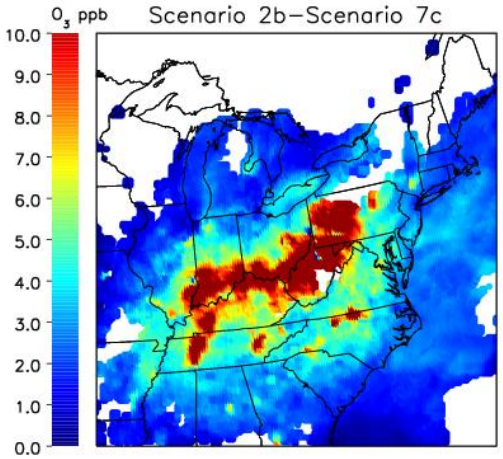
MARYLAND
DEPARTMENT OF THE ENVIRONMENT

Transport Team Update

Preliminary Attainment Modeling Results and a Status Report on a Collaborative Solution to the Ozone Transport Problem



Tad Aburn, Air Director, MDE

OTC Committee Meetings – September 24, 2014

Topics

- Background
- Transport Team Update
- Technical Analyses to Date
  - Maryland's Modeling and Analyses of Emissions Data
- Our "Good Neighbor" Ask of Upwind States
- Timing and Future Efforts
- Discussion

Background – Ozone Transport

- Many, many balls in the air
  - Supreme Court has acted
    - Not real clear on what happens next
  - "Expand the OTR" Petition under Section 176A of the Clean Air Act (CAA)
  - Challenges to EPA over large nonattainment areas (CAA Section 107)
  - Challenges to EPA over "Good Neighbor" SIPs (CAA Section 110A2D)
  - EPA's Transport Rule Process
  - A collaborative effort between upwind and downwind states to address the ozone transport issue
- Remainder of this presentation will focus on modeling results and the collaborative effort

Background – Collaboration

- On August 6, 2013- Approximately 30 Air Directors began a technical collaboration on ozone transport in the East
- There was discussion … and general agreement … on beginning technical analyses of a scenario (called "Phase 1") that would try and capture the progress that could be achieved if:
  - The EPA Tier 3 and Low Sulfur Fuel program is effectively implemented
  - The potential changes in the EGU sector from shutdowns and fuel switching driven by MATS, low cost natural gas and other factors were included
  - The potential changes in the ICI Boiler sector driven by Boiler MACT and low cost natural gas were also included
  - Multiple calls and meetings since August 2013
- In early April 2014, preliminary discussions between Commissioners began
  - These discussions continue

Why Is MD Pushing So Hard

- Only state East of the Mississippi designated as a "Moderate" nonattainment area by EPA
- Baltimore is the only nonattainment area in the East required to submit an "Attainment" SIP by June of 2015
  - This SIP must be supported by an "Attainment Demonstration"
    - The Attainment Demonstration must be based upon photochemical modeling and other technical analyses
    - It must show that monitors in the Baltimore area are expected to comply with the ozone standard by 2018
- We have enough modeling and technical analysis completed to understand what Maryland needs in it's plan to bring the State into attainment
  - This analysis also shows that most other areas in the East should attain the 75 ppb standard

The Key Elements of Maryland's Plan

- Number 1 Need – The Tier 3 Mobile Source and Fuel Standards
  - The most important new program to reduce high ozone in MD and the OTR
- Number 2 – OTC Measures
  - Additional local reductions in MD and close-by neighboring states to reduce mobile source emissions and emissions from other sectors
    - New mobile source efforts in the Ozone Transport Region and new Maryland control programs are on the books or in the works
- Number 3 - Good Neighbor SIPs or Commitments to address transport
  - Current analyses shows that if …
    - Power plants in upwind states simply run the controls that have already been purchased efficiently, and
    - Planned retirements and other changes occur by 2018
    - That transport for the 75 ppb ozone standard will be addressed

Addressing Mobile Sources and …

… other "along the I-95 corridor" controls

- The Maryland modeling looks at more than just upwind power plants
- New federal control programs for mobile sources, like the Tier 3 vehicle and fuel standards, are critical
- Maryland's plan … and the modeling … includes new OTC controls like:
  - California car programs
  - Aftermarket catalyst initiatives
  - RACT requirements
  - Consumer products and paints
  - Diesel Inspection and Maintenance
  - Non-traditional control efforts
  - Many more

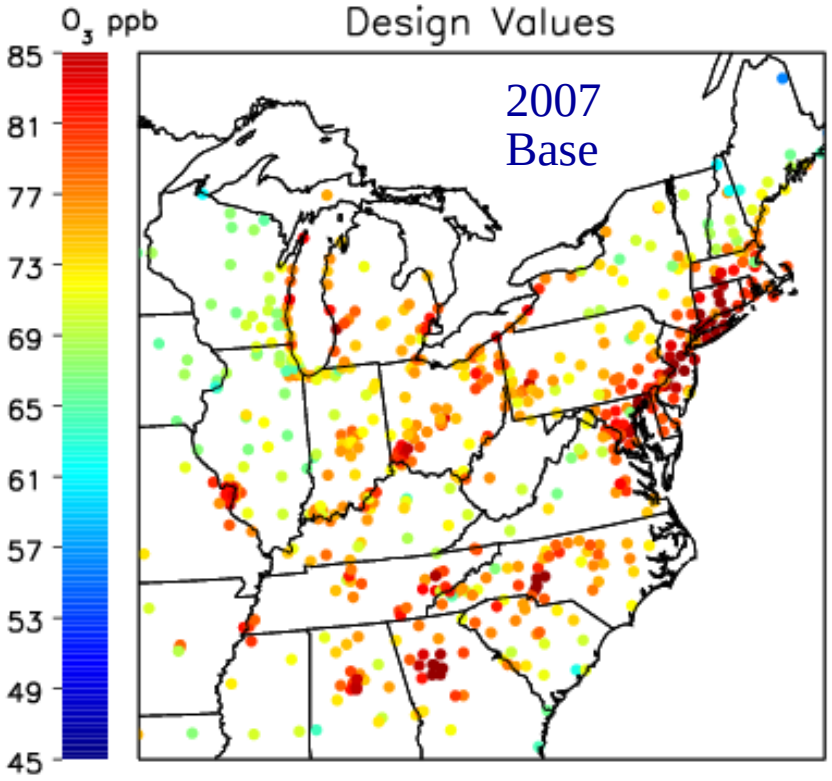
Modeling the Maryland Plan

- Maryland has conducted preliminary modeling of the Plan and believes that the Plan will allow MD to come very close to meeting the 75 ppb ozone standard
  - Will most likely allow most other areas in the East to attain the standard by 2018
- MD's modeling has been conducted as part of the OTC effort … primarily with the OTC platform that uses 2007 as the base year and 2018 as the attainment year
  - As Jeff described earlier, OTC and MD are updating the modeling to use the newer platform based upon EPA modeling efforts
    - This platform uses 2011 as the base year and 2018 as the attainment year
- Based upon available comparisons, it appears that modeling with the 2011 platform will generate results consistent the 2007 platform

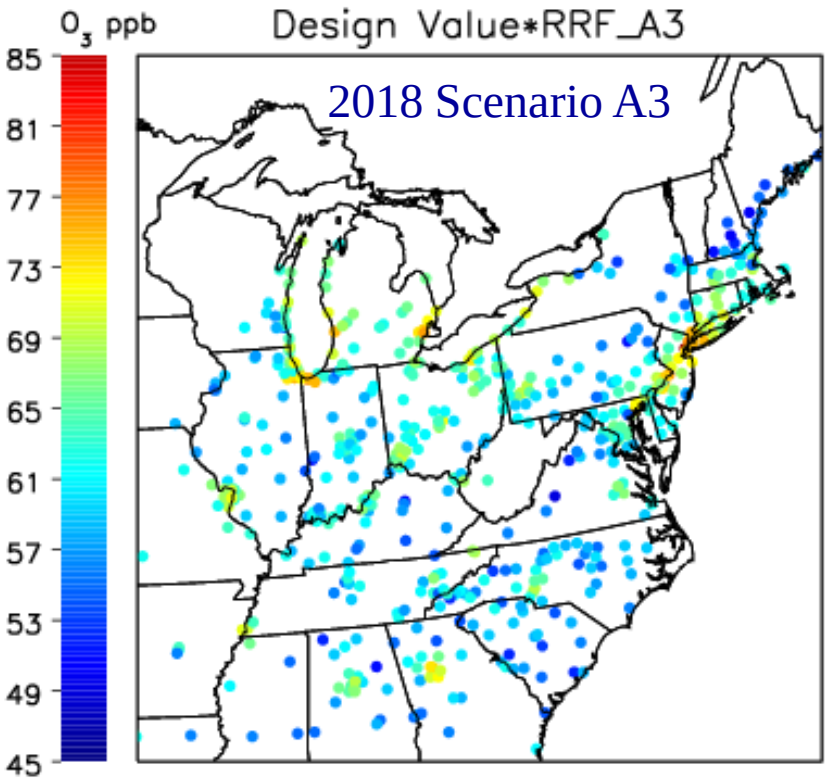
The Bottom Line

Maryland's plan is currently being modeled as "Attainment Run #3" or "Scenario A3"

Before Scenario A3



After Scenario A3



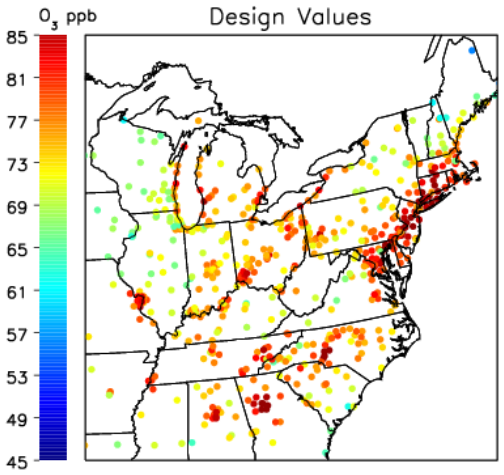
Bottom Line by Monitor

… Before and After Scenario A3

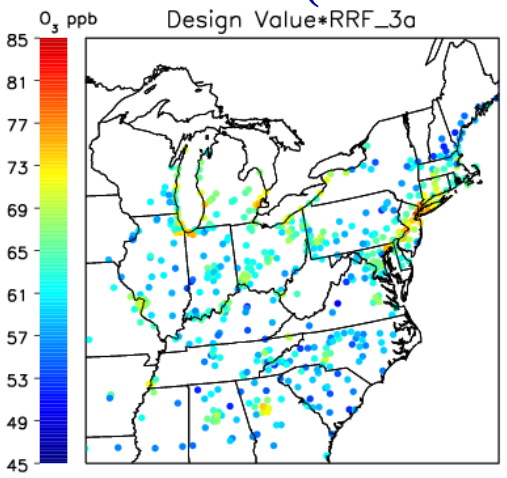
Toughest Monitors in the East	Design Value 2007	After Scenario A3 2018
Harford, MD	90.7	74.7
Prince Georges, MD	85.3	65.1
Fairfield, CT	88.7	70.8
New Castle, DE	81.3	66.3
Bucks, PA	90.7	76.8
Suffolk, NY	88.0	71.0
Camden, NJ	87.5	74.2
Fairfax, VA	85.3	66.9
Franklin, OH	84.7	69.7
Fulton County, GA	90.3	73.7
Wayne, MI	81.3	74.5
Sheboygan, WI	83.3	70.8
Mecklenberg Co, NC	87.0	67.6
Knoxville, TN	80.7	70.7
Jefferson County, KY	80.0	67.0
Lake County, IN	77.5	77.4
Cook County, IL	77.0	75.0

Building the Clean Air Plan

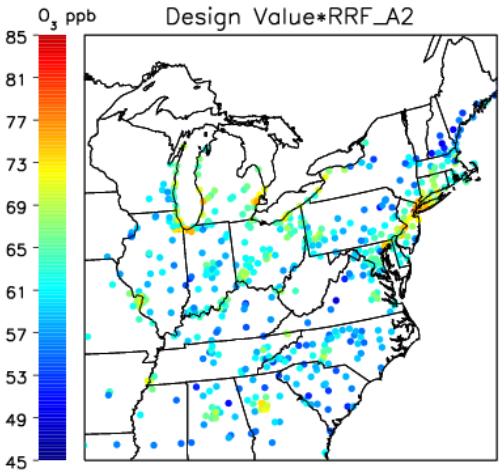
The 2007 Base



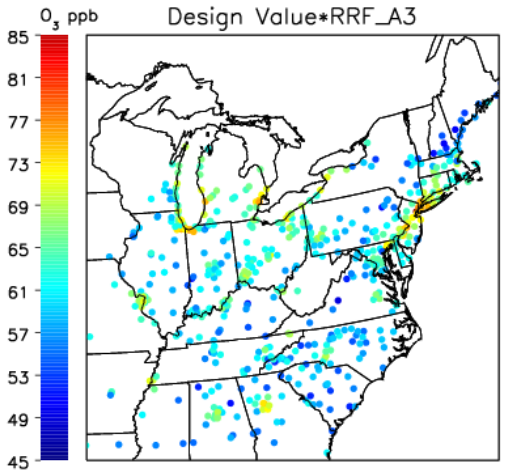
Add the regional controls across the East (Scenario 3a)



Add the "OTR" controls along the I-95 corridor (Scenario A2)



Add the new controls just in MD (Scenario A3)



Updated CMAQ Chemistry?

- For years, OTC, MD and the University of Maryland have been analyzing model performance aloft, where most transport takes place … Not always great
- Also analyzing measured data to look at mobile source inventories
- In 2011, the Discover AQ field study in the Mid-Atlantic provided new unique data aloft
- U of M has analyzed aloft chemistry and found some problems with nitrogen chemistry
  - Fails to carry NOx reduction benefits downwind
- Working on new aloft chemistry concepts … Also looking at inconsistencies in mobile source inventories
  - Will show small, but important additional benefits from regional scale NOx strategies
  - Maybe an extra 1 or 2 ppb benefit in Maryland

A Little More Detail on Attainment Run 3

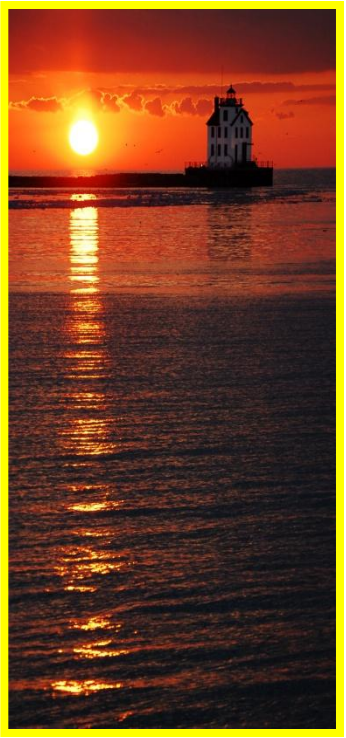
- Scenario A3 includes control measures to address local emissions and transport. It includes the following:
  - Implementation of the federal Tier 3 vehicle and fuel standards across the East
  - Implementation of all "on-the-books" federal control programs across the East
  - Implementation of new and old "Inside the Ozone Transport Region" control measures like the new OTC Aftermarket Catalyst initiative and continued implementation of California car standards
  - Implementation of new local measures in certain states like Maryland, Connecticut and New York
  - Good Neighbor SIPs or commitments from 10 upwind states to insure that power plants run previously purchased controls during the core summer ozone season

Running Power Plant Controls Effectively

- OTC, MD and several other states have analyzed power plant (Electric Generating Unit or EGU) emissions data from Continuous Emissions Monitors (CEMS) to see how well existing pollution controls are being run
  - This data is managed by EPA's Clean Air Markets Division (CAMD)
- Changes in the energy market, a regulatory system that is driven by ozone season tonnage caps and inexpensive NOx allowances have created an unexpected situation where many EGU operators can meet ozone season tonnage caps without operating their control technologies efficiently
  - Sometimes not at all

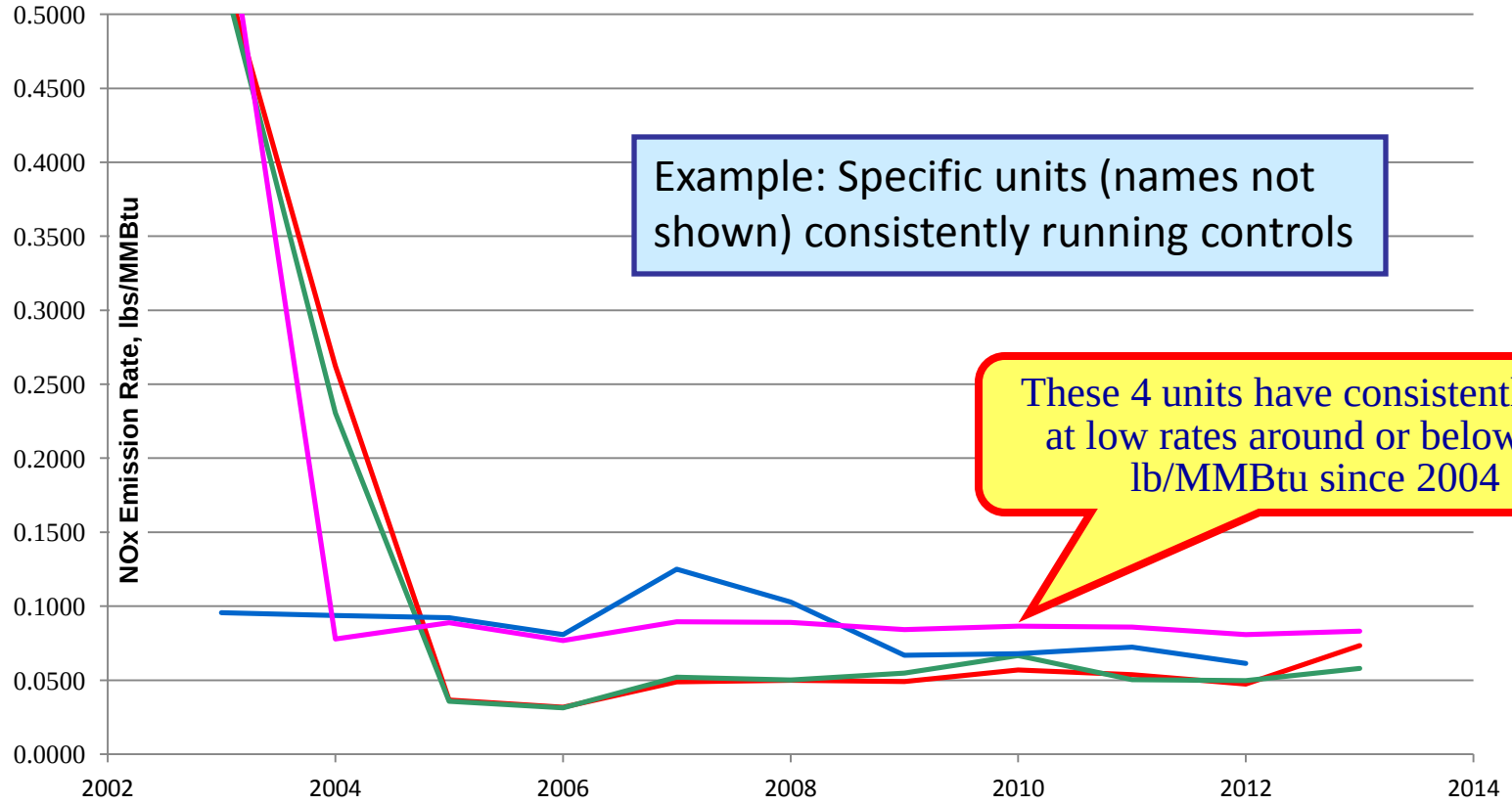
The EGU Data Analyses

- Building from work performed by the OTC SAS Committee, MD began its data analyses in late 2012
  - Looked at EGUs in the 9 upwind states named in the 176A Petition (IL, IN, KY, NC, MI, OH, TN, VA, WV) … MD and PA
- Primary data used was CAMD CEM data from sources and state supplied ERTAC EGU data to capture projected changes between 2012 and 2018
- Shared drafts of the data analyses with other states multiple times
  - Included updates and new information as provided
- Analyzed data between 2002 and 2014 and conducted detailed daily analyses for a 2011 and 2012 ozone episode
  - The episodes analyzed capture two of the worst ozone periods in 2011 and 2012
- Other states, like Wisconsin and Delaware have done similar analyses and reached similar conclusions

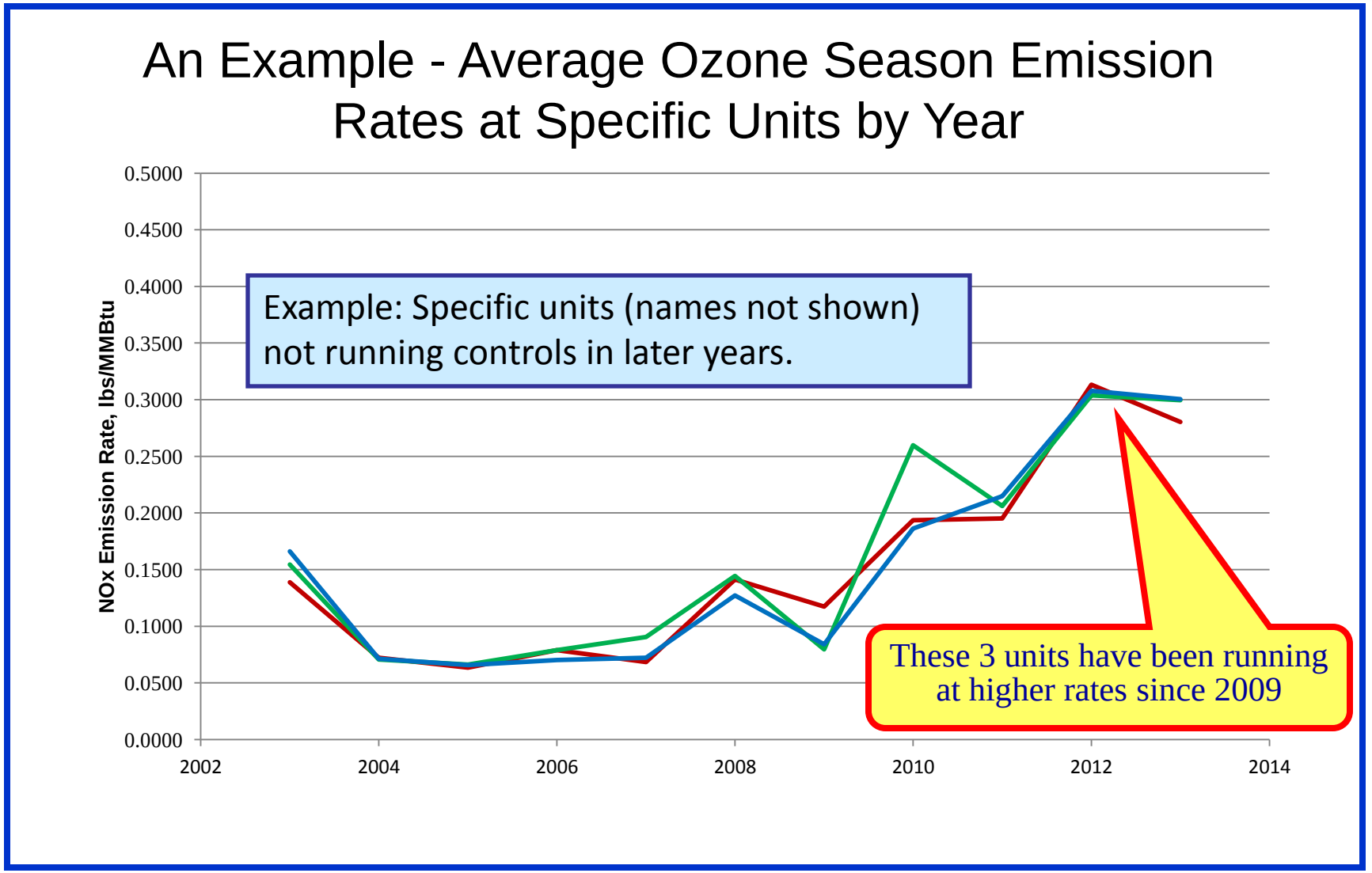


Running Controls

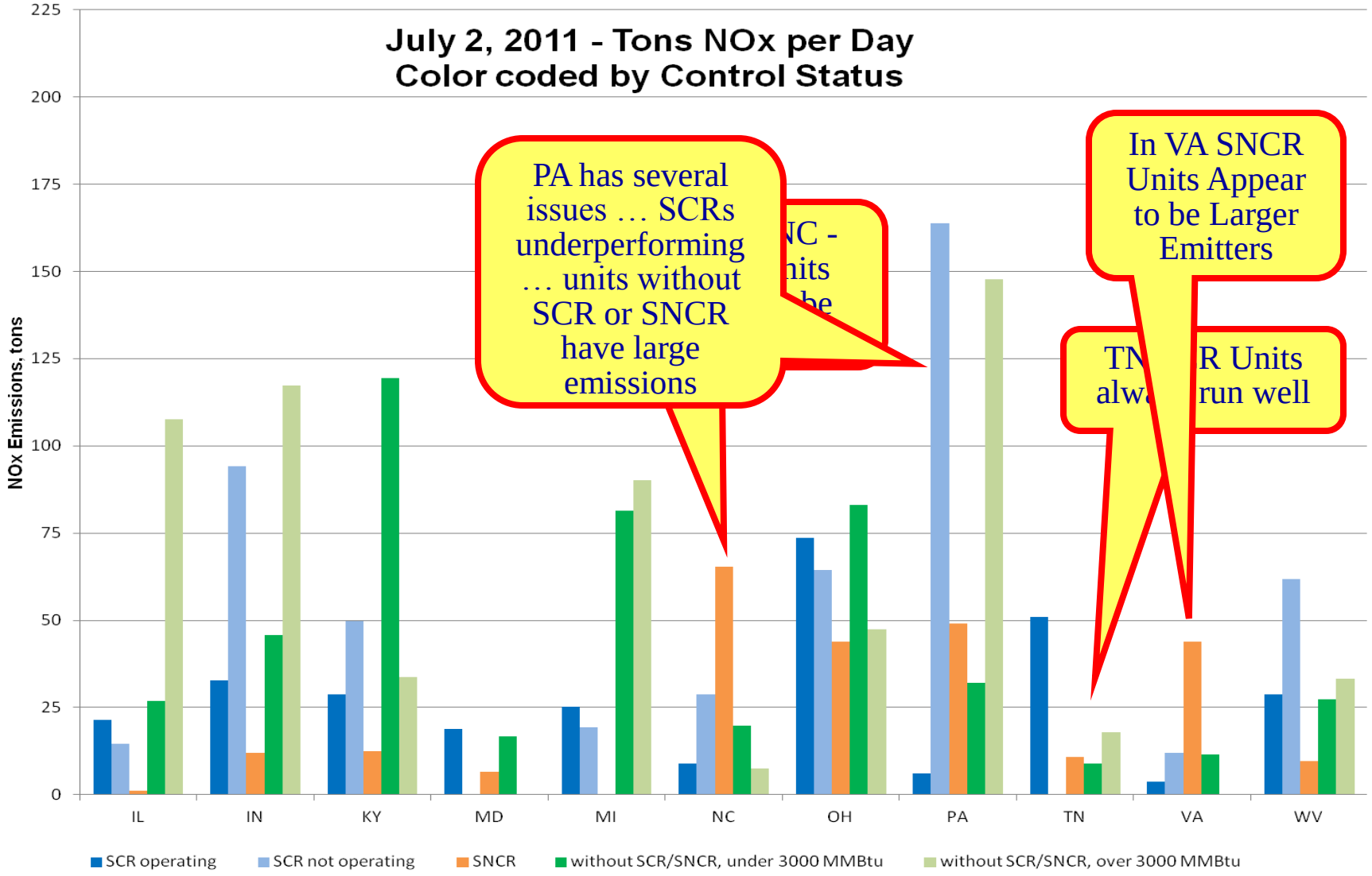
An Example - Average Ozone Season Emission Rates at Specific Units by Year



Not Running Controls as Well

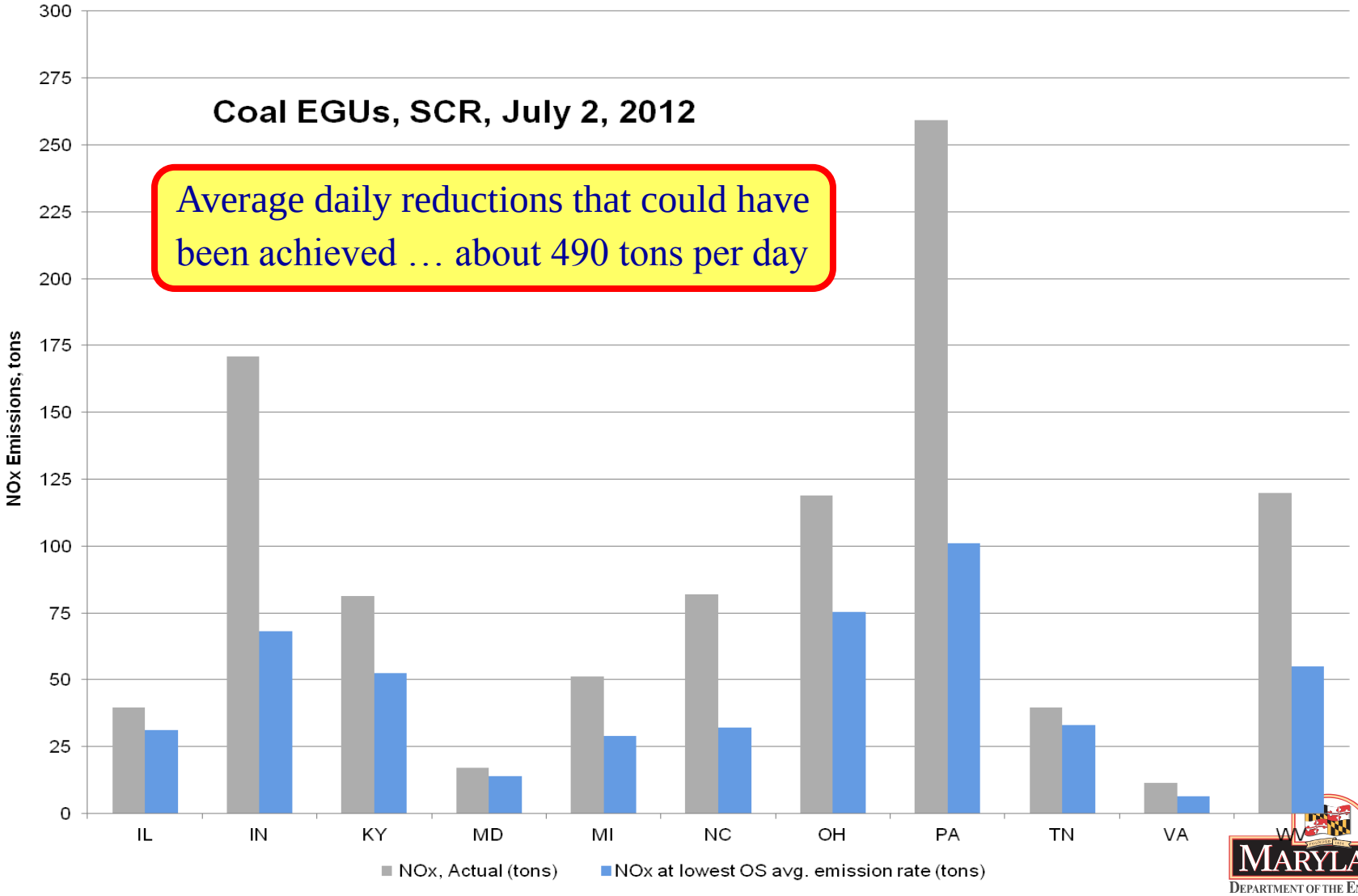


11 State Emissions – An Example



Reductions That Could Have Been Achieved

… An Example - 11 State Total



How Might This Affect Ozone?

- Maryland has performed several very preliminary model runs to look at how much running EGU controls inefficiently might increase ozone levels
- Three runs:
  - Scenario 2B – Total Benefit
    - What is the total incremental benefit provided by current SCR and SNCR controls
  - Scenario 3B – A worst data run
    - Assumes SCR and SCR units all run at worst rates seen in CAMD data - 2005 to 2012
  - Scenario 3C – Based upon CAMD data analysis for actual EGU performance in 2011 and 2012
    - Assumes that units that had higher ozone season emission rates were operating at the best ozone season rates observed since 2005

These are Preliminary Runs …

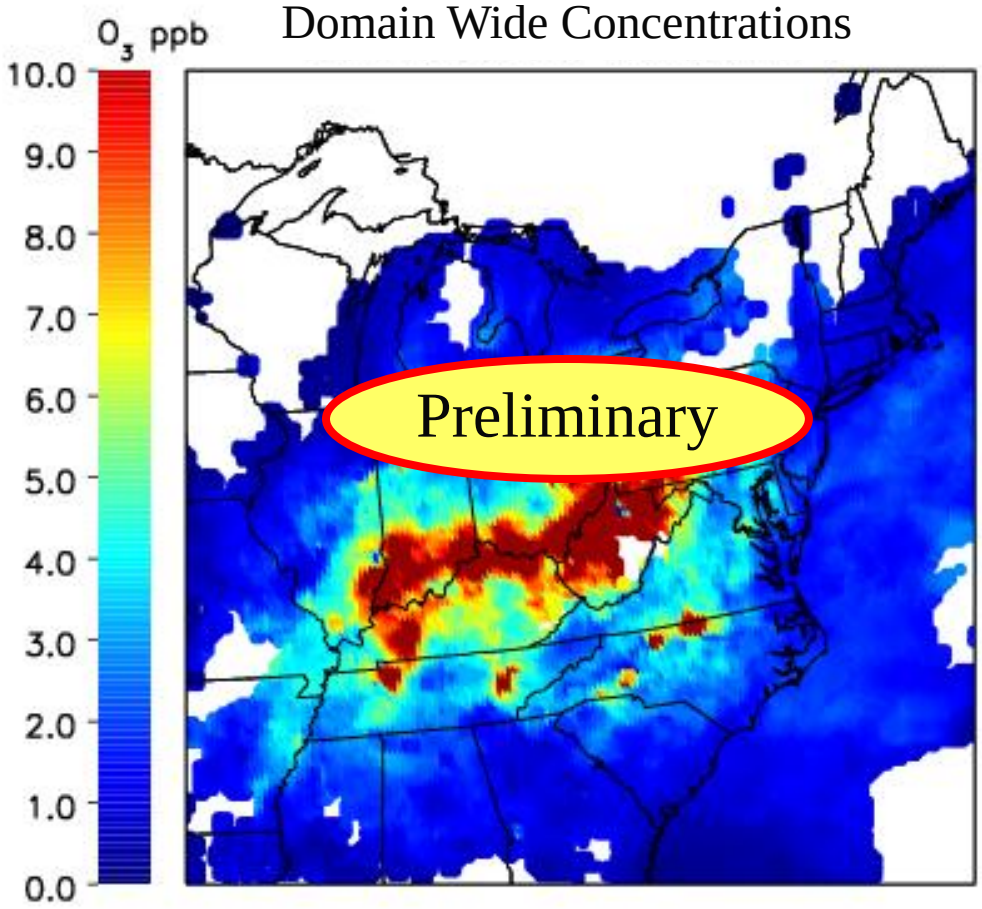
… as the modeling improves some of the details will change, but the overall conclusions will not

- These are sensitivity runs
  - They are not perfect, but they are clearly meaningful and policy relevant
- From our 2007 platform
  - One month screening runs
  - Input data continues to be enhanced

Total Benefit from Controls

… Current SCR and SNCR controls

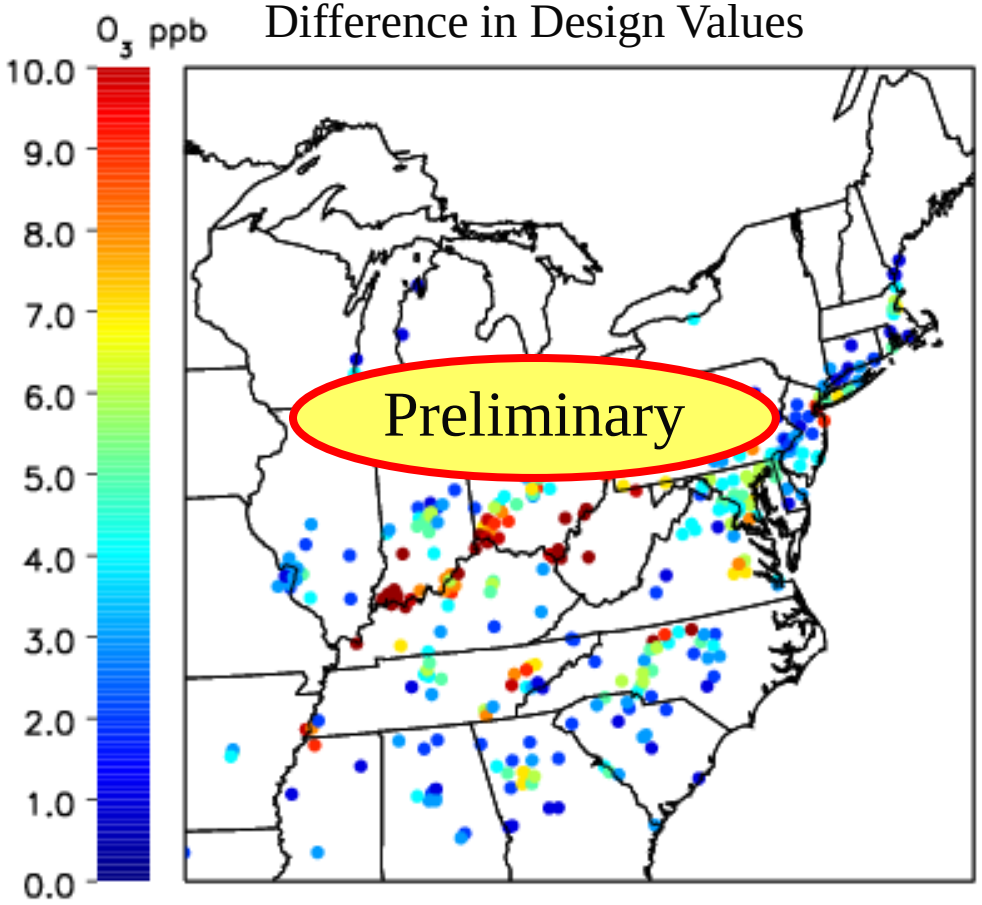
- Difference plot … 2018 with and without controls



Total Benefit from Controls - DVs

… Current SCR and SNCR controls

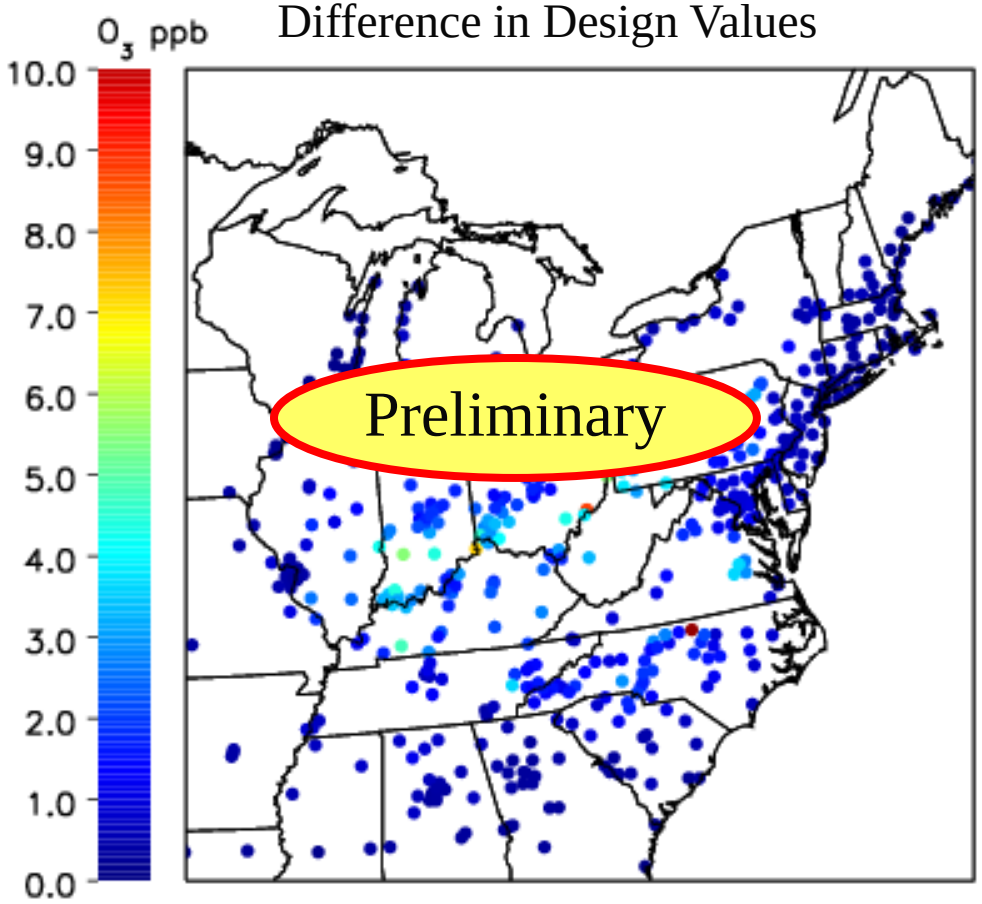
- Difference plot … DVs … 2018 with and without controls



Lost Ozone Benefits – Worst Data

… SCR or SNCR controls run at highest rates in CAMD data

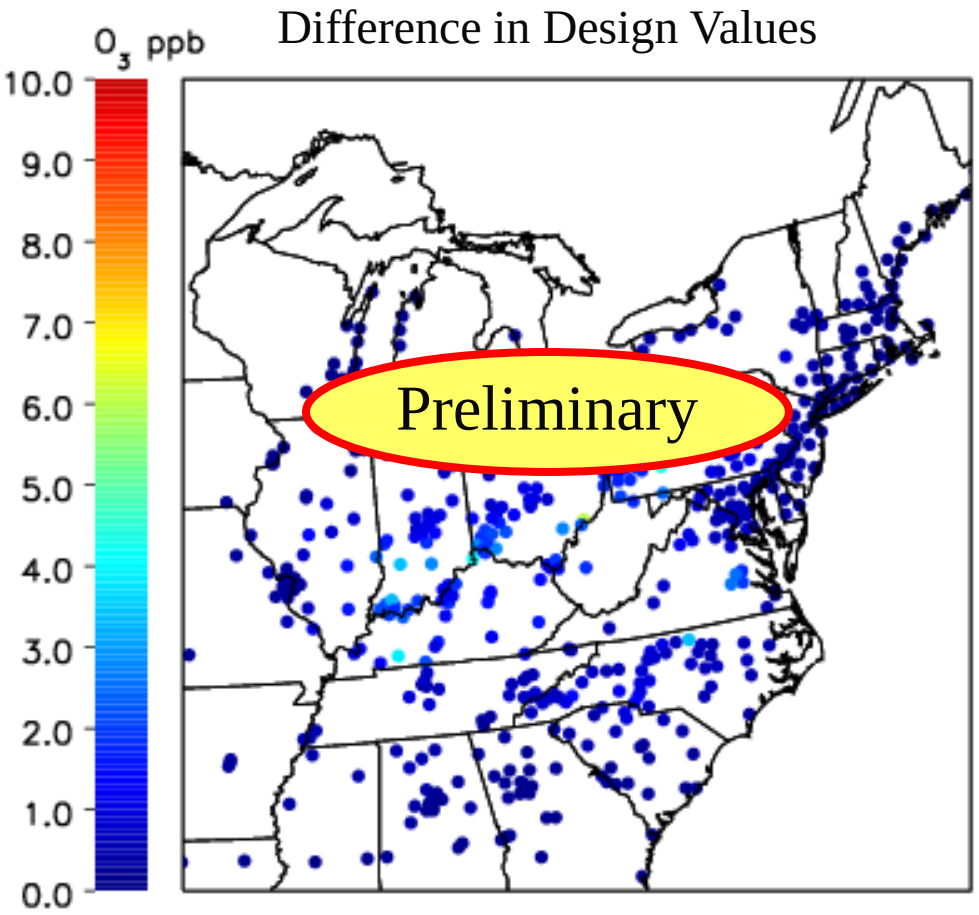
- Difference plot … DVs … 2018 with and without controls



Lost Ozone Benefits – 2011/2012

… based upon 2011 and 2012 CAMD EGU performance data

- Difference plot … DVs … 2018 with and without controls



Potential Lost Ozone Benefit in PPB

Most Difficult Monitors	Increased Ozone in 2018 – 2 EGU Control Scenarios	
County	Using worst rate CAMD Data (Scenario 3B)	Using actual 2011/2012 Data (Scenario 3C)
Harford, MD	1.2	0.5
Prince Georges, MD	1	0.5
Fairfield, CT	0.3	0.1
New Castle, DE	0.8	0.4
Bucks, PA	0.6	0.4
Suffolk, NY	0.4	0.2
Camden, NJ	0.5	0.3
Fairfax, VA		0.5
Franklin, OH		1
Fulton County, GA	0.3	0.2
Wayne, MI	0.5	0.2
Sheboygan, WI	0.1	0.1
Mecklenberg Co, NC	1.8	1.2
Knoxville, TN	0.7	0.5
Jefferson County, KY	2	1.5
Lake County, IN	0.2	0.1
Cook County, IL	0.2	0.1

Preliminary

Potential Lost Ozone Benefits – Clean Monitors

… EPA will propose a new ozone standard soon … 60 to 70 ppb range … designations to most likely be based upon 2014 to 2016 or 2015 to 2017 data

Projected to be Clean in 2018 … Potentially at Risk		Increased Ozone in 2018 – 2 EGU Control Scenarios	
County	2018 – Running Well (Scenario 3A)	ate CAMD Data (Scenario 3B)	Using actual 2011/2012 Data (Scenario 3C)
Blair, PA	58.7	64	62.7
Armstrong, PA	66.4	70.7	68.8
Washington, OH	60.1	68.9	66.2
Warren, OH	68.8	72.1	70.9
Kanawa, WV	64.5	67.8	66.3
Monogolia, WV	61.4	64.4	63.1
Oldham, KY	67.2	70.2	69.1
Boone, KY	57.5	64.7	61.6
Campbell, KY	61.6	64.3	63.3
Greene, IN	61.8	67.3	65.2
Vanderburgh, IN	62.3	65.8	64.7
Person, NC	60.2	71.7	63.6
Garrett, MD	58.7	62.6	61.1

Preliminary

Greater than 70 ppb | 65 to 70 ppb | 60 to 65 ppb

Next Steps With this Modeling

- Run for full ozone season
- Run some regional sensitivity tests
- Run with enhanced chemistry and mobile source adjustments from research
  - This will show slightly greater loss of benefit from not always running controls effectively
- Run with 2011/2018 Platform ASAP
- Work with the Midwest Ozone Group (MOG) on this issue
  - Modeling and potential solution
- Continue to refine as part of the Maryland Attainment SIP

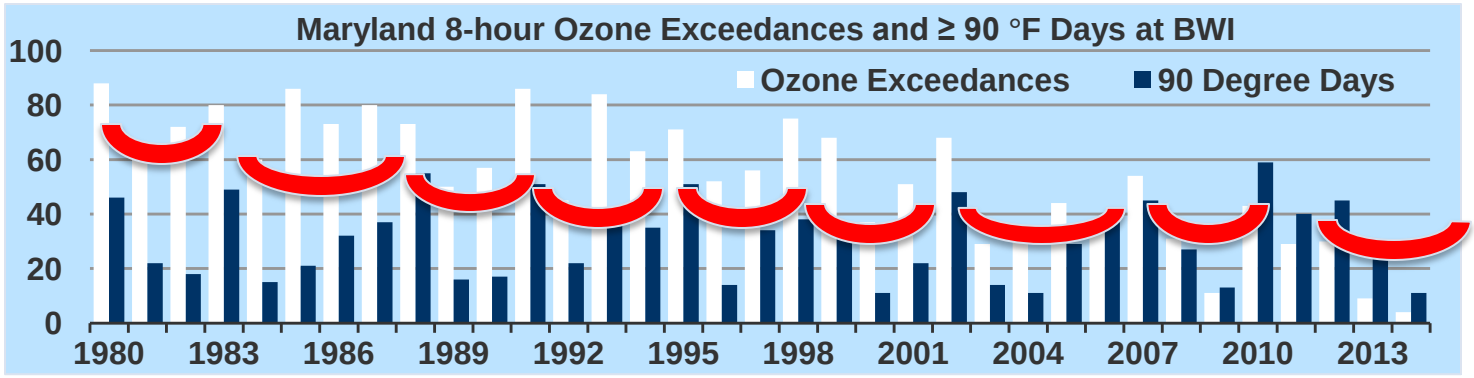
So where do we go from here?

How Do We Move Forward?

- Preliminary discussions with other states and EGU operators have been very positive
  - Maryland believes that a collaborative solution is within reach
- Clearly continue the technical collaboration at the Air Director level with other states
- Continue Commissioner level discussions
- Work towards a resolution by the end of 2014 or early 2015

A Closing Comment

- In 2014, the Baltimore area recorded the lowest ozone levels seen in the last 30 years
  - Yes … it was also one of the coolest and climatologically different summers we've ever seen
- The ozone was so low we believe that the data for our worst monitor … the Edgewood monitor … in the past, the highest reading monitor east of the Mississippi … may be meeting the standard
- Cool weather is not the only reason we've seen such low ozone
  - Many emission reduction programs have clearly helped – local and regional emissions were low in 2014
  - We did not see the traditional weather patterns in MD that transports ozone and precursors from the south and west … i.e. … We had no transport
- Unfortunately
  - The weather patterns appear to have not been so kind to CT. Transport weather patterns shifted to the north in 2014
  - Our research also shows us that ozone weather cycles in 3 to 4 year periods from "cool and friendly" to "hot and unfriendly" - 2014 was at the friendliest part of the current cycle



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Thanks …
Questions?