



# Mid-course Review

MWAQC Technical Advisory Committee

November 12, 2004

Sunil Kumar

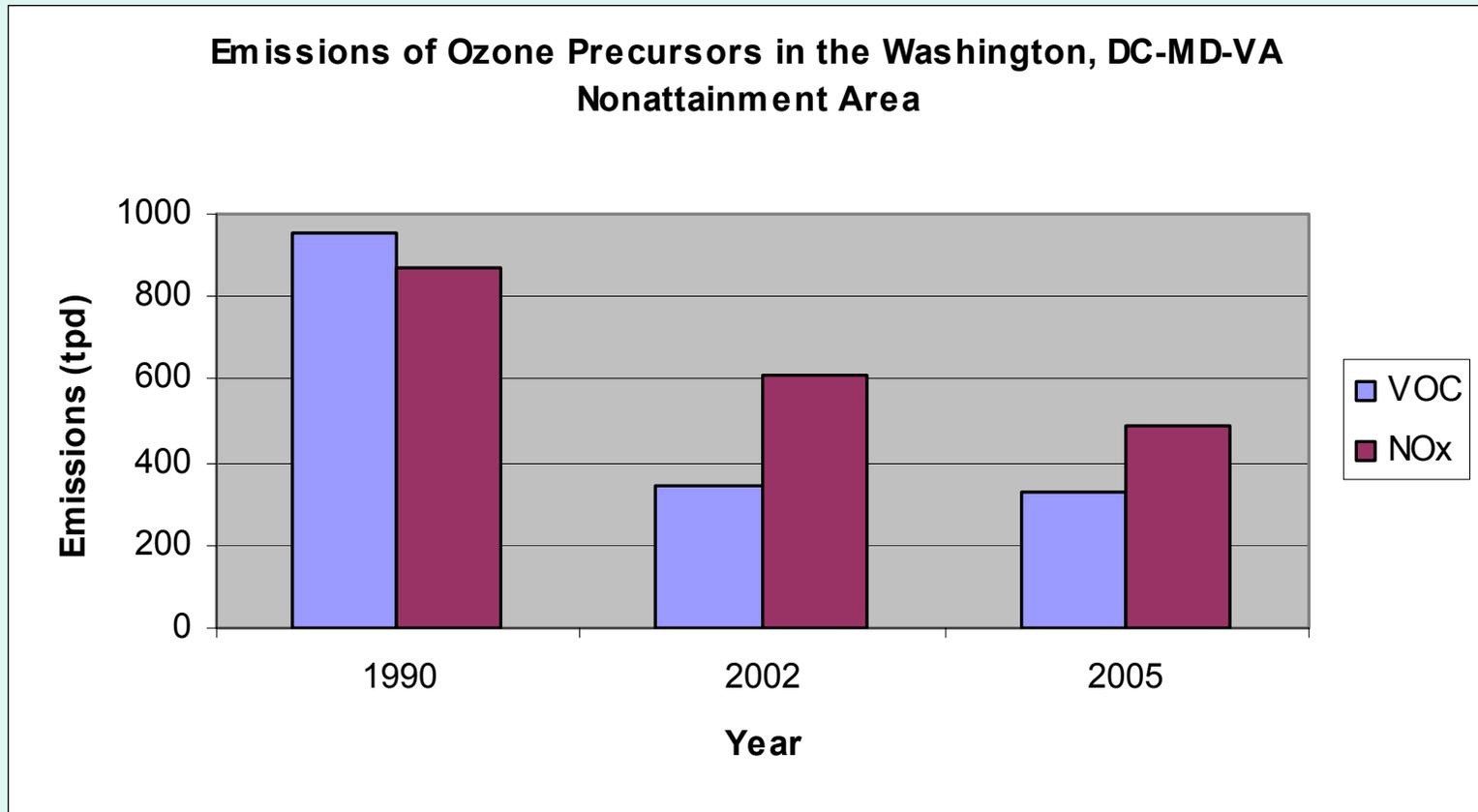




# A Snapshot of Washington Area MCR

- 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

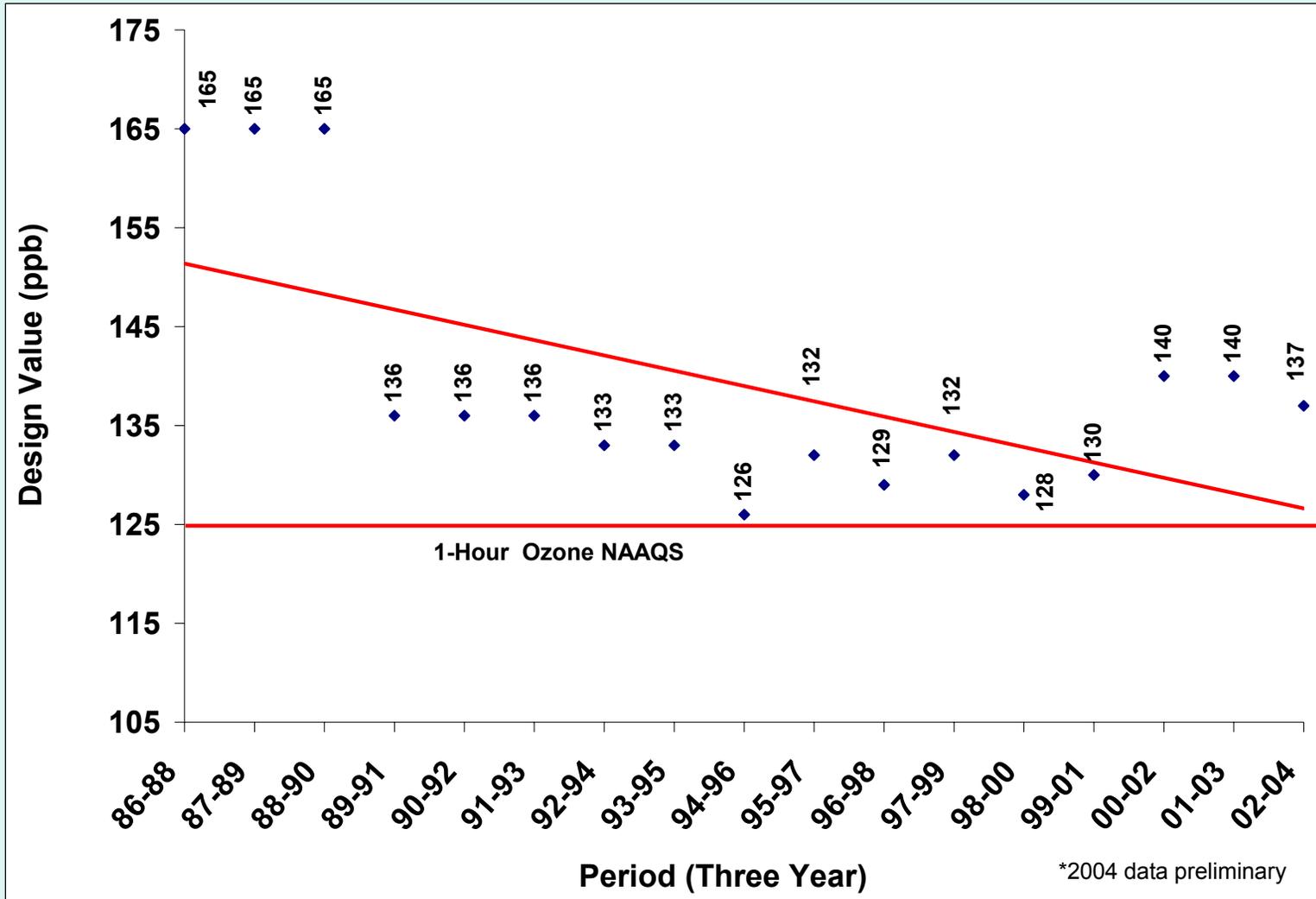
VOC 64%

66%

NOx 30%

44%

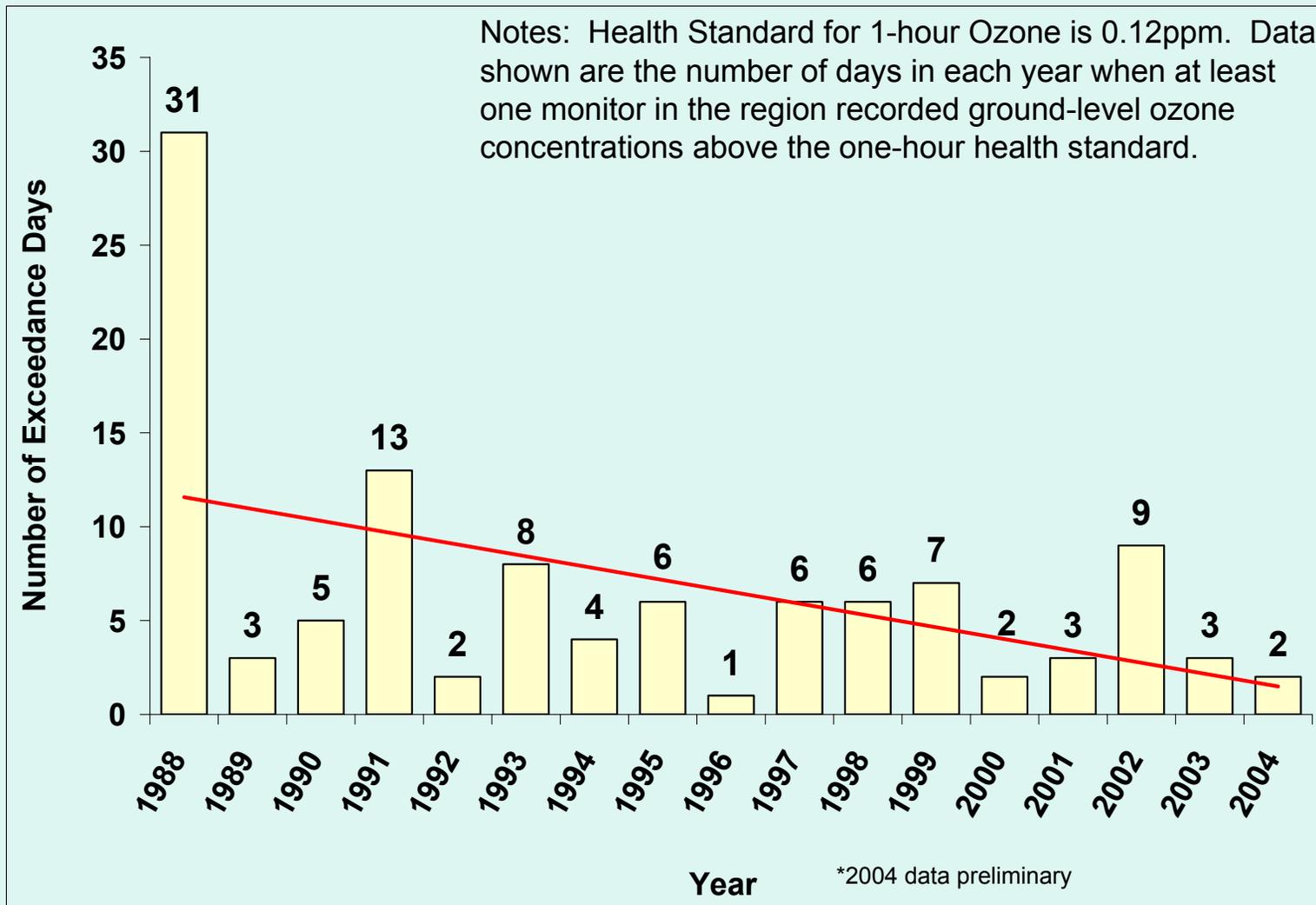
# Trend in 1-Hour Ozone Design Value (1988-2004)



# Trend in Monitored Exceedances Across All Monitors in Washington Nonattainment Area

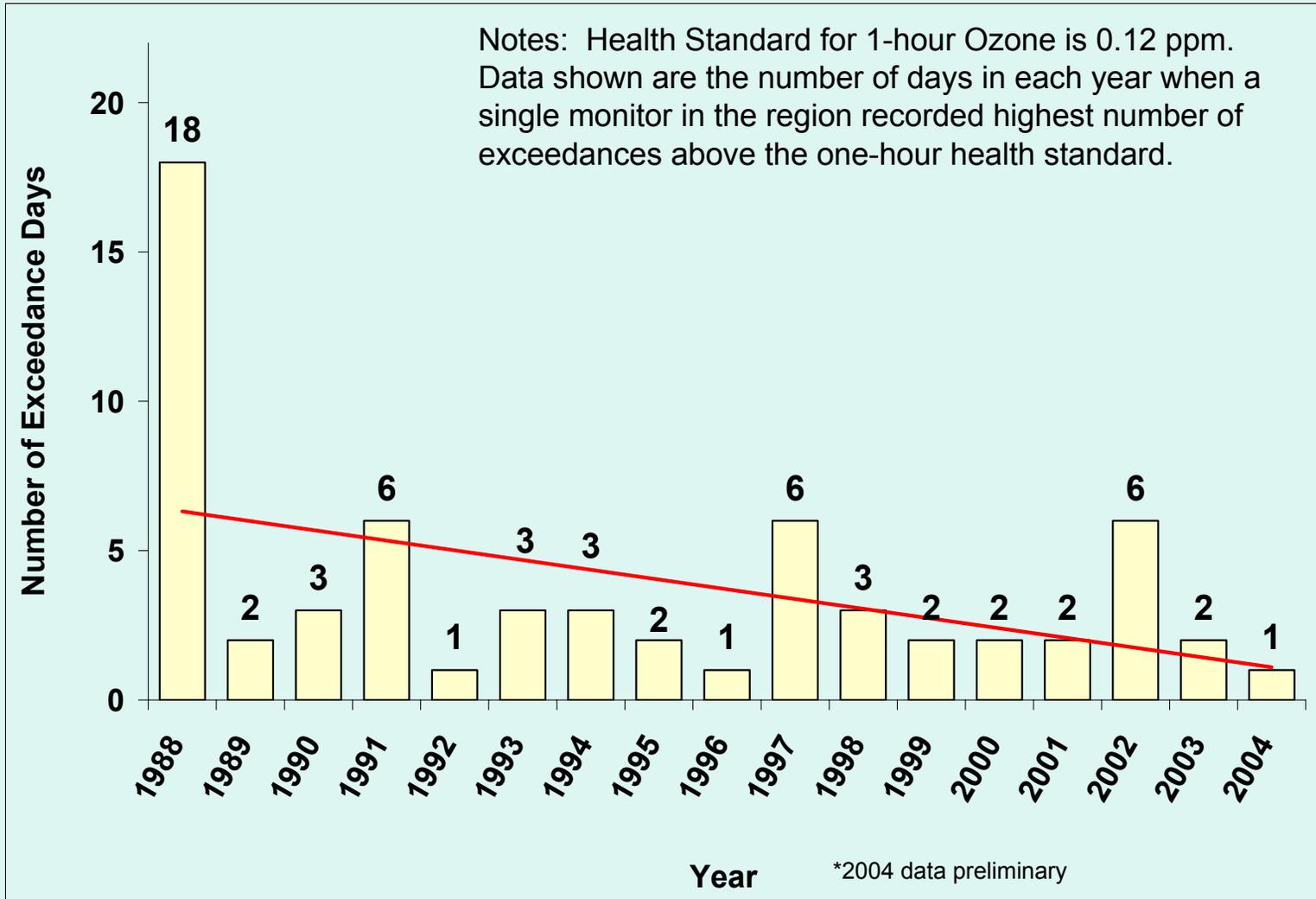


(1988-2004)

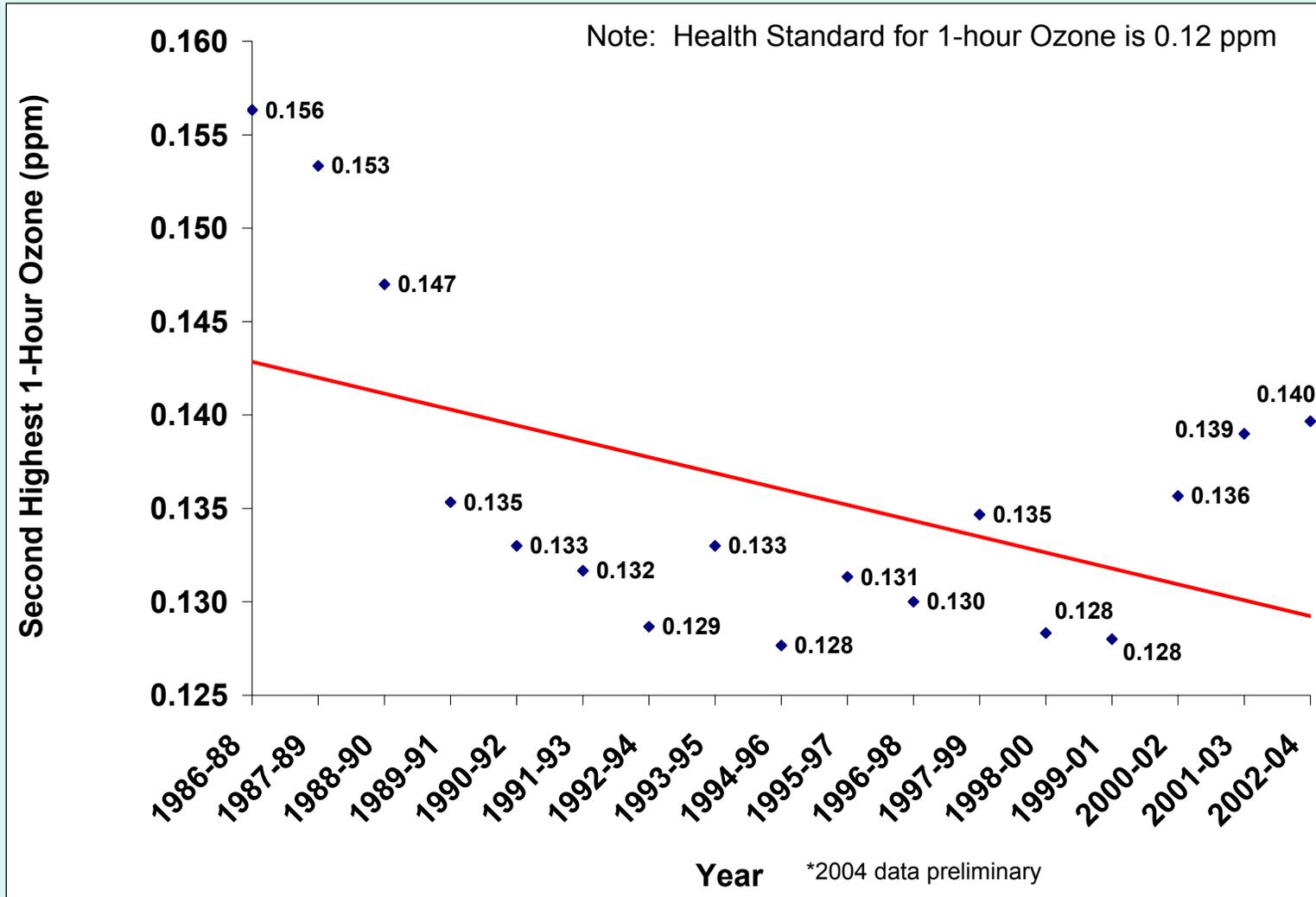




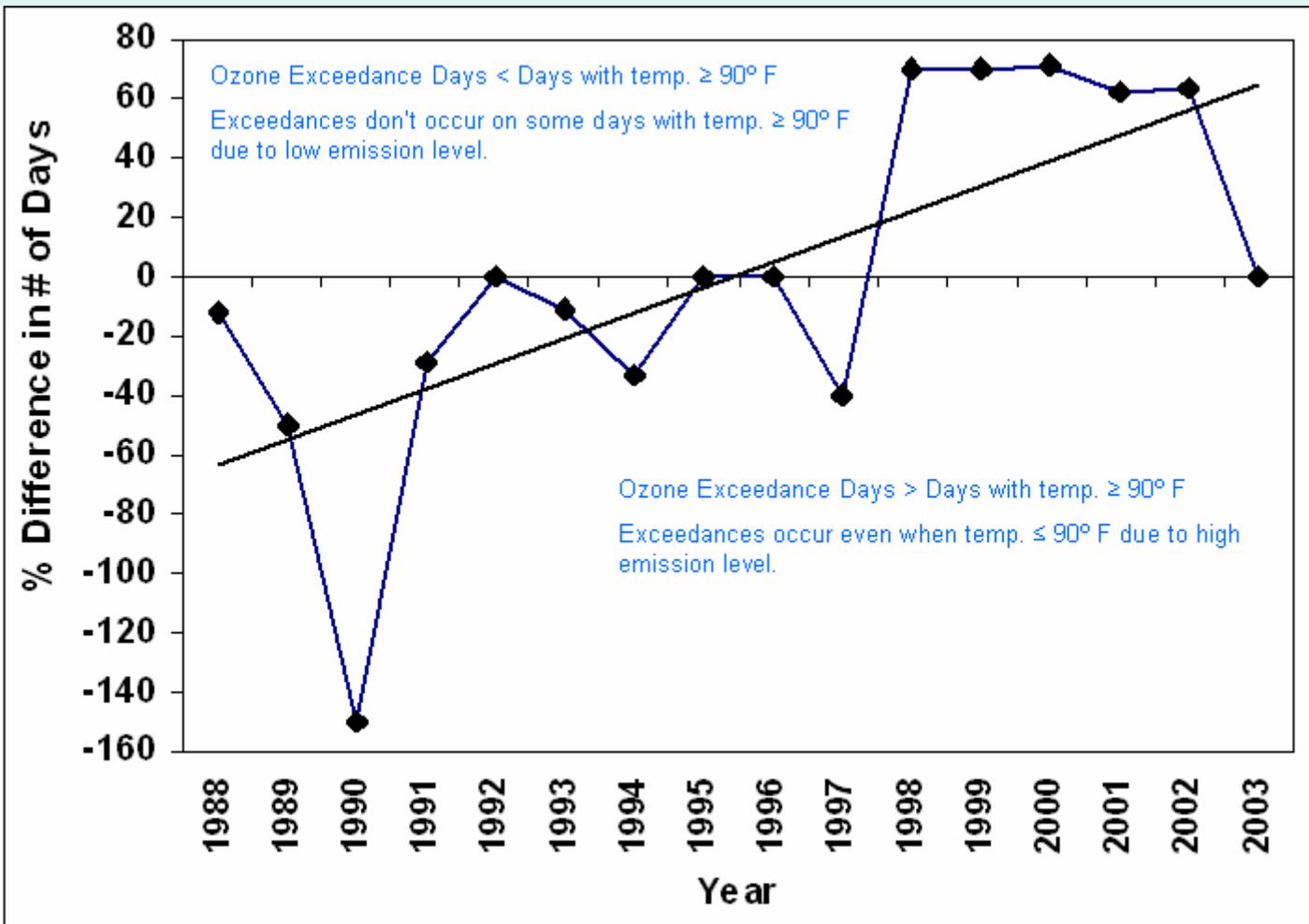
# Trend in Monitored Exceedances at the Monitor with Most Exceedances in Washington Nonattainment Area (1988-2004)



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



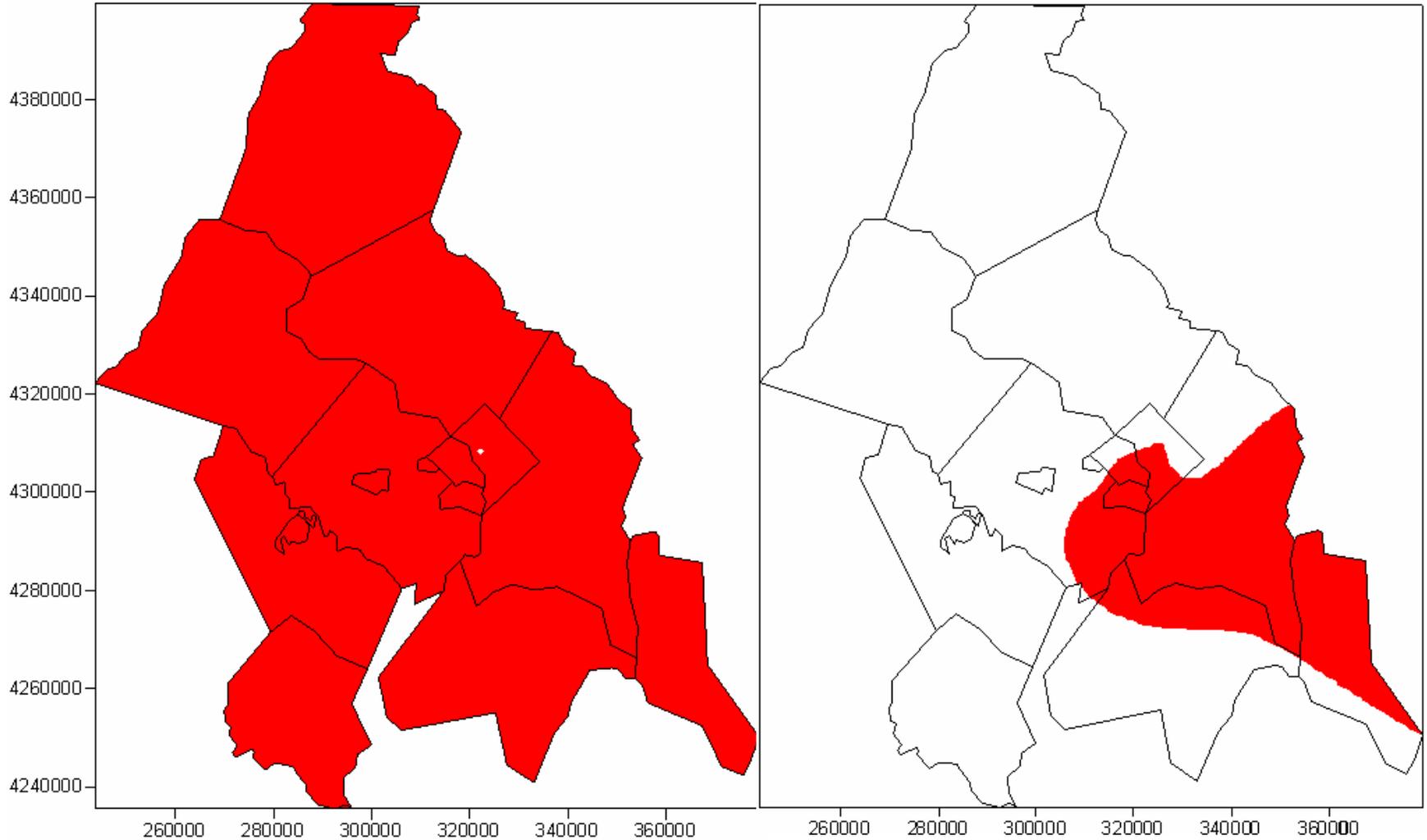
# Trend in Percent Difference between # of Days with Temp. $\geq 90^{\circ}\text{F}$ and # of 1-Hour Ozone Exceedance Days (1988-2004)



# Washington 1-Hour Ozone Nonattainment Zones

## 1-Hour Design Value > 124 ppb

(1988-90 & 2002-04)



1988-1990

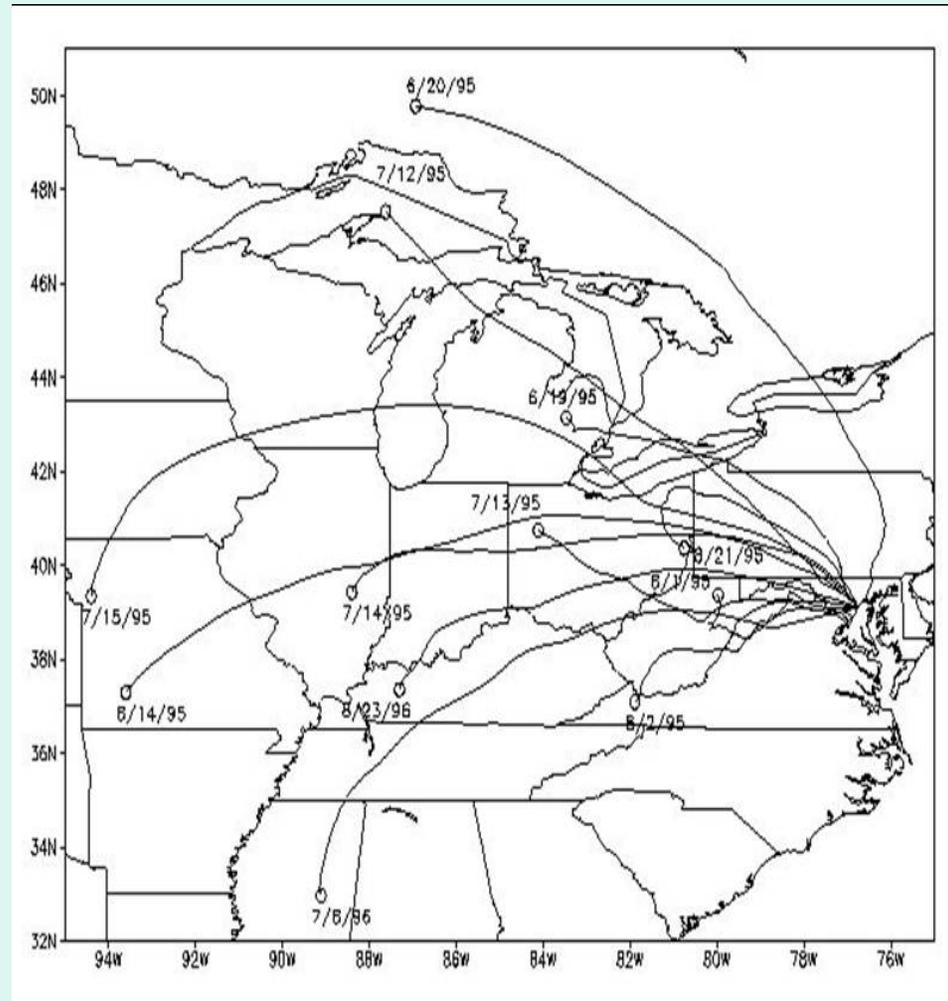
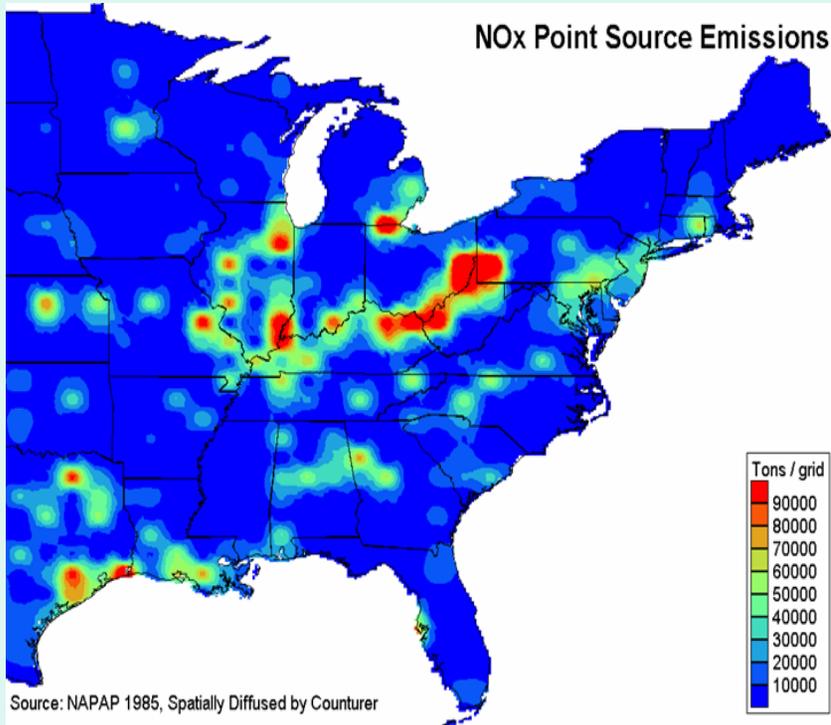
2002-2004



# Transported Ozone Remains a Problem

- Evidence
  - Back Trajectories
  - Shenandoah National Park Monitor
  - North American Electrical Blackout Study
  - Low Level Jets
- Solution?
  - NO<sub>x</sub> 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

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



# 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 SO<sub>2</sub> and NO<sub>x</sub> 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

- Proportional Extrapolation Method
- Unit Sensitivity
  - 0.0294 ppbv per ton of VOC
  - 0.1141 ppbv per ton of NO<sub>x</sub>
- Emission Reduction (2004 - 2005)
  - 7 tpd VOC
  - 41 tpd NO<sub>x</sub>
- Normalized Design Value for 2004
  - 127 ppbv
- Ozone Response (Unit Sensitivity \* Emission Reduction)
  - 4.9 ppbv
- Predicted Design Value for 2005 (Normalized Design Value – Ozone Response)
  - 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

- Workgroup Review Drafts (4 to date)
- TAC recommends approval of MCR, Nov. 12, 2004
- MWAQC approves MCR, Nov. 24, 2004
- States submit MCR to EPA – Dec. 2004