February 4, 2005

Mr. Thomas Diggs, Chief
Air Planning Section (6PD-L)
U.S. Environmental Protection Agency
Region VI
1445 Ross Avenue
Dallas, TX 75202-2733

Dear Mr. Diggs:

In a letter to the TCEQ dated August 9, 2004, EPA Region VI commented on the State's proposed 8-hour ozone attainment demonstration for Beaumont-Port Arthur (BPA). In the letter, EPA stated its belief that there are technical uncertainties in the modeling, and that its staff would be meeting with TCEQ to discuss the details of EPA's concerns. During this meeting, which was held on September 2, 2004, EPA requested specific analyses that would assist with its review of the adopted BPA attainment demonstration.

This letter provides the additional information agreed to by EPA and the TCEQ during the September 2 meeting. We are providing the following analyses: a base case quantile-quantile (Q-Q) plot, base case performance evaluation metrics using a 7x7 grid cell array about each monitoring station, and a screening analysis for the future case. A description of each analysis is provided below.

**Base Case Quantile-Quantile Plot**

The Q-Q plot, provided in Figure 1, was developed from all observed and predicted 8-hour ozone concentration pairs for August 12-13, 2000, August 29-31, 2000, September 1-4, 2000, and September 6, 2000. Data for September 5, 2000 were not included because base case model performance on that day did not meet EPA acceptance criteria. Data for August 10-11, 2000 were excluded because these were modeling ramp up days. As discussed in EPA's 1991 document, ***Guidance on the Regulatory Application of the Urban Airshed Model***, the observed and predicted data for Q-Q plots are sorted by rank order separately, and then the ranked data are paired and plotted on a scatter diagram. The diagram includes a perfect prediction (1:1) line, and ±20% bounds. The ±20% bounds are recommended in the EPA's 1999 document, ***Draft Guidance on the Use of Models and Other Analyses in Attainment Demonstrations for the 8-Hour Ozone NAAQS*.** For the episode days considered, and for all data pairs at the upper end of the distribution (where the observed ozone concentrations area greater than 50 ppb), the data lie between the ±20% bounds recommended in EPA's guidance.

**Base Case Performance Evaluation**

As requested by EPA Region VI staff, base case performance metrics of unpaired peak accuracy, normalized bias, and normalized gross error were recomputed using alternative methodologies. As per the 1991 ***Guidance on the Regulatory Application of the Urban Airshed Model***, these statistics are normally calculated using bi-linear interpolation so that the model predictions can

be matched in space as closely as possible with the observational data. For this EPA-requested exercise, the TCEQ staff used a 7x7 array of predicted ozone concentrations surrounding each monitor, and computed the performance statistics using the maximum, minimum, mean, and median predicted 8-hour values within the 7x7 array. Since 1-hour performance statistics, by nature of the short time frame applied to the statistics, provide a better indication of whether models are predicting "the right answer for the right reason" than 8-hour performance statistics, 1-hour performance data were computed as well. Results for these base case performance evaluation metrics are provided in Tables 1 through 8. Although August 13 and 29, and September 2-6 were not 1-hour exceedance days in BPA, they are also included here. As expected, using the maximum predicted values within the 7x7 array leads to a much higher positive bias with respect to the other three versions, as well as with respect to the bilinear interpolation method used in the SIP. Similarly, using the minimum value leads to severe negative bias. The normalized gross error is also dramatically different when using either maximum or minimum values. Use of the 7x7 median, 7x7 mean, and bilinear interpolation would appear to be more reasonable approaches. The TCEQ continues to favor the bilinear interpolation method since it is the only one of these methods for which the model's predictions are matched in space with the observational data. Thus, this method serves best as a measure of the model's ability to reproduce observations.

**Screening Analysis**

The 1999 EPA document, ***Draft Guidance on the Use of Models and Other Analyses in Attainment Demonstrations for the 8-Hour Ozone NAAQS***, indicates that a "screening" test should be performed for each grid cell having a modeled daily maximum that is more than 5% greater than occurred at any grid cell within a 15 km radius around any monitor, for 50% or more of the modeled days. Specifically, the draft Guidance states:

> An additional review is necessary, particularly in nonattainment areas, where the ozone monitoring network just meets or minimally exceeds the size of the network required to report data to AIRS. This review is intended to insure that a control strategy leads to reduction in ozone at other locations which could have current design values exceeding the NAAQS were a monitor deployed there. The test is called a "screening" test, because if a current design value were measured at a location identified in the test, modeled results suggest it *might* exceed any at sites with available measurements.

The screening test was applied to the future year 2007, for which there was a modeling inventory available, and to 2005, which represents the middle year of the three-year period (2004-2006) that will likely be used to assess monitored 8-hour attainment. The choice of 2005 and 2007 for the screening test is consistent with the future years chosen for the analyses contained in the adopted SIP for BPA.

Figures 2 and 3 show the 15-km radius surrounding all BPA area monitors and the grid cells that are subject to the screening test, respectively. As shown in Figure 3, the cells subject to the screening test are only those over the northern end of Sabine Lake. These cells are referred to in Tables 9 and 10 as HOT1, HOT2, HOT3, HOT4, HOT5, HOT6, and HOT7. The screening Relative Reduction Factors and Future Design Value (RRF/DVF) calculations are shown in

Tables 9 and 10. For Table 9, 2007 is used as the future year, while for Table 10 an interpolated 2005 RRF/DVf is used. Following EPA's draft 8-hour guidance, the screening design value for 2007, which was calculated as 85.163, truncates to 85 ppb.

For Table 10, TCEQ staff used the following approach to derive a 2005 RRF/DVf from the 2007 modeling data. Although all BPA-area controls will be in place by 2005 ozone season, 80% of the Houston/Galveston/Brazoria point source NOx controls will be in place. Since ozone concentrations during the episode modeled are affected by emissions from both HGB and BPA, the effective reduction is somewhere between 80% and 100%. To be conservative, the ozone reduction benefit for 2005 was assumed to be 80% of that for 2007. The mean 2007 future case (over all days) predicted ozone concentration was subtracted from the mean 2000 base case (over all days) concentration for each monitoring station, including the screening cell (referred to as ZHOT in the table). Based on the 80 % assumption discussed above, for each station, this difference was multiplied by 0.8. The reduced difference was then subtracted from the 2000 mean base case ozone for each station, yielding a "2005" future case mean predicted ozone for each station. The "2005" future case mean ozone was divided by the 2000 base case mean ozone (again for each station) in order to yield the 2005 RRFs. As recommended by EPA for the case of the screening cells HOT1 through HOT7, the highest domain-wide 8-hour design value of 91 ppb (from the Sabine Pass station (S640) for 2000-2002) was used for the next step. Using the 2005 RRF for HOT6 of 0.945681 (highest of the seven cells) and multiplying by the Sabine Pass monitor's design value of 91 ppb yielded a "2005" screening design value of 86.057, which truncates to 86 ppb. Although both the 2007 and 2005 values exceed the 8-hour threshold of 84 ppb for indicating attainment, there are several factors that should be considered regarding the screening test:

- The Sabine Pass station, from which the monitored design value of 91 ppb was obtained, is much further away from the screening cells HOT1 through HOT7 than several other BPA monitoring stations, including CAMS28 (Port Arthur West), CAMS9 (West Orange), and the Jefferson County Airport (S643). Using the highest 8-hour design values from the closer stations would yield a maximum 2005 screening value among the screening cells of 84 ppb, based on the Jefferson County Airport site. This concentration is below the 8-hour ozone standard. Using the Jefferson County Airport design value, the 2007 screening DVf would be 83 ppb, which is also below the 8-hour ozone standard. Alternative DVf calculations are shown in Table 11.

  The use of design values for stations closer to the screening cells would be more appropriate than use of the design value from the Sabine Pass monitor. The Sabine Pass monitor is located approximately 20 kilometers from the station closest to the screening cells. Meteorological regimes that lead to high ozone over the Sabine Pass area are different from regimes nearest to the screening cells. Thus, the use of the design value at the Sabine Pass monitor in this case is not appropriate.

- The screening cells HOT1 through HOT7 are located over Sabine Lake. In a practical sense, TCEQ will not be able to locate a monitor in the lake for an extended period to assess attainment of the ozone standard.

- Historical TCEQ modeling runs covering bodies of water such as Sabine Lake indicate that mixing over water is difficult to simulate in both the meteorological model (MM5 in this case) and the photochemical model (CAMx in this case). Simulated mixing heights over bodies of water tend to be extremely shallow, leading to high predicted ozone concentrations. Although relatively low mixing heights over water makes sense conceptually, there were no upper air data available to verify the modeled mixing heights over Sabine Lake. Thus, our confidence in the predicted ozone concentrations over the lake is diminished.

**Summary**

In this letter we have provided additional performance evaluation data using alternative procedures suggested by EPA. TCEQ continues to favor the bilinear interpolation method since it is the only method for which the model's predictions are matched in space with the observational data. Furthermore, results have been provided from a screening test that do not contradict the conclusion in the adopted SIP revision that the BPA area will be in attainment of the 8-hour ozone standard by 2005 and 2007.

As pointed out in the adopted SIP revision, the attainment analysis for BPA is strengthened by several other factors that must also be taken into account. Several new Texas programs including cleaner diesel fuel, energy efficiency reductions from statewide building codes, and the Texas Emissions Reduction Program (TERP) as well as new federal programs will be coming on line in the future. As these additional programs are put into effect in Southeast Texas, the air quality will continue to improve.

The results provided in this letter may change due to adjustments in emission rates related to a revised motor vehicle emissions budget under development for BPA. We expect to have the revised technical work completed by the end of March 2005.

If you have any question or comments, please call me at (512) 239-3900 You may also direct questions or comments to Mr. James Red of my staff at (512)239-1465.

Sincerely,

Candice Garrett, Director
Air Quality Planning and Implementation Division
Texas Commission on Environmental Quality

Enclosures

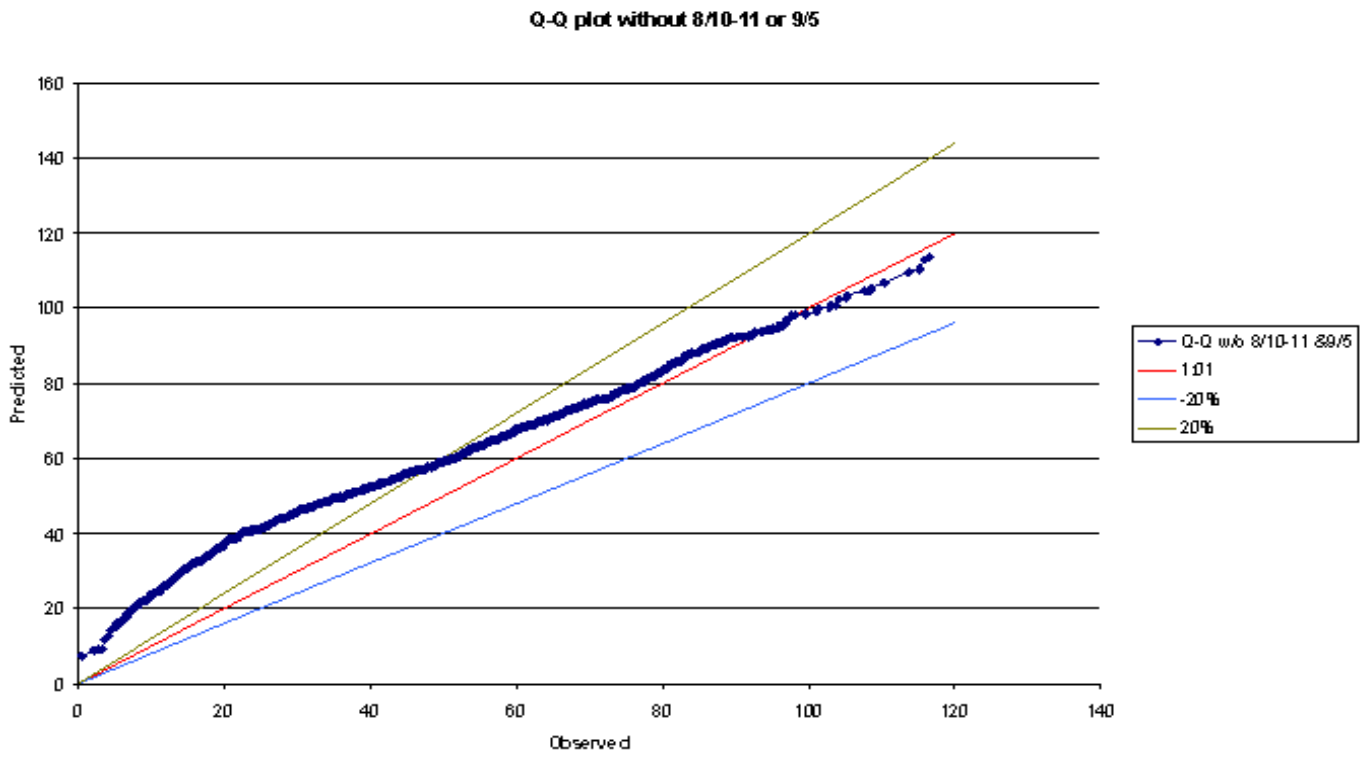


Figure 1: Q-Q plot of 8-hour observed vs predicted

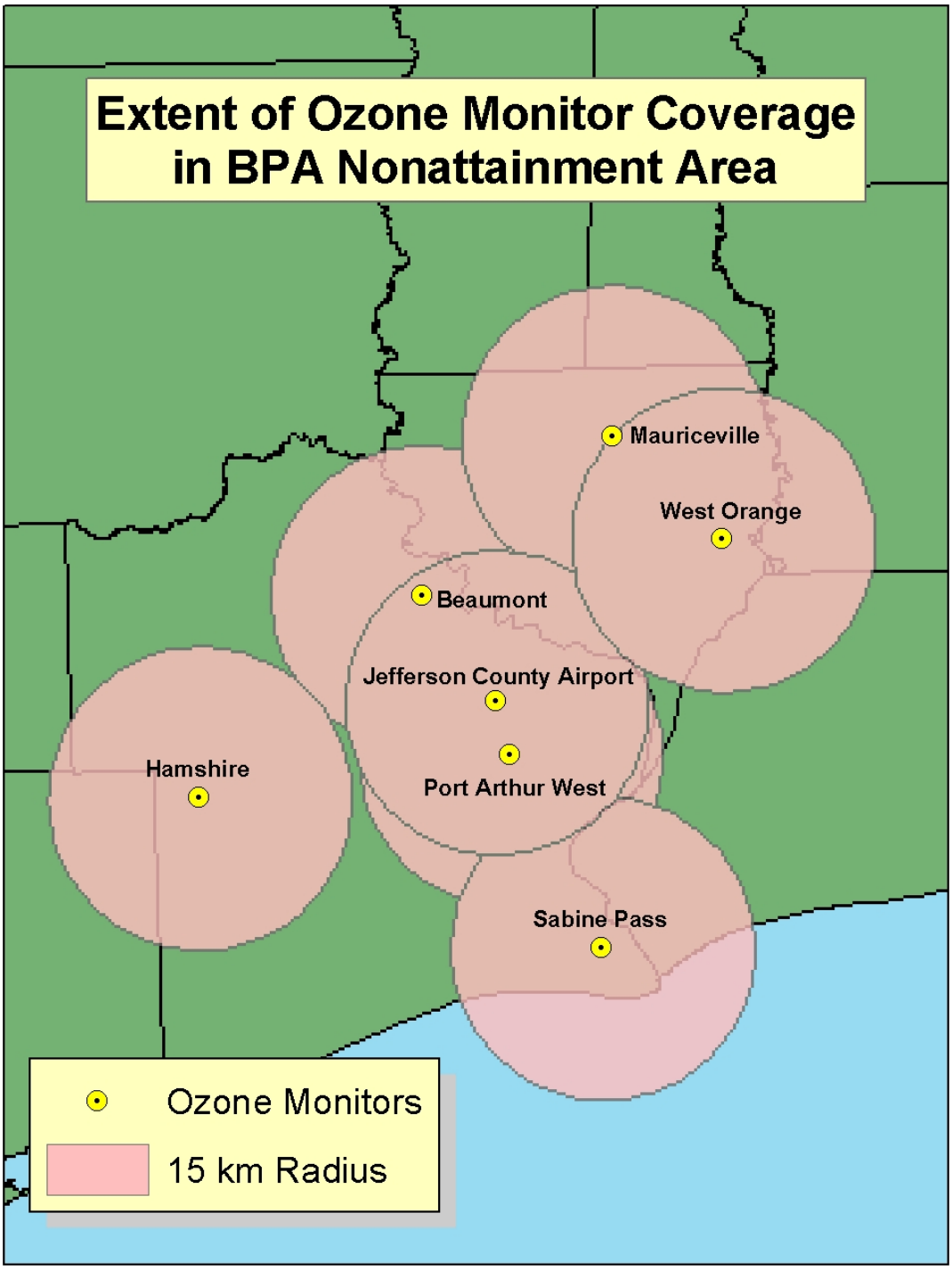


Figure 2 : 15-km Radii, BPA-area monitors

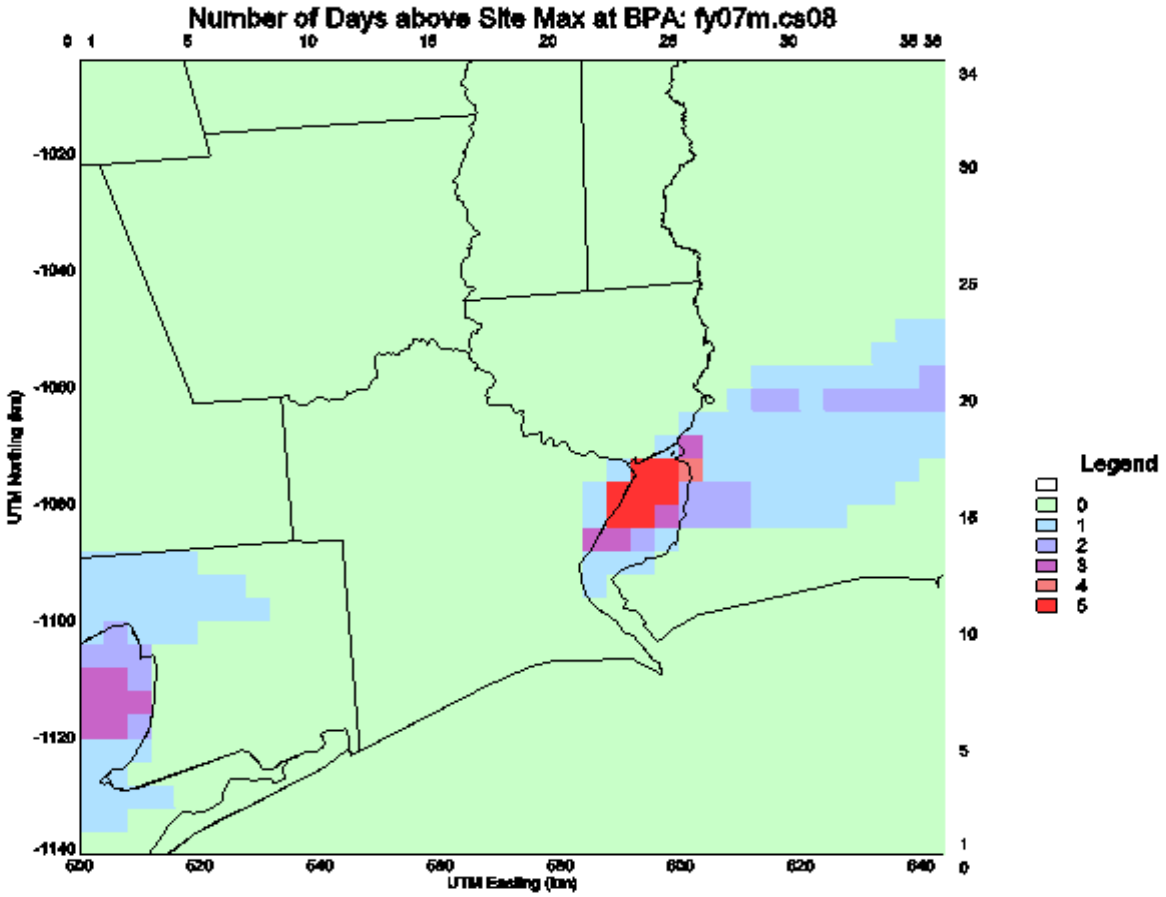


Figure 3: Grid cells greater than site maximum over BPA modeling domain

Table 1: 1-hour metrics - maximum value within 7x7 array

| HGMCR: base5b.pto2n2 (1h_07x07max) (Hourly Averages) | | | | | | |
|---|---|---|---|---|---|---|
| BPA area in HGBPA Sub-domain (cell size: 4x4km) | | | | | | |
| | All Data Pair of Obs > 60.0 ppb | | Domain Maximum | | | |
| Episode Date | Normalized Bias | Normalized Gross Error | Accuracy | Modeled | Observed | |
| | 5-15% | 30-35% | 15-20% | ppb | ppb | Site |
| **8/12/2000** | 13.8 | 20.7 | -4.3 | 120.6 | 126 | PAWC |
| **8/13/2000** | 6.5 | 11.9 | -7.9 | 93.9 | 102 | BMTC |
| **8/29/2000** | 16.4 | 19.5 | -7.6 | 105.3 | 114 | WORA |
| **8/30/2000** | 12.8 | 28.3 | -25.1 | 123.6 | 165 | PAWC |
| **8/31/2000** | 35.3 | 35.7 | -1.4 | 149.9 | 152.1 | S40S |
| **9/1/2000** | 34.1 | 41.3 | -19.1 | 129.5 | 160 | PAWC |
| **9/2/2000** | 22.7 | 31.3 | 36 | 137 | 100.8 | S40S |
| **9/3/2000** | 38 | 38.9 | 15.8 | 123.9 | 107 | WORA |
| **9/4/2000** | 18.1 | 20.8 | 11.9 | 128.7 | 115 | PAWC |
| **9/6/2000** | 19.4 | 24.3 | -4.1 | 108.4 | 113 | PAWC |

PAWC - Port Arthur West CAMS28
BMTC - Beaumont CAMS2
WORA - West Orange CAMS9
S40S - CAMS640

Table 2: 1-hour metrics - median value within 7x7 array

| HGMCR: base5b.pto2n2 (1h_07x07median) (Hourly Averages) | | | | | | |
|---|---|---|---|---|---|---|
| BPA area in HGBPA Sub-domain (cell size: 4x4km) | | | | | | |
| | All Data Pair of Obs > 60.0 ppb | | Domain Maximum | | | |
| Episode Date | Normalized Bias | Normalized Gross Error | Accuracy | Modeled | Observed | |
| | 5-15% | 30-35% | 15-20% | ppb | ppb | Site |
| 8/12/2000 | -5.6 | 16.2 | -4.3 | 120.6 | 126 | PAWC |
| 8/13/2000 | -7.2 | 12.3 | -7.9 | 93.9 | 102 | BMTC |
| 8/29/2000 | -2.3 | 12.4 | -7.6 | 105.3 | 114 | WORA |
| 8/30/2000 | -5.2 | 18.1 | -25.1 | 123.6 | 165 | PAWC |
| 8/31/2000 | 5 | 14.1 | -1.4 | 149.9 | 152.1 | S40S |
| 9/1/2000 | 17.1 | 30.7 | -19.1 | 129.5 | 160 | PAWC |
| 9/2/2000 | -0.3 | 19 | 36 | 137 | 100.8 | S40S |
| 9/3/2000 | 11 | 17.2 | 15.8 | 123.9 | 107 | WORA |
| 9/4/2000 | -1.4 | 12.2 | 11.9 | 128.7 | 115 | PAWC |
| 9/6/2000 | 8.6 | 15.8 | -4.1 | 108.4 | 113 | PAWC |
| | | | | | | |

PAWC - Port Arthur West CAMS28
BMTC - Beaumont CAMS2
WORA - West Orange CAMS9
S40S - CAMS640

Table 3: 1-hour metrics - mean value within 7x7 array

| HGMCR: base5b.pto2n2 (1h_07x07mean) (Hourly Averages) | | | | | | |
|---|---|---|---|---|---|---|
| BPA area in HGBPA Sub-domain (cell size: 4x4km) | | | | | | |
| | All Data Pair of Obs > 60.0 ppb | | Domain Maximum | | | |
| Episode Date | Normalized Bias | Normalized Gross Error | Accuracy | Modeled | Observed | |
| | 5-15% | 30-35% | 15-20% | ppb | ppb | Site |
| 8/12/2000 | -5.6 | 15.6 | -4.3 | 120.6 | 126 | PAWC |
| 8/13/2000 | -7.4 | 12.3 | -7.9 | 93.9 | 102 | BMTC |
| 8/29/2000 | -2.4 | 12.4 | -7.6 | 105.3 | 114 | WORA |
| 8/30/2000 | -6 | 17.8 | -25.1 | 123.6 | 165 | PAWC |
| 8/31/2000 | 6.6 | 14.2 | -1.4 | 149.9 | 152.1 | S40S |
| 9/1/2000 | 17.1 | 30.7 | -19.1 | 129.5 | 160 | PAWC |
| 9/2/2000 | 1 | 19 | 36 | 137 | 100.8 | S40S |
| 9/3/2000 | 11.7 | 17.4 | 15.8 | 123.9 | 107 | WORA |
| 9/4/2000 | -1.1 | 13.1 | 11.9 | 128.7 | 115 | PAWC |
| 9/6/2000 | 8.1 | 15.7 | -4.1 | 108.4 | 113 | PAWC |

PAWC - Port Arthur West CAMS28
BMTC - Beaumont CAMS2
WORA - West Orange CAMS9
S40S - CAMS640

Table 4: 1-hour metrics - minimum value within 7x7 array

| HGMCR: base5b.pto2n2 (1h_07x07min) (Hourly Averages) | | | | | | |
|---|---|---|---|---|---|---|
| BPA area in HGBPA Sub-domain (cell size: 4x4km) | | | | | | |
| | All Data Pair of Obs > 60.0 ppb | | Domain Maximum | | | |
| Episode Date | Normalized Bias | Normalized Gross Error | Accuracy | Modeled | Observed | |
| | 5-15% | 30-35% | 15-20% | ppb | ppb | Site |
| 8/12/2000 | -26.5 | 28.5 | -4.3 | 120.6 | 126 | PAWC |
| 8/13/2000 | -22.7 | 23.8 | -7.9 | 93.9 | 102 | BMTC |
| 8/29/2000 | -20.9 | 23.6 | -7.6 | 105.3 | 114 | WORA |
| 8/30/2000 | -26.3 | 26.7 | -25.1 | 123.6 | 165 | PAWC |
| 8/31/2000 | -15.2 | 19.7 | -1.4 | 149.9 | 152.1 | S40S |
| 9/1/2000 | 1.6 | 25.3 | -19.1 | 129.5 | 160 | PAWC |
| 9/2/2000 | -15.3 | 20.3 | 36 | 137 | 100.8 | S40S |
| 9/3/2000 | -7.9 | 12 | 15.8 | 123.9 | 107 | WORA |
| 9/4/2000 | -19.1 | 20.9 | 11.9 | 128.7 | 115 | PAWC |
| 9/6/2000 | -7.4 | 14.2 | -4.1 | 108.4 | 113 | PAWC |

PAWC - Port Arthur West CAMS28
BMTC - Beaumont CAMS2
WORA - West Orange CAMS9
S40S - CAMS640

Table 5: 8-hour metrics - maximum value within 7x7 array

| HGMCR: base5b.pto2n2 (8h_07x07max) (8-Hour Moving Averages) | | | | | | |
|---|---|---|---|---|---|---|
| BPA area in HGBPA Sub-domain (cell size: 4x4km) | | | | | | |
| | All Data Pair of Obs > 40.0 ppb | | Domain Maximum | | | |
| Episode Date | Normalized Bias | Normalized Gross Error | Accuracy | Modeled | Observed | |
| | 5-15% | 30-35% | 15-20% | ppb | ppb | Site |
| 8/12/2000 | 26 | 27.7 | 5.6 | 105.3 | 99.8 | PAWC |
| 8/13/2000 | 12.1 | 14.4 | -5.6 | 84 | 89 | JEFC |
| 8/29/2000 | 23.8 | 23.8 | 5.9 | 88.3 | 83.4 | BMTC |
| 8/30/2000 | 22.2 | 24.8 | -7.7 | 107.4 | 116.4 | S40S |
| 8/31/2000 | 35.1 | 35.1 | 28.5 | 135.3 | 105.2 | PAWC |
| 9/1/2000 | 33.1 | 34.8 | 18.6 | 113.9 | 96 | PAWC |
| 9/2/2000 | 19.5 | 20.9 | 14.2 | 99.1 | 86.8 | PAWC |
| 9/3/2000 | 38.5 | 39.2 | 24.2 | 93.4 | 75.2 | WORA |
| 9/4/2000 | 22.7 | 22.7 | 7 | 105.1 | 98.3 | S40S |
| 9/6/2000 | 34.4 | 34.4 | 17.6 | 100.9 | 85.8 | PAWC |
| | | | | | | |

PAWC - Port Arthur West CAMS28
JEFC - Hamshire CAM64
BMTC - Beaumont CAMS2
WORA - West Orange CAMS9
S40S - CAMS640

Table 6: 8-hour metrics - median value within 7x7 array

| HGMCR: base5b.pto2n2 (8h_07x07median) (8-Hour Moving Averages) | | | | | | |
|---|---|---|---|---|---|---|
| BPA area in HGBPA Sub-domain (cell size: 4x4km) | | | | | | |
| | All Data Pair of Obs > 40.0 ppb | | Domain Maximum | | | |
| Episode Date | Normalized Bias | Normalized Gross Error | Accuracy | Modeled | Observed | |
| | 5-15% | 30-35% | 15-20% | ppb | ppb | Site |
| 8/12/2000 | 4.7 | 14.8 | 5.6 | 105.3 | 99.8 | PAWC |
| 8/13/2000 | 1.7 | 10.2 | -5.6 | 84 | 89 | JEFC |
| 8/29/2000 | 9.5 | 12 | 5.9 | 88.3 | 83.4 | BMTC |
| 8/30/2000 | 5.8 | 15.7 | -7.7 | 107.4 | 116.4 | S40S |
| 8/31/2000 | 13.4 | 15.1 | 28.5 | 135.3 | 105.2 | PAWC |
| 9/1/2000 | 24.3 | 28.6 | 18.6 | 113.9 | 96 | PAWC |
| 9/2/2000 | 6.7 | 14.5 | 14.2 | 99.1 | 86.8 | PAWC |
| 9/3/2000 | 24 | 25.7 | 24.2 | 93.4 | 75.2 | WORA |
| 9/4/2000 | 7.5 | 12.2 | 7 | 105.1 | 98.3 | S40S |
| 9/6/2000 | 25.1 | 25.6 | 17.6 | 100.9 | 85.8 | PAWC |
| | | | | | | |

PAWC - Port Arthur West CAMS28
JEFC - Hamshire CAM64
BMTC - Beaumont CAMS2
WORA - West Orange CAMS9
S40S - CAMS640

Table 7: 8-hour metrics - mean value within 7x7 array

| HGMCR: base5b.pto2n2 (8h_07x07mean) (8-Hour Moving Averages) | | | | | | |
|---|---|---|---|---|---|---|
| BPA area in HGBPA Sub-domain (cell size: 4x4km) | | | | | | |
| | All Data Pair of Obs > 40.0 ppb | | Domain Maximum | | | |
| Episode Date | Normalized Bias | Normalized Gross Error | Accuracy | Modeled | Observed | |
| | 5-15% | 30-35% | 15-20% | ppb | ppb | Site |
| **8/12/2000** | **6** | **14.9** | **5.6** | **105.3** | **99.8** | **PAWC** |
| **8/13/2000** | **1.7** | **10.3** | **-5.6** | **84** | **89** | **JEFC** |
| **8/29/2000** | 9.4 | 12 | 5.9 | 88.3 | 83.4 | BMTC |
| **8/30/2000** | 5.5 | 15.2 | -7.7 | 107.4 | 116.4 | S40S |
| **8/31/2000** | 14.5 | 15.9 | 28.5 | 135.3 | 105.2 | PAWC |
| **9/1/2000** | 23.7 | 27.8 | 18.6 | 113.9 | 96 | PAWC |
| **9/2/2000** | 6.9 | 14.1 | 14.2 | 99.1 | 86.8 | PAWC |
| **9/3/2000** | 24.3 | 25.9 | 24.2 | 93.4 | 75.2 | WORA |
| **9/4/2000** | 8.3 | 12.5 | 7 | 105.1 | 98.3 | S40S |
| **9/6/2000** | 24.5 | 25 | 17.6 | 100.9 | 85.8 | PAWC |

PAWC - Port Arthur West CAMS28
JEFC - Hamshire CAM64
BMTC - Beaumont CAMS2
WORA - West Orange CAMS9
S40S - CAMS640

Table 8: 8-hour metrics - minimum value within 7x7 array

| HGMCR: base5b.pto2n2 (8h_07x07min) (8-Hour Moving Averages) | | | | | | |
|---|---|---|---|---|---|---|
| BPA area in HGBPA Sub-domain (cell size: 4x4km) | | | | | | |
| | All Data Pair of Obs > 40.0 ppb | | Domain Maximum | | | |
| Episode Date | Normalized Bias | Normalized Gross Error | Accuracy | Modeled | Observed | |
| | 5-15% | 30-35% | 15-20% | ppb | ppb | Site |
| 8/12/2000 | -12.2 | 19 | 5.6 | 105.3 | 99.8 | PAWC |
| 8/13/2000 | -9.6 | 16.1 | -5.6 | 84 | 89 | JEFC |
| 8/29/2000 | -5.9 | 13.8 | 5.9 | 88.3 | 83.4 | BMTC |
| 8/30/2000 | -9.7 | 15.1 | -7.7 | 107.4 | 116.4 | S40S |
| 8/31/2000 | -1.5 | 11.9 | 28.5 | 135.3 | 105.2 | PAWC |
| 9/1/2000 | 12.6 | 20.6 | 18.6 | 113.9 | 96 | PAWC |
| 9/2/2000 | -5.8 | 15.3 | 14.2 | 99.1 | 86.8 | PAWC |
| 9/3/2000 | 12.9 | 16.1 | 24.2 | 93.4 | 75.2 | WORA |
| 9/4/2000 | -4 | 15.3 | 7 | 105.1 | 98.3 | S40S |
| 9/6/2000 | 10.4 | 16.4 | 17.6 | 100.9 | 85.8 | PAWC |

PAWC - Port Arthur West CAMS28
JEFC - Hamshire CAM64
BMTC - Beaumont CAMS2
WORA - West Orange CAMS9
S40S - CAMS640

Table 9: 2007 Screening Cells Analysis for BPA

| | | | | **Ozone Concentrations (ppb) of 2000 Base Case base5c.psito2n2** | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Site** | **99-01** | **00-02 DVc** | **01-03 DVc** | **8/12/00** | **8/13/00** | **8/29/00** | **8/30/00** | **8/31/00** | **9/1/00** | **9/2/00** | **9/3/00** | **9/4/00** | **9/6/00** | | |
| **BMTC** | **80** | 80 | 78 | 70.16 | 78.96 | 86.52 | 94.4 | 105.48 | 107.67 | 94.5 | 78.06 | 82.7 | 79.33 | | |
| **HOT1** | 90 | 91 | 91 | 103.77 | 78.64 | [68.46] | 106.99 | 133.07 | 110.63 | 80.11 | 92.32 | 105.49 | 89.17 | | |
| **HOT2** | 90 | 91 | 91 | 104.18 | 80.89 | 70.73 | 106.99 | 133.07 | 110.63 | 87.62 | 92.32 | 105.49 | 86.46 | | |
| **HOT3** | 90 | 91 | 91 | 103.77 | 78.28 | [68.46] | 106.99 | 135.22 | 112.41 | 79.83 | 93.35 | 105.49 | 92.67 | | |
| **HOT4** | 90 | 91 | 91 | 104.18 | 80.89 | 70.73 | 107.26 | 135.22 | 113.95 | 84.54 | 93.35 | 105.49 | 88.37 | | |
| **HOT5** | 90 | 91 | 91 | 104.18 | 82.29 | 73.19 | 107.26 | 135.22 | 113.95 | 90.41 | 93.35 | 105.49 | 85.52 | | |
| **HOT6** | 90 | 91 | 91 | 104.18 | 80.89 | 70.73 | 107.26 | 135.22 | 113.95 | 82.11 | 93.35 | 105.49 | 91.52 | | |
| **HOT7** | 90 | 91 | 91 | 104.18 | 82.22 | 71.75 | 107.26 | 135.22 | 113.95 | 87.76 | 93.35 | 105.49 | 87 | | |
| **JEFC** | | 79 | 75 | 76.39 | 80.38 | 75.51 | 75.69 | 85.17 | 100.98 | 93.21 | 82.5 | 91.22 | 88.13 | | |
| **PAWC** | 85 | 84 | 78 | 95.76 | 80.21 | [67.10] | 94.35 | 105.26 | 97.05 | 83.03 | 84.05 | 98.07 | 85.75 | | |
| **S404** | 90 | 91 | 91 | 99.1 | 72.3 | [52.20] | 97.52 | 117.67 | 94.97 | [65.63] | 70.84 | 95.27 | 99.84 | | |
| **S42S** | 92 | 76 | 76 | [57.07] | 73.35 | 84.39 | 80.23 | 77.92 | 102.64 | 87.5 | 77.5 | 71.55 | 76.49 | | |
| **S43S** | 89 | 85 | 86 | 92.08 | 80.84 | 70.7 | 94.34 | 102.92 | 96.92 | 90.05 | 82.83 | 96.49 | 85.61 | | |
| **WORA** | 74 | 81 | 80 | 72.72 | 83.1 | 81.94 | 91.1 | 95.64 | 108.4 | 93.68 | 79.97 | 78.07 | 78.64 | | |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| | | | | **Ozone Concentrations (ppb) of 2007 Case fy07m.cs08** | | | | | | | | | | | |
| **Site** | **99-01** | **00-02 DVc** | **01-03 DVc** | **8/12/00** | **8/13/00** | **8/29/00** | **8/30/00** | **8/31/00** | **9/1/00** | **9/2/00** | **9/3/00** | **9/4/00** | **9/6/00** | | |
| **BMTC** | **80** | 80 | 78 | 65.57 | 77.5 | 77.7 | 88.96 | 97.32 | 98.32 | 84.12 | 71.76 | 77.62 | 74.95 | | |
| **HOT1** | 90 | 91 | 91 | 99.22 | 77.37 | [66.63] | 97.29 | 118.43 | 96.64 | 71.83 | 83.08 | 104.08 | 86.21 | | |
| **HOT2** | 90 | 91 | 91 | 100.14 | 79.19 | 68.35 | 97.29 | 118.43 | 96.64 | 78 | 83.08 | 104.08 | 83.34 | | |
| **HOT3** | 90 | 91 | 91 | 99.22 | 76.57 | [66.63] | 97.29 | 119.85 | 98.91 | 71.72 | 84.25 | 104.08 | 89.85 | | |
| **HOT4** | 90 | 91 | 91 | 100.14 | 79.19 | 68.35 | 97.56 | 119.85 | 100.38 | 75.7 | 84.68 | 104.08 | 85.36 | | |
| **HOT5** | 90 | 91 | 91 | 100.14 | 81 | 71.17 | 97.56 | 119.85 | 100.38 | 81.46 | 84.68 | 104.08 | 82.32 | | |
| **HOT6** | 90 | 91 | 91 | 100.14 | 79.19 | 68.35 | 97.56 | 119.85 | 100.38 | 74.87 | 84.68 | 104.08 | 88.74 | | |
| **HOT7** | 90 | 91 | 91 | 100.14 | 80.6 | 69.24 | 97.56 | 119.85 | 100.38 | 79.39 | 84.68 | 104.08 | 84.06 | | |
| **JEFC** | | 79 | 75 | 67.81 | 78.14 | 61.75 | 66.33 | 72.48 | 84.5 | 79.05 | 70.94 | 83.92 | 82.1 | | |
| **PAWC** | 85 | 84 | 78 | 90.06 | 79.23 | [62.66] | 85.21 | 94.41 | 81.81 | 71.37 | 73.88 | 94.5 | 83.67 | | |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **S404** | 90 | 91 | 91 | 83.75 | 70.18 | [52.17] | 82.07 | 103.04 | 80.77 | [57.84] | 60.51 | 84.91 | 97.25 | | |
| **S42S** | 92 | 76 | 76 | [55.37] | 71.56 | 72.75 | 73.3 | 70.52 | 87.62 | 76.74 | 73.31 | 70.17 | 74.09 | | |
| **S43S** | 89 | 85 | 86 | 88.1 | 80.45 | 67 | 85.21 | 93.17 | 82.3 | 78.29 | 74.73 | 92.36 | 83.04 | | |
| **WORA** | 74 | 81 | 80 | 70.03 | 81.5 | 74.76 | 85.54 | 86.45 | 94.84 | 82.39 | 72.78 | 76.95 | 75.39 | | |
| | | | | | | | | | | | | | | | |
| | | | | **Relative Reduction Factors** | | | | | | | | | | | |
| **Site** | **99-01** | **00-02 DVc** | **01-03 DVc** | **8/12/00** | **8/13/00** | **8/29/00** | **8/30/00** | **8/31/00** | **9/1/00** | **9/2/00** | **9/3/00** | **9/4/00** | **9/6/00** | **Mean** | **2007 DVf** |
| **BMTC** | **80** | 80 | 78 | 0.935 | 0.982 | 0.898 | 0.942 | 0.923 | 0.913 | 0.89 | 0.919 | 0.939 | 0.945 | 0.929 | 74.281 |
| **HOT1** | 90 | 91 | 91 | 0.956 | 0.984 | | 0.909 | 0.89 | 0.874 | 0.897 | 0.9 | 0.987 | 0.967 | 0.929 | 84.558 |
| **HOT2** | 90 | 91 | 91 | 0.961 | 0.979 | 0.966 | 0.909 | 0.89 | 0.874 | 0.89 | 0.9 | 0.987 | 0.964 | 0.932 | 84.813 |
| **HOT3** | 90 | 91 | 91 | 0.956 | 0.978 | | 0.909 | 0.886 | 0.88 | 0.898 | 0.903 | 0.987 | 0.97 | 0.93 | 84.6 |
| **HOT4** | 90 | 91 | 91 | 0.961 | 0.979 | 0.966 | 0.91 | 0.886 | 0.881 | 0.895 | 0.907 | 0.987 | 0.966 | 0.934 | 84.98 |
| **HOT5** | 90 | 91 | 91 | 0.961 | 0.984 | 0.972 | 0.91 | 0.886 | 0.881 | 0.901 | 0.907 | 0.987 | 0.963 | 0.935 | 85.104 |
| **HOT6** | 90 | 91 | 91 | 0.961 | 0.979 | 0.966 | 0.91 | 0.886 | 0.881 | 0.912 | 0.907 | 0.987 | 0.97 | 0.936 | 85.163 |
| **HOT7** | 90 | 91 | 91 | 0.961 | 0.98 | 0.965 | 0.91 | 0.886 | 0.881 | 0.905 | 0.907 | 0.987 | 0.966 | 0.935 | 85.066 |
| **JEFC** | | 79 | 75 | 0.888 | 0.972 | 0.818 | 0.876 | 0.851 | 0.837 | 0.848 | 0.86 | 0.92 | 0.932 | 0.88 | 69.53 |
| **PAWC** | 85 | 84 | 78 | 0.94 | 0.988 | | 0.903 | 0.897 | 0.843 | 0.86 | 0.879 | 0.964 | 0.976 | 0.917 | 77.909 |
| **S404** | 90 | 91 | 91 | 0.845 | 0.971 | | 0.842 | 0.876 | 0.85 | | 0.854 | 0.891 | 0.974 | 0.888 | 80.797 |
| **S42S** | 92 | 76 | 76 | | 0.976 | 0.862 | 0.914 | 0.905 | 0.854 | 0.877 | 0.946 | 0.981 | 0.969 | 0.92 | 75.461 |
| **S43S** | 89 | 85 | 86 | 0.957 | 0.995 | 0.948 | 0.903 | 0.905 | 0.849 | 0.869 | 0.902 | 0.957 | 0.97 | 0.926 | 82.379 |
| **WORA** | 74 | 81 | 80 | 0.963 | 0.981 | 0.912 | 0.939 | 0.904 | 0.875 | 0.879 | 0.91 | 0.986 | 0.959 | 0.931 | 75.393 |
| | | | | | | | | | | | | | | | |

PAWC - Port Arthur West CAMS28
JEFC - Hamshire CAM64
BMTC - Beaumont CAMS2
WORA - West Orange CAMS9
S40S - CAMS640
S42S - Mauriceville CAMS642

Table 10: 2005 Screening Cells Analysis for BPA

| | | | | **Ozone Concentrations (ppb) of 2000 Base Case base5b.pto2n2 (8/12-13/2000) & base5c.psito2n2 (8/29-9/6/2000)** | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Site** | **99-01 DVc** | **00-02 DVc** | **01-03 DVc** | **8/12/00** | **8/13/00** | **8/29/00** | **8/30/00** | **8/31/00** | **9/1/00** | **9/2/00** | **9/3/00** | **9/4/00** | **9/6/00** | **Mean base** |
| **BMTC** | 80 | 80 | 78 | 70.16 | 78.96 | 86.52 | 94.4 | 105.48 | 107.67 | 94.5 | 78.06 | 82.7 | 79.33 | 87.778 |
| **HOT1** | 90 | 91 | 91 | 103.77 | 78.64 | [68.46] | 106.99 | 133.07 | 110.63 | 80.11 | 92.32 | 105.49 | 89.17 | 100.021111 |
| **HOT2** | 90 | 91 | 91 | 104.18 | 80.89 | 70.73 | 106.99 | 133.07 | 110.63 | 87.62 | 92.32 | 105.49 | 86.46 | 97.838 |
| **HOT3** | 90 | 91 | 91 | 103.77 | 78.28 | [68.46] | 106.99 | 135.22 | 112.41 | 79.83 | 93.35 | 105.49 | 92.67 | 100.89 |
| **HOT4** | 90 | 91 | 91 | 104.18 | 80.89 | 70.73 | 107.26 | 135.22 | 113.95 | 84.54 | 93.35 | 105.49 | 88.37 | 98.398 |
| **HOT5** | 90 | 91 | 91 | 104.18 | 82.29 | 73.19 | 107.26 | 135.22 | 113.95 | 90.41 | 93.35 | 105.49 | 85.52 | 99.086 |
| **HOT6** | 90 | 91 | 91 | 104.18 | 80.89 | 70.73 | 107.26 | 135.22 | 113.95 | 82.11 | 93.35 | 105.49 | 91.52 | 98.47 |
| **HOT7** | 90 | 91 | 91 | 104.18 | 82.22 | 71.75 | 107.26 | 135.22 | 113.95 | 87.76 | 93.35 | 105.49 | 87 | 98.818 |
| **JEFC** | | 79 | 75 | 76.39 | 80.38 | 75.51 | 75.69 | 85.17 | 100.98 | 93.21 | 82.5 | 91.22 | 88.13 | 84.918 |
| **PAWC** | 85 | 84 | 78 | 95.76 | 80.21 | [67.10] | 94.35 | 105.26 | 97.05 | 83.03 | 84.05 | 98.07 | 85.75 | 91.5033333 |
| **S40S** | 90 | 91 | 91 | 99.1 | 72.3 | [52.20] | 97.52 | 117.67 | 94.97 | [65.63] | 70.84 | 95.27 | 99.84 | 93.43875 |
| **S42S** | 82 | 76 | 76 | [57.07] | 73.35 | 84.39 | 80.23 | 77.92 | 102.64 | 87.5 | 77.5 | 71.55 | 76.49 | 81.2855556 |
| **S43S** | 89 | 85 | 86 | 92.08 | 80.84 | 70.7 | 94.34 | 102.92 | 96.92 | 90.05 | 82.83 | 96.49 | 85.61 | 89.278 |
| **WORA** | 74 | 81 | 91 | 72.72 | 83.1 | 81.94 | 91.1 | 95.64 | 108.4 | 93.68 | 79.97 | 78.07 | 78.64 | 86.326 |
| | | | | **Ozone Concentrations (ppb) of 2007 Case fy07m.cs08** | | | | | | | | | | |
| **Site** | **99-01 DVc** | **00-02 DVc** | **01-03 DVc** | **8/12/00** | **8/13/00** | **8/29/00** | **8/30/00** | **8/31/00** | **9/1/00** | **9/2/00** | **9/3/00** | **9/4/00** | **9/6/00** | **Mean future** |
| **BMTC** | 80 | 80 | 78 | 65.57 | 77.5 | 77.7 | 88.96 | 97.32 | 98.32 | 84.12 | 71.76 | 77.62 | 74.95 | 81.382 |
| **HOT1** | 90 | 91 | 91 | 99.22 | 77.37 | [66.63] | 97.29 | 118.43 | 96.64 | 71.83 | 83.08 | 104.08 | 86.21 | 92.6833333 |
| **HOT2** | 90 | 91 | 91 | 100.14 | 79.19 | 68.35 | 97.29 | 118.43 | 96.64 | 78 | 83.08 | 104.08 | 83.34 | 90.854 |
| **HOT3** | 90 | 91 | 91 | 99.22 | 76.57 | [66.63] | 97.29 | 119.85 | 98.91 | 71.72 | 84.25 | 104.08 | 89.85 | 93.5266667 |
| **HOT4** | 90 | 91 | 91 | 100.14 | 79.19 | 68.35 | 97.56 | 119.85 | 100.38 | 75.7 | 84.68 | 104.08 | 85.36 | 91.529 |
| **HOT5** | 90 | 91 | 91 | 100.14 | 81 | 71.17 | 97.56 | 119.85 | 100.38 | 81.46 | 84.68 | 104.08 | 82.32 | 92.264 |
| **HOT6** | 90 | 91 | 91 | 100.14 | 79.19 | 68.35 | 97.56 | 119.85 | 100.38 | 74.87 | 84.68 | 104.08 | 88.74 | 91.784 |
| **HOT7** | 90 | 91 | 91 | 100.14 | 80.6 | 69.24 | 97.56 | 119.85 | 100.38 | 79.39 | 84.68 | 104.08 | 84.06 | 91.998 |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **JEFC** | | 79 | 75 | 67.81 | 78.14 | 61.75 | 66.33 | 72.48 | 84.5 | 79.05 | 70.94 | 83.92 | 82.1 | 74.702 |
| **PAWC** | 85 | 84 | 78 | 90.06 | 79.23 | [62.66] | 85.21 | 94.41 | 81.81 | 71.37 | 73.88 | 94.5 | 83.67 | 83.7933333 |
| **S40S** | 90 | 91 | 91 | 83.75 | 70.18 | [52.17] | 82.07 | 103.04 | 80.77 | [57.84] | 60.51 | 84.91 | 97.25 | 82.81 |
| **S42S** | 82 | 76 | 76 | [55.37] | 71.56 | 72.75 | 73.3 | 70.52 | 87.62 | 76.74 | 73.31 | 70.17 | 74.09 | 74.4511111 |
| **S43S** | 89 | 85 | 86 | 88.1 | 80.45 | 67 | 85.21 | 93.17 | 82.3 | 78.29 | 74.73 | 92.36 | 83.04 | 82.465 |
| **WORA** | 74 | 81 | 80 | 70.03 | 81.5 | 74.76 | 85.54 | 86.45 | 94.84 | 82.39 | 72.78 | 76.95 | 75.39 | 80.063 |
| | | | | | | | | | | | | | | |
| **Site** | **1999-2001 DVc** | **2000-2002 DVc** | **2001-2003 DVc** | | **Reduction from base case (ppb)** | **80% reduction (ppb)** | **80% future case** | **80%RRF** | **80% DVf** | | | | | |
| **BMTC** | 80 | 80 | 78 | | 6.396 | 5.1168 | 82.6612 | 0.941707 | 75.3366 | | | | | |
| **HOT1** | 90 | 91 | 91 | | 7.3377778 | 5.8702222 | 94.15089 | 0.94131 | 85.65923 | | | | | |
| **HOT2** | 90 | 91 | 91 | | 6.984 | 5.5872 | 92.2508 | 0.942893 | 85.8033 | | | | | |
| **HOT3** | 90 | 91 | 91 | | 7.3633333 | 5.8906667 | 94.99933 | 0.941613 | 85.68678 | | | | | |
| **HOT4** | 90 | 91 | 91 | | 6.869 | 5.4952 | 92.9028 | 0.944153 | 85.91795 | | | | | |
| **HOT5** | 90 | 91 | 91 | | 6.822 | 5.4576 | 93.6284 | 0.944921 | 85.98777 | | | | | |
| **HOT6** | 90 | 91 | 91 | | 6.686 | 5.3488 | 93.1212 | 0.945681 | 86.05696 | | | | | |
| **HOT7** | 90 | 91 | 91 | | 6.82 | 5.456 | 93.362 | 0.944787 | 85.97565 | | | | | |
| **JEFC** | | 79 | 75 | | 10.216 | 8.1728 | 76.7452 | 0.903757 | 71.39677 | | | | | |
| **PAWC** | 85 | 84 | 78 | | 7.71 | 6.168 | 85.33533 | 0.932593 | 79.27037 | | | | | |
| **S40S** | 90 | 91 | 91 | | 10.62875 | 8.503 | 84.93575 | 0.908999 | 82.71893 | | | | | |
| **S42S** | 82 | 76 | 76 | | 6.8344444 | 5.4675556 | 75.818 | 0.932736 | 76.48439 | | | | | |
| **S43S** | 89 | 85 | 86 | | 6.813 | 5.4504 | 83.8276 | 0.93895 | 83.56657 | | | | | |
| **WORA** | 74 | 81 | 80 | | 6.263 | 5.0104 | 81.3156 | 0.94196 | 75.35676 | | | | | |
| | | | | | | | | | | | | | | |

PAWC - Port Arthur West CAMS28
JEFC - Hamshire CAM64
BMTC - Beaumont CAMS2
WORA - West Orange CAMS9
S40S - CAMS640
S42S - Mauriceville CAMS642

Table 11: Alternate 2007 screening DVfs using other station design values

| Alternate 2007 screening DVfs using other station design values | | | | | | |
|---|---|---|---|---|---|---|
| | | **CAMS28** | **CAMS9** | **S643S** | | |
| **Design Value** | | 85 | 81 | 89 | | |
| **HOT1** | 0.929 | 78.965 | 75.249 | 82.681 | | |
| **HOT2** | 0.932 | 79.22 | 75.492 | 82.948 | | |
| **HOT3** | 0.93 | 79.05 | 75.33 | 82.77 | | |
| **HOT4** | 0.934 | 79.39 | 75.654 | 83.126 | | |
| **HOT5** | 0.935 | 79.475 | 75.735 | 83.215 | | |
| **HOT6** | 0.936 | 79.56 | 75.816 | 83.304 | | |
| **HOT7** | 0.935 | 79.475 | 75.735 | 83.215 | | |
| | | | | | | |
| | | | | | | |
| **Alternate 2005 screening DVfs using other station design values** | | | | | | |
| | | **CAMS28** | **CAMS9** | **S643S** | | |
| **Design Value** | | 85 | 81 | 89 | | |
| **HOT1** | 0.94131 | 80.01136 | 76.24612 | 83.7766 | | |
| **HOT2** | 0.942893 | 80.14594 | 76.37436 | 83.91751 | | |
| **HOT3** | 0.941613 | 80.0371 | 76.27065 | 83.80356 | | |
| **HOT4** | 0.944153 | 80.25303 | 76.47642 | 84.02965 | | |
| **HOT5** | 0.944921 | 80.31825 | 76.53857 | 84.09793 | | |
| **HOT6** | 0.945681 | 80.38288 | 76.60015 | 84.1656 | | |
| **HOT7** | 0.944787 | 80.30693 | 76.52778 | 84.08608 | | |
| | | | | | | |

PAWC - Port Arthur West CAMS28
JEFC - Hamshire CAM64
BMTC - Beaumont CAMS2
WORA - West Orange CAMS9
S40S - CAMS640
S42S - Mauriceville CAMS642