



DFW Modeling Update

Brian Foster

Environmental Trade Fair

May 10, 2006

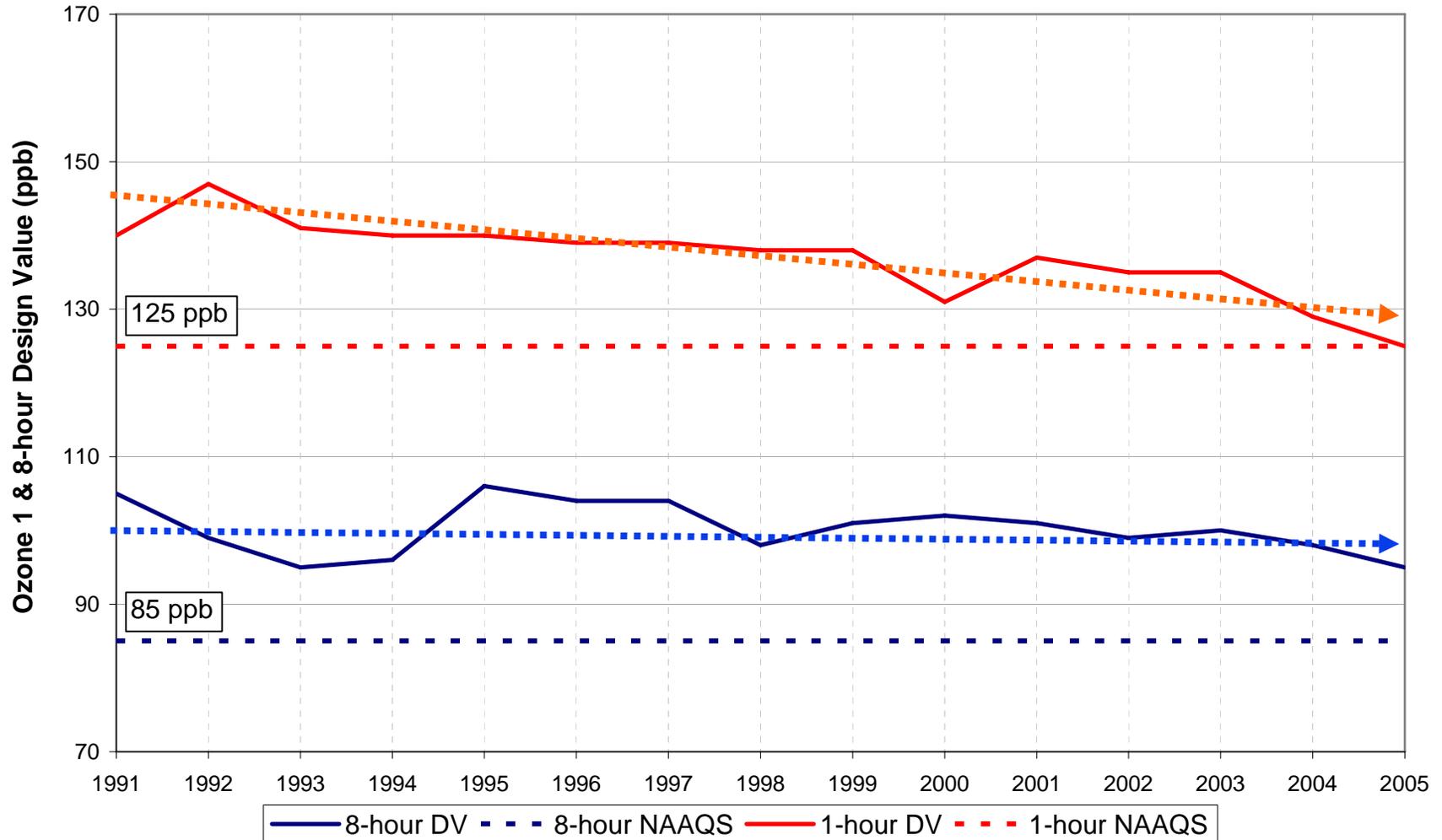


DFW Modeling Overview

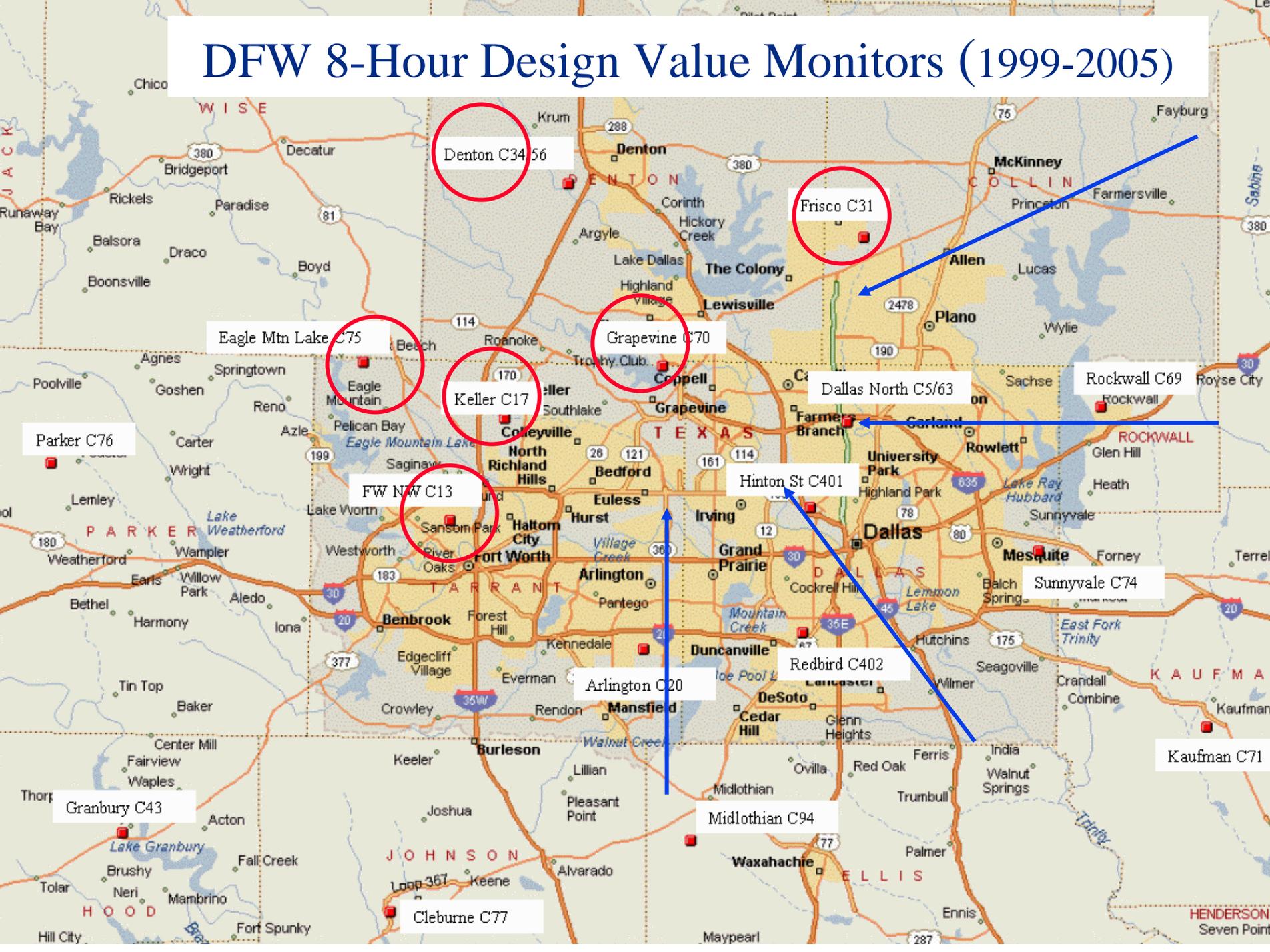
- Conceptual Model and Episode Selection
- Base Case Model Performance
- 2009 Future Case Response Curves
- Future Modeling Plans



DFW Design Value Trends 1991 - 2005



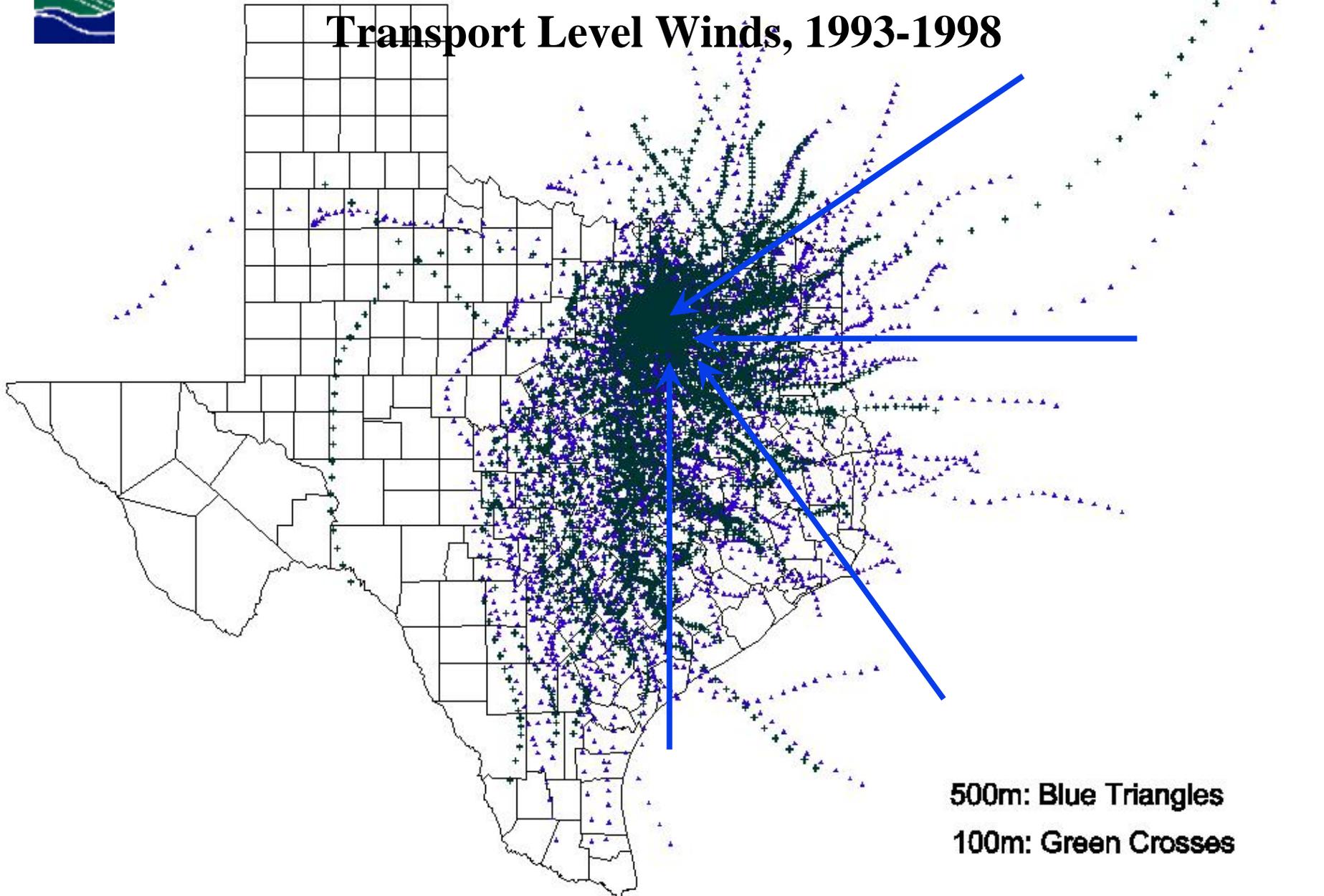
DFW 8-Hour Design Value Monitors (1999-2005)





DFW Back Trajectories for 8-Hour Ozone

Transport Level Winds, 1993-1998



500m: Blue Triangles
100m: Green Crosses



DFW 8-Hour Ozone Episode

August 13 - August 22, 1999 Ozone Episode

Day	Date	Max O3	Site Name	# Sites	Remarks
F	Aug 13	67	Frisco	0	SW Winds, Ramp Day
Sa	Aug 14	103	Arlington	4	NE Winds
Sun	Aug 15	97	Keller	6	East Winds
M	Aug 16	107	Keller	6	East Winds
T	Aug 17	<u>126</u>	Frisco, Denton	7	Light SE Winds
W	Aug 18	116	Frisco	4	Light South Winds
Th	Aug 19	108	Midlothian	2	Weak Front, N Winds
Fri	Aug 20	98	Midlothian	1	NE Winds
Sa	Aug 21	98	Arlington	5	East Winds
Sun	Aug 22	89	Denton	2	SE Winds
Mon	Aug 23	59	Denton	0	S Winds, Low Ozone



Episode Selection Summary

- August 13-22, 1999 DFW Ozone Episode
 - Nine Days of High 8-hour Ozone
 - 5 Weekdays, 2 Saturdays, 2 Sundays
 - Occurs during August, the core of the Ozone Season
 - Follows a complete Ozone Cycle
 - Natural progression of wind directions
 - Mix of light and moderate wind speeds
 - Exceedances within +/- 10 ppb of DV
 - High Background concentrations



1999 Base Case

- DFW Modeling
 - Modeled on national grid (includes Canada, Atlantic)
 - Fine Grid (4 k) in DFW area
 - Follows Synoptic Cycle, peaks on right days
 - Good Bias and Gross Error Statistics
 - Good hourly time series for Ozone, NO_x and VOC
 - Good transported background concentrations
 - Shows urban contributions, w/peaks downwind of city



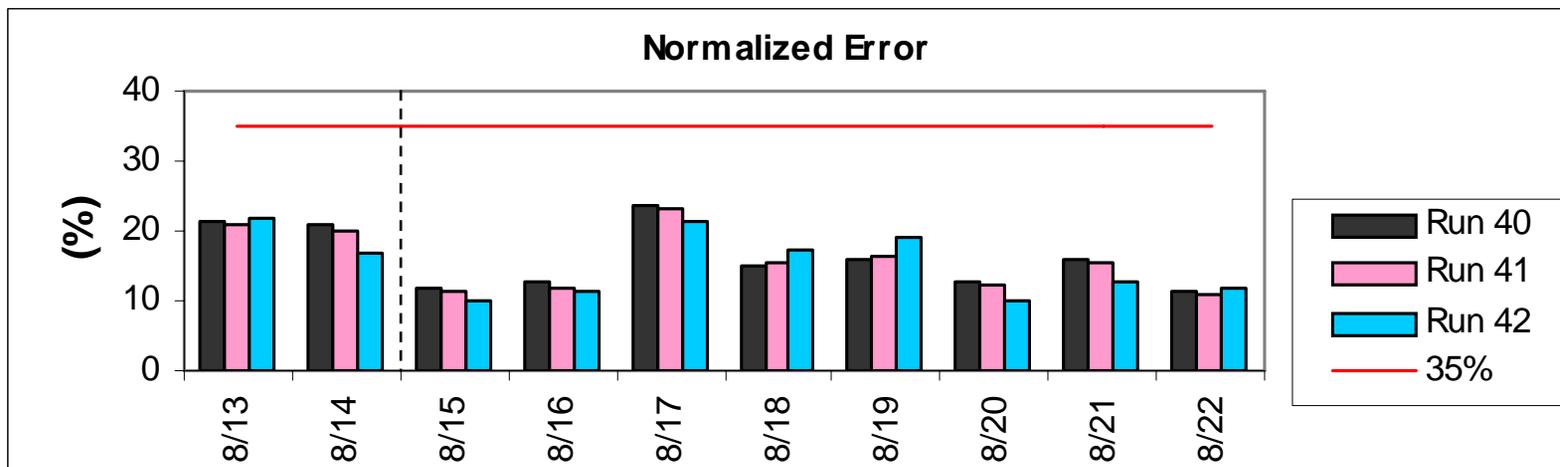
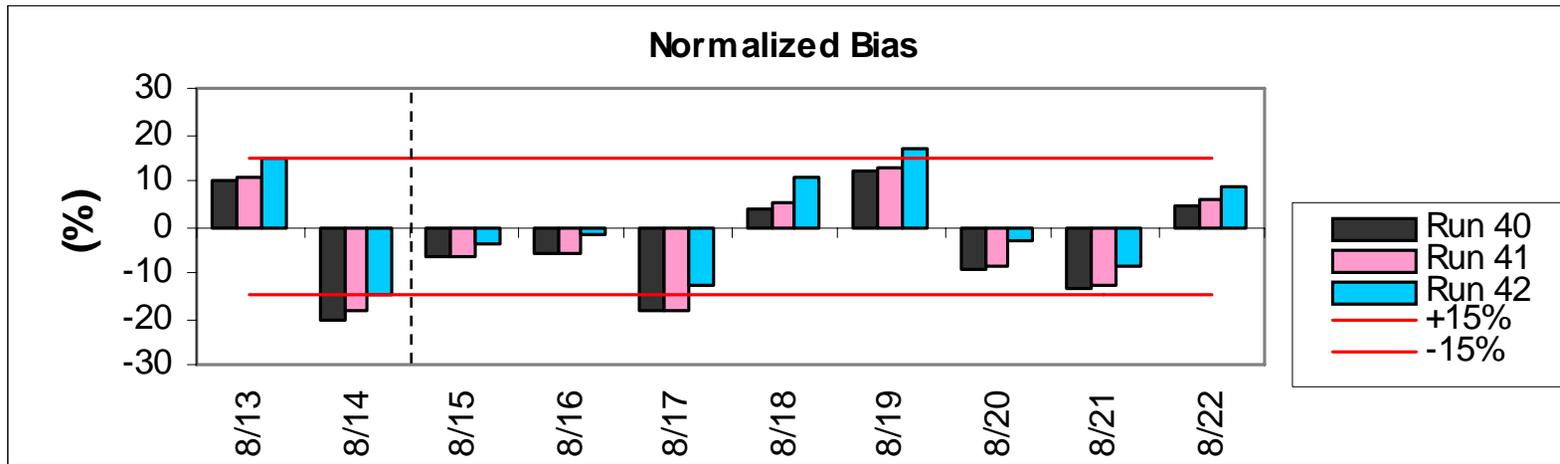
Base Case Upgrades

- Revise Mobile Emissions
 - Differentiate days (Mon, Tue-Thurs, Fri, Sat, Sun)
 - Adjust for decreased weekend truck traffic
- Revise Non-Road Emissions
 - Include new NONROAD model
 - Recent Texas equipment surveys
- Adjust for thermal/turbulent low level mixing
 - Upgrade the Kv100 algorithm



Performance Evaluation

Latest Runs



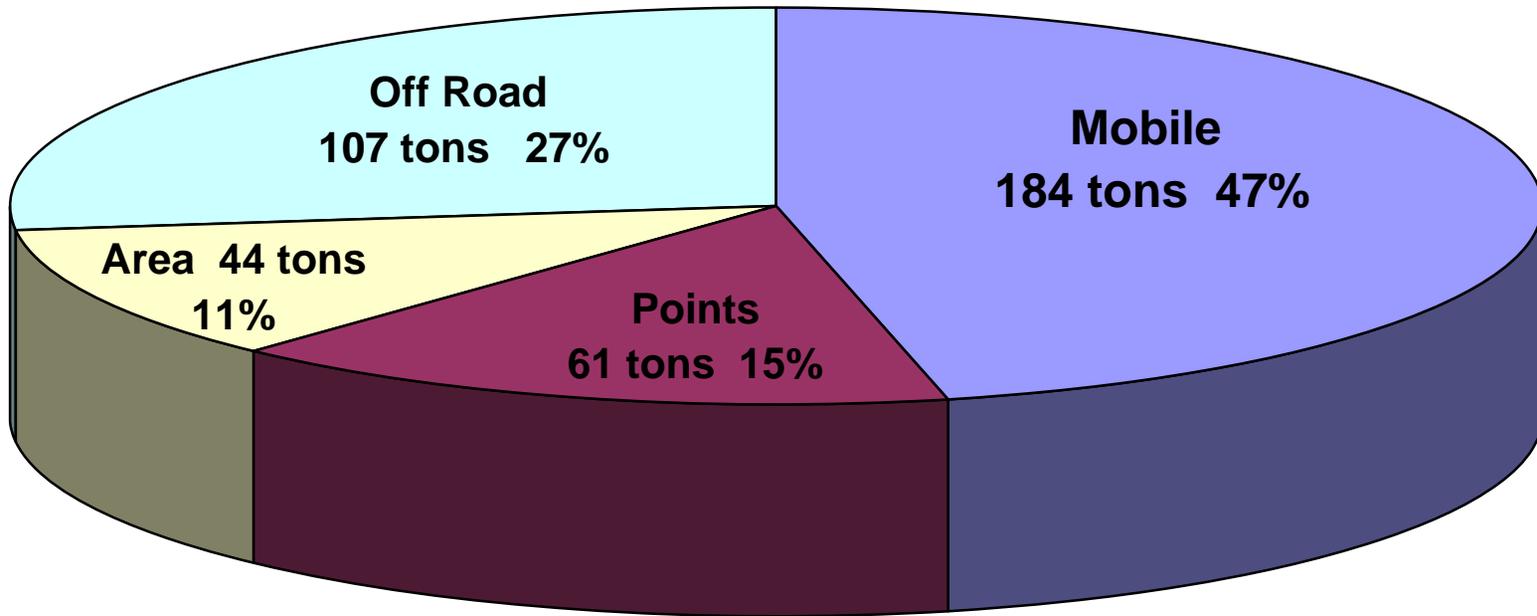


2009 Future Case

- Project Baseline Emissions Inventory into Future
 - Apply expected growth
 - Apply mandated controls
 - EGU emissions projected from 2005 Acid Rain Data
- Run CAMx for Future Case
 - Calculate Relative Response Factors
 - Calculate Future Design Values
- Estimate Control Requirements
 - Run Matrix of NO_x and VOC Controls
 - Plot Response Curves



DFW 9-County Future Case (2009) NO_x Emissions Model Run44.fy2009.a1



**DFW Total 9-County Anthropogenic NO_x = 396 tons/day
6.4% less than in previous 2009.a0 model run**

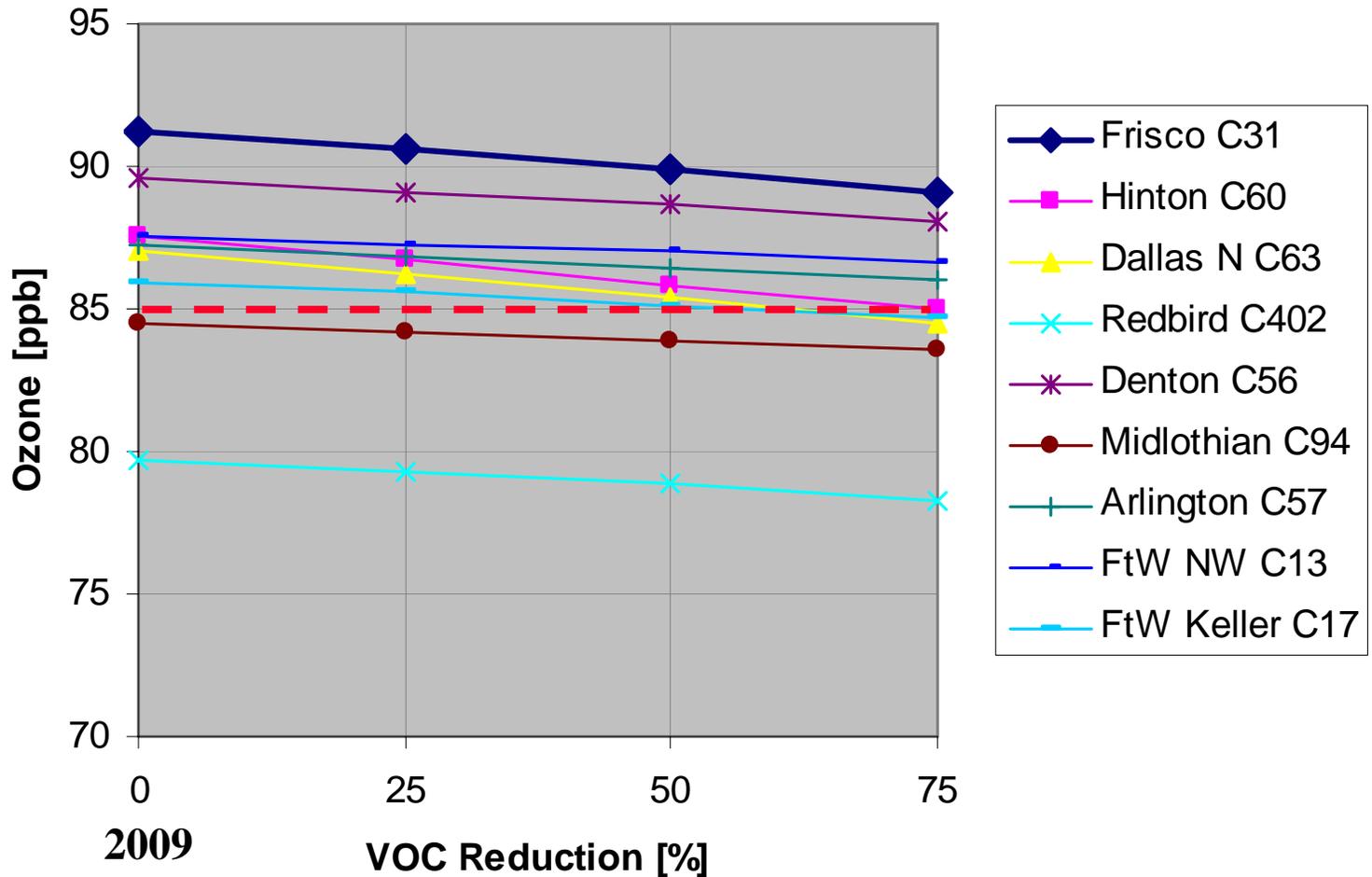


Future Design Values

Site	2009.a0 run	2009.a1 run
Frisco C31	91.9	91.2
Hinton C60	88.0	87.6
Dallas N C63	87.9	87.0
Redbird C402	80.5	79.7
Denton C56	90.7	89.6
Midlothian C94	85.4	84.5
Arlington C57	88.4	87.2
FtW NW C13	88.9	87.6
FtW Keller C17	86.9	86.0

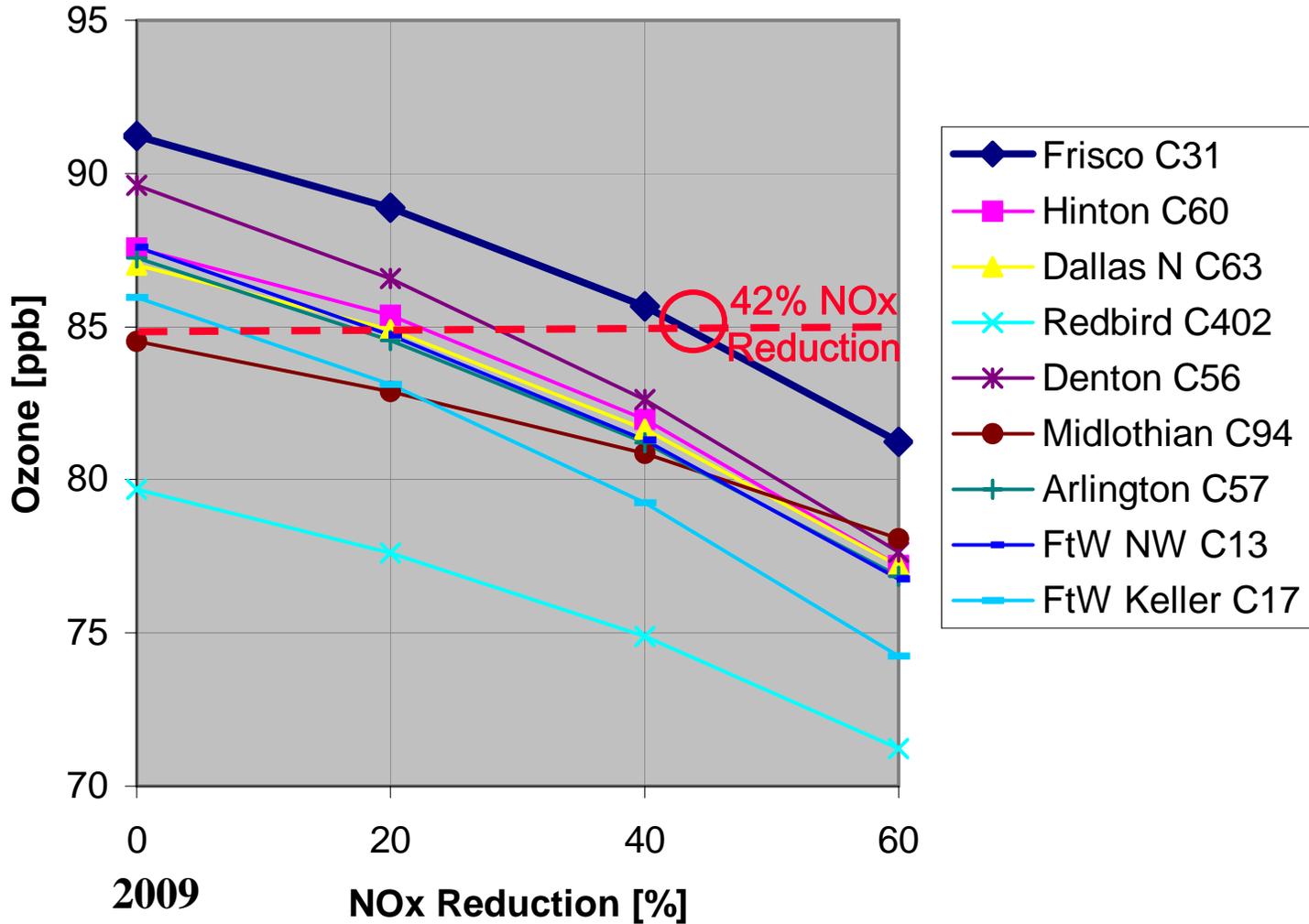


DFW 2009 Design Value Scaled 8-Hour Ozone. VOC Reductions. Run44.fy2009.a1 Aug 13-22, 1999



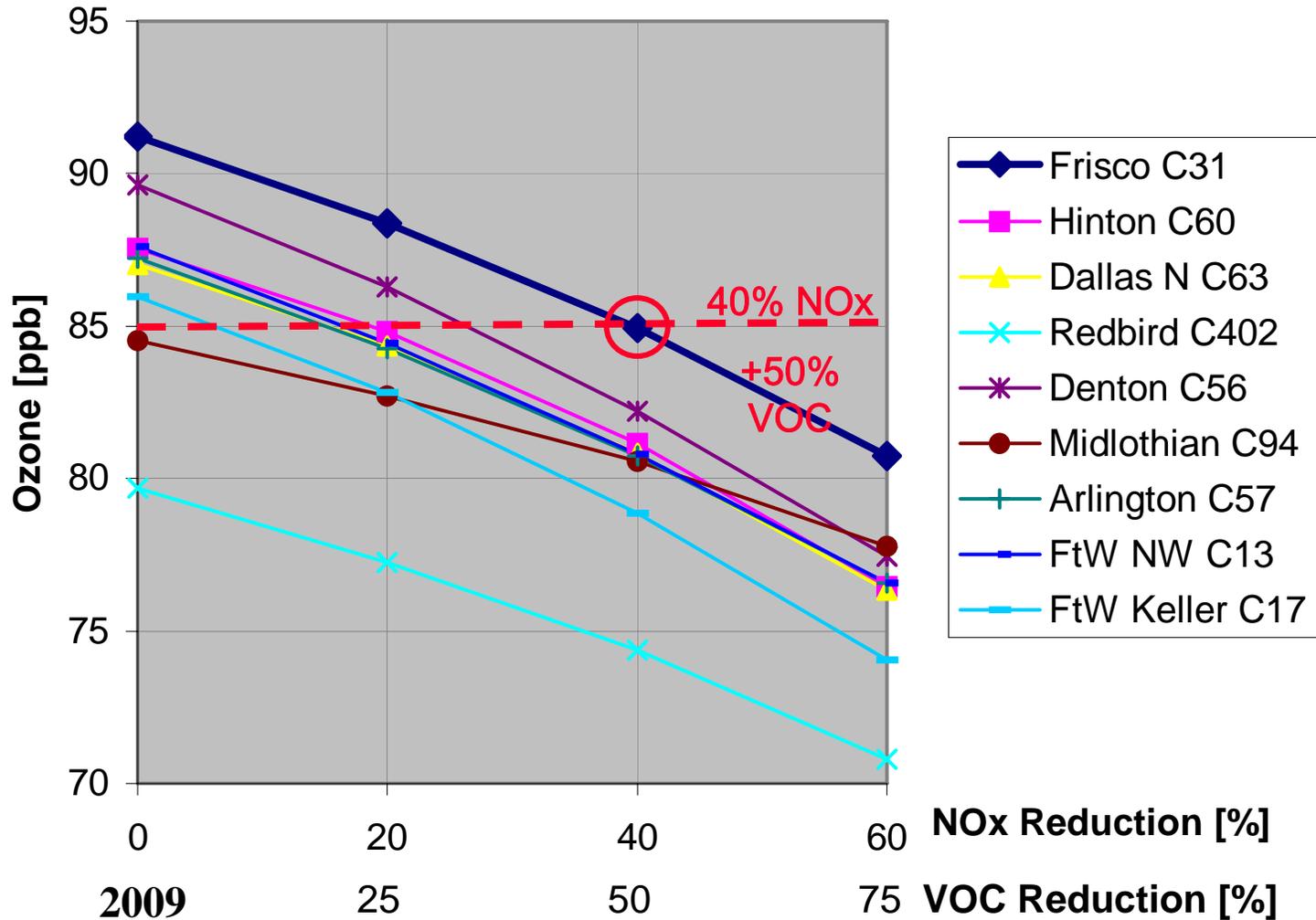


DFW 2009 Design Value Scaled 8-Hour Ozone. NOx Reductions. Run44.fy2009.a1 Aug 13-22, 1999





DFW 2009 Design Value Scaled 8-Hour Ozone. NOx and VOC Reductions. Run44.fy2009.a1 Aug 13-22, 1999





Summary of Future Case

Updated Future Case (Run 44.fy2009.a1)			
Ozone Precursor	Reduction Required (%)	9-County Emissions Inventory	Reduction Required (Tons)
VOC	---	333 Tons	---
NO _x	42%	396 Tons	166.3 Tons
NO _x + VOC	40% 50%	396 Tons 333 Tons	158.9 Tons 166.5 Tons



Summary (cont.)

- The control of ozone is more responsive to NO_x reductions than to VOC reductions
 - A 20% NO_x reduction is more effective than a 50% VOC reduction
- The Frisco monitor is the last to reach compliance with the Denton monitor close behind
 - The future design value at Frisco is 91.2 ppb
 - It will take about 6.2 ppb of ozone reduction to meet the standard
- Frisco requires a 42% NO_x reduction to reach attainment
 - The target for NO_x reductions inside the DFW 9-county area is 166 tons per day



Sensitivity Testing

- Determine effectiveness of potential control options
- Test controls inside DFW 9-county area
- Test regional controls outside DFW



Future Sensitivity Testing

- Sensitivity Tests Running and/or Planned
 - DFW Cement Kilns
 - DFW 9-County Major Sources
 - DFW 9-County Minor Sources
 - NCTCOG Local Controls
 - DFW 9-County EGU Controls
 - East Texas Engine Rules
 - EGU APCA Test



Contributors

- TCEQ

- Jim MacKay
- Ron Thomas
- Chris Kite
- Zhaohua Fang
- Fernando Mercado
- Sharon McDonald
- Pete Breitenbach

- ENVIRON

- Ed Tai
- Greg Yarwood