	Cedar Bayou	3460	CBY3	2.807	
RN100825371	Cedar Bayou 4	3460	CBY41		0.077
RN100825371	Cedar Bayou 5	3460	CBY42		0.066
RN100542877	AES Western Power	3461	DWP9	0.167	
RN100542851	Greens Bayou	3464	GBY5	0.670	
RN100542851	Greens Bayou	3464	GBY73	0.022	
RN100542851	Greens Bayou	3464	GBY74	0.022	
RN100542851	Greens Bayou	3464	GBY81	0.025	
RN100542851	Greens Bayou	3464	GBY82	0.025	
RN100542851	Greens Bayou	3464	GBY83	0.025	
RN100542851	Greens Bayou	3464	GBY84	0.030	
RN101062826	P H Robinson	3466	PHR1	1.487	
RN101062826	P H Robinson	3466	PHR2	1.626	
RN101062826	P H Robinson	3466	PHR3	1.476	
RN101062826	P H Robinson	3466	PHR4	1.875	
RN100825389	Sam Bertron	3468	SRB3		0.542
RN100825389	Sam Bertron	3468	SRB4		0.485
RN100825389	Sam Bertron	3468	SRB1	0.208	
RN100825389	Sam Bertron	3468	SRB2	0.284	
RN100825389	SAM BERTRON	3468	SRB3	0.000	
RN100825389	SAM BERTRON	3468	SRB4	0.000	
RN100542885	T H Wharton	3469	THW2	0.432	
RN100542885	T H Wharton	3469	THW31	0.290	

TCEQ Regulated Entity Number	CAMD Facility Name	CAMD ORISPL ID	CAMD UNIT ID	CAIR Allocation from General Pool, tpd	CAIR Allocation from New Pool, tpd
RN100542885	T H Wharton	3469	THW32	0.251	
RN100542885	T H Wharton	3469	THW33	0.268	
RN100542885	T H Wharton	3469	THW34	0.276	
RN100542885	T H Wharton	3469	THW41	0.268	
RN100542885	T H Wharton	3469	THW42	0.243	
RN100542885	T H Wharton	3469	THW43	0.273	
RN100542885	T H Wharton	3469	THW44	0.271	
RN100542885	T H Wharton	3469	THW51	0.038	
RN100542885	T H Wharton	3469	THW52	0.041	
RN100542885	T H Wharton	3469	THW53	0.046	
RN100542885	T H Wharton	3469	THW54	0.044	
RN100542885	T H Wharton	3469	THW55	0.044	
RN100542885	T H Wharton	3469	THW56	0.038	
RN100888312	W A Parish	3470	WAP8		9.441
RN100888312	W A Parish	3470	WAP1	0.281	
RN100888312	W A Parish	3470	WAP2	0.205	
RN100888312	W A Parish	3470	WAP3	0.530	
RN100888312	W A Parish	3470	WAP4	1.369	
RN100888312	W A Parish	3470	WAP5	9.942	
RN100888312	W A Parish	3470	WAP6	9.499	
RN100888312	W A Parish	3470	WAP7	8.942	
RN100542992	Webster	3471	WEB3	0.440	
RN102156916	Knox Lee Power Plant	3476	2	0.011	
RN102156916	Knox Lee Power Plant	3476	3	0.016	
RN102156916	Knox Lee Power Plant	3476	4	0.090	
RN102156916	Knox Lee Power Plant	3476	5	1.038	
RN100542620	Lone Star Power Plan	3477	1	0.030	
RN100542596	Wilkes Power Plant	3478	1	0.290	
RN100542596	Wilkes Power Plant	3478	2	0.997	
RN100542596	Wilkes Power Plant	3478	3	1.041	
RN100224765	Jones Station	3482	151B	1.432	
RN100224765	Jones Station	3482	152B	1.254	
RN100224955	Moore County Station	3483	3	0.055	
RN100224641	Nichols Station	3484	141B	0.312	
RN100224641	Nichols Station	3484	142B	0.303	
RN100224641	Nichols Station	3484	143B	0.634	
RN100224419	Plant X	3485	111B	0.079	
RN100224419	Plant X	3485	112B	0.183	
RN100224419	Plant X	3485	113B	0.281	
RN100224419	Plant X	3485	114B	0.888	
RN100693308	Eagle Mountain	3489	1	0.161	
RN100693308	Eagle Mountain	3489	2	0.295	

TCEQ Regulated Entity Number	CAMD Facility Name	CAMD ORISPL ID	CAMD UNIT ID	CAIR Allocation from General Pool, tpd	CAIR Allocation from New Pool, tpd
RN100693308	Eagle Mountain	3489	3	0.730	
RN102563426	Graham	3490	1	0.716	
RN102563426	Graham	3490	2	1.060	
RN102336906	Handley Generating Sta	3491	1A	0.230	
RN102336906	Handley Generating Sta	3491	1B	0.186	
RN102336906	Handley Generating Sta	3491	2	0.150	
RN102336906	Handley Generating Sta	3491	3	1.437	
RN102336906	Handley Generating Sta	3491	4	0.929	
RN102336906	Handley Generating Sta	3491	5	0.839	
RN102285848	Morgan Creek	3492	3	0.011	
RN102285848	Morgan Creek	3492	4	0.082	
RN102285848	Morgan Creek	3492	5	0.451	
RN102285848	Morgan Creek	3492	6	1.929	
RN102285848	Morgan Creek	3492	CT1	0.016	
RN102285848	Morgan Creek	3492	CT2	0.016	
RN102285848	Morgan Creek	3492	CT3	0.019	
RN102285848	Morgan Creek	3492	CT4	0.030	
RN102285848	Morgan Creek	3492	CT5	0.022	
RN102285848	Morgan Creek	3492	CT6	0.022	
RN102764933	North Main	3493	4	0.101	
RN102183969	Permian Basin	3494	5		0.258
RN102183969	Permian Basin	3494	6	2.577	
RN102183969	Permian Basin	3494	CT1	0.025	
RN102183969	Permian Basin	3494	CT2	0.025	
RN102183969	Permian Basin	3494	CT3	0.025	
RN102183969	Permian Basin	3494	CT4	0.030	
RN102183969	Permian Basin	3494	CT5	0.025	
RN101198059	Big Brown	3497	1	9.806	
RN101198059	Big Brown	3497	2	9.404	
RN100784735	Collin	3500	1	0.249	
RN101698520	Lake Creek	3502	1	0.161	
RN101698520	Lake Creek	3502	2	0.571	
RN101983344	River Crest	3503	1	0.082	
RN101621449	Stryker Creek	3504	1	0.361	
RN101621449	Stryker Creek	3504	2	1.694	
RN102566494	Tradinghouse	3506	1	1.667	
RN102566494	Tradinghouse	3506	2	3.055	
RN101943868	Trinidad	3507	9	0.413	
RN102285855	Valley (TXU)	3508	1	0.402	
RN102285855	Valley (TXU)	3508	2	1.820	
RN102285855	Valley (TXU)	3508	3	0.525	
RN102688439	Oak Creek Power Sta	3523	1	0.292	

TCEQ Regulated Entity Number	CAMD Facility Name	CAMD ORISPL ID	CAMD UNIT ID	CAIR Allocation from General Pool, tpd	CAIR Allocation from New Pool, tpd
RN100215300	Paint Creek Power Sta	3524	1	0.049	
RN100215300	Paint Creek Power Sta	3524	2	0.052	
RN100215300	Paint Creek Power Sta	3524	3	0.038	
RN100215300	Paint Creek Power Sta	3524	4	0.271	
RN102688835	Rio Pecos Power Station	3526	5	0.096	
RN102688835	Rio Pecos Power Station	3526	6	0.424	
RN101531226	San Angelo Power Station	3527	2	0.721	
RN100219872	Decker Creek	3548	1	1.041	
RN100219872	Decker Creek	3548	2	1.205	
RN100219872	Decker Creek	3548	GT1	0.011	
RN100219872	Decker Creek	3548	GT2	0.016	
RN100219872	Decker Creek	3548	GT3	0.016	
RN100219872	Decker Creek	3548	GT4	0.011	
RN100220045	Holly Street	3549	1	0.087	
RN100220045	Holly Street	3549	2	0.044	
RN100220045	Holly Street	3549	3	0.342	
RN100220045	Holly Street	3549	4	0.473	
RN100219450	Silas Ray	3559	10		0.008
RN100219450	Silas Ray	3559	8	0.005	
RN100219450	Silas Ray	3559	9	0.098	
RN101612851	Bryan	3561	6	0.068	
RN102528510	C E Newman	3574	BW5	0.022	
RN100219203	Ray Olinger	3576	BW2	0.456	
RN100219203	Ray Olinger	3576	BW3	0.473	
RN100219203	Ray Olinger	3576	CE1	0.243	
RN100219203	Ray Olinger	3576	GE4		0.005
RN102038486	Sim Gideon	3601	1	0.249	
RN102038486	Sim Gideon	3601	2	0.306	
RN102038486	Sim Gideon	3601	3	1.260	
RN102545142	Alex Ty Cooke Genera	3602	1		0.142
RN102545142	Alex Ty Cooke Genera	3602	2	0.118	
RN100217678	J Robert Massengale	3604	GT1	0.205	
RN100217439	Leon Creek	3609	3	0.022	
RN100217439	Leon Creek	3609	4	0.036	
RN100217439	Leon Creek	3609	CGT1		0.005
RN100217439	Leon Creek	3609	CGT2		0.008
RN100217439	Leon Creek	3609	CGT3		0.008
RN100217439	Leon Creek	3609	CGT4		0.008
RN100217173	Mission Road	3610	3	0.033	
RN100217975	O W Sommers	3611	1	1.069	
RN100217975	O W Sommers	3611	2	0.820	
RN100217835	V H Braunig	3612	1	0.383	

TCEQ Regulated Entity Number	CAMD Facility Name	CAMD ORISPL ID	CAMD UNIT ID	CAIR Allocation from General Pool, tpd	CAIR Allocation from New Pool, tpd
RN100217835	V H Braunig	3612	2	0.249	
RN100217835	V H Braunig	3612	3	0.820	
RN100217835	V H Braunig	3612	CT01	0.831	
RN100217835	V H Braunig	3612	CT02	0.793	
RN100217611	W B Tuttle	3613	1	0.019	
RN100217611	W B Tuttle	3613	2	0.055	
RN100217611	W B Tuttle	3613	3	0.052	
RN100217611	W B Tuttle	3613	4	0.096	
RN100216993	North Texas	3627	3	0.011	
RN102033891	R W Miller	3628	1	0.128	
RN102033891	R W Miller	3628	2	0.429	
RN102033891	R W Miller	3628	3	0.719	
RN102033891	R W Miller	3628	4	0.115	
RN102033891	R W Miller	3628	5	0.109	
RN100222652	Sam Rayburn Plant	3631	CT7		0.025
RN100222652	Sam Rayburn Plant	3631	CT8		0.025
RN100222652	Sam Rayburn Plant	3631	CT9		0.025
RN100223023	Power Lane Steam Plant	4195	2	0.008	
RN100223023	Power Lane Steam Plant	4195	3	0.036	
RN100214766	Spencer	4266	4	0.098	
RN100214766	Spencer	4266	5	0.150	
RN100219468	T C Ferguson	4937	1	1.227	
RN100215557	Fort Phantom Power Sta	4938	1	0.568	
RN100215557	Fort Phantom Power Sta	4938	2	0.787	
RN100642040	Barney M. Davis	4939	1	1.427	
RN100642040	Barney M. Davis	4939	2	1.752	
RN100214550	Gibbons Creek Steam	6136	1	6.359	
RN100213370	Welsh Power Plant	6139	1	8.343	
RN100213370	Welsh Power Plant	6139	2	8.026	
RN100213370	Welsh Power Plant	6139	3	8.141	
RN102583093	Martin Lake	6146	1	11.965	
RN102583093	Martin Lake	6146	2	11.626	
RN102583093	Martin Lake	6146	3	12.549	
RN102285921	Monticello	6147	1	9.117	
RN102285921	Monticello	6147	2	9.243	
RN102285921	Monticello	6147	3	11.729	
RN100226919	Coleto Creek	6178	1	8.890	
RN100226844	Sam Seymour	6179	1	8.374	
RN100226844	Sam Seymour	6179	2	8.751	
RN100226844	Sam Seymour	6179	3	7.023	
RN100216191	Oak Grove	6180	1		0.184
RN100217975	J T Deely	6181	1	6.797	

TCEQ Regulated Entity Number	CAMD Facility Name	CAMD ORISPL ID	CAMD UNIT ID	CAIR Allocation from General Pool, tpd	CAIR Allocation from New Pool, tpd
RN100217975	J T Deely	6181	2	6.646	
RN100226539	San Miguel	6183	SM-1	6.920	
RN100224849	Harrington Station	6193	061B	6.357	
RN100224849	Harrington Station	6193	062B	6.220	
RN100224849	Harrington Station	6193	063B	6.234	
RN100224534	Tolk Station	6194	171B	8.259	
RN100224534	Tolk Station	6194	172B	8.674	
RN102166576	Roland C. Dansby Power	6243	1	0.380	
RN101611556	Roland C. Dansby Power	6243	2		0.005
RN102147881	Sandow	6648	4	9.945	
RN100226570	Twin Oaks Power, LP	7030	U1	2.449	
RN100226570	Twin Oaks Power, LP	7030	U2	2.577	
RN100217975	J K Spruce	7097	**1		9.521
RN100542901	San Jacinto Steam El	7325	SJS1	0.891	
RN100542901	San Jacinto Steam El	7325	SJS2	0.891	
RN100224989	Calpine Hidalgo Ener	7762	HRSG1	0.801	
RN100224989	Calpine Hidalgo Ener	7762	HRSG2	0.855	
RN100215052	Sand Hill Energy Center	7900	SH1		0.019
RN100215052	Sand Hill Energy Center	7900	SH2		0.016
RN100215052	Sand Hill Energy Center	7900	SH3		0.016
RN100215052	Sand Hill Energy Center	7900	SH4		0.014
RN100215052	Sand Hill Energy Center	7900	SH5		0.307
RN100214287	H W Pirkey Power Plant	7902	1	9.901	
RN100664812	Decordova	8063	1	3.558	
RN100664812	Decordova	8063	CT1	0.049	
RN100664812	Decordova	8063	CT2	0.046	
RN100664812	Decordova	8063	CT3	0.044	
RN100664812	Decordova	8063	CT4	0.044	
RN100233998	Bayou Cogeneration Plant	10298	GEN1	0.752	
RN100233998	Bayou Cogeneration Plant	10298	GEN2	0.782	
RN100233998	Bayou Cogeneration Plant	10298	GEN3	0.757	
RN100233998	Bayou Cogeneration Plant	10298	GEN4	0.749	
RN100216837	AES Deepwater, Inc.	10670	1001	0.962	
RN100239672	Clear Lake Cogeneration	10741	G102	0.984	
RN100239672	Clear Lake Cogeneration	10741	G103	0.981	
RN100239672	Clear Lake Cogeneration	10741	G104	0.929	
RN100216555	Paris Energy Center	50109	HRSG1	0.719	
RN100216555	Paris Energy Center	50109	HRSG2	0.686	
RN100226554	New Gulf Power Facility	50137	1	0.016	
RN100223395	Sweetwater Generation	50615	GT01	0.189	
RN100223395	Sweetwater Generation	50615	GT02	0.462	
RN100223395	Sweetwater Generation	50615	GT03	0.470	

TCEQ Regulated Entity Number	CAMD Facility Name	CAMD ORISPL ID	CAMD UNIT ID	CAIR Allocation from General Pool, tpd	CAIR Allocation from New Pool, tpd
RN102450756	Exxonmobil Beaumont	50625	61STK1		0.184
RN102450756	Exxonmobil Beaumont	50625	61STK2		0.384
RN102450756	Exxonmobil Beaumont	50625	61STK3		0.351
RN100210863	Altura Channelview C	50815	ENG101	0.757	
RN100210863	Altura Channelview C	50815	ENG201	0.765	
RN100210863	Altura Channelview C	50815	ENG301	0.560	
RN100210863	Altura Channelview C	50815	ENG401	0.571	
RN100210863	Altura Channelview C	50815	ENG501	0.558	
RN100210863	Altura Channelview C	50815	ENG601	0.762	
RN105369805	Sandow Station	52071	5A		0.419
RN105369805	Sandow Station	52071	5B		0.403
RN100224245	Texas City Cogeneration	52088	GT-A	1.044	
RN100224245	Texas City Cogeneration	52088	GT-B	1.044	
RN100224245	Texas City Cogeneration	52088	GT-C	1.074	
RN100215896	C. R. Wing Cogeneration	52176	1	0.678	
RN100215896	C. R. Wing Cogeneration	52176	2	0.678	
RN100223312	Johnson County Gener	54817	EAST	1.405	
RN100217033	Sweeny Cogeneration	55015	1	1.186	
RN100217033	Sweeny Cogeneration	55015	2	1.233	
RN100217033	Sweeny Cogeneration	55015	3	1.219	
RN100217033	Sweeny Cogeneration	55015	4	1.265	
RN100222041	Pasadena Power Plant	55047	CG-1	1.323	
RN100222041	Pasadena Power Plant	55047	CG-2	1.115	
RN100222041	Pasadena Power Plant	55047	CG-3	1.025	
RN100245539	Tenaska Frontier Gen	55062	1	1.156	
RN100245539	Tenaska Frontier Gen	55062	2	1.170	
RN100245539	Tenaska Frontier Gen	55062	3	1.011	
RN100217298	Blackhawk Station	55064	1	1.181	
RN100217298	Blackhawk Station	55064	2	1.183	
RN101286433	Mustang Station	55065	1	1.224	
RN101286433	Mustang Station	55065	2	1.186	
RN102547957	Gregory Power Facility	55086	101	1.692	
RN102547957	Gregory Power Facility	55086	102	1.703	
RN102596400	Midlothian Energy	55091	STK1	0.588	
RN102596400	Midlothian Energy	55091	STK2	0.708	
RN102596400	Midlothian Energy	55091	STK3	0.645	
RN102596400	Midlothian Energy	55091	STK4	0.732	
RN102596400	Midlothian Energy	55091	STK5		0.112
RN102596400	Midlothian Energy	55091	STK6		0.110
RN100218882	Lamar Power (Paris)	55097	1	0.877	
RN100218882	Lamar Power (Paris)	55097	2	0.921	
RN100218882	Lamar Power (Paris)	55097	3	0.872	

TCEQ Regulated Entity Number	CAMD Facility Name	CAMD ORISPL ID	CAMD UNIT ID	CAIR Allocation from General Pool, tpd	CAIR Allocation from New Pool, tpd
RN100218882	Lamar Power (Paris)	55097	4	0.872	
RN102344645	Frontera Generation	55098	1	0.588	
RN102344645	Frontera Generation	55098	2	0.585	
RN100209766	Sabine Cogeneration	55104	SAB-1	0.445	
RN100209766	Sabine Cogeneration	55104	SAB-2	0.445	
RN101986818	SRW Cogen Limited Partner	55120	CTG-1		0.170
RN101986818	SRW Cogen Limited Partner	55120	CTG-2		0.233
RN100209576	Magic Valley Generation	55123	CTG-1		0.468
RN100209576	Magic Valley Generation	55123	CTG-2		0.501
RN101514214	Tenaska Gateway Gen	55132	OGTDB1		0.271
RN101514214	Tenaska Gateway Gen	55132	OGTDB2		0.299
RN101514214	Tenaska Gateway Gen	55132	OGTDB3		0.266
RN100218742	Rio Nogales Power Project	55137	CTG-1		0.211
RN100218742	Rio Nogales Power Project	55137	CTG-2		0.219
RN100218742	Rio Nogales Power Project	55137	CTG-3		0.233
RN100219195	Wolf Hollow I, LP	55139	CTG1		0.652
RN100219195	Wolf Hollow I, LP	55139	CTG2		0.532
RN100211689	Hays Energy Project	55144	STK1		0.107
RN100211689	Hays Energy Project	55144	STK2		0.118
RN100211689	Hays Energy Project	55144	STK3		0.132
RN100211689	Hays Energy Project	55144	STK4		0.159
RN100225820	Guadalupe Generating	55153	CTG-1	0.899	
RN100225820	Guadalupe Generating	55153	CTG-2	0.784	
RN100225820	Guadalupe Generating	55153	CTG-3		0.455
RN100225820	Guadalupe Generating	55153	CTG-4		0.427
RN100723915	Lost Pines 1	55154	1		0.274
RN100723915	Lost Pines 2	55154	2		0.271
RN101056851	Bastrop Clean Energy	55168	CTG-1A		0.416
RN101056851	Bastrop Clean Energy	55168	CTG-1B		0.458
RN100226232	Bosque County Power	55172	GT-1	0.191	
RN100226232	Bosque County Power	55172	GT-2	0.167	
RN100226232	Bosque County Power	55172	GT-3		0.353
RN100542695	Eastman Cogeneration	55176	1		0.375
RN100542695	Eastman Cogeneration	55176	2		0.392
RN100220276	Channelview Cogeneration	55187	CHV1		0.211
RN100220276	Channelview Cogeneration	55187	CHV2		0.189
RN100220276	Channelview Cogeneration	55187	CHV3		0.181

TCEQ Regulated Entity Number	CAMD Facility Name	CAMD ORISPL ID	CAMD UNIT ID	CAIR Allocation from General Pool, tpd	CAIR Allocation from New Pool, tpd
RN100220276	Channelview Cogeneration	55187	CHV4		0.225
RN100224302	Corpus Christi Energy	55206	CU1		0.540
RN100224302	Corpus Christi Energy	55206	CU2		0.592
RN100223882	Odessa-Ector Generation	55215	GT1		0.321
RN100223882	Odessa-Ector Generation	55215	GT2		0.471
RN100223882	Odessa-Ector Generation	55215	GT3		0.466
RN100223882	Odessa-Ector Generation	55215	GT4		0.540
RN100212430	Ennis Power Company,	55223	GT-1		0.386
RN102333853	Freestone Power Generation	55226	GT1		0.370
RN102333853	Freestone Power Generation	55226	GT2		0.386
RN102333853	Freestone Power Generation	55226	GT3		0.307
RN102333853	Freestone Power Generation	55226	GT4		0.334
RN100221985	Jack County Generation	55230	CT-1		0.252
RN100221985	Jack County Generation	55230	CT-2		0.266
RN100668052	Channel Energy Center	55299	CTG1		0.230
RN100668052	Channel Energy Center	55299	CTG2		0.236
RN102584844	Wise County Power Co	55320	GT-1		0.353
RN102584844	Wise County Power Co	55320	GT-2		0.367
RN102326204	Baytown Energy Center	55327	CTG-1		0.271
RN102326204	Baytown Energy Center	55327	CTG-2		0.195
RN102326204	Baytown Energy Center	55327	CTG-3		0.203
RN100216092	Brazos Valley Energy	55357	CTG1		0.175
RN100216092	Brazos Valley Energy	55357	CTG2		0.159
RN400226109	Cottonwood Energy Project	55358	CT1		0.153
RN400226109	Cottonwood Energy Project	55358	CT2		0.142
RN400226109	Cottonwood Energy Project	55358	CT3		0.162
RN400226109	Cottonwood Energy Project	55358	CT4		0.184
RN102041282	Exelon Laporte Gener	55365	GT-1		0.005
RN102041282	Exelon Laporte Gener	55365	GT-2		0.005
RN102041282	Exelon Laporte Gener	55365	GT-3		0.003
RN102041282	Exelon Laporte Gener	55365	GT-4		0.003
RN100222033	Deer Park Energy Center	55464	CTG1		0.178
RN100222033	Deer Park Energy Center	55464	CTG2		0.153

TCEQ Regulated Entity Number	CAMD Facility Name	CAMD ORISPL ID	CAMD UNIT ID	CAIR Allocation from General Pool, tpd	CAIR Allocation from New Pool, tpd
RN100222033	Deer Park Energy Center	55464	CTG3		0.159
RN100222033	Deer Park Energy Center	55464	CTG4		0.145
RN103934493	South Houston Green	55470	EPN801		0.238
RN103934493	South Houston Green	55470	EPN802		0.252
RN103934493	South Houston Green	55470	EPN803		0.249
RN100213420	FPLE Forney, LP	55480	U1		0.389
RN100213420	FPLE Forney, LP	55480	U2		0.334
RN100213420	FPLE Forney, LP	55480	U3		0.345
RN100213420	FPLE Forney, LP	55480	U4		0.452
RN100213420	FPLE Forney, LP	55480	U5		0.499
RN100213420	FPLE Forney, LP	55480	U6		0.458
RN101061927	Harrison County Power	55664	GT-1		0.041
RN101061927	Harrison County Power	55664	GT-2		0.077
RN104333521	Mustang Station Unit	56326	GEN1		0.025
RN104333521	Mustang Station Unit	56326	GEN2		0.005
RN104763099	Quail Run Energy Center	56349	CT1A		0.063
RN104763099	Quail Run Energy Center	56349	CT1B		0.055
RN104763099	Quail Run Energy Center	56349	CT2A		0.063
RN104763099	Quail Run Energy Center	56349	CT2B		0.052
RN104772538	Colorado Bend Energy	56350	CT1A		0.066
RN104772538	Colorado Bend Energy	56350	CT1B		0.052
RN104772538	Colorado Bend Energy	56350	CT2A		0.093
RN104772538	Colorado Bend Energy	56350	CT2B		0.096
RN105295927	San Jacinto County P	56603	SJCCT1		0.005
RN105295927	San Jacinto County P	56603	SJCCT2		0.008
RN105295802	Hardin County Peaking	56604	HCCT1		0.011
RN105295802	Hardin County Peaking	56604	HCCT2		0.003
RN105377352	Winchester Power Partners	56674	1		0.003
RN105377352	Winchester Power Partners	56674	2		0.005
RN105377352	Winchester Power Partners	56674	3		0.003
RN105377352	Winchester Power Partners	56674	4		0.005
New Pool CAIR Allocation	available for new facilities				1.126

ATTACHMENT2: ON-ROAD MOBILE SOURCE MODELING EMISSIONS DEVELOPMENT WITH MOBILE6.2

ON-ROAD MOBILE SOURCE EMISSIONS INVENTORIES FOR NINE-COUNTY DFW AREA

The purpose of this section is to provide a brief overview of the nine-county DFW area on-road mobile source emissions inventory files that were input into the photochemical model for the 2006 base case, the 2006 baseline case, and the 2012 future case used in the proposed DFW SIP revision. These inventory data sets were developed under contract by the North Central Texas Council of Governments (NCTCOG) based on travel demand model output for the DFW area. For each of the nine DFW counties, NCTCOG combined MOBILE6.2 emissions rate output with vehicle miles traveled (VMT) estimates from the local travel demand model. The net result is referred to as a link-based inventory because both hourly VMT and emissions estimates are developed for each roadway segment or link in the network. For each year, summer season on-road emission inventories were developed for the five day types of weekday (i.e., Tuesday-Thursday average), Friday, Saturday, Sunday, and Monday. Since these days types are based on a summer season, development of separate baseline OSD emissions were not needed. For the on-road category, base case and baseline emissions are the same.

Table 64, Att. 2: *VMT, NO_X, VOC, and CO Summary for 2006 DFW On-Road Inventory* and Table 65, Att. 2: *VMT, NO_X, VOC, and CO Summary for 2012 DFW On-Road Inventory* provide summaries of the total VMT, NO_X, VOC, and CO emissions for the entire nine-county DFW area for each day type for the 2006 case and 2012 future case, respectively. As shown, Fridays have the highest total VMT of the week, while Saturdays and Sundays have the lowest total daily VMT. While overall VMT increases with future growth, total emissions decrease from 2006 to 2012 as a result of more stringent emissions standards for newer vehicles entering the fleet, combined with the simultaneous attrition of older, higher-emitting vehicles. Consistent with current federal and state rules, the on-road inventories from NCTCOG include the benefits of:

- reformulated gasoline (RFG) in Collin, Dallas, Denton, and Tarrant Counties;
- low Reid vapor pressure (RVP) gasoline in Ellis, Johnson, Kaufman, Parker, and Rockwall Counties;
- the inspection and maintenance (I/M) Program in all nine counties; and
- Texas low emission diesel (TxLED) fuel for all nine counties.

Table 64, Att. 2: VMT, NO_X, VOC, and CO Summary for 2006 DFW On-Road Inventory

Day Type	Vehicle Miles Traveled	NO_X (tpd)	VOC (tpd)	CO (tpd)
Weekday	154,154,062	226.90	105.04	1,234.98
Friday	169,104,545	235.09	115.61	1,358.91
Saturday	136,580,382	162.03	96.19	1,150.26
Sunday	111,703,992	138.00	80.16	958.93
Monday	148,647,961	221.01	100.78	1,198.70

Table 65, Att. 2: VMT, NO_X, VOC, and CO Summary for 2012 DFW On-Road Inventory

Day Type	Vehicle Miles Traveled	NO_X (tpd)	VOC (tpd)	CO (tpd)
Weekday	188,134,364	123.13	79.85	986.17
Friday	209,263,216	130.94	89.48	1,098.21
Saturday	171,997,564	97.58	75.83	946.73
Sunday	141,782,290	82.97	63.50	793.48
Monday	188,108,918	123.26	79.62	987.82

Even though all of the day type on-road inventory data sets were used for photochemical model input, only the summer weekday emissions will be detailed here. For the 2006 base case and 2012 future case, Table 66, Att. 2: *Summary of 2006 DFW Summer Weekday On-Road Inventory by County* and *Table 67, Att. 2: Summary of 2012 DFW Summer Weekday On-Road Inventory by County* present respective summaries of the VMT, NO_X, VOC, and CO emissions for each of the nine counties in the DFW area.

Table 66, Att. 2: Summary of 2006 DFW Summer Weekday On-Road Inventory by County

DFW Area County	Vehicle Miles Traveled	NO_X (tpd)	VOC (tpd)	CO (tpd)
Collin	16,068,710	19.36	9.50	116.53
Dallas	64,281,838	84.40	46.21	527.59
Denton	13,408,318	18.95	8.03	98.25
Ellis	5,298,407	14.93	3.58	44.37
Johnson	4,345,589	9.05	3.45	39.43
Kaufman	4,533,347	12.08	3.17	39.66
Parker	3,796,119	10.26	2.70	33.13
Rockwall	1,926,972	5.11	1.22	15.03
Tarrant	40,494,762	52.77	27.17	320.99
Total	154,154,062	226.90	105.04	1,234.98

Table 67, Att. 2: Summary of 2012 DFW Summer Weekday On-Road Inventory by County

DFW Area County	Vehicle Miles Traveled	NO_X (tpd)	VOC (tpd)	CO (tpd)
Collin	20,189,452	10.64	7.32	97.63
Dallas	75,484,002	47.43	33.95	410.42
Denton	18,516,332	10.38	6.82	89.32
Ellis	7,237,704	7.61	3.11	38.44
Johnson	5,343,688	4.72	2.66	30.55
Kaufman	5,632,724	5.77	2.52	31.41
Parker	4,663,328	4.92	2.04	25.21

DFW Area County	Vehicle Miles Traveled	NO_X (tpd)	VOC (tpd)	CO (tpd)
Rockwall	2,321,347	2.22	0.92	11.45
Tarrant	48,745,787	29.44	20.52	251.75
Total	188,134,364	123.13	79.85	986.17

Table 68, Att. 2: Summary of 2006 DFW Summer Weekday On-Road Inventory by Vehicle Type and Table 69, Att. 2: *Summary of 2012 DFW Summer Weekday On-Road Inventory by Vehicle Type* present respective summaries for 2006 and 2012 of the VMT, NO_X, VOC, and CO emissions for each of the 28 vehicle classes in MOBILE6.2.

Table 68, Att. 2: Summary of 2006 DFW Summer Weekday On-Road Inventory by Vehicle Type

MOBILE6.2 Vehicle Category	Vehicle Miles Traveled	NO_X (tpd)	VOC (tpd)	CO (tpd)
LDGV	103,439,304	65.74	69.06	805.46
LDGT1	6,767,949	4.92	5.63	66.77
LDGT2	22,530,425	23.35	19.57	243.84
LDGT3	6,579,826	5.83	3.30	54.37
LDGT4	3,025,868	3.83	1.66	25.82
HDGV2b	1,005,286	3.36	0.46	6.08
HDGV3	288,283	1.33	0.26	2.81
HDGV4	145,049	0.72	0.16	1.29
HDGV5	79,791	0.57	0.25	2.12
HDGV6	136,526	0.73	0.20	1.90
HDGV7	34,277	0.23	0.06	0.52
HDGV8a	34,410	0.27	0.08	0.83
HDGV8b	4,688	0.04	0.01	0.09
LDDV	119,035	0.13	0.06	0.17
LDDT12	67,925	0.18	0.19	0.33
HDDV2b	1,256,044	3.92	0.18	1.02
HDDV3	337,857	1.28	0.06	0.32
HDDV4	239,324	1.14	0.06	0.27
HDDV5	161,645	0.83	0.04	0.20
HDDV6	519,480	3.62	0.18	0.66
HDDV7	188,968	1.72	0.09	0.31
HDDV8a	325,046	4.87	0.16	0.86
HDDV8b	5,634,984	92.36	2.31	12.95
MC	110,268	0.14	0.31	1.50
HDGB	44,298	0.41	0.21	3.01
HDDBT	146,971	2.39	0.06	0.53
HDDBS	208,046	2.33	0.14	0.48
LDDT34	722,489	0.66	0.28	0.48

MOBILE6.2 Vehicle Category	Vehicle Miles Traveled	NO_X (tpd)	VOC (tpd)	CO (tpd)
Total	154,154,062	226.90	105.04	1,234.98

Table 69, Att. 2: Summary of 2012 DFW Summer Weekday On-Road Inventory by Vehicle Type

MOBILE6.2 Vehicle Category	Vehicle Miles Traveled	NO_X (tpd)	VOC (tpd)	CO (tpd)
LDGV	128,270,065	43.13	50.51	649.51
LDGT1	7,296,632	3.57	4.49	50.39
LDGT2	24,292,930	17.24	15.86	189.97
LDGT3	9,387,705	4.35	3.02	50.39
LDGT4	4,316,079	2.93	1.53	24.16
HDGV2b	1,187,278	1.07	0.24	5.40
HDGV3	295,583	0.46	0.10	1.66
HDGV4	164,343	0.28	0.07	0.90
HDGV5	60,140	0.27	0.12	0.45
HDGV6	113,261	0.42	0.13	0.79
HDGV7	24,833	0.12	0.03	0.19
HDGV8a	25,882	0.16	0.05	0.23
HDGV8b	2,506	0.01	0.00	0.03
LDDV	112,780	0.03	0.01	0.08
LDDT12	225	0.00	0.00	0.00
HDDV2b	1,779,557	2.73	0.19	0.55
HDDV3	475,441	0.87	0.06	0.19
HDDV4	336,252	0.82	0.06	0.19
HDDV5	223,885	0.56	0.04	0.11
HDDV6	718,053	2.02	0.16	0.36
HDDV7	215,397	0.94	0.07	0.17
HDDV8a	365,728	2.42	0.12	0.46
HDDV8b	7,071,910	33.56	2.18	6.64
MC	132,265	0.13	0.37	1.89
HDGB	31,197	0.24	0.06	0.35
HDDBT	208,413	2.07	0.05	0.38
HDDBS	319,109	2.48	0.17	0.46
LDDT34	706,916	0.24	0.15	0.29
Total	188,134,364	123.13	79.85	986.17

The MOBILE6.2 input files used to develop these inventories, along with detailed reports and tab-delimited summary output data, can be found on the following FTP sites for 2006 and 2012, respectively:

- ftp://amdaftp.tceq.texas.gov/pub/Mobile_EI/DFW/m62/2006/
- ftp://amdaftp.tceq.texas.gov/pub/Mobile_EI/DFW/m62/2012/

On-Road Mobile Source Emission Adjustments and Controls

The on-road emissions inventory data provided by NCTCOG were prepared for input into the photochemical model using EPS3. When input into EPS3, the inventory data are in a readable text-based format. However, once within EPS3, the emissions data are maintained in a binary format. Table 70, Att. 2: *EPS3 Modules Used to Process Nine-County DFW On-Road Emissions Data* summarizes the EPS3 modules that were used to process the nine-county DFW on-road inventories.

Table 70, Att. 2: EPS3 Modules Used to Process Nine-County DFW On-Road Emissions Data

EPS3 Module	Description
LBASE	Spatially allocate link-based emissions among grid cells.
PREAM	Prepare non-link "roadway type" emissions for further processing.
PREPNT	Prepare stationary extended idling emissions for further processing.
CNTLEM	Apply controls to model strategies, apply adjustments, etc.
TMPRL	Apply temporal profiles to extended idling emissions.
CHMSPL	Chemically speciate emissions into NO, NO_2, olefins, parrafins, etc.
GRDEM	Sum emissions by grid cell for photochemical model input.
MRGUAM	Merge and adjust multiple gridded files for photochemical model input.

The EPS3 CNTLEM module was used to:

- remove 3.4% of the HDDV8a and HDDV8b (eighteen-wheeler) emissions for separate processing as extended idling emissions in accordance with the January 2004 *EPA Guidance for Quantifying and Using Long Duration Truck Idling Emission Reductions in State Implementation Plans and Transportation Conformity*; and
- apply a temperature/humidity NO_X correction to both diesel and heavy-duty gasoline vehicles.

EPA issued a document in January 2004 entitled *Guidance for Quantifying and Using Long Duration Truck Idling Emission Reductions in State Implementation Plans and Transportation Conformity*. This EPA guidance states that extended idling emissions account for 3.4% of the total emissions calculated with MOBILE6.2 for the HDDV8a and HDDV8b vehicle classes. As shown above, the CNTLEM module was used to remove 3.4% of the hourly NO_X, VOC, and CO emissions from the running emissions prepared for photochemical model input from the HDDV8a and HDDV8b classes. Using a combination of SAS and LINUX code, these extended idling emissions were aggregated into a nine-county 24-hour total and spatially assigned to known truck stop locations. The extended idling emissions were then processed through EPS3 as if they were stationary low-level point sources. The emissions were temporally allocated as the inverse of HDDV8a/HDDV8b hourly VMT. Consequently, more of the extended idling emissions were allocated during overnight hours rather than daytime hours. The extended idling emissions were also run through the CNTLEM module to receive a temperature/humidity NO_X correction. The summer weekday extended idling emissions by county are presented below in Table 71, Att. 2: *2006 HDDV8a and HDDV8b Extended Idling Emissions for Nine-County*

DFW and Table 72, Att. 2: *2012 HDDV8a and HDDV8b Extended Idling Emissions for Nine-County DFW*. Greater detail on heavy-duty vehicle idling activity specific to Texas metropolitan areas can be found in reports located on the following web site: http://www.tceq.texas.gov/airquality/airmod/project/pj_report_mob.html.

Table 71, Att. 2: 2006 HDDV8a and HDDV8b Extended Idling Emissions for Nine-County DFW

DFW Area County	NO_X (tpd)	VOC (tpd)	CO (tpd)
Collin	0.261	0.007	0.039
Dallas	0.884	0.023	0.129
Denton	0.259	0.007	0.038
Ellis	0.243	0.006	0.036
Johnson	0.021	0.001	0.003
Kaufman	0.500	0.013	0.074
Parker	0.492	0.013	0.071
Rockwall	0.191	0.005	0.028
Tarrant	0.352	0.009	0.052
Total	3.204	0.084	0.470

Table 72, Att. 2: 2012 HDDV8a and HDDV8b Extended Idling Emissions for Nine-County DFW

DFW Area County	NO_X (tpd)	VOC (tpd)	CO (tpd)
Collin	0.097	0.006	0.020
Dallas	0.327	0.022	0.066
Denton	0.096	0.006	0.020
Ellis	0.090	0.006	0.018
Johnson	0.008	0.001	0.002
Kaufman	0.185	0.012	0.038
Parker	0.182	0.012	0.037
Rockwall	0.071	0.005	0.015
Tarrant	0.130	0.009	0.027
Total	1.185	0.078	0.242

Temperature/Humidity NO_X Correction

The MOBILE6.2 model accounts for the effects that changes in hourly temperature and humidity have on NO_X emissions for only six of the 28 total vehicle types. These vehicle types are the MOBILE6.2 light-duty gasoline vehicle (LDGV), light-duty gasoline trucks 1-4 (LDGT1-4), and motorcycle (MC) classes. There is no temperature/humidity NO_X correction in MOBILE6.2 for the remaining 22 vehicle classes, which include all 13 of the diesel-powered vehicle classes and the nine heavy-duty gasoline vehicle classes. Under contract to the Houston Advanced Research Center (HARC), Environ worked with the Southwest Research Institute

(SwRI) to develop temperature/humidity NO_X correction equations to apply to both the 13 diesel and nine heavy-duty gasoline vehicle classes in MOBILE6.2. These equations reflect the fact that as ambient temperature increases, tailpipe NO_X emissions increase. However, as ambient humidity increases, tailpipe NO_X emissions decrease. Greater detail on the development of these correction equations can be found in Appendices F.4 and F.5 of the December 2004 Houston-Galveston-Brazoria (HGB) SIP revision, which can be found at http://www.tceq.texas.gov/implementation/air/sip/dec2004hgb_mcr.html.

The EPS3 CNTLEM module referenced above in Table 70 allows the user to apply a different NO_X, VOC, and/or CO correction for each hour, episode day, county, and vehicle type combination. TCEQ modeling staff developed SAS code to calculate the appropriate NO_X adjustment factors for each county and vehicle type using hourly inputs for temperature, relative humidity, and barometric pressure. The hourly temperature, relative humidity, and barometric pressure inputs used by the SAS software were also used by NCTCOG in its development of the 2006 and 2012 on-road inventories. These meteorological data were obtained from National Weather Service (NWS) and TCEQ monitors in the DFW area for the time period of May 15-September 15, 2006. The spreadsheets that were developed to obtain the final hourly inputs are available at ftp://amdaftp.tceq.texas.gov/pub/Mobile_EI/DFW/m62/2006/.

Table 73, Att. 2: *Summary of 2006 Temperature/Humidity On-Road NO_X Correction* and Table 11, Att. *2:* Table 74, Att. 2: *Summary of 2012 Temperature/Humidity On-Road NO_X Correction* present the temperature and humidity corrections applied to each day type for the 2006 base case and 2012 future case, respectively. For each episode day, there are greater NO_X reductions during the overnight and early morning hours when the temperature is at its minimum and the relative humidity is at its maximum. However, during the hottest hours of the afternoon when the relative humidity is at its lowest, the temperature/humidity correction either decreases NO_X very slightly or increases it somewhat, depending upon the specific conditions for that hour. Overall, the temperature/humidity correction procedure allows not only for improved estimates of the total on-road NO_X emissions, but also for improved spatial and temporal allocation of those emissions.

Table 73, Att. 2: Summary of 2006 Temperature/Humidity On-Road NO_X Correction

Day Type	**Temperature/Humidity NO_X Reduction** (tpd)
Weekday	1.59
Friday	1.47
Saturday	0.74
Sunday	0.49
Monday	1.53

Table 74, Att. 2: Summary of 2012 Temperature/Humidity On-Road NO_X Correction

Day Type	**Temperature/Humidity NO_X Reduction** (tpd)
Weekday	0.66
Friday	0.61
Saturday	0.32

Day Type	Temperature/Humidity NO_X Reduction (tpd)
Sunday	0.21
Monday	0.65

Reformulated Gasoline Benefits

The 2006 and 2012 on-road inventories for the nine-county DFW area include the benefits of RFG, low RVP gasoline, and I/M. The summer weekday RFG benefits for 2006 and 2012 are provided in Table 75, Att.2: *Summary of 2006 Summer Weekday RFG Benefits by County* and Table 76, Att. 2: *Summary of 2012 Summer Weekday RFG Benefits by County*, respectively.

Table 75, Att.2: Summary of 2006 Summer Weekday RFG Benefits by County

DFW Area County	NO_X (tpd)	VOC (tpd)	CO (tpd)
Collin	0.23	2.07	12.26
Dallas	1.05	10.38	59.00
Denton	0.19	1.79	10.62
Tarrant	0.60	5.94	35.83
Total	2.08	20.18	117.70

Table 76, Att. 2: Summary of 2012 Summer Weekday RFG Benefits by County

DFW Area County	NO_X (tpd)	VOC (tpd)	CO (tpd)
Collin	0.11	1.61	9.72
Dallas	0.58	7.46	41.76
Denton	0.10	1.52	9.06
Tarrant	0.32	4.43	25.27
Total	1.12	15.02	85.82

Low Reid Vapor Pressure Gasoline Benefits

The summer weekday low RVP gasoline benefits for 2006 and 2012 are provided in Table 77, Att. 2: *Summary of 2006 Summer Weekday Low RVP Gasoline Benefits by County* and Table 78, Att. 2: *Summary of 2012 Summer Weekday Low RVP Gasoline Benefits by County*, respectively.

Table 77, Att. 2: Summary of 2006 Summer Weekday Low RVP Gasoline Benefits by County

DFW Area County	NO_X (tpd)	VOC (tpd)	CO (tpd)
Ellis	0.04	0.28	0.97
Johnson	0.03	0.29	0.89
Kaufman	0.03	0.25	0.92
Parker	0.03	0.21	0.70
Rockwall	0.01	0.10	0.33
Total	0.14	1.13	3.80

Table 78, Att. 2: Summary of 2012 Summer Weekday Low RVP Gasoline Benefits by County

DFW Area County	NO_X (tpd)	VOC (tpd)	CO (tpd)
Ellis	0.04	0.23	0.83
Johnson	0.03	0.21	0.66
Kaufman	0.03	0.19	0.72
Parker	0.02	0.15	0.52
Rockwall	0.01	0.07	0.25
Total	0.13	0.86	2.98

Inspection/Maintenance Program Benefits

The summer weekday I/M program benefits for 2006 and 2012 are provided in Table 79, Att. 2: *Summary of 2006 Summer Weekday I/M Program Benefits by County* and Table 80, Att. 2: *Summary of 2012 Summer Weekday I/M Program Benefits by County*, respectively.

Table 79, Att. 2: Summary of 2006 Summer Weekday I/M Program Benefits by County

DFW Area County	NO_X (tpd)	VOC (tpd)	CO (tpd)
Collin	1.72	1.44	25.13
Dallas	7.97	6.77	115.71
Denton	1.43	1.20	21.01
Ellis	0.57	0.53	10.03
Johnson	0.54	0.53	9.36
Kaufman	0.50	0.47	8.94
Parker	0.43	0.41	7.65
Rockwall	0.20	0.19	3.43
Tarrant	4.73	4.00	69.62
Total	18.09	15.52	270.87

Table 80, Att. 2: Summary of 2012 Summer Weekday I/M Program Benefits by County

DFW Area County	NO_X (tpd)	VOC (tpd)	CO (tpd)
Collin	2.37	1.71	31.92
Dallas	10.12	7.50	133.72
Denton	2.17	1.57	28.93
Ellis	0.83	0.68	13.19
Johnson	0.70	0.59	10.88
Kaufman	0.67	0.55	10.85
Parker	0.55	0.44	8.75
Rockwall	0.26	0.21	4.07
Tarrant	6.05	4.45	80.61
Total	23.72	17.70	322.91

Texas Low Emission Diesel Fuel Benefits

Based on an EPA memorandum entitled *Texas Low Emission Diesel (LED) Fuel Benefits*, September 27, 2001, a 4.8% NO_X TxLED benefit should be claimed for 2002-and-newer diesel vehicles and a 6.2% NO_X TxLED benefit should be claimed for 2001-and-older diesel vehicles. In order to determine the specific TxLED adjustment factors that should apply to each of the 13 diesel vehicle types, MOBILE6.2 runs were performed for the DFW area to determine NO_X emissions rates by model year. By using these data, the 4.8% and 6.2% reduction factors were weighted according to NO_X emission model year contributions for each vehicle type. The resulting TxLED adjustment factors and benefits for both 2006 and 2012 are summarized in Table 81, Att. 2: *Summary of 2006 Summer Weekday TxLED Benefits by Vehicle Type* and Table 82, Att. 2: *Summary of 2012 Summer Weekday TxLED Benefits by Vehicle Type*, respectively. The TxLED adjustment factors were incorporated by NCTCOG into the on-road inventories by post-processing the MOBILE6.2 diesel NO_X emission rates.

Table 81, Att. 2: Summary of 2006 Summer Weekday TxLED Benefits by Vehicle Type

Diesel Vehicle Type	NO_X Reduction	Adjustment Factor	NO_X Benefit (tpd)
LDDV	6.14%	0.9386	0.008
LDDT12	6.20%	0.9380	0.012
HDDV2b	5.11%	0.9489	0.209
HDDV3	5.42%	0.9458	0.072
HDDV4	5.66%	0.9434	0.068
HDDV5	5.59%	0.9441	0.049
HDDV6	5.66%	0.9434	0.215
HDDV7	5.73%	0.9427	0.103
HDDV8a	5.92%	0.9408	0.302
HDDV8b	5.84%	0.9416	5.661
HDDBT	5.87%	0.9413	0.147

Diesel Vehicle Type	NO_X Reduction	Adjustment Factor	NO_X Benefit (tpd)
HDDBS	5.87%	0.9413	0.143
LDDT34	5.56%	0.9444	0.039
Total			7.028

Table 82, Att. 2: Summary of 2012 Summer Weekday TxLED Benefits by Vehicle Type

Diesel Vehicle Type	NO_X Reduction	Adjustment Factor	NO_X Benefit (tpd)
LDDV	5.81%	0.9419	0.002
LDDT12	6.20%	0.9380	0.000
HDDV2b	4.97%	0.9503	0.141
HDDV3	5.04%	0.9496	0.046
HDDV4	5.30%	0.9470	0.046
HDDV5	5.30%	0.9470	0.031
HDDV6	5.26%	0.9474	0.111
HDDV7	5.35%	0.9465	0.053
HDDV8a	5.60%	0.9440	0.142
HDDV8b	5.13%	0.9487	1.793
HDDBT	5.54%	0.9446	0.120
HDDBS	5.75%	0.9425	0.149
LDDT34	5.20%	0.9480	0.013
Total			2.647

On-Road Control Strategy Benefits Summary

The on-road control strategy benefits referenced above are summarized below in Table 83, Att. 2: *Summary of 2006 Summer Weekday On-Road Control Strategy Benefits* and Table 84, Att. 2: *Summary of 2012 Summer Weekday On-Road Control Strategy Benefits*. When determining the amount of benefit assigned to specific on-road control strategies, the sequence in which they are modeled with MOBILE6.2 is important. For example, the RFG benefit for each county was determined by calculating the difference between a MOBILE6.2 run with conventional gasoline and a run with RFG. For both runs, the I/M program was not modeled and all other inputs were held constant. Then, the I/M program benefits were determined by calculating the difference between a MOBILE6.2 run with RFG and a run with both RFG and I/M. If the benefits were calculated in a different order, the benefit assigned to each individual strategy would vary, but the magnitude of the combined benefits would not change. Since RFG and I/M affect gasoline-powered vehicles only, it does not matter where in the sequence TxLED is modeled because it only affects diesel-powered vehicles.

Table 83, Att. 2: Summary of 2006 Summer Weekday On-Road Control Strategy Benefits

Control Strategy	NO_X (tpd)	VOC (tpd)	CO (tpd)
RFG	2.08	20.18	117.70
Low RVP	0.14	1.13	3.80
I/M	18.09	15.52	270.87
TxLED	7.03		
Total	27.34	36.83	392.38

Table 84, Att. 2: Summary of 2012 Summer Weekday On-Road Control Strategy Benefits

Control Strategy	NO_X (tpd)	VOC (tpd)	CO (tpd)
RFG	1.12	15.02	85.82
Low RVP	0.13	0.86	2.98
I/M	23.72	17.70	322.91
TxLED	2.65		
Total	27.61	33.59	411.70

Nine-County DFW Photochemical Modeling Input

The summer weekday on-road emissions by county that were input into the photochemical model are summarized below in Table 85, Att. 2: *2006 Summer Weekday On-Road Mobile Source Inventory by County* and Table 86, Att. 2: *2012 Summer Weekday On-Road Mobile Source Inventory by County*. The on-road inventory summaries in Table 85 and Table 86 are a combination of both running and extended idling emissions. In addition, the temperature/humidity NO_X correction has been applied as summarized above.

Table 85, Att. 2: 2006 Summer Weekday On-Road Mobile Source Inventory by County

DFW Area County	NO_X (tpd)	VOC (tpd)	CO (tpd)
Collin	19.19	9.50	116.53
Dallas	83.96	46.21	527.59
Denton	18.81	8.03	98.25
Ellis	14.69	3.58	44.37
Johnson	8.83	3.45	39.43
Kaufman	12.09	3.17	39.66
Parker	10.50	2.70	33.13
Rockwall	5.12	1.22	15.03
Tarrant	52.14	27.17	320.99
Total	225.31	105.04	1,234.98

Table 86, Att. 2: 2012 Summer Weekday On-Road Mobile Source Inventory by County

DFW Area County	NO_X (tpd)	VOC (tpd)	CO (tpd)
Collin	10.58	7.32	97.63
Dallas	47.25	33.95	410.42
Denton	10.34	6.82	89.32
Ellis	7.50	3.11	38.44
Johnson	4.63	2.66	30.55
Kaufman	5.77	2.52	31.41
Parker	5.00	2.04	25.21
Rockwall	2.22	0.92	11.45
Tarrant	29.19	20.52	251.75
Total	122.47	79.85	986.17

The total nine-county DFW on-road emissions input to the photochemical model by day type are summarized below in Table 87, Att. 2: *2006 On-Road Mobile Source Inventory by Day Type* and Table 88, Att. 2: *2012 On-Road Mobile Source Inventory by Day Type*.

Table 87, Att. 2: 2006 On-Road Mobile Source Inventory by Day Type

Day Type	NO_X (tpd)	VOC (tpd)	CO (tpd)
Weekday	225.31	105.04	1,234.98
Friday	234.03	116.54	1,366.64
Saturday	161.41	96.27	1,150.89
Sunday	136.81	78.84	948.06
Monday	219.36	100.67	1,197.91

Table 88, Att. 2: 2012 On-Road Mobile Source Inventory by Day Type

Day Type	NO_X (tpd)	VOC (tpd)	CO (tpd)
Weekday	122.47	79.85	986.17
Friday	130.79	90.22	1,105.69
Saturday	97.28	75.77	946.95
Sunday	82.12	62.31	783.62
Monday	122.57	79.48	987.47

For the on-road mobile inventory portion of the DFW subdomain, the EPS3 message files along with the gridded files input into the photochemical model for 2006 and 2012 are available on the following FTP sites, respectively:

- ftp://amdaftp.tceq.texas.gov/pub/Mobile_EI/DFW/eps3/2006/

- ftp://amdaftp.tceq.texas.gov/pub/Mobile_EI/DFW/eps3/2012/

Similar on-road mobile EPS3 message and gridded files for the Texas-only portion of the larger 12 km modeling domain are available for 2006 and 2012, respectively, on the following FTP sites:

- ftp://amdaftp.tceq.texas.gov/pub/Mobile_EI/Statewide/eps3/2006/
- ftp://amdaftp.tceq.texas.gov/pub/Mobile_EI/Statewide/eps3/2012/

Similar on-road mobile EPS3 message and gridded files for both the Texas and non-Texas portions of the larger 12 km modeling domain are available for 2006 and 2012, respectively, on the following FTP sites:

- ftp://amdaftp.tceq.texas.gov/pub/Mobile_EI/US/eps3/2006/
- ftp://amdaftp.tceq.texas.gov/pub/Mobile_EI/US/eps3/2012/

Attainment Demonstration Motor Vehicle Emissions Budget

By definition, the future case on-road emissions inventory input into the final attainment demonstration photochemical modeling run should establish the motor vehicle emissions budget (MVEB). However, use of the EPS3 processor introduces unique adjustments to the on-road emissions inventory that are necessary for photochemical modeling efforts. An EPS3 processing step necessary for photochemical model input involves the use of Central Standard Time (CST) instead of Central Daylight Time (CDT). All photochemical modeling inventory files must be in CST to be consistent with the way meteorological data are reported and modeled. However, emissions inventory files are typically developed in CDT.

When governmental organizations need to demonstrate conformity to the MVEB, they will not be developing photochemical modeling inventories and therefore will not apply this time-shift step. Consequently, the 2012 MVEB for the nine-county DFW area will start with the summer weekday on-road inventory as received from NCTCOG in CDT format. Then, adjustments for the temperature/humidity NO_X correction are applied outside of EPS3, but in a manner consistent with the descriptions included above. This approach is summarized below in Table 89, Att. 2: *2012 Attainment Demonstration MVEB for the Nine-County DFW Area*.

Table 89, Att. 2: 2012 Attainment Demonstration MVEB for the Nine-County DFW Area

Nine-County DFW Area On-Road Emissions	NO_X (tpd)	VOC (tpd)
2012 On-Road Inventory From NCTCOG (Table 28) Includes RFG, Low RVP, I/M, and TxLED	123.13	79.85
2012 Temperature/Humidity NO_X Correction	0.66	
2012 Nine-County DFW Attainment Demonstration Motor Vehicle Emissions Budget	122.47	79.85

The following pages contain graphical plots of the 2006 and 2012 on-road summer weekday NO_X and VOC emissions for the greater DFW area. These plots are respectively entitled

- Figure 47, Att. 2: *2006 DFW Summer Weekday NO_X Emissions*,
- Figure 48, Att. 2: *2006 DFW Summer Weekday VOC Emissions*,

- Figure 49, Att. 2: *2012 DFW Summer Weekday NO_X Emissions*, and
- Figure 50, Att. 2: *2012 DFW Summer Weekday VOC Emissions*.

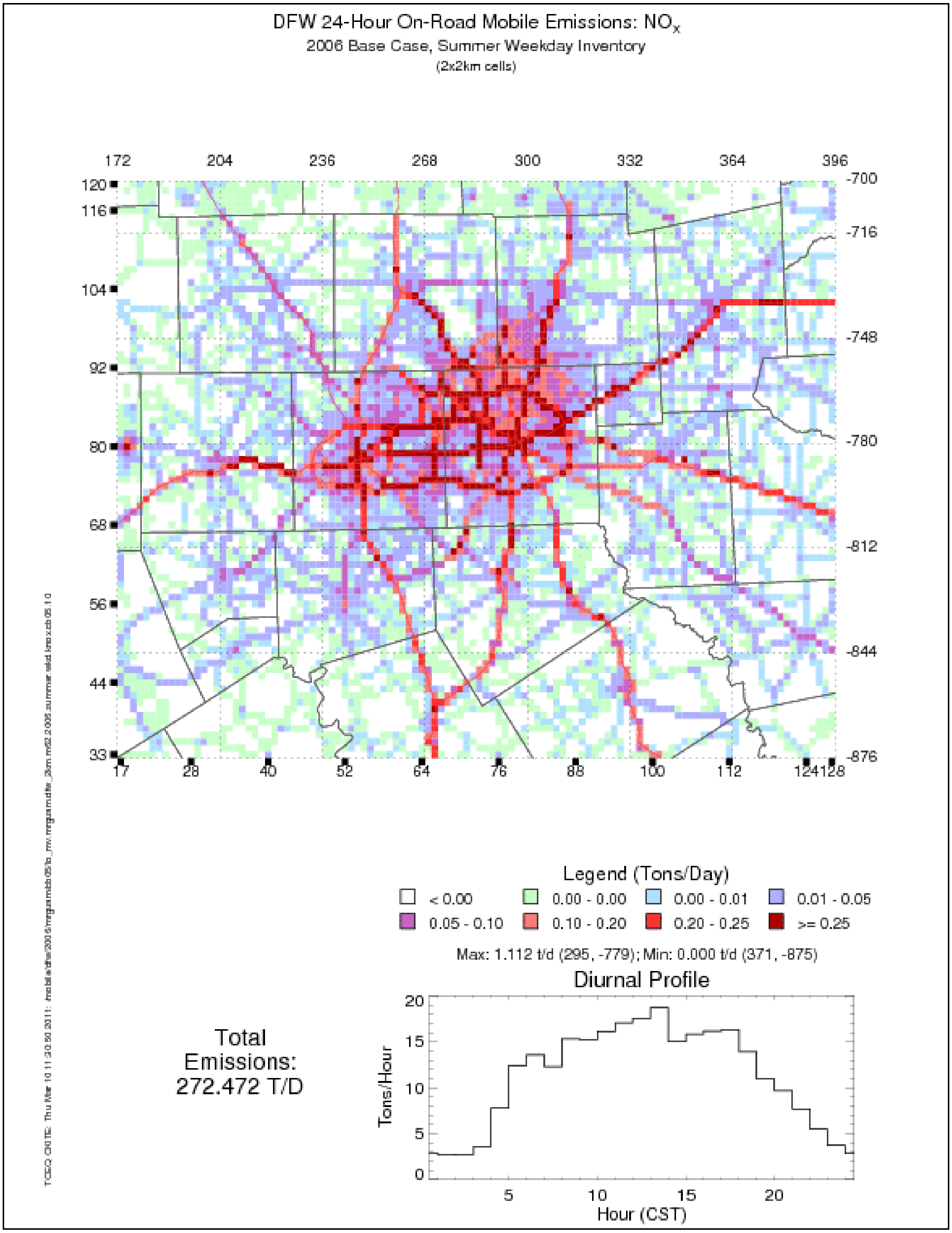

Figure 47, Att. 2: 2006 DFW Summer Weekday NO_X Emissions

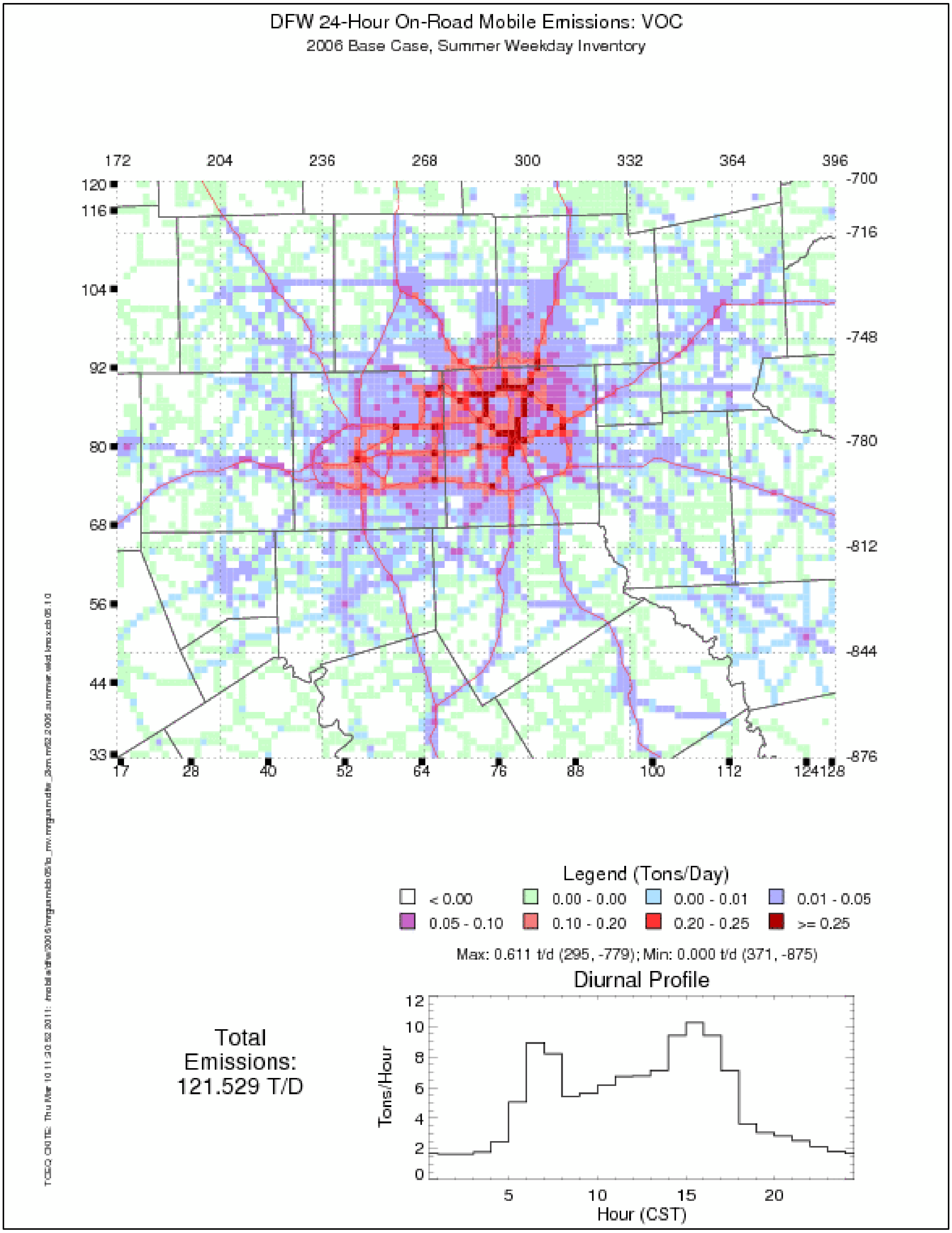

Figure 48, Att. 2: 2006 DFW Summer Weekday VOC Emissions

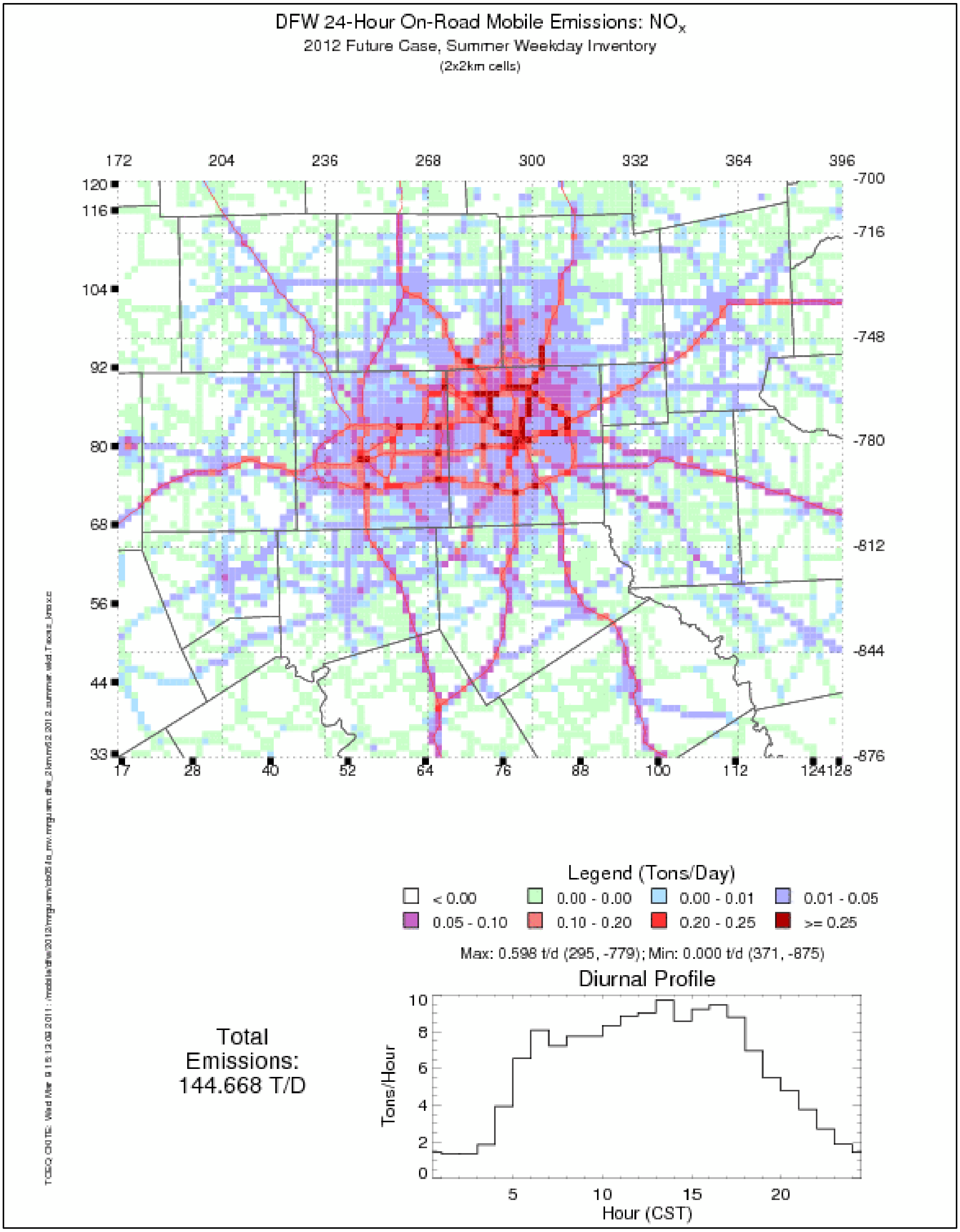

Figure 49, Att. 2: 2012 DFW Summer Weekday NO_X Emissions

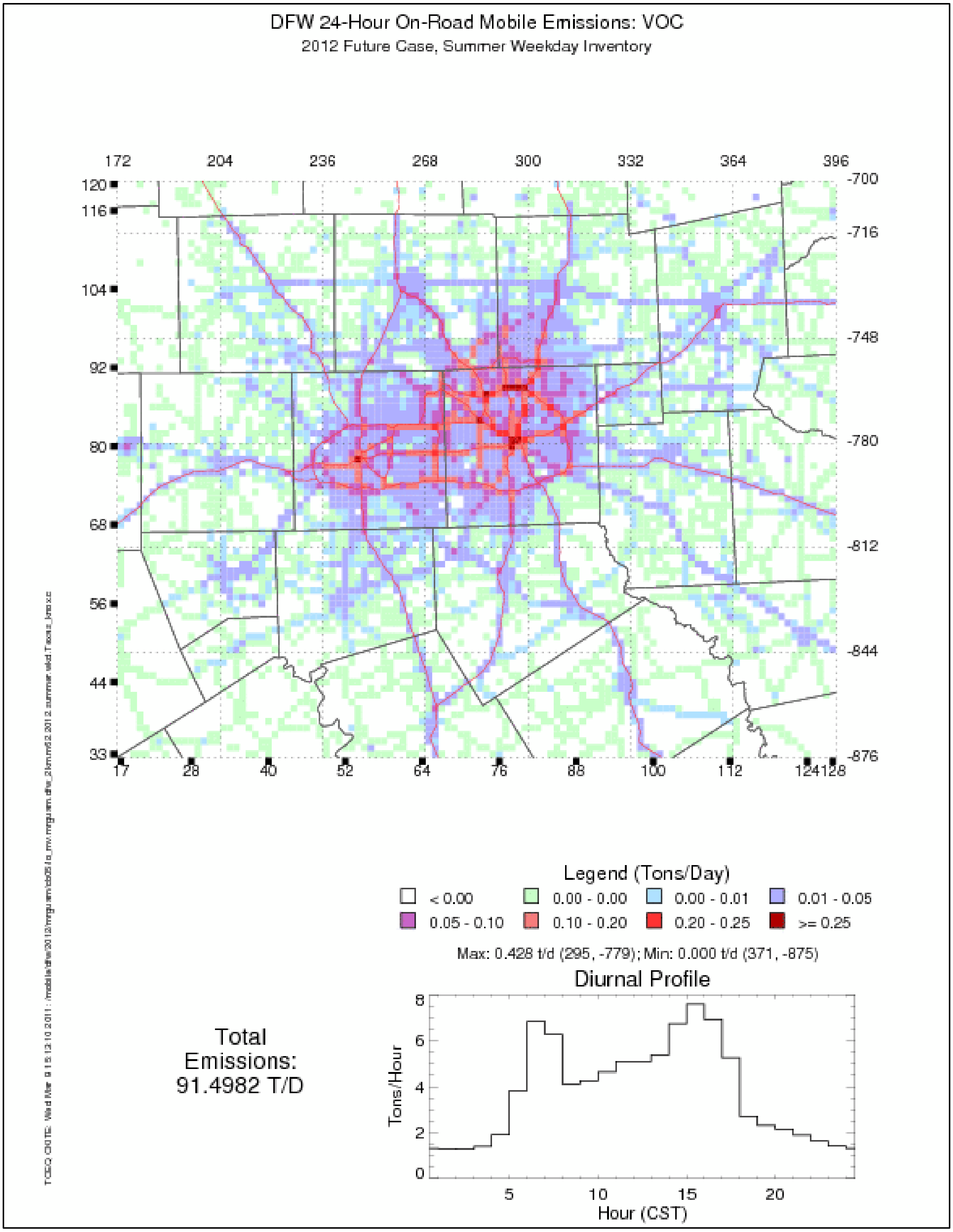

Figure 50, Att. 2: 2012 DFW Summer Weekday VOC Emissions

On-Road Mobile Source Emissions Inventories for Non-DFW Areas

On-road emission inventories for 2006 and 2012 were also developed for portions of the modeling domain outside of the nine-county DFW area. For the three counties of Hood, Hunt, and Wise, a similar link-based inventory development approach was taken by NCTCOG based on local travel demand model output. Similar to the nine-county DFW area, on-road emissions were developed for the five day types of weekday, Friday, Saturday, Sunday, and Monday. More detail on the development of these Hood, Hunt, and Wise inventories is available on the following FTP sites:

- ftp://amdaftp.tceq.texas.gov/pub/Mobile_EI/DFW/m62/2006/
- ftp://amdaftp.tceq.texas.gov/pub/Mobile_EI/DFW/m62/2012/

For the Texas counties outside of the DFW area, on-road emissions were developed by the Texas Transportation Institute (TTI) using Highway Performance Monitoring System (HPMS) data as the basis for VMT estimates. Summer season emission estimates were developed for the four day types of weekday, Friday, Saturday, and Sunday. Hourly emission rates from MOBILE6.2 were coupled with county-level VMT estimates by roadway type for 2006 and 2012. More detail on the development of these HPMS-based on-road inventories is available on the following FTP sites:

- ftp://amdaftp.tceq.texas.gov/pub/Mobile_EI/Statewide/eps3/2006/
- ftp://amdaftp.tceq.texas.gov/pub/Mobile_EI/Statewide/eps3/2012/

On-road emission estimates for non-Texas states within the photochemical modeling domain were developed for 2006 and 2012 using the EPA National Mobile Inventory Model (NMIM), which is available at http://www.epa.gov/otaq/nmim.htm and can be used to develop on-road county-level emission estimates for every year from 1999-2050. However, the NMIM activity database is only populated with county-level VMT figures for 1999 and 2002. Historical annual VMT figures by state from 1980-2006 were obtained from the Federal Highway Administration (FHWA) Highway Statistics Series webpage, which is available at http://www.fhwa.dot.gov/policy/ohpi/hss/index.cfm. Linear trends were established with these data to project 2012 VMT for each state and roadway type. NMIM was run for 2006 and 2012 for all non-Texas states after inclusion of these FHWA-based VMT figures into the NMIM activity tables, and the results are available at:

- ftp://amdaftp.tceq.texas.gov/pub/Mobile_EI/US/eps3/2006/
- ftp://amdaftp.tceq.texas.gov/pub/Mobile_EI/US/eps3/2012/

Since only average weekday emissions can easily be obtained with NMIM, Friday, Saturday, and Sunday day type emissions were estimated for the non-Texas area by applying adjustment factors with the EPS3 TMPRL module. These adjustment factors were based on the ratios of Friday/weekday, Saturday/weekday, and Sunday/weekday emissions from the statewide inventories developed by NCTCOG and TTI for Texas. More detail on this approach is documented in a report entitled *Use of the National Mobile Inventory Model for Photochemical Modeling Applications in Texas*, which was presented at the 17th International Emissions Inventory Conference and is available at ftp://amdaftp.tceq.texas.gov/pub/Mobile_EI/NMIM/. A summary of the different emission estimation approaches taken for this DFW SIP revision is provided in Table 90, Att. 2: *On-Road Inventory Development by Area within the Modeling Domain*.

Table 90, Att. 2: On-Road Inventory Development by Area within the Modeling Domain

On-Road Inventory Development Parameter	Texas Metropolitan Areas	Texas Rural Areas	Non-Texas States and Counties
VMT Source	Travel Demand Models (TDMs)	HPMS Data Sets	NMIM Database / FHWA Statistics
VMT Resolution	Roadway Links From TDM	19 Roadway Types	12 Roadway Types
Season Types	School and Summer (i.e., non-School)	Summer Only	Summer Only
Day Types	Weekday, Friday, Saturday, and Sunday	Weekday, Friday, Saturday, and Sunday	Weekday, Friday, Saturday, and Sunday
Hourly VMT?	Yes	Yes	No
VMT Mix Variation by Day/Time Period	Yes	Yes	No
Roadway Speed Distribution	Varies by Hour and Link	Varies by Hour and Roadway Type	MOBILE6.2 Default
Spatial Resolution	Excellent	Very Good	Good
Temporal Resolution	Excellent	Very Good	Good
Number of MOBILE6.2 Vehicle Types	28	28	12
Temperature/Humidity Diesel NO_X Correction	Yes	Yes	No
"Eighteen-Wheeler" Idling Emissions Separation	Yes	No	No

ATTACHMENT 3: ALTERNATIVE POINT SOURCE GROWTH MODELING SENSITIVITY

A 2012 modeling sensitivity was completed using the ERC registry of 0.9 tpd and the DERC flow control limit of 5.93 tpd instead of the TIPI-REMI-EGAS projection of 0.2 tpd for DFW nonattainment area point source growth, as described in Section 2.3.2.1.2. In general, ozone concentrations in 2012 using the ERC registry and DERC flow control limit growth were slightly higher in the DFW nonattainment area than the TIPI-REMI-EGAS growth, though some decreases from NO_X titration were observed near the source locations. Figure 51, Att. 3: *June 14 Eight-Hour Ozone Max Difference Tile Plot Comparing ERC and DERC Flow Control Limit to* TIPI-REMI-EGAS Growth below shows the difference of the maximum eight-hour ozone concentrations on June 14 with the ERC and DERC flow control limit versus the TIPI-REMI-EGAS growth. The blue colors represent ozone reductions while yellow through red represent ozone increases due to the ERC and DERC flow control NO_X limit. Similar results occurred for all days during the June 2006 episode.

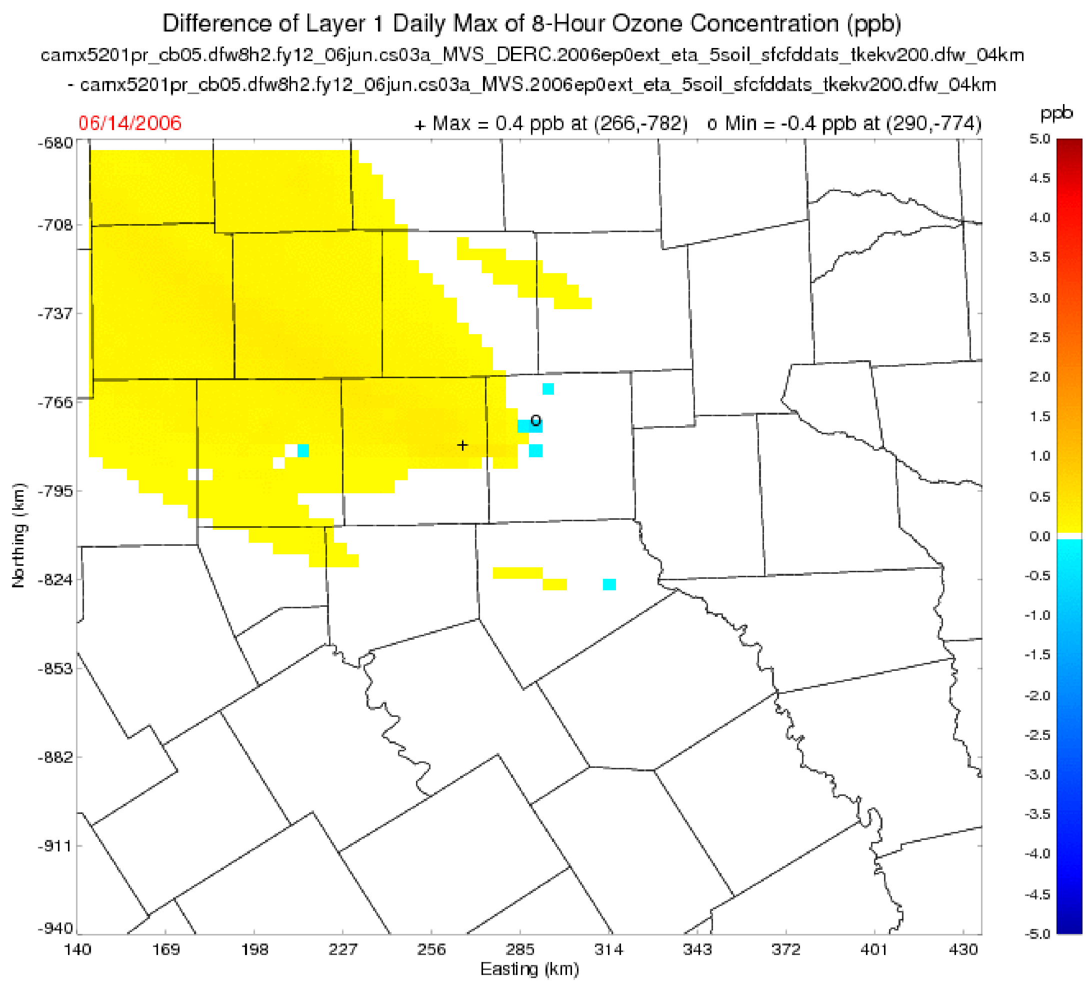

Figure 51, Att. 3: June 14 Eight-Hour Ozone Max Difference Tile Plot Comparing ERC and DERC Flow Control Limit to TIPI-REMI-EGAS Growth

By modeling the ERC registry and DERC flow control limit, which increased the NO_X emissions in the DFW nonattainment area from the final future baseline modeling, the 2012 future year ozone design values (DV_Fs) also increased. Table 91, Att. 3: *2012 Future Design Values Using the ERC registry and DERC Flow Control Limit* or TIPI-REMI-EGAS Growth shows that every DFW area monitor's DV_F was unchanged or increased slightly by modeling with the ERC registry and the DERC flow control limit for growth. However when the DV_Fs are truncated according to EPA's final design value calculation method, the 2012 DV_Fs are unchanged except for Dallas Hinton.

Table 91, Att. 3: 2012 Future Design Values Using the ERC registry and DERC Flow Control Limit or TIPI-REMI-EGAS Growth

Monitor	2012 DV_F w/ TIPI-REMI-EGAS (ppb)	2012 DV_F w/ DERC Flow Control Limit (ppb)	DV_F Difference (ppb)
Denton C56	77.03	77.30	0.27
Eagle Mountain Lake C75	78.06	78.28	0.22
Keller C17	76.45	76.60	0.15
Grapevine Fairway C70	76.17	76.44	0.27
Fort Worth Northwest C13	75.36	75.49	0.13
Frisco C31	74.45	74.58	0.13
Weatherford Parker County C76	72.71	72.92	0.21
Dallas North C63	71.15	71.31	0.16
Dallas Exec Airport C402	70.58	70.73	0.15
Cleburne C77	70.85	70.98	0.13
Arlington C61	70.32	70.45	0.13
Dallas Hinton C401	67.89	68.04	0.15
Pilot Point C1032	67.35	67.53	0.18
Midlothian Tower C94	66.63	66.73	0.10
Rockwall Heath C69	63.27	63.29	0.02
Midlothian OFW C52	62.24	62.32	0.08
Kaufman C71	60.42	60.42	0.00
Granbury C73	69.66	69.78	0.12
Greenville C1006	59.96	59.97	0.01

[#] Pilot Point C1032, Midlothian Tower C94, and Midlothian OFW C52 did not measure enough data from 2004 through 2008 to calculate a complete baseline design value. A DV_B was calculated using all available data for the DV_Fs shown.

* Granbury C73 and Greenville C1006 are outside the 1997 eight-hour ozone NAAQS DFW nonattainment area.

The results of the ERC registry and DERC flow control limit sensitivity complement the DFW SIP revision modeling with the TIPI-REMI-EGAS growth as both indicate the DFW area will attain the 1997 eight-hour ozone standard by June 2013.