

APPENDIX G

Development of 2014 On-Road Mobile Source Winter Weekday CO Emissions for the El Paso CO Zone

DEVELOPMENT OF 2014 ON-ROAD MOBILE SOURCE WINTER WEEKDAY CO EMISSIONS FOR THE EL PASO CO ZONE

The Texas A&M Transportation Institute (TTI) developed the 2014 on-road mobile source winter weekday carbon monoxide (CO) emissions for the El Paso CO zone (CO maintenance area) using the detailed, travel demand model (TDM) link-based, time-of-day methodology. These emissions were developed consistent with (same data and procedures) the El Paso portion of the 2014 Air Emissions Reporting Requirements (AERR). More information regarding the El Paso portion of the 2014 AERR and the overall procedures and data used to develop the inventory documented here can be found in the report, *Development of 2014 On-Road Mobile Source Annual, Summer Weekday, and Winter Work Weekday Emissions Inventories for Specified Areas: El Paso Area* (TTI, August 2015).

The only significant difference between the procedures used in the AERR and these CO emissions is the area of interest. Where the AERR was focused on the El Paso county-level activity (resulting in county-level emissions), the activity for these CO emissions focused only on the El Paso CO zone, which includes the group of TDM network zones and associated links that are within the El Paso CO maintenance area boundary. As defined in the El Paso CO SIP the El Paso CO zone is the portion of the City of El Paso bounded on the north by Highway 10 from Porfirio Diaz Street to Raynolds Street, Raynolds Street from Highway 10 to the Southern Pacific Railroad lines, the Southern Pacific Railroad lines from Raynolds Street to Highway 62, Highway 62 from the Southern Pacific Railroad lines to Highway 20 and Highway 20 from Highway 62 to Polo Inn Road; bounded on the east by Polo Inn Road from Highway 20 to the Texas Mexico border; bounded from the south by the Texas-Mexico border from Polo Inn Road to Porfirio Diaz Street; and bounded on the west by Porfirio Diaz Street from the Texas-Mexico border to Highway 10. Since the CO zone is a subset of the county, the activity was adjusted to reflect only the CO zone (the emission rates remained at the county-level). Table 1 shows a summary of the 2014 winter weekday VMT and CO emissions for the El Paso CO zone.

Table 1. El Paso CO Zone 2014 Winter Weekday Emissions (Tons/Day).

VMT	Speed	CO
1,370,483	47.56	8.62

OVERVIEW OF METHODOLOGY

To develop the 2014 CO zone winter weekday (inventory scenario) emissions inventory, TTI used the detailed, hourly, MOVES rates-per-activity, TDM link-based method, which produces hourly emissions estimates by vehicle type, pollutant, and emissions process. This method calculates emissions based on two categories: VMT-based emissions and off-network emissions (i.e., emissions that occur when the vehicle is not in motion). For the VMT-based emissions, this method applied emissions rates for all emissions processes in terms of miles-traveled activity (e.g., grams/mile [g/mi]).

For the off-network emissions, off-network activity measures (i.e., starts, source hours parked [SHP], source hours idling [SHI], and auxiliary power unit [APU] hours) were used. Associated emissions rates were produced in these terms for the off-network emissions process calculations. All of the activity-based rates required in the TTI inventory process are directly available from MOVES, except for the SHP-based rates. These emissions rates are produced using TTI inventory utilities, recently updated for use with MOVES2014.

Major Components

The emissions inventory estimation process requires development of the following major inventory components. All are inputs to the emissions calculations, except vehicle populations, which are an intermediate input needed for calculating estimates of SHP and vehicle starts:

- District, four-period, time-of-day, vehicle type VMT mix — designates the vehicle types included in the analysis and specifies the fraction of on-road fleet VMT attributable to each vehicle type by MOVES road type;
- Hourly, on-road fleet link VMT and average speeds — link-level winter weekday, directional, link-VMT and associated average fleet speed for those links within the CO zone;
- County vehicle type populations — based on vehicle registration data and vehicle population factors derived from the VMT mix;
- County, hourly vehicle type SHP — estimated as a function of total hours (hours a vehicle exists or vehicle population) minus its hours of operation on roads (source hours operating [SHO], which is the same as vehicle hours of travel [VHT]) and distributed to the CO zone and Non-CO zone areas of the county based on the VHT (more VHT within the zone results in less SHP);
- County, hourly vehicle type starts — based on the MOVES national default starts per vehicle, and the local county vehicle type population estimates and distributed to the CO zone and Non-CO zone areas of the county based on the number of trips from the trip tables used with the TDM;
- County, hourly combination long-haul truck SHI and APU hours — estimated based on information from the TCEQ *Extended Idling Study* (ERG, August 2004) and distributed to the CO zone and Non-CO zone areas of the county by assuming that all hoteling activity locations are outside the CO zone; and
- County, hourly vehicle type emissions rates (mass/mile, mass/SHP, mass/start, mass/SHI, and mass/APU hour) — local emissions factor modeling input parameters (e.g., weather and fleet characteristics, fuel properties, and inspection/maintenance [I/M] program) were used in MOVES emissions rate mode runs. The initial post-processing was to calculate rates in the form needed that are not directly available from MOVES, and the final post-processing was performed to screen out un-needed pollutants and to make required adjustments (i.e., apply estimated Texas Low Emissions Diesel [TxLED] effects on diesel vehicle oxides of nitrogen [NO_x] rates).

Weekday Emissions Calculations

The inventory scenario (2014 CO zone winter weekday) emissions were calculated using the previously described major inputs:

- Texas Department of Transportation (TxDOT) district-level time-of-day VMT mix by MOVES road type;
- Inventory scenario county, hourly on-road fleet link VMT and speed estimates;
- Inventory scenario hourly off-network activity estimates by vehicle type of SHP, starts, SHI, and APU hours (for CLHT diesel only); and
- County-level look-up tables of hourly emissions rates by MOVES road type, speed bin, vehicle type (source use type/fuel type), and emissions process.

For the VMT-based calculations, county-to-TxDOT district, TDM road type/area type-to-MOVES road type, and hour-of-day to time-of-day period designations were used to match the appropriate VMT mixes with the link VMT. The VMT mixes by MOVES road type were multiplied by the link fleet VMT to distribute each link's VMT to the different vehicle type categories. Since this emissions inventory is for the CO zone only (a subset of the county), only those links within the CO zone were included in the VMT-based emissions calculations. Emissions rates for each link's average speed were interpolated (see procedure in Appendix B of the El Paso AERR document) from the appropriate set of look-up table emissions factors and corresponding index speeds (i.e., the average bin speeds of 2.5, 5.0, 10.0, 15.0, ... 75.0 mph), bounding the link's average speed. For link speeds below or above the minimum and maximum average bin speeds of 2.5 and 75 mph, the rates for those bounding speeds were used. The estimated vehicle type and MOVES road type link speed-specific emissions factors for each pollutant process were then multiplied by the associated VMT to produce the link-based emissions estimates.

For the off-network emissions calculations, which were calculated at the county level, the vehicle type emissions factors were multiplied by the associated off-network activity estimate from the CO zone, as determined by the pollutant process.