

**State Air Pollution Control Board
&
Department of Environmental Quality**

**Presentation
By
City of Alexandria**

March 20, 2008



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**PRGS Operation Must Conform to Virginia Law
Established to Protect the AAQS**

- Virginia's 9 VAC 5-80-1180.A.3 prohibits the issuance of a permit unless the facility has been

"designed, built and equipped to operate without preventing or interfering with the attainment or maintenance of any ambient air quality standard (AAQS) and without causing or exacerbating a violation of any applicable ambient air quality standard".

- Any guidance from VDEQ or EPA contrary to this regulation is invalid and unlawful



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Proposed Two-Stack Permit Is Flawed and Does not Address SAPCB Mandate

- SAPCB's mandate to VDEQ has been to consider one of the following permitting options for the proposed stack merger:
 - A NSR pre-construction permit
 - Synthetic minor permit by establishing NAAQS-compliant baseline emissions for all pollutants

THIS PERMIT IS NEITHER OF THE ABOVE



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VDEQ Wrong in Using 2002-2003 As a Baseline

Emissions violate NAAQS

Table 2.02: 2002-2003 Average Annual Emissions (Metric Tons)

Pollutant	Averaging Time	Total Concentration		Multiple of NAAQS
		ug m ⁻³	NAAQS (ug m ⁻³)	
PM ₁₀	1 yr	8,985.90	133	69
	24 hr	1,359.90	26	51
PM _{2.5}	1 yr	205.3	7.9	26
	24 hr	207	14.7	14
SO ₂	1 yr	1,359.90	35	39
	24 hr	1,359.90	35	39
NO _x	1 yr	1,359.90	40	34
	24 hr	1,359.90	40	34
CO	1 yr	1,359.90	4.4	31
	24 hr	1,359.90	4.4	31



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Proposed Limits Exceed 24-month Baseline (10/05 – 09/07)

Pollutant	Baseline Emissions (tons/year)	Proposed Two-Stack SOP		Proposed Five-Stack SOP	
		Proposed Limit (tons/year)	Proposed Change (tons/year)	Proposed Limit (tons/year)	Proposed Change (tons/year)
PM _{2.5}	46	100	+54	100	+54

- * Actual emissions, but not NAAQS-compliant
- * NAAQS-compliant PM_{2.5} baseline is ~46 tons/year



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Proposed Permits Significantly Increase Short-term SO₂ Limits

June 07 SO ₂ Permit		Proposed Two-Stack SOP		Proposed Five-Stack SOP	
lb/hr	lb/day	lb/hr	lb/day	lb/hr	lb/day
100	2400	200	4800	200	4800

Because short-term SO₂ emissions double, without any PM baseline or NAAQS limit, two-stack permit allows PM_{2.5} increases compared to existing operations and makes current non-compliant situation worse



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NAAQS-Compliant PM_{2.5} Baseline for Five-Stack SOP

- PM_{2.5} limit of 163 tons/yr is too high
 - Based on 0.055 lb/MMBtu – stack test is 0.012 lb/MMBtu
 - Greater than past 24 months (117 tons/year)
 - Not NAAQS-compliant – NAAQS compliance at 46 tons/year
- Board requested “synthetic minor” SOP with NAAQS-compliant baseline
 - City’s PM_{2.5} modeling of three-boiler scenario under June 07 SOP shows PM_{2.5} NAAQS compliance at 46 tons/yr
- Emissions greater than 46 tons/yr trigger NSR, requiring baghouse



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Baghouse is Justified

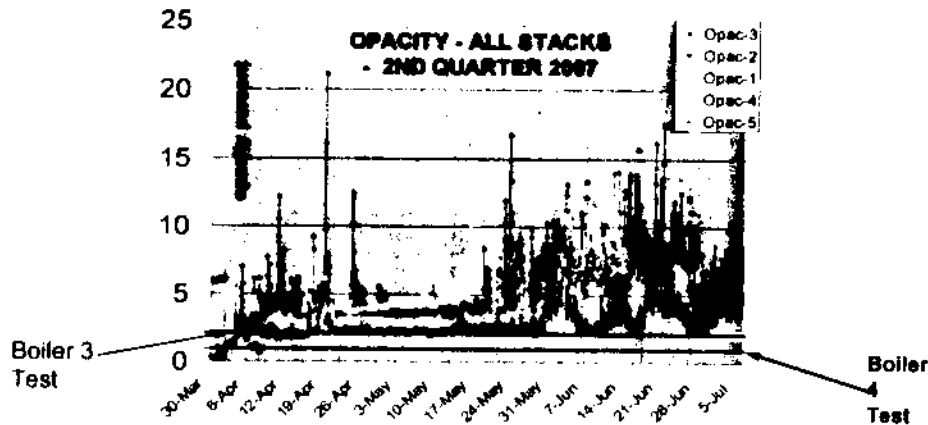
- Baghouse required if PM_{2.5} > 46 tons/yr
- Baghouse can achieve < 0.01 lb/MMBtu
 - Reliant Energy Seward - 0.0081 lb/MMBtu (PM₁₀ including condensable)
 - State Line, Indiana - 0.000027 lb/MMBtu (PM₁₀ filterable)
- Baghouse allows dispersion credit
- PM_{2.5} NAAQS compliance under two-stack scenario with PM dispersion credit
 - NAAQS compliance at **117 tons/yr**
 - Past 24 months @ **117 tons/yr** (Oct'05 – Sep'07)
 - Limit of 117 tons/yr prevents backsliding



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Current ESPs Provide Unreliable PM Control Performance



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Baghouses are Required to Adequately Control PM_{2.5} Emissions

- City's analysis shows that the use of any dry sorbent for acid gas emission control is basically a trade-off between acid gas emissions and particulate emissions **unless it is accompanied with an upgrade of the existing particulate control system, e.g., baghouses**
 - Resolves NSR & NAAQS compliance
 - Prevents backsliding on emission limits
 - Consistent PM removal performance
 - Mercury control as required by MACT
 - Provide multi-pollutant control, e.g., mercury, acid gases, enhanced removal of SO₂ with trona
 - Allows dispersion credit for stack merger



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PRGS Testing Results Are Incomplete and Do not Allow Full Evaluation of Sodium Bicarbonate

- PRGS testing results were incomplete and do not allow a full evaluation of sodium bicarbonate, especially in terms of
 - SO₂ removal efficiency at different SBC injection rates
 - ESP removal efficiency with SBC compared to Trona
 - Characteristics of SBC as injected – was it milled prior to being used and what was the particle size distribution?
 - Testing done only on one boiler



Use of Sodium Bicarbonate Appears to Significantly Increase PM Emissions

Pollutant/ Parameter	No Sorbent Boiler 3 Dec 2006	Trona On Boiler 3 Dec 2006	SBC On Boiler 4 Nov 2007	SBC On vs. No Sorbent	SBC On vs. Trona On
	Measured Emissions (lb./MMBtu)			% Increase in Emissions	
PM ₁₀	0.0163	0.0136	0.0188	15.3%	38.2%
PM _{2.5}	0.0145 ⁽¹⁾	0.0116	0.0173	19.3%	49.1%
Calculated PM _{2.5} Fraction (wt %)			Increase in PM _{2.5} Fraction		
PM _{2.5} -to-PM ₁₀ Ratio	89%	85%	92%	3%	7%

(1) The test results for Trona Off scenario are suspect because the cold ESP registered very low control efficiency, i.e., in the range of about 50% to 70%, during the test runs compared to an expected efficiency of greater than 90%. At 90% efficiency of the cold ESP, these emissions would be lower.



Use of Sodium Bicarbonate Appears to Significantly Increase PM Emissions

Pollutant	Baseline Emissions ⁽¹⁾ (tons/yr)	% Increase Due to SBC ⁽²⁾	Increase in Emissions ⁽²⁾ (tons/yr)	Major NSR Threshold (tons/yr)
PM ₁₀	137	38%	52	15
PM _{2.5}	117	49%	57	15

(1) Based on 24 months of available data from Oct 2005 through Sept 2007, using the average annual heat input during this period of 14,675,115 MMBtu/yr, the highest PM-10 stack test result of 0.0186 lb/MMBtu (Dec 2005) and the highest PM2.5-to-PM10 ratio of 0.86 (Dec 2006). Trona was in use during the baseline period.

(2) Assuming these emission increase percentages apply to all five boilers.

(3) Assuming that NSR applicability threshold for PM2.5 is the same as for PM10.



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Use of Sodium Bicarbonate Must not be Pre-authorized

- Sodium bicarbonate can consistently achieve <0.2 lb/MMBtu SO₂ emissions (~85% removal efficiency), based on several published data
 - At 3,813 tpy SO₂ annual limit, PRGS can operate at >38,130,000 MMBtu annually or about 2.7 times the current heat input level
- Consequently, proposed permit, if unchanged, will allow Mirant to increase heat input and therefore, PM₁₀, PM_{2.5}, and NOx emissions without exceeding the SO₂ annual limit



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Pre-approving sorbent
without PM_{2.5} NAAQS-
compliant baseline

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License to increase
PM_{2.5} emissions



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EPA Proposed Rule for PM_{2.5} NAAQS Implementation Supports Ambient Air Quality Modeling Analysis

- "States must require that emissions from construction or operation of the facility will not cause or contribute to a violation of the PM_{2.5} NAAQS."
- "Condensable emissions are essentially fine particles..."
- "Direct PM_{2.5} emissions can be evaluated with current models."
- "requiring... the Section 165(a)(3) air quality analysis for the PM_{2.5} NAAQS will adequately cover the remaining gap that results from using PM₁₀ as a surrogate..."



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There is Nothing "Complex" About Simulating Impacts of PM_{2.5} Direct Emissions

- AERMOD is an Appendix W model
- Appendix W Procedure Basic Analysis
 - *Source's Max. Potential Impacts + Worst-case Background*
 \leq NAAQS
- EPA requires PM limits must include filterable and condensable components
- Compliance demonstration tests must quantify both filterable and condensable PM



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Monitoring Is not a Substitute for Modeling

Modeling

- Worst Operating Condition
- + Worst Meteorological Condition
- + Receptors include the most impacted location
- = Higher level of public health protection

Monitoring

- Not the worst Operating Condition
- + Not the worst Meteorological Condition
- + Monitors may not be the most impacted location for all conditions
- = Lower level of public health protection

NAAQS must be protected under all conditions, including the worst case, at all locations



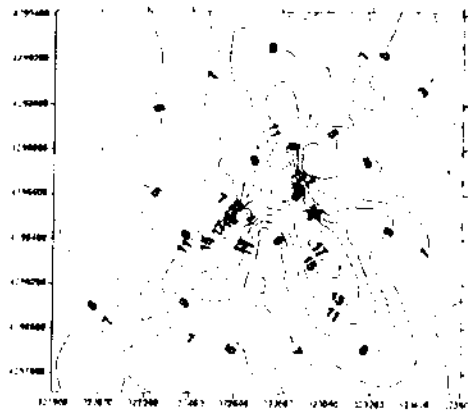
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PM_{2.5} MONITORING CANNOT SERVE AS NAAQS COMPLIANCE

**SOLE GROUND-BASED
PM_{2.5} MONITOR WAS
NOT IN LOCATION OF
ACTUAL MAXIMUM
IMPACTS IN 2007**

Maximum 24-hour Impacts for PRGS Operation in 2007
Location of Sole PM_{2.5} Monitor is Indicated

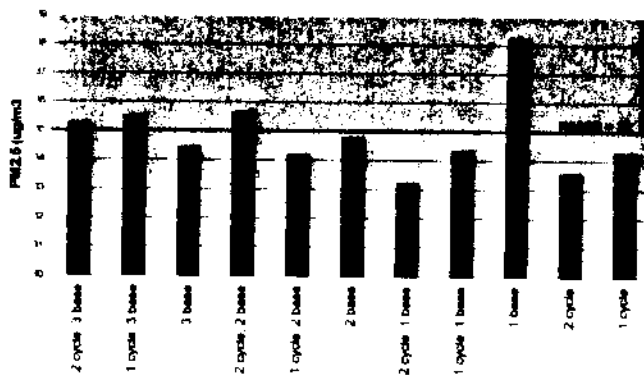


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Merged Stacks with Baghouse Technology Modeled 24-Hour Maximum Potential PM_{2.5} Impacts Vs. NAAQS

PM_{2.5} emission rate of 0.009 lb/MMBtu

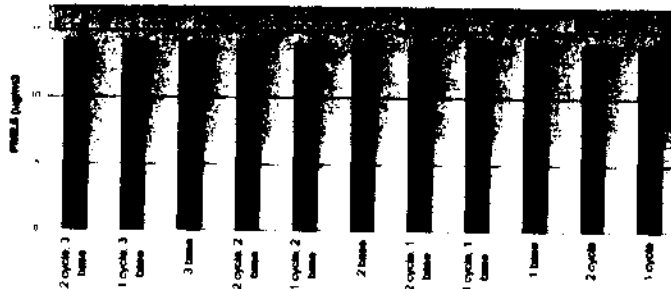


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Merged Stacks with Baghouse Technology Annual Maximum Potential PM_{2.5} Impacts Vs. NAAQS

PM_{2.5} emission rate of 0.009 lb/MMBtu



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VDEQ Wrong on NSR

- LNB/SOFA
 - PCP exclusion vacated as if never existed
 - No regulatory authority to allow PCP exclusion
 - Must now be rectified in SOP
- Trona
 - Stack test is invalid
 - Opacity indicates PM increases
 - PM reductions in Consent Decree not creditable for NSR
 - NOV issued for failure to maintain these measures
- Stack Merger
 - It is a physical modification
 - Board has already determined emission increase is possible
 - Potential to increase boiler capacity, enhance availability & reliability
 - Historical data show capacity increase is possible



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VDEQ Wrong on Purpose of SOP

- DEQ claims NAAQS compliance is the only purpose of these SOPs
- However, purpose is to also resolve past NSR violations, generate "synthetic minor" limits
- DEQ ignores regulations - operate plant and pollution controls to "minimize emissions"
- Proposed limits allow emission increases, i.e., backsliding
- Limits must reflect pollution control performance



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VDEQ Wrong on PM_{2.5} Modeling

- Board asked DEQ on Nov. 30, 2007 to model PM_{2.5} and develop NAAQS-compliant emissions for both SOPs
- PM_{2.5} NAAQS compliance required by regulation
- Other states are applying AERMOD – the right tool for primary PM_{2.5}



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VDEQ Wrong on Dispersion Credit

- Trona installed in Feb. 2006
- Stack merger first proposed in Summer 2006 – no relation to trona - no dispersion credit allowed
- Trona increases PM_{10} / $PM_{2.5}$ – no dispersion credit allowed



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VDEQ Wrong on Alternate Sorbent

- SOP authorizes SBC without public review and comment
- PM_{10} / $PM_{2.5}$ emissions with SBC are greater than with trona, per stack test
- SBC can increase $PM_{2.5}$ without appropriate baseline limit
- Must be reviewed for NSR applicability



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VDEQ Wrong on Baghouse

- Baghouse performance is far better than ESP, especially for $PM_{2.5}$
- Demonstrated at Mirant's State Line plant in Indiana (ESP retrofit to baghouse)
- Baghouse will enhance sorbent control of condensible PM



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Summary of Alexandria's Requests

Alexandria respectfully requests that:

- $PM_{2.5}$ emissions from PRGS be modeled and NAAQS-compliant emission limits be established in the permit
- Short term (hourly and daily) emissions are arbitrary and unreasonable. They must be revised to reflect actual operating performance
- Baghouses must be required on all five boilers to protect $PM_{2.5}$ NAAQS and public health



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Summary of Alexandria's Requests

- Deny dispersion credit for SO₂ and PM for stack merger project
- The SOP must not be used to pre-authorize the use of sodium bicarbonate or another alternate sorbent without a complete evaluation and NSR applicability analysis
- NOx limits and compliance requirements of CAIR must be included in the SOP



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Summary of Alexandria's Requests

- Based on present pollution control performance and/or NAAQS compliance criteria, the limits in the SOP must not exceed the following:

• SO ₂	< 0.30 lb/MMBtu	(Irona optimization)
• NOx	< 0.22 lb/MMBtu	(LNB/SOFA optimization)
• PM	< 0.03 lb/MMBtu	(ESP performance)
• PM ₁₀	< 0.02 lb/MMBtu	(ESP performance)
• PM _{2.5}	< 0.003 - 0.009 lb/MMBtu	(NAAQS compliance)
• CO	< 0.20 lb/MMBtu	(BACT)
• Hg	< 37 lb/yr	(actual baseline emissions)
• Coal sulfur	< 0.9 wt%	(current limit for PRGS)



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Summary of Alexandria's Requests

- Annual emissions must be NAAQS-compliant and not exceed baseline emissions during the most recent 24-month period (46 tons/year for $PM_{2.5}$)
- CEMS for CO and PM must be an immediate requirement for all five boilers



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Thank You

Questions?

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