

AERMOD Implementation Workgroup

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Outline

- Goals
- Technical Support Process
- Guidance Development Process
- Initial Guide
- Issues not being covered by Initial guidance
- Developmental needs
- Improvements
- Workgroup Outputs

Goals

- Propose AERMOD implementation PROCESS
 - Technical support: building expertise
 - Develop implementation guidance
 - Case specific
 - Generic
- Define the Landscape
 - What help can we provide now?
 - Develop initial guide to accompany promulgation
 - Identify unresolved issues
 - Identify suggested improvements
- Approach to solving issues
 - Organize issues
 - Prioritize
 - Suggest solutions where possible

Technical Support

- Technical questions:
 - Point of contact
 - Experts group
 - Archiving & dissemination (SCRAM?)
- Training
 - Is there a need? (Workgroup thinks not)
 - What's available
 - Video course
 - Some regions run training
 - Private sector training courses

Guidance Development Process

- Basic considerations:
 - Basic tenets for guidance development
 - Prescriptive vs. General : Keep principle based
 - Precedent control: Initial decisions are critical
 - Allow flexibility for unique cases
 - Vet, document & rule make where appropriate
 - Categories of implementation issues – Solutions require:
 - Interpretation and consensus
 - Moderate degree of work – can be handled in-house
 - Extensive work – external resources needed (\$\$\$); e.g. Bulk Richardson technique
 - Developmental work – e.g. urban reformulation

Guidance Development Process (cont.)

- Basic considerations (cont.)
 - Types of guidance
 - Appendix “W”
 - EPA Report
 - OAQPS policy memos
 - Clearinghouse memos
 - Individual precedents
 - Clearinghouse – past practice
 - State contacts Region
 - Region writes memo to Clearinghouse
 - Clearinghouse memo back to Region
 - Archive memos / Annual report
 - As precedents and consensus builds, develop general guidance

Guidance Development Process (cont.)

- Proposed Approach
 - Provide initial guide with promulgation
 - Re-institute Clearinghouse (past practice)
 - Minimize unwanted precedents: Have most initial decisions pass through Clearinghouse
 - Clearinghouse utilize an ad-hoc AERMOD implementation workgroup
 - Resources
 - OAQPS staff
 - Regional / State / Local: consider formal arrangement
 - Re-establish AERMIC (get AMS to recommit): Technical support and development
 - Contractor support: Maintenance & development

Initial Guidance

- Consensus to-date
 - NWS representativeness (winds & surface characteristics)
 - B_o & r should be considered regional in nature – provide considerable flexibility to reviewing agency
 - Z_o representativeness is important
 - Depends on nature of application
 - Judge based on decision context
 - Case-specific sensitivity analysis where appropriate
 - Selecting surface characteristics
 - Surface roughness:
 - Base on meteorological site
 - Use a minimum 30° arc
 - Use a 3km fetch
 - Apply an area weighted average
 - Bowen ratio & albedo: Allow reviewing agency to choose among:
 - Regional based
 - Meteorological site based
 - Source site based

Initial Guidance (cont.)

- Consensus to-date (cont.)
 - Urban sources:
 - Use ISC guidance to define source as urban (Auer)
 - If NWS site is used
 - Use meteorological site surface characteristics for AERMET
 - Apply urban option keyword
 - Input urban z_o (default = 1.0 m) into AERMOD if met site is rural
 - If site-specific met is used
 - Same as with NWS if measured on-site profiles are not used
 - Do not use URBAN option if measured mixing heights & profiles of wind, turbulence, and temperature are being used
 - Selection of population data
 - Use MSA data for source located in isolated MAS
 - For areas with multiple MSA: Select sub-area thought to best describe the urban heat island that effects the source
 - For non MSA areas: Select area in which population exceeds 750 people/km²

Initial Guidance (cont.)

- Consensus to-date (cont.)
 - Gently sloping terrain: Flat terrain option may be used at the discretion of the reviewing authority
 - Capped & Horizontal Stacks
 - If no building downwash: Preserve buoyancy flux and eliminate plume momentum
 - Set exit gas velocity to 0.001 m/s
 - Establish an effective diameter to preserve buoyancy
 - Turn off stack-tip downwash (STD)
 - For capped stacks only: Reduce h_s by 3 stack diameters
 - If downwash applies: Can't apply effective diameter (issue with PRIME plume rise)
 - Set exit gas velocity to 0.001 m/s
 - Use actual stack diameter
 - Do not adjust for STD
 - Adding receptors to AERMAP wo/ DEM file: guidance will be provided for work-around

Initial Guidance (cont.)

- Outstanding Issues: Can we say something about the following in our initial guide?
 - Defining domain: Under what circumstances can the 10° slope approach be relaxed?
 - How recent does the 5yr met period need to be?
 - Rural areas with large anthropogenic heat flux (e.g., steel mills)
 - Warning messages
 - Provide additional info on AERMOD sensitivity (e.g. Joe Sims work)

Issues Not Covered by Initial Guidance

- Bulk Richardson #: Beta version available, additional testing needed
- Use of gridded met data
- PRIME:
 - Complex terrain impacts ?
 - Need better documentation
- AERSCREEN
- BPIP-PRIME:
 - Could select the wrong structure (too far away - lower impacts than if building near stack were selected)
 - 45° to long buildings could include stacks that shouldn't be included
- Revise Appendix C checklist
- Remove reference to SCREEN3 in App W – replace with “use appropriate screening techniques”
- Credits: Broad implications, need policy discussions – workgroup will not handle
- Need permanent fix for capped & horizontal stacks:
 - Consider proposal to double diameter & decrease gas velocity by 4x for capped stacks

Developmental Needs / Possible Improvements

- Developmental Needs:
 - Meander for area sources
 - Reformulate urban
 - Evaluate alternative algorithms for profiling d^2/dz – Current algorithms can produce very conservative lapse rates.
 - Algorithm for localizing NWS data (i.e., up-over-down)
 - PM2.5 Output: 98th percentile concentrations
 - Code:
 - Optimize
 - Multi-processor
 - Lahey compatible version

Developmental Needs / Possible Improvements

- Possible Improvements:
 - Evaluate area source algorithm
 - wind tunnel data
 - Duke Forest database
 - Add wind direction dependency for h_c
 - Add line source algorithm
 - Add buoyant line source algorithm
 - Add flare option
 - Automate guidance for capped and horizontal stacks
 - Improve debug output
 - Allow user-specified sounding time & generic upper air data
 - Improve B_o treatment by including soil moisture
 - Misc. improvements for convenient operation (e.g. Long filenames, etc.)
 - Modify AERMET to allow input of sigma-v
 - Property line receptor option

Workgroup Outputs

- Initial Guide by promulgation
- Report:
 - Recommendations
 - Procedure for handling issues
 - Ad-hoc workgroup for Clearinghouse
 - Categorize and prioritize issues
 - Group issues into categories (resource burden)
 - Prioritize within categorizes
- Standing workgroup: Support future guidance development