APPENDIX J
AIR QUALITY TECHNICAL REPORT

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AIR QUALITY ANALYSIS

TECHNICAL REPORT

I-69, Evansville to Indianapolis

Section 5 - SR 37 to SR 39

Monroe and Morgan Counties, Indiana

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1.0 INTRODUCTION

The air quality analysis for the I-69 Tier 1 Final Environmental Impact Statement (FEIS) generated comparative emissions data for each of the corridor alternatives and identified any alternatives that might have a high likelihood of placing the air quality conformity status of either Indianapolis or Evansville in jeopardy. The Tier 1 FEIS found that there were minor differences in the area-wide ozone impacts for the alternatives, but that none of the final alternatives (including Preferred Alternative 3C) would place the air quality conformity status of Indianapolis or Evansville in jeopardy.

The Build Alternatives for Tier 2 Section 5 are located within the existing SR 37 corridor, which is more densely developed in the southern portion than in the northern portion. The following Tier 2 air quality conformity analysis uses the Preferred Alternative (Alternative 8). The analysis must show that it conforms to the State Implementation Plan (SIP) by not causing or contributing to any new violations of the National Ambient Air Quality Standards (NAAQS), increasing the frequency or severity of NAAQS violations, or delaying the timely attainment of the NAAQS or any interim milestones, in accordance with requirements of Section 176(c) of the Clean Air Act (CAA). Under the National Environmental Policy Act (NEPA), Carbon Monoxide (CO) and Mobile Source Air Toxics (MSATs) were also analyzed.

The regional conformity issues in Section 5 involve the Morgan County 8-hour ozone maintenance area and the $PM_{2.5}$[1] nonattainment area. Monroe County is in attainment for the NAAQS.

As mentioned, this report also addresses MSAT and the health effects related to MSAT. For the reasons given later in the report, a quantitative analysis of MSAT emissions is not required for this project.

Finally, this report also addresses the emerging issue of Greenhouse Gases (GHG).

2.0 CONFORMITY REQUIREMENTS

The CAA requires the United States Environmental Protection Agency (USEPA) to establish NAAQS for pollutants that are considered to be harmful to the public health and environment.

The Clean Air Act Amendments (CAAA) of 1990, linked transportation funding to air quality actions. Specific requirements aimed at transportation may include vehicle inspection and maintenance, reformulated fuels, alternative-fuel vehicles, and transportation control measures. Federal funding is available for certain projects that benefit air quality.

[1] Particulate matter 2.5 microns or smaller in size (a potential air pollutant).

The Federal Highway Administration (FHWA), in consultation with Indiana Department of Environmental Management (IDEM), USEPA, and Indiana Department of Transportation (INDOT), is responsible for determining transportation conformity in nonattainment and maintenance areas for the transportation-related pollutants: ozone, NO_2, PM, and CO. The Section 5 corridor is located in Monroe and Morgan Counties. Monroe County is in attainment for all NAAQS, and thus, conformity requirements do not apply. Morgan County is in nonattainment for the $PM_{2.5}$ (1997) standard, is a maintenance area for 8-hour ozone (re-designated to maintenance 10/19/2007) and in attainment for all other NAAQS pollutants.

Under the CAA, USEPA set forth NAAQS for six principal pollutants—PM, sulfur dioxide (SO_2), CO, ozone, nitrogen dioxide (NO_2), and lead.[2] An area that does not meet the NAAQS for one or more pollutants is designated by the USEPA as a "nonattainment area." An area that was formerly in nonattainment and now meets the NAAQS is known as a "maintenance area" for a period of 20 years after coming into attainment. Under the CAA, each state is required to establish a plan for achieving the NAAQS in nonattainment areas and maintaining the NAAQS in maintenance areas. This plan is known as the State Implementation Plan (SIP).

Section 176 of the CAA prohibits federal agencies from approving, funding, or supporting in any way actions in nonattainment or maintenance areas unless the federal agency determines that the action "conforms" to the applicable SIP for that area. Regional and project-level requirements must be met before a Record of Decision (ROD) can be issued for non-exempt federal transportation projects. At the regional level, a project must be included in a regional emission analysis which demonstrates that future emissions from the transportation system are consistent with the SIP for any pollutants contributing to the designation of an area as nonattainment or maintenance for NAAQS. CO and/or PM project-level analyses are required if the project falls in a nonattainment or maintenance area for these pollutants. This is done to demonstrate that emission concentrations adjacent to the new roadway are below the USEPA standard.

Because of the maintenance designation for 8-hour ozone and nonattainment for $PM_{2.5}$, the I-69 project (Section 5, Morgan County) is subject to transportation conformity requirements found in 40 CFR Part 93, as amended. These requirements are met through the inclusion of the project in the Indianapolis Metropolitan Planning Organization's (MPO) long-range transportation plan, which must conform with the SIP as a whole. As of the publication of this document, the Indianapolis MPO has adopted a draft of the *2035 Long-Range Transportation Plan: 2012 Amendment* that includes the approved Section 5 project corridor. It also includes the corresponding "Air Quality Conformity Determination Report."[3]

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[2] For further information about the NAAQS and criteria pollutant levels, please refer to USEPA's NAAQS website, http://www.epa.gov/air/criteria.html

[3] Indianapolis MPO, 2035 Long Range Transportation Plan and Amendment, http://www.indympo.org/Plans/Documents/2035LRTP_2012Amendment_Final.pdf

Since Morgan County has been designated a maintenance area for 8-hour ozone and nonattainment for the annual $PM_{2.5}$ standard, a regional-level conformity analysis must demonstrate that emissions from the I-69 Section 5 project are below the SIP budgets for volatile organic compounds (VOCs) and NO_x. Since Morgan and Monroe counties are in attainment for CO, project-level analyses are not required for a transportation conformity determination for the proposed project in Section 5. Nevertheless, a worst-case CO project-level analysis was performed for information purposes to demonstrate that there are no local air quality impacts associated with CO under NEPA.

A joint FHWA/Federal Transit Administration (FTA) policy memorandum of May 20, 2003, provides clarifying guidance concerning air quality conformity requirements for projects in nonattainment or maintenance areas requiring Environmental Impact Statements (EIS). For a copy of this memorandum, see **Appendix L** of the DEIS, *Air Quality Conformity* (*Policy Memorandum: Clarification of Transportation Conformity Requirements for FHWA/FTA Projects Requiring Environmental Impact Statements*. The memorandum states that, in general, any required conformity determination should be made by the time of the FEIS, but in any event, "the conformity determination must be made prior to the issuance of the Record of Decision (ROD)." Therefore, the conformity requirements for Section 5 must be completed before the Tier 2 ROD for Section 5 can be signed.

3.0 PROJECT DESCRIPTION

The purpose of the project for Section 5 is to advance the overall goals of the I-69 Evansville-to-Indianapolis project in a manner consistent with the commitments in the Tier 1 ROD, while also addressing local needs identified in the Tier 2 process. The local needs identified in Tier 2 for Section 5 include:

- Complete Section 5 of I-69 Between Victor Pike South of Bloomington and SR 39 in Martinsville
- Reduce Existing and Forecasted Traffic Congestion
- Improve Traffic Safety
- Support Local Economic Development Initiatives

Section 5 begins at just north of the intersection of SR 37 and Victor Pike, south of Bloomington, and continues northward to just south of the existing interchange of SR 37 and SR 39 in Martinsville. This section of the I-69 project is approximately 21 miles in length and extends through Monroe and Morgan Counties, Indiana, along the alignment of existing SR 37, a multi-lane divided principal arterial highway with partial access control. The majority of the corridor is in Monroe County.

4.0 ALTERNATIVES UNDER CONSIDERATION

4.1 No-Build Alternative

The No-Build Alternative is one in which FHWA would take no action to construct Section 5 of I-69. Under the No-build Alternative, no federally funded highway project would be implemented, and traffic from the existing and future developments would use the local roadways. The No-Build Alternative was not selected in the Tier 1 ROD. While this alternative will not receive further consideration, it does provide a baseline for environmental analysis.

4.2 Build Alternatives

Generally, the description for Build Alternatives 4, 5, 6, 7 and Preferred Alternative 8 are complex and extensive. Please refer to **Chapter 6**, *Comparison of Alternatives*, of the DEIS for a complete narrative of the build alternatives for Section 5.

5.0 METHODOLOGY

5.1 Introduction

The primary source of air pollutants associated with either construction of a new highway or the improvement of an existing highway is from motor vehicle use. One major pollutant emitted by motor vehicles is CO, which is formed primarily by the combustion of fuel associated with transportation. EPA and FHWA regulations require that Ozone, CO, $PM_{2.5}$, MSAT and GHG be analyzed for proposed projects as part of the NEPA and/or air quality conformity process.

5.2 Analysis Techniques

5.2.1 Carbon Monoxide

In general, CO emissions are associated with large volumes of slow-moving traffic, such as exists at highly congested intersections. A project-level analysis for CO is a standard part of the NEPA process for highway projects. A project level analysis is known as a "microscale" analysis because it focuses on a relatively small geographic area.

The purpose of a CO project-level analysis is to determine if CO emissions generated by a proposed project would cause or contribute to an exceedance of the air quality standard for CO as promulgated by the USEPA. The NAAQS for CO are found in 40 CFR Part 50, and are as follows:

One hour:	35 ppm or 40 mg/m^3
Eight hour:	9 ppm or 10 mg/m^3
Note:	ppm = parts per million; mg/m^3 = milligrams per cubic meter

These concentration values may not be exceeded more than once per year. Any computer-modeled concentration that occurs above either the 1-hour or 8-hour standard is considered a violation. Because CO is a product of combustion, is relatively inert, and is emitted near the ground surface, the highest concentrations are typically found near the source.

For the Tier 2 study, a CO project-level analysis comparing existing and future conditions (build and no-build) was performed for the worst-case areas carrying the highest traffic volumes in the project corridor. The highest intersection traffic volumes were found at the SR 46/southbound on-ramp intersection. The highest traffic volumes for the free-flow segment were found along SR 37 between the SR 48/3rd Street and SR 46 street interchanges.

The dispersion of CO in the Study Area was simulated using CAL3QHC (with CAL3Q Interface software), a microcomputer dispersion model developed to predict the level of CO or other inert pollutant concentrations. The model predicts concentrations based on motor vehicles traveling near roadway intersections. It is the standard model used by USEPA for these types of analyses. The analysis used simulated meteorological conditions designed to yield "worst-case" CO concentrations. One-hour and 8-hour concentrations were calculated to permit comparison with air quality standards for CO, which are described above.

The results of the analyses conducted for the Existing Condition, the No-build and Build alternatives are presented in Section 4 of this report. The forecast year used in this analysis (for the Build and No-Build conditions) was 2035, which is consistent with the forecast year used for other analyses in the Tier 2 study.

Data inputs to the computer model include: motor vehicle traffic volumes, motor vehicle emission factors, worst-case meteorological conditions, signal timing, and receptor and roadway site geometry. CO emission factors (i.e., the rates at which vehicles emit CO) were generated using the Easy Mobile Inventory Tool (EMIT) computer modeling program. The inputs/outputs for these models will be provided to INDOT and FHWA on a CD upon completion of the analysis.

The air quality analysis was conducted under simulated meteorological conditions designed to yield "worst-case" CO concentrations. These conditions include:

Wind Speed – The wind speed was assumed to be one meter per second (1 m/sec), which represents very little, or no dispersion of the pollutants.

Stability Class – Pasquill's stability class is a measure of atmospheric turbulence, and ranges from "A" (very turbulent) to "F" (very stable). Stability class "D" (neutral) was used to model the free-flow and project-level portions of the project corridor.

Wind Angle – The wind angle may vary from 0° to 360°, depending on the receptor site locations. The computer model has the flexibility of requiring the program to conduct an incremental worst-case wind angle search. A wind angle search in increments of 10° was used for this analysis.

Surface Roughness – Local terrain characteristics, or surface roughness, can affect the dispersion of pollutants. Surface roughness can range from 1 cm (0.4 inch) for flat, level terrain to 500 cm (16.4 feet) for urban areas (e.g., central business district). A roughness of 108 cm (single-family residential area) was used for the analysis at SR 46, and 0.75 cm (long grass area) for the free-flow analysis.

Mixing Height – The mixing height algorithm is intended for the study of nocturnal inversions. It was assigned a value of 1,000 meters (3,280 feet).

Background Concentrations – All CO concentrations emitted by sources other than those modeled are considered background concentrations. They originate from either nearby parking lots or nearby adjacent intersections. For the purposes of this study, one-hour and eight-hour background concentrations of 2.0 ppm and 1.2 ppm, respectively, were used.

In addition to meteorological input data, the computer model requires the roadway and receptor site geometries to be defined within a Cartesian coordinate system. Roadway segments are defined as free-flow links each having a constant width, height, traffic volume, and emission factor. Receptors are located where the maximum total projected pollutant concentration is most likely to occur, as described above.

The air quality impacts analysis associated with the existing alignment, the No-Build, and the Build Alternatives were based on average daily traffic (ADT) and peak hourly volume projections for the year 2035 developed for this project.

The modeling procedure described above was used to predict hourly "worst-case" CO concentrations. One-hour and eight-hour concentrations were calculated to permit comparison with NAAQS. Eight-hour concentrations were determined by subtracting the one-hour background concentration from the total one-hour concentration, then multiplying this value by the persistence factor. A persistence factor of 0.7 was used to account for the variation in traffic and meteorological conditions over an eight-hour period. The eight-hour background concentration was added to arrive at the total eight-hour concentration.

5.2.2 $PM_{2.5}$

The USEPA initially issued guidance for completion of qualitative (project-level) analysis of $PM_{2.5}$ on March 29, 2006. For projects located in nonattainment areas, USEPA issued public guidance for quantitative project-level analysis (USEPA-420-B-10-040, December, 2010). Qualitative or quantitative $PM_{2.5}$ assessments are only required for projects of air quality concern within $PM_{2.5}$ nonattainment areas. Since the Morgan County portion of the Section 5 study area is in the nonattainment area for $PM_{2.5}$, an analysis is required. The interagency coordination process is ongoing to determine the need for a quantitative project-level analysis. The results will be discussed in the FEIS.

5.2.3 MSAT

The FHWA has developed a tiered approach for analyzing MSAT in NEPA documents, depending on specific project circumstances. This project is considered a "minor widening project" (Low Potential MSAT Effects). A "minor highway widening project" includes those efforts for which the ultimate traffic level is predicted to be less than 150,000 AADT. The design year AADT's are predicted to be below 100,000. Prototype language is included in **Section 5.9.5,** *Analysis*, in the subsection, "MSAT Qualitative Analysis".

A qualitative analysis of MSAT is required for Section 5 of I-69 as the forecasted daily traffic volumes do not reach the significantly higher threshold level requiring a quantitative analysis.

The qualitative analysis for projects with low potential for MSAT effects involves a comparison of the vehicle miles travelled (VMT) for the Build and No-build Alternatives because the amount of MSAT emitted is proportional to VMT.

6.0 AIR QUALITY ANALYSIS

6.1 Ozone Analysis

Morgan County is a maintenance area for 8-hour ozone standard. Mobile sources (cars and trucks) contribute to the generation of ozone by emitting hydrocarbons (also known as volatile organic compounds, or VOCs) and NO_x. Air quality modeling is required to demonstrate that the projects in the Indiana Statewide Transportation Improvement Program (INSTIP) and Statewide Long-Range Transportation Plan conform.

The Indianapolis Metropolitan Planning Organization (MPO) adopted the 2035 Long-Range Transportation Plan: 2012 Amendment that includes the approved Section 5 project corridor and corresponding "Air Quality Conformity Determination Report", dated July 23, 2012.[4] With this determination report, the FHWA and FTA found the Indianapolis MPO 2035 Transportation Plan updated and FY 2009-2012 Tips as amended, which include the I-69 project, demonstrate conformity for 8-hour ozone and the annual standard for $PM_{2.5}$ as required by the conformity rule.

USEPA issued a Federal Register Notice on April 30, 2012 designating nonattainment areas for the new more restrictive 8-hour Ozone Standard (2008 standard of 0.075 ppm, rather than 1997 0.08 standard in which Morgan County was determined "maintenance"). The air quality in Indiana has improved to the point that the only two areas in Indiana have been determined nonattainment to the new more restrictive standard: the Cincinnati area (Lawrenceburg Township in Dearborn County, Indiana) and the Chicago area (Lake & Porter County in

[4] Indianapolis MPO, 2035 Long Range Transportation Plan and Amendment, http://www.indympo.org/Plans/Documents/2035LRTP_2012Amendment_Final.pdf ..

Northwest Indiana). Morgan County is listed as attainment to the new more restrictive 8-hour ozone standard, along with most of the rest of Indiana. "Therefore, for transportation conformity purposes, this final rule provides a seamless transition from demonstrating conformity for the 1997 ozone NAAQS to demonstrating conformity for the 2008 ozone NAAQS. Revoking the 1997 ozone NAAQS one year after the effective date of designations for the limited purpose of transportation conformity would leave no gap in conformity's application in any 2008 ozone nonattainment area." USEPA will revoke the 1997 8-hour Ozone standard for purposes of demonstrating conformity in July 2013. FHWA will no longer need to demonstrate conformity to the ozone SIP for Central Indiana (including Morgan County) once the 1997 8-hour Ozone Standard is revoked for purposes of demonstrating conformity.

USEPA also issued a Federal Register Notice on June 21, 2012[5] that found the updated Central Indiana 8-hour Ozone SIP (1997 NAAQS) adequate for conformity demonstration purposes. The 8-hour Ozone SIP was updated using MOVES and the 2009 Indiana fleet mix data. This new maintenance SIP budget became effective July 23, 2012.

6.2 CO Intersection Project-level Analysis

Existing Condition: The results of the Existing Condition analysis indicate that the highest predicted 1-hour concentration of CO is 6.1 ppm, while the highest 8-hour concentration is 4.1 ppm. These concentrations represent the results of a worst-case screening model run. The results of the screening indicate that the total concentrations are well below both the 1-hour (35 ppm) and 8-hour (9 ppm) NAAQS criteria.

Future No-build Condition: The results of the worst-case screening analysis for the Future No-build Condition analysis indicate that the highest predicted 1-hour concentration is 5.5 ppm, while the highest 8-hour concentration is 3.7 ppm. The results of the screening indicate that the total concentrations are well below both the 1-hour (35 ppm) and 8-hour (9 ppm) NAAQS criteria. When compared to the Existing Condition, the predicted 1-hour and 8-hour CO concentrations for the Future No-build Condition are decreased.

Build Alternative: The results of the worst-case Build Alternative analysis indicate that the highest 1-hour concentration is 6.7 ppm, while the highest 8-hour concentration is 4.5 ppm. When compared to the Existing and Future No-Build Conditions, the 1-hour and 8-hour CO concentrations for the Build Alternative are predicted to increase slightly. The screening analysis are indicative of Build Alternative results that do NOT take account for an optimized intersection design which is still under development, i.e., optimal level of service, signal timing, signal phasing, number of lanes, etc. As a result, the actual CO concentrations will likely be below the worst-case screening results shown above. Nonetheless, the worst-case screening results are still below the NAAQS criteria.

[5] 77 FR 120, page 37328, June 21, 2012.

6.3 CO I-69 / SR 37 Free-flow Section Analysis

The maximum worst-case screened 1-hour CO concentration for the Build Alternative is 3.5 ppm, while the highest 8-hour concentration is 2.3 ppm. None of the CO values pertaining to I-69, either now (SR 37) or in 2035, exceeds the NAAQS criteria. There is a slight increase in total CO concentrations over the Future No-Build condition as a result of the predicted traffic increase; however, the values are still well below the NAAQS criteria (1-hour: 35 ppm, 8-hour: 9 ppm).

None of the CO values pertaining to this section of I-69, either now or in 2035, exceed the ambient air quality standards mandated by the USEPA. **Table 1** shows the CO concentrations for both the intersection project-level and free-flow analyses.

Table 1: Maximum 1-Hour and 8-Hour CO Concentrations (ppm)

Modeled Segment	Modeled Location	Existing Roadway Network		Future No-Build Year 2035		Build Alternative Year 2035	
		1-Hr.	8-Hr.	1-Hr.	8-Hr.	1-Hr.	8-Hr.
Intersection	SR 46/Southbound entrance ramp to I-69	6.1	4.1	5.5	3.7	6.7*	4.5*
Free-flow	SR 37/ I-69 between 3rd Street/SR 48 and SR 46	3.4	2.2	3.1	2.0	3.5	2.3

National Ambient Air Quality Standards: 1-hour: 35.0 parts per million (ppm); 8-hour: 9.0 ppm
Background CO Concentrations: 1-hour: 2.0 ppm; 8-hour: 1.2 ppm
**Worst-case analysis. The Build Alternative results do NOT take account for an optimized intersection design which is still under development, i.e., optimal Level-of-Service, signal timing, signal phasing, number of lanes, etc. As a result, the actual CO concentrations will likely be below the worst-case screening results shown above. Nonetheless, the worst-case screening results are still below the NAAQS criteria.*

6.4 $PM_{2.5}$ Analysis

In addition to demonstrating conformity in nonattainment and maintenance areas for the NAAQS at the regional-level, transportation conformity requirements may also require project-level analyses for $PM_{2.5}$ in nonattainment and maintenance areas. Section 93.109(b) of the federal conformity rule states the requirements for project-level conformity determinations. It specifies that interagency consultation is required to determine whether a project meets the criteria that would require a project-level analysis. Since Morgan County is in nonattainment of the standard, interagency coordination was initiated during a conference call on August 23, 2012, with state and federal agencies involved in the project planning process. The interagency call included an overview of the project and identified additional data needs to support future decisions. During subsequent interagency meetings, a determination will be made if a quantitative analysis is appropriate, along with the methods and procedures to be used for conducting that analysis, if needed.

6.5 MSAT Analysis

On September 30, 2009, FHWA issued an interim guidance update to the February 3, 2006, interim guidance on addressing MSAT in NEPA documents. The guidance is considered interim because MSAT analysis research is still ongoing. As the science progresses, FHWA will update the guidance.

In addition to the NAAQS, USEPA also regulates air toxics. The CAAA of 1990 identified 188 air toxics, also known as hazardous air pollutants. USEPA has assessed this expansive list of toxics and identified a group of 93 compounds as mobile source air toxics, which are set forth in the latest USEPA rule, Control of Emissions of Hazardous Air Pollutants from Mobile Sources.[6] USEPA also extracted a subset of this list of 93 that it now labels as the seven priority MSATs. These are *acrolein, benzene, 1,3-butadiene, diesel particulate matter/diesel exhaust organic gases, formaldehyde, naphthalene, and polycyclic organic matter.* Some of these toxic compounds are present in fuel and are emitted to the air when the fuel evaporates or passes through the engine unburned. Other toxics are emitted from the incomplete combustion of fuels or as secondary combustion products. Metal air toxics result from engine wear or from impurities in oil or gasoline. While these MSATs are considered the priority transportation toxics, USEPA stresses that the lists are subject to change and may be adjusted in future revisions to the rules.

The 2007 USEPA rule mentioned above requires controls that will dramatically decrease MSAT emissions through cleaner fuels and cleaner engines. According to an FHWA analysis, the total annual emission rate for the priority MSAT will be reduced even if the VMT increase.

Air toxics analysis is a continuing area of research. While much work has been done to assess the overall health risk of air toxics, many questions remain unanswered. In particular, the tools and techniques for assessing project-specific health outcomes as a result of lifetime MSAT exposure remain limited. These limitations impede FHWA's ability to evaluate how mobile source health risks should factor into project-level decision-making under NEPA. In addition, USEPA has not established regulatory concentration targets for the seven relevant MSAT pollutants appropriate for use in the project development process. Given the emerging state of the science and of project-level analysis techniques, there are no established criteria for determining when MSAT emissions should be considered a significant issue in the NEPA context.

Nonetheless, air toxics concerns continue to be raised on transportation projects during the NEPA process. As the science emerges, FHWA is increasingly expected by the public and other agencies to address MSAT impacts in its environmental documents. FHWA has issued an interim guidance on how MSATs should be addressed in NEPA documents for highway projects while research is ongoing to try to more clearly define potential risks from MSAT emissions

[6] Federal Register, Vol. 72, No. 37, page 8430, February 26, 2007.

associated with transportation projects. FHWA will continue to monitor the developing research in this emerging field.

The FHWA has developed a three-tiered approach for analyzing MSAT in NEPA documents, depending on specific project circumstances. For the design year 2035, I-69 is forecasted to have an ADT of approximately 92,000 vehicles per day (VPD) as the highest volume (Alternative 5, between SR 48/3rd Street and SR 46) of all the proposed alternatives. As traffic for the design year 2035 is below the 140,000 to 150,000 ADT threshold, I-69 falls into the second analysis level involving a qualitative analysis for projects with low potential MSAT effects.

USEPA has existing and newly promulgated mobile source control programs that include the reformulated gasoline program, national low emission vehicle standards, Tier 2 motor vehicle emissions standards and gasoline sulfur control requirements, heavy duty engine and vehicle standards, and on-highway diesel fuel sulfur control requirements. Thus, USEPA regulations for vehicle engines and fuels will cause overall MSAT emissions to decline significantly over the next several decades. Based on regulations now in effect, an analysis of national trends with USEPA's MOBILE 6.2 model forecasts a combined reduction of 72 percent in the total annual emission rate for the priority MSAT from 1999 to 2050 while vehicle miles of travel are projected to increase by 145 percent, as shown in **Figure 1** and **Table 2**.

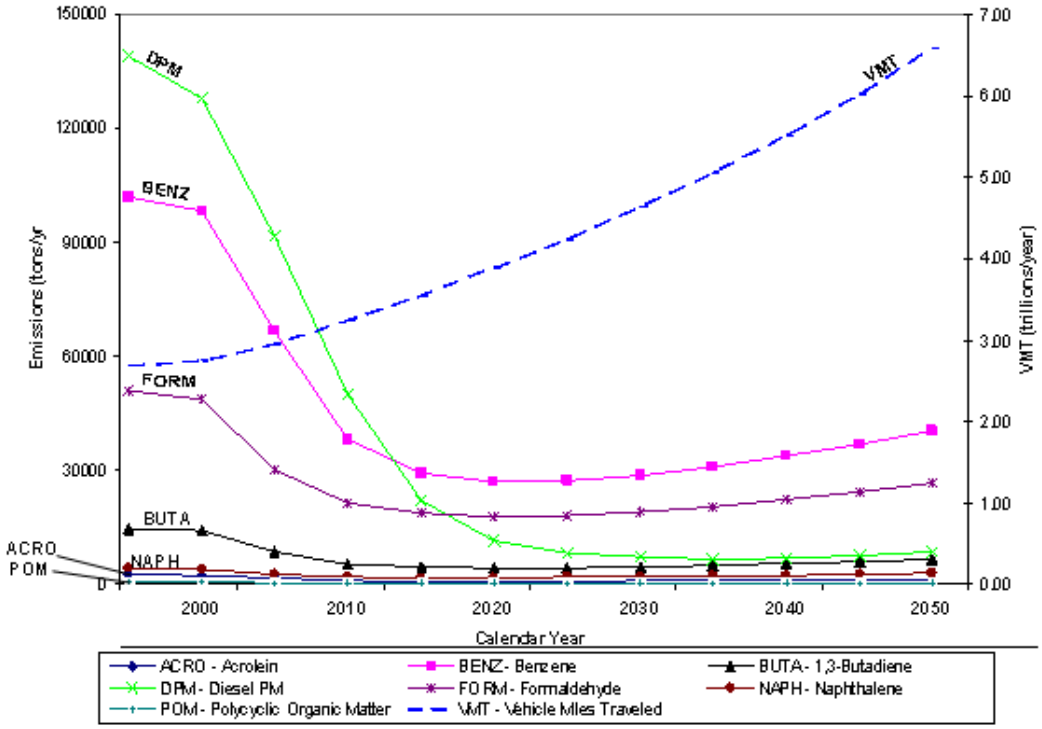

Figure 1: National MSAT Emission Trends 1999-2050 for Vehicles Operating on Roadways Using EPA's MOBILE6.2 Model

Source: USEPA. MOBILE6.2 Model run, 20 August 2009.
Note: (1) Annual emissions of polycyclic organic matter are projected to be 561 tons/year for 1999, decreasing to 373 tons/year for 2050.
Note: (2) Trends for specific locations may be different, depending on locally derived information representing vehicle-miles travelled, vehicle speeds, vehicle mix, fuels, emission control programs, meteorology, and other factors.

Table 2: Projected National MSAT Emissions and Percent Reduction for 1999-2050 for Vehicles Operating on Roadways Using EPA's MOBILE6.2 Model

Pollutant/VMT	Pollutant Emissions (tons) and Vehicle-Miles Traveled (VMT) by Calendar Year							Reduction-1999 to 2050
	1999	2000	2010	2020	2030	2040	2050	
Acrolein	2,570	2,430	1,000	775	824	970	1,160	-55%
Benzene	102,000	98,400	38,000	27,000	28,700	33,900	40,500	-60%
1,3-Butadiene	14,400	14,100	5,410	4,360	4,630	5,460	6,520	-55%
Diesel PM	139,000	128,000	50,000	11,400	7,080	7,070	8,440	-94%
Formaldehyde	50,900	48,800	21,400	17,800	19,000	22,400	26,800	-47%
Naphthalene	4,150	4,030	1,990	1,780	2,030	2,400	2,870	-31%
Polycyclic Organic Matter	561	541	259	233	265	313	373	-33%
Trillions VMT	2.69	2.75	3.24	3.88	4.63	5.51	6.58	145%

Source: USEPA. MOBILE6.2 Model run, 20 August 2009.

The USDOT and FHWA are currently working with USEPA to develop and evaluate the technical tools necessary to perform air toxics analysis, including improvements to emissions models and air quality dispersion models. FHWA's ongoing work in air toxics includes a research program to determine and quantify the contribution of mobile sources to air toxic emissions, the establishment of policies for addressing air toxics in environmental reports, and the assessment of scientific literature on health impacts associated with motor vehicle toxic emissions.

6.5.1 Availability of Information for Project Specific MSAT Impact Analysis

As noted, the science and modeling of project specific MSAT impacts has not developed to the point where there is certainty or scientific community acceptance on predicting the impacts from transportation projects. Accordingly, information on MSAT impacts on any of the alternatives evaluated in this DEIS is not available, and the means to obtain this information is not currently known. When this is the case, 40 CFR §1502.22(b) requires FHWA to address four provisions: (1) a statement that such information is incomplete or unavailable; (2) a statement of the relevance of the incomplete or unavailable information to evaluating reasonably foreseeable significant adverse impacts on the human environment; (3) a summary of existing credible scientific evidence which is relevant to evaluating the reasonably foreseeable significant adverse impacts on the human environment; and (4) the agency's evaluation of such impacts based upon theoretical approaches or research methods generally accepted in the scientific community.

6.5.2 Project Specific MSAT Impact Analysis

This DEIS includes a qualitative analysis of the likely MSAT emission impacts of this project. However, technical shortcomings or uncertain science prevent a more complete prediction of the project-specific health impacts of the emission changes associated with the alternatives in this DEIS. Due to these limitations, the following information[7] is included in accordance with Council on Environmental Quality (CEQ) regulations (40 CFR §1502.22(b)) regarding incomplete or unavailable information.

Information that is Unavailable or Incomplete. 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 the uncertainly 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.

[7] See FHWA's Memorandum, September 30, 2009: *Interim Guidance Update on Mobile Source Air Toxic Analysis in NEPA Documents* (http://www.fhwa.dot.gov/environment/airtoxic/100109guidmem.htm) for description of levels of MSAT analysis.

- Emissions. The methodologies for forecasting health impacts include emissions modeling; dispersion modeling and exposure modeling; and the 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 (i.e., 70 years) assessments, particularly because unsupportable assumptions would have to be made regarding changes in travel patterns and vehicle technology (which affects emissions rates) over that time frame, since such information is unavailable. The results produced by the EPA's MOBILE 6.2 model, the California EPA's Emfac2007 model, and the EPA's MOVES model in forecasting MSAT emissions are inconsistent. Indications from the development of the MOVES model are that MOBILE 6.2 significantly underestimates diesel particulate matter (PM) emissions and significantly overestimates benzene emissions.

- Dispersion. Regarding air dispersion modeling, an extensive evaluation of EPA's guideline CAL3QHC model was conducted in an NCHRP study (http://www.epa.gov/scram001/dispersion_alt.htm#hyroad) which documents poor model performance at ten sites across the country – three where intensive monitoring conducted plus an additional seven with less intensive monitoring. The study indicates a bias of the CAL3QHC model to overestimate concentrations near highly congested intersections and underestimate concentrations near uncongested intersections. The consequence of this is a tendency to overstate the air quality benefits of mitigating the congestion at intersections. Such poor model performance is less difficult to manage for demonstrating compliance with National Ambient Air Quality Standards for relatively short time frames than it is for forecasting individual exposure over an entire lifetime, especially given that some information needed for estimating 70-year lifetime exposure is unavailable. It is particularly difficult to reliably forecast MSAT exposure near roadways, and to determine the portion of time that people are actually exposed at a specific location.

- Exposure Levels and Health Effects. There are considerable uncertainties associated with the existing estimates of toxicity of the various MSAT, because of factors such as low-dose extrapolation and translation of occupational exposure data to the general population, a concern expressed by the Health Effects Institute (HEI) (http://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. The EPA and HEI 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 the 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 a "safe" or "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 two-step process do not guarantee that cancer risks from exposure to air toxins 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 US 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 safe or acceptable.

Summary of Existing Credible Scientific Evidence Relevant to Evaluating the Impacts of MSATs. The EPA is responsible for protecting the public health and welfare from any known or anticipated effect of an air pollutant. They are the lead authority for administering the Clean Air Act and its amendments and have specific statutory obligations with respect to hazardous air pollutants and MSAT. The USEPA is in the continual process of assessing human effects, exposures, and risks posed by air pollutants. They maintain 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. Each report contains assessments of non-cancerous 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 effects of MSAT, including the Health Effects Institute (HEI). 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 is the adverse human health effects of MSAT compounds at current concentrations or in the future as vehicle emissions substantially decrease.

Relevance of Unavailable or Incomplete Information to Evaluating Reasonably Foreseeable Significant Adverse Impacts on the Environment, and Evaluation of impacts based upon theoretical approaches or research methods generally accepted in the scientific community. Because of the limitations in the methodologies for forecasting health impacts described, 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 this document, FHWA provides a qualitative assessment that acknowledges that the project alternatives may result in increased exposure to MSAT emissions in certain locations, although

the concentrations and duration of exposures are uncertain. Because of this uncertainty, the health effects from these emissions cannot be estimated.

6.5.3 MSAT Qualitative Analysis

For each alternative in this document, the amount of MSAT emitted would be proportional to the VMT, assuming that other variables such as fleet mix are the same for each alternative. The VMT estimated for each of the Build Alternatives is slightly higher than that for the No-Build Alternative, because the additional capacity increases the efficiency of the roadway and attracts rerouted trips from elsewhere in the transportation network.

Table 3 shows the VMT for the greatest volume link for each alternative including the No-Build alternative. The highest predicted road link traffic volume for the no-build condition is SR37 between 3rd Street/SR 48 and Vernal Pike. The highest predicted road link traffic volume for the build alternative is between SR 46 and 3rd Street/SR 48 for Alternatives 4, 5 and 6 (~1.9 miles). The highest predicted road link traffic volume for the build alternative is between Bloomfield Road/SR 45 and 3rd Street/SR 48 for Alternatives 7 and 8 (~1.2 miles). In order to compare the alternatives on an equal distance footing, the entire road length between Bloomfield Road/SR 45 and SR 46 was included.

Table 3: VMT For Alternatives

Design Year No-Build	Build Alternatives				
	Alternative 4	Alternative 5	Alternative 6	Alternative 7	Alternative 8
191,500	231,100	245,000	236,500	244,700	244,800

Note: The VMT is based on ADT (daily) values

This increase in VMT would lead to higher MSAT emissions for the build alternatives. The emissions increase is offset somewhat by lower MSAT emission rates due to increased speeds; according to EPA's MOBILE6.2 emissions model, emissions of all of the priority MSAT except for diesel particulate matter decrease as speed increases. The extent to which these speed-related emissions decreases would offset VMT-related emissions increases cannot be reliably projected due to the inherent deficiencies of technical models. Because the estimated VMT under each of the Build Alternatives are nearly the same, varying by approximately 7 percent between the highest and the lowest values, it is expected there would be no appreciable difference in overall MSAT emissions among the various alternatives. Also, regardless of the alternative chosen, emissions will likely be lower than present levels in the design year as a result of EPA's national control programs that are projected to reduce annual MSAT emissions by 72 percent between

1999 and 2050[8]. Local conditions may differ from these national projections in terms of fleet mix and turnover, VMT growth rates, and local control measures. However, the magnitude of the EPA-projected reductions is so great (even after accounting for VMT growth) that MSAT emissions in the study area are likely to be lower in the future in nearly all cases.

In this document, a qualitative MSAT assessment has been provided relative to the various alternatives of MSAT emissions and has acknowledged that some of the project alternatives may result in increased exposure to MSAT emissions in certain locations, although the concentrations and duration of exposures are uncertain, and because of this uncertainty, the health effects from these emissions cannot be estimated. MSAT emissions are projected to decrease substantially in the future as a result of new USEPA programs to reduce MSAT emissions nationwide. As a result, the I-69 Section 5 project is expected to result in low potential MSAT effects.

6.6 Greenhouse Gases

USEPA has not established criteria or thresholds for greenhouse gas emissions at this time. Due to this, the FHWA has determined that it is not informative at this time to consider greenhouse gas emissions in an EIS. FHWA is actively engaged in many activities with the USDOT Center for Climate Change to develop strategies to reduce transportation's greenhouse gas contribution, and to assess the risks to transportation systems and services from climate change. As more information emerges and policies and legal requirements evolve, the FHWA will review and update its approach to climate change at both the project and regulatory level.

7.0 SUMMARY AND CONCLUSIONS

Pursuant to the 1990 CAA Amendments, Monroe County has been designated as being in attainment for all the NAAQS criteria pollutants. Morgan County has been designated as a maintenance area for the 8-hour ozone standard and nonattainment for PM2.5. The conformity determination requirements of the I-69 Section 5 project will be determined after further interagency consultation. The process will be completed prior to issuance of the ROD for Section 5.

Section 5 passes through CO attainment areas for NAAQS, and a conformity demonstration is not required at the regional-level or project-level. However, results of project level CO and the free-flow section analyses (which were measured at the worst-case scenario locations) for the Build Alternative indicate no violation of the CO NAAQS. As a result, there are no local air quality impacts of concern for CO.

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[8] See FHWA's Memorandum, September 30, 2009: *Interim Guidance Update on Mobile Source Air Toxic Analysis in NEPA Documents* (http://www.fhwa.dot.gov/environment/airtoxic/100109guidmem.htm) for description of levels of MSAT analysis.

Morgan County has been designated as being in nonattainment of the $PM_{2.5}$ standard. The interagency coordination process is ongoing to determine the need for a quantitative project-level analysis. The results will be discussed in the FEIS.

Finally, although regional and localized increases in MSAT emissions are expected for the Build Alternative over the No-build Alternative Condition, total MSAT emissions are projected to decrease substantially in the future compared to the present because of new USEPA programs to reduce MSAT emissions nationwide. Thus, the I-69 Section 5 project is expected to result in low potential MSAT effects.

8.0 REFERENCES

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