Project-Level Analysis Template

Guide to color coding:
Blue Text = Instructions and guidelines to be deleted from the final document.
Red Text = Instructions to be replaced with project-specific text
Black Text = Boilerplate text that generally will not need to be modified for each project.
Purple Text = Sample text that must be modified or deleted, provided as a useful reference/example for how a particular section can be completed.

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1.0 Summary

The purpose of the summary is to provide a concise overview of the air quality analyses and conclusions associated with this transportation project. The summary text can be modified as needed for inclusion as part of the National Environmental Policy Act (NEPA) documentation for the project. If previous air quality studies have been conducted for the project, this may be noted in the text or in a footnote, as appropriate for the project.

Sample summary text excerpted from the *SR 99: Alaskan Way Viaduct Replacement Project Final EIS Air Discipline Report* (July 2011) is provided below. This example summary also included an overview of the alternatives being evaluated and other background information on the project which have been omitted for brevity.

The purpose of this report is to identify potential effects on air quality associated with the project. The Alaskan Way Viaduct is part of SR 99, a regionally important north-south highway on the western edge of downtown Seattle.

Traffic in the project area would be affected by changes in the number of vehicles, the travel speeds, and the levels of congestion experienced on local roadways. Air quality, which is a general term used to describe pollutant concentrations in the atmosphere, can be affected by these changes.

The study area evaluated for effects on air quality includes areas likely to be affected by changes in pollutant concentrations due to changes in traffic conditions resulting from the build alternatives. The study area also includes areas likely to be affected by emissions from the tunnel ventilation system that could result from the Bored Tunnel Alternative and the Cut-and-Cover Tunnel Alternative. Both the Cut-and-Cover Tunnel Alternative and the Elevated Structure Alternative would include a new ventilation system for the Battery Street Tunnel.

The air quality analyses for this project followed current guidelines developed by the U.S. Environmental Protection Agency (EPA), FHWA, the Washington State Department of Transportation (WSDOT), the Washington State Department of Ecology (Ecology), and the Puget Sound Regional Council (PSRC).

EPA has identified several air pollutants that are a concern nationwide. These pollutants are known as *criteria pollutants*. The sources of these pollutants, their effects on human health and the nation's welfare, and their concentrations in the atmosphere vary considerably. Under the Clean Air Act, EPA has established

National Ambient Air Quality Standards (NAAQS), which specify maximum allowable concentrations for these criteria pollutants (EPA 2010). Areas in compliance with the NAAQS are deemed *attainment areas;* areas not in compliance with the NAAQS are deemed *nonattainment areas;* and areas that were once classified as nonattainment areas but have since demonstrated attainment of the NAAQS are classified as *maintenance areas*. The study area is located within a maintenance area for carbon monoxide (CO) and an attainment area for all of the other criteria pollutants.

In addition to the criteria pollutants for which there are NAAQS, EPA also regulates *air toxics*, which are pollutants known or suspected to cause cancer or other serious health effects. Most air toxics originate from human-made sources, including on-road mobile sources, non-road mobile sources (e.g., airplanes, construction equipment, marine vessels, and locomotives), area sources (e.g., dry cleaners), and stationary sources (e.g., factories and refineries). *Mobile source air toxics* (MSATs) are compounds emitted from highway vehicles and non-road equipment. EPA has assessed the extensive list of air toxics and identified the following compounds with significant contributions from mobile sources: benzene, acrolein, formaldehyde, 1,3-butadiene, diesel exhaust, naphthalene, and polycyclic organic matter (POM). FHWA, which has issued guidance for consideration of MSATs for transportation projects, considers these the priority MSATs. The list is subject to change and may be adjusted in consideration of future EPA rules.

Because the project area is located within a CO maintenance area, the preferred alternative (the Bored Tunnel Alternative), must comply with the project-level and regional conformity criteria described in EPA's Transportation Conformity Rule (Code of Federal Regulations, Title 40, Part 93 [40 CFR 93]) and with Washington Administrative Code, Chapter 173-420 (WAC 173-420). Because the Bored Tunnel Alternative would not cause or exacerbate an exceedance of the NAAQS or increase regional emissions, it would meet the project-level conformity requirements (40 CFR 93.123).

The project is included in PSRC's long-range transportation plan (LRTP), approved May 20, 2010, and referred to as *Transportation 2040* (PSRC 2010a), and the Statewide Transportation Improvement Program (WSDOT 2010a). The inclusion and appropriate modeling of this project is required to show that the project conforms with the Puget Sound region's Air Quality Maintenance Plans and would not cause or contribute to exceedances of the NAAQS at the regional level. The project meets all the requirements of 40 CFR 93 and WAC 173-420 and demonstrates regional conformity.

The Washington State Intersection Screening Tool (WASIST) was used to estimate CO concentrations at sensitive receptor sites near heavily congested intersections that are expected to be affected by the Viaduct Closed (No Build Alternative) and the three build alternatives. The analysis showed that the non-tolled and tolled Bored Tunnel Alternative, the non-tolled and tolled Cut-and-Cover Tunnel Alternative, and the non-tolled and tolled Elevated Structure Alternative would not cause or contribute to any new localized violations of the NAAQS for CO, increase the frequency or severity of any existing violations of the NAAQS, or delay the timely attainment of the NAAQS in the 2030 design year.

In accordance with FHWA guidelines, the Easy Mobile Inventory Tool (EMIT) was used to calculate annual MSAT pollutant burdens (in tons per year) for the seven priority MSATs. To assess potential project-related effects, existing MSAT pollutant emission burdens were compared to future burdens under each build alternative. The future MSAT concentrations are predicted to be lower than the existing concentrations, even with the increase in vehicle miles of travel (VMT). Because regional MSAT emissions are not expected to increase and no exceedances of the NAAQS are expected, no significant adverse effects on air quality are expected to result from the three build alternatives. Therefore, no mitigation measures for operational effects would be required.

Construction effects on air quality would occur primarily as a result of emissions from heavy-duty construction equipment (such as bulldozers, backhoes, and cranes), diesel-fueled mobile sources (such as trucks, brooms, and sweepers), diesel- and gasoline-fueled generators, and on- and off-site project-related vehicles (such as service trucks and pickup trucks). Fugitive dust (particulate matter) emissions are associated with demolition, land clearing, ground excavation, grading, cut-and-fill operations, and structure erection.

If construction traffic and lane closures increase congestion and reduce the speed of other vehicles in the area, emissions from traffic would increase temporarily while those vehicles are delayed. These emissions would be temporary, and the effects of these emissions would generally be limited to the immediate area in which the congestion occurs. Some construction stages (particularly those involving paving operations using asphalt) would result in short-term odors, which might be detectable by some people near the site, and they would be diluted as the distance from the site increases.

A fugitive dust control plan implemented as part of project would require dust control measures during construction. The plan could include measures such as spraying exposed soil with water, covering truck loads and materials as needed, washing truck wheels before the trucks leave the site, removing particulate matter from roads, routing and scheduling construction trucks to reduce delays, ensuring well-maintained equipment, and implementing other temporary mitigation measures as needed and considered appropriate.

2.0 Project Background

2.1 Project Description

Include a brief description of project and alternatives, including the project location, surrounding land uses, year of completion, phasing and design elements or scoping information that may inform the emission and dispersion modeling to be conducted. The latter may include project termini, before and after number of lanes, design and posted speeds, grade and slopes, median widths, right of way, typical sections, etc. Inclusion of the project in the applicable transportation plan and/or program should be noted if that information is available. Readers may be referred to other publicly available documents (EA or EIS project description sections for example) for related information such as Purpose and Need as defined for NEPA purposes or other project details. Include exhibits for project location map, plans, aerials, and typical sections to help readers understand the project.

An example project description is provided below, excerpted from Indiana DOT's I-*80/94 Interchange Modification at I-65 PM2.5 Qualitative Hot Spot Analysis* (2007).

The Environmental Assessment for the entire I-80 corridor stated that "I-80 is one of the key commercial vehicle and automobile corridors for cross-country travel in the U.S. When accompanied by companion route I-90/94, this corridor south of Lake Michigan becomes the most crucial, most congested, and the least predictable in terms of travel speed and time in the U.S."

The FHWA "concurred with the finding of no significant impact for the Environmental Assessment for the entire I-80 corridor on April 29, 2004" The INDOT proposed I-80/94 Interchange Modification at I-65 is the last improvement identified in the EA to be constructed along the I-80/94 corridor. The general location of the project is shown on Figure 1. A more detailed map of the study area is shown on Figure 2.

The existing cross section of the I-80/94 mainline, from just east of Georgia Street to the eastern terminus, has three 12 foot travel lanes in both directions. Both the outside and inside shoulders are 12 feet in width with a center median barrier separating the inside shoulders.

The I-65 existing cross section at the southern terminus of the project, in the vicinity of E 35th Avenue, has four 12 foot travel lanes in both directions. The inside shoulders in both direction are 14 feet wide separated by a median barrier. The outside shoulders are 12 feet wide. The north bound I-65 off ramp to west bound I-80/94 has two 12 foot travel lanes bordered by 12 foot wide outside shoulder and a 4 foot wide inside shoulder. The ramp tapers down to a one lane ramp prior to merging onto west bound I-80/94. The east bound off ramp from I-80/94 to south bound I-65 begins with a 15 foot wide travel lane with a 10 foot wide outside shoulder and a 4 foot wide inside shoulder. Within the first 1000 feet of the ramp gore the pavement widens to two 11 foot lanes

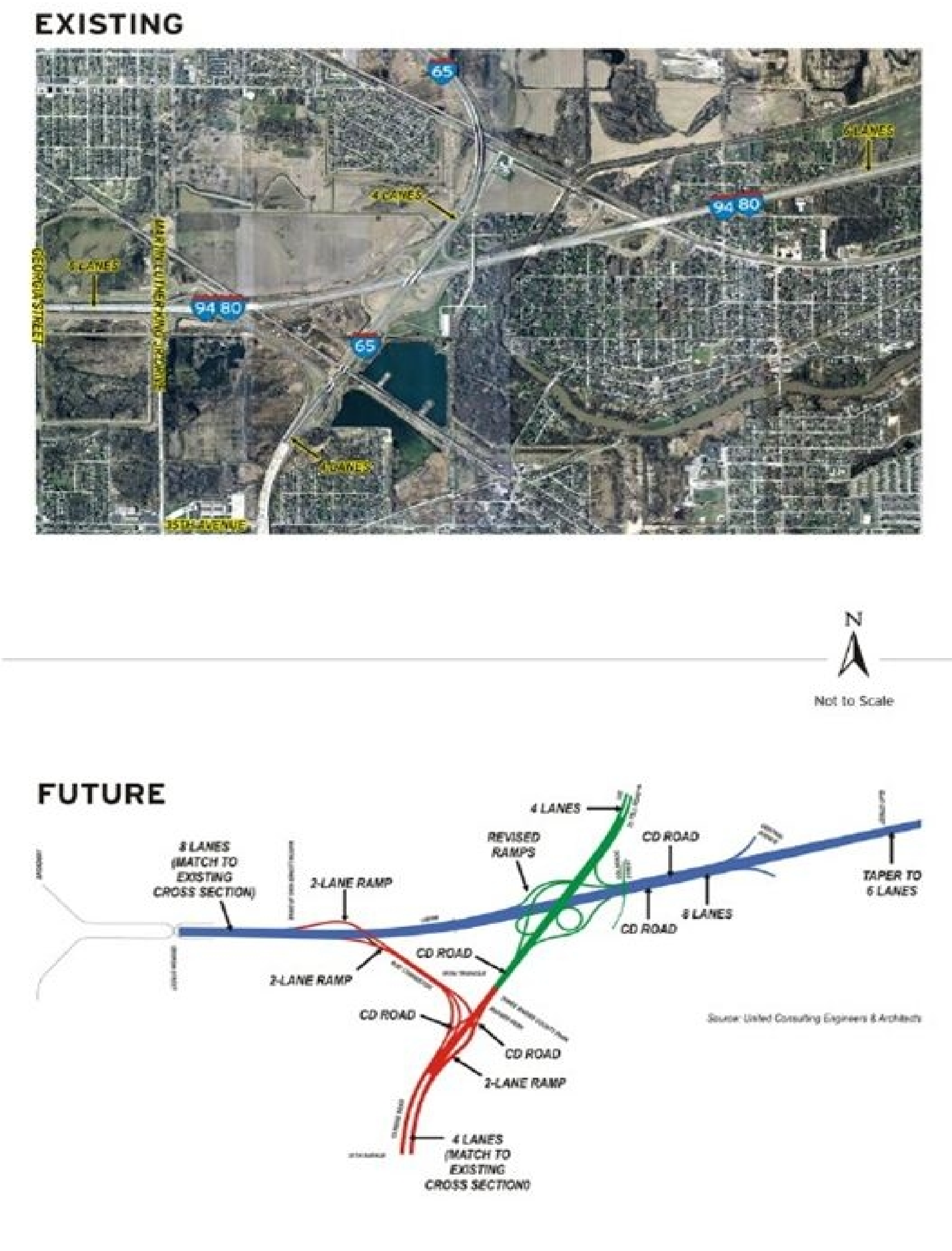
North of the I-65 north bound to I-80/94 west bound and I-80/94 east bound to I-65 south bound directional ramps the existing cross section of I-65 has two 12 foot wide travel lanes in both directions. The outside shoulder varies from 10 to 12 feet. The inside shoulders vary from 14 feet wide in both directions, separated by a median barrier at the southern end, to a paved median 60 feet wide with a center safety barrier just prior to the I-65 bridge structures over the I-65 north bound to I-80/94 west bound ramp. North of the interchange to the northern terminus the cross section of I-65 on structure is the same. When I-65 is not on structure the grass median is 45 feet wide.

The proposed reconstruction of I-80 begins approximately 0.2 mile east of Georgia Street in Gary, IN, continues east through the I-65 interchange terminating 0.8 mile east of Clay Street in Lake Station, IN. Along I-65 the reconstruction begins south of the interchange at 37th Street in Hobart, IN, continuing north through the I-80/94 interchange extending to the south bridge approach of I-65 over Central Avenue and Conrail Calumet railroad in Gary, IN. The total length along I-80/94 (Borman Expressway) is 2.84 miles. The length for the I-65 reconstruction is 1.31 miles. The project is scheduled to be completed in December of 2009.

Improvements will include, but not be limited to the following:

- Accommodate projected 20-year traffic growth.
- Four 12.0 foot travel lanes bordered by a 14.0 foot inside shoulder and 14.0 foot outside shoulder in each direction on I-80/94.
- A 30.5 foot wide median with a 2.5 foot median barrier between the eastbound and westbound lanes on I-80/94.
- Revised vertical profile to facilitate drainage.
- A collector distributor road adjacent to both the eastbound and westbound lanes along I-80/94 from just west of I-65 to just east of the Central Avenue interchange.
- A new semi-directional ramp for the westbound movement from I-80/94 to I-65.
- Four 12.0 foot travel lanes bordered by a 14.0 foot shoulder and a 12.0 foot outside shoulder in each direction with a 2.5 foot barrier median on I-65 from the south project limits to the I-80/94 interchange.
- Two 12.0 foot travel lanes bordered by a 14.0 foot shoulder and a 12.0 foot outside shoulder in each direction with a 2.5 foot barrier median on I-65 from the I-80/94 interchange to the northern terminus.
- A collector distributor road adjacent to both the northbound and southbound lanes along I-65 from 37th Avenue to the I-80/94 interchange.
- Two 12.0 foot travel lanes bordered by a 10 foot outside shoulder and a 6.0 foot inside shoulder for both the I-65 north bound to I-80/94 west bound and I-80/94 east bound to I-65 south bound directional ramps. Where these two ramps are parallel they will be separated by safety barrier median.

The cross sections of the proposed improvements at the west terminus and south terminus will match the recently completed cross section of I-80/94 and the existing cross section of I-65, respectively. The proposed improvements at the western terminus of this section of I-80/94 are extremely important to avoid the possibility of congestion created by 4 lanes of east bound main line traffic merging into three lanes just past Georgia Street. A comparison of existing and future conditions is presented on Figure 3.



$PM_{2.5}$ Qualitative Hot-spot Analysis
I-80/94 Interchange Modification at I-65
Lake County, IN

Figure 3
Existing and
Future Conditions

2.2 Summary of Traffic Data and Forecasts

The purpose of this section is to summarize the general patterns of existing traffic in the project area, as well as the projected future traffic data for the No Build Alternative and Build Alternatives. This should include the source of the traffic data, traffic volumes for each link of the project, the analysis years, and other key traffic parameters for air quality analysis such as intersection level of service, speeds and heavy truck traffic percentages. A summary table, as shown in this example should be included. Schematics illustrating the volumes on the corresponding links should also be included. For larger projects, supporting traffic data tables and diagrams can be included in an appendix or through cross reference to the traffic technical report for the project.

The quality and reasonableness of the travel demand forecasting and traffic analysis is a crucial underpinning to meaningful project-level air quality analysis and compliance with the "latest planning assumptions" requirement under the transportation conformity rule. Travel demand forecasting assumptions (including underlying future land use assumptions) have also been a focus area of litigation of transportation projects under NEPA. For more information on best practice recommendations for conducting travel demand forecasting for NEPA and transportation conformity purposes, refer to FHWA's 2010 *Interim Guidance on the Application of Travel and Land Use Forecasting in NEPA*.[1]

This section should also address traffic-based criteria (such as design year ADT or truck percentages that may be specified in applicable programmatic agreements and/or categorical findings, as applicable.

An example summary traffic data section is provided below, excerpted from Virginia DOT's *Route 7 Widening Air Quality Analysis Update* (2011). This summary specifies design year ADT and truck percentages that are considered later in the report in reference to threshold criteria specified in applicable programmatic agreements for air quality analyses and federal guidance.

Exhibit 2-1 presents a summary of base year and forecast annual average daily traffic (ADT) demand for the project as developed in 2008 by the Northern Virginia District. The forecasts are demand-based (i.e., not capacity-constrained), therefore identical for both the Build and No Build scenarios, and in effect serve as a worst-case (high traffic volume) scenario for the air quality analysis. As presented in these forecasts, ADT demand will reach up to 103 thousand west of Georgetown Pike (Route 193) by 2032. Additionally, truck traffic is estimated as four percent of ADT, and is comprised of Class 4-5 (2%), Class 6-7 (1%) and Class 8-13 (1%) trucks. A copy of the 2008 environmental traffic data (ENTRADA) memorandum (including peak hour turning movements) as provided by the Northern Virginia District is included in Attachment A to this report.

Exhibits 2-2 and 2-3 presented updated forecasts for AM and PM peak hour traffic volumes including turning movements10. Additionally, Attachment A includes updated ENTRADA tables for the section of Route 7 east of Georgetown Pike 11. Changes in design as well as later opening and design years from the 2008 memorandum are reflected in the updated forecasts. Truck percentages, which are based on historical data, were not changed from those presented with the 2008 memorandum. Additionally, the ADT demand forecasts for the project were unchanged from those presented with the 2008 memorandum.

[1] http://environment.fhwa.dot.gov/projdev/travel_landUse.asp

Exhibit 2-1: Annual Average Daily Traffic (AADT) Data and Forecasts

Route 7 Widening Existing & Forecasted AADT					
Facility	Existing 2007 AADT	Demand AADT			
		2013 (1)		2032 (2)	
		Build	No-build	Build	No-build
Route 7 E. of Route 193 G. Pk.	60,000	68,000	68,000	88,000	88,000
Route 7 W. of Route 193 G. Pk.	65,000	74,000	74,000	103,000	103,000
Reston Pky S. of Route 7	11,000	12,000	12,000	17,000	17,000
Reston Ave. S. of Route 7	3,600	4,000	4,000	6,000	6,000
Georgetown Pk, Route 193	22,000	25,000	25,000	35,000	35,000
Rolling Holly Dr., Route 6224	2,500	3,000	3,000	4,000	4,000
Fairfax Co. Pky, Route 7100 (3)	35,000	40,000	40,000	56,000	56,000
Holly Knoll Dr., Route 6220 (3)	21,000	24,000	24,000	34,000	34,000
Total Network AADT and Annual Percent Growth	220,100	250,000	250,000	343,000	343,000
		2.1%		1.8%	
(1) - Existing AADT @ 2.1% per year. (2) - Interim AADT @ 1.8% per year. (3) - Yr. 2008 3-day Traffic Count		For Build and No-build conditions, the demand AADT is used			

Source: VDOT Northern Virginia District, "Route 7, Leesburg Pike Widening ENTRADA Forecasts. Limits of Study: Reston Ave. to Fairfax County Pky.", memorandum dated December 22, 2008.

3.0 Regulatory Requirements and Guidance

This section provides a detailed overview of regulations and guidance potentially applicable to project-level air quality analysis. Some agencies prefer to include detailed regulatory information in their reports to aid the reader in understanding the context for the analyses subsequently presented. Others prefer to keep the review of regulatory information very concise and focused on the provisions applicable to the specific project. Either approach is acceptable and the level of detail provided below can be reduced based on the report writing preferences of each agency utilizing the template.

3.1 National Environmental Policy Act of 1969 (NEPA)

Air quality is an environmental concern within the broad purview of NEPA. The key action forcing component of NEPA was the introduction of a requirement for federal agencies to prepare a "detailed statement" addressing the environmental impacts of their proposed projects and programs. The requirements of NEPA have been further defined in the Council of Environmental Quality's NEPA regulations that apply to all federal agencies (40 CFR 1500) and the FHWA/FTA joint NEPA procedures (23 CFR 771).

The transportation conformity regulations provide detailed analysis procedures and guidance that apply to certain projects located in nonattainment and maintenance areas for CO and PM. In contrast, the text of the NEPA statute, the CEQ NEPA regulations and FHWA's NEPA regulations do not contain any specific requirements for air quality analyses. For actions subject to NEPA, but not transportation conformity, FHWA has considerable discretion to select an air quality analysis approach that is the most appropriate for the circumstances of each project and has issued guidance for this purpose. Unlike the transportation conformity requirements discussed in Section 3.2.2, NEPA applies to all federally-funded projects and other federal discretionary decisions or approvals of state or private developments. Thus, in some circumstances it may be prudent to conduct a hot-spot or other air quality analyses under NEPA even though such an analysis is not required for transportation conformity. Guidance documents addressing air quality analysis under NEPA as distinct from conformity are summarized in sections 3.1.1 through 3.1.4 below.

3.1.1 FHWA Guidance and Software

3.1.1.1 FHWA 18987 Technical Advisory 6640.8A and Hot Spot Analysis

FHWA's 1987 Technical Advisory 6640.8A, *Guidance for Preparing and Processing Environmental and Section 4(f) Documents* provides some general considerations for determining if a CO hot-spot analysis should be conducted for NEPA purposes and provides guidance on the documentation of CO hot-spot analyses (updated guidance from FHWA is pending at the time of preparation of this template; check for updates at the time the air quality study is prepared):the latest version at the time the air quality study is prepared):

"Carbon monoxide is a project- related concern and as such should be evaluated in the draft EIS. A microscale CO analysis is unnecessary where such impacts (project CO contribution plus background) can be judged to be well below the 1- and 8-hour National Ambient Air Quality Standards (or other applicable State or local standards). This judgment may be based on (1) previous analyses for similar projects; (2) previous general analyses for various classes of projects; or (3) simplified graphical or "look-up" table evaluations. In these cases, a brief statement stating the basis for the judgment is sufficient.

For those projects where a microscale CO analysis is performed, each reasonable alternative should be analyzed for the estimated time of completion and design year. A brief summary of the methodologies and assumptions used should be included in the draft EIS. Lengthy discussions, if needed, should be included in a separate technical report and referenced in the EIS. Total CO concentrations (project contribution plus estimated background) at identified reasonable receptors for each alternative should be reported. A comparison should be made between alternatives and with applicable State and national standards. Use of a table for this comparison is recommended for clarity.

As long as the total predicted 1-hour CO concentration is less than 9 ppm (the 8-hour CO standard), no separate 8-hour analysis is necessary. If the 1-hour CO concentration is greater than 9 ppm, an 8-hour analysis should be performed. Where the preferred alternative would result in violations of the 1 or 8-hour CO standards, an effort should be made to develop reasonable mitigation measures through early coordination between FHWA, EPA, and appropriate State and local highway and air quality agencies. The final EIS should discuss the proposed mitigation measures and include evidence of the coordination."

In general, technical considerations in preparing a hot-spot analysis for NEPA purposes include information on background concentrations in the project area, expected future emissions trends, the proximity of receptors to the project and detailed analyses conducted for similar nearby projects, among others. For legal sufficiency, the important point is that the rationale for the decision whether or not to conduct a hot-spot analysis is explained in the administrative record. Consultation with other agencies (especially those with expertise and/or jurisdiction over air quality issues) and the public during scoping can also be helpful tool in deciding whether or not a hot-spot analysis should be conducted for NEPA purposes.

3.1.1.2 FHWA Interface Software

FHWA has developed user-friendly interface software to facilitate the application of US EPA dispersion models to meet all applicable federal requirements and guidance. By assisting modelers in specifying appropriate inputs for worst-case scenario modeling and screening analyses, the FHWA interface model helps to guide and streamline the modeling process, improve quality control and assurance, and minimize time and costs for modeling.

At the time of preparation of this analysis, a major update, referred to as *Cal3i*, is pending to the existing FHWA interface software, *Cal3Interface*[2].

3.1.2 Mobile Source Air Toxics (MSATs) and FHWA Interim Guidance

3.1.2.1 Overview of Mobile Source Air Toxics

Section 202(l)(2) of the Clean Air Act requires EPA to set emission standards to control air toxics from motor vehicles and motor vehicle fuels. Unlike the criteria pollutants for which National Ambient Air Quality Standards (NAAQS) are established, the Clean Air Act did not grant EPA the authority to establish health-based ambient air quality standards for MSATs. In addition, there are no transportation conformity requirements for MSATs to ensure consistency between air toxic reduction efforts and the transportation planning process.

As part of the 2007 *Control of Hazardous Air Pollutants from Mobile Sources* Rule, EPA identified seven compounds with substantial contributions from mobile sources that are among the national and regional-scale cancer risk drivers from their 1999 National Air Toxics Assessment (NATA).[3] These are acrolein, benzene, 1,3-butadiene, diesel particulate matter plus diesel exhaust organic gases (diesel

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[2] A new version of the FHWA interface software for dispersion modeling is in development. The new software ("*Cal3i*") is based upon the existing software ("*Cal3Interface")* but includes significant new features and enhancements. *Cal3Interface* was designed as a user-friendly interface model for the US EPA CALINES3 and CAL3QHC models. It was released in December 2006 and updated periodically since. For more background on the existing *Cal3Interface* model and the FHWA worst-case scenario modeling guidance, see:

- M. Claggett (FHWA), "CAL3Interface – A Graphical User Interface for the CALINE3 and CAL3QHC Highway Air Quality Models", ca 2006.
- M. Claggett (FHWA), "Update of FHWA's CAL3Interface – A Graphical User Interface for the CALINE3 and CAL3QHC Highway Air Quality Models", ca 2008

FHWA also developed an interface model ("*EMIT*") for emission modeling using the US EPA MOBILE6.2 model. *EMIT* also served to support and streamline modeling for mobile source air toxics (MSATs). An update to the *EMIT* model for MOVES is not currently planned.

To download the FHWA interface software, see:

- FHWA: http://fhwa.adobeconnect.com/airqualitytst?launcher=false&disclaimer-consent=true
- Transportation Research Board, Transportation and Air Quality Committee (ADC20) Project-Level Analysis Subcommittee webpage: http://www.trbairquality.org/projectpage/

[3] http://www.epa.gov/oms/toxics.htm#mobile

PM), formaldehyde, naphthalene, and polycyclic organic matter (POM). FHWA considers these seven compounds to be the priority MSATs (FHWA, 2009).[4] EPA considers benzene to be the most significant contributor to cancer risk from all outdoor air toxics. According to the 2005 NATA, 39% of benzene emissions nationally are attributed to the mobile on-road sources.[5]

Previous EPA regulations and the 2007 EPA Final Rule *Control of Hazardous Air Pollutants from Mobile Sources* require controls that will dramatically decrease future MSAT emissions through cleaner fuels and cleaner engines. Among other measures, these regulations established fuel based standards (e.g. standards for the maximum allowable benzene content in gasoline) and emissions standards for passenger vehicles when operating at cold temperatures. MSAT emissions are also projected to decrease due to other mobile source regulations, such as the reformulated gasoline (RFG) program, the National Low Emission Vehicle (NLEV) standards, Tier 2 motor vehicle emission standards and gasoline sulfur control requirements, and proposed heavy duty engine and vehicle standards and on-going highway diesel fuel sulfur control requirements. At the national level, EPA expects a 65% reduction in MSAT emissions from on-road mobile sources between 1999 and 2020, despite a 57% increase in vehicle miles traveled (VMT) over this same time period. Despite these significant reductions in mobile source air toxics emissions in the future, predicted cancer and noncancer health risks attributable to MSATs are likely to remain a public health concern.

3.1.2.2 Mobile Source Air Toxics and the National Environmental Policy Act

The requirement of NEPA for federal agencies to consider the environmental consequences of their actions is broad and extends beyond the need to comply with other substantive environmental laws and regulations. Thus, although there are no ambient air quality standards or transportation conformity requirements for MSATs, MSATs are within the broader purview of NEPA because they have been shown to contribute to health risks, especially for populations in proximity to major roadways. Addressing MSATs in the NEPA process can be challenging because there are no clear standards and because of the uncertainty and methodological issues involved in attributing long-term health impacts to specific transportation alternatives.

In 2006, FHWA issued interim guidance to encourage a consistent approach to addressing MSATs in NEPA documents and this MSAT guidance was subsequently updated in 2009.[6] FHWA has identified three levels of MSAT analysis and criteria to determine which category applies to a project:

1. No analysis for projects with no potential for meaningful MSAT effects;
2. Qualitative analysis for projects with low potential MSAT effects; or
3. Quantitative analysis to differentiate alternatives for projects with higher potential MSAT effects.

The criteria for determining which category a project falls in are summarized in Table 1.

[4] http://www.fhwa.dot.gov/environment/air_quality/air_toxics/policy_and_guidance/100109guidmem.cfm
[5] http://www.epa.gov/ttn/atw/nata2005/pie_charts.ppt#271 ,9,Slide 9
[6] Federal Highway Administration. 2006. *Interim Guidance on Air Toxic Analysis in NEPA Documents*. Federal Highway Administration. 2009. *Interim Guidance Update on Mobile Source Air Toxic Analysis in NEPA Documents*.
http://www.fhwa.dot.gov/environment/air_quality/air_toxics/policy_and_guidance/100109guidmem.cfm

Table 1
MSAT Analysis Categories under 2009 FHWA Interim Guidance

Category	Name	Criteria
1	Projects with No Meaningful Potential MSAT Effects or Exempt Projects	Projects qualifying as a categorical exclusion under 23 CFR 771.117(c); Projects exempt under the Clean Air Act conformity rule under 40 CFR 93.126; or Other projects with no meaningful impacts on traffic volumes or vehicle mix.
2	Projects with Low Potential MSAT Effects	Projects not meeting category 1 or category 3 criteria fall in this category. Examples of these types of projects are minor widening projects; new interchanges, such as those that replace a signalized intersection on a surface street; or projects where design year traffic is projected to be less than 140,000 to 150,000 annual average daily traffic (AADT).
3	Projects with Higher Potential MSAT Effects	• Create or significantly alter a major intermodal freight facility that has the potential to concentrate high levels of diesel particulate matter in a single location; or • Create new or add significant capacity to urban highways such as interstates, urban arterials, or urban collector-distributor routes with traffic volumes where the AADT is projected to be in the range of 140,000 to 150,000 2 or greater by the design year; **And also** • Proposed to be located in proximity to populated areas.

Additionally, FHWA guidance (2009) indicates that: “Although not required, projects with high potential for litigation on air toxics issues may also benefit from a more rigorous quantitative analysis to enhance their defensibility in court.”

The FHWA guidance includes prototype language that can be adapted for use in NEPA documents and this prototype language can be used in the section of this report addressing MSAT analysis (Section 5.4).

The FHWA interim guidance does not provide detailed recommendations on the methodology for conducting a quantitative MSAT emissions analysis. Several quantitative MSAT analyses base their approach on the Claggett and Miller paper entitled *A Methodology for Evaluating Mobile Source Air Toxic Emissions Among Transportation Project Alternatives*.[7] Claggett and Miller’s methodology involved identifying a subset of links in a regional travel demand model that have a +/- 5% change in volumes between the No Build and Build conditions and developing an emissions inventory for these links using MOBILE6.2 emission factors. A similar approach could be applied using EPA’s Motor Vehicle Emission Simulator (MOVES2010) model.[8] An update of the FHWA guidance incorporating

[7] Michael Claggett and Terry L. Miller. 2006. *A Methodology for Evaluating Mobile Source Air Toxic Emissions Among Transportation Project Alternatives*. Transportation Research Record, No. 1987.
[8] The latest version of the MOVES model is currently MOVES2010b. Throughout this report, the term MOVES2010 generically refers to any of the currently approved MOVES2010 models. The latest version of the MOVES2010 model can be found at: http://www.epa.gov/otaq/models/moves/index.htm

reference to MOVES is pending. The 2009 guidance does not recommend dispersion modeling of MSAT due to the lack of clear standards for assessing impacts and limitations in the available analysis tools. Emission modelers need to check the EPA and FHWA websites to ensure that they have the latest MOVES model and guidance documents, as these are subject to change.

3.1.3 EPA 2011 Recommendation to Section 309 Reviewers on use of MOVES Model for NEPA Documents

Under Section 309 of the Clean Air Act (CAA), EPA is required to review and publicly comment on the environmental impacts of major Federal actions including actions which are the subject of draft and final Environmental Impact Statements, proposed environmental regulations, and other proposed major actions.[9] On February 8, 2011, EPA issued guidance to its Section 309 reviewers making a number of recommendations with respect to the use of the MOVES model in analyses conducted only for NEPA purposes (e.g. in an attainment area or for pollutants not addressed by the CAA transportation conformity requirements).[10]

- For criteria pollutants, EPA recommends using the same emissions model for conformity and NEPA purposes to minimize confusion. Outside of California, MOVES2010 should be used at the earliest practicable time during the grace period, although (40 CFR 93.1 I 1 (c)) allows agencies to continue using the prior emissions model (MOBILE6.2) if the analysis was started before or during the grace period.
- For projects where a DEIS using MOBILE6.2 is issued before or during the grace period, but the FEIS is not issued until after the grace period, EPA recommends agencies continue to rely on the DEIS MOBILE6.2 analysis results in the FEIS as long as the FEIS is released within three years of the DEIS.
- Where project sponsors are conducting local emissions analyses for NEPA purposes and not transportation or general conformity, EPA recommends that MOVES2010 be used at the earliest practicable time
- EPA recommends the use of MOVES2010 as the best available tool for analyzing mobile source air toxics in NEPA documents (mobile source air toxics are not regulated under transportation conformity).
- EPA recommends the use of MOVES2010 as the best available tool for analyzing greenhouse gas emissions from the transportation sector for NEPA purposes. (Greenhouse gas emissions are not regulated under transportation conformity at this time.)

Emission modelers need to check the EPA websites to ensure that they have the latest MOVES model and guidance documents, as these are subject to change.

3.1.4 Programmatic Agreements (Federal and state, if any)

Programmatic agreements[11] are legal documents between the US DOT and a state DOT that are designed to help streamline the environmental clearance process for transportation projects by eliminating the need for project-specific modeling for projects that are expected to have minor or no

[9] For more information see: http://energy.gov/sites/prod/files/nepapub/nepa_documents/RedDont/G-EPA-309_caa_nepa.pdf
[10] http://www.epa.gov/compliance/resources/policies/nepa/using-the-MOVES-and-EMFAC-emissions-models-in-NEPA-evaluations-pg.pdf
[11] Federal Highway Administration. "Programmatic Agreements FAQs". Located online at: http://www.fhwa.dot.gov/everydaycounts/pdfs/spd/pa_faq.pdf

impacts. Programmatic agreements can help focus limited resources on assessing larger projects with greater potential for air quality impacts. In this sense, programmatic agreements serve a similar function to "categorical findings" that may be established under the federal transportation conformity rule. Given the difference in applicability based on air quality status, threshold criteria (quantitative or qualitative) established for programmatic agreements that apply in areas in attainment for the NAAQS are generally expected to be no more stringent than criteria established for categorical findings that apply in areas in nonattainment or maintenance of one or more NAAQS.

At the time of preparation of this analysis, no programmatic agreements relating to air quality have been approved by the US DOT for application at a national or multi-state regional level. [For [name the state], programmatic agreements and their key terms addressing air quality directly or indirectly are summarized below.]

3.1.4.1 State Programmatic Agreement #1

[e.g. established threshold criteria, including referencing as a minimum thresholds established in applicable federal or state categorical findings executed by the US DOT and changes thereto]

3.1.4.2 State Programmatic Agreement #2

[e.g. establishing when updates to air studies are needed such as when project scopes and schedules and/or related key planning information such as socioeconomic forecasts have changed]

3.2 Integration of NEPA and Transportation Conformity Requirements

The CEQ NEPA regulations at 40 CFR 1506.4 encourage agencies to integrate NEPA requirements with other environmental review and consultation requirements. In addition, 40 CFR 1502.25 directs agencies to prepare environmental impact statements "concurrently with and integrated with environmental impact analyses and related surveys and studies required…." by other environmental laws and executive orders.

The FHWA/FTA joint NEPA regulations expand on the CEQ regulations and require NEPA documents to demonstrate compliance with other environmental requirements. "The final EIS or FONSI should document compliance with requirements of all applicable environmental laws, Executive orders, and other related requirements. If full compliance is not possible by the time the final EIS or FONSI is prepared, the final EIS or FONSI should reflect consultation with the appropriate agencies and provide reasonable assurance that the requirements will be met." (23 CFR 771.133). If possible, the transportation conformity determination should be included in the final EIS. In instances when the final EIS does not document full compliance with the transportation conformity provisions, the conformity determination must be made prior to issuance of a Record of Decision (ROD). This is consistent with the transportation conformity rule which refers to NEPA process completion as the point at which FHWA or FTA issues a ROD (40 CFR 93.101).

In keeping with these requirements, FHWA NEPA documents typically contain the air quality analyses needed to comply with transportation conformity requirements as well as the project-level transportation conformity determination. For those pollutants and alternatives evaluated for transportation conformity, the conformity analyses generally meet the objectives of NEPA in terms of considering air quality impacts of proposed actions.

In the remainder of this section, document preparers should explain whether the conformity analysis for their project is being conducted for transportation conformity purposes, NEPA purposes or both.

The air quality analyses documented in this report were conducted to address both transportation conformity and NEPA requirements. The PM2.5 hot-spot analysis for the preferred alternative was conducted in accordance with the transportation conformity regulations and guidance documents. Since no exceedances of the NAAQS were found in the analysis of the preferred alternative, an analysis of the No Build Alternative was not required for transportation conformity purposes. However, a hot-spot analysis of the No Build Alternative was conducted for NEPA purposes to illustrate the incremental air quality effect of the project (the difference between the No Build and Build conditions). A quantitative analysis of MSAT emissions was also conducted for NEPA purposes to disclose the potential effects of the project.

Some key distinctions between the transportation conformity regulations and NEPA are summarized in Table 2 to assist analysts in determining the scope of air quality studies intended to address both transportation conformity and NEPA requirements.

Table 2
Comparison of Transportation Conformity and NEPA Air Quality Analysis Requirements

	Transportation Conformity	NEPA
Project Location Considerations	Applies in designated nonattainment and maintenance areas (and only for the specific pollutants/NAAQs the area is designated for).	Applies in all areas.
Determining which Projects Require Hot-Spot Analysis	The transportation conformity regulations provide specific guidelines for determining when a hot-spot analysis should be conducted for CO and PM (40 CFR 93.123). Screening criteria can be further defined at the state level and projects where the need for a hot-spot analysis is uncertain can be reviewed through the interagency consultation process.	No criteria for determining which projects require hot-spot analysis are defined in NEPA statute or regulations. A microscale CO analysis is unnecessary if the potential impacts can be judged to be well below the NAAQS (per 1987 Technical Advisory).Screening criteria may be established at the state level or and implemented in a programmatic agreement executed with the US DOT.
Determining which Pollutants to Analyze	Transportation conformity hot-spot analysis requirements currently apply to CO, PM10 and PM2.5 (and only for the specific pollutants/NAAQs the area is designated for).	No limit on the pollutants that could be considered.[12] Current guidance focuses on CO and MSATs. Transportation agencies have discretion to determine which pollutants represent a significant issue warranting an analysis for a specific project.

[12] Greenhouse gas (GHG) emissions are a global issue and not a concern for hot-spot analysis, but it is worth noting the availability of Draft CEQ Guidance for the analysis of greenhouse gas emissions in NEPA documents http://www.whitehouse.gov/administration/eop/ceq/initiatives/nepa/ghg-guidance
Nitrogen dioxide (NO_2) is a criteria pollutant where high concentrations occur in the near road environment and could be considered for a NEPA-only hot-spot analysis for certain projects (no NO_2 nonattainment areas have been designated at this time).

	Transportation Conformity	NEPA
Determining which Alternatives to Analyze	Required to analyze preferred alternative. If there are no exceedances of the NAAQS, the No Build does not have to be analyzed in most cases. If there is an exceedance of the NAAQS, the No Build must also be analyzed to determine if the project is worsening a violation.	"Reasonable alternatives" identified through scoping process, as well as the No Build Alternative. Analyzing the No Build Alternative or other Build Alternatives for NEPA purposes will not necessarily require modeling in every instance.[13] Modeling of alternatives for EIS documents is typically more extensive than that for EA or CE documents.
Determining which Years to Analyze	Regulations and EPA guidance define analysis year requirements (e.g. year with peak emissions from project and new or worsened violation most likely to occur based on background concentration trends).	1987 Technical Advisory recommends year of completion and design year for CO hot-spot analysis. No specific analysis year requirement in regulations, although typical practice for major projects is a 20 year outlook. To ensure air quality impacts are not underestimated by using an analysis year farther in the future (with a cleaner vehicle fleet), consider following conformity guidance for selecting NEPA air quality analysis years. For internal document consistency, agencies should be sure that one of the analysis years used for the NEPA air quality analysis matches with the analysis year used for traffic and other disciplines in the EA or EIS.
Construction Air Quality Impacts	Construction emissions occurring for less than five years in any particular location do not need to be included in a hot-spot analysis. As a result, few projects are required to address construction emissions under transportation conformity since even major projects typically involve a phased construction approach that does not last five years at each construction site.	NEPA applies to both long-term and short-term impacts and construction air quality impacts need to be considered (at least qualitatively), even though quantitative analysis may not be required for the project under the transportation conformity regulations.

[13] For example, the expected future No Build air quality condition could be discussed qualitatively based on existing and expected future trends. However, for projects with a long time horizon and major changes in emissions over time due to population and employment growth or other sources in the project area, the preferred approach would be to model the No Build alternative so that the results of the Build alternatives can be compared to the No Build quantitatively. Similarly, minor design variations between Build Alternatives can be addressed through an explanation in the text addressing why the variations would not create impacts greater than those of the alternative that was analyzed in detail. Interagency coordination could be used to inform the decisions made on which alternatives to analyze or a general approach could be agreed on programmatically. The basis for the decision should be documented for the administrative record.

	Transportation Conformity	NEPA
Mitigation	Mitigation is only required if the hot-spot analysis finds exceedances of the NAAQS without mitigation. Mitigation commitments must be documented in writing.	NEPA documents need to discuss mitigation measures whenever there are "adverse impacts." An adverse impact could occur from an increase in pollutant concentrations due to the project that does not exceed the NAAQS and thus would not require mitigation under transportation conformity.[14] NEPA documents do not need a written commitment for each potential mitigation measure discussed. Final NEPA mitigation commitments for the preferred alternative are documented in the ROD or FONSI.

3.3 Clean Air Act

3.3.1 National Ambient Air Quality Standards

The Clean Air Act and its amendments led to the creation of National Ambient Air Quality Standards (NAAQS) by the U.S. Environmental Protection Agency (EPA) for six criteria air pollutants: carbon monoxide, sulfur dioxide, ozone, particulate matter, nitrogen dioxide, and lead. There are two types of NAAQS—primary standards and secondary standards. Primary standards set limits to protect public health, including the health of sensitive populations such as asthmatics, children, and the elderly. Secondary standards set limits to protect public welfare, including protection against decreased visibility, damage to animals, crops, vegetation, and buildings.[15] Table 3 summarizes the NAAQS for the transportation-related pollutants applicable to project-level analysis. Ozone is transportation-related pollutant, but it is an issue of regional as opposed local concern, and analysis of ozone precursors at the project level is not required for transportation conformity as long as the project comes from a conforming long-range plan and TIP. The standards shown for CO are the primary NAAQS (no secondary NAAQS established for CO). For PM2.5 and PM10, the primary and secondary NAAQS are the same. Table 3 also shows the averaging time used to assess each NAAQS and the statistical form of the standard used to assess compliance.

Table 3. National Ambient Air Quality Standards Applicable to Project-Level Analysis

Pollutant	Level	Averaging Time	Statistical Form for Assessing Compliance
Carbon Monoxide	9 ppm	8-hour	Not to be exceeded more than once per year
	35 ppm	1-hour	
Particulate Matter (PM_{10})	150 µg/m^3	24-hour	Not to be exceeded more than once per year on average over 3 years
Particulate Matter ($PM_{2.5}$)	15 µg/m^3	Annual	Annual mean, averaged over 3 years
	35 µg/m^3	24-hour	98th percentile, averaged over 3 years

Source: US EPA webpage on NAAQS - http://www.epa.gov/air/criteria.html (accessed September 12, 2012). See website for more details on these standards.

[14] The determination of whether or not an increase is an adverse impact is left to the transportation agencies to determine on a project-specific basis, taking into account the definition of significance under NEPA 40 CFR 1508.27.

[15] http://www.epa.gov/air/criteria.html

Areas which have never been designated nonattainment for a pollutant and NAAQS are considered attainment areas. Areas that do not meet the NAAQS are classified as nonattainment areas for that pollutant. Control strategy State Implementation Plans (SIPs) are designed to bring nonattainment areas into compliance with the NAAQS. Former nonattainment areas currently meeting the NAAQS are designated maintenance areas.

3.3.2 Description of Project-Level Criteria Pollutants

Carbon monoxide (CO) is a toxic colorless and odorless gas that results from the incomplete combustion of gasoline and other fossil fuels. Because CO disperses quickly the concentrations can vary greatly over relatively short distances. Relatively high concentrations of CO are typically found near congested intersections, along heavily used roadways conveying slow-moving traffic, and in areas where atmospheric dispersion is inhibited by urban "street canyon" conditions.

Particulate matter is a broad class of air pollutants that exist as liquid droplets or solids, with a wide range of size and chemical composition. Particulate matter is emitted by a variety of sources, both natural and man-made. Major man-made sources of particulate matter include the combustion of fossil fuels in vehicles, power plants and homes; construction activities, agricultural activities, and wood-burning fireplaces. Smaller particulates that are smaller than or equal to 10 and 2.5 microns in size (PM10 and PM2.5) are of particular health concern because they can get deep into the lungs and affect respiratory and heart function.

3.3.3 Project-Level Transportation Conformity

The Clean Air Act, Title 23 and Title 49 U.S.C. requires that transportation and air quality planning be integrated in areas designated by the U.S. Environmental Protection Agency (EPA) as air quality nonattainment or maintenance areas. In nonattainment and maintenance areas, federal funding and approval for transportation projects is only available if transportation activities are consistent with air quality goals through the transportation conformity process.

Table 1 of Section 93.109(b) of the conformity rule contains the comprehensive list of conformity requirements for project-level conformity determinations.

First, transportation conformity rules require that the project must come from a currently conforming transportation plan and currently conforming transportation improvement program (TIP) at the time of project approval. If not, the project must be added to the next transportation plan and TIP. A project is considered to be from a conforming transportation plan and TIP if the project's design concept and scope have not changed significantly from those which were described and modeled in the conforming transportation plan/TIP. If the TIP includes requirements for project-level emissions mitigation or control measures, written commitments to implement such measures must be obtained from the project sponsor. Per 40 CFR §93.107, for projects not from a conforming transportation plan or TIP, a conformity determination may be made if the project NEPA document includes sufficient analyses and documentation to demonstrate that each of the criteria in 40 CFR §§93.109 through 93.119 are met.

In addition, a hot-spot analysis is required for certain projects in CO, $PM_{2.5}$, and PM_{10} nonattainment and maintenance areas. Project-level conformity requires that a new project must not cause or contribute to any new or existing localized CO, PM_{10}, and/or $PM_{2.5}$violations, or delay timely attainment of any NAAQS or interim milestones in CO, PM_{10}, or $PM_{2.5}$ nonattainment and maintenance areas.[16] Hot-spot conformity analyses are designed to evaluate whether there are air quality impacts on a smaller scale and relates a project to the standards on a more localized basis. A hot-spot analysis is not required for other pollutants and precursors for transportation conformity purposes. An additional hot-spot requirement applies to CO nonattainment areas, as referenced in 40 CFR §93.116(b): "Each FHWA/FTA project must eliminate or reduce the severity and number of localized CO violations in the area substantially affected by the project (in CO nonattainment areas).

The specific sections of the transportation conformity rule relating to hot-spot analyses can be found at 40 CFR §93.116, and 40 CFR §93.123. The sections below summarize the key provisions of the transportation conformity regulations and various EPA guidance documents for determining if transportation conformity applies, if a hot-spot analysis is required, conducting the hot-spot analysis, identifying mitigation measures and meeting applicable interagency and public consultation requirements.

3.3.3.1 Determining if Transportation Conformity Applies

The determination of whether or not transportation conformity applies to the project can be discussed in this section. Note that a hot-spot analysis is not required for every project that transportation conformity applies to; refer to Section 3.3.3.2 to determine if a hot-spot analysis is required.

Based on the following factors, the proposed project was determined to be [subject to or not subject to] transportation conformity requirements:

- The proposed project is located in a [nonattainment area] for the following transportation-related criteria pollutants: [list pollutants]. And/Or The proposed project is located in a [maintenance area] for the following transportation-related criteria pollutants: [list pollutants].

- The project [does or does not] meet the definition of a highway project or transit project under 40 CFR 93.101 because [explain rationale based on project description].

- The project [does or does not] require FHWA/FTA funding or approvals. [Explain what FHWA/FTA funding program or approval is needed, if any].

- The project [is or is not] a type of project exempt from transportation conformity under 40 CFR 93.126. [Explain rationale if some judgment was required to reach this conclusion, including which specific exempt project type(s) apply]

For projects with no FHWA/FTA funding or approvals, note whether or not the sponsor agency is a routine recipient of federal highway or transit funding. If the sponsor is a recipient of federal highway or transit funds, note whether or not the project is "regionally significant" and thus subject to 40 CFR 93.121.

The following questions can be used to help determine if transportation conformity applies to a given project:

[16] In nonattainment areas for CO, a special additional requirement applies under 40 CFR 93.116(b). FHWA/FTA projects in nonattainment areas for CO must eliminate or reduce the severity and number of localized CO violations in the area substantially affected by the project. There are currently no nonattainment areas for CO designated. However, there are some areas designated as maintenance for CO that do not have limited maintenance SIPs, and therefore, CO hot-spot evaluations are still required.

- Is the project located in an EPA designated nonattainment or maintenance area for transportation-related criteria pollutants? If not, transportation conformity requirements do not apply.
- Is the project a highway or transit project? If not, transportation conformity requirements do not apply. Specific definitions of "highway project" and "transit project" are provided at 40 CFR 93.101. A non-highway/non-transit project in a nonattainment or maintenance area and requiring a federal approval may be subject to General Conformity (40 CFR 93 Subpart B) instead of transportation conformity. Refer to FHWA's *Transportation and General Conformity FAQs* for information on the relationship between transportation conformity and general conformity and situations where general conformity may apply to all or portions of an FHWA/FTA project.[17]
- Does the project require funding or approval from FHWA or FTA? If not, a transportation conformity determination is not required. However, certain requirements still apply to regionally significant non-FHWA/FTA projects being advanced by a "recipient of funds designated under title 23 U.S.C. or the Federal Transit Laws." For example, a state DOT is a routine recipient of FHWA and FTA funds and thus regionally significant (defined at 40 CFR 93.101) state DOT projects with no FHWA/FTA approval or funding would still be subject to the requirements listed in 40 CFR 93.121. FHWA/FTA funding means Title 23 (highway) or Title 49 (transit) funding.
- Is the project exempt from transportation conformity? The types of projects exempt from transportation conformity are listed in 40 CFR 93.126.

3.3.3.2 Determining if a Hot-spot Analysis and Project-level Conformity Determination is Required (including categorical findings)

Carbon Monoxide (CO)

To be consistent with 40 CFR §93.123(a)(1), a project in a nonattainment or maintenance area for CO and meeting any of the following conditions triggers the need for a quantitative CO hot-spot analysis:

1. For projects in or affecting locations, areas, or categories of sites which are identified in the applicable SIP as sites of violation or possible violation;
2. For 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. For 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 SIP; and
4. For 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 SIP.

For other projects not meeting one of the four criteria listed above, compliance with the hot-spot analysis requirements for CO can be demonstrated in one of two ways:

1) Quantitative methods that represent reasonable and common professional practice; or
2) A qualitative consideration of local factors, if this can provide a clear demonstration that air quality requirements are met.

In addition, some states have developed EPA-approved procedures for further screening which individual projects will need a hot-spot analyses (40 CFR 93.123(a)(1)). The Department of Transportation, in consultation with EPA, may also choose to make a categorical hot-spot finding that

[17] http://www.fhwa.dot.gov/environment/air_quality/conformity/reference/faqs/genfaqsmemo.cfm

is met without further hot-spot analysis for any project described above, based on appropriate modeling.

Categorical Finding for CO:

At the time of preparation of this report, the US DOT in consultation with the US EPA has initiated the development of federal categorical finding for CO. The findings are to be based upon extensive modeling conducted using the latest applicable models and guidance. Any proposed project that meets the criteria to be specified in the federal categorical finding for CO will not require project-specific modeling. For documentation purposes, the federal finding and its criteria are referenced and project-specific data or other information are presented as appropriate to show that the proposed project meets the specified criteria and therefore does not require project-specific modeling.

PM_{10}, $PM_{2.5}$

A project in a nonattainment or maintenance area for PM_{10} or $PM_{2.5}$ and meeting any of the following conditions is referred to as a "project of local air quality concern" and requires a quantitative PM hot-spot analysis.

1. 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; (40 CFR 93.123(b)(1)(i))

2. 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; (40 CFR 93.123(b)(1)(ii))

3. New bus and rail terminals and transfer points that have a significant number of diesel vehicles congregating at a single location; (40 CFR 93.123(b)(1)(iii))

4. Expanded bus and rail terminals and transfer points that significantly increase the number of diesel vehicles congregating at a single location; (40 CFR 93.123(b)(1)(iv)) and

5. Projects in or affecting locations, areas, or categories of sites which are identified in the PM_{10} or $PM_{2.5}$ applicable SIP, as sites of violation or possible violation. (40 CFR 93.123(b)(1)(v))

Additional projects in certain PM_{10} areas may also require a PM hot-spot analysis in limited cases where a state's approved conformity SIP is based on pre-2006 conformity requirements. See Appendix C of EPA's Quantitative PM Hot-spot Guidance.

The types of projects that would require PM hot-spot analysis were further clarified through a series of examples provided in the preamble of the March 2006 Final Rule.

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[18]
- 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.

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 $PM_{2.5}$ or PM_{10} 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) 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).

[18] 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."

Categorical Finding for PM:

At the time of preparation of this report, the US DOT in consultation with the US EPA has initiated the development of federal categorical finding for PM. The findings are to be based upon extensive modeling conducted using the latest applicable models and guidance. Any proposed project that meets the criteria to be specified in the federal categorical finding for PM will not require project-specific modeling. For documentation purposes, the federal finding and its criteria are referenced and project-specific data or other information are presented as appropriate to show that the proposed project meets the specified criteria and therefore does not require project-specific modeling.

3.3.3.3 Hot-Spot Analysis Methodology Requirements and Guidance Documents

Regulatory Requirements

Key methodology considerations specified in the transportation conformity regulations include the following:

- **Latest planning assumptions (40 CFR 93.110)**. Project-level conformity determinations must be based upon the most recent planning assumptions in force at the time the conformity analysis begins. Assumptions must be derived from the estimates of current and future population, employment, travel, and congestion most recently developed by the MPO or other agency authorized to make such estimates and approved by the MPO. The conformity determination must also be based on the latest assumptions about current and future background concentrations. Key assumptions shall be specified and included in the draft documents and supporting materials used for the interagency and public consultation required by 40 CFR §93.105

- **Latest emissions model (40 CFR 93.111)**. The conformity determination must be based on the latest emission estimation model available and approved for use by EPA (notices are published in the Federal Register). Use of a previous model for a project-level conformity determination is permitted if the analysis began before or during a grace period established by EPA and if the final environmental document for the project is issued no more than three years after the issuance of the draft environmental document.

- **Guideline on Air Quality Models (40 CFR 93.123(a)(1)).** Hot-spot analyses must be based on quantitative analysis using the applicable air quality models, data bases, and other requirements specified in 40 CFR part 51, Appendix W (Guideline on Air Quality Models).

- **General Requirements (40 CFR 93.123(c)).**

    - Estimated pollutant concentrations must be based on the total emissions burden which may result from the implementation of the project, summed together with future background concentrations. The total concentration must be estimated and analyzed at appropriate receptor locations in the area substantially affected by the project.

    - Hot-spot analyses must include the entire project, and may be performed only after the major design features which will significantly impact concentrations have been identified. The future background concentration should be estimated by multiplying current background by the ratio of future to current traffic and the ratio of future to current emission factors.[19]

- Hot-spot analysis assumptions must be consistent with those in the regional emissions analysis for those inputs which are required for both analyses.

- CO, PM_{10}, or $PM_{2.5}$ mitigation or control measures shall be assumed in the hot-spot analysis only where there are written commitments from the project sponsor and/or operator to implement such measures, as required by §93.125(a).

- CO, PM_{10}, and $PM_{2.5}$ hot-spot analyses are not required to consider construction-related activities which cause temporary increases in emissions. Each site which is affected by construction-related activities shall be considered separately, using established "Guideline" methods. Temporary increases are defined as those which occur only during the construction phase and last five years or less at any individual site.

<u>Guidance Documents</u>

Guidance documents provide greater detail on the procedures and criteria that EPA recommends for use in complying with the transportation conformity regulations.

CO

Current EPA guidance on the use of the MOVES model to for CO screening and refined analyses is provided in the 2010 document "Using MOVES in Project-Level Carbon Monoxide Analyses". The 2010 guidance focuses on the emissions modeling aspect of CO hot-spot analysis and references the 1992 EPA guidance on CO analysis "Guideline for Modeling Carbon Monoxide from Roadway Intersections" for information on the dispersion modeling procedures for CO screening and refined analyses. Users should check the EPA website to ensure that they have the latest MOVES model and guidance documents, as these are likely to be updated over time.

PM_{10}/$PM_{2.5}$

EPA's 2010 document "Transportation Conformity Guidance for Quantitative Hot-spot Analyses in $PM_{2.5}$ and PM_{10} Nonattainment and Maintenance Areas" provides comprehensive guidance and a step-by-step framework for conducting PM hot-spot analyses using MOVES2010 for emissions modeling and AERMOD or CAL3QHCR for dispersion modeling. Users should check the EPA website to ensure that they have the latest MOVES and dispersion model and guidance documents, as these are subject to periodic updates.

3.3.3.4 Mitigation and Control Measures

Control measures need to be considered if the hot-spot analysis results show the project does not conform (e.g. new or worsened violation of NAAQS). The transportation conformity regulations require CO, PM_{10}, or $PM_{2.5}$ mitigation or control measures to be assumed in the hot-spot analysis and conformity determinations only where there are written commitments from the project sponsor and/or operator to implement such measures.

[19] Note that this methodology for estimating future background concentrations generally only applies to CO and possibly PM10 on a case-by-case basis.

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

- Retrofitting, replacing vehicles/engines, and using cleaner fuels (CO and PM);
- Reducing idling (CO and PM);
- Redesigning the transportation project itself (CO and PM);
- Controlling fugitive dust (PM only); and
- Controlling other sources of emissions (most likely PM only due to localized nature of CO concentrations).

Refer to the EPA PM guidance for a description of each of these categories of control measures.

3.3.3.5 Interagency and Public Consultation

The conformity rule requires that Federal, State and local transportation and air quality agencies establish formal procedures for interagency coordination. Typical participants in interagency consultation include FHWA, FTA, EPA, state DOTs, MPOs, and other local transportation agencies, and state and regional air quality agencies. In addition, public transportation operators are often active participants in interagency consultation. Interagency consultation provides an opportunity to reach agreements on key assumptions to be used in conformity analyses, strategies to reduce mobile source emissions, specific impacts of major projects, issues associated with travel demand and emissions modeling for hot-spot analyses. 40 CFR 93.105(c)(1)(i) requires interagency consultation to "evaluate and choose models and associated methods and assumptions." Per EPA's hot-spot guidance,[20] "for many aspects of PM hot-spot analyses, the general requirement of interagency consultation can be satisfied without consulting separately on each and every specific decision that arises. In general, as long as the consultation requirements are met, agencies have discretion as to how they consult on hot-spot analyses." For example, the interagency consultation process could be used to define the models and procedures that would be used for any hot-spot analyses within a metropolitan area. Further consultation would only be needed if alternatives to the agreed-upon process were needed for a specific project. Topics that should be addressed through consultation (either on a project-by-project basis or a predetermined agreement including a state guidance document) include:

- Defining screening criteria to determine if a hot-spot analysis is needed.
- Defining the geographic area covered by the analysis.
- Selecting the analysis year(s).
  Selecting the emissions model and dispersion model.
- Selecting peak hour factors and diurnal distribution of traffic.
- Selecting representative meteorological data, including preprocessed data.
- Determining whether and how to include road and construction dust emissions in the analysis.
- Determining the background data to use in the analysis and any nearby sources to be included in modeling.
- Defining appropriate receptor locations.
- Determining whether to use the urban or rural dispersion option for projects located on the edge of an urban area.

[20] US EPA. 2010. Transportation Conformity Guidance for Quantitative Hot-spot Analyses in PM2.5 and PM10 Nonattainment and Maintenance Areas" located online at: http://www.epa.gov/otaq/stateresources/transconf/policy/420b10040.pdf , page 8.

Interagency consultation is also recommended (but not required) for specific circumstances in the EPA guidance, such as the use of the option to conduct PM10 and PM2.5 emissions and air quality modeling for only one quarter of the year when future NAAQS violations and peak emissions are expected to occur only in that quarter. Interagency consultation may also address the following special circumstances (page numbers reference EPA's PM hot-spot guidance, http://www.epa.gov/otaq/stateresources/transconf/policy/420b10040.pdf):

- Deciding to not use additional available traffic data if it is determined that the use of this additional data would not significantly impact the emissions modeling results. (page 35)
- Determining the source type distribution for bus or freight terminals based on analysis of similar existing projects. (46)
- Using a microsimulation model to develop link drive schedules or operating mode distributions if the model has been validated to demonstrate it adequately predicts speed/accelerate patterns for relevant vehicle classes. (48)
- Placing receptors closer than 5 meters from the source for projects involving urban street canyons. (92)
- Interpolating data from several ambient monitors when it is determined that no single monitor is sufficiently representative of the project area (99).
- Using Chemical Transport Model-based options for determining background concentrations. (102)
- Use of alternative methods to calculating design values from those provided in the EPA PM hot-spot guidance. (123)
- Determining whether to include terrain effects in AERMOD if there is the potential for significant concentrations to result from nearby elevated sources (J-10).

The conformity rule also requires agencies completing project-level conformity determinations to establish a proactive public involvement process that provides opportunity for public review and comment (40 CFR 93.105). The NEPA public involvement process is typically used to satisfy this public participation requirement. If a project-level conformity determination that includes a CO or PM hot-spot analysis is performed after NEPA is completed, a public comment period must still be provided to support that determination. In these cases, agencies have flexibility to decide what specific public participation procedures are appropriate, as long as the procedures provide a meaningful opportunity for public review and comment.[21]

4.0 Existing Conditions

4.1 Air Quality Attainment Status of Project Area

[Name of Area] is considered in [attainment, maintenance, nonattainment] for [pollutant]. Include a few sentences of information on historical changes in the air quality status of the local area. Refer to Table 3 in Section 3.3.1. Summarize area's status for each NAAQS in a table, indicating whether the area is attainment/nonattainment/maintenance for each standard. Users should refer to EPA's website for the latest NAAQS that are relevant for project-level actions. As appropriate, conclude section noting the area is in attainment of all other NAAQS.

The example text below is from Colorado DOT's I-70 East Draft Environmental Impact Statement (2008).

[21] US EPA. 2010. Transportation Conformity Guidance for Quantitative Hot-spot Analyses in PM2.5 and PM10 Nonattainment and Maintenance Areas" located online at: http://www.epa.gov/otaq/stateresources/transconf/policy/420b10040.pdf

The Denver metropolitan area is designated as an attainment/maintenance area for CO, PM10, and the one hour O3 standard. No violations of the NAAQS for these pollutants have been recorded in the Denver metropolitan area since 1995. In April 2004, EPA designated the Denver area (Adams, Arapahoe, Boulder, Broomfield, Denver, Douglas, Jefferson and parts of Larimer and Weld counties) as non-attainment for the 8-hour ozone standard, but deferred the effective date of the designation based on a commitment from the State of Colorado, the Regional Air Quality Council, and others to implement ozone control measures sooner than required by the Clean Air Act. This commitment was contained in the Denver Early Action Compact. In return for this early action and for meeting certain milestones, EPA agreed to defer the effective date of the non-attainment designation under the 8-hour ozone standard.

According to state-validated air quality data from 2005, 2006, and the first three quarters of 2007, the Denver area violated the 8-hour federal health based standard for ozone. Based on this data, EPA has allowed a non-attainment designation to take effect, thus the area has forfeited its participation in the Early Action Compact program. The Colorado Department of Public Health and Environment (CDPHE), the Regional Air Quality Council, and others are working on a revised state implementation plan to address the Denver area's 8-hour ozone non-attainment issues. The revised plan is expected to contain additional control measures that will ensure the area meets the 8-hour ozone standard in the shortest time possible.

4.2 Climate and Meteorology

Briefly describe existing climate and meteorology characteristics of the project area. Having a clear understanding of these patterns is helpful for the hot-spot analysis process and this text can be referred to in other sections of the report where a characteristic of the study (such as predominant wind direction) is discussed.

The example text below is from the Caltrans *State Route 11 and the Otay Mesa Port of Entry Tier II DEIS* (2010).

The project is located in the San Diego Air Basin (SDAB), which is coincident with San Diego County. The climate of San Diego County is characterized by warm, dry summers and mild, wet winters. One of the main determinants of the climatology is a semipermanent high pressure area (the Pacific High) in the eastern Pacific Ocean. In the summer, this pressure center is located well to the north, causing storm tracks to be directed north of California. This high pressure cell maintains clear skies for much of the year. When the Pacific High moves southward during the winter, this pattern changes, and low pressure storms are brought into the region, causing widespread precipitation. The Pacific High also influences the wind patterns of California. The predominant wind directions are westerly and west-southwesterly throughout the year, and the average annual wind speed is 5.6 miles per hour (mph).

A common atmospheric condition known as a temperature inversion affects air quality in San Diego. During an inversion, air temperatures get warmer rather than cooler with increasing height. Subsidence inversions occur during the warmer months (May through October) as descending air associated with the Pacific High comes into contact with cooler marine air. The boundary between the layers of air represents a temperature inversion that traps pollutants below it. The inversion layer is approximately 2,000 feet above MSL during the months of May through October; during the remaining months (November through April), the temperature inversion is approximately 3,000 feet above MSL. Inversion layers are important elements of local air quality because they inhibit the dispersion of pollutants, thus resulting in a temporary degradation of air quality.

4.3 Ambient Air Quality Data and Trends

Discuss the trend in emissions in the region for pollutant(s) of concern and where monitors are located in relation to the project. It might be helpful to include a graph of nearby concentration levels compared to the NAAQS. See this example from Michigan:

The trend in CO is clearly down and has been for some time with all values well under the one- and eight-hour standards (Figures 2-3 and 2-4). In time, it is expected that the region will advance from maintenance to full attainment.

5.0 Project Assessment

5.1 Definition of Project Area Modeled

Explain the definition of the project area selected for the air quality analysis (the “area substantially affected by the project”). It is important to include a map of the project area boundaries and to document interagency concurrence on the determination of the project area.

Within the project area, explain how the existing and proposed roadways were divided into links. Provide a schematic showing how the project was divided into links, with corresponding volumes and speeds. Brief descriptions of why these links were selected should be discussed, e.g., changes in vehicle speed, changes in volumes, etc. See EPA’s PM Hot-Spot training materials for examples.

5.2 Particulate Matter

5.2.1 Level of Analysis Determination

In this section, discuss how the specific determination for the project was made for NEPA and/or conformity. This would include meeting the conditions needed to trigger a PM quantitative hot-spot analysis. Include determination of Project of Air Quality Concern and categorization using criteria specified in Programmatic Agreements and/or Categorical Findings, if any. Include a statement indicating how the requirements for interagency consultation were met (e.g., Through the interagency consultation process, the data sources and modeling inputs discussed in the sections below were discussed and agreed to as the latest planning assumptions for this area.)

If the federal categorical finding referenced earlier eliminates the need for project specific modeling for this project, then the following sections on project-specific modeling will not be needed and should be deleted: Sections 5.2.2 through 5.2.6.

5.2.2 Summary of Traffic Data and Forecasts for the PM Analysis

In this section, discuss seasonal and temporal adjustments to the traffic data to be used to fulfill the requirements of the specified PM analysis (e.g., adjustment of annual volumes to four seasons, and determination of am peak, pm peak, and off-peak volumes and speeds.) Alternatively, if all the necessary traffic information is covered under Section 2.2, this section can be deleted.

5.2.3 PM Emissions Analysis

5.2.3.1 Modeling Scenarios

Analysis Years

Explain rationale for selecting the years to be used in the modeling analysis based on both NEPA and conformity requirements, addressing base, opening and design years.

Year 20XX was selected as the analysis year for this hot-spot analysis. Section 93.116(a) of the conformity rule requires that projects in a PM_{10} or $PM_{2.5}$ nonattainment or maintenance area demonstrate *"that during the time frame of the transportation plan no new local violations will be created and the severity or number of existing violations will not be increased as a result of the project."* This area's transportation plan goes through the year 20YY. Thus, years from the beginning of the project through year 20YY were considered. EPA's PM hot-spot guidance states that *"Conformity requirements are met if the analysis demonstrates that no new or worsened violations occur in the year(s) of highest expected emissions – which includes the project's emissions in addition to background emissions."* To determine the year of peak emissions from the project, the following factors were considered:

- Changes in the vehicle fleet mix due to the project; and
- Changes in traffic volumes, speeds, and vehicle miles traveled in the project area.

Note that fleet turnover to vehicles constructed to meet more stringent emissions standards results in reductions in fleet average emission rates on a g/mi basis. Thus, the highest emissions year is not always the long-range year with highest traffic volumes but may be an earlier year.

Example: Based on the traffic analysis, the year with the highest expected traffic volumes is expected to be 20XX. Based on trends in emission rates and VMT, the year of highest traffic volumes is expected to be the year of peak emissions and is therefore used as the analysis year.

Build and No-Build Scenarios

It was determined that only a build scenario would be initially modeled. If the resulting PM concentrations from the build scenario are lower than or equal to the relevant NAAQS, the project would be in conformity, and the additional No-Build modeling would not be needed. After modeling of the build scenario, the project was found to exceed the NAAQS at least one receptor location. Therefore, a No-Build scenario was also modeled, including the same number of MOVES runs as the Build scenario.

NAAQS Evaluated

Explain which NAAQS are relevant to this project (e.g., 24-hour PM_{10} NAAQS, 24-hour $PM_{2.5}$ NAAQS, or annual $PM_{2.5}$ NAAQS).

5.2.3.2 Emissions from On-Road Mobile Sources

Emissions Model

EPA's Motor Vehicle Emission Simulator (MOVES2010 [insert actual version of model used]) model, and the corresponding default MOVES database [insert default database name] dated [date] was used to calculate hourly emissions/emission rates (select appropriate choice depending upon needs of dispersion model used). This model was run for the analysis year(s), scenario(s), and pollutant(s) selected as described above. The specific MOVES inputs are described below and fully documented in Appendix A.

Project Links

Figures x to y are maps of the project area. Figure x is an overall map that shows the entire project area. The project was broken down into road segments and off-network locations where a similar type of vehicle activity occurs, to be modeled as individual links in MOVES. For projects including roadways and/or intersections: Roadway or running links were identified as segments within the project designed to capture changes in speeds, volumes, fleet mix, and purpose. For projects with parking lots or terminals: Each off-network link was identified to capture an area of the project with a similar number of vehicle starts per hour, similar fleet mix, and similar idling activity. Figure y is a schematic that shows the road links and off-network links to be included in the modeling. Table x lists key data for each link, including traffic volume associated with each link, length of each link, starts per hour, and idling time. Note the source of the speed and volume data. Reference any traffic simulation models that may have been used. If count data are used, they should also be referenced.

Include a map of project area, with links to be modeled indicated on map; length of each link, number of lanes (not relevant to MOVES, but useful later), direction, link type (queue, cruise, acceleration). The above wording describes one option for dividing a project into links. Depending on the detail in the traffic data, the project sponsor may choose to divide links differently.

Number of MOVES Runs

The number of MOVES runs needed to appropriately represent this project was determined in accordance with EPA's PM Hot-Spot Guidance. The number of runs was selected to capture the variability in emission rates over the day and year, by appropriately representing the variation in temperatures, fleet mix, and activity by seasons as well as the changes in fleet mix and activity by time of day. Based on the EPA guidance, it was determined that 16 MOVES runs would be needed to model the build scenario [for areas affected by the annual $PM_{2.5}$ NAAQS] **OR** 16 MOVES runs would be needed to model the build scenario since the area's PM violations occur in more than one quarter of the year [for areas affected by the 24-hour $PM_{2.5}$ or the 24-hour PM_{10} NAAQS only and with violations in more than one quarter of the year] **OR** 4 MOVES runs would be needed to model the build scenario since the area's hourly PM violations occur in only one quarter of the year [for areas affected by the 24-hour $PM_{2.5}$ or the 24-hour PM10 NAAQS only and with violations in only one quarter of the year]. Note that the option of selecting 4 MOVES runs to represent the one quarter of the year with violations must be decided on through interagency consultation.

Basic Run Specification Inputs

The following selections were made within the MOVES model:

Scale: Project-level

Calculation Type: "Inventory" was selected to obtain total emissions for each link to correspond with the grams per hour input needed since AERMOD is being used for the dispersion modeling. **OR** "Emission Rates" was selected to obtain emissions per vehicle for each link to correspond with the grams per vehicle mile input needed since CAL3QHCR (or CAL3QHC) is being used for the dispersion modeling.

Time Span: The hour, month, year, and weekday were selected to represent the analysis year (20XX), the month and hour of each scenario, and weekday. Table 4 summarizes the selections.

Table 4. MOVES Selections for Time Spans by Scenario

Scenario	Season/Time Period	Modeled Month	Representing Months	Modeled Start Hour-End Hour	Representing Hours
1	Winter AM peak	Jan	Jan, Feb, Mar	07:00–08:00	6 am – 9 am
2	Winter Midday	Jan	Jan, Feb, Mar	12:00–13:00	9 am – 4 pm
3	Winter PM peak	Jan	Jan, Feb, Mar	17:00–18:00	4 pm – 7 pm
4	Winter Overnight	Jan	Jan, Feb, Mar	00:00-01:00	7 pm – 6 am
5	Spring AM peak	Apr	Apr, May, Jun	07:00–08:00	6 am – 9 am
6	Spring Midday	Apr	Apr, May, Jun	12:00–13:00	9 am – 4 pm
7	Spring PM peak	Apr	Apr, May, Jun	17:00–18:00	4 pm – 7 pm
8	Spring Overnight	Apr	Apr, May, Jun	00:00-01:00	7 pm – 6 am
9	Summer AM peak	Jul	Jul, Aug, Sep	07:00–08:00	6 am – 9 am
10	Summer Midday	Jul	Jul, Aug, Sep	12:00–13:00	9 am – 4 pm
11	Summer PM peak	Jul	Jul, Aug, Sep	17:00–18:00	4 pm – 7 pm
12	Summer Overnight	Jul	Jul, Aug, Sep	00:00-01:00	7 pm – 6 am
13	Fall AM peak	Oct	Oct, Nov, Dec	07:00–08:00	6 am – 9 am
14	Fall Midday	Oct	Oct, Nov, Dec	12:00–13:00	9 am – 4 pm
15	Fall PM peak	Oct	Oct, Nov, Dec	17:00–18:00	4 pm – 7 pm
16	Fall Overnight	Oct	Oct, Nov, Dec	00:00-01:00	7 pm – 6 am

Geographic Bounds: Sample County in Sample State was selected since the project in located in that county.

Vehicles/Equipment: All possible combinations of gasoline and diesel (and CNG buses, if applicable) fueled vehicles were selected since all vehicle types are present in the project area.

Road Type: The following road types were selected:

- Urban Restricted Access, representing Links a and b;
- Urban Unrestricted Access, representing Links c and d; and
- Off-Network, representing parking area e, to account for starts and extended idling.

Pollutants and Processes: Since this project is in a $PM_{2.5}$ nonattainment (maintenance) area, the following pollutants were selected: Primary Exhaust $PM_{2.5}$ - Total, Primary $PM_{2.5}$ – Organic Carbon, Primary $PM_{2.5}$ – Elemental Carbon, Primary $PM_{2.5}$ – Sulfate Particulate, Primary $PM_{2.5}$ – Brakewear Particulate, and Primary $PM_{2.5}$ – Tirewear Particulate. **OR** Since this project is in a PM_{10} nonattainment (maintenance) area, the following pollutants were selected: Primary Exhaust PM_{10} - Total, Primary PM_{10} – Organic Carbon, Primary PM_{10} – Elemental Carbon, Primary PM_{10} – Sulfate Particulate, Primary PM_{10} – Brakewear Particulate, and Primary PM_{10} – Tirewear Particulate. (NOTE: The brakewear and tirewear PM components only need to be included for projects with roadways or intersections.)

Since this project includes roadway/intersection links, the following emission processes were selected: Running Exhaust, Crankcase Running Exhaust, Brake Wear, and Tire Wear. Since this project includes an off-network link, the following emission processes were selected: Start Exhaust, Extended Idle Exhaust, Crankcase Start Exhaust, and Crankcase Extended Idle Exhaust.

General Output: The output database was named ProjectXX_out. Mass Units was set to Grams; Energy Units was set to Joules; and Distance Units was set to Miles. Distance Traveled and Population activity types were selected. (Other activity options may also be selected, if desired, to aid in evaluating the results.)

Output Emissions Detail: Emission Process was selected from the "for All Vehicle/Equipment Categories" menu and Source Use Type was selected from the On Road menu. (Additional selections may be made, but will increase the database size. When running MOVES in the "Emission Rates" mode, for use with the CAL3QHC or CAL3QHCR dispersion model, no selections should be made on the Output Emissions Detail tab in MOVES.)

<u>Project Data Manager</u>

Additional data inputs were provided to MOVES through the use of the Project Data Manager. This includes information on the links, age distribution, fuel parameters, meteorology, and inspection and maintenance (I/M) programs. The actual inputs used are shown in Appendix X.
The MOVES model was run for scenarios described above and the specified inputs documented in the sections below with the resultant emission rates used in the air quality dispersion modeling.

Meteorological Inputs

Hourly temperature and humidity data represent the average temperature for each time period and set of months modeled. These temperatures are consistent with and are from the same surface air meteorological station as those used in the regional emissions modeling as well as the air quality modeling inputs used in the hot-spot dispersion modeling. The temperature and humidity data input to MOVES were derived from [number of years] years of meteorological data reported at the [name of meteorological station] covering the period from [list the range of years coverered]. The average hourly temperature and humidity over these [number of years] years were first calculated for each month ([list the months modeled in MOVES]) and hour of the day. The meteorological data representing the hours included in each time period were then averaged together to obtain average temperature and humidity data for each of the [number of months modeled] months and [number of time periods] time periods.

Age Distribution

The age distribution modeled was also obtained from the latest regional emissions modeling. Include the date of the registration data used (e.g., developed by DMV in 2012 utilizing registration data extracted as of July 1, 2010.) If the project includes a captive fleet, such as for a bus terminal, then the age distribution may be different that that used in regional modeling.

Fuel Parameters

The MOVES default fuel parameters for Sample County for the selected months in year 20XX were determined to be appropriate and consistent with modeling performed for regional modeling in the area.

Any changes to the MOVES default fuel formulations to reflect local conditions or control programs, such as Reid vapor pressure (RVP) or ethanol content should be documented here. Additionally, if the area updates vehicle fuel mix fractions (e.g., diesel vs. gas sales fractions or CNG fractions for buses) through the MOVES Alternative Vehicle Fuels & Technologies (AVFT) panel, this should be noted here.

I/M Programs

(I/M does not affect PM results, so this is not needed for PM hot-spot analyses.)

Link-Level Inputs

Lay out link data, or reference to appendix table if lengthy, detailing link ID, length, volume, average speed, and grade. If operating mode distribution or link drive schedule used, provide discussion of data source and derivation of this information. Provide source of traffic information used to derive link volumes.

Fuel Type and Technologies Input[22]

If the project involves vehicle mixes by fuel type for individual source types that are known or expected to differ from the MOVES defaults, this input should be used to reflect the appropriate mix of fuel types. This would occur particularly for projects with higher than normal diesel traffic or bus projects where it is known that there are no CNG-fueled buses.

A Fuel Types and Technologies input was developed for this project to modify the MOVES default fuel fractions for the vehicles in the project area. Indeed, based on national data, MOVES assumes that transit buses use a mix of gasoline, diesel, and CNG. In this case, the fleet was changed to 100 percent of transit buses running on diesel.

Off-Network Activity

For facilities (e.g., bus terminals), the number of vehicles, start fraction, and extended idle fraction must be included in the MOVES run to capture off-network activity. See EPA's PM Hot-Spot Guidance regarding the development, collection, and documentation of off-network activity data.

[22] Note that in versions of MOVES prior to MOVES2010b, these same data were accesses through the Alternative Vehicle Fuels and Technologies (AVFT) panel

5.2.3.3 Emissions from Road Dust, Construction and Additional Sources

Road Dust

$PM_{2.5}$

Since $PM_{2.5}$ re-entrained road dust emissions have been found to be a significant contributor to the $PM_{2.5}$ nonattainment/maintenance area by [name of state air quality agency], these emissions must be included in the $PM_{2.5}$ hot-spot analysis for this area, as specified in 40 CFR 93.102(b)(3) and 93.119(f)(8).

OR

Emissions from re-entrained road dust are not required in this hot-spot analysis since these have not been determined by [name of state air quality agency] to be a significant contributor to $PM_{2.5}$ nonattainment in this area.

PM_{10}

Since this area is a PM_{10} nonattainment/maintenance area, emissions from re-entrained road dust are required to be included in the hot-spot analysis.

Construction

NOTE: This section should only be included if construction effects are determined above to be needed in the analysis.

{Describe construction phase of project, timeline for construction, phases of construction (where applicable), construction period. Discussion of whether construction effects are required to be considered in the hot-spot analysis and sources of emissions from construction. AP-42 as source for construction dust emission factors. Other sources, such as EPA's NONROAD model, may be used if exhaust emissions from construction are relevant.}

For NEPA, qualitative assessment of temporary construction air quality effects recommended (even when quantitative analysis is not required for conformity).

Construction from this project is expected to take less than five years and would cause only temporary increases in emissions. Therefore, construction emissions are not included in this hot-spot analysis.

OR

Construction activities at this project site are expected to last for more than five years. Therefore, emissions from the construction activities are included in this analysis, as required by 40 CFR 93.123(c)(5). [Provide details of emissions in this case.]

Additional Sources

Include only when locomotive emissions or other additional sources are needed.

5.2.4 PM Dispersion Modeling (AERMOD)

This template uses AERMOD for PM_{10} (24-hr standard) and $PM_{2.5}$ (24-hr and annual standards).

5.2.4.1 Dispersion Model

The AERMOD dispersion model (version 11103) was selected for the PM_{10} and $PM_{2.5}$ analyses in accordance with the 2010 PM Guidance. The interagency consultation process approved the selection of AERMOD for this project (See Appendix XX). Five years of meteorological data was joined prior to preprocessing to allow for the analysis to be completed with one model run for each pollutant. The flat terrain option was used.

5.2.4.2 Source Characterization

Key inputs in characterizing sources for AERMOD are summarized below.

- The roadway links developed for modeling with MOVES were spatially defined for AERMOD as area sources. Some MOVES roadway links were broken down into smaller areas for AERMOD in order to account for curves. Figures xx through xx provide mapping of the area sources labeled with a receptor ID that corresponds to the MOVES link ID.

- All sources were defined as urban sources in AERMOD. For projects in an urban area, all sources should be defined as urban (AERMOD Implementation Guide 5.1).

- The seasonal hourly MOVES2010a emissions for each link were converted into the grams/second per square meter format required by AERMOD for area sources.

- Release height above ground was determined to be xx meters based on emissions weighted average method described in the 2010 PM Guidance (J.3.3).

- The initial vertical dispersion coefficient was determined to be xx meters based on emissions weighted average method described in the 2010 PM Guidance (J.3.3).

5.2.4.3 Meteorological Data

Representative meteorological data stations were identified and the data available for the most recent five consecutive years at each station was obtained. The identification of representative surface meteorological stations considered the distance from the project area, prevailing wind patterns, land use/land cover and other features such as large bodies of water that could affect the representativeness of meteorological data. Upper air data varies less on a regional basis, therefore the upper air station closest to the project area was selected (insert station name and ID number). The surface meteorological data stations considered and the final stations selected are summarized in Table 5a. The interagency consultation process approved the selected surface and upper air meteorological stations selected.

Table 5a. Surface Meteorological Stations Considered

Name/Location	Station ID Number	Distance from Project Area (miles)	Predominant Land Use	Topography	Latest Five Year Period with Available Data
Selected Station		*15*	*Urban (airport)*	*Flat*	*2006-2010*
Other Station 1					
Other Station 2					

A quality assurance/quality control protocol was implemented prior to the use of meteorological data. Describe the specific QA/QC procedures used and any adjustments made to account for missing data.[23] Meteorological data for each of the five years was joined together and processed with AERMET to prepare it for use in AERMOD. Surface characteristic inputs to AERMET (albedo, surface roughness, and bowen ratio) were developed using the EPA program AERSURFACE and U.S. Geological Survey land cover data for a 1.0 km distance around the surface meteorological station. OR Pre-processed surface and upper air meteorological data for the selected station was obtained from [name of air agency]. It is expected that few users will need to process their own data. State air agencies typically have comprehensive processed meteorological data. However, if the state agency meteorological data was processed with an older/incompatible version of AERMET, this can cause AERMOD to not run (users guide error #395). The best solution in this situation is to re-process the raw meteorological data for the area with the latest version of AERMET. The state air agency may still be able to provide the raw data needed.

5.2.4.4 Surface Characteristics

Surface characteristic inputs to AERMET (albedo, surface roughness, and bowen ratio) were developed using the EPA program AERSURFACE and U.S. Geological Survey land cover data for a 1.0 km distance around the surface meteorological station.

5.2.4.5 Terrain Data

Most projects will be modeled with flat terrain and will not need to include this section. This section should be included only for projects that include point sources and complex terrain where the AERMOD elevated terrain option may be appropriate. Not applicable to CAL3QHCR.

5.2.4.6 Urban vs. Rural Dispersion

AERMOD accounts for urban dispersion effects by using urban area population as a surrogate for the degree of urban heat island effect occurring in a specific area. As [urban area name] is relatively isolated, the urban population input to AERMOD was based on the 2010 U.S. Census population for the [MSA name] Metropolitan Statistical Area (MSA)—[number of persons]. Alternatively, if the project was located in an area with numerous adjacent metropolitan areas (such as the New York-New Jersey- Connecticut metropolitan area), the population input to AERMOD should be defined using the population density method described in Section 5.2 of the 2009 AERMOD Implementation Guide.

[23] Meteorological guidance documents, including procedures for addressing missing data and for quality assuring meteorological measurements are available through EPA's Support Center for Regulatory Atmospheric Modeling (SCRAM) website: http://www.epa.gov/ttn/scram/metguidance.htm

5.2.4.7 Receptors

Receptors were located throughout the project area in publicly accessible areas where high PM concentrations would be expected. Receptors were placed in accordance with Appendix W (Section 7.2.2) and 2010 PM Guidance. Receptors were placed no closer than 5 meters from roadways. Receptors were placed with 10 meter spacing within 50 meters of the edge of the source and with 20 meter spacing between 50 and 100 meters of the edge of the source. Mapping of the receptor locations for each intersection provided in Figures xx through xx. Project-specific conditions considered in defining the receptor grid should be described, such as topography, prevailing winds, interagency consultation, etc.

For the $PM_{2.5}$ annual and 24-hr standards, receptors must be “population oriented” comparison to the NAAQS. Section 58.1 of the $PM_{2.5}$ monitoring regulations defines population-oriented sites as: “…residential areas, commercial areas, recreational areas, industrial areas where workers from more than one company are located, and other areas where a substantial number of people may spend a significant fraction of their day.” As noted in the 2010 PM Guidance, most locations in an urban area are population oriented. All the receptors used for this project are population oriented.

A receptor height of 1.8 meters was used to reflect breathing height for ground-level receptors.

5.2.4.8 Building Downwash

Building downwash will not be included for most analyses and this section will not need to be included. Include for projects that may involve new buildings with point sources or new point sources on existing buildings, such as a transit station building.

5.2.5 Dispersion Modeling (CAL3QHCR)

This template uses CAL3QHCR for PM_{10} (24-hr standard) and $PM_{2.5}$ (24-hr and annual standards).

5.2.5.1 Dispersion Model

The CAL3QHCR dispersion model was selected for the PM_{10} and $PM_{2.5}$ analyses in accordance with the 2010 PM Guidance. The interagency consultation process approved the selection of CAL3QHCR for this project (See Appendix XX). A total of 20 model runs were used to reflect quarterly variations in emissions and meteorology over five years of meteorological data.

5.2.5.2 Source Characterization

The CAL3QHCR model characterizes roadway links as line sources. Key inputs in characterizing sources for CAL3QHCR are summarized below.

- The free flow and queue links defined for modeling with MOVES were spatially defined for input into CAL3QHCR. Figure xx provides a map of the modeled links. Guidance: Ensure link length is always greater than link width.

- 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 (2010 PM Guidance J.3.1).

- Source height was specified for each link based on the elevation of the roadway relative to ground level. Ensure that the height of the roadway relative to the surrounding ground does not exceed +/- 10 meters (an alternative model or approach should be considered through interagency consultation for projects with elevated or depressed sections outside this range).

- The MOVES2010 emissions factors (Section 5.2.3) and traffic volumes/speeds (Section 5.2.2) developed for the project were used in a Tier II analysis in CAL3QHCR.

- The CAL3QHCR queuing algorithm was not used.[24] Instead, idling emissions were accounted for in the development of emissions factors with MOVES2010.

5.2.5.3 Meteorological Data

Representative meteorological data stations were identified and the data available for the most recent five consecutive years at each station was obtained. The identification of representative surface meteorological stations considered the distance from the project area, prevailing wind patterns, land use/land cover and other features such as large bodies of water that could affect the representativeness of meteorological data. Upper air data varies less on a regional basis, therefore the upper air station closest to the project area was selected (insert station name and ID number). The surface meteorological data stations considered and the final stations selected are summarized in Table 5b. The interagency coordinating group concurred with the selected surface and upper air meteorological stations selected.

Table 5b. Surface Meteorological Stations Considered

Name/Location	Station ID Number	Distance from Project Area (miles)	Predominant Land Use	Topography	Latest Five Year Period with Available Data
Selected Station		15	Urban (airport)	Flat	2006-2010
Other Station 1					
Other Station 2					

A quality assurance/quality control protocol was implemented prior to the use of meteorological data. Describe the specific QA/QC procedures used and any adjustments made to account for missing data. Quarterly surface and upper air meteorological data input files were developed for each of the five years of data using the Meteorological Processor for Regulatory Models.[25]

5.2.5.4 Surface Characteristics

Surface roughness is a required input to CAL3QHCR that accounts for the effect of different terrain types on mechanical turbulence and dispersion. Based on the predominately [land cover type] land

[24] See U.S. EPA. 1992. "Guideline for Modeling Carbon Monoxide from Roadway Intersections." and U.S. EPA. 2010. "Using MOVES in Project-Level Carbon Monoxide Analyses," EPA-420-B-10-041, December 2010.

[25] Meteorological guidance documents, including procedures for addressing missing data and for quality assuring meteorological measurements are available through EPA's Support Center for Regulatory Atmospheric Modeling (SCRAM) website: http://www.epa.gov/ttn/scram/metguidance.htm

cover in the project area, a surface roughness length of [length in cm] was selected based on the 1992 Guideline (Table 4-1).

5.2.5.5 Urban vs. Rural Dispersion

CAL3QHCR accounts for urban dispersion effects (e.g. the urban heat island effect) and there is required input to designate the project area as urban or rural. The [urban or rural] option was selected for this project based on the land use classification technique described in Appendix W, Section 7.2.3. Information on the land use classification analysis is provided in Appendix xx.

5.2.5.6 Receptors

Receptors were located throughout the project area in publicly accessible areas where high PM concentrations would be expected. Receptors were placed in accordance with Appendix W (Section 7.2.2) and 2010 PM Guidance. Receptors were placed no closer than 5 meters from roadways. Receptors were placed with 10 meter spacing within 50 meters of the edge of the source and with 20 meter spacing between 50 and 100 meters of the edge of the source. Mapping of the receptor locations for each intersection provided in Figures xx through xx.

A receptor height of 1.8 meters was used to reflect breathing height for ground-level receptors.

5.2.6 Determination of Background Concentrations

Background concentrations are needed in combination with the modeling results to determine the total predicted pollutant concentrations for comparison to the NAAQS. Based on a consideration of several monitors in the area, the [name/location of monitor] was selected as representative of the project area because it has similar land use and is upwind of the project area (See Table 6). The interagency consultation process approved the selected monitoring site. See Section 8.3.1 of the 2010 PM Guidance. Do not use monitoring data for which EPA has granted data exclusion under the Exceptional Events rule (see 40 CFR 50.14).

Describe any interpolation methods used if multiple monitoring sites are used.

Table 6. Air Quality Monitoring Sites Considered

Name/Location	Monitor ID Number	Monitor Height above Ground Level	Pollutants	Distance from Project Area (miles)	Predominant Land Use	Topography	Upwind or Downwind from project area	Latest Three Year Period with Available Data
Selected Monitor			*CO, PM_{10}, $PM_{2.5}$*	*15*	*Commercial*	*Flat*	*Upwind*	*2008-2010*
Other Station 1								
Other Station 2								

{Discuss process used to select representative air quality monitor(s) to establish background concentrations. Summarize the monitors selected (location, distance from project, upwind/downwind, id, land use etc. in a table). Describe any interpolation methods used.}

5.2.7 Modeling Results for PM

The calculation of design values is the process by which the modeled concentrations due to the project and background concentrations from monitoring data are combined in manner that is compatible with the statistical form of the NAAQS. This section should present the PM incremental concentrations expected to result from the project and the corresponding PM design values. Follow the guidance in EPA's hot-spot guidance for this analysis. Present summary tables of the results. Discuss results in relation to NAAQS and also discuss any increase in the number of expected violations. If some receptors have failing design values, the representativeness of the receptor placement should be discussed. Such discussion should indicate whether the receptors are population oriented and representative of community-wide air quality, as appropriate. Supporting figures and discussion will be necessary for any receptors determined to be not comparable the NAAQS. This might include a contour plot of the results.

5.3 Carbon Monoxide

5.3.1 Level of Analysis Determination

In this section, discuss how the specific determination for the project was made for NEPA and/or conformity. This would include meeting the conditions needed to trigger a CO quantitative hot-spot analysis. Include categorization using criteria specified in Programmatic Agreements and/or Categorical Findings, if any.

If the federal categorical finding referenced earlier eliminates the need for project specific modeling for this project, then the following sections on project-specific modeling will not be needed and should be deleted: Sections 5.3.2 through 5.3.7.

For projects where the only hot-spot analysis requirement is CO, a screening analysis will likely be all that is necessary to demonstrate conformity. For projects that require both CO and $PM_{2.5}$ or PM_{10} hot-spot analysis, it is recommended to analyze CO using the same dispersion model, meteorological data and input assumptions as required for the PM analyses. This will ensure the results are consistent and avoid the work required to setup a separate screening analysis for CO. A refined CO analysis could also be required if exceedances of the NAAQS occur in the screening level analysis or where the project includes non-roadway sources of CO that need to be included in the modeling.

5.3.2 Summary of Traffic Data and Forecasts for the CO Analysis

In this section, discuss seasonal and temporal adjustments to the traffic data to be used to fulfill the requirements of the specified CO analysis (e.g., adjustment of annual volumes to necessary seasons, and determination of am volumes and speeds in the specified periods.) For screening analysis, this should discuss what the worst case volumes and speeds are and how they were determined. For the refined analyses, this needs to include the determination of data for the specific season(s) and time period(s) to be modeled.

5.3.3 CO Emissions Analysis

5.3.3.1 Modeling Scenarios

Analysis Years

Explain rationale for selecting the years to be used in the modeling analysis based on both NEPA and conformity requirements, addressing base, opening and design years.

Year 20XX was selected as the analysis year for this hot-spot analysis. Section 93.116(a) of the conformity rule requires that projects in a CO nonattainment or maintenance area demonstrate *"that during the time frame of the transportation plan no new local violations will be created and the severity or number of existing violations will not be increased as a result of the project."* This area's transportation plan goes through the year 20YY. Thus, years from the beginning of the project through year 20YY were considered. Conformity requirements are met if the analysis demonstrates that no new or worsened violations occur in the year(s) of highest expected emissions – which includes the project's emissions in addition to background emissions. To determine the year of peak emissions from the project, the following factors were considered:

- Changes in the vehicle fleet mix due to the project; and
- Changes in traffic volumes, speeds, and vehicle miles traveled in the project area.

Example: Based on the traffic analysis, the year with the highest expected traffic volumes is expected to be 20XX. As emissions are trending downwards in the future, this year of highest traffic volumes was expected to be the year of peak emissions and is therefore used as the analysis year.

Build and No-Build Scenarios

For a CO screening analysis, typically only a worst-case build scenario would need to be analyzed. For a refined analysis, both a build and no-build scenario may be needed. In this case, the basic differences between the modeling of these two scenarios should be discussed, primarily in terms of traffic inputs.

5.3.3.2 Emissions from On-Road Mobile Sources for CO Screening Analyses

Note that the purpose of a screening analysis is to estimate the maximum likely impacts of emissions from a given source, generally at the receptor with the highest concentrations, based on worst-case traffic and meteorological data.

Emissions Model

EPA's Motor Vehicle Emission Simulator (MOVES2010 [insert actual version of model used]) model, and the corresponding default MOVES database [insert default database name] dated [date] was used to calculate hourly emissions/emission rates (select appropriate choice depending upon needs of dispersion model used). This model was run for the analysis year(s), scenario(s), and pollutant(s) selected as described above. The specific MOVES inputs are described below and fully documented in Appendix A.

Project Links

Figures x to y are maps of the project area. Figure x is an overall map that shows the entire project area. The project was broken down into free-flow approach links, free-flow departure links, and queue links where a similar type of vehicle activity occurs, to be modeled as individual links in MOVES.[26] For projects with parking lots or terminals: Each off-network link was identified to capture an area of the project with a similar number of vehicle starts per hour, similar fleet mix, and similar idling activity. Figure y is a schematic that shows the road links and off-network links to be included in the modeling. Table x lists key data for each link, including traffic volume associated with each link, length of each link, starts per hour, and idling time. Note the source of the speed and volume data. Reference any traffic simulation models that may have been used. If count data are used, they should also be referenced.

Include a map of project area, with links to be modeled indicated on map; length of each link, number of lanes (not relevant to MOVES, but useful later), direction, link type (free-flow approach, free-flow departure, queue).

Number of MOVES Runs

The number of MOVES runs needed to appropriately represent this project was determined in accordance with EPA's CO Project-level Guidance. For screening projects of roadway intersections, only one MOVES run is needed per analysis year. For all other screening analyses, the number of runs was selected to capture the variability in emission rates and activity over the day and year, by appropriately representing the variation in temperatures, fleet mix, and activity by seasons as well as the changes in fleet mix and activity by time of day, through application of best professional practice.

Basic Run Specification Inputs

The following selections were made within the MOVES model:

Scale: Project-level

Calculation Type: "Emission Rates" was selected to obtain emissions per vehicle for each link to correspond with the grams per vehicle mile input needed since CAL3QHC is being used for the screening analysis dispersion modeling.

Time Span: The hour, month, year, and weekday were selected to represent the analysis year (20XX), the month and hour of each scenario, and weekday. Table 7 summarizes the selections.

Table 7. MOVES Selections for Time Spans by Scenario

Scenario	Season/Time Period	Modeled Month	Representing Months	Modeled Start Hour- End Hour	Representing Hours
1	Winter AM peak	Jan	Jan	07:00–08:00	7 am – 8 am

Geographic Bounds: Sample County in Sample State was selected since the project in located in that county.

[26] See EPA's CO Project-Level guidance for more information on how intersections should be modeled for screening analyses: http://www.epa.gov/otaq/stateresources/transconf/policy/420b10041.pdf

Vehicles/Equipment: All possible combinations of gasoline and diesel fueled vehicles (and CNG buses, if applicable) were selected since all vehicle types are present in the project area.

Road Type: The following road types were selected:

- Urban Restricted Access, representing Links a and b;
- Urban Unrestricted Access, representing Links c and d; and
- Off-Network, representing parking area e, to account for starts and idling.

Pollutants and Processes: Since this project is in a CO nonattainment (maintenance) area, Carbon Monoxide was selected. Since this project includes roadway/intersection links, the following emission processes were selected: Running Exhaust, and Crankcase Running Exhaust. Since this project includes an off-network link, the following emission processes were selected: Start Exhaust, Extended Idle Exhaust, Crankcase Start Exhaust, and Crankcase Extended Idle Exhaust.

General Output: The output database was named ProjectXX_out. Mass Units was set to Grams; Energy Units was set to Joules; and Distance Units was set to Miles. Distance Traveled and Population activity types were selected. (Other activity options may also be selected, if desired, to aid in evaluating the results.)

Output Emission Detail: No selections were made from this tab, since MOVES is being run in the "Emission Rates" mode and CAL3QHC requires a single summary emission rate for each link. The Emission Process box is automatically selected in this case by MOVES.

Project Data Manager

Additional data inputs were provided to MOVES through the use of the Project Data Manager. This includes information on the links, age distribution, fuel parameters, meteorology, and inspection and maintenance (I/M) programs. The actual inputs used are shown in Appendix X. All of these inputs were discussed and agreed to as the latest planning assumptions on [insert date] through the specified interagency consultation process.

Meteorological Inputs

Hourly temperature and humidity data represent the worst case meteorology expected for this project. These data are consistent with and are from the same surface air meteorological station as those used in the regional emissions modeling as well as the air quality modeling inputs used in the hot-spot dispersion modeling.

Age Distribution

The age distribution modeled was also obtained from the latest regional emissions modeling. Include the date of the registration data used (e.g., developed by DMV in 2012 utilizing registration data extracted as of July 1, 2010.) If the project includes a captive fleet, such as for a bus terminal, then the age distribution may be different that that used in regional modeling.

Fuel Parameters

The MOVES default fuel parameters for Sample County for the selected months in year 20XX were determined to be appropriate and consistent with modeling performed for regional modeling in the area.

Any changes to the MOVES default fuel formulations to reflect local conditions or control programs, such as Reid vapor pressure (RVP) or ethanol content should be documented here. Additionally, if the area updates vehicle fuel mix fractions (e.g., diesel vs. gas sales fractions or CNG fractions for buses) through the MOVES Alternative Vehicle Fuels & Technologies (AVFT) panel, this should be noted here.

I/M Programs

The I/M program inputs from the latest regional emission modeling were used (insert reference or footnote).

Link-Level Inputs

Lay out link data, or reference to appendix table if lengthy, detailing link ID, length, volume, average speed, and grade. Provide source of traffic information used to derive link volumes.

Fuel Type and Technologies Input[27]

If the project involves vehicle mixes by fuel type for individual source types that are known or expected to differ from the MOVES defaults, this input should be used to reflect the appropriate mix of fuel types. This would occur particularly for projects with higher than normal diesel traffic or bus projects where it is known that there are no CNG-fueled buses.

A Fuel Types and Technologies input was developed for this project to modify the MOVES default fuel fractions for the vehicles in the project area. Indeed, based on national data, MOVES assumes that transit buses use a mix of gasoline, diesel, and CNG. In this case, the fleet was changed to 100 percent of transit buses running on diesel.

Off-Network Activity

For facilities, the number of vehicles, start fraction, soak time distribution, and extended idle fraction, must be included in the MOVES run to capture off-network activity.

5.3.3.3 Emissions from On-Road Mobile Sources for CO Refined Analyses

Emissions Model

EPA's Motor Vehicle Emission Simulator (MOVES2010 [insert actual version of model used]) model, and the corresponding default MOVES database [insert default database name] dated [date] was used to calculate hourly emissions/emission rates (select appropriate choice depending upon needs of dispersion model used). This model was run for the analysis year(s), scenario(s), and pollutant(s) selected as described above. The specific MOVES inputs are described below and fully documented in Appendix A.

Project Links

Figures x to y are maps of the project area. Figure x is an overall map that shows the entire project area. The project was broken down into road segments and off-network locations where a similar

[27] Note that in versions of MOVES prior to MOVES2010b, these same data were accesses through the Alternative Vehicle Fuels and Technologies (AVFT) panel

type of vehicle activity occurs, to be modeled as individual links in MOVES. For projects including roadways and/or intersections: Roadway or running links were identified as segments within the project designed to capture changes in speeds, volumes, fleet mix, and purpose. For projects with parking lots or terminals: Each off-network link was identified to capture an area of the project with a similar number of vehicle starts per hour, similar fleet mix, and similar idling activity. Figure y is a schematic that shows the road links and off-network links to be included in the modeling. Table x lists key data for each link, including traffic volume associated with each link, length of each link, starts per hour, and idling time. Note the source of the speed and volume data. Reference any traffic simulation models that may have been used. If count data are used, they should also be referenced.

Include a map of project area, with links to be modeled indicated on map; length of each link, number of lanes (not relevant to MOVES, but useful later), direction, link type (queue, cruise, acceleration).

Number of MOVES Runs

The number of MOVES runs needed to appropriately represent this project was determined in accordance with EPA's CO Project-level Guidance. For refined analyses, the number of runs was selected to capture the variability in emission rates and activity over the day and year, by appropriately representing the variation in temperatures, fleet mix, and activity by seasons as well as the changes in fleet mix and activity by time of day, through application of best professional practice.

Basic Run Specification Inputs

The following selections were made within the MOVES model:

Scale: Project-level

Calculation Type: "Inventory" was selected to obtain total emissions for each link to correspond with the grams per hour input needed since AERMOD is being used for the dispersion modeling. **OR** "Emission Rates" was selected to obtain emissions per vehicle for each link to correspond with the grams per vehicle mile input needed since CAL3QHCR is being used for the dispersion modeling.

Time Span: The hour, month, year, and weekday were selected to represent the analysis year (20XX), the month and hour of each scenario, and weekday. Table 8 summarizes the selections.

Table 8. MOVES Selections for Time Spans by Scenario

Scenario	Season/Time Period	Modeled Month	Representing Months	Modeled Start Hour-End Hour	Representing Hours
1	Winter AM peak	Jan	Jan, Feb, Mar	07:00–08:00	6 am – 9 am
2	Winter Midday	Jan	Jan, Feb, Mar	12:00–13:00	9 am – 4 pm
3	Winter PM peak	Jan	Jan, Feb, Mar	17:00–18:00	4 pm – 7 pm
4	Winter Overnight	Jan	Jan, Feb, Mar	00:00-01:00	7 pm – 6 am
5	Spring AM peak	Apr	Apr, May, Jun	07:00–08:00	6 am – 9 am
6	Spring Midday	Apr	Apr, May, Jun	12:00–13:00	9 am – 4 pm
7	Spring PM	Apr	Apr, May, Jun	17:00–	4 pm – 7 pm

	peak			18:00	
8	Spring Overnight	Apr	Apr, May, Jun	00:00-01:00	7 pm – 6 am
9	Summer AM peak	Jul	Jul, Aug, Sep	07:00–08:00	6 am – 9 am
10	Summer Midday	Jul	Jul, Aug, Sep	12:00–13:00	9 am – 4 pm
11	Summer PM peak	Jul	Jul, Aug, Sep	17:00–18:00	4 pm – 7 pm
12	Summer Overnight	Jul	Jul, Aug, Sep	00:00-01:00	7 pm – 6 am
13	Fall AM peak	Oct	Oct, Nov, Dec	07:00–08:00	6 am – 9 am
14	Fall Midday	Oct	Oct, Nov, Dec	12:00–13:00	9 am – 4 pm
15	Fall PM peak	Oct	Oct, Nov, Dec	17:00–18:00	4 pm – 7 pm
16	Fall Overnight	Oct	Oct, Nov, Dec	00:00-01:00	7 pm – 6 am

Geographic Bounds: Sample County in Sample State was selected since the project in located in that county.

Vehicles/Equipment: All possible combinations of gasoline and diesel fueled vehicles were selected since all vehicle types are present in the project area.

Road Type: The following road types were selected:

- Urban Restricted Access, representing Links a and b;
- Urban Unrestricted Access, representing Links c and d; and
- Off-Network, representing parking area e, to account for starts and idling.

Pollutants and Processes: Since this project is in a CO nonattainment (maintenance) area, Carbon Monoxide was selected.

Since this project includes roadway/intersection links, the following emission processes were selected: Running Exhaust, and Crankcase Running Exhaust. Since this project includes an off-network link, the following emission processes were selected: Start Exhaust, Extended Idle Exhaust, Crankcase Start Exhaust, and Crankcase Extended Idle Exhaust.

General Output: The output database was named ProjectXX_out. Mass Units was set to Grams; Energy Units was set to Joules; and Distance Units was set to Miles. Distance Traveled and Population activity types were selected. (Other activity options may also be selected, if desired, to aid in evaluating the results.)

Output Emission Detail: Emission Process was selected from the "for All Vehicle/Equipment Categories" menu and Source Use Type was selected from the On Road menu. (Additional selections may be made, but will increase the database size.)

<u>Project Data Manager</u>

Additional data inputs were provided to MOVES through the use of the Project Data Manager. This includes information on the links, age distribution, fuel parameters, meteorology, and inspection and maintenance (I/M) programs. The actual inputs used are shown in Appendix X. All of these inputs were discussed and agreed to as the latest planning assumptions on [insert date] through the specified interagency consultation process.

Meteorological Inputs

Hourly temperature and humidity data represent the average temperature for each time period and set of months modeled. These temperatures are consistent with and are from the same surface air meteorological station as those used in the regional emissions modeling as well as the air quality modeling inputs used in the hot-spot dispersion modeling.

Age Distribution

The age distribution modeled was also obtained from the latest regional emissions modeling. If the project includes a captive fleet, such as for a bus terminal, then the age distribution may be different that that used in regional modeling.

Fuel Parameters

The MOVES default fuel parameters for Sample County for the selected months in year 20XX were determined through to be appropriate and consistent with modeling performed for regional modeling in the area.

Any changes to the MOVES default fuel formulations to reflect local conditions or control programs, such as Reid vapor pressure (RVP) or ethanol content should be documented here. Additionally, if the area updates vehicle fuel mix fractions (e.g., diesel vs. gas sales fractions or CNG fractions for buses) through the MOVES Alternative Vehicle Fuels & Technologies (AVFT) panel, this should be noted here.

I/M Programs

The I/M program inputs from the latest regional emission modeling were used.

Link-Level Inputs

Lay out link data, or reference to appendix table if lengthy, detailing link ID, length, volume, average speed, and grade. If operating mode distribution or link drive schedule used, provide discussion of data source and derivation of this information. Provide source of traffic information used to derive link volumes.

Off-Network Activity

For facilities, the number of vehicles, start fraction, soak time distribution, and extended idle fraction must be included in the MOVES run to capture off-network activity.

5.3.3.4 Emissions from Construction and Additional Sources

Construction

NOTE: This section should only be included if construction effects are determined above to be needed in the analysis.

{Describe construction phase of project, timeline for construction, phases of construction (where applicable), construction period. Discussion of whether construction effects are required to be considered in the hot-spot analysis and sources of emissions from construction. EPA's NONROAD model may be used if CO emissions from construction equipment need to be quantified.}

For NEPA, qualitative assessment of temporary construction air quality effects recommended (even when quantitative analysis is not required for conformity).

Construction from this project is expected to take less than five years and would cause only temporary increases in emissions. Therefore, construction emissions are not included in this hot-spot analysis.

OR

Construction activities at this project site are expected to last for more than five years. Therefore, emissions from the construction activities are included in this analysis, as required by 40 CFR 93.123(c)(5). [Provide details of emissions in this case.]

Additional Sources

Include only when locomotive emissions or other additional sources are needed. Generally not relevant for most CO hot-spot analyses.

5.3.4 CO Dispersion Modeling-Screening Analyses for Roadway Intersections

5.3.4.1 Dispersion Model

The CAL3QHC dispersion model (Version 2.0) was selected for the CO screening analysis in accordance with Section 5.2.3 of Appendix W to 40 CFR Part 5. The interagency consultation process approved the selection of CAL3QHC for this project (See Appendix XX). One model run was conducted using worst-case emissions, traffic and meteorology assumptions. AERMOD should not be used for screening analyses.

5.3.4.2 Source Characterization

The CAL3QHC model characterizes roadway links as line sources. Key inputs in characterizing sources for CAL3QHC are summarized below.

- The free flow and queue links defined for modeling with MOVES were spatially defined for input into CAL3QHC. Figure xx provides a map of the modeled links. Guidance: Ensure link length is always greater than link width.
- The link width for free flow links was 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 (CAL3QHC Users Guide 3.2.1). For queue links, link width was defined as the total width of the travel lanes only (CAL3QHC Users Guide 3.2.2).
- Source height was specified as 0.0 meters (1992 Guideline 4.7.4).
- The MOVES2010 emissions factors (Section 5.3.3) and traffic volumes/speeds (Section 5.3.2) developed for the project were used in CAL3QHC.

- The CAL3QHC queuing algorithm was used to determine intersection idle queues as recommended by EPA for screening level analyses.[28] Information on the average signal timing for each intersection, average red time for each approach, clearance lost time saturation flow rate, signal timing type and arrival rate were estimated based on the traffic study for the project. Complete documentation of these inputs for each intersection or approach is provided in Appendix xx. Guidance: The queuing algorithm is to be used for screening analyses only. Refined analyses must characterize idling emissions in the development of emissions factors with MOVES2010. Saturation flow rate, signal timing type and arrival rate are optional inputs. Refer to Section 4.2 of the 1992 Guideline for more information

5.3.4.3 Meteorological Data

The CO screening analysis used worst-case meteorological conditions consistent with the 1992 Guideline. Table 9 summarizes the meteorological inputs used for this project.

Table 9. Worst-Case Meteorological Assumptions for CO Screening Analysis

Meteorological Parameter	Input Used	Guidance Citation/Notes
Wind Speed	1.0 m/s	1992 Guideline 4.7.1
Wind Direction	Every 10 degrees from 0 to 350 (36 total directions)	1992 Guideline 4.7.1
Atmospheric Stability Class	D (for urban area) Or E (for rural area)	1992 Guideline 4.7.1. In areas with both rural and urban land use, the 1992 Guideline recommends basing this input on the land use classification of the majority of the area using the Auer technique.[29] In suburban areas on the edge of urban development, it is very important to obtain interagency concurrence on the atmospheric stability class used.
Mixing Height	1,000 m	1992 Guideline 4.7.1
Settling velocity	0 cm/s	To reflect negligible gravitational effects
Deposition velocity	0 cm/s	To reflect negligible deposition effects

5.3.4.4 Surface Characteristics

Surface roughness is a required input to CAL3QHC that accounts for the effect of different terrain types on mechanical turbulence and dispersion. Based on the predominately [land cover type] land cover in the project area, a surface roughness length of [length in cm] was selected based on the 1992 Guideline (Table 4-1).

[28] See U.S. EPA. 1992. "Guideline for Modeling Carbon Monoxide from Roadway Intersections." and U.S. EPA. 2010. "Using MOVES in Project-Level Carbon Monoxide Analyses," EPA-420-B-10-041, December 2010.

[29] Auer, A. 1978. "Correlation of Land Use and Cover with Meteorological Anomalies." Journal of Applied Meteorology 17: 636-643.

5.3.4.5 Receptors

As discussed in Section xx, the CO screening analysis was limited to specific intersections as required under the transportation conformity rule (40 CFR 93.123). At each of the analyzed intersections, receptors were located in publicly accessible areas where the highest CO concentrations would be expected. Receptors were not placed within 3 meters of roadways because CAL3QHC cannot make valid concentration estimates at distances closer than 3 meters. Receptor placement followed the 1992 Guideline and receptors were located on both sides of the approach roadways. Receptors were located at the edges of intersections and at mid-block as recommended in the 1992 Guideline. Receptors were also placed at 25 meters and 50 meters from the intersection along each approach. Mapping of the receptor locations for each intersection provided in Figures xx through xx.

A receptor height of 1.8 meters was used to reflect breathing height for ground-level receptors.

5.3.5 Determination of Background Concentrations

Background concentrations are needed in combination with the modeling results to determine the total predicted pollutant concentrations for comparison to the NAAQS. Based on a consideration of several monitors in the area, the [name/location of monitor] was selected as representative of the project area because it has similar land use and is upwind of the project area (See Table 11). The interagency consultation process approved the selected monitoring site. See Section 8.3.1 of the 2010 PM Guidance. Do not use monitoring data for which EPA has granted data exclusion under the Exceptional Events rule (see 40 CFR 50.14).

Describe any interpolation methods used if multiple monitoring sites are used.

Table 11. Air Quality Monitoring Sites Considered

Name/Location	Monitor ID Number	Monitor Height above Ground Level	Distance from Project Area (miles)	Predominant Land Use	Topography	Upwind or Downwind from project area	Latest Three Year Period with Available Data
Selected Monitor			15	Commercial	Flat	Upwind	2008-2010
Other Station 1							
Other Station 2							

{Discuss process used to select representative air quality monitor(s) to establish background concentrations. Summarize the monitors selected (location, distance from project, upwind/downwind, id, land use etc. in a table).

5.3.6 CO Dispersion Modeling-Refined Analyses

The template below assumes CAL3QHCR is the model selected, although AERMOD could also be used and would be preferred if there were other non-line sources affected by the project.

5.3.6.1 Dispersion Model

The CAL3QHCR dispersion model was selected for the refined CO analysis in accordance with Section 5.2.3 of Appendix W to 40 CFR Part 5. The interagency consultation process approved the selection of CAL3QHCR for this project (See Appendix XX). A total of 20 model runs were used to reflect quarterly variations in emissions and meteorology over five years of meteorological data.

5.3.6.2 Source Characterization

The CAL3QHCR model characterizes roadway links as line sources. Key inputs in characterizing sources for CAL3QHCR are summarized below.

- The free flow and queue links defined for modeling with MOVES were spatially defined for input into CAL3QHCR. Figure xx provides a map of the modeled links. Ensure link length is always greater than link width.

- 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 (2010 PM Guidance J.3.1).

- Source height was specified for each link based on the elevation of the roadway relative to ground level. Ensure that the height of the roadway relative to the surrounding ground does not exceed +/- 10 meters (an alternative model or approach should be considered through interagency consultation for projects with elevated or depressed sections outside this range).

- The MOVES2010 emissions factors (Section xx) and traffic volumes/speeds (Section xx) developed for the project were used in a Tier II analysis in CAL3QHCR.
- The CAL3QHCR queuing algorithm was not used.[30] Instead, idling emissions were accounted for in the development of emissions factors with MOVES2010.

5.3.6.3 Meteorological Data

Representative meteorological data stations were identified and the data available for the most recent five consecutive years at each station was obtained. The identification of representative surface meteorological stations considered the distance from the project area, prevailing wind patterns, land use/land cover and other features such as large bodies of water that could affect the representativeness of meteorological data. Upper air data varies less on a regional basis, therefore the upper air station closest to the project area was selected (insert station name and ID number). The surface meteorological data stations considered and the final stations selected are summarized in Table 10. The interagency coordinating group concurred with the selected surface and upper air meteorological stations selected.

[30] See U.S. EPA. 1992. "Guideline for Modeling Carbon Monoxide from Roadway Intersections." and U.S. EPA. 2010. "Using MOVES in Project-Level Carbon Monoxide Analyses," EPA-420-B-10-041, December 2010.

Table 10 Surface Meteorological Stations Considered

Name/Location	Station ID Number	Distance from Project Area (miles)	Predominant Land Use	Topography	Latest Five Year Period with Available Data
Selected Station		15	Urban (airport)	Flat	2006-2010
Other Station 1					
Other Station 2					

A quality assurance/quality control protocol was implemented prior to the use of meteorological data. Describe the specific QA/QC procedures used and any adjustments made to account for missing data. Quarterly surface and upper air meteorological data input files were developed for each of the five years of data using the Meteorological Processor for Regulatory Models.[31]

5.3.6.4 Surface Characteristics

Surface roughness is a required input to CAL3QHCR that accounts for the effect of different terrain types on mechanical turbulence and dispersion. Based on the predominately [land cover type] land cover in the project area, a surface roughness length of [length in cm] was selected based on the 1992 Guideline (Table 4-1).

5.3.6.5 Urban vs. Rural Dispersion

CAL3QHCR accounts for urban dispersion effects (e.g. the urban heat island effect) and there is required input to designate the project area as urban or rural. The [urban or rural] option was selected for this project based on the land use classification technique described in Appendix W, Section 7.2.3. Information on the land use classification analysis is provided in Appendix xx.

5.3.6.6 Receptors

As discussed in Section xx, the CO analysis was limited to specific intersections as required under the transportation conformity rule (40 CFR 93.123). At each of the analyzed intersections, receptors were located in publicly accessible areas where high CO concentrations would be expected. Receptors were placed in accordance with Appendix W (Section 7.2.2) and 2010 PM Guidance.[32] Receptors were placed no closer than 5 meters from roadways. Receptors were placed with 10 meter spacing within 50 meters of the edge of the source and with 20 meter spacing between 50 and 100 meters of the edge of the source. Mapping of the receptor locations for each intersection provided in Figures xx through xx.

A receptor height of 1.8 meters was used to reflect breathing height for ground-level receptors.

[31] Meteorological guidance documents, including procedures for addressing missing data and for quality assuring meteorological measurements are available through EPA's Support Center for Regulatory Atmospheric Modeling (SCRAM) website: http://www.epa.gov/ttn/scram/metguidance.htm

[32] The 2010 PM Guidance is relevant because many of the receptor placement issues discussed in it are applicable to CO and the 1992 Guideline did not address requirements for refined analysis .

5.3.7 Determination of Background Concentrations

Background concentrations are needed in combination with the modeling results to determine the total predicted pollutant concentrations for comparison to the NAAQS. Based on a consideration of several monitors in the area, the [name/location of monitor] was selected as representative of the project area because it has similar land use and is upwind of the project area (See Table 11). The interagency consultation process approved the selected monitoring site. See Section 8.3.1 of the 2010 PM Guidance. Do not use monitoring data for which EPA has granted data exclusion under the Exceptional Events rule (see 40 CFR 50.14).

Describe any interpolation methods used if multiple monitoring sites are used.

Table 11. Air Quality Monitoring Sites Considered

Name/Location	Monitor ID Number	Monitor Height above Ground Level	Distance from Project Area (miles)	Predominant Land Use	Topography	Upwind or Downwind from project area	Latest Three Year Period with Available Data
Selected Monitor			15	Commercial	Flat	Upwind	2008-2010
Other Station 1							
Other Station 2							

{Discuss process used to select representative air quality monitor(s) to establish background concentrations. Summarize the monitors selected (location, distance from project, upwind/downwind, id, land use etc. in a table).

5.3.8 Modeling Results and Calculation of Design Values for CO

The calculation of design values is the process by which the modeled concentrations due to the project and background concentrations from monitoring data are combined in manner that is compatible with the statistical form of the NAAQS. The form of the CO NAAQS is “not to be exceeded more than once per year.” This section should present the CO incremental concentrations expected to result from the project and the corresponding CO design values. Present summary tables of the results. Discuss results in relation to NAAQS and also discuss any increase in the number of expected violations. If some receptors have failing design values, the representativeness of the receptor placement should be discussed. Supporting figures and discussion will be necessary for any receptors determined to be not comparable to the NAAQS. This might include a contour plot of the results.

This section could also discuss the calculation of 8-hr CO concentrations from the modeled 1-hr concentrations using persistence factors as outlined in the 1992 CO Guideline.

5.4 MSAT Analyses

FHWA’s guidance on MSAT’s should be consulted. The guidance contains appendices with boilerplate language that can be tailored to the needs of specific projects.
http://www.fhwa.dot.gov/environment/air_quality/air_toxics/policy_and_guidance/100109guidmem.cfm

5.4.1 Level of Analysis Determination

Based on the traffic information presented in Section 2, this subsection should state whether the project is: 1) a project with no meaningful potential MSAT effects, 2) a project with low potential MSAT effects, or 3) a project with higher potential MSAT effects.

5.4.2 Alternatives Analyzed

The differences in traffic volumes and speeds and any other affected parameters among the alternatives to be analyzed should be discussed here.

5.4.3 Qualitative (or Quantitative) MSAT Analyses

Discuss the MSAT analysis performed. Utilized language from the FHWA guidance referenced above.

5.5 Indirect Effects and Cumulative Impacts

5.5.1 Indirect Effects

Indirect effects are defined by the Council on Environmental Quality (CEQ) as "effects which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water or other natural systems, including ecosystems" (40 CFR 1508.8(b)). For transportation projects, induced growth is attributed to changes in accessibility caused by the project that influences the location and/or magnitude of future development.[33]

The contents of this section will vary greatly depending on the specifics of the project. The key point is to ensure that the discussion of indirect effects in this section is consistent with the indirect effects conclusions in the main NEPA documentation for the project. For projects where the indirect effects assessment concludes that the project is not likely to affect growth patterns, this section would simply cross reference that conclusion and no analysis to address indirect air quality impacts would be needed. For projects where land use changes are predicted to result from the project, the air quality impacts of these changes may need to be incorporated in the modeling (especially if quantitative methods are used to define the incremental change in households and employment due to the project). One way to accomplish this integration is to use the induced growth assessment results as input in the travel demand model (by altering the households and employment by traffic analysis zone for the Build condition). The travel demand model volumes incorporating the induced growth are then refined for use in the traffic analyses and the traffic analyses are used for the air quality analyses.

The example text below is from a project where an integrated transportation-land use model was used (Circ-Williston Transportation Project, Vermont).

The regional-level and micro-scale air quality analyses for each of the Build Alternatives incorporate the evaluation of indirect impacts because the travel demand estimates upon which the analyses are based incorporate the land use changes estimated by Land Use Allocation Module for each of the five-year time-steps in forecast of traffic from 2000 to 2030. The effect of land use change on traffic

[33] http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_466.pdf

patterns and congestion is therefore incorporated in the findings—no exceedances of the NAAQS are anticipated, and NOx and VOC and Mobile Source Air Toxics emissions would decrease in the future under the Build Alternatives (See Chapter 8).

Changes in patterns of land use and traffic conditions under the Build Alternatives in areas beyond Chittenden County are small enough so as not to alter future baseline conditions. Vehicle use and related emissions in the five counties outside of Chittenden County are expected to remain substantially lower than vehicle use within the metropolitan county under the No Build and Build Alternatives.

5.5.2 Cumulative Impacts

Cumulative impacts are “the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.” (40 CFR 1508.7). According to the Federal Highway Administration’s (FHWA) *Interim Guidance: Questions and Answers Regarding the Consideration of Indirect and Cumulative Impacts in the NEPA Process*, cumulative impacts include the total of all impacts to a particular resource that have occurred, are occurring, and will likely occur as a result of any action or influence, including the direct and reasonably foreseeable indirect impacts of a proposed project.

No separate air quality analysis is typically needed to address cumulative impacts because these impacts are usually addressed as part of the SIP, regional conformity determinations and through the use transportation modeling assumptions at the project level that incorporate other reasonably foreseeable projects and growth in population and employment. Cumulative impacts are also addressed for air quality through the use of background concentrations and the inclusion of other sources in the modeling of the project area in certain situations.

The first example below is from the I-93 Improvements (Salem to Manchester) Supplemental EIS (New Hampshire) and is an example of a simple way of explaining how cumulative impacts were addressed for air quality.

The assessments presented in Chapter 4: Traffic and Chapter 5: Air Quality constitute complete cumulative impact analyses of those resources. The SEIS traffic analyses have been conducted to explicitly account for the indirect land use effects of the 2005 Selected Alternative, in combination with the expected levels of population and employment growth expected in the future No Build condition. The traffic analysis methodology also accounts for the effects of other reasonably foreseeable transportation projects on traffic patterns. The traffic analysis results are used as inputs to the air quality analyses; therefore the microscale and regional air quality analysis results described in Chapter 5: Air Quality are the cumulative mobile source emissions results from the 2005 Selected Alternative and actions by others.

The example below from Virginia provides an explanation of how emission standards and regional conformity address cumulative impacts.

The potential for indirect effects or cumulative impacts to air quality that may be attributable to this project is not expected to be significant. From a broader national (and regional) perspective, the ongoing implementation of ever more stringent motor vehicle emission and fuel quality standards as previously referenced helps to minimize the potential for growth in emissions and associated impacts even with long-term growth in economic activity and associated traffic. Related trends in ambient air quality data as presented earlier show the benefit of these controls for specific pollutants.

Additionally, for projects located in areas subject to federal conformity requirements, available analyses indicate compliance with all applicable conformity and state implementation plan (SIP) requirements. Detailed federally-required regional transportation conformity analyses are conducted to document compliance or conformity of long-range transportation plans and programs with the applicable air quality SIP revision. Land use changes are considered as appropriate in the development of and modeling for the regional long-range transportation plan.

In the conformity analysis process, motor vehicle emissions for the entire on-road regional transportation systems must be shown to not exceed the budgets or caps for emissions set in the regional air quality SIP for budget years, the horizon year of the long range transportation plan, and an interim year such that modeling years are not more than ten years apart. The emission budgets are developed by the state air agency (and approved by EPA) based on detailed regional modeling that considers emissions from all sources (including industrial, institutional and other stationary, area, and nonroad mobile sources, as well as the on-road mobile source sector, i.e., the regional transportation system). The budgets are set at a level that would meet the NAAQS. Therefore, as long as the regional conformity analysis that includes the proposed project demonstrates that emission budgets or caps specified in the SIP are met for all years tested through the horizon year of the long-range transportation plan, it may be reasonably be concluded that the corresponding NAAQS would be met well into the future.

Overall, inclusion of the proposed project in the currently conforming transportation plan and program for which compliance or “conformity” with the applicable air quality plan or SIP has been or will be demonstrated through the horizon year of the regional long-range transportation plan supports a general conclusion that the potential for indirect effects or cumulative impacts attributable to the proposed project are not expected to be significant.

At the time of preparation of this report, the region in which the project is located typically conducts a conformity analysis each year for the transportation plan and program. This project would be included in a conforming plan and program prior to implementation, consistent with federal conformity requirements.

6.0 Mitigation

6.1 Short-Term Construction Impacts Mitigation

Discuss the mitigation may be needed as a result of construction impacts for this project. This includes discussion of the relevant area and whether any actions to mitigate these emissions need to be taken. Construction air quality mitigation measures should be included for all projects undergoing NEPA evaluation, regardless of whether construction emissions needed to be considered for transportation conformity purposes.

Sample text excerpted from the SR 99: Alaskan Way Viaduct Replacement Project Final EIS Air Discipline Report (July 2011) is provided below.

During construction activities, the Puget Sound Clean Air Agency (PSCAA) would regulate particulate emissions (in the form of fugitive dust). WSDOT would take reasonable precautions to prevent these emissions from becoming airborne and would have to maintain and operate the source (i.e., construction equipment) to minimize emissions.

A Memorandum of Agreement between WSDOT and PSCAA is in place to help eliminate, confine, or reduce construction-related emissions for WSDOT projects. WSDOT will develop a plan for controlling fugitive dust during construction. This fugitive dust control plan would reduce air pollutant emissions near the construction site, including residences located along Battery Street adjacent to the open grates in the Battery Street roadway. Some measures that will be included in the plan are the following:

- Cover all trucks transporting materials to reduce particulate emissions during transportation on paved public roadways.
- When feasible and where practicable, route construction trucks away from residential and business areas to minimize annoyance from dust.
- Coordinate construction activities between WSDOT and the Seattle Department of Transportation with respect to other projects in the area to reduce the cumulative effects of concurrent construction projects.

The project's traffic management plan will include detours and strategic construction planning (e.g., weekend work, parking restrictions, and signal timing enhancements) to continue moving traffic through the area and reduce backups for the traveling public to the extent possible. It will also include provisions for reducing vehicle emissions resulting from vehicle idling and traffic congestion. Construction areas, staging areas (see Appendix B, Alternatives Description and Construction Methods Discipline Report), and material transfer sites would be set up in a way that reduces standing wait times for equipment, engine idling, and the need to block vehicle movement associated with other activities on the site. These strategies would reduce fuel consumption by reducing wait times and ensuring that construction equipment operates efficiently, thereby mitigating the effects of vehicle emissions on air quality. Due to space constraints at the work site and the benefit of additional emissions reductions, ridesharing and other efforts to reduce commute trips may be encouraged for employees working on the project.

In addition to the strategies detailed above, other possible measures for reducing air pollutant emissions near construction areas include the following (Associated General Contractors of Washington 1997):

- Spray exposed soil with water or other dust palliatives to reduce emissions of PM10 and deposition of particulate matter.
- Remove particulate matter deposited on paved public roads to reduce mud and windblown dust on area roadways.
- Require appropriate emission-control devices (e.g., diesel oxygen catalyst, diesel particulate filters, and particulate traps) on large pieces of diesel powered equipment to reduce CO, nitrogen oxide, and particulate emissions in vehicle exhaust.
- Enclose conveyor systems transporting dirt from the tunnel excavation sites to the waterfront, if barges are used.
- Use electrical equipment as feasible.
- Use relatively new, well-maintained equipment to reduce CO and nitrogen oxide emissions.
- Require the use of low or ultra-low sulfur fuels in construction equipment to allow the use of effective particulate-emission control devices on diesel vehicles.

6.2 Long-Term Operational Impacts Mitigation

If the hot-spot analysis shows potential exceedances or worsening of air quality, list the actions that will be undertake to mitigate emission increases and demonstrate conformity through modeling the project incorporating the mitigation. Also include compliance with state level air quality requirements in the discussion of mitigation measures. Reference the written commitment to implement mitigation measures in an appendix. Refer to the EPA PM hot-spot guidance for a discussion of potential mitigation measures to consider. Many of these mitigation measures are also potentially applicable to CO.

7.0 Conclusions

Discuss and summarize the whether the project meets the necessary requirements and what mitigation measures (if any) are being taken.

This project has been assessed for potential air quality impacts and compliance with applicable air quality regulations and requirements. The assessment indicates that the project would meet all applicable air quality requirements of the Clean Air Act and federal and state transportation conformity regulations. As such, the project will not cause or contribute to a new violation, increase the frequency or severity of any violation, or delay timely attainment of the national ambient air quality standards as established by the US EPA. Additionally, best available information indicates that, nationwide, regional levels of air toxics are expected to decrease in the future due to fleet turnover and the continued implementation of more stringent emission and fuel quality regulations. Nevertheless, it is possible that some localized areas may show an increase in emissions and ambient levels of these pollutants due to locally increased traffic levels associated with the project.

If a hot-spot analysis was conducted for transportation conformity, this will typically satisfy NEPA for the pollutants and alternatives evaluated, and the conclusion should indicate as much if that is the case, including any consultation on this point. If no hot-spot analysis for transportation conformity was required for this project, then the conclusion should include sufficient information to establish that NEPA requirements were met by summarizing any qualitative air quality analyses undertaken for NEPA purposes.

8.0 References

All relevant regulations, guidance, models, user guides, implementation guides, and other documents relied upon in the analysis should be cited here. Some likely references and resources are listed below. This list may not be all-inclusive, and users should check for more recent updates at the time of the analysis.

40 CFR Part 51, Appendix W. "Revision to the Guideline on Air Quality Models: Adoption of a Preferred General Purpose (Flat and Complex Terrain) Dispersion Model and Other Revisions," November 9, 2005. http://www.epa.gov/ttn/scram/guidance/guide/appw_05.pdf

40 CFR Part 93, Subpart A. "Conformity to State or Federal Implementation Plans of Transportation Plans, Programs and Projects Developed, Funded or Approved Under Title 23 USC or the Federal Transit Laws," March 2010. http://www.epa.gov/otaq/stateresources/transconf/regs/420b10006.pdf

40 CFR Part 58, Appendix D. "Network Design Criteria for Ambient Air Quality Monitoring."

40 CFR Part 58, Appendix E. "Probe and Monitoring Path Siting Criteria for Ambient Air Quality Monitoring."

75 FR 9411, 2010: "Official Release of the MOVES2010 Motor Vehicle Emissions Model for Emissions Inventories in SIPs and Transportation Conformity," Notice of Availability, Volume 75, Number 40, March 2, 2010. http://www.gpo.gov/fdsys/pkg/FR-2010-03-02/html/2010-4312.htm

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Appendices

Include Appendices, as needed, for the following:

- Detailed link and traffic data;
- MOVES modeling inputs;
- Emission factor output;
- Dispersion modeling details, including inputs, results, and descriptions of receptor matrix;

- Background concentration data;
- Details of emissions calculations for any re-entrained road dust, construction emissions, or nearby sources that were included in the analysis;
- Analysis of any needed mitigation measures and associated written commitments; and
- Specifics of interagency consultation process.