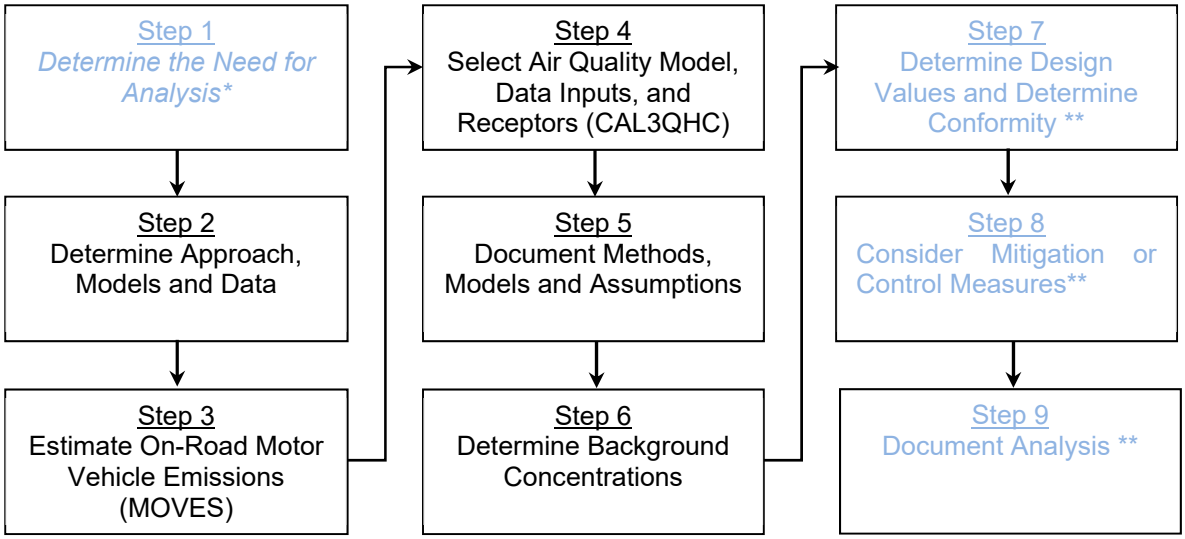
Project Level CO Quantitative Hot-Spot Analysis – Consultation Document

General Instructions: The Arizona Department of Transportation (ADOT) developed the following consultation document for the projects of air quality concern that are funded by Federal Highway Administration (FHWA) and Federal Transit Administration (FTA). The Purpose of this document is to describe the methods, models and assumptions used for a CO quantitative Hot-spot analysis as required in 40 CFR 93.105(c)(1)(i), 93.123, 93.116.

Completing a Carbon Monoxide (CO) Hot-Spot Analysis

The general steps required to complete a quantitative CO hot-spot analysis are outlined below and described in detail in the EPA Office of Transportation and Air Quality guidance document "Using MOVES2014 in Project-Level Carbon Monoxide Analyses" EPA-420-B-15-028, March 2015, and "Guideline for Modeling Carbon Monoxide from Roadway Intersections" EPA-454/R-92-005, November 1992.



* Described in the previous section (Air Quality Concern Questionnaire).
** These Steps will be described and documented in a final air quality analysis report.

Step 2: Determine the Approach, Models, and Data

a. Describe the project area (area substantially affected by the project, 58 FR 62212) and emission sources.
b. Determine general approach and analysis year(s) – year(s) of peak emissions during the time frame of the transportation plan (69 FR 40056).
c. Determine CO National Ambient Air Quality Standards (NAAQS) to be evaluated.
d. Select emissions and dispersion models and methods to be used.
e. Obtain project-specific data (e.g., fleet mix, peak-hour volumes and average speed).

Step 3: Estimate On-Road Motor Vehicle Emissions with MOVES

a. Generate RunSpec and enter project-specific data into Project Data Manager

b. Estimate on-road motor vehicle emissions.

Step 4: Select Air Quality Model, Data Inputs, and Receptors for CAL3QHC

a. Obtain and input required site data (e.g., meteorological).
b. Input MOVES outputs (emission factors).
c. Determine number and location of receptors, roadway links, and signal timing.
d. Run air quality dispersion model and obtain concentration results.

Step 5: Document Methods, Models and Assumptions

a. Summarize the methods, models and assumptions based on Step 3 & 4 (see the example in Table 1).
b. Submit the summary document to ADOT for review.

Step 6: Determine Background Concentrations

a. Determine background concentrations from nearby and other emission sources excluding the emissions from the project itself.

Step 7: Calculate Design Values and Determine Conformity

a. Add step 5 results to background concentrations to obtain values for the Build scenario.
b. Determine if the design values allow the project to conform.

Step 8: Consider Mitigation or Control Measures

a. Consider measures to reduce emissions and redo the analysis. If mitigation measures are required for project conformity, they must be included in the applicable SIP and be enforceable.
b. Determine if the design values from allow the project to conform after implementing mitigation or control measures.

Step 9: Document Analysis

a. Determine if the project conforms or not based on the results of step 7 or step 8.

To support the conclusion that a project meets conformity under 40 CFR 93.116 and 93.123, at a minimum the documentation will include:

- *Description of proposed project, when it is expected to open, and projected travel activity data.*
- *Analysis year(s) examined and factors considering in determining year(s) of peak emissions.*
- *Emissions modeling data, model used with inputs and results, and how characterization of project links.*
- *Model inputs and results for road dust, construction emissions, and emissions from other source if needed.*
- *Air Quality modeling data, included model used, inputs and results and receptors.*
- *How background concentrations were determined.*
- *Any mitigation and control measures implemented, including public involvement or consultation if needed.*
- *How interagency and public participation requirements were met.*
- *Conclusion that the proposed project meets conformity requirements.*
- *Sources of data for modeling.*

Methods, Models and Assumptions for CO *(Example)*

Table 1. Methods, Models and Assumptions		
Estimate On-Road Motor Vehicle Emissions (Step 3)		
MOVES	**Description**	**Data Source**
Scale	*On road, Project, Inventory*	EPA Using MOVES2014 in Project-Level Carbon Monoxide Analyses, Section 2.3.2
Time Span	*EPA 1992 Guideline conservatively uses a typical peak-hour traffic activity in one MOVES run to generate emission rates.*	EPA Using MOVES2014 in Project-Level Carbon Monoxide Analyses, Section 2.3.3
Geographic Bounds	*Maricopa County; Pima County for any conformity determinations prior to 7/10/20*	EPA Using MOVES2014 in Project-Level Carbon Monoxide Analyses, Section 2.3.4
Vehicles Equipment	*All Fuels and Source Use Types will be selected*	EPA Using MOVES2014 in Project-Level Carbon Monoxide Analyses, Section 2.3.5
Road Type	*Urban Restricted and Urban Unrestricted access*	EPA Using MOVES2014 in Project-Level Carbon Monoxide Analyses, Section 2.3.6
Pollutants and Processes	*CO Running Exhaust, CO Crankcase Running Exhaust*	EPA Using MOVES2014 in Project-Level Carbon Monoxide Analyses, Section 2.3.7
Output	*Database will be created, Grams, Miles, Distance Traveled, Population will be selected. Emissions process will be selected in the Output Emissions Detail. Emission rates for each process can be appropriately summed to calculate aggregate CO emission rates for each link.*	EPA Using MOVES2014 in Project-Level Carbon Monoxide Analyses, Section 2.3.10
Project Data Manager	*Database will be created and MOVES2014a templates will be created to include local project data and information provided by MPO, e.g., MAG's or PAG's I/M programs, Fuel, Age Distribution, Meteorology data which are consistent with the regional models. Otherwise, the average temperature and humidity in January may be used. Links and Link Source Type will be specific to project as provided by the traffic study, any missing information will use default MOVES2014a data. After running MOVES, the MOVES CO_CAL3QHC_EF post-processing script is run.*	See Table 2 below for details
Select Air Quality Model, Data Inputs, and Receptors (Step 4)		
CAL3QHC	**Description**	**Data Source**

Emissions Sources	*Emissions Rates in grams/mile, as described in MOVES2014a section. The free flow and queue links defined for modeling with MOVES2014a will be used as input into CAL3QHC.*	1992 Guideline for Modeling Carbon Monoxide from Roadway Intersections, EPA-454/R-92-005, November 1992. Section 5.2.3 of Appendix W to 40 CFR Part 51, CO screening analyses of intersection projects should use the CAL3QHC dispersion model.
Receptor Locations	*At least 3m from the roadways at a height of 1.8m, nearby occupied lot, vacant lot, sidewalks, and any locations near breathing height (1.8m) to which the general public has continuous access.*	1992 Guideline for Modeling Carbon Monoxide from Roadway Intersections, Section 2.2
Traffic and Geometric Design	*Lane Configuration, Lane Width, Signalization, Turning Movements, Median Width, Traffic Volume, Level of Service, Grade, % of Heavy-Duty Trucks, and Peak Hour Average Approach Speed.*	1992 Guideline for Modeling Carbon Monoxide from Roadway Intersections, Section 4.7.4
Meteorology	*Temperature, Wind Speed, Wind Direction, Atmospheric Stability Class, Mixing Heights and Surface Roughness.*	1992 Guideline for Modeling Carbon Monoxide from Roadway Intersections, Section 4.7.1
Persistence Factor	*Local persistence factor based on monitoring data. If it is not available, use a default persistence factor of 0.7.*	1992 Guideline for Modeling Carbon Monoxide from Roadway Intersections, Section 4.7.2
Determine Background Concentrations (Step 6)		
Background Monitor	*Should be obtained from a monitoring site not affected by the intersection of interest. Should be adjusted for the future by multiplying the present CO background by the ratio of future to current MOVES CO emission factor and multiplying by the ratio of future to current traffic*	1992 Guideline for Modeling Carbon Monoxide from Roadway Intersections, Section 4.7.3

Table 2. Project Data Manager Inputs		
Input	**Level of Detail/notes**	**Possible Data Source**
Meteorology	*Same for build and no-build scenarios. A minimum of four hours (AM, PM, MD & ON), for one day (weekday) and for a winter month (January) is required. May use the County meteorology file for the county used in the latest SIP or regional conformity analysis.*	ADEQ, MPO EPA Using MOVES2014 in Project-Level Carbon Monoxide Analyses, Section 2.4.1
Age Distribution	*Same for build and no-build scenarios, unless something about the project would change them.*	ADOT, MPO EPA Using MOVES2014 in Project-Level Carbon Monoxide Analyses, Section 2.4.2
Fuel	*Same for build and no-build scenarios. May use the fuel file used in the latest SIP or regional conformity analysis if local information is available. Otherwise, MOVES default fuel supply and formulation information can be used.*	MPO, MOVES defaults EPA Using MOVES2014 in Project-Level Carbon Monoxide Analyses, Section 2.4.3
I/M Programs	*Same for build and no-build scenarios. Projects in Area A and B should define the I/M programs. Use MPO data. If not available, may use the MOVES default I/M programs but review the details and make any necessary changes before use.*	MPO, MOVES defaults EPA Using MOVES2014 in Project-Level Carbon Monoxide Analyses, Section 2.4.4
Retrofit Data	*If necessary. For example, a bus terminal project*	Project specific modeling

	might include plans to mitigate emissions by retrofitting the bus fleet.	EPA Using MOVES2014 in Project-Level Carbon Monoxide Analyses, Section 2.4.7
Links	*Unique inputs needed for each run. Requires information on each link's length (in miles), traffic volume (vehicle per hour), average speed (miles per hour) and road grade (percent).*	Project specific modeling, ADOT, MPO EPA Using MOVES2014 in Project-Level Carbon Monoxide Analyses, Section 2.4.6
Link Source Types	*Unique inputs needed for each run. Project-specific data are preferred. If the source type distribution can be represented by that of the regional fleet, the data used in the latest regional emissions analysis can be provided.*	Project specific modeling, ADOT, MPO EPA Using MOVES2014 in Project-Level Carbon Monoxide Analyses, Section 2.4.5
Link Drive Schedules, Operating Mode Distribution	*Unique inputs needed for each run. Three options are available: 1. Provide average speed and road type through the Links Importer; 2. Provide a link drive schedule using the Link Drive Schedule Importer; 3. Provide a detailed operation distribution for the link.*	Project specific modeling, ADOT, MPO EPA Using MOVES2014 in Project-Level Carbon Monoxide Analyses, Section 2.4.8, 2.4.9
Off-Network, Hotelling	*If necessary. For example, a project analysis includes areas where vehicles are not driving on the project links, but still contributing to the project's emissions.*	EPA Using MOVES2014 in Project-Level Carbon Monoxide Analyses, Section 2.4.9

Table 3. Construction Emissions *(Only if Applicable)*		
Construction Emissions	*Construction Emissions need to be addressed if construction lasts longer than 5 years at any individual site. In the context of CO, this is usually excess CO emissions due to traffic delay and/or detours.*	40CFR93.123(c)(5)"Each site which is affected by construction-related activities shall be considered separately, using established "Guideline" methods." If applicable, include analysis as an Appendix to the Air Quality Report.