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CIBO – NAAQS/Dispersion Modeling Update

♦ September 15, 2015

Presenter: Jay Hofmann
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Outline

- SO2 Designations and Data Requirements Rule (DRR)
- General - Proposed Appendix W Updates – Tyler Fox (EPA)
- Detailed Discussion - Proposed Sections 8 and 9 (40 CFR 51 Appendix W)
- New NO2 Modeling Options (ARM, etc.)
- Highlights from Public Comments
- Technical Content (Appendix) – Roger Brode (EPA)
  - Key Changes to AERMOD Modeling System
    - AERMOD Modeling System, Version: 15181 Regulatory Update
    - Proposed Updates to AERMOD Modeling System
    - AERMOD Evaluations
  - SO2 DRR Modeling and Monitoring Options – Technical Considerations

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SO2 Designations and Data Requirements Rule (DRR)

Elements based on EPA Summary Presentation – 8/19/2015

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2010 SO2 NAAQS – Implementation - Now What?

- Nonattainment Area designations, modeling, SIPs, etc.
- All other areas unclassified or not designated
- 2013 modeling and monitoring guidance
- 5 August 2013 - 29 areas designated NAA
- 13 May 2014 - Data Requirements Rule proposed
- 2 March 2015 - Consent Decree (area designation schedule – certain geographies)
- 20 March 2015 - Updated guidance in memo from EPA (Stephen Page)
- 21 August 2015 – Data Requirements Rule finalized

2010 SO_2 NAAQS Designation Schedule

- Nonattainment area studies are underway
- Consent Decree requirements – by 2 July 2016 two groups of areas must be designated
  - Areas with new violations
  - Areas with sources >16,000 ton/y SO_2 emissions in 2012 or emitted >2,600 ton/y and rate of =>0.45 lbs SO_2/MMBtu

Summary of Court Order – Area Designations

First, by July 2, 2016 (16 months from the date of the court's order), the EPA must sign a notice for publication in the Federal Register that promulgates designations for remaining undesignated areas that:

(a) Based on air quality **monitoring** in the three full calendar years preceding that date have monitored violations of the NAAQS; or

(b) contain any stationary source that has not by March 2, 2015, been ``announced for retirement'' and that, according to data in the EPA's Air Markets Database, either (1) **emitted more than 16,000 tons of SO2 in 2012**, or (2) **emitted more than 2,600 tons of SO2 and had an annual average emission rate of 0.45 lbs. SO2/Mmbtu or higher in 2012.**

(The March 2015 consent decree defines ``announced for retirement'' as meaning ``any stationary source in the United States with a coal-fired unit that as of January 1, 2010, had a capacity of over five (5) megawatts (MW) and that has announced it will cease burning coal at that unit through a company public announcement, public utilities commission filing, consent decree, public legal settlement, final state or federal permit filing, or other similar means of communication.'')

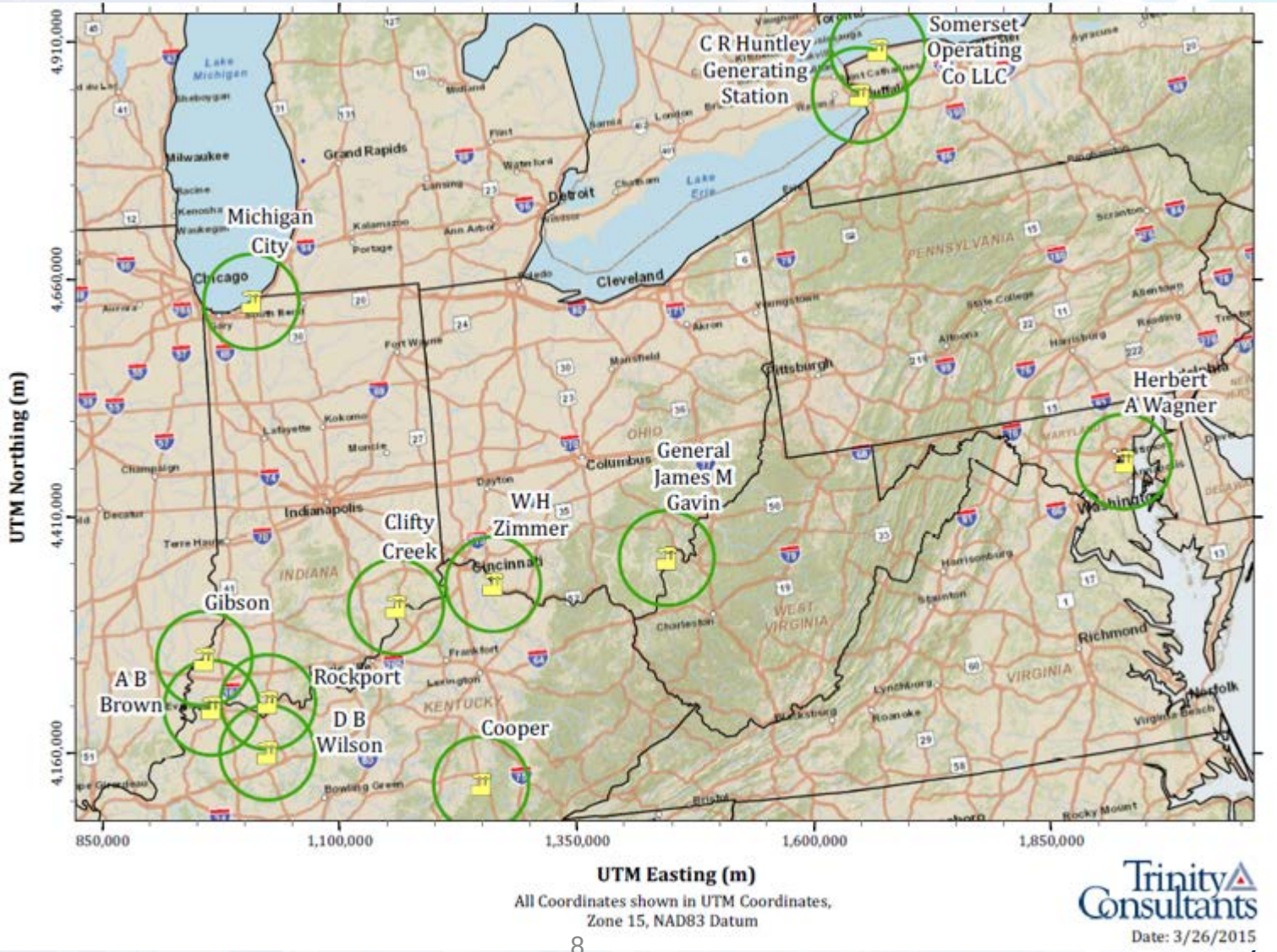
Summary of Court Order – Area Designations (cont.)

Second, by December 31, 2017, the EPA must sign such a notice promulgating designations for remaining undesignated areas in which, by January 1, 2017, states have not installed and begun operating a new SO2 monitoring network meeting EPA's specifications referenced in this rulemaking.

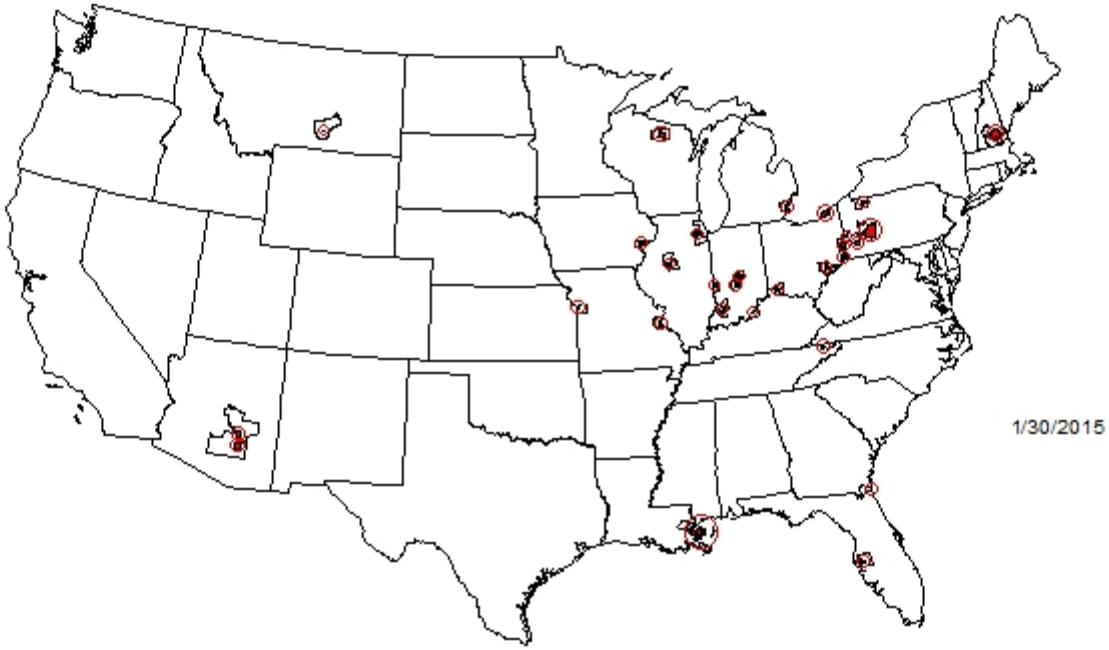
Finally, by December 31, 2020, the EPA must sign a notice promulgating designations for all remaining undesignated areas.

The EPA notes that the schedule imposed by the court will allow at least the latter two stages of designations to be informed and benefited by the additional information that is timely obtained pursuant to this final[DRR]rule, as appropriate.

Who is Affected by Consent Decree? Example from MidWest U.S.



SO2 Nonattainment Areas (2010 Standard)



Nonattainment areas are indicated by color.
When only a portion of a county is shown in color,
it indicates that only that part of the county is within
a nonattainment area boundary.

SO2 Nonattainment Areas

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Source Applicability Threshold (Final DRR)

- Source applicability threshold is 2,000 tons per year (tpy) of actual SO_2 emissions in most recent year for which data are available.
  - Identifies priority sources.
  - No separate threshold based on metro area population.
  - Data submitted annually pursuant to requirements of acid rain program and/or Air Emissions Reporting Rule may be used for evaluating applicability.
- Based on 2011 emissions data, a threshold of 2,000 tpy accounts for *approximately* 400 sources and covers ~90% of U.S. SO_2 emissions.
  - Based on more recent data, it is estimated that about 10% fewer sources now exceed this threshold.

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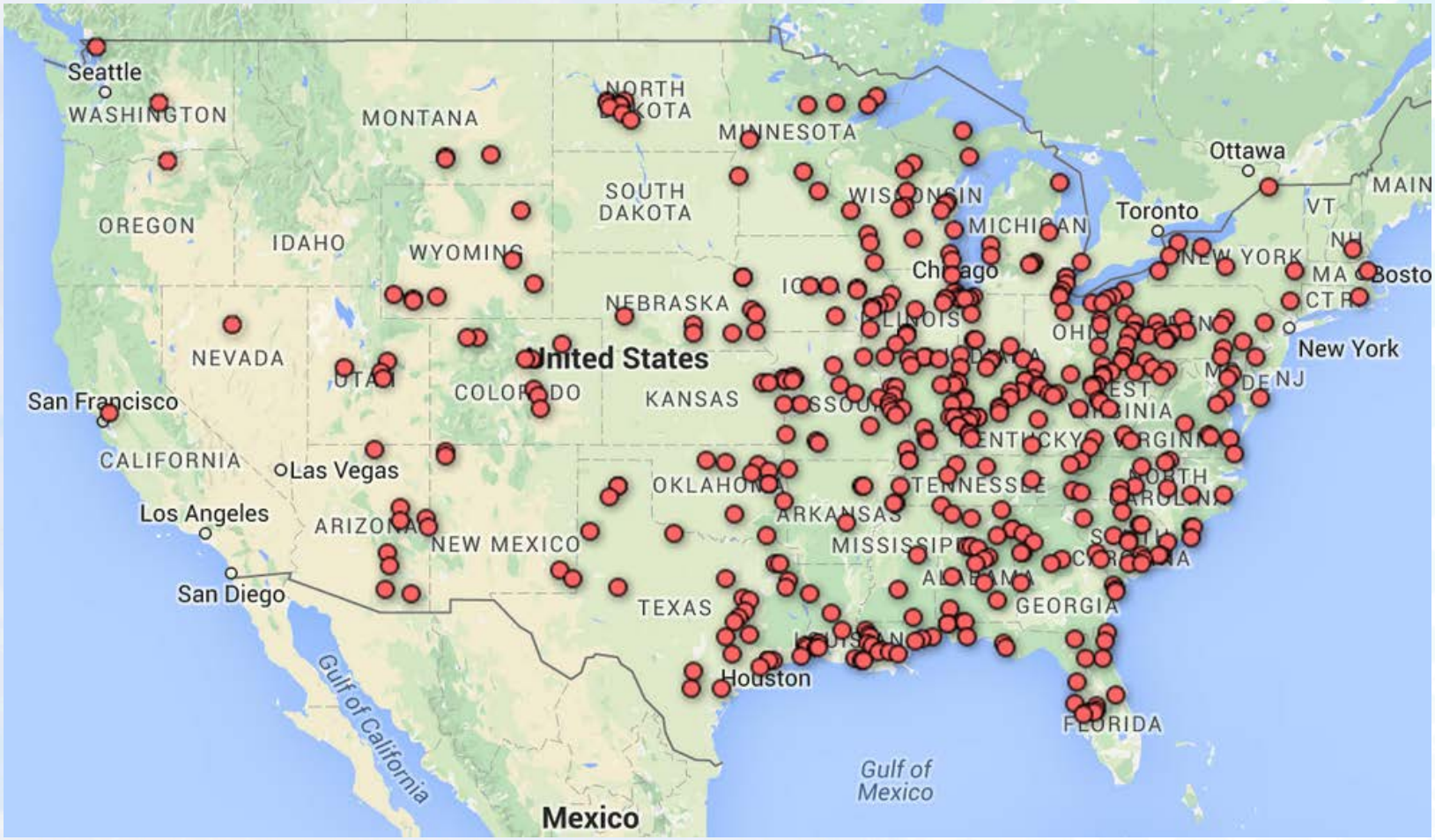
40 CFR 51.1202 - Applicability

This subpart applies to any air agency in whose jurisdiction is located one or more applicable sources of SO2 emissions that have annual actual SO2 emissions of 2,000 tons or more; **or in whose jurisdiction is located one or more sources of SO2 emissions that have been identified by the air agency or by the EPA Regional Administrator as requiring further air quality characterization.** For the purposes of this subpart, the subject air agency shall identify applicable sources of SO2 based on the most recently available annual SO2 emissions data for such sources.

Federally Enforceable Emission Limits

- Air agencies can avoid the requirement for source characterization by working with sources to establish permanent and enforceable emission limitations with compliance by January 13, 2017 that provide for annual emissions to remain below 2,000 tpy. [See 40 CFR 51.1202(b)]
- SO_2 emission limits can be made federally enforceable through various mechanisms (e.g. through a source-specific SIP revision, a minor NSR permit, consent decree, etc.). Not all approaches would require a SIP revision.
- The air agency can also avoid air quality characterization for a source if the air agency can provide documentation that the affected source has permanently shut down operations prior to January 13, 2017. [See 40 CFR 51.1202(b)]

Who is Potentially Affected by DRR?



Sources > 2000 tons SO_2/year (~400 plants)

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Background on the Data Requirements Rule

Data Requirements Rule for 1-Hour SO_2 NAAQS

- Rule proposal printed in the Federal Register on May 13, 2014
  - www.gpo.gov/fdsys/pkg/FR-2014-05-13/pdf/2014-09458.pdf
- Rule finalized on August 21, 2015
  - www.gpo.gov/fdsys/pkg/FR-2015-08-21/pdf/2015-20367.pdf
- Goal: to assist states in implementing the 1-hour SO_2 NAAQS

Background

- CAA requires EPA to issue attainment and nonattainment designations after a new NAAQS is set
- 6/2/2010 -1-hour SO2 NAAQS was set
- 9/21/2011 - EPA sought public comment on draft guidance for implementing the NAAQS
- May-June 2012 – EPA held stakeholder meetings

Background of the Proposed Rule (continued)

- 2/2013 - EPA developed an implementation strategy requiring states to further characterize air quality near large sources of SO_2
- 8/5/2013 – EPA designated 29 areas in 16 states as nonattainment; all based on certified monitoring; areas must develop SIPs
- 1/2014 – EPA released two Technical Assistance Documents (TADs), one for <u>modeling</u> and one for <u>monitoring</u>
- 8/2015 – EPA finalized the DRR

Focus of the DRR

- Allow characterization of non-designated areas for implementation of the 1-hour SO_2 NAAQS

Why the Focus on Specific SO_2 Sources?

- SO_2 is noted by EPA to be:
  - source-oriented
  - relatively stable in the atmosphere in the first few kms
- Thus, focus can be on specific sources causing specific noncompliant air quality
  - dispersion modeling - used to discern culpable sources
  - ambient monitoring - used to measure source impacts
- Some criteria pollutants such as ozone and $PM_{2.5}$ have regional scale attributes and chemical reactivity footprints and do not fit the same kind of air quality assessment techniques as SO_2

How is the EPA Goal Achieved?

- Restating the goal: DRR was developed to assist states in implementing the 1-hour SO_2 NAAQS
- Traditional NAAQS implementation process is described in section 107 of the CAA and generally relies on air quality concentrations characterized by ambient monitoring data.
- Although the current SO_2 monitoring network consists of 400+ monitors nationwide, there are limitations of the current network to characterize source-oriented maximum concentration impacts.

How is the EPA Goal Achieved?

- Thus, EPA introduced an option in which characterization can be done either with modeling of actual/allowable emissions or ambient monitoring
- Areas selected for review will be those with large SO_2 sources or high population areas with smaller sources (to increase public health protection)

Who is Affected?

- Theoretically, states are required to do <u>all the modeling and monitoring work</u>
- Any source on the final list will either be modeled and/or monitored
- Sources include coal-fired power plants and *may* include refineries, smelters, pulp & paper, chemical, and other SO2 sources – particularly if located near (or within) a large SO2 source (subject to the DRR) and/or a group of significant SO2 sources

Timeline

- **August 2015:** EPA issues final rule.
- **Jan. 15, 2016:** Air agency identifies sources exceeding threshold and other sources for which air quality will be characterized.
- **July 1, 2016:** Air agency specifies (for each identified source) whether it will monitor air quality, model air quality, or establish an enforceable limit.
  - Air agency also accordingly submits a revised monitoring plan, modeling protocols, or descriptions of planned limits on emissions to less than 2,000 tpy.
- **January 2017**
  - New monitoring sites must be operational by Jan. 1, 2017.
  - Modeling analyses must be submitted to EPA by Jan. 13, 2017.
  - Documentation of federally enforceable emission limits and compliance must be submitted to EPA by Jan. 13, 2017.
- **Early 2020:** Monitoring sites will have 3 years of quality-assured data which must be submitted to EPA.

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January 15, 2016: Air agency submits list of sources

- The list submitted by the state establishes the sources that must be characterized, and cannot be changed once submitted. [See section 40 CFR 51.1202(a)]
- Before submitting list, consultation between air agencies and EPA Regional Offices is strongly encouraged!
- Air quality characterization is required for sources that emitted at least 2,000 tpy in most recent year for which data is available.
- States and EPA Regional Administrators retain the discretion to require air quality characterization near additional sources below the threshold that may warrant characterization:
  - Near sources with low stack height and plume buoyancy.
  - In areas with multiple, clustered sources below the threshold.
  - Near sources only temporarily below the threshold.

July 1, 2016: Air agency specifies for each source whether it will monitor air quality, model air quality, or establish an enforceable limit

- Submit revised monitoring plan:
  - Draft non-binding Monitoring Technical Assistance Document:
    - *http://www.epa.gov/oaqps001/sulfurdioxide/pdfs/SO2MonitoringTAD.pdf*
  - Include any new monitoring sites established to meet the DRR in annual monitoring plan update.
  - Operate as State and Local Air Monitoring Stations (SLAMS) or in equivalent manner.
  - Report data quarterly; annual certification by May 1 of following year.
- Submit modeling protocol:
  - Draft non-binding Modeling Technical Assistance Document:
    - *http://www.epa.gov/oaqps001/sulfurdioxide/pdfs/SO2ModelingTAD.pdf*
  - Model air quality using actual hourly emissions and meteorology for the most recent 3 years.
  - Review by EPA, and ongoing consultation between EPA and air agency to resolve issues early in process. No formal action by EPA on modeling protocols.
- Describe planned emission limits.
  - Describe intended level, averaging time, approach for making federally enforceable.

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January 2017: Monitoring sites are operational; modeling analyses and documentation of federally enforceable emission limits are due

- New monitoring sites must be operational by January 1, 2017. [See section 51.1203(c)(2)]
  - For the purpose of characterizing air quality using data collected during 2017-2019.
  - If monitoring sites are not operational by the January 1, 2017 deadline, then under the Consent Decree these areas must be designated by December 2017.
- Air agency submits modeling analyses and supporting information to EPA Regional Office by January 13, 2017. [See section 51.1203(d)(2)]
- Air agency submits documentation of federally enforceable emission limits (to less than 2000 TPY) and compliance to EPA Regional Office by Jan. 13, 2017. [See section 51.1203(e)]

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SO_2 Data Requirements and Implementation Timeline (not including those subject to consent decree)

Jan 15, 2016: Agencies submit sources + model or monitor to EPA

July 1, 2016: Modeling protocols due for sources to be modeled

July 1, 2016: Monitoring plans due for sources to be monitored

Jan 1, 2017: SO_2 monitors should be operational

Jan 13, 2017: Modeling studies should be submitted to RAs

Aug 2017: States notified of intended designations (modeled)

Dec 2017: Final designation date (based on modeling)

Aug 2019: Due date for SIPs for 2017 model-based designations

May 2020: Certification of 2019 monitoring data

Aug 2020: States notified of intended designations for remainder of US (monitored)

Dec 2020: Finalize all other designations (based on monitoring)

Aug 2022: Due date for SIPs for 2020 designations

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Treatment Under the DRR of Sources in Areas Already Designated for the 2010 SO_2 NAAQS

- Currently there are 29 areas already designated for the 2010 SO_2 NAAQS, and during the DRR implementation period, some additional areas may be designated pursuant to the consent decree resulting from litigation on the SO_2 NAAQS designations.
- The DRR preamble discusses how sources in already-designated areas would be treated under the DRR:
  - **Sources in "Nonattainment" areas:** Sources located in nonattainment areas are expected to be characterized as a part of the nonattainment plan submittal. Therefore, air quality characterization of these sources is not generally required under the DRR.
    States and Regions retain the discretion to characterize such sources, however (e.g., to address potential impacts to areas outside a nonattainment area).
  - **Sources in "Unclassifiable/attainment" areas:** If an area is designated as "unclassifiable/attainment" prior to the DRR deadline to characterize air quality for sources in the area, information used to inform the designation may be considered to satisfy the source air quality characterization requirements under the DRR.
  - **Sources in "Unclassifiable" areas**: The DRR requires air quality characterization for sources in areas designated as unclassifiable.

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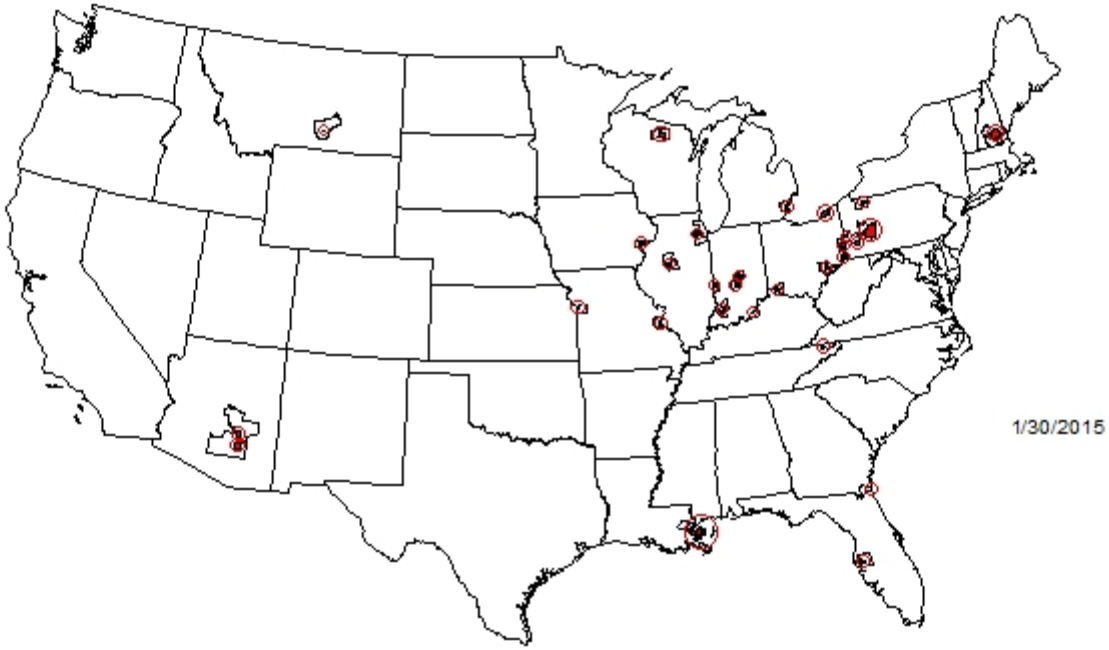
SO2 Nonattainment Areas (2010 Standard)



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SO2 Nonattainment Areas

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Overview of 11th Conference on Air Quality Modeling:

Appendix W Updates & Key Changes to AERMOD

♦ September 15, 2015

Presenter: Jay Hofmann
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Overview of Proposed Revisions to Appendix W

Content based on Tyler Fox (EPA) Presentation

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Regulatory Revisions to Appendix W: Schedule

- Proposed Rulemaking, "Revision to the Guideline on Air Quality Models", **July 29, 2015**
  - Proposes updates to current EPA-preferred models to address input and science issues
  - Incorporates new analytical techniques to address ozone and secondary $PM_{2.5}$
  - Updates for conducting individual source and cumulative impact analysis for NAAQS pollutants
- EPA will accept public comments on the proposal for 90 days through **October 27, 2015**
  - Anyone at Trinity commenting on behalf of clients?
  - Should we submit comment letter on behalf of Trinity?
- Final Rulemaking, "Revision to the Guideline on Air Quality Models", **Spring 2016**
  - **Want to complete before election season**

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Setting the Foundation: Sections 1-3

- Section 1: Introduction
  - Purpose and Applicability of the Guideline
    - Largely unchanged but important to read to understand the foundation
- Section 2: Overview of Model Use
  - Suitability of Models (Several factors)
  - Sophistication of Air Quality Models (Screening/Refined)
    - Current Guideline is very confusing with meaning of terms, e.g., screening technique, screening model, refined model etc.
    - The proposed rule provides a good guide map to clear the confusion and use consistent definitions of terms
- Section 3: Preferred & Alternative Air Quality Models
  - Preferred models: Conditions for Appendix A models
  - Alternative models: Conditions and their approval
  - Role of Model Clearinghouse
    - Section 3 provides the "rules of the game"

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Identifying Modeling Approaches: Sections 4-6 (1/2)

- Section 4: Models for "inert pollutants'
  - AERSCREEN as screening model (now codified)
  - AERMOD Modeling System as preferred model (no change)
  - Remove CALINE3 - AERMOD replaces CALINE3
  - Remove BLP and integrate in AERMOD
    - BLP will not be in Appendix A anymore
  - Multi-tiered approach for NO2
    - Proposing that all ARM2 and OLM/PVMRM become regulatory default (no longer require approval from Regional Office)

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Identifying Modeling Approaches: Sections 4-6 (2/2)

- Section 5: Models for O_3 & Secondary $PM_{2.5}$ (New)
  - Sierra Club petition is the key driver
  - No preferred model or technique
    - Goal was to offer flexibility
  - Recommends two-tiered approach with detailed guidance
    - MERPS (Modeling Emission Rate for Precursors) will establish the level similar to significant emission rates (SERs)
      - Will not replace PSD applicability (PSD/BACT applicability not changed)
      - MERPS in separate rulemaking
      - "Qualitative" assessment in PM2.5 guidance is absent from proposal (replaced by MERPS)
    - First tier will be reduced form modeling or semi-quantitative based on available information (existing photochemical modeling), etc.
    - Second tier will be to do photochemical modeling
      - Photochemical models available are capable of single source modeling
    - See EPA "Guidance on the use of models for assessing the impacts of emissions from single sources on the secondarily formed pollutants ozone and PM2.5 (July, 2015)"
      - www.epa.gov/ttn/scram/11thmodconf/Draft_Guidance_SingleSource_SecondarilyFormed-07152015.pdf
- Section 6: Modeling for AQRVs (Class 1 areas) and Other Govt Programs

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Proposed Updates to AERMOD Modeling System: Preamble

- EPA updated regulatory version from v14134 to v15181 (June 30, 2015) to address several bug fixes.
- EPA has proposed to incorporate specific updates to the regulatory version that are the subject of public review and comment and then would be codified as part of the final rule action.
  - These options have thus remained "beta" in AERMOD V15181 to allow for public testing & evaluation
  - If proposed revisions go through unchanged, LowWind3, ARM2, etc. will become regulatory default
  - Memo will be added to the docket clarifying status of V15181 and beta options

Long-Range Transport Assessments: Section 4

- No longer require CALPUFF (removed as preferred model) or other Lagrangian model
  - Noted that CALPUFF status does not change with respect to BART or existing FLM (Class 1 areas - FLAG) guidance.
  - CALPUFF: not preferred but screening for Class I
- EPA expects that screening using AERMOD at or near 50 km will be sufficient for most cases, and certainly sufficient for NAAQS
  - PSD limited to 50 km, no long range transport
  - EPA recognizes that some analysis may be needed in "limited situations" for Class I increment, but EPA is "reducing the need" to conduct CALPUFF modeling
  - Tyler Fox stated EPA can count on one hand number of CALPUFF Class I analyses
    - Will applicants will need a non-case-by-case methods for Class I AQRV and PSD Increment assessments?

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How to Inform & Apply Models: Sections 7-9 (1/2)

- Section 7: General Modeling Considerations
  - Recommendations for dispersion modeling
    - Scrubbing done for this, because EPA wanted to remove outdated references and keep Appendix W high level
    - Moving certain elements previously in Section 7 to next level of more dynamic guidance documents
- Section 8: Model Input Data
  - Modeling Domain & Source Data
    - Domain ≤ 50 km
    - Number of nearby sources should be reduced from previous status quo with most being captured in background concentration
    - Trying to remedy the past practices of being overly-conservative
    - Nearby sources should use actual emissions
  - Background Concentrations
  - Meteorological Input Data (MMIF)

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How to Inform & Apply Models: Sections 7-9 (1/2)

- Section 9: Regulatory Application of Models
  - Modeling Protocol
  - Multi-stage approach to demonstrating compliance:
    - SIL → cumulative → cause and contribute analysis
  - Use of Measured Data in lieu of Model Estimates
    - Seeking comments. EPA has no recent examples where monitoring would be preferred over modeling

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Detailed Discussion - Sections 8 and 9 of the Proposed Appendix W

8.0 Model Input Data

- 8.1 Modeling Domain
- 8.2 Source Data
- 8.3 Background Concentrations
- 8.4 Meteorology Data

9.0 Regulatory Application

- 9.1 Discussion
- 9.2 Recommendations

  Protocols, design values, NAAQS, PSD increments, compliance demos

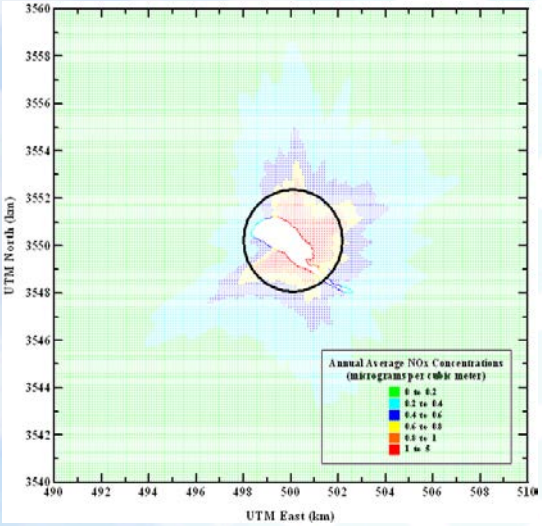
Section 8 and 9 Intent

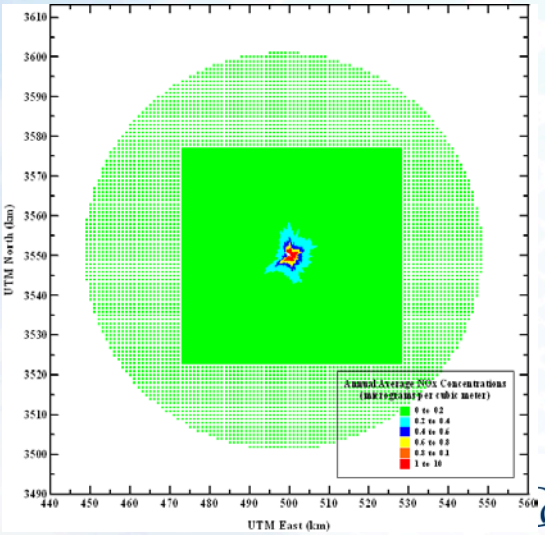
- The proposed changes to Section 8 are intended to modify these past practices and provide more appropriate basis for selection and use of modeling inputs through the *Guideline* itself and supporting guidance.

- The proposed revisions to Section 9 more clearly summarize the general concepts presented in earlier sections of the Guideline and set the stage for appropriate regulatory application of models and/or, in rare circumstances, air quality monitoring data.

Section 8.1 Domain

- Specific requirements for NAAQS or PSD increment assessments, a radius extending
  - to most distant point that is significant (modeled impact at the SIL)
  - to 50 km
  - ***whichever is less!!***





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Section 8.2 Source Data

- Revised nearby source guidance – big change
  - Nearby sources in Tables 8-1 and 8-2 will be based on "actual" emissions rather than allowable
  - Based on most recent 2 years at "nominal" operations
- Revised mobile source emission guidance
- New language how to characterize direct and precursor emissions for SIP demos

Actual Emissions – Table 8-2 for NAAQS Sources

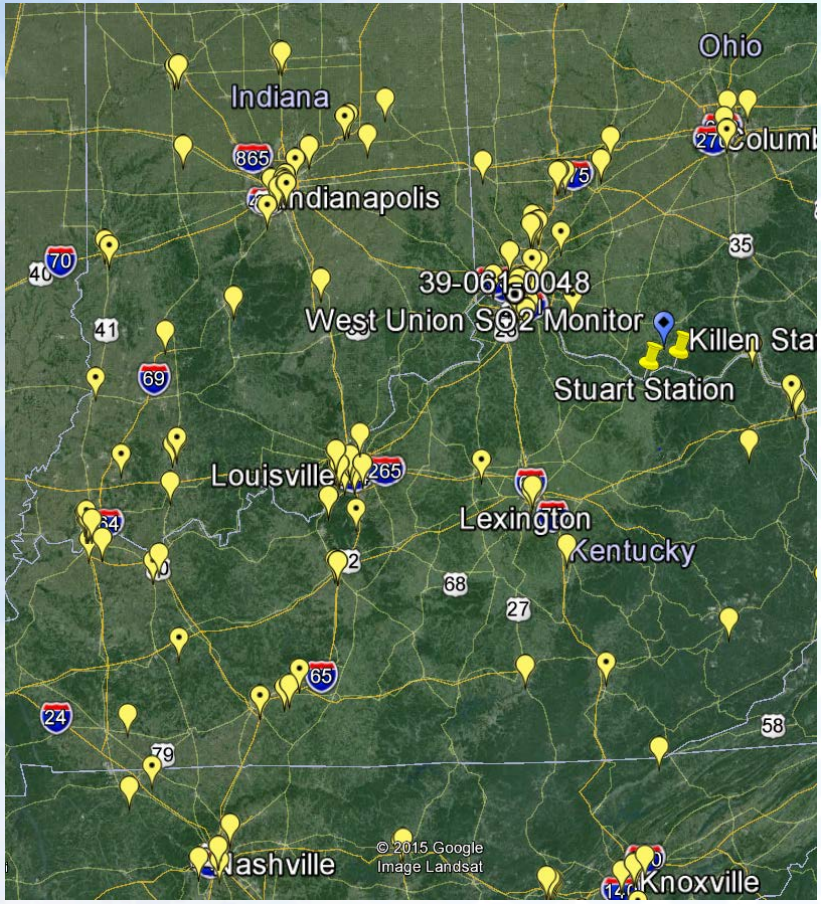
TABLE 8–2—POINT SOURCE MODEL EMISSION INPUT FOR NAAQS COMPLIANCE IN PSD DEMONSTRATIONS

Averaging time	Emissions limit (lb/MMBtu) [1] ×	Operating level (lb/MMBtu) [2] ×	Operating factor (e.g., hr/yr. hr/day)
Proposed Major New or Modified Source			
Annual & quarterly	Maximum allowable emission limit or federal enforceable permit limit.	Design capacity or federally enforceable permit condition.	Continuous operation (i.e., 8760 hours).[2]
Short term (≤24 hours)	Maximum allowable emission limit or federal enforceable permit limit.	Design capacity or federally enforceable permit condition.[3]	Continuous operation, i.e., all hours of each time period under consideration (for all hours of the meteorological database).[2]
Nearby Source(s) [4 5]			
Annual & quarterly	Maximum allowable emission limit or federal enforceable permit limit.[5]	Annual level when actually operating, averaged over the most recent 2 years.[6]	Actual operating factor averaged over the most recent 2 years.[6 8]
Short term (≤24 hours)	Maximum allowable emission limit or federal enforceable permit limit.[5]	Annual level when actually operating, averaged over the most recent 2 years.[6 7]	Continuous operation, i.e., all hours of each time period under consideration (for all hours of the meteorological database).[2]
Other Source(s) [5 9]			

The ambient impacts from Non-nearby or Other Sources (e.g., natural sources, minor sources and,distant major sources, and unidentified sources) can be represented by air quality monitoring data unless adequate data do not exist.

Section 8.3 Background

- Discerning what monitoring data exists
- Isolated versus multi-source situations
- Nearby source contributions versus background
- Use of monitor data to represent other sources
- Seasonal & hourly averages
- 90º exclusion zones (background excluded)



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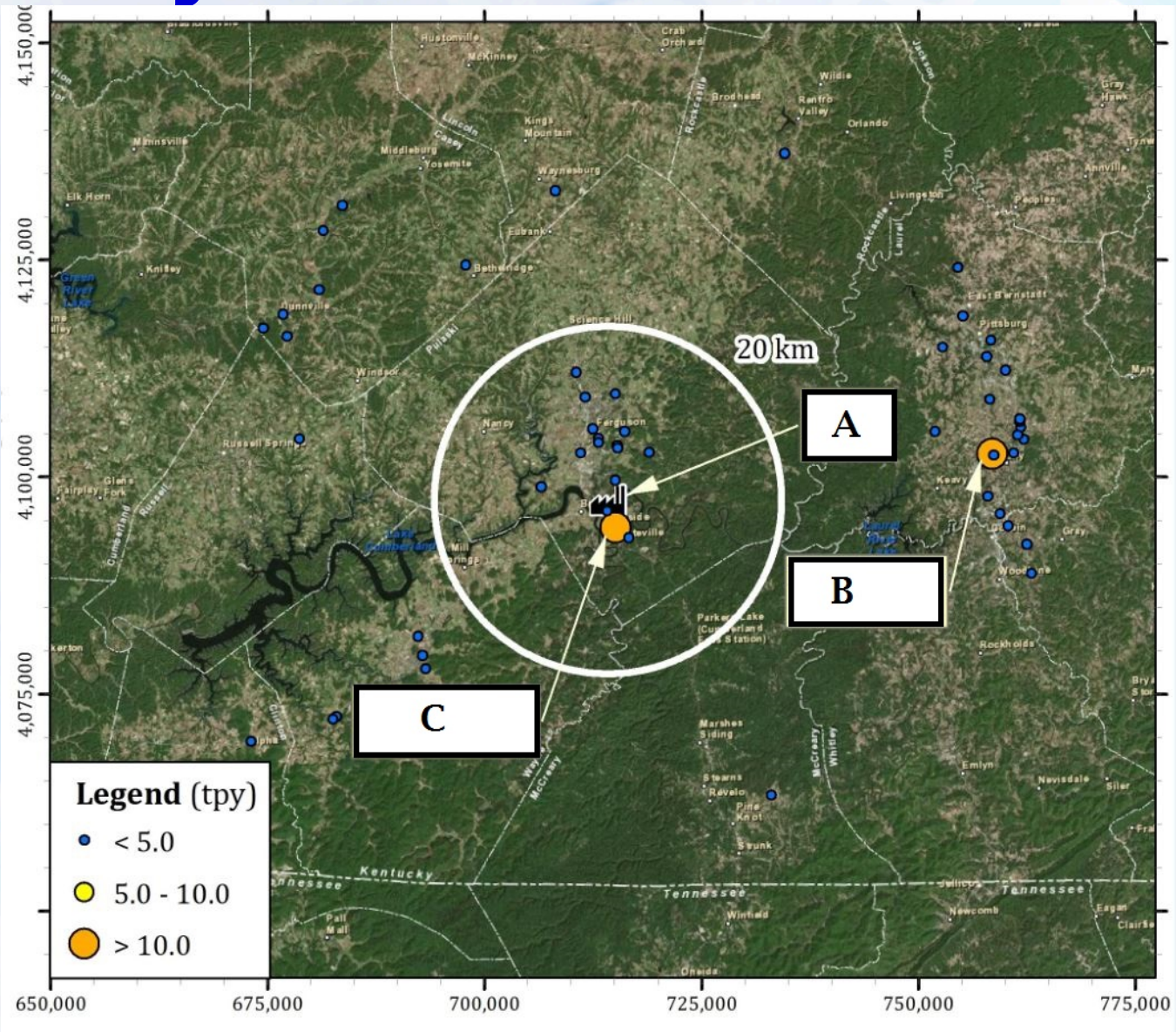
Nearby Source Consideration



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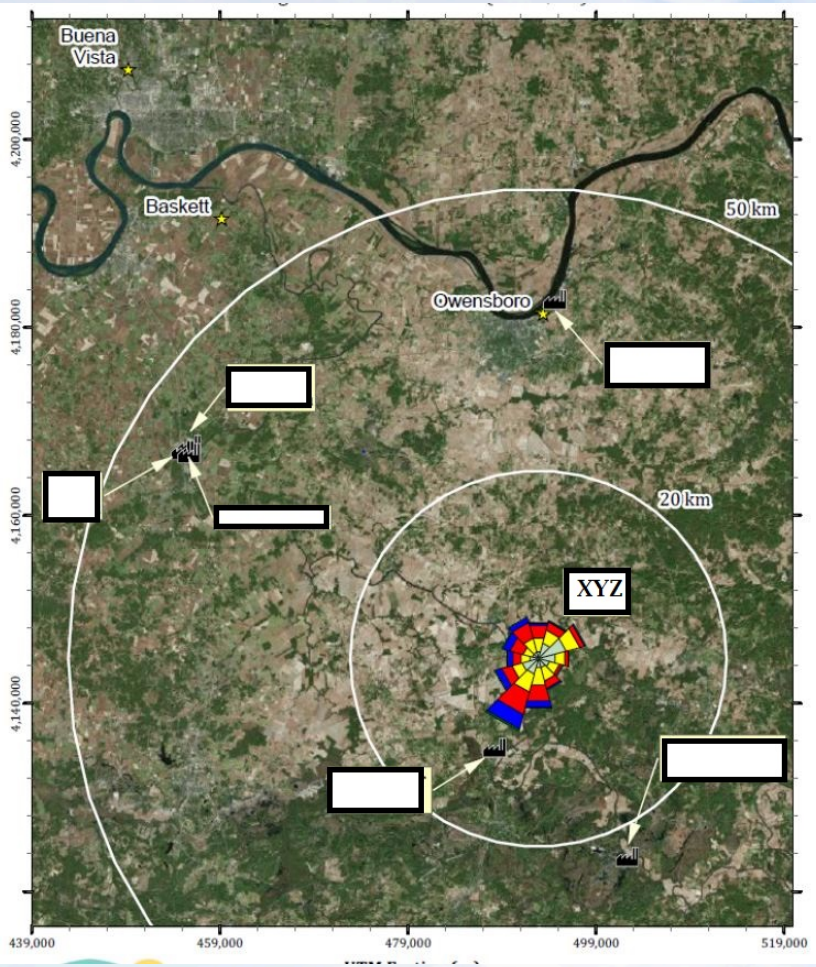

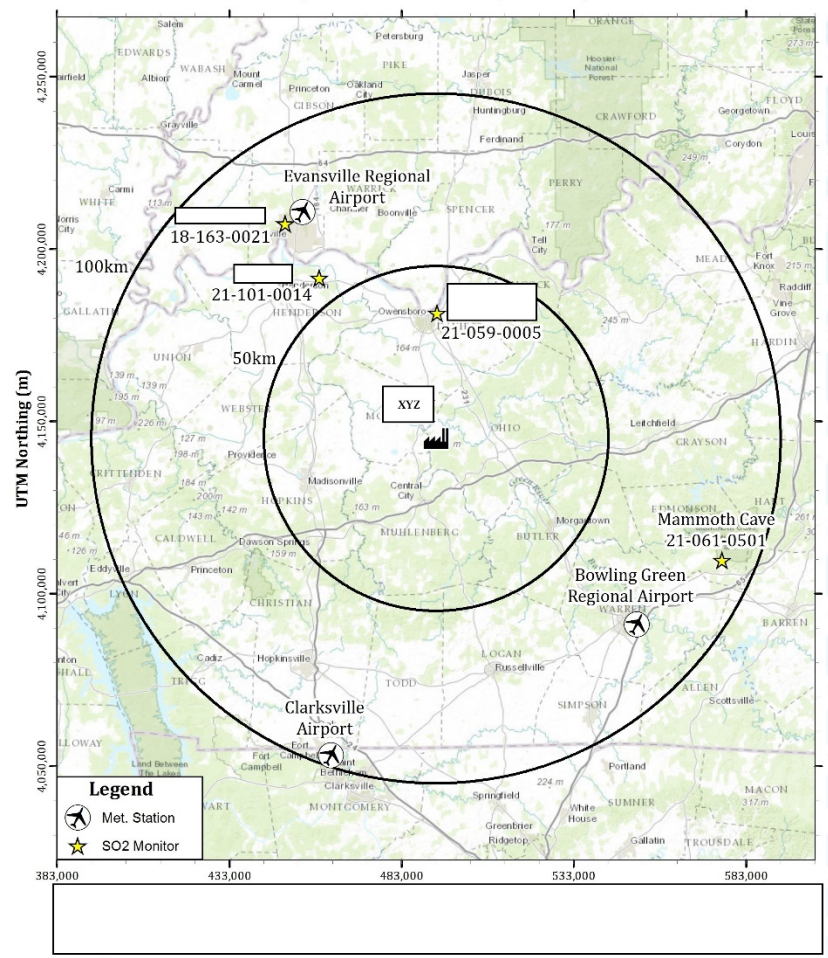

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Section 8.4 Meteorology Data

- 8.4.1 Discussion
  - 8.4.1.c/d Introduce prognostic data
- 8.4.2.a AERMET, AERMINUTE introduced
  - PCRAMMET, MPRM, METPRO still recommended
- 8.4.2.b AERSURFACE introduced, concept of using one cell of a prognostic model
- Other – Years of Data
  - 5 years NWS
  - 1 year onsite
  - 3 years prognostic, incorporate observations

Section 8.4 Meteorology Data

- 8.4.3 NWS Data
- 8.4.4 Site-specific Data
- 8.4.5 Prognostic Data
  - No representative data
  - MMIF* with MM5 or WRF data – must be used to generate data for AERMET then into AERMOD
- 8.4.6 Calms
  - Site-specific Data, use 1 m/s
  - ASOS + Prognostic – use 0.5 m/s

*Mesoscale Model Interface Program

Prognostic Meteorological Data in AERMOD – MMIF* Processor

- Encouraging and welcome option for cases where airport representativeness is uncertain
- Additional testing is recommended for field studies with comprehensive meteorological profiles from tall tower and sodar data
- Comparison of MMIF data to traditional measurements should particularly focus on low winds because these can lead to design concentration predictions
- Any MMIF data limitations? e.g., terrain scales less than MMIF grid sizes, heterogeneous surfaces
- The use of MMIF is encouraged and may become a DEFAULT option

*Mesoscale Model Interface Program

Section 9 Regulatory Applications

- Preferred models
  - Are noted to be identified in Appendix W
  - Subject to systematic performance evaluation
  - Case-by-case consideration of new models (Section 3.2)

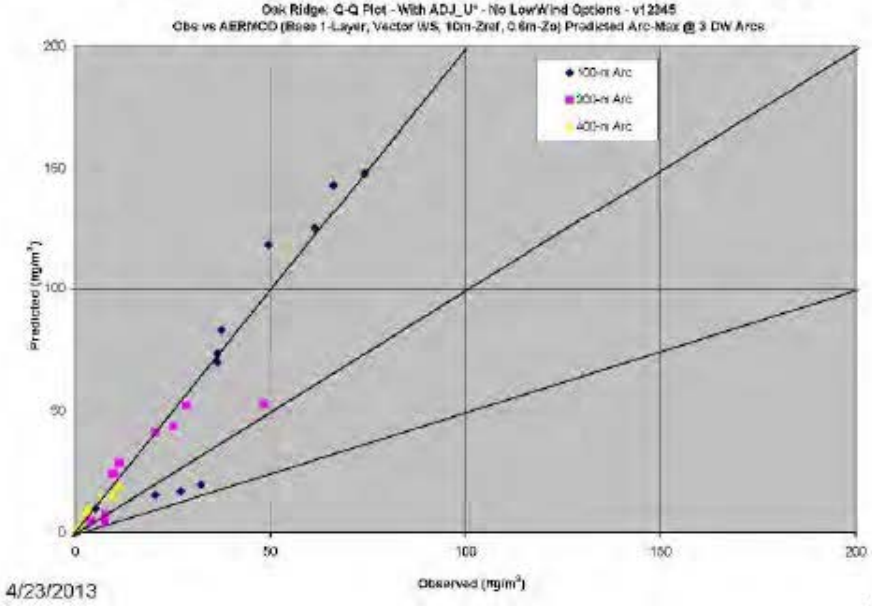
Example u* Alternative Model

> Generally five criteria must be met:

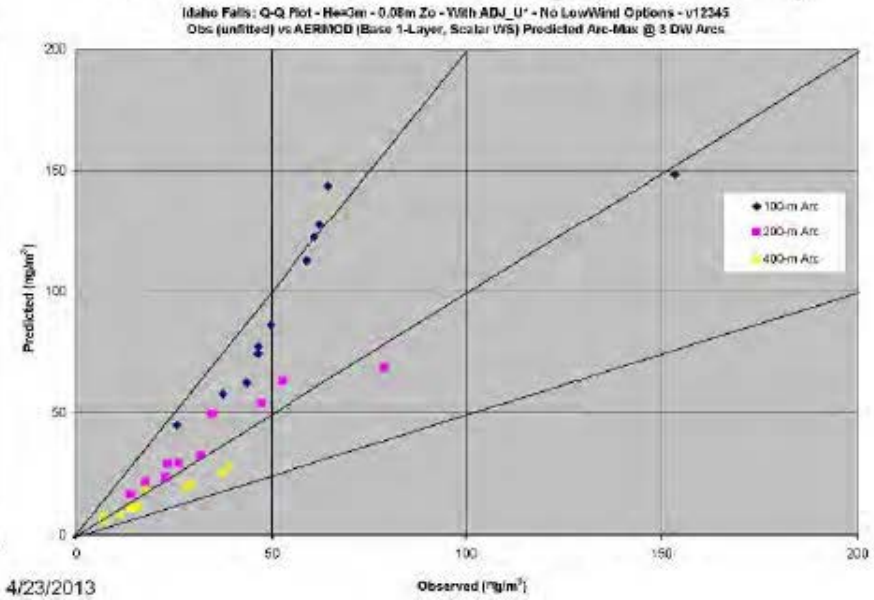
i. The model has received a scientific peer review;
ii. The model can be demonstrated to be applicable to the problem on a theoretical basis;
iii. The data bases which are necessary to perform the analysis are available and adequate;
iv. Appropriate performance evaluations of the model have shown that the model is not biased towards underestimates; and
v. A protocol on methods and procedures to be followed has been established.

Peer Review

Oak Ridge – Adj_U* Only



Idaho Falls – Adj_U* Only



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Applicable to Problem

Table A-1. Distribution of Hourly Observations by Wind Speed and Wind Direction

Dates: 7/1/2012 - 00:00 ... 6/30/2015 - 23:00

	Directions / Wind Classes (m/s)	0.3 - 1.0	1.0 - 2.1	2.1 - 3.6	3.6 - 5.7	5.7 - 8.8	8.8 - 11.0	>= 11.0	Total
1	348.75 - 11.25	228	446	469	320	32	0	0	1495
2	11.25 - 33.75	234	634	740	330	20	0	0	1958
3	33.75 - 56.25	212	350	546	121	10	0	0	1239
4	56.25 - 78.75	154	222	259	44	0	0	0	679
5	78.75 - 101.25	178	285	241	28	1	0	0	733
6	101.25 - 123.75	223	333	123	12	0	0	0	691
7	123.75 - 146.25	429	682	192	52	8	0	0	1363
8	146.25 - 168.75	604	1247	434	66	11	0	0	2362
9	168.75 - 191.25	479	942	794	551	172	6	0	2944
10	191.25 - 213.75	236	668	899	533	182	10	1	2529
11	213.75 - 236.25	166	476	755	639	196	5	1	2238
12	236.25 - 258.75	85	325	532	489	179	19	0	1629
13	258.75 - 281.25	93	286	502	495	287	36	3	1702
14	281.25 - 303.75	80	262	456	510	188	9	2	1507
15	303.75 - 326.25	92	236	400	391	78	0	0	1197
16	326.25 - 348.75	112	225	398	321	57	0	0	1113
	Sub-Total	3605	7619	7740	4902	1421	85	7	25379
	Calms								837
	Missing/Incomplete								64
	Total								26280

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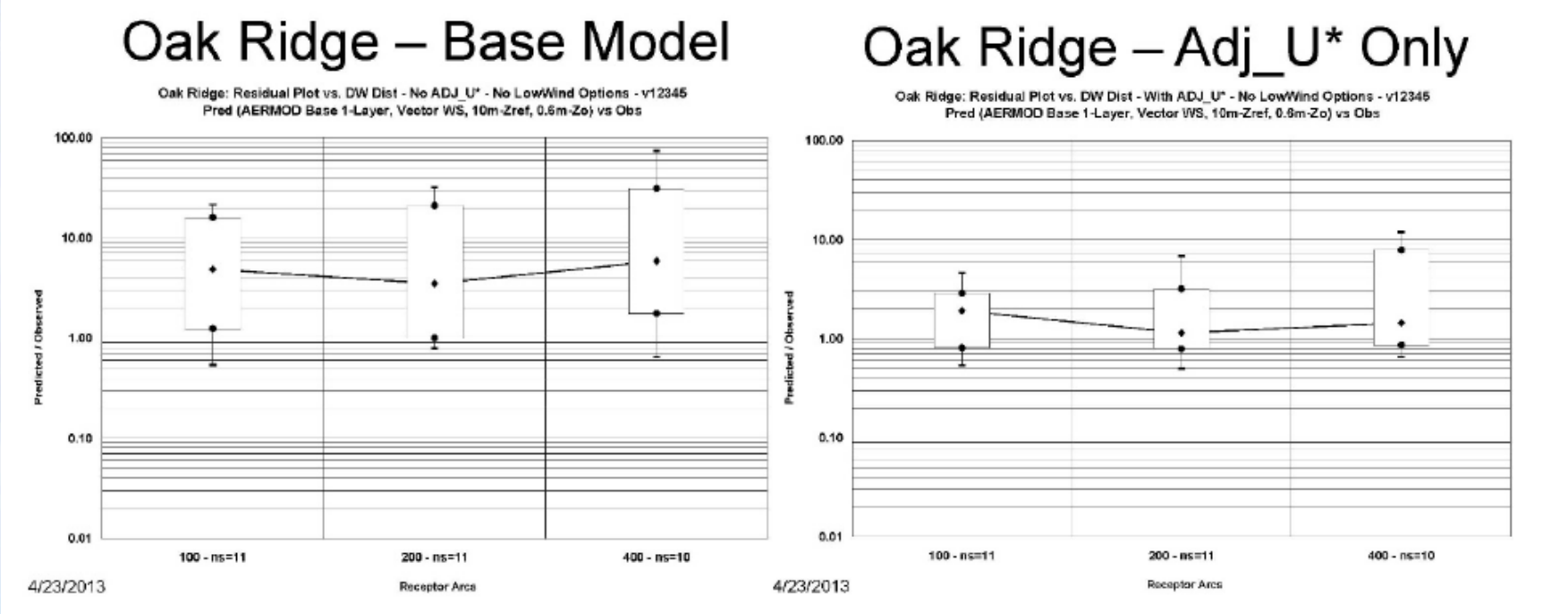
Not Biased Towards Underestimates



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Section 9 Regulatory Applications – What else?

- Modeling protocols
- Design concentrations
- Discussion of receptor sites for modeling with new considerations given the past practice of excessively large grids of receptors – emphasis on receptor density and location
- Clearer NAAQS and PSD steps
- Discussion on using measured data instead of modeled to determine an emission limit

How Do These Modeling Guidance Changes Affect Permitting?

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Impacts on Permit Modeling

- Reduced nearby source inventory requirements
- Smaller modeling domains
- Possible approval of AERMOD options which may reduce ambient impact conservativeness
- More time consuming due to incompletely defined modeling approaches?
  - Protocols often take a long time to be approved and with more uncertainty and more Model Clearinghouse review, this timing may get worse.
- More expensive - Depends
  - More work to prepare protocol, defend options, and usher through review
  - Greater cost and uncertainty for ozone and $PM_{2.5}$ evaluation and modeling
  - Greater effort in defending permit due to undefined approved procedures

Impacts on Permit Modeling

- Less consistent – Most likely
  - Each modeling exercise, because of its case-by-case nature, may be different than others; where is the consistency?
  - The lack of consistency will lead to greater opportunity for permit challenges and a greater chance of litigation.
- More likely to be avoided?
  - Increasing the time, expense and vulnerability for obtaining a permit will lead to further efforts to avoid permits.
  - The PSD permit is a long complex process. Making it longer and more complex is not in the best interests of the agencies or industry.

New NO2 Modeling Options (ARM, etc.)

- Future Modeling Tiers, per the Appendix W Proposal
  - Tier 1 – The same as current (full NOx conversion to NO2)
  - Tier 2 – No more ARM, only a revised version of ARM2, shifting the ratio value applied from 0.9 to a new minimum of 0.5. EPA is justifying this as the recommended minimum in-stack NO2/NOx ratio for Tier 3 is 0.5 (per guidance), and EPA does not want a Tier 2 method to possibly provide a better (lower) result than a Tier 3 method. ARM2 would be moved to regulatory default (no longer requiring explicit regional EPA approval, but still requesting "consultation" whatever that means) unless seeking to utilize a lower minimum ARM2 ratio value.
  - Tier 3 – Use of PVMRM, a modified version of PVMRM (PVMRM2), or OLM. EPA is seeking comment on PVMRM2, and is proposing to incorporate a singular version of PVMRM into the model following the Appendix W finalization (using either the existing PVMRM or new PVMRM2 algorithms). Any Tier 3 method now proposed to be regulatory default (no longer requiring explicit regional EPA approval, but still requesting "consultation" whatever that means).

Highlights from Public Comment Presentations

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Issues not addressed by EPA

1. No corrections to PRIME or BPIP
   - Known errors for: long or wide buildings, corner vortex, stacks above GEP (or between 1.5H and GEP)
   - Presentation from CPP on schedule
2. No guidance (Appendix W or memorandums) supporting use of techniques developed by industry
   - EMVAP
   - Source characterization: urban for industrial heat, liftoff, AERLIFT, AERMOIST
   - Merging stacks that are nearly touching
3. (new) Penetrated plume inappropriately dominating concentrations for tall stacks in flat terrain

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Issues with EPA's Proposal

1. Lack of detail for secondary $PM_{2.5}$ and O_3
   - How can we comment if we don't even know what the MERPS are?
   - Multiple commenters, largely AWMA APM
2. Uncertainty in permitting because of:
   - Model clearinghouse approval needed for "all but simplest model analyses"
   - Case-by-case approach for long range transport analyses
   - AWMA APM, NAAQS coalition, other industry groups
3. ARM2 default minimum ratio changed to 0.5 with little justification and no detail of procedure for using a lower value or what would be needed to justify by applicant
4. No incorporation of chemistry updates to CALPUFF (or any CALPUFF or SCIPUFF) funded by industry
   - Issues identified with CALPUFF relate to management, not issues with the model itself
5. Need an independent "modeling science advisory" panel
6. Shouldn't wait for final promulgation to use technical advances

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AERMOD Modeling System, Version: 15181 Regulatory Update

Based on content from presentation by Roger Brode - EPA OAQPS – 8/12/2015

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Introduction

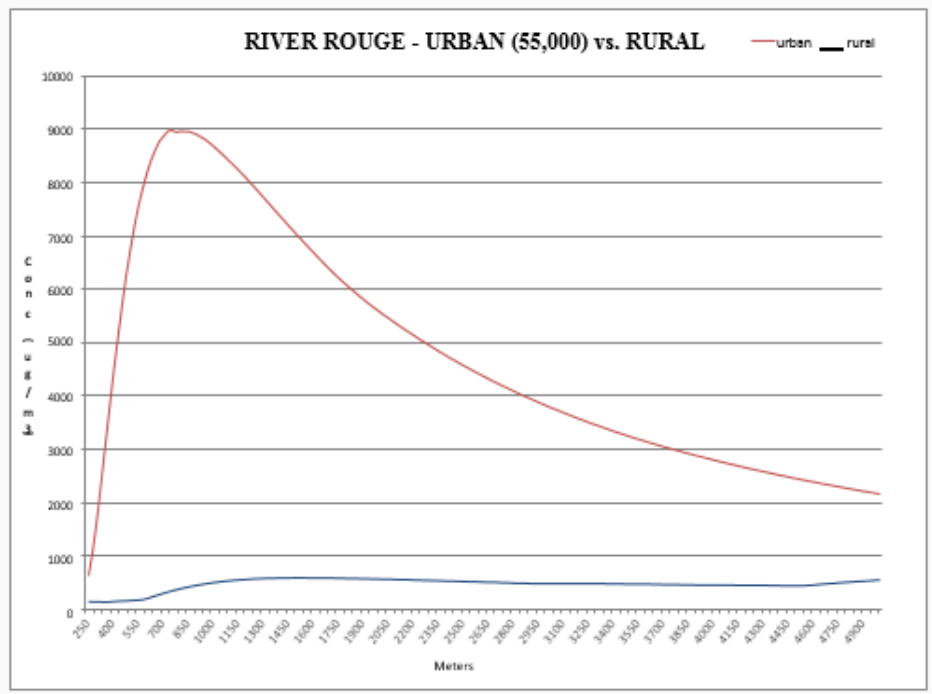
- The regulatory versions of the AERMOD dispersion model and AERMET meteorological processor were recently updated to version 15181 (June 30, 2015);
  - The updates to v15181 of AERMOD and AERMET include several bug fixes, which are discussed below;
  - Version 15181 of AERMOD & AERMET also incorporate proposed enhancements to the non-Default/BETA options which are discussed in the next presentation;
  - The v15181 updates are documented in AERMOD Model Change Bulletin (MCB) 11 and AERMET MCB6.

AERMOD Bug Fixes

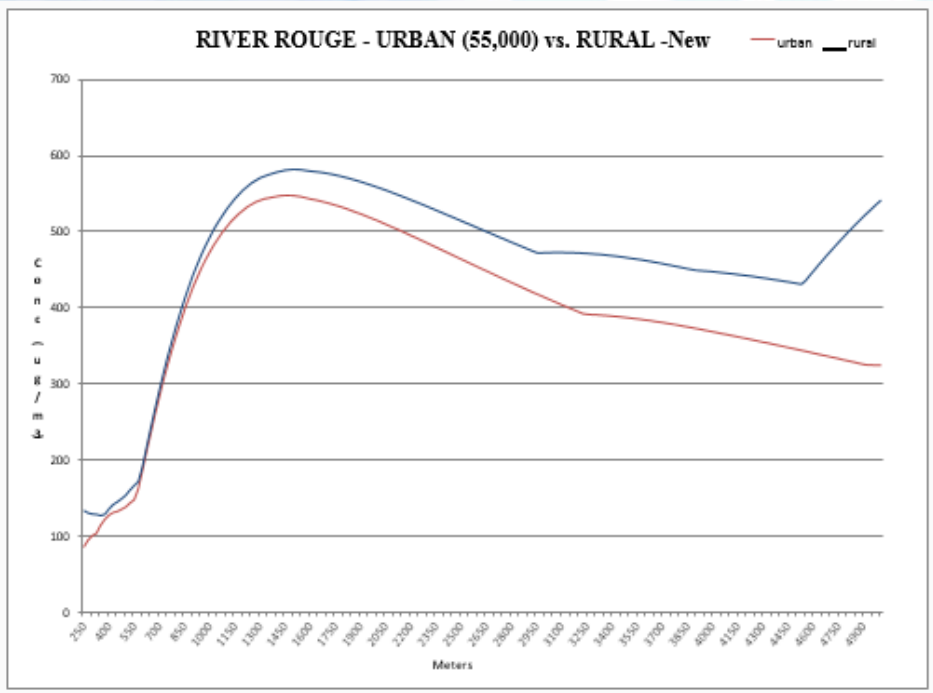
- Incorporated a formulation bug fix to address issues with relatively tall stacks in relatively small urban areas:
  - Previous versions may have applied an unrealistic limit on plume rise, resulting in anomalously high concentrations;
  - Issue has been addressed in the AERMOD Implementation Guide, which recommended treating such sources as rural, with adequate justification;
  - New version emulates approach used for penetrated sources during convective conditions;
  - Example for tall stack with 55,000 population shown in next slide.

Urban vs. Rural Concentrations Before and After Bug Fix

- Before



- After



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AERMOD Bug Fixes (cont.)

- Corrected an issue with use of the NOSTD option with the POINTCAP option for capped stacks;
- Corrected an issue with the emission rate being modified for AREA, LINE and OPENPIT sources if the point source approximation was used under the FASTAREA or FASTALL option;
- Modified the tolerance parameter for AREA and LINE sources to address issues with winds blowing nearly perpendicular to the source.

AERMOD Bug Fixes (cont.)

- Modified several subroutines to address issues associated with the PVMRM option:
  - Included a more explicitly treatment of the vertical and horizontal dimensions of contributing sources for the penetrated plume contribution for unstable conditions;
  - Modified the determination of NOx emissions from major contributing sources to account separately for the horizontal plume component and the terrain-responding plume component.
  - *These changes do affect PVMRM results

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AERMOD Bug Fixes (cont.)

- Modified subroutines HRLOOP, SET_METDATA and DAYRNG to address issues associated with the DAYRANGE keyword for leap years vs. non-leap years:
  - DAYRANGE keyword allows user to specify days to process or a range of days;
  - Days can be specified as Month/Day or as Julian day
  - Month/Day inputs are unambiguous regarding leap year status;
  - Julian day inputs are interpreted as leap year or non-leap year based on the first year in the data file.

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AERMET Bug Fixes

- Modified subroutines UCALST and MPPBL for the ADJ_U* option to improve consistency with Qian and Venkatram (BLM, v138, 2011):
  - Use a constant value of 0.08 for theta-star (THSTAR);
  - Full inclusion of the displacement height;
- *Modified subroutine BULKRI to correct the calculation of CDN to use ZREF(IHR)/Z0(IHR) instead of Z2/Z0(IHR), and to use BETAM = 4.7 for the ADJ_U* option instead of 5.0.

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Proposed Updates to AERMOD Modeling System

Based on content from presentation by Roger Brode - EPA OAQPS – 8/12/2015

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Summary

- EPA has proposed in the NPRM that the following options be incorporated into the regulatory versions of AERMOD and AERMET:
  - The ADJ_U* option in AERMET;
  - The LowWind3 option in AERMOD;
  - The BUOYLINE option in AERMOD for modeling buoyant line sources; and
  - The POINTCAP and POINTHOR source type options in AERMOD to model capped and horizontal stacks.

Introduction

- Beginning with version 12345, AERMOD and AERMET incorporated non-Default/BETA options to address concerns regarding model overpredictions during stable/low-wind conditions
  - These non-Default/BETA enhancements included the LOW_WIND option in AERMOD and the ADJ_U* option in AERMET;
  - Proposed updates to these non-Default/BETA options in version 15181 are discussed here.
- Additional updates to the regulatory options in AERMOD are being proposed, including a buoyant line source option and options to model capped and horizontal stacks.
- Proposed updates are subject to public review and comment and would then be codified as part of the final rule action, as appropriate.

AERMOD Updates – Low_Wind

- Beginning with v12345, AERMOD includes non- DFAULT/BETA Low_Wind options;
  - Prior to v15181, AERMOD included a LowWind1 option and a LowWind2 option, i.e.,
    - LowWind1 eliminates the horizontal meander component and increases the minimum value of sigma-v from the default of 0.2 m/s to 0.5 m/s;
    - LowWind2 includes horizontal meander, but places an upper limit of 0.95 for the meander factor, and increases the minimum value of sigma-v from the default of 0.2 to 0.3 m/s.
  - LowWind1 and LowWind2 are mutually exclusive

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AERMOD Updates – Low_Wind (cont.)

- AERMOD v15181 includes a new LowWind3 (LW3) non-DFAULT/BETA option:
  - LowWind3 increases minimum value of sigma-v from 0.2 to 0.3 m/s, consistent with the LowWind2 option, but eliminates upwind dispersion, consistent with the LowWind1 option;
  - The LowWind3 option uses an "effective" sigma-y value that replicates the centerline concentration accounting for meander, but sets concentrations to zero (0) for receptors more than 6*sigma-y off the plume centerline, similar to the FASTALL option;
  - EPA has proposed in the NPRM that the LowWind3 option be incorporated into regulatory version, while the LowWind1 and LowWind2 options are still available for testing & evaluation purposes.

AERMET/AERMOD Updates – ADJ_U*

- The Beta ADJ_U* option in AERMET associated with the Bulk Richardson Number (BULKRN) option has been modified to include a more refined method for calculating THSTAR and extending its applicability for very stable/low wind conditions, based on Luhar and Raynor (BLM, v132, 2009);
- The updated ADJ_U* option with BULKRN also includes modifications to subroutine TGINIT in AERMOD to calculate THSTAR;
- EPA has proposed in the NPRM that the ADJ_U* option (with or without BULKRN) be incorporated into the regulatory version of AERMET.

Capped and Horizontal Stacks

- A Model Clearinghouse memorandum dated July 9, 1993, provided recommendations for modeling capped and horizontal stacks:
  - Clearinghouse procedure involves setting the exit velocity (V_s) to 0.001 m/s and adjusting the stack diameter (D_s) to maintain the actual flow rate and buoyancy of the plume;
  - The PRIME numerical plume rise algorithm for building downwash uses the input D_s to define the initial radius of the plume – use of a larger effective radius may alter results in physically unrealistic ways;
  - The AERMOD Implementation Guide suggests using V_s=0.001m/s with actual D_s as an interim solution.

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Capped and Horizontal Stacks (cont.)

- Draft/BETA options for capped & horizontal stacks have been incorporated in AERMOD (beginning with v06341):
  - Source types POINTCAP & POINTHOR used to trigger BETA options;
  - User inputs actual stack exit velocity (V_s) and stack diameter (D_s);
  - The Model Clearinghouse procedure is used for non-downwash sources;
  - For the POINTHOR option with downwash the exit velocity is assigned as the initial horizontal velocity of the plume;
  - For the POINTCAP option with downwash, the initial plume radius is assigned as $2*D_s$ to account for initial plume spread from the cap, and the initial horizontal velocity of the plume is assigned as the initial exit velocity specified by the user divided by 4 to account for suppressed momentum and buoyancy.

Buoyant Line Sources

- Appendix W currently recommends the use of the Buoyant Line and Point (BLP) model for buoyant line sources;
- The BLP model is based on outdated dispersion theory and the meteorological data processor for BLP, PCRAMMET, is not capable of processing the current meteorological data, including the 1-minute ASOS data;
- The BLP model also lacks the processing options to support the form of the 1-hr NO2, 1-hr SO2 and 24-hr PM2.5 NAAQS.

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Buoyant Line Sources (cont.)

- Beginning with v15181, AERMOD includes an option to model buoyant line sources, using the BUOYLINE source type;
- The BUOYLINE option in AERMOD model allows for modeling of buoyant line sources using meteorological data processed through the AERMET meteorological processor;
- The BUOYLINE option in AERMOD also allows use of the processing options to support the form of the 1-hr NO2, 1- hr SO2 and 24-hr PM2.5 NAAQS.

Summary

- EPA has proposed in the NPRM that the following options be incorporated into the regulatory versions of AERMOD and AERMET:
  - The ADJ_U* option in AERMET;
  - The LowWind3 option in AERMOD;
  - The BUOYLINE option in AERMOD for modeling buoyant line sources; and
  - The POINTCAP and POINTHOR source type options in AERMOD to model capped and horizontal stacks.

AERMOD Evaluations

Based on content from presentation by Roger Brode - EPA OAQPS – 8/12/2015

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Evaluation of AERMET/AERMOD Updates

- The proposed Beta ADJ_U* option in AERMET and Low_Wind option in AERMOD have been evaluated based on several relevant field studies, including:
  - The 1993 Cordero Rojo surface coal mine fugitive dust study in eastern Wyoming based on 24-hr PM10 concentrations (using v14134);
  - The 1974 NOAA Oak Ridge, TN, tracer study for a low-level release on the Oak Ridge peninsula with sampling arcs at 100m, 200m, and 400m, and wind speeds ranging from 0.15 to 0.73m/s (10 of 11 cases < 0.5m/s);
  - The 1974 NOAA Idaho Falls, ID, tracer study for a low-level release with sampling arcs at 100m, 200m, and 400m, and wind speeds ranging from 0.75 to 1.93m/s (4 of 11 cases < 1.0m/s);

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Model Evaluation Caveats

- Caveats regarding model evaluation:
  - Evaluating performance of dispersion models is a complex endeavor and results may be affected by errors or uncertainties regarding the correct model inputs, including emission rates, source characteristics, surface characteristics and meteorological data;
  - Errors or uncertainties regarding the interpretation of "observed" concentrations may also significantly affect the conclusions regarding model performance;
  - The potential impact of these caveats on conclusion regarding model performance are likely to be exaggerated in cases with very low wind speeds since results may be highly sensitive to relative small "errors" in important inputs or assumptions.

Evaluation of Beta Options

- Surface Coal Mine PM10 Study
  - Cordero Rojo Mine in eastern Wyoming
  - Two-month Field Study in 1993 to evaluate new emission factor and dispersion model options
  - Evaluated 24-hour averages for PM-10 and TSP
  - Majority of emissions (~75%) from roadways
  - Cox-Tikvart protocol for determining the "best performing" model applied to give "confidence intervals" on model performance
- Results presented are for ADJ_U* and LW1 and LW2 based on v14134, but are likely to be similar for v15181

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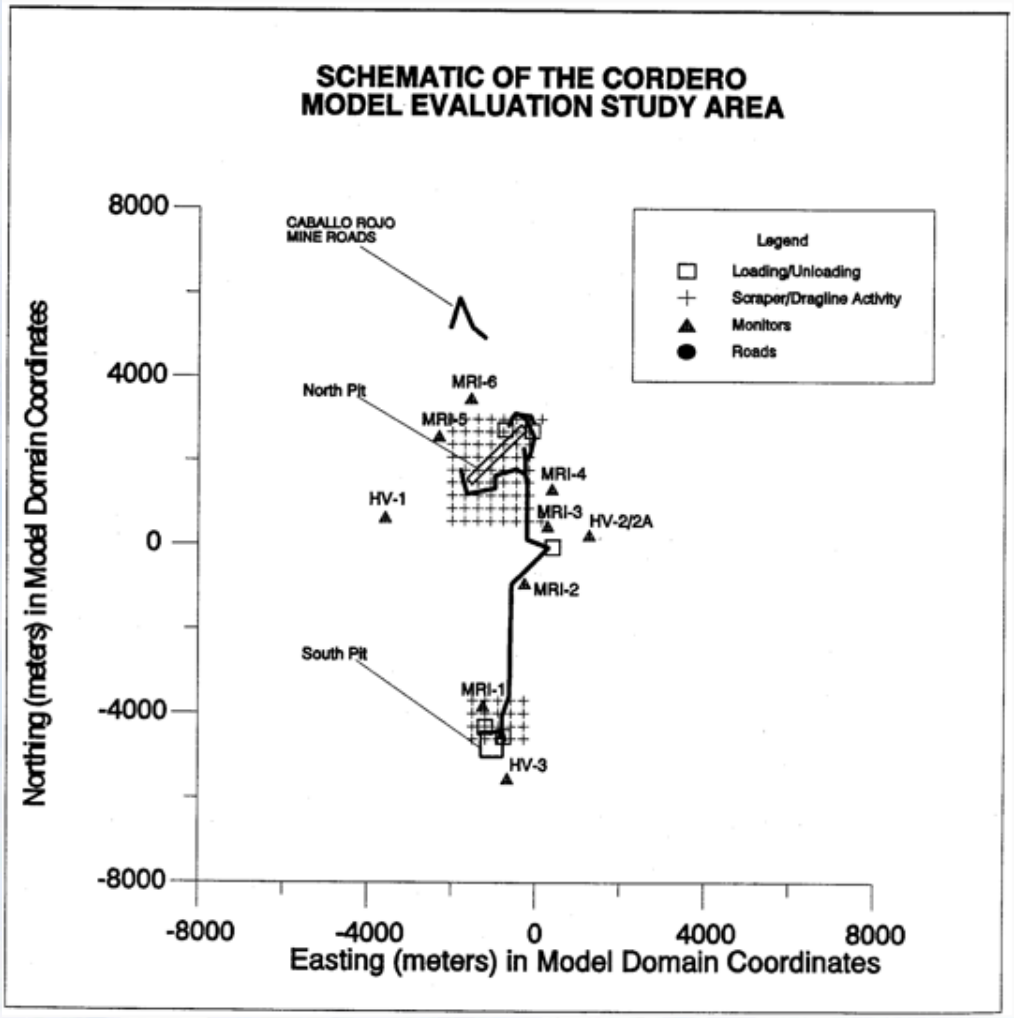
Evaluation of Beta Options



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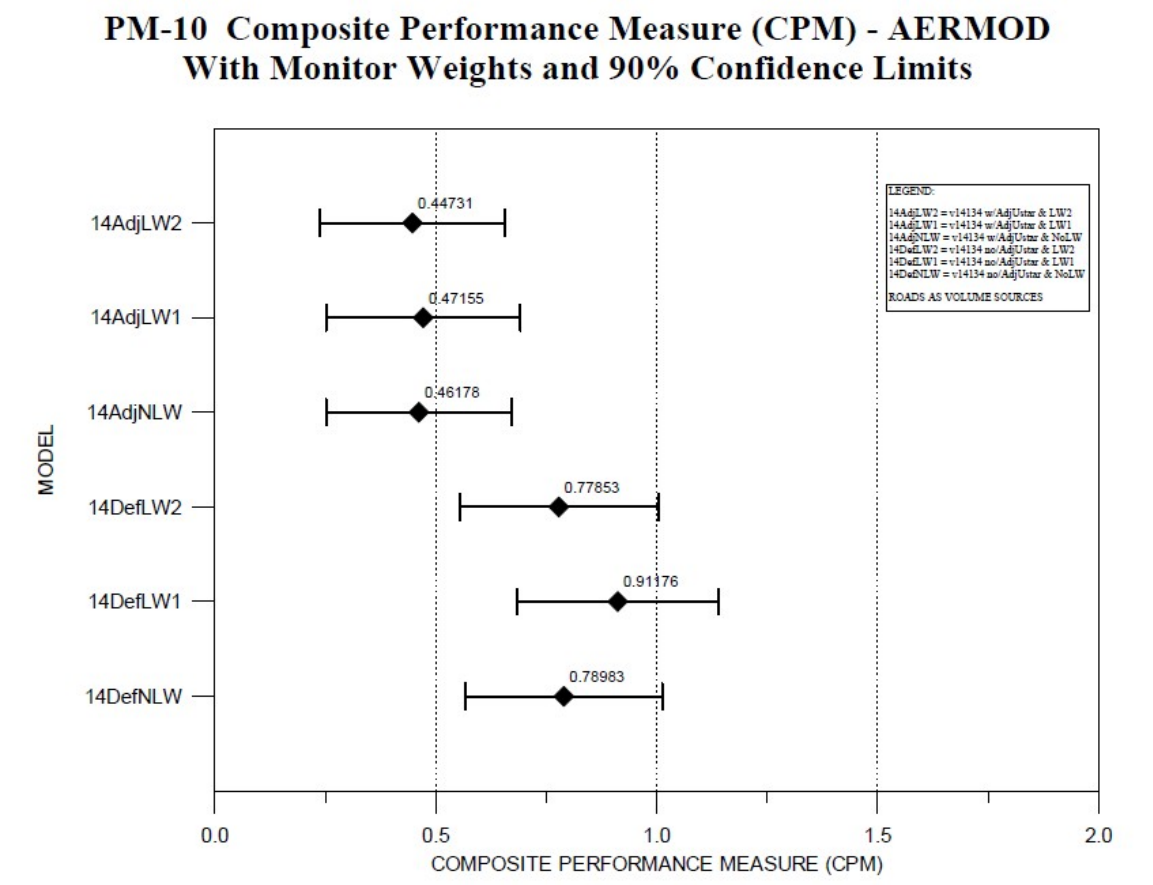
Evaluation of Beta Options – CPM



Note: Smaller value of CPM indicates “better” performance

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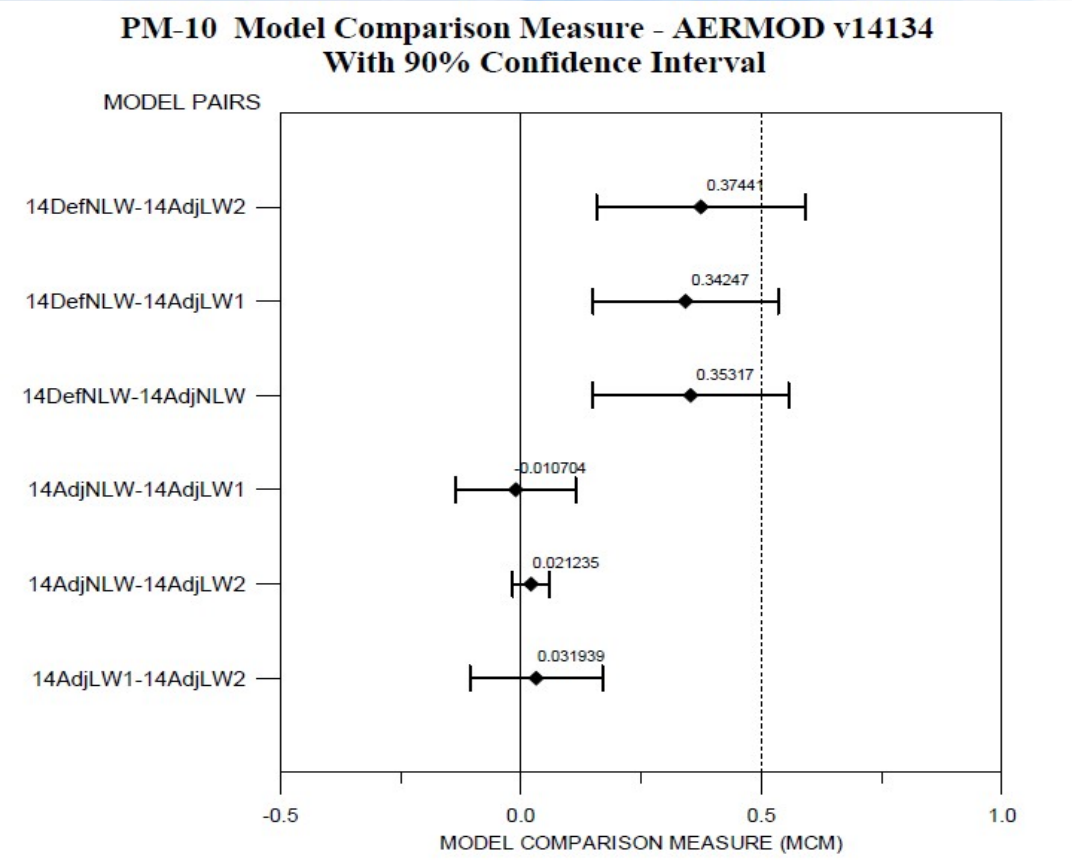
Evaluation of Beta Options – MCM



Note: If MCM confidence interval spans zero performance differences not statistically significant.

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Summary of Cordero PM10 Evaluation

- Use of the proposed ADJ_U* option in AERMET appears to significantly improve model performance for this study;
  - The confidence intervals for the Model Comparison Measure (MCM) do not cross zero when comparing results with ADJ_U* vs. no ADJ_U*;
  - The LW1 and LW2 options in AERMOD appear to have limited affect on modeled performance.

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Oak Ridge and Idaho Falls Evaluations

- EPA's evaluations for the 19974 Oak Ridge and Idaho Falls deviated in some respects from the original evaluations conducted by AECOM/API:
  - EPA assumed a surface roughness of 0.6m for Oak Ridge as compared to 0.2m assumed by AECOM;
  - EPA assumed a wind measurement height of 10m for Oak Ridge, due to the fact that the observed wind speeds were derived from laser anemometry from lasers sited on the top on nearby ridges, as compared to 2m assumed by AECOM;
  - Also note that the Oak Ridge study area is located in a hilly area, with terrain elevations varying about 40m across the study area. Neither the AECOM nor EPA evaluations have incorporated terrain elevations in the analysis;
  - EPA assumed a surface roughness of 0.08m for Idaho Falls, as compared to AECOM's assumption of 0.15m for February and 0.3m for other months (the study spanned from Feb. to May);
  - EPA assumed a release height of 3m for Idaho Falls, based on information presented in the NOAA Technical Memorandum and as assumed by other researchers, as compared to a 1.5m release height assumed by AECOM.

Oak Ridge, TN, Study Area

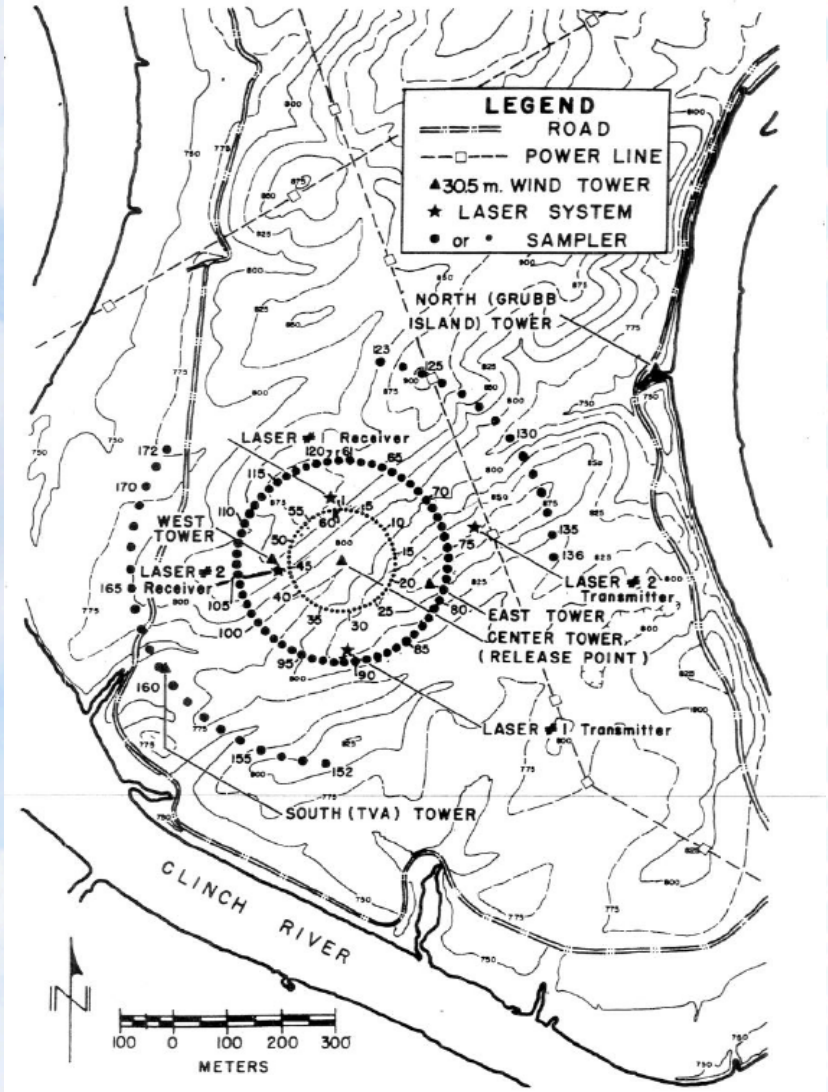

Figure 2b. Detail of inner sampling arcs showing location of meteorological towers and laser transmitters and receivers. (Contour heights are in feet above sea level).

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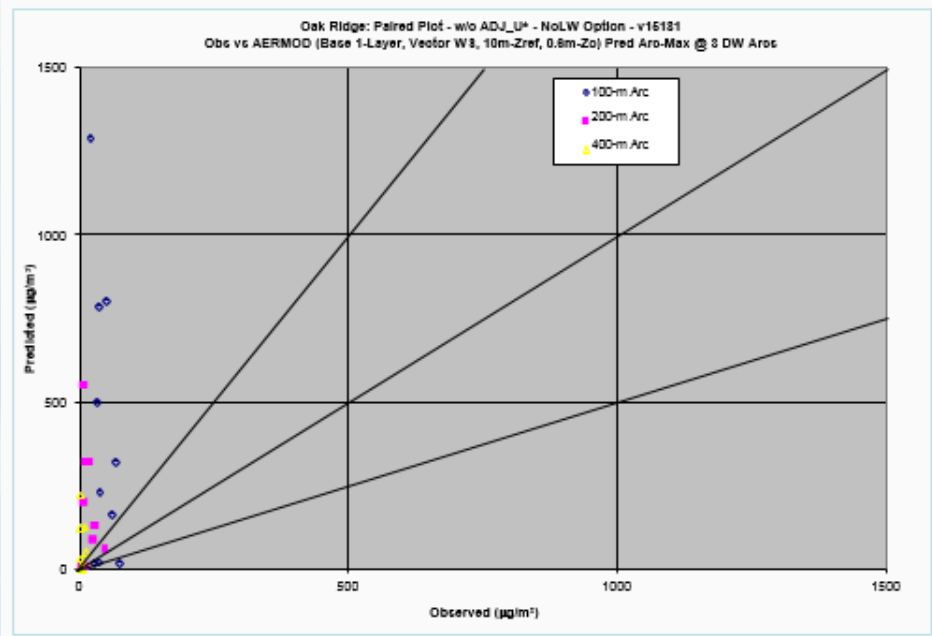
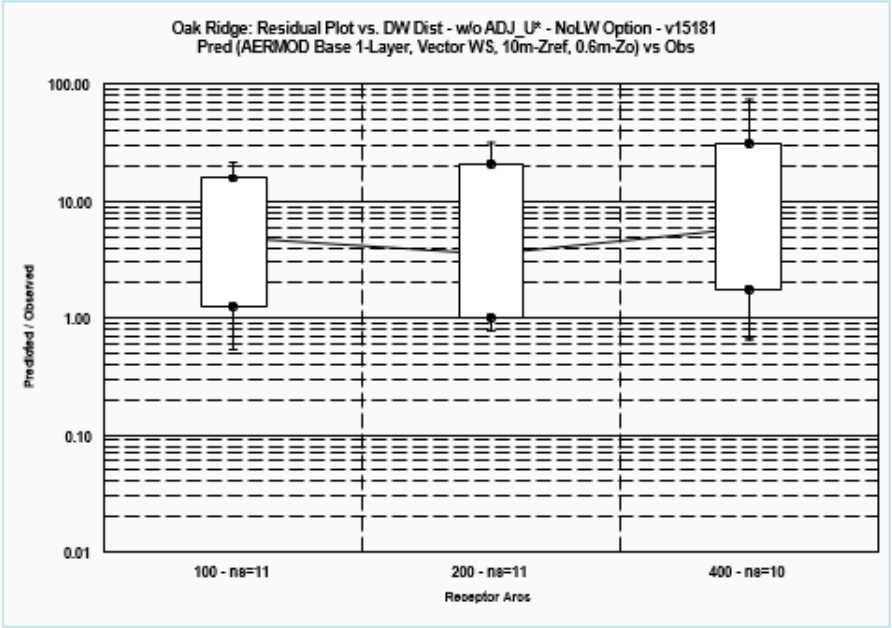
Oak Ridge Results with v15181 Default Options

Paired Conc by Arc



Pred/Obs by Arc



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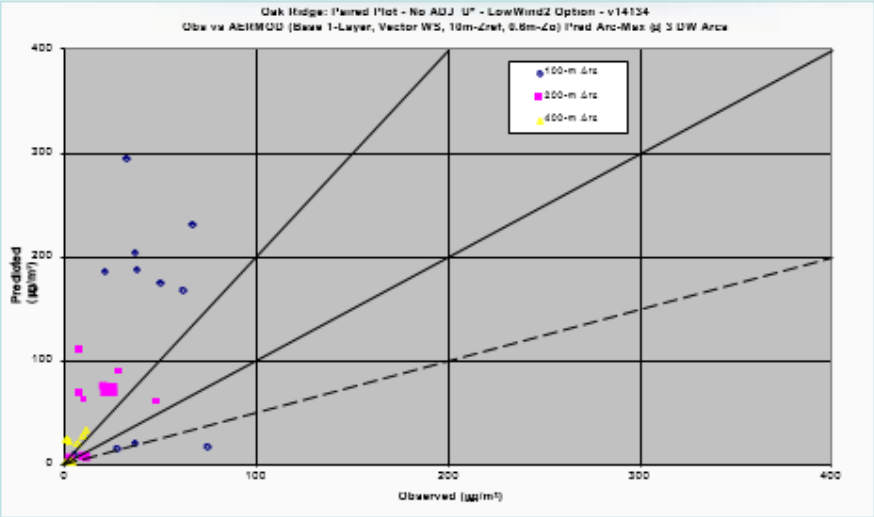
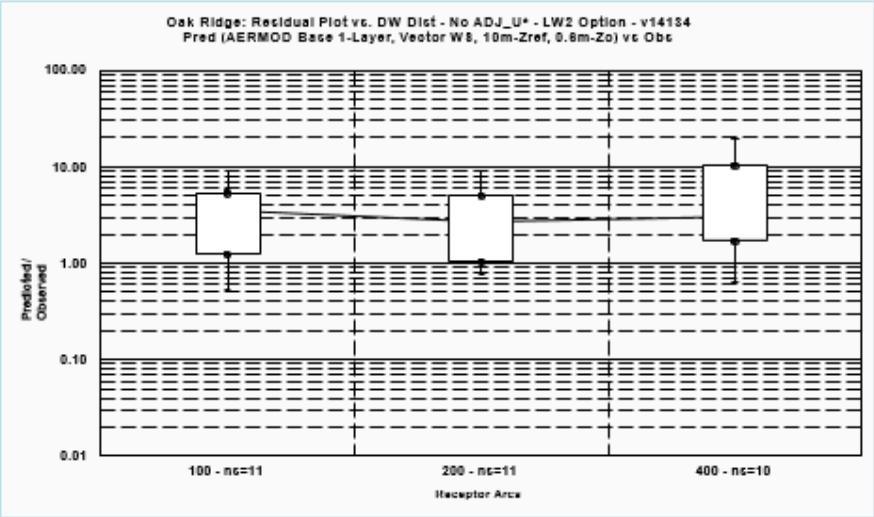
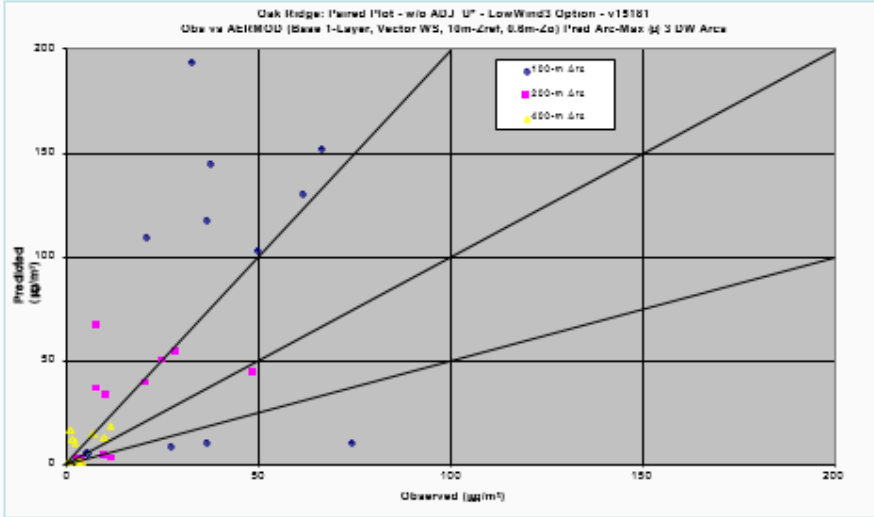
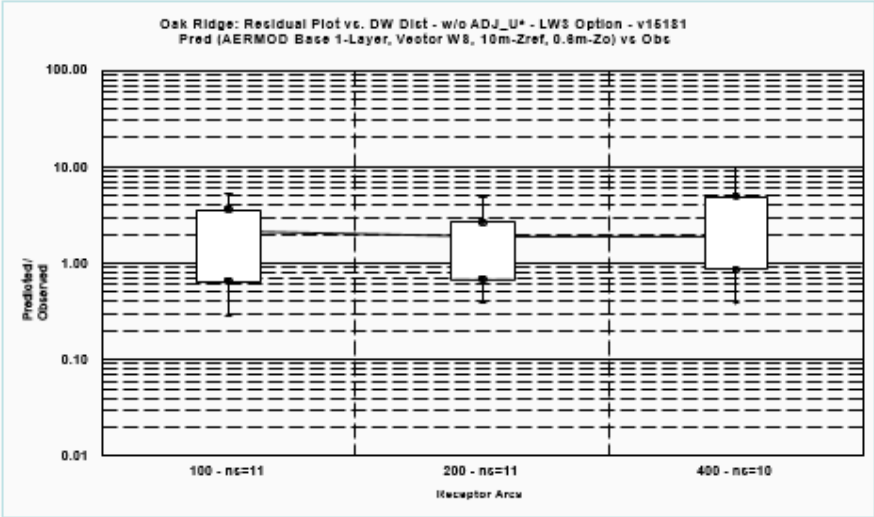
V14134 with No ADJ & LW2





V15181 with No ADJ & LW3





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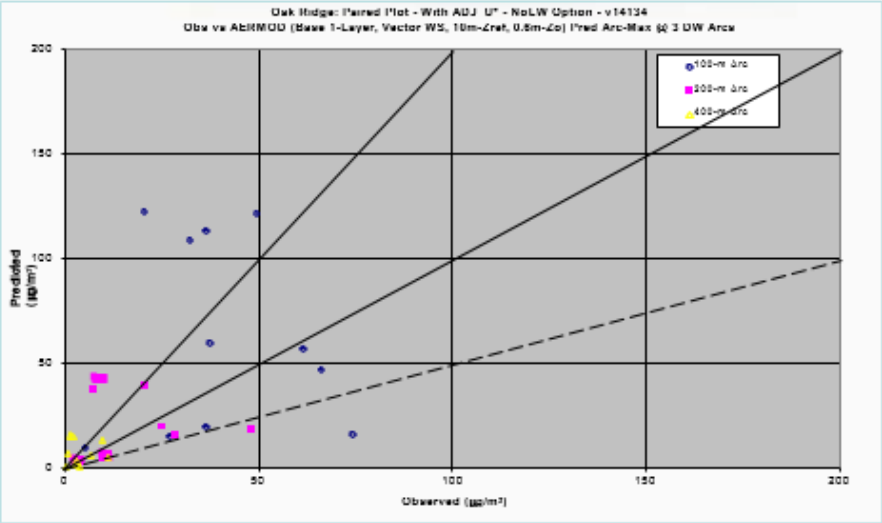
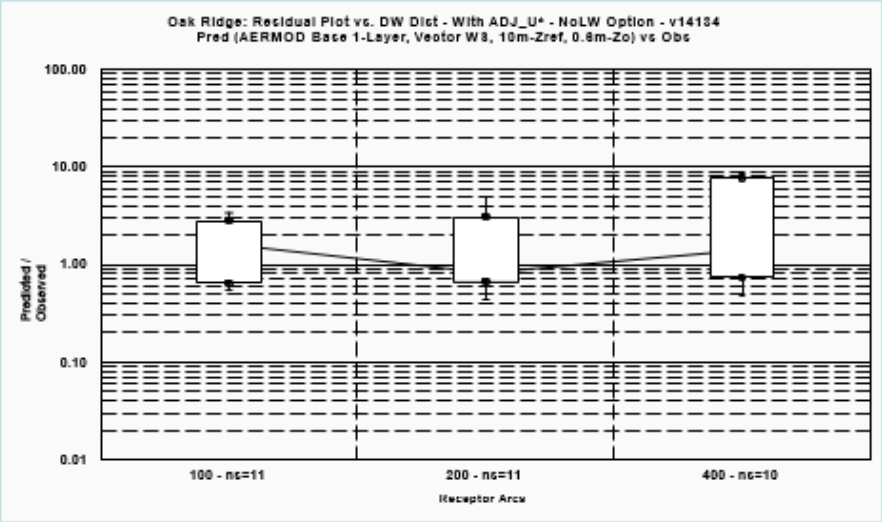
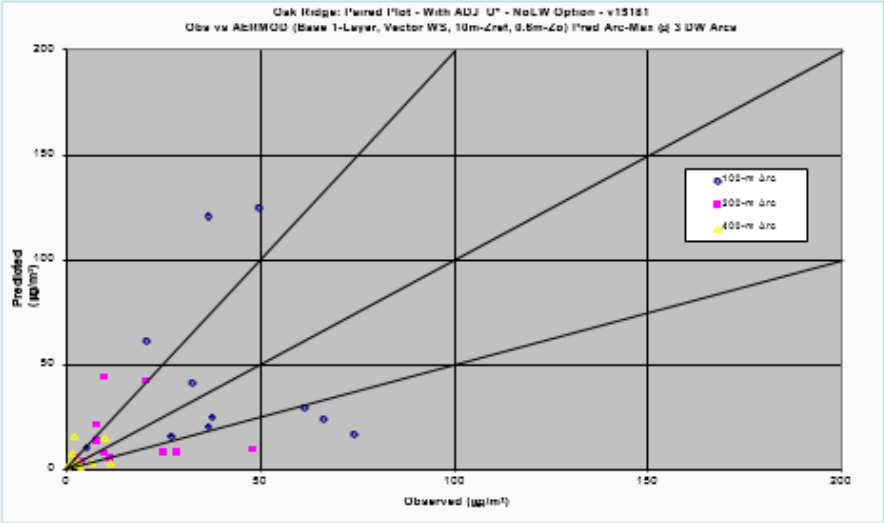
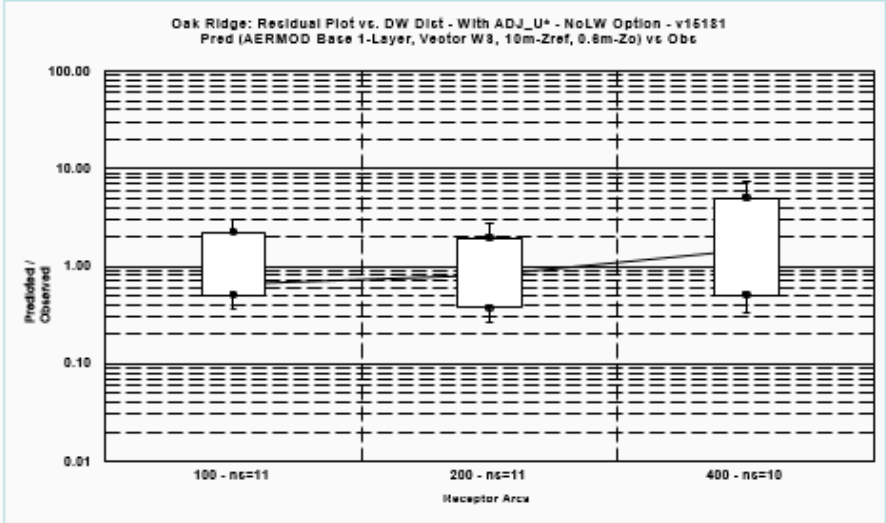
V14134 with No ADJ & No LW





V15181 with No ADJ & No LW





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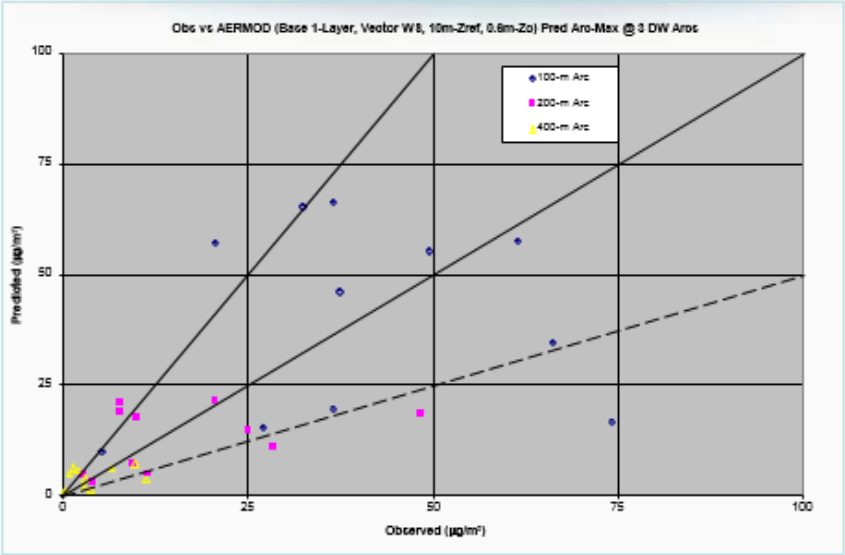
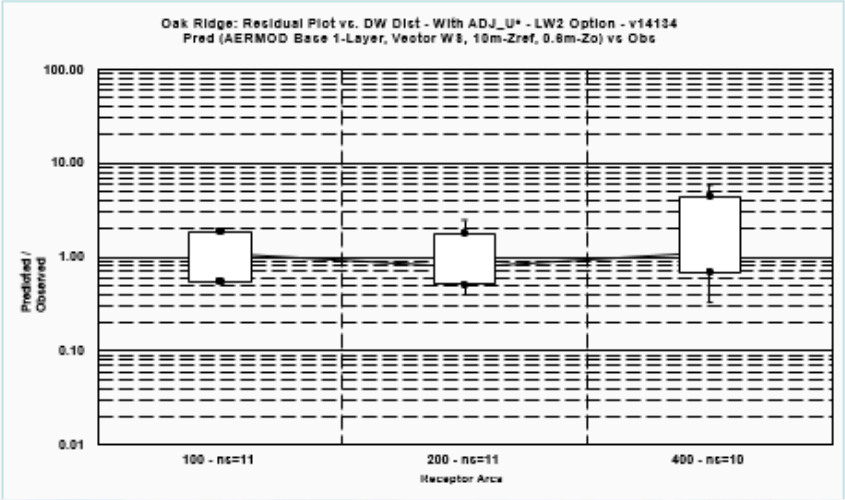
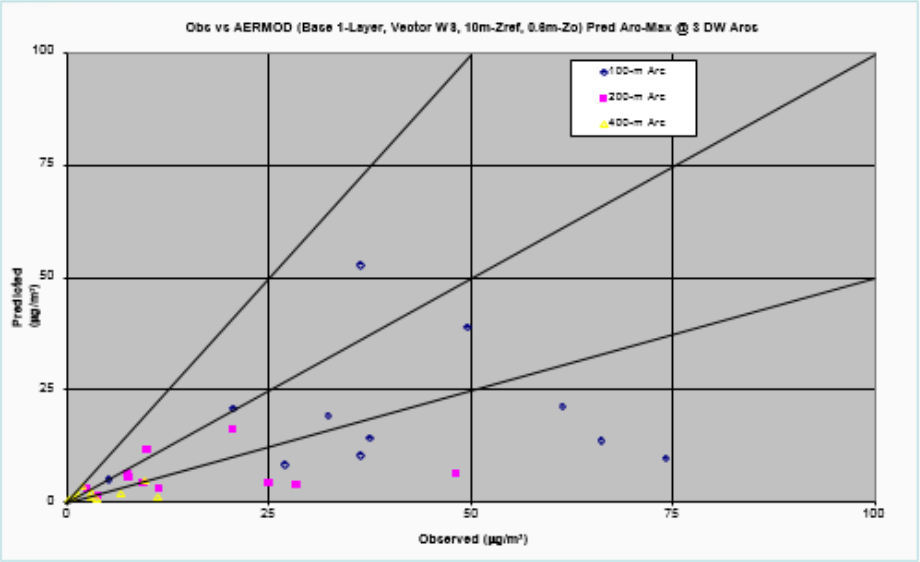
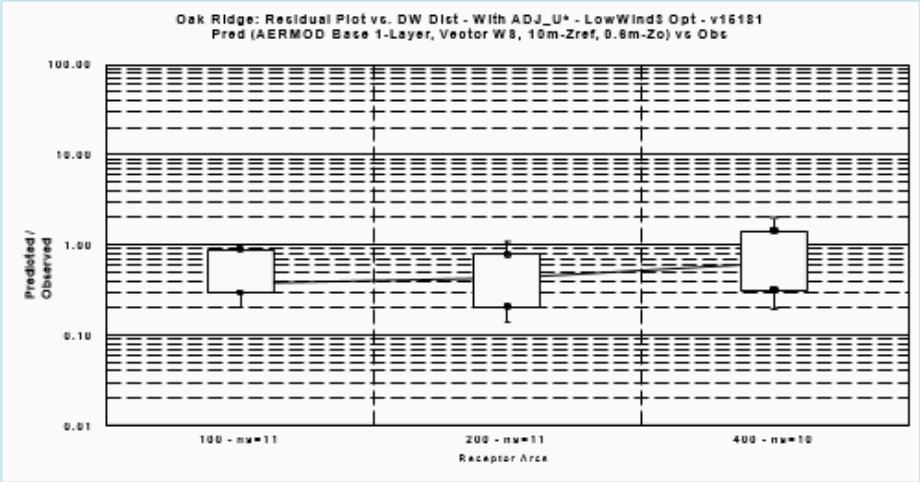
V14134 with ADJ_U* &LW2





V15181 with ADJ_U* & LW3





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Idaho Falls, ID Study Area

Google earth

feet 1000

meters 600

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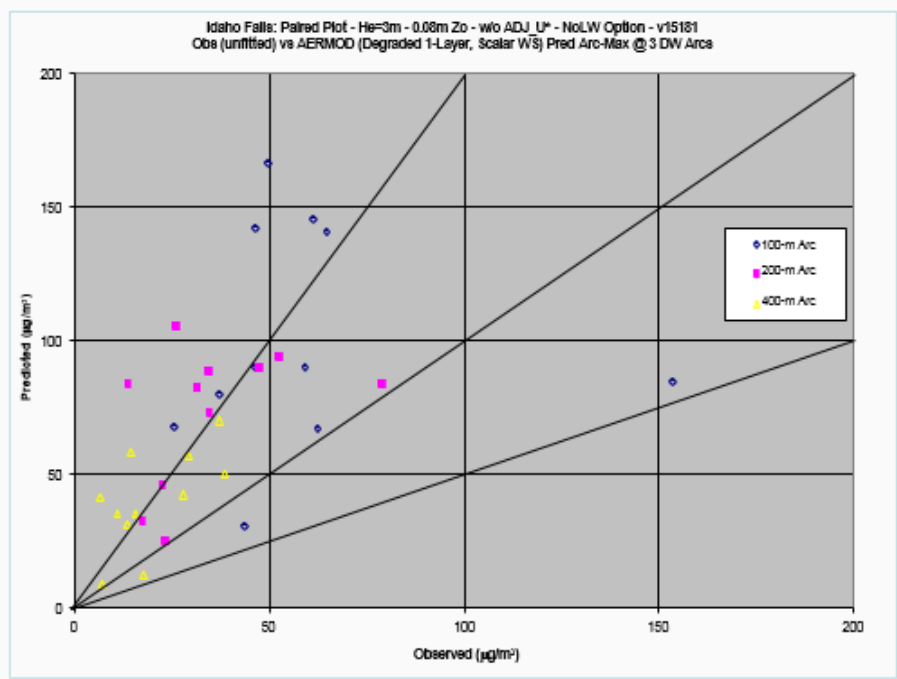
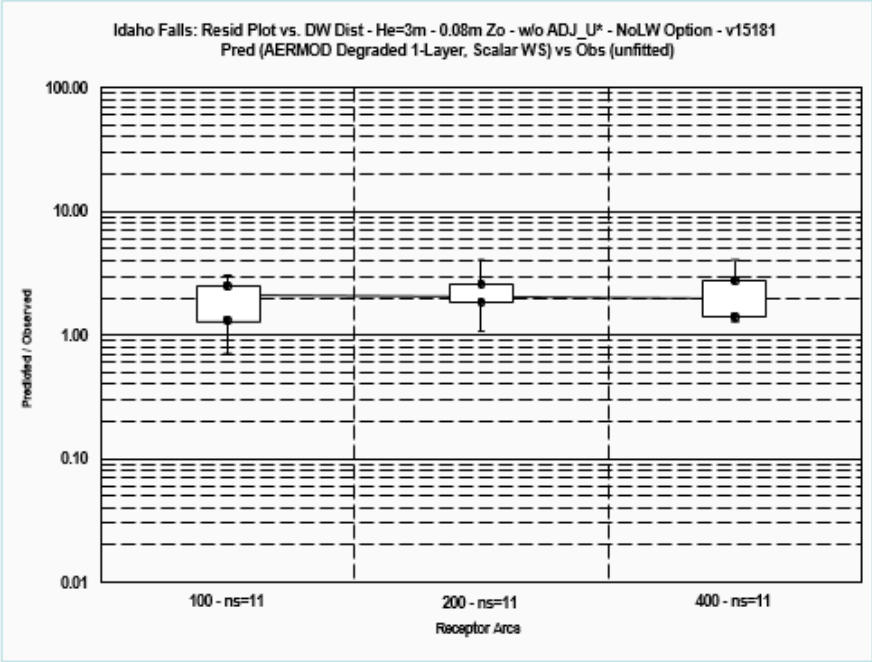
Idaho Falls Results with v15181 Default Options

Paired Conc by Arc



Pred/Obs by Arc



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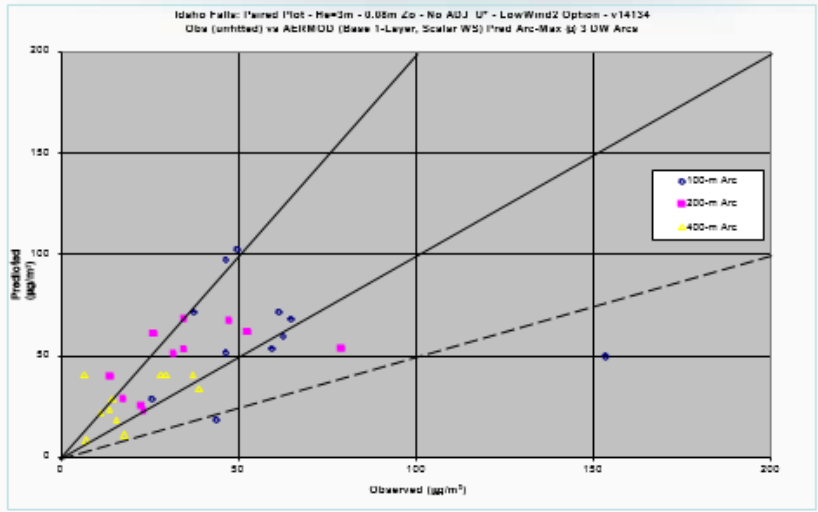
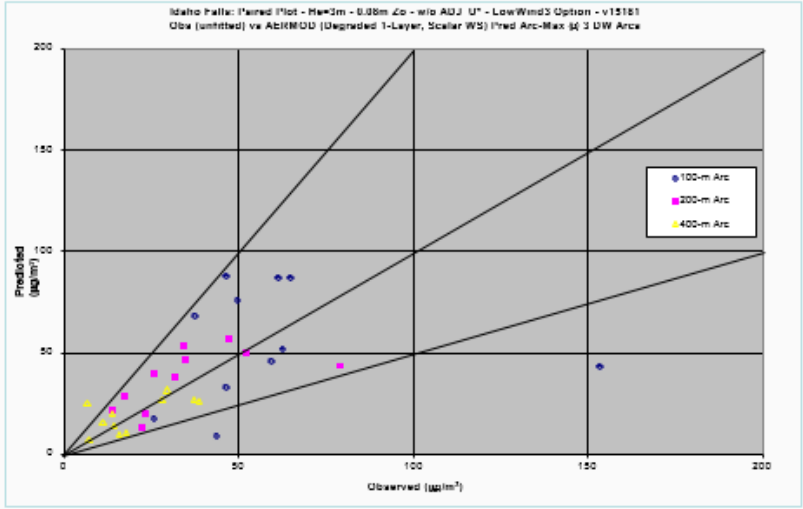
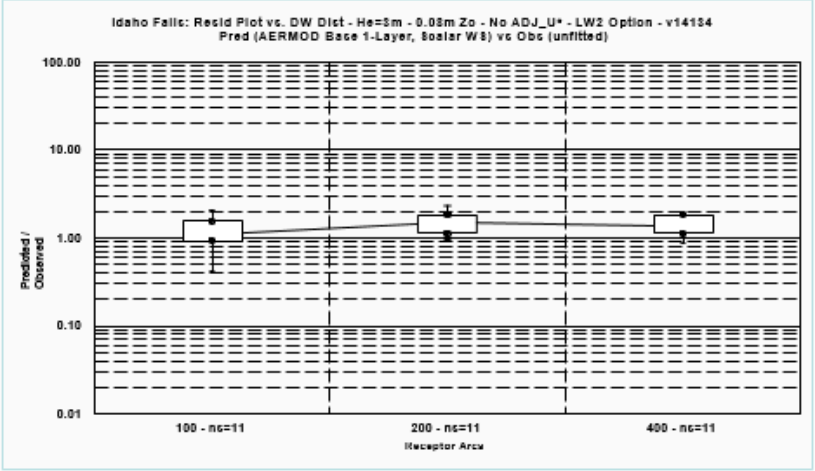
Degraded 1-layer
No Delta_T and No SA

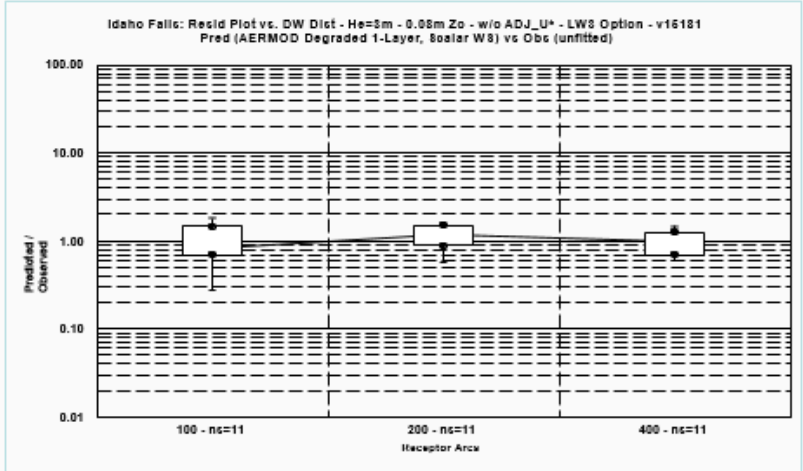
V14134 w/o ADJ U* & LW2

V15181 w/o ADJ_U* & LW3





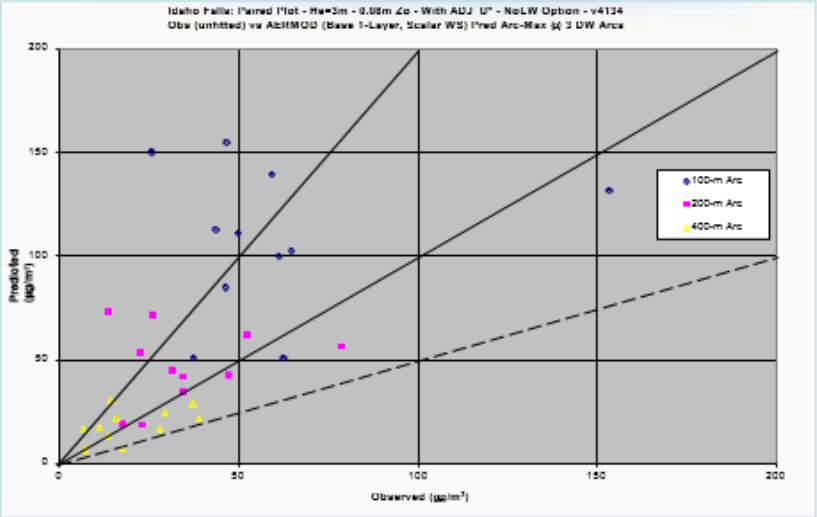


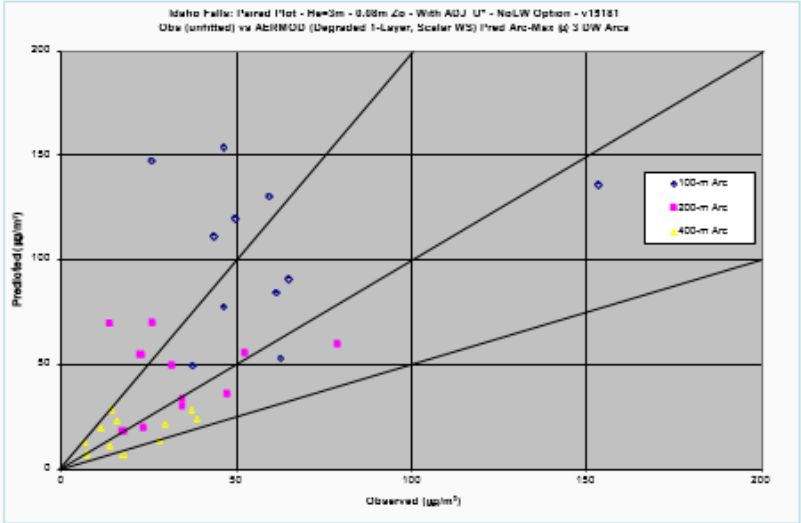


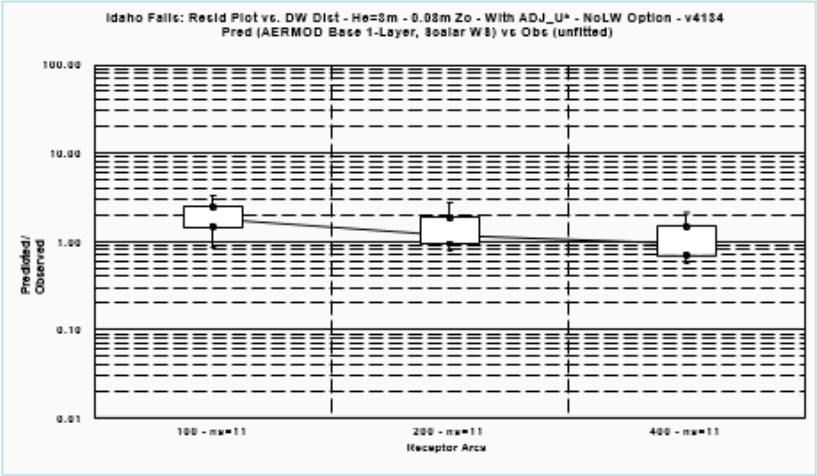
Degraded 1-layer
No Delta_T and No SA

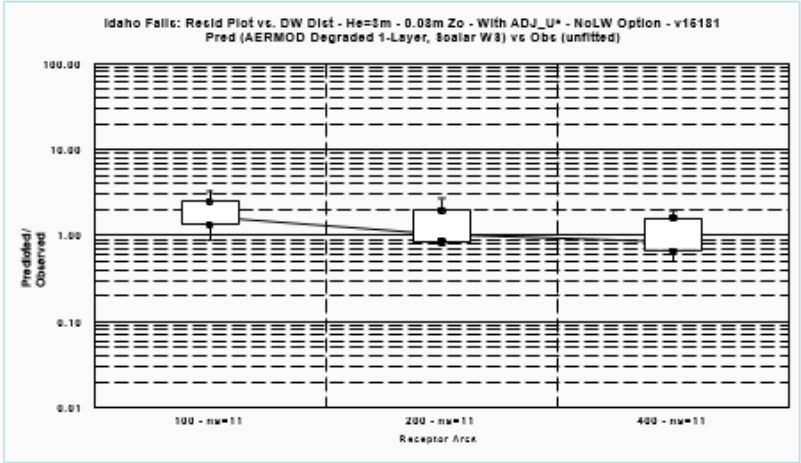
V14134 w/o ADJ U* & No LW

V15181 w/o ADJ_U* & No LW





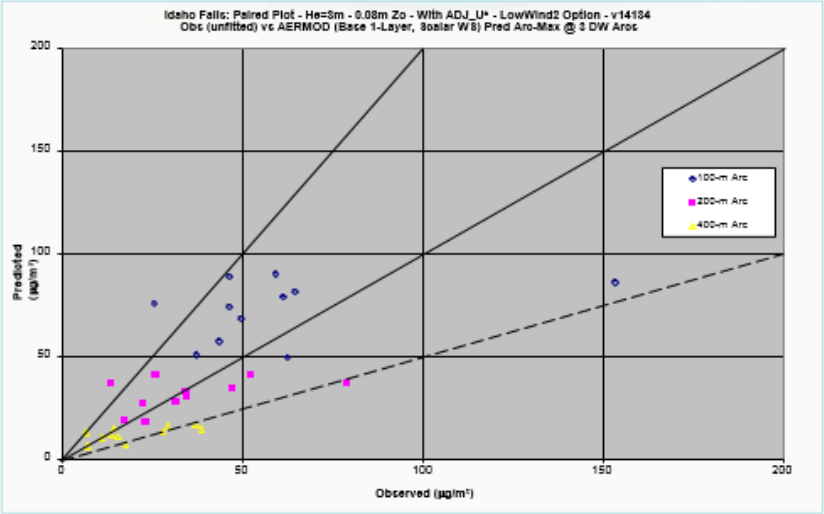


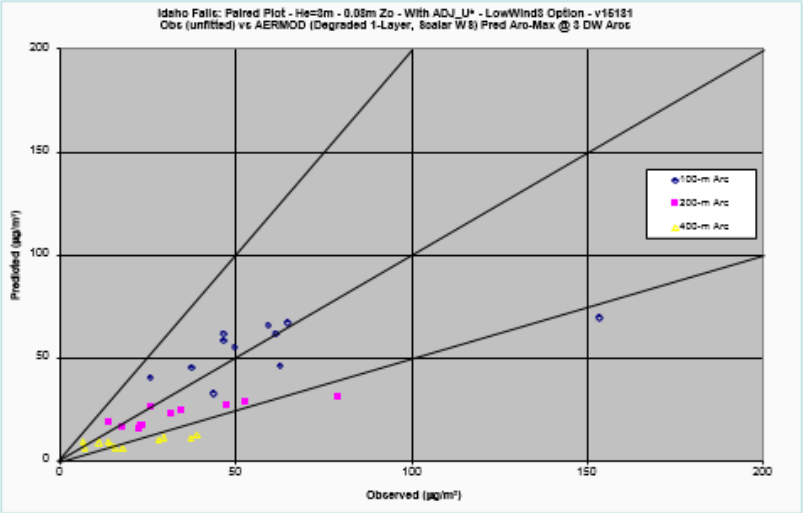


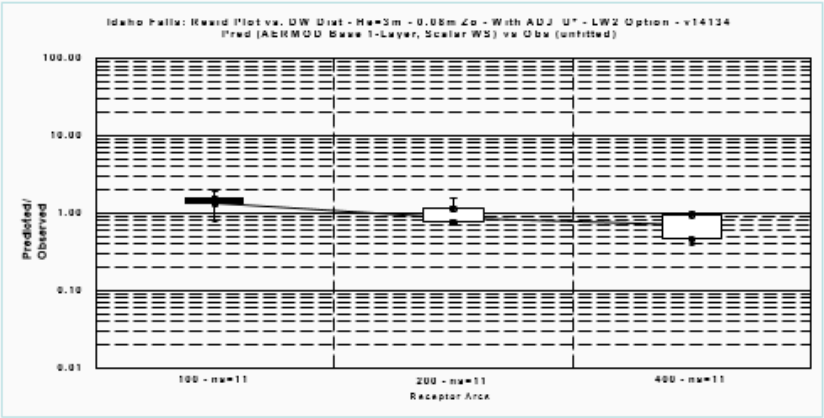
Degraded 1-layer
No Delta_T and No SA

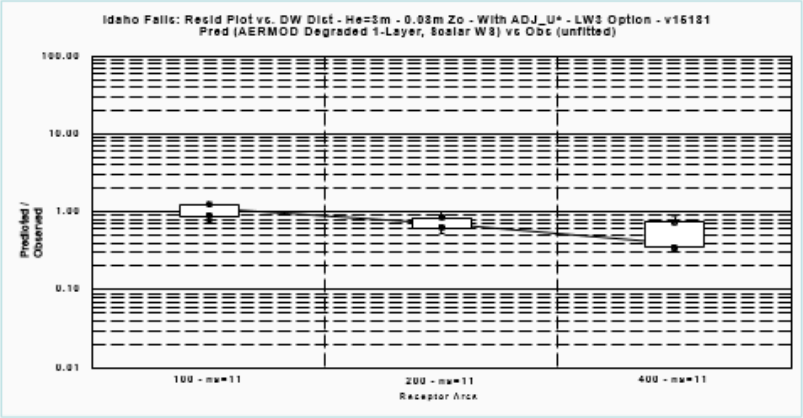
V14134 w/o ADJ U* & No LW2

V15181 w/o ADJ_U* & No LW3









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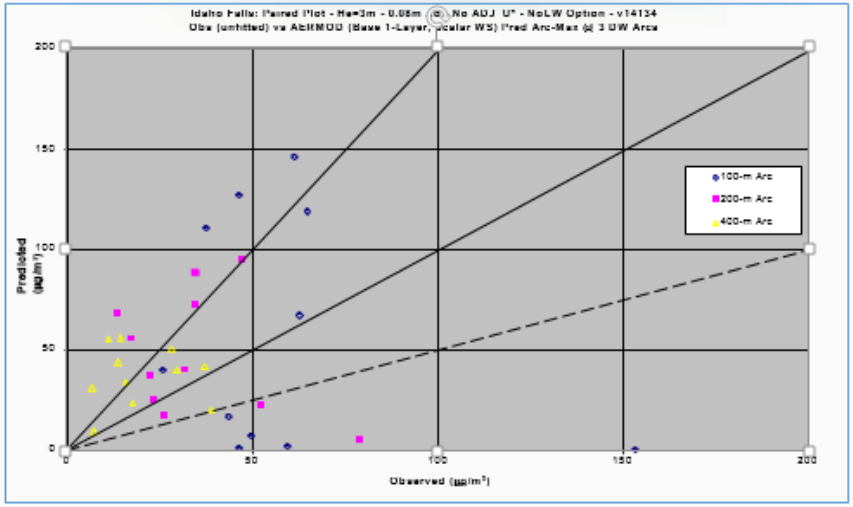
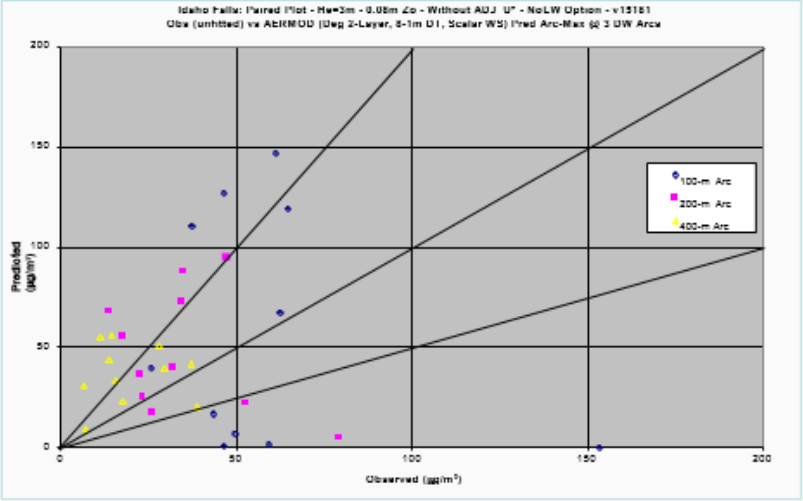
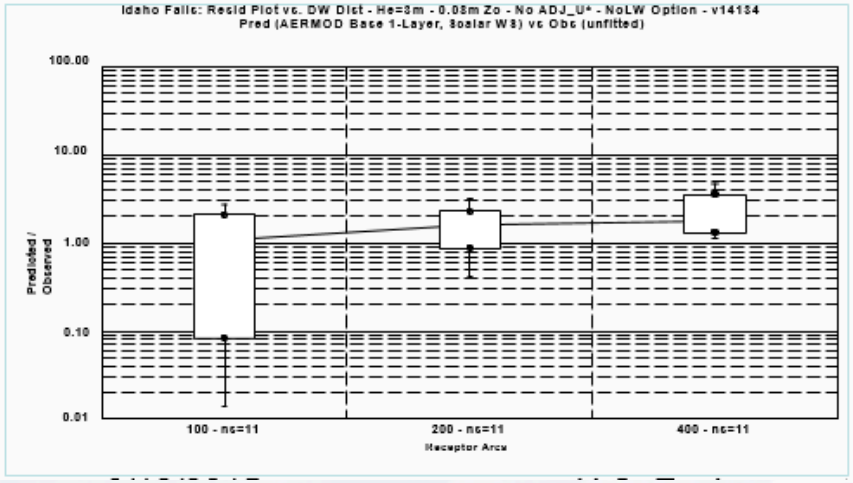
Degraded 2-layer w/8-1m DT and No SA

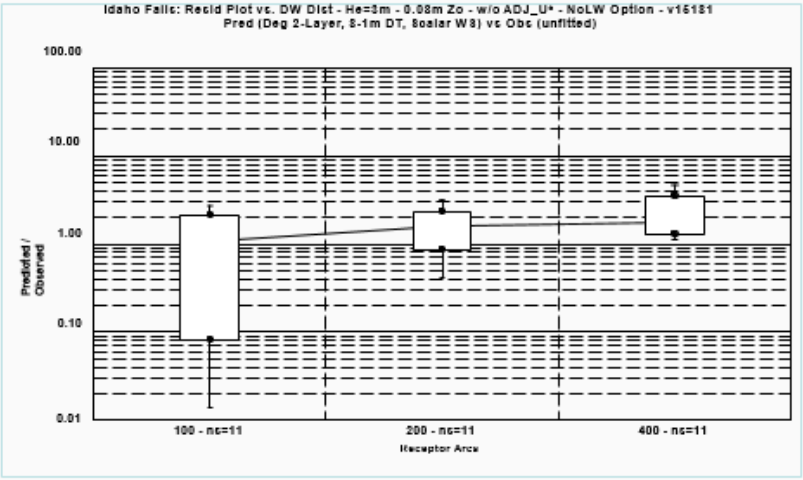
V14134 w/o ADJ U* & No LW

V15181 w/o ADJ_U* & No LW





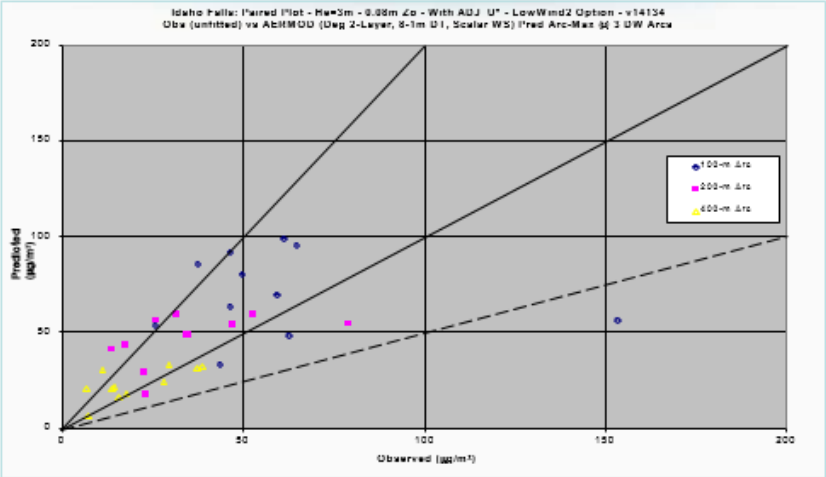


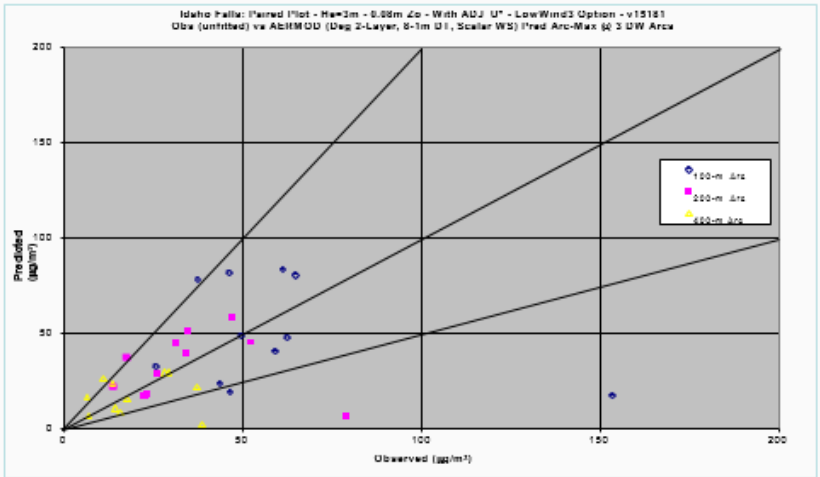


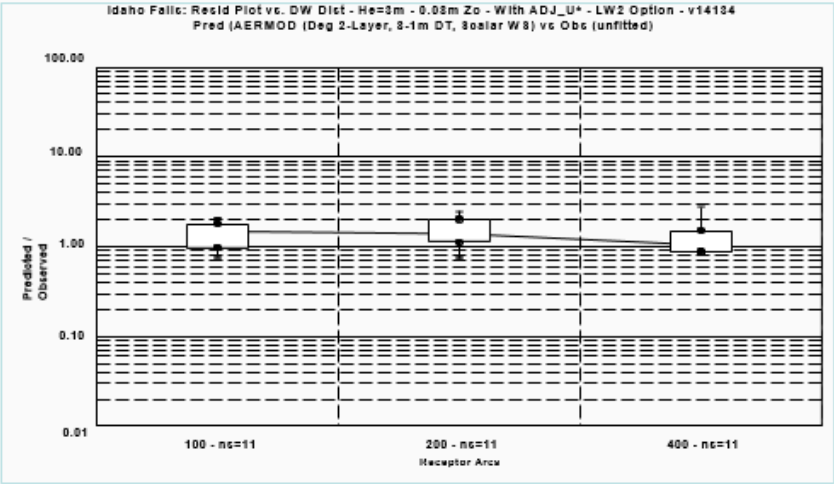
Degraded 2-layer w/8-1m DT and No SA

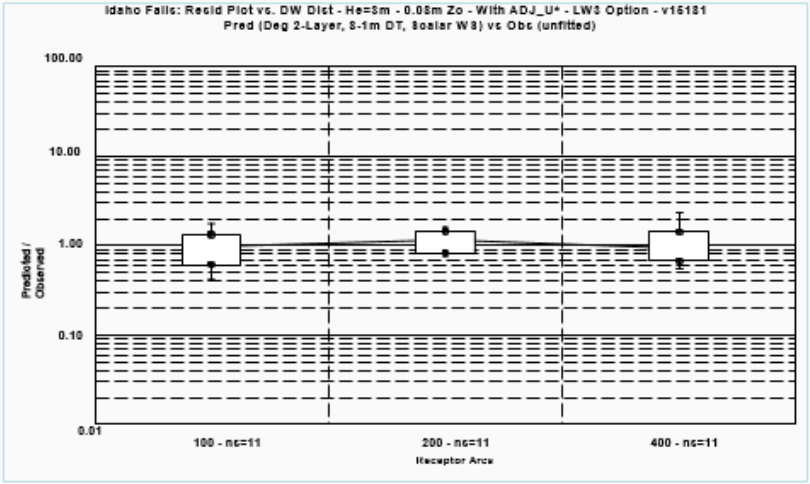
V14134 w/o ADJ U* & No LW2

V15181 w/o ADJ_U* & No LW3









SO2 DRR - Technical Considerations

(recommended for “geeks” only)

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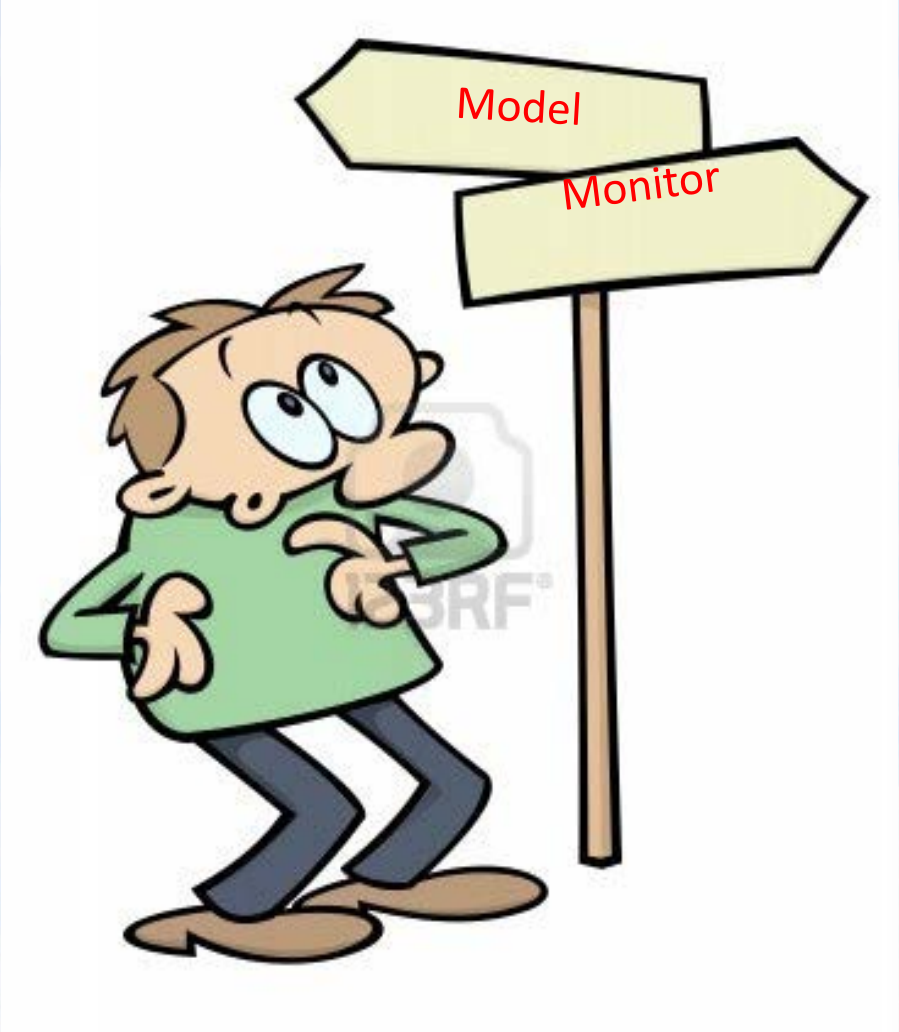
Technical Considerations

- Three options to provide necessary air quality information to EPA
  1. Dispersion modeling
  2. Ambient air quality monitoring
  3. Modeling and monitoring
- Both modeling and monitoring will be source-specific, i.e., will take place "around" the identified source
- For multiple source areas, a common approach (either modeling or monitoring) is recommended

So Which Way Should a Source Select – Modeling or Monitoring?



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Technical Considerations (cont)

- EPA has offered two Technical Assistance Documents (TADs) - one for modeling and one for monitoring
- Modeling TAD offers guidance on models, receptors, source consideration, terrain, meteorology, background concentrations
- Monitoring TAD offers guidance on different approaches for siting source-oriented monitors

Modeling Following the Data Requirements Rule

SO_2 NAAQS Designations Modeling Technical Assistance Document

U.S. EPA

Office of Air and Radiation

Office of Air Quality Planning and Standards

Air Quality Assessment Division

December 2013

DRAFT

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Technical Considerations - Modeling

- From Section V of the draft rule:

> Modeling is generally a less costly and less resource intensive option for providing reliable information for use in designations. In addition, refined dispersion models are able to characterize SO_2 air quality impacts from the modeled sources across the domain of interest on an hourly basis with a high degree of spatial resolution.

- Thus, modeling is an approved method

Technical Considerations - Modeling

- Modeling TAD
  - Focus on 1-hour SO_2 concentrations
  - Use the AERMOD (latest version) Model
  - Style of modeling is unique to the area designation process and include three specific inputs: emissions, stack height, and meteorology

FR 79, No. 92, p. 27463

1. Inputs for Designations Modeling

There are 3 air quality modeling inputs used for designations modeling that would differ from the permit and implementation plan modeling requirements set forth in Appendix W of 40 CFR part 51. As noted above, the objective of this designations modeling approach is to assess actual, current air quality. The 3 modeling inputs that are required to reflect actual air quality are: emissions data, stack height and years of meteorological data.

Technical Considerations – Modeling (continued)

- Emissions data for designation modeling
  - A change from other kinds of regulatory modeling that use potential or allowable emissions
  - Designations depend on understanding of actual emissions
  - EPA recommends the most recent 3 years

Technical Considerations – Modeling (continued)

- Emissions data for designation modeling
  - The range of options for estimating actual emissions is discussed in the modeling TAD
  - States could opt for using allowables
- Consideration of proposed controls or emission reductions (e.g., MATS, renewed Title Vs, boiler MACT)

Technical Considerations – Modeling (continued)

- Stack Height
  - For projecting future air quality, GEP must be used
  - Emissions from actual stack heights should be used to characterize air quality

Technical Considerations – Modeling (cont)

- Meteorology
  - Permit & SIP modeling require 5 years of NWS or 1 year of onsite data
  - For characterizing actual air quality at a simulated monitor, use the most recent 3 years of CEMs data
  - 3 years should match the 3 years of actual emissions used in modeling

Technical Considerations – Modeling (continued)

- General
  - Modeling protocols should be developed
  - Source by source protocol or could have standardized protocol across all sources in state
  - Elements in the protocol are found in the modeling TAD
  - Modeling due to EPA regions by January 13, 2017

And the Guideline on Air Quality Models is Changing!

- Proposed changes to 40 CFR 52, Appendix W and AERMOD Model – Federal Register July 27, 2015
- New options in AERMOD
- New inventory development guidance (old 20D may be gone)
- New guidance on double counting at background monitors
- 11th Modeling Conference – August 12-13, 2015

Monitoring Following the Data Requirements Rule

SO_2 NAAQS Designations

Source-Oriented Monitoring

Technical Assistance Document

U.S. EPA

Office of Air and Radiation

Office of Air Quality Planning and Standards

Air Quality Assessment Division

December 2013

DRAFT

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Technical Considerations - Monitoring

- Monitoring TAD
  - Focus of TAD is on ambient monitoring for 1-hour SO_2 concentrations
  - Source-oriented monitoring sites around facilities that have met the SO_2 emission thresholds (probably option 1)
  - TAD focuses on procedures for placement of the ambient SO_2 monitors

Approach to Source-Oriented Monitor Siting

- There are three recommended techniques to determine **monitor placement**:
  - Modeling
  - Monitor Siting based on exiting data
  - Exploratory monitoring
- The goal is to identify the location(s) of where peak 1-hour SO_2 concentrations are expected to occur

Approach to Source-Oriented Monitor Siting - Modeling

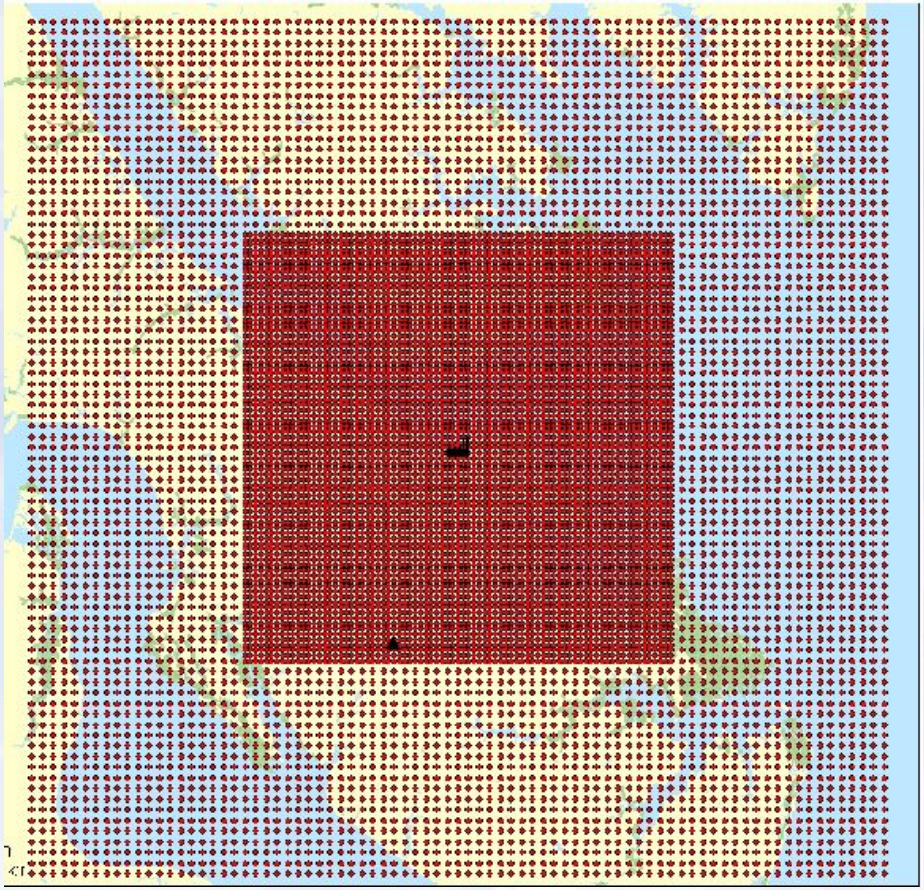
- Modeling to Determine Monitor Placement
  - Modeling is recommended for selecting potential monitoring locations
  - Modeling approach should follow recommendations in Modeling TAD
  - The monitoring TAD recommends use of *normalized emissions* to identify locations of maximum 1-hour SO_2. This is different then the modeling to determine the attainment status of the location

Approach to Source-Oriented Monitor Siting - Modeling

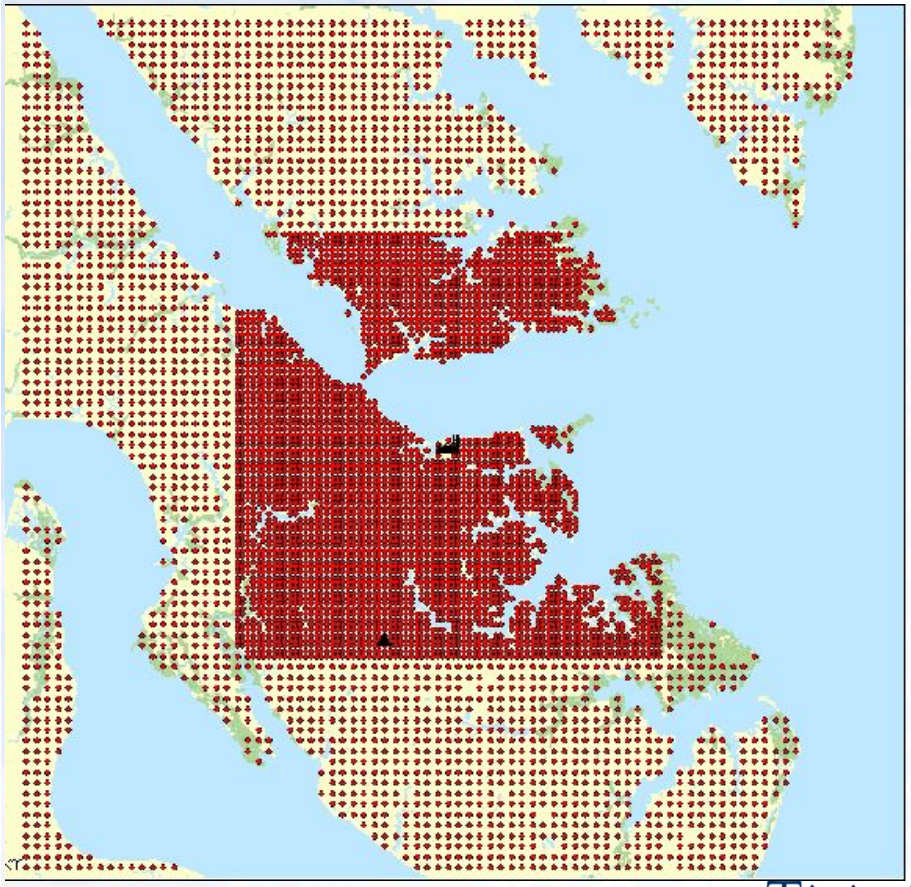
- Modeling to Determine Monitor Placement
  - Modeling outputs should provide the location or locations of expected ambient concentration maxima,
  - AND the frequency of occurrence of a receptor having the highest concentration during the modeled period
  - These data are then used to rank which receptor location(s) are most likely to characterize peak concentrations surrounding a facility

Exclusion Zones from Modeling Conducted to Select Monitors

Traditional Grid



Exclusion Grid



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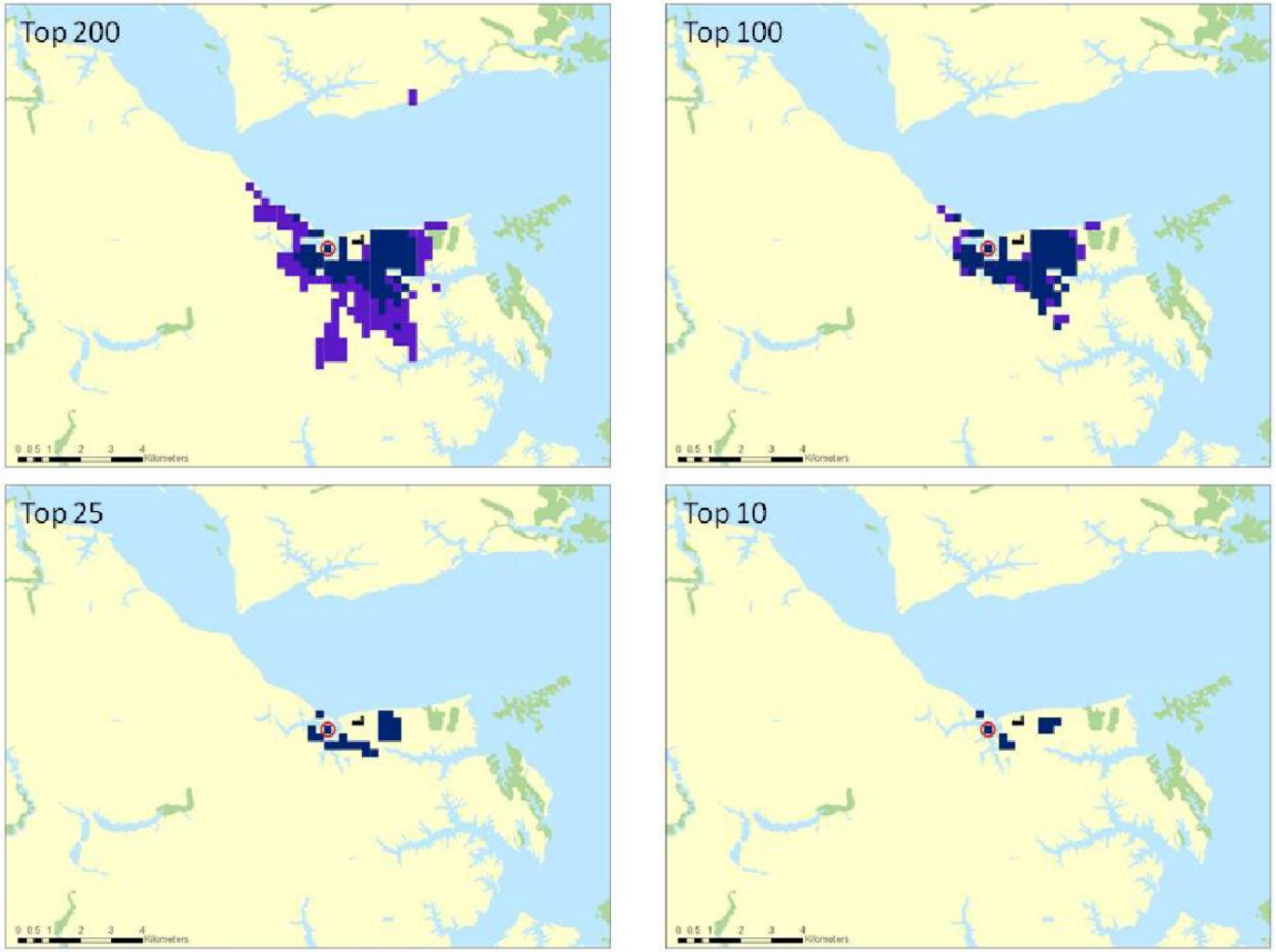
Modeling for the Monitor Location Process



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Modeling for the Monitor Location Process

Receptor X (UTM)	Receptor Y (UTM)	Normalized Design Value Rank (A)	# of Days Rank (B)	Score (A+B)	Score Rank
369401	4119433	1	1	2	1
371401	4119433	2	10	12	2
369151	4119933	6	6	12	3
369901	4119183	7	7	14	4
371151	4119433	5	12	17	5
371151	4119933	15	5	20	6
371151	4119683	3	19	22	7
368901	4119433	11	11	22	8
369651	4118933	16	8	24	9
371401	4119933	12	13	25	10

Approach to Source-Oriented Monitor Siting – Existing Data

- Monitor Siting Based on Existing Data
  - Agencies may be able to identify candidate monitoring locations based on existing information
    - SO_2 Emission Source Data
    - Emissions Data
    - Implemented Controls
    - Existing Air Quality Data
    - Existing Modeling
    - Meteorological Data
    - Geographic Influences
  - EPA does not believe this approach would be robust as a stand-alone siting method

Approach to Source-Oriented Monitor Siting – Exploratory Monitoring

- Exploratory Monitoring for Monitor Placement
  - Used to identify potential monitor locations or increase confidence in candidate locations
  - Example, if agency uses existing data to identify multiple areas where monitoring may be appropriate, exploratory monitoring could bolster evaluation of candidate monitoring location(s)

Monitoring Approach

- Source-oriented monitors should be operated as SLAMS sites
  - Therefore subject to 40 CFR Part 58 data reporting and certification
  - Different than pre- or post-construction PSD monitoring
    - For SO_2, audit schedule and data recovery requirements are different for SLAMS vs PSD ambient monitors
  - Data will be publically available and reported to EPA's AQS database
  - Three-years of data will need to be collected to match the form of the NAAQS (3 year average of the 99th percentile of daily maximum SO_2 conc.)

Monitoring Approach

- Importance of the initial monitoring plan
  - Outlines all activities related to monitoring to ensure quality/validity of data and project objectives are met
  - Defines:
    - Who is involved (project manager, site operators, etc.)
    - Problem being addressed (environmental problem and history)
    - Sampling method (site location, instrumentation, etc.)
    - Data quality objectives and documentation procedures
    - Assessment and oversight (reports to management/data users)
    - Data review, verification, and validation
    - Data archiving and submission (to Agency and EPA's AQS database)

Monitoring Logistics

- Once monitoring site(s) are selected there are logistics to be considered
  - Power
  - Access
  - Security
  - Telemetry
  - Siting/Exposure

Monitoring Logistics

- Site requirements
  - 30 amp service
  - Heating/cooling units keep internal temperatures between 20-30 °C
  - Sites need good access and a level area for placement of the shelter

Monitoring Logistics

- Site requirements
  - Security fencing may be needed
  - Cell phone coverage is desired although alternative telemetry options are available such as satellite, radio and land-line.

Monitoring Logistics

- Site requirements
  - Shelters should be sited per EPA SLAMS specifications
    - Open area with no obstructions
    - 10-meters or further from tree drip line
    - Inlet between 2-15 meters above ground

Monitoring Level-of-Effort

- Ongoing operations
  - Minimal assistance from source – first responder activities
  - On-site quarterly to perform manual calibrations
  - Annual independent audits
  - Data Management/Reporting done remotely

Monitoring Duration

- When can monitoring cease?
  - Two proposals for a monitor to be eligible for shutting down
    - Design value of SO_2 has not exceeded 50 percent of NAAQS.
      - Similar to source-oriented lead monitoring
    - Design value from a 3-year period (2018-2020 or later) that is no greater than 80 percent of NAAQS
      - Similar to pathway for States to shut down SLAMS monitors defined in 40 CFR part 58.14(c)(1)

Next Steps

- Reiterate: designation recommendations are the responsibility of the appropriate State and Local agencies
- Due diligence modeling and monitoring by sources
  - Agencies do not have the funding
  - Agencies do not have the staff
- On-going verification of attainment is recommended to occur on a three-year basis

Next Steps

- What-if scenarios for potential violations
  - Modeling shows a violation of NAAQS:
    - To avoid non-attainment, agency may request source to adopt new emission limits
    - New controls/limits would be based on modeling results and need to be implemented by January 2017 to avoid non-attainment
    - Violation could result in non-attainment status
  - Monitored violation
    - Further evaluation to determine extent of non-attainment area

Final Thoughts

- January 15, 2016 is the deadline for State and Local Agencies to submit pathway for characterizing source NAAQS implementation
  - Sources are encouraged to examine the pros and cons of each pathway

Questions/Discussion?

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