Air Quality Technical Report

South Mountain Freeway

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1.0 Introduction

The Federal Highway Administration (FHWA), in cooperation with the Arizona Department of Transportation (ADOT), prepared a Draft Environmental Impact Statement (DEIS) in accordance with the National Environmental Policy Act (NEPA) for the South Mountain Transportation Freeway Project (the Project) in Maricopa County, Arizona. The DEIS was released in 2013, and the public comment period closed on July 24, 2013.

Since publication of the DEIS, new traffic projections have been developed by the Maricopa County Association of Governments (MAG), and the revised traffic projections were used in this air quality analysis.

In addition, although the qualitative PM_{10} hot-spot analysis performed for the DEIS met the regulations in 40 Code of Federal Regulations § 93.111(c), ADOT and FHWA have updated the qualitative analysis to a quantitative PM_{10} analysis to ensure that a state-of-the-art analysis is completed for the proposed action. In addition to the updated traffic projections, the quantitative mobile-source air toxics (MSAT) analysis and the carbon monoxide (CO) evaluation presented in the DEIS were updated using MOVES2010b for MSATs and CO emissions and CAL3QHCR for CO concentrations.

What is PM_{10}?

PM_{10} is particulate matter less than or equal to 10 microns in aerodynamic diameter.

This report describes the various methodologies, model inputs, and modeled results for the PM_{10} 24-hour and CO hot-spot analyses and the quantitative MSAT analysis.

1.1 Air Quality Study Area

The affected air quality environment for Maricopa County and the South Mountain project areas is described in Chapter 4 (Affected Environment, Environmental Consequences, and Mitigation) of the DEIS and the Final Environmental Impact Statement (FEIS) and is not repeated here.

What is a travel demand model?

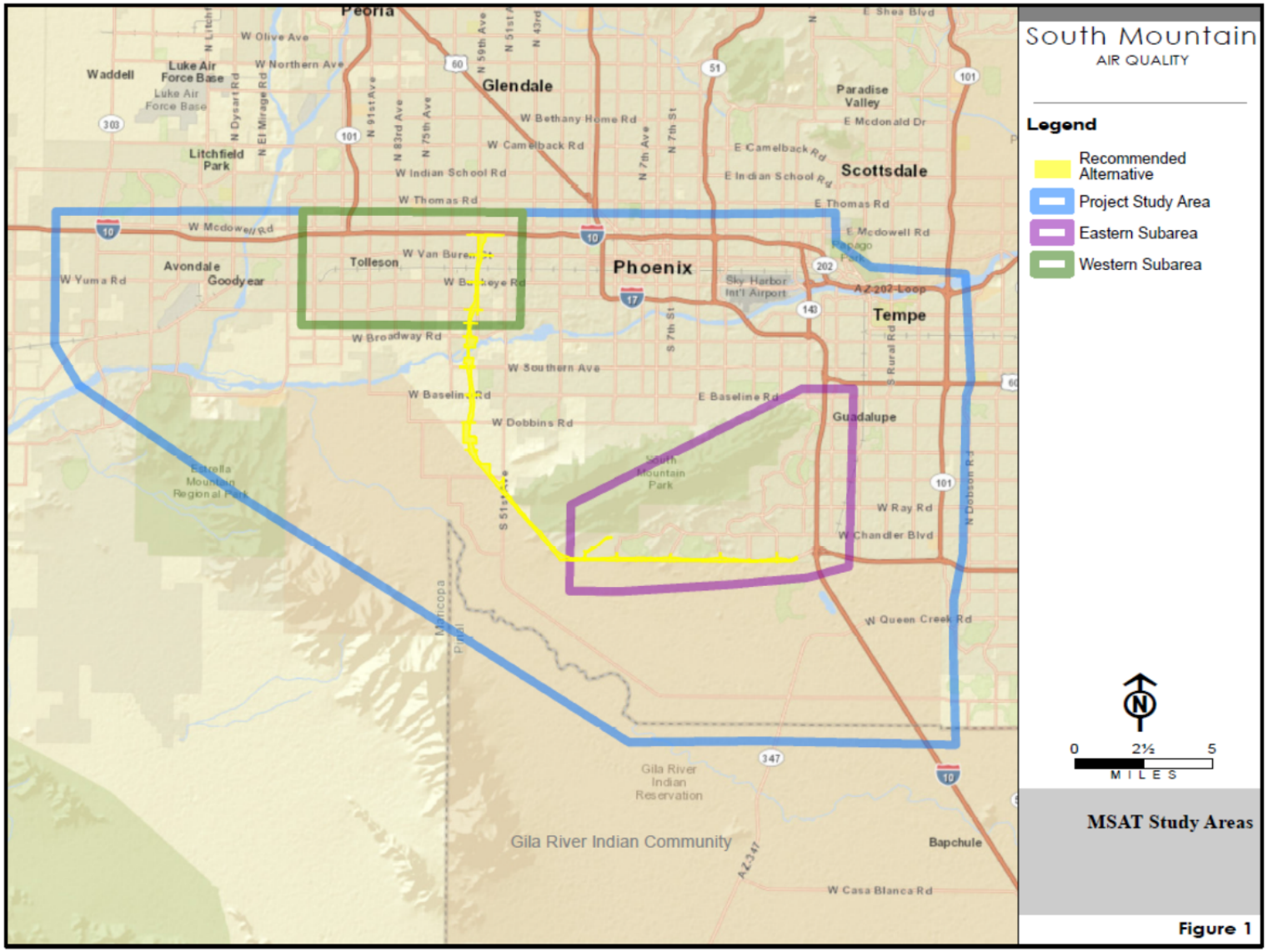
A travel demand model is a computer model that predicts the number of transportation trips (travel demand) in an area at a given time.

The air quality study area varied by the pollutant being studied. For MSATs, the air quality study area encompasses three areas, as shown in Figure 1. The project study area was the portion of the Phoenix metropolitan area where traffic volumes on the roadway network (including the Preferred Alternative) could be affected by the proposed project. This portion of the Phoenix metropolitan area was used to estimate annual MSAT emissions assuming completion of the Preferred Alternative (W59/E1), and then compared to the No-Action Alternative to show the differences between the two scenarios.

The project study area was further subdivided into the eastern and western project subareas as shown in Figure 1 to allow a more detailed review of emissions changes at the project level. The project analysis areas included arterials and interstate highways as included in MAG's travel demand model (TDM).

The project-level hot-spot analyses for CO and PM_{10} were conducted for the intersections and interchanges of the Preferred Alternative with the highest projected traffic volumes or the worst levels of service or both.

Figure 1. MSAT Study Areas



1.2 Preferred Alternative

As described in Chapter 3 (Alternatives Studied in Detail) of the FEIS, ADOT and FHWA have identified the W59 Alternative and the E1 Alternative as the Preferred Alternative in the western section and eastern section of the Study Area, respectively. The evaluations for PM_{10}, MSATs, and CO are based on the Preferred Alternative as described in the FEIS.

1.3 Methodology

The FHWA publication *Guidance for Preparing and Processing Environmental and Section 4(f) Documents* (FHWA 1987) suggests procedures for evaluating air quality impacts associated with transportation projects and provides guidance on completing regional and project-level air quality evaluations. In addition, guidance from the U.S. Environmental Protection Agency (EPA) provides details about the applicability of detailed MOVES2010b and CAL3QHCR modeling requirements for quantitative analyses that involve CO and PM_{10} (EPA 2010, 2013a).

The MOVES2010b model is the mobile-source emission factor model used in this analysis; it replaces the MOBILE6.2 model that was used for the DEIS. MOVES2010b provides great flexibility to capture the influence of time of day, vehicle speeds, and seasonal weather effects on vehicle emission rates.

Depending on the availability of project-specific inputs, MOVES2010b calculates a number of emission-related parameters such as total mass emissions, speed-related emission rates, and total energy consumption, among other outputs. From this output, emission rates (for example, grams per vehicle-mile or grams per hour) can be determined for a wide variety of spatial and time scales. MOVES2010b can also produce inventory outputs (that is, area-wide emissions) and emission rates at the project level for a specific group of roadway segments or links.

Both methods were used in this evaluation; the emission inventory mode was used for estimating MSAT emissions at the project study area and subarea level, and project-specific emission rates were used for PM_{10} and CO dispersion modeling with the latest version of the CAL3QHCR dispersion model (dated 13196 and described in Model Change Bulletin Number 8 dated July 15, 2013) (EPA 2013b).

At the project level, MOVES2010b requires site-specific input data for traffic volumes and other parameters that can change by the time of day or the season of the year. By using site-specific data, the emission results reflect the site-specific traffic characteristics in the project area in great detail.

1.4 Interagency Consultation

According to 40 CFR 93.105(c)(1)(i), interagency consultation must be used to develop a process to evaluate and choose models and associated methods and assumptions to be used in PM hot-spot analyses. Interagency consultation procedures must be used to determine the models and associated methods and assumptions for:

- The geographic area covered by the analysis;
- The emissions models used in the analysis;
- Whether and how to estimate road and construction dust emissions; and
- The nearby sources considered, background data used, and air quality model chosen, including the background monitors/concentrations selected and any interpolation methods used.

For this project, interagency consultation on quantitative hot-spot modeling began with the development of the *South Mountain Freeway DEIS PM_{10} Quantitative Hotspot Analysis Protocol* (protocol) dated November 1, 2013 (see Appendix D). After local agencies (Arizona Department of Environmental Quality [ADEQ], Maricopa County Air Quality Department [MCAQD], FHWA, ADOT, and MAG) had agreed on the models and methods listed above, the protocol was provided to the EPA on November 1, 2013. Following receipt of comments on the protocol from EPA, revisions to the modeling methods were made. These revisions then became part of the iterative interagency consultation process. With each change in modeling method, the change was first addressed with the local agencies and then with EPA until agreement on all items was reached. The local interagency consultation meetings are documented in Appendix E.

2.0 Regulatory Framework

The federal Clean Air Act of 1990 and its amendments establish National Ambient Air Quality Standards (NAAQS) for six criteria pollutants to protect the public from the health hazards associated with air pollution. The six criteria pollutants are CO, lead, nitrogen dioxide, ozone, particulate matter (PM_{10} and $PM_{2.5}$), and sulfur dioxide. The NAAQS for these criteria pollutants were established based on known human health effects and measurable, health-related threshold values. Maricopa County is a nonattainment area for PM_{10} and for the 2008 8-hour ozone standard. Maricopa County is also a maintenance area for CO.

What are nonattainment and maintenance areas?

A nonattainment area is an area that does not meet the NAAQS for a given air pollutant. A maintenance area is an area previously designated as a nonattainment area that has been redesignated to attainment status and is required to have a maintenance plan.

2.1 Transportation Conformity Requirements

All state governments are required to develop a State Implementation Plan (SIP), which explains how the State will comply with the requirements of the federal Clean Air Act of 1990, as amended. The Act requires that transportation plans, programs, and projects that are developed, funded, or approved by FHWA must demonstrate that such activities "conform" to the SIP. Transportation conformity requirements apply to any transportation-related criteria pollutants for which the project area has been designated a nonattainment or maintenance area (for the South Mountain project, these criteria pollutants are ozone, CO, and PM_{10}).

What is a State Implementation Plan (SIP)?

A SIP explains how a State will comply with the requirements of the federal Clean Air Act of 1990, as amended.

Under Section 176(c) of the Clean Air Act, a transportation project is said to "conform" to the provisions and purposes of the SIP if the project, both alone and in combination with other planned projects, does not:

- Cause or contribute to new air quality violations of the NAAQS,
- Worsen existing violations of the NAAQS, or
- Delay timely attainment of the NAAQS or required interim milestones.

As discussed in the DEIS, ozone, CO, and PM_{10} are evaluated at the regional level as part of transportation conformity through the regional emissions for the plan and Transportation Improvement Program (TIP).

The project is included in MAG's FY2014–2018 TIP and 2035 Regional Transportation Plan (RTP), which were found to conform to the ozone, CO, and PM_{10} SIPs by the U.S. Department of Transportation on February 12, 2014. The project is identified in these documents using several different project identification numbers by construction segment (47518, 43086, 43087, 11305, 15671, 19029, 17193, 6458, 1790, 6919, and 47857). The design concept and scope of the Preferred Alternative are consistent with that used in the regional emissions analysis for the RTP and TIP conformity determinations.

The transportation conformity rule establishes the criteria and procedures for determining whether projects conform to the SIP (EPA 2012).

2.2 Need for the Analysis

The transportation conformity rule describes the requirements for project-level conformity determinations, which are:

- The project is included in a conforming plan and TIP.
- The project's design concept and scope have not changed significantly since the conformity determination was made for the plan and TIP from which the project derived.
- The conformity determination includes a hot-spot analysis in:
  - CO nonattainment and maintenance areas
  - PM_{10} and $PM_{2.5}$ nonattainment and maintenance areas (only for projects of air quality concern)
- The project complies with control measures in the PM SIP.

A PM_{10} hot-spot analysis is required for projects of air quality concern in PM_{10} nonattainment and maintenance areas per 40 Code of Federal Regulations § 93.123(b)(1)(i). During interagency consultation, the South Mountain Freeway project required a PM_{10} hot-spot analysis because the project is located in a PM_{10} nonattainment area and was determined to be a project of air quality concern because the project is a new highway project with a significant number of diesel vehicles.

A hot-spot analysis for CO is required because Maricopa County is a CO maintenance area.

3.0 Particulate Matter (PM_{10})

3.1 Methodology

3.1.1 24-Hour PM_{10} Project-Level (Hot-Spot) Analysis

Project-level air quality analyses evaluate air quality impacts at discrete locations. The geographic area covered by the South Mountain Freeway project encompasses more than 156 square miles.

As discussed in EPA's transportation conformity guidance (Section 3.3.2, *Determining the geographic area and emission sources to be covered by the analysis*), for large projects it is appropriate to focus hot-spot analyses on locations that represent the locations that are likely to have the highest concentrations of PM_{10} and that are the most likely to create new or worsened violations of the PM_{10} NAAQS. According to

EPA's guidance, if transportation conformity is demonstrated at the locations expected to have the highest concentrations of PM_{10}, then it can be assumed that conformity is met for the entire project.

Based on the EPA guidance, and in consultation with ADOT, FHWA, and EPA the Interstate 10 (I-10) Interchange was selected for detailed hot-spot modeling for the purpose of demonstrating project conformity. The I-10 Interchange (W59 Alternative) is the freeway-to-freeway interchange between the proposed South Mountain Freeway and I-10 (Papago Freeway) at the north end of the project area (Figure 2). It was selected because it has the highest traffic volumes of any interchange in the project area and is expected to experience poor levels of service during peak hours (ADOT 2014a). See Appendix A for more information related to the selection of interchange locations.

Additional analyses were conducted for National Environmental Policy Act (NEPA) purposes. In response to public concerns, additional interchange locations were analyzed to provide information about projected concentrations at other representative locations along the corridor. Based on their proximity to residential developments as well as their higher traffic volumes in comparison to nearby interchanges, the Broadway Road Interchange and the 40th Street Interchange were included in the detailed hot-spot analysis (see Appendix A for more information related to the selection of interchange locations).

- **Broadway Road Interchange (W59 Alternative)** –This interchange location was selected because of its higher traffic volumes and the residential development on both sides of the alignment (Figure 3).
- **40th Street Interchange (E1 Alternative)** – This interchange was selected because of higher traffic volumes and proximity to the dense residential development on the north side of the alignment (Figure 4).

What is re-entrained road dust?

Re-entrained road dust is dust particles that are dispersed into the air by the movement of vehicles over the roadway.

Detailed hot-spot modeling at each analysis location included the freeways, ramps, and arterials around each interchange.

The air quality analysis included quantitative modeling to estimate project-specific emission rates from vehicle exhaust, brake wear, tire wear, and re-entrained road dust due to project operation. Model inputs for developing emission rates and dispersion modeling parameters were consistent with EPA's quantitative PM hot-spot analysis guidance (EPA 2013a) and consistent with inputs that MAG uses for regional emissions analyses for conformity.

PM_{10} emission rates (from vehicles and re-entrained road dust) were used in the CAL3QHCR dispersion model to generate PM_{10} concentrations at specific receptor locations at each of the three analysis locations. The PM_{10} concentrations (including a background concentration) were used to determine whether the vehicle emissions resulting from the project would cause the applicable NAAQS for PM_{10} to be exceeded. The 24-hour air quality standard for PM_{10} is 150 $\mu g/m^3$ (micrograms per cubic meter).

Analysis Approach and Years

A no-action analysis was not completed for this project. The PM_{10} design values for the Preferred Alternative were compared to the NAAQS. For PM_{10}, air pollutant concentrations are estimated by calculating a "design value" using 2035 emissions projections for vehicles and road dust that is then compared to the PM_{10} NAAQS. A hot-spot evaluation of the no-action scenario is not required to

demonstrate conformity if the build alternative with the Preferred Alternative does not predict an exceedance of the applicable NAAQS (EPA 2013a).

The conformity regulations require hot-spot analyses to address the year or years of peak emissions. Through the interagency consultation process, 2035 was selected as the analysis year when traffic volumes and vehicle-miles traveled (VMT) would be the greatest. According to the *MAG 2012 Five Percent Plan for PM-10 for the Maricopa County Nonattainment Area* (MAG 2012), the largest single source category is paved road dust, including track-out, at 20 percent. By contrast, on-road mobile vehicle exhaust, tire wear, and brake wear contribute 6 percent. The relative contribution of these emissions is expected to represent about the same contribution in the future; therefore, the highest projected VMT and highest PM_{10} emissions would occur in the design year of 2035.

What is track-out?

Track-out includes dirt and mud tracked or blown onto the road from near-by agricultural fields or unpaved roads

PM_{10} Emissions Modeled

For each analysis location, PM_{10} emission rates for running exhaust, crankcase running exhaust, brake wear, and tire wear were developed using MOVES2010b. Re-entrained road dust emission rates were estimated using EPA's *Compilation of Air Pollutant Emission Factors* (AP-42, Fifth Edition) (EPA 2011) and other input factors from the Maricopa County Air Quality Department (MCAQD 2011). Re-entrained road dust emission rates were added to vehicle emission rates prior to dispersion modeling with CAL3QHCR.

The transportation conformity rule in 40 Code of Federal Regulations § 93.123(c)(5) states that hot-spot analyses are not required to consider construction-related activities that cause temporary increases in emissions. Temporary emission increases are defined as those that occur only during the construction phase and last 5 years or less at any individual site. The project is identified in the FY2014–2018 TIP and the 2035 RTP using several different project identification numbers by construction segment (47518, 43086, 43087, 11305, 15671, 19029, 17193, 6458, 1790, 6919, and 47857). The ADOT is evaluating construction delivery methods for the proposed freeway. One concept is to deliver it as a single design-build project. This method would expedite the construction duration for the entire project to around 3 to 3.5 years. Another concept would be to deliver the project in a more traditional method breaking the 22-mile corridor into nine segments (each 1 to 3 miles long) and constructing them in phases. Each segment would be under construction for 1 to 3 years and the total construction duration for the entire corridor would be 5 to 6 years. Any particular area of the Preferred Alternative would not be expected to see construction activities beyond an approximate 2-year period; therefore, the construction effects described above would be temporary and would not require additional analysis.

Project-Specific Data

Transportation conformity requires that the latest planning assumptions be used in the analyses. In addition, the regulations require that the assumptions used in the hot-spot analyses be consistent with the assumptions used in the regional emissions analysis for any inputs that are required for both analyses (EPA 2013a).

MAG provided MOVES2010b input files for the 2012, 2025, and 2035 regional conformity analyses to the project team for use in detailed project-level modeling. The regional conformity input files that were appropriate for hot-spot modeling (for example, inspection-maintenance coverage, fuel formulations, and

vehicle-age distributions) were used in the hot-spot analyses. Project-specific data requirements such as hourly volumes, age distributions, vehicle types, and turning movements were provided by traffic engineers or were derived from the MAG travel demand model (MAG 2013).

Hourly vehicle volumes were developed for the morning (AM) peak, midday peak, evening (PM) peak, and overnight peak to represent four time periods as required for hot-spot modeling. Hourly meteorological data used for the dispersion modeling with CAL3QHCR were downloaded from EPA's Support Center for Regulatory Atmospheric Modeling for the Phoenix Sky Harbor International Airport (surface data) and the Tucson International Airport (upper air data) for the 5-year period from 1987 through 1991 (http://www.epa.gov/ttn/scram/metobsdata_databases.htm). The 5 years of surface and mixing height data were processed with PCRAMMET to develop meteorological input files compatible with CAL3QHCR and incorporated into the PM_{10} and CO model runs at the 3 analysis locations described above. The use of Phoenix Sky Harbor International Airport meteorological data is consistent with MAG's regional conformity analysis, which was approved by the USDOT on February 12, 2014, and with ADEQ's air quality permitting efforts in the region. In addition, the use of these data was agreed to during interagency consultation for the proposed project. The selected 5-year data set is representative of the project area and encompasses the wide variety of weather conditions that are likely to be experienced in the project area.

For each analysis location (I-10 Interchange, Broadway Road Interchange, and 40th Street Interchange), a detailed road-link network was developed. Network links (that is, roadway coordinates) were developed from MicroStation design files for each interchange.

Link speeds were assigned for accelerating and decelerating links, idle speeds, and cruise speeds to reflect vehicle movement on each link in the model. Link vehicle volumes and turning movements on interchange ramps and local arterials for each time period were derived from Synchro output reports (ADOT 2014b). Vehicle speeds on interchange ramps and local arterials were based on best professional judgment consistent with EPA guidance and the availability of detailed project-level design information describing vehicle activity (EPA 2013a, Section 4.5.7, page 45). Freeway volumes and speeds were derived from travel demand model data provided by MAG.

Hourly PM_{10} emission rates for each link at each analysis location were calculated using MOVES2010b for each meteorological season (winter [December through February], spring [March through May], summer [June through August], and fall [September through November]) and, within each season, for four daily peak time periods (AM, midday, PM, and overnight). The 16 combinations of season and time-of-day analyses were performed at each location for the 2035 build alternative when traffic volumes would be greatest and would generate the highest emissions. A MOVES2010b post- processing script was used to generate link-specific (and speed-specific) PM_{10} emission rates.

Emission Rates

PM_{10} emission processes in each MOVES2010b run included running exhaust, crankcase running exhaust, brake wear, and tire wear. The project would not affect traffic behavior related to other emission processes such as starting or extended idling emissions; therefore, those processes were not included in the MOVES2010b runs. Re-entrained road dust emissions were estimated using AP-42 emission factor formulas and Maricopa County input parameters (MCAQD 2011). The road dust emissions were then added to MOVES2010b emission rates and summed to produce a total PM_{10} emission rate for each link (EPA 2013a).

CAL3QHCR Air Quality Dispersion Modeling

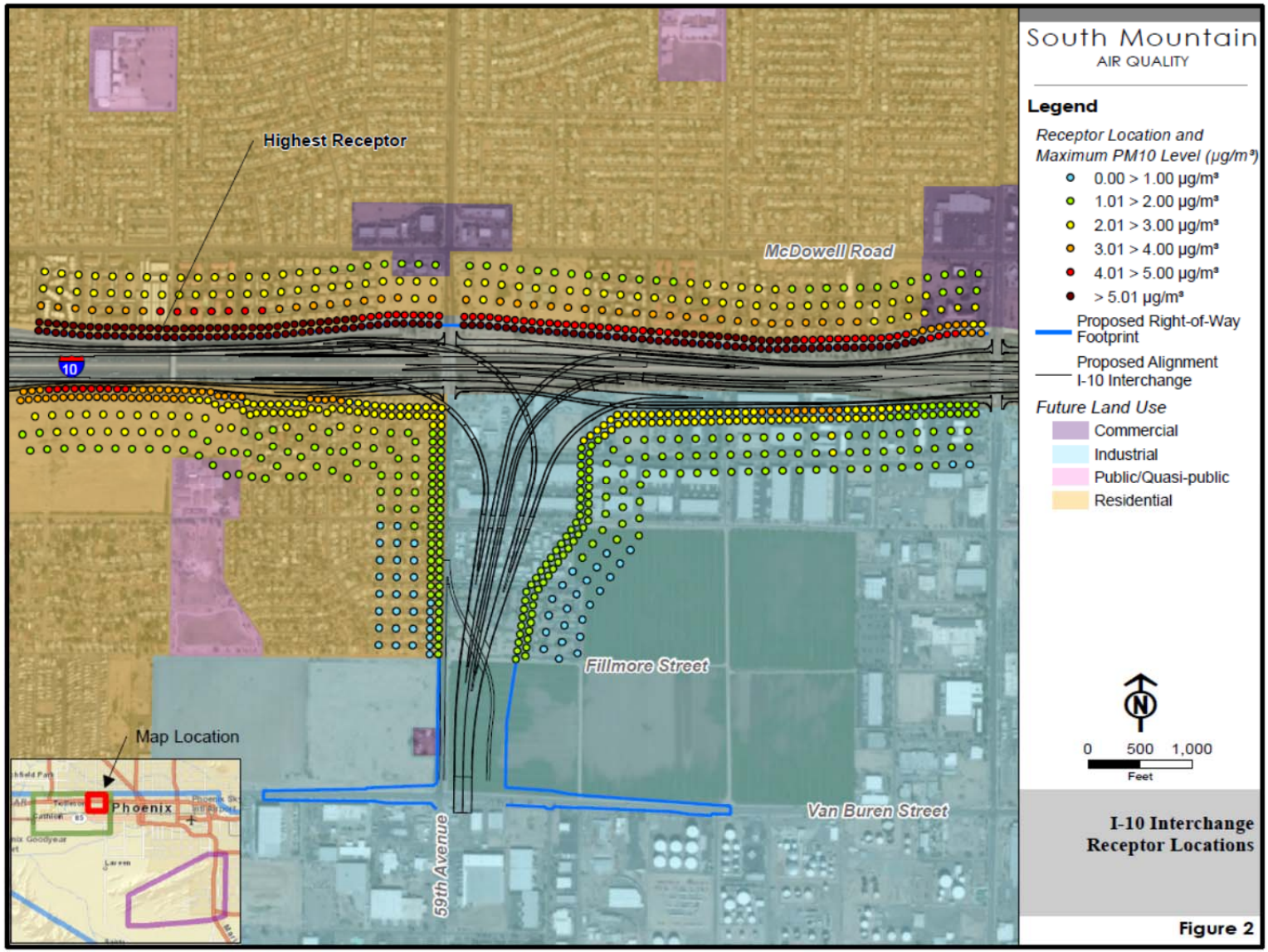
In addition to detailing requirements for MOVES2010b modeling, EPA's transportation conformity guidance also describes the procedures for conducting dispersion analyses with CAL3QHCR. A refined modeling analysis using EPA's CAL3QHCR dispersion model with MOVES2010b emission rates and AP-42 emission rates for re-entrained road dust was conducted to produce estimates of PM_{10} concentrations at discrete receptor locations near each analysis location. Inputs to the CAL3QHCR model consist of detailed information about the alternative alignments, information such as link length, roadway segment width, vehicle volume per hour, emission factors, receptor locations, and hourly meteorological data.

Receptor Locations

As stated in EPA guidance, for the purpose of a project-level conformity analysis, receptors are locations in the project area where an air quality model estimates future PM_{10} concentrations (EPA 2013a). Receptor locations were located to capture emissions that affect concentrations from traffic on the South Mountain Freeway and were extended laterally several hundred feet from each analysis location. The first row of receptors is on the proposed right-of-way line and spaced at 25 meters (82 feet) along the right-of-way line. The 2nd row is 25 meters from the first row with 25 meter spacing between receptors. Wider spacing (50 meters [164 feet]) is then used for the 3rd, 4th, and 5th row. The farthest receptor from the right-of-way line is approximately 175 meters (574 feet) (see Figure 2 through Figure 4). The number of receptors varied between the analysis locations, ranging from 325 (Broadway Road Interchange) to 916 (I-10 Interchange). Receptor locations were confirmed during interagency consultation for the proposed project.

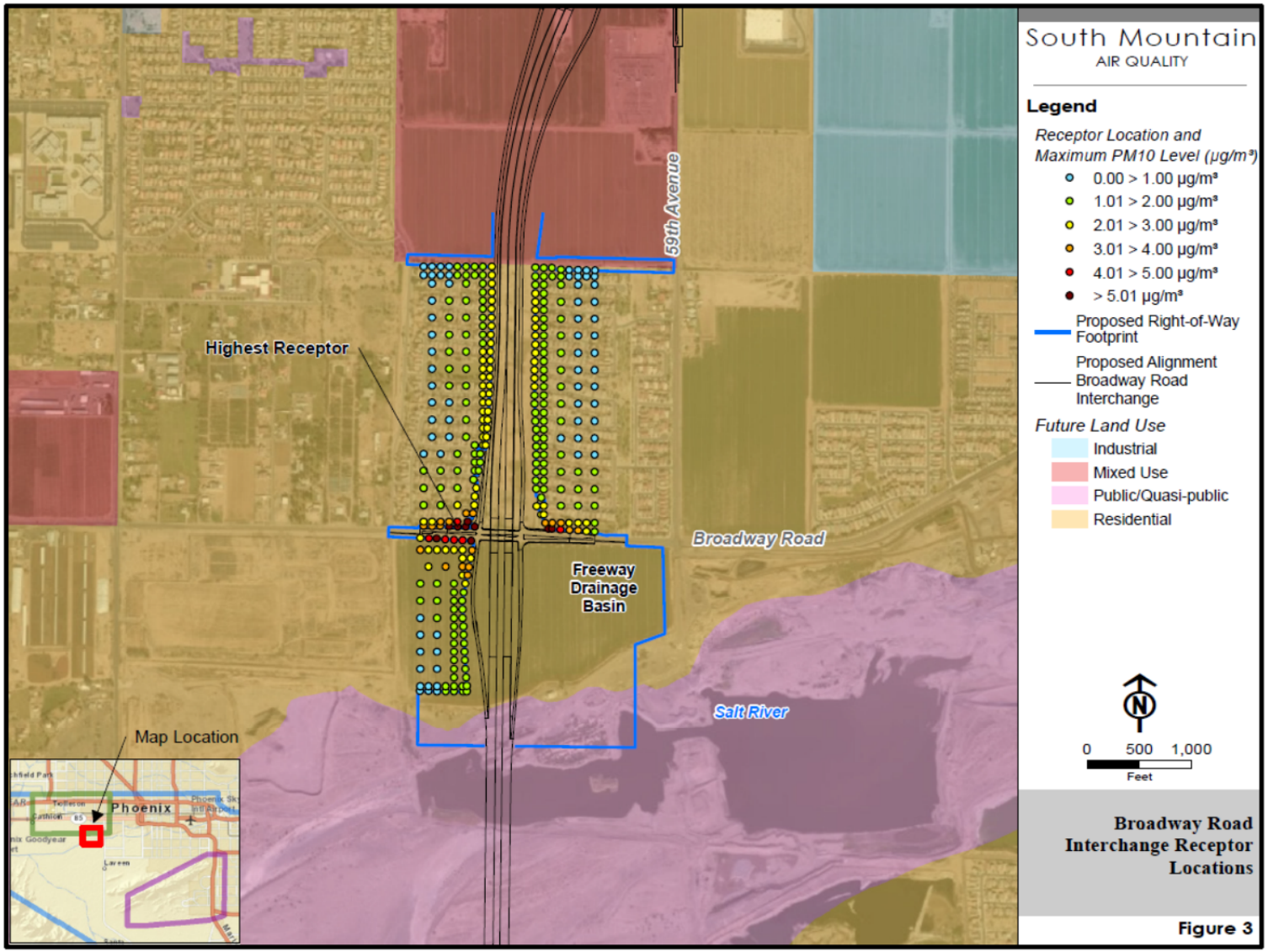
Additional receptors beyond 200 meters were not included because the results of the analysis showed that the highest concentrations are primarily located on the right-of-way line and within a column of receptors, lower concentrations are observed for receptors farther away from the right-of-way line. The color coding based on maximum concentration at the receptors in Figure 2 through Figure 4 reinforces this observation. Based on the results and through interagency consultation it was determined that additional receptors farther away from the project area would not change the analysis results, which focus only on the worst case locations.

Figure 2. I-10 Interchange Receptor Locations and Maximum PM_{10} Concentrations



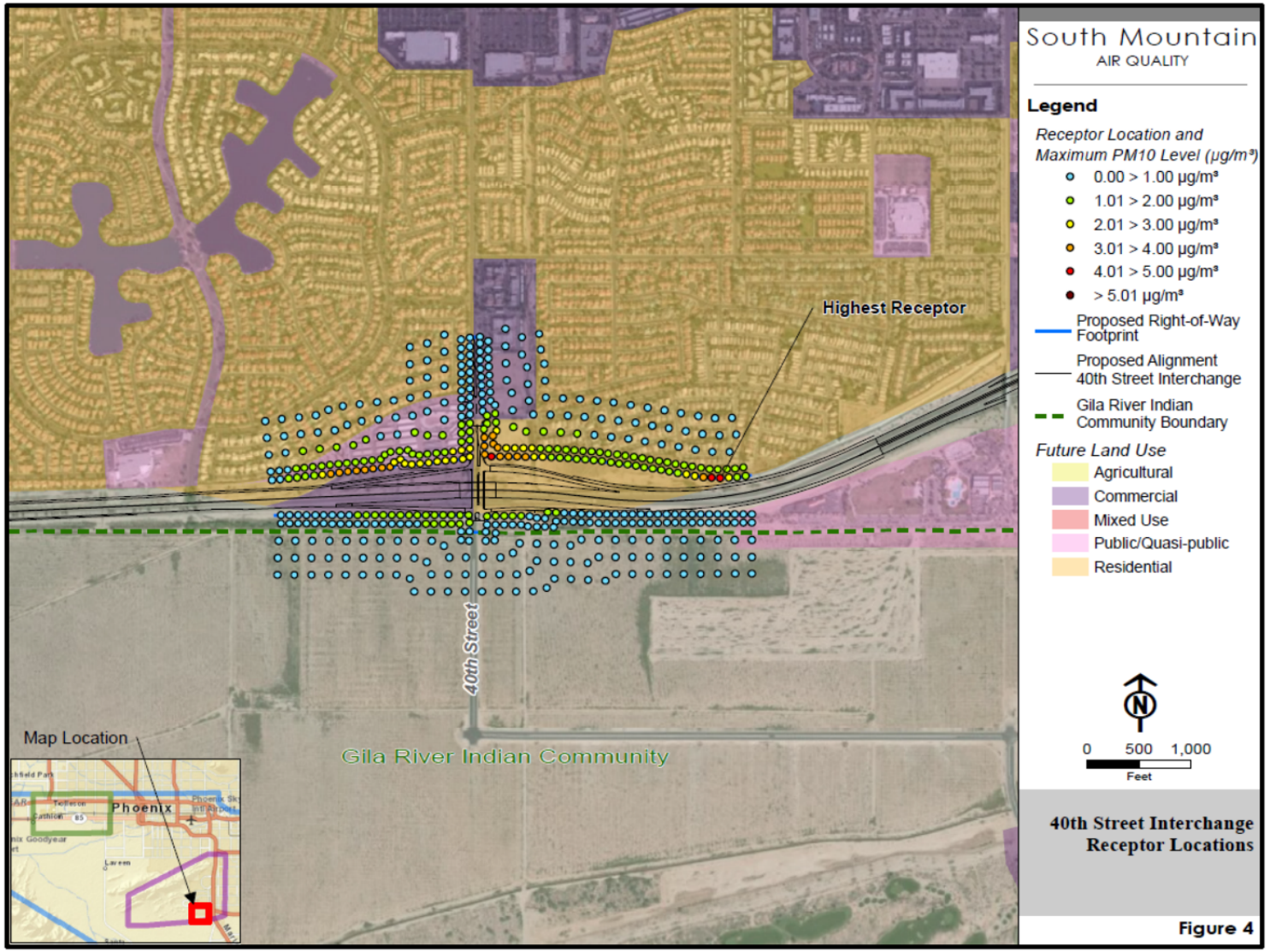
SOURCES | City of Phoenix *General Plan*; ESRI Aerial Basemap 2014; ESRI World Street Map 2014

Figure 3. Broadway Road Interchange Receptor Locations and Maximum PM_{10} Concentrations



SOURCES | City of Phoenix *General Plan*; ESRI Aerial Basemap 2014; ESRI World Street Map 2014

Figure 4. 40th Street Interchange Receptor Locations and Maximum PM_{10} Concentrations



SOURCES | City of Phoenix *General Plan*; ESRI Aerial Basemap 2014; ESRI World Street Map 2014

3.2 Background Concentrations

Background PM_{10} concentrations were calculated from a single air quality monitor in the vicinity of each analysis location. See Appendix B for additional information regarding the process used to identify the most representative monitor for each analysis location. The list below identifies the MCAQD monitor used to develop the background PM_{10} concentration by analysis location:

- I-10 Interchange – West Phoenix monitor (3847 W. Earll Drive)
- Broadway Road Interchange – Durango Complex monitor (2702 AC Ester Brook Boulevard)
- 40th Street Interchange – West Chandler monitor (275 South Ellis)

Twenty-four-hour PM_{10} data for the monitors for 2010, 2011, and 2012 were downloaded from EPA's AirData website (aqsdr1.epa.gov/aqsweb/aqstmp/airdata/download_files.html#Daily). Not all monitoring data were included in the analysis. See Appendix B for additional information regarding the process used to calculate background concentrations, including the excluded dates and the basis for exclusion.

Based on EPA direction, the fourth-highest 24-hour background concentration from the 3 years of monitoring data as described above was used for the background value in the analysis (see Appendix B for more detail). This background value is consistent with the PM_{10} NAAQS design value because the NAAQS allows three exceedances over this time period. Table 1 presents the highest 24-hour concentrations at each monitor over the 3-year period.

Table 1. Highest 24-hour PM_{10} Concentration (µg/m³), 2010–2012

Air Quality Monitor	1st High	2nd High	3rd High	4th High
West Phoenix	148 (6/20/2012)	139 (7/8/2011)	134 (8/3/2011)	**133** (9/2/2011)
Durango Complex	151 (8/18/2011)	145 (9/11/2011)	144 (1/22/2012)	**131** (10/4/2011)
West Chandler	402 (4/3/2012)	196 4/4/2012)	152 (6/20/2012)	**145** (7/21/2012)

Source: EPA 2014

The values in Table 1 are likely conservative because it is expected that ambient PM_{10} concentrations will be lower in future years as a result of the SIP requirements and the general trend in declining vehicle emissions due to technological advances.

3.3 Analysis Results

The CAL3QHCR dispersion model was used to estimate PM_{10} concentrations at discrete receptor locations around each analysis location (Figure 2 through Figure 4 include the maximum PM_{10} concentration at each modeled receptor over the 5-year meteorological data set used in the analysis). Following EPA guidelines for project-level quantitative analyses, vehicle emission rates were developed for the 2035 analysis year for the following months (and hours of the day):

- January (AM, midday, PM, and overnight)
- April (AM, midday, PM, and overnight)
- July (AM, midday, PM, and overnight)
- October (AM, midday, PM, and overnight)

Re-entrained road dust emissions were added to the vehicle emission rates to generate a total emission rate for each season and for each time period. PM_{10} design values were derived by adding the sixth-highest modeled 24-hour concentration over the 5-year meteorological data set for each season and hour to the background PM_{10} concentration as discussed above. As detailed in EPA guidance, the resulting PM_{10} concentration (that is, the design value plus background PM_{10} concentration) was then rounded to the nearest 10 µg/m^3 (EPA 2013a).

3.3.1 PM_{10} Conformity Analysis

Table 2 shows the PM_{10} design value (that is, the sixth-highest modeled receptor concentration over the 5-year modeling period) at the I-10 Interchange for the purpose of demonstrating transportation conformity. As shown in Table 2, the PM_{10} NAAQS would not be exceeded at the I-10 Interchange using MOVES2010b and CAL3QHCR. The PM_{10} design value with the Preferred Alternative would not exceed the 24-hour NAAQS (150 µg/m^3).

Table 2. I-10 Interchange Design Value in 2035

Location	6th-Highest PM_{10} Value (µg/m^3) [a,b]	Background PM_{10} (µg/m^3)	Total Concentration (unrounded) (µg/m^3)	Total Concentration (rounded to the nearest 10 µg/m^3)	PM_{10} NAAQS (µg/m^3)
I-10 Interchange	12.9	133	145.9	150	150

[a] Sixth-highest PM_{10} concentration over 5 years of meteorological data.
[b] Design value computations are included with model files in Appendix C.

Transportation Conformity Statement for PM_{10}

The South Mountain Freeway project area is within the boundaries of the Phoenix nonattainment area for PM_{10}.

The project is included in MAG's FY2014–2018 TIP and 2035 RTP, which were found to conform to the SIP by the U.S. Department of Transportation on February 12, 2014. The project is identified in these documents using several different project identification numbers by construction segment (47518, 43086, 43087, 11305, 15671, 19029, 17193, 6458, 1790, 6919, and 47857). The design concept and scope of the Preferred Alternative are consistent with that used in the regional emissions analysis for the RTP and TIP conformity determinations and in compliance with control measures outlined in the SIP (see Table 4-1 in the *MAG 2012 Five Percent Plan for PM-10 for the Maricopa County Nonattainment Area* for the list of control measures).

The PM_{10} hot-spot analyses described above demonstrate that the proposed project would not contribute to any new local violations, increase the frequency or severity of any existing violation, or delay timely attainment of the NAAQS or any required interim emissions reductions or other milestones.

Therefore, based on the PM_{10} analyses conducted for the Preferred Alternative, it has been determined that this project is consistent with SIP control measures and would not cause an exceedance of the PM_{10} NAAQS. The project complies with the transportation conformity regulations at 40 Code of Federal Regulations, Part 93, and with the conformity provisions of Section 176(c) of the Clean Air Act

3.3.2 PM_{10} NEPA Analysis

Table 3 shows the PM_{10} design values for the interchange locations (Broadway Road and 40th Street) analyzed for NEPA purposes. Similar to the I-10 Interchange location, the PM_{10} NAAQS would not be exceeded at these locations using MOVES2010b and CAL3QHCR.

Table 3. Broadway Road and 40th Street Interchange Design Values in 2035

Location	6th-Highest PM_{10} Value ($\mu g/m^3$) [a,b]	Background PM_{10} ($\mu g/m^3$)	Total Concentration (unrounded) ($\mu g/m^3$)	Total Concentration (rounded to the nearest 10 $\mu g/m^3$)	PM_{10} NAAQS ($\mu g/m^3$)
Broadway Road Interchange	5.3	131	136.3	140	150
40th Street Interchange	3.8	145	148.8	150	150

[a] Sixth-highest PM_{10} concentration over 5 years of meteorological data.
[b] Design value computations are included with model files in Appendix C.

4.0 Carbon Monoxide (CO)

4.1 Methodology

The project-level CO analysis included in the DEIS was based on "generic" representations of interchanges and intersections at ramp termini because limited design information was available at that time. With the selection of a Preferred Alternative, more detailed design information is available. The CO analysis was updated for the FEIS similar to the PM_{10} analysis, using link-specific data and model inputs consistent with the inputs MAG uses for regional CO emissions analyses.

Similar to the PM_{10} analysis, the I-10 Interchange was selected for detailed CO hot-spot modeling for the purpose of demonstrating project conformity. It was selected because it has the highest traffic volumes of any interchange in the project area and is expected to experience poor levels of service during the peak hours (ADOT 2014a). See Appendix A for more information related to the selection of interchange locations.

Similar to the PM_{10} analyses described above, additional CO hot-spot analyses were conducted for NEPA purposes. The same two additional interchange locations were included in the CO hot-spot analysis based on their proximity to residential developments as well as their higher traffic volumes in comparison to nearby interchanges.

For CO modeling, 2035 was modeled as the peak year of emissions after completion of the project and as the year when traffic volumes would be greatest. In addition, 2020 was modeled to represent a year-of-opening scenario when emission rates would be higher. To make the analysis conservative, 2020 emission rates were used with 2025 traffic volumes.

CO emission rates were generated with MOVES2010b for 2020 and 2035 as described above for PM_{10}. The CAL3QHCR dispersion model was used to estimate CO concentrations (rather than CAL3QHC as was used in the DEIS) because it could make use of many inputs that were the same as those used for the PM_{10} analysis. CO concentrations were modeled at the same receptor locations near the I-10 Interchange, Broadway Road Interchange, and 40th Street Interchange locations (see Figure 2 through Figure 4). The 5-year meteorological data set used for the PM_{10} modeling was also used for the CO analyses.

4.2 Background Concentrations

As discussed in ADEQ guidance, the highest 1-hour and 8-hour CO concentrations from the 3 most recent years of available data were used as background concentrations (ADEQ 2013). Maximum 1-hour and 8-hour CO concentrations from 2010 to 2012 are shown in Table 4.

Table 4. 1-Hour (8-Hour) Maximum CO Concentrations (ppm), 2010–2012

Air Quality Monitor	2010	2011	2012
West Phoenix	4.3 (3.3)	4.4 (3.0)	**4.8** (**3.9**)[a]
Durango Complex	ND [b]	ND [b]	ND [b]
West Chandler	2.0 (1.9)	1.8 (1.4)	1.9 (1.4)

Source: EPA 2014

[a] Highest 1-hour (and 8-hour) background concentrations over the 3-year period are shown in bold.

[b] ND = no CO monitoring data for this site.

4.3 Analysis Results

The CAL3QHCR dispersion model was used to estimate CO concentrations at discrete receptor locations around each analysis location (Figure 2 through Figure 4 above). Consistent with MAG's regional conformity analysis, the MOVES2010b meteorological data for CO provided by MAG was from December 16, 1994. Therefore, the vehicle emission rates developed for the 2035 analysis year were based on the winter months in the AM, midday, PM, and overnight hours of the day

The project-level CAL3QHCR files developed for the PM_{10} analyses were revised with CO emission rates to model CO under the same conditions (that is, traffic volumes, speeds, turning movements, and receptor locations). MOVES2010b was used to develop link-specific CO emission rates.

4.3.1 CO Conformity Analysis

Table 5 shows the highest modeled CO concentrations at the I-10 Interchange with the Preferred Alternative. The modeled CO concentrations at all receptor locations in the vicinity of the I-10 Interchange are below the 1-hour and 8-hour NAAQS.

Table 5. Highest Modeled CO Concentrations (Including Background) at the I-10 Interchange (in ppm)

Location	1-Hour Concentration				8-Hour Concentration			
	Existing Conditions (2012) [a]	With Alternative		NAAQS	Existing Conditions (2012) [a]	With Alternative		NAAQS
		2020 [b]	2035 [b]			2020 [c]	2035 [c]	
I-10 Interchange	4.8	5.7 [d]	5.5 [d]	35	3.9	4.6 [d]	4.4 [d]	9

ppm = parts per million

[a] With the existing conditions, the South Mountain project has not been built. The assumed 1-hour and 8-hour concentrations are the 3-year maximum concentrations shown in Table 4.

[b] Includes 1-hour background concentration of 4.8 ppm.

[c] Includes 8-hour background concentration of 3.9 ppm.

[d] Highest modeled CO concentration shown for all scenarios across 5 years of meteorological data.

Transportation Conformity Statement for CO

The project area is within the boundaries of the Phoenix maintenance area for CO.

The CO hot-spot analyses described above demonstrate that the proposed project would not contribute to any new local violations, increase the frequency or severity of any existing violation, or delay timely attainment of the NAAQS or any required interim emissions reductions or other milestones.

The project is included in MAG's FY2014–2018 TIP and 2035 RTP, which were found to conform to the SIP by the U.S. Department of Transportation on February 12, 2014. The project is identified in these documents using several different project identification numbers by construction segment (47518, 43086, 43087, 11305, 15671, 19029, 17193, 6458, 1790, 6919, and 47857). The design concept and scope of the Preferred Alternative are consistent with that used in the regional emissions analysis for the RTP and TIP conformity determinations.

Therefore, based on the CO analyses conducted for the Preferred Alternative, it has been determined that this project would not cause an exceedance of the CO NAAQS. The project complies with the transportation conformity regulations at 40 Code of Federal Regulations, Part 93, and with the conformity provisions of Section 176(c) of the Clean Air Act.

4.3.2 CO NEPA Analysis

Table 6 shows the highest modeled CO concentrations for the additional interchange locations (Broadway Road and 40th Street) analyzed for NEPA purposes. Similar to the I-10 Interchange location, the CO NAAQS would not be exceeded at these locations with the highest modeled concentrations using MOVES2010b and CAL3QHCR.

Table 6. Highest Modeled CO Concentrations (Including Background) at the Broadway Road and 40th Street Interchanges (in ppm)

Location	1-Hour Concentration				8-Hour Concentration			
	Existing Conditions (2012) [a]	With Alternative		NAAQS	Existing Conditions (2012) [a]	With Alternative		NAAQS
		2020 [b]	2035 [b]			2020 [c]	2035 [c]	
Broadway Road interchange	4.8	5.4 [d]	5.3 [d]	35	3.9	4.3 [d]	4.2 [d]	9
40th Street interchange	4.8	5.5 [d]	5.4 [d]	35	3.9	4.3 [d]	4.2 [d]	9

ppm = parts per million

[a] With the existing conditions, the South Mountain project has not been built. The assumed 1-hour and 8-hour concentrations are the 3-year maximum concentrations shown in Table 4.

[b] Includes 1-hour background concentration of 4.8 ppm.

[c] Includes 8-hour background concentration of 3.9 ppm.

[d] Highest modeled CO concentration shown for all scenarios across 5 years of meteorological data.

The modeled CO concentrations in this report are higher than those reported in the DEIS for several reasons, including the use of higher background concentrations derived from monitoring data over multiple years (rather than the 2.0 ppm [parts per million] and 1.4 ppm used in the DEIS for 1-hour and 8-hour concentrations, respectively) and the use of more-detailed design-level intersection configurations. Background CO concentrations for the 1-hour and 8-hour scenarios were 140 percent and 179 percent higher, respectively, than those used in the DEIS analyses.

In general, the highest 1-hour CO concentrations are about 35 percent higher than those reported in the DEIS (using CAL3QHC). Similarly, the highest 8-hour concentrations are more than 50 percent higher than those reported in the DEIS. However, even with the higher modeled results (with higher background CO concentrations and more-detailed design information), the CO NAAQS would not be approached.

5.0 Mobile-Source Air Toxics (MSATs)

5.1 Methodology

An emissions inventory analysis for the project was conducted to estimate annual emissions (in tons per year) of MSATs emitted from vehicles in the project study area (as a whole) and the eastern and western subareas (see Figure 1). The project study area includes both subareas. The MSAT analyses were performed using guidance and methodologies discussed in FHWA's MSAT guidance (FHWA 2012) and discussions with FHWA technical staff.

MSATs modeled were acrolein, benzene, 1,3-butadiene, diesel particulate matter/diesel exhaust organic gases (diesel PM), formaldehyde, naphthalene, and polycyclic organic matter (POM). POM consists of 30 individual pollutants in gaseous and particle forms. MSAT emissions of each pollutant were calculated for the project study area and project subarea in the analysis years of 2025 and 2035 and converted to annual emissions (tons per year).

The analysis updates the MSAT analysis discussed in the DEIS in several ways. First, MSATs were calculated using EPA's newer MOVES2010b model for the No-Action Alternative and the Preferred Alternative. MSAT emissions were estimated using updated average annual daily traffic (AADT) and speeds for each freeway, primary arterial, secondary arterial, and collector. All roads in each area for which AADT volumes were available from MAG were included in the analysis; in the DEIS, only roads that experienced a substantial change in traffic volume due to the project were included. Therefore, the analysis in this report represents total MSAT emissions within the project study area and each subarea rather than emissions from only the affected portions of the network within each area. Lastly, local inputs for age distribution, vehicle mix, meteorology, and fuel data were consistent with the inputs used for the PM_{10} hot-spot analysis and have been updated compared to input data used in the DEIS analysis.

5.2 Analysis Results

A quantitative analysis was performed to forecast project-area emission trends of the priority MSATs for the 2012 existing conditions, the 2025 No-Action Alternative, the 2025 Preferred Alternative (W59/E1), and the 2035 Preferred Alternative (W59/E1). 2025 and 2035 represent the years used in the most recent update to the MAG regional conformity analysis.

The emissions modeling developed for the Preferred Alternative in 2035 showed that, for the project study area, total MSAT emissions compared to the No-Action Alternative in 2035 are estimated to increase by less than 1 percent. The Preferred Alternative would have slightly more diesel PM emissions in the 2025 interim year compared to the No-Action Alternative in 2025. However, for both alternatives, the emissions of this pollutant in 2025 are projected to be more than 90 percent lower than the estimated emissions in 2012.

Total estimated MSAT emissions in 2035 with the Preferred Alternative would be lower than they are today, and emissions in the study area in 2035 would be very nearly the same as emissions with the No-Action Alternative if it were selected. Although total estimated MSAT emissions would be lower, emissions of some individual MSAT pollutants would be slightly higher, as shown in Table 9. Specifically, annual emissions of 1,3-butadiene, naphthalene gas, and formaldehyde would be slightly higher in 2035 with the Preferred Alternative compared to the No-Action Alternative. However, for both alternatives, the emissions of these pollutants in 2035 are projected to be about 60 percent to 70 percent lower than the estimated emissions in 2012.

The Preferred Alternative would also reduce in-vehicle MSAT exposure compared to the No-Action Alternative. EPA has found that in-vehicle benzene concentrations were between 2.5 and 40 times higher than nearby ambient concentrations, based on a review of studies discussed in the Regulatory Impact Analysis for EPA's 2007 MSAT rulemaking (EPA 2007a, page 3-17). Constructing the South Mountain Freeway would reduce drivers' and passengers' exposure to benzene for two reasons: decreased travel times (motorists would spend less time in traffic to reach their destinations) and lower emission rates (due to speed improvements). Reducing on-road exposure would provide a health benefit for motorists using the South Mountain Freeway.

Tables 7, 8, and 9 show the MSAT modeling results for the South Mountain Freeway in the eastern and western project subareas as well as the project study area for the Preferred Alternative (for the project study area and subarea locations, see Figure 1).

Table 7. Modeled Mobile-Source Air Toxics Emissions, Preferred Alternative (W59/E1), Eastern Subarea

Parameter	2012	2025				2035			
		No Action		Build		No Action		Build	
	Existing Conditions	Modeled Value	Change from 2012 (%)	Modeled Value	Change from 2012 (%)	Modeled Value	Change from 2012 (%)	Modeled Value	Change from 2012 (%)
Daily VMT	2,178,414	2,624,862	20	3,066,877	41	2,849,452	31	3,538,835	62
MSAT Compound Emissions (tons per year)									
Benzene	3.79	1.75	–54	1.98	–48	1.53	–60	1.86	–51
1,3 butadiene	0.63	0.28	–56	0.31	–51	0.24	–62	0.30	–52
Formaldehyde	4.27	1.39	–67	1.55	–64	1.28	–70	1.52	–64
Acrolein	0.28	0.06	–78	0.07	–75	0.05	–82	0.06	–79
POMs (polycyclic organic matter)	0.23	0.05	–78	0.06	–74	0.04	–83	0.06	–74
Naphthalene gas	0.52	0.16	–69	0.18	–65	0.14	–73	0.17	–67
Diesel particulate matter	24.15	2.30	–90	2.54	–89	1.82	–92	2.13	–91
Total MSAT Emissions	**33.87**	**5.99**	**–82**	**6.69**	**–80**	**5.1**	**–85**	**6.10**	**–82**

Table 8. Modeled Mobile-Source Air Toxics Emissions, Preferred Alternative (W59/E1), Western Subarea

Parameter	2012	2025				2035			
		No Action		Build		No Action		Build	
	Existing Conditions	Modeled Value	Change from 2012 (%)	Modeled Value	Change from 2012 (%)	Modeled Value	Change from 2012 (%)	Modeled Value	Change from 2012 (%)
Daily VMT	2,844,982	3,703,135	30	4,064,354	43	4,128,574	45	4,371,887	54
MSAT Compound Emissions (tons per year)									
Benzene	4.99	2.46	–51	2.66	–47	2.21	–56	2.33	–53
1,3 butadiene	0.84	0.39	–54	0.42	–50	0.35	–58	0.37	–56
Formaldehyde	5.64	1.95	–65	2.10	–63	1.85	–67	1.93	–66
Acrolein	0.37	0.09	–76	0.09	–76	0.08	–78	0.08	–78
POMs (polycyclic organic matter)	0.30	0.07	–77	0.08	–73	0.06	–80	0.07	–77
Naphthalene gas	0.69	0.23	–67	0.24	–65	0.21	–70	0.22	–68
Diesel particulate matter	31.86	3.23	–90	3.46	–89	2.63	–92	2.72	–91
Total MSAT Emissions	**44.69**	**8.42**	**–81**	**9.05**	**–80**	**7.39**	**–83**	**7.72**	**–83**

Table 9. Modeled Mobile-Source Air Toxics Emissions, Preferred Alternative (W59/E1), Project Study Area

Parameter	2012	2025				2035			
		No Action		Build		No Action		Build	
	Existing Conditions	Modeled Value	Change from 2012 (%)	Modeled Value	Change from 2012 (%)	Modeled Value	Change from 2012 (%)	Modeled Value	Change from 2012 (%)
Daily VMT	19,518,246	24,082,899	23	23,935,323	27	28,179,357	44	28,623,078	47
MSAT Compound Emissions (tons per year)									
Benzene	34.59	15.86	–54	15.71	–55	14.97	–57	14.94	–57
1,3 butadiene	5.79	2.51	–57	2.49	–57	2.37	–59	2.40	–59
Formaldehyde	39.21	12.52	–68	12.38	–68	12.37	–68	12.44	–68
27 (acrolein)	2.54	0.56	–78	0.55	–78	0.53	–79	0.53	–79
POMs (polycyclic organic matter)	2.11	0.47	–78	0.47	–78	0.44	–79	0.44	–79
Naphthalene gas	4.78	1.46	–69	1.45	–70	1.39	–71	1.40	–71
Diesel particulate matter	221.23	19.85	–91	20.43	–91	17.48	–92	17.54	–92
Total MSAT Emissions	**310.25**	**53.23**	**–83**	**53.48**	**–83**	**49.55**	**–84**	**49.69**	**–84**

5.2.1 Preferred Alternative (W59/E1), Eastern Subarea

Annual estimated MSAT emissions in the eastern subarea for the Preferred Alternative are shown in Table 7. As shown in Table 7, projected annual MSAT emissions for each individual MSAT would be substantially lower in both 2025 and 2035 with both the build and no-action scenarios compared to the 2012 existing conditions.

With the Preferred Alternative in 2025, modeled MSAT emissions for individual MSATs in the eastern subarea would decrease by a range of about 48 percent to nearly 90 percent over 2012 emissions depending on the individual MSAT, even with a 41 percent increase in VMT over 2012 conditions. Total emissions would decrease by about 80 percent.

With the Preferred Alternative in 2035, modeled MSAT emissions for individual MSATs would decrease by about 50 percent to more than 90 percent with a 62 percent increase in VMT in the eastern subarea compared to 2012 conditions. Total MSAT emissions would decrease by about 82 percent.

The decrease in MSAT emissions in future years is due to EPA's ongoing programs to control hazardous air pollutants from mobile sources.

5.2.2 Preferred Alternative (W59/E1), Western Subarea

Annual estimated MSAT emissions in the western subarea for the Preferred Alternative are shown in Table 8. Similar to MSAT emissions discussed above for the eastern subarea, annual MSAT emissions for each individual MSAT are projected to be substantially lower in both 2025 and 2035 with both the build and no-action scenarios compared to the 2012 existing conditions.

With the Preferred Alternative in 2025, modeled MSAT emissions for individual MSATs in the western subarea would decrease by a range of about 47 percent to nearly 90 percent over 2012 emissions depending on the individual MSAT, even with a 43 percent increase in VMT over 2012 conditions. Total emissions would decrease by about 80 percent.

With the Preferred Alternative in 2035, modeled MSAT emissions for individual MSATs would decrease by about 53 percent to more than 90 percent with a 54 percent increase in VMT in the western subarea compared to 2012 conditions. Total MSAT emissions would decrease by about 83 percent.

5.2.3 Preferred Alternative (W59/E1), Project Study Area Impact Projections

The project study area emissions modeling demonstrated that future-year MSAT emissions (assuming build-out of the Preferred Alternative) would be lower than the 2012 emission estimates, even with a 47 percent increase in project study area VMT in 2035(Table 9).

In the project study area, constructing the Preferred Alternative is estimated to have a marginal effect on annual emissions in 2025 (less than a 1 percent difference in total annual emissions in 2025 between the build and no-action scenarios). In 2035, there would also be a less than 1 percent difference in total annual MSAT emissions between the build and no-build scenarios. In 2025 and 2035, total emissions in the project study area would decrease by more than 80 percent compared to emissions in 2012.

With the Preferred Alternative in 2035, modeled MSAT emissions for individual MSATs would decrease by about 57 percent to more than 90 percent with a 47 percent increase in VMT in the project study area compared to 2012 conditions. Total MSAT emissions would decrease by about 84 percent.

5.3 Information Availability Constraints in Analyzing Project-Specific MSATs Impacts

In its MSAT guidance, FHWA acknowledges that, while much work has been done to assess the overall health risk of MSATs, analytical tools and techniques for assessing project-specific health outcomes as a result of lifetime exposures to MSATs remain limited. These limitations impede the ability to evaluate the potential health risks due to exposure to MSATs as part of the decision-making process in the NEPA context.

In FHWA's view, information is incomplete or unavailable to credibly predict the project-specific health impacts due to changes in MSAT emissions associated with a proposed set of highway alternatives. The outcome of such an assessment, adverse or not, would be influenced more by the uncertainty introduced into the process through assumption and speculation rather than any genuine insight into the actual health impacts directly attributable to MSAT exposure associated with a proposed action.

EPA is responsible for protecting the public health and welfare from any known or anticipated effect of an air pollutant. It is the lead authority for administering the Clean Air Act and its amendments and has specific statutory obligations with respect to hazardous air pollutants and MSATs. EPA is in the continual process of assessing human health effects, exposures, and risks posed by air pollutants. It maintains the Integrated Risk Information System (IRIS), which is "a compilation of electronic reports on specific substances found in the environment and their potential to cause human health effects" (EPA, www.epa.gov/iris). Each report contains assessments of noncancerous and cancerous effects for individual compounds and quantitative estimates of risk levels from lifetime oral and inhalation exposures with uncertainty spanning perhaps an order of magnitude.

Other organizations are also active in the research and analyses of the human health effects of MSATs, including the Health Effects Institute (HEI). Two HEI studies are summarized in Appendix D of FHWA's *Interim Guidance Update on Mobile Source Air Toxic Analysis in NEPA* (FHWA 2012). Among the adverse health effects linked to MSAT compounds at high exposures are cancer in humans in occupational settings; cancer in animals; and irritation to the respiratory tract, including the exacerbation of asthma. Less obvious are the adverse human health effects of MSAT compounds at current environmental concentrations (HEI, pubs.healtheffects.org/view.php?id=282) or in the future as vehicle emissions substantially decrease (HEI, pubs.healtheffects.org/view.php?id=306). A few MSAT health risk assessments performed for roadway projects by organizations other than FHWA are presented in Appendix F.

The methodologies for forecasting health impacts include emissions modeling, dispersion modeling, exposure modeling, and then final determination of health impacts—each step in the process building on the model predictions obtained in the previous step. All are encumbered by technical shortcomings or uncertain science that prevents a more complete differentiation of the MSAT health impacts among a set of project alternatives. These difficulties are magnified for lifetime (that is, 70-year) assessments, particularly because unsupportable assumptions would have to be made regarding changes in travel patterns and vehicle technology (which affect emission rates) over that timeframe, since such information is unavailable.

It is particularly difficult to reliably forecast 70-year lifetime MSAT concentrations and exposure near roadways; to determine the portion of time that people are actually exposed at a specific location; and to establish the extent attributable to a proposed action, especially given that some of the information needed is unavailable.

There are considerable uncertainties associated with the existing estimates of toxicity of the various MSATs because of factors such as low-dose extrapolation and translation of occupational exposure data to the general population, a concern expressed by HEI (pubs.healtheffects.org/view.php?id=282). As a result, there is no national consensus on air dose-response values assumed to protect the public health and welfare for MSAT compounds, and in particular for diesel PM. EPA (www.epa.gov/risk/basicinformation.htm#g) and HEI (pubs.healtheffects.org/getfile.php?u=395) have not established a basis for quantitative risk assessment of diesel PM in ambient settings.

There is also the lack of a national consensus on an acceptable level of risk. The current context is the process used by EPA as provided by the Clean Air Act to determine whether more-stringent controls are required in order to provide an ample margin of safety to protect public health or to prevent an adverse environmental effect for industrial sources subject to the maximum achievable control technology standards, such as benzene emissions from refineries. The decision framework is a two-step process. The first step requires EPA to determine an "acceptable" level of risk due to emissions from a source, which is generally no greater than approximately 100 in a million. Additional factors are considered in the second step, the goal of which is to maximize the number of people with risks less than 1 in a million due to emissions from a source. The results of this statutory two-step process do not guarantee that cancer risks from exposure to air toxics are less than 1 in a million; in some cases, the residual risk determination could result in maximum individual cancer risks that are as high as approximately 100 in a million. In a June 2008 decision, the U.S. Court of Appeals for the District of Columbia Circuit upheld EPA's approach to addressing risk in its two-step decision framework. Information is incomplete or unavailable to establish that even the largest of highway projects would result in levels of risk greater than deemed acceptable.

Because of the limitations in the methodologies for forecasting health impacts described above, any predicted difference in health impacts between alternatives is likely to be much smaller than the uncertainties associated with predicting the impacts. Consequently, the results of such assessments would not be useful to decision-makers, who would need to weigh this information against project benefits—such as reducing traffic congestion, accident rates, and fatalities plus improved access for emergency response—that are better suited for quantitative analysis.

In FHWA's view, because of the well-documented uncertainties of health risk assessment and the continuing decline in emissions and risk, a health risk assessment for MSATs is not necessary for meeting the applicable CEQ regulatory requirements for NEPA documents, nor would the results from a health risk assessment provide additional information over an MSAT emission assessment for decision-makers. Courts have consistently recognized that individual federal agencies have the discretion to choose appropriate methodologies for analyzing environmental impacts as part of the NEPA process, as long as those choices are explained and are not arbitrary and capricious.

The FEIS presents information and analysis about the Preferred Alternative and the enhanced conditions compared to the No-Action Alternative and concludes that the Preferred Alternative would not cause a significant adverse effect on human health. FHWA and ADOT's FEIS for the South Mountain Freeway accounts for both adverse and beneficial impacts. The FEIS provides in-depth discussion of the expected air quality impacts of the Preferred Alternative.

During the period during which the South Mountain Freeway project has been under review, EPA has issued two rules on controlling MSAT emissions from motor vehicles (66 Federal Register 17,229 [March 29, 2001] and 72 Federal Register 8,427 [February 26, 2007]). In those rules, EPA examined the impacts of existing and newly promulgated mobile-source control programs, including its reformulated

gasoline program, its national low-emission-vehicle standards, its Tier 2 motor-vehicle-emissions standards and gasoline sulfur control requirements, and heavy-duty engine and vehicle standards and on-highway diesel fuel sulfur-control requirements. As a result, EPA adopted controls on gasoline and passenger vehicles that significantly reduce emissions of benzene and other MSATs such as 1,3-butadiene, formaldehyde, acetaldehyde, acrolein, and naphthalene as well as emissions of particulate matter from passenger vehicles. On March 3, 2014, EPA also promulgated new Tier 3 vehicle and fuel regulations, which will lead to additional reductions of MSAT pollutants. Since these reductions have not yet been incorporated into EPA's emissions model, they are not accounted for in the South Mountain Freeway analysis.

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2012 Interim Guidance Update on Mobile Source Air Toxic Analysis in NEPA. www.fhwa.dot.gov/environment/air_quality/air_toxics/policy_and_guidance/aqintguidmem.cfm. December 6.

[MAG] Maricopa Association of Governments

2012 MAG 2012 Five Percent Plan for PM-10 for the Maricopa County Nonattainment Area. May.

2013 Regional Travel Demand Model Output (TransCAD). Phoenix.

[MCAQD] Maricopa County Air Quality Department

2011 2008 PM_{10} Periodic Emissions Inventory for the Maricopa County, Arizona, Nonattainment Area. June.

APPENDIX A

PM_{10} Analysis Location

PM_{10} Hot-spot Analysis Locations

Location Selected for PM_{10} Conformity Analysis

As discussed in EPA's transportation conformity guidance (Section 3.3.2, *Determining the geographic area and emission sources to be covered by the analysis*), for large projects it is appropriate to focus hot-spot analyses on the location that is likely to have the highest concentration of PM_{10} and is the most likely to create new or worsened violations of the PM_{10} NAAQS. According to EPA's guidance, if transportation conformity is demonstrated at the location expected to have the highest PM_{10} concentration, then it can be assumed that conformity is met for the entire project area.

The proposed project includes thirteen new service traffic interchanges at major arterial crossings and one new system-to-system traffic interchange at I-10 (Papago Freeway). The project team evaluated potential locations for the hot-spot analysis considering:

- Daily traffic volumes (including heavy vehicles) along the main line, ramps, and crossroads for the design year 2035 (see Table A-1)
- Peak hour level of service at the interchange for the design year 2035 (see Table A-2)
- Existing and planned land uses surrounding the interchange (see Figure A-1 and A-2)

Based on EPA guidance and project information and through interagency consultation, the new system-to-system traffic interchange at I-10 (Papago Freeway) was selected as the hot-spot analysis location for the conformity demonstration. The vehicle volumes and especially heavy truck volumes on the I-10 main line and system-to-system ramps would be substantially higher than at other potential locations and the I-10 main line is projected to experience poor levels of service in the peak hours. Therefore, this location would be most likely to produce the highest concentrations of PM_{10}.

Additional Locations Selected for NEPA Analysis

Next, the project team determined that the remainder of the project corridor would be best represented by selecting one interchange from the Ahwatukee Foothills Village and one from the combined Laveen/Estrella Villages. The 40th Street interchange in the Ahwatukee Foothills Village was selected because it had the highest projected vehicle and heavy truck traffic, worst projected peak-hour congestion, and highest likelihood of future development on the south side of the freeway. Analysis of the 40th Street interchange was also responsive to a comment submitted on the DEIS by the Gila River Indian Community that requested analysis of "…concentrations of air pollutants along the stretch of freeway bordering the Gila River Indian Community Reservation between I-10 on the east near Chandler and the point where the proposed freeway will cross the point parallel with the western border of the Community."

The Study Area for the proposed freeway includes three distinct areas:

1. Ahwatukee Foothills Village, located south of the South Mountains, is primarily residential. It would be served by the 40th Street, 24th Street, Desert Foothills Parkway, and 17th Avenue interchanges.
2. Laveen Village, located north of the South Mountains and south of the Salt River, is primarily residential or agricultural with future commercial uses planned along the proposed freeway. It

would be served by the 51st Avenue, Elliot Road, Baseline Road, and Southern Avenue interchanges.

3. Estrella Village, located north of the Salt River and south of I-10 (Papago Freeway), is primarily residential, industrial, and agricultural with future industrial and commercial uses planned along the proposed freeway. It would be served by the Broadway Road, Lower Buckeye Road, Buckeye Road, and Van Buren Street interchanges.

In the Laveen/Estrella Villages, there were a number of interchanges (51st Avenue, Elliot Road, Dobbins Road, Baseline Road, and Lower Buckeye Road) that are projected to experience relatively lower levels of total traffic and minor congestion in comparison to the other locations. These interchanges were eliminated from consideration. The Van Buren Street, Buckeye Road, Broadway Road, and Southern Avenue interchanges were carried forward for consideration.

From these final four interchange locations, Broadway Road was selected based on the following factors:

- Broadway Road provides the best balance of factors: it is projected to experience high daily volumes, high percentage of heavy truck traffic, high peak-hour congestion, currently has residential land uses in close proximity, and is centrally located in the western section of the Study Area.
- While Buckeye Road and Van Buren Street are projected to have higher daily volumes on the on- and off-ramps, the Broadway Road interchange is projected to experience the highest delay among the four interchanges during the PM peak hour.
- The existing and future land uses surrounding the Van Buren Street and Buckeye Road interchanges are primarily commercial and industrial, which have the potential for shorter-term exposure than residential land uses.
- The Southern Avenue interchange is planned to be surrounded by residential multifamily and commercial land uses in the future.
- Broadway Road is the only location with existing residential neighborhoods in proximity, which have the potential for exposure for longer periods of time than would commercial and industrial land uses. The vacant land south of Broadway Road is planned for residential multifamily land uses in the future.
- Buckeye Road and Van Buren Street are close (less than 2 miles) to the I-10 (Papago Freeway) system-to-system interchange which is being modeled and the results from the I-10 analysis would be conservatively representative of these locations.

Table A-1. Interchange ramp and crossroad traffic volumes, 2035

Interchange location	Daily volume on- and off-ramps		Daily volume crossroad	Daily volume ramps and crossroad	Daily volume freeway[a] main line
	All vehicles	Heavy trucks	All vehicles	All vehicles	All vehicles
40th Street	27,110	1,370	18,820	45,930	131,000
24th Street	19,340	650	9,610	28,950	131,000
Desert Foothills Parkway	15,960	450	8,000	23,960	128,000
17th Avenue	27,390	660	13,610	41,000	125,000
51st Avenue	22,750	1,630	11,350	34,100	125,000
Elliot Road	15,200	400	8,220	23,420	118,000
Dobbins Road	17,360	730	14,390	31,750	130,000
Baseline Road	28,590	1,450	22,330	50,920	138,000
Southern Avenue	33,340	1,680	25,790	59,130	154,000
Broadway Road	33,680	3,400	20,250	53,930	190,000
Lower Buckeye Road	24,480	1,190	28,320	52,800	128,000
Buckeye Road	49,760	5,890	31,690	81,450	139,000
Van Buren Street	47,320	2,980	37,180	84,500	160,000
I-10 (Papago)	110,450	10,300	Not applicable	110,450	117,000[b]

[a] proposed South Mountain Freeway
[b] the I-10 (Papago) main line daily volume is approximately 260,000 vehicles

Table A-2. Interchange level of service (LOS) analysis results

Interchange location	AM				AM/PM	PM			
	North/East signal		South/West signal		Cycle Length (sec)	North/East signal		South/West signal	
	Delay[a]	LOS	Delay	LOS		Delay	LOS	Delay	LOS
40th Street	20.7	C	20.1	C	70	26.1	C	19.7	B
24th Street	17.2	B	16.4	B	70	20.1	C	18.4	B
Desert Foothills Parkway	14.6	B	14.3	B	70/60	17.4	B	21.0	C
17th Avenue	14.5	B	8.3	A	60	18.5	B	20.5	C
51st Avenue	21.4	C	11.6	B	60/70	18.3	B	12.2	B
Elliot Road	8.0	A	13.8	B	60	8.9	A	15.9	B
Dobbins Road	13.4	B	10.8	B	60	10.8	B	16.7	B
Baseline Road	13.9	B	18.7	B	60	15.3	B	17.4	B
Southern Avenue	16.1	B	33.0	C	70	24.3	C	34.1	C
Broadway Road	17.6	B	16.2	B	60/90	31.9	C	33.6	C
Lower Buckeye Road	28.3	C	18.4	B	75/65	20.6	C	25.4	C
Buckeye Road	23.5	C	26.1	C	90/60	21.4	C	29.9	C
Van Buren Street	16.7	B	19.6	B	70/80	31.3	C	20.4	C
I-10 (Papago)	20.7	C	20.1	C	70	26.1	C	19.7	B

[a] average intersection delay in seconds

APPENDIX B

PM_{10} Background Concentrations

PM_{10} Background Concentrations

PM_{10} background values are an essential element in evaluating project-related impacts; therefore, careful consideration is given in their development and use in modeling. The methods to calculate background concentrations allowed in EPA's quantitative PM hot-spot guidance (EPA 2013) include:

- Using chemical transport models
- Using a single monitor
- Interpolating between several monitors

Through consultation between ADEQ, MCAQD, MAG, ADOT, and FHWA and based on the guidance given by EPA, it was determined that the use of a single monitor in the vicinity of each individual analysis location was the most appropriate methodology for developing a background PM_{10} concentration.

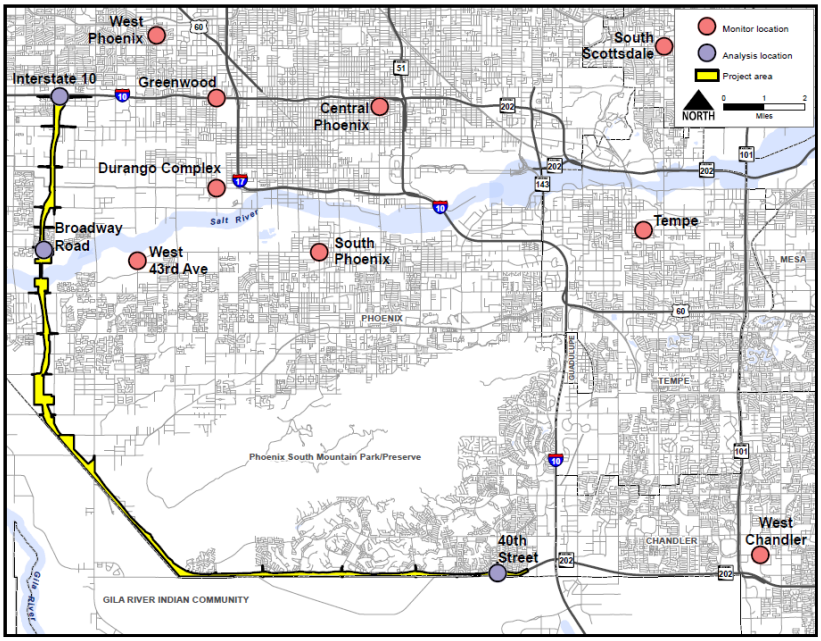
Using a Single Monitor

The EPA guidance for the use of a single monitor states that the simplest approach would be to use data from the monitor closest to and upwind of the project area. Additional information was considered in the evaluation of monitors, including:

- Similar characteristics between the monitor location and project area
- Distance of monitor from the project area
- Wind patterns between the monitor and the project area

The network of PM_{10} air quality monitors operated by the MCAQD was mapped in relation to the analysis locations (see Figure B-1). The following sections describe the evaluation process of monitors for each analysis location.

Figure B-1. Monitor and Analysis Locations



Background Monitor Selected for Conformity Analysis

I-10 Interchange

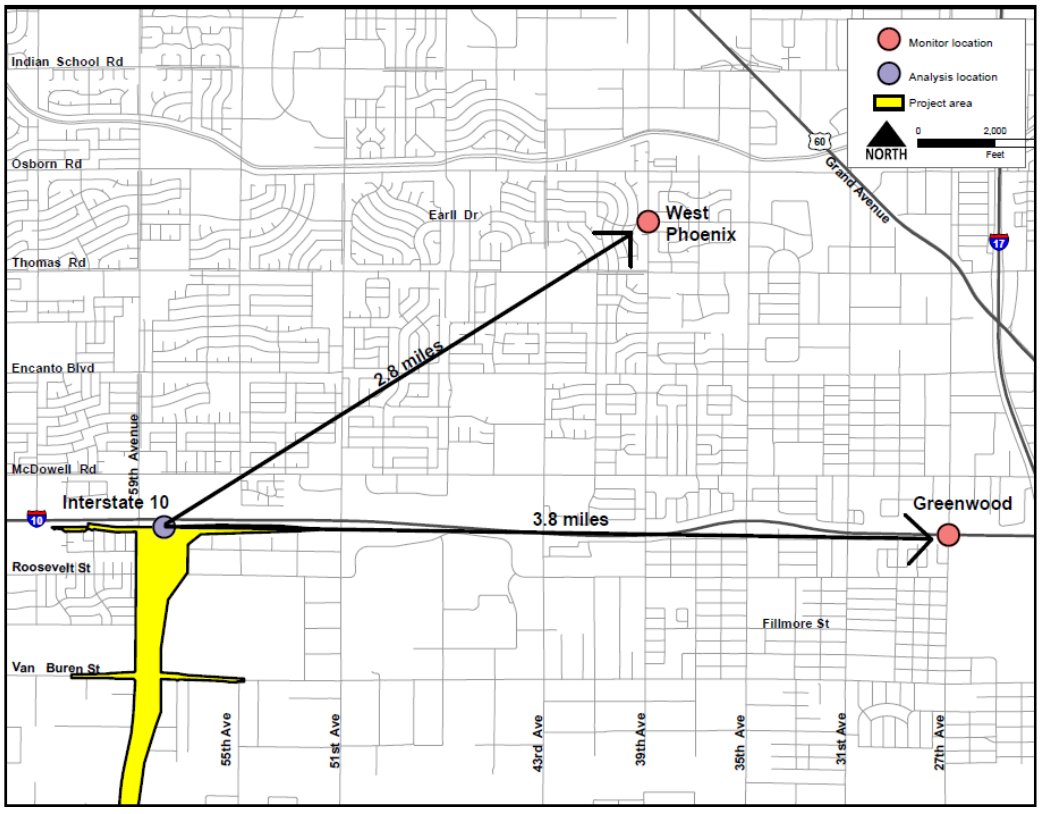
The West Phoenix monitor and Greenwood monitor are located in proximity to the I-10 Interchange (see Figure B-2).

- The West Phoenix monitor was established in 1984 (PM_{10} monitoring began in 1988) and is located in an area of stable, high-density residential population. It represents a neighborhood scale (0.5-4 kilometers) and its objective is population exposure.
- The Greenwood monitor was established in 1993 (converted to continuous PM_{10} monitoring in 2006) and is bordered by I-10 to the north, neighborhoods to the west and south, and the Greenwood cemetery to the east. It represents a middle scale (100-500 meters) and its objective is population exposure.

The West Phoenix monitor was selected because it is closest to the I-10 Interchange site (2.8 miles away) and best represents the non-transportation land uses around the I-10 Interchange location. The Greenwood monitor was not selected because it is 1 mile farther than the West Phoenix monitor to the I-10 Interchange site. Also, due to its proximity to the I-10 main line, its use would result in double-counting the influence of I-10 traffic because the hot-spot analysis design value includes modeled concentrations from I-10 traffic as well.

The selection of the West Phoenix monitor for the project-level conformity demonstration was agreed to through interagency consultation.

Figure B-2. Monitors in Proximity to the I-10 Interchange



Background Monitors Selected for NEPA Analysis

Broadway Road Interchange

The West 43rd Avenue monitor, Durango Complex monitor, and South Phoenix monitor are located in proximity to the Broadway Road Interchange (see Figure B-3).

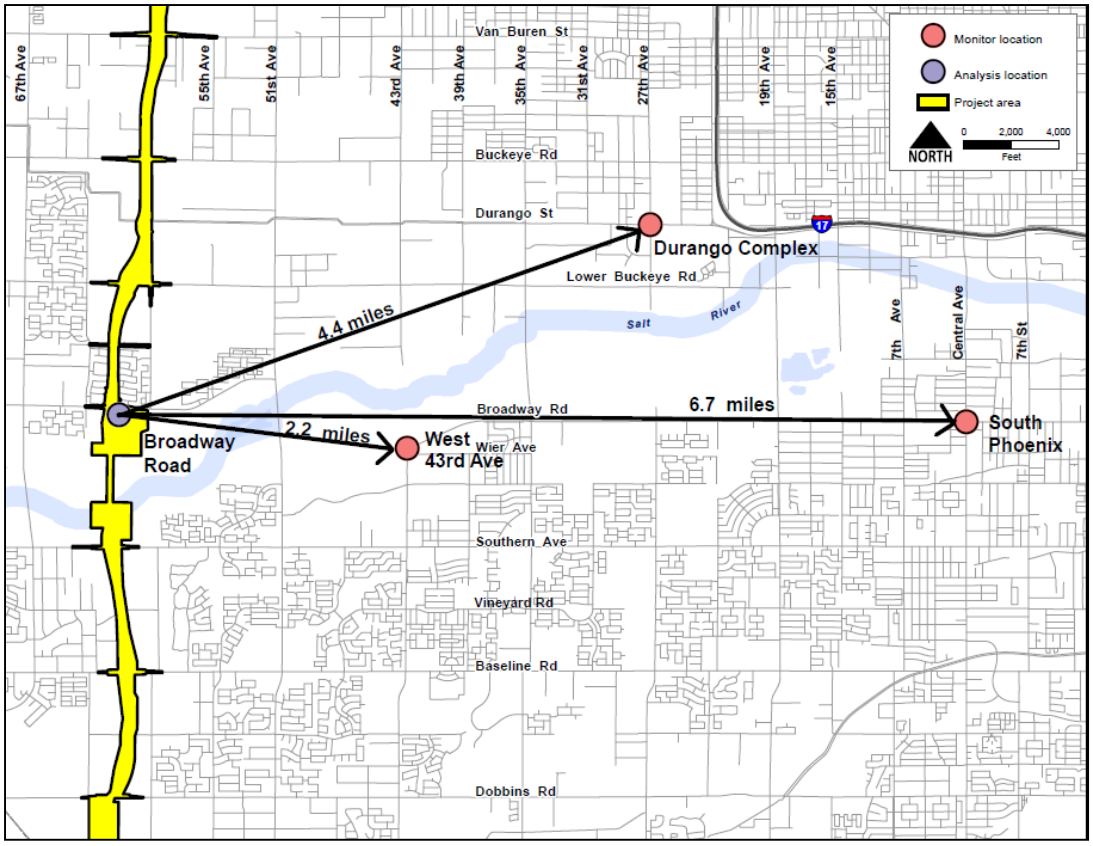
- The West 43rd Avenue monitor was established in 2002 and is located just north of Broadway Road and just south of the Salt River. It represents a middle scale (100-500 meters) and its objective is maximum concentration. The monitor is surrounded by heavy industrial and residential homes and its specific purpose is to determine the impact on ambient pollution levels of significant sources or source categories including sand and gravel operations, auto- and metal-recycling facilities, landfills, paved and unpaved haul roads, and cement casting operations.
- The Durango Complex monitor was established in 1999 and is located at the Maricopa County Flood Control District headquarters near 27th Avenue and Durango Street. It represents a middle scale (100-500 meters) and its objective is highest concentration. The site is surrounded by light industrial and residential uses.
- The South Phoenix monitor was established in 1974 (PM_{10} monitoring began in 1999) and is located at Broadway Road and Central Avenue. It represents a neighborhood scale (0.5-4 kilometers) and its objective is population exposure. The site is surrounded by mixed residential and commercial uses.

Although closest to the Broadway Road Interchange site, the West 43rd Avenue monitor was not selected because it is not representative of the land uses at the analysis location. The West 43rd Avenue monitor was established to specifically monitor the high-intensity industrial activities along Broadway Road and within the Salt River at 43rd Avenue. Through interagency consultation, ADEQ, MCAQD, ADOT, and MAG agreed that the West 43rd Ave monitor is not appropriate for determining a background concentration.

The Durango Complex monitor was selected because it is the next closest monitor to the Broadway Road Interchange site and is surrounded by a mixture of residential and industrial land uses that is representative of the Broadway Road Interchange site.

The selection of the Durango Complex monitor for the NEPA analysis was agreed to through interagency consultation.

Figure B-3. Monitors in Proximity to the Broadway Road Interchange

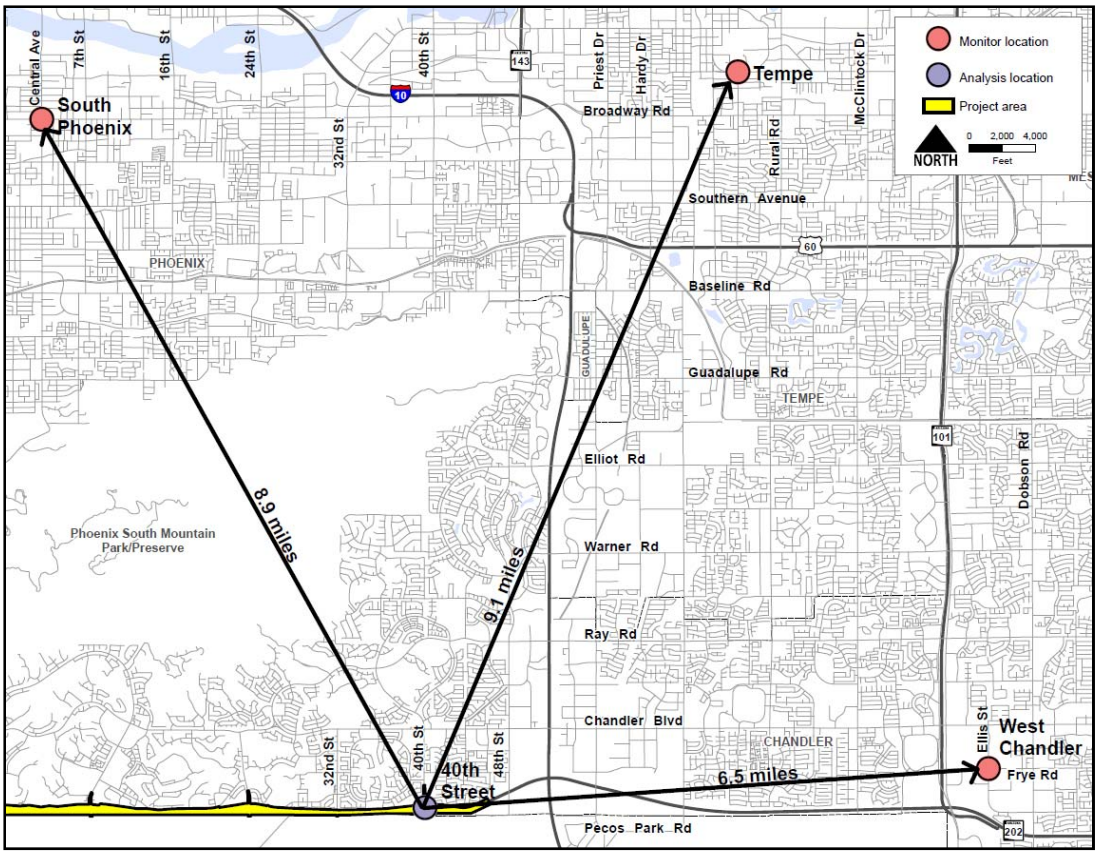


40th Street Interchange

The West Chandler monitor is the closest monitor to the 40th Street Interchange, is the only monitor located south of the South Mountains, and is representative of the land uses surrounding the 40th Street Interchange site (see Figure B-4). The West Chandler monitor was established in 1993 and is located 0.5 miles east of Loop 101 and 0.5 miles north of Loop 202. It represents a middle scale (100-500 meters) and its objective is population exposure.

The selection of the West Chandler monitor for NEPA analysis was agreed to through interagency consultation.

Figure B-4. Monitors in Proximity to the 40th Street Interchange



Background Concentration Calculation

Background PM_{10} concentrations were developed from air quality monitoring data in the vicinity of the analysis locations. Additional guidance was provided by the Arizona Department of Environmental Quality, Air Quality Division (ADEQ, Air Quality Division), ADOT, and EPA. The following MCAQD monitors nearest the analysis locations were used to develop the background PM_{10} concentration:

- I-10 Interchange – West Phoenix monitor (3847 W. Earll Drive)
- Broadway Road interchange - Durango Complex (2702 AC Ester Brook Boulevard)
- 40th Street interchange - West Chandler (275 South Ellis)

Not all data were used in the background computation. EPA guidance (EPA 2013a) states that monitoring data for which EPA has granted data exclusion under the Exceptional Events rule (see 40 Code of Federal Regulations 50.14) should not be used in the calculations. All EPA-approved exceptional events in 2010, 2011, and 2012 were excluded from the background PM_{10} determination. (See www.AZDEQ.gov/environ/air/plan/nee.html for all exceptional events submitted.) After excluding EPA-confirmed exceptional events, the four highest 24-hour background concentrations over the 3-year period were identified at each monitor. Since the NAAQS allow for three exceedances over this time period, the fourth highest 24-hour PM_{10} concentration over 3 years of monitoring data was used in the analysis and determination of the PM_{10} design value.

APPENDIX C

Model Input and Output Files

[MOVES2010b and CAL3QHCR files provided on separate disc]

APPENDIX D

PM_{10} Protocol

U.S. Department of Transportation
Federal Highway Administration

ARIZONA DIVISION

4000 North Central Avenue
Suite 1500
Phoenix, Arizona 85012-3500
Phone: (602) 379-3646
Fax: (602) 382-8998
http://www.fhwa.dot.gov/azdiv/index.htm

November 1, 2013

In Reply Refer To:
NH-202-D(ADY)
HOP-AZ

NH-202-D(ADY)
TRACS No. 202L MA 054 H5764 01L
South Mountain Freeway (Loop 202)
PM_{10} Hotspot Analysis

Mr. Jared Blumenfeld
United States Environmental Protection Agency
Office of the Regional Administration
Region IX
75 Hawthorne Street
San Francisco, CA 94105-3901

RE: Request to review the PM_{10} Hotspot Modeling Protocol for the South Mountain Freeway (Loop 202), I-10 (Papago Freeway) to I-10 (Maricopa Freeway), TRACS No. 202L MA 054 H5764 01L, Federal Project No. NH-202-D(ADY)

Dear Mr. Blumenfeld:

The Arizona Department of Transportation (ADOT) and the Federal Highway Administration (FHWA) received your July 23, 2013 comments on the South Mountain (Loop 202), I-10 (Papago Freeway) to I-10 (Maricopa Freeway) Draft Environmental Impact Statement (DEIS). One of the major comments received requested completion of an assessment of potential PM_{10} hotspot impacts.

The project team drafted the PM_{10} modeling framework or protocol, updated with new traffic estimates based on the 2010 Census. It was reviewed and approved by the air quality specialists within ADOT, Arizona Department of Environmental Quality, and FHWA.

FHWA now requests the Environmental Protection Agency (EPA) review the protocol and let us know if you have any comments. We would appreciate any comments you have submitted to us by November 15, 2013.

We appreciate the involvement of the EPA Region IX Office on this project and look forward to continuing our partnership. Please submit your comments to Rebecca Yedlin, FHWA

Environmental Coordinator, 4000 N. Central Ave., Suite 1500, Phoenix, AZ 85012; or Rebecca.Yedlin@dot.gov. If you have any questions, contact Rebecca at 602-382-8979.

Sincerely,

Rebecca Yedlin

Karla S. Petty
Division Administrator

Enclosure

cc:
Colleen McKaughan, USEPA Region 9, mckaughan.colleen@epa.gov
Clifton Meek, USEPA Region 9,, 75 Hawthorne St., San Francisco, CA 94105
Ben Spargo, HDR Engineering, Inc., 3200 E. Camelback Rd., Suite 350, Phoenix, AZ 85018
Darcy Anderson (EM02)
Brent Cain (EM01)
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Rebecca Yedlin
RYedlin:cdm

November 1, 2013

South Mountain Freeway DEIS
PM_{10} Quantitative Hotspot Analysis Protocol

Project Description

The proposed South Mountain Transportation Corridor (SMTC) will link the Interstate 10 (I-10) corridor west of Phoenix to the I-10 corridor south of Phoenix and consists of three north-south alternative alignments that will connect with an east-west alignment adjacent to the Ahwatukee Foothills. The proposed freeway would serve to provide additional access to I-10 and other Valley locations for residents in the southwest Valley, ease congestion on arterial streets in the southwest Valley and provide a direct link between I-10 to the south and I-10 to the west. The roadway would consist of a divided 8-lane roadway (6 general-purpose lanes and 2 high-occupancy vehicle lanes) with grade-separated interchanges.

The South Mountain Freeway Draft EIS included a qualitative evaluation for PM_{10}. This analysis was conducted for NEPA purposes for the development of the DEIS (a formal draft conformity determination is not required until the FEIS). In March 2006, EPA and FHWA issued a joint guidance document on performing qualitative hotspot analyses in PM2.5 and PM10 nonattainment and maintenance areas. Projects that are of "air quality concern" as defined by 40 C.F.R. § 93.123(b)(1) require a hot-spot analysis. The proposed action is such a project. In December 2010, EPA established transportation conformity guidance for performing quantitative PM2.5 and PM10 hot-spot analyses for transportation projects and established a 2-year grace period. EPA conformity guidance continues to allow qualitative PM10 hot-spot conformity analyses for analyses that were started before or during the grace period and if the final environmental document for the project is issued no more than 3 years after issuance of the draft environmental document [40 C.F.R. § 93.111(c)]. A PM10 qualitative analysis was performed for this project because the initial air quality technical analysis report was produced in October of 2005. Although the qualitative hotspot analysis would be sufficient under the conformity grace period guidance, the Arizona Department of Transportation (ADOT) plans to update the qualitative analysis to a quantitative analysis for the FEIS to ensure that a state-of-the-art analysis is completed for the proposed project.

Process to Determine Project of Air Quality Concern

Determining whether a project is of air quality concern and requires a PM_{10} quantitative hot-spot analysis is based on the ADOT Checklist for Project Level Conformity – Particulate Matter Nonattainment Area Screening Process. The following sections address the multiple criteria for determining the need for quantification. These criteria are consistent with those listed in the conformity regulations (40 CFR 93.123(a)).

New Highway Capacity Expansion

1. Are the design year total Build condition traffic volumes ≥125,000 annual average daily traffic (AADT) and truck volumes ≥10,000 heavy-trucks per day (8%) in the project vicinity?

   YES - Projected 2035 AADT ranges from 117,000 to 190,000 and projected heavy-trucks range from 3,800 to 17,000. (MAG 9/20/2013)

2. Does the project cause ≥ 6,250 and ≥ 500 increases in AADT and truck volumes, respectively between the Build and No-Build conditions?

   YES - Because this is a new facility, projected increases between the Build and No-Build AADT range from 117,000 to 190,000 and 3,800 to 17,000 additional trucks. (MAG 9/20/2013)

If yes to either of the above questions, it is potentially a project of air quality concern (POAQC) and may require interagency consultation; if no on both, it is not.

Other Considerations:

1. Does the project affect intersections that are of Level-of-Service (LOS) D, E, or F with a significant number of diesel vehicles?

   YES

2. Does the project affect locations, areas or categories of sites that are identified in the PM_{10} or $PM_{2.5}$ applicable implementation plan or implementation plan submissions, as appropriate, as sites of violation or potential violation?

   YES – PM_{10} **Not applicable** - $PM_{2.5}$

3. Is the project considered significant or environmentally controversial with respect to future impact on localized pollutant concentrations (e.g., evaluated using environmental impact statement (EIS) or environmental assessment (EA)? (www.epa.gov/compliance/basics/nepa.html)

   YES – The FHWA considers the potential impact on the project area to be controversial and to generate a great deal of public interest. The project currently has a completed Draft EIS (DEIS).

4. Is the project in a conforming plan and/or TIP?

   YES

Completing a Quantitative Particulate Matter Hot-Spot Analysis

(EPA Office of Transportation and Air Quality EPA-420-F-10-052, December 2010)

1. Determine the need for analysis – is this a project of local air quality concern?

   YES – Both ADOT and the Arizona Department of Environmental Quality (ADEQ) consider this project a POAQC.

2. Determine the approach, models, and data.

   a. Define the project area (area substantially affected by the project, 58 FR 62212) and emission sources.

      The project area encompasses more than 156 square miles. The project area includes the alternative alignments:

      - The north-south alternative alignments area is bordered approximately by McDowell Road to the north, Elliot Road to the south, 51st Avenue to the east, and 107th Avenue to the west. The three highest volume interchanges along the Preferred Alternative will be modeled.

      - The east-west alternative alignment area is bordered approximately by South Mountain Park to the north, the Gila River Indian Community to the south, I-10 to the east, and 51st Avenue to the west.

   b. Determine general approach for modeling the preferred alternative (the W59/E1 Alternatives) and analysis year(s) – year(s) of peak emissions during the time frame of the transportation plan (69 FR 40056).

      Emission rates in 2015, 2025 and 2035 will be estimated using EPA's MOVES2010b program. These analysis years are included in the most recent update to the Maricopa Association of Governments (MAG) regional conformity analysis. Under the Build Alternative emission rates will be developed for the three highest volume interchanges. Each location will be modeled for morning (AM) peak, Midday hours, afternoon (PM) peak, and overnight. PM_{10} emissions will be modeled incorporating operating conditions included in EPA's *Transportation Conformity Guidance for Quantitative Hot-spot Analyses in $PM_{2.5}$ and PM_{10} Nonattainment and Maintenance Areas*, publication number EPA-420-B-10-040, December 2010. Based on the most recent MAG Conformity Analysis, the peak year of emissions will be determined and used to quantify PM_{10} emissions associated with the project.

Following the development of peak year emission rates, the three worst-case interchanges and locations expected to have the highest concentrations under the Build Alternative will be selected in consultation with FHWA for detailed dispersion modeling with CAL3QHCR. Traffic projections by link will be used the analysis. CAL3QHCR dispersion modeling will incorporate a 5 year meteorological data set and other guidelines suggested by EPA guidance for quantitative PM_{10} analyses.

As noted in EPA's "Transportation Conformity Guidance for Quantitative Hot-Spot Analyses in PM2.5 and PM10 Nonattainment and Maintenance Areas" (December 2010), to avoid unnecessary work, EPA recommends modeling the build scenario (including background concentrations) first. In those instances if the design values under the build scenario are less than or equal to the relevant PM10 NAAQS, then the project conforms and no additional modeling is required.

In the event that the design value for the build scenario exceeds the PM10 NAAQS, the no-build scenario (without the South Mountain project) will be modeled. Under that scenario (and following EPA guidance), if the design values for the build scenario are less than or equal to the design values for the no-build scenario , then the project meets the conformity rule's hot-spot requirements.

In either instance if the project fails to meet conformity requirements, mitigation and/or control measures will be considered and additional modeling will be completed to ensure that the build scenario is less than or equal to the PM10 NAAQS or the no-build scenario, as applicable.

Vehicle PM_{10} exhaust emissions are expected to decrease substantially over time; however, brake and tire wear, and re-entrained road dust emissions are not expected to decrease. Re-entrained road dust will be incorporated into model results using emission rates provided by MAG in its most recent Conformity Analysis.

Roadway configurations will be based on available information, comparable freeway designs such as the San Tan Freeway, and will be consistent among the alternatives.

c. Determine National Ambient Air Quality Standards (NAAQS) and Particulate Matter types to be evaluated.

The evaluation will be performed for PM_{10} with the applicable PM_{10} 24-Hour standard (150 $\mu g/m^3$).

d. Select emissions and dispersion models and methods to be used.

The PM_{10} emission factor model to be used in this analysis is the EPA model MOVES2010b (revised) released on October 30, 2012. Re-entrained road dust will be incorporated into model results using emission rates provided by MAG. PM_{10} background concentrations will be determined in consultation with MAG, ADOT and FHWA and included with model results. The analysis of PM_{10} impacts will follow the guidelines established by the EPA in *Transportation Conformity Guidance for Quantitative Hot-spot Analyses in $PM_{2.5}$ and PM_{10} Nonattainment and Maintenance Areas*, publication number EPA-420-B-10-040, December 2010.

e. Obtain project-specific data (e.g., fleet mix, peak-hour volumes and average speed).

New socioeconomic subarea projections based on the 2010 U.S. Census and Arizona Department of Administration (ADOA) county-level projections have been approved by the MAG Regional Council. Based on these new projections, revised traffic data were provided by MAG following completion of the updated traffic projection models; new projections were also provided for truck traffic.

Fleet mix, vehicle hours travelled (VHT), travel speeds by link and hour, Inspection/Maintenance (I/M) Programs, fuel formulation, fuel supply, age distribution, and other MOVES inputs will be based on MAG data for years 2015, 2025 and 2035 (MAG personal communication from Taejoo Shin 10-17-13).

Meteorological inputs to MOVES will be based on data from the Phoenix Sky Harbor Airport (surface) and Tucson International Airport (upper air) and be consistent with MAG inputs to MOVES.

3. Estimate on-road motor vehicle emissions using MOVES.

Using data discussed in Step 2, MOVES PM_{10} emission factors will be calculated for the various roadway variables, using MOVES at the Project scale, and used for input to CAL3QHCR.

4. Estimate emissions from road dust, construction, and additional sources.
   a. Estimate road dust emissions using AP-42 Paved Roads (13.2.1, 2011)

Re-entrained road dust will be estimated using emission rates provided by MAG. Fugitive dust PM_{10} emission factors for paved roads were calculated using the AP-42 equation and the MAG

region approved silt loading values and other MAG-approved input parameters.

b. Do emissions from other sources need to be considered?

NO - This was agreed to during interagency consultation. Construction dust does not need to be modeled, and there are no major freight terminals or other facilities that need to be included in the model.

5. Select air quality dispersion model, data inputs, and receptors.
   a. Obtain and input required site data (e.g., meteorological).

Five years of surface meteorological data (2008 - 2012) from the Phoenix Sky Harbor Airport and five years of upper air data (2008 - 2012) from the Tucson International Airport will be provided by ADOT and used with CAL3QHCR.

b. Input MOVES and AP-42 outputs (emission factors).

Emission factors from MOVES and AP-42 re-entrained road dust emissions will be incorporated into CAL3QHCR model inputs.

c. Determine number and location of receptors, roadway links, and signal timing.

Receptors will be selected to estimate maximum impacts associated with the roadway and will follow EPA guidance recommendations for receptor placement in CAL3QHCR; receptor height will be set to 1.8 meters. Wind distribution patterns will be reviewed to assist in the selection of receptor locations impacted during stable atmospheric conditions; additional receptors will be located downwind of the modeled roadway. Receptor placement will be based on guidance in EPA-420-B-10-040, Section 7.6.2.

Roadway links will be defined by common characteristics; signal times will be used for queue links and will be based on applicable guidelines.

d. Run air quality dispersion model and obtain concentration results.

CAL3QHCR will be run for each quarter and year of meteorological data for the build, no-build and alternative locations selected for detailed dispersion analysis. Model results will be used to estimate maximum 24-hour PM_{10} concentrations.

6. Determine background concentration using existing monitors in the nonattainment or maintenance area representative of the project area.

Ambient monitoring data will be evaluated and selected carefully to determine appropriate background concentrations for the project area. Although the South Mountain project area includes monitoring stations with some of the highest PM_{10} concentrations in the valley (West 43rd Avenue Site), these concentrations are directly related to industrial and resource mining activities near the monitoring stations and are not representative of the ambient PM_{10} concentrations for the project area. To obtain representative background concentrations, data from a monitoring station in the region that is not impacted by local sources should be used. Data from all monitoring stations in the region will be reviewed to determine the most appropriate value through interagency consultation.
The MAG 2012 Five Percent Plan (Plan) demonstrates attainment of the 24-hour PM_{10} standard for three areas, including portions of the project area. The background values used in the Plan were 14.9 $\mu g/m^3$ for wind speeds less than or equal to 12 miles per hour (mph) (5.4 meters per second [m/s]) and 21.9 $\mu g/m^3$ for wind speeds greater than 12 mph (5.4 m/s). These values were based on data collected at a remote location approximately 30 miles west of the boundary of the project area.

At this time, a background concentration has not been determined; the selection of a background concentration will require coordination and consultation with ADOT, FHWA, and ADEQ. If EPA takes action on the 5% plan before the release of the FEIS, the MAG background value will be used. This approach was agreed to under interagency consultation.

7. Calculate design values and determine conformity.

    a. Add step 5 results to background concentrations to obtain values for the Build scenario.

        The 6th highest 24-hour concentration obtained over the 5 years of data for each receptor will be identified. Of these, the highest will be identified. This value will be added to the background concentration and rounded to the nearest $10\mu g/m^3$; this is the highest design value in the Build scenario.

    b. Do the design values allow the project to conform?

        The design values will be compared with the 24-hour NAAQS. If the highest build design value is less than or equal to the NAAQS, the project is in conformity. If the build design value is over the NAAQS, the No-build scenario will also be evaluated and compared to the build scenario.

8. Consider mitigation or control measures if the design values are above the NAAQS.

a. Consider measures to reduce emissions and redo the analysis. If mitigation measures are required for project conformity, they must be included in the applicable SIP and be enforceable.

   Mitigation measures will be considered if necessary

Documentation

Reviewers will be provided with all files necessary to replicate the analysis from beginning to end. This includes spreadsheets and other files containing raw modeling input data, MOVES Project Data Manager input spreadsheets, MOVES runspecs, input and output databases, and any spreadsheets used to consolidate MOVES output and road dust emissions factors into dispersion modeling input rates. This also includes CAL3QHCR input and output files and spreadsheet files with design value calculations.

Modeling files will use consistent naming conventions so that reviewers can determine which MOVES runspecs, input databases, input data spreadsheets, and output databases go together, and what each CAL3QHCR run signifies. The Description box will be used in MOVES runspecs to explain what each run does.

The provided documentation will include a brief "readme" document explaining what each file is. The documentation will also explain any anomalies (e.g., a MOVES output database that contains more than one run when others don't, etc.).

APPENDIX E

Interagency Consultation Meeting Minutes

FINAL MEETING MINUTES

H5764: SOUTH MOUNTAIN FREEWAY PM10 HOT-SPOT INTERAGENCY CONSULTATION

Date: May 20, 2014
Time: 1:30 PM
Summary Published Date: TBD
Location: ADEQ Conference Room 3100B, 1110 W. Washington St., Phoenix, AZ 85007
Prepared By: Joe D'Onofrio, Environmental Planning Group, EM 02
1611 W. Jackson St., Phoenix, AZ 85007 Phone: (602) 712-6161 Fax: (602) 712-3066

MEETING ATTENDEES

Diane Arnst	Arizona Department of Environmental Quality (ADEQ)
Steve Calderon	ADEQ
Bryan Paris	ADEQ
Lisa Tomczak	ADEQ
Joe D'Onofrio	ADOT Environmental Planning Group (EPG)
Ralph Ellis	ADOT EPG
Ruth Greenspan	ADOT EPG
Jonwoon Joo	ADOT Multimodal Planning Division
Darcy Anderson	ADOT Environmental Services (ES)
Wendy Terlizzi	ADOT ES
Steve Boschen	ADOT State Engineers Office (SEO)
Robert Samour	ADOT SEO
Keith Killough	ADOT Transportation Analysis
Carmelo Acevedo	ADOT Urban Project Management
Cathy Arthur	Maricopa Association of Governments (MAG)
Lindy Bauer	MAG Environmental Programs
Chaun Hill	MAG
Beverly Chenausky	Maricopa County Air Quality Division (MCAQD)
Ben Spargo	HDR

NOTE: The following meeting minutes have been organized by agenda topic and do not necessarily reflect the order in which items were discussed.

1) Introductions

Jonwoon Joo opened the meeting and began meeting attendee self-introductions.

2) ITEM 1 – Discussion on Meeting Minutes from October 17, 2013

Darcy Anderson asked attendees of the October 17, 2013 interagency consultation (IAC) if there were comments on the meeting minutes. There were no comments. Beverly Chenausky motioned to accept the minutes and Joe D'Onofrio seconded the motion. All attendees of the previous IAC who were there agreed.

3) ITEMS 2 and 3 – Discussion on options for PM10 hot-spot background calculation

Carmelo Acevedo stated the primary purpose of the meeting – to gain interagency consensus regarding removal of two air quality exceedance events registered by the West Chandler monitoring station that were determined to be data outliers in the determination of a background concentration for the PM10 hot-spot analysis.

Ralph Ellis provided a brief summary of events leading the current IAC on the PM10 hot-spot analysis and the background concentrations, specifically. FHWA provided guidance to reference the MAG 5% Plan for background concentrations in the PM10 hot-spot analysis. EPA disagreed with this approach. FHWA then directed the study team to use monitoring data from stations within the South Mountain study area. Data from four stations were used.

Darcy Anderson provided additional detail on the history of interagency discussions concerning the PM10 hot-spot analysis assumptions and analyses to date:

- Jeff Houk of FHWA (not in attendance) previously stated that the Draft EIS AQ analysis "began prior to the end of the grace period for qualitative analysis and the FEIS was issued < 3 years from the DEIS, so that analysis was sufficient at that time."
- ADOT and FHWA have updated the qualitative PM10 analysis to ensure a state-of-the-art quantitative analysis is completed for the proposed action.
- ADOT MPD completed two formal IACs with ADEQ in 2013 to discuss the modeling protocol, background concentrations, and design values for the PM10 hot-spot analysis.
- MAG provided updated traffic based on the 2010 census data for the air quality analyses.
- EPA expressed concern to FHWA about use of the MAG 5% Plan PM10 background concentration value in the hot-spot analysis, preferring the use of a chemical transport model (CTM) as recommended in their guidance.
- In response, FHWA directed ADOT to use an alternative method for the background concentration value based on reference to nearby monitoring station data; EPA recommended coordination between ADEQ and ADOT on the use of the monitoring data.
- ADOT and MCAQD identified representative monitor locations; four of six identified were chosen based on EPA guidance. The closest monitor location to the study area, located on the Gila Indian River Community, was eliminated due to the unapproved status of their QA plan by EPA.
- EPA and ADEQ provided guidance for removing PM10 exceptional days from the monitoring data. Additionally, exceptional-type event days based on draft National Cooperative Highway Research Program (NCHRP) guidance were followed in determining background concentrations for the hot-spot analysis; Darcy Anderson stated that the draft NCHRP report is not scheduled to be published until August 2014.
- Among the days removed from the monitoring data, April 3-4, 2012 at the West Chandler monitor were removed based on NCHRP draft guidance and were also shown to be statistical outliers, 6 standard deviations from the median (or greater than a 99% variation), from all other recorded data at this site in 2012 through a standard deviation statistical analysis.

4) ITEM 4 – Discussion on documentation of interagency consultation consensus

Comments on these assumptions and the Air Quality Technical Report (AQTR) [May 2014] followed.

- Diane Arnst requested a change of the word 'uncontrollable' in the AQTR in describing the exceedances that occurred on April 3-4, 2012 at the West Chandler monitoring station, describing it as a compliance issue. It was suggested and agreed upon by meeting attendees that the verbiage 'one-time compliance issue that was resolved within a 24-hour period' would be substituted throughout the AQTR.
- Bryan Paris also indicated that the two exceedance days occurred back-to-back within a 24-hour period and could therefore be considered one event.

- Darcy Anderson stated that the draft NCHRP guidance is based on a study of Phoenix monitoring station data and therefore appropriate as a methodology for removing exceptional-type events and establishing PM10 background concentrations. She also noted that the background concentration is used for a design value calculation and is not for regulatory purposes.
- Beverly Chenausky indicated that MCAQD and not ADEQ validates monitoring data for the stations used in the analysis because they are responsible for maintaining the stations.
- Chaun Hill asked if there were any concerns about a mix-and-match approach in the analysis of the monitors. Diane Arnst said there is no evidence that the event that occurred at the West Chandler station exhibits a repeating pattern throughout the year or year-to-year since no similar events having occurred at that station since April 3-4, 2012.
- Lindy Bauer asked if the ADEQ description of events at the West Chandler station as a 'one-time compliance issue that was resolved within a 24-hour period' was legally defensible. Diane Arnst said yes, because this was a non-recurring event and IAC can be used to establish appropriate background concentrations.
- Chaun Hill asked if IAC is sufficient for removing outliers in monitoring data. Beverly Chenausky said EPA guidance purposely leaves the determination of background concentrations open ended to be resolved through the IAC process.
- Carmelo Acevedo suggested adding language in the report indicating that the background concentration values used in the analysis are more conservative (higher) than those contained in the supplemental statistical analysis summarized in Appendix A. Beverly Chenausky suggested language from the MCAQD 2012 Air Monitoring Network Review could be used.
- Cathy Arthur questioned the inclusion in the AQTR Appendix A of the statement, regarding April 3-4, 2012, that "EPA requested that ADEQ not submit these events for formal exclusion by EPA". Darcy Anderson and Ralph Ellis suggested removing the language altogether.

Discussion Conclusion

- There was consensus among attendees that the April 3-4, 2012 exceedances at the West Chandler monitoring station are statistical outliers. The resultant 152 $\mu g/m^3$ background concentration for 2012 at the West Chandler monitoring station identified in the AQTR is valid.
- No additional IAC is required for the study.

ACTION ITEMS

1. Jeff Houk of FHWA will communicate to EPA Region IX that the outlier data issue with the West Chandler monitoring data has been resolved through the IAC process.

2. ADEQ and other attendees will submit additional comments on the AQTR to Ralph Ellis.

3. Suggested edits regarding the description of the West Chandler monitoring station exceedances on April 3-4, 2012 will be included in Appendix A of the AQTR.

4. The draft meeting minutes will be posted for review on the ADOT project website this week (ending 5/30/14).

Attachments (1) sign-in sheet and an agenda

Cc: Paul O'Brien

ADOT/ADEQ Consultation Meeting

Tuesday, May 20, 2014 • 1:30 P.M.-3:00 P.M.

ADEQ • 1110 West Washington Street, Room 3100B • PHOENIX, AZ 85007

Completion of this sign-in sheet is completely voluntary and helps the project team keep an accurate record of meeting attendees. Under state law, any identifying information provided below will become part of the public record and, as such, must be released to any individual upon request. Please print clearly.

NAME	TITLE	COMPANY	ADDRESS	PHONE	EMAIL
Ralph Ellis	Planning Sect. Mgr	ADOT		602-712-7973	REllis@AZDOT.Gov
Joe D'Onofrio	Noise & Air Specialist	ADOT	611 W Jackson St.	602-712-6161	JDOnofrio@AZDOT.gov
Daryl Anderson	Air Quality Program Coordinator	ADOT	"	602-712-6171	danderson3@azdot.gov
Ruth Greenspon	EPS Technical Section Manager	ADOT	"	602-712-6266	rgreenspon@azdot.gov
Wendy Terlizzi	Water & Air Quality Mgr.	ADOT	"	602-712-8353	wterlizz@azdot.gov
Ben Spargo	Consultant Project Manager	HDR	3200 E Camelback Suite 350, Phx, 85018	602 522-7776	ben.spargo@hdrinc.com
Joanwon Joo	Sr. Transport Planner	ADOT	206. S. 17th Ave Phoenix, AZ	602-712-7166	JJoo@azdot.gov
Keith Killough	Director, Transp Analysis	ADOT	"	602 712 6407	KKillough@azdot.gov
Steve Boschen	Deputy State Eng	ADOT	" "	602-712-7391	sboschen@azdot.gov
Lisa Tomczak	Planning Unit	ADEQ	1110 W. Washington PHX 85042	602-771-4450	l+5@azdeq.gov
Lindy Bauer	Env. Director	MAG	302 N 1st Ave Phx 85003	602-254-6300	lbauer@mag.az.gov

ADOT

ADEQ Arizona Department of Environmental Quality

FOR MORE INFORMATION:
azdot.gov

ADOT/ADEQ Consultation Meeting

Tuesday, May 20, 2014 • 1:30 P.M.-3:00 P.M.

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NAME	TITLE	COMPANY	ADDRESS	PHONE	EMAIL
Beverly Chenausky	AQ Planner	MCAQD	1001 N. Central Ave	602-506-6867	beverly.chenausky@maricopa.gov
Carmelo Acevedo	South Mtn Proj Mgr	ADOT		602 712 7559	CAcevedo@azdot.gov
STEVE CALDERON	SIP Mgr	ADEQ	1110 W. Washington ST.	602-771-2352	smc@azdeq.gov
Diane Arnett	Legal Support Atty	ADEQ	1110 W Washington	602-771-2375	da2@azdeq.gov
Robert Samour	Senior Deputy State Engineer	ADOT	206 South 17th Avenue	602 712-8274	rsamour@azdot.gov
Bryan Pares	ADEQ Manag.	ADEQ	1110 W. Wash.	602-771-7665	bp2@azdeq.gov
Cathy Arthur	MAG Associate	MAG	302 N 1st Ave Phoenix	602-254-6300	carthur@mag.com
CHAUN HILL	SENIOR PLANNER	MAG	302 N 1ST AVE PHOENIX	602-254 6300	chill@azmag.gov

ADOT

ADEQ Arizona Department of Environmental Quality

FOR MORE INFORMATION:
azdot.gov

ADEQ & ADOT INTERAGENCY CONSULTATION

Meeting Minutes

Tuesday, July 22nd, 2014
TIME: 10:30-11:30 p.m.
1611 West Jackson Street, Phoenix, AZ 85007

ATTENDEES: ADOT – Robert Samour, Carmelo Acevedo, Ralph Ellis, Joonwon Joo
ADEQ – Diane Arnst, Steve Calderon, Lisa M. Tomczak, Bryan Paris
HDR – Ben Spargo

ITEM 1: Welcome and Introductions
Carmelo Acevedo opened the meeting and attendees introduced themselves.

ITEM 2: Review of activities since May 20th meeting
Ben Spargo and Robert Samour discussed inter-agency activities related to the project since the last meeting (May 20th). Since Air Quality Report was submitted to the Environmental Protection Agency (EPA) on June 2, there has been ongoing comment and response between Federal Highway Association (FHWA) and EPA. Comment resolution conference calls were made on June 17th and July 15th, and formal comments are expected during the week of August 4th.

ITEM 3: Interagency Consultation Topics
1) Meteorological Data
Ben Spargo stated that Met-data for MOVES modeling was obtained from MAG that is consistent with regional PM10 conformity analysis, and that Met-data for CAL3QHCR modeling was purchased from Lakes Environmental by ADOT. He noted that the project team discussed about actual and model data issues with EPA. EPA was asked by FHWA to contact Lakes Environmental directly to discuss their concerns.

2) Receptor Locations
Ben Spargo noted that the project team also discussed verification of receptor locations with EPA and explained methods for receptor locations. Robert Samour mentioned that the team had agreed to make the recommended changes requested by the EPA. Hard copies of figures showing the receptor arrays were provided to the group to review.

3) Analysis Locations
Ben Spargo noted that the team concurred with EPA's I-10 system to system interchange location to be used to demonstrate conformity because of its projected 2035 traffic volume. He also stated that two

additional locations (Broadway Road and 40th Street) were selected, at the team's discretion to aid in replying to public comments and adhere to the NEPA process.

4) Background Value Calculation

Ben Spargo explained that a single monitor analysis method would be used for background value calculation to conform with EPA's requirements. Then, he discussed the monitor selection criteria for the three analysis locations. He explained why West Phoenix monitor for I-10 interchange, Durango Complex monitor for Broadway Road interchange and West Chandler monitor for 40th Street interchange locations were selected for the analysis.

Bryan Paris asked why West Phoenix monitor was selected over Greenwood monitor. Ben answered and Carmelo Acevedo emphasized that the Greenwood monitor was not chosen, because it would result in double counting the traffic influence on air quality because of the monitor's adjacent proximity to the freeway. Bryan Paris also asked why Durango monitor was selected over West 43rd Ave monitor since Durango monitor also has industrial land uses around its location. Ben Spargo answered that the teams chose not to use the West 43rd Ave monitor because it is an exclusive source monitor for the sand and gravel operations and the industrial activities in the surrounding area. The Durango monitor was ultimately recommended over the South Phoenix monitor based on it being closer and with similar surroundings.

Discussion Conclusion:

The project team will send the latest draft of Air Quality Analysis Technical Report for South Mountain Freeway and other accompanied documents to ADEQ. After reviewing the documents, ADEQ will notify ADOT of its final consensus decision on the methodologies used for the report by July 25th.

RESOURCES: Agendas and meeting minutes will be available on the MPD Air Quality Consultation Website @ http://www.azdot.gov/business/environmental-services-and-planning/air-quality-planning/conformity

MAG & ADOT INTERAGENCY CONSULTATION

Meeting Minutes

Thursday, July 24, 2014

TIME: 9:00-10:00 a.m.

302 N. 1st Avenue; Suite 200, Phoenix, AZ 85003

ATTENDEES: ADOT – Robert Samour, Carmelo Acevedo, Ralph Ellis
MAG – Chaun Hill, Lindy Bauer, Dean Giles
FHWA – Rebecca Yedlin (conference call)
HDR – Ben Spargo

ITEM 1: Welcome and Introductions

Carmelo Acevedo opened the meeting and attendees introduced themselves.

ITEM 2: Review of activities since May 20th meeting

Ben Spargo and Robert Samour discussed activities related to the project since the last meeting (May 20th). The Air Quality Report was submitted to the U.S. Environmental Protection Agency (EPA) on June 2. Since then, there has been ongoing comment and response between Federal Highway Association (FHWA) and EPA. FHWA and EPA held conference calls on June 17th and July 15th. During the July 15th call, EPA directed FHWA to update the analysis and methodology related to meteorological data, receptor locations, analysis locations and background value calculations. The focus of this meeting is to brief the area air quality agencies on the direction received from EPA and document concurrence through the interagency consultation process.

ITEM 3: Interagency Consultation Topics

1) Meteorological Data

Ben Spargo stated that met-data for MOVES modeling obtained from MAG is consistent with regional PM_{10} conformity analysis and that met-data for CAL3QHCR modeling was purchased from Lakes Environmental by ADOT. EPA had raised concerns related to the Lakes Environmental data and FHWA asked EPA to contact Lakes Environmental directly to discuss their concerns. FHWA has confirmed that EPA contacted Lakes Environmental, but it has not been confirmed whether the issue is resolved.

2) Receptor Locations

Ben Spargo stated that the project team has revised the receptor locations so that they are aligned in an array or grid surrounding the interchange analysis location. The first row of receptors is located on the right-of-way line, the second is 25 meters away from there, and then multiple rows at 50 meter spacing are included up to approximately 200 meters. Ben passed out maps showing the receptor location arrays at each analysis location. EPA had raised concern that additional receptors be included beyond 200

meters from the analysis locations. HDR prepared additional maps that displayed that the results at each receptor. These maps showed that concentrations decreased at receptors farther from the freeway and supporting that additional receptors were not warranted.

3) Analysis Locations

Ben Spargo stated that EPA expressed to the team that it is only required to analyze the worst-case location to demonstrate project conformity. EPA agreed that the I-10 system-to-system interchange represented the worst-case location. Therefore, the team will separate the analysis for the I-10 Interchange to specifically demonstrate conformity. Although not required, the project team will also present analysis results at two additional, Broadway Road and 40th Street, in the National Environmental Policy (NEPA) context and to respond to public interest and comment.

4) Background Value Calculation

Ben Spargo explained that EPA directed the team to use a single monitor to establish the background value for each analysis location. Each analysis location would be represented by a monitor in proximity and which represented the existing or planned surroundings at the analysis location.

For the I-10 Interchange, the West Phoenix monitor was selected because it was closest and because the Greenwood monitor would not be appropriate since it is already influenced by traffic-related emissions on I-10. For the Broadway Road Interchange, the Durango Complex monitor was recommended. The team determined that the West 43rd Avenue (which is closest to the analysis location) was not appropriate for use as a background monitor because its specific purpose is to measure maximum concentrations from sources or source categories including sand and gravel operations, auto- and metal-recycling facilities, landfills, paved and unpaved haul roads, and cement casting operations. Similar sources are not present at the Broadway Road Interchange site. For the 40th Street Interchange, the West Chandler monitor was selected because it was closest and was located south of the South Mountains.

Discussion Conclusion:

MAG expressed general concurrence with the methodology presented by the project team.

The project team will send the meeting presentation, notes, and sign-in to MAG for review. MAG agreed to respond to ADOT by July 25th.

RESOURCES: Agendas and meeting minutes will be available on the MPD Air Quality Consultation Website @ http://www.azdot.gov/business/environmental-services-and-planning/air-quality-planning/conformity

MCAQD & ADOT INTERAGENCY CONSULTATION

Meeting Minutes

Thursday, July 24, 2014
TIME: 1:00-2:00 p.m.
1611 West Jackson Street, Phoenix, AZ 85007

ATTENDEES: ADOT – Robert Samour, Carmelo Acevedo, Ralph Ellis, Joonwon Joo, Keith Killough
MCAQD – Ben Davis
HDR – Ben Spargo

ITEM 1: Welcome and Introductions
Carmelo Acevedo opened the meeting and attendees introduced themselves.

ITEM 2: Review of activities since May 20th meeting
Ben Spargo and Robert Samour discussed activities related to the project since the last meeting (May 20th). The Air Quality Report was submitted to the U.S. Environmental Protection Agency (EPA) on June 2. Since then, there has been ongoing comment and response between Federal Highway Association (FHWA) and EPA. FHWA and EPA held conference calls on June 17th and July 15th. During the July 15th call, EPA directed FHWA to update the analysis and methodology related to meteorological data, receptor locations, analysis locations and background value calculations. The focus of this meeting is to brief the area air quality agencies on the direction received from EPA and document concurrence through the interagency consultation process.

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Ben Spargo stated that the project team has revised the receptor locations so that they are aligned in an array or grid surrounding the interchange analysis location. The first row of receptors is located on the right-of-way line, the second is 25 meters away from there, and then multiple rows at 50 meter spacing are included up to approximately 200 meters. Ben passed out maps showing the receptor location arrays at each analysis location. EPA had raised concern that additional receptors be included beyond 200 meters from the analysis locations. HDR prepared additional maps that displayed that the results at each

receptor. These maps showed that concentrations decreased at receptors farther from the freeway and supporting that additional receptors were not warranted.

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Ben Spargo stated that EPA expressed to the team that it is only required to analyze the worst-case location to demonstrate project conformity. EPA agreed that the I-10 system-to-system interchange represented the worst-case location. Therefore, the team will separate the analysis for the I-10 Interchange to specifically demonstrate conformity. Although not required, the project team will also present analysis results at two additional, Broadway Road and 40th Street, in the National Environmental Policy (NEPA) context and to respond to public interest and comment.

4) Background Value Calculation

Ben Spargo explained that EPA directed the team to use a single monitor to establish the background value for each analysis location. Each analysis location would be represented by a monitor in proximity and which represented the existing or planned surroundings at the analysis location.

For the I-10 Interchange, the West Phoenix monitor was selected because it was closest and because the Greenwood monitor would not be appropriate since it is already influenced by traffic-related emissions on I-10. For the Broadway Road Interchange, the Durango Complex monitor was recommended. The team determined that the West 43rd Avenue (which is closest to the analysis location) was not appropriate for use as a background monitor because its specific purpose is to measure maximum concentrations from sources or source categories including sand and gravel operations, auto- and metal-recycling facilities, landfills, paved and unpaved haul roads, and cement casting operations. Similar sources are not present at the Broadway Road Interchange site. For the 40th Street Interchange, the West Chandler monitor was selected because it was closest and was located south of the South Mountains.

Ben Davis confirmed that the West 43rd Avenue monitor was located by EPA to measure maximum concentrations of pollutants and its readings are directly influenced by the heavy industrial activities surrounding it. Since the Broadway Road Interchange is not surrounded by similar heavy industrial activities, it is not appropriate as a representative background monitor for that location. Ben Davis also stated that the Durango Complex monitor is surrounded by a more diverse set of land uses including light industrial, residential that is more similar to the Broadway Road Interchange location.

Ben concluded by summarizing the methodology used to revise the Air Quality Report including updates to the CO methodology.

Discussion Conclusion:

Maricopa County Air Quality Division (MCAQD) expressed concurrence with the methodology presented by the project team.

APPENDIX F

Summary of Past Health Risk Assessment Studies for Highway Projects

A few MSAT health risk assessments have been performed for roadway projects by organizations other than FHWA. Two examples involve freight transportation associated with major seaport infrastructure projects: expansion of the China Basin area of the Port of Los Angeles and the Schuyler Heim bridge replacement to facilitate goods movement from the Port of Long Beach. Another involved roadway expansion projects related to the relocation of several thousand U.S. Marines to the island of Guam (Guam Haul Road project) and a fourth analysis was for a hypothetical roadway under a National Cooperative Highway Research Program (NCHRP) research project.

All four of the modeled health risk assessments involved very conservative assumptions regarding emissions and exposure. These assumptions are made to reduce the analysis workload, or simply because better information is not available, but they are a source of very large uncertainties. For example, each of the studies assumes constant exposure to fixed emissions rates. This is reasonable in the context of a risk assessment for a facility with relatively constant emissions (e.g., an industrial facility with a permit that allows it to emit a certain amount of a given pollutant per year), but it is not reasonable for motor vehicle emissions, which are affected over time by technology improvements and vehicle emissions regulations, and also by changes in traffic and congestion. All four of these studies assume that emissions will remain fixed for a long period of time (30 years for one study, 70 years for the other three) at levels expected for a given calendar year. In effect, they all assume that there will be no hybrid, electric or fuel cell vehicles, and that EPA will never again tighten vehicle emissions regulations. Because vehicle technology is improving and because EPA does have a long history of adopting tighter vehicle emissions control regulations (and has in fact adopted new, tighter “Tier 3” regulations), they likely overestimate the concentrations of pollutants that people would be exposed to.

Likewise, all four of the modeling studies assume constant breathing of outside ambient concentrations for either 30 or 70 years. The assumption that people will remain in a fixed location outdoors for any long period of time is incorrect, because people change residence (every 8 years on average), change jobs (every 3 years on average), change schools if they are of school age, and even travel to different parts of a metropolitan area over the course of a given day (26 miles per day of travel, on average). The assumption that a person at a given location will not do any of these things over a 30- or 70-year period introduces a considerable amount of uncertainty into risk assessment results.

The following table summarizes the findings of these studies with respect to near-road health risk from exposure to MSAT pollutants.

Study	Daily Traffic Volumes	Estimated Cancer Risk	Non-cancer Hazard Index, chronic/acute[1]	Pollutants
China Basin	Not applicable[2]	0.08/million[3]	0.0135/0.0025[3]	Acetaldehyde, benzene, formaldehyde, naphthalene, 4 other hydrocarbons, and 16 inorganic substances (mostly metals)
Schuyler Heim Bridge	60,540 (30,340 trucks)	0.3-0.6 per million[4]	<1.0 for all receptors and scenarios	Acetaldehyde, benzene, 1-3 butadiene, formaldehyde, chromium, nickel (varies by vehicle type)
Guam Haul Road	136,400	<2 in a million (2014 emissions),<1 in a million (2030 emissions)[5]	2014 emissions: 0.20/0.02 2030 emissions: 0.09/0.09	Acrolein, benzene, 1-3 butadiene, formaldehyde, naphthalene, polycyclic organic matter
NCHRP	125,000-334,000	1 in a million	(Not calculated for vehicle traffic)	Benzene only
For comparison purposes, daily traffic volumes on the South Mountain Freeway will range from117,000 to190,000 vehicles in 2035, depending on location.				

[1] This is a risk indicator for non-cancer health outcomes; values <1.0 are considered acceptable by EPA.

[2] This risk assessment was for a port project, which involved truck traffic and many other sources of emissions. Information in this table is based on the contribution of trucks at the maximum receptor, which is located adjacent to the port. While not a highway project, the port improvement project would result in an increase of approximately 4,300 trucks per day visiting the port.

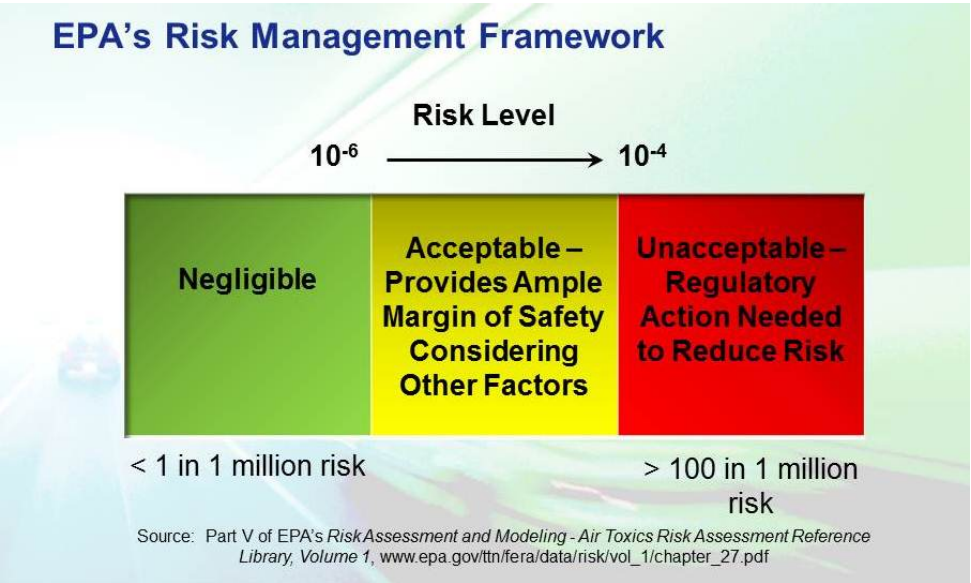
[3] Source: "Health Risk Assessment for the Port of Los Angeles Berth 97-109 Container Terminal Project," April 2008. Calculated from the maximum residential impact (Table E3-7-1) times the off-terminal truck contribution (Table E3-7-2) times the non-diesel particulate matter (DPM) contribution (Table E3-7-3). This is the incremental risk resulting from the proposed project. DPM was included in this study, and accounted for 99 percent of total cancer risk, but is not included in this summary because EPA has not adopted a cancer risk value for DPM. DPM is included in the non-cancer effects.

[4] From Table 3-1 of "Human Health Risk Assessment--Schuyler-Heim Bridge and SR-47 Expressway," October 2008. This is the incremental risk resulting from the proposed project. DPM was included in this study, and accounted for 97 percent of total cancer risk, but is not included in this summary because EPA has not adopted a cancer risk value for DPM.

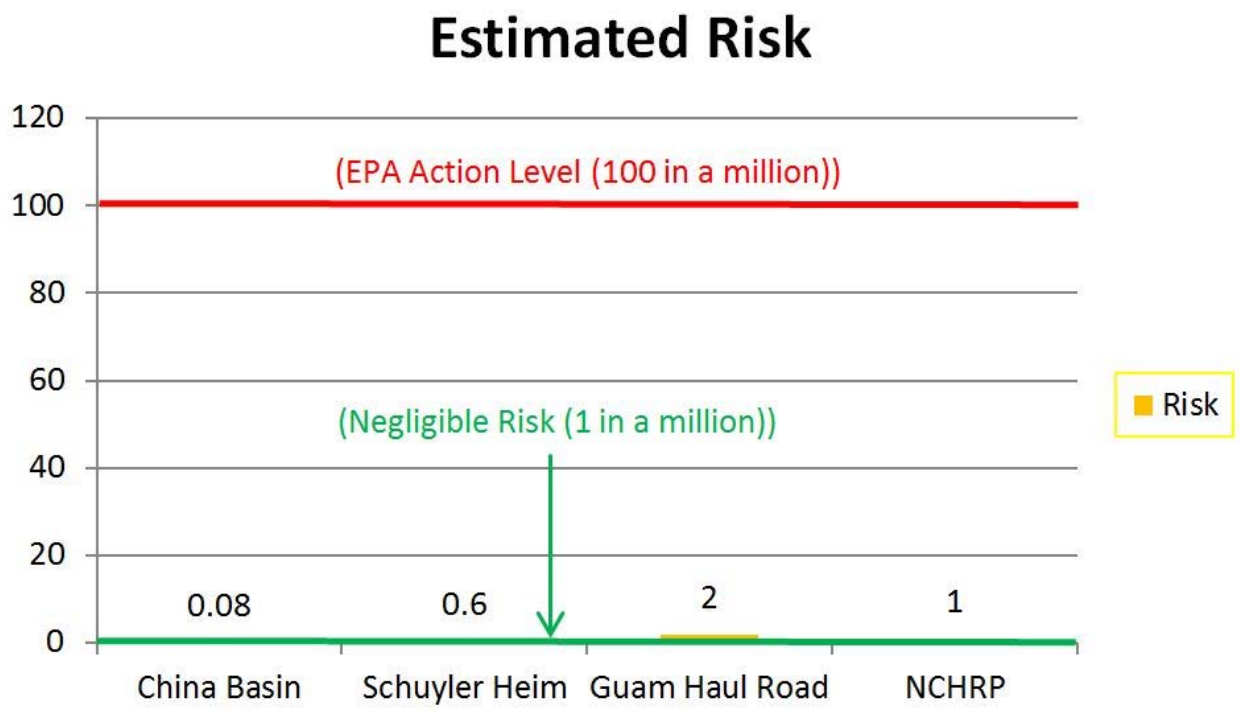
[5] At actual receptors. On sidewalks, cancer risk estimated at 4.3/million or less, hazard index <1.0. Risk calculated based on 30-year exposure.

The Schuyler-Heim analysis is unique it that it also included a population-weighted risk estimate, to reflect the fact that if there are not a million people in the study area, then the effective risk will be less. A population-weighted risk estimate (also known as a cancer burden estimate) applies the expected risk to the number of people in the area to estimate how many cases of cancer would occur. For example, if the risk is 2 cases of cancer per million people, and there are 50,000 people in the geographic area subject to this risk, then the population-weighted risk would be 0.025 of a person—that is, one of the 50,000 people would have a 2.5 percent additional chance of developing cancer, and the other 49,999 people would have zero additional risk. And again, even this low risk assumes that the person will breathe outdoor air at their residence continuously for 70 years, and that vehicle emissions will never decline.

What level of risk is acceptable?



There is no universally-accepted definition of "acceptable risk." The graphic above summarizes the risk management framework from EPA's Air Toxics Risk Assessment Reference Library, with an "acceptable" range between one in a million and 100 in a million, and an "action level" of risk over 100 in a million. A level of "one in a million" risk is frequently mentioned in discussions of health risk, but under EPA risk assessment guidelines, this merely represents a level below which risk is considered negligible, and is not a "standard" or other type of pass/fail threshold. All four of the highway risk assessment studies summarized in the table above identified risks much lower (between 50 and 1250 times lower) than EPA's 100 in a million "action level," even using very conservative assumptions regarding emissions and exposure. The graph below re-summarizes the incremental risk findings in the context of EPA's risk management framework:



To a large extent, the level of "acceptable risk" is up to the judgment of the person subject to the risk. For example, in 2010, there were 2.47 million deaths in the US, and 32,728 of these were due to traffic fatalities, meaning that the risk of dying in a traffic accident in 2010 was 0.0106 percent (106 in a million per year, or 7,420 in a million extended over a 70-year lifetime). Most people seem to consider this risk acceptable, because they do not decline to make vehicle trips to avoid it.[6] (Also, if the MSAT risk estimates in the studies summarized above are correct, it means that the risk of cancer from breathing air near a major roadway is several hundred times lower than the risk of a fatal accident from using one.)

EPA must make decisions regarding acceptable risk when it develops regulations to control hazardous air pollutants (air toxics) under Titles II and III of the Clean Air Act. EPA's National Emission Standards for Hazardous Air Pollutants (NESHAPs) standard for benzene emissions is based on attaining a risk level of no more than 100 cases of cancer per million people. This regulation was challenged in court, and upheld[7]. EPA's 2007 mobile source air toxics rule, covering vehicles, fuels, and fuel containers, is designed to result in a remaining risk of approximately 5 in a million[8].

[6] The 308,745,538 people in the US in 2010 generated 2.96 trillion vehicle miles of travel on roadways in 2010, for an average of 9587 miles per person, or 26.3 miles per person per day. If a person travelled that distance each day for an entire 70-year lifetime, they would have a one-in-a-million chance of dying in a traffic accident for each 90 miles of driving (about 3 days' worth).

[7] Natural Resources Defense Council v. Environmental Protection Agency, No. 07-1053, June 8, 2008

[8] Table 3.2-14, Final Regulatory Impact Analysis, Control of Hazardous Air Pollutants from Mobile Sources, February 2007