

Effects of HGB Emissions Controls and Improving Air Quality on EPA's 8-hr Ozone Attainment Test

Presented at

SETPMTC
Houston, TX

Prepared by

James G. Wilkinson
Alpine Geophysics, LLC
Eugene, OR

Thomas W. Tesche
Climate & Atmospheric
Research Associates, LLC
Ft. Wright, KY

18 February 2009



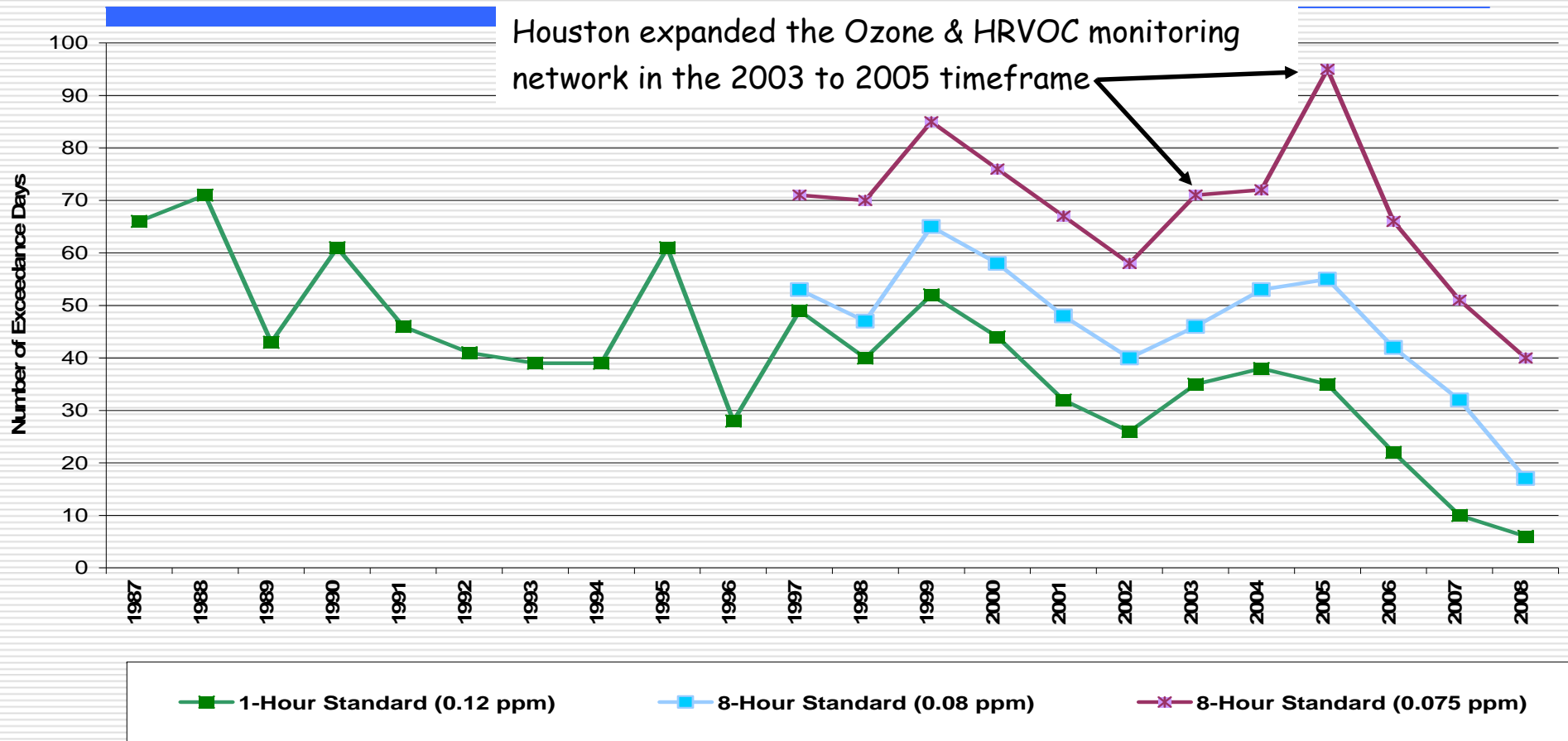
Overview

- Recent air quality trends in the Houston area
- How can the newer monitored ozone values be used in the HGB SIP analyses?
- EPA's guidance for performing the 8-hr ozone attainment test
- How might the attainment test change when data from a newer year (e.g., 2006) is used?
- Conclusions

Current Monitored Air Quality Trends in Houston

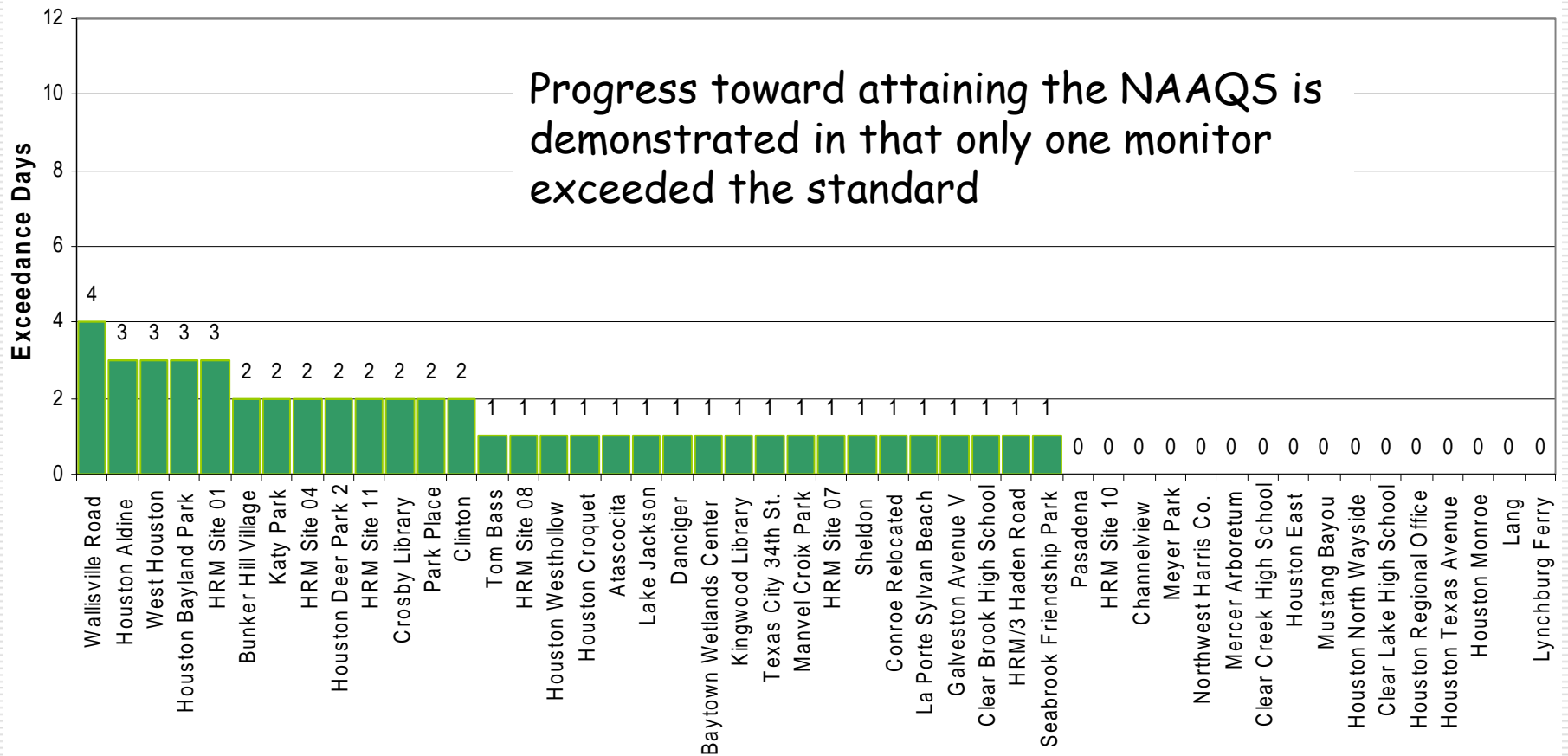
- Houston's expansive air monitoring network shows a significant and consistent downward trend in ozone
- A similar downward trend is observed for ozone precursors (NO_x and HRVOCs)
- Criteria for defining ozone conducive days is becoming more exclusive over time demonstrating that improvements are independent of weather

Houston 8-hr Ozone Trends: Total Exceedance Days



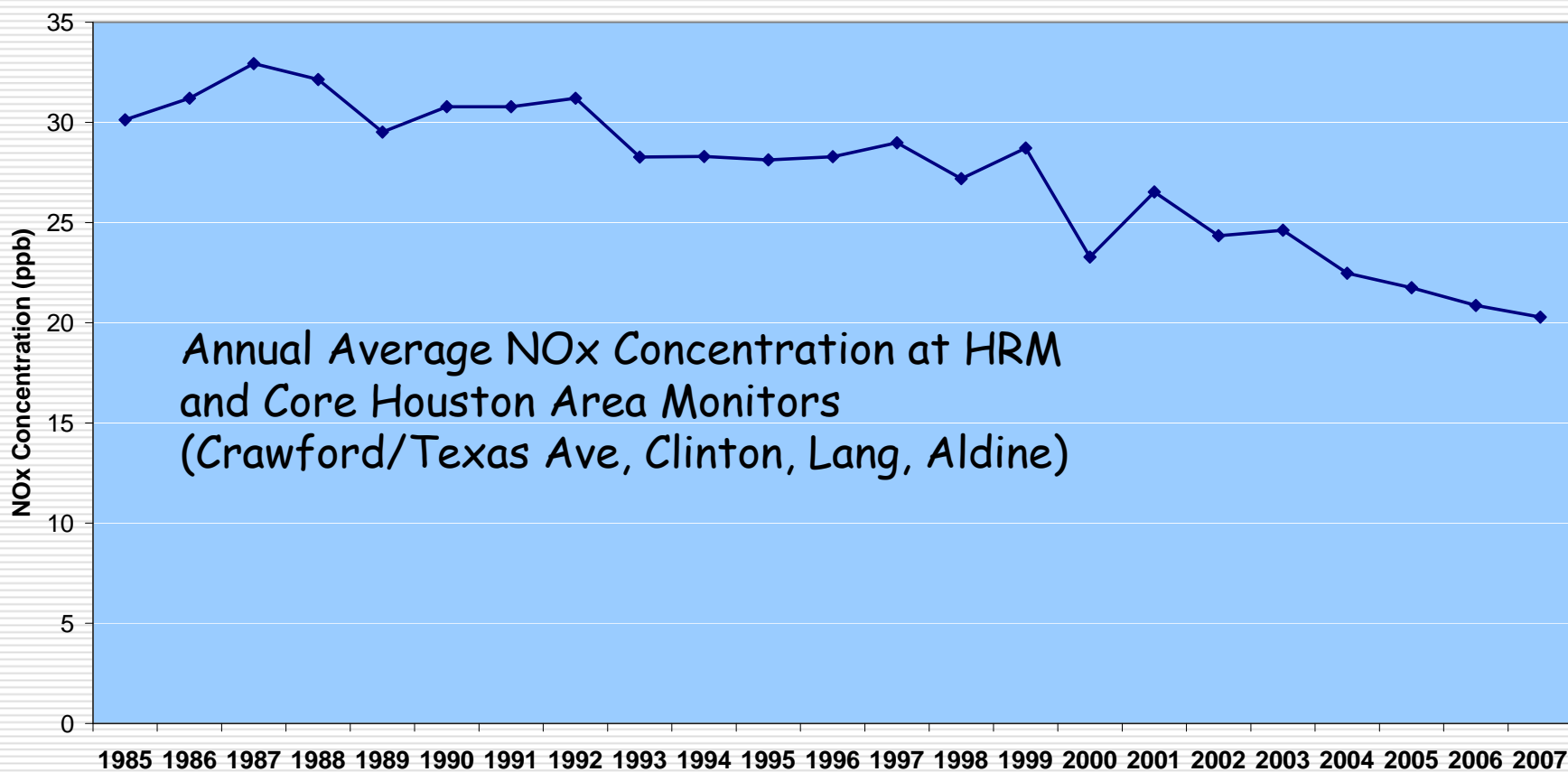
Houston 8-hr Ozone Trends: Exceedance Days by Monitor

Cumulative 8-Hour Ozone Exceedance Days in the HGB Area (2008)
(NAAQS=0.08 ppm-v)



Houston NOx Precursor Trends

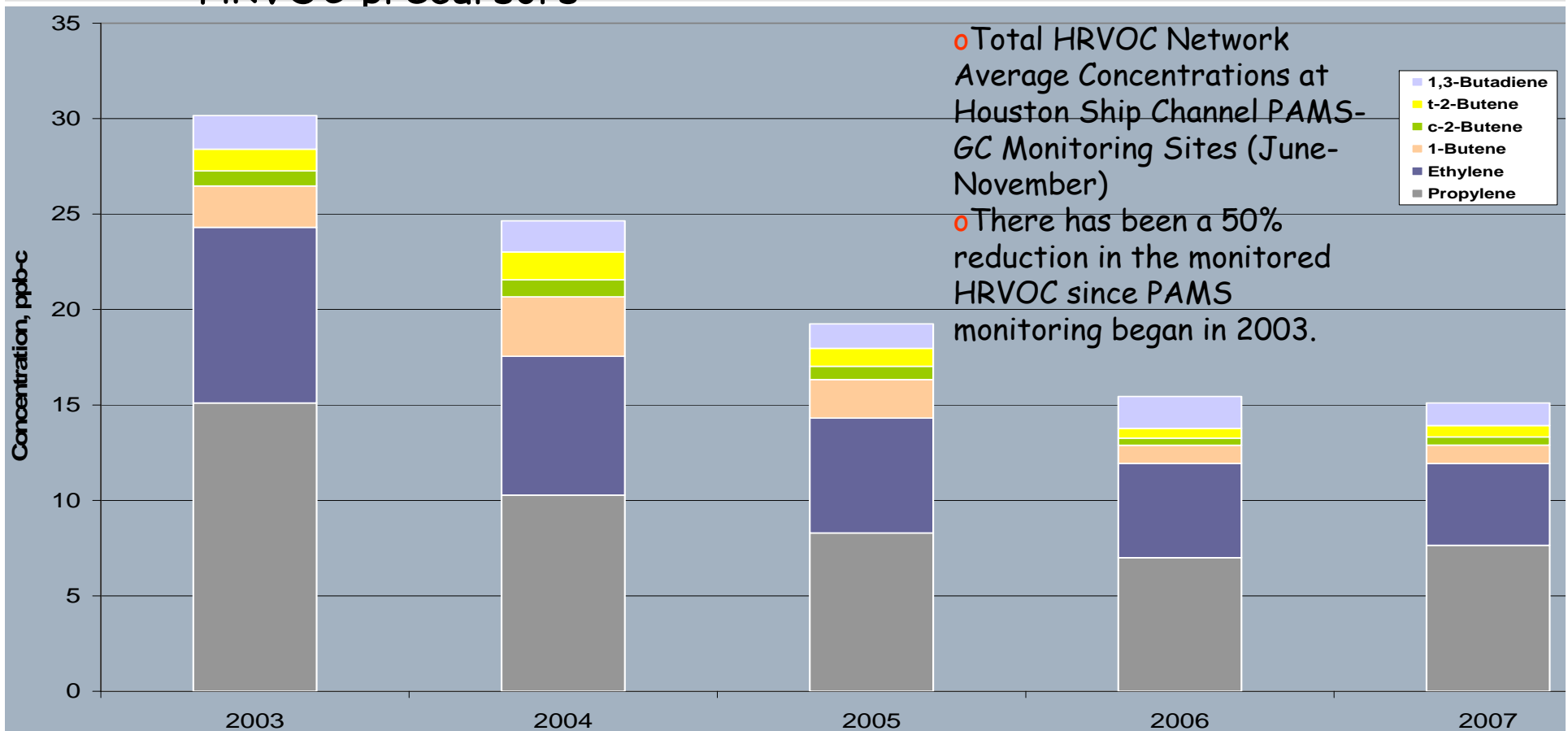
□ Declining ozone is consistent with downward trends in NOx



Hansen, S., 2009. Monitoring and Data Analysis Issue Area Report. 11-Feb.

Houston HRVOC Precursor Trends

□and declining ozone is consistent with downward trends in HRVOC precursors



Smith, S., 2009. Air Quality Trends in Houston. TCC Air Conservation Committee. 05-February.

Emissions Reductions Programs in the Houston Area

- ❑ 2001-2008 80% NO_x Reduction Program
- ❑ 2001-2005 Industry Voluntary Episodic Emissions Reduced
- ❑ 2002 HRVOC Reportable Quantities Lowered
- ❑ 2004-2008 TERP (\$253 Million) Accelerates Mobile Source Reductions
- ❑ 2004 NO_x CEM's
- ❑ 2004 Federal Cleaner Gasoline
- ❑ 2005 HRVOC Flare, CT, Vent, Safety Valve Monitoring
- ❑ 2005 Voluntary Use of Commercial VOC imaging IR cameras
- ❑ 2006 HRVOC Hourly Limit Program Begins
- ❑ 2006 Federal On-Road Cleaner Diesel
- ❑ 2007 HRVOC Annual Cap & Trade Year 1
- ❑ 2007 Participation in DIAL and Other Cooperative Emissions Studies
- ❑ 2007-2008 Lower Emissions from Storage Vessels

Can We Incorporate the Current Monitored Data Into Our SIP Analyses?

- How can we accomplish?
- What is the potential range in the 8-hr ozone attainment test estimates?
- In order to answer these questions, we need to examine EPA guidance (2007) on this issue which encourages using the most recent monitoring data available

EPA Attainment Test: Basic Equation

- The 8-hr ozone attainment test is based on the algebraic expression

This is based on model predictions

$$DV_f = RRF * DV_b \quad (\text{Eq. 1})$$

where:

This is based on monitored data

DV_f (ppb) is the future year design value;
 RRF is the relative response factor; and
 DV_b (ppb) is the baseline design value

EPA Attainment Test: RRF

$$DV_f = \text{RRF} * DV_b$$

- ❑ CAMx ozone estimates are extracted for the base year and future year (2005 and 2018 for current TCEQ modeling)
- ❑ The RRF is the ratio of the future-to-base year 8-hr ozone concentrations near each monitor, averaged over multiple, high ozone days
- ❑ EPA offers various methods for extracting model estimates near each monitor for use in calculating the RRF

EPA Attainment Test: DV_b

$$DV_f = RRF * DV_b$$

- Monitored ozone concentrations are used to calculate the baseline design value (DV_b)
- EPA offers various methods for calculating monitor-specific DV_b s for the baseline period
 - Five years centered on baseline year with weighting (i.e., Straddle Method suggested by EPA [2007])

EPA Attainment Test: DV_f

$$DV_f = RRF * DV_b$$

- The future year design value (DV_f) is calculated from Equation 1 by multiplying the RRF (based on CAMx results) and the DV_b (based on monitoring data)
- The DV_f at each monitor is compared with the NAAQS to determine attainment
- Weight-of-Evidence analyses are performed to confirm results of attainment test

Summary

- Why incorporate the newer monitored ozone data into the SIP attainment test?
 - HGB air quality is improving as demonstrated by recent downward trends in ozone, NO_x, and HRVOCs
 - EPA encourages the incorporation of the most recent monitored data

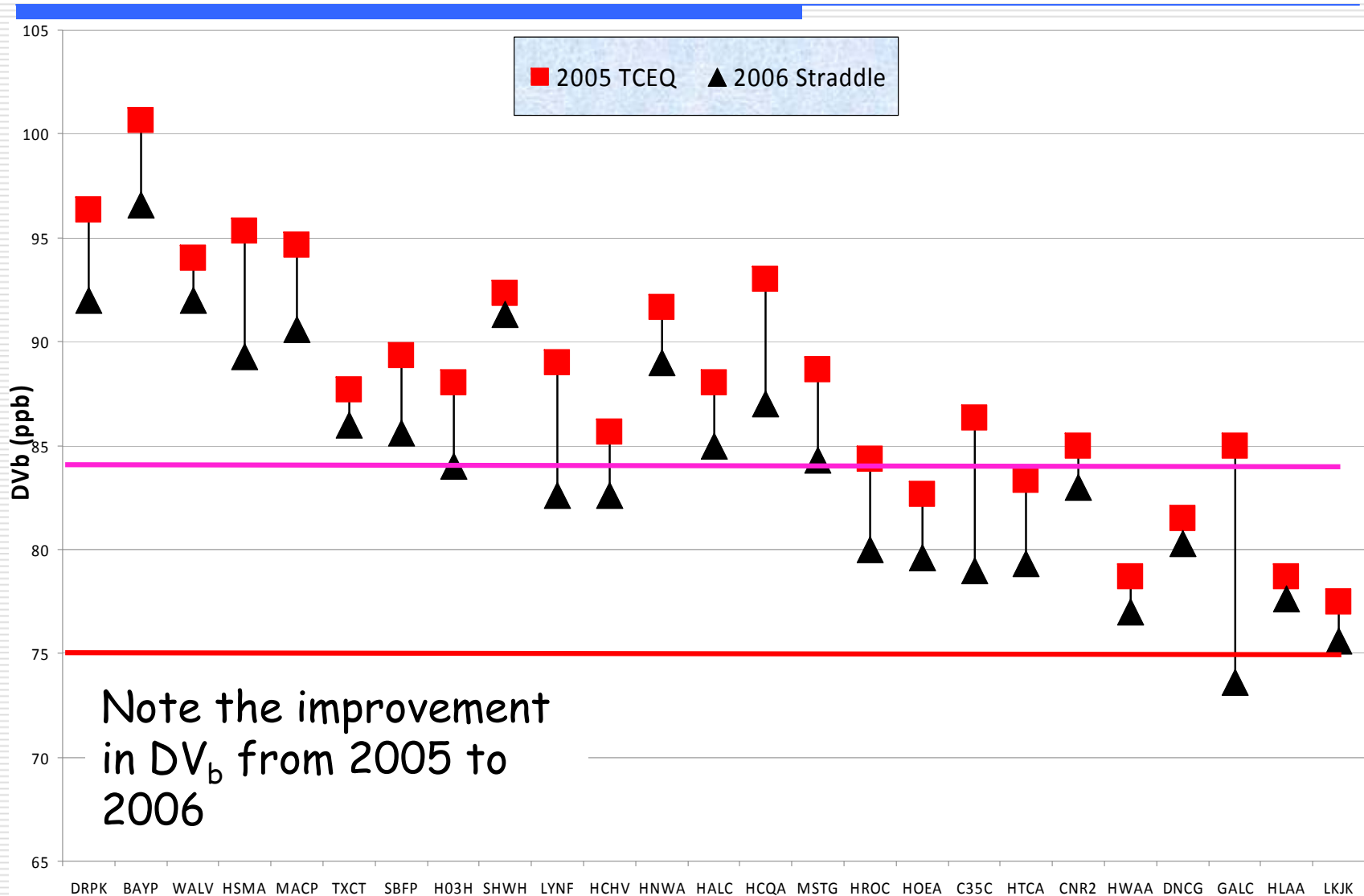
□ How?

$$DV_f = RRF * DV_b$$

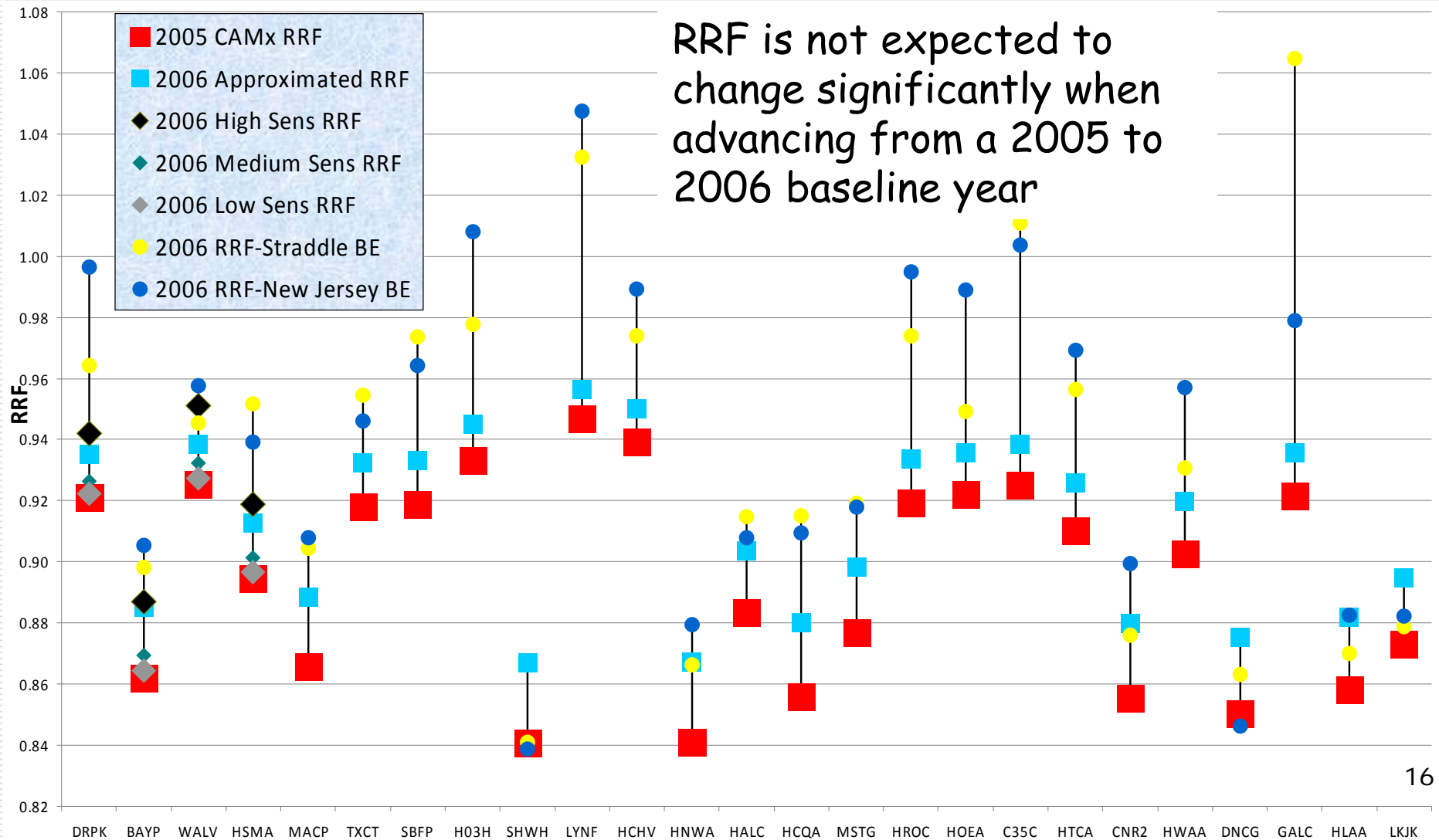
This is based on model predictions

This is based on monitored data

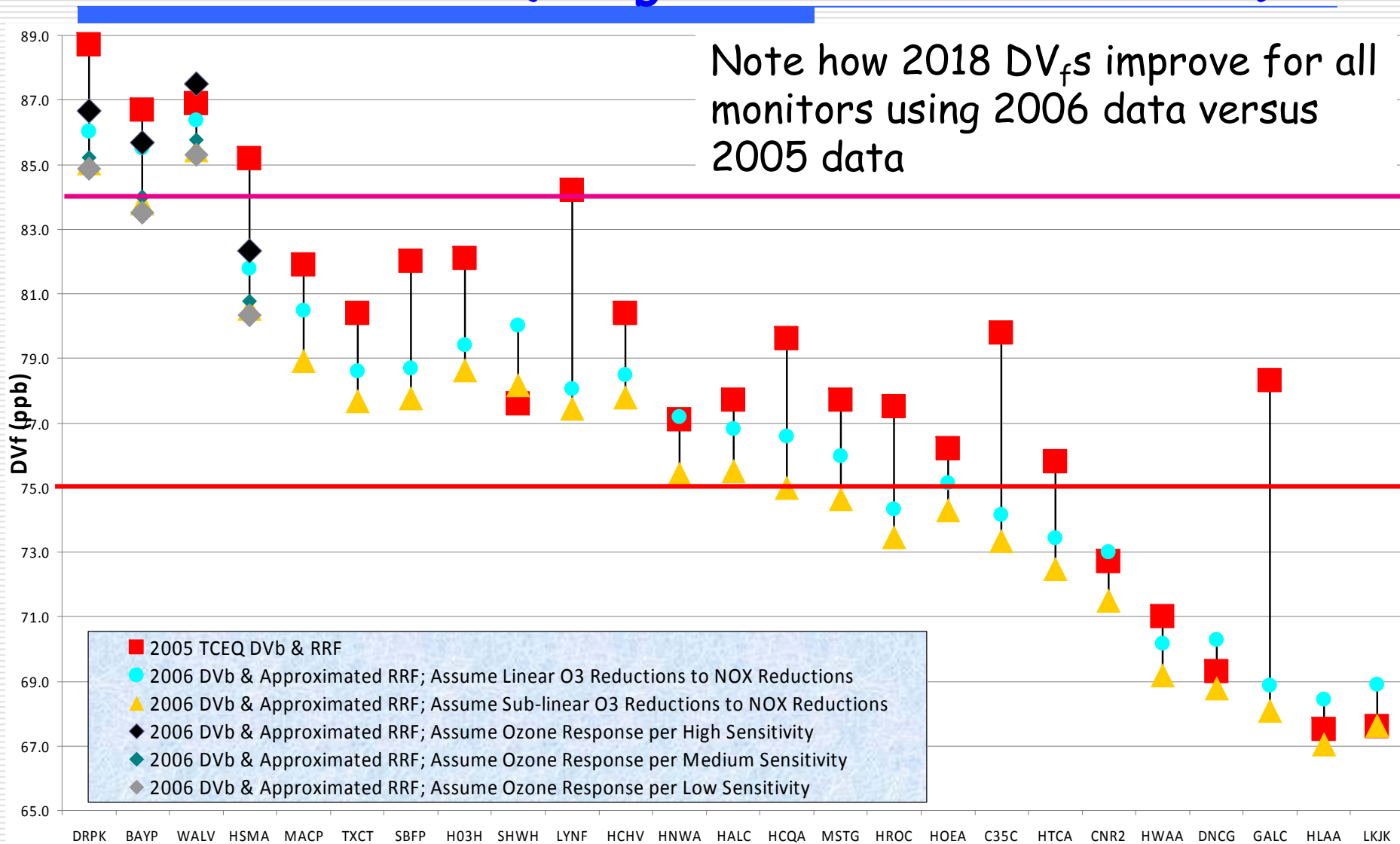
2005 DV_b versus 2006 DV_b (Straddle Method)



2005-2018 RRF versus Approximated 2006-2018 RRF



Comparison of 2018 DV_f Derived From 2006 Data To 2018 DV_f Derived From 2005 Data (DV_b Straddle Method)



Conclusion

- ❑ Air quality is improving in the HGB region
- ❑ It is reasonable and prudent to incorporate recent air quality improvements in the ozone SIP attainment analysis
- ❑ EPA guidance encourages this, promoting the use of the most recent year possible for the attainment test baseline
- ❑ Advancing to the 2006 baseline year allows Houston to appropriately account for the investment in recent control programs and associated air quality improvements