Issues Facing the State of Maryland

Tad Aburn - Air Director, MDE
AQAST 5th Annual Meeting - June 5, 2013
Department of the Environment

Just submit the SIP!! …
I don’t care what you think - the law says you can clean the air by 2013

But that's scientifically impossible … man
Our Partnership With U. of M.

MDE works in partnership with local universities (UMD at College Park, UMBC, and Howard University) to measure and analyze pollution being transported into Maryland.

• For over 20 years MDE has worked with the University of Maryland, UM – Baltimore County, Howard University and Penn State University to build a policy driven, air pollution research program.

• The focus has been air pollution transport

• Thanks to Russ and the RAMMP research team for all of their help
  – Good science can influence policy !!!!
Topics Covered

• Background
  – Understanding regulators

• The key role of science

• Issues
  – Is the problem local or regional?
    • The critical need to understand air pollution transport
  – The science is never perfect
    • If I must regulate someone …Who would you tell me to regulate first …And can you help me support that with solid science
  – Research from PhDs is great … But can you communicate the policy relevance of your work to a U.S. Senator?
    • There is no such thing as too simple

• The future – Continued collaboration
Background

- My perspective
  - I’m a regulator
    - Basic Questions
      - Who do I regulate?
      - Who else do I regulate?
      - When have I regulated enough?
      - How do I use the science to make sure that these decisions reduce air pollution effectively and efficiently?
  - My regulatory tools
    - Inventories
      - The basic building block
    - Air Quality Models
      - Who and how much to regulate
    - Research
      - How can research help us interpret/adjust the model results
    - Air Monitoring
      - Is what I’m doing … working
      - Who to regulate

“ALL MODELS ARE WRONG; SOME ARE USEFUL”
George Box, mentor of W. Edwards Deming
The Key Role of Science

... and the challenge for the Research Community

• Believe it or not ...
  – Policy and regulatory decisions are always based upon the best available science
    • The key word is “available”

• Laws have deadlines
  – When the deadlines hit
    • You make decisions … regulate
    • If you don’t … you get sued

• The challenge
  – How can the researchers provide help
    • … on how to most likely succeed
    • … when the science is still evolving
Starting With the Science

Driving Policy With Science

• The first step in developing a new air quality plan (called a State Implementation Plan or SIP) is to develop a science-based vision of what it will take to further clean up the air.

• For example – Ozone in Maryland
  – How much of the ozone problem is local?
    • How much ozone (and emissions) are transported into Maryland from upwind states?
  – What pollutants? What sources?
  – How aggressive do we need to be with new local control programs?
  – Who will we need help from?
    • How much help?
Inventories – The Basic Building Block

• What causes our air pollution?
  – Pollutants
  – Sources
  – Timing

• Where are we starting from?

• Where do we need to get to?

• What will solve our problem?

• How to track progress?
### 2009 Emissions – How Can This Be True?

<table>
<thead>
<tr>
<th>City</th>
<th>VOC TPD</th>
<th>NOx TPD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baltimore NAA</td>
<td>0</td>
<td>236.46</td>
</tr>
<tr>
<td>Washington NAA</td>
<td>348.75</td>
<td>362.06</td>
</tr>
<tr>
<td>Philadelphia NAA</td>
<td>640.43</td>
<td>590.94</td>
</tr>
<tr>
<td>New York City NAA</td>
<td>1314.27</td>
<td>960.8</td>
</tr>
</tbody>
</table>

Baltimore … the bad boy of eastern ozone is actually an emissions wimp

- Half the emissions of Washington
- A third of the emissions in Philly
- 25% of NY emissions
Air Quality Modeling

• Historically, the most critical tool we use
• Used to tell us what might work
• Used to tell us when we have enough controls in the Plan
• Sometimes we use the modeling correctly
  – Is this strategy directionally correct?
• Sometimes the process forces us to use the models in ways that stretch their capabilities
  – In the summer of 2018, will the monitor in Edgewood Maryland record 0.074 ppm or 0.076 ppm?
Will “Scenario 4” Get Us to 75 ppb?

Note: “Scenario 4” includes aggressive, but achievable, NOx reductions from priority source categories across the entire East and additional NOx and VOC reductions along the I-95 Corridor.

Benefits Outside of the OTR are even More Dramatic.
## Results – Toughest Monitors in the East

<table>
<thead>
<tr>
<th>NON-ATTAINMENT AREAS</th>
<th>2007 Monitored Design Value (ppb)</th>
<th>2018 PPB After 50% NOx &amp; 30% VOC Run</th>
<th>2018 PPB After 70% NOx &amp; 30% VOC Run</th>
<th>2018 PPB After OTC Scenario 4</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>New York</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Bayonne</td>
<td>85</td>
<td>81</td>
<td>74</td>
<td>78</td>
</tr>
<tr>
<td>- NYC/Queens</td>
<td>77</td>
<td>72</td>
<td>67</td>
<td>69</td>
</tr>
<tr>
<td><strong>Philadelphia</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Camden</td>
<td>88</td>
<td>75</td>
<td>65</td>
<td>68</td>
</tr>
<tr>
<td>- Bristol</td>
<td>90</td>
<td>76</td>
<td>64</td>
<td>67</td>
</tr>
<tr>
<td><strong>Cleveland/A/L</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Mayfield</td>
<td>79</td>
<td>74</td>
<td>64</td>
<td>71</td>
</tr>
<tr>
<td>- Eastlake</td>
<td>79</td>
<td>72</td>
<td>62</td>
<td>69</td>
</tr>
<tr>
<td><strong>Columbus</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Albany HS</td>
<td>84</td>
<td>71</td>
<td>62</td>
<td>67</td>
</tr>
<tr>
<td><strong>Washington</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- River Terrace</td>
<td>83</td>
<td>70</td>
<td>59</td>
<td>62</td>
</tr>
<tr>
<td><strong>Baltimore</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Edgewood</td>
<td>91</td>
<td>68</td>
<td>55</td>
<td>59</td>
</tr>
</tbody>
</table>
# Weight of Evidence

or ... the fuzzy SIP

## Philadelphia 8-Hour Ozone NAA WOE Attainment Demonstration

Without Voluntary Measures & With Voluntary Measures

<table>
<thead>
<tr>
<th>Site Name</th>
<th>Site ID Number</th>
<th>2002 Base Year</th>
<th>2009 SOTW 8a</th>
<th>2012 SOTW 8a</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fairhill</td>
<td>240150002</td>
<td>97.7</td>
<td>91</td>
<td>75</td>
</tr>
<tr>
<td>Brandywine Creek</td>
<td>100010010</td>
<td>92.7</td>
<td>81</td>
<td>75</td>
</tr>
<tr>
<td>Barbentons</td>
<td>100010013</td>
<td>90.3</td>
<td>78</td>
<td>74</td>
</tr>
<tr>
<td>Killens Pond</td>
<td>100010002</td>
<td>88.3</td>
<td>78</td>
<td>74</td>
</tr>
<tr>
<td>Lewes</td>
<td>100051003</td>
<td>87.0</td>
<td>77</td>
<td>74</td>
</tr>
<tr>
<td>Lums Pond</td>
<td>100031007</td>
<td>94.5</td>
<td>79</td>
<td>74</td>
</tr>
<tr>
<td>Seaforth</td>
<td>100051002</td>
<td>86.0</td>
<td>76</td>
<td>70</td>
</tr>
<tr>
<td>Colliers Mills</td>
<td>340200006</td>
<td>106.7</td>
<td>91</td>
<td>98</td>
</tr>
<tr>
<td>Rider</td>
<td>340210005</td>
<td>97.0</td>
<td>96</td>
<td>91</td>
</tr>
<tr>
<td>Aocora State</td>
<td>340071001</td>
<td>105.7</td>
<td>87</td>
<td>82</td>
</tr>
<tr>
<td>Camden</td>
<td>340070003</td>
<td>98.3</td>
<td>86</td>
<td>83</td>
</tr>
<tr>
<td>Clarksboro</td>
<td>340155001</td>
<td>95.3</td>
<td>86</td>
<td>93</td>
</tr>
<tr>
<td>Millville</td>
<td>340110007</td>
<td>95.7</td>
<td>61</td>
<td>75</td>
</tr>
<tr>
<td>Nasoate Creek</td>
<td>340010005</td>
<td>89.0</td>
<td>77</td>
<td>73</td>
</tr>
<tr>
<td>Bristol</td>
<td>420170012</td>
<td>99.0</td>
<td>98</td>
<td>94</td>
</tr>
<tr>
<td>West Chester</td>
<td>420350080</td>
<td>95.0</td>
<td>82</td>
<td>77</td>
</tr>
<tr>
<td>New Garden</td>
<td>420290100</td>
<td>94.7</td>
<td>79</td>
<td>73</td>
</tr>
<tr>
<td>Chester</td>
<td>420460002</td>
<td>91.7</td>
<td>31</td>
<td>77</td>
</tr>
<tr>
<td>Norristown</td>
<td>420010013</td>
<td>92.8</td>
<td>91</td>
<td>77</td>
</tr>
<tr>
<td>Smtwood</td>
<td>421010135</td>
<td>83.0</td>
<td>75</td>
<td>71</td>
</tr>
<tr>
<td>Lea</td>
<td>421010304</td>
<td>71.3</td>
<td>54</td>
<td>51</td>
</tr>
<tr>
<td>Roxborough</td>
<td>421010214</td>
<td>92.7</td>
<td>32</td>
<td>73</td>
</tr>
<tr>
<td>Northeast Airport</td>
<td>421010324</td>
<td>96.7</td>
<td>97</td>
<td>92</td>
</tr>
</tbody>
</table>
Faster and Faster

- Policy process continues to become more dynamic
  - Answers in days and weeks not months and years
    - OTC’s use of CALGRID as a screening tool and CMAQ for the SIPs
- Air regulators and research partners need to be able to react to this dilemma
  - Use of best available science for desired purpose
    - Perfection can not be the enemy of the good
  - Need for iterative policy making process
  - Ability to characterize the uncertainty of the inventory, the modeling and the science in general in a way that is relevant to the policy issue under consideration
Key Messages

• To the Researchers:
  – Ask your local regulator what the most critical issues are that they need your help in resolving
  – Simple is better
    • Good communication is critical
  – Speak up in the policy arena
    • Directly or through your local “middle man”
  – Policy is most often made using the best currently available science
    • Not perfect science
    • Advise … even if all questions are not answered
      – Legal deadlines can’t wait
Key Messages

• To the regulators
  – Make time for the science
  – Push for and financially support more and better data analysis from state staff and the research community
  – Policy relevant research that serves as the basis of a scientific paper is the win-win of this partnership
  – Tell the researchers when you don’t understand
  – Perhaps most importantly … Make it clear to the data analysts and researchers what the critical policy questions are that you need their help in answering
Keeping it Simple

• If you want your research to influence policy …
  – Work as hard on how you communicate as you do on your research paper

• Simpler is always better

• Tell a policy relevant story
  – Show how your research helps resolve difficult policy issues
  – Work with your regulatory “middle man” if you need help on the communication piece

• A couple of examples
Will Regional NOx Reductions Work?

**Ground Level Ozone Drops Dramatically in the Same Time Frame**

- Simple – but effective data analysis
- Tells a story that policy folks can understand
- The classic ozone transport story
  - Incoming ozone levels (as high as 80 ppb) collect in an elevated reservoir over night
  - Real world programs like the NOx SIP call have shown that
    - Adding regional controls
    - Results in regional NOx emission reductions …
    - Which lead to reduced ozone in the elevated reservoir …
    - Which lead to lower ozone at ground level and public health protection!
Measuring Night-Time Transport

Wind Speed and Wind Direction - Beltsville, MD on August 9 - 10, 2010

- Wind direction
- Wind speed
- From the ground up

August 9th, 11 PM – 7 AM
Winds from the southwest at about 25 - 30 mph

Nocturnal Inversion up to 1000 ft

August 10th, 10 PM – 8 AM
Winds from the southwest at about 25 - 40 mph

30 mph for 7 hours is about 210 miles

What does this graph tell us?
- Wind direction
- Wind speed
- From the ground up
Howard University launched 4 ozonesondes on July 12-13, 2008. The 10:30 PM (Saturday, July 12th) and 2:30 AM (Sunday, July 13th) occurred during a NLLJ event, as captured by MDE’s Wind Profiler.

10:30 PM
Ozone Spike at NLLJ Core

2:30 AM
Near Code Red Ozone

(22+ mph for 14+ hours)
Air Traveled 300+ miles
Help Us With This Story

• We understand the science of ozone better than ever
• We’ve implemented programs that have worked in the real world
• We need a two-part strategy
  1. Local (along the I-95 Corridor) NOx and VOC controls are still critical
     • Can help reduce about 1/3 of the ozone problem in most OTC cities
  2. National/super-regional NOx reductions to reduce transport are even more critical
     • Incoming ozone is already measured at levels above a 60-80 ppb standard
     • Regional contribution represents approximately 2/3 of the ozone problem in most OTC cities

Very little disagreement over this issue
Great deal of disagreement over this issue.
QUESTIONS?