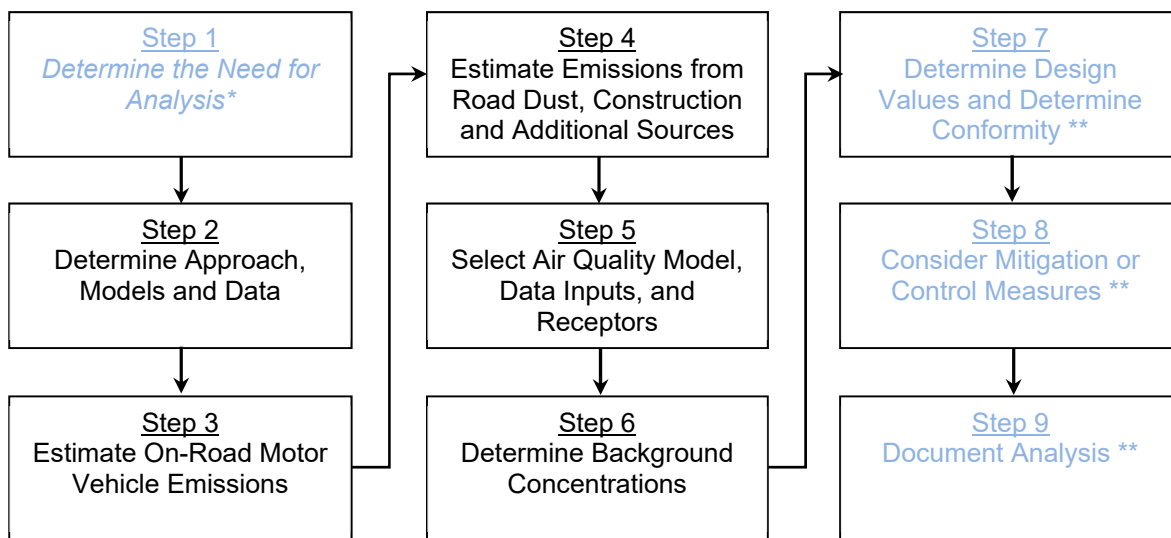


# Project Level PM Quantitative Hot-Spot Analysis – Consultation Document for Project of Air Quality Concern

*General Instructions: The Arizona Department of Transportation (ADOT) developed the following consultation document for projects that are administering Federal Highway Administration (FHWA) and Federal Transit Administration (FTA) funding that is projects of air quality concern as determined through interagency consultation. The Purpose of this document is to describe the methods, models and assumptions used for a quantitative Hot-spot analysis as required in 40 CFR 93.105(c)(1)(i), 93.123, 93.116 and to document that the analysis follows the Transportation Conformity Guidance for Quantitative Hot-Spot Analyses in PM<sub>2.5</sub> and PM<sub>10</sub> Nonattainment and Maintenance Areas.*

## Completing a Particulate Matter (PM) Hot-Spot Analysis

The general steps required to complete a quantitative PM hot-spot analysis are outlined below and described in detail in the EPA Office of Transportation and Air Quality guidance document “Transportation Conformity Guidance for Quantitative Hot-spot Analyses in PM<sub>2.5</sub> and PM<sub>10</sub> Nonattainment and Maintenance Areas” EPA-420-B-15-084, November 2015.



\* 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

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

### Step 3: Estimate On-Road Motor Vehicle Emissions

- Estimate on-road motor vehicle emissions using MOVES.

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#### **Step 4: Estimate Emissions from Road Dust, Construction, and Additional Sources**

- a. Estimate road dust emissions using AP-42 Paved Roads.
- b. Do emissions from other sources (e.g., locomotives) need to be considered?

#### **Step 5: Select Air Quality Model, Data Inputs, and Receptors**

- a. Obtain and input required site data (e.g., meteorological).
- b. Input MOVES and AP-42 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 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.

## Interagency Consultation

ADOT will circulate the following Tables along with the *Project Level Conformity – Particulate Matter Project of Air Quality Concern Questionnaire* to describe in detail how the steps listed in EPA hot spot guidance will be followed. It is requested that consulted parties provide comments or questions on the methods, models and assumptions within 30 business days, a non-response will be interpreted to mean that the party concurs with the planning assumptions as describe in the Table.

Identify under each area the assumptions, data, and method that is proposed for each identified step found in Methods, Models and Assumptions Table.

### Methods, Models and Assumptions for PM (Example)

Table 1. Methods, Models and Assumptions		
Estimate On-Road Motor Vehicle Emissions (Step 3)		
MOVES	Description	Data Source
Scale	<i>On road, Project Emissions Rate</i>	EPA Hot Spot Guidance Section 4.4.2
Time Span	<i>4 weekday runs for each of the following months January (Quarter 1), April (Quarter 2), July (Quarter 3); October (Quarter 4) for each year. Each of these 4 runs will further be split by Morning peak hours, Midday Emissions, Evening Peak and Overnight hours as defined by TDM model.</i>	EPA Hot Spot Guidance Sections 2.8, 4.3.2, 4.4.3
Geographic Bounds	<i>County</i>	EPA Hot Spot Guidance Section 4.4.4
Vehicles Equipment	<i>All Fuels and Source Use Types will be selected</i>	EPA Hot Spot Guidance Section 4.4.5
Road Type	<i>Urban Restricted and Urban Unrestricted access</i>	EPA Hot Spot Guidance Section 4.4.6
Pollutants and Processes	<i>Primary Exhaust, Tire wear Break wear for PM10 (and PM2.5 as a prerequisite for model), Organic Carbon, Elemental Carbon, Sulfate Particulate.</i>	EPA Hot Spot Guidance Sections 2.5, 4.4.7
Manage Input Data Set	<i>Input database will be created and modified for Project level using required Regional Inputs from latest Regional Conformity Analysis.</i>	EPA Hot Spot Guidance Section 4.4.8, See Project Data Manager below
Output	<i>Database will be created, Grams, Joules, Miles, Distance Traveled, Population will be selected. Fuel type, Emissions process, Road Type and Source Use Type will be selected in the Output Emissions Detail. After running MOVES for a particular hour/day/month scenario, the PM10_Grams_Per_Veh_Mile script can be run on the output database.</i>	EPA Hot Spot Guidance Section 4.4.10, 4.6

Project Data Manager	<i>Database will be created and MOVES templates will be created to include local project data and information provided by xx, e.g., I/M programs, Fuel, Age Distribution, Meteorology Data, to be consistent with the regional model. Links and Link Source Type will be specific to project as provided by the traffic study, any missing information will use default MOVES2014a data.</i>	See Table 2 below for details
<b>Estimate Emissions from Road Dust, Construction, and Additional Sources (Step 4)</b> (ADOT will develop AP-42 emission factors below based on SIP or Regional Conformity Analysis provided by ADEQ, MAG, PAG or YMPO depending on the projects' locations)		
<b>AP-42, Fifth Edition, 2011</b>	<b>Description</b>	<b>Data Source</b>
Average Weight Vehicles	<i>All roads xx Ton, Freeway xx Ton, Arterials xx Ton</i>	<i>Source of Data TIP or RTP, Regional Conformity Analysis</i>
Silt Loading	<i>Section 13.2.1 Paved Roads from AP 42 will be used, consistent with the Regional analysis from xx. Emission factors for road and construction dust should be added to the emission factors generated for each link by MOVES. Ex. Silt loading – Freeways .02 g/m<sup>2</sup>, Arterials &gt;10,000 ADT .067g/m<sup>2</sup>, Low traffic roads &lt;10,000 ADT .23g/m<sup>2</sup>.</i>	<i>EPA Hot Spot Guidance Section 6, When estimating emissions of re-entrained road dust from paved roads, site-specific silt loading data must be consistent with the data used for the project's county in the regional emissions analysis (40 CFR 93.123(c)(3)).</i>
Construction Dust	<i>Construction Emissions need to be addressed if construction lasts longer than 5 years at any individual site. There are no other sources (e.g., locomotives) that need to be considered for most projects.</i>	<i>EPA Hot Spot Guidance Section 6.4</i>
Precipitation	<i>In xxx SIP/Regional Conformity used average of xx days with at least .01 inch of precipitation County</i>	<i>Source of Data TIP or RTP, Regional Conformity Analysis, SIP</i>
<b>Select Air Quality Model, Data Inputs, and Receptors (Step 5)</b>		
<b>AERMOD v.16216r</b>	<b>Description</b>	<b>Data Source</b>
Emissions Sources	<i>Emissions Rates in grams/time for AERMOD, all four quarters of analysis years as described in MOVES section. The free flow and queue links defined for modeling with MOVES will be used as inputs. The link width was defined as the width of the travel lanes plus 3 meters on either side of the roadway to account for the dispersion of the plume generated by the wake of moving vehicles. All links will be modeled at grade, with a source height of 0 m.</i>	<i>EPA Hot Spot Guidance Section 7.4, Appendix J, Revision to the Guideline on Air Quality Models: Adoption of a Preferred General Purpose Dispersion Model and Other Revisions Final Rule (U.S. EPA 2005)</i>
Background concentration	<i>A value of 0 will be used as recommended in guidance.</i>	<i>EPA Hot Spot Guidance Section 7, Appendix J</i>
Queuing algorithm	<i>While modeling arterial/intersection projects, the PM hot-spot guidance recommends not using the queuing algorithm.</i>	<i>EPA Hot Spot Guidance Section 7, Appendix J</i>

Meteorological Data	<i>The meteorological data will be based on the meteorological data derived from the EPA's Support Center for Regulatory Atmospheric Modeling for the Phoenix International Airport (surface data) and the Tucson International Airport (upper air data) for the 5-year period from 1987 through 1991.</i>	EPA Hot Spot Guidance Section 7.5, Appendix J
Surface Roughness, Dispersion	<i>Based on land cover surface roughness of xx cm used Single family residential. The urban option will be selected based on the land use classification in the project areas.</i>	AERMOD User Guide
Output	<i>While AERMOD requires that users specify the type and format of output files in the main input file for each run, all necessary data will be developed for each quarter.</i>	EPA Hot Spot Guidance Appendix J.6.1, J.6.2
Receptors	<i>Receptors are suggested to be placed at a height of 6 feet above the ground. Around the sources, receptors are placed more closely together (e.g., 30 to 90 feet); and farther from a source, they are spaced more widely (e.g., 150 to 300 feet). Receptor locations are placed in the area most impacted by the project.</i>	EPA Hot Spot Guidance Section 7.6.2, Appendix K and EPA 1992 Guideline for Modeling Carbon Monoxide from Roadway Intersections (1992 EPA Guideline). Placed in appropriate locations in "the area substantially impacted by the project" (in the "project area") (93.123(c)(1)) 40 CFR Part 58: Appendix D, E
<b>Determine Background Concentrations (Step 6)</b>		
Background Monitor	<i>Select a monitor with similar land use to the project and upwind from project. Three years of monitoring data (20xx-20xx) using the 4th highest readings based on total number of sampling days of 1076 days, the 4<sup>th</sup> highest monitor value over these three years is xxx. To estimate the sixth-highest concentration, for each receptor, the six highest 24-hour concentrations from each quarter and year of meteorological data will be arrayed together and ranked, then added to the xxx monitor value. Data from exceptional event days are not used in calculating the 4<sup>th</sup> highest readings.</i>	EPA Hot Spot Guidance Section 8.3

<b>Table 2. Project Data Manager Inputs</b>		
<b>Input</b>	<b>Level of Detail/notes</b>	<b>Possible Data Source</b>
Meteorology	<i>Same for build and no-build scenarios. A minimum of four hours (AM, PM, MD &amp; ON), for one day (weekday) and for January, April, July and October is required. May use the County meteorology file for the county used in the latest SIP or regional conformity analysis.</i>	ADEQ, MPO EPA Hot Spot Guidance Section 4.5.1
Age Distribution	<i>Same for build and no-build scenarios, unless something about the project would change them.</i>	ADOT, MPO EPA Hot Spot Guidance Section 4.5.2
Fuel	<i>Same for build and no-build scenarios. May use</i>	MPO, MOVES defaults

	<i>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.</i>	EPA Hot Spot Guidance Section 4.5.3
I/M Programs	<i>No impact on PM emissions.</i>	EPA Hot Spot Guidance Section 4.5.4
Retrofit Data	<i>If necessary. For example, a bus terminal project might include plans to mitigate emissions by retrofitting the bus fleet.</i>	Project specific modeling EPA Hot Spot Guidance Section 4.5.5
Links	<i>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).</i>	Project specific modeling, ADOT, MPO EPA Hot Spot Guidance Section 4.5.6, Appendix D
Link Source Types	<i>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.</i>	Project specific modeling, ADOT, MPO EPA Hot Spot Guidance Section 4.5.7
Link Drive Schedules, Operating Mode Distribution	<i>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.</i>	Project specific modeling, ADOT, MPO EPA Hot Spot Guidance Section 4.5.8
Off-Network, Hotelling	<i>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.</i>	EPA Hot Spot Guidance Section 4.5.9