Development of Mexico Emission Inventories for the 2014 Modeling Platform

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1.0 INTRODUCTION

The U.S. Environmental Protection Agency (EPA) is developing an air quality modeling platform for the year 2014 based on the 2014 NEI, version 1. The air quality modeling platform consists of all the emissions inventories and ancillary data files used for emissions modeling, as well as the meteorological, initial condition, and boundary condition files needed to run the air quality model. This modeling platform includes all the criteria air pollutants and precursors, and several of the hazardous air pollutants. The standard modeling domain for the platform includes portions of Mexico and Canada, and representative emissions for those areas are required for all regions to properly characterize air quality in the United States near the borders. Hemispheric modeling to be conducted by EPA also requires emissions for the entire country of Mexico.

Under Work Assignment 5-18, ERG developed criteria pollutant emission inventories for Mexico to support EPA's 2014 modeling platform. The Work Assignment specified the pollutants to be included: nitrogen oxides (NO_x), sulfur dioxide (SO_2), volatile organic compounds (VOC), carbon monoxide (CO), particulate matter with an aerodynamic diameter of 10 micrometers (µm) or less (PM_{10}), particulate matter with an aerodynamic diameter of 2.5 µm or less ($PM_{2.5}$), ammonia (NH_3), and pyrolytic elemental carbon (PEC) (i.e., black carbon). Mexico consists of 31 states and the Federal District (i.e., 32 federal entities); within these 32 federal entities, there are a total of 2,457 municipalities (as of 2014), or municipios. Mexico municipalities are the equivalent of counties in the United States. In general, onroad, commercial marine, area source and nonroad mobile source emissions were estimated at the municipality-level; one exception was that the emissions from bus terminals were estimated at the state-level. Point source emissions were estimated at the facility- and unit-level. The 32 federal entities are displayed in Figure 1; Figure 1 also includes the southern boundary of the 36 km Continental United States (CONUS) modeling domain. This Work Assignment covers the entire country of Mexico. It should be noted that the two largest metropolitan areas of Mexico (i.e., Mexico City and Guadalajara) are located outside of the 36 km CONUS modeling domain. Mexico City is primarily located in Distrito Federal and the state of México, while Guadalajara is located in the central part of the state of Jalísco.

Figure 1. Mexico States and the 36 km CONUS Modeling Domain

Mexico States:

01 – Aguascalientes	09 – Distrito Federal	17 – Morelos	25 – Sinaloa
02 – Baja California	10 – Durango	18 – Nayarit	26 – Sonora
03 – Baja California Sur	11 – Guanajuato	19 – Nuevo León	27 – Tabasco
04 – Campeche	12 – Guerrero	20 – Oaxaca	28 – Tamaulipas
05 – Coahuila	13 – Hidalgo	21 – Puebla	29 – Tlaxcala
06 – Colima	14 – Jalisco	22 – Querétaro	30 – Veracruz
07 – Chiapas	15 – México	23 – Quintana Roo	31 – Yucatán
08 – Chihuahua	16 – Michoacán	24 – San Luis Potosí	32 – Zacatecas

For Task 2 ERG developed a 2014 Mexico inventory for all major sectors, including use of the newly- developed MOVES-Mexico model for onroad emissions, and updates to some commercial marine and port-related sectors. 2014 emissions for area, point and nonroad sources were projected from the previous 2008 MNEI. For Task 3, ERG used MOVES-Mexico to produce on-road emission inventories for calendar years 2011, 2018, 2023 and 2028 at the municipio level. This report provides details on how these inventories were developed. Section 2 covers on-road sources, Section 3 covers commercial marine, and Section 4 covers point, area and other nonroad emissions. The inventories themselves are too large to include in this document, and were delivered to EPA separately via ERG's FTP site.

2.0 ON-ROAD MOBILE SOURCES

2.1 MOVES-Mexico Background

Under the sponsorship of USAID, through the Mexico Low Emissions Development Program (MLED), in early 2016 ERG adapted MOVES2014a (https://www.epa.gov/moves) to Mexico (USAID, 2016). As with the U.S. version of the model, "MOVES-Mexico" has the capability to produce comprehensive national vehicle emission inventories, and to provide a framework for users to create detailed regional emission inventories and microscale emission assessments. A full description of the model's development, sources of input data, validation and results is contained in the referenced USAID report; this section provides only a broad overview for context of the inventory work performed under this work assignment. The approach for adapting MOVES was determined based on Mexico's available vehicle fleet and activity data, and to account for significant differences in vehicle emissions standards between Mexico and the U.S. To aid this, the Mexican government agency National Institute of Ecology and Climate Change (*Instituto Nacional de Ecología y Cambio Climático* orINECC) provided data for fundamental model inputs such as vehicle kilometers travelled, vehicle population, age distribution, and emission standards. INECC also provided data on over 250,000 roadside remote sensing device (RSD) measurements across 24 Mexican cities, which were analyzed to help calibrate MOVES-Mexico emission rates. The data from INECC and other government sources have been synthesized to create a national Mexico-specific MOVES database that can be used directly with MOVES2014a as an alternate default database, replacing the U.S. default database that comes with the U.S. model download. MOVES-Mexico can estimate vehicle emissions for calendar years 1990 through 2050 at the nation, state or municipio (county-equivalent) level.

As part of testing and evaluation of MOVES-Mexico, ERG generated fuel consumption and criteria pollutant national totals. Calendar year 2013 fuel consumption estimates derived from MOVES-Mexico were compared to fuel sales estimates from PEMEX, and were within 10 percent for gas and diesel. Considering the uncertainties within MOVES and in energy content estimates used to calculate fuel consumption, this was considered a very good result, and indicative that the underlying vehicle fleet, activity and energy rates in the MOVES-Mexico are sound. ERG also generated annual, national totals for VOC, CO, NOx, and $PM_{2.5}$ to assess trends from calendar year 1990 to 2050. The Mexico per-mile emissions are consistently higher than the comparable U.S. rates, resulting in very different on-road emission inventory projections between Mexico and the U.S. In the U.S., a significant decline in emissions is projected over time due to stringent vehicle and fuel standards coupled with modest VMT growth. Conversely, Mexico's onroad emissions are projected to increase over time. For NOx and CO, current "on-the-books" standards mitigate this increase for a period of time, but all pollutants trend upwards past 2030 as aggressive VMT growth outpaces current standards. As a result of the opposite emissions trends in the U.S. and Mexico, onroad emissions in Mexico are projected to surpass those in U.S. by about 2030, despite accruing only one-fifth of the VMT. Overall, the analysis of national Mexico onroad emissions using MOVES-Mexico demonstrated the value of MOVES-Mexico in assessing long-term emission trends and evaluating the potential impact of more stringent vehicle and fuel standards, and was therefore proposed by ERG for use in developing onroad inventories for EPA's modeling platform.

2.2 Generating Municipio-Level Emissions

Under Task 2, the 2014 on-road mobile source emissions inventory was developed using output from MOVES-Mexico. Emissions were generated for each municipio; for a typical weekday and typical weekend by month; for the pollutant set used for the U.S. NEI. Total annual emissions were compiled into a single Flat File 10 (FF10) format file. MOVES-Mexico was run in default mode, which reflects Mexico-specific data for key inputs such as vehicle population, VMT, fuels, inspection and maintenance (I/M) programs and Mexico's emission standards.

The time required to execute MOVES-Mexico runs for all 2,457 municipios in series on a single computer would be prohibitive – approximately 11,500 hours, or more than a year. To obtain results in a reasonable amount of time, ERG used the Amazon Web Service (AWS) to run MOVES in the cloud. AWS enables simultaneous execution on hundreds of computers in parallel, and decreases the overall clock time to less than a day. Each computer in the cloud, known as an instance, was used to execute the runs for a single municipio. For each municipio, MOVES was run twice: once to generate evaporative emissions, and once for non-evaporative processes according to the run specifications shown in Table 1. Splitting the runs in this manner allowed us to exclude diesel vehicles from the evaporative runs and to aggregate the non-evaporate runs by day instead of by hour, thereby decreasing runtime. The basic configuration of the cloud computers, called a machine image, was provided by the U.S. EPA, and consisted of MOVES2014a installed on the Linux operating system.

Table 1. Summary of MOVES runspecs

Parameter	Value
domain/scale	National
geographic bounds	municipio (single county)
time aggregation level (evaporative)	Hour
time aggregation level (non-evaporative)	Day
months	12
days	2 (weekday and weekend)
hours	24
vehicle type	motorcycle (sourceTypeID 11) passenger car (sourceTypeID 21) passenger truck (sourceTypeID 31) light commercial truck (sourceTypeID 32) transit bus (sourceTypeID 42) single unit long-haul truck (sourceTypeID 52) single unit long-haul truck (sourceTypeID 53) combination short-haul truck (sourceTypeID 61) combination long-haul truck (sourceTypeID 62)
fuel types (evaporative)	gasoline
fuel types (non-evaporative)	gasoline and diesel

Parameter	Value
road types	off-network (roadTypeID 1) rural restricted access (roadTypeID 2) rural unrestricted access (roadTypeID 3) urban restricted access (roadTypeID 4) urban unrestricted access (roadTypeID 5)
emissions units	Grams

Post-processing of MOVES runs

The outputs of the MOVES-Mexico runs were processed to obtain total annual emissions by pollutant and EPA Source Classification Code (SCC) and compiled into a single FF10 format file. This involved looping through the output databases for all the individual municipios; extracting the emissions for a particular pollutant from both the evaporative and non-evaporative output databases; and summing the emissions across all hours to obtain total emissions by day type (weekend and weekday) for each month. The total monthly emissions were then calculated as the product of the daily weekend (weekday) emissions and the number of weekends (weekdays) in each month. The monthly emissions were then summed to obtain annual emissions and converted to U.S. short tons.

2.3 Comparison to Previous Onroad Inventories

EPA requested that ERG perform a comparison between MOVES-Mexico results and previous onroad inventories from Mexico, in particular the 2008 inventory that was the basis of previous projections. In addition to 2014, EPA had requested that ERG run MOVES-Mexico for 2011, 2018, 2023 and 2028 in the same manner described in the previous section. As in the U.S., for each of these years the default database for MOVES-Mexico accounts for changes in vehicle population, VKT, and the turnover of the fleet to new emission standards over time. The 2011 and 2014 results from this work assignment were used as a basis of comparison to the previous Mexican national emissions inventories (Inventario Nacional de Emisiones de Mexico or INEM in Mexico), referred to here as MNEIs. The 2011 results were compared to the previously developed inventory for calendar year 2008, at the national and state level. ERG also included a comparison to national totals from the 1999 MNEI to illustrate significant differences between the two Mexico inventories, and provide context for MOVES-Mexico results.

National Comparison

Annual onroad emission totals are shown in Table 2 for the 1999 and 2008 MNEIs, and MOVES-Mexico results for 1999/2008 (from the USAID project), and 2011/2014 from this work assignment 5-18. The 1999 and 2008 MOVES-Mexico results were run at the national/annual level of aggregation for the USAID project; the 2011 and 2014 results were aggregated across all municipios and scaled up to annual totals.

Table 2. Total Onroad Emissions in Mexico (Tons)

	Previous MNEIs		MOVES-Mexico			
			Previous National Runs		*5-18 Runs*	
Pollutant	**1999**	**2008**	**1999**	**2008**	**2011**	**2014**
CO	5,319,053	23,220,743	4,561,479	6,013,715	5,882,519	6,295,127
NH3		53,309			9,162	9,882
NOX	770,979	1,650,448	718,223	1,326,463	1,410,526	1,472,090
PM10-PRI	22,671	16,582			57,734	68,761
PM25-PRI	20,773	12,002	29,964	41,413	43,538	52,555
SO2	30,797	25,449			22,443	24,912
VOC	670,427	2,159,346	380,652	534,497	541,030	554,416

ERG supported development of the 1999 Mexico NEI. A version of MOBILE5 adapted to Mexico was used in conjunction with available fleet and activity data, which was sparse at the time. The 2008 MNEI was developed directly by Mexico's Ministry of Environment and Natural Resources (Secretaría del Medio Ambiente y Recursos Naturales or SEMARNAT). Details on how the inventory was developed are not readily available, since documentation was not produced for the inventory, but we assume it also relied on MOBILE. Because the previous MNEIs used adaptations of MOBILE and used different sources of input data, the MOVES-Mexico estimates aren't expected to align. The level of difference in 1999 results for the previous MNEI and MOVES-Mexico is therefore considered reasonable, and in the case of NOx (within 10 percent) and CO (within 20 percent) are surprisingly close. In contrast, except for NOx, the differences between MOVES-Mexico and the 2008 MNEI are very large. MOVES estimates are about 75 percent lower than the MNEI for CO and VOC, and about 2.5 times higher for PM. Strikingly, the differences between the 1999 and 2008 MNEI estimates are also much greater than would be expected by differences in fleet turnover and VKT growth. This suggests that the 2008 MNEI was developed independently of the 1999 MNEI work, and that fleet and activity inputs are not consistent.

State Comparison

State-level emissions were also available for the 2008 MNEI and 2011/2014 MOVES-Mexico runs. Figures 2 through 6 shows total onroad emissions by state and pollutant for 2008 MNEI and 2011 MOVES-Mexico.

Figure 2.Onroad CO emissions from 2008 MNEI and 2011 MOVES-Mexico (Tons)

Figure 3. Onroad NOx and PM2.5 emissions from 2008 MNEI and 2011 MOVES-Mexico (Tons)

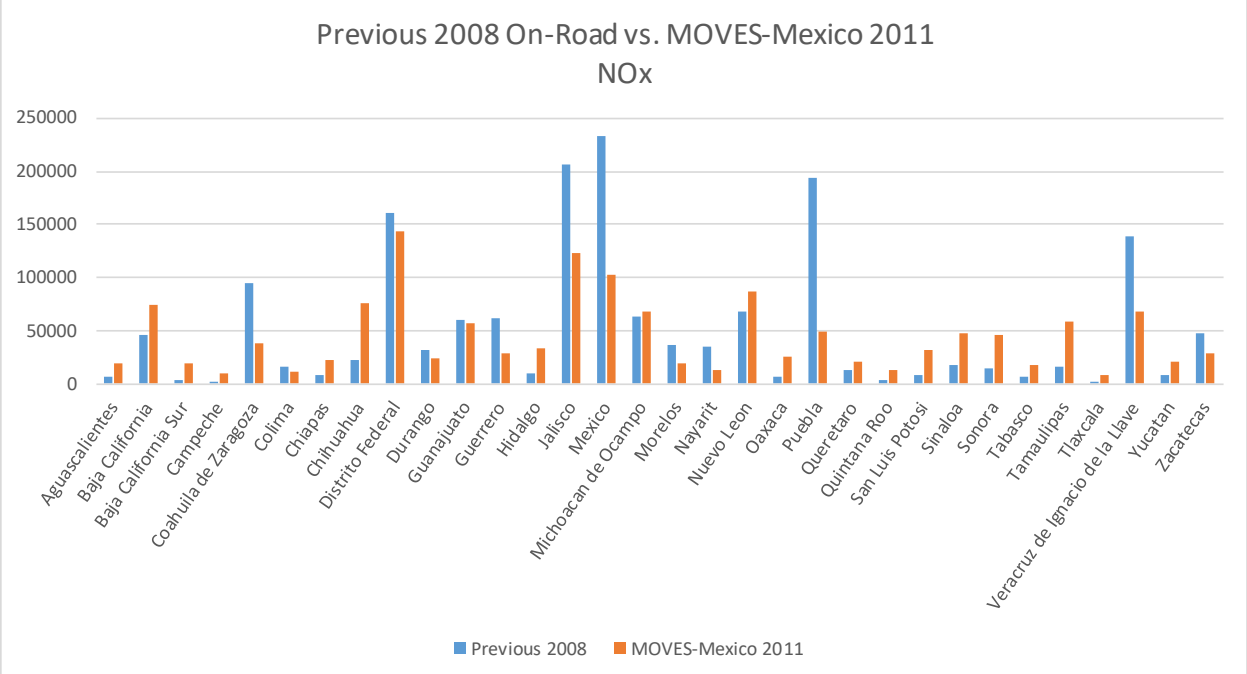
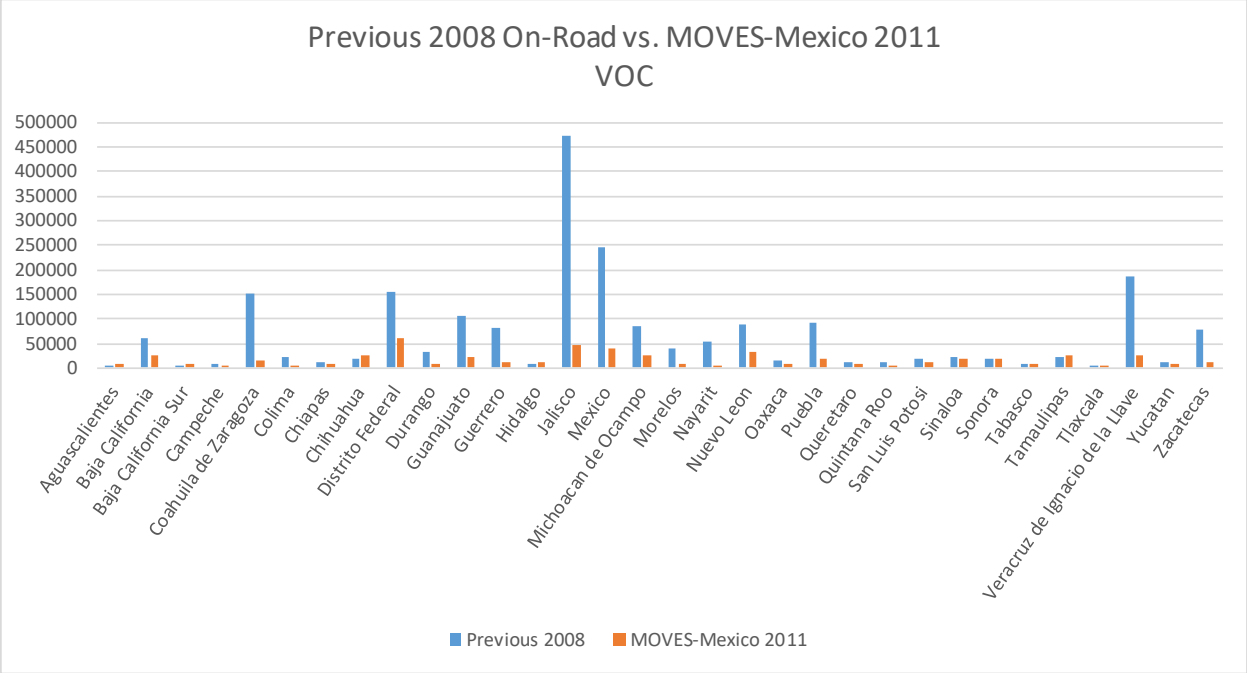


Figure 4. Onroad NOx and PM2.5 emissions from 2008 MNEI and 2011 MOVES-Mexico (Tons)

Figure 5. Onroad SO2 and VOC emissions from 2008 MNEI and 2011 MOVES-Mexico (Tons)

Figure 6. Onroad NOx and PM2.5 emissions from 2008 MNEI and 2011 MOVES-Mexico (Tons)



The state-by-state results suggest that for CO and VOC, where MOVES is significant lower than the MNEI, the differences are attributable to a subset of states, generally the most populous. For example, in Jalisco (where Guadalajara is located), CO and VOC results from the MNEI are about 9 times higher than MOVES, while SO2 (which tracks fuel consumption) is about 40 percent higher. Without understanding how the 2008 was developed at a state-by-state level it is difficult to diagnoses why differences are so large in some states but not others. One possible explanation is that vehicle population and activity estimates for 2008 were scaled to human population without constraint by a national total, whereas the MOVES-Mexico inputs (provided by the Mexican government) were based first on national totals, then allocated down to state/municipio based on fuel sales.

Summary of Onroad Comparison

MOVES-Mexico results were compared to previous estimates of onroad emissions from the 1999 and 2008 MNEI). Differences in models and input data between all three analyses lead to differences in all three estimates. At a national level, MOVES 1999 estimates compared favorably to the MNEI, despite these differences. MOVES 2008 estimates for CO, VOC and PM where quite different from the MNEI estimates, however. Differences between 1999 and 2008 estimates suggest significant changes in methodology for estimating fleet and activity data in 2008 that likely contribute to these differences. State-by-state comparison of 2008 MNEI to 2011 MOVES confirms this, with the majority of difference coming for populous states such as Jalisco, Mexico State and Distrito Federal (D.F, central Mexico City). Lack of documentation on the 2008 inventory prevents further investigation as to the reason for the differences.

3.0 COMMERCIAL MARINE VESSELS

ERG developed the Mexico port emission inventory for commercial marine vessels and cargo handling equipment based on an inventory developed by ERG for the Commission for Environmental Cooperation (CEC) in 2015 (CEC, 2015).

For the CEC project, local activity data provided by SEMARNAT were applied to more recent marine engine and cargo handling equipment (CHE) emission factors, providing a more up-to date and comprehensive port emission inventory. To estimate emissions from CHE, the type of freight handled at Mexican ports was evaluated – noting that Mexican ports tend to handle a significant quantity of liquid cargo, whereas many U.S. ports deal primarily with container and bulk cargo types. This information was useful in matching Mexican ports to similar ports in the U.S., providing a CHE activity profile that represented equipment used at Mexican ports. Further refinements were made by SEMARNAT who noted that smaller ports were unlikely to have some of the equipment types available at larger ports; as such, SEMARNAT recommended the removal of specific equipment types for ports that handled less than 1 million metric tons of cargo. CHE emissions were developed using the latest version of the U.S. EPA's NONROAD model for 2011 and 2030.

Mexico port vessel emissions were developed in the original CEC study for ships that were approaching, maneuvering, or leaving a port and while hoteling at the dock. The previous 2008 Mexico port vessel inventory provided detailed fuel usage data for individual vessels as they transited port waters. These local fuel data were adjusted to represent 2011 levels of activity and applied to emission factors recently compiled by the Argonne National Laboratory's Greenhouse Gases, Regulated Emissions, and Energy Use in Transportation (GREET) system (ANL, 2013). Vessel dockside emissions were revised for the original 13 ports included in the 2008 MNEI, by updating the vessel daily fuel usage rates and emission factors. The revised daily fuel usage rates were linked to the vessel days at port data provided by SEMARNAT. The recent GREET emission factors were applied to the revised vessel fuel data for both underway vessel movements and dockside hoteling to get revised 2011 emission estimates.

Since the new 2011 Mexican port inventory was expanded to include 35 ports, an adjustment factor was developed based on port cargo handling data to approximate port emissions from all 35 Mexican ports. The expanded 2011 Mexico port emission data were adjusted to represent year 2014 based on the ports of Mexico commercial traffic data from the American Association of Port Authorities (AAPA). The AAPA had multiple freight assessments of Mexican marine trade – the source of these data is SCT, Coordinacion General del Puertos y Mercante, Estadisticsa Mensualies; unfortunately none of the studies included both 2011 and 2014 activities levels; instead two different freight assessments were used 1) include commercial traffic data (2009-2013) (CTD) that provided freight estimates for 2011 and 2013 and; 2) Traffic Profiles data (TPD) that covered the period for 2013 to 2014 . The CTD appeared to be more complete than the TPD estimates. To extrapolate the CTD to 2014, the percent growth between 2013 and 2014 was calculated from the TPD. This factor was applied to the 2013 CTD value to get a 2014 CTD value. The 2011 CTD value was compared with the estimated 2014 CTD to get a growth factor to adjust 2011 activity to represent 2014.

The table below shows the AAPA data used to develop adjustment factors.

Table 3. American Association of Port Authorities (AAPA) Ports of Mexico Commercial Traffic and Traffic Profiles

Year	Total Trade of Cargo (Metric Tons)	
	Commercial Traffic Data	Traffic Profiles Data
2011	282,902,427	
2013	287,912,406	165,560,553
2014	288,988,264[1]	166,179,212

[1] Value calculated based on a 0.3% increase from 2013 to 2014 in total cargo from the traffic profiles.

There is a 2.15% increase in total trade of cargo from 2011 to 2014. The 2011 data were multiplied by 1.0215 to approximate 2014 emission estimates.

4.0 POINT, AREA AND NONROAD SOURCES

4.1 2008 MNEI Background

The 2008 MNEI was obtained from Mexico's Secretariat of Environment and Natural Resources (*Secretaría del Medio Ambiente y Recursos Naturales* or SEMARNAT) in January 2014. The 2008 MNEI represents the latest and most accurate national inventory in Mexico. The 2008 MNEI was provided as a set of Excel spreadsheets; some limited supporting documentation (methodology documentation) was also subsequently provided (SEMARNAT, 2013). All 2008 MNEI inventory emissions were in units of megagrams (Mg) per year. All emissions presented in this report have been converted into units of U.S. short tons.

The 2008 MNEI consists of separate spreadsheets for point sources, on-road motor vehicles, and nonroad mobile sources. In addition, each individual area source category has its own separate spreadsheet. Biogenic and other natural source emissions were not included in the 2008 MNEI. The 2008 MNEI on-road emissions and data were not used in this project; instead, on-road emissions were developed using the MOVES-MEXICO model (refer to Section 2.0 for further details on MOVES-MEXICO). In addition, commercial marine vessels (CMV) source category emissions and associated data (SCC 2280000000) were excluded from the 2008 MNEI and replaced with a port inventory developed for 2011 and scaled up to 2014 (refer to Section 3.0 for further details on the port inventory).

Previously, as part of Work Assignment 4-09 under Contract EP-D-11-006 (for EPA), ERG performed quality assurance activities on the 2008 MNEI raw data obtained from Mexico. Under this effort, ERG checked all the point source facility coordinates in GIS to ensure that they are located within the reported Mexican state. Apart from the point source facility location analysis, ERG performed various QA activities on point, area, and nonroad sources as applicable (e.g., checking that source-level $PM_{2.5}$ emissions are equal or less than PM_{10} emissions; checking to ensure all combustion sources report combustion pollutants such as CO, NO_x, and SO_2; checking to ensure that solvent evaporation categories report VOC emissions; gap filling inaccurate and non-reported SCC codes; gap filling missing stack parameters using U.S. based SCC defaults; and converting emissions units to the required units for the FF10 file format). These quality assured area, point, and nonroad datasets were used as a starting point for the Mexico 2014 inventory for area, point, and nonroad sources (excluding commercial marine vessels).

Table 4 identifies which pollutants were included in the 2008 base year inventory for each source type (excluding on-road).

Table 4. 2008 MNEI Pollutants by Source Type

Source Type	NO_x	SO_2	VOC	CO	PM_{10}	$PM_{2.5}$	NH_3	PEC
Point	✓	✓	✓	✓	✓	✓	✓	✓
Area	✓	✓	✓	✓	✓	✓	✓	✓
Nonroad	✓	✓	✓	✓	✓	✓	✓	

4.2 Point Sources

The 2008 base year point source data contained emissions data from 7,510 facilities. ERG used the quality assured dataset from WA 4-09 under Contract EP-D-11-006 as the starting point. These data were already quality assured and gap-filled for all required FF10 fields, as discussed in Section 4.1 above.

Industrial facilities in Mexico are classified as being either under federal jurisdiction or state jurisdiction. The differentiation between federal and state jurisdiction point sources is not based upon an emissions threshold. Instead, federal jurisdiction point sources include facilities in the following industrial sectors:

- Petroleum extraction and petroleum/petrochemical manufacturing
- Chemical manufacturing
- Paints and inks manufacturing
- Metal products manufacturing
- Automotive parts manufacturing
- Pulp and paper manufacturing
- Cement and lime manufacturing
- Asbestos mining and manufacturing
- Glass manufacturing
- Electrical energy generation
- Hazardous waste treatment

- Federal jurisdiction point sources also include industrial facilities that are located within various types of "federal zones".

ERG performed GIS analysis on all the point source coordinate data to ensure that are located within the reported municipality. Of the 7,510 facilities in the point source data, ERG identified 404 facilities with inaccurate geographic coordinates (i.e., facility plots in the neighboring municipality or in a different state than what was reported under the FIPS field). ERG then used urban-locality coordinates obtained from the National Institute of Statistics Geography and Information (Instituto Nacional de Estadística Geografía e Informática or INEGI) (INEGI, 2014) as surrogates in place of the inaccurate coordinates for these 404 point source facilities.

4.3 Area Sources

The 2008 MNEI contained area source emissions at the municipality-level for all 32 federal entities. The data obtained from SEMARNAT included individual datasets for each of the various area source categories. Similar to the point sources, ERG used the 2008 area source dataset developed as part of WA 4-09, under Contract EP-D-11-006, as the starting point. These data were already quality assured and gap-filled for all required FF10 fields.

The 2008 MNEI area source categories included the following:

- Fuel combustion

    - Industrial fuel combustion – diesel and LPG
    - Commercial fuel combustion – natural gas and LPG
    - Residential fuel combustion – natural gas, LPG, kerosene, and wood
    - Agricultural fuel combustion – diesel, LPG, and kerosene
- Solvent evaporation
    - Architectural coatings
    - Asphalt paving
    - Autobody refinishing
    - Consumer solvent use
    - Degreasing operations
    - Dry cleaning
    - Graphic arts
    - Industrial surface coatings
    - Traffic markings
- Fuel distribution
    - Gasoline
    - Liquid petroleum gas (LPG)
- Agricultural
    - Agricultural fertilizer application
    - Agricultural pesticide application
    - Agricultural burning/crop burning
    - Agricultural tilling
    - Cattle feedlots
- Other
    - Construction activities
    - Bakeries
    - Charbroiling
    - Domestic ammonia
    - Treated and untreated municipal wastewater
    - Structure fires
    - Forest fires/wildfires
    - Hospital sterilization operations
    - Border crossings
    - Bus terminals

After comparing the 2008 MNEI to various existing U.S. inventories and the 1999 MNEI, the following area source categories were identified as not being included in the 2008 MNEI:

- Paved road dust
- Unpaved road dust
- Area source coal combustion
- Area source oil & gas (i.e., exploration, extraction, processing, distribution, etc.)
- Open burning
- Landfills
- Managed/prescribed burning
- Brick kilns

4.4 Nonroad Mobile Sources

The 2008 MNEI contained nonroad mobile source emissions from commercial marine vessels (CMVs), locomotives, aircraft, airport ground support equipment (GSE), construction equipment, and agricultural equipment. For the construction and agricultural equipment categories, only diesel-powered equipment were included. The 2008 nonroad mobile source emissions data did not contain many of the conventional nonroad equipment categories that typically are included in U.S. emission inventories (e.g., recreational vehicles, lawn and garden equipment, industrial equipment, logging equipment, etc.). Similar to the point and area sources, ERG used the 2008 nonroad source dataset from WA 4-09 under Contract EP-D-11-006 as the starting point. These data were already quality assured and gap-filled for all required FF10 fields.

Similar to the area source, the nonroad mobile source emissions data were available at the municipality-level for all 32 states. ERG excluded CMV emissions (SCC 2280000000) from the 2008 base year nonroad dataset and instead incorporated a separately developed port emissions inventory into the projections (refer to Section 3.0 for details on the port inventory).

4.5 Future Year Projections for Point, Area and Nonroad Sources

In general, ERG projected 2014 point, area, and nonroad emissions by multiplying the base year 2008 MNEI emissions by a projection factor as shown in the following equation:

$$E_{2014,s} = E_{2008,s} \times P_{2014,s}$$

Where: $E_{2014,s}$ = projected emissions for future year 2014 for source *s*;
$E_{2008,s}$ = estimated base year emissions for 2008 for source *s*; and
$P_{2014,s}$ = projection factor for future year 2014 for source *s*.

A projection factor greater than 1.0 represents increasing emissions, while a projection factor less than 1.0 represents decreasing emissions. A projection factor of 1.0 represents a situation of no growth (i.e., projected emissions were equal to base year emissions). The projection factors were based on "surrogates" for all sources except on-road motor vehicles and CMV emissions, as explained below.

Pre-Projection Adjustments

Before projecting the 2008 MNEI emissions forward to the future year of 2014, an adjustment was made to the 2008 base year MNEI inventory addressing the creation of three new municipalities subsequent to the 2008 base year. This adjustment is discussed below.

New Municipalities

Since 2007 (and prior to the future year of 2014), three new municipalities were created in Mexico. Two of these are in Quintana Roo (State FIPS 23) and one in Jalisco (State FIPS 14). All of these new municipalities were created from existing municipalities (i.e., one municipality split into two). Information regarding these new municipalities is summarized in Table 5.

In Jalisco, the municipality of San Ignacio Cerro Gordo (FIPS 14125) was split from the existing municipality of Arandas (FIPS 14009) in January 2007. This new municipality was included in the 2008 base year data for area sources and on-road motor vehicles, but not nonroad mobile sources. Nonroad mobile source emissions for Arandas were split between Arandas and San Ignacio Cerro Gordo based on the population ratio between both the municipalities (i.e., an 80-20 percent split).

In Quintana Roo, the municipality of Tulum (FIPS 23009) was split from the existing municipality of Solidaridad (FIPS 23008) in March 2008 and the municipality of Bacalar (FIPS 23010) was split from the existing municipality of Othon P. Blanco (FIPS 23004) in February 2011. Tulum was included in the 2008 base year data for area sources only, while Bacalar was not included at all in the 2008 base year inventory. On-road motor vehicle and nonroad mobile source emissions for Solidaridad were split between Solidaridad and Tulum based on the population ratio between both municipalities (i.e., an 85-15 percent split). Likewise, area source, on-road motor vehicle, and nonroad mobile source emissions for Othon P. Blanco were split between Othon P. Blanco and Bacalar based on the population ratio between both municipalities (i.e., an 85-15 percent split).

An additional third municipality in Quintana Roo (Puerto Morelos – FIPS 23011) was split from the existing municipality of Benito Juárez (FIPS 23005) in December 2015; however, since this occurred after 2014, no adjustment was made for this new municipality.

For point sources, none of the facilities were located in the three new municipalities based upon reported facility coordinates.

Table 5. New Municipalities in Mexico

New Municipality	Existing Municipality	Existing Municipality Population Ratio (2010 pop)	New Municipality Population Ratio (2010 pop)	Included in 2008 MNEI?			
				Point	Area	On-Road	Nonroad
San Ignacio Cerro Gordo (14125)	Arandas (14009)	80% (73,697)	20% (17,847)	n/a	Yes	Yes	No
Tulum (23009)	Solidaridad (23008)	85% (162,362)	15% (28,823)	n/a	Yes	No	No
Bacalar (23010)	Othon P. Blanco (23004)	85% (211,838)	15% (37,370)	n/a	No	No	No

n/a = not applicable

Projection Factors – Point Sources

ERG used the following data sources as surrogates to develop point source projection factors for Mexico:

- Electricity generation sector:
  - Petroleum products usage (i.e., distillate fuel oil, residual fuel oil, and petroleum coke) (regional-level) (SENER, 2015a)
  - Natural gas usage (regional-level) (SENER, 2015b)
  - Coal usage (regional-level) (SENER, 2015c)
- Oil and natural gas sector:
  - Crude oil production (national-level) (SENER, 2015a)
  - Crude oil refining (regional-level) (SENER, 2015a)
  - Natural gas demand (regional-level) (SENER, 2015b)
- All other sectors:
  - Gross domestic product (GDP) (national-level) (PCIF, 2014)

The regional divisions used by the Secretaría de Energía (Secretariat of Energy) (SENER) are defined as follows:

- Noroeste (Northwest) – Baja California, Baja California Sur, Sinaloa, Sonora
- Noreste (Northeast) – Coahuila, Chihuahua, Durango, Nuevo León, Tamaulipas
- Centro-Occidente (Central-West) – Aguascalientes, Colima, Guanajuato, Jalisco, Michoacán, Nayarit, Querétaro, San Luis Potosí, Zacatecas
- Centro (Central) – Distrito Federal, Hidalgo, México, Morelos, Puebla, Tlaxcala
- Sur-Sureste (South-Southeast) – Campeche, Chiapas, Guerrero, Oaxaca, Quintana Roo, Tabasco, Veracruz, Yucatán

The assignment of surrogates to point source NAICS codes (*Sistema de Clasificación Industrial de América del Norte or SCIAN*) codes is provided in Appendix A; the projection factors developed from these surrogates are presented in Appendix B.

It should be noted that projection factors were applied to the reported emissions for existing point sources in the 2008 MNEI. No attempt was made to anticipate the location of future point sources (e.g., planned electricity generation projects, planned refineries). In addition, reductions from potential future control measures were not accounted for.

Projection Factors – Area Sources

ERG used the following data sources as surrogates to develop area source projection factors for Mexico:

- Population data:
  - Census data (municipality-level) (INEGI, 2010)
  - Intracensal data (municipality-level) (INEGI, 2005)
  - Population projections (municipality-level) (CONAPO, 2012)
- Fuel usage:
  - Petroleum product usage (i.e., gasoline, distillate fuel oil, and jet fuel) (regional-level) (SENER, 2015a)
  - Natural gas and LPG usage (regional-level) (SENER, 2015b)
- GDP estimates (national-level) (PCIF, 2014)
- Agricultural acreage (total and sugarcane) (SIAP, 2016)

The assignment of surrogates to Mexico area source categories is provided in Appendix C. The area source projection factors (except for population-based projection factors) are included in Appendix D. The population-based projection factors were submitted in an Excel spreadsheet along with this final report.

Future year population projections were available from the National Council on Population (Consejo Nacional de Población or CONAPO) for each of the municipalities in Mexico. However, in order to apply the 2014 population projections, an estimate of 2008 population was needed for each municipality. ERG derived 2008 population estimates using linear interpolation between the 2005 intracensal populations (INEGI, 2005) and the 2010 census populations (INEGI, 2010).

Projection of the agricultural acreage surrogate was based upon the actual planted acreage (total and sugarcane) at the state-level for 2008 and 2014 (SIAP, 2016).

Projection Factors – Nonroad Mobile Sources

Nonroad mobile sources in Mexico included locomotives, aircraft, and nonroad equipment (i.e, airport ground support equipment, construction and mining equipment, and agricultural equipment). ERG used diesel and jet fuel usage projections (SENER, 2013a) and agricultural acreage (SAGARPA, 2014) as surrogates for projecting emissions from nonroad mobile sources in Mexico for all nonroad mobile sources (except commercial marine vessels). The assignment of surrogates to Mexico nonroad mobile source categories is provided in Appendix E, while the projection factors are included in Appendix F.

FUTURE YEAR PROJECTION DATA SUBMITTAL

After developing the future year projection factors as described above in Section 4.0, these projection factors were applied to the 2008 base year MNEI inventory resulting in projected 2014 emissions.

ERG then prepared the projected inventory files in the required annual FF10 format. Because the 2008 base year MNEI inventory had been cleaned up and already in FF10 format, only minimal effort was required to develop the 2014 annual FF10 files. FF10 files were then submitted to EPA.

5.0 SUMMARIES AND MAPS

Emissions summaries for 2014 in annual short tons were compiled for state and national totals by sector and SCC. This is an extensive table, so is not reproduced in this memo, but was provided as a separate Excel file to EPA via ERG's FTP site. A summary of the 2014 national-level emissions by source type is presented in the table below.

Table 6. 2014 Mexico National-Level Emissions (Short Tons)

Source Type	NO_X	SO_2	VOC	CO	PM_{10}-PRI	$PM_{2.5}$-PRI	NH_3	PEC
Area	479,139	26,459	3,708,330	3,142,590	630,547	452,904	913,060	52,482
CMV	344,693	181,782	15,666	129,159	27,469	25,473	NE	NE
Nonroad	232,710	4,038	32,227	146,261	29,760	28,774	20	NE
Point	696,614	2,159,751	317,134	672,794	249,835	175,378	33,978	21,452
Onroad	1,473,456	24,942	554,777	6,300,798	55,722	50,887	9,891	17,276
Total	**3,226,876**	**2,396,990**	**4,628,469**	**10,391,657**	**995,255**	**733,856**	**958,582**	**91,213**

Maps of totals emissions for CO, VOC, NO_x, SO_2, PM_{10}, NH_3, and PEC by municipio (short tons) , and the density of emissions (short tons per municipio / area of municipio in square miles) are shown in Figures 7-20. The density charts draw out the concentration of emissions in large urban centers, which tend to have municipios of smaller geographic area.

Figure 7. Absolute CO Emissions by Municipio (short tons)

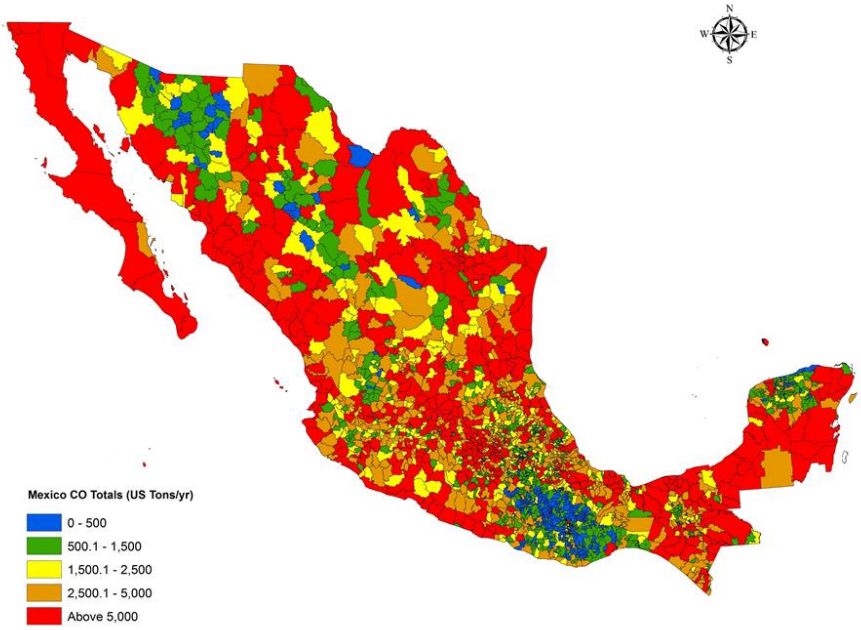


Figure 8. CO Emissions Density by Municipio (short tons/square miles)

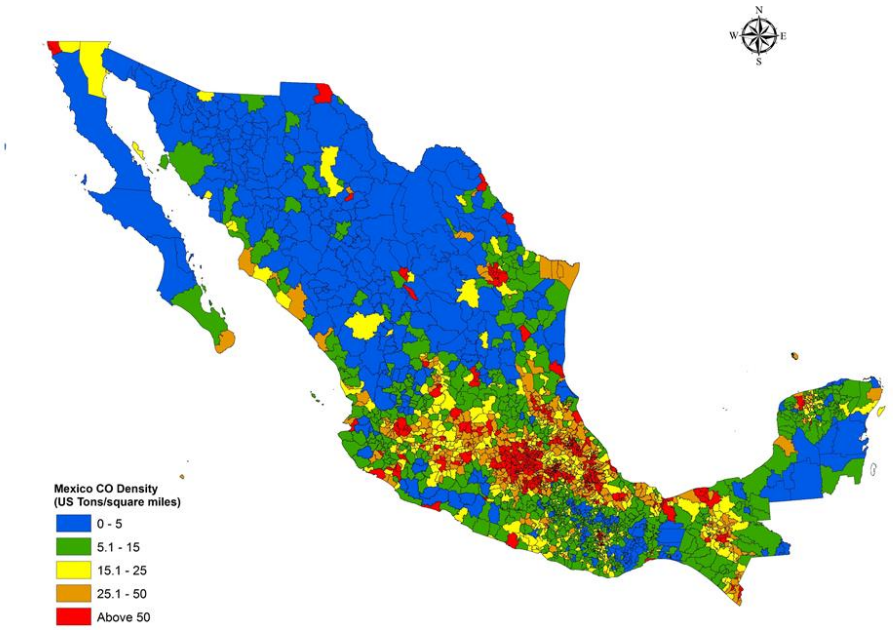


Figure 9. Absolute VOC Emissions by Municipio (short tons)

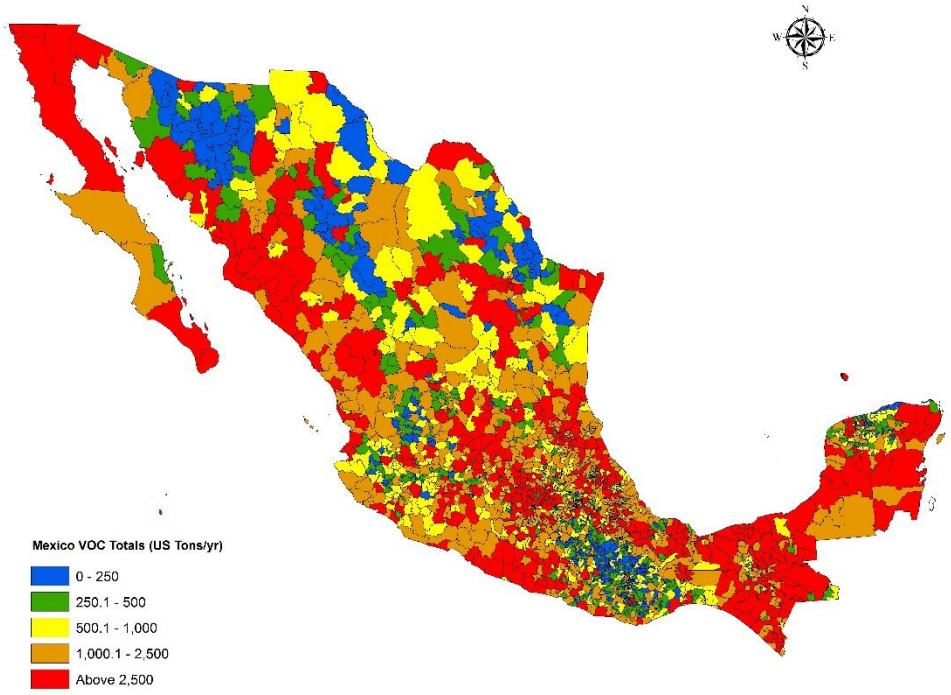


Figure 10. VOC Emissions Density by Municipio (short tons/square miles)

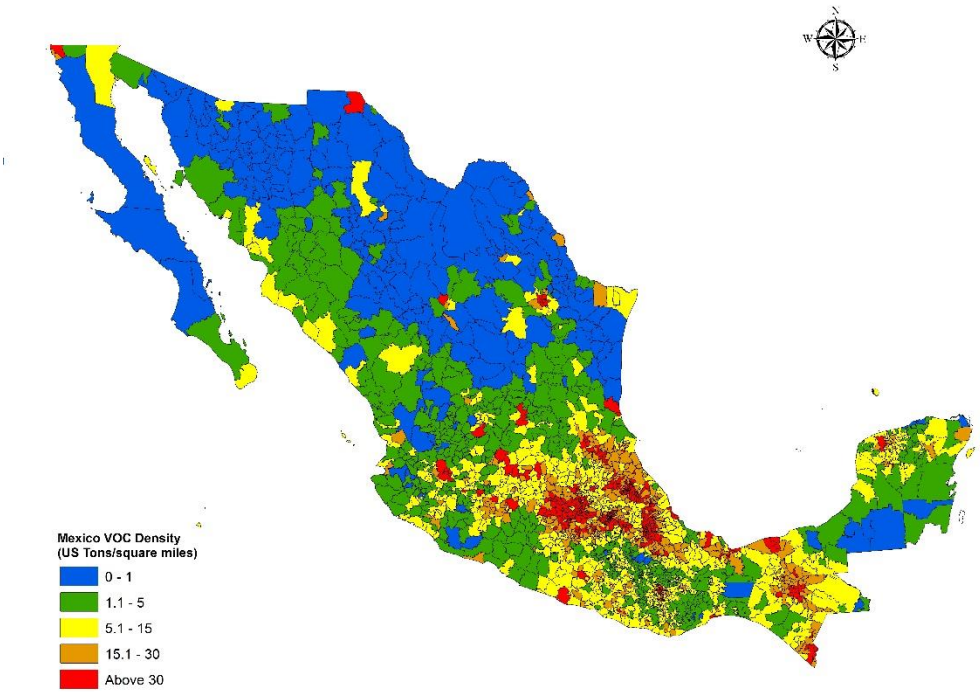


Figure 11. Absolute NOx Emissions by Municipio (short tons)

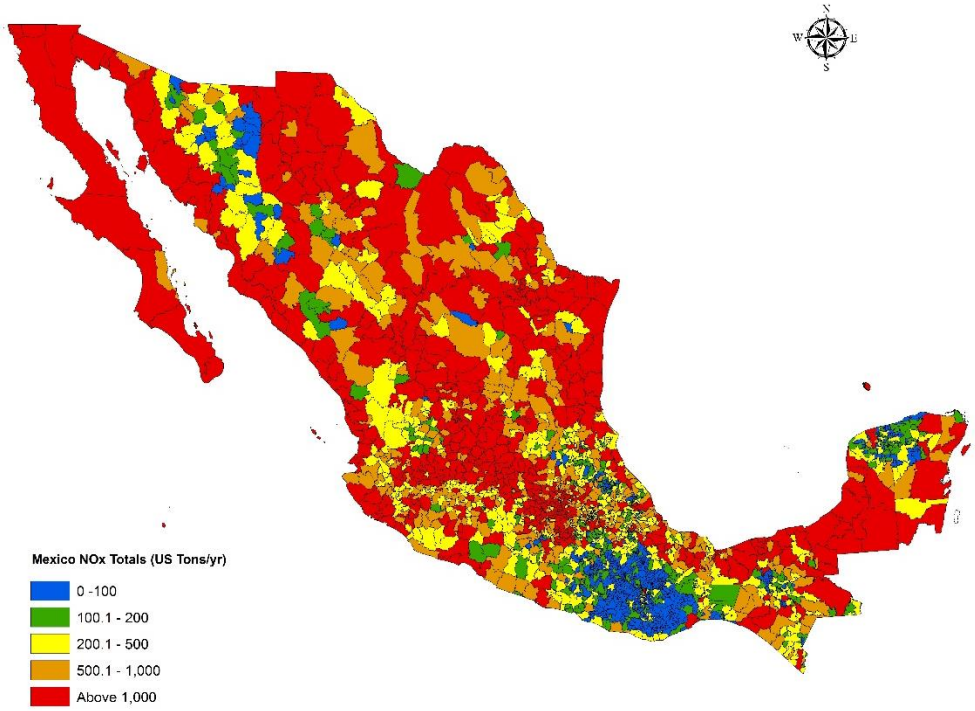


Figure 12. NOx Emissions Density by Municipio (short tons/square miles)

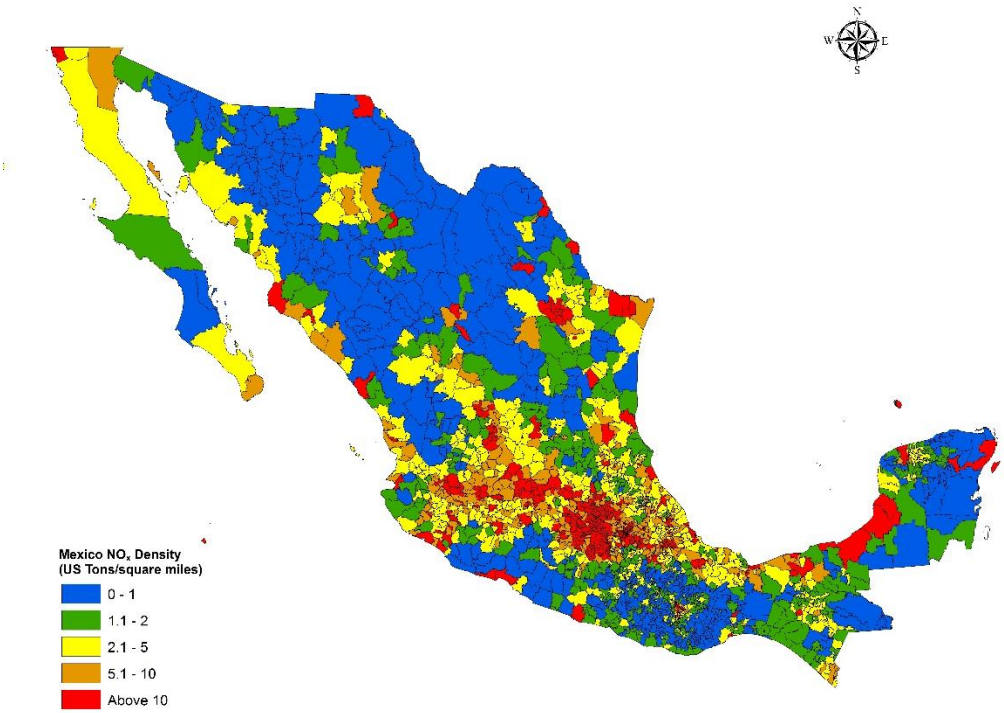


Figure 13. Absolute SO2 Emissions by Municipio (short tons)

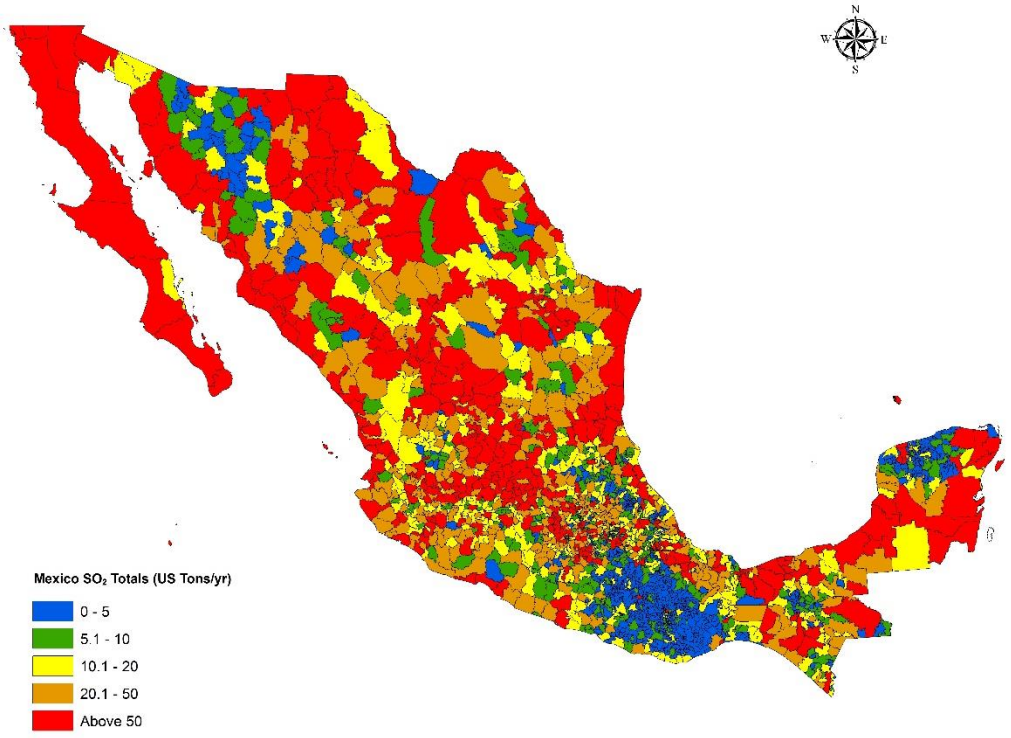


Figure 14. SO2 Emissions Density by Municipio (short tons/square miles)

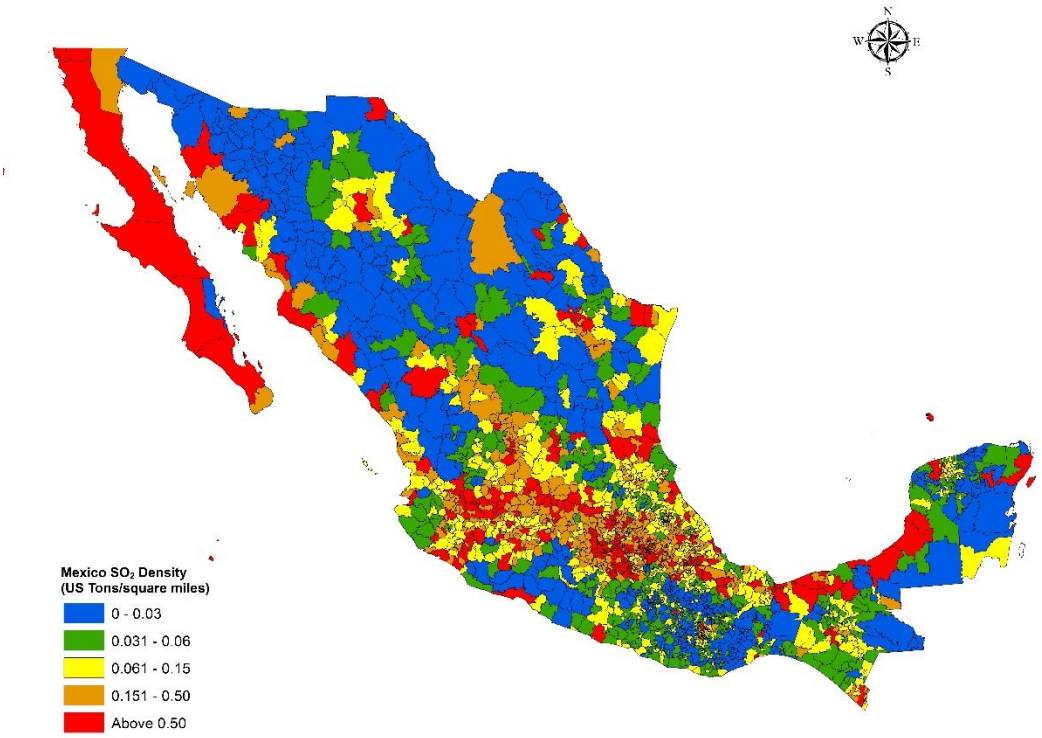


Figure 15. Absolute PM10 Emissions by Municipio (short tons)

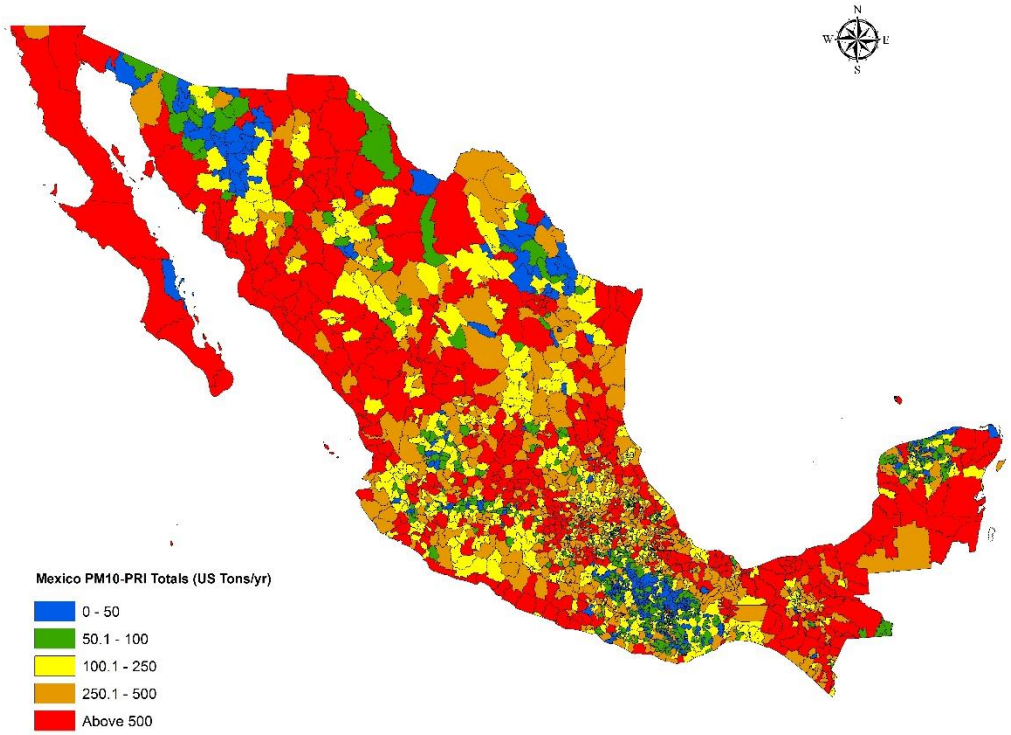


Figure 16. PM10 Emissions Density by Municipio (short tons/square miles)

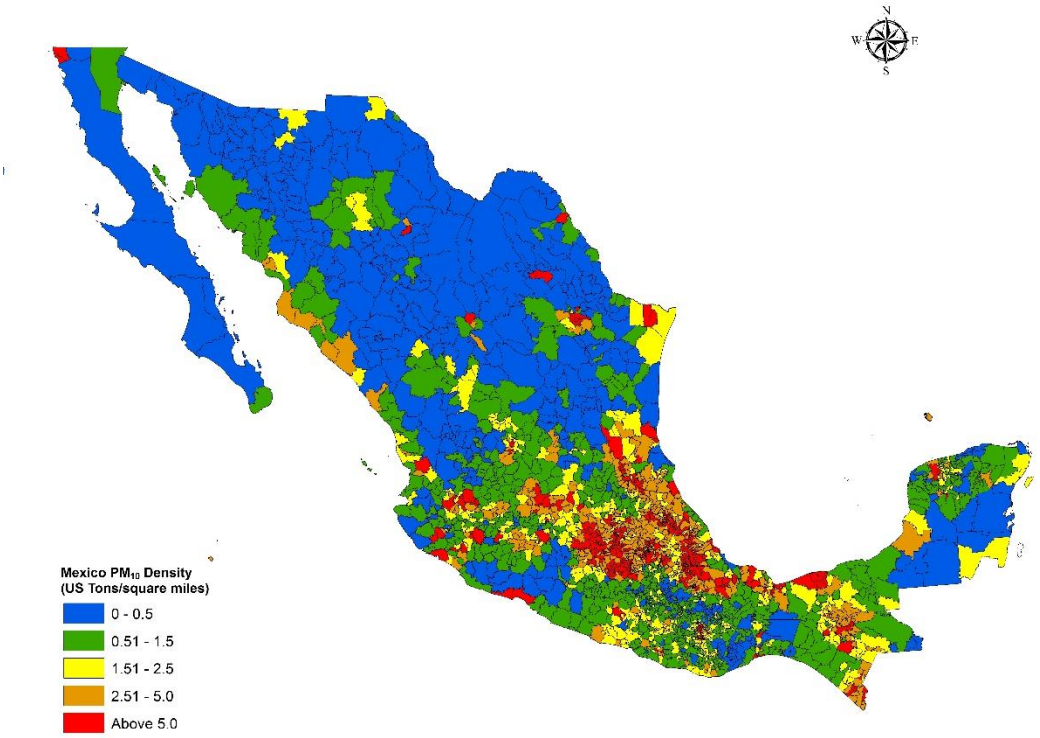


Figure 17. Absolute NH3 Emissions by Municipio (short tons)

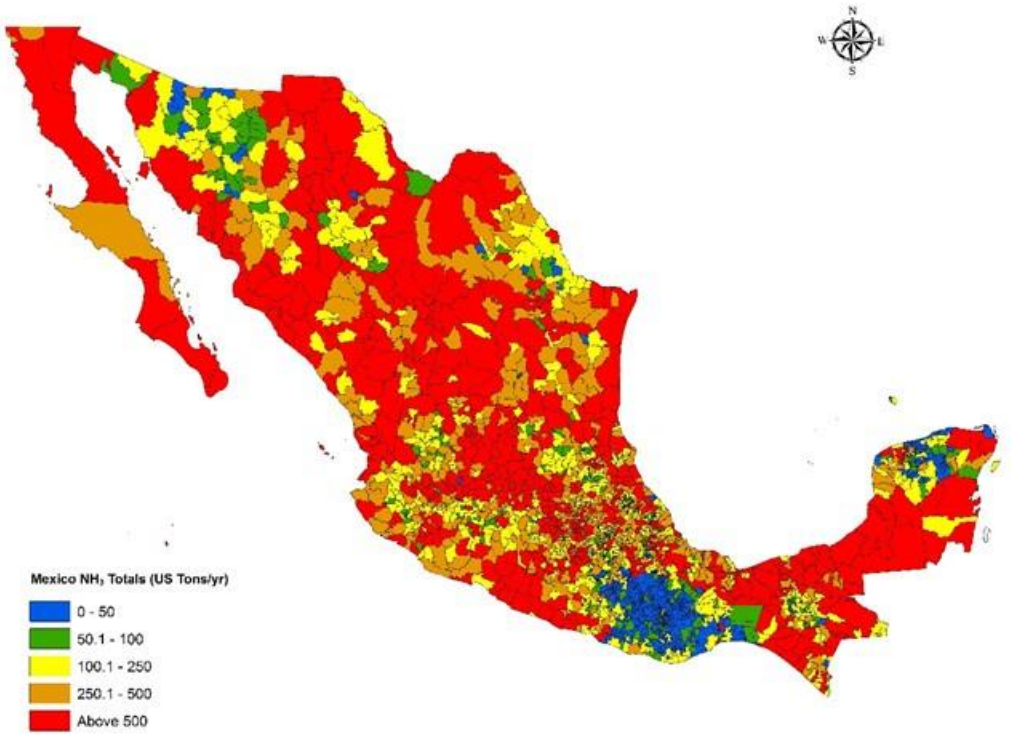


Figure 18. NH3 Emissions Density by Municipio (short tons/square miles)

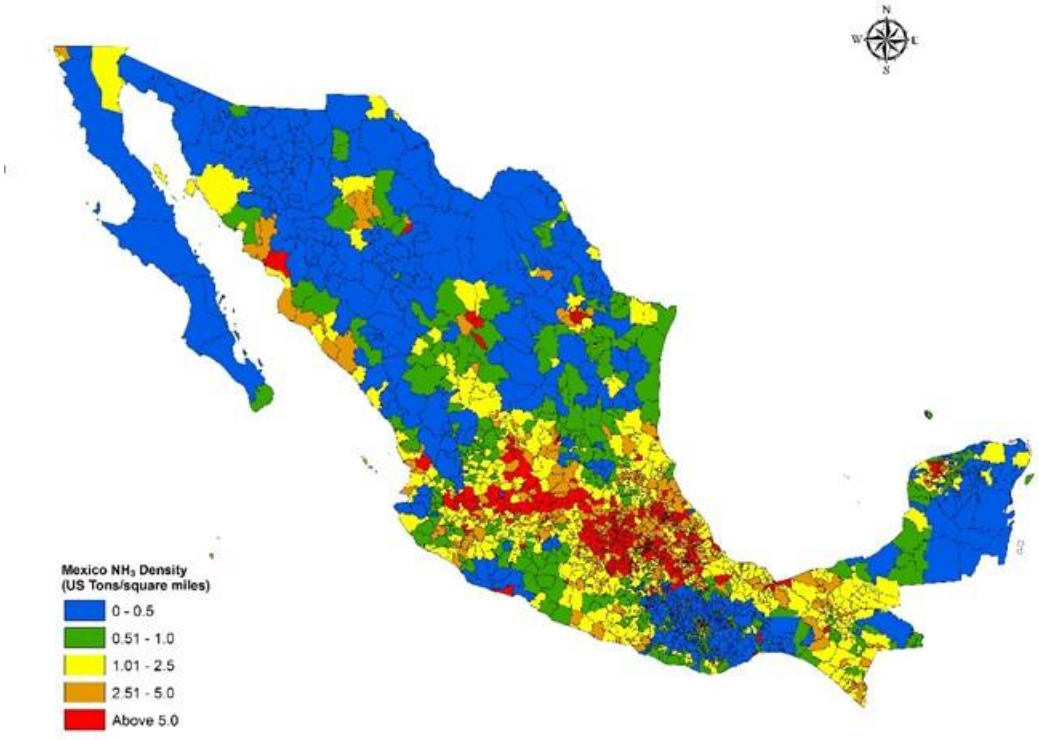


Figure 19. Absolute PEC Emissions by Municipio (short tons)

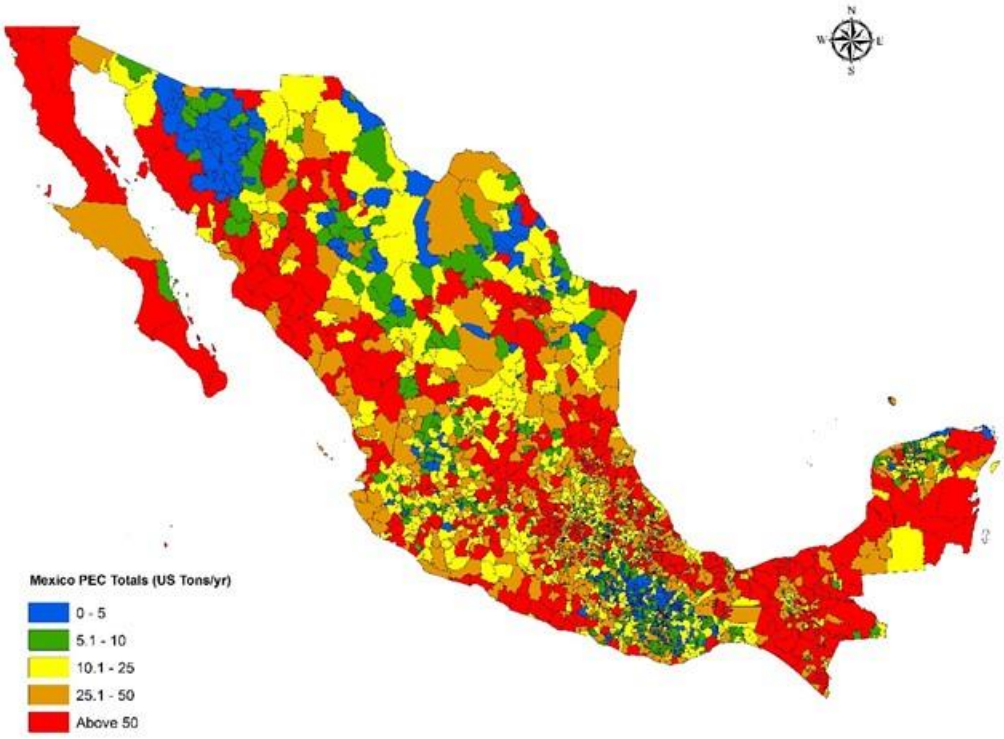
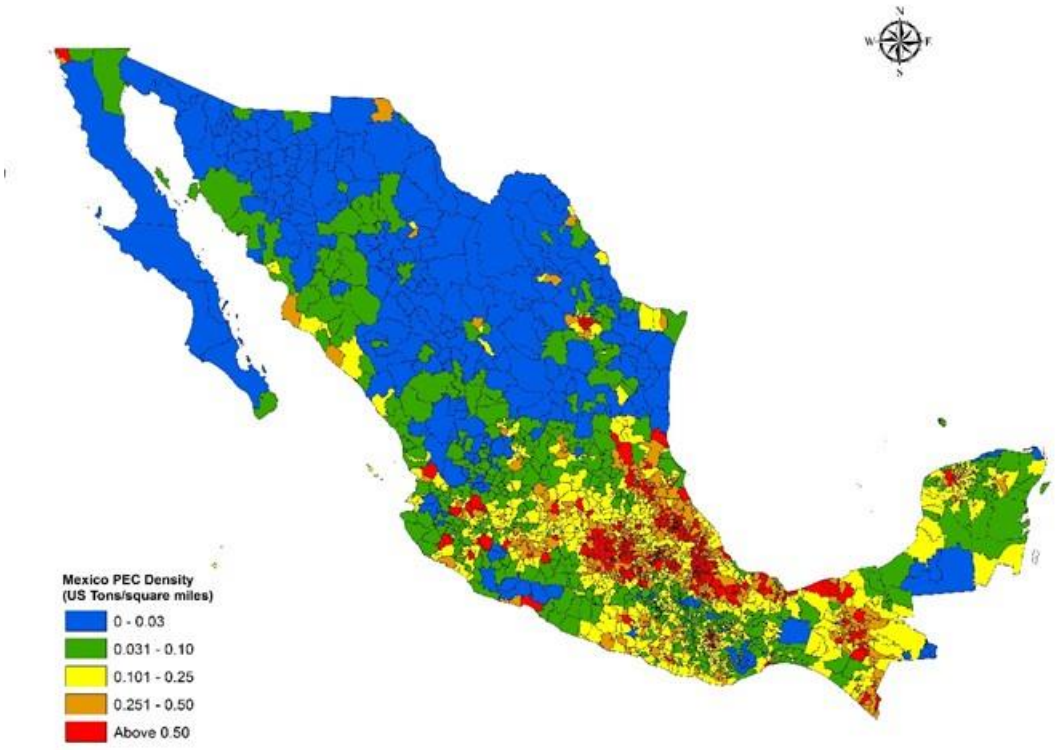


Figure 20. PEC Emissions Density by Municipio (short tons/square miles)



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APPENDIX A – POINT SOURCE SURROGATE ASSIGNMENTS

POINT SOURCE SURROGATE ASSIGNMENTS

NAICS	SCC	NAICS Definition	Surrogate
32419	All	Other petroleum and coal products manufacturing	Crude Oil Refining
211110	All	Oil and gas extraction	Crude Oil Production
221110	10100401	Electric power generation, transmission and distribution	Electricity - Residual
221110	10100405	Electric power generation, transmission and distribution	Electricity - Residual
221110	10100501	Electric power generation, transmission and distribution	Electricity - Distillate
221110	10100601	Electric power generation, transmission and distribution	Electricity - Natural Gas
221110	10200221	Electric power generation, transmission and distribution	Electricity - Coal
221110	10200401	Electric power generation, transmission and distribution	Electricity - Residual
221110	10200501	Electric power generation, transmission and distribution	Electricity - Distillate
221110	10200601	Electric power generation, transmission and distribution	Electricity - Natural Gas
221110	10200802	Electric power generation, transmission and distribution	Electricity - Coke
221110	20100101	Electric power generation, transmission and distribution	Electricity - Distillate
221110	20100102	Electric power generation, transmission and distribution	Electricity - Distillate
221110	20100201	Electric power generation, transmission and distribution	Electricity - Natural Gas
221110	20200101	Electric power generation, transmission and distribution	Electricity - Distillate
221110	20200201	Electric power generation, transmission and distribution	Electricity - Natural Gas
221110	30300310	Electric power generation, transmission and distribution	Electricity - Coke
221110	30300312	Electric power generation, transmission and distribution	Electricity - Coke
324110	All	Petroleum refining	Crude Oil Refining
324120	All	Asphalt products manufacturing	Crude Oil Refining
324191	All	Lubricating oils and greases manufacturing	Crude Oil Refining
324199	All	Coke and other products derived from refined petroleum and coal, manufacturing	Crude Oil Refining
486110	All	Pipeline transportation of crude oil	Crude Oil Refining
486210	All	Pipeline transportation of natural gas	Natural Gas Pipelines
486910	All	Pipeline transportation of refined petroleum products	Crude Oil Refining
All Others	All		GDP

APPENDIX B – POINT SOURCE PROJECTION FACTORS

POINT SOURCE PROJECTION FACTORS

State Code	State	Region	Factors	2014 Projection Factor
01	Aguascalientes	Centro-Occidente	Electricity Generation - Residual	0.2827
02	Baja California	Noroeste	Electricity Generation - Residual	0.7960
03	Baja California Sur	Noroeste	Electricity Generation - Residual	0.7960
04	Campeche	Sur-Sureste	Electricity Generation - Residual	0.6770
05	Coahuila	Noreste	Electricity Generation - Residual	0.3931
06	Colima	Centro-Occidente	Electricity Generation - Residual	0.2827
07	Chiapas	Sur-Sureste	Electricity Generation - Residual	0.6770
08	Chihuahua	Noreste	Electricity Generation - Residual	0.3931
09	Distrito Federal	Centro	Electricity Generation - Residual	1.0000
10	Durango	Noreste	Electricity Generation - Residual	0.3931
11	Guanajuato	Centro-Occidente	Electricity Generation - Residual	0.2827
12	Guerrero	Sur-Sureste	Electricity Generation - Residual	0.6770
13	Hidalgo	Centro	Electricity Generation - Residual	1.0000
14	Jalisco	Centro-Occidente	Electricity Generation - Residual	0.2827
15	México	Centro	Electricity Generation - Residual	1.0000
16	Michoacán	Centro-Occidente	Electricity Generation - Residual	0.2827
17	Morelos	Centro	Electricity Generation - Residual	1.0000
18	Nayarit	Centro-Occidente	Electricity Generation - Residual	0.2827
19	Nuevo León	Noreste	Electricity Generation - Residual	0.3931
20	Oaxaca	Sur-Sureste	Electricity Generation - Residual	0.6770
21	Puebla	Centro	Electricity Generation - Residual	1.0000
22	Querétaro	Centro-Occidente	Electricity Generation - Residual	0.2827
23	Quintana Roo	Sur-Sureste	Electricity Generation - Residual	0.6770
24	San Luis Potosí	Centro-Occidente	Electricity Generation - Residual	0.2827
25	Sinaloa	Noroeste	Electricity Generation - Residual	0.7960
26	Sonora	Noroeste	Electricity Generation - Residual	0.7960
27	Tabasco	Sur-Sureste	Electricity Generation - Residual	0.6770
28	Tamaulipas	Noreste	Electricity Generation - Residual	0.3931
29	Tlaxcala	Centro	Electricity Generation - Residual	1.0000
30	Veracruz	Sur-Sureste	Electricity Generation - Residual	0.6770
31	Yucatán	Sur-Sureste	Electricity Generation - Residual	0.6770
32	Zacatecas	Centro-Occidente	Electricity Generation - Residual	0.2827
01	Aguascalientes	Centro-Occidente	Electricity Generation - Distillate	0.6667
02	Baja California	Noroeste	Electricity Generation - Distillate	1.6087
03	Baja California Sur	Noroeste	Electricity Generation - Distillate	1.6087
04	Campeche	Sur-Sureste	Electricity Generation - Distillate	1.2333
05	Coahuila	Noreste	Electricity Generation - Distillate	3.0000
06	Colima	Centro-Occidente	Electricity Generation - Distillate	0.6667
07	Chiapas	Sur-Sureste	Electricity Generation - Distillate	1.2333
08	Chihuahua	Noreste	Electricity Generation - Distillate	3.0000
09	Distrito Federal	Centro	Electricity Generation - Distillate	0.4000
10	Durango	Noreste	Electricity Generation - Distillate	3.0000
11	Guanajuato	Centro-Occidente	Electricity Generation - Distillate	0.6667
12	Guerrero	Sur-Sureste	Electricity Generation - Distillate	1.2333
13	Hidalgo	Centro	Electricity Generation - Distillate	0.4000
14	Jalisco	Centro-Occidente	Electricity Generation - Distillate	0.6667
15	México	Centro	Electricity Generation - Distillate	0.4000

POINT SOURCE PROJECTION FACTORS

State Code	State	Region	Factors	2014 Projection Factor
16	Michoacán	Centro-Occidente	Electricity Generation - Distillate	0.6667
17	Morelos	Centro	Electricity Generation - Distillate	0.4000
18	Nayarit	Centro-Occidente	Electricity Generation - Distillate	0.6667
19	Nuevo León	Noreste	Electricity Generation - Distillate	3.0000
20	Oaxaca	Sur-Sureste	Electricity Generation - Distillate	1.2333
21	Puebla	Centro	Electricity Generation - Distillate	0.4000
22	Querétaro	Centro-Occidente	Electricity Generation - Distillate	0.6667
23	Quintana Roo	Sur-Sureste	Electricity Generation - Distillate	1.2333
24	San Luis Potosí	Centro-Occidente	Electricity Generation - Distillate	0.6667
25	Sinaloa	Noroeste	Electricity Generation - Distillate	1.6087
26	Sonora	Noroeste	Electricity Generation - Distillate	1.6087
27	Tabasco	Sur-Sureste	Electricity Generation - Distillate	1.2333
28	Tamaulipas	Noreste	Electricity Generation - Distillate	3.0000
29	Tlaxcala	Centro	Electricity Generation - Distillate	0.4000
30	Veracruz	Sur-Sureste	Electricity Generation - Distillate	1.2333
31	Yucatán	Sur-Sureste	Electricity Generation - Distillate	1.2333
32	Zacatecas	Centro-Occidente	Electricity Generation - Distillate	0.6667
01	Aguascalientes	Centro-Occidente	Electricity Generation - Natural Gas	1.8244
02	Baja California	Noroeste	Electricity Generation - Natural Gas	1.1474
03	Baja California Sur	Noroeste	Electricity Generation - Natural Gas	1.1474
04	Campeche	Sur-Sureste	Electricity Generation - Natural Gas	0.9612
05	Coahuila	Noreste	Electricity Generation - Natural Gas	1.2942
06	Colima	Centro-Occidente	Electricity Generation - Natural Gas	1.8244
07	Chiapas	Sur-Sureste	Electricity Generation - Natural Gas	0.9612
08	Chihuahua	Noreste	Electricity Generation - Natural Gas	1.2942
09	Distrito Federal	Centro	Electricity Generation - Natural Gas	1.1215
10	Durango	Noreste	Electricity Generation - Natural Gas	1.2942
11	Guanajuato	Centro-Occidente	Electricity Generation - Natural Gas	1.8244
12	Guerrero	Sur-Sureste	Electricity Generation - Natural Gas	0.9612
13	Hidalgo	Centro	Electricity Generation - Natural Gas	1.1215
14	Jalisco	Centro-Occidente	Electricity Generation - Natural Gas	1.8244
15	México	Centro	Electricity Generation - Natural Gas	1.1215
16	Michoacán	Centro-Occidente	Electricity Generation - Natural Gas	1.8244
17	Morelos	Centro	Electricity Generation - Natural Gas	1.1215
18	Nayarit	Centro-Occidente	Electricity Generation - Natural Gas	1.8244
19	Nuevo León	Noreste	Electricity Generation - Natural Gas	1.2942
20	Oaxaca	Sur-Sureste	Electricity Generation - Natural Gas	0.9612
21	Puebla	Centro	Electricity Generation - Natural Gas	1.1215
22	Querétaro	Centro-Occidente	Electricity Generation - Natural Gas	1.8244
23	Quintana Roo	Sur-Sureste	Electricity Generation - Natural Gas	0.9612
24	San Luis Potosí	Centro-Occidente	Electricity Generation - Natural Gas	1.8244
25	Sinaloa	Noroeste	Electricity Generation - Natural Gas	1.1474
26	Sonora	Noroeste	Electricity Generation - Natural Gas	1.1474
27	Tabasco	Sur-Sureste	Electricity Generation - Natural Gas	0.9612
28	Tamaulipas	Noreste	Electricity Generation - Natural Gas	1.2942
29	Tlaxcala	Centro	Electricity Generation - Natural Gas	1.1215
30	Veracruz	Sur-Sureste	Electricity Generation - Natural Gas	0.9612

POINT SOURCE PROJECTION FACTORS

State Code	State	Region	Factors	2014 Projection Factor
31	Yucatán	Sur-Sureste	Electricity Generation - Natural Gas	0.9612
32	Zacatecas	Centro-Occidente	Electricity Generation - Natural Gas	1.8244
01	Aguascalientes	Centro-Occidente	Electricity Generation - Coke	1.2503
02	Baja California	Noroeste	Electricity Generation - Coke	1.2503
03	Baja California Sur	Noroeste	Electricity Generation - Coke	1.2503
04	Campeche	Sur-Sureste	Electricity Generation - Coke	1.2503
05	Coahuila	Noreste	Electricity Generation - Coke	1.2503
06	Colima	Centro-Occidente	Electricity Generation - Coke	1.2503
07	Chiapas	Sur-Sureste	Electricity Generation - Coke	1.2503
08	Chihuahua	Noreste	Electricity Generation - Coke	1.2503
09	Distrito Federal	Centro	Electricity Generation - Coke	1.2503
10	Durango	Noreste	Electricity Generation - Coke	1.2503
11	Guanajuato	Centro-Occidente	Electricity Generation - Coke	1.2503
12	Guerrero	Sur-Sureste	Electricity Generation - Coke	1.2503
13	Hidalgo	Centro	Electricity Generation - Coke	1.2503
14	Jalisco	Centro-Occidente	Electricity Generation - Coke	1.2503
15	México	Centro	Electricity Generation - Coke	1.2503
16	Michoacán	Centro-Occidente	Electricity Generation - Coke	1.2503
17	Morelos	Centro	Electricity Generation - Coke	1.2503
18	Nayarit	Centro-Occidente	Electricity Generation - Coke	1.2503
19	Nuevo León	Noreste	Electricity Generation - Coke	1.2503
20	Oaxaca	Sur-Sureste	Electricity Generation - Coke	1.2503
21	Puebla	Centro	Electricity Generation - Coke	1.2503
22	Querétaro	Centro-Occidente	Electricity Generation - Coke	1.2503
23	Quintana Roo	Sur-Sureste	Electricity Generation - Coke	1.2503
24	San Luis Potosí	Centro-Occidente	Electricity Generation - Coke	1.2503
25	Sinaloa	Noroeste	Electricity Generation - Coke	1.2503
26	Sonora	Noroeste	Electricity Generation - Coke	1.2503
27	Tabasco	Sur-Sureste	Electricity Generation - Coke	1.2503
28	Tamaulipas	Noreste	Electricity Generation - Coke	1.2503
29	Tlaxcala	Centro	Electricity Generation - Coke	1.2503
30	Veracruz	Sur-Sureste	Electricity Generation - Coke	1.2503
31	Yucatán	Sur-Sureste	Electricity Generation - Coke	1.2503
32	Zacatecas	Centro-Occidente	Electricity Generation - Coke	1.2503
01	Aguascalientes	Centro-Occidente	Electricity Generation - Coal	1.5118
02	Baja California	Noroeste	Electricity Generation - Coal	1.5118
03	Baja California Sur	Noroeste	Electricity Generation - Coal	1.5118
04	Campeche	Sur-Sureste	Electricity Generation - Coal	1.5118
05	Coahuila	Noreste	Electricity Generation - Coal	1.5118
06	Colima	Centro-Occidente	Electricity Generation - Coal	1.5118
07	Chiapas	Sur-Sureste	Electricity Generation - Coal	1.5118
08	Chihuahua	Noreste	Electricity Generation - Coal	1.5118
09	Distrito Federal	Centro	Electricity Generation - Coal	1.5118
10	Durango	Noreste	Electricity Generation - Coal	1.5118
11	Guanajuato	Centro-Occidente	Electricity Generation - Coal	1.5118
12	Guerrero	Sur-Sureste	Electricity Generation - Coal	1.5118
13	Hidalgo	Centro	Electricity Generation - Coal	1.5118

POINT SOURCE PROJECTION FACTORS

State Code	State	Region	Factors	2014 Projection Factor
14	Jalisco	Centro-Occidente	Electricity Generation - Coal	1.5118
15	México	Centro	Electricity Generation - Coal	1.5118
16	Michoacán	Centro-Occidente	Electricity Generation - Coal	1.5118
17	Morelos	Centro	Electricity Generation - Coal	1.5118
18	Nayarit	Centro-Occidente	Electricity Generation - Coal	1.5118
19	Nuevo León	Noreste	Electricity Generation - Coal	1.5118
20	Oaxaca	Sur-Sureste	Electricity Generation - Coal	1.5118
21	Puebla	Centro	Electricity Generation - Coal	1.5118
22	Querétaro	Centro-Occidente	Electricity Generation - Coal	1.5118
23	Quintana Roo	Sur-Sureste	Electricity Generation - Coal	1.5118
24	San Luis Potosí	Centro-Occidente	Electricity Generation - Coal	1.5118
25	Sinaloa	Noroeste	Electricity Generation - Coal	1.5118
26	Sonora	Noroeste	Electricity Generation - Coal	1.5118
27	Tabasco	Sur-Sureste	Electricity Generation - Coal	1.5118
28	Tamaulipas	Noreste	Electricity Generation - Coal	1.5118
29	Tlaxcala	Centro	Electricity Generation - Coal	1.5118
30	Veracruz	Sur-Sureste	Electricity Generation - Coal	1.5118
31	Yucatán	Sur-Sureste	Electricity Generation - Coal	1.5118
32	Zacatecas	Centro-Occidente	Electricity Generation - Coal	1.5118
01	Aguascalientes	Centro-Occidente	Refining	0.8989
02	Baja California	Noroeste	Refining	1.0000
03	Baja California Sur	Noroeste	Refining	1.0000
04	Campeche	Sur-Sureste	Refining	0.9624
05	Coahuila	Noreste	Refining	0.8045
06	Colima	Centro-Occidente	Refining	0.8989
07	Chiapas	Sur-Sureste	Refining	0.9624
08	Chihuahua	Noreste	Refining	0.8045
09	Distrito Federal	Centro	Refining	0.9258
10	Durango	Noreste	Refining	0.8045
11	Guanajuato	Centro-Occidente	Refining	0.8989
12	Guerrero	Sur-Sureste	Refining	0.9624
13	Hidalgo	Centro	Refining	0.9258
14	Jalisco	Centro-Occidente	Refining	0.8989
15	México	Centro	Refining	0.9258
16	Michoacán	Centro-Occidente	Refining	0.8989
17	Morelos	Centro	Refining	0.9258
18	Nayarit	Centro-Occidente	Refining	0.8989
19	Nuevo León	Noreste	Refining	0.8045
20	Oaxaca	Sur-Sureste	Refining	0.9624
21	Puebla	Centro	Refining	0.9258
22	Querétaro	Centro-Occidente	Refining	0.8989
23	Quintana Roo	Sur-Sureste	Refining	0.9624
24	San Luis Potosí	Centro-Occidente	Refining	0.8989
25	Sinaloa	Noroeste	Refining	1.0000
26	Sonora	Noroeste	Refining	1.0000
27	Tabasco	Sur-Sureste	Refining	0.9624
28	Tamaulipas	Noreste	Refining	0.8045

POINT SOURCE PROJECTION FACTORS

State Code	State	Region	Factors	2014 Projection Factor
29	Tlaxcala	Centro	Refining	0.9258
30	Veracruz	Sur-Sureste	Refining	0.9624
31	Yucatán	Sur-Sureste	Refining	0.9624
32	Zacatecas	Centro-Occidente	Refining	0.8989
01	Aguascalientes	Centro-Occidente	Crude Oil Production	0.8584
02	Baja California	Noroeste	Crude Oil Production	0.8584
03	Baja California Sur	Noroeste	Crude Oil Production	0.8584
04	Campeche	Sur-Sureste	Crude Oil Production	0.8584
05	Coahuila	Noreste	Crude Oil Production	0.8584
06	Colima	Centro-Occidente	Crude Oil Production	0.8584
07	Chiapas	Sur-Sureste	Crude Oil Production	0.8584
08	Chihuahua	Noreste	Crude Oil Production	0.8584
09	Distrito Federal	Centro	Crude Oil Production	0.8584
10	Durango	Noreste	Crude Oil Production	0.8584
11	Guanajuato	Centro-Occidente	Crude Oil Production	0.8584
12	Guerrero	Sur-Sureste	Crude Oil Production	0.8584
13	Hidalgo	Centro	Crude Oil Production	0.8584
14	Jalisco	Centro-Occidente	Crude Oil Production	0.8584
15	México	Centro	Crude Oil Production	0.8584
16	Michoacán	Centro-Occidente	Crude Oil Production	0.8584
17	Morelos	Centro	Crude Oil Production	0.8584
18	Nayarit	Centro-Occidente	Crude Oil Production	0.8584
19	Nuevo León	Noreste	Crude Oil Production	0.8584
20	Oaxaca	Sur-Sureste	Crude Oil Production	0.8584
21	Puebla	Centro	Crude Oil Production	0.8584
22	Querétaro	Centro-Occidente	Crude Oil Production	0.8584
23	Quintana Roo	Sur-Sureste	Crude Oil Production	0.8584
24	San Luis Potosí	Centro-Occidente	Crude Oil Production	0.8584
25	Sinaloa	Noroeste	Crude Oil Production	0.8584
26	Sonora	Noroeste	Crude Oil Production	0.8584
27	Tabasco	Sur-Sureste	Crude Oil Production	0.8584
28	Tamaulipas	Noreste	Crude Oil Production	0.8584
29	Tlaxcala	Centro	Crude Oil Production	0.8584
30	Veracruz	Sur-Sureste	Crude Oil Production	0.8584
31	Yucatán	Sur-Sureste	Crude Oil Production	0.8584
32	Zacatecas	Centro-Occidente	Crude Oil Production	0.8584
01	Aguascalientes	Centro-Occidente	Natural Gas Pipelines	1.4945
02	Baja California	Noroeste	Natural Gas Pipelines	1.1581
03	Baja California Sur	Noroeste	Natural Gas Pipelines	1.1581
04	Campeche	Sur-Sureste	Natural Gas Pipelines	1.0118
05	Coahuila	Noreste	Natural Gas Pipelines	1.2999
06	Colima	Centro-Occidente	Natural Gas Pipelines	1.4945
07	Chiapas	Sur-Sureste	Natural Gas Pipelines	1.0118
08	Chihuahua	Noreste	Natural Gas Pipelines	1.2999
09	Distrito Federal	Centro	Natural Gas Pipelines	1.1697
10	Durango	Noreste	Natural Gas Pipelines	1.2999
11	Guanajuato	Centro-Occidente	Natural Gas Pipelines	1.4945

POINT SOURCE PROJECTION FACTORS

State Code	State	Region	Factors	2014 Projection Factor
12	Guerrero	Sur-Sureste	Natural Gas Pipelines	1.0118
13	Hidalgo	Centro	Natural Gas Pipelines	1.1697
14	Jalisco	Centro-Occidente	Natural Gas Pipelines	1.4945
15	México	Centro	Natural Gas Pipelines	1.1697
16	Michoacán	Centro-Occidente	Natural Gas Pipelines	1.4945
17	Morelos	Centro	Natural Gas Pipelines	1.1697
18	Nayarit	Centro-Occidente	Natural Gas Pipelines	1.4945
19	Nuevo León	Noreste	Natural Gas Pipelines	1.2999
20	Oaxaca	Sur-Sureste	Natural Gas Pipelines	1.0118
21	Puebla	Centro	Natural Gas Pipelines	1.1697
22	Querétaro	Centro-Occidente	Natural Gas Pipelines	1.4945
23	Quintana Roo	Sur-Sureste	Natural Gas Pipelines	1.0118
24	San Luis Potosí	Centro-Occidente	Natural Gas Pipelines	1.4945
25	Sinaloa	Noroeste	Natural Gas Pipelines	1.1581
26	Sonora	Noroeste	Natural Gas Pipelines	1.1581
27	Tabasco	Sur-Sureste	Natural Gas Pipelines	1.0118
28	Tamaulipas	Noreste	Natural Gas Pipelines	1.2999
29	Tlaxcala	Centro	Natural Gas Pipelines	1.1697
30	Veracruz	Sur-Sureste	Natural Gas Pipelines	1.0118
31	Yucatán	Sur-Sureste	Natural Gas Pipelines	1.0118
32	Zacatecas	Centro-Occidente	Natural Gas Pipelines	1.4945
01	Aguascalientes	Centro-Occidente	GDP	1.1273
02	Baja California	Noroeste	GDP	1.1273
03	Baja California Sur	Noroeste	GDP	1.1273
04	Campeche	Sur-Sureste	GDP	1.1273
05	Coahuila	Noreste	GDP	1.1273
06	Colima	Centro-Occidente	GDP	1.1273
07	Chiapas	Sur-Sureste	GDP	1.1273
08	Chihuahua	Noreste	GDP	1.1273
09	Distrito Federal	Centro	GDP	1.1273
10	Durango	Noreste	GDP	1.1273
11	Guanajuato	Centro-Occidente	GDP	1.1273
12	Guerrero	Sur-Sureste	GDP	1.1273
13	Hidalgo	Centro	GDP	1.1273
14	Jalisco	Centro-Occidente	GDP	1.1273
15	México	Centro	GDP	1.1273
16	Michoacán	Centro-Occidente	GDP	1.1273
17	Morelos	Centro	GDP	1.1273
18	Nayarit	Centro-Occidente	GDP	1.1273
19	Nuevo León	Noreste	GDP	1.1273
20	Oaxaca	Sur-Sureste	GDP	1.1273
21	Puebla	Centro	GDP	1.1273
22	Querétaro	Centro-Occidente	GDP	1.1273
23	Quintana Roo	Sur-Sureste	GDP	1.1273
24	San Luis Potosí	Centro-Occidente	GDP	1.1273
25	Sinaloa	Noroeste	GDP	1.1273
26	Sonora	Noroeste	GDP	1.1273

POINT SOURCE PROJECTION FACTORS

State Code	State	Region	Factors	2014 Projection Factor
27	Tabasco	Sur-Sureste	GDP	1.1273
28	Tamaulipas	Noreste	GDP	1.1273
29	Tlaxcala	Centro	GDP	1.1273
30	Veracruz	Sur-Sureste	GDP	1.1273
31	Yucatán	Sur-Sureste	GDP	1.1273
32	Zacatecas	Centro-Occidente	GDP	1.1273

APPENDIX C – AREA SOURCE SURROGATE ASSIGNMENTS

AREA SOURCE SURROGATE ASSIGNMENTS

SCC	SCC Description	Projection Profile
2102004000	Fuel Combustion - Industrial - Diesel	Diesel - Industrial
2102007000	Fuel Combustion - Industrial - LPG	LPG - Industrial
2103006000	Fuel Combustion - Commercial - Natural Gas	Natural Gas - Service
2103007000	Fuel Combustion - Commercial - LPG	LPG - Service
2104006000	Fuel Combustion - Residential - Natural Gas	Natural Gas - Residential
2104007000	Fuel Combustion - Residential - LPG	LPG - Residential
2104008001	Fuel Combustion - Residential - Wood	Population
2104011000	Fuel Combustion - Residential - Kerosene	Population
2202420000	Bus Terminals	Population
2222222222	Border Crossings	Gasoline - Transportation
2302002000	Commercial Cooking - Charbroiling	Population
2302050000	Bakeries	Population
2311010000	Residential Construction Dust	Population
2401001000	Solvent Evaporation - Architectural Coatings	Population
2401005000	Solvent Evaporation - Autobody Refinishing	Population
2401008000	Solvent Evaporation - Traffic Markings	Unchanged
2401020000	Surface Coating - Wood Furniture	Mexico GDP
2401050000	Surface Coating - Miscellaneous Finished Metals	Mexico GDP
2401055000	Surface Coating - Machinery and Equipment	Mexico GDP
2401065000	Surface Coating - Electronic and Other Electrical	Mexico GDP
2401080000	Surface Coating - Marine	Mexico GDP
2401990000	Surface Coating - Other	Mexico GDP
2415000000	Solvent Evaporation - Degreasing	Mexico GDP
2415010000	Degreasing - All	Mexico GDP
2420000055	Solvent Evaporation - Drycleaning	Population
2425000000	Graphic Arts - All General	Population
2425010000	Graphic Arts - Lithography	Population
2425030000	Graphic Arts - Rotogravure	Population
2425040000	Graphic Arts - Flexography	Population
2461020000	Solvent Evaporation - Asphalt Pavings	Unchanged
2461850000	Solvent Evaporation - Agricultural Pesticide Application	Agricultural Acreage - Total
2465000000	Consumer Products - General	Population
2465100000	Consumer Products - Personal Care	Population
2465200000	Consumer Products - Household	Population
2465400000	Consumer Products - Auto Aftermarket	Population
2465600000	Consumer Products - Adhesives/Sealants	Population
2465800000	Consumer Products - Pesticides	Population
2465900000	Consumer Products - Miscellaneous	Population
2501060000	Gasoline Distribution	Gasoline - Transportation
2630030000	Wastewater Treatment - Residential - Treated	Population
2630090000	Wastewater Treatment - Residential - Untreated	Population
2801000000	Agricultural Dust - Planting and Harvesting	Agricultural Acreage - Total
2801500250	Field Burning - Sugarcane	Agricultural Acreage - Sugarcane
2801520004	Fuel Combustion - Agricultural - Diesel	Agricultural Acreage - Total
2801520010	Fuel Combustion - Agricultural - LPG	LPG – Agricultural
2801520020	Fuel Combustion - Agricultural - Kerosene	Agricultural Acreage - Total
2801700000	Fertilizer Application	Agricultural Acreage - Total
2805000000	Livestock Waste Ammonia	Unchanged

AREA SOURCE SURROGATE ASSIGNMENTS

SCC	SCC Description	Projection Profile
2805001000	Livestock Fugitive Dust	Unchanged
2810001000	Forest Wildfires	Unchanged
2810030000	Structure Fires	Population
2850000010	Hospitals - Sterilization Operations	Population
3333333333	LPG Distribution	LPG - Total
5555555555	Domestic Ammonia	Population

APPENDIX D – AREA SOURCE PROJECTION FACTORS (OTHER)

AREA SOURCE PROJECTION FACTORS (OTHER)

State Code	State	Region	Surrogate	2014 Projection Factor
01	Aguascalientes	Centro-Occidente	LPG - Industrial	1.4773
02	Baja California	Noroeste	LPG - Industrial	1.0000
03	Baja California Sur	Noroeste	LPG - Industrial	1.0000
04	Campeche	Sur-Sureste	LPG - Industrial	1.5263
05	Coahuila	Noreste	LPG - Industrial	0.8103
06	Colima	Centro-Occidente	LPG - Industrial	1.4773
07	Chiapas	Sur-Sureste	LPG - Industrial	1.5263
08	Chihuahua	Noreste	LPG - Industrial	0.8103
09	Distrito Federal	Centro	LPG - Industrial	0.9583
10	Durango	Noreste	LPG - Industrial	0.8103
11	Guanajuato	Centro-Occidente	LPG - Industrial	1.4773
12	Guerrero	Sur-Sureste	LPG - Industrial	1.5263
13	Hidalgo	Centro	LPG - Industrial	0.9583
14	Jalisco	Centro-Occidente	LPG - Industrial	1.4773
15	México	Centro	LPG - Industrial	0.9583
16	Michoacán	Centro-Occidente	LPG - Industrial	1.4773
17	Morelos	Centro	LPG - Industrial	0.9583
18	Nayarit	Centro-Occidente	LPG - Industrial	1.4773
19	Nuevo León	Noreste	LPG - Industrial	0.8103
20	Oaxaca	Sur-Sureste	LPG - Industrial	1.5263
21	Puebla	Centro	LPG - Industrial	0.9583
22	Querétaro	Centro-Occidente	LPG - Industrial	1.4773
23	Quintana Roo	Sur-Sureste	LPG - Industrial	1.5263
24	San Luis Potosí	Centro-Occidente	LPG - Industrial	1.4773
25	Sinaloa	Noroeste	LPG - Industrial	1.0000
26	Sonora	Noroeste	LPG - Industrial	1.0000
27	Tabasco	Sur-Sureste	LPG - Industrial	1.5263
28	Tamaulipas	Noreste	LPG - Industrial	0.8103
29	Tlaxcala	Centro	LPG - Industrial	0.9583
30	Veracruz	Sur-Sureste	LPG - Industrial	1.5263
31	Yucatán	Sur-Sureste	LPG - Industrial	1.5263
32	Zacatecas	Centro-Occidente	LPG - Industrial	1.4773
01	Aguascalientes	Centro-Occidente	LPG - Services	1.1512
02	Baja California	Noroeste	LPG - Services	1.0500
03	Baja California Sur	Noroeste	LPG - Services	1.0500
04	Campeche	Sur-Sureste	LPG - Services	1.2857
05	Coahuila	Noreste	LPG - Services	1.0678
06	Colima	Centro-Occidente	LPG - Services	1.1512
07	Chiapas	Sur-Sureste	LPG - Services	1.2857
08	Chihuahua	Noreste	LPG - Services	1.0678
09	Distrito Federal	Centro	LPG - Services	0.9114
10	Durango	Noreste	LPG - Services	1.0678
11	Guanajuato	Centro-Occidente	LPG - Services	1.1512
12	Guerrero	Sur-Sureste	LPG - Services	1.2857
13	Hidalgo	Centro	LPG - Services	0.9114
14	Jalisco	Centro-Occidente	LPG - Services	1.1512
15	México	Centro	LPG - Services	0.9114

AREA SOURCE PROJECTION FACTORS (OTHER)

State Code	State	Region	Surrogate	2014 Projection Factor
16	Michoacán	Centro-Occidente	LPG - Services	1.1512
17	Morelos	Centro	LPG - Services	0.9114
18	Nayarit	Centro-Occidente	LPG - Services	1.1512
19	Nuevo León	Noreste	LPG - Services	1.0678
20	Oaxaca	Sur-Sureste	LPG - Services	1.2857
21	Puebla	Centro	LPG - Services	0.9114
22	Querétaro	Centro-Occidente	LPG - Services	1.1512
23	Quintana Roo	Sur-Sureste	LPG - Services	1.2857
24	San Luis Potosí	Centro-Occidente	LPG - Services	1.1512
25	Sinaloa	Noroeste	LPG - Services	1.0500
26	Sonora	Noroeste	LPG - Services	1.0500
27	Tabasco	Sur-Sureste	LPG - Services	1.2857
28	Tamaulipas	Noreste	LPG - Services	1.0678
29	Tlaxcala	Centro	LPG - Services	0.9114
30	Veracruz	Sur-Sureste	LPG - Services	1.2857
31	Yucatán	Sur-Sureste	LPG - Services	1.2857
32	Zacatecas	Centro-Occidente	LPG - Services	1.1512
01	Aguascalientes	Centro-Occidente	LPG - Residential	0.7654
02	Baja California	Noroeste	LPG - Residential	1.0000
03	Baja California Sur	Noroeste	LPG - Residential	1.0000
04	Campeche	Sur-Sureste	LPG - Residential	0.7986
05	Coahuila	Noreste	LPG - Residential	1.0000
06	Colima	Centro-Occidente	LPG - Residential	0.7654
07	Chiapas	Sur-Sureste	LPG - Residential	0.7986
08	Chihuahua	Noreste	LPG - Residential	1.0000
09	Distrito Federal	Centro	LPG - Residential	0.9549
10	Durango	Noreste	LPG - Residential	1.0000
11	Guanajuato	Centro-Occidente	LPG - Residential	0.7654
12	Guerrero	Sur-Sureste	LPG - Residential	0.7986
13	Hidalgo	Centro	LPG - Residential	0.9549
14	Jalisco	Centro-Occidente	LPG - Residential	0.7654
15	México	Centro	LPG - Residential	0.9549
16	Michoacán	Centro-Occidente	LPG - Residential	0.7654
17	Morelos	Centro	LPG - Residential	0.9549
18	Nayarit	Centro-Occidente	LPG - Residential	0.7654
19	Nuevo León	Noreste	LPG - Residential	1.0000
20	Oaxaca	Sur-Sureste	LPG - Residential	0.7986
21	Puebla	Centro	LPG - Residential	0.9549
22	Querétaro	Centro-Occidente	LPG - Residential	0.7654
23	Quintana Roo	Sur-Sureste	LPG - Residential	0.7986
24	San Luis Potosí	Centro-Occidente	LPG - Residential	0.7654
25	Sinaloa	Noroeste	LPG - Residential	1.0000
26	Sonora	Noroeste	LPG - Residential	1.0000
27	Tabasco	Sur-Sureste	LPG - Residential	0.7986
28	Tamaulipas	Noreste	LPG - Residential	1.0000
29	Tlaxcala	Centro	LPG - Residential	0.9549
30	Veracruz	Sur-Sureste	LPG - Residential	0.7986

AREA SOURCE PROJECTION FACTORS (OTHER)

State Code	State	Region	Surrogate	2014 Projection Factor
31	Yucatán	Sur-Sureste	LPG - Residential	0.7986
32	Zacatecas	Centro-Occidente	LPG - Residential	0.7654
01	Aguascalientes	Centro-Occidente	LPG - Agricultural	0.9091
02	Baja California	Noroeste	LPG - Agricultural	1.2000
03	Baja California Sur	Noroeste	LPG - Agricultural	1.2000
04	Campeche	Sur-Sureste	LPG - Agricultural	2.5000
05	Coahuila	Noreste	LPG - Agricultural	0.7391
06	Colima	Centro-Occidente	LPG - Agricultural	0.9091
07	Chiapas	Sur-Sureste	LPG - Agricultural	2.5000
08	Chihuahua	Noreste	LPG - Agricultural	0.7391
09	Distrito Federal	Centro	LPG - Agricultural	0.6000
10	Durango	Noreste	LPG - Agricultural	0.7391
11	Guanajuato	Centro-Occidente	LPG - Agricultural	0.9091
12	Guerrero	Sur-Sureste	LPG - Agricultural	2.5000
13	Hidalgo	Centro	LPG - Agricultural	0.6000
14	Jalisco	Centro-Occidente	LPG - Agricultural	0.9091
15	México	Centro	LPG - Agricultural	0.6000
16	Michoacán	Centro-Occidente	LPG - Agricultural	0.9091
17	Morelos	Centro	LPG - Agricultural	0.6000
18	Nayarit	Centro-Occidente	LPG - Agricultural	0.9091
19	Nuevo León	Noreste	LPG - Agricultural	0.7391
20	Oaxaca	Sur-Sureste	LPG - Agricultural	2.5000
21	Puebla	Centro	LPG - Agricultural	0.6000
22	Querétaro	Centro-Occidente	LPG - Agricultural	0.9091
23	Quintana Roo	Sur-Sureste	LPG - Agricultural	2.5000
24	San Luis Potosí	Centro-Occidente	LPG - Agricultural	0.9091
25	Sinaloa	Noroeste	LPG - Agricultural	1.2000
26	Sonora	Noroeste	LPG - Agricultural	1.2000
27	Tabasco	Sur-Sureste	LPG - Agricultural	2.5000
28	Tamaulipas	Noreste	LPG - Agricultural	0.7391
29	Tlaxcala	Centro	LPG - Agricultural	0.6000
30	Veracruz	Sur-Sureste	LPG - Agricultural	2.5000
31	Yucatán	Sur-Sureste	LPG - Agricultural	2.5000
32	Zacatecas	Centro-Occidente	LPG - Agricultural	0.9091
01	Aguascalientes	Centro-Occidente	LPG - Total	0.9350
02	Baja California	Noroeste	LPG - Total	1.0120
03	Baja California Sur	Noroeste	LPG - Total	1.0120
04	Campeche	Sur-Sureste	LPG - Total	0.9545
05	Coahuila	Noreste	LPG - Total	1.0075
06	Colima	Centro-Occidente	LPG - Total	0.9350
07	Chiapas	Sur-Sureste	LPG - Total	0.9545
08	Chihuahua	Noreste	LPG - Total	1.0075
09	Distrito Federal	Centro	LPG - Total	0.9659
10	Durango	Noreste	LPG - Total	1.0075
11	Guanajuato	Centro-Occidente	LPG - Total	0.9350
12	Guerrero	Sur-Sureste	LPG - Total	0.9545
13	Hidalgo	Centro	LPG - Total	0.9659

AREA SOURCE PROJECTION FACTORS (OTHER)

State Code	State	Region	Surrogate	2014 Projection Factor
14	Jalisco	Centro-Occidente	LPG - Total	0.9350
15	México	Centro	LPG - Total	0.9659
16	Michoacán	Centro-Occidente	LPG - Total	0.9350
17	Morelos	Centro	LPG - Total	0.9659
18	Nayarit	Centro-Occidente	LPG - Total	0.9350
19	Nuevo León	Noreste	LPG - Total	1.0075
20	Oaxaca	Sur-Sureste	LPG - Total	0.9545
21	Puebla	Centro	LPG - Total	0.9659
22	Querétaro	Centro-Occidente	LPG - Total	0.9350
23	Quintana Roo	Sur-Sureste	LPG - Total	0.9545
24	San Luis Potosí	Centro-Occidente	LPG - Total	0.9350
25	Sinaloa	Noroeste	LPG - Total	1.0120
26	Sonora	Noroeste	LPG - Total	1.0120
27	Tabasco	Sur-Sureste	LPG - Total	0.9545
28	Tamaulipas	Noreste	LPG - Total	1.0075
29	Tlaxcala	Centro	LPG - Total	0.9659
30	Veracruz	Sur-Sureste	LPG - Total	0.9545
31	Yucatán	Sur-Sureste	LPG - Total	0.9545
32	Zacatecas	Centro-Occidente	LPG - Total	0.9350
01	Aguascalientes	Centro-Occidente	Natural Gas - Service	1.8095
02	Baja California	Noroeste	Natural Gas - Service	2.0000
03	Baja California Sur	Noroeste	Natural Gas - Service	2.0000
04	Campeche	Sur-Sureste	Natural Gas - Service	2.5000
05	Coahuila	Noreste	Natural Gas - Service	1.0116
06	Colima	Centro-Occidente	Natural Gas - Service	1.8095
07	Chiapas	Sur-Sureste	Natural Gas - Service	2.5000
08	Chihuahua	Noreste	Natural Gas - Service	1.0116
09	Distrito Federal	Centro	Natural Gas - Service	1.3571
10	Durango	Noreste	Natural Gas - Service	1.0116
11	Guanajuato	Centro-Occidente	Natural Gas - Service	1.8095
12	Guerrero	Sur-Sureste	Natural Gas - Service	2.5000
13	Hidalgo	Centro	Natural Gas - Service	1.3571
14	Jalisco	Centro-Occidente	Natural Gas - Service	1.8095
15	México	Centro	Natural Gas - Service	1.3571
16	Michoacán	Centro-Occidente	Natural Gas - Service	1.8095
17	Morelos	Centro	Natural Gas - Service	1.3571
18	Nayarit	Centro-Occidente	Natural Gas - Service	1.8095
19	Nuevo León	Noreste	Natural Gas - Service	1.0116
20	Oaxaca	Sur-Sureste	Natural Gas - Service	2.5000
21	Puebla	Centro	Natural Gas - Service	1.3571
22	Querétaro	Centro-Occidente	Natural Gas - Service	1.8095
23	Quintana Roo	Sur-Sureste	Natural Gas - Service	2.5000
24	San Luis Potosí	Centro-Occidente	Natural Gas - Service	1.8095
25	Sinaloa	Noroeste	Natural Gas - Service	2.0000
26	Sonora	Noroeste	Natural Gas - Service	2.0000
27	Tabasco	Sur-Sureste	Natural Gas - Service	2.5000
28	Tamaulipas	Noreste	Natural Gas - Service	1.0116

AREA SOURCE PROJECTION FACTORS (OTHER)

State Code	State	Region	Surrogate	2014 Projection Factor
29	Tlaxcala	Centro	Natural Gas - Service	1.3571
30	Veracruz	Sur-Sureste	Natural Gas - Service	2.5000
31	Yucatán	Sur-Sureste	Natural Gas - Service	2.5000
32	Zacatecas	Centro-Occidente	Natural Gas - Service	1.8095
01	Aguascalientes	Centro-Occidente	Natural Gas - Residential	1.2500
02	Baja California	Noroeste	Natural Gas - Residential	1.2000
03	Baja California Sur	Noroeste	Natural Gas - Residential	1.2000
04	Campeche	Sur-Sureste	Natural Gas - Residential	1.0000
05	Coahuila	Noreste	Natural Gas - Residential	0.9498
06	Colima	Centro-Occidente	Natural Gas - Residential	1.2500
07	Chiapas	Sur-Sureste	Natural Gas - Residential	1.0000
08	Chihuahua	Noreste	Natural Gas - Residential	0.9498
09	Distrito Federal	Centro	Natural Gas - Residential	1.0815
10	Durango	Noreste	Natural Gas - Residential	0.9498
11	Guanajuato	Centro-Occidente	Natural Gas - Residential	1.2500
12	Guerrero	Sur-Sureste	Natural Gas - Residential	1.0000
13	Hidalgo	Centro	Natural Gas - Residential	1.0815
14	Jalisco	Centro-Occidente	Natural Gas - Residential	1.2500
15	México	Centro	Natural Gas - Residential	1.0815
16	Michoacán	Centro-Occidente	Natural Gas - Residential	1.2500
17	Morelos	Centro	Natural Gas - Residential	1.0815
18	Nayarit	Centro-Occidente	Natural Gas - Residential	1.2500
19	Nuevo León	Noreste	Natural Gas - Residential	0.9498
20	Oaxaca	Sur-Sureste	Natural Gas - Residential	1.0000
21	Puebla	Centro	Natural Gas - Residential	1.0815
22	Querétaro	Centro-Occidente	Natural Gas - Residential	1.2500
23	Quintana Roo	Sur-Sureste	Natural Gas - Residential	1.0000
24	San Luis Potosí	Centro-Occidente	Natural Gas - Residential	1.2500
25	Sinaloa	Noroeste	Natural Gas - Residential	1.2000
26	Sonora	Noroeste	Natural Gas - Residential	1.2000
27	Tabasco	Sur-Sureste	Natural Gas - Residential	1.0000
28	Tamaulipas	Noreste	Natural Gas - Residential	0.9498
29	Tlaxcala	Centro	Natural Gas - Residential	1.0815
30	Veracruz	Sur-Sureste	Natural Gas - Residential	1.0000
31	Yucatán	Sur-Sureste	Natural Gas - Residential	1.0000
32	Zacatecas	Centro-Occidente	Natural Gas - Residential	1.2500
01	Aguascalientes	Centro-Occidente	Diesel - Industrial	1.0364
02	Baja California	Noroeste	Diesel - Industrial	1.5385
03	Baja California Sur	Noroeste	Diesel - Industrial	1.5385
04	Campeche	Sur-Sureste	Diesel - Industrial	1.0571
05	Coahuila	Noreste	Diesel - Industrial	1.5156
06	Colima	Centro-Occidente	Diesel - Industrial	1.0364
07	Chiapas	Sur-Sureste	Diesel - Industrial	1.0571
08	Chihuahua	Noreste	Diesel - Industrial	1.5156
09	Distrito Federal	Centro	Diesel - Industrial	0.6774
10	Durango	Noreste	Diesel - Industrial	1.5156
11	Guanajuato	Centro-Occidente	Diesel - Industrial	1.0364

AREA SOURCE PROJECTION FACTORS (OTHER)

State Code	State	Region	Surrogate	2014 Projection Factor
12	Guerrero	Sur-Sureste	Diesel - Industrial	1.0571
13	Hidalgo	Centro	Diesel - Industrial	0.6774
14	Jalisco	Centro-Occidente	Diesel - Industrial	1.0364
15	México	Centro	Diesel - Industrial	0.6774
16	Michoacán	Centro-Occidente	Diesel - Industrial	1.0364
17	Morelos	Centro	Diesel - Industrial	0.6774
18	Nayarit	Centro-Occidente	Diesel - Industrial	1.0364
19	Nuevo León	Noreste	Diesel - Industrial	1.5156
20	Oaxaca	Sur-Sureste	Diesel - Industrial	1.0571
21	Puebla	Centro	Diesel - Industrial	0.6774
22	Querétaro	Centro-Occidente	Diesel - Industrial	1.0364
23	Quintana Roo	Sur-Sureste	Diesel - Industrial	1.0571
24	San Luis Potosí	Centro-Occidente	Diesel - Industrial	1.0364
25	Sinaloa	Noroeste	Diesel - Industrial	1.5385
26	Sonora	Noroeste	Diesel - Industrial	1.5385
27	Tabasco	Sur-Sureste	Diesel - Industrial	1.0571
28	Tamaulipas	Noreste	Diesel - Industrial	1.5156
29	Tlaxcala	Centro	Diesel - Industrial	0.6774
30	Veracruz	Sur-Sureste	Diesel - Industrial	1.0571
31	Yucatán	Sur-Sureste	Diesel - Industrial	1.0571
32	Zacatecas	Centro-Occidente	Diesel - Industrial	1.0364
01	Aguascalientes	Centro-Occidente	Diesel - Transportation	1.0351
02	Baja California	Noroeste	Diesel - Transportation	1.0040
03	Baja California Sur	Noroeste	Diesel - Transportation	1.0040
04	Campeche	Sur-Sureste	Diesel - Transportation	0.9691
05	Coahuila	Noreste	Diesel - Transportation	0.9618
06	Colima	Centro-Occidente	Diesel - Transportation	1.0351
07	Chiapas	Sur-Sureste	Diesel - Transportation	0.9691
08	Chihuahua	Noreste	Diesel - Transportation	0.9618
09	Distrito Federal	Centro	Diesel - Transportation	1.0391
10	Durango	Noreste	Diesel - Transportation	0.9618
11	Guanajuato	Centro-Occidente	Diesel - Transportation	1.0351
12	Guerrero	Sur-Sureste	Diesel - Transportation	0.9691
13	Hidalgo	Centro	Diesel - Transportation	1.0391
14	Jalisco	Centro-Occidente	Diesel - Transportation	1.0351
15	México	Centro	Diesel - Transportation	1.0391
16	Michoacán	Centro-Occidente	Diesel - Transportation	1.0351
17	Morelos	Centro	Diesel - Transportation	1.0391
18	Nayarit	Centro-Occidente	Diesel - Transportation	1.0351
19	Nuevo León	Noreste	Diesel - Transportation	0.9618
20	Oaxaca	Sur-Sureste	Diesel - Transportation	0.9691
21	Puebla	Centro	Diesel - Transportation	1.0391
22	Querétaro	Centro-Occidente	Diesel - Transportation	1.0351
23	Quintana Roo	Sur-Sureste	Diesel - Transportation	0.9691
24	San Luis Potosí	Centro-Occidente	Diesel - Transportation	1.0351
25	Sinaloa	Noroeste	Diesel - Transportation	1.0040
26	Sonora	Noroeste	Diesel - Transportation	1.0040

AREA SOURCE PROJECTION FACTORS (OTHER)

State Code	State	Region	Surrogate	2014 Projection Factor
27	Tabasco	Sur-Sureste	Diesel - Transportation	0.9691
28	Tamaulipas	Noreste	Diesel - Transportation	0.9618
29	Tlaxcala	Centro	Diesel - Transportation	1.0391
30	Veracruz	Sur-Sureste	Diesel - Transportation	0.9691
31	Yucatán	Sur-Sureste	Diesel - Transportation	0.9691
32	Zacatecas	Centro-Occidente	Diesel - Transportation	1.0351
01	Aguascalientes	Centro-Occidente	Gasoline - Transportation	0.9762
02	Baja California	Noroeste	Gasoline - Transportation	0.9172
03	Baja California Sur	Noroeste	Gasoline - Transportation	0.9172
04	Campeche	Sur-Sureste	Gasoline - Transportation	1.0653
05	Coahuila	Noreste	Gasoline - Transportation	0.9251
06	Colima	Centro-Occidente	Gasoline - Transportation	0.9762
07	Chiapas	Sur-Sureste	Gasoline - Transportation	1.0653
08	Chihuahua	Noreste	Gasoline - Transportation	0.9251
09	Distrito Federal	Centro	Gasoline - Transportation	1.0018
10	Durango	Noreste	Gasoline - Transportation	0.9251
11	Guanajuato	Centro-Occidente	Gasoline - Transportation	0.9762
12	Guerrero	Sur-Sureste	Gasoline - Transportation	1.0653
13	Hidalgo	Centro	Gasoline - Transportation	1.0018
14	Jalisco	Centro-Occidente	Gasoline - Transportation	0.9762
15	México	Centro	Gasoline - Transportation	1.0018
16	Michoacán	Centro-Occidente	Gasoline - Transportation	0.9762
17	Morelos	Centro	Gasoline - Transportation	1.0018
18	Nayarit	Centro-Occidente	Gasoline - Transportation	0.9762
19	Nuevo León	Noreste	Gasoline - Transportation	0.9251
20	Oaxaca	Sur-Sureste	Gasoline - Transportation	1.0653
21	Puebla	Centro	Gasoline - Transportation	1.0018
22	Querétaro	Centro-Occidente	Gasoline - Transportation	0.9762
23	Quintana Roo	Sur-Sureste	Gasoline - Transportation	1.0653
24	San Luis Potosí	Centro-Occidente	Gasoline - Transportation	0.9762
25	Sinaloa	Noroeste	Gasoline - Transportation	0.9172
26	Sonora	Noroeste	Gasoline - Transportation	0.9172
27	Tabasco	Sur-Sureste	Gasoline - Transportation	1.0653
28	Tamaulipas	Noreste	Gasoline - Transportation	0.9251
29	Tlaxcala	Centro	Gasoline - Transportation	1.0018
30	Veracruz	Sur-Sureste	Gasoline - Transportation	1.0653
31	Yucatán	Sur-Sureste	Gasoline - Transportation	1.0653
32	Zacatecas	Centro-Occidente	Gasoline - Transportation	0.9762
01	Aguascalientes	Centro-Occidente	Jet Fuel - Aviation	0.9038
02	Baja California	Noroeste	Jet Fuel - Aviation	1.1587
03	Baja California Sur	Noroeste	Jet Fuel - Aviation	1.1587
04	Campeche	Sur-Sureste	Jet Fuel - Aviation	1.1832
05	Coahuila	Noreste	Jet Fuel - Aviation	0.8806
06	Colima	Centro-Occidente	Jet Fuel - Aviation	0.9038
07	Chiapas	Sur-Sureste	Jet Fuel - Aviation	1.1832
08	Chihuahua	Noreste	Jet Fuel - Aviation	0.8806
09	Distrito Federal	Centro	Jet Fuel - Aviation	0.9467

AREA SOURCE PROJECTION FACTORS (OTHER)

State Code	State	Region	Surrogate	2014 Projection Factor
10	Durango	Noreste	Jet Fuel - Aviation	0.8806
11	Guanajuato	Centro-Occidente	Jet Fuel - Aviation	0.9038
12	Guerrero	Sur-Sureste	Jet Fuel - Aviation	1.1832
13	Hidalgo	Centro	Jet Fuel - Aviation	0.9467
14	Jalisco	Centro-Occidente	Jet Fuel - Aviation	0.9038
15	México	Centro	Jet Fuel - Aviation	0.9467
16	Michoacán	Centro-Occidente	Jet Fuel - Aviation	0.9038
17	Morelos	Centro	Jet Fuel - Aviation	0.9467
18	Nayarit	Centro-Occidente	Jet Fuel - Aviation	0.9038
19	Nuevo León	Noreste	Jet Fuel - Aviation	0.8806
20	Oaxaca	Sur-Sureste	Jet Fuel - Aviation	1.1832
21	Puebla	Centro	Jet Fuel - Aviation	0.9467
22	Querétaro	Centro-Occidente	Jet Fuel - Aviation	0.9038
23	Quintana Roo	Sur-Sureste	Jet Fuel - Aviation	1.1832
24	San Luis Potosí	Centro-Occidente	Jet Fuel - Aviation	0.9038
25	Sinaloa	Noroeste	Jet Fuel - Aviation	1.1587
26	Sonora	Noroeste	Jet Fuel - Aviation	1.1587
27	Tabasco	Sur-Sureste	Jet Fuel - Aviation	1.1832
28	Tamaulipas	Noreste	Jet Fuel - Aviation	0.8806
29	Tlaxcala	Centro	Jet Fuel - Aviation	0.9467
30	Veracruz	Sur-Sureste	Jet Fuel - Aviation	1.1832
31	Yucatán	Sur-Sureste	Jet Fuel - Aviation	1.1832
32	Zacatecas	Centro-Occidente	Jet Fuel - Aviation	0.9038
01	Aguascalientes	Centro-Occidente	Unchanged	1.0000
02	Baja California	Noroeste	Unchanged	1.0000
03	Baja California Sur	Noroeste	Unchanged	1.0000
04	Campeche	Sur-Sureste	Unchanged	1.0000
05	Coahuila	Noreste	Unchanged	1.0000
06	Colima	Centro-Occidente	Unchanged	1.0000
07	Chiapas	Sur-Sureste	Unchanged	1.0000
08	Chihuahua	Noreste	Unchanged	1.0000
09	Distrito Federal	Centro	Unchanged	1.0000
10	Durango	Noreste	Unchanged	1.0000
11	Guanajuato	Centro-Occidente	Unchanged	1.0000
12	Guerrero	Sur-Sureste	Unchanged	1.0000
13	Hidalgo	Centro	Unchanged	1.0000
14	Jalisco	Centro-Occidente	Unchanged	1.0000
15	México	Centro	Unchanged	1.0000
16	Michoacán	Centro-Occidente	Unchanged	1.0000
17	Morelos	Centro	Unchanged	1.0000
18	Nayarit	Centro-Occidente	Unchanged	1.0000
19	Nuevo León	Noreste	Unchanged	1.0000
20	Oaxaca	Sur-Sureste	Unchanged	1.0000
21	Puebla	Centro	Unchanged	1.0000
22	Querétaro	Centro-Occidente	Unchanged	1.0000
23	Quintana Roo	Sur-Sureste	Unchanged	1.0000
24	San Luis Potosí	Centro-Occidente	Unchanged	1.0000

AREA SOURCE PROJECTION FACTORS (OTHER)

State Code	State	Region	Surrogate	2014 Projection Factor
25	Sinaloa	Noroeste	Unchanged	1.0000
26	Sonora	Noroeste	Unchanged	1.0000
27	Tabasco	Sur-Sureste	Unchanged	1.0000
28	Tamaulipas	Noreste	Unchanged	1.0000
29	Tlaxcala	Centro	Unchanged	1.0000
30	Veracruz	Sur-Sureste	Unchanged	1.0000
31	Yucatán	Sur-Sureste	Unchanged	1.0000
32	Zacatecas	Centro-Occidente	Unchanged	1.0000
01	Aguascalientes	Centro-Occidente	GDP	1.1273
02	Baja California	Noroeste	GDP	1.1273
03	Baja California Sur	Noroeste	GDP	1.1273
04	Campeche	Sur-Sureste	GDP	1.1273
05	Coahuila	Noreste	GDP	1.1273
06	Colima	Centro-Occidente	GDP	1.1273
07	Chiapas	Sur-Sureste	GDP	1.1273
08	Chihuahua	Noreste	GDP	1.1273
09	Distrito Federal	Centro	GDP	1.1273
10	Durango	Noreste	GDP	1.1273
11	Guanajuato	Centro-Occidente	GDP	1.1273
12	Guerrero	Sur-Sureste	GDP	1.1273
13	Hidalgo	Centro	GDP	1.1273
14	Jalisco	Centro-Occidente	GDP	1.1273
15	México	Centro	GDP	1.1273
16	Michoacán	Centro-Occidente	GDP	1.1273
17	Morelos	Centro	GDP	1.1273
18	Nayarit	Centro-Occidente	GDP	1.1273
19	Nuevo León	Noreste	GDP	1.1273
20	Oaxaca	Sur-Sureste	GDP	1.1273
21	Puebla	Centro	GDP	1.1273
22	Querétaro	Centro-Occidente	GDP	1.1273
23	Quintana Roo	Sur-Sureste	GDP	1.1273
24	San Luis Potosí	Centro-Occidente	GDP	1.1273
25	Sinaloa	Noroeste	GDP	1.1273
26	Sonora	Noroeste	GDP	1.1273
27	Tabasco	Sur-Sureste	GDP	1.1273
28	Tamaulipas	Noreste	GDP	1.1273
29	Tlaxcala	Centro	GDP	1.1273
30	Veracruz	Sur-Sureste	GDP	1.1273
31	Yucatán	Sur-Sureste	GDP	1.1273
32	Zacatecas	Centro-Occidente	GDP	1.1273
01	Aguascalientes	Centro-Occidente	Agricultural Acreage - Total	0.9068
02	Baja California	Noroeste	Agricultural Acreage - Total	0.9185
03	Baja California Sur	Noroeste	Agricultural Acreage - Total	1.2369
04	Campeche	Sur-Sureste	Agricultural Acreage - Total	1.2932
05	Coahuila	Noreste	Agricultural Acreage - Total	0.9582
06	Colima	Centro-Occidente	Agricultural Acreage - Total	0.9412
07	Chiapas	Sur-Sureste	Agricultural Acreage - Total	1.0187

AREA SOURCE PROJECTION FACTORS (OTHER)

State Code	State	Region	Surrogate	2014 Projection Factor
08	Chihuahua	Noreste	Agricultural Acreage - Total	1.0738
09	Distrito Federal	Centro	Agricultural Acreage - Total	0.7480
10	Durango	Noreste	Agricultural Acreage - Total	1.0407
11	Guanajuato	Centro-Occidente	Agricultural Acreage - Total	0.9247
12	Guerrero	Sur-Sureste	Agricultural Acreage - Total	1.0385
13	Hidalgo	Centro	Agricultural Acreage - Total	0.9956
14	Jalisco	Centro-Occidente	Agricultural Acreage - Total	1.0239
15	México	Centro	Agricultural Acreage - Total	0.9782
16	Michoacán	Centro-Occidente	Agricultural Acreage - Total	1.0823
17	Morelos	Centro	Agricultural Acreage - Total	1.0520
18	Nayarit	Centro-Occidente	Agricultural Acreage - Total	1.0424
19	Nuevo León	Noreste	Agricultural Acreage - Total	1.0432
20	Oaxaca	Sur-Sureste	Agricultural Acreage - Total	1.0282
21	Puebla	Centro	Agricultural Acreage - Total	0.9981
22	Querétaro	Centro-Occidente	Agricultural Acreage - Total	0.9544
23	Quintana Roo	Sur-Sureste	Agricultural Acreage - Total	1.1302
24	San Luis Potosí	Centro-Occidente	Agricultural Acreage - Total	1.1544
25	Sinaloa	Noroeste	Agricultural Acreage - Total	0.9187
26	Sonora	Noroeste	Agricultural Acreage - Total	1.0671
27	Tabasco	Sur-Sureste	Agricultural Acreage - Total	1.0381
28	Tamaulipas	Noreste	Agricultural Acreage - Total	1.0058
29	Tlaxcala	Centro	Agricultural Acreage - Total	1.0035
30	Veracruz	Sur-Sureste	Agricultural Acreage - Total	1.0269
31	Yucatán	Sur-Sureste	Agricultural Acreage - Total	0.9681
32	Zacatecas	Centro-Occidente	Agricultural Acreage - Total	0.9548
01	Aguascalientes	Centro-Occidente	Agricultural Acreage - Sugarcane	1.0000
02	Baja California	Noroeste	Agricultural Acreage - Sugarcane	1.0000
03	Baja California Sur	Noroeste	Agricultural Acreage - Sugarcane	1.0000
04	Campeche	Sur-Sureste	Agricultural Acreage - Sugarcane	1.5688
05	Coahuila	Noreste	Agricultural Acreage - Sugarcane	1.0000
06	Colima	Centro-Occidente	Agricultural Acreage - Sugarcane	1.8203
07	Chiapas	Sur-Sureste	Agricultural Acreage - Sugarcane	1.0666
08	Chihuahua	Noreste	Agricultural Acreage - Sugarcane	1.0000
09	Distrito Federal	Centro	Agricultural Acreage - Sugarcane	1.0000
10	Durango	Noreste	Agricultural Acreage - Sugarcane	1.0000
11	Guanajuato	Centro-Occidente	Agricultural Acreage - Sugarcane	1.0000
12	Guerrero	Sur-Sureste	Agricultural Acreage - Sugarcane	1.0000
13	Hidalgo	Centro	Agricultural Acreage - Sugarcane	1.0000
14	Jalisco	Centro-Occidente	Agricultural Acreage - Sugarcane	1.1421
15	México	Centro	Agricultural Acreage - Sugarcane	1.0000
16	Michoacán	Centro-Occidente	Agricultural Acreage - Sugarcane	0.9849
17	Morelos	Centro	Agricultural Acreage - Sugarcane	1.1993
18	Nayarit	Centro-Occidente	Agricultural Acreage - Sugarcane	0.9565
19	Nuevo León	Noreste	Agricultural Acreage - Sugarcane	1.0000
20	Oaxaca	Sur-Sureste	Agricultural Acreage - Sugarcane	1.2682
21	Puebla	Centro	Agricultural Acreage - Sugarcane	1.1593
22	Querétaro	Centro-Occidente	Agricultural Acreage - Sugarcane	1.0000

AREA SOURCE PROJECTION FACTORS (OTHER)

State Code	State	Region	Surrogate	2014 Projection Factor
23	Quintana Roo	Sur-Sureste	Agricultural Acreage - Sugarcane	1.3373
24	San Luis Potosí	Centro-Occidente	Agricultural Acreage - Sugarcane	1.3897
25	Sinaloa	Noroeste	Agricultural Acreage - Sugarcane	0.3840
26	Sonora	Noroeste	Agricultural Acreage - Sugarcane	1.0000
27	Tabasco	Sur-Sureste	Agricultural Acreage - Sugarcane	1.1983
28	Tamaulipas	Noreste	Agricultural Acreage - Sugarcane	1.0894
29	Tlaxcala	Centro	Agricultural Acreage - Sugarcane	1.0000
30	Veracruz	Sur-Sureste	Agricultural Acreage - Sugarcane	1.0706
31	Yucatán	Sur-Sureste	Agricultural Acreage - Sugarcane	1.0000
32	Zacatecas	Centro-Occidente	Agricultural Acreage - Sugarcane	1.0000

APPENDIX E – NONROAD MOBILE SOURCE SURROGATE ASSIGNMENTS

NONROAD MOBILE SOURCE SURROGATE ASSIGNMENTS

SCC	SCC Description	Projection Profile
2270002000	Off-highway Diesel - Construction and Mining Equipment	Diesel - Transportation
2270005000	Off-highway Diesel - Agricultural Equipment	Agricultural Acreage - Total
2270008010	Off-highway Diesel - Airport Ground Support Equipment	Jet Fuel - Aviation
2275000000	Aircraft	Jet Fuel - Aviation
2285000000	Locomotives	Diesel - Transportation

APPENDIX F – NONROAD MOBILE SOURCE PROJECTION FACTORS

State Code	State	Region	Surrogate	2014 Projection Factor
01	Aguascalientes	Centro-Occidente	Diesel - Transportation	1.0351
02	Baja California	Noroeste	Diesel - Transportation	1.0040
03	Baja California Sur	Noroeste	Diesel - Transportation	1.0040
04	Campeche	Sur-Sureste	Diesel - Transportation	0.9691
05	Coahuila	Noreste	Diesel - Transportation	0.9618
06	Colima	Centro-Occidente	Diesel - Transportation	1.0351
07	Chiapas	Sur-Sureste	Diesel - Transportation	0.9691
08	Chihuahua	Noreste	Diesel - Transportation	0.9618
09	Distrito Federal	Centro	Diesel - Transportation	1.0391
10	Durango	Noreste	Diesel - Transportation	0.9618
11	Guanajuato	Centro-Occidente	Diesel - Transportation	1.0351
12	Guerrero	Sur-Sureste	Diesel - Transportation	0.9691
13	Hidalgo	Centro	Diesel - Transportation	1.0391
14	Jalisco	Centro-Occidente	Diesel - Transportation	1.0351
15	México	Centro	Diesel - Transportation	1.0391
16	Michoacán	Centro-Occidente	Diesel - Transportation	1.0351
17	Morelos	Centro	Diesel - Transportation	1.0391
18	Nayarit	Centro-Occidente	Diesel - Transportation	1.0351
19	Nuevo León	Noreste	Diesel - Transportation	0.9618
20	Oaxaca	Sur-Sureste	Diesel - Transportation	0.9691
21	Puebla	Centro	Diesel - Transportation	1.0391
22	Querétaro	Centro-Occidente	Diesel - Transportation	1.0351
23	Quintana Roo	Sur-Sureste	Diesel - Transportation	0.9691
24	San Luis Potosí	Centro-Occidente	Diesel - Transportation	1.0351
25	Sinaloa	Noroeste	Diesel - Transportation	1.0040
26	Sonora	Noroeste	Diesel - Transportation	1.0040
27	Tabasco	Sur-Sureste	Diesel - Transportation	0.9691
28	Tamaulipas	Noreste	Diesel - Transportation	0.9618
29	Tlaxcala	Centro	Diesel - Transportation	1.0391
30	Veracruz	Sur-Sureste	Diesel - Transportation	0.9691
31	Yucatán	Sur-Sureste	Diesel - Transportation	0.9691
32	Zacatecas	Centro-Occidente	Diesel - Transportation	1.0351
01	Aguascalientes	Centro-Occidente	Jet Fuel - Aviation	0.9038
02	Baja California	Noroeste	Jet Fuel - Aviation	1.1587
03	Baja California Sur	Noroeste	Jet Fuel - Aviation	1.1587
04	Campeche	Sur-Sureste	Jet Fuel - Aviation	1.1832
05	Coahuila	Noreste	Jet Fuel - Aviation	0.8806
06	Colima	Centro-Occidente	Jet Fuel - Aviation	0.9038
07	Chiapas	Sur-Sureste	Jet Fuel - Aviation	1.1832
08	Chihuahua	Noreste	Jet Fuel - Aviation	0.8806
09	Distrito Federal	Centro	Jet Fuel - Aviation	0.9467
10	Durango	Noreste	Jet Fuel - Aviation	0.8806
11	Guanajuato	Centro-Occidente	Jet Fuel - Aviation	0.9038
12	Guerrero	Sur-Sureste	Jet Fuel - Aviation	1.1832
13	Hidalgo	Centro	Jet Fuel - Aviation	0.9467
14	Jalisco	Centro-Occidente	Jet Fuel - Aviation	0.9038
15	México	Centro	Jet Fuel - Aviation	0.9467
16	Michoacán	Centro-Occidente	Jet Fuel - Aviation	0.9038
17	Morelos	Centro	Jet Fuel - Aviation	0.9467

State Code	State	Region	Surrogate	2014 Projection Factor
18	Nayarit	Centro-Occidente	Jet Fuel - Aviation	0.9038
19	Nuevo León	Noreste	Jet Fuel - Aviation	0.8806
20	Oaxaca	Sur-Sureste	Jet Fuel - Aviation	1.1832
21	Puebla	Centro	Jet Fuel - Aviation	0.9467
22	Querétaro	Centro-Occidente	Jet Fuel - Aviation	0.9038
23	Quintana Roo	Sur-Sureste	Jet Fuel - Aviation	1.1832
24	San Luis Potosí	Centro-Occidente	Jet Fuel - Aviation	0.9038
25	Sinaloa	Noroeste	Jet Fuel - Aviation	1.1587
26	Sonora	Noroeste	Jet Fuel - Aviation	1.1587
27	Tabasco	Sur-Sureste	Jet Fuel - Aviation	1.1832
28	Tamaulipas	Noreste	Jet Fuel - Aviation	0.8806
29	Tlaxcala	Centro	Jet Fuel - Aviation	0.9467
30	Veracruz	Sur-Sureste	Jet Fuel - Aviation	1.1832
31	Yucatán	Sur-Sureste	Jet Fuel - Aviation	1.1832
32	Zacatecas	Centro-Occidente	Jet Fuel - Aviation	0.9038
01	Aguascalientes	Centro-Occidente	Agricultural Acreage - Total	0.9068
02	Baja California	Noroeste	Agricultural Acreage - Total	0.9185
03	Baja California Sur	Noroeste	Agricultural Acreage - Total	1.2369
04	Campeche	Sur-Sureste	Agricultural Acreage - Total	1.2932
05	Coahuila	Noreste	Agricultural Acreage - Total	0.9582
06	Colima	Centro-Occidente	Agricultural Acreage - Total	0.9412
07	Chiapas	Sur-Sureste	Agricultural Acreage - Total	1.0187
08	Chihuahua	Noreste	Agricultural Acreage - Total	1.0738
09	Distrito Federal	Centro	Agricultural Acreage - Total	0.7480
10	Durango	Noreste	Agricultural Acreage - Total	1.0407
11	Guanajuato	Centro-Occidente	Agricultural Acreage - Total	0.9247
12	Guerrero	Sur-Sureste	Agricultural Acreage - Total	1.0385
13	Hidalgo	Centro	Agricultural Acreage - Total	0.9956
14	Jalisco	Centro-Occidente	Agricultural Acreage - Total	1.0239
15	México	Centro	Agricultural Acreage - Total	0.9782
16	Michoacán	Centro-Occidente	Agricultural Acreage - Total	1.0823
17	Morelos	Centro	Agricultural Acreage - Total	1.0520
18	Nayarit	Centro-Occidente	Agricultural Acreage - Total	1.0424
19	Nuevo León	Noreste	Agricultural Acreage - Total	1.0432
20	Oaxaca	Sur-Sureste	Agricultural Acreage - Total	1.0282
21	Puebla	Centro	Agricultural Acreage - Total	0.9981
22	Querétaro	Centro-Occidente	Agricultural Acreage - Total	0.9544
23	Quintana Roo	Sur-Sureste	Agricultural Acreage - Total	1.1302
24	San Luis Potosí	Centro-Occidente	Agricultural Acreage - Total	1.1544
25	Sinaloa	Noroeste	Agricultural Acreage - Total	0.9187
26	Sonora	Noroeste	Agricultural Acreage - Total	1.0671
27	Tabasco	Sur-Sureste	Agricultural Acreage - Total	1.0381
28	Tamaulipas	Noreste	Agricultural Acreage - Total	1.0058
29	Tlaxcala	Centro	Agricultural Acreage - Total	1.0035
30	Veracruz	Sur-Sureste	Agricultural Acreage - Total	1.0269
31	Yucatán	Sur-Sureste	Agricultural Acreage - Total	0.9681
32	Zacatecas	Centro-Occidente	Agricultural Acreage - Total	0.9548