Technical Support Document (TSD)

for the Transport Rule

Docket ID No. EPA-HQ-OAR-2009-0491

Non-EGU Emissions Reductions Cost and Potential

U.S. Environmental Protection Agency

Office of Air and Radiation

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1. Introduction

The purpose of this document is to discuss the currently available information on emissions and control measures for sources of SO_2 and NO_X other than electric generating units (EGUs). We discuss relative contributions of nonEGU categories to emissions inventories, control measures for the most important categories, and finally the effect of current and future rulemakings on emissions from nonEGU sources.

In section 2, we present and discuss 2012 emissions totals and inventory percentages for non-EGU stationary sources categories. We present contribution percentages across the eastern half of the United States, and for individual states.

In section 3, we discuss available information on SO_2 controls for sources with the greatest contributions to the regional or state-specific inventories.

In section 4, we discuss available information on NOx controls for sources with the greatest contributions to the regional or state-specific inventories and also present estimates of available NOx reductions using EPA's Control Strategy Tool (CoST).

Section 5 is a brief discussion of SO_2 and NO_X emissions and control measures for mobile sources.

2. Discussion of NonEGU Contributions to Overall Regional and State-by-State Emissions Inventories

a. SO_2

EPA reviewed its emissions inventory for 2005 and 2012 for stationary sources. Generally the emissions from the nonEGU sector were similar for these two years, both in terms of tons/year of emissions and in terms of the percentage of the stationary source inventory contributed by a given category.

Table 1 shows the contributions from point source categories for 2012 over the 37-state region of the United States addressed by the proposed rule. Categories are identified in the first column by EPA Source Classification Code (SCC), and in the second column by name. For each of the point source categories included in the table, we list the 2012 SO2 emissions (tons/yr), and the percentage that a given tons/year represents over the entire 37-state stationary source total. Because the 37-state total is 2,926,000 tons, as indicated in the second row, each percentage listed in the table is a percentage of this value. For some categories, the percentages are provided only by a more disaggregated 3-digit SCC level. For the largest contributing 3-digit SCCs, we provide for breakdowns to a more disaggregated level.

Observations from table 1:
-- The largest contributors to the point source inventory are external combustion boilers, chemical manufacturing (particularly carbon black and sulfuric acid manufacturing), minerals production (particularly cement), petroleum industry sources, and pulp and paper (particular Kraft pulp mills).
-- The emissions inventory breakdowns in this table are very similar to those EPA found at the time of CAIR, and which are summarized in a document entitled "Identification and Discussion of Sources of Regional Point Source NOx and SO2 emissions other than EGUs. EPA OAQPS and CAMD, January 2004.
-- In EPA's current inventories nonpoint sources are a significant contributor the overall stationary source inventory. For the 2012 inventory, point sources account for only about 60% of the overall stationary source total.

At this time, EPA has not prepared a detailed breakdown of the 2012 nonpoint SO_2 inventory. We do, however, have such a breakdown for the 2005 inventory as identified in Table 2. Table 2 indicates that the largest contributors to the 2005 nonpoint SO2 inventory are nonpoint industrial, commercial and institutional fuel combustion and residential heating. EPA notes there is significant uncertainty in the nonpoint estimates in the inventory, particularly regarding those estimates for nonpoint coal combustion.

Table 3 provides information on individual state contributions to the SO_2 inventory for those States affected by the Transport Rule. In table 3, we list source category emissions in each state "linked" to a downwind nonattainment PM2.5 nonattainment area. Source categories, including stationary (point and nonpoint) and mobile source categories, are included in table 3 if the contribute more than 1 percent of the total non fire emissions in

a given state. EGU emissions are included in the "total nonfire" amount, but are not listed in the table. Observations from table 3:

-- the source categories that have the greatest emissions contributions regionally as shown in tables 1 and 2 are generally the same categories that comprise more than 1 percent of a given state's SO_2 inventory.

-- in a few states (generally those with low EGU emissions) nonEGU sources are a significant portion of the overall state inventory. For example, in MA and CT, residential fuel combustion represents 32 and 47 percent, respectively, of those's states total 2012 SO_2 inventory. In LA, carbon black and other chemical plants represent more than 30 percent of the non-EGU point emissions inventory.

Table 1. 2012[1] Point Source SO_2 Contributions for 37 Eastern States

scc	Sccdesc	2012 SO2 emissions at 3-digit level	2012 SO2 Emissions more detailed breakdown	Percentage of 37-State sum of nonEGU Stationary (37-state sum includes nonpoint)	
	GRAND 37-state sum of Non-EGU Stationary Inventory = 2,926,000 tons				
	Unclassified NonEGU Point	5,025	5,025	0.2%	0.2%
101	External Combustion Boilers: Electric Generation: Total	46,071		1.6%	
101XXXXX	External Combustion Boilers: Electric Generation: Other		1,161		0.0%
101002	External Combustion Boilers: Electric Generation: Bituminous/Subbituminous Coal		40,068		1.4%
101004	External Combustion Boilers: Electric Generation: Residual Oil		1,533		0.1%
101009	External Combustion Boilers: Electric Generation: Wood/Bark Waste		1,675		0.1%
101012	External Combustion Boilers: Electric Generation: Solid Waste		1,634		0.1%
102	External Combustion Boilers: Industrial: Total	711,687		24.3%	
102XXXXX	External Combustion Boilers: Industrial: Other		1,134		0.0%
102001	External Combustion Boilers: Industrial: Anthracite Coal		2,382		0.1%
102002	External Combustion Boilers: Industrial: Bituminous/Subbituminous Coal		483,005		16.5%
102003	External Combustion Boilers: Industrial: Lignite		7,104		0.2%
102004	External Combustion Boilers: Industrial: Residual Oil		98,007		3.3%
102005	External Combustion Boilers: Industrial: Distillate Oil		6,872		0.2%
102006	External Combustion Boilers: Industrial: Natural Gas		28,126		1.0%
102007	External Combustion Boilers: Industrial: Process Gas		34,401		1.2%
102008	External Combustion Boilers: Industrial: Petroleum Coke		17,840		0.6%
102009	External Combustion Boilers: Industrial: Wood/Bark Waste		24,242		0.8%
102012	External Combustion Boilers: Industrial: Solid Waste		4,703		0.2%
102013	External Combustion Boilers: Industrial: Liquid Waste		2,613		0.1%
102014	External Combustion Boilers: Industrial: CO Boiler		1,257		0.0%

[1] For all of the 2012 point source emissions presented in this document, the source of the emissions estimates is EPA's 2012 base case inventory used for this transport rule. Further documentation of the 2012 inventory is available in another Technical Support Document entitled "Federal Transport Rule Phase 1 (TR1) Emissions Inventory for Air Quality Modeling"

scc	Sccdesc	2012 SO2 emissions at 3-digit level	2012 SO2 Emissions more detailed breakdown	Percentage of 37-State sum of nonEGU Stationary (37-state sum includes nonpoint)	
103	External Combustion Boilers: Commercial/Institutional: Total	87,528		3.0%	
103XXXXX	External Combustion Boilers: Commercial/Institutional: Other		1,758		0.1%
103002	External Combustion Boilers: Commercial/Institutional: Bituminous/Subbituminous Coal		61,444		2.1%
103004	External Combustion Boilers: Commercial/Institutional: Residual Oil		11,507		0.4%
103005	External Combustion Boilers: Commercial/Institutional: Distillate Oil		11,579		0.4%
103006	External Combustion Boilers: Commercial/Institutional: Natural Gas		1,240		0.0%
105	External Combustion Boilers: Space Heaters: Total	343	343	0.0%	0.0%
201	Internal Combustion Engines: Electric Generation: Total	2,656	2,656	0.1%	0.1%
202	Internal Combustion Engines: Industrial: Total	3,567	3,567	0.1%	0.1%
203	Internal Combustion Engines: Commercial/Institutional: Total	1,191	1,191	0.0%	0.0%
204	Internal Combustion Engines: Engine Testing: Total	373	373	0.0%	0.0%
260	Internal Combustion Engines: Off-highway 2-stroke Gasoline Engines: Total	14	14	0.0%	0.0%
270	Internal Combustion Engines: Off-highway Diesel Engines: Total	10	10	0.0%	0.0%
273	Internal Combustion Engines: Off-highway LPG-fueled Engines: Total	0	0	0.0%	0.0%
275	Internal Combustion Engines: Fixed Wing Aircraft L & TO Exhaust: Total	0	0	0.0%	0.0%
276	Internal Combustion Engines: Rotary Wing Aircraft L & TO Exhaust: Total	0	0	0.0%	0.0%
288	Internal Combustion Engines: Fugitive Emissions: Total	12	12	0.0%	0.0%
301	Industrial Processes: Chemical Manufacturing: Total	216,652		7.4%	
301XXXXX	Industrial Processes: Chemical Manufacturing: Other		4,622		0.2%
301005	Industrial Processes: Chemical Manufacturing: Carbon Black Production		74,153		2.5%
301016	Industrial Processes: Chemical Manufacturing: Phosphoric Acid: Wet Process		8,687		0.3%
301018	Industrial Processes: Chemical Manufacturing: Plastics Production		1,529		0.1%
301023	Industrial Processes: Chemical Manufacturing: Sulfuric Acid (Contact Process)		88,153		3.0%
301032	Industrial Processes: Chemical Manufacturing: Elemental Sulfur Production		5,775		0.2%
301035	Industrial Processes: Chemical Manufacturing: Inorganic Pigments		1,342		0.0%
301900	Industrial Processes: Chemical Manufacturing: Fuel Fired Equipment		6,325		0.2%
301999	Industrial Processes: Chemical Manufacturing: Other Not Classified		26,066		0.9%
302	Industrial Processes: Food and Agriculture: Total	6,629	6,629	0.2%	0.2%
303	Industrial Processes: Primary Metal Production: Total	136,612		4.7%	

scc	Sccdesc	2012 SO2 emissions at 3-digit level	2012 SO2 Emissions more detailed breakdown	Percentage of 37-State sum of nonEGU Stationary (37-state sum includes nonpoint)	
303XXXXX	Industrial Processes: Primary Metal Production: Other		419		0.0%
303001	Industrial Processes: Primary Metal Production: Aluminum Ore (Electro-reduction)		34,135		1.2%
303003	Industrial Processes: Primary Metal Production: By-product Coke Manufacturing		21,500		0.7%
303006	Industrial Processes: Primary Metal Production: Ferroalloy, Open Furnace		2,876		0.1%
303008	Industrial Processes: Primary Metal Production: Iron Production (See 3-03-015 for Integrated Iron & Steel MACT)		9,757		0.3%
303009	Industrial Processes: Primary Metal Production: Steel Manufacturing (See 3-03-015 for Integrated Iron & Steel MACT)		5,671		0.2%
303010	Industrial Processes: Primary Metal Production: Lead Production		41,840		1.4%
303023	Industrial Processes: Primary Metal Production: Taconite Iron Ore Processing		3,475		0.1%
303024	Industrial Processes: Primary Metal Production: Metal Mining (General Processes)		2,305		0.1%
303030	Industrial Processes: Primary Metal Production: Zinc Production		3,804		0.1%
303900	Industrial Processes: Primary Metal Production: Fuel Fired Equipment		10,829		0.4%
304	Industrial Processes: Secondary Metal Production: Total	26,630	26,630	0.9%	0.9%
305	Industrial Processes: Mineral Products: Total	241,590		8.3%	
305XXXXX	Industrial Processes: Mineral Products: Other		3,546		0.1%
305001	Industrial Processes: Mineral Products: Asphalt Roofing Manufacture		1,023		0.0%
305002	Industrial Processes: Mineral Products: Asphalt Concrete		4,929		0.2%
305003	Industrial Processes: Mineral Products: Brick Manufacture		11,094		0.4%
305006	Industrial Processes: Mineral Products: Cement Manufacturing (Dry Process)		84,812		2.9%
305007	Industrial Processes: Mineral Products: Cement Manufacturing (Wet Process)		59,767		2.0%
305009	Industrial Processes: Mineral Products: Clay and Fly Ash Sintering		4,303		0.1%
305010	Industrial Processes: Mineral Products: Coal Mining, Cleaning, and Material Handling (See 305310)		1,793		0.1%
305012	Industrial Processes: Mineral Products: Fiberglass Manufacturing		1,228		0.0%
305014	Industrial Processes: Mineral Products: Glass Manufacture		16,533		0.6%
305016	Industrial Processes: Mineral Products: Lime Manufacture		31,923		1.1%
305017	Industrial Processes: Mineral Products: Mineral Wool		2,565		0.1%
305029	Industrial Processes: Mineral Products: Lightweight Aggregate Manufacture		3,119		0.1%
305092	Industrial Processes: Mineral Products: Catalyst Manufacturing		1,181		0.0%
305150	Industrial Processes: Mineral Products: Calcining		11,623		0.4%

scc	Sccdesc	2012 SO2 emissions at 3-digit level	2012 SO2 Emissions more detailed breakdown	Percentage of 37-State sum of nonEGU Stationary (37-state sum includes nonpoint)	
305999	Industrial Processes: Mineral Products: Other Not Defined		2,151		0.1%
306	Industrial Processes: Petroleum Industry: Total	119,849		4.1%	
306XXXXX	Industrial Processes: Petroleum Industry: Other		1,558		0.1%
306001	Industrial Processes: Petroleum Industry: Process Heaters		11,953		0.4%
306002	Industrial Processes: Petroleum Industry: Catalytic Cracking Units		29,570		1.0%
306004	Industrial Processes: Petroleum Industry: Blowdown Systems		3,463		0.1%
306006	Industrial Processes: Petroleum Industry: Vacuum Distillate Column Condensors		788		0.0%
306008	Industrial Processes: Petroleum Industry: Fugitive Emissions		7,373		0.3%
306009	Industrial Processes: Petroleum Industry: Flares		12,794		0.4%
306014	Industrial Processes: Petroleum Industry: Petroleum Coke Calcining		28,321		1.0%
306033	Industrial Processes: Petroleum Industry: Desulfurization		2,787		0.1%
306099	Industrial Processes: Petroleum Industry: Incinerators		11,327		0.4%
306888	Industrial Processes: Petroleum Industry: Fugitive Emissions		939		0.0%
306999	Industrial Processes: Petroleum Industry: Petroleum Products - Not Classified		8,977		0.3%
307	Industrial Processes: Pulp and Paper and Wood Products: Total	56,601		1.9%	
307XXXXX	Industrial Processes: Pulp and Paper and Wood Products: Other		1,272		0.0%
307001	Industrial Processes: Pulp and Paper and Wood Products: Sulfate (Kraft) Pulping		52,768		1.8%
307002	Industrial Processes: Pulp and Paper and Wood Products: Sulfite Pulping		2,561		0.1%
308	Industrial Processes: Rubber and Miscellaneous Plastics Products: Total	11	11	0.0%	0.0%
309	Industrial Processes: Fabricated Metal Products: Total	148	148	0.0%	0.0%
310	Industrial Processes: Oil and Gas Production: Total	43,686		1.5%	
310XXXXX	Industrial Processes: Oil and Gas Production: Other		1,136		0.0%
310002	Industrial Processes: Oil and Gas Production: Natural Gas Production		39,580		1.4%
310003	Industrial Processes: Oil and Gas Production: Natural Gas Processing Facilities		2,971		0.1%
312	Industrial Processes: Machinery, Miscellaneous: Total	10	10	0.0%	0.0%
313	Industrial Processes: Electrical Equipment: Total	210	210	0.0%	0.0%
314	Industrial Processes: Transportation Equipment: Total	32	32	0.0%	0.0%
315	Industrial Processes: Photo Equip/Health Care/Labs/Air Condit/SwimPools: Total	5	5	0.0%	0.0%
316	Industrial Processes: Photographic Film Manufacturing: Total	0	0	0.0%	0.0%

scc	Sccdesc	2012 SO2 emissions at 3-digit level	2012 SO2 Emissions more detailed breakdown	Percentage of 37-State sum of nonEGU Stationary (37-state sum includes nonpoint)	
330	Industrial Processes: Textile Products: Total	8	8	0.0%	0.0%
360	Industrial Processes: Printing and Publishing: Total	0	0	0.0%	0.0%
385	Industrial Processes: Cooling Tower: Total	39	39	0.0%	0.0%
390	Industrial Processes: In-process Fuel Use: Total	25,855	25,855	0.9%	0.9%
399	Industrial Processes: Miscellaneous Manufacturing Industries: Total	28,160	28,160	1.0%	1.0%
401	Petroleum and Solvent Evaporation: Organic Solvent Evaporation: Total	11	11	0.0%	0.0%
402	Petroleum and Solvent Evaporation: Surface Coating Operations: Total	129	129	0.0%	0.0%
403	Petroleum and Solvent Evaporation: Petroleum Product Storage at Refineries: Total	260	260	0.0%	0.0%
404	Petroleum and Solvent Evaporation: Petroleum Liquids Storage (non-Refinery): Total	18	18	0.0%	0.0%
405	Petroleum and Solvent Evaporation: Printing/Publishing: Total	15	15	0.0%	0.0%
406	Petroleum and Solvent Evaporation: Transportation and Marketing of Petroleum Products: Total	204	204	0.0%	0.0%
407	Petroleum and Solvent Evaporation: Organic Chemical Storage: Total	70	70	0.0%	0.0%
408	Petroleum and Solvent Evaporation: Organic Chemical Transportation: Total	5	5	0.0%	0.0%
490	Petroleum and Solvent Evaporation: Organic Solvent Evaporation: Total	382	382	0.0%	0.0%
501	Waste Disposal: Solid Waste Disposal - Government: Total	9,445	9,445	0.3%	0.3%
502	Waste Disposal: Solid Waste Disposal - Commercial/Institutional: Total	3,419	3,419	0.1%	0.1%
503	Waste Disposal: Solid Waste Disposal - Industrial: Total	2,588	2,588	0.1%	0.1%
504	Waste Disposal: Site Remediation: Total	30	30	0.0%	0.0%
625	MACT Source Categories: Food and Agricultural Processes: Total	132	132	0.0%	0.0%
646	MACT Source Categories: Vinyl-based Resins: Total	0	0	0.0%	0.0%
648	MACT Source Categories: Miscellaneous Polymers: Total	0	0	0.0%	0.0%
682	MACT Source Categories: Miscellaneous Processes: Total	1	1	0.0%	0.0%
684	MACT Source Categories: Miscellaneous Processes (Chemicals): Total	0	0	0.0%	0.0%
TOTALS		1,772,888	1,772,888	60.6%	60.6%

Table 2. Nonpoint contributions to 2005 SO2 Stationary Source Inventory from 37 Eastern States

SCC	Nonpoint Category	2005 SO2 Emissions from the category	% of 2005 Stationary Source Inventory
2102	Stationary Source Fuel Combustion: Industrial	675,124	22.0%
2103	Stationary Source Fuel Combustion: Commercial/Institutional	209,583	6.8%
2104	Stationary Source Fuel Combustion: Residential	164,398	5.4%
2199	Stationary Source Fuel Combustion: Total Area Source Fuel Combustion	25,241	0.8%

Table 3. 2012 SO_2 Annual Emissions for NonEGU Point, Nonpoint, and Mobile Source Categories That Comprise More Than 1 Percent of Total Non-Fire Emissions from States Significantly Contributing to PM2.5 Under the Proposed Transport Rule

State in Eastern US	SCC	Source Category	Percentage of State's Entire non-Fire Inventory[a] (%)	Percentage of State's Entire non-Fire Inventory[a] (%) – more detailed breakdown	2012 SO2 Emissions at 3-digit SCC level (Tons per Year)	2012 SO2 Emissions – More detailed Breakdown (Tons per Year)
Alabama	210400	Stationary Source Fuel Combustion – Commercial/Institutional		8.6		38,919
	310	Oil and Gas Production	3.5		15,892	
	310002	Oil and Gas Production – Natural Gas		2.9		13,505
	102	External Combustion Boilers:Industrial	3.2		14,620	
	210200	Stationary Source Fuel Combustion - Industrial		2.7		12,673
	307	Pulp and Paper/Wood Products	2.6		11,793	
	307001	Pulp and Paper/Wood Products – Kraft Pulping		2.6		11,752
	305	Mineral Products	1.6		8,325	
	304	Secondary Metal	1.4		6,285	
	301	Chemical Manufacturing	1.2		5,732	
	303	Primary Metal	1.1		4,871	
Connecticut						
	210400	Stationary Source Fuel Combustion – Residential		46.9		12,354
	210300	Stationary Source Fuel Combustion – Commercial/Institutional		22.1		5,808
	501	Waste Disposal: Solid Waste Disposal – Govt.	2.8		737	
	102	External Combustion Boilers:Industrial	2.6		681	
	102004	External Combustion Boilers:Industrial: Residual Oil		2.5		652

	103	External Combustion Boilers:Commercial/Institutional Boilers	1.4		363	
		Onroad Mobile	1.3		330	
Delaware						
	102	External Combustion Boilers:Industrial	35.1		8,699	
	102002	External Combustion Boilers:Bituminous/Subbituminous Coal		19.9		4,921
	102004	External Combustion Boilers:Industrial: Residual Oil		12.5		3,086
	210200	Stationary Source Fuel Combustion – Industrial		12.5		3,089
	210300	Stationary Source Fuel Combustion – Commercial/Institutional		7.1		1,779
	306	Petroleum Industry	5.7		1,415	
	306009	Petroleum Industry – Flares		1.9		480
	210400	Stationary Source Fuel Combustion – Residential		3.9		989
	301	Chemical Manufacturing	1.0		272	
District of Columbia						
	210300	Stationary Source Fuel Combustion – Commercial/Institutional		51.4		1,180
	210400	Stationary Source Fuel Combustion – Residential		15.1		347
	103	External Combustion Boilers:Commercial/Institutional Boilers	3.0		69	
	103005	External Combustion Boilers:Commercial/Institutional Boilers – Distillate Oil		2.9		67
		Onroad	1.8		41	

Florida						
	301	Chemical Manufacturing	9.5		34,036	
	301023	Chemical Manufacturing - Sulfuric Acid Plants		9.3		33,284
	219	Stationary Source Fuel Combustion – Area Source	7.0		25,194	
	210200	Stationary Source Fuel Combustion – Industrial		6.9		24,901
	210300	Stationary Source Fuel Combustion – Commercial/Institutional		5.5		19,671
	102	External Combustion Boilers:Industrial	3.6		13,062	
	102004	External Combustion Boilers:Industrial:Residual Oil		1.6		5,651
	102002	External Combustion Boilers:Industrial: Bituminous/Subbituminous Coal		1.4		5,127
	307	Pulp and Paper and Wood Products	1.2		4,458	
Georgia						
	210200	Stationary Source Fuel Combustion – Industrial		8.2		54,757
	102	External Combustion Boilers:Industrial	6.1		40,912	
	102002	External Combustion Boilers:Industrial:Bituminous/Subbituminous Coal	3.7		24,954	
Illinois	102	External Combustion Boilers:Industrial	6.3		54,267	
	102002	External Combustion Boilers:Industrial :Bituminous/Subbituminous Coal		6.1		52,552
	306	Petroleum Industry	3.0		25,571	
	301	Chem. Manufacturing	1.4		12,526	
	103	External Combustion Boilers: Commercial/Institutional	1.1		9,312	
	103002	External Combustion Boilers:		1.1		9,253

		Commercial/Institutional: Bituminous/Subbituminous Coal				
Indiana						
	210200	Stationary Source Fuel Combustion – Industrial		5.2		54,651
	102	External Combustion Boilers:Industrial	3.0		29,501	
	102002	External Combustion Boilers:Industrial: Bituminous/Subbituminous Coal		1.7		17,135
	303	Primary Metals	2.6		25,614	
	103	Commercial/Institutional Boilers	1.9		18,955	
	103002	Commercial/Institutional Boilers – Bituminous/Subbituminous Coal		1.2		11,473
	305	Mineral Products	1.0		10,327	
Iowa						
	102	External Combustion Boilers:Industrial	13.5		33,930	
	102002	External Combustion Boilers:Industrial Bituminous/Subbituminous Coal		13.1		32,817
	305	Mineral Products	6.4		16,022	
	305006	Mineral Products – Cement Manufacturing (Dry Process)		6.2		15,643
	210300	Stationary Source Fuel Combustion – Commercial/Institutional		4.3		10,725
	210200	Stationary Source Fuel Combustion – Industrial		2.4		5,962
	103	External Combustion Boilers:Commercial/Institutional Boilers	2.2		5,363	
	103002	External Combustion Boilers: Commercial/Institutional:Bituminous/Subbituminous Coal		2.1		5,184
	210400	Stationary Source Fuel Combustion – Residential		1.1		2,641
Kansas						
	210200	Stationary Source Fuel Combustion –		22.2		24,220

		Industrial				
	280	Agricultural Production – Crops	10.0		10,937	
	305	Mineral Products	4.7		5,162	
	305006	Mineral Products – Cement Manufacturing (Dry)		2.1		2,311
	305007	Mineral Products – Cement Manufacturing (Wet)		1.2		1,302
	306	Petroleum Industry	3.0		3,396	
	301	Chem. Manufacturing	2.0		2,205	
	301005	Chem. Manufacturing – Carbon Black Production		1.9		2,107
	102	External Combustion Boilers:Industrial	1.0		1,047	
Kentucky						
	210200	Stationary Source Fuel Combustion – Industrial		14.8		26,484
	303	Primary Metal	1.1		8,226	
Louisiana						
	301	Chem. Manufacturing	34.6		90,994	
	301005	Chem. Manufacturing – Carbon Black Production		17.7		46,465
	301023	Chem. Manufacturing – Sulfuric Acid Production		7.3		19,268
	306	Petroleum Industry	7.4		19,415	
	102	External Combustion Boilers:Industrial	6.5		16,972	
	102008	External Combustion Boilers:Industrial: Petroleum Coke		3.2		8,541
	304	Secondary Metal	3.7		9,842	
	305	Mineral Products	2.5		6,451	
	307	Pulp and Paper/Wood Products	2.1		5,498	
	307001	Pulp and Paper/Wood Products – Kraft Pulping		2.1		5,463

Maryland						
	210200	Stationary Source Fuel Combustion – Industrial		21.7		30,952
	102	External Combustion Boilers:Industrial	17.2		21,540	
	102002	External Combustion Boilers:Industrial Bituminous/Subbituminous Coal		15.2		19,083
	303	Primary Metals	4.7		5,885	
	303001	Primary Metals – Aluminum Ore		2.6		3,253
	303008	Primary Metals – Iron Production		2.1		2,624
	210300	Stationary Source Fuel Combustion – Commercial/Institutional		3.9		4,988
	210400	Stationary Source Fuel Combustion – Residential		3.5		4,508
	305	Mineral Products	3.1		3,902	
Massachusetts						
	210400	Stationary Source Fuel Combustion – Residential		32.7		20,196
	102	External Combustion Boilers:Industrial	19.0		11,748	
	102004	External Combustion Boilers:Industrial : Residual Oil		16.5		10,212
	103	External Combustion Boilers: Commercial/Institutional Boilers	7.2		4,451	
	103004	External Combustion Boilers: Commercial/Institutional Boilers: Residual Oil		3.9		2,414
	103005	External Combustion Boilers: Commercial/Institutional: Distillate Oil		2.6		1,592
	210300	Stationary Source Fuel Combustion – Commercial/Institutional		5.7		3,542
	305	Mineral Products	1.3		810	
	501	Waste Disposal: Solid Waste Disposal – Government	1.2		780	

	203	Internal Combustion Engines - Commercial/Institutional	1.2		730	
Michigan						
	210200	Stationary Source Fuel Combustion – Industrial		9.5		38,416
	305	Mineral Products	7.2		29,276	
	305006	Mineral Products – Cement Manufacturing (Dry)		4.8		19,698
	305007	Mineral Products – Cement Manufacturing (Wet)		1.7		7,129
	102	External Combustion Boilers:Industrial	6.6		26,705	
	102002	External Combustion Boilers:Industrial: Bituminous/Subbituminous Coal		5.5		22,503
	303	Primary Metals	1.5		6,197	
Minnesota						
	102	External Combustion Boilers:Industrial	12.6		11,879	
	102002	External Combustion Boilers:Industrial: Bituminous/Subbituminous Coal		6.7		6,314
	102004	External Combustion Boilers:Industrial External Combustion Boilers:Industrial : Residual Oil		2.8		2,629
	102008	External Combustion Boilers: Petroleum Coke		2.7		2,539
	210200	Stationary Source Fuel Combustion – Industrial		7.0		10,747
	390	Industrial Processes: In-Process Fuel Use	2.9		2,715	
	305	Mineral Products	2.4		2,279	
	210400	Stationary Source Fuel Combustion – Residential		1.5		2,266
	304	Secondary Metal	1.9		1,766	
	103	External Combustion Boilers: Commercial/Institutional	1.7		1,631	
	399	Miscellaneous Manufacturing	1.6		1,495	

	501	Waste Disposal: Solid Waste Disposal – Government	1.0		979	
Missouri						
	303	Primary Metal	8.1		46,346	
	303010	Primary Metal – Lead Production		7.3		41,840
	210200	Stationary Source Fuel Combustion – Industrial		5.8		33,291
	305	Mineral Products	2.9		16,423	
	305006	Mineral Products – Cement Manufacturing (Dry)		1.4		7,939
	102	External Combustion Boilers:Industrial		1.7		9,636
	102002	External Combustion Boilers:Industrial: Bituminous/Subbituminous Coal		1.6		9,219
	210300	Stationary Source Fuel Combustion – Commercial/Institutional		1.6		9,293
Nebraska						
	210200	Stationary Source Fuel Combustion – Industrial		18.1		28,333
	305	Mineral Products	3.1		4,853	
	305006	Mineral Products – Cement Manufacturing (Dry)		3.0		4,776
New Jersey						
	210400	Stationary Source Fuel Combustion – Residential		12.3		6,883
	210300	Stationary Source Fuel Combustion – Commercial/Institutional		6.0		3,348
	301	Chemical Manufacturing	3.9		2,164	
	301023	Chemical Manufacturing – Sulfuric Acid		3.8		2,135

		Manufacturing				
	501	Waste Disposal: Solid Waste Disposal – Govt.	1.9		1,047	
	102	External Combustion Boilers:Industrial	1.4		810	
	399	Misc. Industrial Processes	1.3		754	
	305	Mineral Products	1.3		732	
New York						
	210200	Stationary Source Fuel Combustion – Industrial		12.9		42,774
	210400	Stationary Source Fuel Combustion – Residential		10.6		35,026
	210300	Stationary Source Fuel Combustion – Commercial/Institutional		10.5		34,667
	102	External Combustion Boilers:Industrial	8.2		27,025	
	102002	External Combustion Boilers:Industrial : Bituminous/Subbituminous Coal		7.0		22,971
	305	Mineral Products	5.9		19,468	
	305007	Mineral Products – Cement Manufacturing (Wet)		5.5		18,129
North Carolina						
	102	External Combustion Boilers:Industrial	14.2		30,562	
	102005	External Combustion Boilers:Industrial: Distillate Oil		7.5		16,271
	102002	External Combustion Boilers:Industrial: Bituminous/Subbituminous Coal		4.8		10,418
	210200	Stationary Source Fuel Combustion – Industrial		4.9		10,638
	301	Chemical Manufacturing	3.6		7,856	
	301023	Chemical Manufacturing – Sulfuric Acid Production		3.1		6,762
	305	Mineral Products	1.9		4,170	
	307	Pulp and Paper and Wood Products	1.2		2,507	

Ohio						
	102	External Combustion Boilers:Industrial	6.8		73,031	
	102002	External Combustion Boilers:Industrial: Bituminous/Subbituminous Coal		6.3		67,313
	305	Mineral Products	1.2		14,308	
Pennsylvania						
	102	External Combustion Boilers:Industrial	2.7		30,729	
	102002	External Combustion Boilers:Industrial : Bituminous/Subbituminous Coal		1.8		19,813
	210400	Stationary Source Fuel Combustion – Residential		2.6		30,334
	305	Mineral Products	2.0		22,328	
	210300	Stationary Source Fuel Combustion – Commercial/Institutional		1.7		19,235
	210200	Stationary Source Fuel Combustion – Industrial		1.6		18,247
South Carolina						
	210200	Stationary Source Fuel Combustion – Industrial		12.0		25,344
	102	External Combustion Boilers:Industrial	7.3		15,483	
	102002	External Combustion Boilers:Industrial: Bituminous/Subbituminous Coal		4.1		8,577
	305	Mineral Products	3.6		7,638	
	305006	Mineral Products – Cement Manufacturing (Dry)		2.0		4,327
	307	Pulp and Paper/Wood Products	2.1		4,514	
	307001	Pulp and Paper/Wood Products – Kraft Pulping		2.1		4,466
	303001	Primary Metals (All from Aluminum Ore)		1.5		3,197

Tennessee						
	102	External Combustion Boilers:Industrial	6.7		47,170	
	102002	External Combustion Boilers:Industrial : Bituminous/Subbituminous Coal		5.7		40,646
	210200	Stationary Source Fuel Combustion – Industrial		4.4		31,143
	103	External Combustion Boilers: Commercial/Institutional	2.1		14,579	
	103002	External Combustion Boilers: Commercial/Institutional Boilers Bituminous/Subbituminous Coal		2.0		14,347
Virginia						
	102	External Combustion Boilers:Industrial	13.9		34,463	
	102002	External Combustion Boilers:Industrial:Bituminous/Subbituminous Coal		8.0		19,767
	102004	External Combustion Boilers: Industrial: Residual Oil		4.0		10,042
	2102002	Stationary Source Fuel Combustion – Industrial		7.3		18,135
	399	Misc. Industrial Processes	3.6		8,883	
	210300	Stationary Source Fuel Combustion – Commercial/Institutional		3.2		7,911
	210400	Stationary Source Fuel Combustion – Residential		2.6		6,343
	305	Mineral Products	2.2		5,392	
	303	Primary Metal Production	2.0		4,974	
	303003	Primary Metal Production – By-Product Coke Manufacturing		1.9		4,820
	307	Pulp and Paper/Wood Products	2.0		4,854	
	307001	Pulp and Paper/Wood Products – Kraft Pulping		1.9		4,807

	301	Chem. Manufacturing	1.0		2,362	
West Virginia						
	102	External Combustion Boilers:Industrial	3.6		22,934	
	102002	External Combustion Boilers:Industrial Bituminous/Subbituminous Coal		3.3		21,378
	210200	Stationary Source Fuel Combustion – Industrial		1.4		9,544
	306	Petroleum Industry	1.3		8,647	
	306014	Petroleum Industry – Petroleum Coke Calcining		1.3		8,539
Wisconsin						
	102	External Combustion Boilers:Industrial	32.7		59,141	
	102002	External Combustion Boilers:Industrial : Bituminous/Subbituminous Coal		28.0		50,600
	210400	Stationary Source Fuel Combustion – Residential		1.9		3,491

[a] The non-fire emissions inventory refers to all emissions in the NEI except those from fires (natural wildfires and prescribed burning).

b. NO_X

Table 4 shows the contributions from point source categories for 2012 over the 37-state region of the United States addressed by the proposed rule. Categories are identified in the first column by EPA Source Classification Code (SCC), and in the second column by name. For each of the point source categories included in the table, we list the 2012 NO_X emissions (tons/yr), and the percentage that a given tons/year represents over the entire 37-state stationary source total. Because the 37-state total is 3,205,261 tons, as indicated in the second row, each percentage listed in the table is a percentage of this value. For some categories, the percentages are provided only by a more disaggregated 3-digit SCC level. For the largest contributing 3-digit SCCs, we provide for breakdowns to a more disaggregated level. Observations from table 4:

-- the largest emitting point source categories are: external combustion (industrial, commercial and institutional) boilers, IC engines, chemical manufacturing (from a variety of different SCCs), primary metals production, mineral products (especially cement production), petroleum industry, kraft pulp mills, and municipal incineration.

-- As was the case for SO_2, the emissions inventory breakdowns in this table are very similar to those EPA found at the time of CAIR, and which are summarized in a document entitled "Identification and Discussion of Sources of Regional Point Source NOx and SO2 emissions other than EGUs. EPA OAQPS and CAMD, January 2004.

Table 5 provides information on individual state contributions to the NO_X inventory for those States affected by the Transport Rule. In table 5, we list source category emissions in each state "linked" to a downwind nonattainment PM2.5 or ozone nonattainment area. Source categories, including stationary (point and nonpoint) and mobile source categories, are included in table 5 if the contribute more than 1 percent of the total non fire emissions in a given state. EGU emissions are included in the "total nonfire" amount, but are not listed in the table. Observations from table 5:

-- the source categories that exceed 1 percent of individual states' entire inventory (from table 5) are generally the same as those the are the largest emitting categories in table 4. A few additional categories exceed 1 percent in some states; for example, residential fuel combustion in a number of states, and agricultural crop production in Kansas.

-- the largest contribution to the inventory in most states is onroad and nonroad mobile sources.

Table 4. 2012 Point Source NOx Contributions for 37 Eastern States

scc	Sccdesc	2012 NO_X emissions at 3-digit SCC level (tons/yr)	2012 NOX emissions,more detailed breakdown (tons/yr)	Percentage of 37-State sum of nonEGU Stationary (37-state sum includes nonpoint)	
	GRAND 37-state sum of Non-EGU Stationary Inventory	**3,205,261**			
	Unclassified NonEGU Point	51,893	51,893	1.6%	
101	External Combustion Boilers: Electric Generation: Total	34,914			1.1%
101XXXXX	External Combustion Boilers: Electric Generation: Other		1,037		0.0%
101002	External Combustion Boilers: Electric Generation: Bituminous/Subbituminous Coal		11,135		0.3%
101006	External Combustion Boilers: Electric Generation: Natural Gas		9,945		0.3%
101007	External Combustion Boilers: Electric Generation: Process Gas		891		0.0%
101009	External Combustion Boilers: Electric Generation: Wood/Bark Waste		5,832		0.2%
101012	External Combustion Boilers: Electric Generation: Solid Waste		6,074		0.2%
102	External Combustion Boilers: Industrial: Total	419,006		13.1%	
102XXXXX	External Combustion Boilers: Industrial: Other		1,754		0.1%
102002	External Combustion Boilers: Industrial: Bituminous/Subbituminous Coal		156,479		4.9%
102003	External Combustion Boilers: Industrial: Lignite		5,535		0.2%
102004	External Combustion Boilers: Industrial: Residual Oil		37,431		1.2%
102005	External Combustion Boilers: Industrial: Distillate Oil		4,206		0.1%
102006	External Combustion Boilers: Industrial: Natural Gas		109,595		3.4%
102007	External Combustion Boilers: Industrial: Process Gas		28,426		0.9%
102008	External Combustion Boilers: Industrial: Petroleum Coke		3,442		0.1%
102009	External Combustion Boilers: Industrial: Wood/Bark Waste		57,560		1.8%
102011	External Combustion Boilers: Industrial: Bagasse		2,319		0.1%
102012	External Combustion Boilers: Industrial: Solid Waste		5,520		0.2%
102013	External Combustion Boilers: Industrial: Liquid Waste		3,344		0.1%
102014	External Combustion Boilers: Industrial: CO Boiler		3,395		0.1%
103	External Combustion Boilers: Commercial/Institutional: Total	49,539		1.5%	
103XXXXX	External Combustion Boilers: Commercial/Institutional: Other		966		0.0%
103002	External Combustion Boilers: Commercial/Institutional: Bituminous/Subbituminous Coal		15,988		0.5%

scc	Sccdesc	2012 NO_X emissions at 3-digit SCC level (tons/yr)	2012 NOX emissions,more detailed breakdown (tons/yr)	Percentage of 37-State sum of nonEGU Stationary (37-state sum includes nonpoint)	
103004	External Combustion Boilers: Commercial/Institutional: Residual Oil		5,549		0.2%
103005	External Combustion Boilers: Commercial/Institutional: Distillate Oil		6,661		0.2%
103006	External Combustion Boilers: Commercial/Institutional: Natural Gas		16,192		0.5%
103009	External Combustion Boilers: Commercial/Institutional: Wood/Bark Waste		4,183		0.1%
105	External Combustion Boilers: Space Heaters: Total	4,008		0.1%	
201	Internal Combustion Engines: Electric Generation: Total	29,931		0.9%	
202	Internal Combustion Engines: Industrial: Total	491,743		15.3%	
202XXXXX	Internal Combustion Engines: Industrial: Other		1,315		0.0%
202001	Internal Combustion Engines: Industrial: Distillate Oil (Diesel)		8,867		0.3%
202002	Internal Combustion Engines: Industrial: Natural Gas		472,777		14.8%
202004	Internal Combustion Engines: Industrial: Large Bore Engine		8,784		0.3%
203	Internal Combustion Engines: Commercial/Institutional: Total	21,899		0.7%	
204	Internal Combustion Engines: Engine Testing: Total	6,412		0.2%	
260	Internal Combustion Engines: Off-highway 2-stroke Gasoline Engines: Total	5		<0.1%	
270	Internal Combustion Engines: Off-highway Diesel Engines: Total	77		<0.1%	
273	Internal Combustion Engines: Off-highway LPG-fueled Engines: Total	21		<0.1%	
275	Internal Combustion Engines: Fixed Wing Aircraft L & TO Exhaust: Total	1		<0.1%	
276	Internal Combustion Engines: Rotary Wing Aircraft L & TO Exhaust: Total	5		<0.1%	
288	Internal Combustion Engines: Fugitive Emissions: Total	330		<0.1%	
301	Industrial Processes: Chemical Manufacturing: Total	78,456		2.4%	
301XXXXX	Industrial Processes: Chemical Manufacturing: Other		8,043		0.3%
301003	Industrial Processes: Chemical Manufacturing: Ammonia Production		9,583		0.3%
301005	Industrial Processes: Chemical Manufacturing: Carbon Black Production		11,421		0.4%
301006	Industrial Processes: Chemical Manufacturing: Charcoal Manufacturing		1,605		0.1%
301013	Industrial Processes: Chemical Manufacturing: Nitric Acid		7,539		0.2%
301018	Industrial Processes: Chemical Manufacturing: Plastics Production		1,955		0.1%
301023	Industrial Processes: Chemical Manufacturing: Sulfuric Acid (Contact Process)		1,596		0.0%
301035	Industrial Processes: Chemical Manufacturing: Inorganic Pigments		1,190		0.0%
301197	Industrial Processes: Chemical Manufacturing: Butylene, Ethylene, Propylene, Olefin Production		2,770		0.1%
301900	Industrial Processes: Chemical Manufacturing: Fuel Fired Equipment		20,935		0.7%

scc	Sccdesc	2012 NO_X emissions at 3-digit SCC level (tons/yr)	2012 NOX emissions,more detailed breakdown (tons/yr)	Percentage of 37-State sum of nonEGU Stationary (37-state sum includes nonpoint)	
301999	Industrial Processes: Chemical Manufacturing: Other Not Classified		11,819		0.4%
302	Industrial Processes: Food and Agriculture: Total	4,847		0.2%	
303	Industrial Processes: Primary Metal Production: Total	57,332		1.8%	
303XXXXX	Industrial Processes: Primary Metal Production: Other		935		0.0%
303002	Industrial Processes: Primary Metal Production: Aluminum Hydroxide Calcining		1,028		0.0%
303003	Industrial Processes: Primary Metal Production: By-product Coke Manufacturing		11,142		0.3%
303006	Industrial Processes: Primary Metal Production: Ferroalloy, Open Furnace		1,882		0.1%
303008	Industrial Processes: Primary Metal Production: Iron Production (See 3-03-015 for Integrated Iron & Steel MACT)		4,197		0.1%
303009	Industrial Processes: Primary Metal Production: Steel Manufacturing (See 3-03-015 for Integrated Iron & Steel MACT)		15,135		0.5%
303023	Industrial Processes: Primary Metal Production: Taconite Iron Ore Processing		16,132		0.5%
303900	Industrial Processes: Primary Metal Production: Fuel Fired Equipment		6,881		0.2%
304	Industrial Processes: Secondary Metal Production: Total	11,920		0.4%	
305	Industrial Processes: Mineral Products: Total	301,826		9.4%	
305XXXXX	Industrial Processes: Mineral Products: Other		5,443		0.2%
305002	Industrial Processes: Mineral Products: Asphalt Concrete		5,621		0.2%
305003	Industrial Processes: Mineral Products: Brick Manufacture		2,843		0.1%
305006	Industrial Processes: Mineral Products: Cement Manufacturing (Dry Process)		120,385		3.8%
305007	Industrial Processes: Mineral Products: Cement Manufacturing (Wet Process)		54,555		1.7%
305008	Industrial Processes: Mineral Products: Ceramic Clay/Tile Manufacture		1,119		0.0%
305009	Industrial Processes: Mineral Products: Clay and Fly Ash Sintering		2,763		0.1%
305010	Industrial Processes: Mineral Products: Coal Mining, Cleaning, and Material Handling (See 305310)		2,245		0.1%
305012	Industrial Processes: Mineral Products: Fiberglass Manufacturing		4,718		0.1%
305014	Industrial Processes: Mineral Products: Glass Manufacture		59,999		1.9%
305016	Industrial Processes: Mineral Products: Lime Manufacture		36,970		1.2%
305020	Industrial Processes: Mineral Products: Stone Quarrying - Processing (See also 305320)		1,092		0.0%
305029	Industrial Processes: Mineral Products: Lightweight Aggregate Manufacture		1,556		0.0%

scc	Sccdesc	2012 NO_X emissions at 3-digit SCC level (tons/yr)	2012 NOX emissions,more detailed breakdown (tons/yr)	Percentage of 37-State sum of nonEGU Stationary (37-state sum includes nonpoint)	
305900	Industrial Processes: Mineral Products: Fuel Fired Equipment		2,517		0.1%
306	Industrial Processes: Petroleum Industry: Total	69,753		2.2%	
306XXXXX	Industrial Processes: Petroleum Industry: Other		2,406		0.1%
306001	Industrial Processes: Petroleum Industry: Process Heaters		44,577		1.4%
306002	Industrial Processes: Petroleum Industry: Catalytic Cracking Units		13,449		0.4%
306003	Industrial Processes: Petroleum Industry: Catalytic Cracking Units		480		0.0%
306004	Industrial Processes: Petroleum Industry: Blowdown Systems		2,022		0.1%
306009	Industrial Processes: Petroleum Industry: Flares		2,441		0.1%
306014	Industrial Processes: Petroleum Industry: Petroleum Coke Calcining		2,834		0.1%
306999	Industrial Processes: Petroleum Industry: Petroleum Products - Not Classified		1,546		0.0%
307	Industrial Processes: Pulp and Paper and Wood Products: Total	72,069		2.2%	
307XXXXX	Industrial Processes: Pulp and Paper and Wood Products: Other		3,296		0.1%
307001	Industrial Processes: Pulp and Paper and Wood Products: Sulfate (Kraft) Pulping		58,833		1.8%
307002	Industrial Processes: Pulp and Paper and Wood Products: Sulfite Pulping		2,545		0.1%
307007	Industrial Processes: Pulp and Paper and Wood Products: Plywood Operations		2,050		0.1%
307010	Industrial Processes: Pulp and Paper and Wood Products: Oriented Strandboard (OSB) Manufacture		1,753		0.1%
307013	Industrial Processes: Pulp and Paper and Wood Products: Miscellaneous Paper Products		1,740		0.1%
307900	Industrial Processes: Pulp and Paper and Wood Products: Fuel Fired Equipment		1,853		0.1%
308	Industrial Processes: Rubber and Miscellaneous Plastics Products: Total	1,926		0.1%	
309	Industrial Processes: Fabricated Metal Products: Total	2,121		0.1%	
310	Industrial Processes: Oil and Gas Production: Total	26,132		0.8%	
312	Industrial Processes: Machinery, Miscellaneous: Total	80		<0.1%	
313	Industrial Processes: Electrical Equipment: Total	99		<0.1%	
314	Industrial Processes: Transportation Equipment: Total	434		<0.1%	
315	Industrial Processes: Photo Equip/Health Care/Labs/Air Condit/SwimPools: Total	7		<0.1%	
316	Industrial Processes: Photographic Film Manufacturing: Total	105		<0.1%	
320	Industrial Processes: Leather and Leather Products: Total	1		<0.1%	
330	Industrial Processes: Textile Products: Total	305		<0.1%	

scc	Sccdesc	2012 NO_X emissions at 3-digit SCC level (tons/yr)	2012 NOX emissions,more detailed breakdown (tons/yr)	Percentage of 37-State sum of nonEGU Stationary (37-state sum includes nonpoint)	
360	Industrial Processes: Printing and Publishing: Total	4		<0.1%	
385	Industrial Processes: Cooling Tower: Total	19		<0.1%	
390	Industrial Processes: In-process Fuel Use: Total	47,781		1.5%	
390XXXXX	Industrial Processes: In-process Fuel Use: Other		3,238		0.1%
390002	Industrial Processes: In-process Fuel Use: Bituminous Coal		3,791		0.1%
390004	Industrial Processes: In-process Fuel Use: Residual Oil		1,014		0.0%
390006	Industrial Processes: In-process Fuel Use: Natural Gas		35,418		1.1%
390007	Industrial Processes: In-process Fuel Use: Process Gas		4,321		0.1%
399	Industrial Processes: Miscellaneous Manufacturing Industries: Total	32,528		1.0%	
399XXXXX	Industrial Processes: Miscellaneous Manufacturing Industries: Other		204		0.0%
399007	Industrial Processes: Miscellaneous Manufacturing Industries: Process Heater/Furnace		2,830		0.1%
399900	Industrial Processes: Miscellaneous Manufacturing Industries: Miscellaneous Manufacturing Industries		3,297		0.1%
399999	Industrial Processes: Miscellaneous Manufacturing Industries: Miscellaneous Industrial Processes		26,197		0.8%
401	Petroleum and Solvent Evaporation: Organic Solvent Evaporation: Total	13		<0.1%	
402	Petroleum and Solvent Evaporation: Surface Coating Operations: Total	5,212		0.2%	
403	Petroleum and Solvent Evaporation: Petroleum Product Storage at Refineries: Total	197		<0.1%	
404	Petroleum and Solvent Evaporation: Petroleum Liquids Storage (non-Refinery): Total	392		<0.1%	
405	Petroleum and Solvent Evaporation: Printing/Publishing: Total	384		<0.1%	
406	Petroleum and Solvent Evaporation: Transportation and Marketing of Petroleum Products: Total	356		<0.1%	
407	Petroleum and Solvent Evaporation: Organic Chemical Storage: Total	160		<0.1%	
408	Petroleum and Solvent Evaporation: Organic Chemical Transportation: Total	24		<0.1%	
490	Petroleum and Solvent Evaporation: Organic Solvent Evaporation: Total	263		<0.1%	
501	Waste Disposal: Solid Waste Disposal - Government: Total	62,001		1.9%	
501XXXXX	Waste Disposal: Solid Waste Disposal - Government: Other		77		0.0%
501001	Waste Disposal: Solid Waste Disposal - Government: Municipal Incineration		57,454		1.8%
501004	Waste Disposal: Solid Waste Disposal - Government: Landfill Dump		2,512		0.1%
501005	Waste Disposal: Solid Waste Disposal - Government: Other Incineration		1,958		0.1%

scc	Sccdesc	2012 NO_X emissions at 3-digit SCC level (tons/yr)	2012 NOX emissions,more detailed breakdown (tons/yr)	Percentage of 37-State sum of nonEGU Stationary (37-state sum includes nonpoint)	
502	Waste Disposal: Solid Waste Disposal - Commercial/Institutional: Total	4,329		0.1%	
503	Waste Disposal: Solid Waste Disposal - Industrial: Total	5,038		0.2%	
504	Waste Disposal: Site Remediation: Total	417		<0.1%	
625	MACT Source Categories: Food and Agricultural Processes: Total	142		<0.1%	
646	MACT Source Categories: Vinyl-based Resins: Total	30		<0.1%	
648	MACT Source Categories: Miscellaneous Polymers: Total	1		<0.1%	
651	MACT Source Categories: Inorganic Chemicals Manufacturing: Total	0		<0.1%	
682	MACT Source Categories: Miscellaneous Processes: Total	7		<0.1%	

Table 5. NO_x Annual Non-EGU Point, Nonpoint, and Mobile Emissions in Categories with More Than 1 Percent of a State's Emissions in the Transport Rule Region – from 2012 Inventory (NEI v2)

State in Transport Rule Region	SCC	Source Category	Percentage of State's Entire non-Fire Inventory (%) at 3-digit SCC level	Percentage of State's Entire non-Fire Inventory (%) – more detailed breakdown	2012 NOx Emissions at 3-digit SCC level (Tons Per Year)	2012 NOx Emissions– more detailed breakdown (Tons Per Year)
Alabama		Onroad Mobile	24.7		82,135	
		Nonroad Mobile	6.5		21,636	
	305	Mineral Products	5.6		18,574	
	305006	Mineral Products: Cement Manufacturing (Dry)		3.2		10,671
	210400	Stationary Source Fuel Combustion: Residential	5.1	5.1		16,756
	102	External Combustion Boilers: Industrial	5.0		16,605	
	102009	External Combustion Boilers: Industrial: Wood/Bark Waste	2.3	2.3		7,681
	202	Internal Combustion Engines: Industrial	4.7		15,679	
	202002	Internal Combustion Engines: Industrial: Natural Gas		4.6		15,415
	307	Pulp and Paper and Wood Products	2.5		8,425	
	307001	Pulp and Paper and Wood Products – Kraft Pulping		2.3		7,671
	210300	Stationary Source Fuel Combustion: Commercial/Institutional	2.3	2.3		7,729
	303	Primary Metal Production	1.3		4,415	
Arkansas		Onroad Mobile	27.7		46,959	
		Nonroad Mobile	12.1		20,435	
	210200	Stationary Source Fuel Combustion: Industrial	9.1	9.1		15,076
	102	External Combustion Boilers:	6.7		11,290	

		Industrial				
	202	Internal Combustion Engines: Industrial	4.0		6,848	
	202002	Internal Combustion Engines: Natural Gas	4.0	4.0		6,799
	305	Mineral Products	3.3		5,634	
	305	Mineral Products: Cement Manufacturing (Wet)	2.3	2.3		3,947
	307	Pulp and Paper and Wood Products	2.8		4,747	
	307001	Pulp and Paper and Wood Products: Sulfate (Kraft) Pulping		2.2		3,729
	210400	Stationary Source Fuel Combustion: Residential		1.8		3,032
	399	Miscellaneous Manufacturing Industries	1.7		2,838	
	399990	Miscellaneous Manufacturing Industries: Miscellaneous Industrial Processes		1.7		2,818
Connecticut		Onroad Mobile	52.9		37,847	
		Nonroad Mobile	17.6		12,619	
	210400	Stationary Source Fuel Combustion: Residential		6.9		8,016
	501	Waste Disposal: Solid Waste Disposal – Government; Total	5.6		4,029	
	501001	Waste Disposal: Solid Waste Disposal – Government; Municipal Incineration		5.5		3,917
	210300	Stationary Source Fuel Combustion: Commercial/Institutional		5.1		3,654
Delaware		Onroad Mobile	38.0		10,700	
	102	External Combustion Boilers: Industrial	16.0		4,507	

	102014	External Combustion Boilers: Industrial: CO Boiler	5.2	5.2		1,477
	102002	External Combustion Boilers: Industrial: Bituminous/Subbituminous Coal		4.5		1,253
		Nonroad Mobile	14.2		3,984	
	210200	Stationary Source Fuel Combustion: Industrial		6.2		1,534
	210400	Stationary Source Fuel Combustion: Residential		3.9		965
	210300	Stationary Source Fuel Combustion: Commercial/Institutional		2.9		720
District of Columbia		Onroad Mobile	52.1		4,857	
		Nonroad Mobile	23.9		2,224	
	210300	Stationary Source Fuel Combustion: Commercial/Institutional		5.7		904
	210400	Stationary Source Fuel Combustion: Residential		5.2		820
	103	External Combustion Boilers: Commercial/Institutional: Total	3.2		294	
	103006	Commercial/Institutional Boilers: Total: Natural Gas		1.6		257
Florida		Onroad Mobile	42.4		275,603	
		Nonroad Mobile	14.6		94,808	
	210200	Stationary Source Fuel Combustion: Industrial		2.6		16,617
	305	Mineral Products	1.6		10,145	
	501	Waste Disposal : Solid Waste Disposal - Government	1.5		9,694	
	501001	Waste Disposal : Solid Waste Disposal – Government – Municipal Incineration		1.5		9,440
	102	External Combustion Boilers: Industrial	1.4		9,015	
	202	Internal Combustion Engines: Industrial	1.0		6,741	

Georgia		Onroad Mobile	42.9		158,771	
		Nonroad Mobile	11.2		41,427	
	210200	Stationary Source Fuel Combustion: Industrial		4.1		23,589
	102	External Combustion Boilers: Industrial	4.9		18,133	
	102002	External Combustion Boilers: Industrial: Bituminous/Subbituminous Coal		2.7		9,888
	307	Pulp and Paper and Wood Products	2.8		10,343	
	307001	Pulp and Paper and Wood Products: Kraft Pulping		2.2		8,155
	210400	Stationary Source Fuel Combustion: Residential		2.0		7,302
	202	Internal Combustion Engines: Industrial	1.4		5,102	
	202002	Internal Combustion Engines: Industrial: Natural Gas		1.3		4,905
	305	Mineral Products	1.4		5,005	
Illinois		Onroad Mobile	18.3		157,915	
		Nonroad Mobile	9.4		81,153	
	210400	Stationary Source Fuel Combustion: Residential		3.4		24,481
	202	Internal Combustion Engines: Industrial	2.6		22,773	
	202002	Internal Combustion Engines: Industrial: Natural Gas		2.6		22,388
	102	External Combustion Boilers: Industrial	1.9		16,783	
	102002	External Combustion Boilers: Industrial: Bituminous/Subbituminous Coal		1.1		9,886

	305	Mineral Products	1.9		16,400	
	305006	Mineral Products: Cement Manufacturing (Dry)		1.1		9,135
	210200	Stationary Source Fuel Combustion: Industrial		1.3		11,205
	210300	Stationary Source Fuel Combustion: Commercial/Institutional		1.2		10,116
Indiana		Onroad Mobile	24.5		114,396	
		Nonroad Mobile	9.6		44,716	
	102	External Combustion Boilers: Industrial	3.3		15,606	
	210200	Stationary Source Fuel Combustion: Industrial		3.1		14,434
	202	Internal Combustion Engines: Industrial	2.8		12,985	
	202002	Internal Combustion Engines: Industrial: Natural Gas		2.7		12,581
	305	Mineral Products	2.7		12,460	
	305006	Mineral Products: Cement Manufacturing (Dry)		1.5		7,214
	210400	Stationary Source Fuel Combustion: Residential		1.9		9,076
	303	Primary Metal Production	1.9		8,959	
	103	External Combustion Boilers: Commercial/Institutional: Total	1.8		8,167	
Iowa		Onroad Mobile	25.9		58,920	
		Nonroad Mobile	21.1		48,055	
	202	Internal Combustion Engines: Industrial	6.1		13,975	
	202002	Internal Combustion Engines: Industrial: Natural Gas		6.0		13,741
	102	External Combustion Boilers: Industrial	5.0		11,488	
	102002	External Combustion Boilers: Industrial: Bituminous/Subbituminous Coal		4.1		9,395

	305	Mineral Products	3.6		8,286	
	305006	Mineral Products: Cement Manufacturing (Dry)		3.0		6,888
	210200	Stationary Source Fuel Combustion: Industrial		2.3		5,230
	210400	Stationary Source Fuel Combustion: Residential		2.3		5,229
	210300	Stationary Source Fuel Combustion: Commercial/Institutional		1.4		3,153
Kansas						
	202	Internal Combustion Engines: Industrial	19.5		51,356	
	202002	Internal Combustion Engines: Industrial: Natural Gas		19.2		50,579
		Onroad Mobile	16.7		43,914	
		Nonroad Mobile	13.6		35,877	
		Miscellaneous Area Sources: Agriculture Production - Crops	11.0		29,094	
	305	Mineral Products	3.5		9,181	
	305006	Mineral Products: Cement Manufacturing (Dry)		1.8		4,811
	210200	Stationary Source Fuel Combustion: Industrial		2.4		6,300
	306	Petroleum Industry	1.7		4,421	
	210400	Stationary Source Fuel Combustion: Residential		1.6		4,206
	102	External Combustion Boilers: Industrial	1.1		2,825	
Kentucky		Onroad Mobile	24.1		71,284	
		Nonroad Mobile	7.8		23,149	
	202	Internal Combustion Engines: Industrial	2.9		8,451	
	202002	Internal Combustion Engines: Industrial: Natural Gas		2.8		8,426

	210200	Stationary Source Fuel Combustion: Industrial		2.7		8,245
	305	Mineral Products	2.2		6,376	
	102	External Combustion Boilers: Industrial	2.0		5,976	
	210400	Stationary Source Fuel Combustion: Residential		1.5		4,597
	399	Industrial Processes: Miscellaneous Manufacturing Industries	1.0		3,060	
Louisiana		Onroad Mobile	20.0		64,074	
	202	Internal Combustion Engines: Industrial	18.4		59,154	
	202002	Internal Combustion Engines: Industrial: Natural Gas		17.8		57,031
	102	External Combustion Boilers: Industrial	11.0		35,319	
	102006	External Combustion Boilers: Industrial: Natural Gas		4.7		14,980
		Nonroad Mobile	7.0		22,532	
	301	Industrial Processes: Chemical Manufacturing	5.9		18,784	
	210200	Stationary Source Fuel Combustion: Industrial		5.5		17,634
	306	Petroleum Industry	5.1		16,383	
	306001	Petroleum Industry: Process Heaters		5.1		12,568
	307	Pulp and Paper and Wood Products	2.0		6,532	
	307001	Pulp and Paper and Wood Products: Kraft Pulping		1.8		5,762
	301005	Industrial Processes: Chemical Manufacturing: Carbon Black Production		2.0		6,474
	399	Industrial Processes: Miscellaneous Manufacturing Industries	1.2		3,972	
	310	Industrial Processes: Oil and Gas Production	1.0		3,246	

Maryland		Onroad Mobile	43.2		64,368	
		Nonroad Mobile	14.1		21,087	
	305	Mineral Products	4.8		7,213	
	305006	Mineral Products: Cement Manufacturing (Dry)		3.1		4,637
	210200	Stationary Source Fuel Combustion: Industrial		4.6		6,837
	210400	Stationary Source Fuel Combustion: Residential		4.5		6,631
	102	External Combustion Boilers: Industrial	3.5		5,192	
	102002	External Combustion Boilers: Industrial: Bituminous/Subbituminous Coal		2.5		3,756
	501	Waste Disposal: Solid Waste Disposal - Government	2.8		4,118	
	501001	Waste Disposal: Solid Waste Disposal - Government: Municipal Incineration	2.8		4,113	
	210300	Stationary Source Fuel Combustion: Commercial/Institutional	2.3		3,470	
	303	Primary Metal Production	1.9		2,906	
	303008	Primary Metal Production: Iron Production	1.2		1,810	
	202	Internal Combustion Engines: Industrial	1.0		1,476	
Massachusetts		Onroad Mobile	41.7		57,147	
		Nonroad Mobile	15.5		21,342	
	210400	Stationary Source Fuel Combustion: Residential		11.5		15,749
	210200	Stationary Source Fuel Combustion: Industrial		9.8		13,434
	102	External Combustion Boilers:	3.7		5,084	

		Industrial				
	102004	External Combustion Boilers: Industrial: Residual Oil		2.3		3,199
	210300	Stationary Source Fuel Combustion: Commercial/Institutional		3.7		5,074
	501	Waste Disposal: Solid Waste Disposal: Government	3.3		4,553	
	501001	Waste Disposal: Solid Waste Disposal: Government- Municipal Incineration		3.3		4,504
	103	External Combustion Boilers: Commercial/Institutional: Total	1.9		2,620	
Michigan		Onroad Mobile	36.3		163,505	
		Nonroad Mobile	11.8		53,064	
	210400	Stationary Source Fuel Combustion: Residential		4.2		18,855
	305	Mineral Products	4.0		18,027	
	305006	Mineral Products: Cement Manufacturing (Dry)		2.8		12,759
	102	External Combustion Boilers: Industrial	3.7		16,641	
	102002	External Combustion Boilers: Industrial: Bituminous/Subbituminous Coal		2.1		9,312
	303	Primary Metal Production	3.0		13,485	
	303023	Primary Metal Production: Taconite Iron Ore Processing		2.0		8,970
	202	Internal Combustion Engines: Industrial	3.1		13,876	
	202002	Internal Combustion Engines: Industrial: Natural Gas		2.9		12,919
	210200	Stationary Source Fuel Combustion: Industrial		2.8		12,664
	310	Oil and Gas Production	2.7		11,991	
Minnesota		Onroad Mobile	27.8		86,198	
		Nonroad Mobile	16.8		52,189	

	210200	Stationary Source Fuel Combustion: Industrial		8.1		37,886
	390	Industrial Processes: In-process Fuel Use	6.5		20,335	
	390006	In-process Fuel Use: Natural Gas		6.5		20,335
	102	External Combustion Boilers: Industrial	3.9		12,074	
	210400	Stationary Source Fuel Combustion: Residential		2.9		8,947
	210300	Stationary Source Fuel Combustion: Commercial/Institutional		2.7		8,232
	303	Primary Metal Production	2.3		7,266	
	303023	Primary Metal Production: Taconite Iron Ore Processing		2.3		7,162
	202	Internal Combustion Engines: Industrial	1.4		4,482	
	501	Waste Disposal: Solid Waste Disposal – Government	1.4		4,383	
	501001	Waste Disposal: Solid Waste Disposal – Government: Municipal Incineration		1.3		4,144
	399	Industrial Processes: Miscellaneous Manufacturing Industries	1.0		3,073	
Mississippi		Onroad Mobile	30.8		52,709	
	202	Internal Combustion Engines	17.2		29,391	
	202002	Internal Combustion Engines: Natural Gas		16.9		29,009
		Nonroad mobile	9.6		16,374	
	102	External Combustion Boilers: Industrial	5.2		8,924	
	102009	Industrial Boilers: Wood/Bark Waste		2.6		4,439
	210200	Stationary Source Fuel Combustion: Industrial		2.9		4,889
	210400	Stationary Source Fuel Combustion: Residential		2.1		3,615
	307	Pulp and Paper and Wood Products	2.0		3,495	

	307001	Pulp and Paper and Wood Products: Sulfate (Kraft) Pulping		1.8		3,009
	305	Mineral Products	2.0		3,416	
	305007	Mineral Products: Cement Manufacturing (Wet)		1.4		2,352
	306	Petroleum Industry	1.3		2,141	
	306001	Petroleum Industry: Process Heaters		1.0		1,739
	301	Chemical Manufacturing	1.0		1,726	
Missouri		Onroad Mobile	36.8		108,298	
		Nonroad mobile	13.7		40,217	
	305	Mineral Products	7.1		20,782	
	305007	Mineral Products: Cement Manufacturing (Wet)		2.7		7,890
	305006	Mineral Products: Cement Manufacturing (Dry)		2.6		7,519
	210200	Stationary Source Fuel Combustion: Industrial		3.8		11,005
	210400	Stationary Source Fuel Combustion: Residential		2.8		8,493
	202	Internal Combustion Engines: Industrial	3.0		8,963	
	202002	Internal Combustion Engines: Industrial: Natural Gas		2.8		8,390
Nebraska		Onroad Mobile	23.7		33,907	
		Nonroad Mobile	21.4		30,613	
	210200	Stationary Source Fuel Combustion: Industrial		4.4		6,244
	202	Internal Combustion Engines: Industrial	2.9		4,154	
	202002	Internal Combustion Engines: Industrial: Natural Gas		2.5		3,649
	305	Mineral Products	2.6		3,701	
	305006	Mineral Products: Cement Manufacturing (Dry Process)		2.6		3,660
	210400	Stationary Source Fuel Combustion: Residential		1.8		2,555

	102	External Combustion Boilers: Industrial	1.0		1,422	
New Jersey		Onroad Mobile	45.6		76,979	
		Nonroad Mobile	18.1		30,475	
	210400	Stationary Source Fuel Combustion: Residential	9.2	9.2		15,517
	210300	Stationary Source Fuel Combustion: Commercial/Institutional		5.4		9,232
	501	Waste Disposal: Solid Waste Disposal - Government:	2.0		3,444	
	501001	Waste Disposal: Solid Waste Disposal - Government: Municipal Incineration		2.0		3,313
	399	Industrial Processes: Miscellaneous Manufacturing Industries	1.7		2,855	
	102	External Combustion Boilers: Industrial	1.2		1,994	
	305	Mineral Products	1.0		1,756	
New York		Onroad Mobile	40.5		154,260	
		Nonroad Mobile	15.3		58,381	
	210400	Stationary Source Fuel Combustion: Residential		9.8		37,250
	210300	Stationary Source Fuel Combustion: Commercial/Institutional		7.9		30,109
	102	External Combustion Boilers: Industrial	4.7		18,097	
	102006	External Combustion Boilers: Industrial: Natural Gas		3.0		11,436
	102002	External Combustion Boilers: Industrial: Bituminous/Subbituminous Coal		1.3		5,055
	210200	Stationary Source Fuel Combustion: Industrial		3.6		13,810
	305	Mineral Products	3.0		11,494	
	305007	Mineral Products: Cement Manufacturing (Wet)		2.2		8,498

	501	Waste Disposal: Solid Waste Disposal - Government	2.5		9,504	
	501001	Waste Disposal: Solid Waste Disposal - Government: Municipal Incineration		2.4		9,112
	202	Internal Combustion Engines: Industrial	1.0		3,828	
North Carolina		Onroad Mobile	43.0		126,081	
		Nonroad Mobile	14.4		42,065	
	102	External Combustion Boilers: Industrial	7.3		21,273	
	102002	External Combustion Boilers: Industrial: Bituminous/Subbituminous Coal		2.7		8,041
	102009	External Combustion Boilers: Industrial: Wood/Bark Waste		2.0		5,964
	210400	Stationary Source Fuel Combustion: Residential		2.5		7,082
	305	Mineral Products	1.6		4,779	
	307	Pulp and Paper and Wood Products	1.5		4,407	
	307001	Pulp and Paper and Wood Products: Kraft Pulping		1.3		3,830
	202	Internal Combustion Engines: Industrial	1.1		3,207	
	202002	Internal Combustion Engines: Industrial: Natural Gas	1.0	1.0		2,853
Ohio		Onroad Mobile	31.0		149,134	
		Nonroad Mobile	12.8		61,501	
	210400	Stationary Source Fuel Combustion: Residential		4.3		20,590
	102	External Combustion Boilers: Industrial	4.3		20,582	
	102002	External Combustion Boilers: Industrial: Bituminous/Subbituminous		2.6		12,665

		Coal				
	305	Mineral Products	3.9		18,821	
	305016	Mineral Products: Lime Manufacture		2.1		9,913
	210200	Stationary Source Fuel Combustion: Industrial		2.0		9,732
	210300	Stationary Source Fuel Combustion: Commercial/Institutional		1.8		8,691
	202	Internal Combustion Engines: Industrial	1.7		8,290	
	202002	Internal Combustion Engines: Industrial: Natural Gas		1.7		8,170
Oklahoma		Onroad Mobile	20.5		71,207	
		Nonroad Mobile	13.0		55,424	
	202	Internal Combustion Engines: Industrial	11.7		40,876	
	202002	Internal Combustion Engines: Industrial: Natural Gas	11.7	11.7		40,802
		Miscellaneous Area Sources: Agriculture Production – Crops	5.5		18,645	
	305	Mineral Products	2.0		6,792	
	305014	Mineral Products: Glass Manufacture	1.4	1.4		4,935
	102	External Combustion Boilers: Industrial	1.9		6,688	
	306	Petroleum Industry	1.4		4,768	
	301	Industrial Processes: Chemical Manufacturing	1.3		4,449	
	390	In-process Fuel Use	1.2		4,332	
Pennsylvania		Onroad Mobile	27.5		142,217	
		Nonroad Mobile	8.3		42,635	
	305	Mineral Products	6.0		30,762	
	305014	Mineral Products: Glass Manufacturing		2.0		10,174
	305006	Mineral Products: Cement Manufacturing (Dry)		1.9		9,656
	210400	Stationary Source Fuel Combustion: Residential		4.4		22,495

	102	External Combustion Boilers: Industrial	2.8		14,563	
	210300	Stationary Source Fuel Combustion: Commercial/Institutional		2.7		14,169
	210200	Stationary Source Fuel Combustion: Industrial		2.2		11,764
	202	Internal Combustion Engines: Industrial	1.6		8,027	
	202002	Internal Combustion Engines: Industrial: Natural Gas		1.5		7,604
	501	Waste Disposal: Solid Waste Disposal – Government	1.3		6,912	
	501001	Waste Disposal: Solid Waste Disposal – Government: Municipal Incineration		1.3		6,733
	303	Primary Metal Production	1.2		5,940	
South Carolina		Onroad Mobile	39.3		75,994	
		Nonroad Mobile	10.6		20,559	
	210200	Stationary Source Fuel Combustion: Industrial		6.6		12,993
	305	Mineral Products	5.0		9,749	
	305006	Mineral Products: Cement Manufacturing (Dry)				5,006
	305007	Mineral Products: Cement Manufacturing (Wet)		1.3		2,552
	102	External Combustion Boilers: Industrial	4.8		9,276	
	102002	External Combustion Boilers: Industrial: Bituminous/Subbituminous Coal		1.9		3,673
	102009	External Combustion Boilers: Industrial: Wood/Bark Waste		1.2		2,349
	102006	External Combustion Boilers : Industrial: Natural Gas		1.0		1,910

	307	Pulp and Paper and Wood Products	2.9		5,518	
	307001	Pulp and Paper and Wood Products: Kraft Pulping		2.8		5,358
	202	Internal Combustion Engines: Industrial	1.4		2,636	
	202002	Internal Combustion Engines: Industrial: Natural Gas		1.3		2,493
Tennessee		Onroad Mobile	41.8		126,353	
		Nonroad Mobile	9.8		29,546	
	102	External Combustion Boilers:Industrial	8.1		24,614	
	102002	External Combustion Boilers: Industrial: Bituminous/Subbituminous Coal		5.0		15,029
	102006	External Combustion Boilers: Industrial: Natural Gas	2.1	2.1		6,295
	210200	Stationary Source Fuel Combustion: Industrial		2.9		8,764
	305	Mineral Products	2.8		8,584	
	305014	Mineral Products: Glass Manufacture	1.5	1.5		4,413
	305006	Mineral Products: Cement Manufacture (Dry)		1.1		8,584
	103	External Combustion Boilers: Commercial/Institutional Boilers	2.1		3,179	
	103002	External Combustion Boilers : Commercial/Institutional Boilers: Bituminous/Subbituminous Coal		1.9		5,681
	202	Internal Combustion Engines	1.8		5,540	

	202002	Internal Combustion Engines: Natural Gas		1.8		5,453
	210400	Stationary Source Fuel Combustion: Residential		1.5		4,748
	307	Pulp and Paper and Wood Products	1.0		2,937	
Texas		Onroad Mobile	26.7		303,453	
	202	Internal Combustion Engines: Industrial	11.2		127,076	
	202002	Internal Combustion Engines: Industrial: Natural Gas		11.1		125,820
	310	Industrial Boilers: Oil and Gas Production	12.4		210,708	
		Nonroad Mobile	9.7		109,631	
	305	Mineral Products	3.6		40,318	
	305006	Mineral Products: Cement Manufacturing (Dry)		1.7		18,932
	210200	Stationary Source Fuel Combustion: Industrial		3.2		36,182
	102	External Combustion Boilers: Industrial	2.9		33,245	
	102006	External Combustion Boilers: Industrial: Natural Gas	1.1		12,879	
	301	Industrial Processes: Chemical Manufacturing	2.0		23,209	
	301900	Industrial Processes: Chemical Manufacturing: Fuel Fired Equipment		1.5		16,668
	306	Industrial Processes: Petroleum Industry	1.8		20,636	
	306001	Industrial Processes: Petroleum Industry: Process Heaters		1.2		13,681

Virginia		Onroad Mobile	38.1		111,583	
		Nonroad Mobile	10.9		31,981	
	210200	Stationary Source Fuel Combustion: Industrial		7.9		36,328
	102	External Combustion Boilers: Industrial	7.1		20,760	
	102002	External Combustion Boilers: Industrial: Bituminous/Subbituminous Coal		4.1		12,050
	210400	Stationary Source Fuel Combustion: Residential		1.7		7,892
	202	Internal Combustion Engines	2.8		8,185	
	202002	Internal Combustion Engines: Natural Gas		2.5		7,276
	301	Industrial Processes: Chemical Manufacturing	2.5		7,193	
	210300	Stationary Source Fuel Combustion: Commercial/Institutional		1.4		6,692
	305	Mineral Products	1.7		4,974	
	501	Waste Disposal: Solid Waste Disposal - Government	1.5		4,524	
	501001	Waste Disposal: Solid Waste Disposal – Government: Municipal Incineration		1.4		4,236
	307	Pulp and Paper and Wood Products	1.5		4,279	
	307001	Pulp and Paper and Wood Products: Kraft Pulping		1.2		3,636
West Virginia		Onroad Mobile	14.8		27,694	
	202	Internal Combustion Engines:	5.7		10,670	

		Industrial				
	202002	Internal Combustion Engines: Industrial: Natural Gas		5.7		10,644
	102	External Combustion Boilers: Industrial	4.6		8,537	
	102002	External Combustion Boilers: Industrial: Bituminous/Subbituminous Coal		3.1		5,737
	203	Internal Combustion Engines: Commercial/Institutional	4.0		7,445	
	203002	Internal Combustion Engines: Commercial/Institutional: Natural Gas		4.0		7,445
	210200	Stationary Source Fuel Combustion: Industrial		4.0		7,427
		Nonroad Mobile	3.3		6,158	
	305	Mineral Products	2.6		4,945	
	305007	Mineral Products: Cement Manufacturing (Wet)		1.8		3,331
	210300	Stationary Source Fuel Combustion: Commercial/Institutional		1.8		3,353
Wisconsin		Onroad Mobile	36.3		86,315	
		Nonroad Mobile	16.5		39,327	
	102	External Combustion Boilers: Industrial	11.0		26,191	
	102002	External Combustion Boilers: Industrial : Bituminous/Subbituminous		7.2		17,054

		Coal				
	102006	External Combustion Boilers: Industrial: Natural Gas		1.8		4,381
	210400	Stationary Source Fuel Combustion: Residential		4.7		11,176
	210300	Stationary Source Fuel Combustion: Commercial/Institutional		2.7		6,376
	210200	Stationary Source Fuel Combustion: Industrial		1.6		3,826

[a] The non-fire emissions inventory refers to all emissions in the NEI include EGU, nonEGU point, mobile, and nonpoint sources, except for those associated with fires (natural wildfires and prescribed burning).

3. Discussion of control measures for SO_2 by source category

From the inventory information for SO_2 presented in section 2 above, the highest-emitting categories of non-EGU SO_2 emissions are: (1) industrial, commercial, and institutional (ICI) boilers, (2) Portland cement manufacturing, (3) petroleum refining, and (4) sulfuric acid manufacturing.

a. SO_2 Controls for ICI Boilers

For ICI boilers, most of the SO_2 emissions are from coal-fired boilers, and to a lesser degree from residual or distillate oil-fired boilers. Possible ways to reduce SO_2 emissions from ICI boilers include fuel switching, flue gas desulfurization, and dry sorbent duct injection. SO_2 controls for ICI boilers are discussed in detail in a document prepared for the Northeast States for Coordinated Air Use Management (NESCAUM) entitled "Applicability and Feasibility of NOx, SO2, and PM Emissions Control Technologies Industrial, Commercial, and Institutional (ICI) Boilers." NESCAUM, November 2008 (revised January 2009). This report is available online at: www.nescaum.org/documents/ici-boilers-20081118-final.pdf .

Fuel switching possibilities evaluated by NESCAUM included switching from high sulfur residual oil to lower sulfur residual oil, or to distillate oil. NESCAUM estimated, based on 2007 fuel prices that switching from 3 % sulfur residual oil to 1% residual oil would cost $771/ton (2005 dollars, $823/ton in 2006 dollars[2]), while switching from 3 % sulfur oil to 0.2% distillate oil would cost over $5000/ton. EPA notes that this calculation is sensitive to the actual percent sulfur for a given residual-oil fired boiler (i.e., sulfur contents less than 3% would have a higher cost/ton), as well as the capacity factor (that is, the fraction of boiler capacity that is used in a year). Moreover, for most states (and for the eastern half of the United States overall) residual oil use constitutes at ICI boilers represents a relatively low fraction of the overall SO_2 inventory. Emissions are a relatively higher percentage in a few northeast states.

The NESCAUM study did not evaluate fuel switching from higher to lower sulfur coal. EPA finds it difficult to generalize these costs because of variability in operations variation in boiler fuel capabilities, and variations in capacity factor.

The NESCAUM study evaluated several types of add-on equipment including wet FGD scrubbers, dry scrubbing (spray dryers) and duct injection of sorbents. Wet and dry FGD costs ranged from about $1600 per ton to over $5000/ton (2006 dollars), and these calculations were made for relatively large boilers. The NESCAUM study provided example calculations for various boiler sizes, and did not attempt calculations of actual reductions of the overall emission inventory at varying cost levels.

[2] Escalation of costs from 2005 to 2006 year dollars accomplished by using the Chemical Engineering Plant Cost Index (CEPCI) annual values. The 2005 annual value is 468.2; the 2006 annual value is 499.6. The escalation factor in this case is 499.6/468.2 = 1.07. For more information, refer to the Chemical Engineering magazine, April 2010 or www.che.com.

The NESCAUM study discusses duct sorbent injection of reagents such as hydrated lime, trona, and sodium bicarbonate. While the report presents information on estimated capital costs per million BTU of boiler capacity, operating costs are not presented. EPA believes that overall annualized costs for sorbent injection are likely to be highly dependent on reagent costs, and the amount of reagent used, and addition are dependent on whether the reagent is milled (smaller particle size of reagent) or non-milled (larger particle size of reagent). Control efficiencies for milled and unmilled trona varied from 30-80 % depending on the amount of reagent used per unit of SO_2 emitted.

b. SO_2 controls for Portland cement manufacturing

For Portland cement manufacturing, information from a 2006 report prepared by the Lake Michigan Air Directors Consortium (LADCO) estimated costs for SO_2 scrubbing to be between $2,211 - 6,917 per ton (in year 2003$, or $2,745 – 8,577 per ton in year 2006$[3]). The LADCO "white papers" discussion is available from the following website: http://www.ladco.org/reports/control/final_reports/identification_and_evaluation_of_candidate_control_measures_ii_june_2006.pdf.

c. SO_2 controls for petroleum refining

For petroleum refining, the largest sources of SO_2 emissions are from catalytic cracking, sulfur recovery units, and process heaters. A good discussion of petroleum refinery emissions sources and controls can be found as chapter 11 of "Controlling Fine Particulate Matter Under the Clean Air Act: A Menu of Options." STAPPA/ALAPCO (now NACAA). March 2006. For example, refineries currently make widespread use of (1) wet scrubbing technology for simultaneous control of particulates and sulfur dioxide from catalytic cracking units.

For each of the sources in the petroleum refining sector, EPA believes that SO_2 controls are generally more limited at refineries covered by the recent settlement agreements EPA has entered into with numerous petroleum refineries. Moreover, such agreements cover 88 percent of U.S refining capacity, and will lead to up to 250,000 tons of SO_2 emissions reductions annually. Compliance with these agreements has already taken place at most affected refineries, and these reductions are generally reflected in our 2012 base case emissions inventory for the transport rule.

d. SO_2 controls for sulfuric acid manufacturing

For sulfuric acid manufacturing, the SO_2 emissions are related to the percent recovery of sulfuric acid product. Because the percent recovery is plant-specific, the

[3] Escalation of 2003 to 2006 year dollars accomplished using the CEPCI. The 2003 CEPCI annual value is 402.0; the 2006 annual value is 499.6. The escalation factor between the two years is 499.6/402.0 = 1.24. For more information, refer to the Chemical Engineering magazine, April 2010, or www.che.com.

available emissions reductions and the cost per ton of controls are highly variable. At the time of the CAIR, EPA made rough calculations that the then-existing 126,000 tons of SO2 would be reduced by about one-half if all of the sulfuric acid manufacturing in the eastern U.S. was controlled to meet the NSPS level of 4 pounds of SO2 per ton of product. EPA did not develop cost estimates for these approximate reductions and such cost estimates are still not available. EPA notes, however, that it has entered into a number of settlement agreements with sources in the sulfuric acid production industry, and a significant amount of the estimated available reductions has already been realized. Over 36,000 tons of SO_2 reductions have taken place at 22 plants in the U.S. by 2012 as a result of 6 settlement agreements. More than half of these plants are in states affected by this proposal.

e. Effects on SO_2 from recent rulemakings

The recently proposed ICI boilers MACT is estimated to reduce 340,000 tons per year of SO_2 nationwide by 2013 as a co-impact of this standard. In addition, the proposed Portland cement MACT is estimate to reduce 120,000 tons per year of SO_2 nationwide by 2013 as a co-impact of that standard. The ICI boilers MACT is expected to be promulgated in December 2010, and the Portland cement MACT is expected to be promulgated in the summer of 2010. Thus, non-EGU source categories identified as important emissions sources from various States in this report will be affected by these MACT standards once they are implemented.

4. Discussion of control measures for NO_X by source category

In order to identify source categories for further discussion for NO_X, we conducted an additional step. In addition to reviewing the emissions inventory contributions, EPA conducted an analysis of potential NOX emission reductions using its Control Strategy Tool (CoST). CoST is the tool EPA uses for regulatory impact analyses (RIAs) and other analyses. Further discussion of the CoST tool is available on EPA's website at http://www.epa.gov/ttnecas1/cost.htm

For purpose of identifying a preliminary list of potential nonEGU NOx categories of interest, EPA used the results of CoST with an average cost cutoff of $5000 per ton (in year 2006 dollars) for the 37 Eastern US States. The results of this analysis are displayed in table 6. In this table, we display the source categories the contributed more than 1 percent of the emission reductions as shown by CoST. From this preliminary analysis, it appears that the following source categories comprise the greatest potential for nonEGU stationary source emissions reductions: external combustion ICI boilers, internal combustion (IC) engines, Portland cement manufacturing, glass manufacturing, petroleum refining, kraft pulp mills (nonboiler sources), iron and steel production. We discuss each of these categories in greater detail in this section.

a. ICI boilers

Similar to EGU boilers, ICI boiler control measures included combustion controls, low-NOx burners and add-on controls such as selective catalytic reduction (SCR) and selective non-catalytic reduction (SNCR). These measures are described in a recent report entitled "Applicability and Feasibility of NOx, SO2, and PM Emissions Control Technologies for Industrial, Commercial, and Institutional (ICI) Boilers." NESCAUM, November 2008.

For ICI boilers, costs will vary depending on a number of factors, including the plant's capacity utilization, the boiler size, and plant configuration issues affecting retrofit costs.

b. IC engines

The term "internal combustion engines" encompasses both (1) "reciprocating" IC engines such as the natural gas and diesel engines covered the stationary reciprocating internal combustion engines (RICE) MACT standards, and (2) other types of internal combustion engines such as gas turbines.

For diesel compression-ignition (CI) IC engines, a variety of NOx control measures are available. Among them are exhaust gas recirculation (EGR), SCR, lean NOx catalyst, and NOx adsorbers,. EGR works by circulating a portion of an engine's exhaust gas back to the combustion air fed to the engine cylinders. The exhaust gas/combustion air mixture lowers the temperature and also the oxygen content in the

combustion cylinder. This leads to reduced formation of NOx in the combustion cylinder. Reduction of NOx often ranges from 25 to 50 percent for EGR, and an EGR is often found with a diesel particulate filter (DPF) system on mobile diesel engines. SCR is an add-on device placed in the exhaust stream of the engine. SCR can reduce NOx up to 90 percent from a diesel IC engine. Ammonia or, more commonly, urea is injected into the exhaust stream of the engine and reacts with NO and NO_2 in the presence of a catalyst to form N_2 and water. Lean NOx catalyst and NOx adsorbers are newer control technologies for diesel IC engines. A lean NOx catalyst controls NOx by injecting a small amount of diesel fuel or other hydrocarbon into the exhaust upstream of a catalyst. The fuel or hydrocarbon serves as the reducing agent for the catalytic conversion of NOx into N_2. Currently, peak NOx reduction efficiencies range from 10 to 30 percent. Finally, NOx adsorbers or lean NOx traps operates by trapping NOx emissions in the form of a metal nitrate during lean operation of the engine. The NOx adsorbers store NOx under lean conditions and release and catalytically reduce stored NOx under rich conditions. Reductions of up to 90 percent have been claimed by vendors, but no studies or examples have been found for stationary diesel engines. For more information on these controls, please refer to the ACT for Stationary Diesel Engines released in March 2010 by US EPA.

For natural gas-fired spark-ignition (SI) IC engines, the primary technology for NOx controls is non-selective catalytic reduction (NSCR). NSCR has been commercially available for many years and has been widely used on stationary IC engines. The technology can be applied to rich burn stationary engines and is capable of significantly reducing NOx emissions from stationary RICE. The technology is also capable of considerably reducing CO and HAP emissions from rich burn stationary RICE. Based on available information, NSCR appears to be technically feasible for rich burn engines down to 25 hp. Up to 90 percent reduction is available from NSCR.

Industries with SI IC engines will be required to meet emissions limits for HAPs in a coming final MACT standard proposed in March, 2009 and to be promulgated by EPA on August 10, 2010. NSCR is expected to be the technology necessary for SI engines (4 stroke lean burn, in particular) to meet the requirements of the proposed standard. This proposed standard will also have requirements for 2 stroke and 4 stroke lean-burn SI engines as well. Reductions in NOx will likely be a co-impact of the MACT. This final rule will be implemented by mid-2013.

c. Portland cement manufacturing

At cement kilns, NOx emissions are typically reduced through process (or combustion) controls such as burner design and staged combustion in the calciner (SCC). Such measures can achieve up to 30 percent NOx reduction from a kiln. Add-on (or post-combustion) controls used to reduce NOx emissions include selective non-catalytic reduction (SNCR) and selective catalytic reduction (SCR). In an SNCR, ammonia, urea, or another reagent is injected in the flue gas into an appropriate temperature zone and at an appropriate ratio of ammonia to NOx. If the ratio is very high, some ammonia may not react with NOx and will be emitted (ammonia slip). SNCR can reduce NOx from about 30 to 60 percent on average. SCR has been used worldwide on three cement kilns

as an add-on NOx control, but not in the U.S. However, a consent decree entered into on January 20, 2010 between the U.S. Department of Justice and Lafarge Cement Company requires the installation of an SCR in the next several years at Lafarge's Kiln 1 located at Joppa, Illinois, the first instance of an SCR installation at a cement kiln in the U.S. For more information, refer to http://www.epa.gov/compliance/resources/cases/civil/caa/lafarge-infosht.html. SCR is capable of reducing NOx emissions at cement kilns by about 80 percent.

Cement kilns are a non-EGU source category covered under the NOx SIP call issued in September 1998, and an ACT for new cement kilns was published in November 2007. At present, the NSPS for cement kilns is under review, and a revised NSPS will be promulgated in June, 2010. A NOx emissions limit will be included in the revised NSPS.

d. Glass manufacturing

There are a large variety of NOx control measures available for glass manufacturing furnaces. Low NOx burners, staged firing, and fuel reburn are three combustion control measures that can be used depending on the type of furnace. Low NOx burners are designed to reduce peak flame temperature with slower mixing of fuel and air, and minimum injection velocities. Reduction of 30 40 percent can take place from this measure. Staged firing, or air staging, is a staged combustion process where combustion air is reduced initially in order to reduce NOx formation followed by an oxygen-enriched second stage to complete combustion with no additional NOx formed. This measure is applicable to regenerative furnaces, and can achieve 75 to 85 percent NOx reduction. Fuel reburn involves injection of fuel after the combustion zone in the furnace to create a reducing atmosphere for converting NO to N_2. This measure can achieve 50 to 65 percent reduction of NOx, and is applicable to regenerative furnaces.

Two other measures are batch preheat and electric boost. Batch preheat involves preheating the raw materials and cullet before adding to the furnace. The preheat of these materials reduces the furnace heat-load thereby reducing NOx emissions. NOx reductions can range from 10 to 20 percent, but energy savings from reduced fuel usage and lower furnace temperature are almost equal to the percent of NOx reductions. Also, greenhouse gas (GHG) emissions will be reduced due to the lower furnace temperatures. Electric boost is a measure in which an electric cullet passed through the glass mixture in the furnace to provide, thus reducing fuel requirements and associated NOx generation. This measure is currently used in most container glass plants and in more than half of regenerative furnaces. Reductions of NOx can range from 10 to 30 percent.

A fairly new type of furnace technology, Oxy-firing, can yield NOx reductions as well as more efficient furnace operation. Oxy-firing is a furnace technology in which the combustion air is replaced with pure oxygen which reduces nitrogen (and hence NOx) during combustion. Reduced air volumes yield higher energy efficiency. Used in oil and gas-fired furnaces, it is now available in more than 25 percent of glass furnaces, and is being required upon rebuild in Northeast States. Reductions range from 75 to 85 percent.

Add-on controls such as SNCR and SCR are also available for glass furnaces. The operation of these controls for glass furnaces is similar to their operation for cement kilns. SNCR can yield from 20 to 60 percent reduction from glass furnaces, and SCR can yield 60 to 90 percent reductions. While SCR has not been applied on glass furnaces in the US, a recent consent decree will require Saint-Gobains Containers, Inc. to install SCR on three container glass furnaces at their Dolton, Illinois facility by 2018. Refer to http://www.epa.gov/compliance/resources/cases/civil/caa/saintgobain-infosht0110.html for more details.

More information on these controls can be found in the LADCO Interim White Paper on candidate control measures for the glass manufacturing industry published in December 2005 and found at http://www.ladco.org/reports/control/white_papers/glass_fiberglass_manufacturing_plants.pdf.

e. Petroleum refining

Petroleum refinery combustion sources with controllable NO_X emissions include process heaters and catalytic cracking units. EPA notes that while emission reductions estimates were applied using CoST for table 6, no rigorous attempt was made to determine whether plants being controlled were already subject to refinery enforcement settlements. Because such settlements affect about 90 percent of refining capacity in the U.S., EPA believes that controls for refinery sources are likely to be limited in their applicability.

f. Kraft pulp mills

The source categories and controls from the CoST tool listed for pulp mills in Table 6 are those that are applicable to sources other than power boilers. EPA generally considers the power boilers to be the largest source of controllable NO_X at kraft pulp mills, and EPA considers these estimates to be uncertain. Further work is needed to refine these preliminary estimates in determining whether cost-effective controls are available for non-boiler sources at kraft pulp mills.

g. Iron and steel production

NO_X controls are available for combustion sources at steel mills such as reheat and annealing furnaces and other gas-fired equipment. The most common controls in use are low-NO_X burners. Other potentially controllable sources in the industry include coke plant underfiring stacks, sinter plants, and steelmaking furnaces such as electric arc furnaces. Available references for describing NO_X controls in this industry are available from references including:

-- Midwest RPO. Boiler Best Available Retrofit Technology (BART) Engineering Analysis. Prepared for LADCO, March 30, 2005.

-- Alternative Control Techniques Guidance Document (ACT) – NO_X emissions from Iron and Steel Mills. EPA September 1994.

-- "Proper Application of Low-NO_X Technology to Reheating Furnaces – Environmental and Efficiency Advantages." April 2005. David G. Schalles and John C. Dormire, Bloom Engineering col Inc, Pittsburgh, PA. Published in AIST's "Iron and Steel Technology."

-- "Fuel Savings and Reduced Emissions: Experience from 80 Oxy-fuel Installations in Reheat Furnaces." May 2005 . Per Verterberg, J. von Scheele, G. Moroz. Published in AIST's "Iron and Steel Technology."

Table 6. NOx Control Measures identified as part of Preliminary Potential Control Analyses in 37 Eastern States Using EPA's Control Strategy Tool (CoST)

Category	SCCs with most of the reductions	Measure	Current estimate of NOx cost/ton, based on analysis from CoST for 2012 (in 2006 dollars)
ICI boilers (40% of overall nonEGU NOx reduction estimate)	102002XX, 103002XX Coal	SCR	$ 960-2,400
	102004XX , 103004XX Residual Oil	SCR	$1,300-1,900
	102006XX , 103006XX Natural Gas	SCR	$2,800
	10200701 Refinery Gas	SCR	$2,800
	10200704 Blast Furnace Gas	SCR	$2,800
	10200707 Coke oven gas	SCR	$2,800
	102009XX, 103009XX Wood/bark	SNCR	$1,500-2,300
	102011XX Bagasse	SNCR	$2,300
	102012XX Solid waste (?)	SNCR	$2,600
	102003XX Liquid waste (?)	SCR	$1,900
Industrial/commercial Internal combustion engines and combustion turbines (25% of overall nonEGU NOx reduction reduction estimate)	20200101 diesel turbines	SCR/water injection	$3,600
	20200102 diesel reciprocating	NSCR	$540
	20200201 natl gas turbines	SCR/ steam injection	$2,900 – 3,200
	20200202 natl gas reciprocating	NSCR	$620
	20200203 natl gas turbine co-gen	SCR/steam injection	$3,200
	20200204 natl gas recip co-gen	NSCR	$620
	20200252 2 cycle lean burn	SCR/steam injection	$2,500 – 3,200
	20200253 4 cycle rich burn	SCR/steam injection	$1,600 – 3,200
	20200254 4 cycle lean burn	SCR/steam injection	$2,400- 3,200
	20200401 large bore diesel	NSCR	$ 410
	20300101 diesel recip commercial	NSCR	$ 540
	20300201 natl gas recip commercial	NSCR	$ 620

Category	**SCCs with most of the reductions**	**Measure**	**Current estimate of NOx cost/ton, based on analysis from CoST for 2012 (in 2006 dollars)**
Cement (8% of overall nonEGU NOx reduction estimates)	30500606 dry process kilns 30500622,30500623 preheater precalciner 30500706 wet process kilns	SCR Biosolid injection Mid kiln firing	$4,200 $ 402 $ 72
Glass (5%)	30501402 container glass melting furnace 30501403 flat glass melting furnace 30501404 pressed blown glass melt fce	SCR Oxy-firing SCR	$3,500 $3,000 $4,000
Non-boiler Pulp mill (5%)	30700104 Digester 30700106 Recovery furnace direct contact 30700110 Recovery furnace indirect cont	SCR LNB SCR	$2,800 $ 900 $2,800
Petroleum refining (2 %)	30600104 process heaters 30600106 process heaters 30600201 cat cracking	ULNB, ULNB+SNCR ULNB LNB + FGR	$2,400- 4,200 $2,400 $3,900
Iron and steel (1.5%)	30300306 coke oven underfire stack 30300933 steel reheat furnaces 30300934 steel heat treating/annealing 30390003 fuel fired eq: natl gas 30390004 fuel fired eq: process gas	SNCR LNB + FGR LNB + SNCR ULNB LNB + FGR	$2,600 $600 $2,700 $2,400 $900

5. Mobile source controls

EPA has undertaken a comprehensive program to tighten emissions standards for both on-road and non-road mobile sources and to reduce the sulfur content of gasoline and on- and non-road diesel fuel used in these vehicles and engines. With the introduction of these cleaner fuels and the turnover of the fleets of vehicles and engines to new vehicles and engines that meet the more stringent standards, emissions of NO_X and SO_2 (as well as direct PM and HAPs) decline significantly. In addition to those national standards, control measures are available to States reduce NO_X and SO_2 from mobile sources. These types of measures include (1) application of retrofits to existing engines and (2) programs to reduce vehicle miles traveled. In 2007, EPA prepared a list of mobile source measures in summary tables of emissions control measures for $PM_{2.5}$ and its precursors. These tables are available at EPA's website at: http://epa.gov/pm/measures/pm_control_measures_tables_ver1.pdf . While for most of the measures there are wide ranges for the cost estimates, the cost of the measures is well above the cost levels considered for the proposed transport rule.

Most recently in December 2009 EPA finalized a rule to regulate NO_X, SO_2, and PM emissions from ocean-going vessels. This regulation applies to diesel engines in US flagged and registered Category 3 (C3) vessels. Beginning in 2010 NOx emissions from in-use engines are to be reduced by 15-20 percent. In 2011 NOx emissions from new C3 engines must be reduced by 20 percent and in 2016 NOx emissions from new engines must be reduced by 80 percent. In addition, the sulfur content of the fuel used in these marine engines bu be reduced by 30 in 2012 and 97 percent in 2015. This means that the sulfur content of these fuels will be reduced from the current 35,000 ppm to 1000 ppm in 2015. This will result in substantial reductions in SO_2 from C3 marine vessels. Reductions in PM will also take place as a co-impact of this rule. This rulemaking is in tandem with the establishment of an Emissions Control Area (ECA) for North America by the International Maritime Organization (IMO). The IMO established this ECA in March 2010Enforcement of emission limits for the North American ECA will begin in August, 2012.

On an annual basis beginning in 2010, the NOx controls are expected to cost about $510 per ton of NOx reduced, and SO_2 controls are expected to cost $930 per ton of SO_2 reduced (2006 dollars).[4] PM reductions will occur along with reductions in either NOx and SO_2. These reductions will continue to 2030 and beyond. More information on this final rule and its Regulatory Impact Analysis can be found at http://www.epa.gov/otaq/oceanvessels.htm#regs.

[4] It should be noted that the costs of these controls are estimated using a net present value (NPV) approach that is different than how the non-EGU costs are estimated in this report. For more information on how the costs of the C3 controls are estimated, please refer to the RIA found at http://www.epa.gov/otaq/oceanvessels.htm.