Technical Support Document

Identification and Discussion of Sources of Regional Point Source NOx and SO2 emissions other than EGUs

Tim Smith and Doug Grano
EPA/OAQPS

John Robbins, Kevin Culligan and Mikhail Adamantiades
EPA/CAMD

January 2004

Contents

1. Introduction

The purpose of this document is to discuss the currently available information on emissions and control measures for non-EGU sources of SO2 and NOx other than boilers and turbines. We conducted this analysis for a region that includes the following 30 States and the District of Columbia: AL, AR, DC, DE, FL, GA, IA, IL, IN, KS, KY, LA, MA, MD, MI, MN, MO, MS, NC, ND, NJ, NY, OH, OK, PA, SC, TN, TX, VA, WI, WV.

In order to gain perspective on emissions and controls from categories other than boilers and turbines, we carried out the following steps. First, we developed a year 2010 projected emissions inventory and identified source categories with the greatest emissions of SO2 and NOx. For relatively high-emitting categories, we searched for available sources of information on potentially applicable control measures and their costs.

2. Discussion of the Emissions Inventory. Identification of Source Categories Emitting More than 1 Percent of the Regional Stationary Source Total

For this analysis, we used a projected year 2010 inventory [projected from a 1996 base year inventory as described in a document entitled "Air Quality Modeling Technical Support Document for the Proposed Interstate Air Quality Rule (January 2004)]." We produced a spreadsheet that includes all the point source emissions units of SO2 and NOx in the 30-State plus D.C. geographic area described above. This spreadsheet is included in the docket, and is entitled "30 State plus DC 2010 combined nonEGU unit level sorted by NOx and SO2 zero emitting taken out." Summaries of the inventory are shown in Table 1 (SO2 summary) and Table 2 (NOx summary).

In examining non-EGU categories for emission reduction opportunities, we identified categories emitting more than one percent of the overall projected SO2 or NOx year 2010 emissions inventory for the geographic area of interest (30 States plus the District of Columbia). For SO2, the total projected year 2010 emissions from stationary sources in this 30-State region are about 13 million tons. For NOx, the total is 6 million tons. Accordingly for SO2, one percent of the inventory is 130,000 tons per year, and for NOx, one percent of the inventory is 60,000 tons per year. Tables 1 and 2 show, **in bold**, the source categories that meet or exceed these levels. In listing source categories for these tables, we attempted to define logical groupings of industries or equipment using the source classification codes (SCCs).

Table 1. Projected Year 2010 Sulfur Dioxide Emissions for non-Utility Point Source in 30 States + the District of Columbia

EMISSIONS CATEGORY/ SCCs included in the category	**Projected Year 2010 SO_2 EMISSIONS (tons per year)**		**% OF TOTAL POINT SOURCE EMISSIONS (12,625,000 tons/yr)**
Boilers			
102XXXXX -Industrial Boilers	***Industrial boiler total : 1,436,000***		11
103XXXXX - Commercial/Institutional	***Commercial/institutional total: 203,000***		1.6
105XXXXX- Space Heaters Commercial/Industrial	*Space heater total: 1,300*		< 0.1
IC engines including combustion turbines (2XXXXXXX)	*Engine and turbine total: 4,800*		< 0.1
Industrial Processes			
301XXXXX	*Chemical mfg (total: 322,000)*		*2.6*
30119701	Olefin production	1,300	<0.1
301005XX	Carbon black production	50, 000	0.4
301032XX	Elemental sulfur production	72,000	0.6
301023XX	**Sulfuric acid manufacturing**	**128, 000**	**1.0**
301900XX	Fuel-fired eq	8,500	<0.1
301999XX	"Other"	45,000	0.4
[all other 301's not listed]	All other 301XXXXX	15,000	0.1
302XXXXX	*Food and agriculture (total = 5, 100)*		<0.1

EMISSIONS CATEGORY/ SCCs included in the category	**Projected Year 2010 SO_2 EMISSIONS (tons per year)**		**% OF TOTAL POINT SOURCE EMISSIONS (12,625,000 tons/yr)**
303XXXXX	*Primary metals (Total: 281,000)*		*2.2*
303001XX and 303000XX	Primary Aluminum	36,000	0.3
303005XX	Primary copper	7, 200	<0.1
303014XX	Barium Ore Processing	3,100	<0.1
303003XX	By-product coke mfg	81,000	0.6
303006XX	Ferroalloy	3,700	<0.1
303008XX	Iron production	24,000	0.2
303009XX	Steel only (not integ ir/steel)	13,000	0.1
303010XX	Primary lead	99,000	0.8
[total from those not listed]	All other 303XXXXX's	14,000	0.1
304XXXXX	*Secondary metals (total: 40,000)*		*0.3*
304020XX	Furnace electrode mfg	15,000	0.1
304004XX	Secondary lead	15,000	0.1
[total from those not listed]	All other 304XXXXX's	10,000	0.1
305XXXXX	*Mineral products (total: 302, 000)*		*2.4*
305006XX,305007XX, 39000201	**Cement-dry, wet, in process coal**	**192,000**	**1.5**
39000203, 305016XX	Lime - kiln, in process coal use	25,000	0.2
30501001	Coalmining cleaning matl handling	9,600	<0.1
305900XX	Fuel fired eq	11,000	0.1
305014XX	Glass melting furnaces	24,000	0.2
[total from those not listed]	All other 305XXXXX's	40,000	0.3
306XXXXX	*Petroleum industry (total: 372,000)*		*3.0*
306002XX	**Catalytic cracking**	**158,000**	**1.3**
306009XX	Flares	24,000	0.2
306008XX and 306888XX	Fugitives	19,000	0.2
306099XX	Incinerators	13,000	0.1
30601401	Coke Calcining	16,000	0.1
306001XX	Process heaters	112,000	0.9
[total from those not listed]	All other 306XXXXX's	30,000	0.3

EMISSIONS CATEGORY/ SCCs included in the category	**Projected Year 2010 SO_2 EMISSIONS (tons per year)**	**% OF TOTAL POINT SOURCE EMISSIONS (12,625,000 tons/yr)**
307XXXXX	*Pulp and Paper (total: 131, 000)*	*1.0*
30700106	Kraft process - Lime kiln 6,400	<0.1
30700104 and 30700110	Kraft process - Recovery furnace 102,000	0.8
307002XX	Pulp mills Sulfite process 7,200	<0.1
[total from those not listed]	All other 307XXXXX's 15,000	0.1
310XXXXX	*Oil and gas production 93,000*	*0.7*
399XXXX	"Misc manufacturing– misc" 11,000	0.1
50XXXXXX	Waste incinerators 16,000	0.1

Table 2. NO_X Sources

EMISSIONS CATEGORY/ SCCs included in the category	**Projected Year 2010 NO_X EMISSIONS (tons per year)**	**% OF TOTAL POINT SOURCE NO_X (6,000,000 tons/yr)**
Boilers		
102XXX -Industrial Boilers	***Industrial boiler total 770,000***	13
103XXX - Commercial/Institutional	***Commercial/institutional total: 73,000***	1.2
105XXXX- Space Heaters Commercial/Industrial	*Space heater total: 3,400*	.1

EMISSIONS CATEGORY/ SCCs included in the category	**Projected Year 2010 NO_X EMISSIONS (tons per year)**	**% OF TOTAL POINT SOURCE NO_X (6,000,000 tons/yr)**
Internal Combustion 2XXXXXXX	*Total internal combustion 739,000*	12
20200201,20200203,20200901, 20300102, 20300202, 20300702, 204003XX	**Combustion turbines 124,000**	**2.1**
	Remainder (assume all are IC engines) 615,000	**10**
Industrial processes		
301XXXXX	*Chemical mfg (total) 184,000*	
301005XX	Carbon black production 6,500	0.1
301900XX	Fuel-fired eq 23,000	0.4
301999XX	"Other" 43,000	0.7
301003XX	Ammonia production 22,000	0.4
301013XX	Nitric acid production 48,000	0.8
[all other 301's not listed]	All other 301XXXXX 41,500	0.7
302XXXXX	*Food and agriculture (total) 6,800*	0.1
303XXXXX	*Primary metals (total) 108,000*	
303003XX	By-product coke mfg 19,000	0.3
303900XX	Fuel fired eq 7,000	0.1
303009XX	Iron production 4,900	0.1
303010XX	Steel only (not integ ir/steel) 24,000	0.4
303023XX	Taconite 46,000	0.8
[total from those not listed]	All other 303XXXXX's 7,000	0.1
304XXXXX	*Secondary metals 18,000*	*0.3*

EMISSIONS CATEGORY/ SCCs included in the category	**Projected Year 2010 NO_X EMISSIONS (tons per year)**	**% OF TOTAL POINT SOURCE NO_X (6,000,000 tons/yr)**
305XXXXX	*Mineral products (total:) 289,000*	4.8
305006XX,305007XX, 39000201	**Cement-dry, wet, in process coal 161,000**	**2.7**
	Lime - kiln, in process coal use 18,000	
39000203, 305016XX		0.3
30501001	Coalmining cleaning matl handling 4,600	0.1
305014XX	**Glass melting furnaces 72,000**	**1.2**
[total from those not listed]	All other 305XXXXX's 33,000	0.5
306XXXXX	*Petroleum industry (total:) 204,000*	*3.4*
30600401	Blowdown systems 4,600	0.1
306002XX	Catalytic cracking 29,000	0.5
306009XX	Flares 6,200	0.1
306001XX	**Process heaters 160,000**	**2.7**
[total from those not listed]	All other 306XXXXX's 4,000	0.1
307XXXXX	*Pulp and Paper (total) 89,000*	1.5
307001XX	Kraft process	
30700106	Lime kiln 18,000	0.3
30700104 and 30700110	Recovery furnace 47,000	0.8
30700105	Smelt dissolving 9,600	0.2
[total from those not listed]	All other 307XXXXX's 14,000	0.2
310XXXXX	*Oil and gas production 57,000*	1.0
390XXXXX	Misc in-process fuel use 28,000	0.5
399XXXX	"Misc manufacturing– misc" 11,000	0.2
50XXXXXX	Waste incinerators 43,000	0.7

3. Discussion of Control Measures for SO2 Source Categories

For a number of source categories, including all of those emitting more than one percent of the point source inventory, we conducted a review to identify available controls. At this point in time, we have not developed cost estimates for these controls, and we are continuing to seek information sufficient to provide for reliable cost estimates.

a. Cement Kilns

For cement kilns, we identified the following potential control measures:

– Fuel switching. While EPA believes it is generally infeasible for cement kilns to switch to natural gas, it may be possible to achieve relatively modest reductions in sulfur dioxide through switching to lower sulfur coal. We are seeking further information on the quantities and sulfur content of coal now used in cement kilns, to allow quantification of potential SO_2 reductions and their cost.

– Flue gas desulfurization. We are aware of studies where others such as the Western Regional Air Partnership (WRAP) have concluded that add-on flue gas desulfurization (FGD) scrubbers are not considered cost-effective, in part due to the inherent control of SO_2 due to the limestone in the kiln. We are seeking any additional information relative to this category, including any engineering reviews that may have been conducted for prevention of significant deterioration (PSD) permits.

b. Petroleum refinery catalytic cracking.

For petroleum refinery catalytic cracking units, we note that sulfur dioxide emissions are being increasingly controlled by FGD scrubbers. Many of these FGD systems are being installed in response to settlements of refinery enforcement cases. We have not yet developed cost estimates for this category, although information may be available to do so.

At present the projected 2010 inventories on which emission reduction opportunities and reductions can be calculated do not reflect the numerous enforcement settlement agreements that are in place. Any calculations of the potential for future reduction opportunities must take this into account.

c. Sulfuric acid manufacturing.

For sulfuric acid manufacturing, our emission inventory source classification codes (SCCs) differentiate emissions units according to their percent recovery, as reported by the source or by the state air agency. In addition, EPA's AP-42 emission factors are related to the percent recovery The source classification codes (SCCs) for sulfuric acid manufacturing, and emission factors, for sulfuric acid manufacturing, are as follows:

SCC Code	% Recovery	Emission factor, lb SO2 per ton of product
3-01-023-18	93	96
3-01-023-16	94	82
3-01-023-14	95	70
3-01-023-12	96	55
3-01-023-10	97	40
3-01-023-08	98	26
3-01-023-06	99	14
3-01-023-04	99.5	7
3-01-023-01	99.7	4

We used these emissions factors and a review of emissions inventory information to obtain a preliminary estimate of the degree to which sulfuric acid manufacturing facilities could reduce their emissions by upgrading the current percent recovery sufficiently to meet the 4 lb/ton new source performance standard (NSPS). Appendix 1 shows an analysis for the potential for such reductions in an area of the eastern United States that included 28 States plus the District of Columbia. From this analysis, it appears that the potential for such reductions would appear to be about ½ the current inventory. Presently, EPA notes that these estimates are somewhat uncertain. Additionally, EPA staff are not aware of any available engineering or cost analysis describing the measures and associated costs required to upgrade to the NSPS from the various possibilities for current conditions (i.e., from 93 to 99.7 percent recovery, from 97 to 99.7 percent recovery, etc).

d. Industrial and Commercial Boilers

There are two primary methods that industrial and commercial boilers could use to reduce emissions of SO2, they could switch to lower sulfur coal or they could install post combustion emission control devices.

Because EPA has limited data on the sulfur content of fuel burned by industrial and commercial boilers, EPA is unable to develop accurate estimates of the amount of emission reductions that could be obtained from switching to lower sulfur coal. The information that EPA has suggests that many of these units are not burning the lowest sulfur coal available and could therefore reduce SO2 emissions by switching to lower sulfur coal. If one assumes that the costs that these units would incur is similar to the costs that an EGU would incur, there may be opportunities for low cost emission reductions from this sector. The costs that these units incur to switch to lower sulfur coal is dependent upon a number of factors including; cost for lower sulfur coal and cost to make any necessary modifications to the boiler needed to burn the lower sulfur coal. Because these boilers are typically owned by companies purchasing significantly less coal than the owners of EGUs, they may not be able to purchase lower sulfur coal at costs as low as the owners of EGUs. Similarly because many industrial and commercial boilers are smaller and run at lower capacity factors, the capital expenditures necessary to switch to lower sulfur coal may be higher. "Preliminary Cost Estimates for Flue Gas Conditioning Retrofits for Industrial Boilers" (located in the docket) details some of the costs an industrial boiler may incur when switching to a lower sulfur coal.

EPA has similar problems making estimates about the cost of installing post combustion SO2 control equipment on industrial boilers. While some industrial boilers (particularly larger boilers, that are frequently operated, that are currently burning higher sulfur coal and that have open space around them for installation of post combustion controls) may have highly cost effective emission reduction opportunities others may not. The cost of reducing SO2 emissions using post combustion control equipment is highly dependant upon: the size of the boiler, the capacity factor of the unit, the sulfur content of the fuel the unit is burning and the ease (or difficulty) of installing post combustion control equipment at the unit. "Preliminary SO2 Control Cost Estimates for Industrial Boilers", (located in the docket) details potential costs for post combustion SO2 controls depending upon the size and capacity factor of the boiler and the sulfur content of the fuel burned by the boiler. It attempts to include the costs of such difficulty in retrofitting post combustion control devices but may not include all costs associated with such difficulty. Furthermore, EPA does not have a good understanding of the costs and operational effects of integrating post combustion SO2 and NOx control technologies for these particular sources. Industrial boiler backend equipment configurations and flue gas temperatures exiting Industrial boilers are different than those generally present with EGUs. These features may also vary greatly among industrial boilers themselves, making it difficult to determine feasibility of some of these technologies and apply one single set of design criteria to them.

4. Discussion of Control Measures for NOx Source Categories

As noted in table 2, [in addition to boilers and combustion turbines] there are four source categories exceeding one percent of the regionwide stationary source inventory for NO_X --cement kilns, internal combustion (IC) engines, process heaters, and glass manufacturing. Unlike SO2, EPA has developed more robust cost estimates for NOx controls. These estimates were discussed in EPA's NOx SIP Call rule, and they reflect in part a number of Available Control Techniques (ACT) documents developed under section 183(c) of the Clean Air Act. As shown in the following table, EPA determined the cost effectiveness of available controls for these source categories (for additional information, see the Regulatory Impact Analysis for the NOx SIP Call, Volume 1, Section 7, September 1998).

Source category	$/ton NOx reduced (ozone season 1990$)
cement kilns	1,500
glass manufacturing	2,020
process heaters	2,900
stationary IC engines	1,200

The emissions budgets for EPA's NO_X SIP Call rule (63 FR 57417) reflect highly cost-effective emission reductions for large cement kilns and IC engines, in addition to those for large industrial boilers and turbines. In the NOx SIP Call rule, "large" cement kilns and IC engines means sources emitting greater than one ton NOx per day (ozone season average). That is, in States covered by the NOx SIP Call rule, the required NOx budgets were calculated, in part, assuming emission reductions at large sources in these 4 source categories. At the time of the NO_X SIP Call, we did not determine that highly cost effective NO_X emission reductions were available from large process heaters or glass manufacturing, as their estimated cost per ton exceeded our "highly cost effective" definition of $2000 per ton (1990$) .

We describe below three possible approaches for obtaining NOx reductions beyond those calculated in the NOx SIP Call rule with respect to non-EGU point sources. (Non-EGU boilers and turbines are discussed later in this section.)

1. Extend the NOx SIP Call level of control to States not covered by the NOx SIP Call rule but covered by the IAQR. Under this approach, the affected statewide NOx budgets would reflect emissions reductions at large cement kilns and IC engines. This approach would affect the following States: AR, FL, IA, KS, LA, MN, MS, ND, OK, TX, & WI. We estimate the NOx emission reduction would be up to about 77,000 tons per year.[1]

2. Calculate emission reductions at cement kilns and IC engines which are larger than 100 tons per year. Under this approach, additional NO_X emission reductions would be obtained by reducing the NOx SIP Call cutoff for IC engines and cement kilns to 100 tons/year (from 365 tons/year or 1 ton/day). Sources of this size will generally be subject to NO_X control in ozone nonattainment areas under the RACT requirements of the Clean Air Act. This approach would affect the following States: AR, FL, IA, KS, LA, MN, MS, ND, OK, TX, & WI. In addition, this calculation would affect units emitting between 100-365 tons/year in following NOx SIP Call states: AL, GA, IL, IN, KY, MI, MO, NC,

[1] IC engines emitting greater than 364 tons/year in the 11 states total emissions of 76,066. A 90% reduction gives a 68,459 ton/year reduction. Cement kilns emitting more than 364 tons/year in the 11 states account for 27,035 tons/year. A 30% control level results in a reduction of 8,111 tons/year. These estimates assume the units are currently uncontrolled.

OH, SC, TN, VA, & WV. We estimate the emission reduction to be up to about 252,000 tons per year in the 11 States.[2] In addition, in the NOx SIP Call States (not including OTC States which have already implemented NOx RACT) we estimate another 50,000 tons/year.[3]

3. Apply RACT controls in all States covered by the IAQR. Under this approach, reductions could be obtained by applying NO_X RACT statewide for all NO_X sources greater than 100 tons per year. This RACT requirement may be separate or in addition to requirements of options 1 or 2 above and is similar to RACT requirements already being implemented in the Northeast Ozone Transport Region.

Opportunities for reductions in emissions at glass manufacturing and process heaters are modest because the inventory of NOx emissions is relatively small. We estimate a potential emissions reduction from large units in these 2 categories to be about 33,000 tons/year.[4]

Industrial and Commercial Boilers:

There are two primary methods that industrial and commercial boilers could use to reduce emissions of NOx: they could install combustion controls (e.g., low-NOx burners) or they could install post combustion emission control devices. EPA has developed estimates of the cost of Nox reduction technologies for these sources. "Preliminary Nox Control Cost Estimates for Industrial Boilers" (located in the docket) details these costs.

As with SO2 controls, there are a number of uncertainties associated with the estimates for this sector. First, because EPA does not possess actual capacity factor data for all of the sources in this sector, EPA had to assume capacity factors in order to estimate costs. Such estimates are difficult to accurately estimate for this particular sector due to the wide variety of operating characteristics of these sources. For example, capacity factors for this sector can range from near zero (standby units) up to 100% as well as anywhere in between these extremes. In

---

[2] 1,267 IC engines emitting greater than 100 tons/year in the 11 states total emissions of 270,068. A 90% reduction gives a 243,061 ton/year reduction. 32 cement kilns emitting more than 100 tons/year in the 11 states account for 28,585 tons/year. A 30% control level results in a reduction of 8,576 tons/year. These estimates assume the units are currently uncontrolled.

[3] 283 IC engines emitting between 100-365 tons/year have total emissions of 54,506. A 90% reduction gives a 49,055 ton/year reduction. 8 cement kilns emitting between 100-365 tons/year account for 1,615 tons/year. A 30% control level results in a reduction of 484 tons/year. These estimates assume the units are currently uncontrolled.

[4] Emissions in the 30 State area from glass manufacturing and process heaters above 364 tons/year are estimated to be 48,297 and 62,477 tons/year, respectively. Assuming a 30% control level, the emission reduction would be about 33,000 tons/year.

comparison, utility boilers typically operate with high capacity factors.

Second, similar to post-combustion SO2 controls, space constraints have the potential of complicating or making installation of SCR technology infeasible.

Third, EPA's current inventories of industrial boilers in the SIP call region do not reflect all the NOx control technologies planned as a result of the SIP call. As a result, the NOx emission rates used to develop cost estimates for these sources are not based on full implementation of the SIP call.

Last, EPA does not have a good understanding of the costs and operational effects of integrating post combustion SO2 and NOx control technologies for these particular sources. Industrial boiler backend equipment configurations and flue gas temperatures exiting industrial boilers are different than those generally present with EGUs. These features may also vary greatly among industrial boilers themselves, making it difficult to determine feasibility of some of these technologies and apply one single set of design criteria to them.

Appendix 1. Preliminary Estimates of Potential SO2 Reductions from Sulfuric Acid Manufacturing

FIPSST	PLANTID	POINT ID	SCC		SIC	SO2_ ANN	Subgrouping	Available controls	Annual SO2
48	0031	097	30102201	General	2911	1,032			
17	1217	005	30102201	General	2819	119			
37	0071	014	30102301	Absorber/@ 99.9% Conversion	2874	3,053			
12	0059	042	30102301	Absorber/@ 99.9% Conversion	2874	1,745			
12	0055	004	30102301	Absorber/@ 99.9% Conversion	2874	1,705			
12	0059	044	30102301	Absorber/@ 99.9% Conversion	2874	1,691			
37	0071	011	30102301	Absorber/@ 99.9% Conversion	2874	1,682			
12	0055	005	30102301	Absorber/@ 99.9% Conversion	2874	1,677			
12	0053	005	30102301	Absorber/@ 99.9% Conversion	2874	1,543			
12	0046	032	30102301	Absorber/@ 99.9% Conversion	2874	1,541			
12	0059	004	30102301	Absorber/@ 99.9% Conversion	2874	1,529			
12	0046	033	30102301	Absorber/@ 99.9% Conversion	2874	1,512			
12	0059	003	30102301	Absorber/@ 99.9% Conversion	2874	1,508			
37	0071	012	30102301	Absorber/@ 99.9% Conversion	2874	1,502			
12	0005	007	30102301	Absorber/@ 99.9% Conversion	2874	1,499			
12	0008	005	30102301	Absorber/@ 99.9% Conversion	2874	1,484			
12	0046	012	30102301	Absorber/@ 99.9% Conversion	2874	1,478			
12	0059	002	30102301	Absorber/@ 99.9% Conversion	2874	1,474			
12	0008	006	30102301	Absorber/@ 99.9% Conversion	2874	1,413			
12	0005	003	30102301	Absorber/@ 99.9% Conversion	2874	1,405			
22	0004	008	30102301	Absorber/@ 99.9% Conversion	2874	1,330			
12	0005	004	30102301	Absorber/@ 99.9% Conversion	2874	1,263			
12	0002	022	30102301	Absorber/@ 99.9% Conversion	2874	1,214			
12	0048	002	30102301	Absorber/@ 99.9% Conversion	2874	1,129			
12	0053	004	30102301	Absorber/@ 99.9% Conversion	2874	1,008			
48	0010	002	30102301	Absorber/@ 99.9% Conversion	2819	1,004			
12	0002	021	30102301	Absorber/@ 99.9% Conversion	2874	999			
12	0051	017	30102301	Absorber/@ 99.9% Conversion	2874	905			
12	0051	016	30102301	Absorber/@ 99.9% Conversion	2874	859			
12	0053	003	30102301	Absorber/@ 99.9% Conversion	2874	769			
37	0071	013	30102301	Absorber/@ 99.9% Conversion	2874	685			

12	0057	005	30102301	Absorber/@ 99.9% Conversion	2874	510				
48	0001	277	30102301	Absorber/@ 99.9% Conversion	2911	204				
17	0104	120	30102301	Absorber/@ 99.9% Conversion	2911	167				
42	0032	614	30102301	Absorber/@ 99.9% Conversion	3339	153				
22	0005	042	30102301	Absorber/@ 99.9% Conversion	2911	86				
22	0016	01M	30102301	Absorber/@ 99.9% Conversion	2911	70				
22	0005	0Z3	30102301	Absorber/@ 99.9% Conversion	2911	16				
12	0005	008	30102301	Absorber/@ 99.9% Conversion	2874	4				
22	0016	05E	30102301	Absorber/@ 99.9% Conversion	2911	2				
48	0001	278	30102301	Absorber/@ 99.9% Conversion	2911	0	42,970	99.9% conv	None	0
18	0242	003	30102304	Absorber/@ 99.5% Conversion	2819	1,339				
12	0005	003	30102304	Absorber/@ 99.5% Conversion	2874	900				
12	0005	002	30102304	Absorber/@ 99.5% Conversion	2874	805				
47	0004	017	30102304	Absorber/@ 99.5% Conversion	3331	778				
48	0029	009	30102304	Absorber/@ 99.5% Conversion	2874	625				
28	0044	01	30102304	Absorber/@ 99.5% Conversion	2874	127				
29	0001	045	30102304	Absorber/@ 99.5% Conversion	2879	108	4,681	99.5% conv	3/7=42% reduction to get to NSPS of 4/ lb/ton	2006
17	0100	002	30102306	Absorber/@ 99.0% Conversion	3339	2,820				
47	0004	021	30102306	Absorber/@ 99.0% Conversion	3331	478				
12	0052	006	30102306	Absorber/@ 99.0% Conversion	2874	345				
28	0044	02	30102306	Absorber/@ 99.0% Conversion	2874	216	3,859	99.0% conv	10/14= 71%	2756
22	0007	001	30102308	Absorber/@ 98.0% Conversion	2819	10,665				
22	0028	001	30102308	Absorber/@ 98.0% Conversion	2819	9,613				
22	0033	002	30102308	Absorber/@ 98.0% Conversion	2819	7,827				
48	0037	011	30102308	Absorber/@ 98.0% Conversion	2819	7,579				
22	0004	005	30102308	Absorber/@ 98.0% Conversion	2874	5,357				
48	0037	008	30102308	Absorber/@ 98.0% Conversion	2819	4,555				
22	0004	007	30102308	Absorber/@ 98.0% Conversion	2874	3,474				
22	0004	006	30102308	Absorber/@ 98.0% Conversion	2874	3,244				
22	0033	003	30102308	Absorber/@ 98.0% Conversion	2819	2,742				
39	5054	001	30102308	Absorber/@ 98.0% Conversion	2819	2,491				
21	0001	001	30102308	Absorber/@ 98.0% Conversion	2819	2,305				
12	0008	004	30102308	Absorber/@ 98.0% Conversion	2874	1,401				

51	0078	002	30102308	Absorber/@ 98.0% Conversion	2819	1,157			
10	0032	011	30102308	Absorber/@ 98.0% Conversion	2819	739			
10	0032	028	30102308	Absorber/@ 98.0% Conversion	2819	483			
13	0077	004	30102308	Absorber/@ 98.0% Conversion	2873	471			
13	0008	001	30102308	Absorber/@ 98.0% Conversion	2819	454			
13	0077	003	30102308	Absorber/@ 98.0% Conversion	2873	328			
40	1468	001	30102308	Absorber/@ 98.0% Conversion	2819	234			
55	0083	P01	30102308	Absorber/@ 98.0% Conversion	2869	127			
39	5001	005	30102308	Absorber/@ 98.0% Conversion	2819	10	65,256 98% conv	22/26 reduction=	55217
01	5009	004	30102310	Absorber/@ 97.0% Conversion	2819	2,386			
22	0004	057	30102310	Absorber/@ 97.0% Conversion	2819	828			
39	5048	003	30102310	Absorber/@ 97.0% Conversion	2819	357	3,571 97% conv	36/40 reduction=	3214
51	0026	14A	30102314	Absorber/@ 95.0% Conversion	2869	670	670 95% conv	66/70 reduction=	632
22	0005	017	30102318	Absorber/@ 93.0% Conversion	4911	1,614			
22	0005	016	30102318	Absorber/@ 93.0% Conversion	4911	1,529			
54	0002	021	30102318	Absorber/@ 93.0% Conversion	3312	225			
39	5048	004	30102318	Absorber/@ 93.0% Conversion	2819	194			
42	0035	107	30102318	Absorber/@ 93.0% Conversion	2816	27	3,589 93% conv	92/96 reduction=	3440
48	0038	001	30102319	Concentrator	2819	391			
22	0006	002	30102319	Concentrator	2873	9			
48	0038	004	30102321	Storage Tank Vent	2819	7			
22	0033	013	30102321	Storage Tank Vent	2819	1			
48	0011	139	30102322	Process Equipment Leaks	2869	160			
22	0004	034	30102322	Process Equipment Leaks	2874	7			
22	0005	041	30102322	Process Equipment Leaks	4911	4			
48	0038	008	30102322	Process Equipment Leaks	2819	1			
22	0003	007	30102399	Other Not Classified	2819	625			
47	0092	003	30102399	Other Not Classified	3339	597			
10	0032	027	30102399	Other Not Classified	2819	107			
10	0032	029	30102399	Other Not Classified	2819	20			
10	0032	036	30102399	Other Not Classified	2819	6			
10	0032	074	30102399	Other Not Classified	2819	5			
24	0109	034	30102399	Other Not Classified	2816	3			
22	0005	025	30102399	Other Not Classified	4911	1			

22	0005	026	30102399	Other Not Classified	4911	1		
10	0032	031	30102399	Other Not Classified	2819	1		
							The current **TOTAL**	126,543 tons
							could possibly be reduced by	67265 tons
							to a level of	59,279 tons
							if all plants met the 4 lb/ton NSPS level	