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Technical Support Document: NOx Emission Controls for Non-EGU Stationary Sources in the LADCO Region

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CONTENTS

Table of Tables

List of Appendices

1.0 INTRODUCTION

Under contract to the Lake Michigan Air Directors Consortium (LADCO), Ramboll identified and evaluated nitrogen oxides (NOx) emissions control options for industrial point sources (i.e., non-electrical generation unit (non-EGU) sources). The potential control measures may be considered by state and local agencies to reduce emission of ozone precursors. Emission reductions in addition to those resulting from on-the-books (OTB) regulations may be necessary to meet state implementation plan (SIP) requirements and to demonstrate attainment of ozone National Ambient Air Quality Standards (NAAQS).

In this technical support document, we describe data sources of control measure data and approach used to evaluate cost effectiveness, total cost, and potential emissions reductions of control measure scenarios. We developed control packets for use with the Sparse Matrix Operator Kernel Emissions (SMOKE) to analyze these emission reductions with air quality modeling and provided tabular summaries of potential surplus emissions reductions and associated cost. This is achieved by applying the control measure database to the applicable sources in the US Environmental Protection Agency (EPA) 2016v1[1] platform emission inventory.

A companion white paper report includes detailed analysis of a subset of the stationary source NOx emission control measures included herein.

The LADCO member states have not yet determined which stationary sources will be subject to additional control requirements or which control measures will be adopted. Therefore, inclusion of a source category or candidate control measure herein does not represent a commitment or decision by any agency to adopt that measure.

The surplus NOx emission reduction estimates were based on available information on existing controls and incremental reductions from existing to potential new controls. Base year control information was unavailable for many sources. When actual control information was not available we used default control information by source category classification (SCC) code. The achievable surplus emission reductions are dependent on this information and further collection of existing control information will improve accuracy of these estimates.

Herein, we present results for LADCO states and ozone nonattainment areas (NAAs). For Indiana, results are presented for the Chicago, Indiana ozone NAA only. The ozone NAAs considered herein are listed below.

- Allegan, MI
- Berrien, MI
- Chicago, IL
- Chicago, IN
- Chicago, WI
- Cincinnati, OH
- Cleveland, OH
- Columbus, OH
- Detroit, MI
- Door, WI
- Manitowoc County, WI

[1] US Environmental Protection Agency (EPA) 2016v1 modeling platform. Available at https://www.epa.gov/air-emissions-modeling/2016v1-platform, accessed in June 2021.

- Muskegon, MI
- Northern Milwaukee/Ozaukee, WI
- Sheboygan, WI
- St. Louis, IL

1.1 Summary of Approach

The technical analysis presented herein was comprised of three main tasks as summarized below.

- **Task 1: Development of a master list of NOx controls for stationary sources**. Ramboll assigned the control measures to applicable stationary source non-EGU SCC codes in the LADCO region, to the extent that control measures were able to be readily identified for each SCC.

- **Task 2: Identification of Control Measure(s) for Each Source Category with Three Levels of Stringency**
  In this task, Ramboll identified control measure(s) for each source category in the LADCO region from the master list compiled under Task 1 to represent three levels of stringency:

  - A high stringency NOx control scenario,
  - A medium stringency NOx control scenario, and
  - A low stringency NOx control scenario.

  Control measures for each stringency scenario were identified based on control efficiency ranking to represent the above three stringency levels. For each source category, the control measure with the highest control efficiency was selected for the high stringency scenario, the lowest control efficiency for the low stringency scenario, and for medium stringency scenario the control measure with control efficiency closest to the average of the low stringency and high stringency control measure was selected. Applicable controls were finalized in coordination with LADCO.

- **Task 3: Evaluation of Cost Effectiveness, Total Cost and Potential Emissions Reductions of Control Measure Scenarios**
  The selected control measures were evaluated to estimate potential emission reductions, total cost and cost-effectiveness associated with implementing these control measures. For each stringency scenario, the control measure emission reduction and cost analysis were developed for the following unit-level emissions thresholds:

  - Sources with assumed potential to emit (APTE) greater than 100 tons per year (tpy) of NOx,
  - Sources with APTE greater than 50 tpy of NOx,
  - Sources with APTE greater than 25 tpy of NOx, and
  - Sources with APTE greater than 10 tpy of NOx.

  APTE was estimated by including sources with actual emissions within 50% of each threshold. As indicated above, for the state of Indiana, only Chicago, Indiana NAA counties (i.e., Lake and Porter counties) with APTE levels of 50 tpy and 100 tpy were evaluated. Potential surplus NOx emission reduction estimates were developed based on estimated potential incremental emission reductions, accounting for existing emission controls to the extent feasible to avoid overestimating potential emission reductions.

2.0 EMISSION INVENTORY AND CONTROL MEASURES

2.1 Emission Inventory

In collaboration with LADCO members, the 2016v1 base year 2016 emission inventory was chosen for use as the reference emission inventory for this analysis. The emission inventory was sorted into category groupings by industry and source types as listed below.

- Cement Kilns
- Coal non-EGUs [Coal-Fired External Combustion Sources]
- Coke [Manufacturing Sources]
- EXCOMB Gas [Gas-fired External Combustion Sources]
- Glass [Manufacturing Sources]
- ICE Diesel [Diesel-fired Internal Combustion Engines]
- ICE Gas [Natural gas-fired Internal Combustion Engines]
- Iron & Steel [Manufacturing Sources]
- Lime Kilns
- Process Heaters
- Other [sources not included in any other source category groupings]

Complete SCC to source category groupings are shown in Appendix Table A1. The 2016v1 non-EGU sector emission inventory is summarized below for the LADCO region by state in Table 2-1 and by NAA in Table 2-2.

Table 2-1. Point non-EGU NOx emissions for each state and source category grouping in the LADCO region.

State	NOx Emissions (tpy[2])										
	Cement Kiln	Coal NONEGU	Coke	EXCOMB Gas	Glass	ICE Diesel	ICE GAS	Iron & Steel	Lime Kiln	Process Heat	Other
IL	3,066	757	376	5,800	3,345	899	1,204	450	-	5,349	11,107
MI	6,882	360	521	4,751	1,005	1,740	817	231	633	2,445	24,164
MN	-	2,714	-	4,466	662	1,394	215	-	318	1,728	21,596
OH	1,460	1,960	1,023	6,633	2,195	375	770	1,020	6,112	4,278	11,456
WI	-	6,623	-	4,776	3,105	264	486	-	1,325	1,123	5,219

Table 2-2. Point non-EGU NOx emissions for each NAA and source category grouping in the LADCO region.

NAA	NOx Emissions (tpy)										
	Cement Kiln	Coal NONEGU	Coke	EXCOMB Gas	Glass	ICE Diesel	ICE GAS	Iron & Steel	Lime Kiln	Process Heat	Other
Allegan, MI	-	-	-	64	-	0	77	-	-	8	32
Berrien, MI	-	-	-	21	-	11	<1	-	-	11	67
Chicago, IL	-	-	-	2,694	190	519	450	12	-	2,301	5,068
Chicago, IN	-	-	3,602	5,892	-	77	13	2,448	1,556	3,361	4,307
Chicago, WI	-	-	-	38	-	1	-	-	-	-	139
Cincinnati, OH	-	414	280	2,229	<1	6	83	57		204	988
Cleveland, OH	-	103	-	593		196	64	269	368	1,071	1,526
Columbus, OH	-	-	-	302	542	3	-	-	-	56	610
Detroit, MI	-	-	521	1,700	1,005	1,121	563	228	565	1,687	2,105
Door, WI	-	-	-	1	-	-	-	-	-	-	1
Louisville, IN	581	-	-	1	65	-	-	-	-	-	30
Manitowoc County, WI	-	-	-	21	-	41	51	-	304	61	83
Muskegon, MI	-	-	-	53	-	31	29	<1	-	51	43
Northern Milwaukee/ Ozaukee, WI	-	-	-	726	106	74	278	-	-	229	390
Sheboygan, WI	-	-	-	36	-	0	-	-	-	42	27
St. Louis, IL	-	-	376	247	-	23	<1	46	-	1,472	1,566

[2] tpy = short tons per year

2.2 Control Measures

Potential control measures for non-EGU point sources in the LADCO region were identified by applicable SCC code from the control measure database compiled in Task 1. The control measure database was based on several key technical resources, mainly the EPA Control Strategy Tool (CoST) Control Measure Database (CMDB), with additions from select sources as listed in Table 2-3 below. The same references are the basis of control efficiency and cost-effectiveness estimates assigned to each control measure in this analysis. To develop a uniform cost analysis, all the control cost estimate were adjusted to 2020 dollars.

Table 2-3. Reference sources that were used to identify control measures and associated control efficiency and cost-effectiveness estimates.

Reference Source	Abbreviation
Control Strategy Tool (CoST) Control Measure Database (CMDB)[3]	CoST CMDB
EPA Clean Air Technology Center[4]	EPA CATC
EPA Menu of Control Measures[5]	EPA MCM
South Coast AQMD 2016 air quality management plan[6]	SCAQMD
Alternative Control Technologies Document -- NOx Emissions from ICI Boilers.[7]	EPA ACT
Four Factor Analysis of Sources for Regional Haze in the LADCO Class I Areas (2015)[8]	LADCO 4FA
Wisconsin NAA SIP Attachment 1: NOx RACT Rules	Wisconsin NOx RACT

2.3 Control Measure Scenarios

In this analysis, Ramboll used the EPA 2016v1 non-EGU inventory and applied selected control measures for each stringency scenario. For each SCC, control measures were assigned to stringency levels as follows:

- High stringency: The control measure with the highest control efficiency was assigned;
- Low stringency: The control measure with the lowest control efficiency was assigned;
- Medium stringency: The control measure closest to the average of the lowest control efficiency and the highest control efficiency was assigned;

In collaboration with LADCO a final listing of control measures for each stringency was finalized.

Ramboll evaluated the selected control measures to estimate potential surplus NOx emission reductions that could be achieved by implementing these control measures. The analysis was conducted for four assumed potential to emit (APTE) levels. For each APTE level, units with 2016v1 emissions greater than or equal to 50% of the APTE level were included in the analysis. APTE estimates were developed to attempt to estimate potential to emit (PTE) based on actual emissions; however, these APTE estimates do not follow the strict definition of a facility's PTE that is typically

[3] https://www.epa.gov/sites/production/files/2020-02/cmdb_2019-10-09.zip, accessed in June 2021
[4] https://www.epa.gov/catc, accessed in June 2021
[5] https://www.epa.gov/air-quality-implementation-plans/menu-control-measures-naaqs-implementation, accessed in June 2021
[6] https://www.aqmd.gov/home/air-quality/clean-air-plans/air-quality-mgt-plan/final-2016-aqmp, accessed in June 2021
[7] https://www3.epa.gov/ttncatc1/dir1/icboiler.pdf, accessed in June 2021
[8] https://www.ladco.org/technical/projects/regional-haze-progress/, accessed in June 2021

included in stationary source permit assessment. APTE levels evaluated in this analysis for each ozone NAA and statewide outside of those nonattainment areas are listed below.

1) Sources with APTE greater than 100 tons per year (tpy) of NOx,
2) Sources with APTE greater than 50 tpy of NOx,
3) Sources with APTE greater than 25 tpy of NOx, and
4) Sources with APTE greater than 10 tpy of NOx

Appendix Table A2 shows the control measures that were implemented for each SCC and stringency level. Existing (as of 2016) NOx controls were accounted for in the analysis; potential surplus emission reductions were calculated as incremental reductions from the existing controls. Existing NOx controls were identified based on "Control ID" in the 2016v1 modeling platform files. If the existing control efficiency was higher than the selected control measure for a unit, no emission reduction or cost was calculated. If the existing control efficiency was lower than the selected control measure, the surplus emission reduction and associated cost was calculated.

Estimated emission reductions are uncertain because 1) information on existing controls is unlikely to be comprehensive and 2) feasibility and emission reduction potential depends on site-specific conditions such as raw materials and fuels used and existing equipment configurations. Emission reductions can be more accurately estimated based on individual facility specific feasibility and emission control analysis. This analysis is a source category-level evaluation; therefore, facility specific analysis is not included.

2.4 Emission Reductions and Cost-effectiveness Estimation Methodology

Surplus NOx emissions reductions and associated cost were estimated at the unit-level as described below.

- Uncontrolled NOx emissions for each emissions unit were estimated as follows:

$$\textit{Uncontrolled Emissions} = \textit{EPA 2016v1 NOx emissions} * (1 - \textit{Existing Control Efficiency})$$

- Potential maximum NOx emission reductions were then estimated as follows:

$$\textit{Potential Max Emission Reduction} = \textit{Uncontrolled Emissions} * \textit{Control Measure Control Efficiency}$$

- Surplus NOx emissions were then estimated as follows:

$$\textit{Surplus Emission Reduction} = \textit{Potential Max Emissions} - (\textit{Uncontrolled Emissions} - \textit{EPA 2016v1 NOx emissions})$$

- Cost for implementation of the control measure was then estimated as follows:

$$\textit{Cost} = \textit{Surplus Emission Reduction} * \textit{Cost-effectiveness}$$

Table 2-4 shows a sample unit-level calculation of surplus emissions reductions and cost.

Table 2-4. Sample unit-level surplus reduction and cost calculation.

Parameter	Example Value	Basis / Sample Calculation
EPA 2016v1 NOx emissions	100.0 tpy	from EPA 2016v1
Existing Control Efficiency	40%	Example, Low NOx Burners
Uncontrolled Emissions	166.7 tpy	=100/(1-0.4)
Control Measure Control Efficiency	90%	Example, SCR
Potential Max Emission Reduction	150.0 tpy	=166.7 x 0.9
Surplus Emission Reduction	***83.3 tpy***	***=(150 – (166.7 – 100))***
Cost-effectiveness	$1,525/ton	Example, SCR
Cost (in 2020 dollars)	***$127,033***	***=83.3 x 1,525***

3.0 CONTROL PACKETS DEVELOPMENT

Ramboll developed SMOKE control packets for each stringency scenario and APTE combination according to the standard SMOKE format as indicated in Table 3-1 below. The control packets include percent reduction by county, SCC, and facility/unit ID.

Table 3-1. Control packet format and fields (adapted from SMOKE 4.8.1 User Manual[9] Table 8.48)

Line	Position	Description	Application Notes
1	A	/CONTROL/	-
2+	A	Country/State/County code or Country/state code with zero for county, or zero (Character)	-
	B	8 or 10-digit SCC (20 digit maximum), or pieces of SCC with remaining digits filled in with zeros, or zero (Character)	-
	C	Pollutant ID, or -9 if not a pollutant-specific control (Character)	-
	D	Primary control equipment code (PCEC); -9 or zero applies to all equipment (not yet supported)	-
	E	Control efficiency (value should be a percent; e.g., enter 90 for a 90% control efficiency) (Real)	Also reported in Appendix Table A2
	F	Rule effectiveness (value should be a percent; e.g., enter 50 for a 50% rule effectiveness) (Real)	Assumed 100% rule effectiveness
	G	Rule penetration rate (value should be a percent; e.g., enter 80 for a 80% rule penetration) (Real)	Assumed 100% rule penetration
	H	Standard Industrial Category (SIC), optional (20-digit Character)	-
	I	Maximum Achievable Control Technology (MACT) code, optional (6- character string)	-

	J	• Application control flag (Character)
		  • Y = control should be applied to inventory
		  • N = control will not be used
			Set to "Y" for all control measures

	K	• Replacement flag (Character)
		  • A = control is applied in addition to controls from /MACT/ packet
		  • R = control replaces controls from /MACT/ packet
			Set to "R" for all control measures

	L	Facility ID for FF10 Point Sources (Plant ID for ORL), optional (Character(15))	Set equal to "Plant ID" for all control measures
	M	Characteristic 1 (for FF10, this is Unit ID; for ORL, this is Point ID), optional (Character(15))	Set equal to "Point ID" for all control measures

[9] UNC, 2020. "SMOKE v4.8.1 User's Manual". The institute for the Environment - The University of North Carolina at Chapel Hill. January 2020. Accessed online at https://www.cmascenter.org/help/documentation.cfm?model=smoke&version=4.8.1, January 2022.

Line	Position	Description	Application Notes
	N	Characteristic 2 (for FF10, this is Release Point ID, (for ORL, this is stack ID); optional (Character(15))	Set equal to "stackID" for all control measures
	O	Characteristic 3 (for FF10, this is Process ID, (for ORL, this is segment ID); optional (Character(15))	Set equal to "process ID" for all control measures
	P	Characteristic 4 (blank for FF10 or ORL inventory input format), optional (Character)	-
	Q	Characteristic 5 (blank for FF10 or ORL inventory input format), optional (Character)	-
3	A	/END/	-

4.0 RESULTS

Emission reduction and cost-effectiveness results are summarized by state in Table 4-1 and NAA in Table 4-2 for each scenario and stringency level. State level surplus emission reductions were 7% to 43% higher for the high stringency scenario compared to the medium stringency scenario and 9% to 82% higher for the medium stringency scenario compared to the low stringency scenario. Overall cost effectiveness by state ranged from $5,945/ton to $12,076/ton for the high stringency scenario, $3,725/ton to $8,138/ton for the medium stringency scenario, and $3,921/ton to $8,555/ton for the low stringency scenario. There is substantial variation in surplus emission reduction and cost-effectiveness estimates by NAA; this is expected due to unique suites of stationary non-EGU sources in each NAA. An electronic file, "LADCO_nonEGU_Controls.xlsx", which includes fully detailed 2016 emissions, surplus emission reductions, cost, and cost-effectiveness, and other ancillary information has been provided to LADCO with this report.

Table 4-1. Emission reductions and cost-effectiveness by state.

State/ Stringency Level	High		Medium		Low	
	Surplus NOx Reduction (tons/year)	Cost-effectiveness (2020$/ton)	Surplus NOx Reduction (tons/year)	Cost-effectiveness (2020$/ton)	Surplus NOx Reduction (tons/year)	Cost-effectiveness (2020$/ton)
IL						
10	17,172	$ 12,076	12,169	$ 7,256	7,457	$ 7,240
25	14,813	$ 10,491	10,481	$ 6,003	6,426	$ 6,065
50	12,882	$ 9,576	9,073	$ 5,280	5,484	$ 5,454
100	10,754	$ 8,790	7,528	$ 4,307	4,497	$ 5,024
MI						
10	31,748	$ 9,187	25,679	$ 7,118	21,525	$ 7,327
25	30,412	$ 8,733	24,753	$ 6,910	20,938	$ 7,189
50	28,787	$ 8,043	23,610	$ 6,563	20,205	$ 6,979
100	27,438	$ 7,786	22,609	$ 6,474	19,522	$ 6,951
MN						
10	23,284	$ 9,960	20,822	$ 8,138	18,212	$ 8,019
25	21,923	$ 9,154	19,864	$ 7,749	17,613	$ 7,815
50	20,454	$ 8,510	18,839	$ 7,472	16,971	$ 7,777
100	18,896	$ 7,786	17,644	$ 7,142	16,145	$ 7,630
OH						
10	17,895	$ 8,791	13,715	$ 5,925	9,800	$ 5,491
25	16,466	$ 7,992	12,669	$ 5,378	9,078	$ 5,009
50	14,707	$ 6,871	11,362	$ 4,543	8,168	$ 4,421
100	13,172	$ 5,945	10,107	$ 3,768	7,312	$ 3,921
WI						
10	12,283	$11,752	9,395	$6,194	5,522	$8,555
25	10,949	$10,690	8,400	$5,263	4,864	$7,836
50	9,803	$9,814	7,575	$4,644	4,267	$7,457
100	8,687	$8,743	6,755	$3,725	3,712	$6,733

Table 4-2. Emission reductions and cost-effectiveness by NAA.

NAA/ Stringency Level	High		Medium		Low	
	Surplus Reduction (tons/year)	Cost-effectiveness (2020$/ton)	Surplus Reduction (tons/year)	Cost-effectiveness (2020$/ton)	Surplus Reduction (tons/year)	Cost-effectiveness (2020$/ton)
Allegan, MI						
10	108	$ 10,440	89	$ 5,543	70	$ 6,541
25	89	$ 6,623	74	$ 3,284	61	$ 4,683
50	76	$ 2,464	65	$ 466	55	$ 2,781
100	0	$0	0	$0	0	$0
Berrien, MI						
10	41	$ 25,668	25	$ 10,476	19	$ 10,852
25	4	$ 2,851	3	$ 3,109	3	$ 3,109
50	0	$0	0	$0	0	$0
100	0	$0	0	$0	0	$0
Chicago, IL						
10	4,509	$ 15,395	3,140	$ 10,760	2,048	$ 9,292
25	3,316	$ 13,147	2,306	$ 9,210	1,523	$ 7,569
50	2,475	$ 12,702	1,690	$ 9,196	1,090	$ 7,194
100	1,628	$ 11,021	1,043	$ 8,422	680	$ 6,085
Chicago, IN [a]						
50	12,687	$ 7,387	9,859	$ 5,275	7,629	$ 4,309
100	11,707	$ 6,537	9,238	$ 4,726	7,196	$ 3,799
Chicago, WI						
10	60	$ 8,679	43	$ 7,168	36	$ 5,822
25	38	$ 2,851	25	$ 3,109	25	$ 3,109
50	38	$ 2,851	25	$ 3,109	25	$ 3,109
100	15	$ 2,851	10	$ 3,109	10	$ 3,109
Cincinnati, OH						
10	2,648	$ 12,955	2,060	$ 9,029	1,310	$ 9,582
25	2,390	$ 11,968	1,859	$ 8,423	1,181	$ 8,960
50	2,111	$ 10,109	1,649	$ 7,167	1,048	$ 7,807
100	1,907	$ 8,135	1,499	$ 5,862	955	$ 6,626
Cleveland, OH						
10	2,062	$ 10,183	1,439	$ 6,733	1,235	$ 6,295
25	1,716	$ 9,213	1,194	$ 5,884	1,044	$ 5,732
50	1,456	$ 7,921	992	$ 4,755	890	$ 4,957
100	1,175	$ 6,485	753	$ 3,474	689	$ 4,066
Columbus, OH						
10	616	$ 10,636	517	$ 5,241	325	$ 6,230
25	533	$ 8,998	454	$ 3,837	281	$ 5,141
50	478	$ 7,755	410	$ 2,971	250	$ 4,744
100	406	$ 5,010	352	$ 842	217	$ 2,970
Detroit, MI						

NAA/ Stringency Level	High		Medium		Low	
	Surplus Reduction (tons/year)	Cost-effectiveness (2020$/ton)	Surplus Reduction (tons/year)	Cost-effectiveness (2020$/ton)	Surplus Reduction (tons/year)	Cost-effectiveness (2020$/ton)
10	5,040	$ 11,402	3,348	$ 7,547	2,234	$ 6,781
25	4,380	$ 10,433	2,891	$ 6,753	1,931	$ 6,060
50	3,510	$ 8,193	2,257	$ 4,883	1,493	$ 4,300
100	2,895	$ 7,670	1,792	$ 4,234	1,167	$ 3,904
Manitowoc County, WI						
10	156	$ 5,070	116	$ 2,046	111	$ 2,448
25	132	$ 4,569	99	$ 1,633	96	$ 1,971
50	104	$ 3,982	81	$ 1,395	81	$ 1,395
100	80	$ 1,445	74	$ 1,384	74	$ 1,384
Muskegon, MI						
10	91	$ 14,236	63	$ 8,064	34	$ 11,213
25	43	$ 14,500	25	$ 10,652	18	$ 11,725
50	0	$0	0	$0	0	$0
100	0	$0	0	$0	0	$0
Northern Milwaukee/Ozaukee, WI						
10	884	$ 9,715	666	$ 5,239	468	$ 6,043
25	734	$ 7,797	559	$ 3,984	396	$ 4,907
50	535	$ 8,332	409	$ 4,925	272	$ 5,777
100	437	$ 8,039	348	$ 5,126	230	$ 5,214
Sheboygan, WI						
10	54	$ 14,638	45	$ 7,813	32	$ 9,897
25	28	$ 10,957	23	$ 3,876	15	$ 10,239
50	28	$ 10,957	23	$ 3,876	15	$ 10,239
100	0	$0	0	$0	0	$0
St. Louis, IL						
10	2,138	$ 9,984	1,625	$ 9,840	1,034	$ 3,898
25	1,948	$ 9,630	1,490	$ 9,716	953	$ 3,570
50	1,728	$ 8,725	1,328	$ 9,381	866	$ 3,037
100	1,256	$ 8,667	986	$ 9,086	663	$ 3,504

[a] 10 tpy and 25 tpy APTE levels were not evaluated for Chicago, IN

APPENDIX A
SOURCE CATEGORY GROUPS AND CONTROL MEASURES BY SCC FOR EACH STRINGENCY SCENARIO

Appendix A. Source Category Groups and Control Measures by SCC for each Stringency Scenario

Table A1. Source Category Groupings by SCC.

SCC	Description 1	Description 2	Description 3	Description 4
Cement Kiln				
30500606	Industrial Processes	Mineral Products	Cement Manufacturing (Dry Process)	Kiln
30500622	Industrial Processes	Mineral Products	Cement Manufacturing (Dry Process)	Preheater Kiln
30500706	Industrial Processes	Mineral Products	Cement Manufacturing (Wet Process)	Kiln
30500623	Industrial Processes	Mineral Products	Cement Manufacturing (Dry Process)	Preheater/Precalciner Kiln
Coal NONEGU				
10200203	External Combustion	Industrial: Boilers	Bituminous/Subbituminous Coal	Bituminous Coal: Cyclone Furnace
10200202	External Combustion	Industrial: Boilers	Bituminous/Subbituminous Coal	Bituminous Coal: Pulverized Coal: Dry Bottom
10200224	External Combustion	Industrial: Boilers	Bituminous/Subbituminous Coal	Subbituminous Coal: Spreader Stoker
10200204	External Combustion	Industrial: Boilers	Bituminous/Subbituminous Coal	Bituminous Coal: Spreader Stoker
10200201	External Combustion	Industrial: Boilers	Bituminous/Subbituminous Coal	Bituminous Coal: Pulverized Coal: Wet Bottom
10200222	External Combustion	Industrial: Boilers	Bituminous/Subbituminous Coal	Subbituminous Coal: Pulverized Coal: Dry Bottom
10100224	External Combustion	Electric Generation: Boilers	Bituminous/Subbituminous Coal	Subbituminous Coal: Boiler, Spreader Stoker
10200903	External Combustion	Industrial: Boilers	Wood/Bark Waste	Wood-fired Boiler - Wet Wood (>=20% moisture)
10200217	External Combustion	Industrial: Boilers	Bituminous/Subbituminous Coal	Bituminous Coal: Atmospheric Fluidized Bed Combustion: Bubbling Bed
10200205	External Combustion	Industrial: Boilers	Bituminous/Subbituminous Coal	Bituminous Coal: Overfeed Stoker
10200901	External Combustion	Industrial: Boilers	Wood/Bark Waste	Bark-fired Boiler
10200802	External Combustion	Industrial: Boilers	Petroleum Coke	All Boiler Sizes
10200902	External Combustion	Industrial: Boilers	Wood/Bark Waste	Wood/Bark-fired Boiler
10200229	External Combustion	Industrial: Boilers	Bituminous/Subbituminous Coal	Subbituminous Coal: Cogeneration
10200212	External Combustion	Industrial: Boilers	Bituminous/Subbituminous Coal	Bituminous Coal: Pulverized Coal: Dry Bottom (Tangential)
Coke				
30300317	Industrial Processes	Primary Metal Production	Metallurgical Coke Manufacturing	By-product Process: Combustion Stack: Coke Oven Gas (COG)
30300318	Industrial Processes	Primary Metal Production	Metallurgical Coke Manufacturing	By-product Process: Combustion Stack: Blast Furnace Gas (BFG)
30300314	Industrial Processes	Primary Metal Production	Metallurgical Coke Manufacturing	By-product Process: Topside Leaks, Lid Leaks
EXCOMB Gas				

SCC	Description 1	Description 2	Description 3	Description 4
10200602	External Combustion	Industrial: Boilers	Natural Gas	10-100 Million BTU/hr
10200601	External Combustion	Industrial: Boilers	Natural Gas	> 100 Million BTU/hr
10300601	External Combustion	Commercial/Institutional: Boilers	Natural Gas	> 100 Million BTU/hr
10300602	External Combustion	Commercial/Institutional: Boilers	Natural Gas	10-100 Million BTU/hr
10200603	External Combustion	Industrial: Boilers	Natural Gas	< 10 Million BTU/hr
10100601	External Combustion	Electric Generation: Boilers	Natural Gas	Boiler, >= 100 Million BTU/hr
10200704	External Combustion	Industrial: Boilers	Process Gas	Blast Furnace Gas
10200799	External Combustion	Industrial: Boilers	Process Gas	Other: Specify in Comments
10200707	External Combustion	Industrial: Boilers	Process Gas	Coke Oven Gas
10100602	External Combustion	Electric Generation: Boilers	Natural Gas	Boiler < 100 Million BTU, except tangential
10500106	External Combustion	Space Heaters	Industrial	Natural Gas
10300603	External Combustion	Commercial/Institutional: Boilers	Natural Gas	< 10 Million BTU/hr
10100702	External Combustion	Electric Generation: Boilers	Process Gas	Boiler < 100 Million Btu/hr
10100604	External Combustion	Electric Generation: Boilers	Natural Gas	Boiler, Tangential-fired
10100701	External Combustion	Electric Generation: Boilers	Process Gas	Boiler, >= 100 Million BTU/hr
Glass				
30501403	Industrial Processes	Mineral Products	Glass Manufacture	Flat Glass: Melting Furnace
30501402	Industrial Processes	Mineral Products	Glass Manufacture	Container Glass: Melting Furnace
30501404	Industrial Processes	Mineral Products	Glass Manufacture	Pressed and Blown Glass: Melting Furnace
ICE Diesel				
20200102	Internal Combustion Engines	Industrial	Distillate Oil (Diesel)	Reciprocating
20400402	Internal Combustion Engines	Engine Testing	Reciprocating Engine	Diesel/Kerosene
20200401	Internal Combustion Engines	Industrial	Other Fuels	Diesel: Large Bore Engine
20100102	Internal Combustion Engines	Electric Generation	Distillate Oil (Diesel)	Reciprocating
20300101	Internal Combustion Engines	Commercial/Institutional	Distillate Oil (Diesel)	Reciprocating
20200402	Internal Combustion Engines	Industrial	Other Fuels	Dual Fuel (Oil/Gas): Large Bore Engine
20100107	Internal Combustion Engines	Electric Generation	Distillate Oil (Diesel)	Reciprocating: Exhaust
20400403	Internal Combustion Engines	Engine Testing	Reciprocating Engine	Distillate Oil
20200104	Internal Combustion Engines	Industrial	Distillate Oil (Diesel)	Reciprocating: Cogeneration
20200103	Internal Combustion Engines	Industrial	Distillate Oil (Diesel)	Turbine: Cogeneration
ICE GAS				
20200201	Internal Combustion Engines	Industrial	Natural Gas	Turbine
20200203	Internal Combustion Engines	Industrial	Natural Gas	Turbine: Cogeneration
20100201	Internal Combustion Engines	Electric Generation	Natural Gas	Turbine
20100202	Internal Combustion Engines	Electric Generation	Natural Gas	Reciprocating
20400401	Internal Combustion Engines	Engine Testing	Reciprocating Engine	Gasoline
20200202	Internal Combustion Engines	Industrial	Natural Gas	Reciprocating
20300702	Internal Combustion Engines	Commercial/Institutional	Digester Gas	Reciprocating: POTW Digester Gas

SCC	Description 1	Description 2	Description 3	Description 4
20200254	Internal Combustion Engines	Industrial	Natural Gas	4-cycle Lean Burn
20300201	Internal Combustion Engines	Commercial/Institutional	Natural Gas	Reciprocating
20300203	Internal Combustion Engines	Commercial/Institutional	Natural Gas	Turbine: Cogeneration
20300202	Internal Combustion Engines	Commercial/Institutional	Natural Gas	Turbine
20200253	Internal Combustion Engines	Industrial	Natural Gas	4-cycle Rich Burn
20400301	Internal Combustion Engines	Engine Testing	Turbine	Natural Gas
20300701	Internal Combustion Engines	Commercial/Institutional	Digester Gas	Turbine
20300204	Internal Combustion Engines	Commercial/Institutional	Natural Gas	Reciprocating: Cogeneration
20300707	Internal Combustion Engines	Commercial/Institutional	Digester Gas	Reciprocating: Exhaust
Iron & Steel				
30301503	Industrial Processes	Primary Metal Production	Integrated Iron and Steel Manufacturing	Sintering: Windbox
30301544	Industrial Processes	Primary Metal Production	Integrated Iron and Steel Manufacturing	Electric Arc Furnace (EAF): Carbon Steel
30301599	Industrial Processes	Primary Metal Production	Integrated Iron and Steel Manufacturing	Other Not Classified
30301526	Industrial Processes	Primary Metal Production	Integrated Iron and Steel Manufacturing	Basic Oxygen Furnace (BOF): Open Hood Stack
30301532	Industrial Processes	Primary Metal Production	Integrated Iron and Steel Manufacturing	Electric Arc Furnace (EAF): Specialty Steel
30301587	Industrial Processes	Primary Metal Production	Integrated Iron and Steel Manufacturing	Heat Treating Furnace: Annealing
30301513	Industrial Processes	Primary Metal Production	Integrated Iron and Steel Manufacturing	Blast Furnace: Casting/Tapping: Local Evacuation
30301522	Industrial Processes	Primary Metal Production	Integrated Iron and Steel Manufacturing	Basic Oxygen Furnace (BOF): Top Blown Furnace: Primary
30301512	Industrial Processes	Primary Metal Production	Integrated Iron and Steel Manufacturing	Blast Furnace: Casting/Tapping: Casthouse Roof Monitor
30301575	Industrial Processes	Primary Metal Production	Integrated Iron and Steel Manufacturing	Coating: Tin, Zinc, etc.
30301511	Industrial Processes	Primary Metal Production	Integrated Iron and Steel Manufacturing	Blast Furnace: Charging
Lime Kiln				
30501604	Industrial Processes	Mineral Products	Lime Manufacture	Calcining: Rotary Kiln (See SCC Codes 3-05-016-18,-19,-20,-21)
30501618	Industrial Processes	Mineral Products	Lime Manufacture	Calcining: Coal-fired Rotary Kiln
30501620	Industrial Processes	Mineral Products	Lime Manufacture	Calcining: Coal- and Gas-fired Rotary Kiln
30700106	Industrial Processes	Pulp and Paper and Wood Products	Sulfate (Kraft) Pulping	Lime Kiln
30501603	Industrial Processes	Mineral Products	Lime Manufacture	Calcining: Vertical Kiln
Process Heat				
30600106	Industrial Processes	Petroleum Industry	Process Heaters	Process Gas
39000699	Industrial Processes	In-process Fuel Use	Natural Gas	General
30390003	Industrial Processes	Primary Metal Production	Fuel Fired Equipment	Natural Gas: Process Heaters
30600104	Industrial Processes	Petroleum Industry	Process Heaters	Gas
30190003	Industrial Processes	Chemical Manufacturing	Fuel Fired Equipment	Process Heater: Natural Gas
30290003	Industrial Processes	Food and Agriculture	Fuel Fired Equipment	Natural Gas: Process Heaters
30490003	Industrial Processes	Secondary Metal Production	Fuel Fired Equipment	Natural Gas: Process Heaters

SCC	Description 1	Description 2	Description 3	Description 4
30590003	Industrial Processes	Mineral Products	Fuel Fired Equipment	Natural Gas: Process Heaters
30390004	Industrial Processes	Primary Metal Production	Fuel Fired Equipment	Process Gas: Process Heaters
30600105	Industrial Processes	Petroleum Industry	Process Heaters	Natural Gas
40201001	Chemical Evaporation	Surface Coating Operations	Coating Oven Heater	Natural Gas
30990003	Industrial Processes	Fabricated Metal Products	Fuel Fired Equipment	Natural Gas: Process Heaters
39990003	Industrial Processes	Miscellaneous Manufacturing Industries	Miscellaneous Manufacturing Industries	Natural Gas: Process Heaters
30190013	Industrial Processes	Chemical Manufacturing	Fuel Fired Equipment	Incinerator: Natural Gas
39900601	Industrial Processes	Miscellaneous Manufacturing Industries	Process Heater/Furnace	Natural Gas
39000797	Industrial Processes	In-process Fuel Use	Process Gas	General
30190004	Industrial Processes	Chemical Manufacturing	Fuel Fired Equipment	Process Heater: Process Gas
39900721	Industrial Processes	Miscellaneous Manufacturing Industries	Process Heater/Furnace	Digester Gas

Table A2. Control measures applied to each stringency scenario by SCC.

SCC	Control Measure for each Stringency Scenario		
	Low	Medium	High
10100204	Selective Non-Catalytic Reduction	Over-fired Air and Selective Non-Catalytic Reduction	Selective Catalytic Reduction
10100205	Selective Non-Catalytic Reduction	Selective Non-Catalytic Reduction	Selective Catalytic Reduction
10100222	Selective Non-Catalytic Reduction	Low NOx Burner, Over-fired Air and Selective Non-Catalytic Reduction	Selective Catalytic Reduction
10100224	Selective Non-Catalytic Reduction	Over-fired Air and Selective Non-Catalytic Reduction	Selective Catalytic Reduction
10100401	Selective Non-Catalytic Reduction	Selective Non-Catalytic Reduction	Selective Catalytic Reduction
10100504	Selective Non-Catalytic Reduction	Selective Non-Catalytic Reduction	Selective Catalytic Reduction
10100601	Low NOx Coal-and-Air Nozzles with separated Over-fired Air	Low NOx Burner, Over-fired Air and Selective Non-Catalytic Reduction	Selective Catalytic Reduction
10100602	Low NOx Coal-and-Air Nozzles with cross-Coupled Over-fired Air	Low NOx Burner, Over-fired Air and Selective Non-Catalytic Reduction	Selective Catalytic Reduction
10100604	Low NOx Coal-and-Air Nozzles with cross-Coupled Over-fired Air	Natural Gas Reburn	Selective Catalytic Reduction
10100701	Selective Catalytic Reduction	Selective Catalytic Reduction	Selective Catalytic Reduction
10100702	Selective Catalytic Reduction	Selective Catalytic Reduction	Selective Catalytic Reduction
10101201	Selective Non-Catalytic Reduction	Selective Non-Catalytic Reduction	Selective Non-Catalytic Reduction
10200201	Selective Non-Catalytic Reduction	Low NOx Burner and Selective Non-Catalytic Reduction	Ultra Low NOx Burner and Selective Catalytic Reduction
10200202	Selective Non-Catalytic Reduction	Low NOx Burner and Selective Non-Catalytic Reduction	Ultra Low NOx Burner and Selective Catalytic Reduction
10200203	Selective Non-Catalytic Reduction	Regenerative Selective Catalytic Reduction	Selective Catalytic Reduction
10200204	Selective Non-Catalytic Reduction	Regenerative Selective Catalytic Reduction	Selective Catalytic Reduction
10200205	Selective Non-Catalytic Reduction	Regenerative Selective Catalytic Reduction	Selective Catalytic Reduction
10200212	Selective Non-Catalytic Reduction	Low NOx Burner and Selective Non-Catalytic Reduction	Ultra Low NOx Burner and Selective Catalytic Reduction
10200217	Selective Non-Catalytic Reduction	Selective Non-Catalytic Reduction	Selective Catalytic Reduction
10200222	Selective Non-Catalytic Reduction	Low NOx Burner and Selective Non-Catalytic Reduction	Ultra Low NOx Burner and Selective Catalytic Reduction
10200224	Selective Non-Catalytic Reduction	Regenerative Selective Catalytic Reduction	Selective Catalytic Reduction
10200229	Selective Non-Catalytic Reduction	Low NOx Burner and Selective Non-Catalytic Reduction	Ultra Low NOx Burner and Selective Catalytic Reduction
10200401	Low NOx Burner and Over-fired Air	Low NOx Burner and Flue Gas Recirculation	Ultra Low NOx Burner and Selective Catalytic Reduction
10200402	Low NOx Burner and Over-fired Air	Low NOx Burner and Flue Gas Recirculation	Ultra Low NOx Burner and Selective Catalytic Reduction
10200501	Low NOx Burner and Over-fired Air	Low NOx Burner and Flue Gas Recirculation	Ultra Low NOx Burner and Selective Catalytic Reduction
10200601	Flue Gas Recirculation	Low NOx Burner and Selective Non-Catalytic Reduction	Ultra Low NOx Burner and Selective Catalytic Reduction
10200602	Flue Gas Recirculation	Low NOx Burner and Selective Non-Catalytic Reduction	Ultra Low NOx Burner and Selective Catalytic Reduction
10200603	Flue Gas Recirculation	Low NOx Burner and Selective Non-Catalytic Reduction	Ultra Low NOx Burner and Selective Catalytic Reduction
10200604	Flue Gas Recirculation	Low NOx Burner and Selective Non-Catalytic Reduction	Ultra Low NOx Burner and Selective Catalytic Reduction

SCC	Control Measure for each Stringency Scenario		
	Low	Medium	High
10200701	Flue Gas Recirculation	Low NOx Burner and Flue Gas Recirculation	Ultra Low NOx Burner and Selective Catalytic Reduction
10200704	Flue Gas Recirculation	Low NOx Burner and Flue Gas Recirculation	Ultra Low NOx Burner and Selective Catalytic Reduction
10200707	Flue Gas Recirculation	Low NOx Burner and Flue Gas Recirculation	Ultra Low NOx Burner and Selective Catalytic Reduction
10200799	Flue Gas Recirculation	Low NOx Burner and Flue Gas Recirculation	Ultra Low NOx Burner
10201401	Flue Gas Recirculation	Low NOx Burner and Selective Non-Catalytic Reduction	Ultra Low NOx Burner and Selective Catalytic Reduction
10300207	Selective Non-Catalytic Reduction	Regenerative Selective Catalytic Reduction	Selective Catalytic Reduction
10300208	Selective Non-Catalytic Reduction	Regenerative Selective Catalytic Reduction	Selective Catalytic Reduction
10300209	Selective Non-Catalytic Reduction	Regenerative Selective Catalytic Reduction	Selective Catalytic Reduction
10300224	Selective Non-Catalytic Reduction	Regenerative Selective Catalytic Reduction	Selective Catalytic Reduction
10300225	Selective Non-Catalytic Reduction	Regenerative Selective Catalytic Reduction	Selective Catalytic Reduction
10300503	Low NOx Burner and Over-fired Air	Low NOx Burner and Flue Gas Recirculation	Ultra Low NOx Burner and Selective Catalytic Reduction
10300601	Flue Gas Recirculation	Low NOx Burner and Selective Non-Catalytic Reduction	Ultra Low NOx Burner and Selective Catalytic Reduction
10300602	Flue Gas Recirculation	Low NOx Burner and Selective Non-Catalytic Reduction	Ultra Low NOx Burner and Selective Catalytic Reduction
10300603	Flue Gas Recirculation	Low NOx Burner and Selective Non-Catalytic Reduction	Ultra Low NOx Burner and Selective Catalytic Reduction
10300701	Flue Gas Recirculation	Low NOx Burner and Flue Gas Recirculation	Ultra Low NOx Burner and Selective Catalytic Reduction
10300799	Flue Gas Recirculation	Low NOx Burner and Flue Gas Recirculation	Ultra Low NOx Burner and Selective Catalytic Reduction
10300811	Flue Gas Recirculation	Low NOx Burner and Flue Gas Recirculation	Ultra Low NOx Burner and Selective Catalytic Reduction
10500106	Selective Non-Catalytic Reduction	Low NOx Burner and Flue Gas Recirculation	Selective Catalytic Reduction
10500206	Selective Non-Catalytic Reduction	Low NOx Burner and Flue Gas Recirculation	Selective Catalytic Reduction
20100102	Ignition Retard	Ignition Retard	Selective Catalytic Reduction
20100107	Ignition Retard	Ignition Retard	Selective Catalytic Reduction
20100201	Water Injection	Low NOx Burner	Selective Catalytic Reduction and Steam Injection
20100202	Adjust Air to Fuel Ratio	Adjust Air to Fuel Ratio	Adjust Air to Fuel Ratio and Ignition Retard
20100801	Water Injection	Low NOx Burner	Selective Catalytic Reduction and Dry Low NOx Combustion
20100802	Adjust Air to Fuel Ratio	Adjust Air to Fuel Ratio	Adjust Air to Fuel Ratio and Ignition Retard
20200102	Ignition Retard	Ignition Retard	Selective Catalytic Reduction
20200103	Ignition Retard	Ignition Retard	Selective Catalytic Reduction
20200104	Ignition Retard	Ignition Retard	Selective Catalytic Reduction
20200201	Water Injection	Dry Low NOx Combustion	EMx and Dry Low NOx Combustion
20200202	Adjust Air to Fuel Ratio	Non-Selective Catalytic Reduction or Adjust Air Fuel Ratio and Ignition Retard	Non-Selective Catalytic Reduction or Layered Combustion
20200203	Water Injection	Dry Low NOx Combustion	EMx and Dry Low NOx Combustion
20200253	Adjust Air to Fuel Ratio	Adjust Air to Fuel Ratio and Ignition Retard	Non-Selective Catalytic Reduction
20200254	Adjust Air to Fuel Ratio	Low Emission Combustion	Layered Combustion
20200401	Ignition Retard	Ignition Retard	Layered Combustion

SCC	Control Measure for each Stringency Scenario		
	Low	Medium	High
20200402	Ignition Retard	Ignition Retard	Layered Combustion
20201607	Ignition Retard	Ignition Retard	Ignition Retard
20201702	Ignition Retard	Ignition Retard	Ignition Retard
20300101	Ignition Retard	Ignition Retard	Selective Catalytic Reduction
20300201	Adjust Air to Fuel Ratio	Adjust Air to Fuel Ratio	Adjust Air to Fuel Ratio and Ignition Retard
20300202	Water Injection	Dry Low NOx Combustion	EMx and Dry Low NOx Combustion
20300203	Water Injection	Dry Low NOx Combustion	EMx and Dry Low NOx Combustion
20300204	Adjust Air to Fuel Ratio	Adjust Air to Fuel Ratio	Adjust Air to Fuel Ratio and Ignition Retard
20300701	Water Injection	Dry Low NOx Combustion	EMx and Dry Low NOx Combustion
20300702	Adjust Air to Fuel Ratio	Adjust Air to Fuel Ratio	Adjust Air to Fuel Ratio and Ignition Retard
20300707	Adjust Air to Fuel Ratio	Adjust Air to Fuel Ratio	Adjust Air to Fuel Ratio and Ignition Retard
20300801	Water Injection	Dry Low NOx Combustion	EMx and Dry Low NOx Combustion
20300802	Adjust Air to Fuel Ratio	Adjust Air to Fuel Ratio	Adjust Air to Fuel Ratio and Ignition Retard
20300809	Water Injection	Dry Low NOx Combustion	EMx and Dry Low NOx Combustion
20400301	Water Injection	Dry Low NOx Combustion	EMx and Dry Low NOx Combustion
20400401	Ignition Retard	Ignition Retard	Ignition Retard
20400402	Ignition Retard	Ignition Retard	Selective Catalytic Reduction
20400403	Ignition Retard	Ignition Retard	Selective Catalytic Reduction
20400499	Ignition Retard	Ignition Retard	Ignition Retard
30100306	Low NOx Burner	Low NOx Burner and Flue Gas Recirculation	Selective Catalytic Reduction
30101301	Selective Catalytic Reduction	Extended Absorption	Non-Selective Catalytic Reduction
30101302	Selective Catalytic Reduction	Extended Absorption	Non-Selective Catalytic Reduction
30190003	Selective Non-Catalytic Reduction	Regenerative Selective Catalytic Reduction	Selective Catalytic Reduction
30190004	Low NOx Burner	Ultra-Low NOx Burner	Low NOx Burner and Selective Catalytic Reduction
30190013	Selective Non-Catalytic Reduction	Selective Non-Catalytic Reduction	Selective Catalytic Reduction
30201421	Low NOx Burner and Flue Gas Recirculation	Low NOx Burner and Flue Gas Recirculation	Low NOx Burner and Flue Gas Recirculation
30290003	Selective Non-Catalytic Reduction	Regenerative Selective Catalytic Reduction	Low NOx Burner and Selective Catalytic Reduction
30300314	Selective Non-Catalytic Reduction	Selective Non-Catalytic Reduction	Selective Non-Catalytic Reduction
30300317	Selective Non-Catalytic Reduction	Selective Non-Catalytic Reduction	Selective Non-Catalytic Reduction
30300318	Selective Non-Catalytic Reduction	Selective Non-Catalytic Reduction	Selective Non-Catalytic Reduction
30301503	Low NOx Burner	Low NOx Burner, Over-fired Air and Gas Reburn	Selective Catalytic Reduction
30301512	Low NOx Burner	Low NOx Burner, Over-fired Air and Gas Reburn	Selective Catalytic Reduction
30301513	Low NOx Burner	Low NOx Burner, Over-fired Air and Gas Reburn	Selective Catalytic Reduction
30301522	Low NOx Burner	Low NOx Burner, Over-fired Air and Gas Reburn	Selective Catalytic Reduction
30301526	Low NOx Burner, Over-fired Air and Gas Reburn	Low NOx Burner, Over-fired Air and Gas Reburn	Low NOx Burner, Over-fired Air and Gas Reburn

SCC	Control Measure for each Stringency Scenario		
	Low	Medium	High
30301532	Selective Catalytic Reduction	Selective Catalytic Reduction	Selective Catalytic Reduction
30301544	Selective Catalytic Reduction	Selective Catalytic Reduction	Selective Catalytic Reduction
30301575	Low NOx Burner	Low NOx Burner	Low NOx Burner and Flue Gas Recirculation
30301587	Low NOx Burner	Low NOx Burner and Flue Gas Recirculation	Low NOx Burner and Selective Catalytic Reduction
30301599	Low Excess Air	Low NOx Burner	Low NOx Burner and Flue Gas Recirculation
30302351	Selective Catalytic Reduction	Selective Catalytic Reduction	Selective Catalytic Reduction
30302352	Selective Catalytic Reduction	Selective Catalytic Reduction	Selective Catalytic Reduction
30302357	Selective Catalytic Reduction	Selective Catalytic Reduction	Selective Catalytic Reduction
30302360	Selective Catalytic Reduction	Selective Catalytic Reduction	Selective Catalytic Reduction
30302381	Selective Catalytic Reduction	Selective Catalytic Reduction	Selective Catalytic Reduction
30302382	Selective Catalytic Reduction	Selective Catalytic Reduction	Selective Catalytic Reduction
30390003	Low NOx Burner	Low NOx Burner and Flue Gas Recirculation	Selective Catalytic Reduction
30390004	Low NOx Burner and Flue Gas Recirculation	Low NOx Burner and Flue Gas Recirculation	Low NOx Burner and Selective Non-Catalytic Reduction
30400103	Low NOx Burner	Low NOx Burner	Low NOx Burner
30400704	Low NOx Burner	Low NOx Burner	Low NOx Burner
30490003	Selective Non-Catalytic Reduction	Regenerative Selective Catalytic Reduction	Selective Catalytic Reduction
30490033	Low NOx Burner	Low NOx Burner	Low NOx Burner
30500606	Low NOx Burner	Selective Non-Catalytic Reduction - Ammonia	Selective Catalytic Reduction
30500622	Low NOx Burner	Selective Non-Catalytic Reduction	Selective Catalytic Reduction
30500623	Biosolid Injection Technology	Selective Non-Catalytic Reduction	Selective Catalytic Reduction
30500706	Low NOx Burner	Selective Non-Catalytic Reduction	Selective Catalytic Reduction
30501212	Low NOx Burner	Low NOx Burner	Low NOx Burner
30501402	Low NOx Burner	Oxygen Enriched Air Staging	Selective Catalytic Reduction
30501403	Electric Boost	Oxygen Enriched Air Staging	Catalytic Ceramic Filter
30501404	Low NOx Burner	Oxygen Enriched Air Staging	Selective Catalytic Reduction
30501603	Low NOx Burner	Low NOx Burner	Low NOx Burner
30501604	Low NOx Burner	Low NOx Burner	Low NOx Burner
30501618	Low NOx Burner	Low NOx Burner	Low NOx Burner
30501620	Low NOx Burner	Low NOx Burner	Low NOx Burner
30590003	Selective Non-Catalytic Reduction	Regenerative Selective Catalytic Reduction	Low NOx Burner and Selective Catalytic Reduction
30600103	Low NOx Burner and Flue Gas Recirculation	Regenerative Selective Catalytic Reduction	Low NOx Burner and Selective Catalytic Reduction
30600104	Excess O3 Control	Low NOx Burner and Flue Gas Recirculation	Selective Catalytic Reduction
30600105	Excess O3 Control	Regenerative Selective Catalytic Reduction	Low NOx Burner and Selective Catalytic Reduction
30600106	Excess O3 Control	Selective Catalytic Reduction	Low NOx Burner and Selective Catalytic Reduction
30600201	Low NOx Burner and Flue Gas Recirculation	Low NOx Burner and Flue Gas Recirculation	Selective Catalytic Reduction
30700104	Low NOx Burner	Low NOx Burner	Selective Catalytic Reduction
30700106	Low NOx Burner	Low NOx Burner	Low NOx Burner
30700110	Low NOx Burner	Oxygen Trim and Water Injection	Selective Catalytic Reduction
30890003	Selective Non-Catalytic Reduction	Regenerative Selective Catalytic Reduction	Selective Catalytic Reduction
30990003	Selective Non-Catalytic Reduction	Regenerative Selective Catalytic Reduction	Low NOx Burner and Selective Catalytic Reduction
31000414	Low NOx Burner and Flue Gas Recirculation	Low NOx Burner and Flue Gas Recirculation	Low NOx Burner and Flue Gas Recirculation

SCC	Control Measure for each Stringency Scenario		
	Low	Medium	High
31000415	Low NOx Burner and Flue Gas Recirculation	Low NOx Burner and Flue Gas Recirculation	Low NOx Burner and Flue Gas Recirculation
39000289	Selective Non-Catalytic Reduction	Selective Non-Catalytic Reduction	Selective Catalytic Reduction
39000699	Low NOx Burner	Low NOx Burner	Selective Catalytic Reduction
39000701	Low NOx Burner and Flue Gas Recirculation	Low NOx Burner and Flue Gas Recirculation	Selective Catalytic Reduction
39000797	Low NOx Burner	Low NOx Burner	Low NOx Burner and Flue Gas Recirculation
39900601	Selective Non-Catalytic Reduction	Regenerative Selective Catalytic Reduction	Selective Catalytic Reduction
39900721	Low NOx Burner and Flue Gas Recirculation	Low NOx Burner and Flue Gas Recirculation	Low NOx Burner and Flue Gas Recirculation
39990003	Selective Non-Catalytic Reduction	Regenerative Selective Catalytic Reduction	Selective Catalytic Reduction
39990024	Selective Non-Catalytic Reduction	Selective Non-Catalytic Reduction	Selective Non-Catalytic Reduction
40201001	Low NOx Burner	Low NOx Burner	Low NOx Burner
50100101	Selective Non-Catalytic Reduction	Selective Non-Catalytic Reduction	Selective Catalytic Reduction
50100103	Selective Non-Catalytic Reduction	Selective Non-Catalytic Reduction	Selective Non-Catalytic Reduction
50100104	Selective Non-Catalytic Reduction	Selective Non-Catalytic Reduction	Selective Non-Catalytic Reduction
50100420	Water Injection	Dry Low NOx Combustion	EMx and Dry Low NOx Combustion
50100515	Selective Non-Catalytic Reduction	Selective Non-Catalytic Reduction	Selective Non-Catalytic Reduction
50100516	Selective Non-Catalytic Reduction	Selective Non-Catalytic Reduction	Selective Non-Catalytic Reduction
50200501	Selective Non-Catalytic Reduction	Selective Non-Catalytic Reduction	Selective Non-Catalytic Reduction
50300101	Selective Non-Catalytic Reduction	Selective Non-Catalytic Reduction	Selective Catalytic Reduction
50300501	Selective Non-Catalytic Reduction	Selective Non-Catalytic Reduction	Selective Non-Catalytic Reduction
50300503	Selective Non-Catalytic Reduction	Selective Non-Catalytic Reduction	Selective Non-Catalytic Reduction
50300504	Selective Non-Catalytic Reduction	Selective Non-Catalytic Reduction	Selective Non-Catalytic Reduction
50300505	Selective Non-Catalytic Reduction	Selective Non-Catalytic Reduction	Selective Non-Catalytic Reduction
50300599	Selective Non-Catalytic Reduction	Selective Non-Catalytic Reduction	Selective Non-Catalytic Reduction
50390005	Low NOx Burner and Over-fired Air	Low NOx Burner and Flue Gas Recirculation	Ultra Low NOx Burner and Selective Catalytic Reduction