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PULP & PAPER INDUSTRY PERSPECTIVE ON PM2.5 MODELING METHODS

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BETTER PRACTICES BETTER PLANET 2020

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- The American Forest & Paper Association is the national trade association of the forest products industry, representing pulp, paper, packaging and wood products manufacturers, and forest landowners.
- The forest products industry accounts for approximately 5 percent of the total U.S. manufacturing GDP. Industry companies produce about $190 billion in products annually and employ nearly 900,000 men and women, exceeding employment levels in the automotive, chemicals and plastics industries.
- The industry meets a payroll of approximately $50 billion annually and is among the top 10 manufacturing sector employers in 47 states.

Industry Perspective

- Integrated pulp & paper mills are "major sources" but generally well-controlled industrial operations
  - Industrial Boilers (NSPS, Boiler MACT)
  - Chemical Recovery (MACT Subpart MM controls PM as surrogate for HAP)
  - Furnish and Finishing Operations (Fugitive Dust Management)
    - Woodyards
    - Haul roads
    - Finishing/converting operations
- Heavily regulated sector…past, present, and future
  - New Source Performance Standards (60 Subparts D*x* and BB)
  - Pulp MACT (63 Subpart S) and Recovery MACT (63 Subpart MM)
  - Boiler MACT
  - BART/Regional Haze
  - Residual Risk/Technology Review

Challenges

- Like many industrial sectors, integrated pulp & paper mills find it difficult to demonstrate compliance with applicable NAAQS ***following current EPA modeling guidance*** resulting in numerous consequences…
  - New projects cannot move forward until modeling issues are resolved
  - Existing operations without projects may be required to evaluate controls if NAAQS evaluation is required as part of operating permit renewals
  - "Better than BACT/MACT" *levels of control* may be necessary to demonstrate compliance, which may require…
    - …significant capital investments in new or upgraded controls
    - …"on-paper" reductions to permit limits
    - …reduced fuels/operational flexibility

"Order of Magnitude" Axiom

- Previous controlling PM standard was 24-hour PM10
  - NAAQS = 150 $\mu g/m^3$
  - Typical background ~ 50 $\mu g/m^3$ suggests 100 $\mu g/m^3$ available
  - Generally evaluated only filterable PM
- PM2.5 24-hour standard substantially more stringent
  - NAAQS = 35 $\mu g/m^3$
  - Typical background ~ 25 $\mu g/m^3$ suggests 10 $\mu g/m^3$ available
  - Now includes condensable PM
- Modeled emission rates essentially equal
  - Filterable PM2.5 ~ 70% Filterable PM10, plus…
  - Condensable PM2.5 ~ (25% to 100%) Filterable PM2.5
- Modeling equal (or greater) emission rate and what previously was designed to fit within 100 $\mu g/m^3$ must now fit into 10 $\mu g/m^3$

Can Emissions Fit?

- Monitoring suggests "YES"
  - Case 1: Federal Reference Monitor < 2 km from large integrated tissue mill and wood products operation
    - 2008-2010 3-year average 98th percentile = **20.8 μg/m^3**
  - Case 2: Special Purpose "High Concentration" Monitor sited within 25 km of industrial corridor including large integrated tissue mill, refinery, chemical plant, power plant, coal/coke handling operation
    - 2008-2010 3-year average 98th percentile = **20.7 μg/m^3**
    - 2008-2010 3-year average 98th percentile = **18.3 μg/m^3** 120 km upwind at "Regional Scale, General Background" monitor
- Monitor design values consistently in range of 18-26 μg/m^3, or 50-75% of NAAQS
  - …an "ample margin" relative to the standard
  - …but leaves little room (9-17 μg/m^3) when added to a conservative model result ***following current guidance***

Can Emissions Fit?

- Modeling suggests "NO" ***following current guidance***
- Consider PM2.5 analyses limited to characteristic sources at integrated pulp & paper mill (utility boilers and chemical recovery units)
- Compare modeling results
  1. Existing Source Recovery MACT + Existing Boiler MACT
  2. New Source Recovery MACT (40-85% lower) + Existing Boiler MACT
     - Apply typical PM2.5 size distribution
     - Include typical condensable PM
       - Fugitive sources not included
       - Regional sources not included
       - Secondary impacts not included
     - Compare results ***following current guidance*** (H1H + 98th percentile background) and "Tier 3" Paired Sums

Can Emissions Fit?

Scenario	Value	Mill A	Mill B	Mill C
24-hour Existing MACT	PM2.5 lb/hr	103.34	166.43	139.20
24-hour Existing MACT	H1H + 98th percentile	82.60	65.07	48.64
24-hour Existing MACT	H8H "Paired Sums"	48.47	36.37	32.12
24-hour Existing MACT	H8H/H1H	59%	56%	66%
24-hour New MACT	PM2.5 lb/hr	44.31	54.79	59.73
24-hour New MACT	H1H + 98th percentile	46.78	42.97	36.94
24-hour New MACT	H8H "Paired Sums"	30.93	27.93	26.63
24-hour New MACT	H8H/H1H	66%	65%	72%

- No scenario suggests attainment ***following current guidance***
- Substantial differences in magnitude of impacts at H1H and H8H levels
  - Sensitivity of H1H result to low wind speed model performance and frequency of low wind speeds due to AERMINUTE
- Room for fugitive source impacts? Regional source impacts?
- Room for secondary formation?
- Room under a revised PM2.5 standard?

AERMINUTE/Model Stability

- Some states require frequent modeling for minor modification and operating permit renewals creating rich history of modeling evaluations
- Consider constant inputs over time with regulatory changes to model, model version, meteorological data set, and processing tools

- All models were determined to be "accurate" at the time, so which is right?
- Up to 25% run-to-run variability
- "Present day" result 38% higher than result 11 years ago
- Step-changes in model results amplify concerns about model stability over time and uncritical application of EPA guidance

Test #	Date	Model	Version	Meteorological Data				Design Value
				Start	End	AERMET	AERMINUTE	
1	2001	ISCST3	00101	1990	1994	Not Applicable		100.00
2	2002	ISCST3	02035	1998	2002	Not Applicable		100.18
3	2004	ISC-PRIME	04269	1998	2002	Not Applicable		117.85
4	2004	AERMOD	04300	1987	1991	04300	No	114.12
5	2007	AERMOD	07026	2001	2005	06341	No	142.11
6	2009	AERMOD	09292	2001	2005	06341	No	142.13
7	2010	AERMOD	09292	2005	2009	06341	No	115.24
8	2011	AERMOD	11103	2001	2005	06341	No	142.15
9	2011	AERMOD	11103	2005	2009	06341	No	117.33
10	2011	AERMOD	11103	2005	2009	11059	No	109.88
11	2011	AERMOD	11103	2005	2009	11059	11059	130.92
12	2012	AERMOD	12060	2006	2010	11059	11325	137.61

Observations/Comments

- AF&PA is concerned that current EPA guidance is overly conservative and cannot be practically implemented
- AF&PA appreciates efforts to …
  - …develop best practices for fugitive source modeling
  - …identify and correct systematic deficiencies in model performance
- AF&PA eagerly anticipates draft PM2.5 guidance and appreciates opportunity to comment
  - Sound, unbiased estimates of impacts, including background and secondary formation
    - Temporal consistency of background concentrations
    - Spatial consistency of secondary impacts
- AF&PA promotes reasonable, practical implementation of new standards and modeling guidance
  - Critical application of EPA guidance in practice to provide stability during regulatory implementation periods
  - Revisit traditional approaches (ambient air, variable emissions)