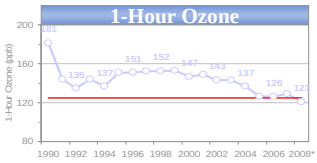
Addressing Transported Air Pollution: It's More Than Just Power Plants

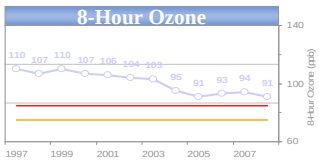
Washington to Baltimore Transport from Mobile Sources

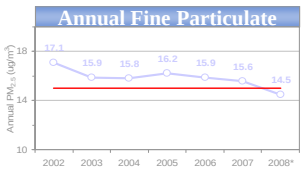
TAC Meeting
July 11, 2011

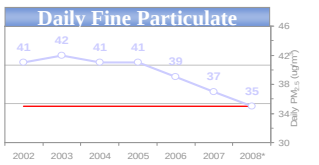
The Good News

- Air pollution levels continue to drop
- Emission control programs are working
- Controls have been equitably spread across all sectors

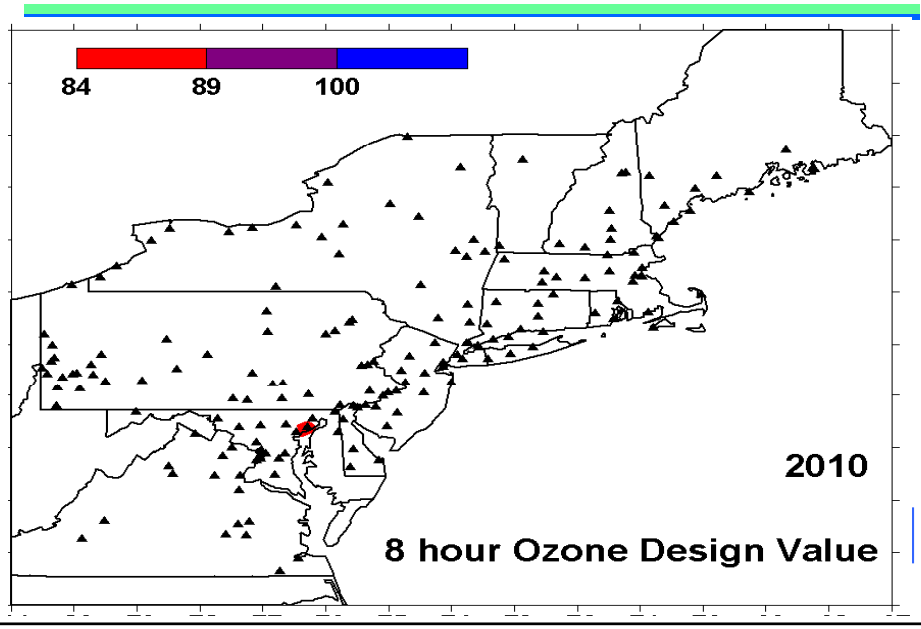








More Good News – Sort Of



The Challenge

- New, much tougher ozone standard in 2011
- Revisions to annual fine particle standards under consideration
  - Tougher fine particle standard likely in the 2012 timeframe
- New air quality plan – 2013 to 2016
  - Called the SIP or State Implementation Plan
- Low hanging fruit is all gone
- Climate change and Bay/Air challenges are very significant
- New mobile model (MOVES) dramatically increases NOx emissions from the mobile sector
  - Shifts the "control" spotlight away from power plants back onto mobile sources

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New Ozone Standard – How Tough?

- On January 8, 2010, EPA proposes a new ozone standard be set at a level between 60 and 70 ppb
  - Final by Summer 2011
  - Consistent with the Clean Air Act Science Advisory Committee (CASAC) recommendation
- A standard at this level is very tough
  - Will require us to think "out-of-the-box" to find additional programs to further reduce ambient levels

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New Controls? - Regional or Local?

- Both
- In very general terms, the ozone in most cities along the I-95 corridor comes from both regional sources and local sources
  - Regional
    - 50% to 70% of the problem
  - Local
    - 30% to 50% of the problem
- Will need new local control programs to meet the new ozone standard
  - Will also need new regional programs

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Reduction Needs - What Do We Know?

- State-of-the-Art modeling system being developed to support the 2013-2016 SIPs
- Preliminary screening modeling gives us a rough feel for how deep the reductions will need to be and what source categories respond best
- Preliminary results are worrisome
  - Can we find enough reductions to attain the new standard?

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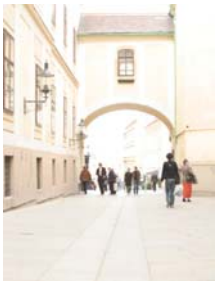
Consequences of Failure

- What happens if we can't find enough emission reduction to put together an approvable SIP?
- Two penalty paths
  - Sanctions
    - Stationary source penalty in 18 months
    - Transportation funding withheld at 2 years
  - Conformity
    - Lapse – If incomplete or no SIP submitted
    - Freeze – If SIP disapproved



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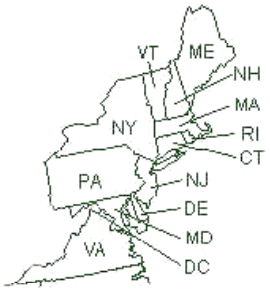
Preliminary Screening Modeling

- OTC did a screening modeling run, assuming an additional 40% NO_X reduction from all sectors domain-wide
- Results showed almost all – but not all - sites below 75 ppb
  - Lower "reconsidered" standard on the way
    - 60 to 70 ppb
- This analysis indicates that – at a minimum
  - An additional 1,700 tons per day (or 500,000 tons per year) of NOx reductions will be needed within the OTR
  - An additional 40+ % reduction is a huge challenge



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Preliminary "Culpability" Modeling

- "What source sectors, when controlled, do the best job of reducing ozone"
- New York City used as a surrogate for all East Coast Cities
  - All East Coast Cities generally act the same way in the model
- Highlights the critical need for even deeper reductions from the mobile source sector along the I-95 corridor
- Used Mobile 6 – Not MOVES
  - MOVES will make the need for mobile reductions even more significant
- Good controls on regional power plants and mobile sources already included

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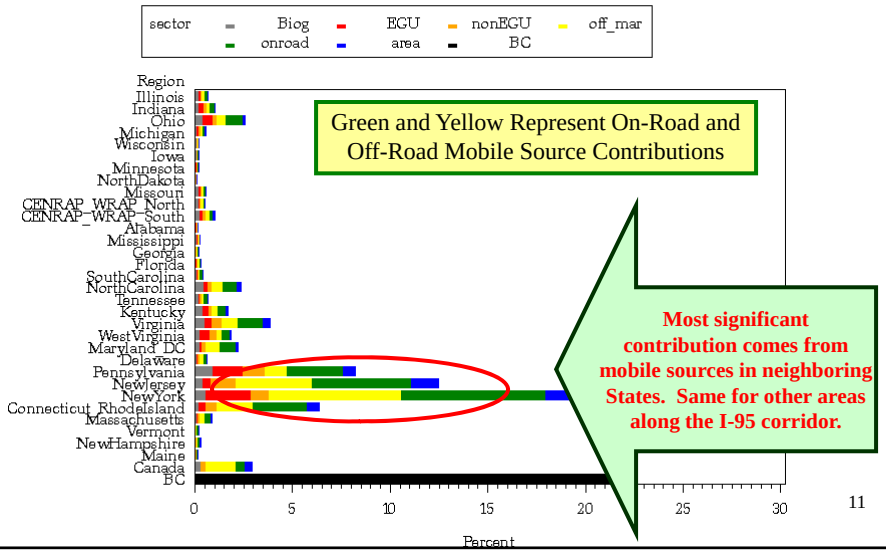
Ozone

Source Sector Contribution by State

New York, NY



Green and Yellow Represent On-Road and Off-Road Mobile Source Contributions

Most significant contribution comes from mobile sources in neighboring States. Same for other areas along the I-95 corridor.

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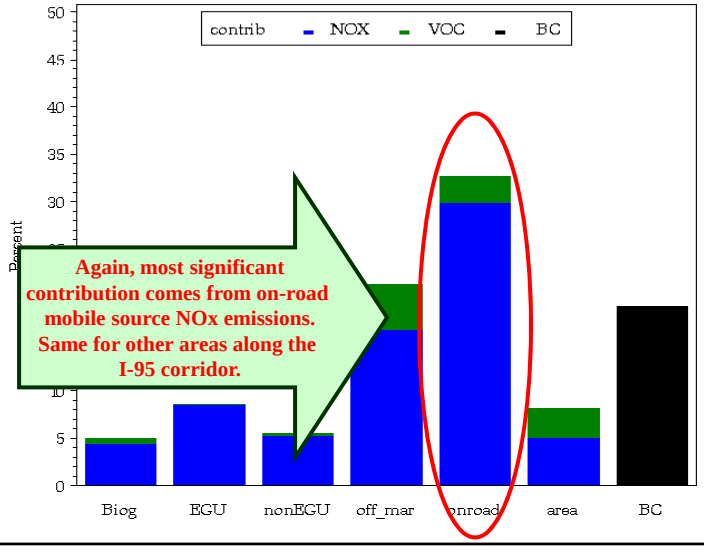
Ozone

Source Sector and Pollutant Contributions

New York, NY



Again, most significant contribution comes from on-road mobile source NOx emissions. Same for other areas along the I-95 corridor.

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Control Priorities – The History

- 1980's
  - Stationary source/VOC
  - Mobile source tailpipe standards/VOC
  - Mobile source fuels/VOC
  - Little effort on power plants, area sources or Travel Demand Management (TDM) or VMT reduction strategies

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Control Priorities – History Continued

- 1990's
  - Power plants/NOx
  - Other stationary sources/NOx
  - Mobile source tailpipe standards/NOx
  - Mobile source fuels/VOC and NOx
  - Minimal reductions from area sources or TDM/VMT reduction strategies
  - Increased effort on "regional" controls to reduce transport started in the 90's

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Control Priorities – History Continued

- 2000's
  - Area sources/VOC and NOx
  - More power plants/NOx
  - More stationary source/NOx
  - More mobile source tailpipe and fuel standards/NOx
  - Minimal reductions from TDM or VMT strategies

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New Controls Being Pursued

REGIONAL STRATEGIES

- Power Plants
- Area sources
  - Paints
  - Consumer products
  - More
- Stationary Sources
  - Industrial, commercial and institutional boilers
  - Cement kilns
  - More
- Mobile Sources
  - Tougher tailpipe standards
  - Cleaner fuel
  - More

LOCAL STRATEGIES

- Power Plants
  - High Electricity Demand Days (HEDD) controls
  - Smaller boilers
  - Oil and gas boilers
  - More
- Stationary Sources
  - Stationary/distri-buted generation
  - Auto refinishing
  - Storage tanks
  - Municipal waste combustors
  - Minor New Source Review
  - More
- Area and Off-Road Sources
  - Ports
  - Off-shore "lightering"
  - Solvent degreasing
  - Gas stations
  - More
- Mobile Sources
  - Non-road idling
  - National catalyst replacement program rec.
  - Diesel I & M
  - VMT reduction initiatives
  - More

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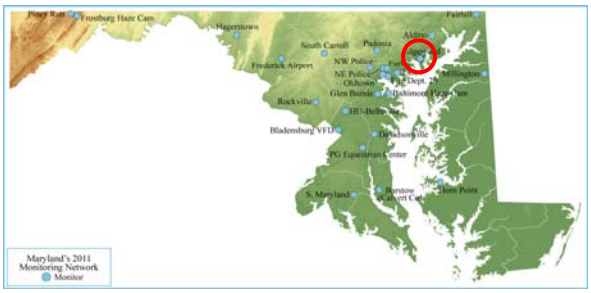
Baltimore Needs Extra Help

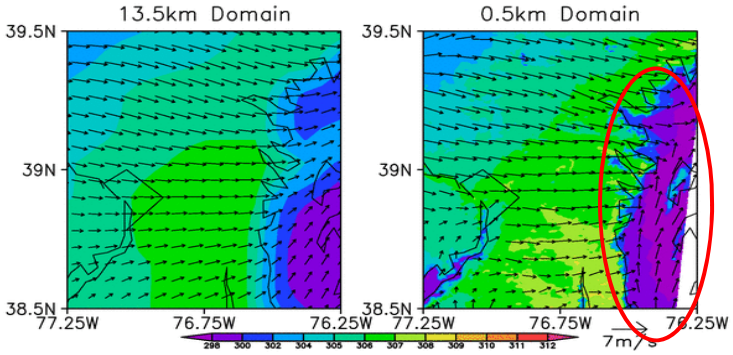
- Baltimore has a very difficult monitor in Edgewood, Maryland
  - Very close to the Chesapeake Bay
  - Last remaining problem monitor in the East for the 85 ppb ozone standard
- Recent research shows that – for ground level ozone - local transport from the Washington, DC area significantly impact this monitor
- Research conducted by U of M and MDE to better understand how Chesapeake Bay breezes affect local air quality
- It's the Bays fault



Understanding the Bay Breeze

- Based upon U of M WRF (meteorological) modeling around the Bay region
- Used a courser and a finer grid
- Finer grid showed very interesting results

July 9, 2007 – 9 am



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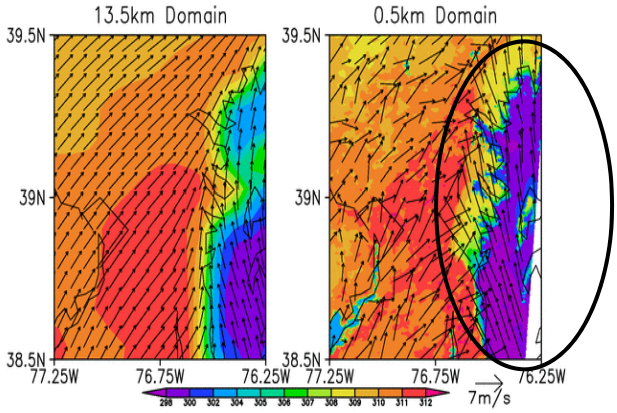
Bending Back to the West

- By the afternoon, winds are actually curving back to the west

July 9, 2007 – 2 pm



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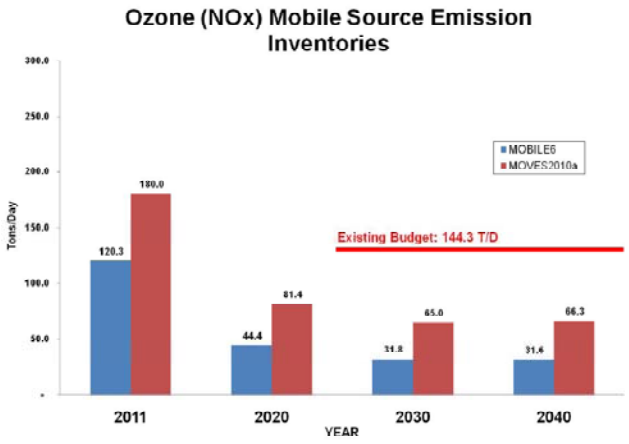
Why Mobile?

- Not just – but mostly - mobile emissions
- Recent TPB analyses of Mobile vs MOVES



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Options for Reducing Mobile Source Emissions

- Three basic strategies
  - Tailpipe standards
    - Cleaner and cleaner engines
  - Clean fuels
  - Reducing travel
    - Travel Demand Management (TDM) and Vehicle Miles Travelled (VMT) policies

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Is a Three P[illegible]?

- Power Plants
  - Three part str[illegible]
  - End of stack t[illegible] standards
    - New controls g[illegible] every large unit w[illegible]
      - Recent $3 Billion[illegible] in MD
    - Cleaner fuels
      - Major push ev[illegible]ere towards cleaner natura[illegible] gas
    - Energy use
      - Major initiatives in all OTR states
      - EmPOWER MD law mandates a 15% reduction in per capita energy consumption by 2015
  - All three pieces are now in place and working effectively

THE PROGRAM IN THE ENERGY SECTOR THAT IS ANALOGOUS TO THE CONCEPT OF VMT REDUCTION IN THE TRANSPORTATION SECTOR IS ALREADY BEING IMPLEMENTED UP AND DOWN THE I-95 CORRIDOR

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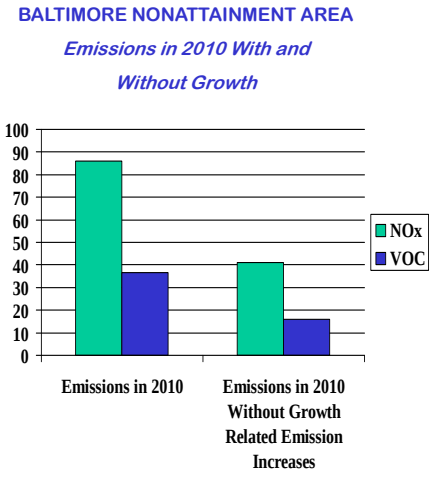
Mobile Sources - What's Worked?

- Tailpipe standards in 2010 are about 99% cleaner than 1970 models
- With new tailpipe standards, new fuels and current fleet turnover …
  - If VMT held steady at 1970 levels
  - Total mobile emissions would be down by about 90% from 1970 levels
- Unfortunately I-95 average VMT growth equals about 1% to 2% per year
  - Total mobile emissions only down by about 80% from 1970 levels



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A Transportation Initiative – Why?

- Despite the progress we've made and our continued efforts to achieve more reductions from power plants and all other emission sectors
  - We still need more reductions
- Modeling tells us that after we require very deep reductions from power plants and all other sectors…
  - **That mobile source reductions (even with the very aggressive tailpipe and fuel standards) are still the most important remaining reduction category – by far - to pursue**
    - We are already pressuring EPA to adopt tougher (Tier III) tailpipe and fuel standards in a timely fashion
- We need significant help from the transportation planning piece of the problem

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Transportation Cap-and-Trade?

- Cap-and-trade has been used very successfully to reduce emissions and minimize costs in the power sector
  - Cap is set
    - Affected facilities have total flexibility to find and implement the most cost-effective programs to meet the cap
- Why can't we use the transportation conformity budgets the same way?

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Washington As An Example

- Using NOx as an example
  - 2010 Conformity Budget = 144.30 TPD
  - 2011 emissions = 120.32 TPD
  - 2020 emissions = 44.35 TPD
  - 2030 emissions = 31.8 TPD
- As an example - To achieve an additional 10% reduction in 2020
  - 2020 Conformity Budget = 39.9 TPD
  - Existing Interagency Consultation process used to identify most cost-effective programs to meet new budget
  - "Trading" for reductions from power plants and other sectors should be considered
- Same for VOC

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Meeting A Lower Budget

- Interagency Consultation Processes are already working effectively in most areas
- Flexibility
  - Any new programs to achieve the additional reductions are OK
    - Technologies, Fuels and VMT
- Other Considerations
  - Should consider:
    - Options for allowing credits from other sectors to be used
    - Temporary off-ramps to avoid conformity nightmares
    - Other banking and trading concepts

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Timing

- Most likely attainment date for next Ozone standard will be 2020 to 2025
- Would establish lower conformity budgets in the 2013/2016 SIP
- Could begin planning to meet those lower budgets now

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Other Benefits

- Further reducing NOx emissions from vehicles will also generate significant co-benefits
  - Nitrogen deposition to the Chesapeake Bay
  - Fine particulate
  - Regional haze
- Many of the strategies to reduce NOx and VOC would also reduce CO2 emissions and help address global warming

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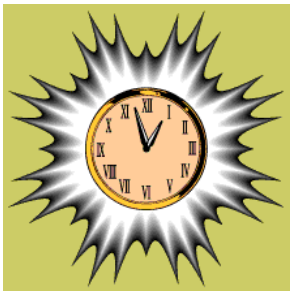
Proposed Schedule

- July to December 2011
  - Work through TAC/TPB TC to discuss and develop new transportation control initiative targeting an additional 5% to 10% NOx and VOC reduction by 2020
  - Coordinate with Baltimore
- Early 2012
  - Brief MWAQC
- 2012
  - Begin planning to meet new, tighter budgets
- 2013 to 2016
  - Include adjusted 2020 transportation conformity budgets in new SIP
- 2020 to 2025
  - Emission reductions achieved



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Wrap-Up

- Ozone and fine particle levels continue to drop
  - This is great news
- Tougher ozone and fine particle standards are on the horizon
  - Still lot's of work to do
- Baltimore remains the last area in the East not attaining the 85 ppb ozone standard
  - Washington contributes to this
  - Emission reductions from mobile sources are absolutely critical
- Priority 1 – A Baltimore effort
- Priority 2 – Washington, DC
- Discussion

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