# Project Level CO Hot-Spot Consulation

*General Instructions: The general steps required to complete a quantitative CO hot-spot analysis are described in detail below using a similar questionnaire as the PM10 hot-spot.*

*The questionnaire is not required for a project that does not require a project-level hot spot analysis under these circumstances:*

* *Is exempt pursuant to 40 CFR 93.126; or*
* *Is a traffic signal synchronization project under 40 CFR 93.128; or*
* *Uses no Federal funds AND requires no Federal approval*

Project Setting and Description

*Should be the same description used in the PM Questionnaire in MAG Region, if applicable. Please describe in detail with the applicable rules and plans MAG Region.*

* *Describe the general project scope and purpose;*
* *Include a Map of the project area*
* *Identify the applicable regional Transportation Improvement Plan (TIP), and State TIP (STIP), if applicable;*
* *Identify the relevant maintenance area(s) for CO;*
* *Identify the conformity status of the applicable State Implementation Plan (SIP) for the maintenance area(s).*

Project Assessment – Part A

The following questionnaire is used to compare the proposed project to a list of project types in 40 CFR 93.123(a) requiring a quantitative analysis of local CO emissions (Hot-spots) in nonattainment or maintenance areas, which include:

1. Projects in or affecting locations, areas, or categories of sites which are identified in the applicable implementation plan as sites of violation or possible violation;
2. Projects affecting intersections that are at Level-of-Service D, E, or F, or those that will change to Level-of-Service D, E, or F because of increased traffic volumes related to the project;
3. Any project affecting one or more of the top three intersections in the nonattainment or maintenance area with highest traffic volumes, as identified in the applicable implementation plan; and
4. Any project affecting one or more of the top three intersections in the nonattainment or maintenance area with the worst level of service, as identified in the applicable implementation plan.

If the project matches one of the listed project types in 40 CFR 93.123(a)(1) above, it is considered a project of local air quality concern and the hot-spot demonstration must be based on quantitative analysis methods in accordance to 40 CFR 93.116(a) and the consultation requirements of 40 CFR 93.105(c)(1)(i).

*Identify which of the above listed project types (i - iv) are relevant to the project.*

**Projects Affecting CO Sites of Violation or Possible Violation**Does the project affect locations, areas or categories of sites that are identified in the CO applicable plan or implementation plan submissions, as appropriate, as sites of violation or potential violation? \*Currently, no plan includes such areas (contact ADOT for update before proceeding)

YES/NO – *discuss the location of sites of violation or potential violation, as identified in the applicable SIP or SIP submission(s), relative to the project location.*

**Projects with Congested Intersections**

Is this a project that affects a congested intersection (LOS D or greater) will change LOS to D or greater because of increased traffic volumes related to the project?

YES/NO– *discuss the LOS of intersections in the design year affected by the project and the total AADT and provide the following data (\*provide the separate files):*

* *The latest traffic study for the project\**
* *GIS shape files for projected no-build and build networks\**
* *A summary table for the traffic data with the data sources (e.g., MAG special runs for the project):*

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| AADT Volumes | | Existing AADT (not necessary if the project is a new highway) | Interim AADT  (optional) | No-Build AADT | Build AADT | AADT  Difference (Build - No-Build) |
| Mainline | a |  |  |  |  |  |
| b |  |  |  |  |  |
| c |  |  |  |  |  |
| . |  |  |  |  |  |
| Intersection | a |  |  |  |  |  |
| b |  |  |  |  |  |
| c |  |  |  |  |  |
| . |  |  |  |  |  |

*Source:*

* *The LOS analysis files (e.g., Synchro or HCM model runs)\**
* *A summary table for the LOS with the data sources:*

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Level of Service (LOS) | | Existing | | Interim (optional) | | No-Build | | Build | |
| AM Peak | PM Peak | AM Peak | PM Peak | AM Peak | PM Peak | AM Peak | PM Peak |
| LOS (Delay- optional) | LOS (Delay) | LOS (Delay) | LOS (Delay) | LOS (Delay) | LOS (Delay) | LOS (Delay) | LOS (Delay) |
| Intersection LOS (overall, not for each link) | a |  |  |  |  |  |  |  |  |
| b |  |  |  |  |  |  |  |  |
| c |  |  |  |  |  |  |  |  |
| . |  |  |  |  |  |  |  |  |

*Source:*

**Projects Affecting Intersections with Highest Traffic Volumes**

Does the project affect one or more of the top three intersections in the CO maintenance area with highest traffic volumes identified in the CO applicable implementation plan?

\*Three Highest Intersections in Current Plans (contact ADOT for update before proceeding)

|  |
| --- |
| MAG1 |
| 16th St & Camelback Rd |
| 107th Ave & Grand Ave |
| Priest Dr & Southern Ave |

1MAG 2013 Carbon Monoxide Maintenance Plan for the Maricopa County Area

YES/NO *– discuss the locations of intersections in the applicable implementation plan and traffic volumes affected by the project, including table of traffic volumes for existing, no-build, and all build scenarios.*

**Projects Affecting Intersections with the Worst Level of Services**

Does the project affect one or more of the top three intersections in the CO maintenance area with the worst level of services identified in the CO applicable implementation plan?

YES/NO *– discuss the locations of intersections in the applicable implementation plan and the LOS of intersections affected by the project, including table of LOS for existing, no-build, and all build scenarios.*

\*Three Worst LOS Intersections in Current Plans (contact ADOT for update before proceeding)

|  |
| --- |
| MAG1 |
| 7th Ave & Van Buren St |
| German Rd & Gilbert Rd |
| Thomas Rd & 27th Ave |

1Same as above

Project Assessment – Part B

Hot-Spot Determination

*State whether the project requires a quantitative hot-spot analysis and summarize the response(s) above that support that determination. If modeling is required, document the relevant agencies that require interagency consultation on any input for the questionnaire from Federal, state, and local transportation and air agencies as necessary for this project per 40 CFR 93.105(c)(1)(i). This information will be included in subsequent air quality analysis and project level conformity determination reports.*

Decide which type of hot-spot analysis is required for the project by choosing a category below.

**If answered “Yes” to any of the questions in the Project Assessment – Part A**

* A quantitative CO hot-spot analysis is required under 40 CFR 93.123(a)(1).

Check **If** a formal air quality report for conformity is required for this project.

* The applicable air quality models, data bases, and other requirements specified in 40 CFR part 51, Appendix W (Guideline on Air Quality Models) should be completed as documented below.
* **Or**

Check **If** the project fits the condition of the “**CO Categorical Hot-Spot Finding”** and Attach all supporting materials to this document.

In the January 24, 2008, Transportation Conformity Rule Amendments, EPA included a provision at 40 CFR 93.123(a)(3) to allow the U.S. DOT, in consultation with EPA, to make categorical hot-spot findings in CO nonattainment and maintenance areas if appropriate modeling showed that a type of highway or transit project would not cause or contribute to a new or worsened air quality violation of the CO NAAQS or delay timely attainment of the NAAQS or required interim milestone(s), as required under 40 CFR 93.116(a).

**Projects Fitting the Condition of the CO Categorical Hot-Spot Finding (Updated 2/1/23)**

If the project’s parameters fall within the acceptable range of modeled parameters, use FHWA 2023 CO Categorical Hot-Spot Finding Spreadsheet Tool: <https://www.fhwa.dot.gov/environment/air_quality/conformity/policy_and_guidance/cmcf_2023/index.cfm>

YES/NO *– If yes, perform an analysis by utilizing the CO Categorical Hot-Spot Finding tools described above. If no, develop an appropriate quantitative analysis method for the project by the interagency consultation process described above.*

**If answered “No” to all of the questions in the Project Assessment – Part A**A qualitative CO analysis is required under 40 CFR 93.123(a)(2). The demonstrations required by 40 CFR 93.116 Localized CO, PM10, and PM2.5 violations (hot-spots) may be based on either:

**(i) Quantitative methods that represent reasonable and common professional practice;**

Check **If** an Air Quality Report includes CO modeling for NEPA EA/EIS use this report to satisfy option (i)

**Or**

**(ii) A qualitative consideration of local factors, if this can provide a clear demonstration that the requirements of 40 CFR 93.116 are met.**

Check **If** there is an Air Quality Report that does not include CO modeling for NEPA EA/EIS use this report to satisfy (ii)

Check **If** the project is a CE under NEPA that does not require Air Quality Report for NEPA EA/EIS use this Questionnaire to add additional justification to satisfy (ii)

# Project Level CO Quantitative Hot-Spot Analysis –

# Modelling Assumptions

*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.

Step 2

Determine Approach, Models and Data

Step 4

Select Air Quality Model, Data Inputs, and Receptors (CAL3QHC)

Step 5

Document Methods, Models and Assumptions

Step 1

*Determine the Need for Analysis\**

Step 7

Determine Design Values and Determine Conformity \*\*

Step 8

Consider Mitigation or Control Measures\*\*

Step 3

Estimate On-Road Motor Vehicle Emissions (MOVES3.1)

Step 6

Determine Background Concentrations

Step 9

Document Analysis \*\*

\* 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**

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

**Step 3: Estimate On-Road Motor Vehicle Emissions with MOVES3.1**

1. Generate RunSpec and enter project-specific data into Project Data Manager
2. Estimate on-road motor vehicle emissions.

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

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

**Step 5: Document Methods, Models and Assumptions**

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

**Step 6: Determine Background Concentrations**

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

**Step 7: Calculate Design Values and Determine Conformity**

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

**Step 8: Consider Mitigation or Control Measures**

1. 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.
2. Determine if the design values from allow the project to conform after implementing mitigation or control measures.

**Step 9: Document Analysis**

1. 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)** | | |
| **MOVES3.1** | **Description** | **Data Source** |
| Scale | *On road, Project, Inventory* | EPA Using MOVES3 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 MOVES3 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 MOVES3 in Project-Level Carbon Monoxide Analyses, Section 2.3.4 |
| Onroad Vehicles | *All Fuels and Source Use Types will be selected* | EPA Using MOVES3 in Project-Level Carbon Monoxide Analyses, Section 2.3.5 |
| Road Type | *Urban Restricted and Urban Unrestricted access* | EPA Using MOVES3 in Project-Level Carbon Monoxide Analyses, Section 2.3.6 |
| Pollutants and Processes | *CO Running Exhaust, CO Crankcase Running Exhaust* | EPA Using MOVES3 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 MOVES3 in Project-Level Carbon Monoxide Analyses, Section 2.3.10 |
| Project Data Manager | *Database and MOVES3.1 templates will be created to include local project data and information provided by MPO, e.g., MAG’s or PAG’s I/M programs, Age Distribution data which are consistent with the regional models. The average temperature and humidity in January for metrology data and the default MOVES fuel data will be used. Links and Link Source Type will be specific to project as provided by the traffic analysis, any missing information will use default MOVES3.1 data. After running MOVES, the MOVES CO\_CAL3QHC\_EF post-processing script is run.* | EPA 1992 Guideline, Section 4.7.1., Using MOVES3 in Project-Level Carbon Monoxide Analyses, Section 2.1, 2.4 for Links; the required data necessary to be consistent with regional emissions analysis (40 CFR 93.123(c)(3)).  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 will be developed using the inputs described in MOVES3.1 section above. The free flow and queue links defined for modeling with MOVES3.1 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 MOVES3 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 MOVES3 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 MOVES3 in Project-Level Carbon Monoxide Analyses, Section 2.4.4 |
| Retrofit Data | *If necessary. For example, a bus terminal project might include plans to mitigate emissions by retrofitting the bus fleet.* | Project specific modeling  EPA Using MOVES3 in Project-Level Carbon Monoxide Analyses, Section 2.4.5 |
| 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 MOVES3 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 MOVES3 in Project-Level Carbon Monoxide Analyses, Section 2.4.7 |
| 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 MOVES3 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 MOVES3 in Project-Level Carbon Monoxide Analyses, Section 2.4.10 |

|  |  |  |
| --- | --- | --- |
| **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. |