E1. MOBILE SOURCE AIR TOXICS

Subsequent to circulation of the Draft EIS, the FHWA released updated guidance regarding MSATs, titled *Interim Guidance Update on MSAT Analysis in NEPA Documents* (FHWA, September 2009) (FHWA Web site: www.fhwa.dot.gov/environment/airtoxic/100109guidmem.htm). The interim guidance update "reflects recent regulatory changes, addresses stakeholder requests to broaden the horizon years of emission trends performed with MOBILE6.2, and updates stakeholders on the status of scientific research on air toxics." The update "does not change any project analysis thresholds, recommendations, or guidelines."

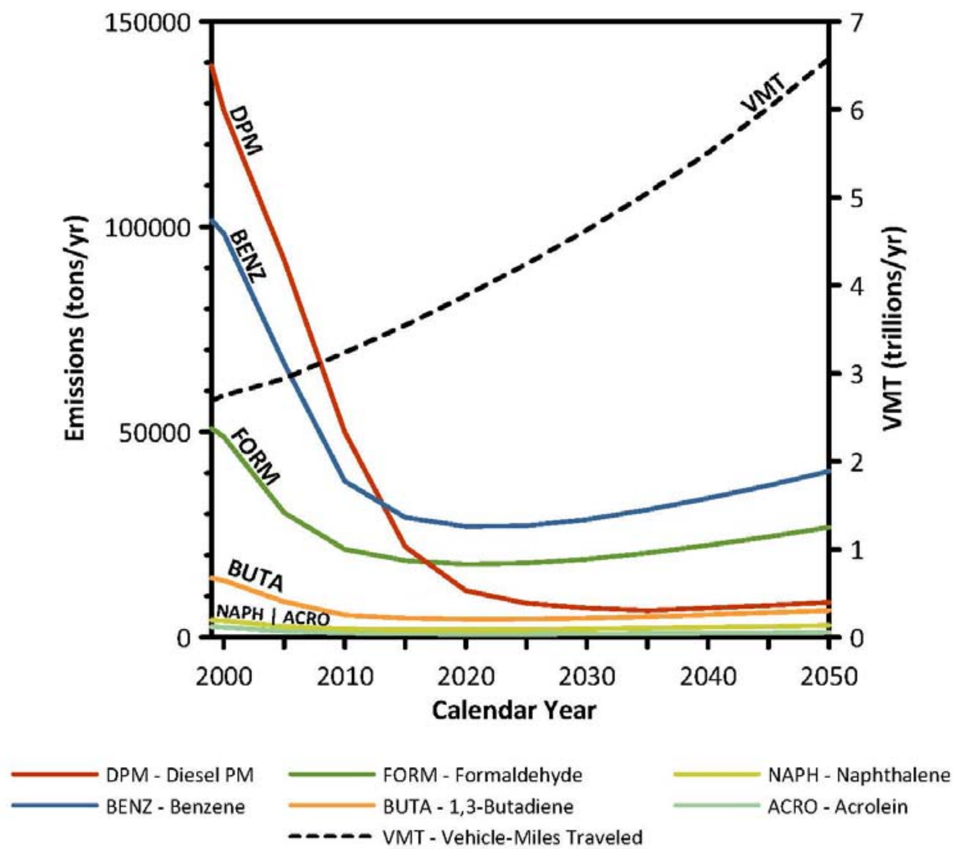
The information presented below replaces the text in Appendix E of the Draft EIS.

Controlling air toxic emissions became a national priority with the passage of the Clean Air Act Amendments (CAAA) of 1990, whereby Congress mandated that the US Environmental Protection Agency (USEPA) regulate 188 air toxics, also known as hazardous air pollutants. The EPA has assessed this expansive list in their latest rule on the Control of Hazardous Air Pollutants from Mobile Sources (Federal Register, Vol. 72, No. 37, page 8430, February 26, 2007) and identified a group of 93 compounds emitted from mobile sources that are listed in their Integrated Risk Information System (IRIS) (http://www.epa.gov/ncea/iris/index.html).

In addition, USEPA identified seven compounds with significant contributions from mobile sources that are among the national and regional-scale cancer risk drivers from their 1999 National Air Toxics Assessment (NATA) (http://www.epa.gov/ttn/atw/nata1999/). These are *acrolein, benzene, 1,3-butidiene, diesel particulate matter plus diesel exhaust organic gases (diesel PM), formaldehyde, naphthalene, and polycyclic organic matter*. While FHWA considers these the priority mobile source air toxics, the list is subject to change and may be adjusted in consideration of future USEPA 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 using USEPA's MOBILE6.2 model, even if vehicle activity (vehicle-miles travelled, VMT) increases by 145 percent as assumed, a combined reduction of 72 percent in the total annual emission rate for the priority MSAT is projected from 1999 to 2050, as shown in **Exhibit E-1**.

EXHIBIT E-1: National MSAT Emission Trends 1999 – 2050 for Vehicles Operating on Roadways Using USEPA's MOBILE6.2 Model



Note: (1) Annual emissions of polycyclic organic matter are projected to be 561 tons/yr for 1999, decreasing to 373 tons/yr for 2050.
(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

Source: http://www.fhwa.dot.gov/environment/airtoxic/100109guidmem.htm

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 the ability to evaluate how the potential health risks posed by MSAT exposure should be factored into project-level decision-making within the context of the NEPA.

Nonetheless, air toxics concerns continue to be raised on highway projects during the NEPA process. Even as the science emerges, FHWA is duly expected by the public and other agencies to address MSAT impacts in our environmental documents. The FHWA, USEPA, the Health Effects Institute, and others have funded and conducted research studies to try to more clearly define potential risks from MSAT emissions associated with highway projects. The FHWA will continue to monitor the developing research in this emerging field.

While this research is ongoing, FHWA requires each NEPA document to qualitatively address MSATs and their relationship to the specific highway project through a tiered approach (*Interim Guidance Update on Mobile Source Air Toxic Analysis in NEPA Documents*, September 30, 2009).

The qualitative analysis of MSATs for this project follows in the next section of this Appendix. Since the updated MSAT guidance "does not change any project analysis thresholds, recommendations, or guidelines", the qualitative analysis presented in **Section E.2** below is the same as the qualitative analysis present in the Draft EIS Appendix E Section E.2 subheading "Qualitative Impact Assessment for Mobile Source Air Toxics".

E2. MOBILE SOURCE AIR TOXICS IMPACT ANALYSIS

In the Draft EIS (Appendix E) and this Final EIS, FHWA has provided a qualitative analysis of MSAT emissions relative to the various alternatives, and has acknowledged that all 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.

The FHWA has developed a tiered approach for analyzing MSATs in NEPA documents. Depending upon the specific project circumstances, FHWA has identified three levels of analysis (*Interim Guidance Update on MSAT Analysis in NEPA Documents,* FHWA, September 2009:

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

Projects requiring a quantitative analysis include projects that have the potential for meaningful differences among project alternatives. To fall into this category, projects must:

- Create or significantly alter a major intermodal freight facility that has the potential to concentrate high levels of diesel particulate matter in a single location, or
- Create new or add significant capacity to urban highways such as interstates, urban arterials, or urban collector-distributor routes with traffic volumes where the annual average daily traffic (AADT) volumes are projected to be in the range of 140,000 to 150,000, or greater, by the design year; and also
- Be proposed to be located in proximity to populated areas or in rural areas, in proximity to concentrations of vulnerable populations (i.e., schools, nursing homes, hospitals).

The proposed project falls into the qualitative analysis category due to its length and regional importance. The project would not qualify as requiring a quantitative analysis because it would not significantly alter a major intermodal facility, nor would the AADT be in the 140,000 to 150,000 range.

A qualitative analysis provides a basis for identifying and comparing the potential differences among MSAT emissions, if any, from the various alternatives. The qualitative assessment presented below is derived in part from a study conducted by the FHWA entitled *A Methodology* *for Evaluating Mobile Source Air Toxic Emissions Among Transportation Project Alternatives*, found at: www.fhwa.dot.gov/environment/airtoxic/msatcompare/msatemissions.htm.

As discussed below, technical shortcomings of emissions and dispersion models and uncertain science with respect to health effects prevent meaningful or reliable estimates of MSAT emissions and effects of this project. Even though reliable methods do not exist to accurately estimate the health impacts of MSATs at the project level, it is possible to qualitatively assess the levels of future MSAT emissions under the project.

The AADTs for the various DSAs vary by segment and range from 41,400 to 95,600 AADT on the western end of the project and 15,400 to 24,800 AADT on the eastern end of the project. **Table E-1** shows the 2035 AADT volume forecasts for the DSAs (*Traffic Forecast for TIP Projects R-3329 & R-2559 Monroe Connector/Bypass*, Wilbur Smith Associates, September 2008).

The highest traffic volumes would be 95,600 AADT for DSAs C, C1, C2, C3, D, D1, D2, and D3, in the area where these DSAs would improve a segment of existing US 74.

TABLE E-1: Year 2035 Traffic Projections Along the Monroe Connector/Bypass

Project Segment	Annual Average Daily Traffic (AADT)	
	DSAs A, A1, A2, A3 B, B1, B2, B3	DSAs C, C1, C2, C3 D, D1, D2, D3
I-485 to Stallings Road	41,400	95,600
Stallings Road to Indian Trail-Fairview Road	49,100	48,200
Indian Trail-Fairview Road to Unionville-Indian Trail Road	50,700	51,200
Unionville-Indian Trail Road to North Rocky River Road	51,500	52,300
North Rocky River Road to US 601	46,200	46,600
US 601 to NC 200 (Morgan Mill Road)	35,000	35,200
NC 200 (Morgan Mill Road) to Austin Chaney Road	24,400	24,800
Austin Chaney Road to Forest Hills School Road	19,300	19,600
Forest Hills School Road to US 74	15,400	16,400

Source: *Traffic Forecast for TIP Projects R-3329 & R-2559 Monroe Connector/Bypass*, Wilbur Smith Associates, September 2008

For each DSA, the amount of MSATs emitted would be proportional to the vehicle miles traveled, (VMT) assuming that other variables such as fleet mix are the same for each alternative. **Table E-2** shows the projected 2035 VMT and vehicle hours traveled (VHT) in the Metrolina region as a whole and also just in Union County (a subset of the Metrolina region), under the No-Build Alternative and the DSAs. The VMT and VHT for Union County under the various scenarios are presented in addition to the VMT and VHT for the Metrolina region as a whole because the Metrolina region is so large (13 counties). Including information for the smaller area of Union County provides another picture of the trends projected for each alternative in the county where the majority of the project is located.

TABLE E-2: Vehicle Miles and Vehicle Hours Traveled Under Various Scenarios

Scenario	Region	2035 Vehicle Miles Traveled (VMT) in 1000's			2035 Vehicle Hours Traveled (VHT) in 1000's		
		Daily	AM Peak	PM Peak	Daily	AM Peak	PM Peak
No-Build Alternative	Union County Only	11,481	2,649	3,042	253.6	58.6	67.4
	Entire Metrolina Region	121,306	28,764	32,378	2,455.6	585.5	666.3
Detailed Study Alternatives A, A1, A2, A3, B, B1, B2, B3 – Toll Facility	Union County Only	10,971	2,543	2,913	238.8	55.2	63.4
	Entire Metrolina Region	121,262	28,752	32,349	2,451.1	584.3	664.5
Detailed Study Alternatives C, C1, C2, C3, D, D1, D2, D3 – Toll Facility	Union County Only	11,503	2,659	3,054	250.8	57.8	66.6
	Entire Metrolina Region	121,221	28,751	32,326	2,450.4	584.4	664.0

Source: *VMT/VHT Analysis*, Wilbur Smith Associates, October 2008.

As shown in **Table E-2**, the estimated 2035 daily VMT in Union County is approximately the same (less than one percent difference) for DSAs C, C1, C2, C3, D, D1, D2, and D3 as it would be for the No-Build Alternative. The 2035 daily VMT in Union County is slightly lower (about 4 percent) for DSAs A, A1, A2, A3, B, B1, B2, and B3 than predicted for the No-Build Alternative. These differences between the DSAs and the No-Build Alternative are less than 1 percent when considering the Metrolina region as a whole.

Because the VMT estimate for the No-Build Alternative is slightly higher than or about the same as any of the DSAs, higher levels of regional MSATs are not expected from any of the DSAs compared to the No-Build Alternative. In addition, because the estimated VMT under each of the DSAs are nearly the same, varying by less than five percent when just considering Union County and by less than one percent for the Metrolina region as a whole, it is expected there would be no appreciable difference in overall MSAT emissions among the various DSAs.

Also, regardless of the alternative chosen, emissions will likely be lower than present levels in the design year as a result of USEPA's national control programs that are projected to reduce MSAT emissions by 57 to 87 percent from 2000 to 2020. 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 USEPA-projected reductions is so great that MSAT emissions in the Metrolina region are likely to be lower in the future in virtually all locations.

Because of the specific characteristics of the DSAs (i.e. new location roadway), there may be localized areas where VMT would increase, and other areas where VMT would decrease. Therefore, it is possible that localized increases and decreases in MSAT emissions may occur. The localized increases in MSAT emissions would likely occur along the new roadway sections that would be built where there are few major roadways and little industry, such as the area east of US 601. However, even if these increases do occur, they too will be substantially reduced in the future due to implementation of USEPA's vehicle and fuel regulations.

As discussed in Section 2.3.2.2 of the Draft EIS, schools, hospitals, and community facilities were mapped and avoided where possible in the development of the DSAs. There are four public schools (and no private schools) located near the boundaries of the Preferred Alternative corridor, as shown in Figure 2-3 of the Final EIS. These are Stallings Elementary School, Poplin Elementary School, Sardis Elementary School, and Forest Hills High School. None would be directly impacted by the proposed functional designs in any of the DSAs (Section 2.5.1.2 of the Final EIS). There are no hospitals or nursing homes within or near the DSA corridors.

In summary, under all DSAs in the design year, it is expected there would be either no change or a slight reduction in MSAT emissions in the immediate area of the project, relative to the No-Build Alternative, due to similar VMT amongst the alternatives. In comparing the DSAs, MSAT levels could be higher in some locations than others, but current tools and science are not adequate to quantify them. However, USEPA's vehicle and fuel regulations will bring about significantly lower MSAT levels for the Metrolina region in the future than today.

E3. CEQ PROVISIONS COVERING INCOMPLETE OR UNAVAILABLE INFORMATION

This section is directly from Appendix C of the *Interim Guidance Update on MSAT Analysis in NEPA Documents* (FHWA, September 2009).

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.

The USEPA 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 health 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" (USEPA, http://www.epa.gov/iris/). 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 health effects of MSAT, 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 Documents*. 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 environmental concentrations (HEI, http://pubs.healtheffects.org/view.php?id=282) or in the future as vehicle emissions substantially decrease (HEI, http://pubs.healtheffects.org/view.php?id=306).

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 (i.e., 70 year) 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 USEPA's MOBILE6.2 model, the California EPA's Emfac2007 model, and the USEPA's DraftMOVES2009 model in forecasting MSAT emissions are highly inconsistent. Indications from the development of the MOVES model are that MOBILE6.2 significantly underestimates diesel particulate matter (PM) emissions and significantly overestimates benzene emissions.

Regarding air dispersion modeling, an extensive evaluation of USEPA'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 was 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 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 17 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.

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 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 USEPA (http://www.epa.gov/risk/basicinformation.htm#g) and the HEI (http://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 the USEPA 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 USEPA 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 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 USEPA'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.

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.