Good Neighbor SIP Analyses Related to 2008 and 2015 Ozone NAAQS

Midwest Ozone Group Meeting

11 January 2018

Good Neighbor SIP Deadlines

2008 Ozone NAAQS

June 30, 2018 – Kentucky

August 2017 – March 2019 – other states

2015 Ozone NAAQS

October 1, 2018

EPA's 4 Step Process

- Step 1 – Identify problem monitors
- Step 2 – Determine state linkages
- Step 3 – Identify cost effective emission reductions
- Step 4 – Establish enforceable measures

Step 1 – Identification of Problem Monitors

In addition to the traditional assessment of nonattainment or maintenance (including consideration of Exceptional Events under §319(b)), state may wish to consider several other factors that may impact on whether there are downwind problem monitors with respect to either the 2008 or 2015 ozone NAAQS

- International Emissions –§7509a(a). Reads as follows:

  Notwithstanding any other provision of law, an implementation plan or plan revision required under this chapter shall be approved by the Administrator if—

  (1) such plan or revision meets all the requirements applicable to it under the chapter other than a requirement that such plan or revision demonstrate attainment and maintenance of the relevant national ambient air quality standards by the attainment date specified under the applicable provision of this chapter, or in a regulation promulgated under such provision, and

  (2) the submitting State establishes to the satisfaction of the Administrator that the implementation plan of such State would be adequate to attain and maintain the relevant national ambient air quality standards by the attainment date specified under the applicable provision of this chapter, or in a regulation promulgated under such provision, but for emissions emanating from outside of the United States.

- Complex Meteorology– There is reason to conclude that the CAMx model may be poorly predicting ozone concentrations by selecting locations in the 12 km grid cells that are located over water. The results could show fewer problem areas avoid the need to move to the next step involving an assessment of contribution.

- Additional emission reduction programs not modeled – It is very likely that the modeling data being generated does not take into consideration control programs that would be required of downwind states because they are in nonattainment. These legally mandated programs could be sufficient to bring a downwind monitor into attainment and eliminate the basis for imposing control on upwind states.

Step 2 – Significant Contribution

- APCA – Should it be necessary to determine significant contribution, states may wish to examine APCA source apportionment data favored by EPA to see if their state significantly contributes (1%) to any of the problem areas. If not, no further action on the part of those states is needed.

- OSAT – Should the APCA technique show significant contribution, states may wish to examine OSAT data to be available in the spring to see if less impact on problem monitors is shown by that technique. If so, states will want to contend that OSAT is the preferred technique since it accounts for anthropogenic emissions separately from biogenics in which case no further action on their part would be necessary.

- Alternative significance level – If a state is shown to have significant impact by both APCA and OSAT, a state may wish to offer and alternative significance level that EPA has not yet approved. The states of Tennessee, Georgia and North Carolina have already been advocating for a significance level of 1 ppb.
  - http://www.csg.org/aapca_site/events/documents/Johnston-CSAPR_Framework_TN_GA_NC_09-21-2017.pdf

Step 3 – Determination of Cost Effective Controls

- If a state is determined to be significantly contributing to downwind problem areas, that state will need to determine whether there are cost effective emission reductions available in 2023 for sources in their state that would bring the problem monitor into attainment or, if not, to eliminate that states significant contribution or otherwise.

  [Note in the case of Harford Maryland, while Kentucky's contribution to that monitor is 1.56 ppb, that monitor is only 0.50 ppb out of compliance. This raises the question of what responsibility other states will have to reduce their emissions to address this monitor.]

- "… the CAA only requires upwind states to prohibit emissions that will significantly contribute to nonattainment or interfere with maintenance …. It does not shift to upwind states the full responsibility for ensuring that all areas in downwind states attain and maintain the NAAQS." 81 Fed. Reg. 74515 (October 26, 2016).

- Once it is clear what air quality reduction are necessary, an upwind state may wish to consider whether it already has in places appropriate cost effective controls for its sources. If so, a state may wish to consider a submittal on that basis.

- If additional cost effective controls are available to state to address it responsibility for achieving its air quality reduction as described above, the state may wish to consider the imposition of those additional control requirements.

Step 4

- Establish enforceable measures

Original MOG GNS Modeling Plan

- Start with EPA 2023el NAAQS NODA platform
  - Augment with updated ERTAC EGU emissions
  - Modify other sectors based on obtainable info
    - RACT, boiler MACT, oil and gas production, etc.
- Process emissions at 12/4km and run CAMx/OSAT to generate 2023 results
- June 2018 SIP revision requires all work and documentation to be complete in January 2018

Final Plan Modification Highlights

- Based on comments received from EPA on draft modeling protocol and assistance from states and MJOs, decision made to change modeling plan
  - EPA expedited release of 2023en platform
    - Excludes CPP, includes compliance with CSAPR FIP budgets
    - Allows us to use data directly without modification
  - Updated version of models
    - Created problem with memory overhead and ability to run planned configuration in time for KY use
  - Revised domain, source apportionment technique, and methods
    - Eliminated 4km modeling from this run
    - Running APCA with KY as only source region

KY GNS Modeling Results*

- All sites identified in the final CSAPR update where Kentucky was identified as a significant contributor are predicted to be well below the 2008 ozone standard (75.9 ppb) by 2023

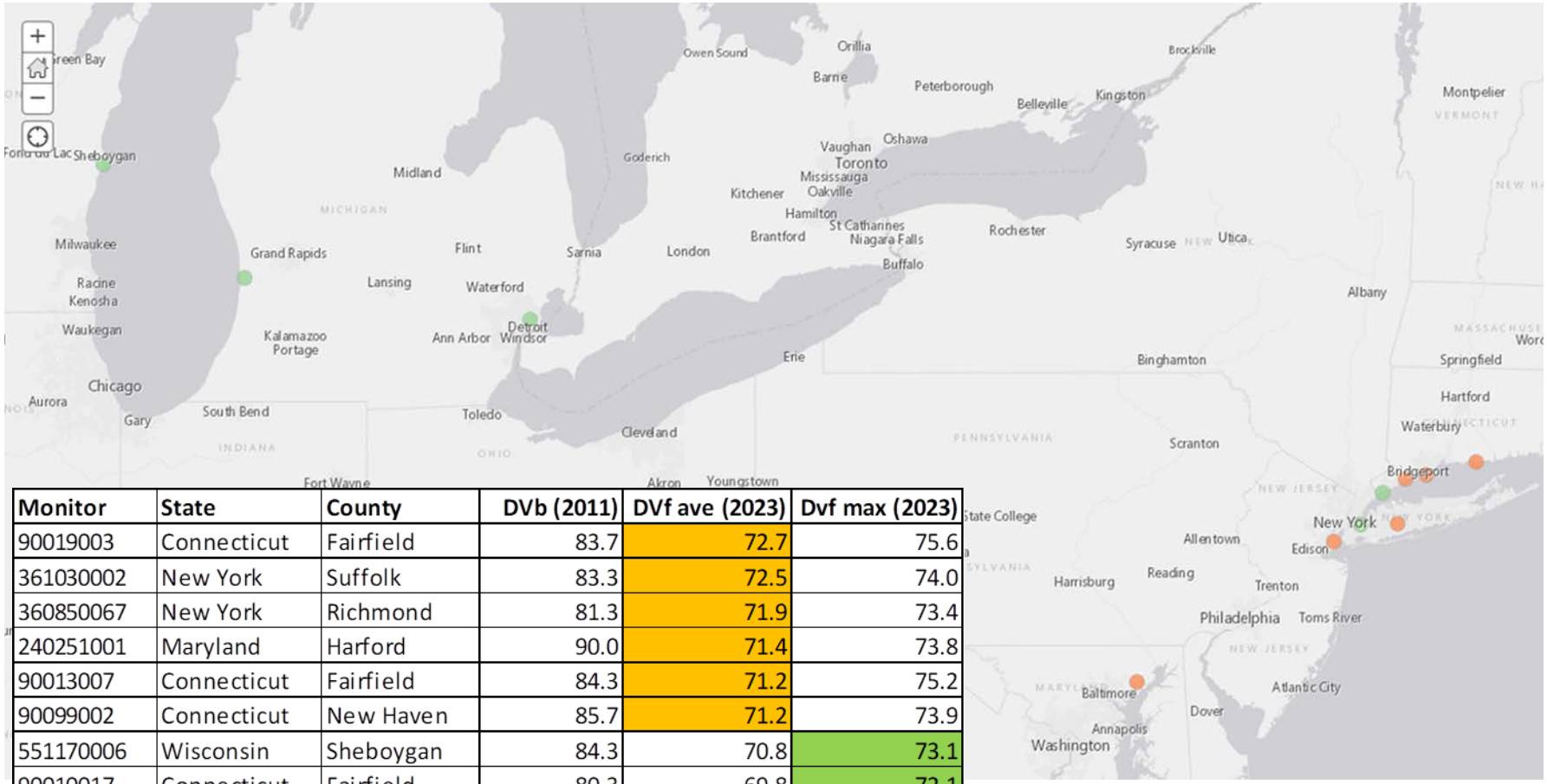
Monitor	State	County	2009-2013 Base Period Average Design Value (ppb)	2009-2013 Base Period Maximum Design Value (ppb)	2023 Base Case Average Design Value (ppb)	2023 Base Case Maximum Design Value (ppb)
390610006	OH	Hamilton	82.0	85	65.0	67.4
421010024	PA	Philadelphia	83.3	87	67.3	70.3
240251001	MD	Harford	90.0	93	71.4	73.8
360850067	NY	Richmond	81.3	83	71.9	73.4

- Based on these calculations, none of the problem monitors are predicted to be in nonattainment or have issues with maintenance in 2023 and therefore Kentucky is not required to estimate its contribution to these monitors

- Through this modeling analysis, the Commonwealth of Kentucky has demonstrated compliance with CAA Section 110(a)(2)(D)(i)(I) for the 2008 Ozone National Ambient Air Quality Standard

* http://www.midwestozonegroup.com/files/Ozone_Modeling_Results_Supporting_Kentucky_GN_SIP_Obligations_Final_Nov_2017_.pdf

No “Problem” Monitors Exist in the East for 2008 Ozone NAAQS



Monitor	State	County	DVb (2011)	DVf ave (2023)	Dvf max (2023)
90019003	Connecticut	Fairfield	83.7	72.7	75.6
361030002	New York	Suffolk	83.3	72.5	74.0
360850067	New York	Richmond	81.3	71.9	73.4
240251001	Maryland	Harford	90.0	71.4	73.8
90013007	Connecticut	Fairfield	84.3	71.2	75.2
90099002	Connecticut	New Haven	85.7	71.2	73.9
551170006	Wisconsin	Sheboygan	84.3	70.8	73.1
90010017	Connecticut	Fairfield	80.3	69.8	72.1
360810124	New York	Queens	78.0	70.1	71.9
260050003	Michigan	Allegan	82.7	69.0	71.8
261630019	Michigan	Wayne	78.7	69.0	71.0

EPA Modeling Results

- EPA also ran the 2023en platform and found corroborating results –

"The EPA's updated modeling indicates that there are no monitoring sites, outside of California, that are projected to have nonattainment or maintenance problems with respect to the 2008 ozone NAAQS of 75 ppb in 2023"

- Steven Page memo* to Regional Air Directors, October 27, 2017

* https://www.epa.gov/sites/production/files/2017-10/documents/final_2008_o3_naaqs_transport_memo_10-27-17b.pdf

CSAPR FIP Budget Compliance

- Regarding the development of the EGU emissions projection used here, it is based on 2016 emissions that are reported to CAMD, with unit-level adjustments made to account for:
  - Announced retirements
  - Announced Post-combustion control retrofits
  - Announced coal-to-gas conversions
  - Announced combustion controls upgrades outside of CSAPR Update states
  - Firm new units
  - CSAPR Update compliance
    - Combustion controls upgrades
    - Optimizing existing SCR
  - State rules
  - Best Available Retrofit Technology (BART) requirements

EGU NOx Comparison (Key States)

	EGU Ozone Season NOx Emissions					
State	2016 (tons)	2023en (tons)	CSAPR Group 2 Budget	CSAPR Assurance Level	2023en as % of CSAPR Group 2 Budget	2023en as % of CSAPR Assurance Level
Alabama Total	11,612	9,027	13,211	15,985	68%	56%
Arkansas Total	13,223	8,551	9,210	11,144	93%	77%
Illinois Total	14,553	12,633	14,601	17,667	87%	72%
Indiana Total	34,636	20,819	23,303	28,197	89%	74%
Iowa Total	10,614	9,715	11,272	13,639	86%	71%
Kansas Total	7,508	7,165	8,027	9,713	89%	74%
Kentucky Total	25,402	16,907	21,115	25,549	80%	66%
Louisiana Total	19,615	19,411	18,639	22,553	104%	86%
Maryland Total	4,468	4,242	3,828	4,632	111%	92%
Michigan Total	17,601	13,716	17,023	20,598	81%	67%
Mississippi Total	7,325	6,522	6,315	7,641	103%	85%
Missouri Total	25,139	13,105	15,780	19,094	83%	69%
New Jersey Total	2,463	2,070	2,062	2,495	100%	83%
New York Total	6,533	6,157	5,135	6,213	120%	99%
Ohio Total	24,205	14,359	19,522	23,622	74%	61%
Oklahoma Total	12,761	10,652	11,641	14,086	92%	76%
Pennsylvania Total	31,896	18,718	17,952	21,722	104%	86%
Tennessee Total	9,774	6,146	7,736	9,361	79%	66%
Texas Total	54,435	51,131	52,301	63,284	98%	81%
Virginia Total	9,831	8,198	9,223	11,160	89%	73%
West Virginia Total	21,178	16,460	17,815	21,556	92%	76%
Wisconsin Total	7,946	7,462	7,915	9,577	94%	78%
22 State Region	**372,717**	**283,164**	**313,626**	**379,488**	**90%**	**75%**

Use of 2023en Modeling Platform

- "[W]e believe that states may be able to rely on the modeling (which includes the CSAPR Update FIP) as part of a demonstration of compliance with the good neighbor requirements. At noted in my earlier email, *we have not historically required states to adopt the specific modeled EPA compliance path EGU control assumptions from the platform (incl. optimization or new SCR installations) at the unit or facility level in their revision to make this case*. Because Kentucky is under the CSAPR Update FIP, one way the state could replace the FIP is to adopt the final EGU NOx ozone season emission budgets into their SIP."

  – Personal communication with David Risley, CAMD, EPA

Initial Signals Related to the 2015 NAAQS

- EPA also produced “No Water” calculations with updated 2023 DVs
  - Removed water cells (>50% water by area) from future year design value calculation
  - Richmond NY moves to attainment
  - Harford MD and New Have CT move to maintenance
  - Sheboygan WI moves to nonattainment
- MOG conducting 4km modeling to compare to these findings

Site	St	County	2009-2013 Avg	2009-2013 Max	2023en "3x3" Avg	2023en "3x3" Max	2023en "No Water" Avg	2023en "No Water" Max	2014-2016
90019003	CT	Fairfield	83.7	87	72.7	75.6	73.0	75.9	85
361030002	NY	Suffolk	83.3	85	72.5	74.0	74.0	75.5	72
360850067	NY	Richmond	81.3	83	71.9	73.4	67.1	68.5	76
240251001	MD	Harford	90.0	93	71.4	73.8	70.9	73.3	73
90013007	CT	Fairfield	84.3	89	71.2	75.2	71.0	75.0	81
90099002	CT	New Haven	85.7	89	71.2	73.9	69.9	72.6	76
551170006	WI	Sheboygan	84.3	87	70.8	73.1	72.8	75.1	79
211110067	KY	Jefferson	85.0	85	70.1	70.1	70.1	70.1	74
360810124	NY	Queens	78.0	80	70.1	71.9	70.2	72.0	69
90010017	CT	Fairfield	80.3	83	69.8	72.1	68.9	71.2	80
260050003	MI	Allegan	82.7	86	69.0	71.8	69.0	71.7	75
261630019	MI	Wayne	78.7	81	69.0	71.0	69.0	71.0	72

Initial Signals Related to the 2015 NAAQS

- Local Control Programs
  - With 2023 design values so close to level of 70 ppb NAAQS, impact of missing local control programs from modeling platform could bring many monitors into attainment
  - Many existing, promulgated programs still have not been quantified and included in recent modeling efforts
    - 2 ppb can bring all “problem” monitors into attainment

Initial Signals Related to the 2015 NAAQS

- APCA v OSAT
  - Sometimes multiple, equally acceptable tools and tests are available – choosing the most appropriate one is important
  - MOG findings indicate selection of appropriate model for significant contribution of anthropogenic source calculation can mean difference between significant or not

Initial Signals Related to the 2015 NAAQS

- APCA v OSAT (con't)
  - Example from 2017 CSAPR draft rule (2008 NAAQS) demonstrates importance of method selection
    - 0.75 ppb reflects significant contribution (red highlight)

			Anthro Contribution (ppb)	
Monitor	**Name**	**Linked State**	**OSAT**	**APCA**
90019003	Fairfield, CT	IL	0.92	0.70
		MI	0.71	0.89
		WV	0.49	0.95
36103002	Suffolk, NY	CT	0.99	0.46
		KY	0.88	0.71
		WV	0.54	0.98

Methods Source: http://midwestozonegroup.com/files/SourceApportionmentScenarioModelingResultsandComparisontothe2017CrossStateAirPollutionRuleModelingPlatform.pdf

Initial Signals Related to the 2015 NAAQS

- Exceptional Events
  - Impact of episodic, non-controllable influence on certain high observation days can be flagged and removed from design value calculation
  - Two episodes concurred by EPA for NE States
    - May 24-26, and July 21-22, 2016
    - CT, MA, NJ, RI, MD*, OH*, and PA*
  - Important as these 2016 design value changes impact designation, modeled DVs and RRF calculations, and attainment classification (nonattainment/maintenance)

* Waiting EPA review and approval

Initial Signals Related to the 2015 NAAQS

- International Transport
  - Global models poorly capture long range anthropogenic international contributions for regional scale modeling
  - Significantly more information on quantification and methods required before full confidence in source apportionment contribution to local monitors
  - More near scale (North American Int'l) impact can be enough to move attainment needle for many monitors
    - Fairfield, CT monitor @ 72.7 ppb [needs 1.80 ppb]
    - Suffolk, NY monitor @ 72.5 ppb [needs 1.60 ppb]

Initial Signals Related to the 2015 NAAQS

- International Transport (con't)
  - Example from 2017 design values and 2017 ozone contributions at individual monitoring sites based upon EPA's air quality modeling for the Final CSAPR Update / 2008 NAAQS

				2017 Average Ozone Design Value (ppb)				
Monitor ID	State	County	2009-2013 Base Period Average Design Value	2017 Base Case	Canada & Mexico Contribution	Initial & Boundary Contribution	w/o Can/Mex	w/o Can/Mex /IC/BC
90019003	Connecticut	Fairfield	83.7	76.5	1.19	16.17	75.31	59.14
361030002	New York	Suffolk	83.3	76.8	1.25	15.67	75.55	59.88

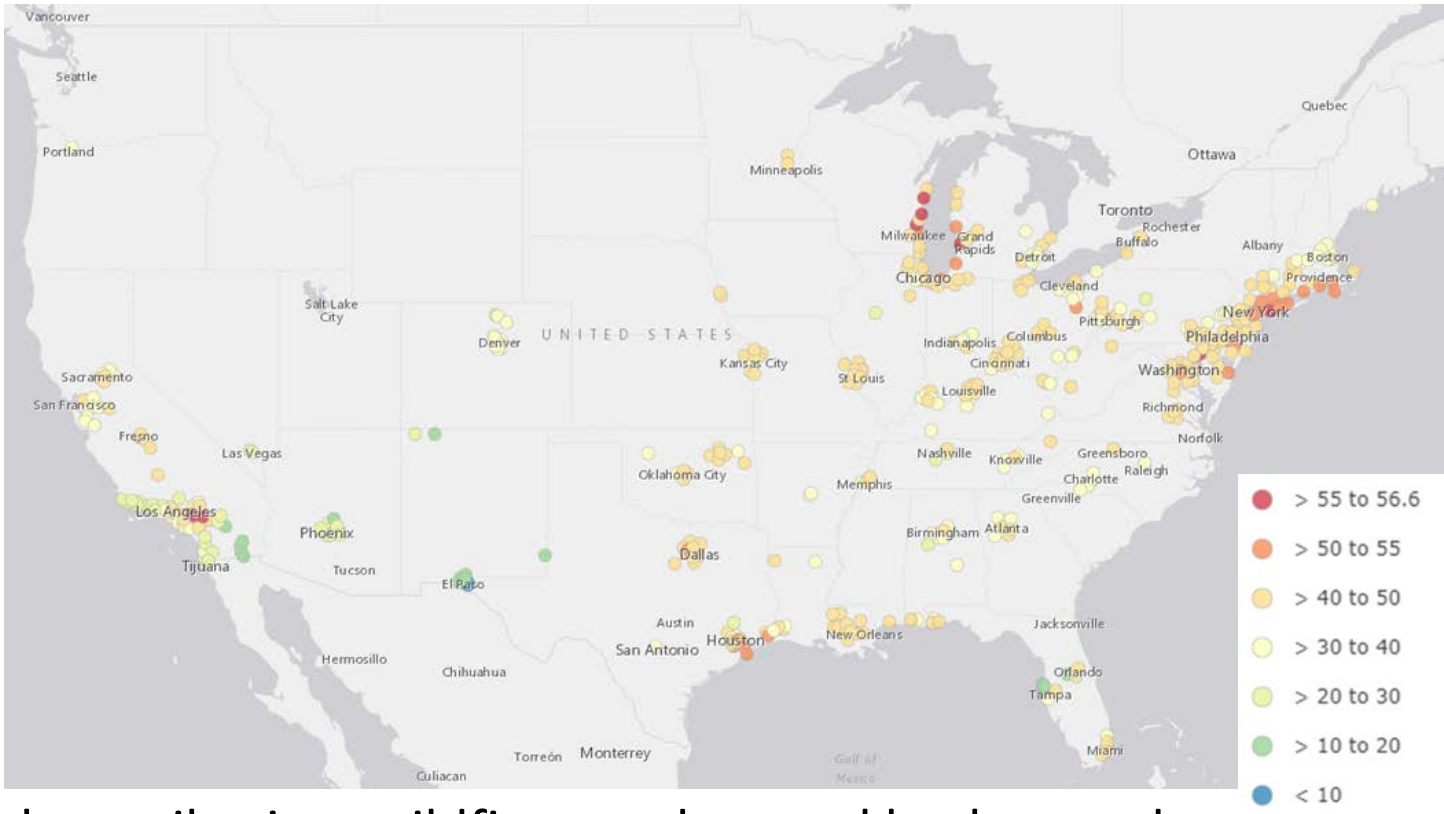
Attainment w/ 2008 NAAQS

Data source: EPA-HQ-OAR-2015-0500-0459

“But For” Contribution Calculation
No Monitor > 56.6 ppb

2023en Final CSAPR MDA8 DVs (ppb) without APCA calculated “Boundary” Contributions

[BC/IC/Can/Mex]



- International contribution, wildfires, and natural background emissions play an ever increasing role in modeled ozone
- We need a better understanding and quantification of the impact of these sources on regional air quality and better tools and policies to account for their presence

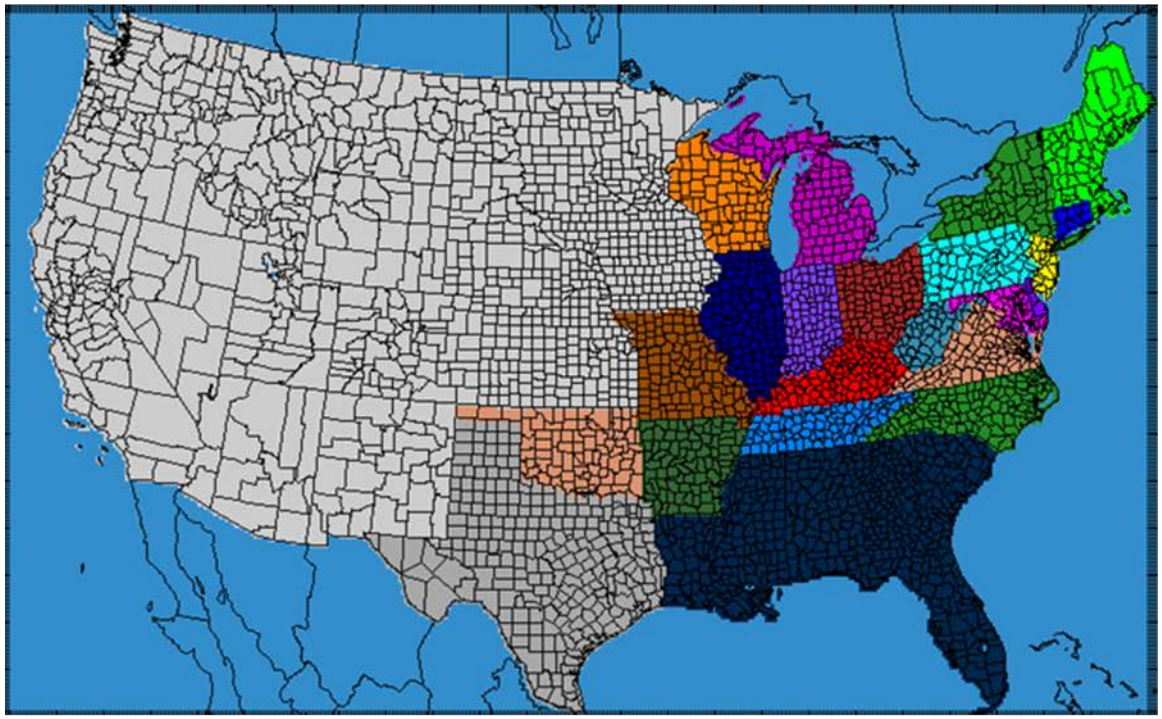
Additional Modeling Information

- 12/4km CAMx/OSAT began in early November
  - Earliest source apportionment and significant contribution results available spring 2018

- Results will be useful for 2015 ozone NAAQS analysis and GNS demonstrations
  - EPA modeling indicates eleven (11) “problem” monitors left in eastern U.S.
    - Monitors that would be initially classified as nonattainment or maintenance based on modeling alone

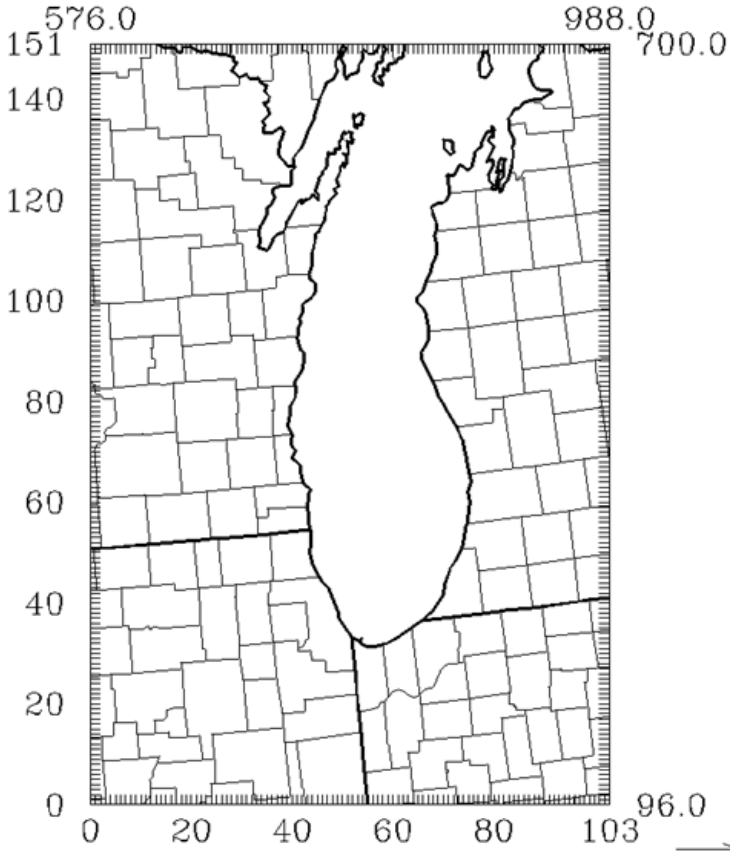
Additional GNS Modeling

- MOG further intends to process entire 12km domain (incl. two 4km subdomains) with OSAT source apportionment calculations for all key eastern states and source categories

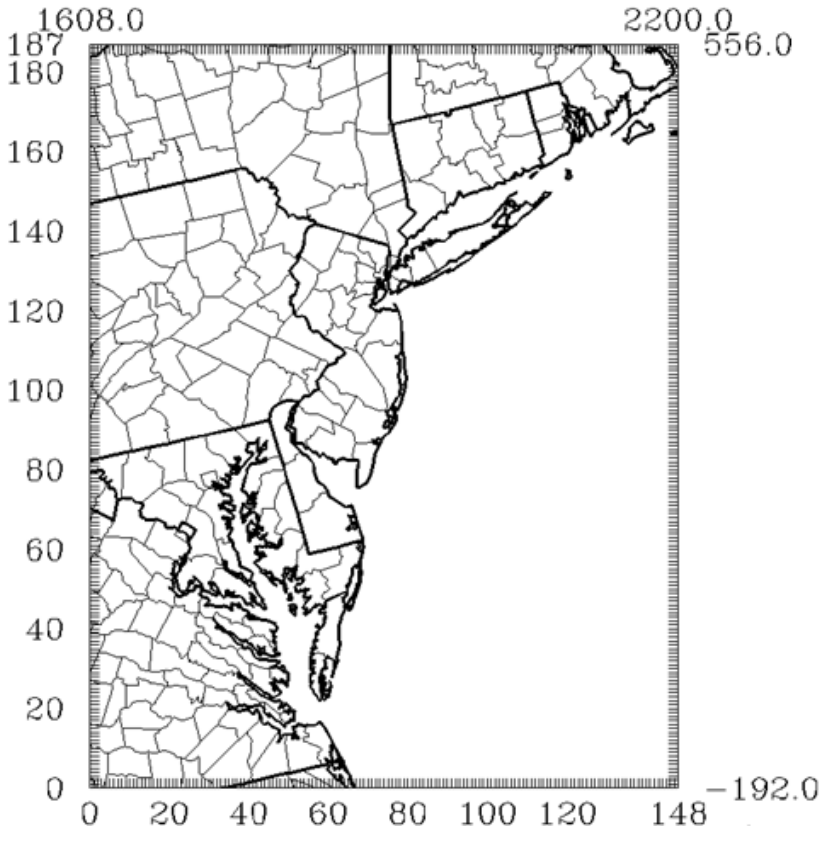


Categories
Biogenic/Fires
Onroad Mobile
Nonroad/Area
EGU Point
Non-EGU Point
Boundary/Initial
Canada/Mexico/Water

4km Modeling Domains



Lake Michigan



Mid-Atlantic

New Base Case Modeling

- MOG considering moving to update base year modeling platform (2014 / 2016) to take advantage of most current design values and control strategy implementation since 2009-2013 associated with EPA 2011 base year platform
  - EPA indicates potential release of 2014v2 in early spring and possible 2016 platform in summer 2018
  - Using these files, new base year modeling could be available late summer 2018

Good Neighbor "Red Lines" Calculation

- Once residual significant contributors are identified, how do they make the decision on how much control is necessary to meet obligation?
  - Under U.S. Court of Appeals CSAPR Remand Decision:
    - Control until insignificant
    - Control must be proportional across all significant states
    - Control until monitor demonstrates attainment
    - Must avoid over control in downwind states

Good Neighbor “Red Lines”

- Outstanding issues to consider
  - Local control first
    - How much is resident state obliged to control
      - Either for own monitor or downwind monitors
  - Multi-monitor impact
    - If upwind state is significant for multiple downwind monitors, does plan have to meet objectives for max contribution monitor?
    - How can upwind state avoid over control at one monitor while meeting needs of another?
  - Multi-state impact
    - If multiple upwind states are significant contributors to downwind monitor, who goes first and will that be enough to bring monitor/s into attainment or are all states provided proportional reduction target?

Open Policy Issues

- Identification of existing control programs that have not yet been modeled which could result in attainment
- Identification of legally mandated controls to be imposed by downwind states in 2023 which could result in attainment
- An alternate approach to addressing maintenance areas
- Desire of upwind states to have 179B TSD prepared for international contribution

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