* *INTERNAL DISCUSSION DRAFT #3* *

ANALYSIS OF STAPPA AND ALAPCO'S MAY 7, 2002 PRINCIPLES FOR A MULTI-POLLUTANT STRATEGY FOR POWER PLANTS

Prepared by the
State and Territorial Air Pollution Program Administrators
and the
Association of Local Air Pollution Control Officials

February 3, 2004

As national discussions over multi-pollutant strategies for power plants continue, the State and Territorial Air Pollution Program Administrators (STAPPA) and the Association of Local Air Pollution Control Officials (ALAPCO) have undertaken an analysis to illustrate what nationwide emissions caps for nitrogen oxides (NO_x), sulfur dioxide (SO_2) and mercury could result from application of the associations' *Principles for a Multi-Pollutant Strategy for Power Plants*, adopted on May 7, 2002 in support of "an integrated approach for regulating air emissions from electric power plants on an expeditious schedule with synchronized deadlines." As a result, the associations have concluded that application of air pollution control technologies consistent with what various states across the country have committed or proposed to implement over the next decade (i.e., through state permits, court-ordered settlement agreements or state regulations) would achieve the most stringent caps for NO_x, SO_2 and mercury contemplated in prominent national multi-pollutant proposals, with a reasonable margin for flexibility and opportunities for increased power generation.

Below are the results of the associations' analysis (see Table 1) and an explanation of how the analysis was conducted. Attached are more detailed discussion of the NO_x and SO_2 methodology used for this analysis (Attachments 1-2), the results of STAPPA and ALAPCO's analysis presented in comparison to provisions of various national multi-pollutant proposals (Attachment 3) and the full text of STAPPA and ALAPCO's May 7, 2002 *Principles for a Multi-Pollutant Strategy for Power Plants* (Attachment 4).

TABLE 1

Results of Analysis of STAPPA/ALAPCO Multi-Pollutant Principles

	BASELINE EMISSION LEVELS 2001 (tons per year)	INTERIM EMISSION CAPS BY 2008 (tons per year)	EMISSION LEVELS BASED ON BEST AVAILABLE CONTROLS BY 2013 (tons per year)
NO_x	4.7 million	1.87 million	0.88 – 1.26 million
SO_2	10.6 million	4.5 million	1.26 – 1.89 million
Mercury	48	15 – 20	5 – 10

NO_x and SO_2 Emission Caps

According to emission data in EPA's acid rain program data base, in 2001, electric steam generating units (EGUs) emitted 4.7 million tons of NO_x and 10.6 million tons of SO_2. STAPPA and ALAPCO have determined that by applying clearly reasonable levels of today's Best Available Control Technology (BACT), EGU NO_x emissions can be reduced to 0.88 to 1.26 million tons per year by 2013 and EGU SO_2 emissions to 1.26 to 1.89 million tons per year. In the calculations presented in Attachments 1 and 2, which illustrate how these respective NO_x and SO_2 emission cap ranges were derived, the amount of heat input in fuel burned by power plants in 2001 is multiplied by a range of NO_x and SO_2 emission performance levels that reflect today's BACT for new and existing units.

The lower (i.e., more stringent) end of each emission cap range reflects the application to all EGUs, new and existing, of new source BACT, based on permits for new units. The new source BACT selected for this analysis represents a somewhat conservative level that is generally less stringent than the most recent permit applications for coal-fired boilers. The higher (i.e., less stringent) end of each emission cap range reflects the application to all EGUs, new and existing, of the most common emission level for existing sources covered under recent EPA settlement agreements for Prevention of Significant Deterioration cases. Gas and oil BACT levels were conservatively assumed to be the same as for coal.

Because the NO_x and SO_2 emission cap ranges resulting from STAPPA and ALAPCO's relatively conservative analysis are at or below the lowest caps contemplated under various legislative proposals, it is reasonable to conclude that the availability of air pollution control technology is not a limiting factor in enacting any of the caps under consideration. Further, it is important to note that technology will continue to improve over time and, as it does, even lower levels of NO_x and SO_2 emissions will be achievable. Accordingly, the NO_x and SO_2 emission cap ranges calculated by STAPPA and ALAPCO should enable substantial opportunity for emission trading and the addition of significant electric generating capacity. In fact, they would be achievable even if all gas and oil burning in power plants was converted to coal.

STAPPA and ALAPCO did not conduct a quantitative analysis of interim cap levels for NO_x and SO_2. The associations did, however, identify interim caps (1.87 million tons per year NO_x and 4.5 million tons per year SO_2, by 2008) based upon their principles in support of quick and effective action and upon their firm belief that such levels are reasonably achievable in the given timeframe. The interim caps selected, which are consistent with those at the lower end of the range embodied in the various legislative proposals, will also ensure not only progress toward the identified final cap range and plant-specific minimum performance standards, but also more expeditious attainment of the health-based National Ambient Air Quality Standards for ozone and fine particulate matter.

Mercury Emission Caps

With respect to mercury, STAPPA and ALAPCO based their analysis on state actions to reduce mercury emissions. State mercury limits proposed or adopted in Connecticut, Massachusetts and New Jersey will achieve control efficiencies on the order of 90 percent or more, while in Wisconsin, where mostly western coal is used, limits are 80 percent. Accordingly, STAPPA and ALAPCO extrapolated such reductions nationwide, arriving at a national mercury emission cap range of 5 to 10 tons per year by 2013; such a range accommodates both eastern and western coal. Further, this range is consistent with STAPPA and ALAPCO's October 2002 recommendation to the EPA Utility MACT Working Group, which, if implemented nationwide, would result in mercury emissions of less than 7.5 tons per year.

The associations also identified a range for an interim mercury emission cap of 15 to 20 tons per year, to be achieved by 2008. This interim cap range is intended to ensure the introduction at some, though not all, facilities of mercury-specific control technologies; such technologies are not only available, but, in some cases, also have low capital cost (e.g., carbon adsorption systems, which can be installed and operated in less than one year). In addition, significant mercury reductions will be achieved as "collateral" benefits of the NO_x and SO_2 caps.

The 20-ton-per-year level results if mercury reductions are achieved in the same proportion as NO_x and SO_2 reductions under the recommended interim caps for those pollutants. The 15-ton-per-year level reflects a desire to be more progressive in controlling mercury, because it is a hazardous air pollutant. Approximately twice the level that STAPPA and ALAPCO recommended for MACT, a 15-ton-per-year level for mercury is appropriate in the context of a harmonized strategy addressing multiple pollutants.

Attachment 1

Analysis of NO_x Caps Based on BACT

EPA's "Emissions Scorecard 2001" (available at www.epa.gov/airmarkets/emissions/ score01/index.html) includes emissions data for power plants in the Acid Rain Program. EPA updated the emissions data in April 2003 based on audits, quality reviews and acceptance of re-submissions to correct emissions and heat input reporting issues.

Table B-2 of EPA's "Plant-by-plant Summary Data Organized by State" can be downloaded or viewed as a PDF, Excel or text file. The sample format of the Table B-2 is as follows:

State (A)	Plant Name (B)	ORISPL (C)	2001 SO_2 (tons) (D)	2001 CO_2 (tons) (E)	2001 NO_x (tons) (F)	2001 Heat Input (mmBtu) (G)
Alabama	Barry	3	65,902	13,683,577	23,026	147,934,447
Alabama	Charles R Lowman	56	16,726	4,171,010	9,779	40,653,009

2001 NO_x Emissions

Total nationwide NO_x emissions for 2001 (4,699,874 tons/year) are derived by adding all state values reported by EPA in column (F).

EPA's reported nationwide heat input for 2001 (25,223,878,738 mmBtu/yr) is derived by adding all state values identified in column (G).

EPA's reported average NO_x emission rate for 2001 (0.37 lb/mmBtu) is calculated by dividing nationwide NO_x emissions in 2001 by nationwide heat input in 2001, as follows:

$$(4{,}699{,}874 \text{ tons/year} \times 2000 \text{ lb/ton}) \div (25{,}223{,}878{,}738 \text{ mmBtu/year}) = 0.37 \text{ lb/mmBtu}$$

BACT Emission Caps for NO_x

STAPPA and ALAPCO sought to compare this reported average NO_x emission rate to current NO_x BACT levels and to identify appropriate emission rates upon which to base reasonable NO_x emission caps for a multi-pollutant strategy,

The associations first reviewed recent BACT determinations in new source permits. A search of EPA's Clean Air Technology Center RBLC Clearinghouse on the agency's Technology Transfer Network (available at www.epa.gov/ttn/catc) was conducted for utility boilers of more than 250 mmBtu/hr that combust coal, including bituminous, sub-bituminous, anthracite and lignite coal. The last five new source permits issued, and their respective NO_x emission rates, as listed in the RBLC database, are as follows:

Permit Date	RBLC ID	Company and Facility Name	Permitted NO_x Emissions
06/17/2003	IA-0067	MIDAMERICAN ENERGY COMPANY	0.07 LB/MMBTU
10/08/2002	KS-0026	SAND SAGE POWER LLC, HOLC # 2	0.08 LB/MMBTU
09/25/2002	WY-0057	BLACK HILLS CORP, WYGEN # 2	0.07 LB/MMBTU
08/17/1999	MO-0050	KANSAS CITY POWER, HAWTHORN	0.08 LB/MMBTU
06/30/1998	IA-0051	ARCHER DANIELS MIDLAND	0.07 LB/MMBTU

In another, more stringent, example, City Public Service of San Antonio, Texas, has proposed a NO_x emission rate of 0.05 lb/mmBtu for a new 750-MW sub-bituminous coal-fired unit.

To allow for a more conservative analysis, a BACT level of 0.07 lb/mmBtu was selected. This new source emission rate was multiplied by the national heat input for 2001 to calculate the lower end of the NO_x emission cap range, as follows:

(0.07 lb/mmBtu x 25,223,878,738 mmBtu/year) ÷ 2000 lb/ton = **0.88 million tons/year**

Next, the associations reviewed retrofit BACT levels in recent EPA settlement agreements for PSD cases, selecting 0.10 lb/mmBtu for this analysis, because it is readily achievable and represents a typical settlement agreement BACT level for a retrofit (e.g., New Jersey's PSE&G-Hudson SCR).

The upper end of the NO_x emission cap range was then calculated by multiplying this emission rate by the national heat input for 2001, as follows:

(0.10 lb/mmBtu x 25,223,878,738 mmBtu/year) ÷ 2000 lb/ton = **1.26 million tons/year**

It is important to note that the above BACT levels include a compliance margin; that the same BACT levels are used for coal, oil and gas, even though more stringent BACT levels are feasible for gas units and oil units; and that future BACT levels for coal-fired plants will be even lower because of technological advances. Therefore, a NO_x cap within this established range of 0.88 and 1.26 million tons per year by 2013 would still leave significant opportunity for emissions trading and expansion of the amount of electricity generated by coal.

Attachment 2

Analysis of SO_2 Caps Based on BACT

EPA's "Emissions Scorecard 2001" (available at www.epa.gov/airmarkets/emissions/score01/index.html) includes emissions data for power plants in the Acid Rain Program. EPA updated the emissions data in April 2003 based on audits, quality reviews and acceptance of re-submissions to correct emissions and heat input reporting issues.

Table B-2 of EPA's "Plant-by-plant Summary Data Organized by State" can be downloaded or viewed as a PDF, Excel or text file. The sample format of the Table B-2 is as follows:

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Alabama	Barry	3	65,902	13,683,577	23,026	147,934,447
Alabama	Charles R Lowman	56	16,726	4,171,010	9,779	40,653,009

2001 SO_2 Emissions

Total nationwide SO_2 emissions for 2001 (10,634,077 tons/year) are derived by adding all state values reported by EPA in column (D).

EPA's reported nationwide heat input for 2001 (25,223,878,738 mmBtu/year) is derived by adding all state values identified in column (G).

EPA's reported average SO_2 emission rate for 2001 (0.84 lb/mmBtu) is calculated by dividing nationwide SO_2 emissions in 2001 by nationwide heat input in 2001, as follows:

(10,634,077 tons/year x 2000 Lb/Ton) ÷ (25,223,878,738 mmBtu/year) = 0.84 lb/mmBtu

BACT Emission Cap for SO_2

STAPPA and ALAPCO sought to compare this reported average SO_2 emission rate to current SO_2 BACT levels and to identify appropriate emission rates upon which to base reasonable SO_2 emission caps for a multi-pollutant strategy.

The associations first reviewed recent BACT determinations in new source permits. A search of EPA's Clean Air Technology Center RBLC Clearinghouse on the agency's Technology Transfer Network (available at www.epa.gov/ttn/catc) was conducted for utility boilers of more than 250 mmBtu/hr that combust coal, including bituminous, sub-bituminous, anthracite and lignite coal. The last five new source permits issued, and their respective SO_2 emission rates, as listed in the RBLC database, are as follows:

Permit Date	RBLC ID	Company and Facility Name	Permitted NOx Emissions
06/17/2003	IA-0067	MIDAMERICAN ENERGY COMPANY	0.1 LB/MMBTU
10/08/2002	KS-0026	SAND SAGE POWER LLC, HOLC # 2	0.12 LB/MMBTU
09/25/2002	WY-0057	BLACK HILLS CORP, WYGEN # 2	0.1 LB/MMBTU
10/29/2001	PR-0007	AES PURTO RICO, AES-PRCP	0.022 LB/MMBTU
04/08/1999	PA-0176	ORION POWER MIDWEST, LP	0.0857 LB/MMBTU

In another, more stringent, example, City Public Service of San Antonio, Texas, has proposed an SO_2 emission rate of 0.06 lb/mmBtu for a new 750-MW sub-bituminous coal-fired unit.

For this analysis, a BACT level of 0.10 lb/mmBtu was selected, even though it is a conservative BACT level for new plants and, further, the trend is toward taking advantage of technological developments and achieving lower levels. This new source emission rate was multiplied by the national heat input for 2001 to calculate the lower end of the SO_2 emission cap range, as follows:

(0.10 lb/mmBtu x 25,223,878,738 mmBtu/Year) ÷ 2000 lb/ton = **1.26 million tons/year**

Next, the associations reviewed retrofit BACT levels in recent EPA settlement agreements for PSD cases, selecting 0.15 lb/mmBtu for this analysis, because it represents a typical settlement agreement BACT level for a retrofit. Further, worst-case sulfur coal (4% sulfur coal) would yield 6.0 lb/mmBtu SO_2 emissions; with a 97.5-percent efficient wet scrubber, SO_2 emissions after control would be 0.15 lb/mmBtu. In addition, using low-sulfur coal (1% sulfur coal) would yield 1.5 lb/mmBtu SO_2 emissions; with a 90-percent efficient spray dryer, SO_2 emissions after control would be 0.15 lb/mmBtu.

The upper end of the SO_2 emissions cap range was then calculated by multiplying the 0.15 lb/mmBtu emission rate by the national heat input for 2001, as follows:

(0.15 lb/mmBtu x 25,223,878,738 mmBtu/year) ÷ 2000 lb/ton = **1.89 million tons/year**

It is important to note that the above BACT levels include a compliance margin; that the same BACT levels are used for coal, oil and gas, even though more stringent BACT levels are feasible for gas units and oil units; and that future BACT levels for coal-fired plants will be even lower because of technological advances. Therefore, an SO_2 cap with the established range of 1.26 to 1.89 million tons per year by 2013 would still leave significant opportunity for emissions trading and expansion of the amount of electricity generated by coal.

**** INTERNAL DISCUSSION DRAFT ****

Attachment 3

STAPPA/ALAPCO Analysis of the Associations'
May 7, 2002 Principles for a Multi-Pollutant Strategy for Power Plants

January 2004

	Jeffords & Waxman/ Boehlert (S. 5366 & H.R. 2042)	**EPA Straw Proposal (July 2001)**	**Carper/Chafee/Gregg (S. 843)**	**Clear Skies (S. 485 & H.R. 999)**	**Analysis of STAPPA/ALAPCO Multi-Pollutant Principles**
NO_x	1.51 million tons – 2008	1.87 million tons – 2008 1.25 million tons – 2012	1.87 million tons – 2009 1.7 million tons – 2013	2.1 million tons – 2008 1.7 million tons – 2018	1.87 million tons – 2008 0.88-1.26 million tons – 2013
SO_x	2.25 million tons – 2008	2 million tons – 2010	4.5 million tons – 2009 3.5 million tons – 2013 2.25 million tons – 2016	4.5 million tons – 2010 3 million tons – 2018	4.5 million tons – 2008 1.26-1.89 million tons – 2013
Hg	5 tons – 2008 (unit-by-unit controls)	24 tons – 2008 7.5 tons – 2012 (70% facility-specific reduction)	24 tons – 2009 10 tons – 2013 (70% reduction at each facility)	34 tons – 2010 (S 485) 26 tons – 2010 (HR 999) 15 tons – 2018	15-20 tons – 2008 5-10 tons – 2013
Impact on CAA Provisions	Retains CAA provisions	Replaces many major provisions of Act	Replaces several major provisions of Act	Replaces many major provisions of Act	Supplement, but do not supplant, existing provisions of the Act. Allow clean unit-type flexibility for NSR (see S/A principles).

Additional Issues:

1. Include a "birthday" provision for the installation of BACT.
2. Include minimum plant-by-plant performance standards for NO_x, SO_x, Hg, PM and CO by 2013.
3. Implementation of the national SO_2 caps shall not result in emission reductions in the West less than those that would be achieved under the emissions milestones for western states promulgated in the regional haze rules.
4. All regions, states and localities retain the authority to adopt and implement their own, more stringent emission caps for any pollutant (including, but not limited to, a seasonal NO_x cap).

Attachment 4

STAPPA / ALAPCO

STATE AND TERRITORIAL
AIR POLLUTION PROGRAM
ADMINISTRATORS

ASSOCIATION OF
LOCAL AIR POLLUTION
CONTROL OFFICIALS

S. WILLIAM BECKER
EXECUTIVE DIRECTOR

Principles for a Multi-Pollutant Strategy for Power Plants

Adopted by the
State and Territorial Air Pollution Program Administrators
and the
Association of Local Air Pollution Control Officials

May 7, 2002

Introduction

Over the past three decades, since authorization of the first federal Clean Air Act, federal, state and local governments have made significant progress in reducing air pollution in the United States. In the aggregate, emissions of the six "criteria pollutants" for which health-based National Ambient Air Quality Standards (NAAQS) have been established have been reduced by 29 percent while, at the same time, Gross Domestic Product has increased by 158 percent, energy consumption by 45 percent and vehicle miles traveled by 143 percent. Notwithstanding this progress, our nation continues to face substantial public health and environmental problems as a result of emissions into our air.

According to the U.S. Environmental Protection Agency's (EPA's) *Latest Findings on National Air Quality: 2000 Status and Trends* (September 2001), the agency's most recent evaluation of our nation's air quality status and trends, more than 160 million tons of pollution are still emitted into the air each year and approximately 121 million people still reside in areas that exceed at least one of the six health-based NAAQS. This report also points to electric utilities as one of the most significant sources of harmful air emissions, responsible for 64 percent of annual sulfur dioxide (SO_2) emissions, which contribute to acid rain and the formation of fine particulate matter ($PM_{2.5}$), and 26 percent of oxides of nitrogen (NO_x) emissions, which are not only a precursor to ground-level ozone, but also a contributor to such public health and welfare threats as secondary $PM_{2.5}$, acid rain, eutrophication of water bodies and regional haze. EPA also estimates that electric utilities are responsible for 37 percent of the carbon dioxide (CO_2) emissions released in the U.S. (*Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-1998*, April 2000).

Power plants also emit substantial quantities of hazardous air pollutants. EPA's *Study of Hazardous Air Pollutant Emissions from Electric Utility Generating Units – Final Report to Congress* (1998) concludes that electric utility steam generating units emit 67 hazardous air

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pollutants (HAPs), including mercury, arsenic, nickel, hydrogen chloride and dioxins. In fact, electric generating units are the major emitter of hydrochloric acid, which is the HAP emitted in the greatest quantity in the U.S. Electric generators are also one of the largest sources of mercury in this country, responsible for more than one-third of anthropogenic mercury emissions. The persistent and bioaccumulative nature of mercury makes it of particular concern relative to aquatic ecosystems, where it can contaminate aquatic life and pose a serious threat to humans who consume the contaminated species. Based on just such a threat, as of July 2000, at least 41 U.S. states and territories had issued fish consumption advisories for mercury for some or all water bodies in their jurisdictions (*National Air Quality and Emissions Trends Report, 1999)*.

Given the significant contribution of power plant emissions to public health and environmental problems in the U.S., the State and Territorial Air Pollution Program Administrators (STAPPA) and the Association of Local Air Pollution Control Officials (ALAPCO) believe that, if properly structured, a comprehensive, integrated control strategy for electric utilities is an appropriate approach that will offer multiple important benefits.

First, such a multi-faceted approach for power plants will provide an excellent opportunity to address multiple pollutants in an integrated and holistic manner, thus increasing and accelerating environmental and public health protection by yielding far greater environmental gains than those achieved by the various existing programs to which power plants are subject. Such an approach will also enhance opportunities for pollution prevention and sustainability, as well as promote more expeditious compliance.

Second, a comprehensive, integrated approach could offer important advantages to the regulated community in the form of increased certainty and cost efficiencies. Today, the power generation industry is subject to almost a dozen separate programs to reduce air pollution. Many of these programs regulate different pollutants and impose varying compliance deadlines and requirements. An integrated approach could not only provide far greater certainty for the regulated community, it could promote enormous cost efficiencies in developing and implementing control measures for multiple pollutants. For example, EPA has estimated that harmonizing control strategies for NO_x, SO_2 and CO_2 in an integrated fashion could save approximately $4 billion, compared to controlling these pollutants separately (EPA presentation to STAPPA/ALAPCO, October 2000).

Finally, a comprehensive, integrated approach could also increase efficiency and certainty for state and local air quality regulators. These efficiencies would extend not only to devising strategies for addressing air pollution control problems from power generators, but also to reviewing and revising operating permits. Further, litigation that could delay emission reductions and environmental improvements would likely be reduced.

Currently, proposals for multi-pollutant strategies for power plants are under consideration in Congress, as well as in a number of states. As discussion ensues regarding these proposals, STAPPA and ALAPCO offer the following principles upon which the associations believe a viable multi-pollutant approach should be based.

STAPPA/ALAPCO Principles for a Multi-Pollutant Strategy for Power Plants

1. Establish an integrated approach for regulating air emissions from electric power plants on an expeditious schedule with synchronized deadlines.

2. Address all significant emissions from electric power generation.

3. Supplement, but do not supplant, the existing Clean Air Act.

4. Cap emissions from power plants to establish the most stringent enforceable national emission reduction goals feasible, and to reflect the installation of technology no less stringent than best available controls on all existing units nationwide, with each existing power plant required to meet a minimum level of control by the final compliance deadline.

5. Equitably allocate any required emissions allowances to all existing sources; include provisions for new sources.

6. Encourage sources to reduce emissions as soon as possible; if early reductions credits are provided, use of such credits should be appropriately limited.

7. Establish interim and final deadlines to ensure steady progress, with the first interim compliance requirements taking effect quickly.

8. Require new units to acquire any required emissions allowances and to comply with existing New Source Review control technology requirements (i.e., Lowest Achievable Emissions Rate in nonattainment areas and Best Available Control Technology in attainment areas), as well as other existing NSR requirements, including, but not limited to, those for offsets in nonattainment areas and for protection of air quality increments to guard against adverse local air quality impacts in attainment areas.

9. Allow existing sources to make major modifications to existing units, provided best available controls are installed on affected units at the time of the modification, the source acquires any required emissions allowances to address emission increases and there are no adverse local health or environmental impacts.

10. Afford the regulated community flexibility in meeting their required emissions reductions, including an emissions trading mechanism with appropriate limitations and protections against any adverse health or environmental impacts.

11. Establish measures that strongly encourage the most efficient use of any fuel used as input to electric generation or process energy sources, including combined heat and power applications.

12. Encourage energy efficiency, energy conservation and renewable electric energy, such as output-based standards and/or allowance allocations.

13. Support efforts to develop consistent approaches for distributed resources and encourage the use of such approaches by jurisdictions interested in regulating the impacts of small units not otherwise covered by a national multi-pollutant strategy.

14. Retain the authority of regions, states and localities to adopt and/or implement measures that are more stringent than those of the federal government, including retention of local offset requirements.