



North Carolina CAPCA Modeling Presentation



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NC Modeling Update / Issues



Purpose

To discuss modeling updates and new/expanded modeling issues associated with the North Carolina permitting process



NC Modeling Update / Issues

- PSD modeling
 - ✦ Class I Area Modeling Policy
 - ✦ PM_{2.5} Modeling
- NC Toxics: Combustion Sources
- AERMOD Meteorological Data
- Quarry General Permit
- Concrete Batch Plant Modeling Exemption

Class I Area Modeling Policy

Class I Area Modeling (PSD)

- Class I PSD Increments (*if Class I analysis requested by the FLM*)
 - ✦ Class I Visibility (*if the PSD Increments exceeded*)
 - ✦ Class I Deposition (*if the PSD Increments exceeded*)



Class I Area Modeling Policy

CLASS I AREA MODELING

	FLM REQUEST	Class I INC (onsite sources)	Class I INC (onsite/offsite sources)		Class I Visibility		Class I Deposition	
		Class I SIL	>SIL	<SIL	> INC	< INC	> INC	< INC
1.	NO	NO	NO	NO	NO	NO	NO	NO
2.	YES	YES	YES	--	YES ¹	--	YES	--
					--	NO ²	--	NO ³
				NO		NO ²		NO ³

¹ must use natural background for background visible range (BVR)

² FLM may conduct analysis - must use existing monitoring (IMPROVE) data for BVR

³ DAQ would not require a deposition analysis but the FLM may conduct analysis



PM_{2.5} Modeling



- PM_{2.5} emissions are evaluated under the PSD permitting program.
- PM_{2.5} emissions are modeled:
 - if PSD PM₁₀ SERs are exceeded
 - pursuant to 15A NCAC 2D.0501, any increase in PM_{2.5} emissions (*evaluated on a case-by-case basis*).



PM_{2.5} Modeling

- PM_{2.5} standard- Based on a 3-year average of the 98th percentile
 - 24 hr impact: highest of the H8H concentrations at each receptor (1 yr met), highest of the multi-year average of the eighth highest concentrations at each receptor (5 yrs met)
 - Annual impact:
 - H1H annual average across the receptor domain (1 yr met)
 - HIH of the multi-year averaged annual means across the receptor domain (5 yrs met)
- Note: 5 yrs met must be concatenated into one sfc file and one pfl file – pollutant ID should be set to “PM25”.
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Guidance provided in section 2.1.3 of the AERMOD User’s Guide Addendum, Jan ’07



NC Toxics: Combustion Sources

Combustion Sources

- 15A NCAC 02Q .0703: boilers, space heaters, internal combustion engines, & combustion turbines which burn unadulterated wood or fossil fuel.
- 15A NCAC 02Q .0702: exempts combustion sources from toxics review.
 - ✦ Boiler MACT vacated : “high risk” facilities required to conduct combustion source modeling – results indicated potential to exceed NC AALs.
- Anticipate rule change (~1-2 yrs) to eliminate exemption for combustion sources.



Meteorological Data

- ISCST₃ to AERMOD
 - Similar structure / smooth transition
 - Significant fundamental differences
- Met Data Representativeness
 - Proximity and terrain
 - Surface characteristics (Z_o , albedo, bowen ratio)
 - “Practical” guidance non-existent



Meteorological Data



- Meteorological data representativeness considerations
 - Comparison of surface characteristics
 - “Unacceptable” and “insignificant” differences
 - Site-specific sensitivity analyses
 - Site-specific met data may be required for a facility with site-specific met data
- “Practical” guidance non-existent



NC Meteorological Data Representativeness



- NC NWS met data being reprocessed using a low, medium, and high surface roughness (Z_o) parameters
- Data selection then based on:
 - Proximity / terrain associated with facility location
 - Z_o of facility



Quarry General Permit



- Developed to minimize/exclude quarries operating within established parameter limits from conducting air quality modeling.
 - Quarry parameters evaluated :
 - quarry size (crushing capacity) : 3 scenarios
 - buffer distance between operational equipment and property lines: 3 scenarios
 - source /pit orientation: 4 scenarios



Quarry General Permit

Modeling Assumptions

- Sources modeled: pit, crushers, screens, conveyers, storage piles, railcar loading, haul roads
- Centralized / compacted emission source location
- Conservative emission source orientation with respect to pit initially determined (i.e., N,S,E,W), then used to establish maximum modeled impacts
- Conservative emission rates



Concrete Batch Plant Modeling Exemption



- Purpose: To exempt truck-mix and central-mix batch plants from Air Dispersion Modeling
 - Production rate limits for arsenic
 - Permitted production rates based on distance to property line from truck load-out operation
 - Available to facilities in non-mountainous regions
 - Must have bagfilter or comparable control device on truck load-out operation
 - Facilities without appropriate controls must submit refined air quality modeling



CONCRETE PRODUCTION MODELING EXEMPTION RATES

TRUCK MIX FACILITY

Closest Distance to Property Line (m)	Production Rate (yd ³ /yr) ¹
10	33,150 ²
15	34,075
20	35,000
25	47,500
30	60,000
35	75,000
40	90,000
45	105,000
50	120,000
55	135,000
60	150,000

¹ production rates for 5-meter property line distances (e.g., 15, 25, 35, etc.) were based on interpolation; additional interpolation can be made for property line distances not shown.

² Production rate calculated from TPER

CENTRAL MIX FACILITY

Closest Distance to Property Line (m)	Production Rate (yd ³ /yr) ¹
10	55,000 ²
15	65,000
20	75,000
25	105,000
30	135,000
35	197,500
40	260,000
45	317,500
50	375,000
55	422,500
60	470,000

¹ production rates for 5-meter property line distances (e.g., 15, 25, 35, etc.) were based on interpolation; additional interpolation can be made for property line distances not shown.

² Production rate calculated from TPER



Concrete Batch Plant Modeling Assumptions

Truck-Mix Assumptions

- Source Emissions Evaluated: Cement silo, Flyash silo, Truck load-out
- Emission Points Modeled: Dust collection baghouse, Truck load-out
- On-site Structures: Control building, Three silos
- Meteorology: Greensboro
- AERMOD used

Central-Mix Assumptions

- Source Emissions Evaluated: Cement silo, Flyash silo, Mixer
- Emission Points Modeled: Mixer baghouse
- On-site Structures: Control building, Three silos
- Meteorology: Charlotte
- AERMOD used



THE END