Appendix F

Development of the 2008 Baseline Emission Inventory

INTRODUCTION

The air quality impact assessment for the Continental Divide-Creston (CD-C) EIS is being performed using the photochemical grid model (PGM) CAMx (Comprehensive Air quality Model with Extensions; ENVIRON, 2009; www.camx.com). The basic modeling strategy used in any EIS that employs a PGM such as CAMx is to first simulate a current year base case using a comprehensive regional emission inventory of actual emissions from all sources (including motor vehicles, power plants, oil and gas exploration and production sources, biogenic sources, etc.). It is preferable to run the model for more than one year so that as many different meteorological regimes as possible are simulated. Pollutants emitted from Project sources may only influence a particular sensitive receptor under certain conditions (wind direction, atmospheric stability) and a conservative estimate of AQ and AQRV impacts requires that those conditions be simulated. While it is not possible to ensure that all possible meteorological conditions that might lead to transport of pollutants from Project sources to sensitive receptors are simulated, modeling two full years increases the likelihood that the relevant conditions will occur.

The base case simulation is evaluated with respect to ambient air quality measurements. If the base case simulation reproduces concentrations of observed species with reasonable fidelity, then the model can be used in the future year impact assessment. The future year modeling involves development of a future year Project emission inventory as well as a future year regional emission inventory. In the future year regional emission inventory, the emissions from human activities are projected from the base year to the future year and changes such as population growth and planned emissions controls (such as controls on motor vehicle emissions) are accounted for. Emissions that are not controllable, such as biogenics and wildfire emissions, are held fixed. The Project emissions are included in the future year emission inventory. The model is run using the future year regional emission inventory with the rest of the model (meteorological fields, boundary conditions, model settings, etc.) in the same configuration as in the base case. If multiple years were simulated in the base case, then the meteorological conditions for those same years are used together with the future year emissions scenario in the future year modeling. Project AQ and AQRV impacts are determined from the future year simulations.

For the CD-C EIS, a base case simulation has been completed. CAMx was applied for the calendar years 2005 and 2006 using a nested-grid modeling domain with horizontal spatial resolution 36/12/4 km (Figure F1). The 2005 and 2006 base case model runs used actual emissions of NO_x, SO_2, PM_{10}, $PM_{2.5}$, VOC and CO from all sources for those years and included a comprehensive inventory of oil and gas (O&G) emissions sources within Southwest Wyoming developed by Carter Lake and BP as well as the WRAP Phase III O&G emissions for the Denver-Julesburg, Piceance, and Uinta Basins. The model used 2005-6 MM5 meteorology. The CAMx gas phase and particle phase model estimates were compared against observed ambient values for those two years and a model performance evaluation was conducted (Appendix A). The base case modeling was approved by the CD-C stakeholders. The next step in the CD-C analysis is to apply CAMx for a baseline emissions scenario and then for future year scenarios for each of the Project Alternatives individually to estimate its AQ and AQRV impacts. The future years to be modeled for each Alternative are to be determined after analysis of the proposed CD-C

Project Alternative emissions; it may be necessary to run two future years corresponding to the maximum VOC and maximum NOx emissions year for each CD-C Project Alternative.

In early 2010, the CD-C stakeholders determined that the baseline year to be used in performing future year modeling and impact analyses would be 2008. Originally, 2006 was to have been the baseline year, but extensive development of oil and gas resources in southwest Wyoming occurred during the 2006-2008 period and emissions of criteria pollutants and ozone precursors from this source category were significantly larger in 2008 than in 2006. The economic slowdown in 2008-9 led to a reduction in the pace of development such that 2009 emissions are expected to be smaller than 2008 emissions. 2008 is a National Emission Inventory Year, in which states submit emission inventories to the EPA. Because emission inventories for 2008 for the state of Wyoming are now available, and 2008 is the year of peak emissions from the energy sector in Wyoming as well as the year of peak measured southwest Wyoming wintertime ozone concentrations, the CD-C stakeholders selected 2008 as the baseline year for the impact analysis modeling. Another important factor is that more ambient monitoring was available in 2008 than in 2006. Carter Lake Consulting and ENVIRON have developed a regional emission inventory for the year 2008 for use in CAMx baseline modeling, and the 2008 inventory is described in this Appendix.

ACTUAL VERSUS TYPICAL EMISSION INVENTORIES

The 2005-6 base case inventory uses actual measured electric generating unit (EGU) emissions and monthly drill rig emissions because the base case model is evaluated against observations to determine whether the model provides a realistic simulation of the atmospheric processes related to ozone and PM formation, transport, and removal. The purpose of the 2008 baseline model, on the other hand, is to serve as the base year from which future year projections are made and against which future year project alternative and cumulative emissions impacts will be evaluated. The 2008 inventory, therefore, uses typical rather than actual emissions for some source categories in order to be consistent with the future year emission inventories. For example, baseline EGU emissions represent typical conditions (no shutdowns for maintenance, for example) in order to be consistent with the future year emissions, which also represent typical conditions and would have no maintenance shutdowns. The base case emission inventory would have a period of zero emissions during a maintenance shutdown. If base case EGU emissions were used rather than typical emissions, a period when a plant was shut down for maintenance would show up as an impact due to an apparent emissions increase in the future year, which would use a typical inventory and would not contain the period of zero emissions from the shutdown. The two source categories for which 2008 typical emissions will be developed are EGUs and drilling rigs. The method for calculating emissions from these source categories is described below.

2008 CAMX BASELINE MODEL CONFIGURATION

The 2008 baseline run will consist of two annual CAMx runs. Both annual simulations will be performed with the 2008 emission inventory; one year will be run with 2005 meteorology and the other year will be run with 2006 meteorology. The 2005-6 meteorological data to be used in the 2008 baseline modeling are the same data used in the 2005-6 base case CAMx modeling. All other CAMx inputs (e.g. photolysis rates, land use files, etc.) and the CAMx model

configuration (dry deposition scheme, PiG model, etc.) are the same as those used in the 2005-6 base case modeling.

2008 EMISSION INVENTORY DEVELOPMENT METHOD

The overall strategy for developing the 2008 inventory was to update the 2006 inventory to 2008 for anthropogenic emissions. For the 2008 baseline simulations using 2005 and 2006 meteorology, the corresponding 2005 and 2006 emission inventories for wildfires, wind-blown dust, biogenics, and ammonia were used.

The Sparse Matrix Operating Kernel Emissions (SMOKE; Coats, 1996) emissions modeling system (available from www.cmascenter.org) was used to generate the hourly, gridded, speciated model-ready 2008 emissions inputs for CAMx. The most recent version of SMOKE is version 2.6, which was used in the processing of the 2008 baseline inventory. SMOKE was applied for the area, off-road mobile, onroad mobile source categories and for point sources. Non-O&G area sources and off-road mobile were linearly interpolated from the latest WRAP 2002 and WRAP 2018 emission inventories. The most recent WRAP emission databases currently available are the "2002 Plan D" and "2018 PRP18b" emissions databases. The 2018 PRP18b database recently developed for Preliminary Reasonable Progress was built from the WRAP 2002 inventory by projecting the impacts of activity growth and emission controls. The methodology for projecting emissions is described in the WRAP PRP Technical Memorandum (Fields and Wolf, 2007), and information on the WRAP 2002 emission inventory can be found in Tonnesen et al. (2006). SMOKE ancillary files from 2005-6 emissions modeling were used for speciation, spatial & temporal allocation.

The MOBILE6 module of SMOKE was used to develop the on-road mobile source emissions. The MOBILE6 parameters, vehicle fleet descriptions, and vehicle miles of travel (VMT) estimates were combined with gridded, episode-specific temperature data to obtain the gridded, temporally allocated emission estimates for weekday, Saturday, and Sunday. 2008 Vehicle Miles Travelled (VMT) were developed by linear interpolation of 2006 VMT developed for the 2006 base case modeling and VISTAS 2009 VMT. VISTA 2009 MOBILE6 inputs were used to specify average speed, fuel parameters, and control programs. 2005 and 2006 MM5 meteorological data were then used with the SMOKE-MOBILE6 processor to generate the gridded speciated day-of-week emissions required as input to CAMx. For each month, emissions were generated for a representative weekday, Saturday and Sunday in 2008. Holidays were treated as Sundays.

ENVIRON and Carter Lake have developed a detailed inventory of point source emissions for the 2008 year for Wyoming based on point source data for major (i.e. Title V) and minor point sources supplied by the WDEQ. 2008 is a national emissions inventory reporting year and emission inventories for Wyoming major and minor point sources have recently been made available by the State of Wyoming. Note that these are draft emission inventories that were under review by the WDEQ at the time of the emissions processing. These inventories were quality-assured by ENVIRON and Carter Lake and prepared for processing through SMOKE to create CAMx-ready emissions inputs. For several sources, modifications to the emissions were made. Emissions for the Black Thunder and Cordero Rojo Mines were double counted and this error was corrected. A haul truck at the Cordero Rojo Mine had NOx emissions of 51,000 tpy.

ENVIRON used the inventory data describing the haul truck as inputs to a run of EPA's NONROAD model in order to estimate emissions for this source. The NONROAD run produced NOx emissions of ~2,000 tpy, which is consistent with the NOx emissions in the 2005-6 inventory for this source; the emissions were adjusted to reflect the results of the NONROAD run. Another outlier was high NOx (~46,000 tpy) emissions from the Pioneer Asphalt plant. These emissions were from a heater having 800,000 MMBTU/hr capacity. Carter Lake investigated this facility and found that it holds a permit waiver and has only one 250 hp/ 0.636 MMBTU/hr heater on-site. Emissions were recalculated using the actual heater capacity and corrected to 0.04 tpy NOx emissions. VOC emissions for the Bairoil Plant were listed as 162,949 tpy (~93% of Wyoming total) VOC emissions. This appears to be the result of expressing in tpy emissions that were actually reported in lbs/hr. When the conversion to tpy was made, this source had VOC emissions of 81.5 tpy, which is consistent with the 2005-6 inventory. Emissions in tpy for the Evans Construction Yard were also recalculated based on their lbs/hr values, as NOx emissions for this source were 17,000 tpy and a units error was suspected. The revised NOx emissions are a more reasonable 60 tpy.

Where SCC information was missing from the inventory, ENVIRON assigned an SCC based on the SCC assigned to the source in the 2005-6 base case inventory or on the description of the source provided in the inventory. Sources missing location information were identified by comparison with the 2005-6 inventory or through an internet search. Locations were assigned to all sources except portable nitrogen vaporizers; these are very small portable source emissions for which no information on where and when they operated was provided in the inventory. These sources were removed from the inventory, but this should not have any measurable effect on the CD-C analysis, given the small size (for all vaporizers combined, ~10 tpy NOx, ~1 tpy VOC) and distributed nature of these sources. For other states within the 12 km domain, non-EGU point emissions were generated by linear interpolation of 2006 and WRAP 2018 (PRP18b) point source emission inventories.

During the initial quality assurance of the 2008 emission inventory, ENVIRON noted sharp declines in non-EGU point source emissions in 2008 relative to 2005 and 2006. Further inspection of the inventory showed that several major point sources that were operational in 2005 were not present in the 2008 inventory (e.g. Kemmerer Mine). ENVIRON prepared a list of these sources and the WDEQ reviewed these sources to determine whether they were operational in 2008. After careful source-by-source review, WDEQ provided a list of sources missing from the 2008 inventory that were still in operation in 2008. For these sources, the WDEQ recommended including them in the 2008 EI and keeping their emissions constant at 2006 levels.

For Wyoming and other states, Continuous Emissions Monitor (CEM) data from the U.S. EPA's Clean Air Markets Division (CAMD) were used to supply actual 2008 hourly emissions for electric generating utilities (EGUs). The hourly emissions were then used to form quarterly averages for each of the 24 hours in a day. These quarterly averages constitute typical emissions for a particular EGU; they are averages that retain information about the typical temporal profile of emissions for that facility during a given season. Use of typical EGU emissions is one important difference between the base case and baseline inventories.

APPENDIX F – DEVELOPMENT OF THE 2008 BASELINE EMISSION INVENTORY

SUMMARY OF PROCESSING OF OIL AND GAS EMISSION INVENTORY

Carter Lake and BP have prepared a detailed emission inventory for oil and gas sources in the 5-county area of southwest Wyoming that is similar in nature and scope to the 2005-6 southwest Wyoming oil and gas inventory used in the base case modeling. The 2008 5-county southwest Wyoming inventory was developed using the oil and gas emissions information available from the state of Wyoming and from operator-provided emissions assumptions. In order to be consistent with future year emission inventories, drill rig emissions were annualized rather than reported by month, as was done for the 2005-6 base case emission inventory. For oil and gas sources in Wyoming outside the 5-county area of southwest Wyoming, emissions were developed from the Wyoming 2008 point source inventory supplied by the Wyoming Department of Environmental Quality Air Quality Division. Well VOC emissions outside the 5-County area were developed by Carter Lake. Emissions for oil and gas sources within the 12 km domain but outside Wyoming were estimated through interpolation of the 2006 and 2010 (Denver-Julesberg) and 2012 (Piceance, Uinta) WRAP Phase III inventories in the basins covered by this inventory and through interpolation of the 2005 and 2018 WRAP Phase II inventories elsewhere.

In this summary, we focus on the oil and gas emission inventory used in the 4 km domain, which contains the sources and receptors of interest in the CD-C impact analysis. We give a brief description of the emission inventories used and then discuss the spatial and temporal allocation of those emissions. A more detailed discussion of the inventories and their processing may be found in Section 4 of the CD-C Modeling Protocol (Carter Lake and ENVIRON, 2010).

Overview of Emission Inventories Used in 4 km Domain

Several different oil and gas emission inventories are used in the 4 km domain. As discussed above, Carter Lake and BP have compiled a detailed and comprehensive emission inventory of O&G sources in Southwest Wyoming for 2008. Based on field data and well data from the Wyoming Oil and Gas Conservation Commission, this inventory includes emissions from drill rigs, well venting, flashing, fugitives, construction and production truck traffic, and well site production equipment such as dehydrators, heaters, and pumps. The Carter Lake/BP inventory covers five Southwest Wyoming counties that have extensive oil and gas exploration and production. These counties are Carbon, Lincoln, Sublette, Sweetwater, and Uinta. The development of the Carter Lake/BP Southwest Wyoming oil and gas emission inventory has been documented in Section 4 of the CD-C Modeling Protocol (Carter Lake and ENVIRON, 2010).

The WRAP Phase III oil and gas inventory (Bar-Ilan et al. 2008; Bar-Ilan et al., 2009) was used for the Denver-Julesberg, Uinta, and Piceance Basins. This inventory is used for regions of Colorado and Utah that fall within the 4 km domain. The WRAP Phase III work expands on the work done under WRAP Phase II, and addresses the limitations of its VOC inventory. The Phase III inventory is being assembled by combining data on permitted sources from states' permit databases, and data on unpermitted sources obtained from industry surveys. These surveys request information on typical equipment types, counts, configurations, annual activity levels, controls, and emissions factors. The IHS database is used to determine oil and gas production statistics, which are used to combine these two groups of source categories to generate a complete basin-wide emissions inventory. To develop 2008 emissions, a linear interpolation

was performed between 2006 and 2012 for the Uinta and Piceance Basins and between 2006 and 2010 for the Denver-Julesberg Basin. The WRAP Phase III emission inventory for the Wind River Basin was finished just as the CD-C 2008 emission inventory was being completed and so is not included in this 2008 inventory.

Oil and gas area source emissions from the remaining areas were obtained from the WRAP Phase II emission inventory (Bar-Ilan et al., 2007). The WRAP Phase II O&G emissions inventory, which is being used in the Regional Haze SIP modeling, is available for all basins in the western U.S. Therefore, the WRAP Phase II inventory was used for all regions within the CD-C modeling domain that are not covered by the Carter Lake/BP or WRAP Phase III (discussed below) inventories. To obtain 2008 emissions, an interpolation was performed between the 2005 and 2018 WRAP Phase II inventories. Because the emphasis of the WRAP Phase II O&G emissions inventory development was on visibility impairment precursors, the inventory was focused on SOx, NOx and PM emissions and is known to underestimate VOC emissions.

Spatial Allocation of Oil and Gas Emissions within the 4 km Domain

Carter Lake/BP Southwest Wyoming Inventory

Spatial surrogates were not required to process the Carter Lake/BP Southwest Wyoming emissions since the wells were modeled as point sources and the latitude and longitudes of the wells were compiled as part of the inventory development. Emissions from drill rigs, completion, and traffic as well as production emissions were all modeled as point sources sited at the well location.

Wrap Phase III Inventory

The allocation of the WRAP Phase III emissions in the 2008 inventory followed the same procedure that was used for the 2005-6 base case emission inventories. The WRAP Phase III O&G inventory for the Denver-Julesburg, Piceance, and Uinta Basins was assembled for both point (permitted) and area (unpermitted) source categories. All the permitted sources were modeled as point sources and unpermitted sources were modeled as area sources. The WRAP Phase III area source emissions were calculated on a basin-wide basis by SCC (Source Classification Code). The next step in the emission inventory development process was to distribute the emissions among the model grid cells within each basin using a spatial surrogate that serves as a proxy for the location of the actual emitting processes. Area sources are often estimated at the county level, and are then allocated to the grid cells within each county based on such spatial surrogates as population or economic activity. Through this process, the spatial resolution of the emissions is matched to the CAMx grid(s). The EPA default spatial allocation surrogates were not detailed enough for the area source oil and gas production emissions, and were based on data from the year 2000. ENVIRON therefore developed a new set of spatial allocation surrogates for 2005-6 base case modeling using the locations of wells within these basins to allocate the county-level area source emissions to the appropriate oil and gas fields.

The updated spatial allocation surrogates were developed using the 2006 IHS database for the WRAP Phase III basins. The oil and gas production surrogates were based on production data at known well locations, while the drilling surrogate was based solely on the number and location of wells drilled. For each individual well, the oil, gas and water production values were divided by the total oil, gas and water production values corresponding to the county in which the well

was located. This division resulted in determination of the fraction of a county's total production taking place at each well. In the case of the drilling surrogate, the number of drilling events, rather than the production values, was used. For each grid cell (intersecting a county) and county combination, well production fraction were summed for wells inside the given grid cell to obtain the surrogate value. A detailed description of the spatial surrogate development is given in Appendix C of the CD-C Modeling Protocol.

WRAP Phase II Inventory

WRAP Phase II emissions were allocated using spatial surrogates developed from 2002 well and spud data obtained from the Wyoming Oil and Gas Conservation Commission (WOGCC), as was done for the 2005-6 base case inventory.

O&G Point Source Emissions

All Wyoming oil and gas sources were modeled as point sources; this includes compressor engines, production sites, drill rigs, and gas plant and compressor station sources. In Colorado (i.e. Piceance & DJ Basins) - small compressor engines, compressor station and gas plants were included in the point source inventory (and therefore modeled as point sources) because of Colorado's requirement that sources with NOx emissions greater than 2 tpy report emissions to the state. In Utah (Uinta Basin), compressor station and gas plants were included in the point inventory. The rest were included in the area inventory and were modeled as area sources.

Temporal Allocation of Oil and Gas Emissions within the 4 km Domain

Carter Lake/BP Southwest Wyoming Inventory

The Carter Lake/BP inventory provided drill rig and construction traffic in Southwest Wyoming as annualized emissions, unlike the 2005-6 base case inventories, which used actual monthly emissions. Heater emissions were provided and processed as actual monthly emissions. It was expected that monthly distribution of heater emissions will remain the same for the future years. Heater emissions were allocated across all hours in the month during which the activity took place according to the default SMOKE temporal profile for oil and gas sources. This profile assumes that the source operates constantly throughout a given time period. Construction traffic emissions were allocated in time using the SMOKE default profile for Heavy Duty Diesel Vehicles (HDDV), which has both weekly and diurnal variation.

Production traffic emissions were temporally allocated using the SMOKE default profile for Heavy Duty Diesel Vehicles. No temporal variation was applied to the rest of the O&G sources, i.e. emissions from well production sources were assumed to be equally distributed across every hour within the calendar year according to the default SMOKE temporal profile for oil and gas sources.

WRAP Phase II and Phase III Inventories

Emissions from the WRAP Phase II and Phase III inventories are given in terms of tons of pollutant per year. No temporal variation was applied to these O&G sources, i.e. emissions from all sources were assumed to be equally distributed across every hour within the calendar year.

Summary of Oil and Gas Emission Inventory QA Procedures

Once the oil and gas emission inventory processing for the 4 km grid was completed, several quality assurance (QA) steps were taken to determine whether the emissions had been properly processed through SMOKE. First, for each source category and county, the SMOKE inputs were compared to SMOKE outputs. The SMOKE inputs consist of the data files that contain the original inventory data. For example, the SMOKE inputs for the drill rig emission inventory are comprised of data for individual rigs provided by Carter Lake/BP. The SMOKE outputs include diagnostic files provided by SMOKE after processing for QA purposes. These diagnostic ("Carter Lake") files can then be compared with the input data spreadsheets to determine whether the emission amounts for each species match and the data have been processed correctly. Once the SMOKE output netCDF files containing the gridded, pre-merged, model-ready emissions had been prepared, these files were checked by applying QA utilities that add up the emissions through the depth of the model by county for each file. These emissions totals were then compared with the emissions from the original SMOKE input files to ensure that the speciation and temporal and spatial allocation of emissions had been performed correctly and that no emissions had been lost or gained during the emissions processing.

Next, emissions tables were prepared that summarize emissions by source category and county for within the 4 km grid and by source category and state within the 12 km grid. Additional 4 km emissions summaries are provided in Table F4 of this Memorandum. In addition to the tables, emissions tile plots were prepared for the 4 km domain for each source category and pollutant. Examples are shown in Figures F11-F13. These plots were used to check that the amount of emissions and their spatial allocation were correct. For example, plots of 2008 mobile source NOx within the 4 km domain were prepared to ensure that the location of the emissions matched the locations where mobile source emissions occurred in 2008.

ADDITIONAL DOCUMENTATION OF SMOKE MODEL INPUTS

There are two types of model-ready emissions inputs files required to run CAMx:

(1) 2-D emissions Fortran binary file with all sources other than point sources
(2) Elevated-point-source Fortran binary file.

These Fortran binary files cannot be opened using a text editor. The model-ready binary files are generated using the SMOKE emissions processor. Emission inventories are generally text or spreadsheet files (The Carter Lake/BP oil and gas emissions inventory provided to WDEQ AQD is an example) that are then converted to text files in fixed format known as IDA format. The IDA files are input to SMOKE. Along with diagnostic Carter Lake files (which can be viewed in a text editor), SMOKE produces two-dimensional surface layer emissions files (area + off-road + on-road + off-shore area + O&G area + biogenic) in I/O API NetCDF format. NetCDF is a self-describing data file format. These surface layer emissions files for the above source categories were then merged together in NetCDF format using a script and then finally converted into UAM-based FORTRAN binary format that is readable by CAMx.

To obtain the elevated-point source Fortran binary file, an ASCII elevated-point-source file was created using the SMOKE program, and was then converted to the required binary format using a standard CAMx preprocessing tool.

The table below provides list of individual emissions components that were merged together to create 2008 12 km model-ready emissions.

Table F1. Pre-merged emissions files for the 2008 12-km domain.

Major Category	Sub Category	File Name
Area	Generic Area excluding dust&fire	argts_l.{date}.1.12k.cdc08.cmaq.cb05p25.ncf
	Road dust	rdgts_s.{date}.1.12k.cdc08.cmaq.cb05p25.ncf
	Fugitive dust	fdgts_s.{date}.1.12k.cdc08.cmaq.cb05p25.ncf
	Wind-blown dust	wb_dust_ii_cmaq_cdc12k_{date}_agadj_tf_b.ncf
	Non-WRAP monthly ammonia	nh3mgts_l.{date}.1.cdc12k.bpcdc06.cmaq.cb05p25.ncf
	WRAP ammonia (fertilizer, domestics, wild animals, livestocks)	nh3all.bp12k.{date}.CMAQ.ncf
Off-road	Annual nonroad	nrygts_l.{date}.1.12k.cdc08.cmaq.cb05p25.ncf
	Monthly nonroad	nrmgts_l.{date}.1.12k.cdc08.cmaq.cb05p25.ncf
Onroad Mobile	US onroad mobile with 2005 meteorological data	mgts_l.{date}.1.cdc12km.cdc08_08.ncf
	US onroad mobile with 2006 meteorological data	mgts_l.{date}.1.cdc12km.cdc08_08.ncf
Point	EGUs	elevegu_l.{date}.1.12k.cdc08.txt
	Non-EGUs	elevnegu_l.{date}.1.12k.cdc08.txt
	Trona	elevtrn_l.{date}.1.12k.cdc08.txt
O&G	Point - Wyoming	elevpt_comp_l.{date}.1.CDC12km.Wyoming2008.txt
		elevpt_prod_l.{date}.1.CDC12km.Wyoming2008.txt
		elevpt_spud_l.{date}.1.CDC12km.Wyoming2008.txt
	WRAP Phase III area	ar_compgts_l.{date}.1.CDC12km.phaseIII2008.cmaq.cb05p25.ncf
		ar_prodgts_l.{date}.1.CDC12km.phaseIII2008.cmaq.cb05p25.ncf
		spudgts_l.{date}.1.CDC12km.phaseIII2008.cmaq.cb05p25.ncf
	WRAP Phase III point	elevpt_comp_l.{date}.1.CDC12km.phaseIII2008.txt
		elevpt_prod_l.{date}.1.CDC12km.phaseIII2008.txt
	'WRAP Phase II area	ar_compgts_l.{date}.1.CDC12km.phaseII2008.cmaq.cb05p25.ncf
		ar_prodgts_l.{date}.1.CDC12km.phaseII2008.cmaq.cb05p25.ncf
		spudgts_l.{date}.1.CDC12km.phaseII2008.cmaq.cb05p25.ncf
	WRAP Phase II point	elevpt_comp_l.{date}.1.CDC12km.phaseII2008.txt
		elevpt_prod_l.{date}.1.CDC12km.phaseII2008.txt
Fire	Low-level fire	emiss.area.ncarfires.soa.cdc_12km.{date}
	Elevated fire	ptsrce.ncarfires.soa.cdc_12km.{date}.bin
Biogenic	Biogenic	emiss_MEGAN_CDC12km_CB05X_{date}.camx

The output files from the SMOKE processor are primarily I/O API NetCDF files. The I/O API files cannot be viewed with a text editor because they are binary files. These binary files use less disk space than ASCII files containing the same data. These I/O API files can be viewed by the Package for Analysis and Visualization of Environmental data [http://www.cep.unc.edu/empd/EDSS/pave_doc/] (PAVE). Files with extension .txt however, are text files that may be viewed with a text editor or in a spreadsheet.

SOURCES MODELED WITH CAMx PLUME-IN-GRID MODEL

Large stationary NOx sources within the 12 km domain were modeled with the CAMx Plume-in-Grid (PiG) model. For each simulated day, PiG sources were identified in the following way:

(1) Identified sources (i.e. individual stacks) emitting more than 1 ton/day NOx emissions
(2) Identified sources co-located with those sources found in (1);
i.e. sources that are within 100 m distance AND have NOx emissions greater than or equal to 0.1 ton/day were identified

The sources identified in this manner for all 366 days of 2008 were appended together to compile a list of distinct sources within the 12 km domain for each year. Sources on this list were selected for PiG treatment in emissions processing. Maps of sources selected for PiG treatment within the 12 km domain are shown in Figures F4-F7. Point sources were broken out by source category into EGU, oil and gas, trona, and non-EGU sources that do not fit under either oil and gas or trona source categories. This was done to configure the inventory for use in potential CAMx source apportionment analyses. PiGged sources are displayed in separate figures by source category and year in Figures F4-F7. Table F3 lists the sources selected for PiG treatment in 2008 along with their locations, source identification information, and NOx, SO_2, CO, NH_3, and PM emissions.

VOC SPECIATION PROFILES

The Carter Lake/BP Southwest Wyoming O&G inventory includes detailed VOC gas composition analyses for the 5-County area. Speciation profiles were developed for the main VOC-emitting processes from oil and gas production activities for each county in the region. Where additional spatial resolution was needed, counties were further subdivided; the Jonah and Pinedale fields were separated out from the rest of Sublette County, and Sweetwater County was divided into East Sweetwater and West Sweetwater. Separate speciation profiles were developed for the following processes: flashing, well venting, pneumatic pumps, and fugitive emissions, which were further broken down into emissions from sales gas, produced gas and condensate. Profile codes and descriptions are shown in Table F5. Since gas analyses for the Southwest Wyoming basin were available for both 2005 and 2006, two-year average profiles were used for those years and the same profiles were used for the 2008 inventory. The Speciation Tool was used to convert these gas composition analyses to CB05 speciation profiles ready for use in SMOKE.

The SMOKE emission model includes default speciation profiles indexed by SCC codes. These profiles are based on EPA default data as well as on various updates and improvements incorporated to account for such things as variations in fuels, solvent composition, and chemical mechanisms used in air quality models. For the CD-C Southwest Wyoming O&G

processing, instead of using generic EPA default profiles, region-specific VOC speciation profiles derived from the gas composition analysis for each basin were used.

Speciation profiles used for modeling of VOC emissions from O&G sources in SW Wyoming are shown in Table F7 and the cross reference between speciation profiles and SCCs that shows which profile was used for a given source category is shown in Table F8. Table F6 provides a key to the abbreviations for the CB05 species. For comparison, EPA default speciation profiles and cross references are shown in Tables F9-F11.

SW WYOMING O&G VOC EMISSION INVENTORY

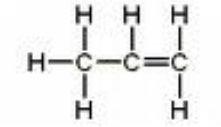
Table F4 shows the emissions of total organic gases (TOG) in SW Wyoming. For ease of comparison with other WDEQ inventories, we also present the TOG emissions broken down into methane, ethane and VOC. Table F12 shows the SW Wyoming emission inventory in terms of the relevant species used in the Carbon Bond 05 (CB05; Yarwood et al., 2005) chemical mechanism for methane (CH4), ethane (ETHA), and VOC (CB05 VOC). Ethane is treated as explicit species in the CB05 mechanism, whereas methane is assumed to have a constant background of 1.7 ppm in the CB05 chemical mechanism as implemented in CAMx and CMAQ. Table F12a shows the input NOx, $PM_{2.5}$, SO_2, and VOC for 2008 for each source category of the SW Wyoming inventory. Table F12b shows the 2008 SMOKE output species once the speciation into CB05 species has been performed.

Inspection of Table F12 shows that the output VOC mass emissions after speciation are close but do not exactly match the input VOC mass emissions. The output VOC mass emissions after speciation are not expected to match the input VOC mass emissions; an explanation for this is provided below.

O&G VOC emission estimates for Southwest Wyoming for each region and source category were provided by the Carter Lake/BP emission inventory. These emission estimates for total VOC were converted to the more detailed chemical speciation used by the CB05 chemical mechanism in CAMx. For each VOC emissions source, a speciation profile code based on the emissions source category determines the "split factors" for that particular profile. The split factors are multiplicative factors for converting grams of criteria pollutant (e.g. VOC) emissions into moles of CB05 species. For example, in Table F7, the JON06 profile gives the split factors required to take VOC emissions from well venting in the Jonah field and speciate the emissions into moles of CB05 species that can then be used by the chemical mechanism in CAMx. Note that the speciation of VOC to CB05 species conserves moles of material. An example of how split factors are derived from data specifying the composition of a hydrocarbon mixture (e.g. a gas composition analysis) is given below.

A given organic compound is assigned to CB05 model species based on its carbon bond structure. This is in contrast to a lumped species approach (e.g., SAPRC99) whereby VOC species with similar characteristics and reactivities are assigned to the same lumped species. In the Carbon Bond approach, a VOC species is decomposed based on its reactive carbon bonds. One advantage of the Carbon Bond approach is that it conserves Carbon atoms, however, information on other atoms that may be attached to the Carbon (e.g., hydrogen and oxygen) is

lost. For example, propene contains 3 carbon atoms with one carbon-carbon double bond (olefin bond) and one carbon-carbon single bond (paraffinic bond) and six hydrogen atoms:



1 mole of propene is therefore assigned to 1 mole of PAR (paraffin) and 1 mole of OLE (olefin).

Consider a hypothetical mixture of several non-methane organic compounds (NMOCs; Table F2). The first column shows the gases that comprise the mixture, and the second column shows the mole fraction for each gas. The third column shows the CB05 mapping for each compound; this mapping is done according to the carbon structure as in the propene example above. The CB05 mappings are weighted by mole fraction (shown in the second column) and then summed to obtain the total CB05 model species per mole of the NMOC mixture emitted (i.e. 0.2 ETHA + 1 PAR + 0.05 ETH + 0.1 OLE + 0.1 FORM + 0.15 TOL + 0.05 XYL).

Table F2. Example calculation to assign a hypothetical non-methane organic compound (NMOC) mixture to CB05 model species.

NMOC Mixture	Mole Fraction	CB05 Mapping (mol/mol specie)	CB05 Mixture (mol/mol NMOC)
Ethane	0.2	1 ETHA	0.2 ETHA
Butane	0.15	4 PAR	0.6 PAR
Ethene	0.05	1 ETH	0.05 ETH
Propene	0.10	1 PAR + 1 OLE	0.1 PAR + 0.1 OLE
Formaldehyde	0.10	1 FORM	0.1 FORM
Acetaldehyde	0.15	1 ALD2	0.15 ALD2
Toluene	0.10	1 TOL	0.1 TOL
Ethylbenzene	0.05	1 PAR + 1 TOL	0.05 PAR + 0.05 TOL
Diethylbenzene	0.05	2 PAR + 1 XYL	0.1 PAR + 0.05 XYL
Acetone	0.05	3 PAR	0.15 PAR
Total	**1.0**		**0.2 ETHA + 1 PAR + 0.05 ETH + 0.1 OLE + 0.1 FORM + 0.15 TOL + 0.05 XYL**

In order to create the SMOKE output CB05 emissions summary tables shown in Table F12, the CB05 VOC species in moles must be converted back to units of weight (i.e. tons). This is done for reporting purposes only and has nothing to do with the CB05 chemical mechanism that is conserving moles of VOC. The default molecular weight for reporting the mass of CB05 species derived from hydrocarbons is the carbon number multiplied by the molecular weight of methane (16 gm/mole), which assumes that there are four hydrogen atoms associated with each carbon atom. Note that the while the number of carbon atoms in the original VOC emissions estimate is preserved throughout the speciation process, the number of atoms of other species (hydrogen, oxygen, etc.) is not, so that the VOC emissions input to SMOKE will not match the VOC emissions tallied after speciation has occurred. Also note that alternative molecular weights than that for methane could also be used for converting the CB05 species from moles to mass units for reporting purposes. For example, in the propene example given above, if we started with 42 gm of propene it would first be converted into one mole of propene (molecular

weight of 42 gm/mole) and then speciated into one mole of PAR and one mole of OLE. To convert back to mass for reporting purposes we assume the molecular weight of methane (16 gm/mole) for each carbon and get the following CB05 VOC mass back for 42 gm of propene:

- 16 x (1 mole PAR) + 2 x 16 x (1 mole of OLE) = 48 gm

So in this case, the CB05 VOC mass for propene coming out of the speciation when reported as mass is 14% higher than the mass of propene going into the speciation. This is solely a reporting convention; as far as the CB05 speciation is concerned carbon, is preserved as three moles of carbon going in the speciation (propene) and three moles of carbon coming out of the speciation (one PAR and one OLE). For hydrocarbon species, the CB05 VOC mass will be the same or higher than the mass of hydrocarbons going into the speciation because the maximum number of hydrogen atoms that can be associated with a carbon atom is 4 (i.e., methane, CH4).

DESCRIPTION OF EMISSIONS TABLES

Emission summary tables appear in the following section, Figures and Tables. Below is an explanation of the information in each table and how the emissions totals were calculated.

Table F4 shows emissions of CO, NOx, TOG, PM and SO_2 within the 4 km domain. The 4 km domain encompasses portions of Colorado, Idaho, Utah, and Wyoming. Wyoming is broken out into two regions: the 5-County area (Sublette, Carbon, Lincoln, Uinta, and Sweetwater) and the rest of Wyoming. The data for the point source categories in Table F4 (Oil and Gas, EGU, NEGU, trona and fires) are totals for the 4 km grid that were extracted from the CAMx-ready binary emissions files. This was necessary because the point source data was processed on the 12 km grid, so emissions information specific to the 4 km grid was not available from the SMOKE processing outputs. The county and state lines for doing the emissions extraction are defined at 4 km resolution and match the true county boundaries only as well as the spatial resolution of the model allows. Therefore, these totals do not match exactly with SMOKE inputs because of inconsistencies in definition of county boundaries introduced by the discretization of the model. The emission totals for the area, onroad, and off-road categories were developed from SMOKE reports from the processing of the 4 km grid emissions.

Emissions estimates shown in Table F12 are drawn from the SMOKE input and output QA reports as discussed above. Tables F13-F17 give a summary of point source emissions within the 12 km domain and were generated from SMOKE input emissions QA reports. Point source emissions are broken down by category into EGU, non-EGU, and trona emissions. Sources are classified within SMOKE as EGU (electricity generating unit) or non-EGU based on SCC code. SCCs considered to be EGUs begin with the digits 101 or 201. The SMOKE EGU/non-EGU convention causes small sources such as hospital emergency generators to be classified as EGUs along with power plants. In the emissions summary tables, all EGU sources are grouped together, but in Figures F2-F3, we have divided EGUs into two categories: EGUs that appear in the EPA Acid Rain Program Database and those that do not.

For regions outside Wyoming, the emissions totals in Tables F13-F17 do not include oil and gas sources. The point source emission inventory for Wyoming was prepared using a different method than the other states. Emissions sources are classified by their SCC and SIC (Standard

Industrial Classification) codes. In the 2005-6 inventory, SCCs were available for Wyoming point sources, but SIC codes were not; therefore, it was difficult to determine whether a given source should be classified as an O&G source. Special efforts were made to identify O&G sources inside the 5-County area of SW Wyoming. Outside the 5-County area, all Wyoming point sources that were not classified as either EGU or trona sources were included in the non-EGU category for 2005-6. For 2008, point source emissions for oil and gas sources were broken out separately from other sources for all of Wyoming.

Emissions for the 5-County area of Southwest Wyoming appear in multiple tables in this memo; we have compiled emissions estimates that were derived using different techniques or from different model grids into a single table for comparison. Table F18 compares emissions for each pollutant for the 5-County Area of Southwest Wyoming from Tables F4, F12 and F13-17 for the year 2008. Comparable emissions totals for the 5-County area are highlighted. For example, 2008 EGU NOx emission totals from Table F14 may be compared with the EGU totals from Table F4a, and these two cells are highlighted in purple in Table F18a.

WYOMING EMISSIONS SUMMARY PLOTS

The upper panel of Figure F9 shows the changes in point source emissions (taken to be the sum of trona processing emissions, EGU emissions and emissions from all non-O&G non-EGU sources) from 2005 and 2006 to 2008 for NOx, VOC, CO and SO2. For all four pollutants, emissions are similar in 2005-6 and decline in 2008. The lower panel of Figure F9, on the other hand, shows O&G point source emissions increasing from 2006 to 2008, with NOx showing the sharpest rise. NOx and TOG emissions from on-road and off-road sources in Wyoming decrease from 2005 through 2008 (Figure F10) but emissions from non-O&G area sources rise going from 2005 to 2008. The non-O&G area source emissions were calculated through interpolation of the 2002 and 2018 WRAP inventories and the increase in the area source emissions with each successive year is due to population growth expected between 2002 and 2018. Figure F11 shows tile plots of the changes in Wyoming onroad and off-road mobile source emissions and area source emissions, respectively. Figure F11 shows reductions in emissions on the roadways going from 2006 to 2008 expected from fleet turnover to cleaner vehicles. Figure F12 shows the increase in non-O&G area emissions, which are concentrated in population centers. Figure F13 shows an increase in O&G emissions in 2008 relative to 2006 in Wyoming. Note that the 2008 emission inventory includes O&G sources outside the SWWY 5–county area that were not included in the O&G source category in the 2006 emission inventory. These sources were included in the non-EGU source category in the 2006 inventory.

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FIGURES AND TABLES

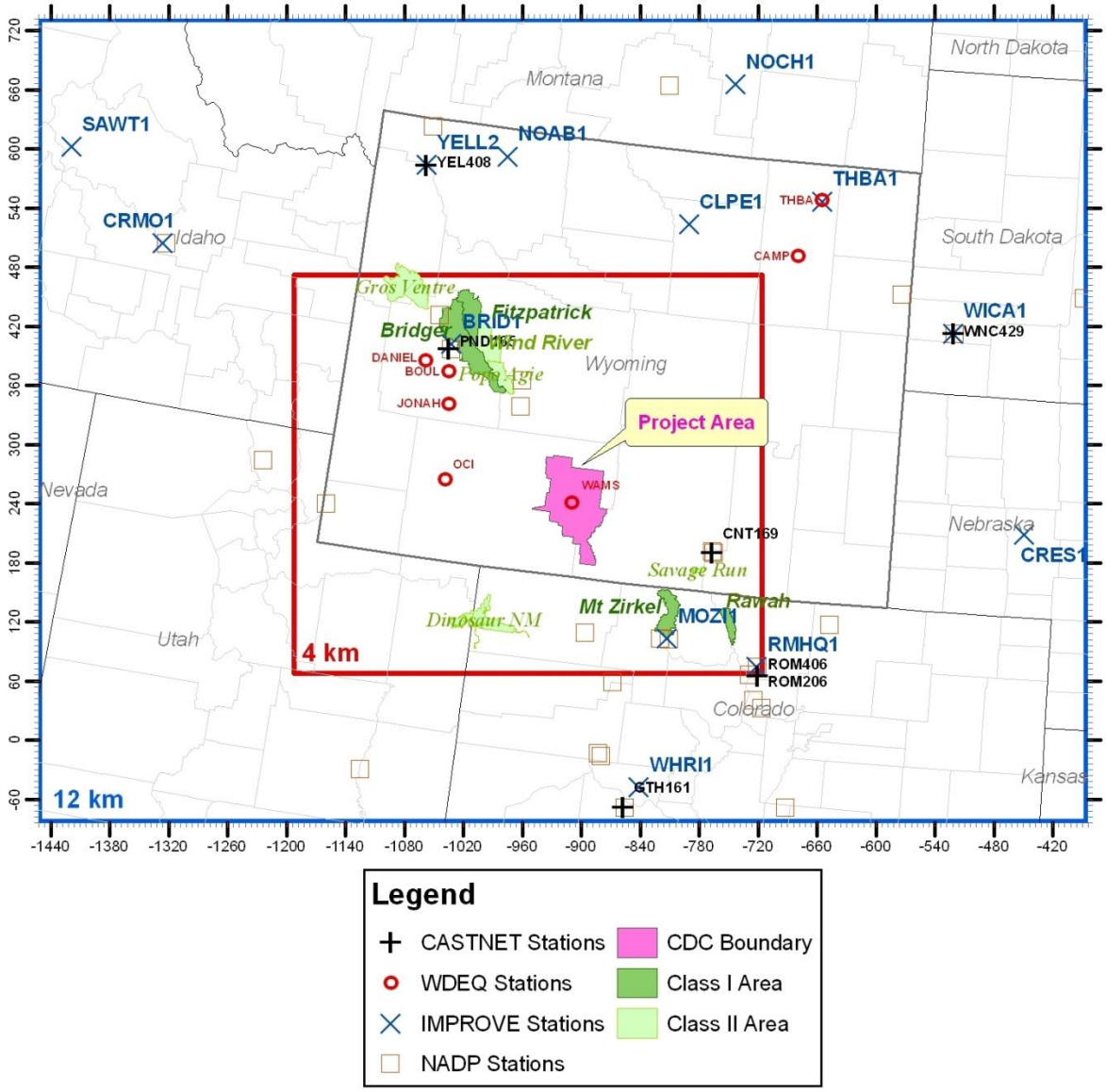


Figure F1. CD-C 12/4 km modeling domain with corrected monitor labels.

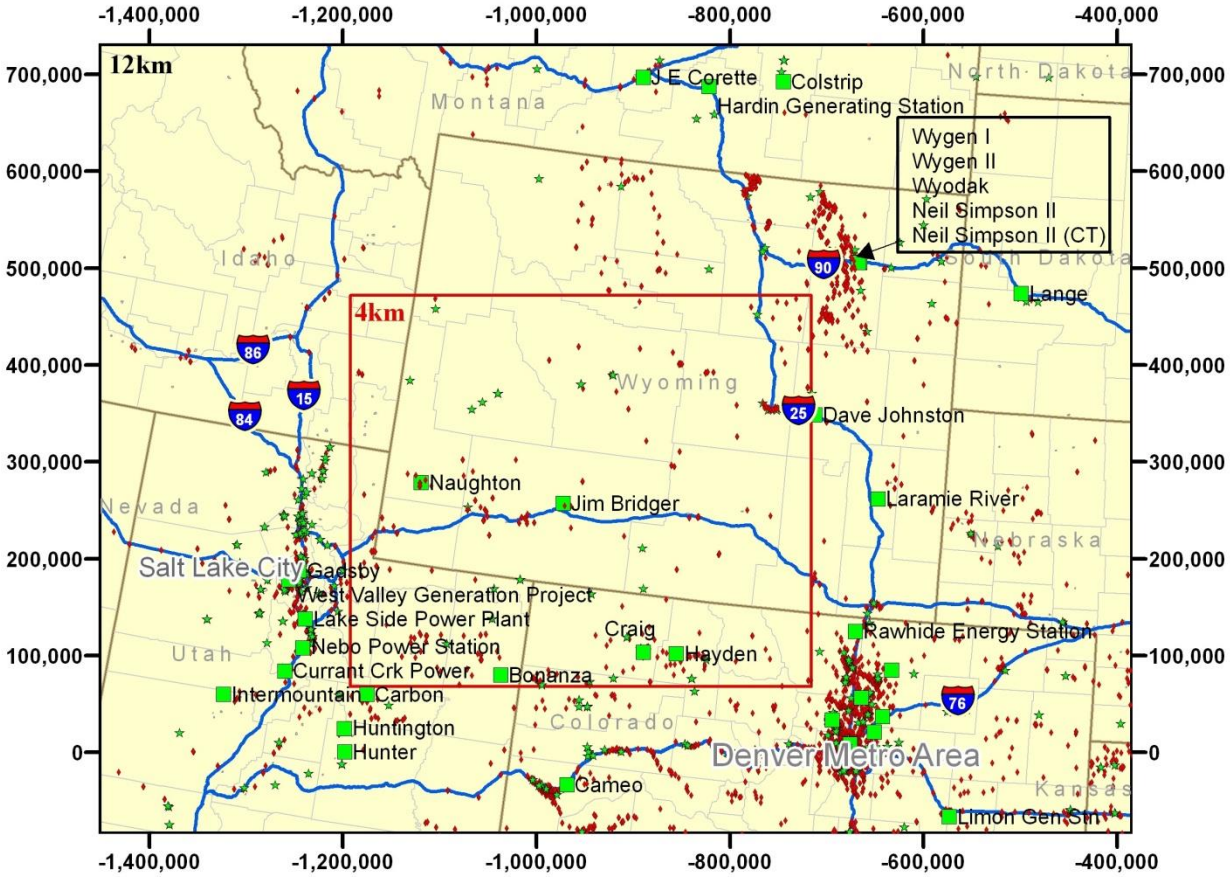


Figure F2. 2008 point sources within the 12 km domain excluding O&G sources for all of Wyoming, and not only within the 5-county area. Sources are classified within SMOKE as EGU (electricity generating unit) or non-EGU based on SCC code. SCCs considered to be EGUs begin with the digits 101 or 201. Because the SMOKE EGU/non-EGU convention causes small sources such as hospital emergency generators to be classified as EGUs along with power plants, we have divided EGUs into two categories: EGUs that appear in the EPA Acid Rain Program Database and those that do not. Only large power plants appear in the Acid Rain Program Database. These EGUs are labeled and indicated by a square icon. Sources in the Denver area are shown separately in Figure F3.

For Wyoming point sources, SCCs were available, but SIC codes were not; therefore, it was difficult to determine whether a given source should be classified as an O&G source. Special efforts were made to identify O&G sources inside the 5-County area of SW Wyoming. Outside the 5-County area, all Wyoming point sources that were not classified as either EGU or trona sources were included in the non-EGU category.

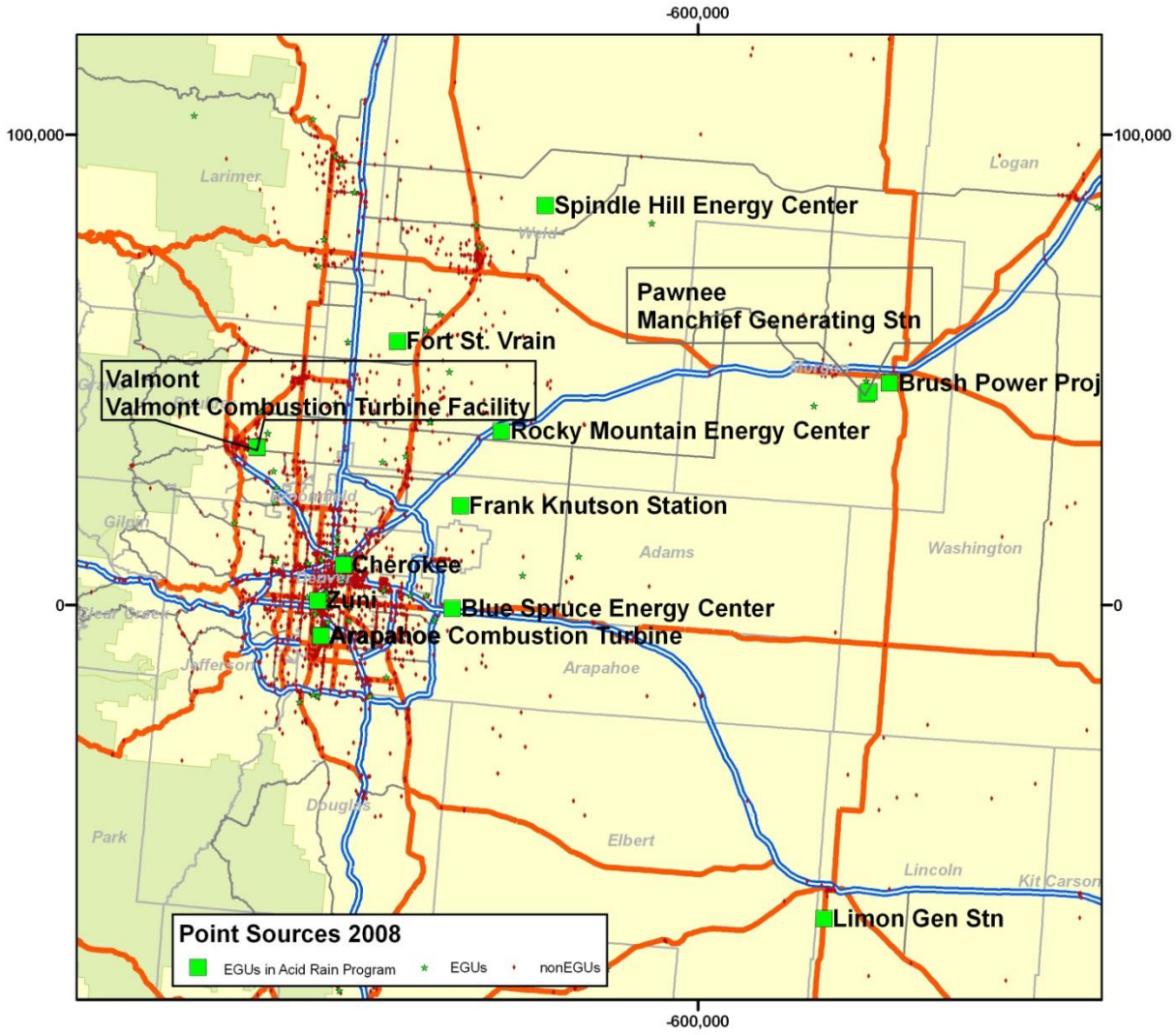


Figure F3. 2008 ARD point sources in the Denver area within the 12 km domain. Sources are classified within SMOKE as EGU (electricity generating unit) or non-EGU based on SCC code. SCCs considered to be EGUs begin with the digits 101 or 201. Because the SMOKE EGU/non-EGU convention causes small sources such as hospital emergency generators to be classified as EGUs along with power plants, we have divided EGUs into two categories: EGUs that appear in the EPA Acid Rain Program Database and those that do not. Only large power plants appear in the Acid Rain Program Database. These EGUs are labeled and indicated in by a square icon.

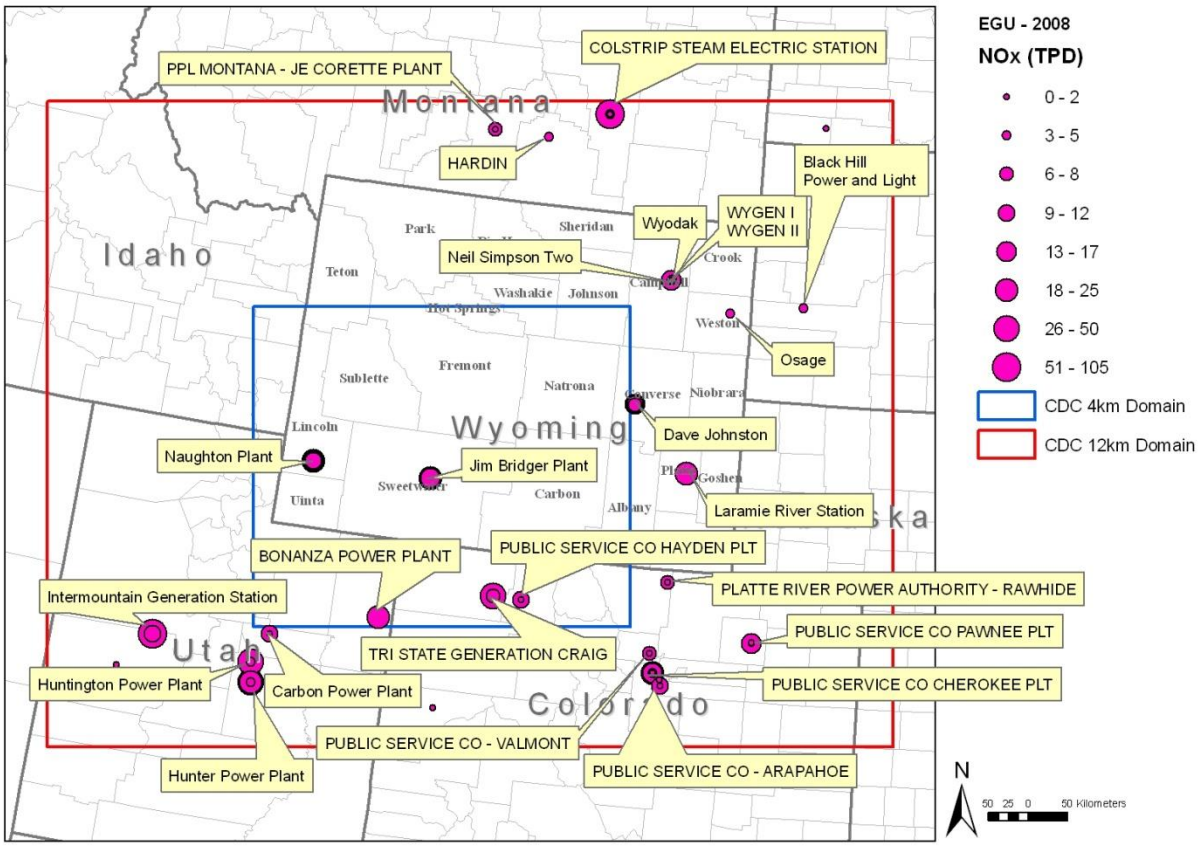


Figure F4. 2008 EGU sources treated with the CAMx Plume-in-Grid (PiG) Model within the 12 km domain.

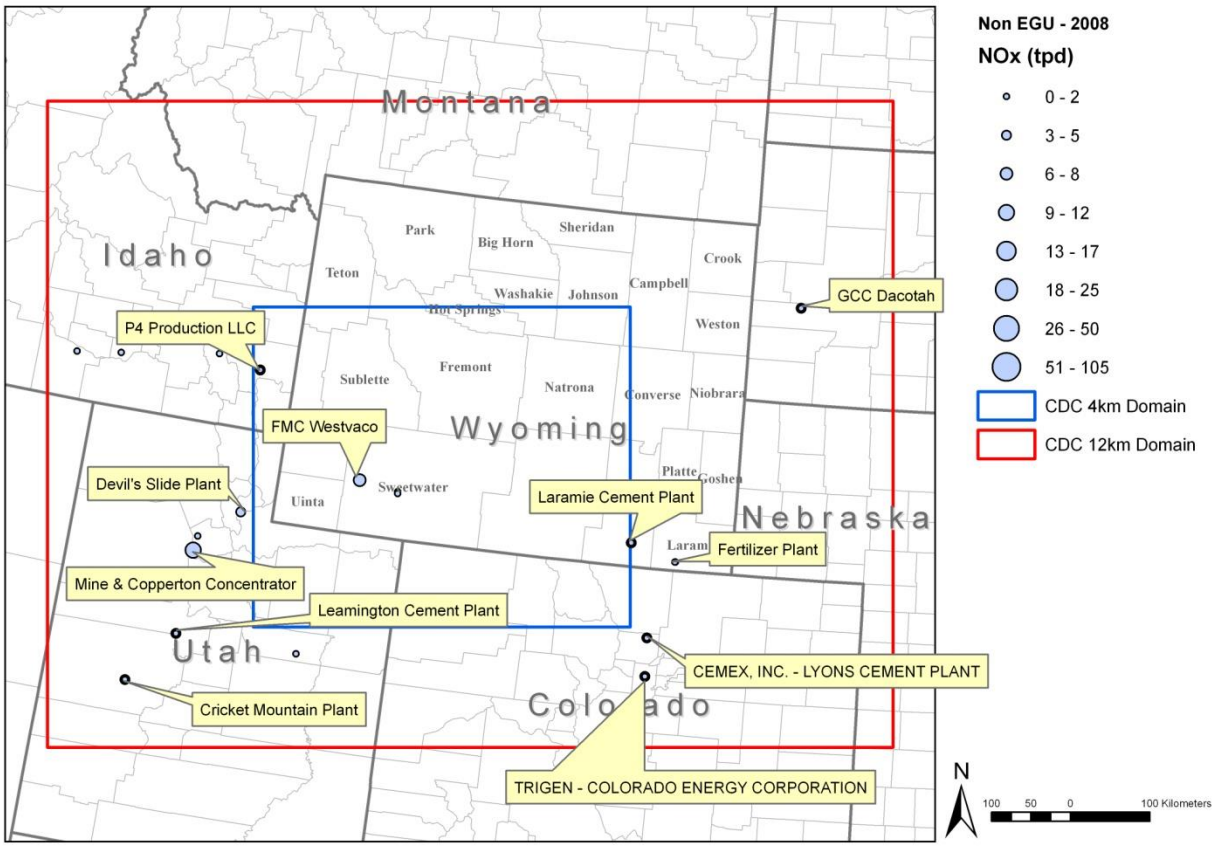


Figure F5. 2008 non-EGU sources treated with the CAMx Plume-in-Grid (PiG) Model within the 12 km domain.

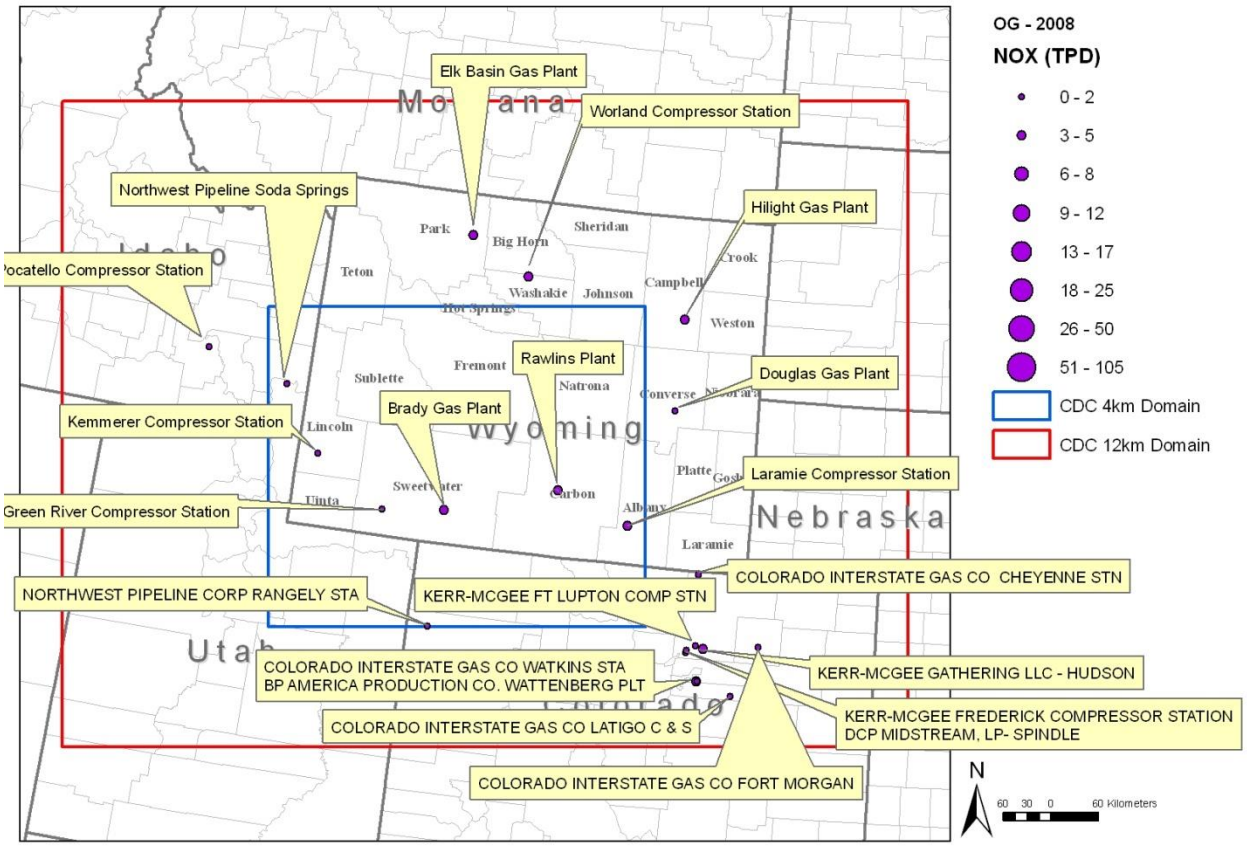


Figure F6. 2008 oil and gas sources treated with the CAMx Plume-in-Grid (PiG) Model within the 12 km domain.

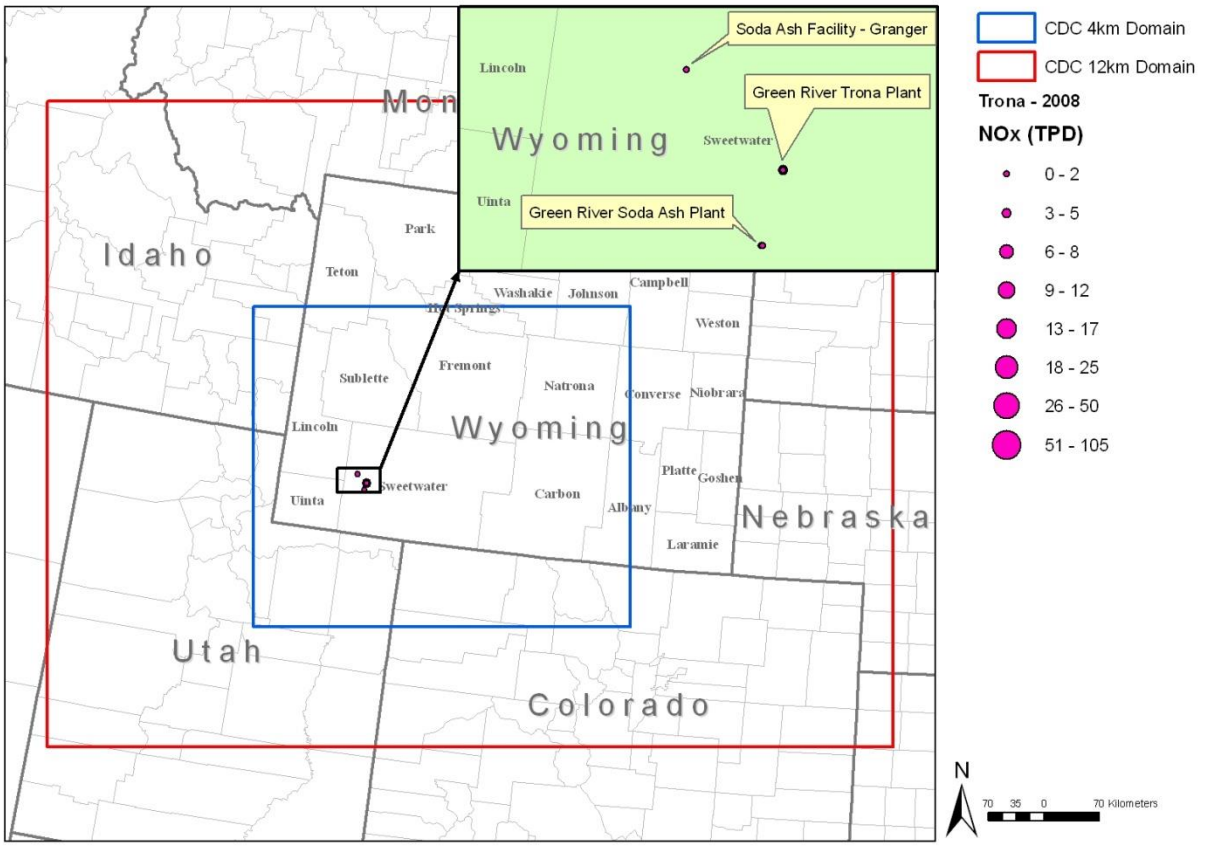


Figure F7. 2008 trona sources treated with the CAMx Plume-in-Grid (PiG) Model within the 12 km domain.

Table F3a. 2008 EGU Sources within the 12/4 km grid modeled with the CAMx Plume-in-Grid. Sources are ranked by their NOx emissions.

		Source Parameters								Emissions (TPY)						
Rank	NOx (tpd)	PT #	X (m)	Y (m)	Plant ID	Stack ID	ORISID	FIPS	Plant	NOx	VOC	CO	SO2	PM10	PM2.5	NH3
1	78.1	517	-1322699	59547	EGU1222	202	6481	49027	Intermountain Generation Station	28532.9	0.0	0.0	5980.3	0.0	0.0	71.5
2	73.6	401	-743950	714784	EGU0727	226	6076	30087	COLSTRIP STEAM ELECTRIC STATION	26215.4	0.0	0.0	13888.6	0.0	0.0	0.0
3	48.2	284	-891863	107264	EGU0175	222	6021	8081	TRI STATE GENERATION CRAIG	17137.5	0.0	0.0	4060.1	0.0	0.0	64.0
4	39.1	506	-1198213	-1559	EGU1220	212	6165	49015	Hunter Power Plant	14179.1	0.0	0.0	5085.5	0.0	0.0	0.0
5	28.8	508	-1198431	24452	EGU1221	212	8069	49015	Huntington Power Plant	10409.2	0.0	0.0	3458.0	0.0	0.0	0.0
6	23.9	859	-971185	255585	5603701002	2163	806	56037	Jim Bridger Power Plant	8594.3	79.4	680.6	5547.3	754.2	754.2	0.0
7	22.5	45	-689997	9568	EGU0163	222	469	8001	PUBLIC SERVICE CO CHEROKEE PLT	8070.9	0.0	0.0	6027.6	0.0	0.0	16.3
8	20.5	843	-646788	261579	5603100001	1350	620	56031	Laramie River Station	7300.1	78.3	652.1	4466.7	581.4	581.4	0.0
9	19.5	736	-1036751	80250	EGU1224	202	7790	49047	BONANZA POWER PLANT	7126.8	52.4	437.0	994.2	568.9	470.2	26.2
10	19.1	842	-646788	261579	5603100001	1349	620	56031	Laramie River Station	6786.9	81.8	681.3	3278.6	223.0	223.0	0.0
11	18.3	841	-646788	261579	5603100001	1338	620	56031	Laramie River Station	6596.6	83.6	696.4	3837.2	245.5	245.5	0.0
12	17.8	505	-1198213	-1559	EGU1220	202	6165	49015	Hunter Power Plant	6441.6	0.0	0.0	1049.6	0.0	0.0	0.0
13	17.6	834	-1119667	277408	5602300004	210	416	56023	Naughton Plant	6249.6	46.5	332.4	5975.6	2860.5	2860.5	0.0
14	14.9	862	-971185	255585	5603701002	2166	806	56037	Jim Bridger Power Plant	5384.4	80.2	687.4	3010.0	752.5	752.5	0.0
15	14.8	818	-712133	348563	5600900001	2193	415	56009	Dave Johnston	5316.1	37.2	309.7	7496.7	0.0	0.0	0.0
16	14.1	804	-665539	505681	5600500046	1317	610	56005	Wyodak Plant	5025.6	62.0	517.3	8196.0	1684.6	1684.6	0.0
17	13.4	307	-563976	46860	EGU0179	222	6248	8087	PUBLIC SERVICE CO PAWNEE PLT	4818.2	0.0	0.0	13980.8	0.0	0.0	27.3
18	13.2	860	-971185	255585	5603701002	2164	806	56037	Jim Bridger Power Plant	4735.9	79.1	677.6	5912.1	755.9	755.9	0.0
19	12.6	861	-971185	255585	5603701002	2165	806	56037	Jim Bridger Power Plant	4561.4	82.3	705.8	6227.2	767.2	767.2	0.0
20	12.4	46	-689997	9568	EGU0163	226	469	8001	PUBLIC SERVICE CO CHEROKEE PLT	4426.1	0.0	0.0	1768.7	0.0	0.0	13.2
21	12.2	833	-1119667	277408	5602300004	209	416	56023	Naughton Plant	4477.3	29.9	213.4	9225.6	2045.2	2045.2	0.0
22	11.7	513	-1322699	59547	10327	202	6481	49027	Intermountain Generation Station	4286.7	0.0	0.0	597.9	0.0	0.0	13.6
23	10.5	344	-856301	102086	EGU0183	226	525	8107	PUBLIC SERVICE CO HAYDEN PLT	3738.5	0.0	0.0	1477.5	0.0	0.0	14.6
24	10.3	343	-856301	102086	EGU0183	222	525	8107	PUBLIC SERVICE CO HAYDEN PLT	3659.6	0.0	0.0	1222.9	0.0	0.0	9.5
25	10.1	466	-1174662	59571	EGU1218	212	3644	49007	Carbon Power Plant	3689.5	0.0	0.0	5596.0	0.0	0.0	0.0
26	10	832	-1119667	277408	5602300004	208	416	56023	Naughton Plant	3605.9	22.7	162.1	7308.1	1621.0	1621.0	0.0
27	9.5	819	-712178	348612	5600900001	2194	415	56009	Dave Johnston	3412.4	52.1	434.5	5405.6	0.0	0.0	0.0
28	9.4	158	-680287	-6529	EGU0165	222	465	8031	PUBLIC SERVICE CO - ARAPAHOE	3401.0	0.0	0.0	3154.8	0.0	0.0	9.9
29	7.9	273	-891863	107264	18	222	6021	8081	TRI STATE GENERATION CRAIG	2799.9	0.0	0.0	656.7	0.0	0.0	12.5
30	7.5	80	-693836	34254	EGU0164	226	477	8013	PUBLIC SERVICE CO - VALMONT	2675.7	0.0	0.0	873.1	0.0	0.0	8.1
31	6.1	817	-712112	348527	5600900001	2192	415	56009	Dave Johnston	2204.1	18.0	150.1	3705.2	0.0	0.0	0.0
32	6.1	813	-712075	348491	5600900001	2179	415	56009	Dave Johnston	2199.7	17.9	149.0	3818.6	0.0	0.0	0.0
33	5.4	418	-889488	696596	EGU0728	226	2187	30111	PPL MONTANA - JE CORETTE PLANT	1926.8	0.0	0.0	3304.8	0.0	0.0	10.5
34	5.4	236	-671031	123737	EGU0173	226	6761	8069	PLATTE RIVER POWER AUTHORITY - RAWHIDE	1951.3	0.0	0.0	979.0	0.0	0.0	16.8
35	4.7	496	-1198213	-1559	10237	212	6165	49015	Hunter Power Plant	1721.2	0.0	0.0	794.3	0.0	0.0	0.0
36	4.2	806	-665582	505394	5600500063	2335	750	56005	Neil Simpson Two	1549.8	4.2	211.0	786.1	84.5	84.5	0.0
37	4	410	-743950	714784	087-0008	226	6076	30087	COLSTRIP STEAM ELECTRIC STATION	1441.6	0.0	0.0	1554.8	0.0	0.0	0.0
38	3.9	501	-1198431	24452	10238	212	8069	49015	Huntington Power Plant	1422.3	0.0	0.0	658.8	0.0	0.0	0.0
39	2.8	11	-689997	9568	1	222	469	8001	PUBLIC SERVICE CO CHEROKEE PLT	999.6	0.0	0.0	869.0	0.0	0.0	3.3
40	2.8	495	-1198213	-1559	10237	202	6165	49015	Hunter Power Plant	1024.5	0.0	0.0	263.5	0.0	0.0	0.0
41	2.8	868	-591155	463494	5604500005	64	0	56045	Osage	964.9	0.0	586.5	2381.3	571.9	571.9	0.0
42	2.4	810	-665255	506078	5600590001	0	5631	56005	WYGEN II	269.7	4.0	301.5	221.1	51.6	0.0	0.0
42	2.6	433	-498985	470013	28.0801-02	1	0	46103	Black Hill Power & Light Company (Ben Fr	887.2	3.4	131.2	759.9	30.2	0.0	0.0
43	2.2	397	-821441	687100	ORIS55749	STKDEF	55749	30003	HARDIN	754.2	71.5	595.9	517.9	38540.2	10054.0	35.8
44	2	12	-689997	9568	1	226	469	8001	PUBLIC SERVICE CO CHEROKEE PLT	379.8	0.0	0.0	146.5	0.0	0.0	1.4
45	1.9	291	-563976	46860	11	222	6248	8087	PUBLIC SERVICE CO PAWNEE PLT	657.0	0.0	0.0	370.8	0.0	0.0	6.0
46	1.8	227	-671031	123737	53	226	6761	8069	PLATTE RIVER POWER AUTHORITY - RAWHIDE	651.9	0.0	0.0	154.5	0.0	0.0	3.0
47	1.8	331	-856301	102086	1	222	469	8107	PUBLIC SERVICE CO CHEROKEE PLT	999.6	0.0	0.0	869.0	0.0	0.0	3.3
48	1.7	160	-680930	986	EGU0166	601	478	8031	Zuni	367.4	0.0	0.0	0.9	0.0	0.0	77.7
49	1.7	265	-968076	-34362	EGU0174	202	468	8077	PUBLIC SERVICE CO CAMEO PLT	626.9	0.0	0.0	1909.8	0.0	0.0	2.7
50	1.6	332	-856301	102086	1	226	469	8107	PUBLIC SERVICE CO CHEROKEE PLT	379.8	0.0	0.0	146.5	0.0	0.0	1.4
51	1.5	459	-1174662	59571	10081	212	3644	49007	Carbon Power Plant	560.9	0.0	0.0	1137.3	0.0	0.0	0.0
52	1.5	809	-665575	505472	5600500146	2759	5547	56005	WYGEN Station I	597.8	8.3	344.5	659.7	82.9	82.9	0.0
53	1.1	512	-1368566	20475	10327	1	6481	49027	Intermountain Generation Station	412.6	15.9	884.2	530.5	70.7	18.5	0.0
54	1.1	306	-564179	47790	EGU0178	201	55127	8087	MANCHIEF POWER COMPANY LLC	219.9	25.1	977.7	2.3	80.1	80.1	76.5
55	1.1	68	-693836	34254	1	226	469	8013	PUBLIC SERVICE CO CHEROKEE PLT	379.8	0.0	0.0	146.5	0.0	0.0	1.4
56	1	403	-743950	714784	EGU0727	801	6076	30087	COLSTRIP STEAM ELECTRIC STATION	416.8	0.0	0.0	2377.2	0.0	0.0	0.0
56	1	431	-470333	696581	NEW-ND1	1	0	38011	Future Coal EGU (Gascoyne/Westmoreland P	338.7	6.9	443.7	254.0	37.2	0.0	0.0
57	0.8	423	-889488	696596	111-0015	226	2187	30111	PPL MONTANA - JE CORETTE PLANT	299.3	0.0	0.0	545.8	0.0	0.0	2.1
58	0.7	47	-689997	9568	EGU0163	601	469	8001	PUBLIC SERVICE CO CHEROKEE PLT	278.9	0.0	0.0	0.9	0.0	0.0	3.1
59	0.6	98	-680930	986	7	601	478	8031	Zuni	229.7	0.0	0.0	0.6	0.0	0.0	9.3
60	0.4	235	-671031	123737	EGU0173	201	6761	8069	PLATTE RIVER POWER AUTHORITY - RAWHIDE	98.3	0.0	0.0	1.9	0.0	0.0	28.4
61	0.2	48	-689997	9568	EGU0163	604	469	8001	PUBLIC SERVICE CO CHEROKEE PLT	69.7	0.0	0.0	0.1	0.0	0.0	1.2
62	0.1	159	-680287	-6529	EGU0165	601	465	8031	PUBLIC SERVICE CO - ARAPAHOE	42.0	0.0	0.0	1.0	0.0	0.0	2.3
63	0.1	305	-564179	47790	72	201	55127	8087	MANCHIEF POWER COMPANY LLC	39.1	1.5	59.0	0.4	0.2	0.1	4.6
64	0.1	13	-689997	9568	1	601	469	8001	PUBLIC SERVICE CO CHEROKEE PLT	34.7	0.0	0.0	0.1	0.0	0.0	0.7

Table F3b. 2008 non-EGU Sources within the 12/4 km grid modeled with the CAMx Plume-in-Grid. Sources are ranked by their NOx emissions.

		Source Parameters								Emissions (TPY)						
Rank	NOx (tpd)	PT #	X (m)	Y (m)	Plant ID	Stack ID	ORISID	FIPS	Plant	NOx	VOC	CO	SO2	PM10	PM2.5	NH3
1	8.4	16600	-1267843	164918	10571	927593	0	49035	Mine & Copperton Concentrator	3124.6	1303.4	286.1	37.8	255.6	255.6	0.0
2	8	23261	-1057458	253150	5603799999		0	56037	FMC Westvaco	2961.2	574.8	281.3	3636.9	1569.1	487.4	0.0
3	4.8	2636	-694677	53910	3	7	0	8013	CEMEX, INC. - LYONS CEMENT PLANT	1801.7	113.3	2.5	15.0	111.6	0.0	0.0
4	4.2	21233	-714531	174056	5600100002	1285	0	56001	Laramie Cement Plant	1565.0	680.2	57.5	79.2	116.5	0.0	0.0
5	4.1	14512	-1289629	59699	10303	1616	0	49023	Leamington Cement Plant	1496.1	17319.2	57.6	0.7	50.9	50.9	3.7
6	3.8	14837	-1207603	213047	10007	16758	0	49029	Devil's Slide Plant	1369.1	892.2	50.8	204.3	16.2	5.1	3.5
7	3.7	10401	-1183016	392330	2900001	10	0	16029	P4 Production LLC	1704.3	213.8	0.0	7293.2	40.2	31.5	0.0
8	3.3	11144	-499781	470177	28.1121-02	9	9	46103	GCC Dacotah	2086.9	1860.5	56.628	221.49	4.283	0	0
9	3	14920	-1207603	213047	10007	948011	0	49029	Devil's Slide Plant	1078.1	640.7	39.0	190.5	12.2	3.8	4.4
10	3	14945	-1207603	213047	10007	952430	0	49029	Devil's Slide Plant	1078.1	640.7	39.0	190.5	12.2	3.8	3.5
11	2.5	14648	-1354245	1417	10313	17059	0	49027	Cricket Mountain Plant	926.4	420.1	45.3	38.1	33.0	26.4	20.7
12	2.3	6650	-697446	5119	820	6	10003	8059	TRIGEN - COLORADO ENERGY CORPORATION	950.4	43.5	5.2	1938.1	16.9	0.0	0.0
13	1.8	22615	-658781	149654	56-021-00002	6979	0	56021	Fertilizer Plant	659.3	53.3	16.3	0.0	0.0	0.0	0.0
14	1.8	22599	-659258	149940	56-021-00002		0	56021	Fertilizer Plant	648.0	169.1	76.4	0.2	44.0	44.0	0.0
15	1.5	16630	-1262021	182635	10572	1312	0	49035	Power Plt/ Lab/ Tailings Impoundment	556.4	27.5	2.2	654.8	7.7	4.2	0.1
16	1.5	16634	-1262021	182635	10572	1316	0	49035	Power Plt/ Lab/ Tailings Impoundment	553.1	31.7	3.9	871.9	21.7	10.2	0.1
17	1.4	10627	-1414379	416258	8300001	10	0	16083	TASCO, Twin Falls	558.1	178.2	4.4	653.4	43.0	22.0	0.0
18	1.3	16628	-1262021	182635	10572	1310	0	49035	Power Plt/ Lab/ Tailings Impoundment	489.1	27.4	2.2	636.6	2.8	1.5	0.1
19	1.3	16631	-1262021	182635	10572	1313	0	49035	Power Plt/ Lab/ Tailings Impoundment	478.3	24.2	1.9	593.1	6.9	3.7	0.1
20	1.3	11168	-499542	470162	28.1121-02	41	0	46103	GCC Dacotah	467.81	417.06	12.7	79.52	7.61	0	0
21	1.3	16632	-1262021	182635	10572	1314	0	49035	Power Plt/ Lab/ Tailings Impoundment	462.4	28.3	2.2	663.5	3.5	2.0	0.1
22	1.2	11138	-499781	470177	28.1121-02	3	0	46103	GCC Dacotah	788.4	101.87	16.24	29.323	151.5	0	0
23	1.2	6648	-697446	5119	820	4	10003	8059	TRIGEN - COLORADO ENERGY CORPORATION	535.7	21.1	2.6	670.2	7.6	0.0	0.0
24	1.2	21228	-714531	174056	5600100002	1278	0	56001	Laramie Cement Plant	455.1	4.9	22.2	118.8	56.8	0.0	0.0
25	1.2	16635	-1262021	182635	10572	1317	0	49035	Power Plt/ Lab/ Tailings Impoundment	439.05	25.058	3.1095	751.91	12.83	5.588	0.1
26	1.2	10628	-1414379	416258	8300001	20	0	16083	TASCO, Twin Falls	509.7	19.8	2.4	746.1	85.6	44.3	0.0
27	1.1	16629	-1262021	182635	10572	1311	0	49035	Power Plt/ Lab/ Tailings Impoundment	410.9	23.8	1.9	568.5	2.4	1.3	0.1
28	1.1	23185	-1009594	238534	560379324		0	56037	"P4 Production, L.L.C."	399.3	10.6	2.3	714.6	75.8	75.2	0.0
29	1.1	12023	-1137841	33914	10096	3236	50951	49007	Sunnyside Cogeneration Facility	396.5	108.1	13.0	893.8	35.2	33.7	0.2
30	1.1	14647	-1354245	1417	10313	73	0	49027	Cricket Mountain Plant	397.1	268.5	25.4	27.9	21.4	17.1	13.2
31	1.1	10572	-1358824	414676	6700001	20	0	16067	TASCO, Paul	446.8	156.6	1.7	165.5	103.7	51.9	0.0
32	1.1	10571	-1358824	414676	6700001	10	0	16067	TASCO, Paul	484.0	21.0	3.1	128.4	94.2	48.4	0.0
33	1.1	16633	-1262021	182635	10572	1315	0	49035	Power Plt/ Lab/ Tailings Impoundment	392.5	24.6	1.9	594.0	2.4	1.3	0.1
34	1	23187	-1009636	236437	5603700003	2021	0	56037	Rock Springs - Rotary Coking	394.25	0.5	2.29	705.56	56.54	0	0
35	1	10398	-1183016	392330	2900001	10	0	16029	P4 Production LLC	1704.3	213.8	0.0	7293.2	40.2	31.5	0.0
36	1	10056	-1234508	412961	500004	90	0	16005	Ash Grove Cement	496.9	622.8	13.4	4.5	21.1	5.4	4.9
37	0.9	14645	-1354245	1417	10313	71	0	49027	Cricket Mountain Plant	312.7	151.2	8.0	4.8	58.2	46.5	7.5
38	0.7	11139	-499781	470177	28.1121-02	4	0	46103	GCC Dacotah	432.71	222.13	17.645	480.74	50.38	0	0
39	0.6	14646	-1354245	1417	10313	72	0	49027	Cricket Mountain Plant	221.2	160.4	14.8	19.8	24.7	19.7	7.9
40	0.4	6647	-697446	5119	820	3	10003	8059	TRIGEN - COLORADO ENERGY CORPORATION	180.9	85.2	0.9	234.7	2.2	0.0	0.0
41	0.8	10055	-1234508	412961	500004	80	0	16005	Ash Grove Cement	409.1	592.6	9.4	14.2	28.6	6.0	1.8
42	0.4	11146	-499781	470177	28.1121-02	11	0	46103	GCC Dacotah	147.94	139.2	4.2397	26.54	7.611	0	0
43	0.4	2610	-694677	53910	3	7	0	8013	CEMEX, INC. - LYONS CEMENT PLANT	1801.7	113.3	2.5	15.0	111.6	0.0	0.0
44	0.3	6639	-697446	5119	820	6	10003	8059	TRIGEN - COLORADO ENERGY CORPORATION	950.4	43.5	5.2	1938.1	16.9	0.0	0.0
45	0.3	10574	-1358824	414676	6700001	40	0	16067	TASCO, Paul	131.4	573.3	6.4	46.3	70.8	35.3	0.0
46	0.2	10565	-1358824	414676	6700001	10	0	16067	TASCO, Paul	484.0	21.0	3.1	128.4	94.2	48.4	0.0
47	0.2	10573	-1358824	414676	6700001	30	0	16067	TASCO, Paul	109.8	422.1	4.6	34.8	86.0	43.1	0.0
48	0.2	10622	-1414379	416258	8300001	20	0	16083	TASCO, Twin Falls	509.7	19.8	2.4	746.1	85.6	44.3	0.0
49	0.2	6637	-697446	5119	820	4	0	8059	TRIGEN - COLORADO ENERGY CORPORATION	535.7	21.1	2.6	670.2	7.6	0.0	0.0
50	0.2	10629	-1414379	416258	8300001	30	0	16083	TASCO, Twin Falls	80.8	285.6	6.2	27.3	33.0	16.4	0.0
51	0.1	10621	-1414379	416258	8300001	10	0	16083	TASCO, Twin Falls	558.1	178.2	4.4	653.4	43.0	22.0	0.0
52	0.2	10054	-1234508	412961	500004	90	0	16005	Ash Grove Cement	496.9	622.8	13.4	4.5	21.1	5.4	4.9
53	0.1	10566	-1358824	414676	6700001	20	0	16067	TASCO, Paul	446.8	156.6	1.7	165.5	103.7	51.9	0.0
54	0.2	10053	-1234508	412961	500004	80	0	16005	Ash Grove Cement	409.1	592.6	9.4	14.2	28.6	6.0	1.8
55	0.1	14516	-1289629	59699	10303	17008	0	49023	Leamington Cement Plant	43.7	43.7	3.1	0.1	4.2	4.2	0.0
56	0.1	10568	-1358824	414676	6700001	40	0	16067	TASCO, Paul	131.4	573.3	6.4	46.3	70.8	35.3	0.0

Table F3c. 2008 oil and gas sources within the 12/4 km grid modeled with the CAMx Plume-in-Grid. Sources are ranked by their NOx emissions.

		Source Parameters								Emissions (TPY)						
Rank	NOx (tpd)	PT #	X (m)	Y (m)	Plant ID	Stack ID	ORISID	FIPS	Plant	NOx	VOC	CO	SO2	PM10	PM2.5	NH3
1	3.8	410	-645330	40222	123-0048	1	-	8123	KERR-MCGEE GATHERING LLC - HUDSON	1381.4	69.9	232.0	0.3	18.6	18.6	-
2	3.6	1070	-936219	562955	5602900012	0	-	56029	Elk Basin Gas Plant	1319.1	38.6	420.5	0.0	0.0	0.0	-
3	3.1	1263	-972850	215796	5603700008	0	-	56037	Brady Gas Plant	1131.1	30.2	43.0	0.0	0.0	0.0	-
4	2.7	427	-667935	455811	56-005-000	0	-	56005	Hilight Gas Plant	973.2	38.8	316.8	0.0	0.0	0.0	-
5	2.6	455	-828947	240288	5600700019	0	-	56007	Rawlins Plant	956.1	101.4	161.0	0.0	0.0	0.0	-
6	2.5	2	-653900	-531	001-0036	1	-	8001	COLORADO INTERSTATE GAS CO WATKINS STA	920.3	88.4	243.7	0.5	7.3	7.3	-
7	2.3	1306	-866388	509639	5604300007	0	-	56043	Worland Compressor Station	840.7	20.8	225.2	0.0	0.0	0.0	-
8	2.2	1	-740374	195338	5600100006	0	-	56001	Laramie Compressor Station	812.6	39.3	152.8	0.8	8.5	8.5	-
9	2	412	-651163	133423	123-0051	1	-	8123	COLORADO INTERSTATE GAS CO CHEYENNE STN	740.1	327.0	375.9	4.1	11.7	11.7	-
10	2	123	-1269939	421949	R10T5-ID-0	1	-	905001	Pocatello Compressor Station	715.5	23.6	81.2	1.4	1.8	0.0	-
11	1.8	1	-652350	-363	001-0025	1	-	8001	BP AMERICA PRODUCTION CO. WATTENBERG PLT	640.3	50.8	129.4	0.1	1.8	1.8	-
12	1.7	909	-1132624	287706	5602300005	0	-	56023	Kemmerer Compressor Station	620.0	15.5	39.8	0.0	0.0	0.0	-
13	1.5	60	-610754	-19271	005-0055	1	-	8005	COLORADO INTERSTATE GAS CO LATIGO C & S	554.9	14.9	153.3	0.1	1.4	1.4	-
14	1.3	1268	-1051284	216732	5603700027	0	-	56037	Green River Compressor Station	469.8	8.8	18.3	0.0	0.0	0.0	-
15	1.2	477	-680866	340637	56009482	0	-	56009	Douglas Gas Plant	438.9	23.7	157.5	0.0	0.0	0.0	-
16	1.2	445	-666557	35213	123-0184	1	-	8123	KERR-MCGEE FREDERICK COMPRESSOR STATION	434.8	108.9	224.4	0.0	12.4	12.4	-
17	1.2	18	-1172147	374572	700008	40	-	16007	Northwest Pipeline Soda Springs	431.1	15.7	94.1	0.1	0.0	0.0	-
18	1.1	407	-666403	38741	123-0015	1	-	8123	"DCP MIDSTREAM, LP - SPINDLE"	401.3	114.2	411.8	0.3	9.0	9.0	-
19	1.1	294	-993845	68874	103-0021	1	-	8103	NORTHWEST PIPELINE CORP RANGELY STA	388.5	14.7	47.3	0.1	4.7	4.7	-
20	1.1	275	-575438	42396	087-0003	1	-	8087	COLORADO INTERSTATE GAS CO FORT MORGAN	382.7	71.4	280.5	114.4	1.0	1.0	-
21	1	413	-654667	43901	123-0057	1	-	8123	KERR-MCGEE FT LUPTON COMPRESSOR STATION	372.8	100.6	231.1	0.2	14.5	14.5	-
22	0.4	16	-1172147	374572	700008	20	-	16007	Northwest Pipeline Soda Springs	148.3	3.7	11.5	0.0	0.0	0.0	-
23	0.4	15	-1172147	374572	700008	10	-	16007	Northwest Pipeline Soda Springs	146.8	3.7	10.0	0.0	0.0	0.0	-
24	0.4	14	-1172147	374572	700008	40	-	16007	Northwest Pipeline Soda Springs	146.3	13.7	82.3	0.1	0.0	0.0	-
25	0.4	17	-1172147	374572	700008	30	-	16007	Northwest Pipeline Soda Springs	140.6	3.5	10.9	0.0	0.0	0.0	-
26	0.1	12	-1172147	374572	700008	20	-	16007	Northwest Pipeline Soda Springs	50.4	3.2	10.1	0.0	0.0	0.0	-
27	0.1	11	-1172147	374572	700008	10	-	16007	Northwest Pipeline Soda Springs	49.8	3.2	8.7	0.0	0.0	0.0	-
28	0.1	13	-1172147	374572	700008	30	-	16007	Northwest Pipeline Soda Springs	47.7	3.1	9.5	0.0	0.0	0.0	-

Table F3d. 2008 trona sources within the 12/4 km grid modeled with the CAMx Plume-in-Grid. Sources are ranked by their NOx emissions.

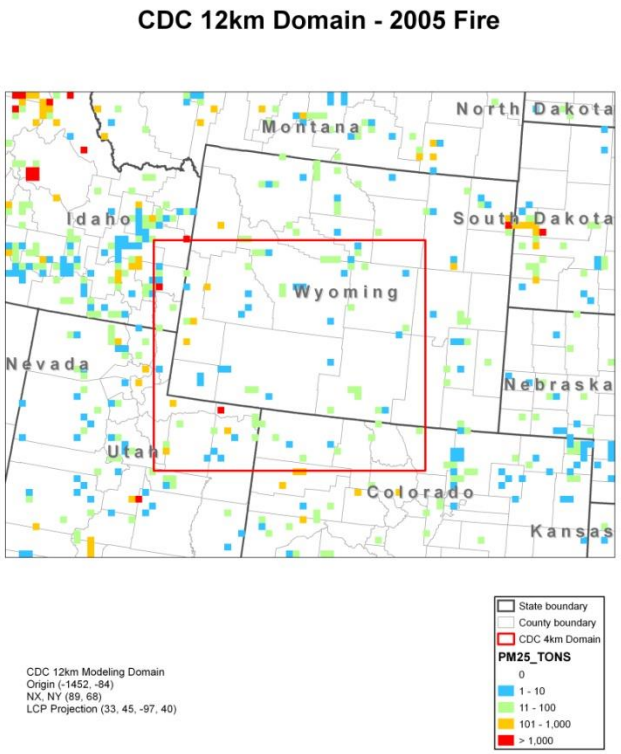
		Source Parameters								Emissions (TPY)						
Rank	NOx (tpd)	PT #	X (m)	Y (m)	Plant ID	Stack ID	ORISID	FIPS	Plant	NOx	VOC	CO	SO2	PM10	PM2.5	NH3
1	4.5	90	-1051622	249014	5603700002	4457	0	56037	Green River Trona Plant	1642.6	11.4	97.5	3285.2	345.5	0	0
2	3	89	-1051622	249014	5603700002	4456	1	56037	Green River Trona Plant	1099.1	7.2	61.6	2096.4	214.8	0	0
3	1.5	154	-1062820	260555	5603700010	4318	2	56037	Soda Ash Facility - Granger	531.3	2.9	153.6	138.6	145	0	0
4	1.4	155	-1062820	260555	5603700010	4319	3	56037	Soda Ash Facility - Granger	525.5	2.7	207	168.2	145.6	0	0
5	1.3	114	-1054153	240283	5603700005	40714	4	56037	Green River Soda Ash Plant	482.5	2	48.2	19.3	21.1	0	0
6	1.3	113	-1054023	240254	5603700005	40713	5	56037	Green River Soda Ash Plant	482.4	2	49.2	19.7	22	0	0
7	0.2	66	-1051622	249014	5603700002	4428	6	56037	Green River Trona Plant	70.7	107.1	1274.8	0	159.2	0	0
8	0.1	67	-1051622	249014	5603700002	4429	7	56037	Green River Trona Plant	52.1	102.5	2472.7	0	159.1	0	0

Table F4a. 2008 CD-C 4 km Domain Emission Summary using 2005 meteorology (tpy).

STATE	Oil and Gas Sources			Source Category							
	Compressor	Drilling	Production	Area	Onroad	Offroad	EGU	NEGU	Trona	Biogenic	Fire
CO											
Colorado	777	0	45	2,448	18,082	7,931	1,356	58	0	10,053	2,224
Idaho	263	0	0	487	2,563	4,545	0	10,909	0	6,777	16,701
Utah	1,747	0	4	1,974	19,482	12,212	426	645	0	2,504	17,793
Wyoming (5 counties)	4,403	2,600	3,509	6,186	37,451	15,649	3,323	3,466	12,492	8,667	6,157
Wyoming (rest)	975	286	540	7,656	34,112	20,696	15	1,416	0	9,532	2,434
NOx											
Colorado	1,311	0	51	152	1,730	1,245	28,689	86	0	566	66
Idaho	1,282	0	0	340	300	675	0	1,932	0	352	575
Utah	3,175	0	4	214	1,920	1,771	7,209	1,130	0	140	515
Wyoming (5 counties)	8,660	5,800	4,206	3,167	4,556	14,154	38,501	7,042	6,330	443	210
Wyoming (rest)	1,957	638	375	3,967	4,004	4,941	27	1,441	0	490	85
TOG											
Colorado	1,097	0	18,299	1,608	1,390	1,703	137	267	0	53,008	116
Idaho	547	0	0	3,895	207	1,458	0	10	0	32,183	704
Utah	24,092	0	151	2,015	1,430	3,533	64	2,057	0	13,009	945
Wyoming (5 counties)	21,955	1,449	891,377	8,823	2,917	3,193	1,072	3,958	16,162	38,617	273
Wyoming (rest)	7,204	148	205,272	9,740	2,838	2,623	6	2,615	0	42,181	102
PM											
Colorado	10	0	8	371	48	135	410	3,852	0		320
Idaho	0	0	0	129	9	96	0	469	0		1,950
Utah	31	0	0	79	55	203	570	225	0		2,602
Wyoming (5 counties)	126	179	120	875	128	667	9,591	10,529	3,610		751
Wyoming (rest)	34	42	23	1,142	113	312	7	600	0		282
SO2											
Colorado	0	0	9	80	11	33	7,794	4	0		20
Idaho	1	0	0	15	2	18	0	8,918	0		125
Utah	5	0	0	144	12	44	973	6	0		159
Wyoming (5 counties)	168	342	1,599	2,430	27	295	43,977	7,960	5,763		48
Wyoming (rest)	5	89	3,298	3,988	25	111	1	1,848	0		18

Table F4b. 2008 CD-C 4 km Domain Emission Summary using 2006 meteorology (tpy).

STATE	Oil and Gas Sources			Source Category							
	Compressor	Drilling	Production	Area	Onroad	Offroad	EGU	NEGU	Trona	Biogenic	Fire
CO											
Colorado	777	0	45	2,448	18,362	7,931	1,356	58	0	10,462	2,073
Idaho	263	0	0	487	2,580	4,545	0	10,909	0	6,916	13,597
Utah	1,747	0	4	1,974	19,598	12,212	426	645	0	2,597	6,011
Wyoming (5 counties)	4,403	2,600	3,509	6,186	38,037	15,649	3,323	3,466	12,492	9,391	15,119
Wyoming (rest)	975	286	540	7,656	34,631	20,696	15	1,416	0	10,071	48,047
NOx											
Colorado	1,311	0	51	152	1,735	1,245	28,689	86	0	607	70
Idaho	1,282	0	0	340	301	675	0	1,932	0	373	491
Utah	3,175	0	4	214	1,924	1,771	7,209	1,130	0	150	197
Wyoming (5 counties)	8,660	5,800	4,206	3,167	4,570	14,154	38,501	7,042	6,330	492	443
Wyoming (rest)	1,957	638	375	3,967	4,018	4,941	27	1,441	0	530	1,446
TOG											
Colorado	1,097	0	18,299	1,608	1,403	1,703	137	267	0	54,105	94
Idaho	547	0	0	3,895	208	1,458	0	10	0	31,941	545
Utah	24,092	0	151	2,015	1,436	3,533	64	2,057	0	13,133	274
Wyoming (5 counties)	21,955	1,449	891,377	8,823	2,938	3,193	1,072	3,958	16,162	42,058	800
Wyoming (rest)	7,204	148	205,272	9,740	2,858	2,623	6	2,615	0	44,609	2,510
PM											
Colorado	10	0	8	371	48	135	410	3,852	0		261
Idaho	0	0	0	129	9	96	0	469	0		1,513
Utah	31	0	0	79	55	203	570	225	0		756
Wyoming (5 counties)	126	179	120	875	128	667	9,591	10,529	3,610		2,203
Wyoming (rest)	34	42	23	1,142	113	312	7	600	0		6,936
SO2											
Colorado	0	0	9	80	11	33	7,794	4	0		16
Idaho	1	0	0	15	2	18	0	8,918	0		97
Utah	5	0	0	144	12	44	973	6	0		48
Wyoming (5 counties)	168	342	1,599	2,430	27	295	43,977	7,960	5,763		134
Wyoming (rest)	5	89	3,298	3,988	25	111	1	1,848	0		422



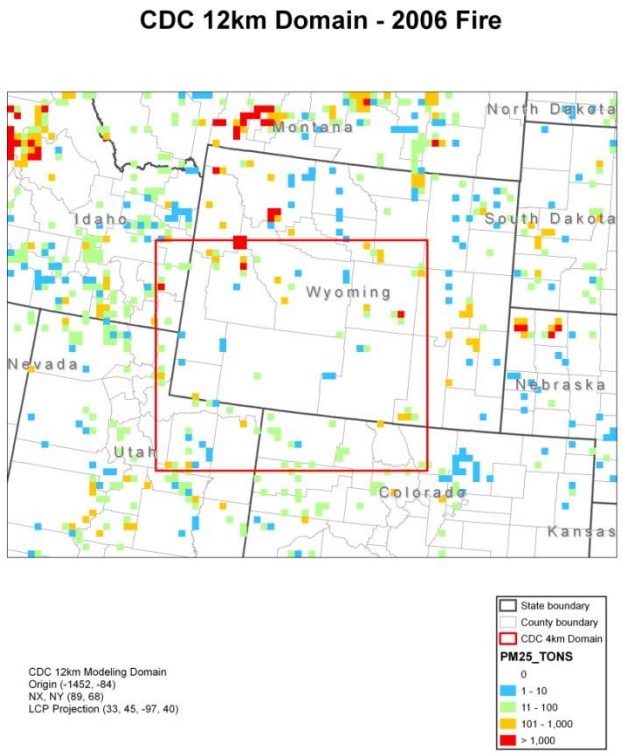
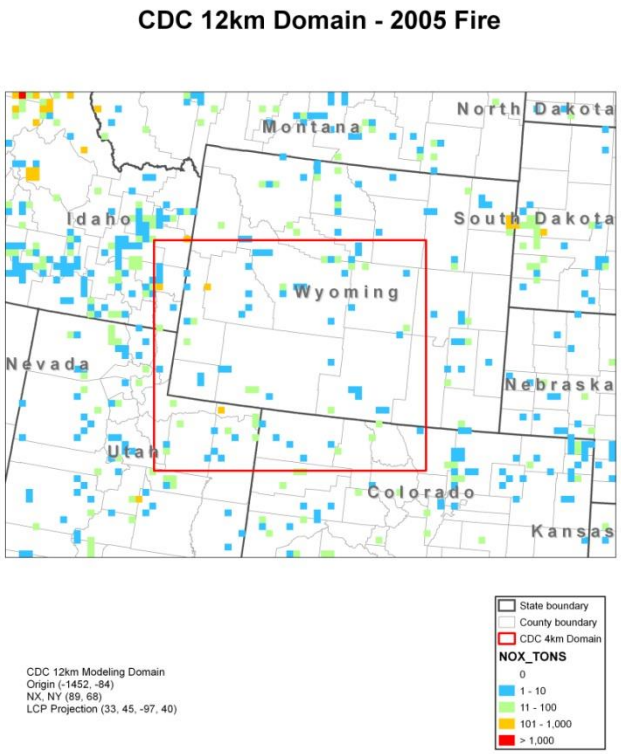


Figure F8a. Comparison of 2005 and 2006 $PM_{2.5}$ fire emissions within the 12/4 km domain. Note that the 2008 baseline simulation using 2005 meteorology will use the 2005 fire emissions, and the 2008 baseline simulation using 2006 meteorology will use the 2006 fire emissions.



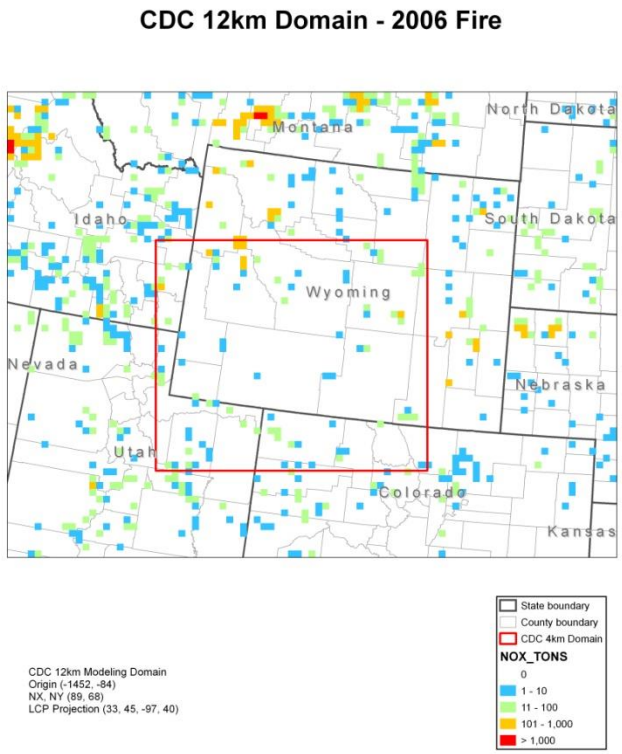


Figure F8b. Comparison of 2005 and 2006 NOx fire emissions within the 12/4 km domain. Note that the 2008 baseline simulation using 2005 meteorology will use the 2005 fire emissions, and the 2008 baseline simulation using 2006 meteorology will use the 2006 fire emissions.

Table F5. Southwest Wyoming Speciation Profile Code by Process by County.

Basin	O&G Field / County	O&G production –Processes	Profile Code
SW Wyoming	Carbon	flash	CBN01
SW Wyoming	Carbon	fugitive - sales	CBN02
SW Wyoming	Carbon	fugitive - produced	CBN03
SW Wyoming	Carbon	fugitive - condensate	CBN04
SW Wyoming	Carbon	pneumatic pumps	CBN05
SW Wyoming	Carbon	well venting	CBN06
SW Wyoming	Jonah	flash	JON01
SW Wyoming	Jonah	fugitives	JON02
SW Wyoming	Jonah	pneumatic pumps	JON05
SW Wyoming	Jonah	well venting	JON06
SW Wyoming	Lincoln	flash	LNC01
SW Wyoming	Lincoln	fugitive - sales	LNC02
SW Wyoming	Lincoln	fugitive - produced	LNC03
SW Wyoming	Lincoln	fugitive - condensate	LNC04
SW Wyoming	Lincoln	pneumatic pumps	LNC05
SW Wyoming	Lincoln	well venting	LNC06
SW Wyoming	Pinedale	flash	PND01
SW Wyoming	Pinedale	fugitives	PND02
SW Wyoming	Pinedale	pneumatic pumps	PND05
SW Wyoming	Pinedale	well venting	PND06
SW Wyoming	Sublette	flash	SBL01
SW Wyoming	Sublette	fugitive - sales	SBL02
SW Wyoming	Sublette	fugitive - produced	SBL03
SW Wyoming	Sublette	fugitive - condensate	SBL04
SW Wyoming	Sublette	pneumatic pumps	SBL05
SW Wyoming	Sublette	well venting	SBL06
SW Wyoming	Sweetwater - East	flash	SWE01
SW Wyoming	Sweetwater - East	fugitive - sales	SWE02
SW Wyoming	Sweetwater - East	fugitive - produced	SWE03
SW Wyoming	Sweetwater - East	fugitive - condensate	SWE04
SW Wyoming	Sweetwater - East	pneumatic pumps	SWE05
SW Wyoming	Sweetwater - East	well venting	SWE06
SW Wyoming	Sweetwater - West	flash	SWW01
SW Wyoming	Sweetwater - West	fugitive - sales	SWW02
SW Wyoming	Sweetwater - West	fugitive - produced	SWW03
SW Wyoming	Sweetwater - West	fugitive - condensate	SWW04

Basin	O&G Field / County	O&G production –Processes	Profile Code
SW Wyoming	Sweetwater - West	pneumatic pumps	SWW05
SW Wyoming	Sweetwater - West	well venting	SWW06
SW Wyoming	Uinta	flash	UNT01
SW Wyoming	Uinta	fugitive - sales	UNT02
SW Wyoming	Uinta	fugitive - produced	UNT03
SW Wyoming	Uinta	fugitive - condensate	UNT04
SW Wyoming	Uinta	pneumatic pumps	UNT05
SW Wyoming	Uinta	well venting	UNT06

Table F6. CB-05 Species Names and Abbreviations Used in Table F5.

Species Name	Description
MEOH	Methanol
ETHA	Ethane
PAR	Paraffin carbon bond (C-C)
TOL	Toluene and other monoalkyl aromatics
XYL	Xylene and other polyalkyl aromatics
UNR	Unreactive

Table F7. SMOKE speciation profiles used in SW Wyoming O&G emissions modeling.

	Sum of splitFactor	modelSpecies												
Data source	Profile	CH4	ETHA	PAR	TOL	UNR	XYL	FORM	OLE	ETH	ALD2	ALDX	IOLE	UNK
Gas profiles provided by Sage	CBN01	0.1397	0.1025	0.6374	0.0090	0.1066	0.0048							
Gas profiles provided by Sage	CBN02	0.7339	0.1103	0.1162	0.0009	0.0382	0.0005							
Gas profiles provided by Sage	CBN03	0.7339	0.1103	0.1162	0.0009	0.0382	0.0005							
Gas profiles provided by Sage	CBN04	0.1400	0.1015	0.6393	0.0090	0.1055	0.0047							
Gas profiles provided by Sage	CBN05	0.7339	0.1103	0.1162	0.0009	0.0382	0.0005							
Gas profiles provided by Sage	CBN06	0.7339	0.1103	0.1162	0.0009	0.0382	0.0005							
Gas profiles provided by Sage	JON01	0.2372	0.1141	0.5530	0.0037	0.0842	0.0078							
Gas profiles provided by Sage	JON02	0.5389	0.0583	0.3373	0.0180	0.0189	0.0287							
Gas profiles provided by Sage	JON05	0.8146	0.0878	0.0744	0.0012	0.0215	0.0006							
Gas profiles provided by Sage	JON06	0.8146	0.0878	0.0744	0.0012	0.0215	0.0006							
Gas profiles provided by Sage	LNC01	0.1545	0.1512	0.5528	0.0146	0.1198	0.0071							
Gas profiles provided by Sage	LNC02	0.8045	0.0902	0.0812		0.0241								
Gas profiles provided by Sage	LNC03	0.8045	0.0902	0.0812		0.0241								
Gas profiles provided by Sage	LNC04	0.1400	0.1015	0.6393	0.0090	0.1055	0.0047							
Gas profiles provided by Sage	LNC05	0.8045	0.0902	0.0812		0.0241								
Gas profiles provided by Sage	LNC06	0.8045	0.0902	0.0812		0.0241								
Gas profiles provided by Sage	PND01	0.2527	0.1272	0.5170	0.0116	0.0854	0.0061							
Gas profiles provided by Sage	PND02	0.5517	0.1076	0.2759	0.0035	0.0594	0.0019							
Gas profiles provided by Sage	PND05	0.8146	0.0878	0.0744	0.0012	0.0215	0.0006							
Gas profiles provided by Sage	PND06	0.7743	0.0990	0.0953	0.0010	0.0298	0.0005							
Gas profiles provided by Sage	SBL01	0.1545	0.1512	0.5528	0.0146	0.1198	0.0071							
Gas profiles provided by Sage	SBL02	0.8045	0.0902	0.0812		0.0241								
Gas profiles provided by Sage	SBL03	0.8045	0.0902	0.0812		0.0241								
Gas profiles provided by Sage	SBL04	0.1555	0.1127	0.6547	0.0100	0.0618	0.0053							
Gas profiles provided by Sage	SBL05	0.8045	0.0902	0.0812		0.0241								
Gas profiles provided by Sage	SBL06	0.8045	0.0902	0.0812		0.0241								
Gas profiles provided by Sage	SWE01	0.1397	0.1025	0.6374	0.0090	0.1066	0.0048							
Gas profiles provided by Sage	SWE02	0.7339	0.1103	0.1162	0.0009	0.0382	0.0005							
Gas profiles provided by Sage	SWE03	0.7339	0.1103	0.1162	0.0009	0.0382	0.0005							
Gas profiles provided by Sage	SWE04	0.1400	0.1015	0.6393	0.0090	0.1055	0.0047							
Gas profiles provided by Sage	SWE05	0.7339	0.1103	0.1162	0.0009	0.0382	0.0005							
Gas profiles provided by Sage	SWE06	0.7339	0.1103	0.1162	0.0009	0.0382	0.0005							
Gas profiles provided by Sage	SWW01	0.1545	0.1512	0.5528	0.0146	0.1198	0.0071							
Gas profiles provided by Sage	SWW02	0.8045	0.0902	0.0812		0.0241								
Gas profiles provided by Sage	SWW03	0.8045	0.0902	0.0812		0.0241								
Gas profiles provided by Sage	SWW04	0.1400	0.1015	0.6393	0.0090	0.1055	0.0047							
Gas profiles provided by Sage	SWW05	0.8045	0.0902	0.0812		0.0241								
Gas profiles provided by Sage	SWW06	0.8045	0.0902	0.0812		0.0241								
Gas profiles provided by Sage	UNT01	0.1545	0.1512	0.5528	0.0146	0.1198	0.0071							
Gas profiles provided by Sage	UNT02	0.8045	0.0902	0.0812		0.0241								
Gas profiles provided by Sage	UNT03	0.8045	0.0902	0.0812		0.0241								
Gas profiles provided by Sage	UNT04	0.1400	0.1015	0.6393	0.0090	0.1055	0.0047							
Gas profiles provided by Sage	UNT05	0.8045	0.0902	0.0812		0.0241								
Gas profiles provided by Sage	UNT06	0.8045	0.0902	0.0812		0.0241								
SPECIATE4.1 profile	1	0.1100		0.4700				0.4200						
SPECIATE4.1 profile	2			0.5034		0.0096		0.4870						
SPECIATE4.1 profile	3	0.5600		0.2864	0.0200	0.0536		0.0800						
SPECIATE4.1 profile	4	0.0760	0.2090	0.4278		0.0945		0.0760	0.1167					
SPECIATE4.1 profile	7	0.7000						0.3000						
SPECIATE4.1 profile	9	0.1160	0.0280	0.1943		0.1223			0.2523	0.2870				
SPECIATE4.1 profile	51	0.2000	0.3000	0.1500		0.1500		0.2000						
SPECIATE4.1 profile	297	0.0880	0.0270	0.7676	0.0140	0.1034								
SPECIATE4.1 profile	1001	0.7669	0.1400	0.0443	0.0006	0.0171	0.0010	0.0082	0.0121	0.0063	0.0003	0.0001	0.0031	
SPECIATE4.1 profile	1010	0.4630	0.0699	0.4115		0.0556								
SPECIATE4.1 profile	1011	0.3760	0.0640	0.4996		0.0604								
SPECIATE4.1 profile	1012	0.6130	0.0790	0.2674		0.0406								
SPECIATE4.1 profile	1201	0.0580		0.4537	0.0055	0.0060		0.0861	0.0602	0.1996	0.0291	0.0171		0.0847

Table F8. SMOKE speciation cross reference for SW Wyoming O&G emissions modeling.

SCC	Source Category	Profile_Name	Profile Description	County	County_Code
2310030300	Industrial Processes, Oil and Gas Production, Natural Gas Liquids, Tanks - Flashing & Standing/Working/Breat	CBN01	flash	Carbon	56007
2310020700	Industrial Processes, Oil and Gas Production, Natural Gas, Fugitives	CBN03	fugitive - produced	Carbon	56007
2310020900	Industrial Processes, Oil and Gas Production, Natural Gas, Pneumatic Pumps	CBN05	pneumatic pumps	Carbon	56007
2310020100	Industrial Processes, Oil and Gas Production, Natural Gas, Dehydrators	CBN03	fugitive - produced	Carbon	56007
2310020400	Industrial Processes, Oil and Gas Production, Natural Gas, Venting - Blowdowns	CBN06	well venting	Carbon	56007
2310030300	Industrial Processes, Oil and Gas Production, Natural Gas Liquids, Tanks - Flashing & Standing/Working/Breat	JON01	flash	Jonah	56034
2310020700	Industrial Processes, Oil and Gas Production, Natural Gas, Fugitives	JON02	fugitives	Jonah	56034
2310020900	Industrial Processes, Oil and Gas Production, Natural Gas, Pneumatic Pumps	JON05	pneumatic pumps	Jonah	56034
2310020100	Industrial Processes, Oil and Gas Production, Natural Gas, Dehydrators	JON02	fugitives	Jonah	56034
2310020400	Industrial Processes, Oil and Gas Production, Natural Gas, Venting - Blowdowns	JON06	well venting	Jonah	56034
2310030300	Industrial Processes, Oil and Gas Production, Natural Gas Liquids, Tanks - Flashing & Standing/Working/Breat	LNC01	flash	Lincoln	56023
2310020700	Industrial Processes, Oil and Gas Production, Natural Gas, Fugitives	LNC03	fugitive - produced	Lincoln	56023
2310020900	Industrial Processes, Oil and Gas Production, Natural Gas, Pneumatic Pumps	LNC05	pneumatic pumps	Lincoln	56023
2310020100	Industrial Processes, Oil and Gas Production, Natural Gas, Dehydrators	LNC03	fugitive - produced	Lincoln	56023
2310020400	Industrial Processes, Oil and Gas Production, Natural Gas, Venting - Blowdowns	LNC06	well venting	Lincoln	56023
2310030300	Industrial Processes, Oil and Gas Production, Natural Gas Liquids, Tanks - Flashing & Standing/Working/Breat	PND01	flash	Pinedale	56036
2310020700	Industrial Processes, Oil and Gas Production, Natural Gas, Fugitives	PND02	fugitives	Pinedale	56036
2310020900	Industrial Processes, Oil and Gas Production, Natural Gas, Pneumatic Pumps	PND05	pneumatic pumps	Pinedale	56036
2310020100	Industrial Processes, Oil and Gas Production, Natural Gas, Dehydrators	PND02	fugitives	Pinedale	56036
2310020400	Industrial Processes, Oil and Gas Production, Natural Gas, Venting - Blowdowns	PND06	well venting	Pinedale	56036
2310030300	Industrial Processes, Oil and Gas Production, Natural Gas Liquids, Tanks - Flashing & Standing/Working/Breat	SBL01	flash	Sublette	56035
2310020700	Industrial Processes, Oil and Gas Production, Natural Gas, Fugitives	SBL03	fugitive - produced	Sublette	56035
2310020900	Industrial Processes, Oil and Gas Production, Natural Gas, Pneumatic Pumps	SBL05	pneumatic pumps	Sublette	56035
2310020100	Industrial Processes, Oil and Gas Production, Natural Gas, Dehydrators	SBL03	fugitive - produced	Sublette	56035
2310020400	Industrial Processes, Oil and Gas Production, Natural Gas, Venting - Blowdowns	SBL06	well venting	Sublette	56035
2310030300	Industrial Processes, Oil and Gas Production, Natural Gas Liquids, Tanks - Flashing & Standing/Working/Breat	SWE01	flash	Sweetwater - East	56038
2310020700	Industrial Processes, Oil and Gas Production, Natural Gas, Fugitives	SWE03	fugitive - produced	Sweetwater - East	56038
2310020900	Industrial Processes, Oil and Gas Production, Natural Gas, Pneumatic Pumps	SWE05	pneumatic pumps	Sweetwater - East	56038
2310020100	Industrial Processes, Oil and Gas Production, Natural Gas, Dehydrators	SWE03	fugitive - produced	Sweetwater - East	56038
2310020400	Industrial Processes, Oil and Gas Production, Natural Gas, Venting - Blowdowns	SWE06	well venting	Sweetwater - East	56038
2310030300	Industrial Processes, Oil and Gas Production, Natural Gas Liquids, Tanks - Flashing & Standing/Working/Breat	SWW01	flash	Sweetwater - West	56037
2310020700	Industrial Processes, Oil and Gas Production, Natural Gas, Fugitives	SWW03	fugitive - produced	Sweetwater - West	56037
2310020900	Industrial Processes, Oil and Gas Production, Natural Gas, Pneumatic Pumps	SWW05	pneumatic pumps	Sweetwater - West	56037
2310020100	Industrial Processes, Oil and Gas Production, Natural Gas, Dehydrators	SWW03	fugitive - produced	Sweetwater - West	56037
2310020400	Industrial Processes, Oil and Gas Production, Natural Gas, Venting - Blowdowns	SWW06	well venting	Sweetwater - West	56037
2310030300	Industrial Processes, Oil and Gas Production, Natural Gas Liquids, Tanks - Flashing & Standing/Working/Breat	UNT01	flash	Uinta	56041
2310020700	Industrial Processes, Oil and Gas Production, Natural Gas, Fugitives	UNT03	fugitive - produced	Uinta	56041
2310020900	Industrial Processes, Oil and Gas Production, Natural Gas, Pneumatic Pumps	UNT05	pneumatic pumps	Uinta	56041
2310020100	Industrial Processes, Oil and Gas Production, Natural Gas, Dehydrators	UNT03	fugitive - produced	Uinta	56041
2310020400	Industrial Processes, Oil and Gas Production, Natural Gas, Venting - Blowdowns	UNT06	well venting	Uinta	56041
2310000110	Industrial Processes, Oil and Gas Production, All Processes, Drill Rigs	9	Reciprocating Distillate Oil Engine		
2310024100	Industrial Processes, Oil and Gas Production, Natural Gas, Heaters	3	External Combustion Boiler - Natural Gas		
2230070000	Mobile Sources; Highway Vehicles - Diesel; All HDDV including Buses (use subdivisions -071 thru -075 if possi	1201	Light-Duty Diesel Vehicles		

Table F8. SMOKE speciation cross reference for SW Wyoming O&G emissions modeling (continued).

SCC	Source Cat	Profile_Name	Profile Description	County	County_Code
20200201	Internal Combustion Engines; Industrial; Natural Gas; Turbine	7	Natural Gas Turbine		
20200202	Internal Combustion Engines; Industrial; Natural Gas; Reciprocating	1001	Internal Combustion Engine - Natural Gas		
20200203	Internal Combustion Engines; Industrial; Natural Gas; Turbine: Cogeneration	7	Natural Gas Turbine		
20200204	Internal Combustion Engines; Industrial; Natural Gas; Reciprocating: Cogeneration	1001	Internal Combustion Engine - Natural Gas		
20200209	Internal Combustion Engines; Industrial; Natural Gas; Turbine: Exhaust	7	Natural Gas Turbine		
20200252	Internal Combustion Engines; Industrial; Natural Gas; 2-cycle Lean Burn	1001	Internal Combustion Engine - Natural Gas		
20200253	Internal Combustion Engines; Industrial; Natural Gas; 4-cycle Rich Burn	1001	Internal Combustion Engine - Natural Gas		
20200254	Internal Combustion Engines; Industrial; Natural Gas; 4-cycle Lean Burn	1001	Internal Combustion Engine - Natural Gas		
20200256	Internal Combustion Engines; Industrial; Natural Gas; 4-cycle Clean Burn	1001	Internal Combustion Engine - Natural Gas		
31000101	Industrial Processes; Oil and Gas Production; Crude Oil Production; Complete Well: Fugitive Emissions	SWE03	fugitive - produced	Sweetwater - East	
31000102	Industrial Processes; Oil and Gas Production; Crude Oil Production; Miscellaneous Well: General	1011	Oil and Gas Production - Fugitives - Valves and Fittings - Liquid Service		
31000103	Industrial Processes; Oil and Gas Production; Crude Oil Production; Wells: Rod Pumps	1011	Oil and Gas Production - Fugitives - Valves and Fittings - Liquid Service		
31000104	Industrial Processes; Oil and Gas Production; Crude Oil Production; Crude Oil Sumps	1011	Oil and Gas Production - Fugitives - Valves and Fittings - Liquid Service		
31000105	Industrial Processes; Oil and Gas Production; Crude Oil Production; Crude Oil Pits	1011	Oil and Gas Production - Fugitives - Valves and Fittings - Liquid Service		
31000107	Industrial Processes; Oil and Gas Production; Crude Oil Production; Oil/Gas/Water/Separation	1011	Oil and Gas Production - Fugitives - Valves and Fittings - Liquid Service		
31000108	Industrial Processes; Oil and Gas Production; Crude Oil Production; Evaporation from Liquid Leaks into Oil We	1011	Oil and Gas Production - Fugitives - Valves and Fittings - Liquid Service		
31000123	Industrial Processes; Oil and Gas Production; Crude Oil Production; Well Casing Vents	1011	Oil and Gas Production - Fugitives - Valves and Fittings - Liquid Service		
31000124	Industrial Processes; Oil and Gas Production; Crude Oil Production; Valves: General	SWE03	fugitive - produced	Sweetwater - East	
31000125	Industrial Processes; Oil and Gas Production; Crude Oil Production; Relief Valves	SWE03	fugitive - produced	Sweetwater - East	
31000126	Industrial Processes; Oil and Gas Production; Crude Oil Production; Pump Seals	SWE03	fugitive - produced	Sweetwater - East	
31000127	Industrial Processes; Oil and Gas Production; Crude Oil Production; Ranges and Connections	SWE03	fugitive - produced	Sweetwater - East	
31000128	Industrial Processes; Oil and Gas Production; Crude Oil Production; Oil Heating	2	External Combustion Boiler - Distillate Oil		
31000129	Industrial Processes; Oil and Gas Production; Crude Oil Production; Gas/Liquid Separation	1011	Oil and Gas Production - Fugitives - Valves and Fittings - Liquid Service		
31000130	Industrial Processes; Oil and Gas Production; Crude Oil Production; Fugitives: Compressor Seals	SWE03	fugitive - produced	Sweetwater - East	
31000132	Industrial Processes; Oil and Gas Production; Crude Oil Production; Atmospheric Wash Tank (2nd Stage of Ga	1011	Oil and Gas Production - Fugitives - Valves and Fittings - Liquid Service		
31000160	Industrial Processes; Oil and Gas Production; Crude Oil Production; Flares	1011	Oil and Gas Production - Fugitives - Valves and Fittings - Liquid Service		
31000199	Industrial Processes; Oil and Gas Production; Crude Oil Production; Processing Operations: Not Classified	1011	Oil and Gas Production - Fugitives - Valves and Fittings - Liquid Service		
31000201	Industrial Processes; Oil and Gas Production; Natural Gas Production; Gas Sweetening: Amine Process	SWE03	fugitive - produced	Sweetwater - East	
31000202	Industrial Processes; Oil and Gas Production; Natural Gas Production; Gas Stripping Operations	1012	Oil and Gas Production - Fugitives - Valves and Fittings - Gas Service		
31000203	Industrial Processes; Oil and Gas Production; Natural Gas Production; Compressors	1001	Internal Combustion Engine - Natural Gas		
31000204	Industrial Processes; Oil and Gas Production; Natural Gas Production; Wells	1012	Oil and Gas Production - Fugitives - Valves and Fittings - Gas Service		
31000205	Industrial Processes; Oil and Gas Production; Natural Gas Production; Flares	51	Flares - Natural Gas		
31000206	Industrial Processes; Oil and Gas Production; Natural Gas Production; Gas Lift	1001	Internal Combustion Engine - Natural Gas		
31000207	Industrial Processes; Oil and Gas Production; Natural Gas Production; Valves: Fugitive Emissions	SWE03	fugitive - produced	Sweetwater - East	
31000208	Industrial Processes; Oil and Gas Production; Natural Gas Production; Sulfur Recovery Unit	1012	Oil and Gas Production - Fugitives - Valves and Fittings - Gas Service		
31000209	Industrial Processes; Oil and Gas Production; Natural Gas Production; Incinerators Burning Waste Gas or Augr	1012	Oil and Gas Production - Fugitives - Valves and Fittings - Gas Service		
31000215	Industrial Processes; Oil and Gas Production; Natural Gas Production; Flares Combusting Gases >1000 BTU/s	51	Flares - Natural Gas		
31000216	Industrial Processes; Oil and Gas Production; Natural Gas Production; Flares Combusting Gases <1000 BTU/s	51	Flares - Natural Gas		
31000220	Industrial Processes; Oil and Gas Production; Natural Gas Production; All Equipt Leak Fugitives (Valves, Flang	SWE03	fugitive - produced	Sweetwater - East	
31000222	Industrial Processes; Oil and Gas Production; Natural Gas Production; Drilling and Well Completion	SWE03	fugitive - produced	Sweetwater - East	
31000223	Industrial Processes; Oil and Gas Production; Natural Gas Production; Relief Valves	SWE03	fugitive - produced	Sweetwater - East	
31000224	Industrial Processes; Oil and Gas Production; Natural Gas Production; Pump Seals	SWE03	fugitive - produced	Sweetwater - East	
31000225	Industrial Processes; Oil and Gas Production; Natural Gas Production; Compressor Seals	SWE03	fugitive - produced	Sweetwater - East	
31000226	Industrial Processes; Oil and Gas Production; Natural Gas Production; Flanges and Connections	SWE03	fugitive - produced	Sweetwater - East	
31000227	Industrial Processes; Oil and Gas Production; Natural Gas Production; Glycol Dehydrator Reboiler Still Stack	SWE03	fugitive - produced	Sweetwater - East	
31000228	Industrial Processes; Oil and Gas Production; Natural Gas Production; Glycol Dehydrator Reboiler Burner	3	External Combustion Boiler - Natural Gas		
31000229	Industrial Processes; Oil and Gas Production; Natural Gas Production; Gathering Lines	1012	Oil and Gas Production - Fugitives - Valves and Fittings - Gas Service		
31000231	Industrial Processes; Oil and Gas Production; Natural Gas Production; Fugitives: Drains	1012	Oil and Gas Production - Fugitives - Valves and Fittings - Gas Service		
31000299	Industrial Processes; Oil and Gas Production; Natural Gas Production; Other Not Classified	1012	Oil and Gas Production - Fugitives - Valves and Fittings - Gas Service		

Table F8 SMOKE speciation cross reference for SW Wyoming O&G emissions modeling (concluded).

SCC	Source Cat	Profile_Name	Profile Description	County	County_Code
31000301	Industrial Processes; Oil and Gas Production; Natural Gas Processing Facilities; Glycol Dehydrators: Reboiler	SWE03	fugitive - produced	Sweetwater - East	
31000302	Industrial Processes; Oil and Gas Production; Natural Gas Processing Facilities; Glycol Dehydrators: Reboiler	SWE03	fugitive - produced	Sweetwater - East	
31000303	Industrial Processes; Oil and Gas Production; Natural Gas Processing Facilities; Glycol Dehydrators: Phase Se	SWE03	fugitive - produced	Sweetwater - East	
31000304	Industrial Processes; Oil and Gas Production; Natural Gas Processing Facilities; Glycol Dehydrators: Ethylene	SWE03	fugitive - produced	Sweetwater - East	
31000305	Industrial Processes; Oil and Gas Production; Natural Gas Processing Facilities; Gas Sweeting: Amine Process	SWE03	fugitive - produced	Sweetwater - East	
31000306	Industrial Processes; Oil and Gas Production; Natural Gas Processing Facilities; Process Valves	SWE03	fugitive - produced	Sweetwater - East	
31000307	Industrial Processes; Oil and Gas Production; Natural Gas Processing Facilities; Relief Valves	SWE03	fugitive - produced	Sweetwater - East	
31000310	Industrial Processes; Oil and Gas Production; Natural Gas Processing Facilities; Pump Seals	SWE03	fugitive - produced	Sweetwater - East	
31000311	Industrial Processes; Oil and Gas Production; Natural Gas Processing Facilities; Flanges and Connections	SWE03	fugitive - produced	Sweetwater - East	
31000401	Industrial Processes; Oil and Gas Production; Process Heaters; Distillate Oil (No. 2)	2	External Combustion Boiler - Distillate Oil		
31000403	Industrial Processes; Oil and Gas Production; Process Heaters; Crude Oil	1	External Combustion Boiler - Residual Oil		
31000404	Industrial Processes; Oil and Gas Production; Process Heaters; Natural Gas	3	External Combustion Boiler - Natural Gas		
31000405	Industrial Processes; Oil and Gas Production; Process Heaters; Process Gas	4	External Combustion Boiler - Refinery Gas		
31000413	Industrial Processes; Oil and Gas Production; Process Heaters; Crude Oil: Steam Generators	1	External Combustion Boiler - Residual Oil		
31000414	Industrial Processes; Oil and Gas Production; Process Heaters; Natural Gas: Steam Generators	3	External Combustion Boiler - Natural Gas		
31000415	Industrial Processes; Oil and Gas Production; Process Heaters; Process Gas: Steam Generators	4	External Combustion Boiler - Refinery Gas		
31000501	Industrial Processes; Oil and Gas Production; Liquid Waste Treatment; Floatation Units	1011	Oil and Gas Production - Fugitives - Valves and Fittings - Liquid Service		
31000502	Industrial Processes; Oil and Gas Production; Liquid Waste Treatment; Liquid - Liquid Separator	1011	Oil and Gas Production - Fugitives - Valves and Fittings - Liquid Service		
31000506	Industrial Processes; Oil and Gas Production; Liquid Waste Treatment; Oil-Water Separation Wastewater Hold	1011	Oil and Gas Production - Fugitives - Valves and Fittings - Liquid Service		
31088801	Industrial Processes; Oil and Gas Production; Fugitive Emissions; Specify in Comments Field	SWE03	fugitive - produced	Sweetwater - East	
31088804	Industrial Processes; Oil and Gas Production; Fugitive Emissions; Specify in Comments Field	SWE03	fugitive - produced	Sweetwater - East	
31088811	Industrial Processes; Oil and Gas Production; Fugitive Emissions; Fugitive Emissions	SWE03	fugitive - produced	Sweetwater - East	
40400301	Petroleum and Solvent Evaporation; Petroleum Liquids Storage (non-Refinery); Oil and Gas Field Storage and	SWE01	flash	Sweetwater - East	
40400302	Petroleum and Solvent Evaporation; Petroleum Liquids Storage (non-Refinery); Oil and Gas Field Storage and	SWE01	flash	Sweetwater - East	
40400304	Petroleum and Solvent Evaporation; Petroleum Liquids Storage (non-Refinery); Oil and Gas Field Storage and	SWE01	flash	Sweetwater - East	
40400305	Petroleum and Solvent Evaporation; Petroleum Liquids Storage (non-Refinery); Oil and Gas Field Storage and	SWE01	flash	Sweetwater - East	
40400306	Petroleum and Solvent Evaporation; Petroleum Liquids Storage (non-Refinery); Oil and Gas Field Storage and	SWE01	flash	Sweetwater - East	
40400307	Petroleum and Solvent Evaporation; Petroleum Liquids Storage (non-Refinery); Oil and Gas Field Storage and	SWE01	flash	Sweetwater - East	
40400311	Petroleum and Solvent Evaporation; Petroleum Liquids Storage (non-Refinery); Oil and Gas Field Storage and	SWE01	flash	Sweetwater - East	
40400312	Petroleum and Solvent Evaporation; Petroleum Liquids Storage (non-Refinery); Oil and Gas Field Storage and	SWE01	flash	Sweetwater - East	
40400313	Petroleum and Solvent Evaporation; Petroleum Liquids Storage (non-Refinery); Oil and Gas Field Storage and	SWE01	flash	Sweetwater - East	
40400314	Petroleum and Solvent Evaporation; Petroleum Liquids Storage (non-Refinery); Oil and Gas Field Storage and	SWE01	flash	Sweetwater - East	
40400315	Petroleum and Solvent Evaporation; Petroleum Liquids Storage (non-Refinery); Oil and Gas Field Storage and	SWE01	flash	Sweetwater - East	
40400322	Petroleum and Solvent Evaporation; Petroleum Liquids Storage (non-Refinery); Oil and Gas Field Storage and	SWE01	flash	Sweetwater - East	
40400332	Petroleum and Solvent Evaporation; Petroleum Liquids Storage (non-Refinery); Oil and Gas Field Storage and	SWE01	flash	Sweetwater - East	
31000000	Compressor Stations	1001	Internal Combustion Engine - Natural Gas		

Table F9. EPA default SMOKE speciation profiles for O&G

Profile	ALD2	ALDX	CH4	ETH	ETHA	FORM	OLE	PAR	TOL	UNK	UNR	ETOH	IOLE	ISOP	MEOH	NVOL	TERP	XYL
0	0.0177	0.0208	0.0732	0.0369	0.0138	0.0156	0.0554	0.4239	0.0620	0.0002	0.1849	0.0138	0.0066	0.0040	0.0139	0.0039	0.0068	0.0467
1			0.1100			0.4200		0.4700										
2						0.4870		0.5034			0.0096							
3			0.5600			0.0800		0.2864	0.0200		0.0536							
4			0.0760		0.2090	0.0760	0.1167	0.4278			0.0945							
51			0.2000		0.3000	0.2000		0.1500			0.1500							
1010			0.4630		0.0699			0.4115			0.0556							
1011			0.3760		0.0640			0.4996			0.0604							
1012			0.6130		0.0790			0.2674			0.0406							
1201	0.0291	0.0171	0.0580	0.1996		0.0861	0.0602	0.4537	0.0055	0.0847	0.0060							
9012			0.1301		0.0605	0.0888	0.0124	0.5983	0.0048		0.1037							0.0014
9015			0.5381		0.0744			0.3394			0.0481							

Table F10. EPA default SMOKE speciation cross reference for O&G.

SCC	Source Category Description	Profile	Profile Description
31000101	Industrial Processes; Oil and Gas Production; Crude Oil Production; Complete Well: Fugitive Emissions	1011	Oil and Gas Production - Fugitives - Valves and Fittings - Liquid Service
31000102	Industrial Processes; Oil and Gas Production; Crude Oil Production; Miscellaneous Well: General	1011	Oil and Gas Production - Fugitives - Valves and Fittings - Liquid Service
31000103	Industrial Processes; Oil and Gas Production; Crude Oil Production; Wells: Rod Pumps	1011	Oil and Gas Production - Fugitives - Valves and Fittings - Liquid Service
31000104	Industrial Processes; Oil and Gas Production; Crude Oil Production; Crude Oil Sumps	1011	Oil and Gas Production - Fugitives - Valves and Fittings - Liquid Service
31000105	Industrial Processes; Oil and Gas Production; Crude Oil Production; Crude Oil Pits	1011	Oil and Gas Production - Fugitives - Valves and Fittings - Liquid Service
31000106	Industrial Processes; Oil and Gas Production; Crude Oil Production; Enhanced Wells, Water Reinjection	1011	Oil and Gas Production - Fugitives - Valves and Fittings - Liquid Service
31000107	Industrial Processes; Oil and Gas Production; Crude Oil Production; Oil/Gas/Water/Separation	1011	Oil and Gas Production - Fugitives - Valves and Fittings - Liquid Service
31000108	Industrial Processes; Oil and Gas Production; Crude Oil Production; Evaporation from Liquid Leaks into	1011	Oil and Gas Production - Fugitives - Valves and Fittings - Liquid Service
31000121	Industrial Processes; Oil and Gas Production; Crude Oil Production; Site Preparation	1011	Oil and Gas Production - Fugitives - Valves and Fittings - Liquid Service
31000122	Industrial Processes; Oil and Gas Production; Crude Oil Production; Drilling and Well Completion	1011	Oil and Gas Production - Fugitives - Valves and Fittings - Liquid Service
31000123	Industrial Processes; Oil and Gas Production; Crude Oil Production; Well Casing Vents	1011	Oil and Gas Production - Fugitives - Valves and Fittings - Liquid Service
31000124	Industrial Processes; Oil and Gas Production; Crude Oil Production; Valves: General	1011	Oil and Gas Production - Fugitives - Valves and Fittings - Liquid Service
31000125	Industrial Processes; Oil and Gas Production; Crude Oil Production; Relief Valves	1011	Oil and Gas Production - Fugitives - Valves and Fittings - Liquid Service
31000126	Industrial Processes; Oil and Gas Production; Crude Oil Production; Pump Seals	1011	Oil and Gas Production - Fugitives - Valves and Fittings - Liquid Service
31000127	Industrial Processes; Oil and Gas Production; Crude Oil Production; Ranges and Connections	1011	Oil and Gas Production - Fugitives - Valves and Fittings - Liquid Service
31000128	Industrial Processes; Oil and Gas Production; Crude Oil Production; Oil Heating	1011	Oil and Gas Production - Fugitives - Valves and Fittings - Liquid Service
31000129	Industrial Processes; Oil and Gas Production; Crude Oil Production; Gas/Liquid Separation	1011	Oil and Gas Production - Fugitives - Valves and Fittings - Liquid Service
31000130	Industrial Processes; Oil and Gas Production; Crude Oil Production; Fugitives: Compressor Seals	1011	Oil and Gas Production - Fugitives - Valves and Fittings - Liquid Service
31000131	Industrial Processes; Oil and Gas Production; Crude Oil Production; Fugitives: Drains	1011	Oil and Gas Production - Fugitives - Valves and Fittings - Liquid Service
31000132	Industrial Processes; Oil and Gas Production; Crude Oil Production; Atmospheric Wash Tank (2nd Stag	1011	Oil and Gas Production - Fugitives - Valves and Fittings - Liquid Service
31000140	Industrial Processes; Oil and Gas Production; Crude Oil Production; Waste Sumps: Primary Light Crude	1011	Oil and Gas Production - Fugitives - Valves and Fittings - Liquid Service
31000141	Industrial Processes; Oil and Gas Production; Crude Oil Production; Waste Sumps: Primary Heavy Crud	1011	Oil and Gas Production - Fugitives - Valves and Fittings - Liquid Service
31000142	Industrial Processes; Oil and Gas Production; Crude Oil Production; Waste Sumps: Secondary Light Cru	1011	Oil and Gas Production - Fugitives - Valves and Fittings - Liquid Service
31000143	Industrial Processes; Oil and Gas Production; Crude Oil Production; Waste Sumps: Secondary Heavy C	1011	Oil and Gas Production - Fugitives - Valves and Fittings - Liquid Service
31000144	Industrial Processes; Oil and Gas Production; Crude Oil Production; Waste Sumps: Tertiary Light Crude	1011	Oil and Gas Production - Fugitives - Valves and Fittings - Liquid Service
31000145	Industrial Processes; Oil and Gas Production; Crude Oil Production; Waste Sumps: Tertiary Heavy Crud	1011	Oil and Gas Production - Fugitives - Valves and Fittings - Liquid Service
31000146	Industrial Processes; Oil and Gas Production; Crude Oil Production; Gathering Lines	1011	Oil and Gas Production - Fugitives - Valves and Fittings - Liquid Service
31000160	Industrial Processes; Oil and Gas Production; Crude Oil Production; Flares	1011	Oil and Gas Production - Fugitives - Valves and Fittings - Liquid Service
31000199	Industrial Processes; Oil and Gas Production; Crude Oil Production; Processing Operations: Not Classif	1011	Oil and Gas Production - Fugitives - Valves and Fittings - Liquid Service
31000201	Industrial Processes; Oil and Gas Production; Natural Gas Production; Gas Sweetening: Amine Process	0	
31000202	Industrial Processes; Oil and Gas Production; Natural Gas Production; Gas Stripping Operations	1012	Oil and Gas Production - Fugitives - Valves and Fittings - Gas Service
31000203	Industrial Processes; Oil and Gas Production; Natural Gas Production; Compressors	1012	Oil and Gas Production - Fugitives - Valves and Fittings - Gas Service
31000204	Industrial Processes; Oil and Gas Production; Natural Gas Production; Wells	1012	Oil and Gas Production - Fugitives - Valves and Fittings - Gas Service
31000205	Industrial Processes; Oil and Gas Production; Natural Gas Production; Flares	51	Flares - Natural Gas
31000206	Industrial Processes; Oil and Gas Production; Natural Gas Production; Gas Lift	1012	Oil and Gas Production - Fugitives - Valves and Fittings - Gas Service
31000207	Industrial Processes; Oil and Gas Production; Natural Gas Production; Valves: Fugitive Emissions	1012	Oil and Gas Production - Fugitives - Valves and Fittings - Gas Service
31000208	Industrial Processes; Oil and Gas Production; Natural Gas Production; Sulfur Recovery Unit	1012	Oil and Gas Production - Fugitives - Valves and Fittings - Gas Service
31000209	Industrial Processes; Oil and Gas Production; Natural Gas Production; Incinerators Burning Waste Gas	1012	Oil and Gas Production - Fugitives - Valves and Fittings - Gas Service
31000211	Industrial Processes; Oil and Gas Production; Natural Gas Production; Pipeline Pigging (releases during	1012	Oil and Gas Production - Fugitives - Valves and Fittings - Gas Service

Table F10. EPA default SMOKE speciation cross reference for O&G (continued).

SCC	Source Category Description	Profile	Profile Description
31000215	Industrial Processes; Oil and Gas Production; Natural Gas Production; Flares Combusting Gases >1000	1012	Oil and Gas Production - Fugitives - Valves and Fittings - Gas Service
31000216	Industrial Processes; Oil and Gas Production; Natural Gas Production; Flares Combusting Gases <1000	1012	Oil and Gas Production - Fugitives - Valves and Fittings - Gas Service
31000220	Industrial Processes; Oil and Gas Production; Natural Gas Production; All Equipt Leak Fugitives (Valves	1012	Oil and Gas Production - Fugitives - Valves and Fittings - Gas Service
31000221	Industrial Processes; Oil and Gas Production; Natural Gas Production; Site Preparation	1012	Oil and Gas Production - Fugitives - Valves and Fittings - Gas Service
31000222	Industrial Processes; Oil and Gas Production; Natural Gas Production; Drilling and Well Completion	1012	Oil and Gas Production - Fugitives - Valves and Fittings - Gas Service
31000223	Industrial Processes; Oil and Gas Production; Natural Gas Production; Relief Valves	1012	Oil and Gas Production - Fugitives - Valves and Fittings - Gas Service
31000224	Industrial Processes; Oil and Gas Production; Natural Gas Production; Pump Seals	1012	Oil and Gas Production - Fugitives - Valves and Fittings - Gas Service
31000225	Industrial Processes; Oil and Gas Production; Natural Gas Production; Compressor Seals	1012	Oil and Gas Production - Fugitives - Valves and Fittings - Gas Service
31000226	Industrial Processes; Oil and Gas Production; Natural Gas Production; Flanges and Connections	1012	Oil and Gas Production - Fugitives - Valves and Fittings - Gas Service
31000227	Industrial Processes; Oil and Gas Production; Natural Gas Production; Glycol Dehydrator Reboiler Still S	1012	Oil and Gas Production - Fugitives - Valves and Fittings - Gas Service
31000228	Industrial Processes; Oil and Gas Production; Natural Gas Production; Glycol Dehydrator Reboiler Burn	1012	Oil and Gas Production - Fugitives - Valves and Fittings - Gas Service
31000229	Industrial Processes; Oil and Gas Production; Natural Gas Production; Gathering Lines	1012	Oil and Gas Production - Fugitives - Valves and Fittings - Gas Service
31000230	Industrial Processes; Oil and Gas Production; Natural Gas Production; Hydrocarbon Skimmer	1012	Oil and Gas Production - Fugitives - Valves and Fittings - Gas Service
31000231	Industrial Processes; Oil and Gas Production; Natural Gas Production; Fugitives: Drains	1012	Oil and Gas Production - Fugitives - Valves and Fittings - Gas Service
31000299	Industrial Processes; Oil and Gas Production; Natural Gas Production; Other Not Classified	1012	Oil and Gas Production - Fugitives - Valves and Fittings - Gas Service
31000301	Industrial Processes; Oil and Gas Production; Natural Gas Processing Facilities; Glycol Dehydrators: Re	1011	Oil and Gas Production - Fugitives - Valves and Fittings - Liquid Service
31000302	Industrial Processes; Oil and Gas Production; Natural Gas Processing Facilities; Glycol Dehydrators: Re	1011	Oil and Gas Production - Fugitives - Valves and Fittings - Liquid Service
31000303	Industrial Processes; Oil and Gas Production; Natural Gas Processing Facilities; Glycol Dehydrators: Ph	1011	Oil and Gas Production - Fugitives - Valves and Fittings - Liquid Service
31000304	Industrial Processes; Oil and Gas Production; Natural Gas Processing Facilities; Glycol Dehydrators: Et	1011	Oil and Gas Production - Fugitives - Valves and Fittings - Liquid Service
31000305	Industrial Processes; Oil and Gas Production; Natural Gas Processing Facilities; Gas Sweeting: Amine F	1011	Oil and Gas Production - Fugitives - Valves and Fittings - Liquid Service
31000306	Industrial Processes; Oil and Gas Production; Natural Gas Processing Facilities; Process Valves	1011	Oil and Gas Production - Fugitives - Valves and Fittings - Liquid Service
31000307	Industrial Processes; Oil and Gas Production; Natural Gas Processing Facilities; Relief Valves	1011	Oil and Gas Production - Fugitives - Valves and Fittings - Liquid Service
31000308	Industrial Processes; Oil and Gas Production; Natural Gas Processing Facilities; Open-ended Lines	1011	Oil and Gas Production - Fugitives - Valves and Fittings - Liquid Service
31000309	Industrial Processes; Oil and Gas Production; Natural Gas Processing Facilities; Compressor Seals	1011	Oil and Gas Production - Fugitives - Valves and Fittings - Liquid Service
31000310	Industrial Processes; Oil and Gas Production; Natural Gas Processing Facilities; Pump Seals	1011	Oil and Gas Production - Fugitives - Valves and Fittings - Liquid Service
31000311	Industrial Processes; Oil and Gas Production; Natural Gas Processing Facilities; Flanges and Connectio	1011	Oil and Gas Production - Fugitives - Valves and Fittings - Liquid Service
31000321	Industrial Processes; Oil and Gas Production; Natural Gas Processing Facilities; Glycol Dehydrators: Ni	1011	Oil and Gas Production - Fugitives - Valves and Fittings - Liquid Service
31000322	Industrial Processes; Oil and Gas Production; Natural Gas Processing Facilities; Glycol Dehydrators: Pr	1011	Oil and Gas Production - Fugitives - Valves and Fittings - Liquid Service
31000323	Industrial Processes; Oil and Gas Production; Natural Gas Processing Facilities; Glycol Dehydrators: An	1011	Oil and Gas Production - Fugitives - Valves and Fittings - Liquid Service
31000401	Industrial Processes; Oil and Gas Production; Process Heaters; Distillate Oil (No. 2)	2	External Combustion Boiler - Distillate Oil
31000402	Industrial Processes; Oil and Gas Production; Process Heaters; Residual Oil	1	External Combustion Boiler - Residual Oil
31000403	Industrial Processes; Oil and Gas Production; Process Heaters; Crude Oil	1	External Combustion Boiler - Residual Oil
31000404	Industrial Processes; Oil and Gas Production; Process Heaters; Natural Gas	3	External Combustion Boiler - Natural Gas
31000405	Industrial Processes; Oil and Gas Production; Process Heaters; Process Gas	4	External Combustion Boiler - Refinery Gas
31000406	Industrial Processes; Oil and Gas Production; Process Heaters; Propane/Butane	1	External Combustion Boiler - Residual Oil
31000411	Industrial Processes; Oil and Gas Production; Process Heaters; Distillate Oil (No. 2): Steam Generators	2	External Combustion Boiler - Distillate Oil
31000412	Industrial Processes; Oil and Gas Production; Process Heaters; Residual Oil: Steam Generators	1	External Combustion Boiler - Residual Oil
31000413	Industrial Processes; Oil and Gas Production; Process Heaters; Crude Oil: Steam Generators	1	External Combustion Boiler - Residual Oil
31000414	Industrial Processes; Oil and Gas Production; Process Heaters; Natural Gas: Steam Generators	3	External Combustion Boiler - Natural Gas
31000415	Industrial Processes; Oil and Gas Production; Process Heaters; Process Gas: Steam Generators	4	External Combustion Boiler - Refinery Gas
31000501	Industrial Processes; Oil and Gas Production; Liquid Waste Treatment; Floatation Units	1011	Oil and Gas Production - Fugitives - Valves and Fittings - Liquid Service
31000502	Industrial Processes; Oil and Gas Production; Liquid Waste Treatment; Liquid - Liquid Separator	1011	Oil and Gas Production - Fugitives - Valves and Fittings - Liquid Service
31000503	Industrial Processes; Oil and Gas Production; Liquid Waste Treatment; Oil-Water Separator	1011	Oil and Gas Production - Fugitives - Valves and Fittings - Liquid Service
31000504	Industrial Processes; Oil and Gas Production; Liquid Waste Treatment; Oil-Sludge-Waste Water Pit	1011	Oil and Gas Production - Fugitives - Valves and Fittings - Liquid Service
31000505	Industrial Processes; Oil and Gas Production; Liquid Waste Treatment; Sand Filter Operation	1011	Oil and Gas Production - Fugitives - Valves and Fittings - Liquid Service
31000506	Industrial Processes; Oil and Gas Production; Liquid Waste Treatment; Oil-Water Separation Wastewat	1011	Oil and Gas Production - Fugitives - Valves and Fittings - Liquid Service
31088801	Industrial Processes; Oil and Gas Production; Fugitive Emissions; Specify in Comments Field	1010	Oil and Gas Production - Fugitives - Unclassified

Table F11. EPA default SMOKE speciation cross reference for O&G .

SCC	Source Category Description	Profile	Profile Description
31088802	Industrial Processes; Oil and Gas Production; Fugitive Emissions; Specify in Comments Field	9015	Not a SPECIATE4 Profile. It used to be in SPECIATE3, but EPA dropped average TOG profiles (9000+) in SPECIATE 4
31088803	Industrial Processes; Oil and Gas Production; Fugitive Emissions; Specify in Comments Field	9015	Not a SPECIATE4 Profile. It used to be in SPECIATE3, but EPA dropped average TOG profiles (9000+) in SPECIATE 4
31088804	Industrial Processes; Oil and Gas Production; Fugitive Emissions; Specify in Comments Field	9012	Not a SPECIATE4 Profile. It used to be in SPECIATE3, but EPA dropped average TOG profiles (9000+) in SPECIATE 4
31088805	Industrial Processes; Oil and Gas Production; Fugitive Emissions; Specify in Comments Field	9015	Not a SPECIATE4 Profile. It used to be in SPECIATE3, but EPA dropped average TOG profiles (9000+) in SPECIATE 4
31088811	Industrial Processes; Oil and Gas Production; Fugitive Emissions; Fugitive Emissions	9015	Not a SPECIATE4 Profile. It used to be in SPECIATE3, but EPA dropped average TOG profiles (9000+) in SPECIATE 4
2310000000	Industrial Processes; Oil and Gas Production: SIC 13; All Processes; Total: All Processes	9015	Not a SPECIATE4 Profile. It used to be in SPECIATE3, but EPA dropped average TOG profiles (9000+) in SPECIATE 4
2310001000	Industrial Processes; Oil and Gas Production: SIC 13; All Processes : On-shore; Total: All Processes	9015	Not a SPECIATE4 Profile. It used to be in SPECIATE3, but EPA dropped average TOG profiles (9000+) in SPECIATE 4
2310002000	Industrial Processes; Oil and Gas Production: SIC 13; All Processes : Off-shore; Total: All Processes	9015	Not a SPECIATE4 Profile. It used to be in SPECIATE3, but EPA dropped average TOG profiles (9000+) in SPECIATE 4
2310010000	Industrial Processes; Oil and Gas Production: SIC 13; Crude Petroleum; Total: All Processes	9015	Not a SPECIATE4 Profile. It used to be in SPECIATE3, but EPA dropped average TOG profiles (9000+) in SPECIATE 4
2310011000	Industrial Processes; Oil and Gas Production: SIC 13; Crude Petroleum : On-shore; Total: All Processes	9015	Not a SPECIATE4 Profile. It used to be in SPECIATE3, but EPA dropped average TOG profiles (9000+) in SPECIATE 4
2310012000	Industrial Processes; Oil and Gas Production: SIC 13; Crude Petroleum : Off-shore; Total: All Processes	9015	Not a SPECIATE4 Profile. It used to be in SPECIATE3, but EPA dropped average TOG profiles (9000+) in SPECIATE 4
2310020000	Industrial Processes; Oil and Gas Production: SIC 13; Natural Gas; Total: All Processes	9015	Not a SPECIATE4 Profile. It used to be in SPECIATE3, but EPA dropped average TOG profiles (9000+) in SPECIATE 4
2310021000	Industrial Processes; Oil and Gas Production: SIC 13; Natural Gas : On-shore; Total: All Processes	9015	Not a SPECIATE4 Profile. It used to be in SPECIATE3, but EPA dropped average TOG profiles (9000+) in SPECIATE 4
2310022000	Industrial Processes; Oil and Gas Production: SIC 13; Natural Gas : Off-shore; Total: All Processes	9015	Not a SPECIATE4 Profile. It used to be in SPECIATE3, but EPA dropped average TOG profiles (9000+) in SPECIATE 4
2310030000	Industrial Processes; Oil and Gas Production: SIC 13; Natural Gas Liquids; Total: All Processes	9015	Not a SPECIATE4 Profile. It used to be in SPECIATE3, but EPA dropped average TOG profiles (9000+) in SPECIATE 4
2310031000	Industrial Processes; Oil and Gas Production: SIC 13; Natural Gas Liquids : On-shore; Total: All Process	9015	Not a SPECIATE4 Profile. It used to be in SPECIATE3, but EPA dropped average TOG profiles (9000+) in SPECIATE 4
2310032000	Industrial Processes; Oil and Gas Production: SIC 13; Natural Gas Liquids : Off-shore; Total: All Process	9015	Not a SPECIATE4 Profile. It used to be in SPECIATE3, but EPA dropped average TOG profiles (9000+) in SPECIATE 4
2270002033	Mobile Sources; Off-highway Vehicle Diesel; Construction and Mining Equipment; Bore/Drill Rigs	1201	Light-Duty Diesel Vehicles

Table F12a. 2008 SMOKE Inputs.

County	Source Category	Emissions (Tons/Year)				
		CO	NOX	PM2.5	SO2	VOC
Carbon County	Compression	323	1,292	49	0	231
	Production	403	539	13	12	30,463
	Spud	387	802	40	48	83
Lincoln County	Compression	577	1,567	59	166	99
	Production	491	605	18	1,378	25,787
	Spud	59	131	4	2	94
Sublette County	Compression	1,458	1,989	10	1	1,096
	Production	1,363	1,872	75	15	26,496
	Spud	1,579	3,699	67	120	462
Sweetwater County	Compression	1,774	3,276	7	0	560
	Production	790	1,021	15	103	74,435
	Spud	565	1,117	66	167	357
Uinta County	Compression	258	516	0	0	156
	Production	316	232	2	95	6,305
	Spud	10	42	2	4	90
Grand Total		10,352	18,699	427	2,112	166,713

Table F12b. 2008 SMOKE Outputs.

County	Source Category	Emissions (Tons/Year)						
		CO	NOx	PM2.5	SO2	CB05 VO	CH4	ETHA
Carbon County	Compression	324	1,295	49	0	240	1,822	349
	Production	461	521	12	12	34,142	105,081	16,681
	Spud	387	799	40	48	96	11	3
Lincoln County	Compression	579	1,570	59	167	84	568	92
	Production	506	567	17	1,378	28,487	122,283	16,699
	Spud	59	131	4	2	110	13	3
Sublette County	Compression	1,461	1,994	10	2	1,129	8,548	1,627
	Production	1,387	1,906	74	15	28,570	126,428	16,956
	Spud	1,580	3,711	67	120	540	63	16
Sweetwater County	Compression	1,780	3,283	7	0	580	4,392	840
	Production	834	979	15	101	75,736	237,477	42,313
	Spud	564	1,117	67	168	414	48	13
Uinta County	Compression	259	517	0	0	166	1,274	247
	Production	321	234	2	95	6,963	29,492	4,072
	Spud	10	42	2	4	105	12	3
Grand Total		10,512	18,666	425	2,110	177,359	637,510	99,911

Table F13. 2008 CD-C 12km Domain Point Source CO Emissions Summary (tpy).

State	County	EGU	Non-EGU	Trona
Colorado	Adams Co	650.0	1,252.3	
	Arapahoe Co	91.2	328.7	
	Boulder Co	173.6	413.4	
	Broomfield Co	4.1	3.0	
	Clear Creek Co	0.0	74.5	
	Delta Co	0.9	0.0	
	Denver Co	306.0	878.8	
	Douglas Co	0.6	199.5	
	Eagle Co	41.6	48.9	
	El Paso Co	89.8	28.8	
	Elbert Co		14.0	
	Garfield Co	32.7	406.9	
	Gilpin Co		0.0	
	Grand Co		28.5	
	Gunnison Co		2.6	
	Jackson Co		0.0	
	Jefferson Co	63.1	1,047.6	
	Kit Carson Co	0.8	18.8	
	Lake Co		0.9	
	Larimer Co	251.7	426.5	
	Lincoln Co	110.7	28.1	
	Logan Co	2.5	44.8	
	Mesa Co	106.7	226.9	
	Moffat Co	1,270.6	25.9	
	Morgan Co	13,379.5	461.0	
	Park Co		0.0	
	Phillips Co	0.2	2.6	
	Pitkin Co		0.0	
	Rio Blanco Co	84.7	442.0	
	Routt Co	76.3	6.3	
	Sedgwick Co		0.0	
	Summit Co		3.3	
	Teller Co		0.0	
	Washington Co		0.0	
	Weld Co	1,111.3	1,175.0	
	Yuma Co	0.0	5.1	

Table F13 (cont.). 2008 CD-C 12km Domain Point Source CO Emissions Summary (tpy).

State	County	EGU	Non-EGU	Trona
Idaho	Bannock Co		1,215.5	
	Bingham Co		302.8	
	Bonneville Co		0.0	
	Butte Co		25.8	
	Caribou Co		10,890.0	
	Cassia Co		0.0	
	Clark Co		14.6	
	Jefferson Co		13.9	
	Madison Co		224.1	
	Minidoka Co		2,305.7	
	Power Co		104.7	
	Twin Falls Co		1,387.3	
Montana	Beaverhead Co		1.6	
	Big Horn Co	885.1	522.6	
	Carbon Co		3.8	
	Fallon Co		0.2	
	Gallatin Co		57.0	
	Madison Co		48.9	
	Park Co		7.4	
	Rosebud Co	585.0	143.4	
	Stillwater Co		47.6	
	Sweet Grass Co		22.8	
	Yellowstone Co	151.4	698.2	
Nebraska	Arthur Co		0.0	
	Banner Co		0.0	
	Box Butte Co		9.1	
	Chase Co		0.0	
	Cheyenne Co		55.8	
	Dawes Co		14.1	
	Deuel Co	0.1	29.5	
	Dundy Co	0.0	0.0	
	Garden Co		0.0	
	Keith Co		1.7	
	Kimball Co		4.7	
	Morrill Co		0.8	
	Perkins Co		0.9	
	Scotts Bluff Co	32.3	62.5	
	Sheridan Co		0.0	
	Sioux Co		0.0	
South Dakota	Harding Co		40.4	
	Lawrence Co		821.5	
	Pennington Co	146.2	3,070.3	

Table F13 (cont.). 2008 CD-C 12km Domain Point Source CO Emissions Summary (tpy).

State	County	EGU	Non-EGU	Trona
Utah	Beaver Co	1.5	9.5	
	Box Elder Co	2.8	1,245.7	
	Cache Co	6.4	72.5	
	Carbon Co	167.5	182.3	
	Daggett Co	0.0	55.0	
	Davis Co	25.0	1,400.8	
	Duchesne Co	0.4	521.6	
	Emery Co	1,862.7	11.0	
	Grand Co		52.7	
	Juab Co	0.1	17,422.1	
	Millard Co	2,301.4	1,109.3	
	Morgan Co	1.3	2,189.8	
	Rich Co		0.5	
	Salt Lake Co	159.9	3,567.9	
	Sanpete Co	1.3	16.4	
	Sevier Co	198.4	21.4	
	Summit Co	1.6	69.2	
	Tooele Co	53.0	484.9	
	Uintah Co	437.9	89.3	
	Utah Co	43.9	776.9	
	Wasatch Co	0.8	7.5	
	Washington Co		0.0	
	Weber Co	76.6	1,471.6	

Table F13 (cont.). 2008 CD-C 12km Domain Point Source CO Emissions Summary (tpy).

State	County	EGU	Non-EGU	Trona
Wyoming	Albany Co		743.9	
	Big Horn Co	2.9	278.6	
	Campbell Co	1,451.5	9,133.4	
	Carbon Co	0.0	648.5	
	Converse Co	1,046.5	337.2	
	Crook Co	44.4	539.5	
	Fremont Co	6.0	178.9	
	Goshen Co		17.7	
	Hot Springs Co		232.6	
	Johnson Co	6.5	510.3	
	Laramie Co	5.8	795.0	
	Lincoln Co	707.9	327.7	
	Natrona Co	5.9	707.6	
	Niobrara Co		116.1	
	Park Co		348.5	
	Platte Co	2,029.7	0.1	
	Sheridan Co	40.7	4,036.3	
	Sublette Co	19.7	83.7	
	Sweetwater Co	2,757.6	2,298.7	12,451.1
	Teton Co	0.0	42.9	
	Uinta Co		102.5	
	Washakie Co	2.9	107.1	
	Weston Co	586.5	179.5	
Wind Rivers Reserv	Wind Rivers Reserv	0.0	0.0	

Table F14. 2008 CD-C 12km Domain Point Source NOx Emissions Summary (tpy).

State	County	EGU	Non-EGU	Trona
Colorado	Adams Co	14,742.9	1,433.8	
	Arapahoe Co	56.4	204.6	
	Boulder Co	3,128.3	2,349.2	
	Broomfield Co	11.2	0.9	
	Clear Creek Co	4.0	53.6	
	Delta Co	6.5	0.1	
	Denver Co	4,205.9	872.5	
	Douglas Co	1.9	90.3	
	Eagle Co	96.3	76.3	
	El Paso Co	56.2	49.3	
	Elbert Co		42.3	
	Garfield Co	31.0	217.0	
	Gilpin Co		0.0	
	Grand Co		42.9	
	Gunnison Co		11.5	
	Jackson Co		0.0	
	Jefferson Co	28.1	2,777.1	
	Kit Carson Co	16.9	5.1	
	Lake Co		3.0	
	Larimer Co	2,784.7	544.7	
	Lincoln Co	80.5	5.4	
	Logan Co	8.8	57.2	
	Mesa Co	657.2	246.8	
	Moffat Co	19,995.0	21.2	
	Morgan Co	5,808.6	465.3	
	Park Co		0.0	
	Phillips Co	0.2	8.8	
	Pitkin Co		0.0	
	Rio Blanco Co	89.2	605.6	
	Routt Co	8,626.9	22.3	
	Sedgwick Co		0.0	
	Summit Co		0.3	
	Teller Co		0.0	
	Washington Co		0.0	
	Weld Co	1,124.4	1,656.1	
	Yuma Co	0.0	19.3	

Table F14 (cont.). 2008 CD-C 12km Domain Point Source NOx Emissions Summary (tpy).

State	County	EGU	Non-EGU	Trona
Idaho	Bannock Co		906.0	
	Bingham Co		268.4	
	Bonneville Co		21.0	
	Butte Co		141.4	
	Caribou Co		1,927.2	
	Cassia Co		0.0	
	Clark Co		125.7	
	Jefferson Co		42.8	
	Madison Co		80.1	
	Minidoka Co		1,174.6	
	Power Co		113.4	
	Twin Falls Co		1,156.0	
Montana	Beaverhead Co		10.1	
	Big Horn Co	914.6	506.4	
	Carbon Co		15.5	
	Fallon Co		0.5	
	Gallatin Co		26.8	
	Madison Co		41.7	
	Park Co		31.5	
	Rosebud Co	28,201.5	11.3	
	Stillwater Co		93.7	
	Sweet Grass Co		14.4	
	Yellowstone Co	2,398.5	1,169.8	
Nebraska	Arthur Co		0.1	
	Banner Co		0.0	
	Box Butte Co		4.5	
	Chase Co		0.0	
	Cheyenne Co		90.7	
	Dawes Co		2.0	
	Deuel Co	0.6	48.2	
	Dundy Co	0.0	0.0	
	Garden Co		0.0	
	Keith Co		0.0	
	Kimball Co		27.4	
	Morrill Co		0.2	
	Perkins Co		0.0	
	Scotts Bluff Co	22.7	78.3	
	Sheridan Co		0.0	
	Sioux Co		0.0	
South Dakota	Harding Co		21.7	
	Lawrence Co		39.7	
	Pennington Co	974.5	4,368.5	

Table F14 (cont.). 2008 CD-C 12km Domain Point Source NOx Emissions Summary (tpy).

State	County	EGU	Non-EGU	Trona
Utah	Beaver Co	2.9	25.3	
	Box Elder Co	6.6	515.4	
	Cache Co	30.4	83.8	
	Carbon Co	4,254.3	553.5	
	Daggett Co	0.1	621.5	
	Davis Co	54.3	2,258.3	
	Duchesne Co	0.5	421.3	
	Emery Co	35,245.6	64.6	
	Grand Co		57.5	
	Juab Co	101.1	1,836.2	
	Millard Co	33,249.0	1,994.6	
	Morgan Co	6.0	3,569.7	
	Rich Co		0.0	
	Salt Lake Co	604.1	9,576.5	
	Sanpete Co	1.6	24.1	
	Sevier Co	196.1	19.0	
	Summit Co	6.0	375.3	
	Tooele Co	185.3	1,350.1	
	Uintah Co	7,132.2	77.4	
	Utah Co	137.8	813.5	
	Wasatch Co	3.8	48.0	
	Washington Co		0.0	
	Weber Co	212.6	304.4	

Table F14 (cont.). 2008 CD-C 12km Domain Point Source NOx Emissions Summary (tpy).

State	County	EGU	Non-EGU	Trona
Wyoming	Albany Co		2,146.6	
	Big Horn Co	2.9	579.3	
	Campbell Co	7,807.7	14,913.4	
	Carbon Co	0.2	619.9	
	Converse Co	13,136.8	444.2	
	Crook Co	56.8	664.7	
	Fremont Co	17.5	194.9	
	Goshen Co		149.9	
	Hot Springs Co		70.3	
	Johnson Co	9.1	492.0	
	Laramie Co	5.8	1,923.4	
	Lincoln Co	14,333.6	1,411.6	
	Natrona Co	6.0	729.9	
	Niobrara Co		118.0	
	Park Co		608.4	
	Platte Co	20,684.0	0.4	
	Sheridan Co	35.9	1,322.9	
	Sublette Co	203.6	104.4	
	Sweetwater Co	23,291.6	4,845.4	6,309.7
	Teton Co	0.0	59.8	
	Uinta Co		45.7	
	Washakie Co	2.9	159.2	
	Weston Co	964.9	260.6	
Wind Rivers Reserv	Wind Rivers Reserv	0.6	8.2	

Table F15. 2008 CD-C 12km Domain Point Source VOC Emissions Summary (tpy).

State	County	EGU	Non-EGU	Trona
Colorado	Adams Co	91.2	4,418.1	
	Arapahoe Co	11.5	2,272.0	
	Boulder Co	30.7	1,706.4	
	Broomfield Co	0.4	351.8	
	Clear Creek Co	0.0	56.1	
	Delta Co	0.2	96.0	
	Denver Co	29.0	3,313.9	
	Douglas Co	0.1	708.4	
	Eagle Co	0.8	172.6	
	El Paso Co	0.9	147.7	
	Elbert Co		32.4	
	Garfield Co	28.5	387.4	
	Gilpin Co		8.3	
	Grand Co		47.0	
	Gunnison Co		4.2	
	Jackson Co		22.1	
	Jefferson Co	27.5	3,170.7	
	Kit Carson Co	0.3	60.5	
	Lake Co		39.7	
	Larimer Co	35.2	1,471.0	
	Lincoln Co	0.0	56.2	
	Logan Co	0.1	142.7	
	Mesa Co	11.1	847.0	
	Moffat Co	15.9	88.3	
	Morgan Co	2,199.6	150.7	
	Park Co		24.5	
	Phillips Co	0.0	25.0	
	Pitkin Co		36.5	
	Rio Blanco Co	40.3	395.0	
	Routt Co	54.3	31.2	
	Sedgwick Co		8.0	
	Summit Co		136.0	
	Teller Co		79.7	
	Washington Co		25.4	
	Weld Co	199.3	2,599.7	
	Yuma Co	2.6	51.0	

Table F15 (cont.). 2008 CD-C 12km Domain Point Source VOC Emissions Summary (tpy).

State	County	EGU	Non-EGU	Trona
Idaho	Bannock Co		22.9	
	Bingham Co		15.3	
	Bonneville Co		0.9	
	Butte Co		4.0	
	Caribou Co		6.0	
	Cassia Co		214.4	
	Clark Co		3.2	
	Jefferson Co		1.5	
	Madison Co		27.0	
	Minidoka Co		55.3	
	Power Co		3.5	
	Twin Falls Co		34.0	
Montana	Beaverhead Co		0.1	
	Big Horn Co	77.0	30.6	
	Carbon Co		2.5	
	Fallon Co		10.2	
	Gallatin Co		48.2	
	Madison Co		3.3	
	Park Co		14.8	
	Rosebud Co	104.5	1.8	
	Stillwater Co		4.9	
	Sweet Grass Co		1.7	
	Yellowstone Co	10.9	1,064.6	
Nebraska	Arthur Co		0.0	
	Banner Co		289.4	
	Box Butte Co		390.8	
	Chase Co		889.4	
	Cheyenne Co		267.4	
	Dawes Co		1.6	
	Deuel Co	0.0	82.5	
	Dundy Co	0.0	0.0	
	Garden Co		148.8	
	Keith Co		174.2	
	Kimball Co		45.8	
	Morrill Co		306.2	
	Perkins Co		51.0	
	Scotts Bluff Co	0.3	738.3	
	Sheridan Co		0.0	
	Sioux Co		156.1	
South Dakota	Harding Co		56.8	
	Lawrence Co		75.5	
	Pennington Co	4.6	198.8	

Table F15 (cont.). 2008 CD-C 12km Domain Point Source VOC Emissions Summary (tpy).

State	County	EGU	Non-EGU	Trona
Utah	Beaver Co	0.2	2.1	
	Box Elder Co	0.4	651.4	
	Cache Co	2.1	234.1	
	Carbon Co	20.3	61.5	
	Daggett Co	0.0	43.9	
	Davis Co	2.1	1,867.4	
	Duchesne Co	0.0	298.4	
	Emery Co	223.2	5.3	
	Grand Co		28.7	
	Juab Co	0.0	93.5	
	Millard Co	28.2	320.1	
	Morgan Co	0.5	132.4	
	Rich Co		0.2	
	Salt Lake Co	28.8	2,501.2	
	Sanpete Co	0.1	3.2	
	Sevier Co	3.7	3.6	
	Summit Co	0.2	267.6	
	Tooele Co	4.8	516.4	
	Uintah Co	52.7	140.0	
	Utah Co	9.0	1,608.9	
	Wasatch Co	0.3	2.9	
	Washington Co		0.0	
	Weber Co	3.1	252.3	

Table F15 (cont.). 2008 CD-C 12km Domain Point Source VOC Emissions Summary (tpy).

State	County	EGU	Non-EGU	Trona
Wyoming	Albany Co		84.6	
	Big Horn Co	0.7	90.8	
	Campbell Co	106.9	2,209.0	
	Carbon Co	0.0	1,031.9	
	Converse Co	125.9	261.1	
	Crook Co	12.4	132.9	
	Fremont Co	1.9	194.3	
	Goshen Co		44.0	
	Hot Springs Co		33.4	
	Johnson Co	1.7	224.4	
	Laramie Co	1.4	239.9	
	Lincoln Co	99.1	39.0	
	Natrona Co	1.5	1,176.1	
	Niobrara Co		27.8	
	Park Co		351.0	
	Platte Co	243.7	27.5	
	Sheridan Co	11.3	623.6	
	Sublette Co	19.1	32.4	
	Sweetwater Co	321.8	1,167.9	7,464.1
	Teton Co	0.0	9.8	
	Uinta Co		116.9	
	Washakie Co	0.7	142.2	
	Weston Co	0.0	178.4	
Wind Rivers Reserv	Wind Rivers Reserv	0.4	2.2	

Table F16. 2008 CD-C 12km Domain Point Source SO2 Emissions Summary (tpy).

State	County	EGU	Non-EGU	Trona
Colorado	Adams Co	9,008.5	1,979.1	
	Arapahoe Co	28.4	56.1	
	Boulder Co	1,020.3	88.0	
	Broomfield Co	0.0	0.0	
	Clear Creek Co	0.0	1.9	
	Delta Co	0.0	0.2	
	Denver Co	3,165.8	340.4	
	Douglas Co	0.0	78.1	
	Eagle Co	1.1	0.9	
	El Paso Co	0.1	3.9	
	Elbert Co		0.1	
	Garfield Co	0.2	11.2	
	Gilpin Co		0.0	
	Grand Co		35.5	
	Gunnison Co		0.0	
	Jackson Co		0.0	
	Jefferson Co	2.3	3,370.7	
	Kit Carson Co	2.8	0.1	
	Lake Co		3.7	
	Larimer Co	1,137.0	156.1	
	Lincoln Co	5.5	0.3	
	Logan Co	6.1	14.0	
	Mesa Co	1,911.7	29.6	
	Moffat Co	4,719.5	2.0	
	Morgan Co	14,356.6	135.3	
	Park Co		0.0	
	Phillips Co	0.0	2.6	
	Pitkin Co		0.0	
	Rio Blanco Co	1.0	3.7	
	Routt Co	3,185.3	2.6	
	Sedgwick Co		0.0	
	Summit Co		0.2	
	Teller Co		0.0	
	Washington Co		0.0	
	Weld Co	50.7	240.5	
	Yuma Co	0.0	0.2	

Table F16 (cont.). 2008 CD-C 12km Domain Point Source SO2 Emissions Summary (tpy).

State	County	EGU	Non-EGU	Trona
Idaho	Bannock Co		18.6	
	Bingham Co		364.7	
	Bonneville Co		58.9	
	Butte Co		26.0	
	Caribou Co		8,895.1	
	Cassia Co		0.0	
	Clark Co		170.9	
	Jefferson Co		124.7	
	Madison Co		13.6	
	Minidoka Co		385.3	
	Power Co		1,759.0	
	Twin Falls Co		1,434.7	
Montana	Beaverhead Co		0.5	
	Big Horn Co	669.4	42.2	
	Carbon Co		2.2	
	Fallon Co		0.2	
	Gallatin Co		1.2	
	Madison Co		4.0	
	Park Co		16.0	
	Rosebud Co	18,287.9	0.6	
	Stillwater Co		10.8	
	Sweet Grass Co		1.3	
	Yellowstone Co	4,903.3	3,608.0	
Nebraska	Arthur Co		0.5	
	Banner Co		19.2	
	Box Butte Co		28.5	
	Chase Co		23.2	
	Cheyenne Co		15.9	
	Dawes Co		0.3	
	Deuel Co	0.0	4.6	
	Dundy Co	0.0	0.0	
	Garden Co		9.9	
	Keith Co		11.6	
	Kimball Co		3.3	
	Morrill Co		21.2	
	Perkins Co		17.1	
	Scotts Bluff Co	5.4	78.0	
	Sheridan Co		0.0	
	Sioux Co		8.5	
South Dakota	Harding Co		0.1	
	Lawrence Co		4.5	
	Pennington Co	761.0	849.7	

Table F16 (cont.). 2008 CD-C 12km Domain Point Source SO2 Emissions Summary (tpy).

State	County	EGU	Non-EGU	Trona
Utah	Beaver Co	0.1	2.3	
	Box Elder Co	0.2	86.8	
	Cache Co	3.4	25.6	
	Carbon Co	6,734.6	915.1	
	Daggett Co	0.0	1.1	
	Davis Co	3.5	3,004.1	
	Duchesne Co	0.0	3.7	
	Emery Co	11,313.1	6.9	
	Grand Co		7.3	
	Juab Co	5.8	33.3	
	Millard Co	7,109.8	127.5	
	Morgan Co	0.4	589.9	
	Rich Co		0.0	
	Salt Lake Co	10.2	7,501.6	
	Sanpete Co	0.0	4.4	
	Sevier Co	38.6	1.4	
	Summit Co	0.1	213.9	
	Tooele Co	2.4	202.2	
	Uintah Co	994.4	1.1	
	Utah Co	7.8	315.1	
	Wasatch Co	0.3	0.1	
	Washington Co		0.0	
	Weber Co	3.2	55.6	

Table F16 (cont.). 2008 CD-C 12km Domain Point Source SO2 Emissions Summary (tpy).

State	County	EGU	Non-EGU	Trona
Wyoming	Albany Co		278.2	
	Big Horn Co	0.0	42.8	
	Campbell Co	10,804.5	899.1	
	Carbon Co	0.0	1,098.7	
	Converse Co	20,425.6	29.4	
	Crook Co	0.0	199.9	
	Fremont Co	1.0	0.9	
	Goshen Co		183.6	
	Hot Springs Co		23.2	
	Johnson Co	0.2	62.9	
	Laramie Co	0.0	45.3	
	Lincoln Co	22,509.1	193.8	
	Natrona Co	0.0	719.1	
	Niobrara Co		0.0	
	Park Co		96.7	
	Platte Co	11,583.0	0.0	
	Sheridan Co	0.0	207.0	
	Sublette Co	0.0	15.8	
	Sweetwater Co	20,700.8	6,618.0	5,748.1
	Teton Co	0.0	13.8	
	Uinta Co		14.6	
	Washakie Co	0.0	47.4	
	Weston Co	2,381.3	716.9	
Wind Rivers Reserv	Wind Rivers Reserv	0.0	1,057.1	

Table F17. 2008 CD-C 12km Domain Point Source PM10 Emissions Summary (tpy).

State	County	EGU	Non-EGU	Trona
Colorado	Adams Co	238.5	2,380.8	
	Arapahoe Co	0.8	1,004.4	
	Boulder Co	47.3	826.4	
	Broomfield Co	0.3	9.3	
	Clear Creek Co	0.0	85.8	
	Delta Co	0.0	592.9	
	Denver Co	111.7	473.0	
	Douglas Co	0.1	146.5	
	Eagle Co	0.8	177.4	
	El Paso Co	0.3	36.7	
	Elbert Co		52.1	
	Garfield Co	0.6	206.8	
	Gilpin Co		0.0	
	Grand Co		99.5	
	Gunnison Co		277.3	
	Jackson Co		24.7	
	Jefferson Co	2.3	622.7	
	Kit Carson Co	1.1	43.7	
	Lake Co		1,231.7	
	Larimer Co	95.7	760.9	
	Lincoln Co	26.4	16.8	
	Logan Co	0.9	26.9	
	Mesa Co	62.8	551.9	
	Moffat Co	230.5	2,157.3	
	Morgan Co	740.4	214.9	
	Park Co		64.3	
	Phillips Co	0.0	14.2	
	Pitkin Co		45.4	
	Rio Blanco Co	0.9	981.1	
	Routt Co	178.8	897.2	
	Sedgwick Co		3.5	
	Summit Co		88.7	
	Teller Co		0.0	
	Washington Co		81.0	
	Weld Co	216.2	1,852.8	
	Yuma Co	0.0	28.7	

Table F17 (cont.). 2008 CD-C 12km Domain Point Source PM10 Emissions Summary (tpy).

State	County	EGU	Non-EGU	Trona
Idaho	Bannock Co		49.6	
	Bingham Co		238.0	
	Bonneville Co		1.3	
	Butte Co		4.4	
	Caribou Co		467.5	
	Cassia Co		0.0	
	Clark Co		62.2	
	Jefferson Co		27.7	
	Madison Co		99.3	
	Minidoka Co		357.5	
	Power Co		194.5	
	Twin Falls Co		203.9	
Montana	Beaverhead Co		22.0	
	Big Horn Co	38,572.3	408.6	
	Carbon Co		19.3	
	Fallon Co		0.7	
	Gallatin Co		18.1	
	Madison Co		78.7	
	Park Co		39.0	
	Rosebud Co	342.1	21.5	
	Stillwater Co		37.5	
	Sweet Grass Co		5.5	
	Yellowstone Co	163.7	447.0	
Nebraska	Arthur Co		0.4	
	Banner Co		27.6	
	Box Butte Co		52.8	
	Chase Co		33.3	
	Cheyenne Co		30.0	
	Dawes Co		10.2	
	Deuel Co	0.0	9.2	
	Dundy Co	0.0	0.0	
	Garden Co		14.2	
	Keith Co		16.6	
	Kimball Co		6.5	
	Morrill Co		30.0	
	Perkins Co		14.3	
	Scotts Bluff Co	5.6	88.0	
	Sheridan Co		2.8	
	Sioux Co		12.2	
South Dakota	Harding Co		1.1	
	Lawrence Co		84.9	
	Pennington Co	35.7	370.0	

Table F17 (cont.). 2008 CD-C 12km Domain Point Source PM10 Emissions Summary (tpy).

State	County	EGU	Non-EGU	Trona
Utah	Beaver Co	42.2	29.8	
	Box Elder Co	0.2	953.7	
	Cache Co	1.8	35.1	
	Carbon Co	237.7	285.2	
	Daggett Co	0.0	3.8	
	Davis Co	1.5	500.6	
	Duchesne Co	0.0	5.5	
	Emery Co	1,721.5	462.0	
	Grand Co		21.3	
	Juab Co	10.1	207.1	
	Millard Co	275.7	662.2	
	Morgan Co	0.4	188.2	
	Rich Co		0.3	
	Salt Lake Co	25.8	4,929.4	
	Sanpete Co	0.1	53.2	
	Sevier Co	27.8	73.8	
	Summit Co	0.1	98.6	
	Tooele Co	3.2	1,868.6	
	Uintah Co	569.1	182.2	
	Utah Co	3.0	476.7	
	Wasatch Co	0.3	7.8	
	Washington Co		0.0	
	Weber Co	5.6	625.0	

Table F17 (cont.). 2008 CD-C 12km Domain Point Source PM10 Emissions Summary (tpy).

State	County	EGU	Non-EGU	Trona
Wyoming	Albany Co		435.8	
	Big Horn Co	1.4	395.2	
	Campbell Co	2,225.0	14,203.6	
	Carbon Co	0.0	267.7	
	Converse Co	1.4	1,272.2	
	Crook Co	6.2	922.1	
	Fremont Co	2.5	4.5	
	Goshen Co		494.1	
	Hot Springs Co		9.0	
	Johnson Co	3.1	176.6	
	Laramie Co	2.9	664.3	
	Lincoln Co	6,526.7	1,344.9	
	Natrona Co	2.9	390.1	
	Niobrara Co		0.3	
	Park Co		135.8	
	Platte Co	1,049.9	262.1	
	Sheridan Co	6.8	182.3	
	Sublette Co	3.0	33.9	
	Sweetwater Co	3,039.0	8,809.0	3,598.4
	Teton Co	0.0	5.3	
	Uinta Co		53.5	
	Washakie Co	1.4	358.5	
	Weston Co	571.9	458.6	
Wind Rivers Reserv	Wind Rivers Reserv	0.0	12.7	

Table F18a. Comparison of 2008 NOx emissions from Tables F4, F12, and F13-F17.

		NOx					
		Compressor	Drilling	Production	EGU	nEGU	Trona
Tables 13-22	Carbon				0	620	
	Lincoln				14,334	1,412	
	Sublette				204	104	
	Sweetwater				23,292	4,845	6,310
	Uinta					46	
	5-county Total				37,829	7,027	6,310
Table 4	5-county Total	8,660	5,800	4,206	38,501	7,042	6,330
Table 12 Inputs	Carbon	1,292	802	539			
	Lincoln	1,567	131	605			
	Sublette	1,989	3,699	1,872			
	Sweetwater	3,276	1,117	1,021			
	Uinta	516	42	232			
	5-county Total	8,640	5,791	4,269			
Table 12 Outputs	Carbon	1,295	799	521			
	Lincoln	1,570	131	567			
	Sublette	1,994	3,711	1,906			
	Sweetwater	3,283	1,117	979			
	Uinta	517	42	234			
	5-county Total	8,659	5,800	4,207			

Table F18b. Comparison of 2008 VOC/TOG emissions from Tables F4, F12, and F13-F17.

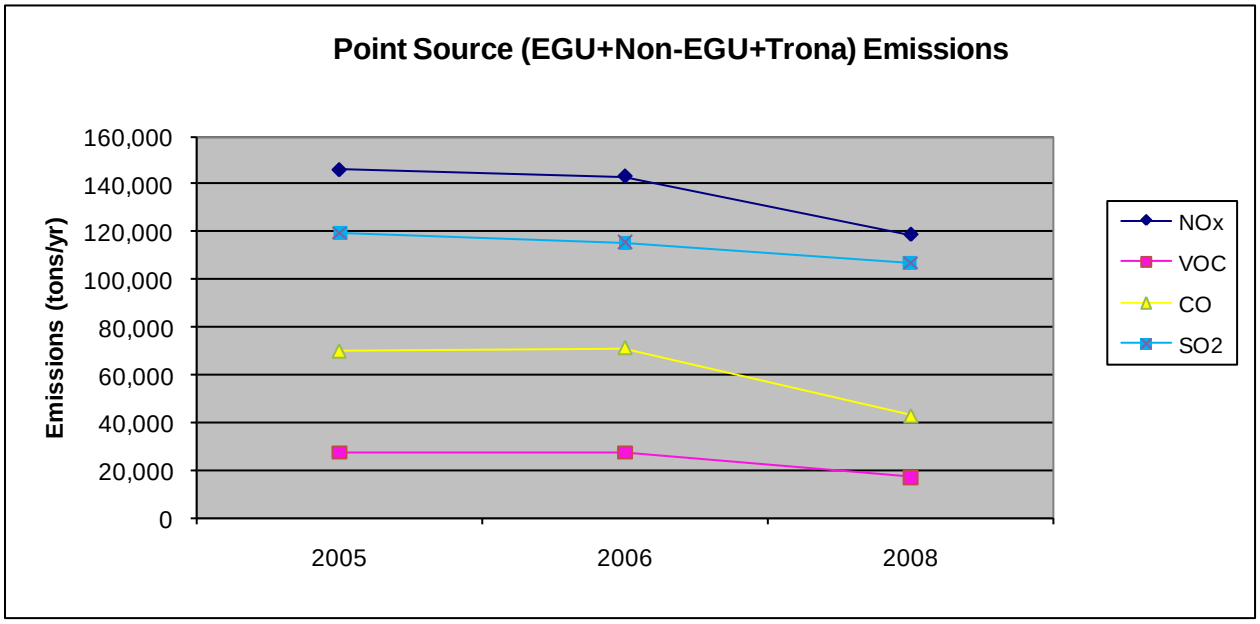
		VOC/TOG						
		Compressor	Drilling	Production	EGU	nEGU	Trona	VOC/TOG
Tables 13-22	Carbon				0	1,032		VOC
	Lincoln				99	39		VOC
	Sublette				19	32		VOC
	Sweetwater				322	1,168	7,464	VOC
	Uinta					117		VOC
	5-county Total				440	2,388	7,464	VOC
Table 4	5-county Total	21,955	1,449	891,377	1,072	3,958	16,162	TOG
Table 12 Inputs	Carbon	231	83	30,463				VOC
	Lincoln	99	94	25,787				VOC
	Sublette	1,096	462	26,496				VOC
	Sweetwater	560	357	74,435				VOC
	Uinta	156	90	6,305				VOC
	5-county Total	2,142	1,086	163,486				VOC
Table 12 Outputs	Carbon	240	96	34,142				VOC
	Lincoln	84	110	28,487				VOC
	Sublette	1,129	540	28,570				VOC
	Sweetwater	580	414	75,736				VOC
	Uinta	166	105	6,963				VOC
	5-county Total	2,199	1,265	173,897				VOC

Table F18c. Comparison of 2008 CO emissions from Tables F4, F12, and F13-F17.

		CO					
		Compressor	Drilling	Production	EGU	nEGU	Trona
Tables 13-22	Carbon				0	649	
	Lincoln				708	328	
	Sublette				20	84	
	Sweetwater				2,758	2,299	12,451
	Uinta					102	
	5-county Total				3,485	3,461	12,451
Table 4	5-county Total	4,403	2,600	3,509	3,323	3,466	12,492
Table 12 Inputs	Carbon	323	387	403			
	Lincoln	577	59	491			
	Sublette	1,458	1,579	1,363			
	Sweetwater	1,774	565	790			
	Uinta	258	10	316			
	5-county Total	4,390	2,600	3,362			
Table 12 Outputs	Carbon	324	387	461			
	Lincoln	579	59	506			
	Sublette	1,461	1,580	1,387			
	Sweetwater	1,780	564	834			
	Uinta	259	10	321			
	5-county Total	4,403	2,600	3,509			

Table F18d. Comparison of 2008 SO2 emissions from Tables F4, F12, and F13-F17.

		SO2					
		Compressor	Drilling	Production	EGU	nEGU	Trona
Tables 13-22	Carbon				0	1,099	
	Lincoln				22,509	194	
	Sublette				0	16	
	Sweetwater				20,701	6,618	5,748
	Uinta				0	15	
	5-county Total				43,210	7,941	5,748
Table 4	5-county Total	168	342	1,599	43,977	7,960	5,763
Table 12 Inputs	Carbon	0	48	12			
	Lincoln	166	2	1,378			
	Sublette	1	120	15			
	Sweetwater	0	167	103			
	Uinta	0	4	95			
	5-county Total	167	341	1,603			
Table 12 Outputs	Carbon	0	48	12			
	Lincoln	167	2	1,378			
	Sublette	2	120	15			
	Sweetwater	0	168	101			
	Uinta	0	4	95			
	5-county Total	169	342	1,601			



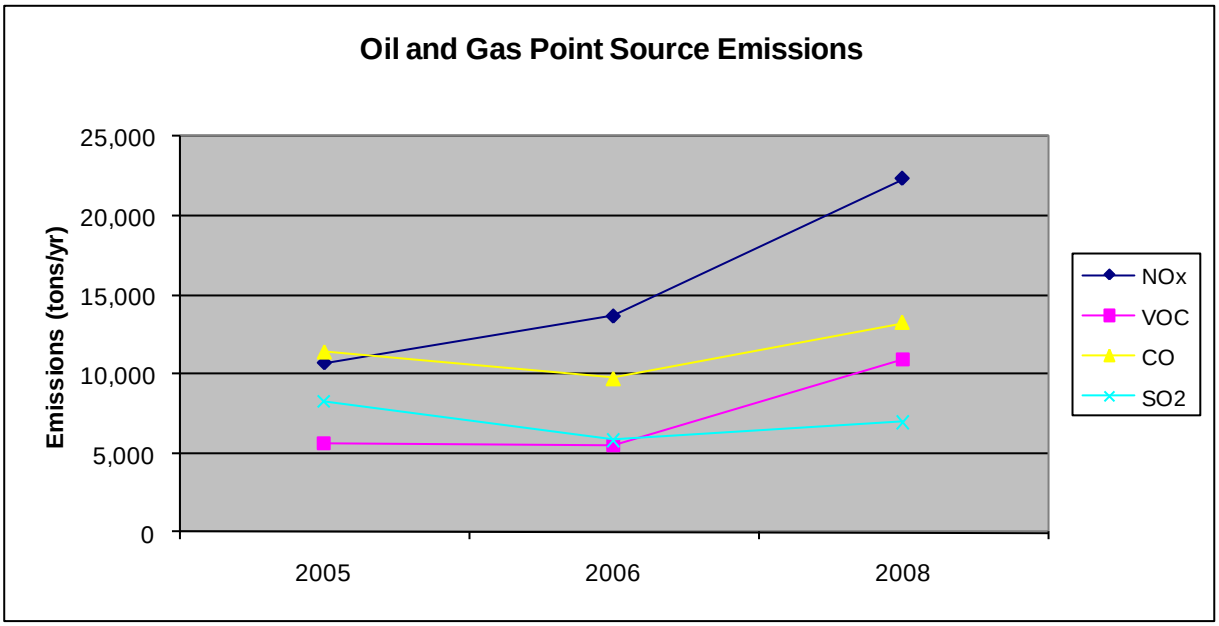


Figure F9. Wyoming Emissions Trends. Top panel: Wyoming point source (not including O&G points) emission trends. Lower panel: Wyoming oil and gas emissions trends.

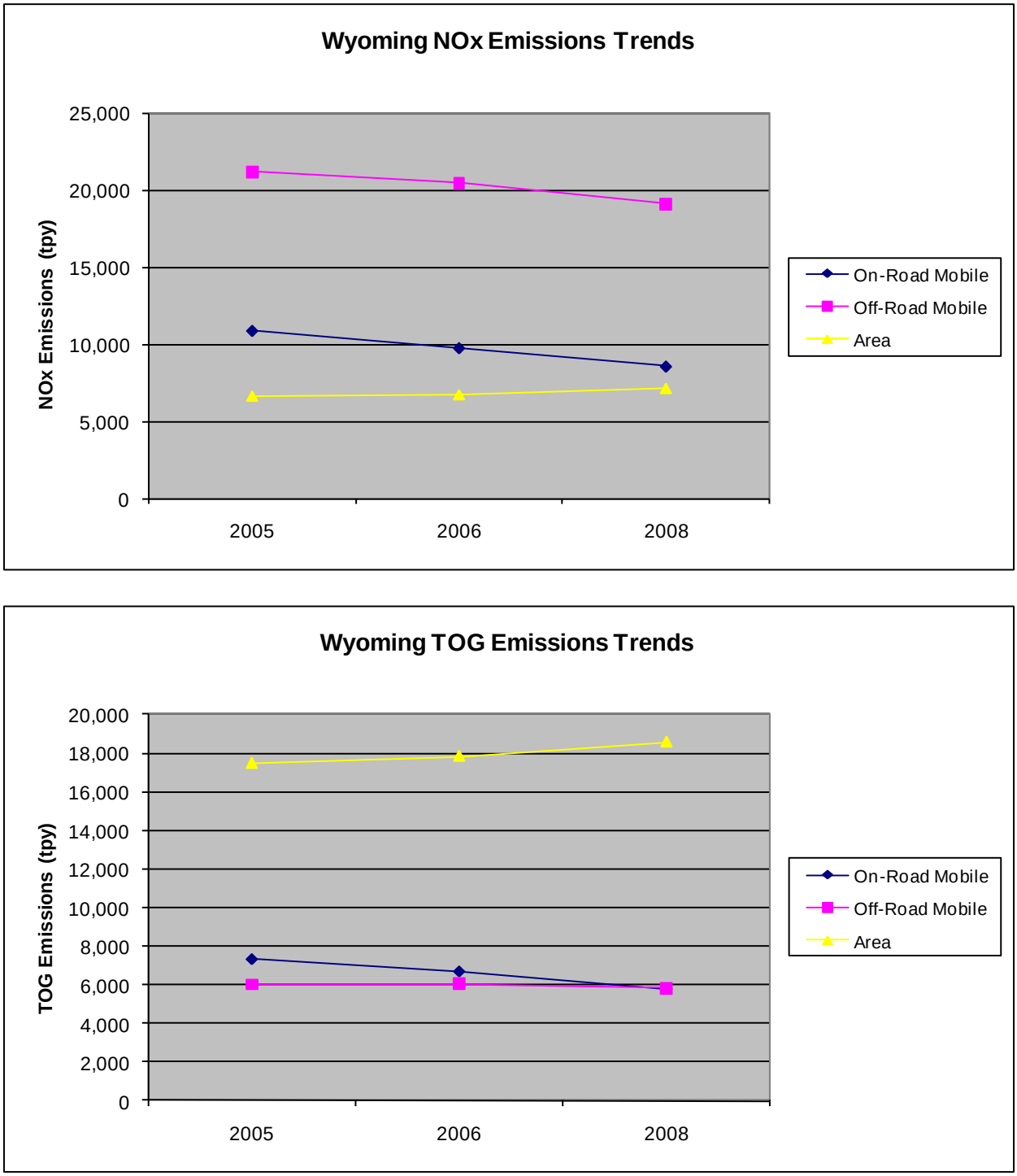


Figure F10. Wyoming Emissions Trends. Top panel: Wyoming NOx emission trends. Lower panel: Wyoming TOG emissions trends.

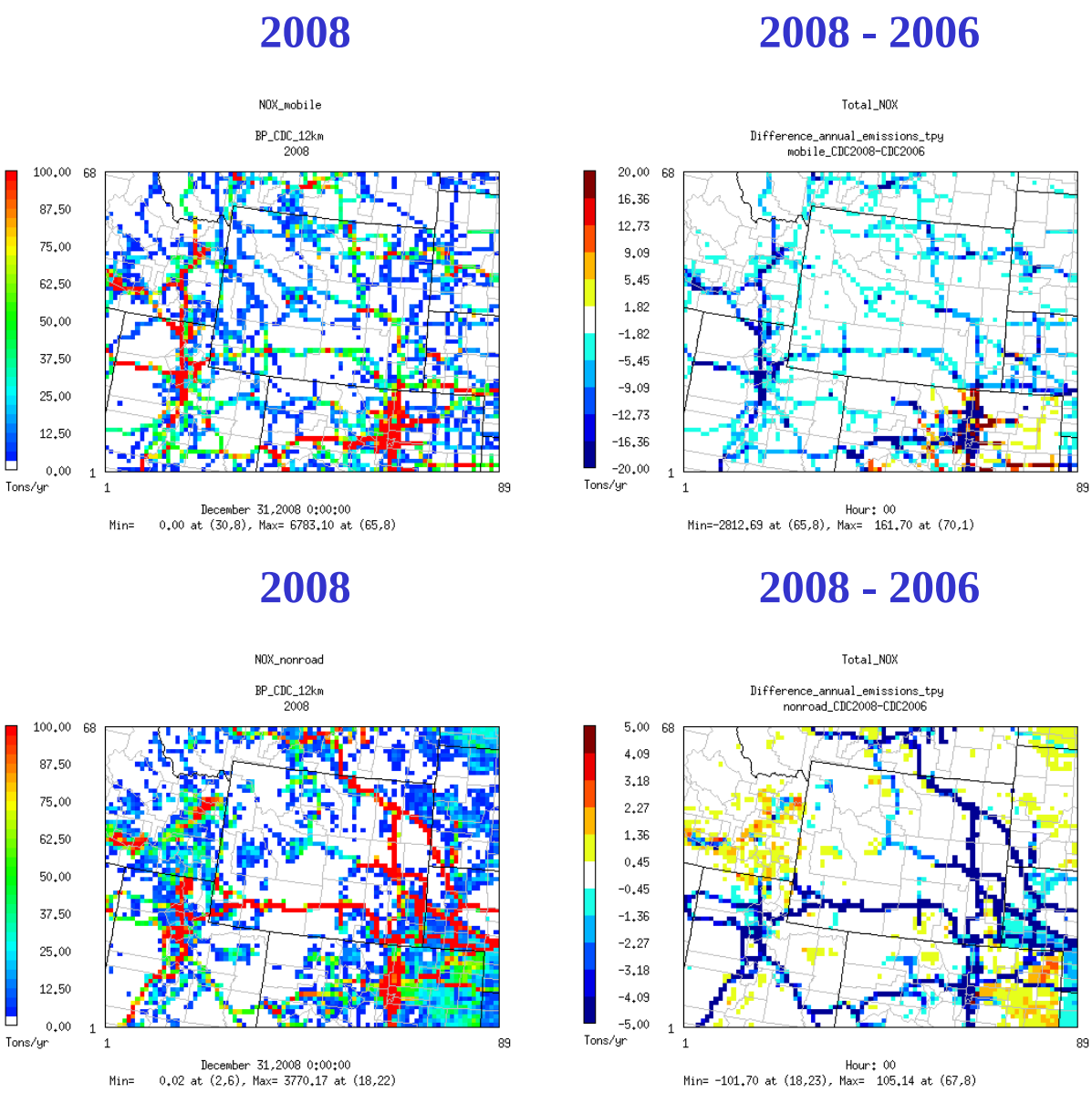


Figure F11. Wyoming Emissions Trends. Top panel: Wyoming onroad mobile NOx emission trends. Lower panel: Wyoming nonroad mobile NOx emissions trends.

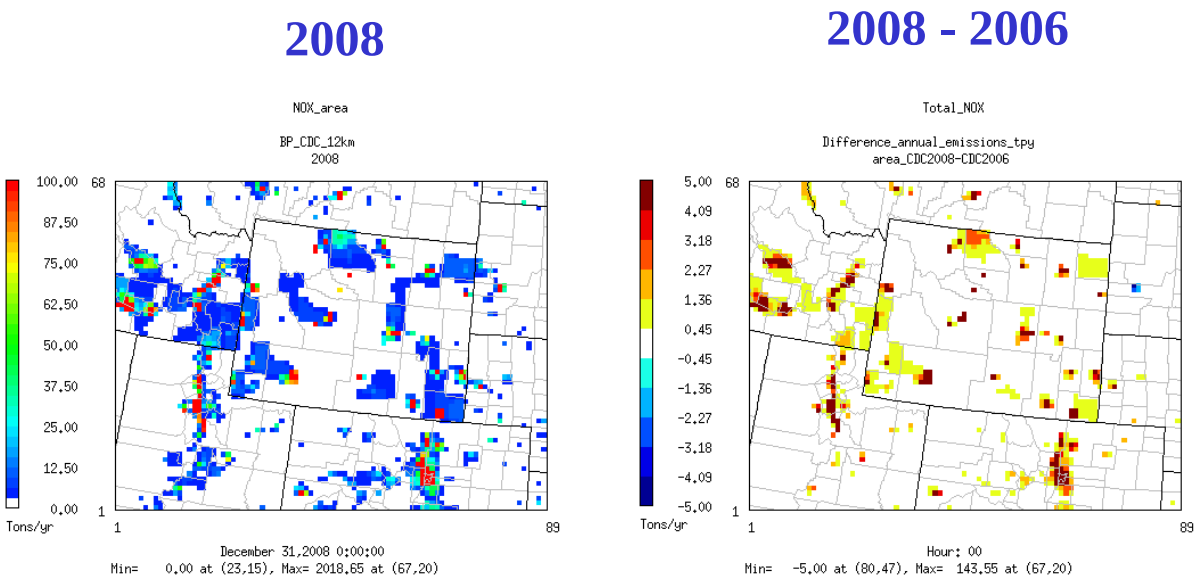


Figure F12. Wyoming Emissions Trends. Top panel: Wyoming non-O&G area source NOx emission trends.

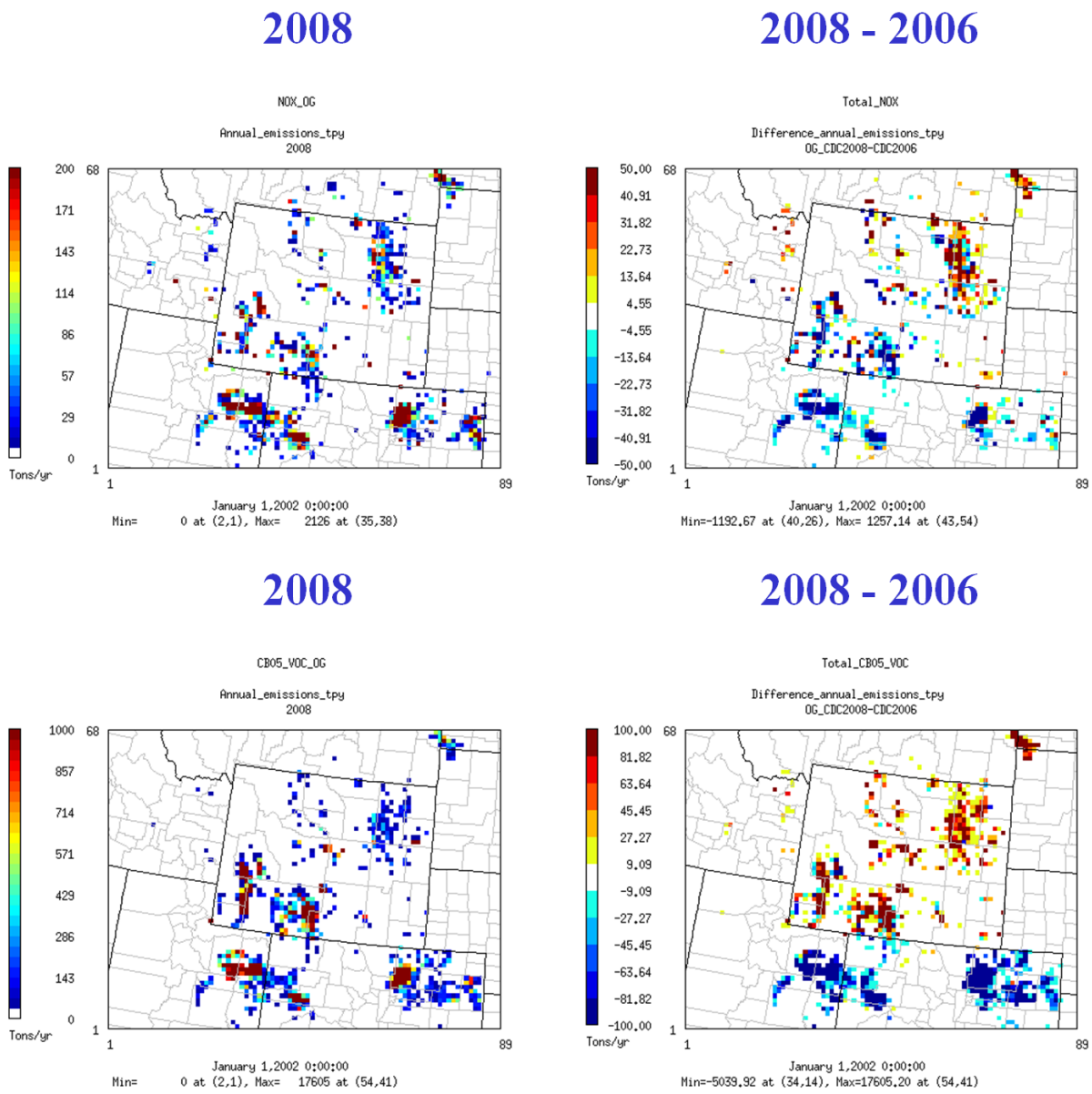


Figure F13. Wyoming O&G Emissions Trends. Top panel: Wyoming O&G source category NOx emission trends. Lower panel: Wyoming O&G source category CB05 VOC emissions trends.