APCA Runs for the 2006 and 2012 Photochemical Modeling Episodes

Technical Report

Prepared for
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PREPARED UNDER A GRANT FROM THE
TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

The preparation of this report was financed through grants from the State of Texas through the Texas Commission on Environmental Quality. The content, findings, opinions and conclusions are the work of the author(s) and do not necessarily represent the findings, opinions or conclusion of the TCEQ.

April 4, 2017

Title: APCA Runs for the 2006 and 2012 Photochemical Modeling Episodes	**Report Date:** April 4, 2017
Authors: AACOG Natural Resources/ Transportation Department	**Type of Report:** Technical Report
Performing Organization Name & Address: Alamo Area Council of Governments 8700 Tesoro Drive, Suite 700 San Antonio, Texas 78217	**Period Covered:** 2017 Projection

Sponsoring Agency:
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Abstract: AACOG completed four technical tasks: calculation of projected 2017 design values using June 2006 episode data, source apportionment modeling for 2017 using June 2006 episode data, source apportionment modeling for 2017 using June 2012 episode data, and calculation of projected 2017 design values using 2012 episode data. Each photochemical model run used Weather Research and Forecasting (WRF) model, Carbon Bond 6 (CB6) chemical mechanism, and Comprehensive Air Quality Model with Extensions (CAMx 6.20). Regional emission inventories were updated in the June 2006 base case and June 2012 photochemical model episode with the latest 2017 projected emission inventory available from TCEQ. The 2017 projection emission inventory was run in the June 2006 at the 4-km, 12-km, and 36-km grid sizes using APCA. Seven source receptors were used in the modeling for the ozone monitors in the CAPCOG region. The emission inventory was grouped into the following source groups: biogenics, anthropogenic, and fires.

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1 Introduction

The Capital Area Council of Governments (CAPCOG) contracted with (AACOG) to complete four technical tasks as follows:

1. Calculation of Projected 2017 Design Values and Relative Response Factors (RRFs) for several monitoring stations within its region using the Texas Commission on Environmental Quality's (TCEQ's) June 2006 Episode Data,
2. Source Apportionment Modeling for 2017 using June 2006 Episode Data,
3. Source Apportionment Modeling for 2017 using June 2012 Episode Data, and.
4. Calculation of Projected 2017 Design Values and RRFs using TCEQ's June 2012 Episode Data.

This project involved running two baseline photochemical modeling episodes based on June 2006 and June 2012 base case modeling platforms developed by TCEQ[1] and 2017 projections using both platforms. The monitoring stations that were analyzed included CAMS 3, 38, 614, 690, 1603, 1675, and 6602.

1.1 Project Background

TCEQ developed two photochemical modeling episodes based on June 2006 and June 2012. TCEQ has continually worked to develop the overall base case photochemical modeling episodes and has periodically updated these modeling files. Most recently, the June 2006 model was used by TCEQ for an attainment demonstration for the Dallas-Fort Worth (DFW) Nonattainment Area for the 2008 Ozone NAAQS and the June 2012 model was used by the TCEQ for an attainment demonstration for the Houston-Galveston-Brazoria (HGB) Nonattainment Area for the 2008 Ozone National Ambient Air Quality Standards (NAAQS). Both of these projects involved projecting emissions to 2017, which is the attainment year for Moderate nonattainment areas.

1.2 Photochemical Model Runs

For this project, AACOG used existing photochemical run files that had been produced by the TCEQ and also produced new source apportionment modeling data using the June 2006 and June 2012 platforms. Details of the configuration for each modeling run used in this project can be found in Appendix E. Each photochemical model run used Weather Research and Forecasting (WRF) model 3.6.1, Carbon Bond 6 (CB6) chemical mechanism, and Comprehensive Air Quality Model with Extensions version 6.20 (CAMx 6.20). Regional emission inventories were updated in the June 2006 and June 2012 photochemical model episode with the latest 2017 projected emission inventory available from TCEQ at the time the modeling runs started.[2] The updates for the episode used to perform the model runs in this project were downloaded from TCEQ's modeling ftp server on May 3, 2016 (Dates and list of input files are provided in Appendix e).

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[1] TCEQ. Available online: ftp://amdaftp.tceq.texas.gov/pub/TX/camx/. Accessed 02/13/17.

[2] TCEQ, July 2016. "SIP modeling files ". Available online: ftp://amdaftp.tceq.texas.gov/pub/. Accessed 06/04/16.

These updates included the latest available area, non-road, off-road, oil and gas production, and point source emissions inventory projections for all areas in the modeling domain.

AACOG used the Weather Research and Forecasting (WRF) meteorological inputs developed by TCEQ for these platforms. The WRF model relies on user inputs of surface and upper air meteorological data. This data can be obtained through various channels such as TCEQ monitors, National Weather Service (NWS) observations, the National Oceanic and Atmospheric Administration (NOAA). Ambient meteorological data is also used to verify model output. Through a process called Four-Dimensional Data Assimilation (FDDA), or nudging, the predicted meteorological conditions can be manipulated to better reflect the reality seen during a particular modeling episode.

CAMx 6.2 was used in all the photochemical model runs performed for CAPCOG. All the CAMx advanced settings used to simulate the June 2006 and the June 2012 episode are consistent with settings used to conduct state implementation plan (SIP) modeling for other areas in Texas. CAMx and WRF models are being used to develop ozone attainment demonstrations for multiple Texas regions including Dallas and Houston. These attainment demonstrations are used to determine if a region is expected to attain the ozone NAAQS by its attainment date.

AACOG is accepting the secondary data obtained from TCEQ for this project as meeting requirements for use in an attainment demonstration State Implementation Plan (SIP) revision. TCEQ is using the June 2006 episode as the basis for an attainment demonstration for the DFW nonattainment area and is using the 2012 episode for new SIP development moving forward. Therefore, the TCEQ considers these inputs to be “SIP-quality,” and therefore should be suitable for use in this project. Likewise, the EPA’s 2011 modeling platform projected to 2017 is being used for making regulatory decisions. While AACOG is not using the EPA’s 2011 modeling platform directly in this project, it will be used as a point of comparison.

The following table shows a summary of some of the performance statistics for each modeling platform for CAMS 3, the key regulatory ozone monitor in Austin with the highest forecasted 2017 design value in EPA’s July 2015 APCA modeling.

Table 1-1. Performance statistics for June 2006, 2011 seasonal, and June 2012 models for CAMS 3 (paired in time and space)

Statistic	2011 v. 6.2[3]	June 2006 release 4[4]	June 2012 release 0[5]
Number of Episode Days	153	33	30
MDA8 Observations >= 60 ppb	34	20	8
% of Episode Days >= 60 ppb	22%	61%	27%
Mean Obs. MDA8 >= 60 ppb (ppb)	69.39	74.41	70.58
Mean Bias for MDA8 (ppb)	-4.65	0.41	2.12
Mean Error for MDA8 (ppb)	6.59	6.67	3.98
Normalized Mean Bias for MDA8 (%)	-6.70%	0.55%	3.01%
Normalized Mean Error for MDA8 (%)	9.49%	8.96%	7.19%

1.3 Quality Assurance

Quality assurance (QA) procedures used to check emissions inventory preparation and the results from the photochemical model included:

- Examination of raw data files for inconsistencies in emissions and/or locations,
- Review of message files from Emissions Preprocessor System version 3 (EPS3) scripts for errors and warnings,
- Verification of consistency between input and output data, and
- Creation of output emissions and ozone tile plots for visual review.

Special emphasis was placed on critical components, such as emissions totals by source classification codes (SCCs), spatial allocation, emissions reductions from emission inventory control packages, and ozone plots.

All raw data files were checked to ensure emissions were consistent by county and source type. Any inconsistencies were noted, checked, and corrected. When running the EPS3 job scripts, several message files are generated from each script that record data inputs, results, and errors. As part of the QA procedure, modeling staff reviewed all error messages and corrected the input data accordingly.

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[3] http://www.epa.gov/sites/production/files/2015-11/updated_2011_camx_performance_stats.xlsx

[4] http://www.tceq.texas.gov/airquality/airmod/data/ts?eps=20060531-20060702, camx620_cb6r2.tx.bc06_06jun.r3d.2006_5layer_YSU_WSM6_3dsfc1h_fddats_gq_sfc_0.tx_4km

[5] http://www.tceq.texas.gov/airquality/airmod/data/ts?eps=20120601-20120630 , camx611_cb6r2.tx.bc 12_12jun.reg3a.2012_wrf361_p2a_i2_a.tx_4km

Errors can occur in EPS3 and go unnoticed by the built-in quality assurance mechanisms; therefore, further QA methods were applied. Input and output emissions by source category were compared. If there were inconsistencies between values, input data was reviewed and any necessary corrections were made. Emissions and ozone tile plots by source category were also developed and reviewed for inconsistencies in emissions and spatial allocation. When errors and omissions were identified, they were corrected and all documentation was updated with the corrections.

As part of the audit of the modeling files, 50% of the data used in this study was reviewed. After each section was completed, the QA/QC manager checked the data inputs into the formulas and checked all documentation on methodologies. All formulas were recalculated by the QA/QC manager to make sure the results can be replicated and are accurate. The QA/QC manager worked closely with the project manager to update the calculations, emission estimates, and documentations. The data is reasonably consistent with other studies and the data was sufficiently complete to be expected to adequately represent emissions. Collected data was assessed for missing data and outliers through communications with industry contacts, oil and gas sector experts, and trade group officials.

The following items were corrected in the photochemical modeling report as a result of the audit of the modeling data:

1. The first Anthropogenic Precursor Culpability Assessment (APCA) maps did not have a unique identifier code for Montana. The APCA 36 km map was updated before starting the photochemical modeling run.
2. When the emissions inventory was processed through EPS3, one of the fire’s SCC were missing in the cntlem file. The cntlem file was updated and EPS3 was run again before starting the APCA photochemical modeling runs.
3. The wrong hour was used to calculate the APCA results for the June 2006 results for C3 on June 4. The hour was corrected and the results were updated.
4. Several of the ozone design values metrics were not calculated for the 2012 modeling episode. The calculations were updated before the draft report was delivered.

2 Calculation of Projected 2017 Design Values Using the June 2006 Episode Data

Consistent with EPA guidance for projecting design values in attainment demonstration modeling, AACOG calculated the projected design values (DV) for CAPCOG ozone monitors using the June 2006 episode projected to 2017. [6] The following calculations were performed in order to calculate the projected design values:

1. Calculation of baseline DVs.
2. Calculation of RRF denominators using the 10 highest modeled ozone levels at monitoring stations in the base year and the peak ozone concentration for each of these days within the 3 x 3 4km cell array around an ozone monitor,
3. Calculation of RRF numerators using the future year modeled ozone levels for the same grid cells on the same days used in the calculation of the RRF denominators, and
4. Multiplication of baseline DVs by the RRFs to get projected 2017 DVs.

Three time periods were used to determine the baseline DVs needed for future year projections: 2004-2006, 2005-2007, and 2006-2008. The time periods cover a five-year period based around the 2006 model year. Using Equation 2-1, the average of the 4th highest value (Table 2-1) at each monitor in the CAPCOG region that was analyzed for this project that was active during all five of these years was calculated. The periods are referred to as 2006, 2007 and 2008 respectively. One deviation AACOG took from the guidance was to carry out the DV value to one decimal place, as opposed to truncating the value during this initial step of the process. This helps avoid "double-truncating" the future design value, since there are truncations done initially in the 3-year design value calculations and then again at the end in the projected future design value. Truncating these values at both ends of the process leads to lower projected design values.

Equation 2-1, the Design Value

$$(DV)_I = [(OZONE)_{1.I} + (OZONE)_{2.I} + (OZONE)_{3.I}] / 3$$

Where,

$(DV)_I$ = the baseline ozone modeling DV at site I (ppb)
$(OZONE)_{1.I}$ = the 4th highest ozone for Year 1 at site I (ppb)
$(OZONE)_{2.I}$ = the 4th highest ozone for Year 2 at site I (ppb)
$(OZONE)_{3.I}$ = the 4th highest ozone for Year 3 at site I (ppb)

Sample Equation: the 2006 Design Value for C3

$$(DV)_I = [(82 \text{ ppb}) + (82 \text{ ppb}) + (82 \text{ ppb})] / 3$$
$$= 82.0 \text{ ppb design value at C3}$$

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[6] EPA, Dec. 3, 2014. "Modeling Guidance for Demonstrating Attainment of Air Quality Goals for Ozone, $PM_{2.5}$, and Regional Haze". Research Triangle Park, North Carolina. p. 39. Available online: http://www.epa.gov/scram001/guidance/guide/Draft_O3-PM-RH_Modeling_Guidance-2014.pdf. Accessed 02/17/17.

Table 2-1: 4th Highest Ozone Value at CAMS 3, 38, and 614, 2004-2008

Monitor	2004	2005	2006	2007	2008
C3	82	82	82	76	74
C38	80	80	83	70	70
C614	75	72	72	65	66

The baseline ozone modeling design value was calculated using Equation 2-2. As determined by the EPA, the average DV methodology "has the desired effect of weighting the projected ozone base design values towards the middle year of a five year period".[7] "The 5-year weighted average value establishes a relatively stable value that is weighted towards the emissions and meteorological modeling year".[8]

Equation 2-2, the Baseline Design Site-Specific Modeling Design Value
(DVB)$_I$ = [(DV 2006)$_I$ + (DV 2007)$_I$ + (DV 2008)$_I$] / 3

Where,
(DVB)$_I$ = the baseline ozone modeling DV at site I (ppb)
(DV 2006)$_I$ = the 2004-2006 baseline DV at site I (ppb) from Equation 2-1
(DV 2007)$_I$ = the 2005-2007 baseline DV at site I (ppb) from Equation 2-1
(DV 2008)$_I$ = the 2006-2008 baseline DV at site I (ppb) from Equation 2-1

Sample Equation: Baseline 2006 Design Site-Specific Design Value for C3
(DVB)$_I$ = [(82.0 ppb) + (80.0 ppb) + (77.3 ppb)] / 3
= 79.7 ppb baseline design site-specific modeling design value at C3

As shown in Table 2-2, C3 had the highest baseline modeling DV at 79.7 ppb. The baseline modeling DVs at the other monitors were 77.6 ppb at C38 and 70.1 ppb at C614.

Table 2-2: Calculated Baseline Modeling Design Values, 2006

Monitoring Site	2004-2006 DV, ppb	2005-2007 DV, ppb	2006-2008 DV, ppb	Baseline Modeling DV ppb
C3	82.0	80.0	77.3	79.7
C38	81.0	77.7	74.3	77.6
C614	73.0	69.7	67.7	70.1

The model attainment test requires the calculation of a RRFs using baseline and future year modeling. The ratio between future and baseline modeling 8-hour ozone predictions near each monitor was multiplied by the monitor-specific modeling DV. The area near a monitor was defined as the 3x3 array of 4-km grid cells surrounding the monitor.[9] The formula used to calculate the Future Design Value is:

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[7] *Ibid*., p. 98.
[8] *Ibid*., p. 99.
[9] *Ibid*., p. 102.

Equation 2-3, Future Design Value Calculation
$(DVF)_I = (RRF)_I \, (DVB)_I$

Where,
$(DVF)_I$ = the estimated future ozone DV for the time attainment is required (ppb)
$(RRF)_I$ = the relative response factor, calculated near site I
$(DVB)_I$ = the baseline ozone modeling DV at site I (ppb) - from Equation 2-2

Sample Equation: Future Design Value for at C3
$(DVF)_I$ = (0.8108) (79.7 ppb)
= 64.62 ppb Future Design Value for at C3

The highest predicted 8-hour daily ozone was selected in the 3x3 array for each monitor for the 2017 projection years. The peak ozone grid cell selected in the baseline year is the same cell that is used in the 2017 projection. The future site-specific DV for each monitor is provided in electronic data files. EPA's guidance calls for the top 10 modeled MDA8 values equal to or greater than 60 ppb to be used in average RRF calculations.

The results for the calculated RRF and Design values are provided in Table 2-3 and Table 2-4. In addition to the primary method for calculating RRFs and design values recommended by EPA in its guidance, AACOG also calculated alternative RRFs based on:

- Two different future year modeling runs for the June 2006 platform – the APCA run and future year run not configured for APCA
- The cell where the monitor is located, rather than the cell with the maximum MDA8 in the vicinity of the monitor
- Top 5 days ≥ 60 ppb, rather than top 10 days ≥ 60 ppb

Table 2-3 results were calculated using TCEQ 2006 baseline and TCEQ 2017 projection case photochemical Modeling run, while Table 2-4 is based on TCEQ 2006 baseline and AACOG's 2017 projection case APCA photochemical modeling run. The differences in the results between the two runs is attributable to AACOG's use of an updated TCEQ 2017 emission inventory for the APCA 2017 projection case[10], different suface grid (camx6_landuse.xxxx.tceq2zhang26a.lai20060 compared to camx6_landuse.xxxx. tceq2zhang26a.lai200606qc108ufun) and a different photolyis rate (camx620_cb6_tuv.rpo_36km.2015AUG31.tuv48 compared to camx6_cb6_tuv.rpo_36km. 2013MAY08.tuv48). The meteorology for all three of these runs that used the June 2006 base case was identical.[11] TCEQ emission inventory that was used in the APCA 2017 projection was also processed by AACOG. To process TCEQ's emission inventory, AACOG used the TCEQ emission and input files available on 5/3/2016 and processed the files for each emission source category through EPS3.

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[10] As per the QAPP, AACOG was required to use the latest emissions data available at the time the APCA run was prepared. Therefore, AACOG used the 2017 EI data released on on 5/3/2016 for the APCA run, rather than the EI data that had been released on 9/3/2015, which TCEQ had used for its future year projection that had been used for the initial set of design value projections described above.

[11] In appendix E, see the details for run 1 (the 2006 baseline), run 2 (the 2017 future year projection available on TCEQ's site), and run 4 (the 2017 APCA run)

Table 2-3: Calculated RRF using the June 2006 Episode (2006 to 2017 Projection), CAPCOG Ozone Monitors

Metric	C3	C38	C614	C690	C1603	C6602	C1675
Top 10 days (2006)	0.8108	0.8076	0.8102	0.8292	0.8106	0.8323	0.8249
Top 5 days (2006)	0.8103	0.7923	0.7837	0.8096	0.7815	0.8449	0.8281
Top 10 days (max grid cell in 2006 on days ≥60 ppb)	0.8042	0.8045	0.8086	0.8276	0.8011	0.8307	0.8247
Top 5 days (max grid cell in 2006 on days ≥60 ppb)	0.8010	0.7865	0.7821	0.8071	0.7730	0.8419	0.8280

Table 2-4: Calculated Future Design Value using the June 2006 Episode (2006 to 2017 Projection), CAPCOG Ozone Monitors

Design Value	C3	C38	C614
Top 10 days (2006)	64.62	62.67	56.79
Top 5 days (2006)	64.58	61.48	54.94
Top 10 days (max grid cell in 2006 on days ≥60 ppb)	64.09	62.43	56.68
Top 5 days (max grid cell in 2006 on days ≥60 ppb)	63.84	61.03	54.83

Table 2-5: Calculated RRF using the June 2006 Episode (2006 to 2017 APCA Projection), CAPCOG Ozone Monitors

Metric	C3	C38	C614	C690	C1603	C6602	C1675
Top 10 days (2006)	0.7742	0.7791	0.7819	0.7941	0.8003	0.7771	0.8111
Top 5 days (2006)	0.7606	0.7789	0.7714	0.7846	0.8061	0.7595	0.8166
Top 10 days (max grid cell in 2006 on days ≥60 ppb)	0.7742	0.7791	0.7819	0.7941	0.8003	0.7771	0.8111
Top 5 days (max grid cell in 2006 on days ≥60 ppb)	0.7606	0.7789	0.7714	0.7846	0.8061	0.7595	0.8166

Table 2-6: Calculated Design Value using the June 2006 Episode (2006 to 2017 APCA Projection), CAPCOG Ozone Monitors

Design Value	C3	C38	C614
Top 10 days (2006)	61.71	60.46	54.81
Top 5 days (2006)	60.62	60.44	54.07
Top 10 days (max grid cell in 2006 on days ≥60 ppb)	61.71	60.46	54.81
Top 5 days (max grid cell in 2006 on days ≥60 ppb)	60.62	60.44	54.07

3 Source Apportionment Modeling for 2017 using June 2006 Episode

"ENVIRON developed an ozone source attribution approach that has become known as the Ozone Source Apportionment Technology, or OSAT. OSAT provides a method for estimating the contributions of multiple source areas, categories, and pollutant types to ozone formation in a single model run."[12] "OSAT uses multiple tracer species to track the fate of ozone precursor emissions (VOC and NO_X) and the ozone formation caused by these emissions within a simulation. The tracers operate as spectators to the normal CAMx calculations, so that the underlying CAMx predicted relationships between emission groups (sources) and ozone concentrations at specific locations (receptors) are not perturbed."[13]

"The ozone reaction tracers allow ozone formation from multiple "source groupings" to be tracked simultaneously within a single simulation. A source grouping can be defined in terms of geographical area and/or emission category."[14] "So that all sources of ozone precursors are accounted, the CAMx boundary conditions and initial conditions are always tracked as separate source groupings. The methodology is designed so that all ozone and precursor concentrations are attributed among the selected source groupings at all times. Thus, for all receptor locations and times, the ozone (or ozone precursor concentrations) predicted by CAMx is attributed among the source groupings selected for OSAT. The methodology also estimates the fractions of ozone arriving at the receptor that were formed en route under VOC- or NO_X-limited conditions. This information indicates how ozone concentrations at the receptor will respond to reductions in VOC and NO_X precursor emissions".[15]

"Anthropogenic Precursor Culpability Assessment (APCA). APCA differs from OSAT in recognizing that certain emission groups are not controllable (e.g., biogenic emissions) and that apportioning ozone production to these groups does not provide information that is relevant to control strategies. To address this, in situations where OSAT would attribute ozone production to non-controllable (i.e., biogenic) emissions, APCA re-allocates that ozone production to the controllable portion of precursors that participated in ozone formation with the non-controllable precursor. In the case where biogenic emissions are the uncontrollable source category, APCA would only attribute ozone production to biogenic emissions when ozone formation is due to the interaction of biogenic VOC with biogenic NO_X."[16]

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[12] ENVIRON International Corporation, April 2014. "User's Guide COMPREHENSIVE AIR QUALITY MODEL WITH EXTENSIONS Version 6.1". Novato, California. Available online: http://www.camx.com/files/camxusersguide_v6-10.pdf. Accessed 08/10/15. p. 144.

[13] *Ibid*.

[14] *Ibid*.

[15] *Ibid*.

[16] *Ibid*. p. 160-161.

The 2017 projection emission inventory was run in the June 2006 at the 4-km, 12-km, and 36-km grid sizes using APCA. For the APCA run, the receptors defined in the run are the following ozone monitors in the CAPCOG region:

1. CAMS 3 (Austin Northwest, Travis County);
2. CAMS 38 (Audubon; Travis County);
3. CAMS 614 (Dripping Springs);
4. CAMS 690 (Lake Georgetown);
5. CAMS 675 & CAMS 1675 (San Marcos);
6. CAMS 1603 (Gorzycki Middle School); and
7. CAMS 6602 (Hutto).

Data for May 16th to May 31th was not included in the analysis because these days were only run at the 36-km grid level.

The emission inventory was separated into biogenics, anthropogenic, and fires. The SCC codes used for the fire emissions are:

- 2810001000: Forest Wildfires
- 2810005000: Managed Burning, Slash;
- 2810015000: Prescribed Forest Burning; and
- 2810020000: Miscellaneous Area Sources: Other Combustion: Prescribed Rangeland Burning.

The APCA run was also divided into 81 geographical areas, initial conditions, and boundary conditions (Table 3-1). Boundary concentrations and top concentrations were treated as one source region. These regions were not separated out in the APCA run. Figure 3-1 shows the geographical regions at the 4-km grid level. The results of the 2017 APCA run based on the June 2006 photochemical modeling episode are provided in Table 3-2. The results in the table are the average contributions to the top 5 MDA8 values modeled using the direct model output. The geographic source apportionment areas are:

Table 3-1: Regions Used in the APCA run.

IC - Initial Conditions	41 - Kendall
BC - Boundary Conditions	42 - Bexar
1 - Offshore	43 - Comal
2 - Remainder of Texas	44 - Guadalupe
3 - Louisiana	45 - Wilson
4 - Arkansas	46 - Kerr
5 - Oklahoma	47 - Frio
6 - Mexico	48 - McMullen
7 - Kansas	49 - Karnes
8 - Missouri	50 - Caldwell
9 - Kentucky	51 - Fayette
10 - Tennessee	52 - Bastrop
11 - Mississippi	53 - Hays
12 - New Mexico	54 - Blanco
13 - Colorado	55 - Travis
14 - Alabama	56 - Gillespie
15 - Georgia	57 - Lee
16 - Florida	58 - Williamson
17 - South Carolina	59 - Deep East COG
18 - North Carolina	60 - Brazos Valley COG
19 - Virginia	61 - Burnet
20 - West Virginia	62 - Llano
21 - Ohio	63 - San Saba
22 - Indiana	64 - Lampasas
23 - Illinois	65 - Mills
24 - Northeast	66 - Coryell
25 - Minnesota	67 - Hamilton
26 - Mountain	68 - Bell
27 - DE/DC/MD	69 - Milam
28 - Michigan	70 - Texoma COG
29 - Wisconsin	71 - Ark-Tex Area COG
30 - Iowa	72 - East Texas COG
31 - Nebraska	73 - South East Texas RPC
32 - South Dakota	74 - Golden Crescent RPC
33 - North Dakota	75 - Houston-Galveston Area Council
34 - Wyoming	76 - North Central Texas COG
35 - Pacific	77 - Coastal Bend COG
36 - Caribbean	78 - South Texas DC
37 - Canada	79 - Lower Rio Grande Valley COG
38 - Atascosa	80 - Heart of Texas COG
39 - Medina	81 - Montana
40 - Bandera	

Figure 3-1: APCA Regions for APCA Photochemical Modeling Run at the 4-km Grid Level, 2018

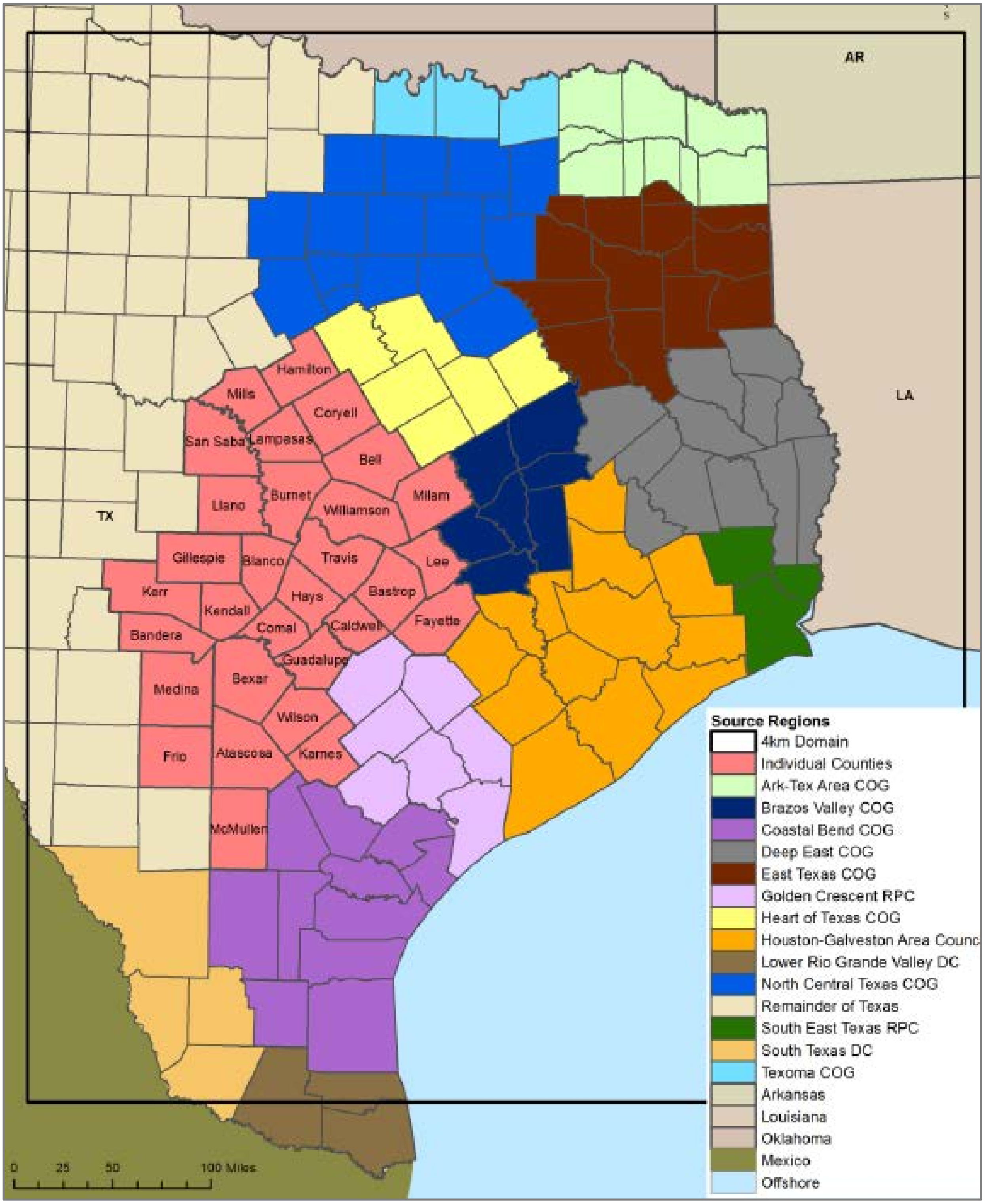

Table 3-2: APCA Results by Source Region, 2017 (June 2006 Episode – Average Modeled MDA8 Contribution on top 5 days)

Source	Source Region	C3		C38		C614		C690		C1675		C1603		C6602	
		ppb	%	ppb	%	ppb	%	ppb	%	ppb	%	ppb	%	ppb	%
0	Initial Conditions	1.70	2.3%	0.16	0.2%	0.16	0.2%	0.81	1.1%	0.92	1.4%	0.82	1.2%	1.15	1.7%
0	Boundary Conditions	20.72	28.7%	25.24	36.3%	25.06	38.0%	22.68	32.3%	23.03	35.6%	22.39	31.6%	21.04	31.2%
1	Offshore	1.99	2.8%	2.21	3.2%	2.33	3.5%	1.97	2.8%	1.04	1.6%	2.13	3.0%	2.43	3.6%
2	Remainder of Texas	0.33	0.5%	0.36	0.5%	0.38	0.6%	0.26	0.4%	0.40	0.6%	0.40	0.6%	0.56	0.8%
3	Louisiana	3.90	5.4%	4.18	6.0%	4.05	6.1%	4.80	6.8%	3.11	4.8%	4.04	5.7%	4.21	6.3%
4	Arkansas	0.75	1.0%	0.80	1.1%	0.73	1.1%	1.01	1.4%	0.47	0.7%	0.72	1.0%	0.85	1.3%
5	Oklahoma	1.10	1.5%	0.41	0.6%	0.40	0.6%	0.47	0.7%	2.18	3.4%	1.11	1.6%	0.53	0.8%
6	Mexico	0.21	0.3%	0.15	0.2%	0.18	0.3%	0.14	0.2%	0.21	0.3%	0.21	0.3%	0.32	0.5%
7	Kansas	0.90	1.2%	0.41	0.6%	0.41	0.6%	0.50	0.7%	0.99	1.5%	0.81	1.1%	0.51	0.8%
8	Missouri	0.54	0.7%	0.48	0.7%	0.46	0.7%	0.55	0.8%	0.35	0.5%	0.51	0.7%	0.51	0.8%
9	Kentucky	0.08	0.1%	0.10	0.1%	0.10	0.1%	0.07	0.1%	0.07	0.1%	0.08	0.1%	0.09	0.1%
10	Tennessee	0.08	0.1%	0.11	0.2%	0.11	0.2%	0.10	0.1%	0.10	0.2%	0.09	0.1%	0.09	0.1%
11	Mississippi	0.45	0.6%	0.59	0.9%	0.55	0.8%	0.78	1.1%	0.76	1.2%	0.47	0.7%	0.49	0.7%
12	New Mexico	0.12	0.2%	0.15	0.2%	0.16	0.2%	0.08	0.1%	0.15	0.2%	0.17	0.2%	0.20	0.3%
13	Colorado	0.19	0.3%	0.20	0.3%	0.21	0.3%	0.18	0.3%	0.25	0.4%	0.24	0.3%	0.24	0.4%
14	Alabama	0.22	0.3%	0.30	0.4%	0.29	0.4%	0.19	0.3%	0.33	0.5%	0.29	0.4%	0.18	0.3%
15	Georgia	0.16	0.2%	0.04	0.1%	0.04	0.1%	0.08	0.1%	0.11	0.2%	0.10	0.1%	0.10	0.2%
16	Florida	0.29	0.4%	0.08	0.1%	0.07	0.1%	0.19	0.3%	0.19	0.3%	0.15	0.2%	0.25	0.4%
17	South Carolina	0.06	0.1%	0.01	0.0%	0.01	0.0%	0.02	0.0%	0.03	0.1%	0.03	0.0%	0.03	0.0%
18	North Carolina	0.06	0.1%	0.01	0.0%	0.01	0.0%	0.02	0.0%	0.04	0.1%	0.04	0.1%	0.03	0.1%
19	Virginia	0.03	0.0%	0.00	0.0%	0.00	0.0%	0.01	0.0%	0.02	0.0%	0.02	0.0%	0.02	0.0%
20	West Virginia	0.02	0.0%	0.01	0.0%	0.01	0.0%	0.01	0.0%	0.01	0.0%	0.01	0.0%	0.01	0.0%
21	Ohio	0.07	0.1%	0.07	0.1%	0.06	0.1%	0.07	0.1%	0.04	0.1%	0.06	0.1%	0.07	0.1%
22	Indiana	0.13	0.2%	0.15	0.2%	0.14	0.2%	0.14	0.2%	0.07	0.1%	0.13	0.2%	0.16	0.2%
23	Illinois	0.39	0.5%	0.43	0.6%	0.41	0.6%	0.41	0.6%	0.21	0.3%	0.38	0.5%	0.45	0.7%
24	Northeast	0.12	0.2%	0.02	0.0%	0.02	0.0%	0.06	0.1%	0.06	0.1%	0.07	0.1%	0.07	0.1%
25	Minnesota	0.29	0.4%	0.28	0.4%	0.27	0.4%	0.29	0.4%	0.48	0.7%	0.28	0.4%	0.30	0.4%
26	Mountain	0.16	0.2%	0.22	0.3%	0.22	0.3%	0.17	0.2%	0.25	0.4%	0.21	0.3%	0.20	0.3%
27	DE/DC/MD	0.02	0.0%	0.00	0.0%	0.00	0.0%	0.01	0.0%	0.01	0.0%	0.01	0.0%	0.01	0.0%
28	Michigan	0.23	0.3%	0.24	0.4%	0.21	0.3%	0.25	0.4%	0.10	0.1%	0.21	0.3%	0.27	0.4%

Source	Source Region	C3		C38		C614		C690		C1675		C1603		C6602	
		ppb	%	ppb	%	ppb	%	ppb	%	ppb	%	ppb	%	ppb	%
29	Wisconsin	0.36	0.5%	0.34	0.5%	0.32	0.5%	0.36	0.5%	0.28	0.4%	0.34	0.5%	0.38	0.6%
30	Iowa	0.58	0.8%	0.49	0.7%	0.45	0.7%	0.56	0.8%	0.37	0.6%	0.53	0.7%	0.56	0.8%
31	Nebraska	0.32	0.4%	0.29	0.4%	0.29	0.4%	0.30	0.4%	0.47	0.7%	0.32	0.5%	0.31	0.5%
32	South Dakota	0.15	0.2%	0.16	0.2%	0.15	0.2%	0.15	0.2%	0.16	0.2%	0.15	0.2%	0.16	0.2%
33	North Dakota	0.16	0.2%	0.16	0.2%	0.16	0.2%	0.16	0.2%	0.16	0.2%	0.16	0.2%	0.16	0.2%
34	Wyoming	0.17	0.2%	0.21	0.3%	0.21	0.3%	0.19	0.3%	0.22	0.3%	0.18	0.3%	0.20	0.3%
35	Pacific	0.08	0.1%	0.14	0.2%	0.14	0.2%	0.12	0.2%	0.16	0.3%	0.12	0.2%	0.10	0.2%
36	Caribbean	0.01	0.0%	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.01	0.0%	0.01	0.0%	0.00	0.0%
37	Canada	0.42	0.6%	0.44	0.6%	0.41	0.6%	0.45	0.6%	0.44	0.7%	0.42	0.6%	0.44	0.7%
38	Atascosa	0.18	0.2%	0.05	0.1%	0.10	0.2%	0.20	0.3%	0.25	0.4%	0.06	0.1%	0.20	0.3%
39	Medina	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.02	0.0%
40	Bandera	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.00	0.0%
41	Kendall	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.01	0.0%
42	Bexar	0.68	0.9%	0.36	0.5%	0.76	1.2%	0.84	1.2%	1.19	1.8%	0.47	0.7%	0.97	1.4%
43	Comal	0.05	0.1%	0.03	0.0%	0.17	0.3%	0.06	0.1%	0.14	0.2%	0.03	0.0%	0.07	0.1%
44	Guadalupe	1.07	1.5%	0.55	0.8%	1.78	2.7%	0.96	1.4%	2.52	3.9%	0.43	0.6%	0.92	1.4%
45	Wilson	0.05	0.1%	0.02	0.0%	0.04	0.1%	0.06	0.1%	0.22	0.3%	0.02	0.0%	0.05	0.1%
46	Kerr	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.00	0.0%
47	Frio	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.02	0.0%
48	McMullen	0.08	0.1%	0.02	0.0%	0.04	0.1%	0.08	0.1%	0.04	0.1%	0.02	0.0%	0.11	0.2%
49	Karnes	0.48	0.7%	0.28	0.4%	0.44	0.7%	0.54	0.8%	1.14	1.8%	0.24	0.3%	0.60	0.9%
50	Caldwell	0.48	0.7%	0.40	0.6%	1.09	1.7%	0.55	0.8%	1.85	2.9%	0.57	0.8%	0.42	0.6%
51	Fayette	0.28	0.4%	0.35	0.5%	0.21	0.3%	0.40	0.6%	0.12	0.2%	0.20	0.3%	0.32	0.5%
52	Bastrop	1.61	2.2%	1.22	1.8%	1.19	1.8%	1.38	2.0%	0.99	1.5%	1.56	2.2%	1.76	2.6%
53	Hays	2.12	2.9%	1.79	2.6%	3.92	6.0%	1.52	2.2%	3.39	5.3%	2.24	3.2%	1.54	2.3%
54	Blanco	0.01	0.0%	0.00	0.0%	0.02	0.0%	0.01	0.0%	0.00	0.0%	0.01	0.0%	0.01	0.0%
55	Travis	13.87	19.2%	11.71	16.9%	6.98	10.6%	10.66	15.2%	3.07	4.8%	14.37	20.3%	8.82	13.1%
56	Gillespie	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.01	0.0%
57	Lee	0.12	0.2%	0.23	0.3%	0.07	0.1%	0.18	0.2%	0.05	0.1%	0.07	0.1%	0.30	0.5%
58	Williamson	0.78	1.1%	2.08	3.0%	0.07	0.1%	2.60	3.7%	0.30	0.5%	0.91	1.3%	1.58	2.3%
59	Deep East COG	0.68	0.9%	0.67	1.0%	0.62	0.9%	0.74	1.1%	0.59	0.9%	0.77	1.1%	0.49	0.7%

Source	Source Region	C3		C38		C614		C690		C1675		C1603		C6602	
		ppb	%	ppb	%	ppb	%	ppb	%	ppb	%	ppb	%	ppb	%
60	Brazos Valley COG	0.70	1.0%	0.40	0.6%	0.29	0.4%	0.32	0.5%	0.46	0.7%	0.69	1.0%	0.27	0.4%
61	Burnet	0.02	0.0%	0.01	0.0%	0.02	0.0%	0.02	0.0%	0.00	0.0%	0.03	0.0%	0.03	0.0%
62	Llano	0.01	0.0%	0.00	0.0%	0.00	0.0%	0.01	0.0%	0.00	0.0%	0.00	0.0%	0.01	0.0%
63	San Saba	0.01	0.0%	0.00	0.0%	0.00	0.0%	0.01	0.0%	0.00	0.0%	0.00	0.0%	0.01	0.0%
64	Lampasas	0.01	0.0%	0.00	0.0%	0.00	0.0%	0.01	0.0%	0.00	0.0%	0.01	0.0%	0.01	0.0%
65	Mills	0.01	0.0%	0.00	0.0%	0.00	0.0%	0.01	0.0%	0.00	0.0%	0.00	0.0%	0.01	0.0%
66	Coryell	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.00	0.0%
67	Hamilton	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.00	0.0%
68	Bell	0.08	0.1%	0.08	0.1%	0.02	0.0%	0.03	0.0%	0.08	0.1%	0.36	0.5%	0.08	0.1%
69	Milam	0.16	0.2%	0.59	0.8%	0.04	0.1%	0.07	0.1%	0.22	0.3%	0.18	0.3%	0.40	0.6%
70	Texoma COG	0.09	0.1%	0.02	0.0%	0.02	0.0%	0.04	0.1%	0.14	0.2%	0.08	0.1%	0.04	0.1%
71	Ark-Tex Area COG	0.36	0.5%	0.17	0.3%	0.14	0.2%	0.13	0.2%	0.32	0.5%	0.41	0.6%	0.19	0.3%
72	East Texas COG	1.13	1.6%	0.40	0.6%	0.32	0.5%	0.37	0.5%	0.56	0.9%	1.00	1.4%	0.57	0.8%
73	South East Texas RPC	0.72	1.0%	0.70	1.0%	0.73	1.1%	0.85	1.2%	0.49	0.8%	0.64	0.9%	0.82	1.2%
74	Golden Crescent RPC	1.12	1.5%	1.54	2.2%	1.84	2.8%	1.94	2.8%	2.54	3.9%	0.87	1.2%	1.31	1.9%
75	Houston-Galveston	4.37	6.0%	4.64	6.7%	4.11	6.2%	5.75	8.2%	3.27	5.1%	3.31	4.7%	5.41	8.0%
76	North Central Texas COG	1.26	1.7%	0.32	0.5%	0.31	0.5%	0.38	0.5%	1.09	1.7%	1.06	1.5%	0.47	0.7%
77	Coastal Bend COG	0.85	1.2%	0.59	0.9%	0.79	1.2%	0.56	0.8%	0.48	0.7%	0.58	0.8%	1.05	1.6%
78	South Texas DC	0.02	0.0%	0.02	0.0%	0.02	0.0%	0.01	0.0%	0.02	0.0%	0.02	0.0%	0.04	0.1%
79	Lower Rio Grande COG	0.06	0.1%	0.02	0.0%	0.06	0.1%	0.04	0.1%	0.01	0.0%	0.04	0.1%	0.16	0.2%
80	Heart of Texas COG	1.14	1.6%	0.42	0.6%	0.38	0.6%	0.24	0.3%	0.67	1.0%	1.02	1.4%	0.43	0.6%
81	Montana	0.09	0.1%	0.10	0.2%	0.10	0.2%	0.11	0.2%	0.12	0.2%	0.10	0.1%	0.09	0.1%
	Total	72.31	100%	69.47	100%	65.86	100%	70.28	100%	64.63	100%	70.81	100%	67.34	100%

4 Source Apportionment Modeling for 2017 using June 2012 Episode

The 2017 projection emission inventory was run in the June 2012 at the 4-km, 12-km, and 36-km grid sizes using APCA. The run used the same source receptors, regions, and emission groups as the APCA run using the June 2006 episode. The results of the 2017 APCA run based on the June 2012 photochemical modeling episode are provided in Table 3-2. The results in the table are the average contributions to the top 5 MDA8 values modeled without adjusting for the projected design values based on the direct model output.

Table 4-1: APCA Results by Source Region, 2017 (June 2012 Episode Average Modeled MDA8 Contribution on top 5 days)

Source	Source Region	C3		C38		C614		C690		C1675		C1603		C6602	
		ppb	%	ppb	%	ppb	%	ppb	%	ppb	%	ppb	%	ppb	%
0	Initial Conditions	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.02	0.0%	0.00	0.0%	0.00	0.0%	0.00	0.0%
0	Boundary Conditions	16.27	23.7%	19.43	28.5%	19.55	30.4%	18.85	28.2%	17.24	26.7%	18.14	27.1%	14.69	22.6%
1	Offshore	1.28	1.9%	1.22	1.8%	1.30	2.0%	1.10	1.6%	1.56	2.4%	1.32	2.0%	1.09	1.7%
2	Remainder of Texas	0.50	0.7%	0.49	0.7%	0.35	0.5%	0.54	0.8%	0.39	0.6%	0.54	0.8%	0.49	0.8%
3	Louisiana	5.59	8.2%	4.48	6.6%	4.54	7.1%	4.97	7.4%	6.05	9.3%	4.83	7.2%	5.52	8.5%
4	Arkansas	2.21	3.2%	1.97	2.9%	1.20	1.9%	1.29	1.9%	1.70	2.6%	2.31	3.4%	2.98	4.6%
5	Oklahoma	0.94	1.4%	0.96	1.4%	0.66	1.0%	2.20	3.3%	0.66	1.0%	0.99	1.5%	0.94	1.4%
6	Mexico	0.23	0.3%	0.20	0.3%	0.18	0.3%	0.43	0.6%	0.22	0.3%	0.22	0.3%	0.21	0.3%
7	Kansas	0.69	1.0%	0.72	1.1%	0.47	0.7%	0.88	1.3%	0.46	0.7%	0.76	1.1%	0.73	1.1%
8	Missouri	0.77	1.1%	0.75	1.1%	0.54	0.8%	0.58	0.9%	0.56	0.9%	0.78	1.2%	0.88	1.4%
9	Kentucky	0.73	1.1%	0.75	1.1%	0.73	1.1%	0.99	1.5%	0.62	1.0%	0.50	0.7%	0.80	1.2%
10	Tennessee	0.88	1.3%	1.00	1.5%	1.00	1.6%	1.16	1.7%	0.79	1.2%	0.70	1.0%	1.05	1.6%
11	Mississippi	1.79	2.6%	1.74	2.6%	1.86	2.9%	1.73	2.6%	1.92	3.0%	1.65	2.5%	1.85	2.8%
12	New Mexico	0.21	0.3%	0.20	0.3%	0.17	0.3%	0.14	0.2%	0.19	0.3%	0.25	0.4%	0.19	0.3%
13	Colorado	0.28	0.4%	0.28	0.4%	0.32	0.5%	0.17	0.2%	0.32	0.5%	0.40	0.6%	0.33	0.5%
14	Alabama	1.37	2.0%	1.72	2.5%	2.05	3.2%	1.51	2.3%	1.14	1.8%	1.33	2.0%	1.09	1.7%
15	Georgia	0.37	0.5%	0.61	0.9%	0.78	1.2%	0.45	0.7%	0.34	0.5%	0.41	0.6%	0.24	0.4%
16	Florida	0.13	0.2%	0.17	0.2%	0.19	0.3%	0.09	0.1%	0.20	0.3%	0.15	0.2%	0.07	0.1%
17	South Carolina	0.03	0.0%	0.06	0.1%	0.08	0.1%	0.05	0.1%	0.04	0.1%	0.04	0.1%	0.02	0.0%
18	North Carolina	0.06	0.1%	0.09	0.1%	0.10	0.2%	0.07	0.1%	0.06	0.1%	0.06	0.1%	0.04	0.1%
19	Virginia	0.05	0.1%	0.06	0.1%	0.07	0.1%	0.05	0.1%	0.05	0.1%	0.05	0.1%	0.03	0.1%
20	West Virginia	0.04	0.1%	0.04	0.1%	0.05	0.1%	0.05	0.1%	0.03	0.1%	0.03	0.0%	0.04	0.1%
21	Ohio	0.24	0.4%	0.16	0.2%	0.15	0.2%	0.34	0.5%	0.17	0.3%	0.09	0.1%	0.26	0.4%
22	Indiana	0.45	0.7%	0.40	0.6%	0.39	0.6%	0.64	1.0%	0.35	0.5%	0.24	0.4%	0.50	0.8%
23	Illinois	0.50	0.7%	0.54	0.8%	0.48	0.7%	0.56	0.8%	0.44	0.7%	0.44	0.7%	0.62	1.0%
24	Northeast	0.15	0.2%	0.05	0.1%	0.05	0.1%	0.16	0.2%	0.11	0.2%	0.05	0.1%	0.15	0.2%
25	Minnesota	0.08	0.1%	0.07	0.1%	0.06	0.1%	0.12	0.2%	0.07	0.1%	0.06	0.1%	0.09	0.1%
26	Mountain	0.35	0.5%	0.41	0.6%	0.39	0.6%	0.31	0.5%	0.34	0.5%	0.45	0.7%	0.35	0.5%
27	DE/DC/MD	0.01	0.0%	0.01	0.0%	0.01	0.0%	0.01	0.0%	0.01	0.0%	0.01	0.0%	0.01	0.0%
28	Michigan	0.19	0.3%	0.07	0.1%	0.07	0.1%	0.23	0.3%	0.13	0.2%	0.05	0.1%	0.20	0.3%

Source	Source Region	C3		C38		C614		C690		C1675		C1603		C6602	
		ppb	%	ppb	%	ppb	%	ppb	%	ppb	%	ppb	%	ppb	%
29	Wisconsin	0.06	0.1%	0.06	0.1%	0.06	0.1%	0.09	0.1%	0.05	0.1%	0.04	0.1%	0.07	0.1%
30	Iowa	0.11	0.2%	0.12	0.2%	0.10	0.2%	0.17	0.3%	0.10	0.2%	0.11	0.2%	0.15	0.2%
31	Nebraska	0.17	0.3%	0.18	0.3%	0.16	0.2%	0.33	0.5%	0.16	0.2%	0.21	0.3%	0.22	0.3%
32	South Dakota	0.06	0.1%	0.06	0.1%	0.06	0.1%	0.10	0.1%	0.06	0.1%	0.07	0.1%	0.08	0.1%
33	North Dakota	0.07	0.1%	0.06	0.1%	0.06	0.1%	0.10	0.1%	0.06	0.1%	0.06	0.1%	0.08	0.1%
34	Wyoming	0.22	0.3%	0.24	0.4%	0.25	0.4%	0.20	0.3%	0.22	0.3%	0.30	0.5%	0.29	0.4%
35	Pacific	0.20	0.3%	0.23	0.3%	0.21	0.3%	0.27	0.4%	0.18	0.3%	0.22	0.3%	0.20	0.3%
36	Caribbean	0.01	0.0%	0.01	0.0%	0.02	0.0%	0.01	0.0%	0.01	0.0%	0.01	0.0%	0.00	0.0%
37	Canada	0.39	0.6%	0.23	0.3%	0.21	0.3%	0.50	0.8%	0.32	0.5%	0.23	0.4%	0.47	0.7%
38	Atascosa	0.02	0.0%	0.02	0.0%	0.04	0.1%	0.02	0.0%	0.04	0.1%	0.02	0.0%	0.01	0.0%
39	Medina	0.01	0.0%	0.00	0.0%	0.00	0.0%	0.01	0.0%	0.01	0.0%	0.00	0.0%	0.00	0.0%
40	Bandera	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.00	0.0%
41	Kendall	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.01	0.0%	0.00	0.0%	0.00	0.0%
42	Bexar	0.19	0.3%	0.38	0.6%	0.90	1.4%	0.09	0.1%	0.31	0.5%	0.31	0.5%	0.03	0.0%
43	Comal	0.01	0.0%	0.03	0.0%	0.19	0.3%	0.02	0.0%	0.05	0.1%	0.02	0.0%	0.00	0.0%
44	Guadalupe	0.26	0.4%	0.59	0.9%	1.90	3.0%	0.32	0.5%	1.79	2.8%	0.48	0.7%	0.04	0.1%
45	Wilson	0.01	0.0%	0.02	0.0%	0.09	0.1%	0.02	0.0%	0.04	0.1%	0.02	0.0%	0.00	0.0%
46	Kerr	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.00	0.0%
47	Frio	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.01	0.0%	0.01	0.0%	0.00	0.0%	0.00	0.0%
48	McMullen	0.01	0.0%	0.01	0.0%	0.01	0.0%	0.01	0.0%	0.02	0.0%	0.01	0.0%	0.01	0.0%
49	Karnes	0.08	0.1%	0.30	0.4%	0.70	1.1%	0.12	0.2%	0.35	0.5%	0.11	0.2%	0.03	0.0%
50	Caldwell	0.40	0.6%	0.57	0.8%	1.14	1.8%	0.26	0.4%	1.49	2.3%	1.16	1.7%	0.04	0.1%
51	Fayette	0.40	0.6%	0.27	0.4%	0.30	0.5%	0.45	0.7%	0.56	0.9%	0.42	0.6%	0.64	1.0%
52	Bastrop	1.37	2.0%	0.76	1.1%	0.52	0.8%	1.44	2.1%	0.90	1.4%	1.42	2.1%	1.49	2.3%
53	Hays	0.67	1.0%	1.83	2.7%	5.10	7.9%	0.43	0.6%	2.49	3.8%	3.34	5.0%	0.07	0.1%
54	Blanco	0.02	0.0%	0.02	0.0%	0.03	0.0%	0.01	0.0%	0.02	0.0%	0.02	0.0%	0.01	0.0%
55	Travis	12.07	17.6%	12.06	17.7%	3.24	5.0%	6.87	10.3%	3.44	5.3%	8.15	12.2%	2.70	4.1%
56	Gillespie	0.01	0.0%	0.00	0.0%	0.01	0.0%	0.00	0.0%	0.01	0.0%	0.00	0.0%	0.00	0.0%
57	Lee	0.13	0.2%	0.11	0.2%	0.13	0.2%	0.16	0.2%	0.30	0.5%	0.27	0.4%	0.32	0.5%
58	Williamson	1.40	2.0%	0.88	1.3%	0.50	0.8%	1.52	2.3%	0.45	0.7%	0.64	1.0%	1.20	1.8%
59	Deep East COG	1.00	1.5%	0.61	0.9%	0.68	1.1%	0.94	1.4%	1.06	1.6%	0.78	1.2%	1.12	1.7%

Source	Source Region	C3		C38		C614		C690		C1675		C1603		C6602	
		ppb	%	ppb	%	ppb	%	ppb	%	ppb	%	ppb	%	ppb	%
60	Brazos Valley COG	0.85	1.2%	0.51	0.8%	0.45	0.7%	0.59	0.9%	0.95	1.5%	0.78	1.2%	1.87	2.9%
61	Burnet	0.03	0.0%	0.08	0.1%	0.14	0.2%	0.01	0.0%	0.02	0.0%	0.06	0.1%	0.03	0.1%
62	Llano	0.01	0.0%	0.01	0.0%	0.01	0.0%	0.00	0.0%	0.01	0.0%	0.00	0.0%	0.00	0.0%
63	San Saba	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.01	0.0%	0.00	0.0%	0.00	0.0%
64	Lampasas	0.00	0.0%	0.00	0.0%	0.01	0.0%	0.01	0.0%	0.01	0.0%	0.00	0.0%	0.00	0.0%
65	Mills	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.01	0.0%	0.00	0.0%	0.00	0.0%	0.00	0.0%
66	Coryell	0.00	0.0%	0.00	0.0%	0.02	0.0%	0.01	0.0%	0.01	0.0%	0.01	0.0%	0.00	0.0%
67	Hamilton	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.00	0.0%
68	Bell	0.83	1.2%	0.18	0.3%	0.11	0.2%	1.39	2.1%	0.19	0.3%	0.14	0.2%	1.18	1.8%
69	Milam	0.20	0.3%	0.16	0.2%	0.33	0.5%	0.29	0.4%	0.38	0.6%	0.67	1.0%	1.47	2.3%
70	Texoma COG	0.03	0.0%	0.04	0.1%	0.03	0.1%	0.10	0.2%	0.02	0.0%	0.03	0.1%	0.03	0.0%
71	Ark-Tex Area COG	0.62	0.9%	0.51	0.8%	0.18	0.3%	0.43	0.6%	0.22	0.3%	0.52	0.8%	0.75	1.2%
72	East Texas COG	2.47	3.6%	1.28	1.9%	0.67	1.0%	1.58	2.4%	1.29	2.0%	1.76	2.6%	3.54	5.4%
73	South East Texas RPC	1.31	1.9%	1.27	1.9%	1.33	2.1%	1.01	1.5%	1.08	1.7%	1.31	1.9%	0.99	1.5%
74	Golden Crescent RPC	0.47	0.7%	0.68	1.0%	1.15	1.8%	0.79	1.2%	3.66	5.7%	0.98	1.5%	0.27	0.4%
75	Houston-Galveston	3.13	4.6%	3.49	5.1%	3.47	5.4%	2.65	4.0%	3.66	5.7%	2.93	4.4%	2.49	3.8%
76	North Central Texas COG	0.45	0.7%	0.37	0.5%	0.64	1.0%	0.85	1.3%	0.53	0.8%	0.61	0.9%	0.48	0.7%
77	Coastal Bend COG	0.09	0.1%	0.13	0.2%	0.21	0.3%	0.15	0.2%	0.17	0.3%	0.09	0.1%	0.07	0.1%
78	South Texas DC	0.02	0.0%	0.01	0.0%	0.01	0.0%	0.04	0.1%	0.02	0.0%	0.01	0.0%	0.02	0.0%
79	Lower Rio Grande COG	0.01	0.0%	0.01	0.0%	0.01	0.0%	0.03	0.0%	0.01	0.0%	0.01	0.0%	0.01	0.0%
80	Heart of Texas COG	2.16	3.2%	0.90	1.3%	1.06	1.6%	2.68	4.0%	1.72	2.7%	1.70	2.5%	7.01	10.8%
81	Montana	0.08	0.1%	0.08	0.1%	0.08	0.1%	0.15	0.2%	0.07	0.1%	0.08	0.1%	0.09	0.1%
	Total	68.51	100%	68.05	100%	64.30	100%	66.92	100%	64.67	100%	66.96	100%	65.16	100%

5 Calculation of Projected 2017 Design Values Using the June 2012 Episode Data

AACOG calculated the projected DV for CAPCOG ozone monitors using the June 2012 episode projected to 2017. The modeled attainment demonstration at CAPCOG's Ozone monitors was conducted by completing a series of steps that are described in the EPA Guidance on the Use of Models.[17] The methodology followed the same procedures used to calculate the future DVs using the June 2006 episode.

Three time periods were used to determine the baseline DVs needed for future year projections. The time periods fell between 2010 and 2014, representing a five-year period based around the 2012 model year. The average of the 4th highest value (Table 2-1) at each regulatory sited monitor in the CAPCOG region was calculated for each of the following periods: 2010-2012, 2011-2013, and 2012-2014. The periods are referred to as 2012, 2013 and 2014 respectively.

Table 5-1: 4th Highest Ozone Value at Each Ozone Monitor in the Austin-Round Rock MSA, 2010-2014

Monitor	2010	2011	2012	2013	2014
C3	74	75	74	69	62
C38	70	73	76	70	63
C614	72	77	73	67	63
C690	65	73	73	75	66
C1603					57
C6602		75	69	69	
C1675		66	72	70	61

As shown in Table 5-2, C38 has the highest baseline modeling DV at 71.8 ppb. The baseline modeling DVs at the other monitors are 71.7 ppb at C3, 71.7 ppb at CAMS 690, 71.3 ppb at C614, and 71.0 ppb at C6602. A modeling DV was not calculated for C1603 because of the lack of monitoring data.

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[17] EPA, Dec. 3, 2014. "Modeling Guidance for Demonstrating Attainment of Air Quality Goals for Ozone, $PM_{2.5}$, and Regional Haze". Research Triangle Park, North Carolina. p. 39. Available online: http://www.epa.gov/scram001/guidance/guide/Draft_O3-PM-RH_Modeling_Guidance-2014.pdf. Accessed 08/04/15.

Table 5-2: Calculated Baseline Modeling Site-Specific Design Value, 2012

Monitoring Site	2010-2012 DV, ppb	2011-2013 DV, ppb	2012-2014 DV, ppb	Baseline DV used in the Modeling Attainment Test, ppb
C3	74.3	72.7	68.3	71.7
C38	73.0	73.0	69.7	71.8
C614	74.0	72.3	67.7	71.3
C690	70.3	73.7	71.3	71.7
C1603				
C6602		71.0		71.0
C1675		69.3	67.7	68.5

The model attainment test requires the calculation of a daily relative response factor (RRF). Instead of using the absolute photochemical model output, a RRF was calculated using the baseline and future case modeling. The ratio between future and baseline modeling 8-hour ozone predictions near each monitor was multiplied by the monitor-specific modeling DV. The area near a monitor was defined as the 3x3 array of 4-km grid cells surrounding the monitor.[18]

The highest predicted 8-hour daily ozone was selected in the 3x3 array for each monitor for the 2017 projection year. The peak ozone grid cell selected in the baseline year is the same cell that is used in the 2017 projection. Once the monitor-specific RRF was calculated for each day, the RRF was averaged. The future site-specific DV for each monitor is provided in the electronic data files. Table 5-3 and Table 5-4 have the calculated RRF factor and the future design value.

Table 5-3: Calculated RRF using the June 2012 Episode (2012 to 2017 APCA Projection), CAPCOG Ozone Monitors

Metric	C3	C38	C614	C690	C1603	C1675	C6602
Top 10 days (2006)	0.8750	0.8748	0.8899	0.8788	0.8886	0.8975	0.8761
Top 5 days (2006)	0.8612	0.8547	0.8753	0.8763	0.8836	0.8847	0.8704
Top 10 days (max grid cell in 2006 on days ≥60 ppb)	0.8750	0.8748	0.8899	0.8788	0.8886	0.8975	0.8761
Top 5 days (max grid cell in 2006 on days ≥60 ppb)	0.8612	0.8547	0.8753	0.8763	0.8836	0.8847	0.8704

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[18] *Ibid*., p. 102.

Table 5-4: Calculated Design Value using the June 2012 Episode (2012 to 2017 APCA Projection), CAPCOG Ozone Monitors

Design Value	C3	C38	C614	C690	C1675	C6602
Top 10 days (2006)	62.74	62.81	63.45	63.01	63.09	61.48
Top 5 days (2006)	61.75	61.37	62.41	62.83	62.74	60.60
Top 10 days (max grid cell in 2006 on days ≥60 ppb)	62.74	62.81	63.45	63.01	63.09	61.48
Top 5 days (max grid cell in 2006 on days ≥60 ppb)	61.75	61.37	62.41	62.83	62.74	60.60

Appendix A: Example of Receptor File

```
SINGLE CELL         C3       3         63        111
SINGLE CELL         C38      3         60        115
SINGLE CELL         C614     3         55        107
SINGLE CELL         C690     3         64        120
SINGLE CELL         C1675    3         59        97
SINGLE CELL         C1603    3         60        107
SINGLE CELL         C6602    3         68        116
```

Appendix B: Example of APCA Source Map

36km grid (western Half)

```
 1  1  1  1  1  1  1  1  1  1 37 37  1  1 37 37 37 37 37 37 37 37 37 37 37 37 37 37 37 37 37 37 37 37 37 37 37 37 37 37 37 37 37 37 37 37 37 37 37 37 37 37 37 37
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```

Appendix C: Example of CAMx Run Script for APCA

June 2012 Episode (2017 Future Projection)

```
#!/bin/csh
# CAMx 6.20
setenv OMP_NUM_THREADS 12

set BASE    = "/home/camx"
set INP     = "$BASE/input"
set EXEC    = "/home/camx/camx6.2_APCA/camx/camx4/CAMx.v6.20.noMPI.pgfomp"
set EMISSA  = "/home/WRF/input/ei"
#
set RUN     = "APCA.j12.17"
set ICBC    = "$INP/icbc"
set OUTPUT  = "$BASE/outputs/$RUN"
mkdir $OUTPUT
mkdir $RUN
#  --- set the dates and times ----
foreach f (120601.120531 120602.120601 120603.120602 120604.120603 120605.120604 120606.120605 120607.120606 120608.120607
120609.120608 120610.120609 120611.120610 120612.120611 120613.120612 120614.120613 120615.120614 120616.120615 120617.120616
120618.120617 120619.120618 120620.120619 120621.120620 120622.120621 120623.120622 120624.120623 120625.120624 120626.120625
120627.120626 120628.120627 120629.120628 120630.120629)
set TODAY = $f:r
set YESTERDAY = $f:e

set YEAR = 2012
set MM   = 06
set DD   = `echo $TODAY | cut -c5-6`

#  --- Create the input file (always called CAMx.in)

cat << ieof > CAMx.in

 &CAMx_Control

 Run_Message      = 'camx620APCA_cb6r2, 20060530, tx.fy17_06jun.c0j.2006_5layer_YSU_WSM6_3dsfc1h_fddats_gq_sfc_0',

!--- Model clock control ---

 Time_Zone        = 6,                 ! (0=UTC,5=EST,6=CST,7=MST,8=PST)
 Restart          = .true,
 Start_Date_Hour  = $YEAR,$MM,$DD,0000.0,  ! (YYYY,MM,DD,HHHH)
 End_Date_Hour    = $YEAR,$MM,$DD,2400.0,  ! (YYYY,MM,DD,HHHH)

 Maximum_Timestep    = 15.0,           ! minutes
 Met_Input_Frequency = 60.,            ! minutes
 Ems_Input_Frequency = 60.,            ! minutes
 Output_Frequency    = 60.,            ! minutes
```

```
!--- Map projection parameters ---

 Map_Projection           = 'LAMBERT', ! (LAMBERT,POLAR,UTM,LATLON)
 LAMBERT_Central_Meridian = -97.0,     ! deg (west<0,south<0)
 LAMBERT_Center_Longitude = -97.0,     ! deg (west<0,south<0)
 LAMBERT_Center_Latitude  = 40.0,      ! deg (west<0,south<0)
 LAMBERT_True_Latitude1   = 33.0,      ! deg (west<0,south<0)
 LAMBERT_True_Latitude2   = 45.0,      ! deg (west<0,south<0)

!--- Parameters for the master (first) grid ---

 Number_of_Grids      = 3,
 Master_Origin_XCoord = -2736.0,        ! km or deg, SW corner of cell(1,1)
 Master_Origin_YCoord = -2088.0,        ! km or deg, SW corner of cell(1,1)
 Master_Cell_XSize    = 36.0,           ! km or deg
 Master_Cell_YSize    = 36.0,           ! km or deg
 Master_Grid_Columns  = 148,
 Master_Grid_Rows     = 112,
 Number_of_Layers     = 28,

!--- Parameters for the second grid ---

 Nest_Meshing_Factor(2) = 3,           ! Relative to master grid
 Nest_Beg_I_Index(2)    = 50,          ! Relative to master grid
 Nest_End_I_Index(2)    = 98,          ! Relative to master grid
 Nest_Beg_J_Index(2)    = 14,          ! Relative to master grid
 Nest_End_J_Index(2)    = 49,          ! Relative to master grid

!--- Parameters for the third grid ---

 Nest_Meshing_Factor(3) = 9,           ! Relative to master grid
 Nest_Beg_I_Index(3)    = 68,          ! Relative to master grid
 Nest_End_I_Index(3)    = 88,          ! Relative to master grid
 Nest_Beg_J_Index(3)    = 17,          ! Relative to master grid
 Nest_End_J_Index(3)    = 40,          ! Relative to master grid

!--- Model options ---

 Diagnostic_Error_Check = false,       ! True = will stop after 1st timestep
 Flexi_Nest             = true,        ! allow flexi-nest of input files including restart
 Advection_Solver       = 'PPM',       ! (PPM,BOTT)
 Chemistry_Solver       = 'EBI',       ! (EBI,IEH,LSODE)
 PiG_Submodel           = 'GREASD',    ! (None,GREASD,IRON)
 Probing_Tool           = 'APCA',      ! (None,OSAT,GOAT,APCA,PSAT,DDM,HDDM,PA,IPR,IRR,RTRAC,RTCMC)
 Chemistry              = .true.,
 Drydep_Model           = 'ZHANG03',   ! (NONE,WESELY89,ZHANG03)  (new in CAMx 5.30)
 Wet_Deposition         = .true.,
 ACM2_Diffusion         = .false.,
 Super_Stepping         = .true.,
 Gridded_Emissions      = .true.,
 Point_Emissions        = .true.,
```

```
 Ignore_Emission_Dates  = .true.,

!--- Output specifications ---

 Root_Output_Name         = '/home/camx/outputs/$RUN/camx.$RUN.20$TODAY'
 Average_Output_3D        = .false.,
 Output_3D_Grid(1)        = .false.,   ! Set Average_Output_3D = .false.
 Output_3D_Grid(2)        = .false.,   ! if you set any of these to .true.
 Output_3D_Grid(3)        = .false.,
 HDF_Format_Output        = .false.,
 Output_Species_Names(1)  = 'O3',

!--- Input files ---

 Chemistry_Parameters = '/home/camx/input/other/chemparam/CAMx6.2.chemparam.2_NONE',
 Photolyis_Rates      = '/home/camx/input/other/tuv/camx6_cb6_tuv.20$TODAY.rpo_36km.2013MAY24.tuv48',
 Ozone_Column         = '/home/camx/input/other/o3map/camx6_o3c.20$TODAY.rpo_36km.2013MAY24',
 Initial_Conditions   = '',
 Boundary_Conditions  = '/home/camx/input/bcic/camx_cb6_bc.20$TODAY.geoschem2013a0.rpo_36km.2012',
 Top_Concentrations   = '',
 Point_Sources        = '/home/WRF/input/ei/camx_cb6_ei_el.jjas.tx.fy17.c0jCAIR',
 Master_Grid_Restart  = '/home/camx/outputs/$RUN/camx.$RUN.20$YESTERDAY.inst'
 Nested_Grid_Restart  = '/home/camx/outputs/$RUN/camx.$RUN.20$YESTERDAY.finst'
 PiG_Restart          = '/home/camx/outputs/$RUN/camx.$RUN.20$YESTERDAY.pig'

 Surface_Grid(1) = '/home/camx/input/other/landuse/camx6_landuse.rpo_36km.tceq2zhang26a.lai201206qc108ufun',
 Met3D_Grid(1)   = '/home/camx/input/met/camx6_met3d.20$TODAY.2012_wrf361_p2a.rpo_36km.v42',
 Met2D_Grid(1)   = '/home/camx/input/met/camx6_met2d.20$TODAY.2012_wrf361_p2a.rpo_36km.v42',
 Vdiff_Grid(1)   = '/home/camx/input/met/camx6_kv.20$TODAY.2012_wrf361_p2a.rpo_36km.v42.CMAQ.kv100',
 Cloud_Grid(1)   = '/home/camx/input/met/camx6_cr.20$TODAY.2012_wrf361_p2a.rpo_36km.v42',
 Emiss_Grid(1)   = '/home/eps3_v2/2017/merge/lo_emiss.bio.tx_36km.cb6.20$TODAY.june12.TCEQ.fy17.reg1.tx_36km',

 Surface_Grid(2) = '/home/camx/input/other/landuse/camx6_landuse.tx_12km.tceq2zhang26a.lai201206qc108ufun',
 Met3D_Grid(2)   = '/home/camx/input/met/camx6_met3d.20$TODAY.2012_wrf361_p2a.tx_12km.v42',
 Met2D_Grid(2)   = '/home/camx/input/met/camx6_met2d.20$TODAY.2012_wrf361_p2a.tx_12km.v42',
 Vdiff_Grid(2)   = '/home/camx/input/met/camx6_kv.20$TODAY.2012_wrf361_p2a.tx_12km.v42.CMAQ.kv100',
 Cloud_Grid(2)   = '/home/camx/input/met/camx6_cr.20$TODAY.2012_wrf361_p2a.tx_12km.v42',
 Emiss_Grid(2)   = '/home/eps3_v2/2017/merge/lo_emiss.bio.tx_12km.cb6.20$TODAY.june12.TCEQ.fy17.reg1.tx_12km',

 Surface_Grid(3) = '/home/camx/input/other/landuse/camx6_landuse.tx_4km.tceq2zhang26a.lai201206qc108ufun',
 Met3D_Grid(3)   = '/home/camx/input/met/camx6_met3d.20$TODAY.2012_wrf361_i2.tx_4km.v42',
 Met2D_Grid(3)   = '/home/camx/input/met/camx6_met2d.20$TODAY.2012_wrf361_i2.tx_4km.v42',
 Vdiff_Grid(3)   = '/home/camx/input/met/camx6_kv.20$TODAY.2012_wrf361_i2.tx_4km.v42.CMAQ.kv100',
 Cloud_Grid(3)   = '/home/camx/input/met/camx6_cr.20$TODAY.2012_wrf361_i2.tx_4km.v42',
 Emiss_Grid(3)   = '/home/eps3_v2/2017/merge/lo_emiss.bio.tx_4km.cb6.20$TODAY.june12.TCEQ.fy17.reg1.tx_4km',
 &END
!-------------------------------------------------------------------------------
 &SA_Control

 SA_File_Root                = '$OUTPUT/camx.$RUN.$YEAR$MM$DD',
```

```
 SA_Master_Sfc_Output        = .false.,
 SA_Nested_Sfc_Output        = .true.,
 SA_Summary_Output           = .true.,
 SA_Stratify_Boundary        = .false.,
 SA_Deposition_Output        = .false.,
 SA_Number_of_Source_Regions = 81,
 SA_Number_of_Source_Groups  = 3,

 Use_Leftover_Group          = .false.,

 Number_of_Timing_Releases   = 0,

 SA_Receptor_Definitions     = '/home/WRF/job/receptor.CAPCOG.CAMS'
 SA_Source_Area_Map(1)       = '/home/WRF/job/APCA.source.36km.map.CAPCOG',
 SA_Source_Area_Map(2)       = '/home/WRF/job/APCA.source.12km.map.CAPCOG',
 SA_Source_Area_Map(3)       = '/home/WRF/job/APCA.source.4km.map.CAPCOG',

 SA_Master_Restart           = '/home/camx/outputs/$RUN/camx.$RUN.20$YESTERDAY.sa.inst '
 SA_Nested_Restart           = ' '

 SA_Points_Group(1)          = ' ',
 SA_Points_Group(2)          = '/home/WRF/input/ei/camx_cb6_ei_el.jjas.tx.fy17.c0jCAIR.2',
 SA_Points_Group(3)          = ' ',

 SA_Emiss_Group_Grid(1,1)    = '/home/camx/input/ei/Components/camx_cb6_ei_bio.20$TODAY.MEGAN210_LAIq108ufunc_WRF361p2i2.rpo_36km' ,
 SA_Emiss_Group_Grid(2,1)    = '/home/eps3_v2/2017/merge/camx/camx_cb6_ei_lo.20$TODAY.TCEQ.fy17.no.fires.reg1.tx_36km' ,
 SA_Emiss_Group_Grid(3,1)    = '/home/eps3_v2/2017/merge/camx/camx_cb6_ei_lo.20$TODAY.TCEQ.fy17.fires.reg1.tx_36km',

 SA_Emiss_Group_Grid(1,2)    = '/home/camx/input/ei/Components/camx_cb6_ei_bio.20$TODAY.MEGAN210_LAIq108ufunc_WRF361p2i2.tx_12km' ,
 SA_Emiss_Group_Grid(2,2)    = '/home/eps3_v2/2017/merge/camx/camx_cb6_ei_lo.20$TODAY.TCEQ.fy17.no.fires.reg1.tx_12km' ,
 SA_Emiss_Group_Grid(3,2)    = '/home/eps3_v2/2017/merge/camx/camx_cb6_ei_lo.20$TODAY.TCEQ.fy17.fires.reg1.tx_12km',

 SA_Emiss_Group_Grid(1,3)    = '/home/camx/input/ei/Components/camx_cb6_ei_bio.20$TODAY.MEGAN210_LAIq108ufunc_WRF361p2i2.tx_4km' ,
 SA_Emiss_Group_Grid(2,3)    = '/home/eps3_v2/2017/merge/camx_cb6_ei_lo.20$TODAY.june12.TCEQ.fy17.no.fires.reg1.tx_4km' ,
 SA_Emiss_Group_Grid(3,3)    = '/home/eps3_v2/2017/merge/camx_cb6_ei_lo.20$TODAY.june12.TCEQ.fy17.fires.reg1.tx_4km',
 &END

ieof
#  --- Execute the model ---

cp -p CAMx.in $RUN/CAMx.$RUN.$TODAY.in
/usr/bin/time $EXEC | & tee $RUN/camx.$RUN.$TODAY.out

@ JDATE ++
end
```

Appendix D: Example of APCA Output

June 2012 Episode, June 30, 2017

```
CAMx,camx620APCA_cb6r2, 20060530, tx.fy17_06jun.c0j.2006_5layer_Y                    ,Anthropogenic Precursor Culpability Analysis,
APCA 150323                       ,
Fri Nov 11 20:12:17 2016

 File Duration  ,     12182,      0.00,     12182,     24.00,
Average Interval ,    1.0000

Number of timing periods     ,         0
Number of source areas       ,        81
Number of emission groupings ,         3
Number of tracer species     ,       980
Number of NOX species        ,       245
Number of VOC species        ,       245
Number of O3N species        ,       245
Number of O3V species        ,       245
Number of INERT TIME species ,         0
Number of DECAY TIME species ,         0

Tracer Names,
NOX000IC ,NOX000BC
,NOX001001,NOX001002,NOX001003,NOX001004,NOX001005,NOX001006,NOX001007,NOX001008,NOX001009,NOX001010,NOX001011,NOX001012,NOX001013,NOX
001014,NOX001015,NOX001016,NOX001017,NOX001018,NOX001019,NOX001020,NOX001021,NOX001022,NOX001023,NOX001024,NOX001025,NOX001026,NOX0010
27,NOX001028,NOX001029,NOX001030,NOX001031,NOX001032,NOX001033,NOX001034,NOX001035,NOX001036,NOX001037,NOX001038,NOX001039,NOX001040,N
OX001041,NOX001042,NOX001043,NOX001044,NOX001045,NOX001046,NOX001047,NOX001048,NOX001049,NOX001050,NOX001051,NOX001052,NOX001053,NOX00
1054,NOX001055,NOX001056,NOX001057,NOX001058,NOX001059,NOX001060,NOX001061,NOX001062,NOX001063,NOX001064,NOX001065,NOX001066,NOX001067
,NOX001068,NOX001069,NOX001070,NOX001071,NOX001072,NOX001073,NOX001074,NOX001075,NOX001076,NOX001077,NOX001078,NOX001079,NOX001080,NOX
001081,NOX002001,NOX002002,NOX002003,NOX002004,NOX002005,NOX002006,NOX002007,NOX002008,NOX002009,NOX002010,NOX002011,NOX002012,NOX0020
13,NOX002014,NOX002015,NOX002016,NOX002017,NOX002018,NOX002019,NOX002020,NOX002021,NOX002022,NOX002023,NOX002024,NOX002025,NOX002026,N
OX002027,NOX002028,NOX002029,NOX002030,NOX002031,NOX002032,NOX002033,NOX002034,NOX002035,NOX002036,NOX002037,NOX002038,NOX002039,NOX00
2040,NOX002041,NOX002042,NOX002043,NOX002044,NOX002045,NOX002046,NOX002047,NOX002048,NOX002049,NOX002050,NOX002051,NOX002052,NOX002053
,NOX002054,NOX002055,NOX002056,NOX002057,NOX002058,NOX002059,NOX002060,NOX002061,NOX002062,NOX002063,NOX002064,NOX002065,NOX002066,NOX
002067,NOX002068,NOX002069,NOX002070,NOX002071,NOX002072,NOX002073,NOX002074,NOX002075,NOX002076,NOX002077,NOX002078,NOX002079,NOX0020
80,NOX002081,NOX003001,NOX003002,NOX003003,NOX003004,NOX003005,NOX003006,NOX003007,NOX003008,NOX003009,NOX003010,NOX003011,NOX003012,N
OX003013,NOX003014,NOX003015,NOX003016,NOX003017,NOX003018,NOX003019,NOX003020,NOX003021,NOX003022,NOX003023,NOX003024,NOX003025,NOX00
3026,NOX003027,NOX003028,NOX003029,NOX003030,NOX003031,NOX003032,NOX003033,NOX003034,NOX003035,NOX003036,NOX003037,NOX003038,NOX003039
,NOX003040,NOX003041,NOX003042,NOX003043,NOX003044,NOX003045,NOX003046,NOX003047,NOX003048,NOX003049,NOX003050,NOX003051,NOX003052,NOX
003053,NOX003054,NOX003055,NOX003056,NOX003057,NOX003058,NOX003059,NOX003060,NOX003061,NOX003062,NOX003063,NOX003064,NOX003065,NOX0030
66,NOX003067,NOX003068,NOX003069,NOX003070,NOX003071,NOX003072,NOX003073,NOX003074,NOX003075,NOX003076,NOX003077,NOX003078,NOX003079,N
OX003080,NOX003081,

Number of receptors ,         7
  No,   Name,     Type,   Grid#,   Xloc,      Yloc,
   1, C3        ,    1,    3,        63,        111,
   2, C38       ,    1,    3,        60,        115,
   3, C614      ,    1,    3,        55,        107,
```

```
   4, C690      ,    1,    3,        64,        120,
   5, C1675     ,    1,    3,        59,         97,
   6, C1603     ,    1,    3,        60,        107,
   7, C6602     ,    1,    3,        68,        116,

Time Varying Tracer Data,

Data for Period,     12182,      0.00,     12182,      1.00,
  Receptor,    1,
2.4005E-17, 1.8415E-07, 6.7630E-10, 2.2227E-10, 3.1015E-10, 4.4579E-12, 1.2692E-10, 2.8994E-09, 2.4402E-10, 5.4885E-11, 1.3662E-09,
3.4652E-09, 8.3101E-10, 2.7239E-10, 2.6288E-10, 1.0787E-08, 1.4567E-08, 3.0979E-09, 1.8218E-09, 1.5664E-09, 3.0595E-10, 6.0295E-11,
1.0424E-10, 1.5765E-10, 4.9538E-11, 5.6650E-12, 2.8087E-12, 8.4495E-10, 2.3347E-12, 8.5261E-12, 4.7129E-12, 2.7460E-11, 3.1755E-10,
2.3739E-10, 1.9876E-11, 4.9250E-10, 1.6822E-10, 1.3331E-09, 2.0810E-11, 2.4551E-14, 4.3685E-14, 2.8338E-14, 2.2335E-14, 5.4784E-13,
2.0494E-08, 1.0240E-06, 6.0339E-10, 5.7267E-14, 3.4230E-14, 3.2361E-14, 2.9407E-10, 1.2842E-05, 3.5793E-06, 1.3173E-05, 1.0887E-05,
1.4149E-08, 6.4912E-05, 9.4601E-14, 1.7769E-07, 1.6926E-06, 7.4830E-12, 4.3873E-10, 2.7019E-08, 1.4061E-13, 2.6573E-13, 1.0221E-13,
1.9091E-13, 1.7136E-13, 2.2756E-17, 6.0884E-14, 2.0007E-09, 7.6204E-13, 3.6338E-13, 3.5550E-13, 6.0941E-12, 1.7439E-05, 4.0026E-06,
2.0939E-12, 1.6636E-10, 7.1966E-13, 1.6523E-13, 4.7922E-13, 3.2134E-10, 3.3390E-06, 1.1152E-09, 7.1627E-09, 3.1579E-11, 8.7972E-10,
1.2345E-09, 1.7191E-09, 4.5194E-10, 9.3165E-09, 2.3209E-08, 8.7192E-09, 1.0381E-09, 2.8529E-09, 4.9577E-08, 1.1572E-07, 4.6937E-08,
1.9023E-08, 2.1315E-08, 5.8344E-09, 1.7769E-09, 4.2473E-09, 4.3975E-09, 1.0384E-09, 5.2956E-10, 7.7828E-11, 4.4738E-09, 1.2329E-10,
2.8219E-10, 1.5495E-10, 4.8988E-10, 1.4026E-09, 4.0186E-10, 1.5983E-10, 3.2300E-09, 1.3360E-09, 2.7857E-09, 5.3192E-10, 3.8008E-13,
1.0099E-13, 2.2519E-14, 3.4504E-14, 2.0050E-12, 5.2863E-08, 6.9919E-06, 2.5802E-09, 6.4915E-14, 1.2845E-13, 3.0342E-13, 1.2813E-08,
8.3324E-05, 3.7000E-05, 7.0872E-05, 3.4233E-04, 1.5704E-08, 1.2707E-03, 6.5226E-14, 6.9607E-07, 2.3106E-05, 1.6716E-11, 2.8512E-09,
9.4325E-09, 3.5700E-14, 1.0753E-13, 1.1205E-13, 1.3079E-13, 1.2144E-13, 2.2350E-17, 4.7190E-13, 2.7527E-09, 2.6279E-12, 2.5682E-12,
2.2800E-12, 1.3230E-10, 1.9178E-04, 5.0481E-05, 1.6560E-11, 6.6252E-10, 2.9053E-12, 1.5557E-12, 2.5819E-12, 8.8558E-10, 1.4964E-15,
2.3888E-17, 2.1851E-17, 2.4490E-17, 2.3888E-17, 2.3888E-17, 2.3888E-17, 2.3888E-17, 2.3888E-17, 2.3888E-17, 2.3888E-17, 2.3888E-17,
2.3888E-17, 2.3888E-17, 2.3888E-17, 2.3888E-17, 2.3363E-17, 2.3888E-17, 2.3888E-17, 2.3888E-17, 2.3888E-17, 2.3888E-17, 2.3888E-17,
2.3888E-17, 2.3888E-17, 2.3888E-17, 2.3888E-17, 2.3888E-17, 2.3888E-17, 2.3888E-17, 2.3888E-17, 2.3888E-17, 2.3888E-17, 2.3888E-17,
1.5336E-14, 2.3888E-17, 2.8112E-15, 2.3888E-17, 2.3888E-17, 2.3888E-17, 2.3888E-17, 2.3888E-17, 2.3888E-17, 2.3888E-17, 2.3888E-17,
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2.3888E-17, 2.3888E-17, 1.6224E-14, 3.9011E-16, 2.3888E-17, 2.3888E-17, 2.3888E-17, 2.3888E-17, 2.3888E-17, 2.3888E-17, 2.3888E-17,
2.3888E-17, 2.3888E-17, 2.3888E-17, 1.4493E-15, 3.1079E-15, 5.4991E-14, 3.7306E-16, 1.7664E-12, 2.7105E-17, 1.1347E-16, 2.3888E-17,
2.3888E-17, 2.3941E-17, 2.3888E-17,
```

Appendix E: Run Log

Item	Run 1	Run 2	Run 3	Run 4	Run 5	Run 6
Run Label	camx620_cb6r2.tx.bl06_06jun.r3d.2006_5layer_YSU_WSM6_3dsfc1h_fddats_gq_sfc_0.control	Camx6.TCEQ.Eagle_Ford	camx620_cb6r2.tx.fy17_06jun.c0jCAIR.2006_5layer_YSU_WSM6_3dsfc1h_fddats_gq_sfc_0.control	basecase.camx6.2.rpo.2017.APCA	baseline.camx6.2.june2012.APCA	Camx6.2jun2012.12
Analysis Year	2006	2012	2017	2017	2017	2012
Date	8/31/2015	5/28/2015	9/3/2015	7/2/2016	7/12/2016	5/13/2016
Performing Party	TCEQ	AACOG	TCEQ	AACOG	AACOG	AACOG
Grid	RPO 36-km grid system, 12-km grid, and 4-km grid	RPO 36-km grid system, 12-km grid, and 4-km grid	RPO 36-km grid system, 12-km grid, and 4-km grid	RPO 36-km grid system, 12-km grid, and 4-km grid	RPO 36-km grid system, 12-km grid, and 4-km grid	RPO 36-km grid system, 12-km grid, and 4-km grid
Model	Camx6.2	Camx6.0	Camx6.2	Camx6.2	Camx6.2	Camx6.2
EPS3 version	EPS3 version 2	EPS3 version 2	EPS3 version 2	EPS3 version 2	EPS3 version 2	EPS3 version 2
dvection_Solver	PPM	PPM	PPM	PPM	PPM	PPM
Chemistry_Solver	EBI	EBI	EBI	EBI	EBI	EBI
PiG_Submodel	GREASD	GREASD	GREASD	GREASD	GREASD	GREASD
Probing_Tool	None	None	None	APCA	APCA	None
Drydep_Model	ZHANG03	ZHANG03	ZHANG03	ZHANG03	ZHANG03	ZHANG03
Wet_Deposition	true	true	true	true	true	true
ACM2_Diffusion	false	false	false	false	false	true
Meterology Release Date	6/22/2015	2/4/2015	9/3/2015	5/3/2016	5/3/2016	5/3/2016
TCEQ Emission Inventory Release Date	6/22/2015	2/4/2015	9/3/2015	5/3/2016	5/3/2016	5/3/2016
Chemistry Parameters	CAMx6.2.chemparam.2_NONE	CAMx6.0.chemparam.7	CAMx6.2.chemparam.2_NONE'	CAMx6.2.chemparam.2_NONE	CAMx6.2.chemparam.2_NONE	CAMx6.2.chemparam.2_NONE
Photolyis Rates	camx620_cb6_tuv.rpo_36km.2015AUG31.tuv48	camx6_cb6_tuv.rpo_36km.2013MAY08.tuv48	camx620_cb6_tuv.rpo_36km.2015AUG31.tuv48	camx6_cb6_tuv.rpo_36km.2013MAY08.tuv48	camx6_cb6_tuv.rpo_36km.2013MAY24.tuv48	camx6_cb6_tuv.rpo_36km.2013MAY24.tuv48
Boundary Conditions	camx_cb6_bc.geoschem.rpo_36km	camx_cb05_bc.geoschem.rpo_36km	camx_cb6_bc.geoschem2013.rpo_36km.2018	camx_cb6_bc.geoschem2013.rpo_36km.2018	camx_cb6_bc.geoschem2013a0.rpo_36km.2012	camx_cb6_bc.geoschem2013.rpo_36km.2018
Ozone Column	camx6_o3c.rpo_36km.2013MAY08	camx6_o3c.rpo_36km.2013MAY08	camx6_o3c.rpo_36km.2013MAY08	camx6_o3c.rpo_36km.2013MAY08	camx6_o3c.rpo_36km.2013MAY24	camx6_o3c.rpo_36km.2013MAY08
Emiss Grid(1)	camx_cb6_ei_lo.tx.bl06_06jun.r3d.rpo_36km	lo_emiss.bio.tx_36km.cb6.bl.06jun.reg1.tx_36km	camx_cb6_ei_lo.tx.fy17_06jun.c0j.rpo_36km	bio.tx_36km.cb6.TCEQ.fy17.reg1.tx_36km	bio.tx_36km.cb6.20xxxxxx.june12.TCEQ.fy17.reg1.tx_36km	camx_cb6p_ei_lo.tx.bl12_12jun.reg3.rpo_36km

Item	Run 1	Run 2	Run 3	Run 4	Run 5	Run 6
Emiss Grid(2)	camx_cb6_ei_lo.tx.bl06_06jun.r3d.tx_12km	lo_emiss.bio.tx_12km.cb6.bl.06jun.reg1.tx_12km	camx_cb6_ei_lo.tx.fy17_06jun.c0j.tx_12km	bio.tx_12km.cb6.TCEQ.fy17.reg1.tx_12km	bio.tx_12km.cb6.20xxxxxx.june12.TCEQ.fy17.reg1.tx_12km	camx_cb6p_ei_lo.tx.bl12_12jun.reg3.tx_12km
Emiss Grid(3)	camx_cb6_ei_lo.tx.bl06_06jun.r3d.tx_4km	lo_emiss.bio.tx_4km.cb6.TCEQ.2012.EPS3_v2.reg1.tx_4km	camx_cb6_ei_lo1.tx.fy17_06jun.c0j.tx_4km	bio.tx_4km.cb6.20xxxxxx.TCEQ.fy17.reg1.tx_4km	bio.tx_4km.cb6.20xxxxxx.june12.TCEQ.fy17.reg1.tx_4km	camx_cb6p_ei_lo.tx.bl12_12jun.reg3.tx_4km
Point Sources	camx_cb6_ei_el.jjas.tx.bl06.reg2i	ptsrce.PIG.cb6.TCEQ.osd_2012	camx_cb6_ei_el.jjas.tx.fy17.c0jCAIR	camx_cb6_ei_el.jjas.tx.fy17.c0jCAIR	camx_cb6_ei_el.jjas.tx.fy17.c0jCAIR	camx_cb6p_ei_el.tx.bc12_12jun.reg3
Local Emissions	No Updated Local Emission Updates	No Updated Local Emission Updates	No Updated Local Emission Updates	No Updated Local Emission Updates	No Updated Local Emission Updates	No Updated Local Emission Updates
Landuse Grid(1)	camx6_landuse.rpo_36km.tceq2zhang26a.lai200606qc108ufun	camx_landuse.rpo_36km.tceq2zhang26a.lai2006jun	camx6_landuse.rpo_36km.tceq2zhang26a.lai200606qc108ufun	camx6_landuse.rpo_36km.tceq2zhang26a.lai200606qc108ufun	camx6_landuse.rpo_36km.tceq2zhang26a.lai201206qc108ufun	camx6_landuse.rpo_36km.tceq2zhang26a.lai201206qc108ufun
Landuse Grid(2)	camx6_landuse.tx_12km.tceq2zhang26a.lai200606qc108ufun	camx_landuse.tx_12km.tceq2zhang26a.lai2006jun	camx6_landuse.tx_12km.tceq2zhang26a.lai200606qc108ufun	camx6_landuse.tx_12km.tceq2zhang26a.lai200606qc108ufun	camx6_landuse.tx_12km.tceq2zhang26a.lai201206qc108ufun	camx6_landuse.tx_12km.tceq2zhang26a.lai201206qc108ufun
Landuse Grid(3)	camx6_landuse.tx_4km.tceq2zhang26a.lai200606qc108ufun	camx_landuse.tx_4km.tceq2zhang26a.lai2006jun	camx6_landuse.tx_4km.tceq2zhang26a.lai200606qc108ufun	camx6_landuse.tx_4km.tceq2zhang26a.lai200606qc108ufun	camx6_landuse.tx_4km.tceq2zhang26a.lai201206qc108ufun	camx6_landuse.tx_4km.tceq2zhang26a.lai201206qc108ufun
Surface Grid(1)	camx6_landuse.rpo_36km.tceq2zhang26a.lai200606	camx6_landuse.rpo_36km.tceq2zhang26a.lai200606	camx6_landuse.rpo_36km.tceq2zhang26a.lai200606	camx6_landuse.rpo_36km.tceq2zhang26a.lai200606qc108ufun	camx6_landuse.rpo_36km.tceq2zhang26a.lai200606	camx6_landuse.rpo_36km.tceq2zhang26a.lai200606
Met3D Grid(1)	camx6_met3d.2006_5layer_YSU_KF_WSM5.rpo_36km.v33	camx6_met3d.2006_5layer_YSU_KF_WSM5.rpo_36km.v33	camx6_met3d.2006_5layer_YSU_KF_WSM5.rpo_36km.v33	camx6_met3d.2006_5layer_YSU_KF_WSM5.rpo_36km.v33	camx6_met3d.2012_wrf361_p2a.rpo_36km.v42	camx6_met3d.2012_wrf361_p2a.rpo_36km.v42
Met2D Grid(1)	camx6_met2d.2006_5layer_YSU_KF_WSM5.rpo_36km.v33	camx6_met2d.2006_5layer_YSU_KF_WSM5.rpo_36km.v33	camx6_met2d.2006_5layer_YSU_KF_WSM5.rpo_36km.v33	camx6_met2d.2006_5layer_YSU_KF_WSM5.rpo_36km.v33	camx6_met2d.2012_wrf361_p2a.rpo_36km.v42	camx6_met2d.2012_wrf361_p2a.rpo_36km.v42
Vdiff Grid(1)	camx6_kv.2006_5layer_YSU_KF_WSM5.rpo_36km.v33.YSU.kv100	camx6_kv.2006_5layer_YSU_KF_WSM5.rpo_36km.v33.YSU.kv100	camx6_kv.2006_5layer_YSU_KF_WSM5.rpo_36km.v33.YSU.kv100	camx6_kv.2006_5layer_YSU_KF_WSM5.rpo_36km.v33.YSU.kv100	camx6_kv.2012_wrf361_p2a.rpo_36km.v42.CMAQ.kv100	camx6_kv.2012_wrf361_p2a.rpo_36km.v42.CMAQ.kv100
Cloud Grid(1)	camx6_cr.2006_5layer_YSU_KF_WSM5.rpo_36km.v33	camx6_cr.2006_5layer_YSU_KF_WSM5.rpo_36km.v33	camx6_cr.2006_5layer_YSU_KF_WSM5.rpo_36km.v33	camx6_cr.2006_5layer_YSU_KF_WSM5.rpo_36km.v33	camx6_cr.2012_wrf361_p2a.rpo_36km.v42	camx6_cr.2012_wrf361_p2a.rpo_36km.v42
Surface Grid(2)	camx6_landuse.tx_12km.tceq2zhang26a.lai200606	camx6_landuse.tx_12km.tceq2zhang26a.lai200606	camx6_landuse.tx_12km.tceq2zhang26a.lai200606	camx6_landuse.rpo_36km.tceq2zhang26a.lai200606qc108ufun	camx6_landuse.tx_12km.tceq2zhang26a.lai201206qc108ufun	camx6_landuse.tx_12km.tceq2zhang26a.lai201206qc108ufun

Item	Run 1	Run 2	Run 3	Run 4	Run 5	Run 6
Met3D Grid(2)	camx6_met3d.2006_5layer_YSU_KF_WSM5.tx_12km.v33	camx6_met3d.2006_5layer_YSU_KF_WSM5.tx_12km.v33	camx6_met3d.2006_5layer_YSU_KF_WSM5.tx_12km.v33	camx6_met3d.2006_5layer_YSU_KF_WSM5.tx_12km.v33	camx6_met3d.2012_wrf361_p2a.tx_12km.v42	camx6_met3d.2012_wrf361_p2a.tx_12km.v42
Met2D Grid(2)	camx6_met2d.2006_5layer_YSU_KF_WSM5.tx_12km.v33	camx6_met2d.2006_5layer_YSU_KF_WSM5.tx_12km.v33	camx6_met2d.2006_5layer_YSU_KF_WSM5.tx_12km.v33	camx6_met2d.2006_5layer_YSU_KF_WSM5.tx_12km.v33	camx6_met2d.2012_wrf361_p2a.tx_12km.v42	camx6_met2d.2012_wrf361_p2a.tx_12km.v42
Vdiff Grid(2)	camx6_kv.2006_5layer_YSU_KF_WSM5.tx_12km.v33.YSU.kv100	camx6_kv.2006_5layer_YSU_KF_WSM5.tx_12km.v33.YSU.kv100	camx6_kv.2006_5layer_YSU_KF_WSM5.tx_12km.v33.YSU.kv100	camx6_kv.2006_5layer_YSU_KF_WSM5.tx_12km.v33.YSU.kv100	camx6_kv.2012_wrf361_p2a.tx_12km.v42.CMAQ.kv100	camx6_kv.2012_wrf361_p2a.tx_12km.v42.CMAQ.kv100
Cloud Grid(2)	camx6_cr.2006_5layer_YSU_KF_WSM5.tx_12km.v33	camx6_cr.2006_5layer_YSU_KF_WSM5.tx_12km.v33	camx6_cr.2006_5layer_YSU_KF_WSM5.tx_12km.v33	camx6_cr.2006_5layer_YSU_KF_WSM5.tx_12km.v33	camx6_cr.2012_wrf361_p2a.tx_12km.v42	camx6_cr.2012_wrf361_p2a.tx_12km.v42
Surface Grid(3)	camx6_landuse.tx_4km.tceq2zhang26a.lai200606	camx6_landuse.tx_4km.tceq2zhang26a.lai200606	camx6_landuse.tx_4km.tceq2zhang26a.lai200606	camx6_landuse.tx_4km.tceq2zhang26a.lai200606qc108ufun	camx6_landuse.tx_4km.tceq2zhang26a.lai201206qc108ufun	camx6_landuse.tx_4km.tceq2zhang26a.lai201206qc108ufun
Met3D Grid(3)	camx6_met3d.2006_5layer_YSU_WSM6_3dsfc1h_fddats_gq_sfc_0.tx_4km.v33	camx6_met3d.2006_5layer_YSU_WSM6_3dsfc1h_fddats_gq_sfc_0.tx_4km.v33	camx6_met3d.2006_5layer_YSU_WSM6_3dsfc1h_fddats_gq_sfc_0.tx_4km.v33	camx6_met3d.2006_5layer_YSU_WSM6_3dsfc1h_fddats_gq_sfc_0.tx_4km.v33	camx6_met3d.2012_wrf361_i2.tx_4km.v42	camx6_met3d.2012_wrf361_i2.tx_4km.v42
Met2D Grid(3)	camx6_met2d.2006_5layer_YSU_WSM6_3dsfc1h_fddats_gq_sfc_0.tx_4km.v33	camx6_met2d.2006_5layer_YSU_WSM6_3dsfc1h_fddats_gq_sfc_0.tx_4km.v33	camx6_met2d.2006_5layer_YSU_WSM6_3dsfc1h_fddats_gq_sfc_0.tx_4km.v33	camx6_met2d.2006_5layer_YSU_WSM6_3dsfc1h_fddats_gq_sfc_0.tx_4km.v33	camx6_met2d.2012_wrf361_i2.tx_4km.v42	camx6_met2d.2012_wrf361_i2.tx_4km.v42
Vdiff Grid(3)	camx6_kv.2006_5layer_YSU_WSM6_3dsfc1h_fddats_gq_sfc_0.tx_4km.v33.YSU.kv100	camx6_kv.2006_5layer_YSU_WSM6_3dsfc1h_fddats_gq_sfc_0.tx_4km.v33.YSU.kv100	camx6_kv.2006_5layer_YSU_WSM6_3dsfc1h_fddats_gq_sfc_0.tx_4km.v33.YSU.kv100	camx6_kv.2006_5layer_YSU_WSM6_3dsfc1h_fddats_gq_sfc_0.tx_4km.v33.YSU.kv100	camx6_kv.2012_wrf361_i2.tx_4km.v42.CMAQ.kv100	camx6_kv.2012_wrf361_i2.tx_4km.v42.CMAQ.kv100
Cloud Grid(3)	camx6_cr.2006_5layer_YSU_WSM6_3dsfc1h_fddats_gq_sfc_0.tx_4km.v33	camx6_cr.2006_5layer_YSU_WSM6_3dsfc1h_fddats_gq_sfc_0.tx_4km.v33	camx6_cr.2006_5layer_YSU_WSM6_3dsfc1h_fddats_gq_sfc_0.tx_4km.v33	camx6_cr.2006_5layer_YSU_WSM6_3dsfc1h_fddats_gq_sfc_0.tx_4km.v33	camx6_cr.2012_wrf361_i2.tx_4km.v42	camx6_cr.2012_wrf361_i2.tx_4km.v42

Appendix F: Photochemical Modeling Files

June 2006 APCA Run Files (Baseline run)
- basecase.camx6.2.rpo.2017.APCA.job
- basecase.camx6.2.rpo.2017.APCA.restart1.job
- basecase.camx6.2.rpo.2017.APCA.restart2.job
- basecase.camx6.2.rpo.2017.APCA.restart3.job

June 2012 APCA Run Files (Baseline run)
- basecase.camx6.2.june2012.APCA.job
- basecase.camx6.2.june2012.APCA.restart1.job
- basecase.camx6.2.june2012.APCA.restart2.job
- basecase.camx6.2.june2012.APCA.restart3.job

CAMx Source Maps
- APCA.source.12km.map.CAPCOG
- APCA.source.36km.map.CAPCOG
- APCA.source.4km.map.CAPCOG

CAMx Receptor Files
- receptor.CAPCOG.CAMS
- receptor.CAPCOG.CAMS.36km

CAMx Receptor Files for the June 2006 APCA Photochemical Modeling Run
- camx.APCA.j06.17.20060524.sa.receptor
- camx.APCA.j06.17.20060525.sa.receptor
- camx.APCA.j06.17.20060526.sa.receptor
- camx.APCA.j06.17.20060527.sa.receptor
- camx.APCA.j06.17.20060528.sa.receptor
- camx.APCA.j06.17.20060529.sa.receptor
- camx.APCA.j06.17.20060530.sa.receptor
- camx.APCA.j06.17.20060531.sa.receptor
- camx.APCA.j06.17.20060601.sa.receptor
- camx.APCA.j06.17.20060602.sa.receptor
- camx.APCA.j06.17.20060603.sa.receptor
- camx.APCA.j06.17.20060604.sa.receptor
- camx.APCA.j06.17.20060605.sa.receptor
- camx.APCA.j06.17.20060606.sa.receptor
- camx.APCA.j06.17.20060607.sa.receptor
- camx.APCA.j06.17.20060608.sa.receptor
- camx.APCA.j06.17.20060609.sa.receptor
- camx.APCA.j06.17.20060610.sa.receptor
- camx.APCA.j06.17.20060611.sa.receptor
- camx.APCA.j06.17.20060612.sa.receptor
- camx.APCA.j06.17.20060613.sa.receptor
- camx.APCA.j06.17.20060614.sa.receptor
- camx.APCA.j06.17.20060615.sa.receptor
- camx.APCA.j06.17.20060616.sa.receptor
- camx.APCA.j06.17.20060617.sa.receptor
- camx.APCA.j06.17.20060618.sa.receptor
- camx.APCA.j06.17.20060619.sa.receptor
- camx.APCA.j06.17.20060620.sa.receptor
- camx.APCA.j06.17.20060621.sa.receptor
- camx.APCA.j06.17.20060622.sa.receptor
- camx.APCA.j06.17.20060623.sa.receptor

camx.APCA.j06.17.20060624.sa.receptor
camx.APCA.j06.17.20060625.sa.receptor
camx.APCA.j06.17.20060626.sa.receptor
camx.APCA.j06.17.20060627.sa.receptor
camx.APCA.j06.17.20060628.sa.receptor
camx.APCA.j06.17.20060629.sa.receptor
camx.APCA.j06.17.20060630.sa.receptor

CAMx Receptor Files for the June 2012 APCA Photochemical Modeling RUn

camx.APCA.j12.17.20120516.sa.receptor
camx.APCA.j12.17.20120517.sa.receptor
camx.APCA.j12.17.20120518.sa.receptor
camx.APCA.j12.17.20120519.sa.receptor
camx.APCA.j12.17.20120520.sa.receptor
camx.APCA.j12.17.20120521.sa.receptor
camx.APCA.j12.17.20120522.sa.receptor
camx.APCA.j12.17.20120523.sa.receptor
camx.APCA.j12.17.20120524.sa.receptor
camx.APCA.j12.17.20120525.sa.receptor
camx.APCA.j12.17.20120526.sa.receptor
camx.APCA.j12.17.20120527.sa.receptor
camx.APCA.j12.17.20120528.sa.receptor
camx.APCA.j12.17.20120529.sa.receptor
camx.APCA.j12.17.20120530.sa.receptor
camx.APCA.j12.17.20120531.sa.receptor
camx.APCA.j12.17.20120601.sa.receptor
camx.APCA.j12.17.20120602.sa.receptor
camx.APCA.j12.17.20120603.sa.receptor
camx.APCA.j12.17.20120604.sa.receptor
camx.APCA.j12.17.20120605.sa.receptor
camx.APCA.j12.17.20120606.sa.receptor
camx.APCA.j12.17.20120607.sa.receptor
camx.APCA.j12.17.20120608.sa.receptor
camx.APCA.j12.17.20120609.sa.receptor
camx.APCA.j12.17.20120610.sa.receptor
camx.APCA.j12.17.20120611.sa.receptor
camx.APCA.j12.17.20120612.sa.receptor
camx.APCA.j12.17.20120613.sa.receptor
camx.APCA.j12.17.20120614.sa.receptor
camx.APCA.j12.17.20120615.sa.receptor
camx.APCA.j12.17.20120616.sa.receptor
camx.APCA.j12.17.20120617.sa.receptor
camx.APCA.j12.17.20120618.sa.receptor
camx.APCA.j12.17.20120619.sa.receptor
camx.APCA.j12.17.20120620.sa.receptor
camx.APCA.j12.17.20120621.sa.receptor
camx.APCA.j12.17.20120622.sa.receptor
camx.APCA.j12.17.20120623.sa.receptor
camx.APCA.j12.17.20120624.sa.receptor
camx.APCA.j12.17.20120625.sa.receptor
camx.APCA.j12.17.20120626.sa.receptor
camx.APCA.j12.17.20120627.sa.receptor
camx.APCA.j12.17.20120628.sa.receptor
camx.APCA.j12.17.20120629.sa.receptor
camx.APCA.j12.17.20120630.sa.receptor

Appendix F: Electronic Data Files

APCA_June_2006

- APCA results by source region and source group for the 2017 projection in the June 2006 photochemical modeling episode. Results are provided for the 81 source regions and the 5 source groups by percentages and ppb reduction
- Results are provided for each day, average for all days, average for of the maximum value for each day, and top five values.

APCA_June_2012

- APCA results by source region and source group for the 2017 projection in the June 2012 photochemical modeling episode. Results are provided for the 81 source regions and the 5 source groups by percentages and ppb reduction
- Results are provided for each day, average for all days, average for of the maximum value for each day, and top five values.

Max_o3.8hr.aacog.04km.summary_CAPCOG

- Calculated 2017 Design Values for June 2006 run
- Calculated 2017 Design Values for June 2012 run
- Calculated 2017 Design Values for June 2006 APCA run
- Calculated 2017 Design Values for June 2012 APCA run
- Photochemical Model Run Log
- Calculated Design Values for each Grid in the 3 x 3 4km grid array