Comments to Pennsylvania Mercury Stakeholder Working Group

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On behalf of the Pennsylvania Coal Association

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Outline

- “Reduction” vs “Removal” Issue
- Banking Issue
- Hotspots
- Technology Status
- Recommendations

Mercury Emission Reduction vs. Removal Issue

- “Removal” refers to the capture of mercury, present in the coal, that would have been emitted absent some capture mechanism, including cobenefit removal. The “removal level” is particularly useful in assessing technology performance.
- “Reduction” in emissions is relative to emissions in some historic period, during which some removal may occur because of co-benefits removal.

Required Mercury Removal and Emission Reduction in Pennsylvania under CAMR

	CAMR Mercury Cap, ton	Required Removal based on Mercury in Coal, ton	Required Reduction based on 1999 Mercury Emissions, ton
		11.2*	4.979**
Phase I	1.78	84%	64%
Phase II	0.70	94%	86%

*** Based on EPA IRC Part II mercury data and 2003 FERC 767 heat input data**

**** EPA estimate based on ICR Part II and Part III Data (http://www.epa.gov/ttn/atw/combust/utiltox/stxstate2.pdf)**

Mercury removal

- CAMR requires between 84% and 94% mercury removal from Pennsylvania coals, or more if the heat input increases from 2003 levels.
- Pennsylvania coals are relatively high in mercury, providing an incentive for switching to non-PA coals or natural gas.
- Despite public statements by the administration, it is not clear how a PA-specific rule helps PA coal mining companies and their workers.

“Banking” Issue

- Banking has been criticized as “delaying the date at which a cap is achieved”
- However, if allowances are banked, cumulative emissions (over time) are always less than they would have been without banking.

“Hotspots” Issue

- PADEP should provide a definition of the term “hotspot” that includes
  - Objective, absolute, measurable criteria (i.e., deposition level)
  - Environmental impact at the “hotspot” level
- PADEP should provide measured deposition data to demonstrate the existence and extent of “hotspots” before and after CAMR implementation
- Recommendation:
  - Establish expanded monitoring network
  - Conduct monitoring during implementation of CAMR Phase I
  - Establish need for remedial action based on deposition measurements and source apportionment, consistent with the “hotspot” definition.

Technology Status – Cobenefit Mercury Removal

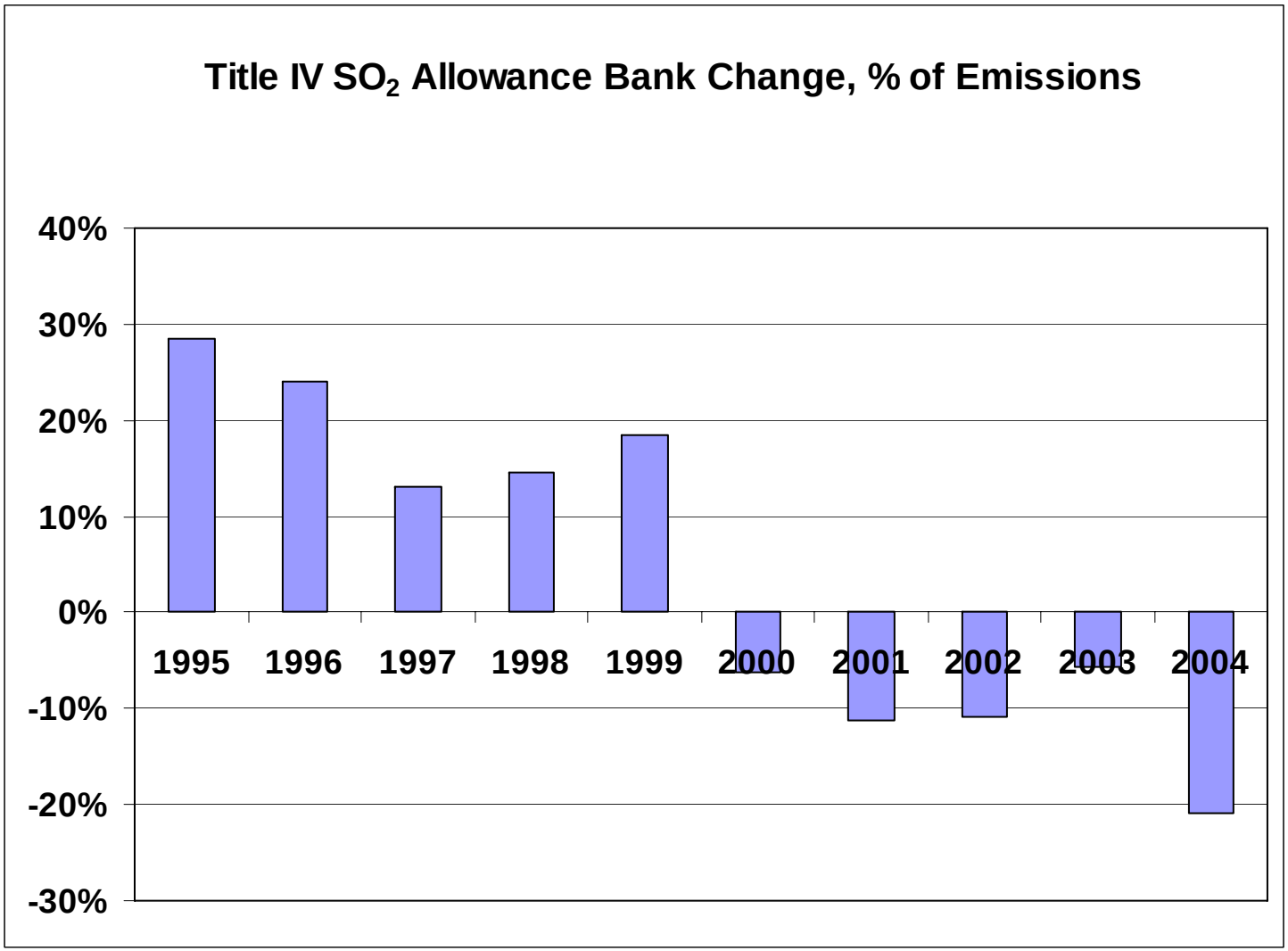
- Cobenefit removal of Wet FGD/CS-ESP ~65%
- Cobenefit removal of SCR/Wet FGD/CS-ESP combination ~80-90% removal
  - Approximately equal to PA CAMR Phase I level
  - Removal is limited by elemental mercury re-emission in FGDs
  - Removal may decline with SCR catalyst age
  - Phase II cap will require mercury-specific technology, particularly if trading is not allowed

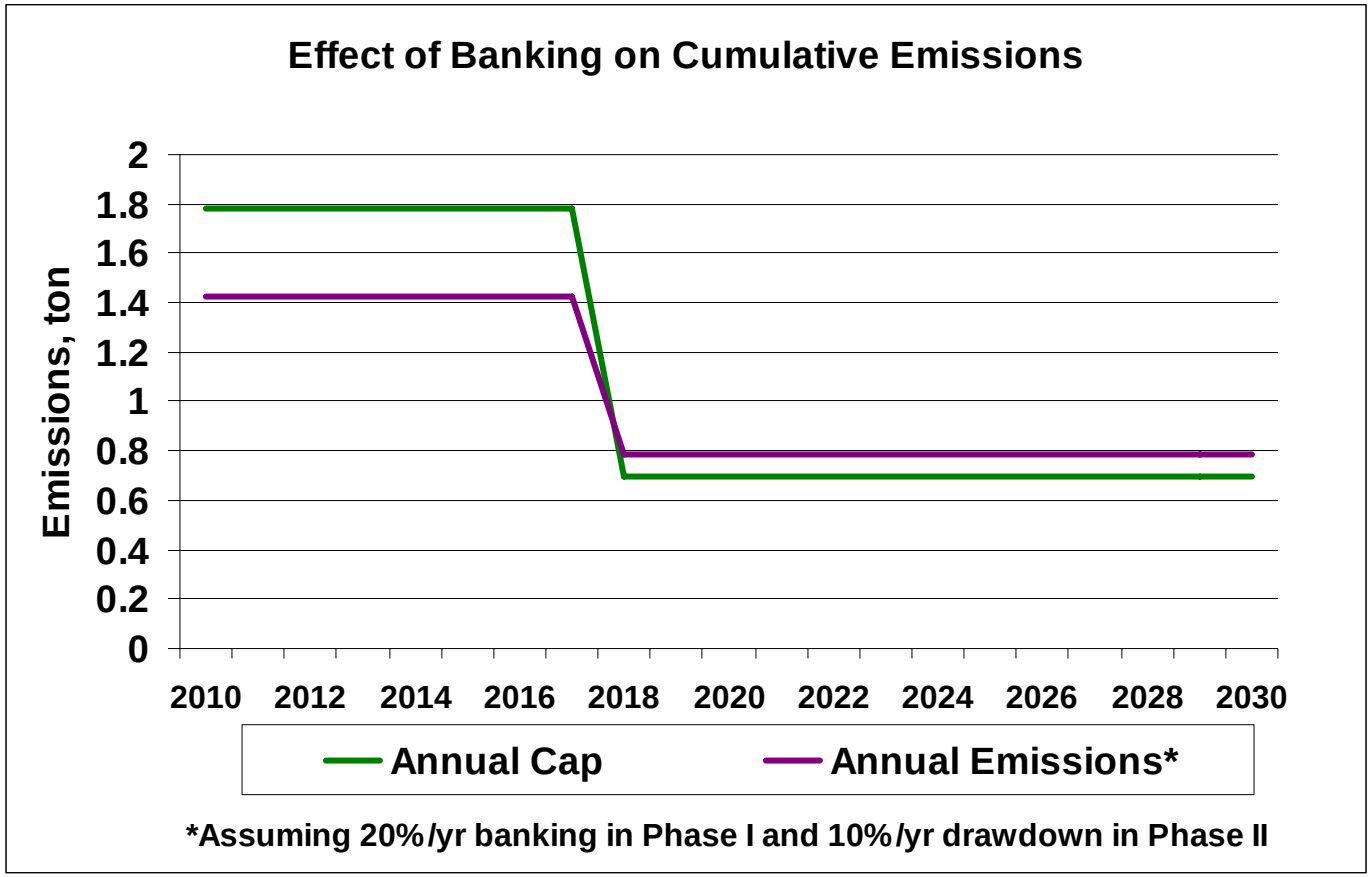
Technology Status: Mercury-specific technology

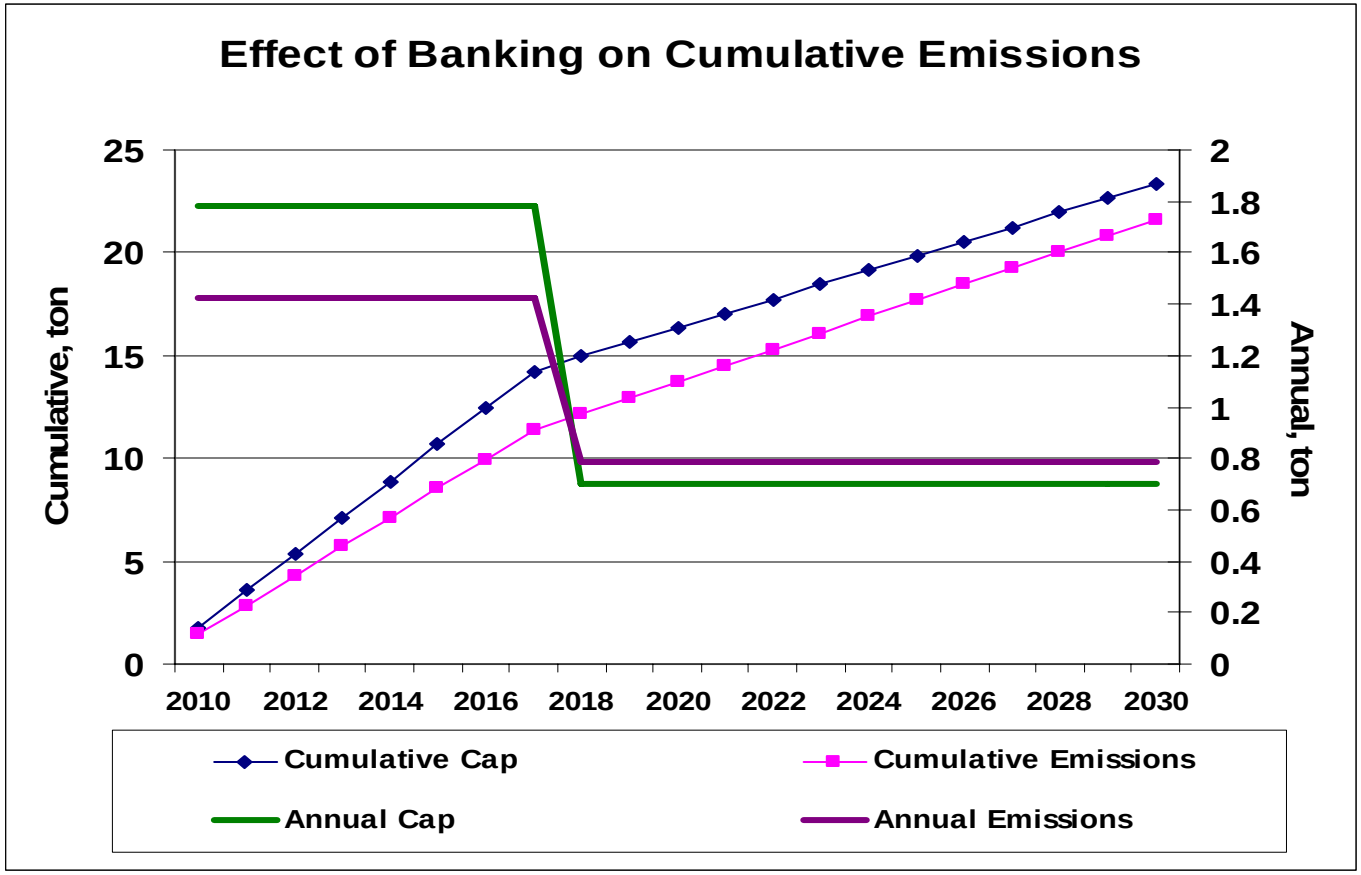
- Relatively little experience with bituminous coals (vendors concentrated on PRB)
  - Only 4 of 19 full-scale tests to date with high-sulfur bituminous coal
  - Only 2 of 15 scheduled tests with high-sulfur bituminous
- Performance poorer with higher-sulfur coals
- DOE conducting extensive R&D through 2010
- DOE projects commercial availability post-2012

Recommendations

- Acknowledge that CAMR is a stringent rule for Pennsylvania EGUs
- Implement CAMR with interstate trading
- Provide a practical definition of “hotspots” that relates measurable deposition levels to environmental effects
- Expand mercury deposition network to determine effect of CAMR implementation
- Promote the development of mercury-specific control technology, recognizing the limitations of current technology for Pennsylvania’s higher-sulfur bituminous coals


Title IV SO2 Allowance Bank Change, % of Emissions
40%
30%
20%
10%
0%
-10%
-20%
-30%
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004


Effect of Banking on Cumulative Emissions
Emissions, ton
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
2010
2012
2014
2016
2018
2020
2022
2024
2026
2028
2030
Annual Cap
Annual Emissions*
*Assuming 20%/yr banking in Phase I and 10%/yr drawdown in Phase II


Effect of Banking on Cumulative Emissions
Cumulative, ton
Annual, ton
25
20
15
10
5
0
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
2010
2012
2014
2016
2018
2020
2022
2024
2026
2028
2030
Cumulative Cap
Cumulative Emissions
Annual Cap
Annual Emissions

Hg Removal in SCR/Wet-FGD Systems with Bituminous Coals*

Unit	Configuration	Mercury Removal, Coal to Stack	Total Mass Balance
3	Limestone, Inhibited Ox.	68	101%
4	Limestone, Natural Ox.	97	111%
5	Limestone, In-Situ Ox.	86	105%
6	Limestone, Ex-Situ Ox.	88	96%
7	Limestone, Ex-Situ Ox.	84	99%
8	Mg-Lime, Ex-Situ Ox.	84	110%
9	Mg-Lime, Inhibited Ox.	87	99%
10	Mg-Lime, Inhibited Ox.	89	88%

* http://www.netl.doe.gov/publications/proceedings/05/Mercury/pdf/Withum-071305-am.pdf

SCR/Non-SCR Comparison*

Site No.	SCR Type	FGD Type	% Elemental Mercury		% Hg Removal, Coal to Stack
			Econ. Outlet (SCR Inlet)	AH Outlet (ESP Inlet)	
4, Unit 1	(none)	Limestone, Natural Ox.	39	9	91
4, Unit 2	Siemens Plate		42	3	97
5, Unit 2	(none)	Limestone, In-Situ Ox.	(NM)	34	51
5, Unit 1	Cormetech Honeycomb		61	2	86
6, Unit 1	(bypassed)	Limestone, Ex-Situ Ox.	(NM)	7	75
6, Unit 1	Hitachi Plate		14	2	88
7, Unit 4	(bypassed)	Limestone, Ex-Situ Ox.	(NM)	12	70
7, Unit 4	Hitachi Plate		49	2	84
10, Unit 1	(none)	Mg-Lime, Inhibited Ox.	(NM)	28	61
10, Unit 2	Siemens Plate		54	2	89

* http://www.netl.doe.gov/publications/proceedings/05/Mercury/pdf/Withum-071305-am.pdf

Technology Status: Mercury-specific technology

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  - Only 4 of 19 full-scale tests to-date were made with high-sulfur bituminous coal
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Effect of Sulfur on PAC Mercury Control