

# PM Hot-spot Analyses: Frequently Asked Questions

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## General

### 1. What is transportation conformity?

Transportation conformity is required under Clean Air Act (CAA) section 176(c) (42 U.S.C. 7506(c)) to ensure that federally supported highway and transit project activities are consistent with (conform to) the purpose of a state air quality implementation plan (SIP). Conformity to the purpose of the SIP means that transportation activities will not cause or contribute to new air quality violations, worsen existing violations, or delay timely attainment of the relevant national ambient air quality standards (NAAQS) or required interim milestones. The U.S. Environmental Protection Agency's (EPA) transportation conformity rule (40 CFR 51.390 and Part 93) establishes the criteria and procedures for determining whether transportation activities conform to the SIP. Conformity applies to transportation activities in nonattainment and maintenance areas for transportation-related pollutants, including  $PM_{2.5}$  and  $PM_{10}$ .

### 2. What is a hot-spot analysis?

A hot-spot analysis is defined in 40 CFR 93.101 as an estimation of likely future localized pollutant concentrations and a comparison of those concentrations to the relevant NAAQS. A hot-spot analysis assesses the air quality impacts on a scale smaller than an entire nonattainment or maintenance area, including, for example, congested highways or transit terminals. Such an analysis of the area substantially affected by the project demonstrates that CAA conformity requirements are met for the relevant NAAQS in the "project area." When a hot-spot analysis is required, it is included within a project-level conformity determination.

### 3. For what other purposes can EPA's quantitative PM hot-spot guidance be used?

Section 1.5 of the Quantitative PM Hot-spot Guidance states:

This guidance addresses how to complete a quantitative PM hot-spot analysis for transportation conformity purposes. However, certain sections of this technical guidance may also be applicable when completing analyses of transportation projects for general conformity determinations and for other purposes. For example, Sections 4 or 5 can be used to estimate transportation project emissions using MOVES or EMFAC, and Sections 7 and 8 can be used to conduct PM air quality analyses of transportation projects.

## Projects Requiring a Hot-Spot Analysis

### 4. What projects require a PM hot-spot analysis?

Section 93.123(b)(1) of the conformity rule defines the projects that require a  $PM_{2.5}$  and  $PM_{10}$  hot-spot analysis as:

- (i) New highway projects that have a significant number of diesel vehicles, and expanded highway projects that have a significant increase in the number of diesel vehicles;

- (ii) Projects affecting intersections that are at Level-of-Service D, E, or F with a significant number of diesel vehicles, or those that will change to Level-of-Service D, E, or F because of increased traffic volumes from a significant number of diesel vehicles related to the project;
- (iii) New bus and rail terminals and transfer points that have a significant number of diesel vehicles congregating at a single location;
- (iv) Expanded bus and rail terminals and transfer points that significantly increase the number of diesel vehicles congregating at a single location; and
- (v) Projects in or affecting locations, areas, or categories of sites which are identified in the PM<sub>2.5</sub> and PM<sub>10</sub> applicable implementation plan or implementation plan submission, as appropriate, as sites of violation or possible violation.

See the following questions for examples of projects that would require or not require a PM hot-spot analysis.

## 5. What are some examples of projects that require a PM hot-spot analysis?

EPA noted in the March 2006 final rule that the examples below are considered to be the most likely projects that would be covered by 40 CFR 93.123(b)(1) and require a PM<sub>2.5</sub> and PM<sub>10</sub> hot-spot analysis (71 FR 12491).<sup>1</sup>

Some examples of projects of local air quality concern that would be covered by 40 CFR 93.123(b)(1)(i) and (ii) are:

- A project on a new highway or expressway that serves a significant volume of diesel truck traffic, such as facilities with greater than 125,000 annual average daily traffic (AADT) and 8% or more of such AADT is diesel truck traffic;
- New exit ramps and other highway facility improvements to connect a highway or expressway to a major freight, bus, or intermodal terminal;
- Expansion of an existing highway or other facility that affects a congested intersection (operated at Level-of-Service D, E, or F) that has a significant increase in the number of diesel trucks; and,
- Similar highway projects that involve a significant increase in the number of diesel transit busses and/or diesel trucks.

Some examples of projects of local air quality concern that would be covered by 40 CFR 93.123(b)(1)(iii) and (iv) are:

- A major new bus or intermodal terminal that is considered to be a “regionally significant project” under 40 CFR 93.101<sup>2</sup>; and,

<sup>1</sup> EPA also clarified section 93.123(b)(1)(i) in the January 24, 2008 final rule (73 FR 4435-4436).

<sup>2</sup> 40 CFR 93.101 defines a “regionally significant project” as “a transportation project (other than an exempt project) that is on a facility which serves regional transportation needs (such as access to and from the area outside of the region, major activity centers in the region, major planned developments such as new retail malls, sports complexes, etc., or transportation terminals as well as most terminals themselves) and would normally be included in the modeling of a metropolitan area’s transportation network, including at a minimum all principal arterial highways and all fixed guideway transit facilities that offer an alternative to regional highway travel.”

- An existing bus or intermodal terminal that has a large vehicle fleet where the number of diesel buses increases by 50% or more, as measured by bus arrivals.

A project of local air quality concern covered under 40 CFR 93.123(b)(1)(v) could be any of the above listed project examples.

## 6. What are some examples of projects that do not require a PM hot-spot analysis?

The March 2006 final rule also provided examples of projects that would not be covered by 40 CFR 93.123(b)(1) and would not require a PM<sub>2.5</sub> or PM<sub>10</sub> hot-spot analysis (71 FR 12491).

The following are examples of projects that are not a local air quality concern under 40 CFR 93.123(b)(1)(i) and (ii):

- Any new or expanded highway project that primarily services gasoline vehicle traffic (i.e., does not involve a significant number or increase in the number of diesel vehicles), including such projects involving congested intersections operating at Level-of-Service D, E, or F;
- An intersection channelization project or interchange configuration project that involves either turn lanes or slots, or lanes or movements that are physically separated. These kinds of projects improve freeway operations by smoothing traffic flow and vehicle speeds by improving weave and merge operations, which would not be expected to create or worsen PM NAAQS violations; and,
- Intersection channelization projects, traffic circles or roundabouts, intersection signalization projects at individual intersections, and interchange reconfiguration projects that are designed to improve traffic flow and vehicle speeds, and do not involve any increases in idling. Thus, they would be expected to have a neutral or positive influence on PM emissions.

Examples of projects that are not a local air quality concern under 40 CFR 93.123(b)(1)(iii) and (iv) would be:

- A new or expanded bus terminal that is serviced by non-diesel vehicles (e.g., compressed natural gas (CNG)) or hybrid-electric vehicles; and,
- A 50% increase in daily arrivals at a small terminal (e.g., a facility with 10 buses in the peak hour).

Some further decisions about projects that fit these general categories have been made in the field since the requirement for quantitative PM hot-spot analyses took effect. For example, the following projects typically do not involve “a significant number of diesel vehicles” or “a significant increase in the number of diesel vehicles” as described in 40 CFR 93.123(b)(1), and thus typically would not need a PM<sub>2.5</sub> or PM<sub>10</sub> hot-spot analysis:

- New HOV lanes and ramp HOV lanes which do not involve a “a significant number of diesel vehicles” or “a significant increase in the number of diesel vehicles” as described in 40 CFR 93.123(b)(1);
- Bus rapid transit projects where the buses are non-diesel, (e.g., CNG buses);

- New transit stations or transit lines with no diesel vehicles; and
- Light rail projects powered by electricity.

In addition to these examples, projects listed in 40 CFR 93.126, “Table 2 – Exempt Projects” are exempt from conformity and as a result, would not need a PM hot-spot analysis. In 2017, based on information from implementation in the field, EPA and Federal Highway Administration (FHWA) determined the following projects belong to categories listed in Table 2, and thus would not need a PM hot-spot analysis:

- Road diets: A road diet is a project where one or more vehicle travel lanes are removed to accommodate a variety of transportation modes.<sup>3</sup> Road diets are done for safety purposes. If a road diet is part of a state’s Highway Safety Improvement Program, the road diet is exempt under the Table 2 item, “Highway Safety Improvement Program implementation.” If not, a road diet can still be considered exempt under the Table 2 item, “Projects that correct, improve, or eliminate a hazardous location or feature.” For more information about road diets, including the “Road Diet Informational Guide,” please refer to FHWA’s webpage at [https://safety.fhwa.dot.gov/road\\_diets/](https://safety.fhwa.dot.gov/road_diets/)
- Auxiliary lanes less than 1 mile in length: An auxiliary lane is defined as the portion of the roadway adjoining the traveled way for speed change, turning, weaving, truck climbing, maneuvering of entering and leaving traffic, and other purposes supplementary to through traffic movement.<sup>4</sup> If an auxiliary lane is less than 1 mile in length, it can be considered exempt under the Table 2 item, “Projects that correct, improve, or eliminate a hazardous location or feature.” For more information about auxiliary lanes, please refer to FHWA’s webpage at [https://ops.fhwa.dot.gov/freewaymgmt/publications/frwy\\_mgmt\\_handbook/chapter5.htm#ref5](https://ops.fhwa.dot.gov/freewaymgmt/publications/frwy_mgmt_handbook/chapter5.htm#ref5)
- Ramp metering: Ramp metering projects involve installing traffic signals on highway on-ramps to control the frequency at which vehicles enter the flow of traffic, and they are also exempt under the Table 2 item, “Projects that correct, improve, or eliminate a hazardous location or feature.” For more information about ramp metering projects, please refer to FHWA’s webpage at <https://ops.fhwa.dot.gov/publications/fhwahop14020/sec1.htm>

Note that 40 CFR 93.126 states that a project on the list in Table 2 is not exempt if, through interagency consultation procedures, it is determined that the project has potentially adverse emissions impacts. Government agencies should refer to the governing interagency consultation procedures for the process to evaluate whether it should be treated as non-exempt.

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<sup>3</sup> A typical road diet involves converting an existing four-lane undivided roadway segment to a three-lane segment consisting of two through lanes and a center, two-way left-turn lane. The reclaimed space can be allocated for other uses, such as turn lanes, bus lanes, pedestrian refuge islands, bike lanes, sidewalks, etc.

<sup>4</sup> “A Policy on Geometric Design of Highways and Streets,” American Association of State Highway and Transportation Officials, Washington, D.C., 2001. As cited in FHWA’s “Freeway Management and Operations Handbook,” Chapter 5, found at [https://ops.fhwa.dot.gov/freewaymgmt/publications/frwy\\_mgmt\\_handbook/chapter5.htm#ref5](https://ops.fhwa.dot.gov/freewaymgmt/publications/frwy_mgmt_handbook/chapter5.htm#ref5)

## Determining the Analysis Approach, Models, and Data

### 7. How do I determine the geographic area I need to include in my modeling?

Section 3.2.2. of the PM Hot-spot Guidance states:

The geographic area to be covered by a PM hot-spot analysis (the “project area”) is to be determined on a case-by-case basis.<sup>5</sup> PM hot-spot analyses must examine the air quality impacts for the relevant PM NAAQS in the area substantially affected by the project (40 CFR 93.123(c)(1)). To meet this and other conformity requirements, it is necessary to define the project, determine where it is to be located, and ascertain what other emission sources are located in the project area.<sup>6</sup> In addition to emissions from the proposed highway or transit project,<sup>7</sup> there may be nearby sources of emissions that need to be estimated and included in air quality modeling (e.g., a freight rail terminal that is affected by the project).

The interagency consultation process should be used to determine the project area for a specific project. See Section 3.3.2 of the PM Hot-spot Guidance for more information.

### 8. If I’m analyzing a very large project, what modeling options are available?

Section 3.3.2 of the PM Hot-spot Guidance states:

Hot-spot analyses must include the entire project (40 CFR 93.123(c)(2)). However, it may be appropriate in some cases to focus the PM hot-spot analysis only on the locations of highest air quality concentrations. For large projects, it may be necessary to analyze multiple locations that are expected to have the highest air quality concentrations and, consequently, the most likely new or worsened PM NAAQS violations. If conformity is demonstrated at such locations, then it can be assumed that conformity is met in the entire project area. For example, if a highway project involves several lane miles with similar travel activity (and no nearby sources that need to be modeled), the scope of the PM hot-spot analysis could involve only the point(s) of highest expected PM concentrations. If conformity requirements are met at such locations, then it can be assumed that conformity is met throughout the project area. Such an approach would be preferable to modeling the entire length of the highway project, which would involve additional time and resources.

The interagency consultation process should be used to determine the project area for a specific project. See Section 3.3.2 of the PM Hot-spot Guidance for more information.

<sup>5</sup> Given the variety of potential projects that may require a PM hot-spot analysis, it is not possible to provide one definition or set of parameters that can be used in all cases to determine the area covered by the PM hot-spot analysis.

<sup>6</sup> See more in the March 24, 2010 final conformity rule entitled “Transportation Conformity Rule PM2.5 and PM10 amendments,” 75 FR 14281; found online at: [www.epa.gov/state-and-local-transportation/transportation-conformity-chronological-list-rulemakings](http://www.epa.gov/state-and-local-transportation/transportation-conformity-chronological-list-rulemakings).

<sup>7</sup> 40 CFR 93.101 defines “highway project” and “transit project” for transportation conformity purposes.

## Selecting an Air Quality Model

### 9. What versions of air quality models are currently approved for PM hot-spot analyses?

The latest EPA-approved versions of the air quality models are listed in [this table](#) on the project-level conformity website. Draft or unapproved versions of air quality models cannot be used to complete PM hot-spot analyses for regulatory purposes.

## Considering Mitigation and Control Measures

### 10. What mitigation or control measures can be considered in PM hot-spot analyses?

Section 10 of the PM Hot-spot Guidance describes mitigation and control measures that could be considered by project sponsors to reduce emissions and any predicted new or worsened PM NAAQS violations. These measures can be applied to the transportation project itself or other PM sources in the project area. Written commitments for mitigation or control measures must be obtained from the project sponsor and/or operator, or other emission source's owner and/or operator, as appropriate, prior to making a project-level conformity determination (40 CFR 93.123(c)(4) and 93.125(a)). If measures are selected, additional emissions and air quality modeling will need to be completed and new design values calculated to ensure that conformity requirements are met.

Evaluating and choosing any models and associated methods and assumptions for any measures that are relied upon in the PM hot-spot analysis must be completed through the process established by each area's interagency consultation procedures (40 CFR 93.105(c)(1)(i)). The models, methods, and assumptions used to quantify reductions should be documented in the final project-level conformity determination.

General categories of mitigation and control measures that could be considered include:

- Retrofitting, replacing vehicles/engines, and using cleaner fuels;
- Reducing idling;
- Redesigning the transportation project itself;
- Controlling fugitive dust; and
- Controlling other sources of emissions.

See Section 10 of the PM Hot-spot Guidance for further details on each of these categories.