



Mid-Course Review

MWAQC Technical Advisory Committee

December 10, 2004

Sunil Kumar

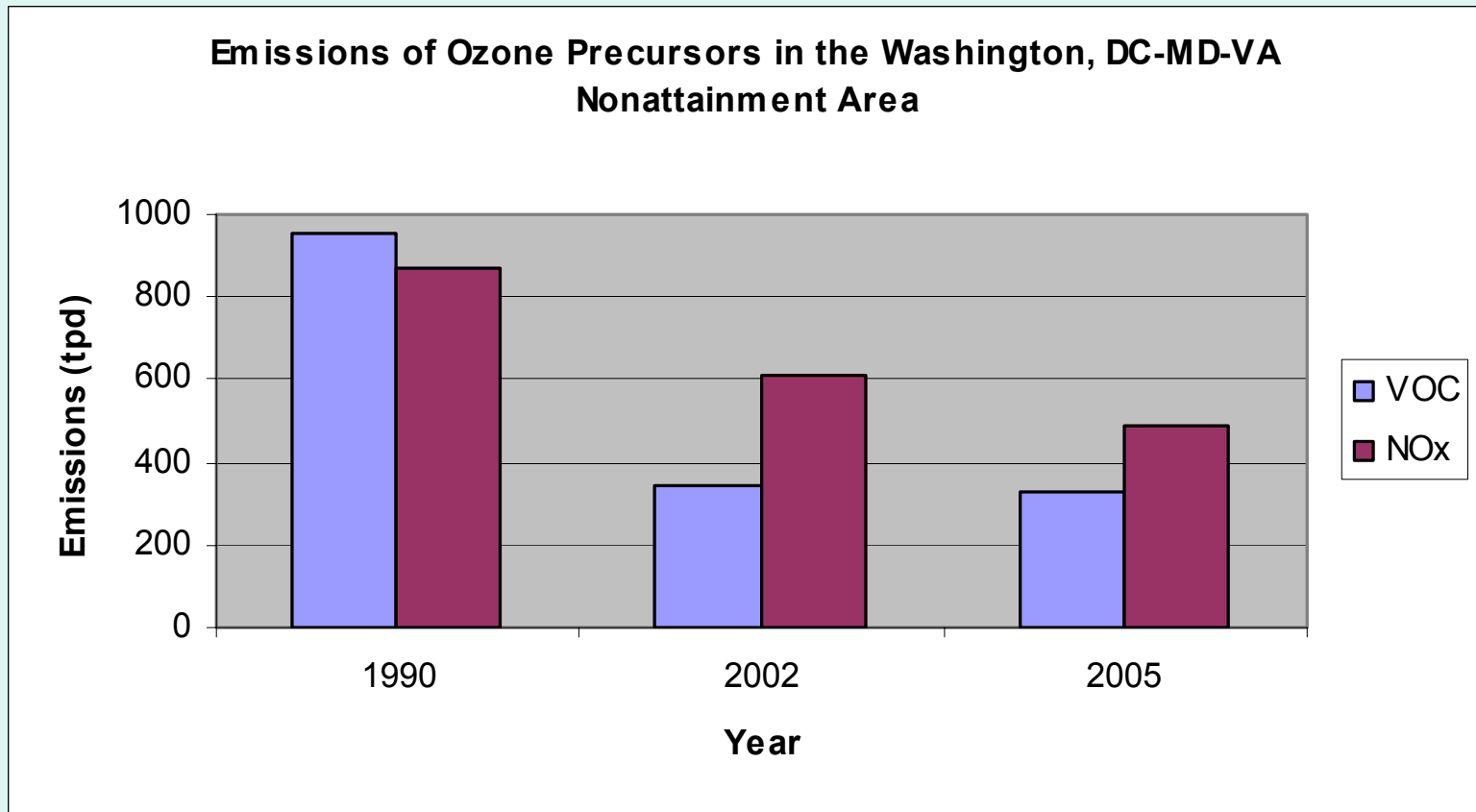




Overview

- Assessment of progress towards attainment of 1-hour ozone standard in 2005
- Emission Levels (1990, 2002 & 2005)
- Control Measure Implementation
- Air Quality Trends
- Impact of Emission Reduction on Design Value
- Ozone Transport

Emission Levels in Washington Area



Emission Reduction

1990 – 2002

1990 - 2005

VOC 64%

66%

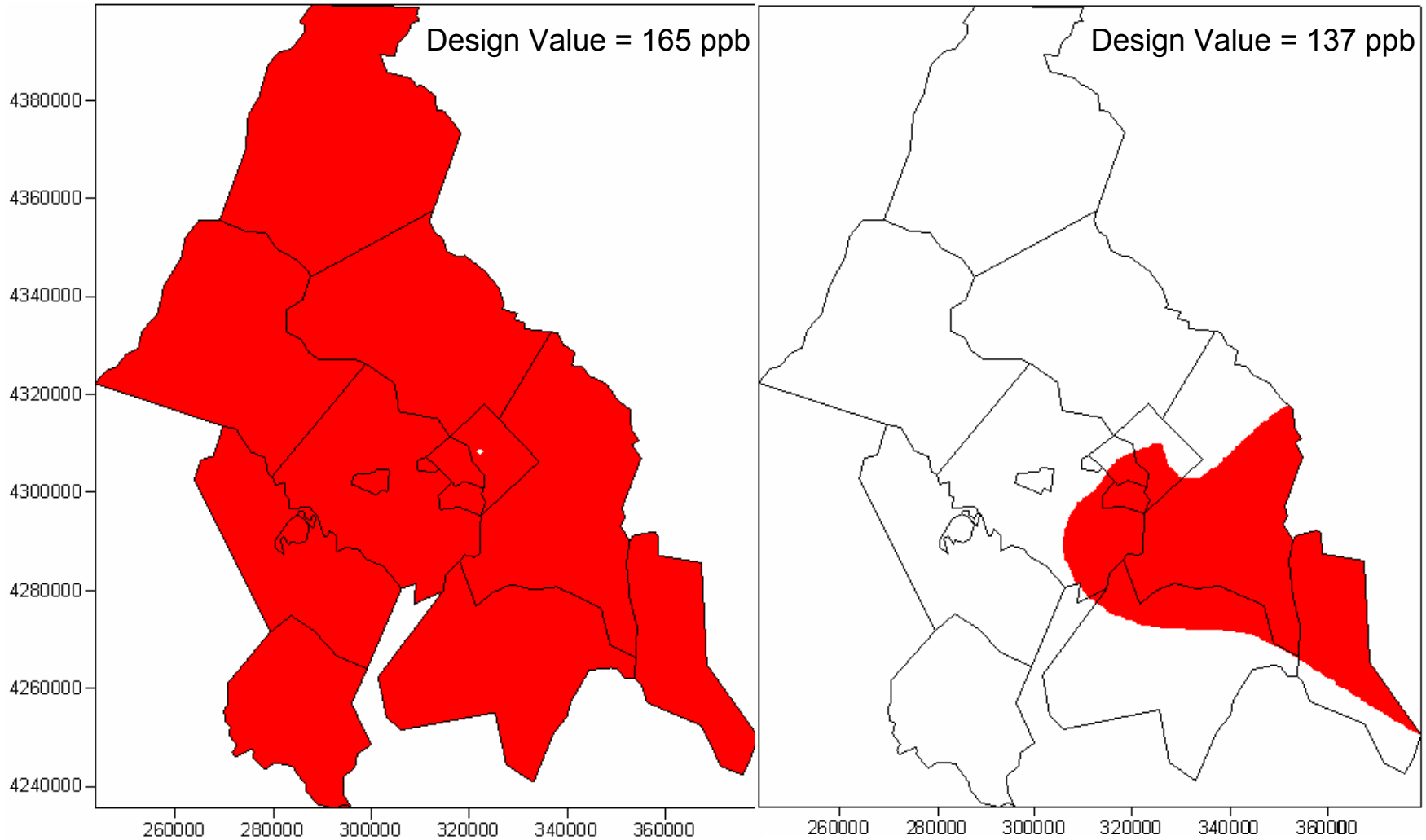
NOx 30%

44%

Washington 1-Hour Ozone Nonattainment Zones

1-Hour Design Value > 124 ppb

(1988-90 & 2002-04)



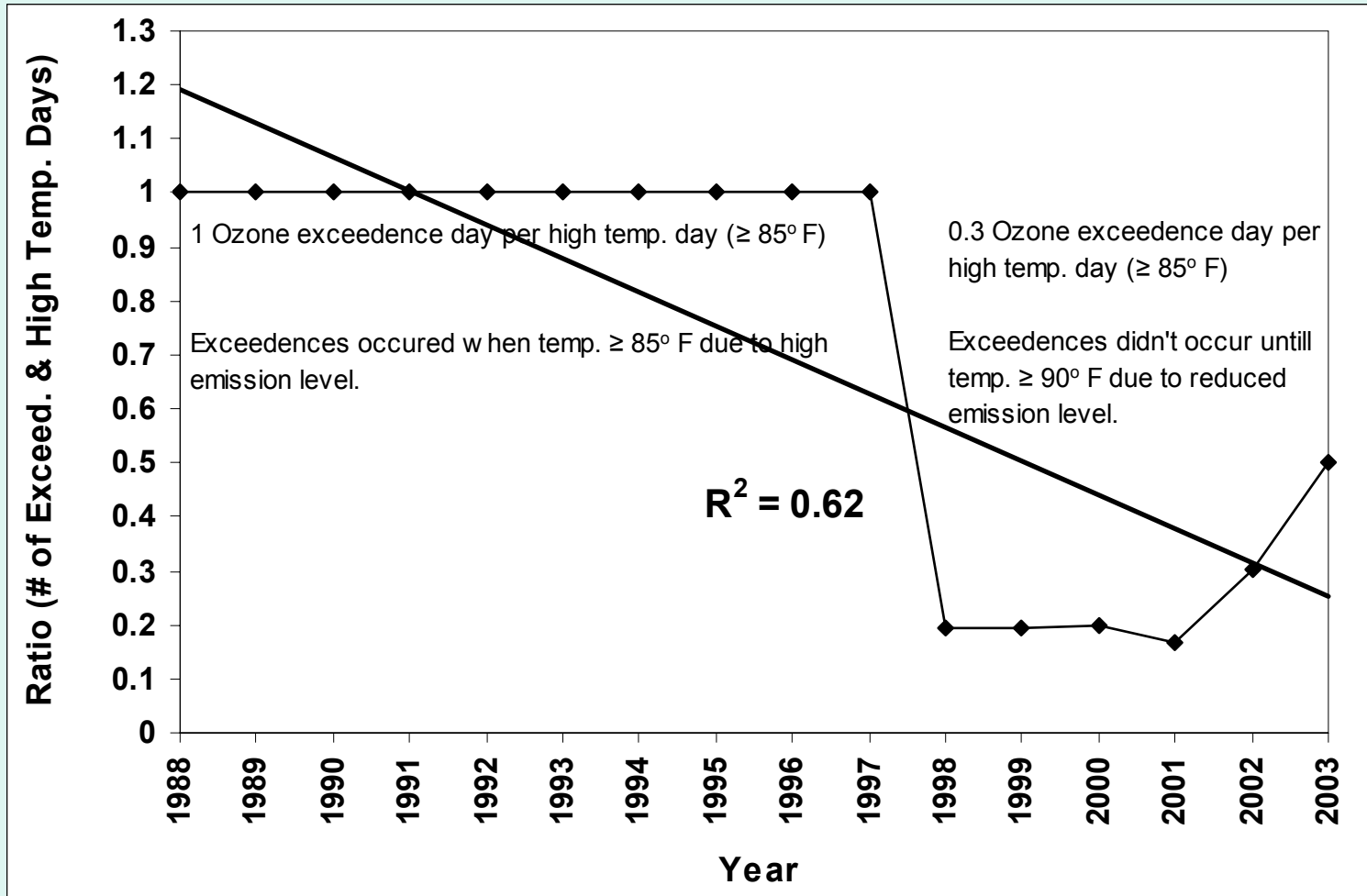
1988-1990

2002-2004

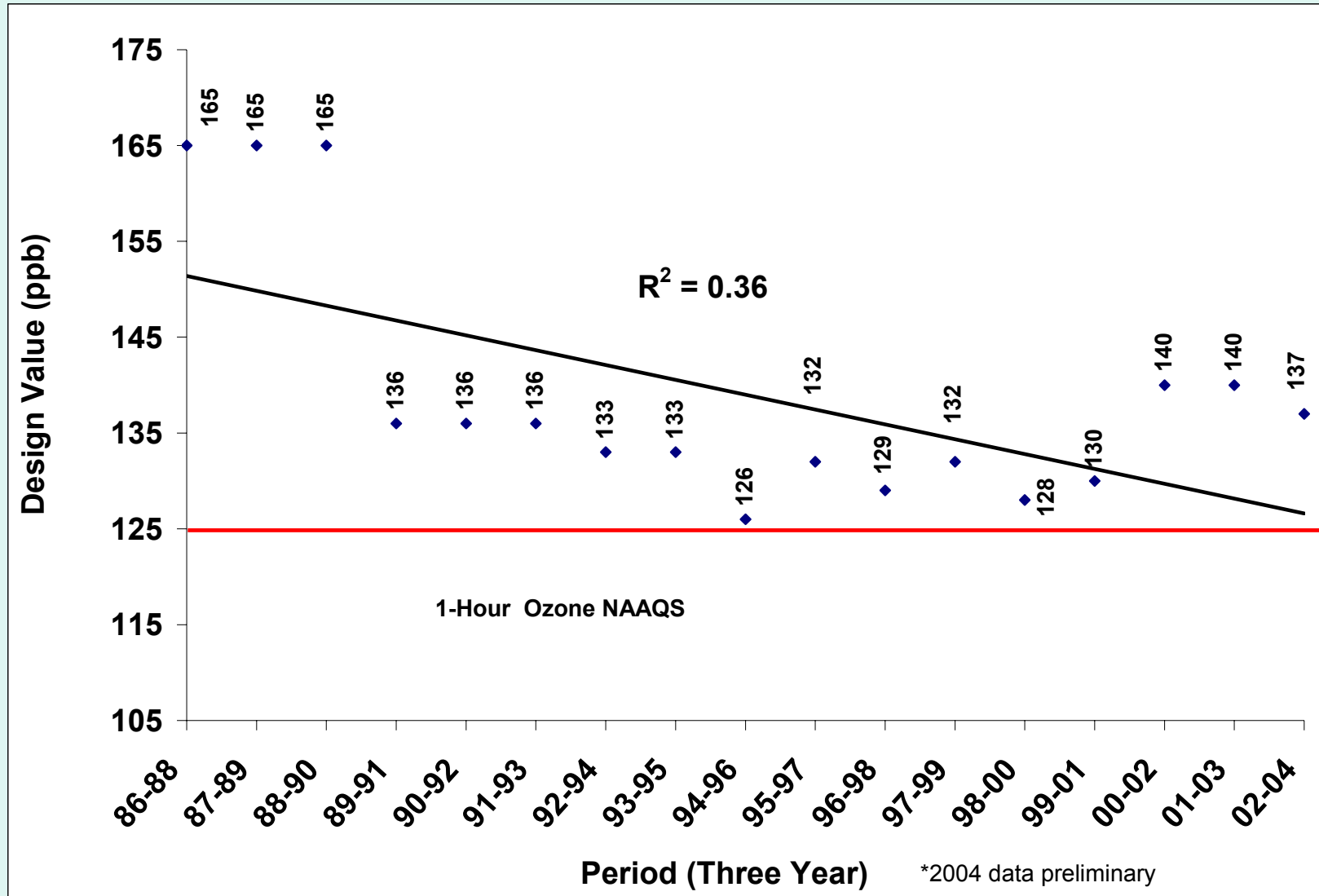


Trend in Ratio of 1-Hour Ozone Exceedance Days and High Temperature Days ($\geq 85^{\circ}\text{F}$)

(1988-2003)



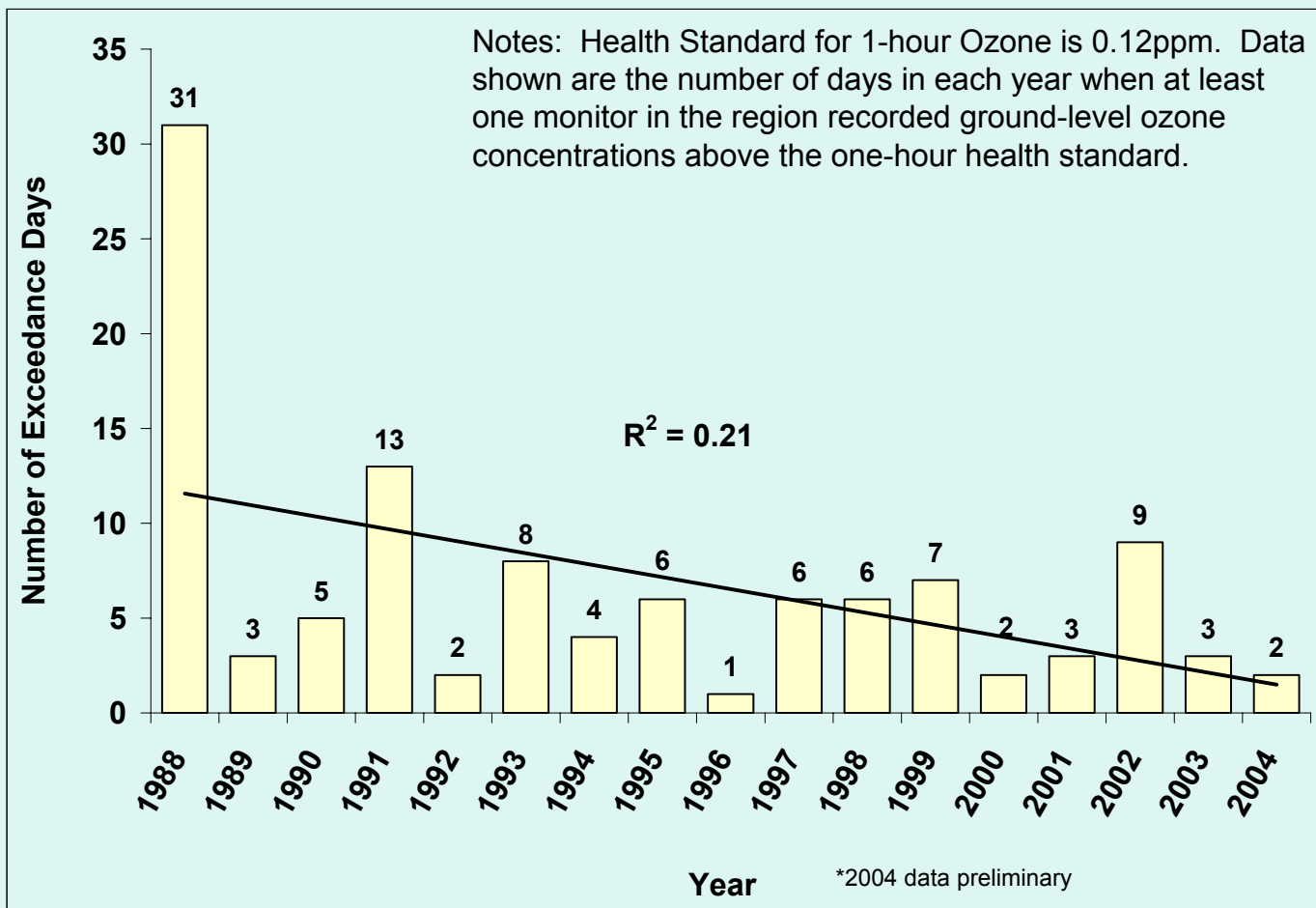
Trend in 1-Hour Ozone Design Value (1988-2004)



Trend in Monitored Exceedances Across All Monitors in Washington Nonattainment Area



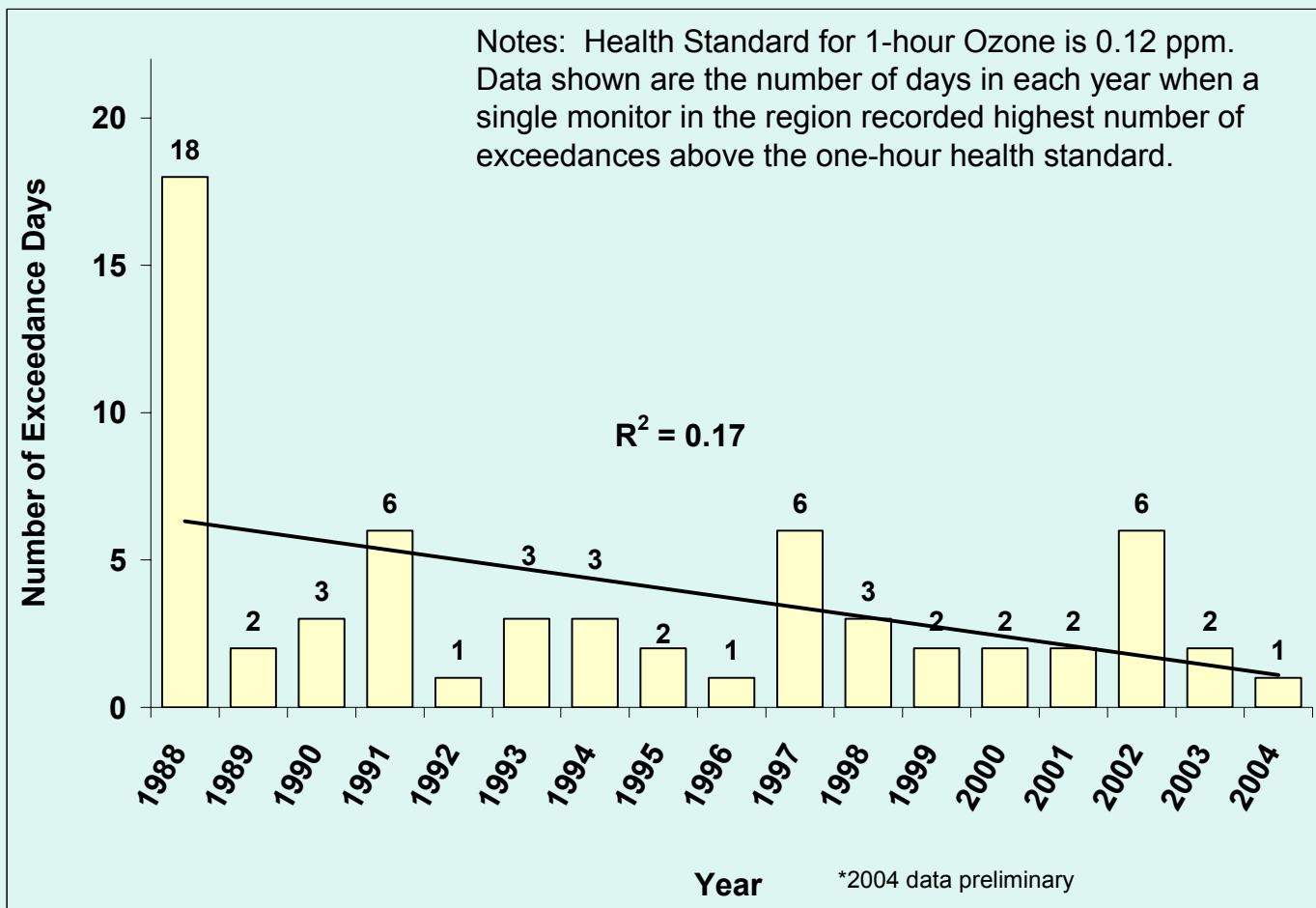
(1988-2004)



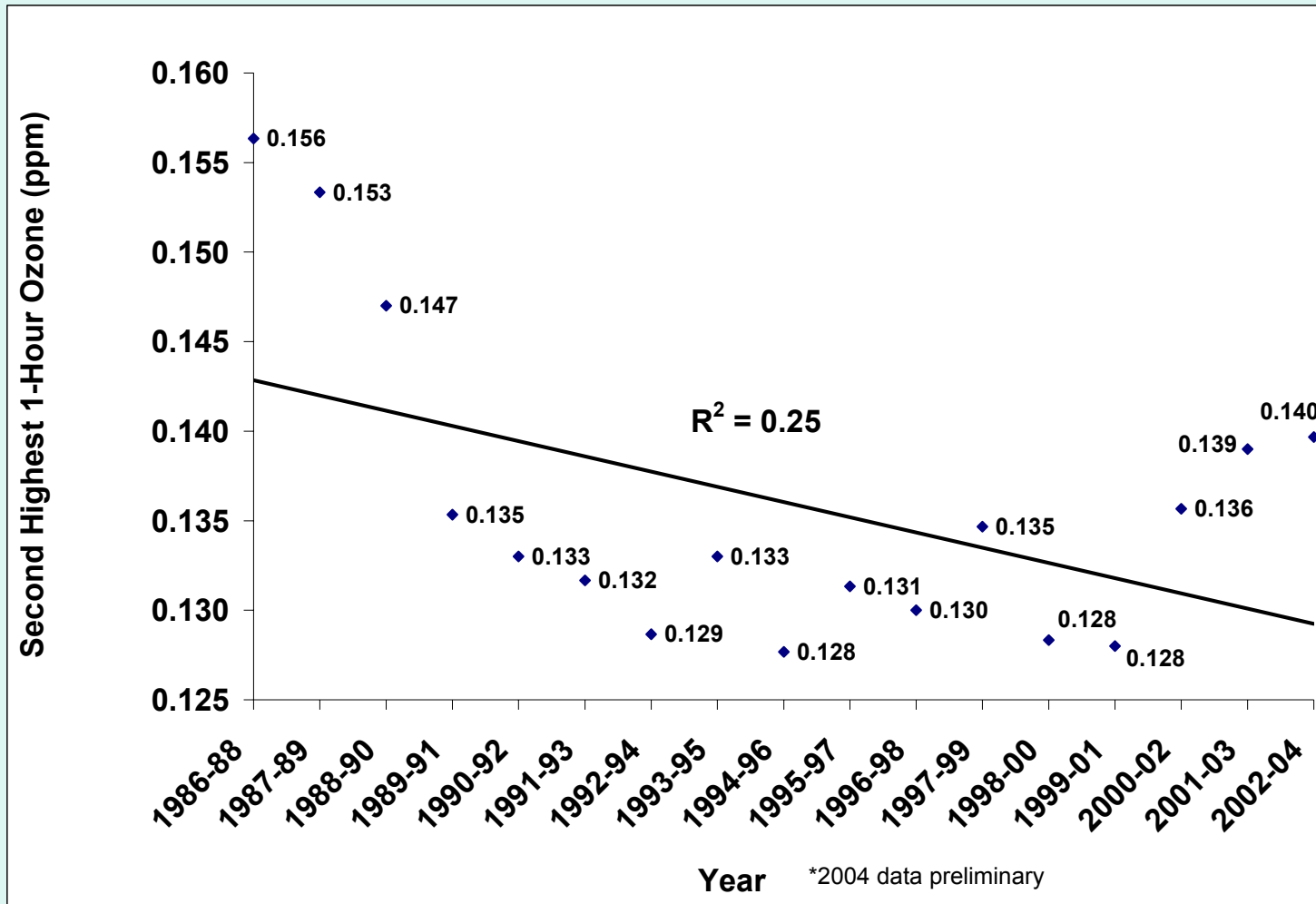
Trend in Monitored Exceedances at the Monitor with Most Exceedances in Washington Nonattainment Area



(1988-2004)



Trend in Highest Running Average 2nd High Daily Maximum Ozone Concentration (1988-2004)

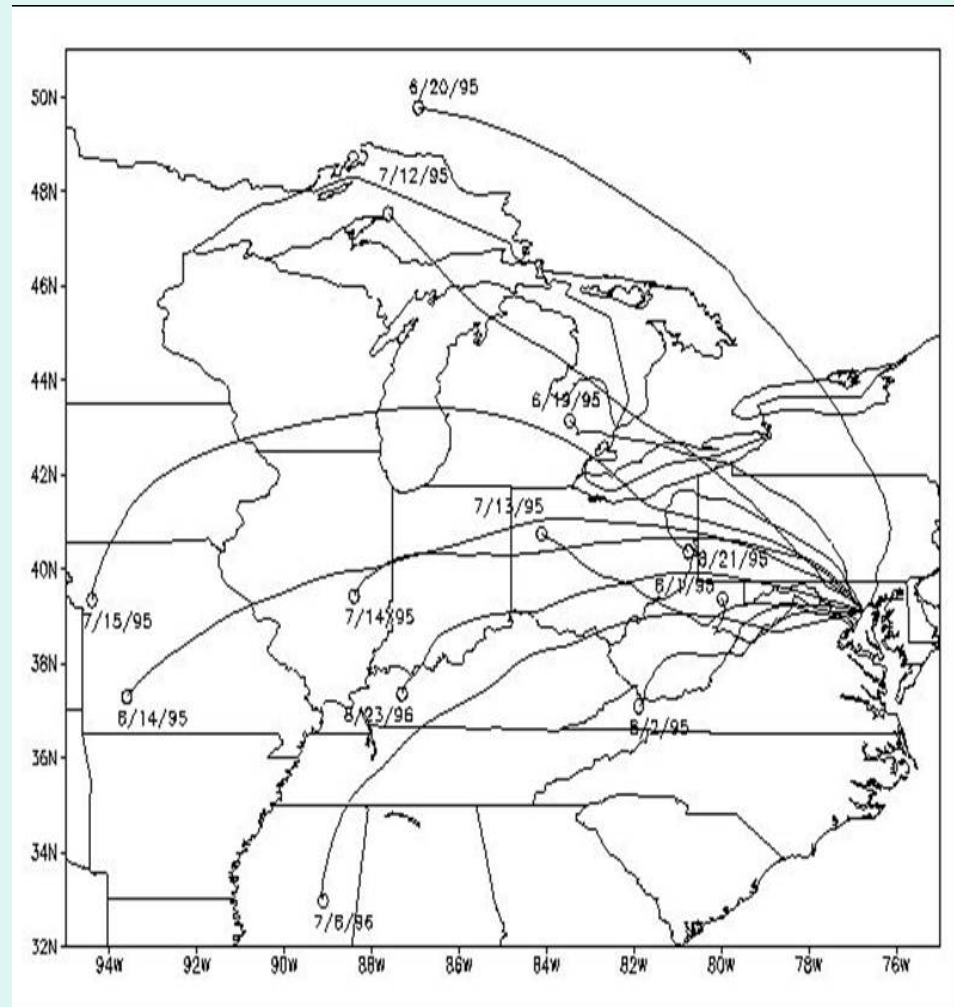
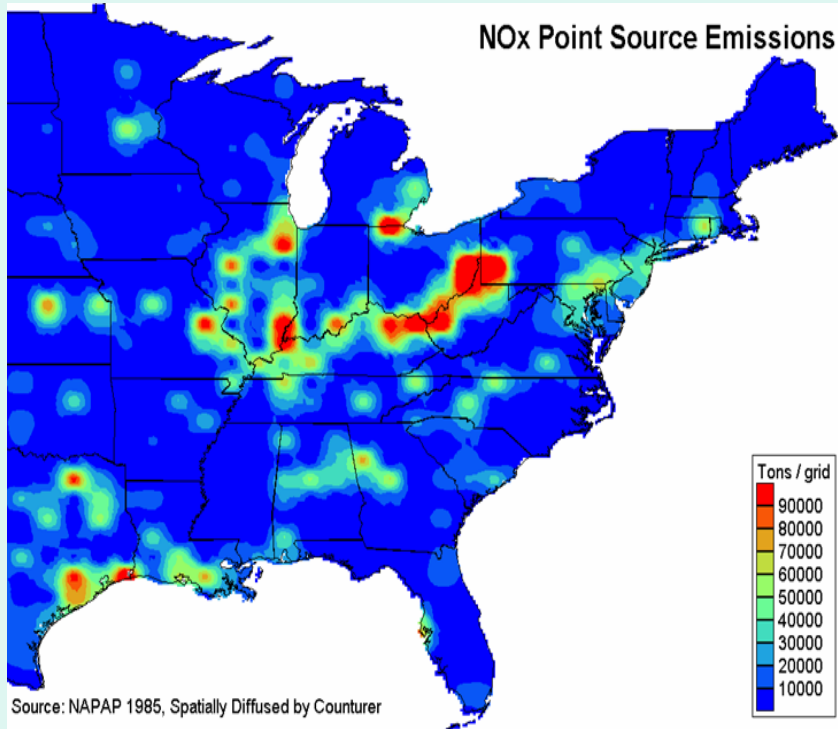




Transported Ozone Remains a Problem

- Evidence
 - Back Trajectories
 - Shenandoah National Park Monitor
 - North American Electrical Blackout Study
 - Low Level Jets
- Solution?
 - NO_x SIP Call Controls coming on line.

Source of Transported Ozone



Regional Transport Analysis using Shenandoah National Park



1-Hour Design Values Shenandoah National Park vs. Washington 1-Hour Nonattainment Area

Monitor	1988-1990 (ppm)	2002-2004 DV (ppm)	Change (%)
Shenandoah National Park	0.106	0.102	-3.8%
Washington	0.165	0.137	-17%



August 2003 North American Electrical Blackout Study by UMD

- Provided a unique opportunity to quantify directly the contribution of power plants located in northeast US and southeastern Canada to ozone levels in Washington, DC region.
- Ozone level decreased by ~38 ppbv in response to about 34 percent & 20 percent reductions in SO₂ and NO_x emissions from power plants .
- Forecasted ozone level - 115 ppbv (August 15, 2003)
- Actual ozone level - 84 ppbv (August 15, 2003)



Ozone Transport via Low-Level Jets

- Low-level jets are nocturnal phenomena that have the potential for moving large pools of ozone in the lower boundary layer.
- Similar to large-scale regional transport with ozone moving above the surface then mixing down to the surface shortly after sunrise.
- Nature of low-level jets makes it difficult to quantify their exact contribution to ozone transport into the Washington area.
- According to an estimate these jets can routinely carry about 80 to 90 ppbv ozone.



Impact of Emission Reduction on Attainment Year Design Value

- Predicted Design Value for 2005 =
Normalized Design Value for 2004 – Ozone reduction between 2004-05
- Normalized Design Value for 2004 = 127 ppbv
- Ozone reduction between 2004-05 = (Unit sensitivity * Emission reduction between 2004-05)
- Unit Sensitivity
 - 0.0294 ppbv ozone per ton of VOC
 - 0.1141 ppbv ozone per ton of NO_x
- Emission Reduction (2004 - 2005)
 - 7 tpd VOC
 - 41 tpd NO_x

Impact of Emission Reduction on Attainment Year Design Value

- Ozone reduction between 2004-05 =
Unit sensitivity * Emission reduction between 2004-05 =
 $(0.0294 * 7) + (0.1141 * 41) = 4.9$ ppbv
- Predicted Design Value for 2005 =
Normalized Design Value – Ozone Reduction between 2004-05 =
 $127 - 4.9 = 122$ ppbv

Conclusions



- Significant emissions reductions since 1990.
- All mandated control measures implemented plus additional local efforts.
- Progress towards 1-hour ozone standard:
 - Downward 1-hour ozone trends show progress between 1990 and 2004
 - Exceedances decreased even on days with temp. $\geq 90^{\circ}\text{F}$ due to low emissions level
 - Size of nonattainment zone decreased between 1990 and 2004
- Transport has continued to significantly limit progress towards attainment of the 1-hour ozone standard. NOX SIP Call will be very helpful in reducing ozone transport.
- Attainment of the 1-hour ozone standard anticipated in 2005.



Next Steps

- TAC recommends approval of MCR, Dec. 10, 2004
- MWAQC approves MCR, Dec. 15, 2004
- States submit MCR to EPA – Dec. 2004