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SPECIFICATION SHEET: OTHAR

Description: Canadian and Mexican area source emissions, for simulating 2016 air quality

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1. EXECUTIVE SUMMARY

Canadian and Mexican area source emissions are processed in the othar sector using an inventory provided by Environment and Climate Change Canada (ECCC) for year 2015, and a projection of Mexico emissions from 2008 to 2016. This sector includes nonroad mobile and area source stationary (except Canada ag) emissions in Canada and Mexico. Temporal profiles and spatial allocation are provided by ECCC. Base year inventories were processed with the Sparse Matrix Operating Kernel Emissions (SMOKE) modeling system version 4.6. SMOKE creates emissions in a format that can be input into air quality models. National and state/province-level emission summaries for key pollutants are provided.

2. INTRODUCTION

This document details the approach and data sources to be used for developing 2016 emissions for the Canadian and Mexican area source (othar, or other area) sector. This sector includes all area source emissions which are not included in the onroad_can, onroad_mex, or othafdust sector. It also does not include Canadian agricultural emissions, which are point sources in this platform.

Canadian emissions for this sector are provided by ECCC for the year 2015, and are used directly (i.e. without projecting) for 2016 modeling. In Canada, the othar sector includes three transportation-related inventories (nonroad, rail, and CMV/marine) and a stationary area source inventory. These inventories do not include fugitive dust or agricultural emissions.

In Mexico, the othar sector includes a nonroad inventory and an area source inventory. The othar sector includes all CMV Category C1/C2 emissions within Canada and Canadian federal waters, but does not include CMV C3 emissions; those were converted to point format and moved to the othpt sector. It does not include any Mexican CMV emissions. The othpt sector includes a small Mexican CMV inventory that covers points only. Underway emissions in Mexican federal waters are in the cmv_c3 sector as part of the non-US ECA-IMO-based inventory.

A list of all SCCs in the othar sector is provided in Appendix A.

3. INVENTORY DEVELOPMENT METHODS

Canada

ECCC provided the Canadian area source emissions inventory for 2015 in a format that is close to, but not exactly, FF10. Some columns that are unused by SMOKE contained metadata that needed to be reformatted or moved prior to importing the data into EPA's Emissions Modeling Framework (EMF), due to restrictions on variables types imposed by the FF10 format (e.g. character values in numeric fields). Emissions for year 2015 were used directly for year 2016 modeling in beta platform. The nonroad Canadian inventory is a monthly inventory, and the marine, rail, and other area inventories are annual.

The Canada othar inventories are all province-level, except for the nonroad inventory in Quebec, Ontario, and British Columbia. In Ontario, nonroad emissions are placed in one of four regions; British Columbia and Quebec have two regions each. Each region has a separate set of spatial surrogates.

Detailed documentation of the ECCC emissions inventories for 2015 is provided in Documentation for SMOKE-Ready 2015 Air Pollutant Emission Inventory (APEI) Package version 1 (ECCC, 2018).¹

The other sector includes four Canadian inventories: three transportation inventories (nonroad, rail, and marine), and the other area inventory.

In the Canada marine inventory, C3 emissions were removed, converted to point format, and moved to the other sector. C1 and C2 CMV emissions remain in the other sector.

Mexico

The other sector includes two Mexico inventories, an area inventory and a nonroad inventory. These Mexico inventories are based on projections of a 2008 inventory. These inventories were originally projected to years 2014 and 2018 (ERG, 2014²; ERG, 2017³). For 2016 beta platform, emissions values from those two years were averaged (interpolated) to 2016. These inventories do not include commercial marine vessel (CMV) emissions in Mexico.

4. ANCILLARY DATA

Spatial Allocation

Spatial allocation of other emissions to the national 36km and 12km domains used for air quality modeling is accomplished using spatial surrogates. Spatial surrogates map county polygons to the uniformly spaced grid cells of a modeling domain.

For development of spatial surrogates in Canada, ECCC did not provide spatial surrogates directly, but instead provided shapefiles and specification files for running the Surrogate Tool. Using those inputs, we ran the Surrogate Tool to create Canadian spatial surrogates for the 36US3 and 12US1 grids.

ECCC provided a cross-reference for mapping SCCs to their surrogates. Canadian nonroad sources use surrogates which include sub-province FIPS codes in Quebec, Ontario, and British Columbia consistent with the nonroad inventory.

¹ ECCC 2018. Documentation for SMOKE-Ready 2015 Air Pollutant Emission Inventory (APEI) Package version 1. Available from ftp://newftp.epa.gov/air/emismod/2016/beta/reports/A18031_2015_Canadian_CAC_EmissionsInventoryPackage_version1.pdf

² ERG 2014. Develop Mexico Future Year Emissions. Available from ftp://newftp.epa.gov/air/emismod/2016/beta/reports/Mexico_Emissions_WA%204-09_final_report_121814.pdf

³ ERG 2017. Development of Mexico Emissions Inventories for the 2014 Modeling Platform. Available from ftp://newftp.epa.gov/air/emismod/2016/beta/reports/EPA%205-18%20Report_Clean%20Final_01042017.pdf

In Mexico, spatial surrogates for the 36US3 and 12US1 domains are unchanged from the 2011 emissions modeling platform, except for a new population surrogate based on 2015 population that was developed in 2017.

Reports summarizing total emissions by spatial surrogate at the state and county level are included in the emissions modeling workgroup reports package. A national summary of emissions by spatial surrogate is in Table 1. Note that Canadian surrogate codes are not consistent with US surrogate codes.

Table 1. Other emissions by spatial surrogate (36US3 domain)

Srg	Description	CO	NH3	NOX	PM10	PM2.5	SO2	VOC
11	MEX 2015 Population	133,637	164,464	168,447	13,596	13,521	1,164	291,178
14	MEX Residential Heating - Wood	2,317,561	0	23,842	317,438	305,597	3,658	2,101,033
16	MEX Residential Heating - Distillate Oil	16	2	58	1	1	16	2
20	MEX Residential Heating - LP Gas	5,206	0	26,526	838	838	0	505
22	MEX Total Road Miles	2,773	1	1,046	3	2	7	2,308
24	MEX Total Railroads Miles	6,255	0	63,136	1,566	1,407	551	2,494
26	MEX Total Agriculture	156,284	713,253	399,070	218,488	80,458	18,650	33,742
32	MEX Commercial Land	21,376	0	457	9,673	7,719	0	106,077
34	MEX Industrial Land	586	8	3,383	22,895	4,833	1	563,953
36	MEX Commercial plus Industrial Land	0	0	0	0	0	0	272,155
38	MEX Commercial plus Institutional Land	1,696	3	6,740	235	235	3	148
40	MEX Residential (RES1-4)+Commercial+Industrial+Institutional+Government	662	0	16	41	39	0	331,216
42	MEX Personal Repair (COM3)	0	0	0	0	0	0	26,261
44	MEX Airports Area	32,101	0	13,429	308	306	1,561	3,766
50	MEX Mobile sources - Border Crossing	2,916	5	161	2	1	3	293
100	CAN Population	3,414	761	54	686	669	15	241
101	CAN total dwelling	0	0	0	0	0	0	150,892
104	CAN Capped Total Dwelling	14,686	421	37,205	2,827	2,766	206	1,952
113	CAN Forestry and logging	144,721	185	2,210	16,134	11,310	45	6,246
211	CAN Oil and Gas Extraction	56	0	31	60	60	22	925
212	CAN Mining except oil and gas	0	0	0	31,575	3,079	0	0
221	CAN Total Mining	0	0	0	544	43	0	0
222	CAN Utilities	332	34	1,858	0	0	386	22
308	CAN Food manufacturing	7,330	0	0	35,444	20,185	0	10,324
321	CAN Wood product manufacturing	11,821	874	4,822	2,580	1,646	383	16,606
323	CAN Printing and related support activities	0	0	0	0	0	0	11,770
324	CAN Petroleum and coal products manufacturing	3,848	0	1,205	8,982	1,542	486	9,304
326	CAN Plastics and rubber products	0	0	0	0	0	0	23,283

Emissions Modeling Platform Collaborative: 2016beta Canada and Mexico Area Sources

Srg	Description	CO	NH3	NOX	PM10	PM2.5	SO2	VOC
	manufacturing							
327	CAN Non-metallic mineral product manufacturing	0	0	0	13,773	6,695	0	0
331	CAN Primary Metal Manufacturing	53,508	0	158	6,101	5,595	30	72
350	CAN Water	15	0	120	2	2	0	4
412	CAN Petroleum product wholesaler-distributors	0	0	0	0	0	0	45,257
448	CAN clothing and clothing accessories stores	0	0	0	0	0	0	149
482	CAN Rail Transportation	526	2	4,980	110	106	12	310
562	CAN Waste management and remediation services	16,822	271	1,977	3,803	2,710	2,528	13,138
901	CAN Airport	70	0	109	11	11	0	11
921	CAN Commercial Fuel Combustion	19,413	243	23,628	2,386	2,333	2,821	1,091
923	CAN TOTAL INSTITUTIONAL AND GOVERNEMNT	0	0	0	0	0	0	14,859
924	CAN Primary Industry	0	0	0	0	0	0	40,376
925	CAN Manufacturing and Assembly	0	0	0	0	0	0	71,198
926	CAN Distribtution and Retail (no petroleum)	0	0	0	0	0	0	7,461
927	CAN Commercial Services	0	0	0	0	0	0	32,167
932	CAN CANRAIL	19,491	61	132,985	3,203	3,107	485	6,567
945	CAN Commercial Marine Vessels	5,412	69	53,264	1,050	966	549	2,659
946	CAN Construction and Mining	0	0	0	0	0	0	4,359
951	CAN Wood Consumption Percentage	1,312,119	1,950	21,662	179,350	179,087	3,095	253,523
990	CAN TOTFERT	989	48	4,456	0	0	9,881	164
1251	CAN OFFR_TOTFERT	47,095	81	77,166	5,787	5,671	58	7,176
1252	CAN OFFR_MINES	570	1	1,004	72	70	1	138
1253	CAN OFFR Other Construction not Urban	74,695	66	53,671	6,247	6,096	47	12,159
1254	CAN OFFR Commercial Services	630,668	40	17,791	2,677	2,552	34	44,338
1255	CAN OFFR Oil Sands Mines	3,955	18	9,491	318	311	10	1,025
1256	CAN OFFR Wood industries CANVEC	9,057	9	5,856	489	476	7	1,318
1257	CAN OFFR Unpaved Roads Rural	161,973	32	11,866	1,237	1,169	28	49,975
1258	CAN OFFR_Uilities	15,892	8	5,579	357	349	7	1,087
1259	CAN OFFR total dwelling	211,448	16	5,768	810	773	14	15,653
1260	CAN OFFR_water	138,254	15	4,356	479	451	29	28,411
1261	CAN OFFR_ALL_INDUST	17,376	4	5,770	260	253	3	1,049
1262	CAN OFFR Oil and Gas Extraction	704	0	368	30	29	0	143
1263	CAN OFFR_ALLROADS	10,383	3	2,418	249	244	2	582
1265	CAN OFFR_CANRAIL	92	0	85	9	9	0	15
9450	CAN Commercial Marine Ports	717	1	5,690	161	148	473	199

Temporal Allocation

Other sector inventories are temporalized to hourly using month-of-year, day-of-week, and hour-of-day temporal profiles. The Canadian nonroad inventory is monthly and does not have month-of-year temporalization applied. ECCC provided temporal profiles and an SCC cross-reference. The Canadian temporal profiles used in beta platform differ from those provided by ECCC in the following ways:

- ECCC provided temporal profiles and cross-references in a format used by older versions of SMOKE (version 3.5 and earlier). We converted their profiles and cross-reference to the format used by SMOKE 4.6.
- ECCC's cross-reference included an overall default profile (SCC=000000000) to be used when specific SCCs were not included in the cross-reference. As a standard practice, we do not include an overall default profile in our temporal cross-reference, so we removed that assignment and filled in missing SCCs, with profiles assigned to those for similar SCCs as needed.

Mexico sources use the same temporal profiles as Canada.

Reports summarizing total emissions according to the monthly, day-of-week, and hour-of-day temporal profile assignments are included in the emissions modeling workgroup reports package at the state and county level. A national summary of emissions by temporal profile is in Table 2.

Table 2. Other emissions by temporal profile

Country	Monthly profile	Weekly profile	Diurnal profile	CO	NH3	NOX	PM10	PM2.5	SO2	VOC
Canada	4	7	24	4,216	59	42,047	781	719	20	2,224
Canada	14	7	24	143,925	183	2,196	16,061	11,242	45	6,160
Canada	21	7	26	39,605	76	62,329	6,486	6,357	54	8,221
Canada	21	9	26	1,519	4	2,631	246	241	2	417
Canada	21	17	26	24,520	54	50,382	4,041	3,961	40	4,899
Canada	21	18	26	0	0	1	0	0	0	0
Canada	22	7	26	199,465	24	3,266	1,729	1,625	21	57,950
Canada	22	7	27	8	0	0	0	0	0	0
Canada	22	9	26	91,316	6	1,381	42	39	5	2,443
Canada	22	17	26	100,380	7	1,644	529	497	6	9,616
Canada	22	17	27	138,776	8	2,161	137	128	8	7,026
Canada	22	18	26	15,861	0	3,372	59	56	0	857
Canada	22	18	27	55	0	3	0	0	0	2
Canada	150	7	24	0	0	0	544	43	0	0

Emissions Modeling Platform Collaborative: 2016beta Canada and Mexico Area Sources

Country	Monthly profile	Weekly profile	Diurnal profile	CO	NH3	NOX	PM10	PM2.5	SO2	VOC
Canada	199	7	26	0	0	0	0	0	0	27,675
Canada	200	7	26	0	0	0	0	0	0	23,348
Canada	258	7	26	0	0	0	0	0	0	118,720
Canada	260	7	26	0	0	0	0	0	0	106,399
Canada	262	7	24	20,147	805	122,106	3,455	3,367	467	6,967
Canada	262	7	26	104,923	898	45,254	49,025	32,154	3,478	86,593
Canada	262	7	27	134,485	14	4,275	454	427	29	26,941
Canada	262	9	26	4,077	0	1,280	20	19	0	11
Canada	262	17	26	399,946	19	6,045	1,744	1,646	16	34,268
Canada	467	7	26	0	0	0	0	0	0	7,925
Canada	485	7	26	552	105	2,214	119	93	1	41
Canada	501	101	25	14,597	36	32,493	2,273	2,228	25	2,702
Canada	502	101	25	1,933	5	4,305	302	296	3	359
Canada	503	101	25	1,447	4	3,267	226	222	3	271
Canada	504	102	102	0	0	0	7,784	3,782	0	0
Canada	506	102	102	0	0	0	4,659	2,267	0	0
Canada	508	102	104	0	4	0	31,582	3,084	0	0
Canada	508	102	106	1,299	0	2	129	120	1	1
Canada	508	102	111	1,246	47	350	6	5	297	428
Canada	508	107	109	0	0	0	0	0	0	40,520
Canada	516	104	104	162	8	67	90	58	4	219
Canada	517	104	104	331	32	132	192	122	10	657
Canada	518	104	104	12	73	129	87	55	37	4
Canada	519	104	104	171	6	65	6	4	8	166
Canada	520	104	104	2,960	192	1,292	1,223	780	17	4,504
Canada	521	102	104	903	68	310	8	5	47	2,034
Canada	522	102	113	0	0	0	0	0	0	149
Canada	523	103	114	20	0	25	8	8	15	3
Canada	532	108	107	1,838	10	89	272	266	13	458
Canada	533	105	108	0	0	0	0	0	0	5,176
Canada	535	103	103	0	0	0	1,384	302	0	7,741
Canada	541	103	103	12	0	5	44	8	2	3
Canada	542	103	103	26	0	15	148	27	0	50
Canada	543	103	103	1,506	0	461	3,297	605	202	4,031
Canada	543	201	27	352	0	11	3	3	0	182
Canada	544	103	103	1,466	0	345	2,152	433	161	788
Canada	546	103	103	102	0	26	505	93	12	474
Canada	547	103	103	235	0	97	689	126	55	894
Canada	548	103	103	246	0	166	2,053	222	0	2,540
Canada	549	103	103	254	0	91	93	27	53	523

Emissions Modeling Platform Collaborative: 2016beta Canada and Mexico Area Sources

Country	Monthly profile	Weekly profile	Diurnal profile	CO	NH3	NOX	PM10	PM2.5	SO2	VOC
Canada	551	103	103	119	0	11	0	0	0	5
Canada	551	201	27	139	0	4	1	1	0	59
Canada	560	103	103	1,671	5	11,433	277	268	42	575
Canada	562	201	27	2,283	0	37	15	14	0	847
Canada	564	118	126	30,175	3	1,489	29	27	3	1,732
Canada	567	201	27	560	0	9	4	4	0	234
Canada	568	201	27	237	0	7	2	2	0	114
Canada	569	201	27	7	0	0	0	0	0	2
Canada	582	103	121	7,492	158	18,538	1,435	1,419	110	1,019
Canada	587	118	126	3,331	0	83	2	2	0	153
Canada	589	118	126	7,106	0	112	3	3	0	376
Canada	597	103	121	20	4	79	4	3	0	1
Canada	605	103	121	836	76	2,605	169	151	8	92
Canada	606	113	129	1,260	13	29	227	210	0	231
Canada	607	103	121	1,421	19	3,377	270	270	21	196
Canada	608	103	121	3,249	43	7,721	618	618	49	449
Canada	611	103	121	436	6	1,045	83	83	7	60
Canada	612	103	121	680	10	1,625	129	129	10	94
Canada	623	118	126	20,121	4	2,407	25	23	3	1,579
Canada	624	118	126	2,610	0	136	2	2	0	143
Canada	625	118	126	55,199	5	2,677	52	49	5	3,104
Canada	626	118	126	8,929	1	1,112	11	10	1	623
Canada	627	118	126	17,325	2	1,232	17	16	2	1,026
Canada	628	118	126	472	0	63	1	1	0	40
Canada	655	201	27	46	0	1	0	0	0	17
Canada	656	102	115	0	0	0	0	0	0	7,709
Canada	750	102	102	2,149	72	485	14	4	1,876	185
Canada	750	103	103	0	3	0	0	0	0	0
Canada	17435	7	26	956,464	1,403	15,586	130,617	130,617	2,227	203,004
Canada	17435	201	1501	355,655	547	6,076	48,733	48,470	868	50,518
Canada	20000	7	24	1,821	11	16,501	415	382	958	620
Canada	20000	201	27	26	0	1	0	0	0	10
Canada	95040	101	25	8	0	51	0	0	1	2
Canada	95041	101	25	232	33	2,078	0	0	8,546	48
Canada	95042	101	25	473	9	1,392	0	0	1,063	70
Canada	95043	101	25	61	2	336	0	0	78	13
Canada	95044	101	25	8	1	88	0	0	189	2
Canada	95045	101	25	0	0	3	0	0	0	0
Canada	95046	101	25	0	0	1	0	0	0	0
Canada	95047	101	25	0	0	0	0	0	0	0

Country	Monthly profile	Weekly profile	Diurnal profile	CO	NH3	NOX	PM10	PM2.5	SO2	VOC
Canada	95048	101	25	73	1	189	0	0	3	10
Canada	95049	101	25	133	2	317	0	0	2	18
Canada	95051	13	25	332	34	1,858	0	0	386	22
Canada	GLCMV12	7	24	75	0	601	16	15	45	20
Canada	GLCMV7	7	24	203	2	2,095	41	38	35	81
Mexico	21	7	26	27,684	2	24,681	2,630	2,552	485	2,863
Mexico	21	17	26	101,370	15	143,026	25,516	24,750	1,865	24,409
Mexico	199	7	26	0	0	0	0	0	0	299,393
Mexico	253	7	26	0	0	0	0	0	0	206,255
Mexico	257	7	26	0	0	0	0	0	0	66,456
Mexico	258	7	26	0	0	0	0	0	0	439,858
Mexico	260	7	26	0	0	0	0	0	0	57,285
Mexico	262	7	24	9,883	165,687	63,700	1,619	1,456	557	273,908
Mexico	262	7	26	97,984	201,363	296,755	195,204	63,823	18,303	265,631
Mexico	262	8	26	1,782	8	9,538	295	288	1	170
Mexico	262	MXON42	MXON42	2,773	1	1,046	3	2	7	234
Mexico	469	8	26	509	3	635	46	46	3	34
Mexico	485	7	26	124,100	716	147,836	11,221	11,221	878	8,121
Mexico	1560	7	27	0	516,171	0	9,579	1,091	0	0
Mexico	17435	201	1501	2,362,102	0	24,300	323,539	311,471	3,728	2,141,413
Mexico	95051	13	25	0	0	0	22,903	4,760	0	0

Chemical Speciation

The other sector includes speciation of PM2.5 and VOC emissions using the same profiles and SCC cross-references as in the US. No HAPs are included in the inventory, and so there is no HAP integration in this sector. In Canada, nonroad VOC emissions are specified by mode (exhaust and evaporative). Mexico nonroad emissions are not mode-specific.

New for beta platform, a GSPRO_COMBO is used to specify a mix of E0 and E10 fuels in Canada, for use in speciating Canadian nonroad gasoline emissions. ECCC provided percentages of ethanol use by province, and these were converted into E0 and E10 split. For example, Alberta has 4.91% ethanol in its fuel, so we applied a mix of 49.1% E10 profiles (4.91% times 10, since E10 is 10% ethanol), and 50.9% E0 fuel. Ethanol splits for all provinces in Canada are listed in Table 1. The Canadian onroad inventory includes four distinct county codes in Ontario, allowing for application of separate E0/E10 in Southern Ontario versus Northern Ontario.

In Mexico, the GSPRO_COMBO serves a different purpose as applied to nonroad gasoline speciation. First, Mexico gasoline is assumed to have no ethanol content for the purposes of

speciation; i.e. Mexico gasoline VOC is speciated using only profiles for E0 fuel. Second, Mexico nonroad VOC emissions are not mode-specific in the inventory, and so the GSPRO_COMBO is used to split VOC speciation between the exhaust E0 profile and the evaporative E0 profile – specifically, a 60% exhaust / 40% evaporative split.

Reports summarizing total PM2.5 and VOC emissions according to speciation profile are included in the emissions modeling workgroup reports package at the state and county level.

Table 2: Ethanol percentages by volume by Canadian province

Province	Ethanol % by volume (E10 = 10%)
Alberta	4.91%
British Columbia	5.57%
Manitoba	9.12%
New Brunswick	4.75%
Newfoundland & Labrador	0.00%
Nova Scotia	0.00%
NW Territories	0.00%
Nunavut	0.00%
Ontario (Northern)	0.00%
Ontario (Southern)	7.93%
Prince Edward Island	0.00%
Québec	3.36%
Saskatchewan	7.73%
Yukon	0.00%

5. EMISSIONS PROJECTION METHODS

Future year projections for the 2016 beta platform have not yet been finalized at the time this was written.

6. EMISSIONS PROCESSING REQUIREMENTS

Other sector emissions were processed for air quality modeling using the Sparse Matrix Operator Kernel Emissions (SMOKE⁴) modeling system. The Canada nonroad inventory is monthly, and so Smkinven was run 12 times, each with a different SMKINVEN_MONTH setting.

⁴ <http://www.smoke-model.org/index.cfm>

Then when Temporal is run, Canada nonroad sources use monthly emissions directly, while the rest of the sector uses monthly temporal profiles. Emissions are processed for seven representative days per month (one for each day of the week). Holiday-specific temporalization is not performed in Canada or Mexico. This is a 2-D sector in which all emissions are output to a single layer gridded emissions file.

7. EMISSIONS SUMMARIES

National, province and state totals by pollutant for the beta platform cases are provided here, and some example plots. Plots and maps are available online through the LADCO website⁵ and the Intermountain West Data Warehouse⁶.

The case descriptions are as follows:

2011en, 2023en, 2028el = Final 2011, 2023, and 2028 cases from the 2011v6.3 platform

2014fd = 2014NEIv2 and 2014 NATA

2016fe = 2016 alpha platform (grown from 2014NEIv2)

2016ff = 2016 beta platform

Table 3. Comparison of Canada national total annual CAPS other emissions (tons/yr)

Pollutant	2011en	2014fd	2016fe	2016ff	2023en	2028el
CO	3,265,982	3,265,982	3,329,900	2,938,333	3,521,654	4,151,170
NH3	509,752	509,752	510,193	5,218	511,517	468,863
NOX	768,873	768,873	700,531	499,826	495,504	667,282
PM10	301,445	301,445	301,827	327,901	302,973	244,765
PM2.5	259,832	259,832	257,442	260,591	250,271	199,352
SO2	86,284	86,284	41,790	21,695	47,818	156,765
VOC	1,243,806	1,243,806	1,257,406	888,686	1,298,207	1,285,976

Table 4. Comparison of Mexico national total annual CAPS other emissions (tons/yr)

Pollutant	2011en	2014fd	2016fe	2016ff	2023en	2028el
CO	2,579,614	2,667,789	2,728,186	2,728,186	2,923,397	3,048,102
NH3	875,696	906,868	883,966	883,966	870,092	876,963
NOX	706,612	690,222	711,516	711,516	798,834	836,047
PM10	574,293	588,270	592,555	592,555	620,331	638,484
PM2.5	404,291	415,175	421,457	421,457	447,877	464,315
SO2	44,083	25,654	25,827	25,827	52,123	56,632
VOC	3,564,949	3,690,638	3,786,030	3,786,030	4,101,385	4,316,435

⁵ <https://www.ladco.org/technical/modeling-results/2016-inventory-collaborative/>

⁶ <http://views.cira.colostate.edu/iwdw/eibrowser2016>

Table 5. Comparison of province total annual NOx other emissions (tons/yr)

Province	2011en	2014fd	2016fe	2016ff	2023en	2028el
Alberta	150,466	150,466	139,573	124,402	106,892	141,209
British Columbia	133,298	133,298	119,408	57,519	77,738	103,465
Manitoba	35,123	35,123	31,208	27,012	19,465	16,943
NW Territories	2,536	2,536	2,368	2,716	1,864	4,736
New Brunswick	12,980	12,980	11,816	9,936	8,326	12,057
Newfoundland	44,914	44,914	41,644	19,477	31,834	32,106
Nova Scotia	46,345	46,345	39,892	14,272	20,535	34,093
Nunavut	3,228	3,228	5,557	3,939	12,542	1,438
Ontario	138,510	138,510	127,812	114,543	95,720	169,367
Prince Edward Island	3,179	3,179	2,799	2,522	1,661	1,309
Quebec	124,163	124,163	111,208	70,488	72,342	96,533
Saskatchewan	73,713	73,713	65,321	52,643	40,146	53,501
Yukon	419	419	1,925	357	6,441	524

Table 6. Comparison of state total annual NOx other emissions (tons/yr)

State	2011en	2014fd	2016fe	2016ff	2023en	2028el
Aguascalientes	6,605	6,383	6,746	6,746	7,492	7,838
Baja Calif	21,841	16,761	18,160	18,160	28,254	30,814
Baja Calif Sur	4,996	3,303	3,267	3,267	6,085	6,563
Campeche	35,074	35,058	34,489	34,489	34,844	35,155
Chiapas	22,097	22,197	22,594	22,594	23,492	23,999
Chihuahua	55,606	56,825	56,600	56,600	59,045	61,546
Coahuila	15,089	14,778	16,085	16,085	19,367	21,244
Colima	3,883	3,113	3,243	3,243	4,601	4,990
Distrito Federal	7,966	7,862	8,737	8,737	10,765	11,884
Durango	27,428	27,758	27,668	27,668	28,670	29,692
Guanajuato	41,641	40,866	43,687	43,687	49,568	51,849
Guerrero	5,770	5,197	5,208	5,208	6,172	6,431
Hidalgo	17,781	17,931	19,043	19,043	21,582	22,653
Jalisco	47,329	47,584	47,714	47,714	50,076	51,936
Mexico	32,009	34,193	33,084	33,084	37,849	40,092
Michoacan	21,496	11,655	30,155	30,155	37,382	39,274
Morelos	13,692	22,522	8,188	8,188	5,457	5,657
Nayarit	13,483	13,685	13,224	13,224	13,091	13,371
Nuevo Leon	24,518	24,250	26,128	26,128	30,517	32,673
Oaxaca	13,735	13,223	13,048	13,048	14,059	14,536
Puebla	17,744	17,891	18,802	18,802	21,075	22,177
Queretaro	8,463	8,660	9,912	9,912	12,791	13,999
Quintana Roo	5,137	4,163	4,014	4,014	5,773	6,313
San Luis Potosi	22,207	23,610	24,265	24,265	27,521	29,528
Sinaloa	35,373	32,880	34,074	34,074	38,123	39,239
Sonora	23,917	24,266	24,987	24,987	27,984	29,701
Tabasco	14,024	10,085	10,409	10,409	16,009	16,969

State	2011en	2014fd	2016fe	2016ff	2023en	2028el
Tamaulipas	46,959	45,770	48,347	48,347	54,576	56,784
Tlaxcala	6,672	6,711	6,929	6,929	7,438	7,682
Veracruz	48,159	46,156	46,717	46,717	50,987	52,348
Yucatan	7,176	6,988	7,161	7,161	7,935	8,347
Zacatecas	38,745	37,899	38,833	38,833	40,253	40,765

Table 7. Comparison of province total annual VOC other emissions (tons/yr)

Province	2011en	2014fd	2016fe	2016ff	2023en	2028el
Alberta	219,727	219,727	225,196	101,975	241,602	205,096
British Columbia	104,627	104,627	106,826	87,325	113,422	122,900
Manitoba	63,740	63,740	65,124	34,200	69,277	67,697
NW Territories	1,536	1,536	1,449	1,054	1,187	2,199
New Brunswick	28,181	28,181	28,857	25,999	30,887	27,446
Newfoundland	66,538	66,538	68,214	41,511	73,243	24,884
Nova Scotia	37,795	37,795	36,855	30,070	34,034	31,588
Nunavut	7,776	7,776	8,607	475	11,101	658
Ontario	326,896	326,896	328,551	277,118	333,517	388,132
Prince Edward Island	8,447	8,447	8,481	6,522	8,584	7,459
Quebec	278,853	278,853	279,335	243,516	280,783	274,657
Saskatchewan	97,252	97,252	97,440	38,110	98,004	132,559
Yukon	2,439	2,439	2,471	811	2,566	702

Table 8. Comparison of state total annual VOC other emissions (tons/yr)

State	2011en	2014fd	2016fe	2016ff	2023en	2028el
Aguascalientes	19,358	20,044	20,908	20,908	23,699	25,606
Baja Calif	61,514	63,952	66,739	66,739	77,009	84,512
Baja Calif Sur	10,889	11,634	12,321	12,321	14,748	16,401
Campeche	35,129	36,699	37,835	37,835	41,592	44,168
Chiapas	312,206	327,689	336,600	336,600	365,483	384,806
Chihuahua	99,006	102,418	105,240	105,240	116,057	124,449
Coahuila	48,687	50,592	52,352	52,352	58,739	63,519
Colima	16,571	17,336	18,013	18,013	20,176	21,594
Distrito Federal	108,040	108,285	109,491	109,491	112,654	114,626
Durango	51,830	53,495	54,675	54,675	59,027	62,216
Guanajuato	122,993	127,054	130,531	130,531	141,500	148,738
Guerrero	176,647	181,728	184,462	184,462	192,150	196,737
Hidalgo	113,582	117,080	119,711	119,711	128,929	135,422
Jalisco	147,659	152,179	157,319	157,319	174,141	185,698
Mexico	344,893	361,911	374,663	374,663	416,931	445,702
Michoacan	152,964	156,956	161,028	161,028	171,488	177,850
Morelos	45,963	48,628	48,826	48,826	52,672	55,583
Nayarit	30,199	31,651	32,756	32,756	36,612	39,325

State	2011en	2014fd	2016fe	2016ff	2023en	2028el
Nuevo Leon	88,474	91,933	95,367	95,367	108,061	117,685
Oaxaca	250,320	256,647	260,160	260,160	270,763	277,319
Puebla	250,507	258,839	264,556	264,556	283,412	296,003
Queretaro	50,165	52,377	54,429	54,429	61,365	66,222
Quintana Roo	38,633	42,307	44,868	44,868	53,296	59,173
San Luis Potosi	106,283	108,900	111,119	111,119	118,702	123,926
Sinaloa	76,165	77,827	79,484	79,484	85,204	88,998
Sonora	60,018	62,480	64,620	64,620	72,372	77,905
Tabasco	103,490	107,442	110,026	110,026	117,803	122,632
Tamaulipas	70,902	73,303	75,614	75,614	83,656	89,470
Tlaxcala	32,549	33,966	35,044	35,044	38,656	41,155
Veracruz	390,957	401,848	409,504	409,504	432,607	447,372
Yucatan	111,556	115,863	119,356	119,356	131,043	139,299
Zacatecas	36,798	37,577	38,412	38,412	40,838	42,324

Appendix A: SCCs in the other sector

SCC descriptions are not available for all SCCs in Canada and Mexico.

SCC	Tier 1 description	Tier 2 description	Tier 3 description	Tier 4 description
30501049	Industrial Processes	Mineral Products	Coal Mining, Cleaning, and Material Handling	Wind Erosion: Exposed Areas
2102004000	Stationary Source Fuel Combustion	Industrial	Distillate Oil	Total: Boilers and IC Engines
2102007000	Stationary Source Fuel Combustion	Industrial	Liquified Petroleum Gas (LPG)	Total: All Boiler Types
2103006000	Stationary Source Fuel Combustion	Commercial/Institutional	Natural Gas	Total: Boilers and IC Engines
2103007000	Stationary Source Fuel Combustion	Commercial/Institutional	Liquified Petroleum Gas (LPG)	Total: All Combustor Types
2104006000	Stationary Source Fuel Combustion	Residential	Natural Gas	Total: All Combustor Types
2104007000	Stationary Source Fuel Combustion	Residential	Liquified Petroleum Gas (LPG)	Total: All Combustor Types
2104008001	Stationary Source Fuel Combustion	Residential	Wood	Fireplace: general
2104008002	Stationary Source Fuel Combustion	Residential	Wood	Fireplaces: Insert; non-EPA certified
2104008004	Stationary Source Fuel Combustion	Residential	Wood	Fireplaces: Insert; EPA certified; catalytic
2104008030	Stationary Source Fuel Combustion	Residential	Wood	Catalytic Woodstoves: General
2104008051	Stationary Source Fuel Combustion	Residential	Wood	Non-catalytic Woodstoves: Non-EPA certified

SCC	Tier 1 description	Tier 2 description	Tier 3 description	Tier 4 description
2104008053	Stationary Source Fuel Combustion	Residential	Wood	Non-catalytic Woodstoves: Pellet Fired
2104008060	#N/A	#N/A	#N/A	#N/A
2104011000	Stationary Source Fuel Combustion	Residential	Kerosene	Total: All Heater Types
2199006001	Stationary Source Fuel Combustion	Total Area Source Fuel Combustion	Natural Gas	All Boiler Types
2202420000	#N/A	#N/A	#N/A	#N/A
2222222222	Mobile Sources	Border Crossings	Border Crossings	Border Crossings
2260001010	Mobile Sources	Off-highway Vehicle Gasoline, 2-Stroke	Recreational Equipment	Motorcycles: Off-road
2260001020	Mobile Sources	Off-highway Vehicle Gasoline, 2-Stroke	Recreational Equipment	Snowmobiles
2260001030	Mobile Sources	Off-highway Vehicle Gasoline, 2-Stroke	Recreational Equipment	All Terrain Vehicles
2260001050	Mobile Sources	Off-highway Vehicle Gasoline, 2-Stroke	Recreational Equipment	Golf Carts
2260001060	Mobile Sources	Off-highway Vehicle Gasoline, 2-Stroke	Recreational Equipment	Specialty Vehicles/Carts
2260001061	#N/A	#N/A	#N/A	#N/A
2260002006	Mobile Sources	Off-highway Vehicle Gasoline, 2-Stroke	Construction and Mining Equipment	Tampers/Rammers
2260002009	Mobile Sources	Off-highway Vehicle Gasoline, 2-Stroke	Construction and Mining Equipment	Plate Compactors
2260002021	Mobile Sources	Off-highway Vehicle Gasoline, 2-Stroke	Construction and Mining Equipment	Paving Equipment
2260002033	Mobile Sources	Off-highway Vehicle Gasoline, 2-Stroke	Construction and Mining Equipment	Bore/Drill Rigs
2260002039	Mobile Sources	Off-highway Vehicle Gasoline, 2-Stroke	Construction and Mining Equipment	Concrete/Industrial Saws
2260003030	Mobile Sources	Off-highway Vehicle Gasoline, 2-Stroke	Industrial Equipment	Sweepers/Scrubbers
2260004010	Mobile Sources	Off-highway Vehicle Gasoline, 2-Stroke	Lawn and Garden Equipment	Lawn Mowers (Residential)
2260004011	Mobile Sources	Off-highway Vehicle Gasoline, 2-Stroke	Lawn and Garden Equipment	Lawn Mowers (Commercial)
2260004015	Mobile Sources	Off-highway Vehicle Gasoline, 2-Stroke	Lawn and Garden Equipment	Rotary Tillers < 6 HP (Residential)
2260004016	Mobile Sources	Off-highway Vehicle Gasoline, 2-Stroke	Lawn and Garden Equipment	Rotary Tillers < 6 HP (Commercial)
2260004020	Mobile Sources	Off-highway Vehicle Gasoline, 2-Stroke	Lawn and Garden Equipment	Chain Saws < 6 HP (Residential)
2260004021	Mobile Sources	Off-highway Vehicle Gasoline, 2-Stroke	Lawn and Garden Equipment	Chain Saws < 6 HP (Commercial)

SCC	Tier 1 description	Tier 2 description	Tier 3 description	Tier 4 description
2260004025	Mobile Sources	Off-highway Vehicle Gasoline, 2-Stroke	Lawn and Garden Equipment	Trimmers/Edgers/Brush Cutters (Residential)
2260004026	Mobile Sources	Off-highway Vehicle Gasoline, 2-Stroke	Lawn and Garden Equipment	Trimmers/Edgers/Brush Cutters (Commercial)
2260004030	Mobile Sources	Off-highway Vehicle Gasoline, 2-Stroke	Lawn and Garden Equipment	Leafblowers/Vacuums (Residential)
2260004031	Mobile Sources	Off-highway Vehicle Gasoline, 2-Stroke	Lawn and Garden Equipment	Leafblowers/Vacuums (Commercial)
2260004035	Mobile Sources	Off-highway Vehicle Gasoline, 2-Stroke	Lawn and Garden Equipment	Snowblowers (Residential)
2260004036	Mobile Sources	Off-highway Vehicle Gasoline, 2-Stroke	Lawn and Garden Equipment	Snowblowers (Commercial)
2260004051	Mobile Sources	Off-highway Vehicle Gasoline, 2-Stroke	Lawn and Garden Equipment	Shredders < 6 HP (Commercial)
2260004075	Mobile Sources	Off-highway Vehicle Gasoline, 2-Stroke	Lawn and Garden Equipment	Other Lawn and Garden Equipment (Residential)
2260004076	Mobile Sources	Off-highway Vehicle Gasoline, 2-Stroke	Lawn and Garden Equipment	Other Lawn and Garden Equipment (Commercial)
2260005010	Mobile Sources	Off-highway Vehicle Gasoline, 2-Stroke	Agricultural Equipment	2-Wheel Tractors
2260005030	Mobile Sources	Off-highway Vehicle Gasoline, 2-Stroke	Agricultural Equipment	Agricultural Mowers
2260005035	Mobile Sources	Off-highway Vehicle Gasoline, 2-Stroke	Agricultural Equipment	Sprayers
2260005040	Mobile Sources	Off-highway Vehicle Gasoline, 2-Stroke	Agricultural Equipment	Tillers : 6 HP
2260006005	Mobile Sources	Off-highway Vehicle Gasoline, 2-Stroke	Commercial Equipment	Generator Sets
2260006010	Mobile Sources	Off-highway Vehicle Gasoline, 2-Stroke	Commercial Equipment	Pumps
2260006030	Mobile Sources	Off-highway Vehicle Gasoline, 2-Stroke	Commercial Equipment	Pressure Washers
2260006035	Mobile Sources	Off-highway Vehicle Gasoline, 2-Stroke	Commercial Equipment	Hydro-power Units
2260007005	Mobile Sources	Off-highway Vehicle Gasoline, 2-Stroke	Logging Equipment	Chain Saws : 6 HP
2265001010	Mobile Sources	Off-highway Vehicle Gasoline, 4-Stroke	Recreational Equipment	Motorcycles: Off-road
2265001020	Mobile Sources	Off-highway Vehicle Gasoline, 4-Stroke	Recreational Equipment	Snowmobiles
2265001030	Mobile Sources	Off-highway Vehicle Gasoline, 4-Stroke	Recreational Equipment	All Terrain Vehicles
2265001050	Mobile Sources	Off-highway Vehicle Gasoline, 4-Stroke	Recreational Equipment	Golf Carts

SCC	Tier 1 description	Tier 2 description	Tier 3 description	Tier 4 description
2265001060	Mobile Sources	Off-highway Vehicle Gasoline, 4-Stroke	Recreational Equipment	Specialty Vehicles/Carts
2265001061	#N/A	#N/A	#N/A	#N/A
2265001062	#N/A	#N/A	#N/A	#N/A
2265002000	Mobile Sources	Off-highway Vehicle Gasoline, 4-Stroke	Construction and Mining Equipment	Total
2265002006	Mobile Sources	Off-highway Vehicle Gasoline, 4-Stroke	Construction and Mining Equipment	Tampers/Rammers
2265002009	Mobile Sources	Off-highway Vehicle Gasoline, 4-Stroke	Construction and Mining Equipment	Plate Compactors
2265002015	Mobile Sources	Off-highway Vehicle Gasoline, 4-Stroke	Construction and Mining Equipment	Rollers
2265002021	Mobile Sources	Off-highway Vehicle Gasoline, 4-Stroke	Construction and Mining Equipment	Paving Equipment
2265002022	#N/A	#N/A	#N/A	#N/A
2265002024	Mobile Sources	Off-highway Vehicle Gasoline, 4-Stroke	Construction and Mining Equipment	Surfacing Equipment
2265002030	Mobile Sources	Off-highway Vehicle Gasoline, 4-Stroke	Construction and Mining Equipment	Trenchers
2265002033	Mobile Sources	Off-highway Vehicle Gasoline, 4-Stroke	Construction and Mining Equipment	Bore/Drill Rigs
2265002036	Mobile Sources	Off-highway Vehicle Gasoline, 4-Stroke	Construction and Mining Equipment	Excavators
2265002039	Mobile Sources	Off-highway Vehicle Gasoline, 4-Stroke	Construction and Mining Equipment	Concrete/Industrial Saws
2265002042	Mobile Sources	Off-highway Vehicle Gasoline, 4-Stroke	Construction and Mining Equipment	Cement and Mortar Mixers
2265002045	Mobile Sources	Off-highway Vehicle Gasoline, 4-Stroke	Construction and Mining Equipment	Cranes
2265002046	#N/A	#N/A	#N/A	#N/A
2265002060	Mobile Sources	Off-highway Vehicle Gasoline, 4-Stroke	Construction and Mining Equipment	Rubber Tire Loaders
2265002066	Mobile Sources	Off-highway Vehicle Gasoline, 4-Stroke	Construction and Mining Equipment	Tractors/Loaders/Backhoes
2265002069	Mobile Sources	Off-highway Vehicle Gasoline, 4-Stroke	Construction and Mining Equipment	Crawler Tractor/Dozers
2265002072	Mobile Sources	Off-highway Vehicle Gasoline, 4-Stroke	Construction and Mining Equipment	Skid Steer Loaders
2265002078	Mobile Sources	Off-highway Vehicle Gasoline, 4-Stroke	Construction and Mining Equipment	Dumpers/Tenders
2265002081	Mobile Sources	Off-highway Vehicle Gasoline, 4-Stroke	Construction and Mining Equipment	Other Construction Equipment
2265003010	Mobile Sources	Off-highway Vehicle Gasoline, 4-Stroke	Industrial Equipment	Aerial Lifts

SCC	Tier 1 description	Tier 2 description	Tier 3 description	Tier 4 description
2265003020	Mobile Sources	Off-highway Vehicle Gasoline, 4-Stroke	Industrial Equipment	Forklifts
2265003021	#N/A	#N/A	#N/A	#N/A
2265003030	Mobile Sources	Off-highway Vehicle Gasoline, 4-Stroke	Industrial Equipment	Sweepers/Scrubbers
2265003031	#N/A	#N/A	#N/A	#N/A
2265003040	Mobile Sources	Off-highway Vehicle Gasoline, 4-Stroke	Industrial Equipment	Other General Industrial Equipment
2265003050	Mobile Sources	Off-highway Vehicle Gasoline, 4-Stroke	Industrial Equipment	Other Material Handling Equipment
2265003070	Mobile Sources	Off-highway Vehicle Gasoline, 4-Stroke	Industrial Equipment	Terminal Tractors
2265003071	#N/A	#N/A	#N/A	#N/A
2265004010	Mobile Sources	Off-highway Vehicle Gasoline, 4-Stroke	Lawn and Garden Equipment	Lawn Mowers (Residential)
2265004011	Mobile Sources	Off-highway Vehicle Gasoline, 4-Stroke	Lawn and Garden Equipment	Lawn Mowers (Commercial)
2265004015	Mobile Sources	Off-highway Vehicle Gasoline, 4-Stroke	Lawn and Garden Equipment	Rotary Tillers < 6 HP (Residential)
2265004016	Mobile Sources	Off-highway Vehicle Gasoline, 4-Stroke	Lawn and Garden Equipment	Rotary Tillers < 6 HP (Commercial)
2265004025	Mobile Sources	Off-highway Vehicle Gasoline, 4-Stroke	Lawn and Garden Equipment	Trimmers/Edgers/Brush Cutters (Residential)
2265004026	Mobile Sources	Off-highway Vehicle Gasoline, 4-Stroke	Lawn and Garden Equipment	Trimmers/Edgers/Brush Cutters (Commercial)
2265004030	Mobile Sources	Off-highway Vehicle Gasoline, 4-Stroke	Lawn and Garden Equipment	Leafblowers/Vacuums (Residential)
2265004031	Mobile Sources	Off-highway Vehicle Gasoline, 4-Stroke	Lawn and Garden Equipment	Leafblowers/Vacuums (Commercial)
2265004035	Mobile Sources	Off-highway Vehicle Gasoline, 4-Stroke	Lawn and Garden Equipment	Snowblowers (Residential)
2265004036	Mobile Sources	Off-highway Vehicle Gasoline, 4-Stroke	Lawn and Garden Equipment	Snowblowers (Commercial)
2265004040	Mobile Sources	Off-highway Vehicle Gasoline, 4-Stroke	Lawn and Garden Equipment	Rear Engine Riding Mowers (Residential)
2265004041	Mobile Sources	Off-highway Vehicle Gasoline, 4-Stroke	Lawn and Garden Equipment	Rear Engine Riding Mowers (Commercial)
2265004046	Mobile Sources	Off-highway Vehicle Gasoline, 4-Stroke	Lawn and Garden Equipment	Front Mowers (Commercial)
2265004051	Mobile Sources	Off-highway Vehicle Gasoline, 4-Stroke	Lawn and Garden Equipment	Shredders < 6 HP (Commercial)
2265004055	Mobile Sources	Off-highway Vehicle Gasoline, 4-Stroke	Lawn and Garden Equipment	Lawn and Garden Tractors (Residential)
2265004056	Mobile Sources	Off-highway Vehicle	Lawn and Garden	Lawn and Garden Tractors

SCC	Tier 1 description	Tier 2 description	Tier 3 description	Tier 4 description
		Gasoline, 4-Stroke	Equipment	(Commercial)
2265004061	Mobile Sources	Off-highway Vehicle Gasoline, 4-Stroke	Lawn and Garden Equipment	Wood Splitters (Commercial)
2265004066	Mobile Sources	Off-highway Vehicle Gasoline, 4-Stroke	Lawn and Garden Equipment	Chippers/Stump Grinders (Commercial)
2265004071	Mobile Sources	Off-highway Vehicle Gasoline, 4-Stroke	Lawn and Garden Equipment	Turf Equipment (Commercial)
2265004075	Mobile Sources	Off-highway Vehicle Gasoline, 4-Stroke	Lawn and Garden Equipment	Other Lawn and Garden Equipment (Residential)
2265004076	Mobile Sources	Off-highway Vehicle Gasoline, 4-Stroke	Lawn and Garden Equipment	Other Lawn and Garden Equipment (Commercial)
2265005010	Mobile Sources	Off-highway Vehicle Gasoline, 4-Stroke	Agricultural Equipment	2-Wheel Tractors
2265005025	Mobile Sources	Off-highway Vehicle Gasoline, 4-Stroke	Agricultural Equipment	Balers
2265005030	Mobile Sources	Off-highway Vehicle Gasoline, 4-Stroke	Agricultural Equipment	Agricultural Mowers
2265005035	Mobile Sources	Off-highway Vehicle Gasoline, 4-Stroke	Agricultural Equipment	Sprayers
2265005040	Mobile Sources	Off-highway Vehicle Gasoline, 4-Stroke	Agricultural Equipment	Tillers : 6 HP
2265005045	Mobile Sources	Off-highway Vehicle Gasoline, 4-Stroke	Agricultural Equipment	Swathers
2265005055	Mobile Sources	Off-highway Vehicle Gasoline, 4-Stroke	Agricultural Equipment	Other Agricultural Equipment
2265006005	Mobile Sources	Off-highway Vehicle Gasoline, 4-Stroke	Commercial Equipment	Generator Sets
2265006010	Mobile Sources	Off-highway Vehicle Gasoline, 4-Stroke	Commercial Equipment	Pumps
2265006015	Mobile Sources	Off-highway Vehicle Gasoline, 4-Stroke	Commercial Equipment	Air Compressors
2265006025	Mobile Sources	Off-highway Vehicle Gasoline, 4-Stroke	Commercial Equipment	Welders
2265006030	Mobile Sources	Off-highway Vehicle Gasoline, 4-Stroke	Commercial Equipment	Pressure Washers
2265006035	Mobile Sources	Off-highway Vehicle Gasoline, 4-Stroke	Commercial Equipment	Hydro-power Units
2265007010	Mobile Sources	Off-highway Vehicle Gasoline, 4-Stroke	Logging Equipment	Shredders : 6 HP
2265007015	Mobile Sources	Off-highway Vehicle Gasoline, 4-Stroke	Logging Equipment	Forest Eqp - Feller/Bunch/Skidder
2265008005	Mobile Sources	Off-highway Vehicle Gasoline, 4-Stroke	Airport Ground Support Equipment	Airport Ground Support Equipment
2267001060	Mobile Sources	LPG	Recreational Equipment	Specialty Vehicles/Carts

SCC	Tier 1 description	Tier 2 description	Tier 3 description	Tier 4 description
2267001061	#N/A	#N/A	#N/A	#N/A
2267002039	Mobile Sources	LPG	Construction and Mining Equipment	Concrete/Industrial Saws
2267002045	Mobile Sources	LPG	Construction and Mining Equipment	Cranes
2267002057	Mobile Sources	LPG	Construction and Mining Equipment	Rough Terrain Forklifts
2267002060	Mobile Sources	LPG	Construction and Mining Equipment	Rubber Tire Loaders
2267003010	Mobile Sources	LPG	Industrial Equipment	Aerial Lifts
2267003020	Mobile Sources	LPG	Industrial Equipment	Forklifts
2267003030	Mobile Sources	LPG	Industrial Equipment	Sweepers/Scrubbers
2267003070	Mobile Sources	LPG	Industrial Equipment	Terminal Tractors
2267004031	Mobile Sources	LPG	Lawn and Garden Equipment	Leafblowers/Vacuums (Commercial)
2267004040	Mobile Sources	LPG	Lawn and Garden Equipment	Rear Engine Riding Mowers (Residential)
2267006005	Mobile Sources	LPG	Commercial Equipment	Generator Sets
2267006025	Mobile Sources	LPG	Commercial Equipment	Welders
2268003030	Mobile Sources	CNG	Industrial Equipment	Sweepers/Scrubbers
2268004055	Mobile Sources	CNG	Lawn and Garden Equipment	Lawn and Garden Tractors (Residential)
2268005060	Mobile Sources	CNG	Agricultural Equipment	Irrigation Sets
2268006005	Mobile Sources	CNG	Commercial Equipment	Generator Sets
2270001030	Mobile Sources	Off-highway Vehicle Diesel	Recreational Equipment	All Terrain Vehicles
2270001060	Mobile Sources	Off-highway Vehicle Diesel	Recreational Equipment	Specialty Vehicles/Carts
2270001061	#N/A	#N/A	#N/A	#N/A
2270001062	#N/A	#N/A	#N/A	#N/A
2270002000	Mobile Sources	Off-highway Vehicle Diesel	Construction and Mining Equipment	Total
2270002003	Mobile Sources	Off-highway Vehicle Diesel	Construction and Mining Equipment	Pavers
2270002006	Mobile Sources	Off-highway Vehicle Diesel	Construction and Mining Equipment	Tampers/Rammers
2270002009	Mobile Sources	Off-highway Vehicle Diesel	Construction and Mining Equipment	Plate Compactors
2270002015	Mobile Sources	Off-highway Vehicle Diesel	Construction and Mining Equipment	Rollers
2270002018	Mobile Sources	Off-highway Vehicle Diesel	Construction and Mining Equipment	Scrapers
2270002021	Mobile Sources	Off-highway Vehicle Diesel	Construction and Mining Equipment	Paving Equipment

SCC	Tier 1 description	Tier 2 description	Tier 3 description	Tier 4 description
2270002022	#N/A	#N/A	#N/A	#N/A
2270002024	Mobile Sources	Off-highway Vehicle Diesel	Construction and Mining Equipment	Surfacing Equipment
2270002027	Mobile Sources	Off-highway Vehicle Diesel	Construction and Mining Equipment	Signal Boards/Light Plants
2270002030	Mobile Sources	Off-highway Vehicle Diesel	Construction and Mining Equipment	Trenchers
2270002033	Mobile Sources	Off-highway Vehicle Diesel	Construction and Mining Equipment	Bore/Drill Rigs
2270002036	Mobile Sources	Off-highway Vehicle Diesel	Construction and Mining Equipment	Excavators
2270002039	Mobile Sources	Off-highway Vehicle Diesel	Construction and Mining Equipment	Concrete/Industrial Saws
2270002042	Mobile Sources	Off-highway Vehicle Diesel	Construction and Mining Equipment	Cement and Mortar Mixers
2270002045	Mobile Sources	Off-highway Vehicle Diesel	Construction and Mining Equipment	Cranes
2270002048	Mobile Sources	Off-highway Vehicle Diesel	Construction and Mining Equipment	Graders
2270002051	Mobile Sources	Off-highway Vehicle Diesel	Construction and Mining Equipment	Off-highway Trucks
2270002054	Mobile Sources	Off-highway Vehicle Diesel	Construction and Mining Equipment	Crushing/Processing Equipment
2270002057	Mobile Sources	Off-highway Vehicle Diesel	Construction and Mining Equipment	Rough Terrain Forklifts
2270002060	Mobile Sources	Off-highway Vehicle Diesel	Construction and Mining Equipment	Rubber Tire Loaders
2270002066	Mobile Sources	Off-highway Vehicle Diesel	Construction and Mining Equipment	Tractors/Loaders/Backhoes
2270002069	Mobile Sources	Off-highway Vehicle Diesel	Construction and Mining Equipment	Crawler Tractor/Dozers
2270002072	Mobile Sources	Off-highway Vehicle Diesel	Construction and Mining Equipment	Skid Steer Loaders
2270002078	Mobile Sources	Off-highway Vehicle Diesel	Construction and Mining Equipment	Dumpers/Tenders
2270002081	Mobile Sources	Off-highway Vehicle Diesel	Construction and Mining Equipment	Other Construction Equipment
2270003010	Mobile Sources	Off-highway Vehicle Diesel	Industrial Equipment	Aerial Lifts
2270003020	Mobile Sources	Off-highway Vehicle Diesel	Industrial Equipment	Forklifts
2270003030	Mobile Sources	Off-highway Vehicle Diesel	Industrial Equipment	Sweepers/Scrubbers
2270003040	Mobile Sources	Off-highway Vehicle	Industrial Equipment	Other General Industrial

SCC	Tier 1 description	Tier 2 description	Tier 3 description	Tier 4 description
		Diesel		Equipment
2270003060	Mobile Sources	Off-highway Vehicle Diesel	Industrial Equipment	AC\Refrigeration
2270003070	Mobile Sources	Off-highway Vehicle Diesel	Industrial Equipment	Terminal Tractors
2270004040	Mobile Sources	Off-highway Vehicle Diesel	Lawn and Garden Equipment	Rear Engine Riding Mowers (Residential)
2270004041	Mobile Sources	Off-highway Vehicle Diesel	Lawn and Garden Equipment	Rear Engine Riding Mowers (Commercial)
2270004046	Mobile Sources	Off-highway Vehicle Diesel	Lawn and Garden Equipment	Front Mowers (Commercial)
2270004055	Mobile Sources	Off-highway Vehicle Diesel	Lawn and Garden Equipment	Lawn and Garden Tractors (Residential)
2270004056	Mobile Sources	Off-highway Vehicle Diesel	Lawn and Garden Equipment	Lawn and Garden Tractors (Commercial)
2270004066	Mobile Sources	Off-highway Vehicle Diesel	Lawn and Garden Equipment	Chippers/Stump Grinders (Commercial)
2270004071	Mobile Sources	Off-highway Vehicle Diesel	Lawn and Garden Equipment	Turf Equipment (Commercial)
2270004075	Mobile Sources	Off-highway Vehicle Diesel	Lawn and Garden Equipment	Other Lawn and Garden Equipment (Residential)
2270004076	Mobile Sources	Off-highway Vehicle Diesel	Lawn and Garden Equipment	Other Lawn and Garden Equipment (Commercial)
2270005000	Mobile Sources	Off-highway Vehicle Diesel	Agricultural Equipment	Total
2270005010	Mobile Sources	Off-highway Vehicle Diesel	Agricultural Equipment	2-Wheel Tractors
2270005015	Mobile Sources	Off-highway Vehicle Diesel	Agricultural Equipment	Agricultural Tractors
2270005020	Mobile Sources	Off-highway Vehicle Diesel	Agricultural Equipment	Combines
2270005025	Mobile Sources	Off-highway Vehicle Diesel	Agricultural Equipment	Balers
2270005035	Mobile Sources	Off-highway Vehicle Diesel	Agricultural Equipment	Sprayers
2270005040	Mobile Sources	Off-highway Vehicle Diesel	Agricultural Equipment	Tillers : 6 HP
2270005045	Mobile Sources	Off-highway Vehicle Diesel	Agricultural Equipment	Swathers
2270005055	Mobile Sources	Off-highway Vehicle Diesel	Agricultural Equipment	Other Agricultural Equipment
2270005060	Mobile Sources	Off-highway Vehicle Diesel	Agricultural Equipment	Irrigation Sets
2270006005	Mobile Sources	Off-highway Vehicle	Commercial Equipment	Generator Sets

SCC	Tier 1 description	Tier 2 description	Tier 3 description	Tier 4 description
		Diesel		
2270006010	Mobile Sources	Off-highway Vehicle Diesel	Commercial Equipment	Pumps
2270006015	Mobile Sources	Off-highway Vehicle Diesel	Commercial Equipment	Air Compressors
2270006025	Mobile Sources	Off-highway Vehicle Diesel	Commercial Equipment	Welders
2270006030	Mobile Sources	Off-highway Vehicle Diesel	Commercial Equipment	Pressure Washers
2270006035	Mobile Sources	Off-highway Vehicle Diesel	Commercial Equipment	Hydro-power Units
2270007015	Mobile Sources	Off-highway Vehicle Diesel	Logging Equipment	Forest Eqp - Feller/Bunch/Skidder
2270007020	Mobile Sources	Off-highway Vehicle Diesel	Logging Equipment	Fellers/Bunchers
2270008000	Mobile Sources	Off-highway Vehicle Diesel	Airport Ground Support Equipment	All
2270008005	Mobile Sources	Off-highway Vehicle Diesel	Airport Ground Support Equipment	Airport Ground Support Equipment
2270009010	Mobile Sources	Off-highway Vehicle Diesel	Underground Mining Equipment	Other Underground Mining Equipment
2270010010	Mobile Sources	Off-highway Vehicle Diesel	Industrial Equipment	Other Oil Field Equipment
2270010015	#N/A	#N/A	#N/A	#N/A
2270010036	#N/A	#N/A	#N/A	#N/A
2270010048	#N/A	#N/A	#N/A	#N/A
2270010051	#N/A	#N/A	#N/A	#N/A
2270010060	#N/A	#N/A	#N/A	#N/A
2270010066	#N/A	#N/A	#N/A	#N/A
2270010069	#N/A	#N/A	#N/A	#N/A
2275000000	Mobile Sources	Aircraft	All Aircraft Types and Operations	Total
2280002100	Mobile Sources	Marine Vessels, Commercial	Diesel	Port emissions
2280002200	Mobile Sources	Marine Vessels, Commercial	Diesel	Underway emissions
2280004000	Mobile Sources	Marine Vessels, Commercial	Gasoline	Total, All Vessel Types
2280004010	Mobile Sources	Marine Vessels, Commercial	Gasoline	Ocean-going Vessels
2282005010	Mobile Sources	Pleasure Craft	Gasoline 2-Stroke	Outboard
2282005015	Mobile Sources	Pleasure Craft	Gasoline 2-Stroke	Personal Water Craft
2282010005	Mobile Sources	Pleasure Craft	Gasoline 4-Stroke	Inboard/Sterndrive
2282020005	Mobile Sources	Pleasure Craft	Diesel	Inboard/Sterndrive

SCC	Tier 1 description	Tier 2 description	Tier 3 description	Tier 4 description
2282020010	Mobile Sources	Pleasure Craft	Diesel	Outboard
2282020020	Mobile Sources	Pleasure Craft	Diesel	Sailboat Auxiliary Inboard
2285000000	Mobile Sources	Railroad Equipment	All Fuels	Total
2285002005	Mobile Sources	Railroad Equipment	Diesel	Line Haul Locomotives (use subdivisions by class/operation)
2285002008	Mobile Sources	Railroad Equipment	Diesel	Line Haul Locomotives: Passenger Trains (Amtrak)
2285002010	Mobile Sources	Railroad Equipment	Diesel	Yard Locomotives
2285002015	Mobile Sources	Railroad Equipment	Diesel	Railway Maintenance
2285004015	Mobile Sources	Railroad Equipment	Gasoline, 4-Stroke	Railway Maintenance
2302002000	Industrial Processes	Food and Kindred Products: SIC 20	Commercial Cooking - Charbroiling	Charbroiling Total
2302040000	Industrial Processes	Food and Kindred Products: SIC 20	Grain Mill Products	Total
2302050000	Industrial Processes	Food and Kindred Products: SIC 20	Bakery Products	Total
2303020000	Industrial Processes	Primary Metal Production: SIC 33	Iron and Steel Foundries	Total
2305070000	Industrial Processes	Mineral Processes: SIC 32	Concrete, Gypsum, Plaster Products	Total
2306010000	Industrial Processes	Petroleum Refining: SIC 29	Asphalt Paving/Roofing Materials	Total
2307020000	Industrial Processes	Wood Products: SIC 24	Sawmills/Planing Mills	Total
2307030000	Industrial Processes	Wood Products: SIC 24	Millwork, Plywood, and Structural Members	Total
2310020600	Industrial Processes	Oil and Gas Exploration and Production	Natural Gas	Compressor Engines
2311010000	Industrial Processes	Construction: SIC 15 - 17	Residential	Total
2311080301	#N/A	#N/A	#N/A	#N/A
2325030000	Industrial Processes	Mining and Quarrying: SIC 14	Sand and Gravel	Total
2401001000	Solvent Utilization	Surface Coating	Architectural Coatings	Total: All Solvent Types
2401003000	Solvent Utilization	Surface Coating	Architectural Coatings - Water-based	Total: All Solvent Types
2401005000	Solvent Utilization	Surface Coating	Auto Refinishing: SIC 7532	Total: All Solvent Types
2401008000	Solvent Utilization	Surface Coating	Traffic Markings	Total: All Solvent Types
2401090000	Solvent Utilization	Surface Coating	Miscellaneous Manufacturing	Total: All Solvent Types
2401100000	Solvent Utilization	Surface Coating	Industrial Maintenance Coatings	Total: All Solvent Types
2401990000	Solvent Utilization	Surface Coating	All Surface Coating	Total: All Solvent Types

SCC	Tier 1 description	Tier 2 description	Tier 3 description	Tier 4 description
			Categories	
2415000000	Solvent Utilization	Degreasing	All Processes/All Industries	Total: All Solvent Types
2420000000	Solvent Utilization	Dry Cleaning	All Processes	Total: All Solvent Types
2420000055	Solvent Utilization	Dry Cleaning	All Processes	Perchloroethylene
2425000000	Solvent Utilization	Graphic Arts	All Processes	Total: All Solvent Types
2430000000	Solvent Utilization	Rubber/Plastics	All Processes	Total: All Solvent Types
2440000000	Solvent Utilization	Miscellaneous Industrial	All Processes	Total: All Solvent Types
2440020000	Solvent Utilization	Miscellaneous Industrial	Adhesive (Industrial) Application	Total: All Solvent Types
2460100000	Solvent Utilization	Miscellaneous Non-industrial: Consumer and Commercial	All Personal Care Products	Total: All Solvent Types
2460940000	Solvent Utilization	Miscellaneous Non-industrial: Consumer and Commercial	Miscellaneous Products: Office Supplies	Total: All Solvent Types
2461000000	Solvent Utilization	Miscellaneous Non-industrial: Commercial	All Processes	Total: All Solvent Types
2461020000	Solvent Utilization	Miscellaneous Non-industrial: Commercial	Asphalt Application: All Processes	Total: All Solvent Types
2461850000	Solvent Utilization	Miscellaneous Non-industrial: Commercial	Pesticide Application: Agricultural	All Processes
2465000000	Solvent Utilization	Miscellaneous Non-industrial: Consumer	All Products/Processes	Total: All Solvent Types
2465200000	Solvent Utilization	Miscellaneous Non-industrial: Consumer	Household Products	Total: All Solvent Types
2501000000	Storage and Transport	Petroleum and Petroleum Product Storage	All Storage Types: Breathing Loss	Total: All Products
2501000120	Storage and Transport	Petroleum and Petroleum Product Storage	All Storage Types: Breathing Loss	Gasoline
2501060000	Storage and Transport	Petroleum and Petroleum Product Storage	Gasoline Service Stations	Total: All Gasoline/All Processes
2601000000	Waste Disposal, Treatment, and Recovery	On-site Incineration	All Categories	Total
2601010000	Waste Disposal, Treatment, and Recovery	On-site Incineration	Industrial	Total
2601020000	Waste Disposal, Treatment, and Recovery	On-site Incineration	Commercial/Institutional	Total

SCC	Tier 1 description	Tier 2 description	Tier 3 description	Tier 4 description
2610000000	Waste Disposal, Treatment, and Recovery	Open Burning	All Categories	Total
2620000000	Waste Disposal, Treatment, and Recovery	Landfills	All Categories	Total
2630030000	Waste Disposal, Treatment, and Recovery	Wastewater Treatment	Residential/Subdivision Owned	Total Processed
2630090000	#N/A	#N/A	#N/A	#N/A
2801000000	Miscellaneous Area Sources	Agriculture Production - Crops	Agriculture - Crops	Total
2801520004	Miscellaneous Area Sources	Agriculture Production - Crops	Orchard Heaters	Diesel
2801520010	Miscellaneous Area Sources	Agriculture Production - Crops	Orchard Heaters	Propane
2801520020	#N/A	#N/A	#N/A	#N/A
2801700000	Miscellaneous Area Sources	Agriculture Production - Crops	Fertilizer Application	Total Fertilizers
2805000000	Miscellaneous Area Sources	Agriculture Production - Livestock	Agriculture - Livestock	Total
2805001000	Miscellaneous Area Sources	Agriculture Production - Livestock	Beef cattle - finishing operations on feedlots (drylots)	Dust Kicked-up by Hooves (use 28-05-020, -001, -002, or -003 for Waste)
2810003000	Miscellaneous Area Sources	Other Combustion	Cigarette Smoke	Total
2810010000	Miscellaneous Area Sources	Other Combustion	Human Perspiration and Respiration	Total
2810015000	Miscellaneous Area Sources	Other Combustion	Prescribed Forest Burning	Unspecified
2810030000	Miscellaneous Area Sources	Other Combustion	Structure Fires	Unspecified
2810060100	Miscellaneous Area Sources	Other Combustion	Cremation	Humans
2850000010	Miscellaneous Area Sources	Health Services	Hospitals	Sterilization Operations
3333333333	LPG Distribution	LPG Distribution	LPG Distribution	LPG Distribution
5555555555	Domestic Ammonia	Domestic Ammonia	Domestic Ammonia	Domestic Ammonia