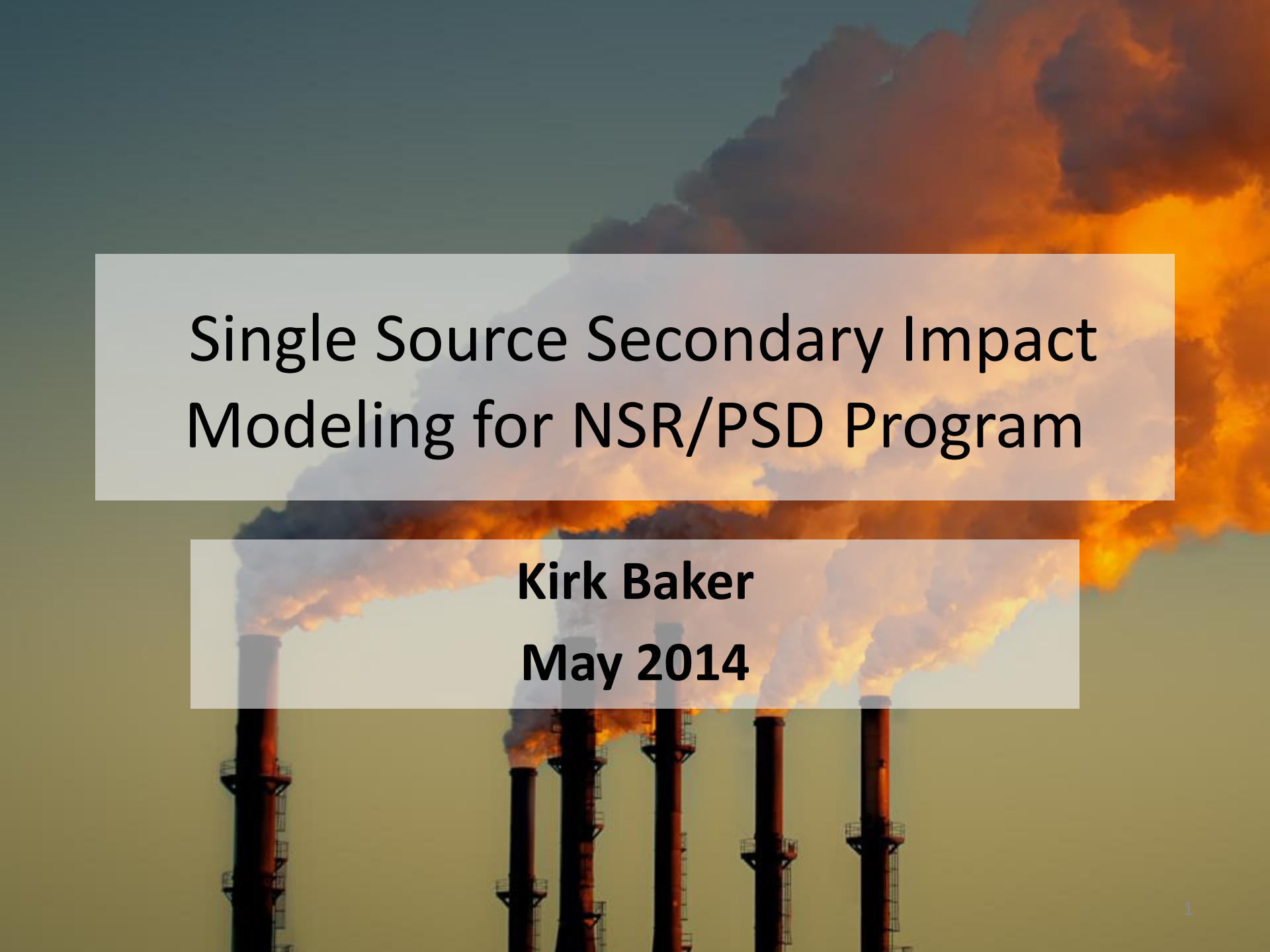


Single Source Secondary Impact Modeling for NSR/PSD Program

Kirk Baker

May 2014

Background

- EPA granted **Sierra Club petition** (Jan 4, 2012) with commitment to update Appendix W (Guideline on Air Quality Models) to address O3 and secondary PM2.5 impacts
- EPA agreed to propose updates to Appendix W and related guidance documents based on CAA schedule for 11th Modeling Conference (Spring 2015) under Sierra Club petition agreement
- A need currently exists to fulfill EPA's commitment to update Appendix W to address chemically reactive pollutants in near field and long range transport applications
  - Separate work is ongoing to update Appendix W for primary pollutants; not the focus of this presentation

Interagency Workgroup on Air Quality Modeling (IWAQM) Phase I and II

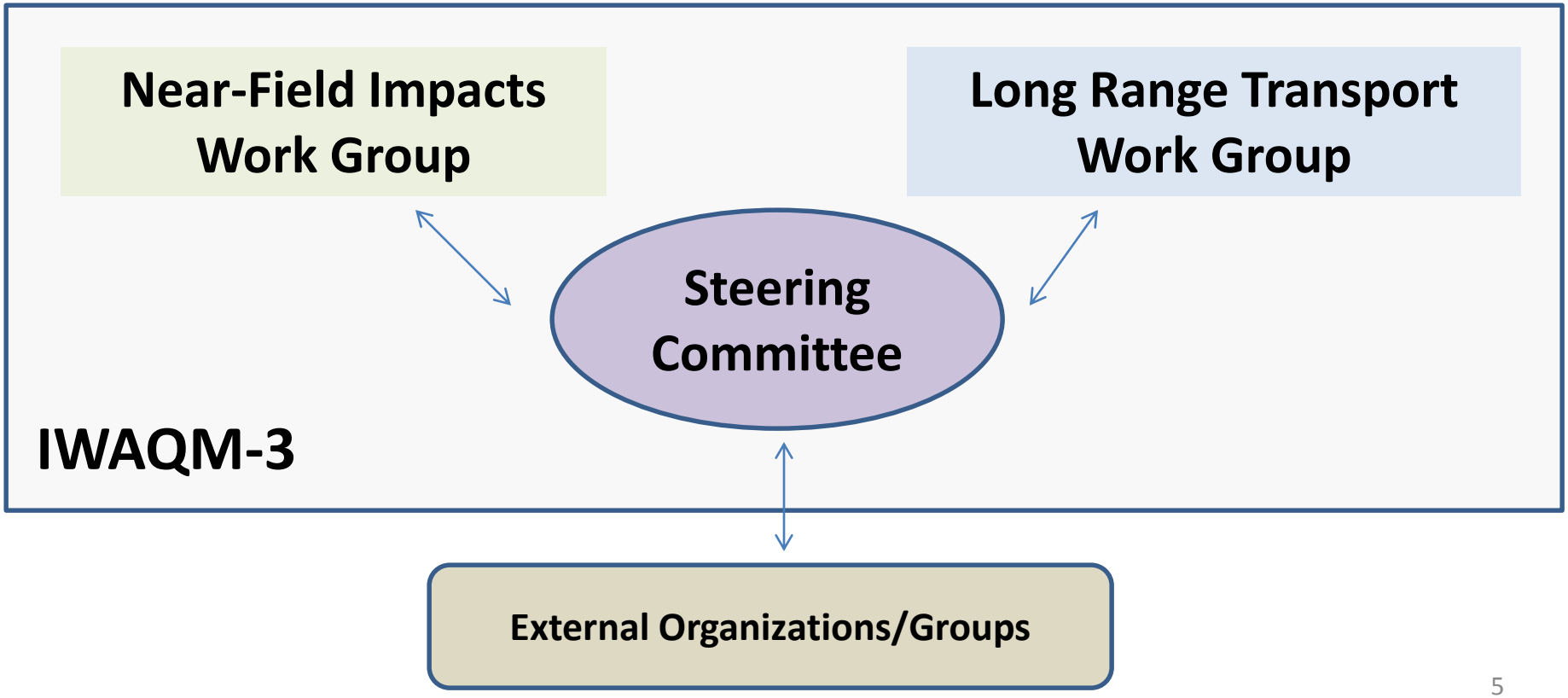
- Originally formed in 1991 to provide a focus for development of technically sound regional air quality models for regulatory assessments of single source impacts on Federal Class I areas
  - Participating Federal agencies: the Environmental Protection Agency (EPA), the U.S. Forest Service (USFS), the U.S. Fish and Wildlife Service (USFWS), and the National Park Service (NPS)
- The IWAQM process largely concluded in 1998 with the publication of the **Interagency Workgroup on Air Quality Modeling** (IWAQM) Phase 2 Summary Report and Recommendations for Modeling Long Range Transport Impacts (EPA-454/R-98-019)
  - The IWAQM Phase 2 report provided a series of recommendations for the application of the CALPUFF model for use in regulatory long range transport (LRT) modeling
  - Basis of subsequent Appendix W update designating CALPUFF as the preferred model for LRT
- Draft updates to the IWAQM Phase 2 report were released in 2009 to better reflect the state-of-the-practice of long range transport modeling techniques

IWAQM Phase 3

- IWAQM (phase 3) initiated in July 2013 to provide a mechanism for updating Appendix W and related guidance documents in partnership with the Regional offices and other Federal Agencies (short term)
  - Increase knowledge regarding NSR/PSD program and single source secondary impacts
  - Understand and evaluate modeling techniques for single source secondary impacts
  - Products from the IWAQM3 process intended to inform and support regulatory revisions to Appendix W

IWAQM3 Organizational Framework

- IWAQM3 consists of 2 working groups and a steering committee



IWAQM3 Participants

Near-Field impacts working group
Kirk Baker, OAQPS (Chair)
Jim Kelly, OAQPS
George Bridgers, OAQPS
Andy Hawkins, Region 7
Randy Robinson, Region 5
Jaime Wagner, Region 5
Rebecca Matichuk, Region 8
Bob Kotchenruther, Region 10
Richard Monteith, Region 4
Rynda Kay, Region 9

Long range transport working group
Bret Anderson, US FS (Chair)
Tim Allen, US F&W
Mike Barna, US NPS
John Notar, US NPS
Craig Nicholls, BLM
Kirk Baker, US EPA OAQPS
Chris Owen, US EPA OAQPS
Gail Tonnesen, US EPA Region 8
Michael Feldman, US EPA Region 6
Rick Gilliam, US EPA Region 4

Steering Committee
Tyler Fox, US EPA OAQPS
Bret Anderson, US FS
Tim Allen, US F&W
Annamaria Coulter, Region 2
Erik Snyder, Region 6
Robert Elleman, Region 10
Carol Bohnenkamp, Region 9
John Vimont, US NPS
Craig Nicholls, BLM
Val Garcia, US EPA ORD
Shawn Roselle, US EPA ORD

Addressing Near-Field Single Source Secondary Impacts

- No existing approaches or tools (just Scheffe tables)
  - Disadvantage is more time and resources are needed to build confidence in tools and approaches for permit modeling
  - Advantage is that energy does not need to be used to change precedent
- Answer fundamental questions:
  - What are typical secondary impacts? How variable are these impacts? What tools are most appropriate?
  - Little research and peer reviewed data exists
  - Understand stack parameter and location impacts on secondary pollutant impacts
  - Relate precursor emissions to downwind O3 and PM impacts
- Explore modeling approaches for single source secondary impacts (ozone and PM2.5)
- Explore approaches for single source secondary impact screening tool; develop a proof of concept approach
- Update Appendix W and related guidance documents

Appendix W

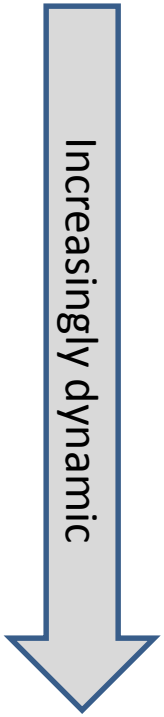
PM Modeling Guidance

O3 Modeling Guidance

FLAG

Single Source Modeling Guidance for Ozone & PM2.5

Secondary Impacts & Screening Approaches Topic Report



Long Range Transport Models, Approaches, and Evaluation Report

EPA Fine Scale Team technical work/projects (outside IWAQM3 process)

- New work related to single source secondary impact evaluation and approaches
- EPA/ENVIRON plume measurement and inert tracer reports
- Critical elements and approaches being prepared for peer review

Appendix W

- Intent is to develop appropriate detail that will be relevant over the long term to minimize the need for future updates
- Increasing technical detail and reflections of the current practice of model application in guidance documents which are more dynamic

Appendix W

PM Modeling Guidance

O3 Modeling Guidance

FLAG

Single Source Modeling Guidance for Ozone & PM2.5

Secondary Impacts & Screening Approaches Topic Report

Increasingly dynamic

Long Range Transport Models, Approaches, and Evaluation Report

Technical Work/Projects

- AWMA extended abstract on photochemical model approaches
- EPA/ENVIRON plume measurement and inert tracer reports
- Critical elements and approaches being prepared for peer review

PM Modeling Guidance (draft)

- Draft guidance released in March 2013
  - http://www.epa.gov/scram001/guidance/guide/Draft_Guidance_for_PM25_Permit_Modeling.pdf
- More technical and programmatic detail than Appendix W
  - Regulatory background
  - Key emissions thresholds
  - Detail where screening and refined analysis are appropriate for NSR/PSD programs
- References the single source modeling guidance for O3 and PM2.5 document, which contains the most dynamic technical details
- IWAQM3 NFI workgroup will review PM Modeling Guidance document for consistency with single source modeling guidance

Appendix W

PM Modeling Guidance

O3 Modeling Guidance

FLAG

Single Source Modeling Guidance for Ozone & PM2.5

Increasingly dynamic

Secondary Impacts & Screening Approaches Topic Report

Long Range Transport Models, Approaches, and Evaluation Report

Technical Work/Projects

- AWMA extended abstract on photochemical model approaches
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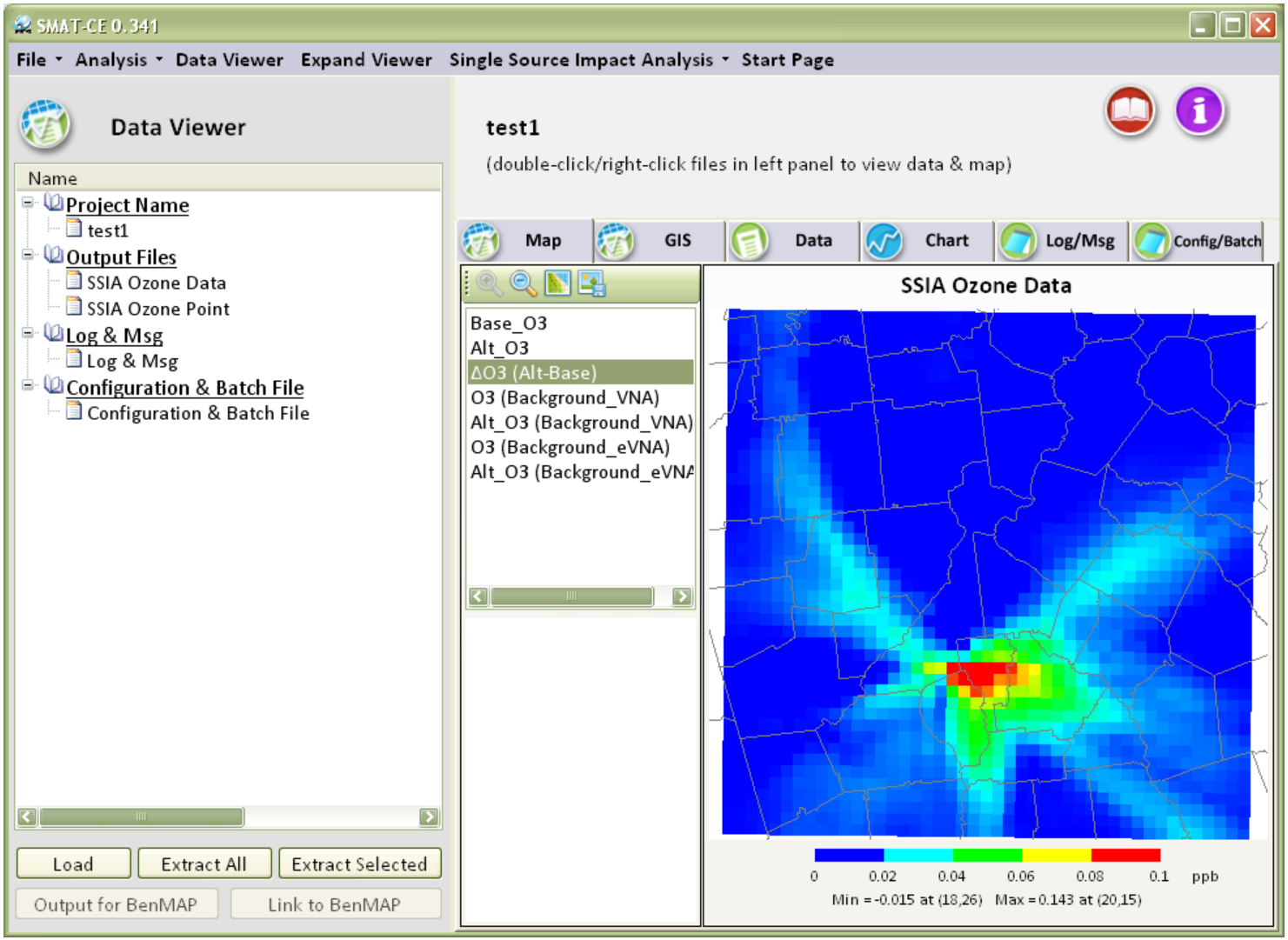
- Critical elements and approaches being prepared for peer review

Single Source Modeling Guidance for O3 & PM2.5

- Broad overview of potential tools to estimate near-field secondary impacts from single sources
  - Criteria for tools to be suitable for this purpose & how to use those tools
- How to apply a suitable model for PSD/NSR impact analysis
  - Appropriate episode selection, inputs, domain, receptor locations, simulation length, etc.
- How to post process model results for PSD/NSR assessment test
  - Approach coded into single source assessment tool (Windows program SMAT-CE)
- Modeling guidance in this document should be consistent with FLAG, PM Modeling guidance, and Appendix W

Working towards a windows based single source assessment tool (alpha) for post processing model results consistently



Appendix W

PM Modeling Guidance

O3 Modeling Guidance

FLAG

Single Source Modeling Guidance for Ozone & PM2.5

Secondary Impacts & Screening Approaches Topic Report

Increasingly dynamic

Long Range Transport Models, Approaches, and Evaluation Report

Technical Work/Projects

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IWAQM NFI Topic Report

Secondary Impacts Review & Screening Approaches Report

- What do we know about the relationships between single source precursors and secondary impacts?
- Overview of published emissions and secondary impacts from single sources to provide context for expected impacts
  - How variable by area, season, by distance from the source, etc.
- Identify credible screening approaches for estimating secondary pollutant impacts from single sources
  - How to use theses tools for a near field impact assessment
  - How broadly applicable are these tools?
  - How to evaluate of a screening approach
  - What gaps in science/research exist related to screening tools for secondary pollutants?

Technical/Policy Coordination