TxDOT AIR QUALITY GUIDELINES

2006

Prepared by the

Environmental Affairs Division
Texas Department of Transportation

AIR QUALITY GUIDELINES
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SECTION 1: INTRODUCTION

1.1 Purpose of the Guidelines

These guidelines are intended to provide background information on air quality issues and terminology, and to clarify the air quality analysis and documentation requirements for environmental documents. The guidelines include sample language which can be used when developing environmental documents.

1.2 Environmental Regulations and Legislation

- The National Environmental Policy Act (NEPA) of 1969 and the 1970 Federal-Aid Highway Act require TxDOT as a state transportation agency to consider the social, economic, and environmental impacts of federal projects.

- The 1970 Clean Air Act (CAA) established National Ambient Air Quality Standards (NAAQS) for six pollutants, also known as criteria pollutants. See Section 2.1 for more details on criteria pollutants.

- The 1990 Clean Air Act Amendments established specific criteria which must be met for air quality nonattainment areas. The criteria are based on the severity of the air pollution problem and include the development and implementation of State Implementation Plans (SIPs) and specific timetables for implementing mobile source emission control strategies. If the criteria are not met, EPA can levy sanctions on all or part of the state. Sanctions include stricter industrial controls and the withholding of federal highway funds.

- Intermodal Surface Transportation Efficiency Act of 1991(ISTEA) and associated federal planning regulations strengthened the role of Metropolitan Planning Organizations (MPO) in transportation planning and programming while emphasizing intermodalism and the environment. Furthermore, ISTEA linked transportation and environmental goals by providing funding flexibility and the Congestion Mitigation and Air Quality Improvement Program (CMAQ).

- Transportation Efficiency Act for the 21st Century (TEA-21) and associated federal planning regulations reaffirmed ISTEA's commitment to transportation intermodalism and continued protection of public health and the environment. TEA-21 also provided a significant increase in federal funding levels to Texas over those of ISTEA.

- Safe, Accountable, Flexible, Efficient Transportation Efficiency Act – Legacy for Users (SAFETEA-LU) provides over $8.5 billion in funds for CMAQ projects for fiscal years 2005-2009. SAFETEA-LU also includes an expanded list of eligible CMAQ projects and revisions to some conformity and planning requirements.

SECTION 2: AIR QUALITY OVERVIEW

Air quality is determined by the amount of harmful effects of emissions to humans, other living organisms, or man-made materials. In essence, air quality is a measure of the cleanliness of the air we breathe.

The U.S. Environmental Protection Agency (EPA) protects human health and the environment through the regulatory process and through voluntary programs. Under the Clean Air Act, EPA sets limits on how much of a pollutant is allowed in the air anywhere in the United States. The 1970 CAA identified six air pollutants (known as criteria pollutants) which can be harmful to human health and the environment. These criteria pollutants are identified in the following table.

Table 2.1 – Criteria Pollutants

Pollutant Name	Chemical Abbreviation
Ozone	O_3
Carbon Monoxide	CO
Particulate Matter (Coarse and Fine)	PM_{10} (Coarse) and $PM_{2.5}$ (Fine)
Nitrogen Dioxide	NO_2
Sulfur Dioxide	SO_2
Lead	Pb

2.1 Criteria Pollutants

Ozone (O_3)

Ozone, an altered form of oxygen, is one of the major components of smog. Because ozone itself is a very pale blue gas the air can look clear even when high ozone concentrations are present. However, it has a pungent odor that is often noticed during electrical storms and in the vicinity of electrical equipment.

Ozone has different health implications depending upon where it is located. In the stratosphere, or "ozone layer," some 6–30 miles above the earth, ozone forms naturally and provides a critical barrier to solar ultraviolet radiation, serving as a protective barrier against skin cancers, cataracts, and serious ecological disruption.

At ground level ozone is an environmental and health hazard. High concentrations can cause shortness of breath, coughing, wheezing, headaches, nausea, eye and throat irritation, and lung damage. People who suffer from lung diseases and colds have even more trouble breathing when ozone concentrations are high. These effects are worsened in children and people who work or exercise outside. Ten to 20 percent of all summertime respiratory-related hospital visits in the northeastern U.S. are associated with ozone pollution.

Ground-level ozone has no direct emission source (i.e., it is not emitted directly into the air by a given source), nor is ozone formation an instant process. Rather, it is formed in the air by complex photochemical reactions involving heat, direct sun light, volatile organic compounds (VOCs) and nitrogen oxides (NO_x). These reactions often take several hours to create substantial amounts of ozone. Since ozone tends to be a warm weather pollutant most NAAQS exceedances occur between May and October. Ozone concentrations tend to peak during the afternoons and then decline rapidly after dark.

Carbon Monoxide (CO)

CO is a colorless, odorless gas whose principal manmade source is an incomplete combustion of organic fuels. CO is toxic because it combines with the hemoglobin of the blood to produce carboxyhemoglobin and, thereby, reduces the blood's ability to carry oxygen. Observed health effects of CO include headaches, dizziness, impaired vision, and slower reaction times.

Some important points to note about CO:

- CO emissions are primarily from motor vehicles
- CO emissions from automobiles are sensitive to both temperature and speed
- CO emissions are roughly twice as high in winter months as in summer months
- Emissions decrease with increases in speed (up to 50 miles per hour (mph)) and then increase again at high speeds.
- Idling and low speeds (less than 15 mph) can produce high CO emissions
- CO is readily modeled for highway projects. CO modeling is required by federal guidelines.

Particulate Matter (PM)

Particulate matter is the general term used for a mixture of solid particles (e.g., soot or ash) and liquid droplets found in the air. These particles, which come in a wide range of sizes, originate from many different stationary and mobile sources as well as from natural sources. They may be emitted directly by a source or formed in the atmosphere by the transformation of gaseous emissions such as sulfur dioxide (SO_2), NO_x, and VOCs into such things as acid rain. Their chemical and physical compositions vary depending on location, time of year, and meteorology.

PM is the main source of haze. It may be present either as larger particles that settle out of the air quickly, as small particles that can remain suspended for extended periods of time, or as aerosols. PM less than 10 microns in size is referred to as PM_{10} and includes such things as windblown dust. Fine PM, which is less than 2.5 microns in size, results from fuel combustion and the transformation of gaseous emissions. PM this size is small enough to be breathed deep into the lungs.

Exposure to PM pollution can cause eye, nose, and throat irritation; wheezing; and other symptoms. It has been linked to increased hospital admissions and emergency room visits for respiratory problems and to an increase in premature deaths. PM air pollution is especially harmful to people with lung and heart disease.

Sulfur Dioxide (SO_2)

Sulfur dioxide is created when sulfur-containing fuel (mainly coal and oil) is burned, primarily in power plants and diesel engines, and during metal smelting and other industrial processes. Although catalytic converters on automobile exhaust systems produce small quantities of SO_2, it is not considered a transportation-related air pollutant.

Lead (Pb)

Lead has been known as a poisonous substance for many years. In the past the major source of lead emissions resulted from leaded gasoline, leaded paint, and smelters. Due to major reductions and now the elimination of lead in gasoline and paint, there has been a significant decrease in air contamination by lead, and it is no longer considered a transportation-related air pollutant.

Nitrogen Dioxide (NO_2)

Nitrogen dioxide and related nitrogen oxides (NO_x) are produced when fuel, including gasoline and coal, is burned at high temperatures, especially in power plants and motor vehicles. Both NO_2 (a colorless gas) and NO_x (a brown, corrosive gas that reduces visibility in the air) are hazardous to human health. Like ozone, NO_2 irritates and damages lung tissue and aggravates chronic lung diseases. NO_x can lower the body's resistance to respiratory infections such as influenza and may cause increased incidence of acute respiratory illness in children.

2.2 Sources of Air Pollution

Emissions sources are typically tracked under five categories – point, area, on-road mobile, non-road mobile, and biogenics. The following table shows examples of each of these source categories.

Table 2.2 - Sources of Air Pollution

Category	Example sources
Point sources (aka stationary)	Large industrial facilities such as refineries and chemical plants
Area sources	Smaller businesses such as gas stations, paint and body shops, dry cleaners, bakeries
On-road mobile sources	Vehicles and fuels associated with highway travel
Non-road mobile sources	All other motorized equipment and associated fuels, such as lawn mowers, marine vehicles, and construction equipment that are not associated with highway travel
Biogenics	Plants and trees

2.3 Nonattainment Areas

For each of the criteria pollutants EPA has established a maximum concentration above which adverse effects on human health may occur. These threshold concentrations are called NAAQS.

The Texas Commission on Environmental Quality (TCEQ) operates continuous air quality monitors across the state to record the levels of these pollutants as well as various meteorological data. This information helps TCEQ examine and interpret the causes, nature, and behavior of air pollution. The data is also reported to EPA and is the basis of determining which areas are in attainment or nonattainment for each of the pollutants.

Nonattainment areas are geographic areas where air quality does not meet the NAAQS (see Appendix B for a description of each NAAQS). The boundaries of a nonattainment area are ultimately defined by EPA after consultation with the states.

Areas determined to be nonattainment are also given classifications based on the magnitude of the area's problem. Nonattainment classifications are used to specify certain regulatory requirements, establish deadlines for states to submit air quality plans, and determine when an area must be in compliance (attainment) with the NAAQS.

For ozone the nonattainment classifications are:

- Marginal
- Moderate
- Serious
- Severe, and
- Extreme

For carbon monoxide and particulate matter the classifications are moderate and serious. The following table outlines the nonattainment areas in Texas and their respective classifications, where applicable.

Table 2.3 – Texas Nonattainment Areas

Area	Standard	Counties/Area Affected
		8-Hour Ozone[1]
Beaumont/Port Arthur	Marginal	Hardin, Jefferson, Orange
Dallas/Fort Worth	Moderate	Collin, Dallas, Denton, Ellis, Johnson, Kaufman, Parker, Rockwall, Tarrant
El Paso	Attainment	n/a (previously nonattainment under the 1-hour standard)[1]
Houston/Galveston	Moderate	Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, Waller
		8-Hour Ozone Early Action Compact Areas
San Antonio	Nonattainment deferred[2]	Bexar, Comal, Guadalupe Counties are designated as nonattainment deferred. Bexar, Comal, Guadalupe, and Wilson are all part of the EAC area
Austin	Attainment	Bastrop, Caldwell, Hays, Travis, Williamson
Tyler/Longview	Attainment	Gregg, Harrison, Rusk, Smith, Upshur
		Particulate Matter$_{10}$
El Paso	Moderate	City of El Paso
		Carbon Monoxide
El Paso	Moderate	Small portion of the City of El Paso
		Lead, Sulfur Dioxide, Nitrogen Dioxide, Particulate Matter$_{2.5}$
None in Texas		

[1]The 1-hour ozone standard was revoked on June 15, 2005. That standard no longer applies.
[2]Due to the area's proactive efforts via the EAC, EPA has deferred the effective date of the area's nonattainment status.

2.4 Early Action Compact (EAC) Areas

Early Action Compact areas are those areas that have chosen to implement plans to achieve and maintain compliance with the 8-hour ozone standard earlier than otherwise required under Federal Clean Air Act requirements. The EAC concept was designed to give local areas more control over the selection of control measures to implement in their early action plans. In exchange for submitting an early action plan and for complying with other milestones outlined within the compact, EPA agreed to defer the effective date of the nonattainment designation for any EAC area that was above the standard when 8-hour designations were finalized in June 2004.

2.5 The State Implementation Plan (SIP)

The SIP is the plan which demonstrates how the state will attain and maintain compliance with the National Ambient Air Quality Standards. Only one SIP exists for each state. For Texas this document is developed by the TCEQ. All SIPs are required to be submitted to and approved by EPA. The original Texas SIP was approved by EPA in May 1972. Since then many revisions to the SIP have been submitted and approved. Rather than re-writing the entire SIP certain portions of the SIP are revised as needed. Revisions are necessary when new federal or state requirements are enacted, when new modeling tools and techniques become available, when a specific area's attainment status changes, or when an area fails to reach attainment.

Revisions are usually prepared with a focus on a particular nonattainment area, a particular control strategy, or a specific facility. For example, a SIP revision was developed for the Houston area to demonstrate how the area would comply with the old 1-hour ozone standard. Subsequent revisions were later developed to add new or amend existing requirements.

The SIP also establishes the motor vehicle emissions budget. The budget is not a financial figure but rather an emissions limit. In order to demonstrate that the SIP will achieve the emission reductions necessary for compliance, limits are established on the amount of emissions that any one source category can emit. For the on-road mobile source category (i.e., transportation projects) this limit is referred to as the motor vehicle emissions budget (aka the MVEB or "the budget"). Metropolitan Planning Organizations (MPOs) are required to demonstrate that transportation plans and programs stay within these budgets. This is done through the transportation conformity process.

SECTION 3: TRANSPORTATION PROGRAMS

3.1 Transportation Conformity

Conformity is a way to ensure that federal funding and approval are given to those transportation activities that are consistent with air quality goals. It ensures that emissions attributed to transportation activities do not worsen air quality or interfere with the purpose of the SIP, which is to meet the EPA standards for air quality.

In nonattainment and maintenance areas Federal Highway Administration/Federal Transit Authority (FHWA/FTA) projects must be found to conform before they are adopted, accepted, approved or funded. With some exceptions (e.g. safety, landscaping, and other projects with neutral or minimal emissions impacts), transportation projects must meet the following criteria:

- They must come from a conforming transportation plan and transportation improvement program (TIP).

- The design concept and scope of the project that was in place at the time of the conformity finding must be maintained through implementation.

- The project design concept and scope must be sufficiently defined to determine emissions at the time of the conformity determination.

Areas that have carbon monoxide or particulate matter problems must also show that new localized violations of those pollutants will not result from project implementation.

The MPO and U.S. DOT through FHWA and FTA, have a responsibility to ensure that the transportation plan and program within the metropolitan planning boundaries conform to the SIP. In metropolitan areas, the policy board of each MPO must formally make a conformity determination on its transportation plan and TIP prior to submitting them to the U.S. DOT for an independent review and conformity determination. Development of conformity determinations for projects outside of these boundaries is the responsibility of the State DOT.

Conformity determinations must be made at least every four years, or as warranted by changes made to plans, TIPs, or projects. Certain events, such as SIP revisions that establish or revise a transportation-related emissions budget, or add or delete transportation control measures (TCMs), may also trigger new conformity determinations.

If a conformity determination cannot be made within appropriate timeframes, a conformity lapse can occur and no new added capacity projects may advance until a new determination for the plan and TIP can be made. This affects transit as well as highway projects. There are exceptions for specific categories of projects that are exempt from the conformity process (pursuant to 40 CFR Part 93) such as highway safety projects. TCMs that are included in approved SIPs, and projects that have received funding commitments for construction may also proceed during a conformity lapse.

Only those projects which have received approval of PS&E (plans, specifications, and estimates), and transit projects that have received a full funding grant agreement or equivalent approvals prior to the conformity lapse may proceed during a conformity lapse.

3.2 Transportation Control Measures

A transportation control measure (TCM) is any measure that is specifically identified in the SIP for the purpose of reducing emissions or concentrations of air pollutants from transportation sources. TCMs are typically targeted at reducing vehicle use or changing traffic flow or congestion conditions.

Examples include:

- Programs for improved public transit
- Passenger bus or high occupancy vehicle (HOV) lanes
- Traffic signal optimization projects designed to improve traffic flow
- Employer-sponsored programs to permit flexible work schedules
- Employer-based transportation management plans, including incentives
- Fringe and transportation corridor parking facilities serving multiple-occupancy vehicle programs or transit service
- Programs for the provision of all forms of high-occupancy, shared ride services.

In areas where TCMs are included in the SIP, the MPO or state must ensure that all TCMs have funding priority consistent with the SIP schedule for implementation as a condition of conformity. This provision is incorporated into the conformity process partly to ensure that TCMs are not postponed due to lack of a funding commitment. This can be a useful tool in reinforcing the linkages between SIPs and transportation plans and TIPs, and may require local, regional, and state transportation officials to make investment trade-offs between projects to ensure TCMs are implemented.

3.3 Congestion Mitigation and Air Quality Improvement Program

In 1990 Congress amended the CAA to bolster America's efforts to attain the NAAQS. The amendments required further reductions in the amount of permissible tailpipe emissions, initiated more stringent control measures in areas that still failed to attain the NAAQS and provided for a stronger, more rigorous linkage between transportation and air quality planning. In 1991, Congress adopted ISTEA. This law authorized the CMAQ program, and provided $6.0 billion in funding for surface transportation and other related projects that contribute to air quality improvements and reduce congestion. The CAA Amendments, ISTEA and the CMAQ program together were intended to realign the focus of transportation planning toward a more inclusive, environmentally-sensitive, and multimodal approach to addressing transportation problems.
The CMAQ program, jointly administered by the FHWA and FTA, was reauthorized in 1998 under TEA-21. TEA-21 provided over $8.1 billion dollars in funds to State DOTs, MPOs, and transit agencies to invest in projects that reduce criteria air pollutants regulated from transportation-related sources over a period of six years (1998-2003). TEA-21 was similar to its ISTEA predecessor, but featured greater program flexibility, several new program options, an expansion of eligible activities available for funding and a redesigned statutory formula for apportioning funds to provide a more equitable distribution.

SAFETEA-LU of 2005 continued the CMAQ program through fiscal year 2009. SAFETEA-LU will provide over $8.5 billion in funds for CMAQ projects for fiscal years 2005-2009. SAFETEA-LU also includes an expanded list of eligible projects and revisions to some conformity and planning requirements.

Congress did not intend CMAQ funding to be the only source of funds to reduce congestion and improve air quality. Other funds under the Surface Transportation Program (STP) or the FTA capital assistance programs, for example, may be used for this purpose as well. Furthermore, the greatest air quality benefit will accrue not solely from federal funds, but from a partnership of federal, state and local efforts.

Typical Texas CMAQ projects include signal synchronization, HOV lanes, fleet conversion to alternate fuels, access lanes such as right and left turn lanes (intersection improvements), and improved transit services.

CMAQ funding does not exempt projects from an environmental review. The documentation for CMAQ projects is the same as for non-CMAQ projects. Significant transportation projects, such as HOV lanes, may trigger the need for an Environmental Impact Statement (EIS) or an Environmental Assessment (EA). Minor projects, such as signal retiming and providing auxiliary lanes, typically only require blanket categorical exclusions or categorical exclusions.

3.4 Congestion Management System (CMS)

A CMS is a systematic process for managing congestion that provides information on transportation system performance and on alternative strategies for alleviating congestion and enhancing the mobility of persons and goods to levels that meet state and local needs. The CMS is developed, established and implemented as part of the metropolitan transportation planning process for all Transportation Management Areas (TMA) in Texas. A TMA is any metropolitan area with a total population of 200,000 or more. The TMAs in Texas are:

- Austin
- Corpus Christi
- Dallas-Fort Worth
- El Paso
- Houston-Galveston
- Lubbock,
- McAllen-Edinburg-Pharr, and
- San Antonio

FHWA and FTA review all operational CMS documents during the metropolitan transportation planning process federal certification reviews (FCR). These FCRs ensure that Texas TMAs are complying with federal CMS regulations.

The following language from 23 CFR 500.109(c) outlines the CMS requirements for CO and/or ozone nonattainment TMAs:

"In a TMA designated as nonattainment for carbon monoxide and/or ozone, the CMS shall provide an appropriate analysis of all reasonable (including multimodal) travel demand reduction and operational management strategies for the corridor in which a project that will result in a significant increase in capacity for single occupancy vehicles (SOVs) (adding general purpose lanes to an existing highway or constructing a new highway) is proposed. If the analysis demonstrates that travel demand reduction and operational management strategies cannot fully satisfy the need for additional capacity in the corridor and additional SOV capacity is warranted, then the CMS shall identify all reasonable strategies to manage the SOV facility effectively (or to facilitate its management in the future). Other travel demand reduction and operational management strategies appropriate for the corridor, but not appropriate for incorporation into the SOV facility itself shall also be identified through the CMS. All identified reasonable travel demand reduction and operational management strategies shall be incorporated into the SOV project or committed to by the State and MPO for implementation."

SECTION 4: TRAFFIC AIR QUALITY ANALYSIS (TAQA)

A TAQA is a project level analysis that determines the CO impacts of proposed transportation projects. In other words, will the project adversely affect local air quality such that CO levels will exceed the 1-hour or 8-hour CO standards?

Table 4.1 should be used to help determine if your project will require a TAQA.

Table 4.1 – TAQA Determination

Project Type	TAQA Required?
The project is not adding capacity - essentially exempt projects such as bridge replacements, auxiliary lanes, etc.	No
The project is adding capacity but the **design year**[1] average annual daily traffic (AADT) is less than 140,000 vehicles per day	No
The project is adding capacity and the **design year** AADT is equal to or greater than 140,000 vehicles per day	Yes

The 140,000 AADT threshold is based on a TxDOT modeling study which demonstrated that it is highly unlikely that the CO standard would ever be exceeded on any project with traffic numbers below this level.

Please note that a TAQA is not dependent on federal funding or attainment status. State-funded projects are also subject to a TAQA, and the TAQA requirement is the same for nonattainment as well as attainment areas.

4.1 Information Needed to Complete a TAQA

Once you have determined that a TAQA will be required for your project the following data will need to be obtained:

- Traffic data – the necessary traffic data to run the TAQA is the Average Annual Daily Traffic (AADT) for the project's **Estimated Time of Completion** (ETC) **year** and the **design year** or the farthest future year that is also being used for purposes of a mobile source air toxics assessment. The document should reference the source of the traffic data being used (i.e. the Metropolitan Planning Organization, the Transportation Planning and Programming Division, a toll authority, etc.)

- The Design Hour Volume (DHV) which can be developed by using Transportation Research Board Special Report 209 (Highway Capacity Manual)

- Schematic layout of the project showing project right-of-way (ROW) line.

[1]Projects are planned and designed to meet the future, anticipated needs and characteristics of a certain year. This is referred to as the design year. Typically, the design year for roadways is twenty years after the construction year. For bridges, the design year is typically greater.

- Background CO levels (see Appendix D).

- Basic geometric design information such as lane widths, ROW width, whether the project is at-grade, depressed, or elevated, etc.

4.2 TAQA Models

A TAQA is required to be performed to assure there is not an exceedance of either the 1-hour or the 8-hour CO standards. The TAQA is completed by using a line dispersion model in conjunction with an emission factor model. The following is a brief description of the EPA-approved line dispersion and emission factor models for use on roadway projects in Texas.

CALINE3 - a line source dispersion model which calculates the amount of CO generated along a roadway and then applies a dispersion model to calculate the peak hour CO concentrations at specific receiver locations along the ROW line. This model can be found on EPA's web site: http://www.epa.gov/scram001/dispersion_prefrec.htm

CAL3QHC – a variation of the CALINE model, CAL3QHC is available for analyzing carbon monoxide concentrations at major congested intersections. Use of this model is acceptable in any areas of Texas, but is required in the El Paso District if the project is located within the CO nonattainment area portion of El Paso County. This model can be found on EPA's web site: http://www.epa.gov/scram001/dispersion_prefrec.htm

MOBILE - the EPA mobile source emissions model. This complex model uses data on temperature, fleet mix, fleet ages, appropriate inspection-maintenance and anti-tampering programs, and vehicle operating modes to calculate VOC, CO, and NOx emissions for different speeds and years. MOBILE carbon monoxide output data is input into the CALINE model to calculate CO concentrations. The current version of the MOBILE model which should be used is MOBILE6.2. This model can be found on EPA's web site: http://www.epa.gov/otaq/m6.htm

CALINE4 was developed for use with emission factors that are specific to California. Therefore it is not an approved model for Texas projects.

EPA requires a worst-case analysis to demonstrate that standards will not be exceeded under the worst possible conditions. To help create the worst case scenario the CALINE3 and CAL3QHC models use the following variables:

- peak hour traffic volumes (DHV).
- receivers on the right-of-way line.
- very stable atmospheric conditions (mixing height of 1,000 meters, 1 meter/second wind speed, stable atmosphere, and winds blowing parallel to the roadway).

4.3 Converting the One-Hour CO Standard to the Eight-Hour CO Standard

Converting the 1-hour results to 8-hour results can be accomplished using the following formula:

$$CO8 = (CO1 - BG1)\ 0.6 + BG8$$

where

CO8 = Eight-hour CO concentration
CO1 = One-hour CO concentration
BG1 = One-hour background CO concentration
0.6 = Persistence factor (meteorology and traffic)
BG8 = Eight-hour background CO concentration

Once the 1-hour and 8-hour CO concentrations are calculated the figure must be converted to a percentage of the 1-hour and 8-hour CO NAAQS, respectively. If a violation occurs, reasonable mitigation measures must be developed. The Environmental Affairs Division will provide assistance in addressing the violation.

SECTION 5: PARTICULATE MATTER HOT SPOT ANALYSES

This section only applies if the project is located within a PM_{10} or $PM_{2.5}$ nonattainment or maintenance area.

5.1 What is a hot-spot analysis?

A hot-spot analysis is defined in 40 CFR 93.101 as an estimation of likely future localized $PM_{2.5}$ or PM_{10} pollutant concentrations and a comparison of those concentrations to the relevant air quality standards. A hot-spot analysis assesses the air quality impacts on a scale smaller than an entire nonattainment or maintenance area, including for example, congested roadway intersections and highways or transit terminals. Such an analysis is a means of demonstrating that a transportation project meets Clean Air Act conformity requirements to support state and local air quality goals with respect to potential localized air quality impacts.

<u>For PM_{10} areas without approved conformity SIPs</u>

For these PM_{10} areas a complete qualitative PM_{10} hot-spot analyses is required only for "projects of air quality concern" as defined by 40 CFR 93.123(b)(1). A qualitative PM_{10} hot-spot analysis is not required for projects that are not an air quality concern. For these types of projects, state and local project sponsors should briefly document in their project-level conformity determination that Clean Air Act and 40 CFR 93.116 requirements were met without a hot-spot analysis, since such projects have been found to not be of air quality concern under 40 CFR 93.123(b)(1).

<u>For PM_{10} areas with approved conformity SIPs</u>

In areas where EPA has already approved conformity SIPs that include PM_{10} hot-spot provisions from previous conformity rulemakings, the revised PM_{10} hot-spot requirements in the March 10, 2006 final rule will only be effective when a state either:

- withdraws the existing provisions from its approved conformity SIP and EPA approves the withdrawal, or
- includes the revised PM_{10} hot-spot requirements in a SIP revision and EPA approves that SIP revision.

<u>For $PM_{2.5}$ areas</u>

For all $PM_{2.5}$ areas, a complete qualitative $PM_{2.5}$ hot-spot analyses is required only for "projects of air quality concern" as defined by 40 CFR 93.123(b)(1). A qualitative $PM_{2.5}$ hot-spot analysis is not required for projects that are not an air quality concern. For these types of projects, state and local project sponsors should briefly document in their project-level conformity determinations that Clean Air Act and 40 CFR 93.116 requirements were met without a hot-spot analysis, since such projects have been found to not be of air quality concern under 40 CFR 93.123(b)(1).

5.2 Projects of Air Quality Concern

The final rule defines the projects of air quality concern that require a PM2.5 or PM10 hot-spot analysis in 40 CFR 93.123(b)(1) as:

- New or expanded highway projects that have a significant number of or significant increase in diesel vehicles;

- Projects affecting intersections that are at Level-of-Service D, E, or F with a significant number of diesel vehicles, or those that will change to Level-of-Service D, E, or F because of increased traffic volumes from a significant number of diesel vehicles related to the project;
- New bus and rail terminals and transfer points that have a significant number of diesel vehicles congregating at a single location;
- Expanded bus and rail terminals and transfer points that significantly increase the number of diesel vehicles congregating at a single location; and
- Projects in or affecting locations, areas, or categories of sites which are identified in the PM2.5 or PM10 applicable implementation plan or implementation plan submission, as appropriate, as sites of violation or possible violation.

If your project will require a qualitative hot-spot analysis please refer to the March 2006 EPA/FHWA Guidance document "Transportation Conformity Guidance for Qualitative Hot-spot Analyses in $PM_{2.5}$ and PM_{10} Nonattainment and Maintenance Areas" for more information. This guidance can be found in Appendix E.

SECTION 6: MOBILE SOURCE AIR TOXICS (MSATs)

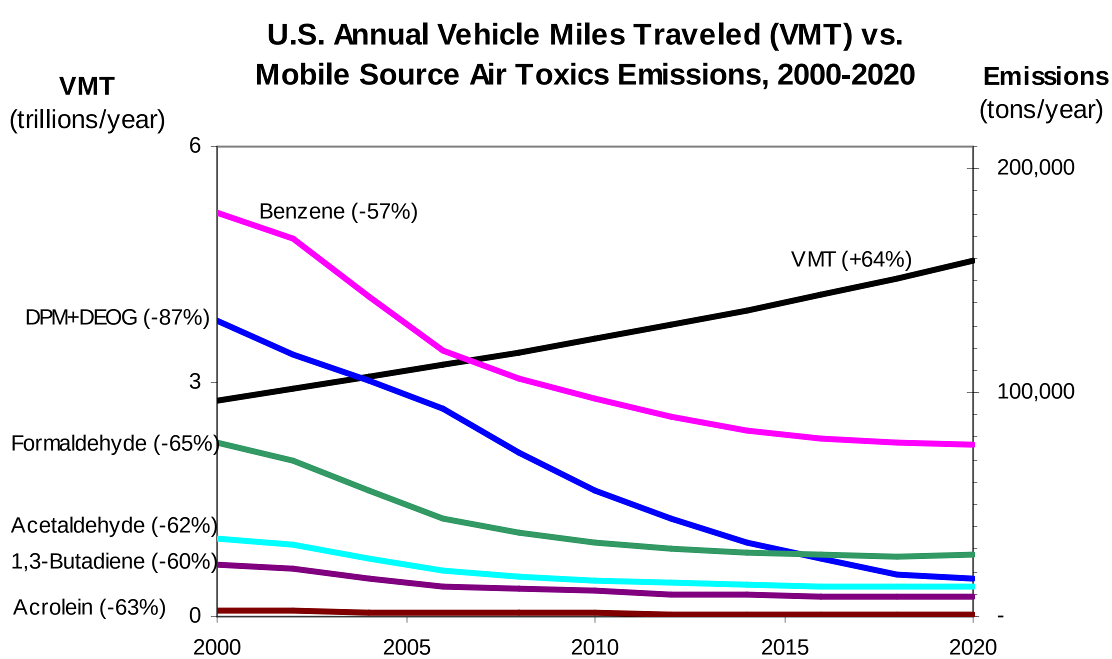
6.1 What are MSATs?

The Clean Air Act identified 188 air toxics, also known as hazardous air pollutants. EPA has assessed this expansive list of toxics and identified a group of 21 as mobile source air toxics, which are set forth in an EPA final rule, *Control of Emissions of Hazardous Air Pollutants from Mobile Sources (66 FR 17235).* EPA also extracted a subset of this list of 21 that it now labels as the six priority MSATs. These are benzene, formaldehyde, acetaldehyde, diesel particulate matter/diesel exhaust organic gases, acrolein, and 1,3-butadiene. While these MSATs are considered the priority transportation toxics, the EPA stresses that the lists are subject to change and may be adjusted in future rules.

MSATs are known or suspected to cause cancer or other serious health or environmental effects. Benzene is of particular concern because it is a known carcinogen and most of the nation's benzene emissions come from mobile sources. People who live or work near major roads, or spend a large amount of time in vehicles are likely to have higher exposures and higher risks.

EPA has issued a number of regulations that will dramatically decrease MSATs through cleaner fuels and cleaner engines. According to an FHWA analysis, even if VMT increases by 64 percent, reductions of 57 percent to 87 percent in MSATs are projected from 2000 to 2020, as shown in the following graph:

Figure 6.1 VMT vs. MSAT Emissions



Notes: For on-road mobile sources. Emissions factors were generated using MOBILE6.2. MTBE proportion of market for oxygenates is held constant, at 50%. Gasoline RVP and oxygenate content are held constant. VMT: *Highway Statistics 2000*, Table VM-2 for 2000, analysis assumes annual growth rate of 2.5%. "DPM +DEOG" is based on MOBILE6.2-generated factors for elemental carbon, organic carbon and SO4 from diesel-powered vehicles, with the particle size cutoff set at 10.0 microns.

National trend information is provided as background. For specific locations, the trend lines may be different, depending on local parameters defining vehicle mix, fuels, meteorology and other factors.

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 impacts from MSATs are limited. These limitations impede TxDOT's and FHWA's ability to evaluate how mobile source health risks should factor into project-level decision-making under NEPA. In addition, EPA has not established regulatory concentration targets for the six relevant MSAT pollutants appropriate for use in the project development process.

Nonetheless, air toxics concerns are being raised more frequently on transportation projects during the NEPA process in Texas and elsewhere in the nation. As the science emerges, TxDOT and FHWA are increasingly expected by the public and other agencies to address MSAT impacts in their environmental documents. FHWA has several research projects underway to more clearly define potential risks from MSAT emissions associated with transportation projects. While this research is ongoing FHWA has issued interim guidance on how MSATs should be addressed in NEPA documents for highway projects. Most of that information has been incorporated into these Air Quality Guidelines. TxDOT will continue to monitor the developing research in this emerging field and will issue updates to this guidance as necessary.

6.2 MSAT Analyses and NEPA Documents

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. Therefore, a range of options may be appropriate for addressing this issue in NEPA documentation. Projects without any meaningful increase in VMT or vehicle mixes may need only standard language regarding MSAT impacts. Projects where there are expected to be some VMT or vehicle mix differences between alternatives may require a qualitative analysis of emissions to compare or differentiate among proposed project alternatives. Most new location projects in urban areas with significant VMT expected will require a quantitative MSAT analysis.

FHWA has developed and TxDOT has adopted a tiered approach for analyzing MSATs in NEPA documents. Depending on the specific project circumstances, FHWA/TxDOT have identified three levels of analysis:

- No analysis for projects with no potential for meaningful MSAT effects (most CEs);
- Qualitative analysis for projects with low potential MSAT effects (Most EAs, and perhaps a limited number of EISs); or
- Quantitative analysis for projects with higher potential MSAT effects (Some EAs and almost all EISs).

<u>Exempt Projects or Projects with No Meaningful Potential MSAT Effects (Most CEs)</u>

Three types of projects included in this category are:

- Projects qualifying as a categorical exclusion under 23 CFR 771.117(c);
- Other categorical exclusions not covered by 23 CFR 771.117(c) that have no potential for meaningful MSAT effects.
- Projects exempt under the Clean Air Act Conformity rule under 40 CFR 93.126

For projects that are categorically excluded under 23 CFR 771.117(c), or are exempt under the Clean Air Act pursuant to 40 CFR 93.126, no analysis or discussion of MSATs is necessary. Documentation sufficient to demonstrate that the project qualifies as a categorical exclusion and/or is an exempt project will suffice. An example of language which should be included in the NEPA document is found in Section 8.

<u>Projects with Low Potential MSAT Effects (Most EAs, few EISs)</u>
The types of projects included in this category are those that serve to improve operations of highway, transit or freight facilities without adding substantial new capacity or without creating a facility that is likely to meaningfully increase emissions. This category covers a broad range of projects. It is anticipated that a significant number of EA level projects should fall within this category. Examples of projects covered by this section include: minor widening projects, new interchanges, and most projects where the design year traffic is not projected to exceed 140,000 AADT.[2]

Projects with low potential for MSAT effects should include a **Qualitative Assessment**. The qualitative assessment should include the following elements:

1) a brief MSAT description and discussion of national trend data projecting substantial overall reductions in emissions due to stricter engine and fuel regulations issued by EPA;
2) a comparison of the expected effect of the project on traffic volumes, vehicle mix, or routing of traffic, and the associated assumed changes in MSATs;
3) an assessment of schools, licensed day cares, elder care facilities, and hospitals located within 100 and 500 meters of the ROW;
4) a discussion of information that is incomplete or unavailable for a project-specific assessment of MSAT impacts, in compliance with CEQ regulations (40 CFR 1502.22(b)); and
5) a summary of current studies regarding the health impacts of MSATs, in compliance with 40 CFR 150.22(b);

Sample language for all of these elements is included in Section 7.

The following factors should be considered when developing a qualitative analysis.

[2] This guidance does not specifically address the analysis of construction-related emissions because of their relatively short duration. FHWA/TxDOT will be considering whether more guidance is needed on construction activities in the future.

- For projects on an existing alignment, MSATs are expected to decline unless VMT more than doubles by 2020 (due to the effect of new EPA engine and fuel standards).
- Projects that result in increased travel speeds will reduce emissions of the VOC-based MSATs (acetaldehyde, benzene, formaldehyde, acrolein, and 1, 3 butadiene); the effect of speed changes on diesel particulate matter is unknown. This speed benefit may be offset somewhat by increased VMT if the more efficient facility attracts additional vehicle trips.
- Projects that facilitate new development may generate additional MSAT emissions from such things as new trips, truck deliveries, and parked vehicles (due to evaporative emissions). However, these may also be activities that are attracted from elsewhere in the metro region (thus, on a regional scale there may be no net change in emissions).
- Projects that create new travel lanes, relocate lanes, or relocate economic activity closer to homes, schools, licensed day cares, hospitals, or elder care facilities (known as sensitive receptors) may increase concentrations of MSATs at those locations relative to the no build scenario.

NOTE: If significant differences in VMT, vehicle mixes, or speeds are identified, the need for a quantitative analysis, regardless of AADT, should be seriously evaluated. In addition, if a significant number of sensitive receptors are located along the roadway and/or if the public has expressed concern about air pollution associated with the project, a quantitative analysis may be more appropriate. Please contact the Environmental Affairs Division if there are any doubts regarding the type of analysis needed for MSATs.

<u>Projects with Higher Potential MSAT Effects (Most EISs)</u>
This category includes projects that have the potential for meaningful differences among project alternatives. It is anticipated that a limited number of projects will require the more detailed type of analysis described in this section. To fall into this category, projects must be proposed to be located in proximity to populated areas or in rural areas, in proximity to concentrations of vulnerable populations (schools, homes, licensed day cares, elder care facilities, and hospitals), and also:

- create or significantly alter a major intermodal freight facility that has the potential to concentrate high levels of diesel particulate matter in a single location; or

- create new or add significant capacity to urban highways such as interstates, urban arterials, or urban collector-distributor routes with traffic volumes where the AADT is projected to be equal to or greater than 140,000 by the design year.

Projects falling within this category should be more rigorously assessed for impacts. In addition to requiring all elements outlined in the Qualitative Assessment, this approach also requires a **Quantitative Assessment**. This assessment is an attempt to measure the level of emissions for the six priority MSATs for all alternatives to use as a basis of comparison.

Please consult with ENV and FHWA before proceeding if you feel a quantitative assessment will be required for your project.

SECTION 7: ENVIRONMENTAL DOCUMENTATION

Once the CO and MSAT analyses have been performed you are ready to prepare the air quality section of the environmental document. Please refer to the following information to verify which elements need to be included for your project. Sample language for each of the following elements is included at the end of this section and in Section 8.

7.1 Attainment/Early Action Compact Area Required Elements:

1) Attainment Status:

- State which county the project is in, that it is in an area that is in attainment of all NAAQS, and that the transportation conformity rules do not apply. EAC areas should also include reference to the early planning efforts in the area.

2) Transportation Plan Statements:

   a. Within a Metropolitan Planning Area - State that the project is consistent with the local MPO's MTP and with the TIP if proposed letting date is within TIP timeframe.

   b. Outside an MPA - State that the project is consistent with the STIP if the proposed letting date is within STIP timeframe (check w/TP&D to verify STIP status)

3) Traffic Air Quality Analysis Statement:

   a. TAQA Required - If a TAQA was required include the results in a table format. Results should include the ETC and design years used, the 1-hour and 8-hour CO concentrations, and the percent of the 1-hour and 8-hour CO standards that was achieved. Also reference the tools used to complete the analysis - CALINE3 or CAL3QHC and MOBILE6.2.

   b. TAQA Not Required - Include a statement explaining why this project was exempt from a TAQA.

4) Air Toxics Documentation (refer to Section 5 to determine the documentation necessary)

7.2 Nonattainment Area Required Elements:

1) Nonattainment status:

- State which county the project is in, that it is in an area that is nonattainment and for which pollutant(s), and that the transportation conformity rules apply.

2) Transportation Plan Statements:

a. Within a Metropolitan Planning Area - State that the project is consistent with the local MPO's conforming MTP (include the date it was found to conform) and with the TIP if the proposed letting date is within the TIP timeframe.

b. Outside an MPA - State that the project is consistent with the project list used in the conformity analysis. Also include the date the conformity determination was approved.

3) Traffic Air Quality Analysis Statement:

a. TAQA Required - Include the results in a table format. Results should include the ETC and design years used, the 1-hour and 8-hour CO concentrations, and the percent of the 1-hour and 8-hour CO standards that was achieved. Also reference the tools used to complete the analysis – CALINE3 or CAL3QHC and MOBILE6.2.

b. TAQA Not Required - Include a statement explaining why this project was exempt from a TAQA.

4) Congestion Management System:

For single occupancy vehicle added capacity projects in nonattainment TMAs, the following should be included in the environmental documents:

a. a statement that the project is consistent with an operational CMS including the date the CMS was approved
b. a table outlining other travel demand reduction or operational management strategies committed to for implementation with the proposed project or in the corridor

5) Air Toxics Documentation (refer to Section 6 to determine the documentation necessary)

7.3 Sample Language for Air Quality Documentation

All shaded language is sample information that will need to be replaced with the appropriate information specific to your project.

Attainment Areas

Example 1 - TAQA required

The project is located in Nueces County which is in an area in attainment of all NAAQS; therefore, the transportation conformity rules do not apply. The proposed action is consistent with the Corpus Christi MPO's 2030 MTP and 2006-2008 TIP. Design year traffic for this project is 141,000 vehicles per day therefore triggering the need for a traffic air quality analysis.

Topography and meteorology of the area in which the project is located would not seriously restrict dispersion of the air pollutants. The traffic data used in the analysis was obtained from the TxDOT TPP Division. Traffic for the estimated time of completion year (2010) and design year (2030) is estimated to be 85,500 vehicles per day, and 141,000 vehicles per day respectively.

Carbon monoxide concentrations for the proposed action were modeled using CALINE3 or CAL3QHC and MOBILE6.2 and factoring in adverse meteorological conditions and sensitive receptors at the right-of-way line in accordance with the Texas Department of Transportation Air Quality Guidelines. Local concentrations of carbon monoxide are not expected to exceed national standards at any time. The following table summarizes the results of the analysis:

Project Carbon Monoxide Concentrations

Year	1-hour CO Standard 35 ppm	1 HR % NAAQS	8-hour CO Standard 9 ppm	8-HR % NAAQS
2010	9.5	27.1%	3.9	43.3%
2030	9.8	28.0%	4.0	44.4%

*The National Ambient Air Quality Standard (NAAQS) for CO is 35 ppm for one-hour and nine ppm for eight hours. Analysis includes a one-hour background concentration of 0.5 ppm and an 8-hour background concentration of 0.3 ppm.

Insert appropriate Mobile Source Air Toxics paragraphs here. See Section 7 for examples.

Example 2 – TAQA not required:

The project is located in Fayette County which is in an area in attainment of all NAAQS; therefore, the transportation conformity rules do not apply. The proposed action is consistent with the 2006-2008 STIP.

Generally, intersection improvements (or enter other appropriate exempt project) are considered exempt from a TAQA because they are intended to enhance traffic safety and improve traffic flow. The proposed action would not add capacity to the existing facility. Current and future emissions should continue to follow existing trends not being affected by this project. Due to the nature of this project, further carbon monoxide analysis was not deemed necessary.

Insert appropriate Mobile Source Air Toxics paragraphs here. See Section 7 for examples.

Example 3 – TAQA not required/Sample EAC Area language:

The project is located in Travis County which is in an area in attainment of all NAAQS; therefore, the transportation conformity rules do not apply. However, due to elevated monitored ozone levels in the Austin area, Bastrop, Caldwell, Hays, Travis, and Williamson Counties voluntarily entered into an Early Action Compact with TCEQ and EPA. This compact resulted in the development and implementation of an emission reduction plan to assure attainment of the 8-hour ozone standard by 2007 and maintenance through 2012.

The proposed action is consistent with the Capital Area Metropolitan Planning Organization's 2030 MTP and the 2004-2008 TIP. Traffic data for the design year (2026) is 56,000 vehicles per day. These traffic projections do not exceed 140,000 vehicles per day; therefore, this project is exempt from a TAQA because previous analyses of similar projects did not result in a violation of the National Ambient Air Quality Standards.

Insert appropriate Mobile Source Air Toxics paragraphs here. See Section 7 for examples.

Nonattainment Areas

Example 1 – TAQA and CMS required :

The project is located within Harris County which is designated a moderate ozone nonattainment area; therefore, the transportation conformity rules apply. Design year traffic data is estimated to be 142,000 vehicles per day, therefore a TAQA is required. This project is adding SOV capacity; therefore, a CMS analysis is also required.

All projects in the Houston-Galveston Area Council's Transportation Improvement Program (TIP) that are proposed for federal or state funds were initiated in a manner consistent with federal guidelines in Section 450, of Title 23 CFR and Section 613.200, Subpart B, of Title 49 CFR. Energy, environment, air quality, cost, and mobility considerations are addressed in the programming of the TIP. The proposed action is consistent with the area's financially constrained Metropolitan Transportation Plan ("2025 Regional Transportation Plan") and the 2006-2008 TIP as proposed by the Houston-Galveston Area Council. The MTP was found to conform to the State Implementation Plan (SIP) on June 3, 2005.

Topography and meteorology of the area in which the project is located would not seriously restrict dispersion of the air pollutants. ETC year traffic (2009) is estimated to be 98,500 vehicles per day and the design year (2029) traffic is estimated to be 142,000 vehicles per day.

Carbon monoxide concentrations for the proposed action were modeled using CALINE3 or CAL3QHC and MOBILE6.2 and factoring in adverse meteorological conditions and sensitive receptors at the right-of-way line in accordance with the Texas Department of Transportation 2005 Air Quality Guidelines. Local concentrations of carbon monoxide are not expected to exceed national standards at any time. The following table summarizes the results of the analysis:

Project Carbon Monoxide Concentrations

Year	1-hour CO Standard 35 ppm	1 HR % NAAQS	8-hour CO Standard 9 ppm	8-HR % NAAQS
2009	9.5	27.1%	3.9	43.3%
2029	9.8	28.0%	4.0	44.4%

*The National Ambient Air Quality Standard (NAAQS) for CO is 35 ppm for one hour and 9 ppm for eight-hours. Analysis includes a one-hour background concentration of 0.5 ppm and an 8-hour background concentration of 0.3 ppm.

The congestion management system (CMS) is a systematic process for managing congestion that provides information on transportation system performance and on alternative strategies for alleviating congestion and enhancing the mobility of persons and goods to levels that meet state and local needs. The project was developed from HGAC's operational CMS, which meets all requirements of CFR 500.109. The CMS was adopted by HGAC on May 20, 2005.

Operational improvements and travel demand reduction strategies are commitments made by the region at two levels: program level and project level implementation. Program level commitments are inventoried in the regional CMS, which was adopted by HGAC; they are included in the financially constrained Metropolitan Transportation Plan, and future resources are reserved for their implementation.

The CMS element of the plan carries an inventory of all project commitments (including those resulting from major investment studies) detailing type of strategy, implementing responsibilities, schedules, and expected costs. At the project programming stage, travel demand reduction strategies and commitments will be added to the regional TIP or included in the construction plans. The regional TIP provides for programming of these projects at the appropriate time with respect to the SOV facility implementation and project specific elements.

Committed congestion reductions strategies and operational improvements within the study boundary will consist of signalization and intersection improvements. Individual projects are listed in Table AA.

Table AA - Congestion Management Strategies

Operational Improvements in the Travel Corridor		
Location	Type	Implementation Date
Davis/Justin	Signal Improvement	June 5, 2005
Bernal/Singleton	Signal Improvement	August 10, 2006
Davis/Gilpin	Intersection Improvement	September 8, 2007

In an effort to reduce congestion and the need for SOV lanes in the region, TxDOT and HGAC will continue to promote appropriate congestion reduction strategies through the CMAQ program, the CMS, and the Metropolitan Transportation Plan. The congestion reduction strategies considered for this project would help alleviate congestion in the SOV study boundary, but would not eliminate it.

Therefore, the proposed project is justified. The CMS analysis for added SOV capacity projects in the TMA is on file and available for review at HGAC.

Insert appropriate Mobile Source Air Toxics paragraphs here. See Section 7 for examples.

Example 2 – TAQA and CMS not required

The project is located within Dallas County which is designated a moderate ozone nonattainment area; therefore, the transportation conformity rules apply. Design year traffic is estimated to be 70,000 vehicles per day; therefore, a TAQA is not required because previous analyses of similar projects did not result in a violation of National Ambient Air Quality Standards. This project is not adding SOV capacity and is therefore exempt from a CMS analysis.

The proposed action is consistent with the area's financially constrained Metropolitan Transportation Plan ("Mobility 2025 – Amended April 2005") and the 2006-2008 TIP as proposed by NCTCOG. Both the MTP and the TIP were found to conform to the State Implementation Plan (SIP) on June 16, 2005. All projects in the North Central Texas Council of Government's (NCTCOG) TIP that are proposed for federal or state funds were initiated in a manner consistent with federal guidelines in Section 450, of Title 23 CFR and Section 613.200, Subpart B, of Title 49 CFR. Energy, environment, air quality, cost, and mobility considerations are addressed in the programming of the TIP.

Insert appropriate Mobile Source Air Toxics paragraphs here. See Section 7 for examples.

SECTION 8: SAMPLE MSAT LANGUAGE

8.1 Sample Language for Exempt Projects or Projects with No Meaningful Potential MSAT Effects

The purpose of this project is to *insert project description*. This project will not result in any meaningful changes in traffic volumes, vehicle mix, location of existing roadways, or any other factor that would cause an increase in emissions impacts relative to the no-build alternative. As such, TxDOT/FHWA have determined that this project will generate minimal air quality impacts for Clean Air Act criteria pollutants and has not been linked with any special MSAT concerns. Consequently, this project is exempt from analysis for MSATs.

Moreover, EPA regulations for vehicle engines and fuels will cause overall MSATs to decline significantly over the next 20 years. Even after accounting for a projected 64% increase in VMT, FHWA predicts MSATs will decline in the range of 57 to 87% from a baseline year of 2000 to 2020 based on the current vehicle and fuel regulations in effect. These reductions will reduce the background level of MSATs as well as the possibility of even minor MSAT emission increases from this project.

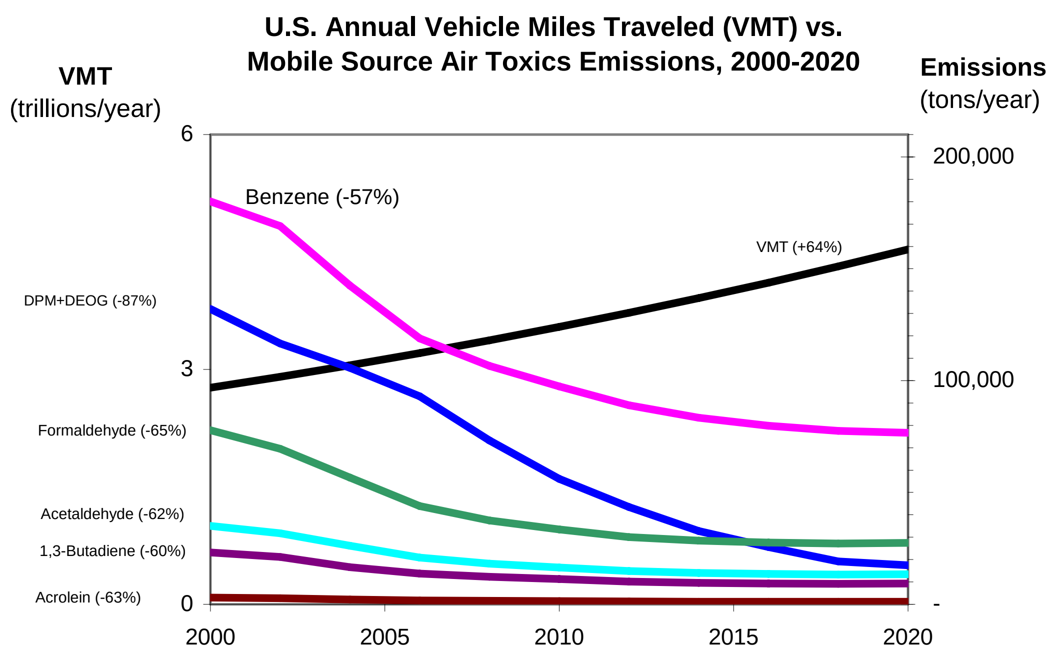
8.2 Sample Language for Qualitative Assessment

Mobile Source Air Toxics

In addition to the criteria air pollutants for which there are National Ambient Air Quality Standards (NAAQS), EPA also regulates air toxics. Most air toxics originate from human-made sources, including on-road mobile sources, non-road mobile sources (e.g., airplanes), area sources (e.g., dry cleaners) and stationary sources (e.g., factories or refineries).

Mobile Source Air Toxics (MSATs) are a subset of the 188 air toxics defined by the Clean Air Act. The MSATs are compounds emitted from highway vehicles and non-road equipment. Some 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 also result from engine wear or from impurities in oil or gasoline.

The EPA is the lead federal agency for administering the Clean Air Act and has certain responsibilities regarding the health effects of MSATs. EPA issued a Final Rule on *Controlling Emissions of Hazardous Air Pollutants from Mobile Sources* (66 FR 17229, March 29, 2001). This rule was issued under the authority in Section 202 of the Clean Air Act. In its rule, EPA examined the impacts of existing and newly promulgated mobile source control programs, including its reformulated gasoline (RFG) program, its national low emission vehicle (NLEV) standards, its Tier 2 motor vehicle emissions standards and gasoline sulfur control requirements, and its proposed heavy duty engine and vehicle standards and on-highway diesel fuel sulfur control requirements. Between 2000 and 2020, FHWA projects that even with a 64 percent increase in VMT, these programs will reduce on-highway emissions of benzene, formaldehyde, 1,3-butadiene, and acetaldehyde by 57 to 65%, and will reduce on-highway diesel PM emissions by 87%, as shown in the following graph:



Notes: For on-road mobile sources. Emissions factors were generated using MOBILE6.2. MTBE proportion of market for oxygenates is held constant, at 50%. Gasoline RVP and oxygenate content are held constant. VMT: *Highway Statistics 2000*, Table VM-2 for 2000, analysis assumes annual growth rate of 2.5%. "DPM + DEOG" is based on MOBILE6.2-generated factors for elemental carbon, organic carbon and SO4 from diesel-powered vehicles, with the particle size cutoff set at 10.0 microns.

As a result, EPA concluded that no further motor vehicle emissions standards or fuel standards were necessary to further control MSATs. The agency is preparing another rule under authority of CAA Section 202(l) that will address these issues and could make adjustments to the full 21 and the primary six MSATs.

Project Specific MSAT Information

Numerous 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 (see "Unavailable Information for Project Specific MSAT Impact Analysis" at the end of this section for more information). However, it is possible to qualitatively assess the levels of future MSAT emissions under the project. Although a qualitative assessment cannot identify and measure health impacts from MSATs, it can give 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

NOTE: The following are examples of qualitative MSAT scenarios for various project types. Each project is different, and some projects may contain elements covered in more than one of the examples below. These scenarios should be used as a starting point only. The document should be tailored to reflect the unique circumstances of the project being considered, particularly those areas that are shaded.

1) Minor Widening Projects

For each alternative in this *EIS/EA*, 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. 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. This increase in VMT would lead to higher MSAT emissions for the action alternative along the highway corridor, along with a corresponding decrease in MSAT emissions along the parallel routes. The emissions increase is offset somewhat by lower MSAT emission rates due to increased speeds; according to EPA's MOBILE6 emissions model, emissions of all of the priority MSATs except for diesel particulate matter decrease as speed increases. The extent to which these speed-related emissions decreases will 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 Alternatives is nearly the same 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 MSAT emissions by 57 to 87 percent between 2000 and 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 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.

[This paragraph and the corresponding language in the next paragraph may apply if the road moves closer to receptors:] The additional travel lanes contemplated as part of the project alternatives will have the effect of moving some traffic closer to nearby homes, schools and businesses; therefore, there may be localized areas where ambient concentrations of MSATs could be higher under the Build Alternative than under the No Build Alternative. The localized increases in MSAT concentrations would likely be most pronounced along the expanded roadway sections that would be built at describe location. However, as discussed previously, the magnitude and the duration of these potential increases compared to the No-build alternative cannot be accurately quantified due to the inherent deficiencies of current models. In sum, when a highway is widened and, as a result, moves closer to receptors, the localized level of MSAT emissions for the Build Alternative could be higher relative to the No Build Alternative, but this could be offset due to increases in speeds and reductions in congestion (which are associated with lower MSAT emissions). Also, MSATs will be lower in other locations when traffic shifts away from them. However, on a regional basis, EPA's vehicle and fuel regulations coupled with fleet turnover will cause region-wide MSAT levels to be significantly lower than today in almost all cases.

2) New Interchange with new connector roadway

This is oriented toward projects where a new roadway segment connects to an existing limited access highway. The purpose of the roadway is primarily to meet regional travel needs, e.g., by providing a more direct route between locations.

For each alternative in this *EIS/EA*, the amount of MSATs emitted would be proportional to the vehicle miles traveled, or VMT, assuming that other variables such as fleet mix are the same for each alternative. Because the VMT estimated for the No Build Alternative is higher than for any of the Build Alternatives, regional MSAT levels are expected to be higher for the No Build Alternative than for any of the Build Alternatives. In addition, because the estimated VMT under each of the Build Alternatives are nearly the same 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 MSAT emissions by 57 to 87% 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 EPA-projected reductions is so great (even after accounting for VMT growth) that MSAT emissions in the study area would likely be lower in the future.

Because of the specific characteristics of the project alternatives [i.e. new connector roadways], under each alternative 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 be most pronounced along the new roadway sections that would be built at [*insert location description*]. However, even if these increases do occur, they too will be substantially reduced in the future due to implementation of EPA's vehicle and fuel regulations.

In sum, under any Build Alternatives in the design year it is expected there would be reduced MSAT emissions in the immediate area of the project, relative to the No Build Alternative, due to the reduced VMT associated with more direct routing, and due to EPA's MSAT reduction programs. In comparing various project alternatives, MSAT levels could be higher in some locations than others, but current tools and science are not adequate to quantify them. However, on a regional basis, EPA's vehicle and fuel regulations coupled with fleet turnover will cause region-wide MSAT levels to be significantly lower than today in almost all cases.

3) New Interchange/ no new connector roadway

(This is oriented toward interchange projects developed in response to or in anticipation of economic development, e.g., a new interchange to serve a new shopping/residential development)

For each alternative in this *EIS/EA*, the amount of MSATs emitted would be proportional to the vehicle miles traveled, or 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 interchange facilitates new development that attracts trips that were not occurring in this area before. This increase in VMT means MSATs under the Build Alternatives would probably be higher than the No Build Alternative in the study area. There could also be localized differences in MSATs from indirect effects of the project such as associated access traffic, emissions of evaporative MSATs (e.g., benzene) from parked cars, and emissions of diesel particulate matter from delivery trucks, depending on the type and extent of development. On a regional scale, this emissions increase would be offset somewhat by reduced travel to other destinations.

Because the estimated VMT under each of the Build Alternatives are nearly the same it is expected there would be no appreciable difference in overall MSAT emissions among the various Build Alternatives. For all Alternatives, emissions are virtually certain to be lower than present levels in the design year as a result of EPA's national control programs that are projected to reduce MSAT emissions by 57 to 87% 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 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 than they are today.

The following discussion would apply to new interchanges in areas already developed to some degree. For new construction in anticipation of economic development in rural or largely undeveloped areas, this discussion would be applicable only to areas where there are concentrations of sensitive populations, such as those found in nursing homes, schools, hospitals, and others.

The new ramps *[and accel/decel lanes] [and additional lanes on the crossing arterial streets]* contemplated as part of the project alternatives will have the effect of moving some traffic closer to nearby homes, schools and businesses; therefore, under each alternative there may be localized areas where ambient concentrations of MSATs would be higher under certain Alternatives than others. The localized differences in MSAT concentrations would likely be most pronounced along the new/expanded roadway sections that would be built at *[insert location description]*. However, as discussed above, the magnitude and the duration of these potential increases cannot be accurately quantified because of limitations on modeling techniques. Further, under all Alternatives, overall future MSATs are expected to be substantially lower than today due to implementation of EPA's vehicle and fuel regulations.

In sum, under all Build Alternatives in the design year it is expected there would be higher MSAT emissions in the study area relative to the No Build Alternative due to increased VMT. There could be slightly elevated but unquantifiable changes in MSATs to residents and others in a few localized areas where VMT increases, which may be important to any members of sensitive populations. However, on a regional basis, EPA's vehicle and fuel regulations coupled with fleet turnover will cause region-wide MSAT levels to be significantly lower than today in almost all cases.

4) Expanded Intermodal Centers or other projects which impact truck traffic, but that do not reach the category three criteria of "major new intermodal center".

The description for these types of projects depends on the nature of the project. The key factor from an MSAT standpoint is the change in truck and rail activity and the resulting change in MSAT emissions patterns.

For each alternative in this *EIS/EA*, the amount of MSATs emitted would be proportional to the amount of truck vehicle miles traveled (VMT) and rail activity, assuming that other variables (such as travel not associated with the intermodal center) are the same for each alternative. The truck VMT and rail activity estimated for each of the Build Alternatives are higher than that for the No Build Alternative, because of the additional activity associated with the expanded intermodal center. This increase in truck VMT and rail activity would lead to the Build Alternatives having higher MSAT emissions (particularly diesel particulate matter) in the vicinity of the intermodal center. The higher emissions could be offset somewhat by two factors: 1) the decrease in regional truck traffic due to increased use of rail for inbound and outbound freight; and 2) increased speeds on area highways due to the decrease in truck traffic (according to EPA's MOBILE6.2 emissions model, emissions of all of the priority MSATs except for diesel particulate matter decrease as speed increases). The extent to which these emissions decreases will offset intermodal center-related emissions increases is not known.

Because the estimated truck VMT and rail activity under each of the Build Alternatives are nearly the same 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 MSAT emissions by 57 to 87% 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 EPA-projected reductions are so significant (even after accounting for VMT growth) that MSAT emissions in the study area are likely to be lower in the future as well.

This paragraph and the corresponding language in the next paragraph may apply if the intermodal center is close to other development: The additional freight activity contemplated as part of the project alternatives will have the effect of increasing diesel emissions in the vicinity of nearby homes, schools and businesses; therefore, under each alternative there may be localized areas where ambient concentrations of MSATs would be higher than under the No Build alternative. The localized differences in MSAT concentrations would likely be most pronounced under Alternatives __. However, as discussed above, the magnitude and the duration of these potential differences cannot be accurately quantified because of current limitations in modeling. Even though there may be differences among the Alternatives, on a region-wide basis, EPA's vehicle and fuel regulations coupled with fleet turnover will, over time, cause region-wide MSAT levels to be significantly lower than today in almost all cases.

[Insert a description of any emissions-reduction activities that are associated with the project, such as truck and train idling limitations or technologies, such as auxiliary power units; alternative fuels or engine retrofits for container-handling equipment, etc.]

In sum, all Build Alternatives in the design year are expected to be associated with higher levels of MSAT emissions in the study area, relative to the No Build Alternative, along with some benefit from improvements in speeds and reductions in region-wide truck traffic. There could be slightly elevated but unquantifiable differences in MSATs among Alternatives in a few localized areas where freight activity occurs closer to homes, schools and businesses, which may be important particularly to any members of sensitive populations. Under all alternatives, MSAT levels are likely to decrease over time due to nationally mandated cleaner vehicles and fuels.

Sensitive Receptor Assessment

There may be localized areas where ambient concentrations of MSATs are slightly higher in any build scenario than in the no build scenario. Dispersion studies have shown that the "roadway" air toxics start to drop off at about 100 meters. By 500 meters, most studies have found it very difficult to distinguish the roadway from background toxic concentrations in any given area. An assessment of some potential sensitive receptors within both 100 and 500 meters should be conducted. Sensitive receptors include those facilities most likely to contain large concentrations of the more sensitive population (hospitals, schools, licensed day cares, and elder care facilities).

The environmental document should include the following three sets of results: 1) a table outlining the receptors within 100 and 500 meters of the project study area for each of the proposed project alternatives; 2) a table showing the specific location of each receptor identified; and 3) a map of the sensitive receptors identified by some type of naming system. The following are samples of the tables and map.

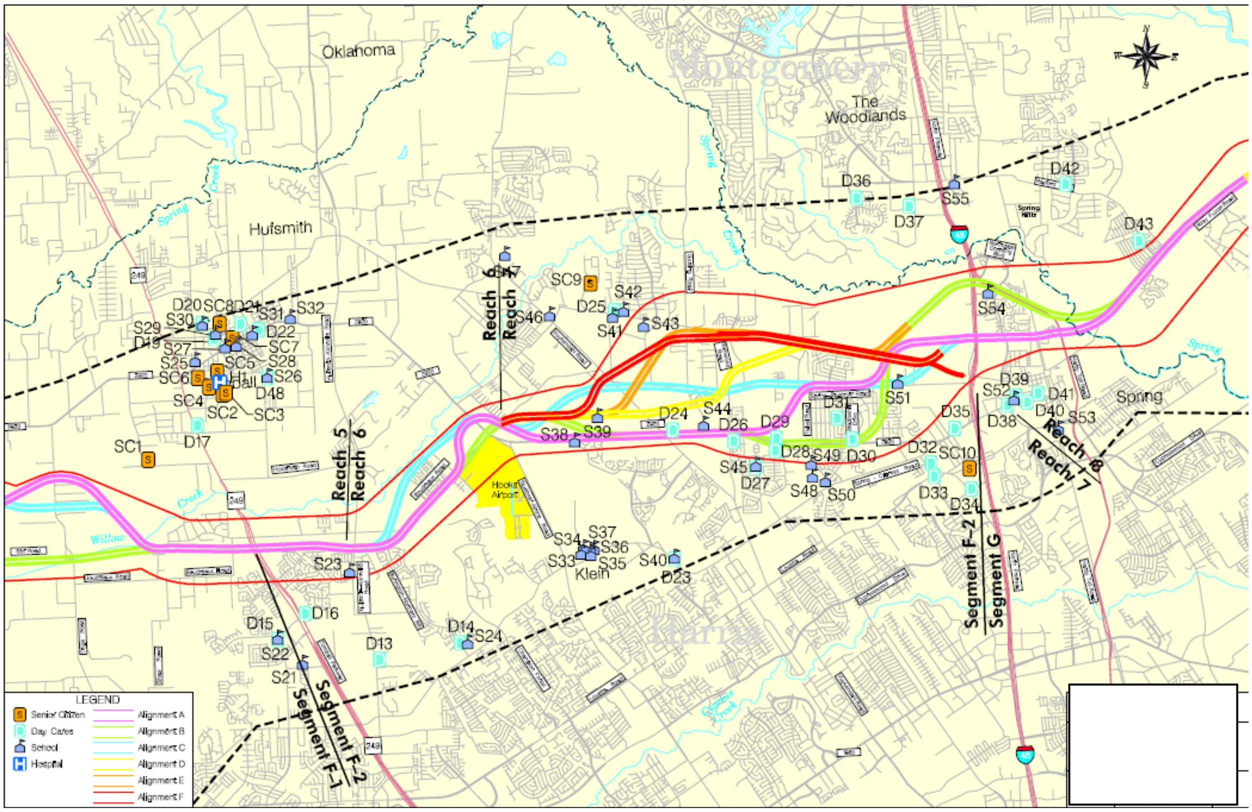
Sample Table - Sensitive Receptors by Distance

Alternative *	Length (miles)	Number of Receivers within:	
		328 ft (100 meters)	1640 ft (500 meters)
A	24	0	3
B	20	0	3
C	32	1	4
D	31	1	4
D-1	32	1	4
D-2	33	1	5
Preferred	29	0	0

Sample Table - Sensitive Receptors in the Study Area

Map ID	Name	Address	City	Zip Code
D1	Holy Covenant Child Day Care	22111 Morton Ranch Rd	Houston	77449
D2	Globow Elementary YMCA Daycare	3535 Lakes of Bridgewater Dr	Houston	77449
D3	Chrissy's Daycare	21806 Olympia Springs Ln	Houston	77449
D4	Home Away From Home Child Ctr	21622 Bay Palms Dr	Houston	77449
D5	Cypress Springs High School B/A	7909 Fry Rd	Houston	77433
D6	Cypress Child Care Center	15802 Jarvis Rd	Houston	77429
D7	St John Lutheran Preschool	15235 Spring Cypress Rd	Houston	77429
D8	Farney Elementary ASP	14425 Barker Cypress Rd	Houston	77429
D9	Little Lambs MDO Preschool	20155 Cypresswood Dr	Houston	77433
D10	Kids R Kids #26 TX	20155 Cypresswood Dr	Houston	77433
D11	La Petite Academy	15255 Mason Rd	Houston	77433
D12	Fairfield Athletic Club Childcare	16055 Mason Rd	Houston	77433
D13	Discovery Playhouse Learning	17822 Huffsmith Kohrville	Houston	77375
D14	YMCA/Hassler Elementary	9325 Lochflora Dr	Houston	77379
D15	Willowcreek Elementary Afterschool	18302 N Eldridge Pkwy	Houston	77377

Sample Map – Sensitive Receptors Identified with 100 and 500 meters of the project study area.



Sensitive receptors should be measured from the Right of Way (ROW) line to the nearest structure or outdoor recreation area (use the shortest distance). If the distance to the nearest structure or outdoor recreational area is unknown, the distance from the ROW line to the property line can be used.

Unavailable Information for Project Specific MSAT Impact Analysis

This document includes a basic analysis of the likely MSAT emission impacts of this project. However, available technical tools do not enable the prediction of project-specific health impacts of the emission changes associated with the alternatives in this project. Due to these limitations, the following discussion is included in accordance with CEQ regulations (40 CFR 1502.22(b)) regarding incomplete or unavailable information:

Information that is Unavailable or Incomplete. Evaluating the environmental and health impacts from MSATs on a proposed highway project would involve several key elements, including emissions modeling, dispersion modeling in order to estimate ambient concentrations resulting from the estimated emissions, exposure modeling in order to estimate human exposure to the estimated concentrations, and then final determination of health impacts based on the estimated exposure. Each of these steps is encumbered by technical shortcomings or uncertain science that prevents a more complete determination of the MSAT health impacts of this project.

1. Emissions: The EPA tools to estimate MSAT emissions from motor vehicles are not sensitive to key variables determining emissions of MSATs in the context of highway projects. While MOBILE6.2 is used to predict emissions at a regional level, it has limited applicability at the project level. MOBILE6.2 is a trip-based model--emission factors are projected based on a typical trip of 7.5 miles, and on average speeds for this typical trip. This means that MOBILE6.2 does not have the ability to predict emission factors for a specific vehicle operating condition at a specific location at a specific time. Because of this limitation, MOBILE6.2 can only approximate the operating speeds and levels of congestion likely to be present on the largest-scale projects, and cannot adequately capture emissions effects of smaller projects. For particulate matter, the model results are not sensitive to average trip speed, although the other MSAT emission rates do change with changes in trip speed. Also, the emissions rates used in MOBILE6.2 for both particulate matter and MSATs are based on a limited number of tests of mostly older-technology vehicles. Lastly, in its discussions of PM under the conformity rule, EPA has identified problems with MOBILE6.2 as an obstacle to quantitative analysis.

   These deficiencies compromise the capability of MOBILE6.2 to estimate MSAT emissions. MOBILE6.2 is an adequate tool for projecting emissions trends, and performing relative analyses between alternatives for very large projects, but it is not sensitive enough to capture the effects of travel changes tied to smaller projects or to predict emissions near specific roadside locations. However, MOBILE6.2 is currently the only available tool for use by FHWA/TxDOT and may function adequately for larger scale projects for comparison of alternatives.

2. Dispersion. The tools to predict how MSATs disperse are also limited. The EPA's current regulatory models, CALINE3 and CAL3QHC, were developed and validated more than a decade ago for the purpose of predicting episodic concentrations of carbon monoxide to determine compliance with the NAAQS. The performance of dispersion models is more accurate for predicting maximum concentrations that can occur at some time at some location within a geographic area. This limitation makes it difficult to predict accurate exposure patterns at specific times at specific highway project locations across an urban area to assess potential health risk. The NCHRP is conducting research on best practices in applying models and other technical methods in the analysis of MSATs. This work also will focus on identifying appropriate methods of documenting and communicating MSAT impacts in the NEPA process and to the general public. Along with these general limitations of dispersion models, FHWA is also faced with a lack of monitoring data in most areas for use in establishing project-specific MSAT background concentrations.

3. Exposure Levels and Health Effects. Finally, even if emission levels and concentrations of MSATs could be accurately predicted, shortcomings in current techniques for exposure assessment and risk analysis preclude us from reaching meaningful conclusions

about project-specific health impacts. Exposure assessments are difficult because it is difficult to accurately calculate annual concentrations of MSATs near roadways, and to determine the portion of a year that people are actually exposed to those concentrations at a specific location. These difficulties are magnified for 70-year cancer assessments, particularly because unsupportable assumptions would have to be made regarding changes in travel patterns and vehicle technology (which affects emissions rates) over a 70-year period. There are also 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. Because of these shortcomings, any calculated difference in health impacts between alternatives is likely to be much smaller than the uncertainties associated with calculating the impacts. Consequently, the results of such assessments would not be useful to decision makers, who would need to weigh this information against other project impacts that are better suited for quantitative analysis.

Summary of Existing Credible Scientific Evidence Relevant to Evaluating the Impacts of MSATs.

Research into the health impacts of MSATs is ongoing. For different emission types there are a variety of studies that show that some either are statistically associated with adverse health outcomes through epidemiological studies (frequently based on emissions levels found in occupational settings) or that animals demonstrate adverse health outcomes when exposed to large doses.

Exposure to toxics has been a focus of a number of EPA efforts. Most notably, the agency conducted the National Air Toxics Assessment (NATA) in 1996 to evaluate modeled estimates of human exposure applicable to the county level. While not intended for use as a measure of or benchmark for local exposure, the modeled estimates in the NATA database best illustrate the levels of various toxics when aggregated to a national or State level.

The EPA is in the process of assessing the risks of various kinds of exposures to these pollutants. The EPA Integrated Risk Information System (IRIS) is a database of human health effects that may result from exposure to various substances found in the environment. The IRIS database is located at http://www.epa.gov/iris. The following toxicity information for the six prioritized MSATs was taken from the IRIS database *Weight of Evidence Characterization* summaries. This information is taken verbatim from EPA's IRIS database and represents the Agency's most current evaluations of the potential hazards and toxicology of these chemicals or mixtures.

- **Benzene** is characterized as a known human carcinogen.
- **Acrolein:** The potential carcinogenicity of acrolein cannot be determined because the existing data are inadequate for an assessment of human carcinogenic potential for either the oral or inhalation route of exposure.
- **Formaldehyde** is a probable human carcinogen, based on limited evidence in humans, and sufficient evidence in animals.
- **1,3-butadiene** is characterized as carcinogenic to humans by inhalation.

- **Acetaldehyde** is a probable human carcinogen based on increased incidence of nasal tumors in male and female rats and laryngeal tumors in male and female hamsters after inhalation exposure.
- **Diesel exhaust** (DE) is likely to be carcinogenic to humans by inhalation from environmental exposures. Diesel exhaust as reviewed in this document is the combination of diesel particulate matter and diesel exhaust organic gases. Diesel exhaust also represents chronic respiratory effects, possibly the primary non-cancer hazard from MSATs. Prolonged exposures may impair pulmonary function and could produce symptoms, such as cough, phlegm, and chronic bronchitis. Exposure relationships have not been developed from these studies.

There have been other studies that address MSAT health impacts in proximity to roadways. The Health Effects Institute, a non-profit organization funded by EPA, FHWA, and industry, has undertaken a major series of studies to research near-roadway MSAT hot spots, the health implications of the entire mix of mobile source pollutants, and other topics. The final summary of the series is not expected for several years.

Some recent studies have reported that proximity to roadways is related to adverse health outcomes -- particularly respiratory problems. Much of this research is not specific to MSATs, instead surveying the full spectrum of both criteria and other pollutants. The FHWA cannot evaluate the validity of these studies, but more importantly, they do not provide information that would be useful to alleviate the uncertainties listed above and enable us to perform a more comprehensive evaluation of the health impacts specific to this project.

Relevance of Unavailable or Incomplete Information

While available tools do allow us to reasonably predict relative emissions changes between alternatives for larger projects, the amount of MSAT emissions from each of the project alternatives and MSAT concentrations or exposures created by each of the project alternatives cannot be predicted with enough accuracy to be useful in estimating health impacts. (As noted above, the current emissions model is not capable of serving as a meaningful emissions analysis tool for smaller projects.) Therefore, the relevance of the unavailable or incomplete information is that it is not possible to make a determination of whether any of the alternatives would have "significant adverse impacts on the human environment."

In this document, a qualitative assessment has been provided relative to the various alternatives of MSAT emissions and has acknowledged that (some, all, or identify by alternative) 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.

APPENDIX A – Acronym List

AADT	Average Annual Daily Traffic
ADT	Average Daily Traffic
CAA	Clean Air Act
CAAA	Clean Air Act Amendments
CMAQ	Congestion Mitigation Air Quality Program
CMS	Congestion Management System
CO	Carbon Monoxide
DHV	Design Hourly Volume
EA	Environmental Assessment
EAC	Early Action Compact
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
ETC	Estimated Time of Completion
FCR	Federal Certification Review
FHWA	Federal Highway Administration
FTA	Federal Transit Authority
HAPs	Hazardous Air Pollutants
HOV	High Occupancy Vehicle lanes
ISTEA	Intermodal Transportation Efficiency Act of 1991
MPA	Metropolitan Planning Area
MPH	Miles per Hour
MPO	Metropolitan Planning Organization
MSATs	Mobile Source Air Toxics
MTP	Metropolitan Transportation Plan (i.e., Long Range Plan)
MVEB	Motor Vehicle Emissions Budget
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NO_2	Nitrogen Dioxide
NO_x	Oxides of Nitrogen
O_3	Ozone
Pb	Lead
$PM_{2.5}$	Particulate Matter smaller than 2.5 microns in diameter
PM_{10}	Particulate Matter smaller than 10 microns in diameter
ppm	parts per million
PS&E	Plans, Specifications, and Estimates
ROW	Right-of-way
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Efficiency Act – Legacy for Users
SIP	State Implementation Plan
SO_2	Sulfur Dioxide
SOV	Single Occupancy Vehicle
STIP	Statewide Transportation Improvement Program
TAQA	Traffic Air Quality Analysis
TCEQ	Texas Commission on Environmental Quality

TCM	Transportation Control Measure
TEA-21	Transportation Efficiency Act for the 21st Century
TIP	Transportation Improvement Program
TMA	Transportation Management Area
TP&D	Transportation Programming and Development
TPP	Transportation Planning and Programming Division
TxDOT	Texas Department of Transportation
U.S. DOT	United States Department of Transportation
VOCs	Volatile Organic Compounds
VMT	Vehicle Miles Traveled

APPENDIX B

National Ambient Air Quality Standards

Pollutant	**Primary Standard (Public Health)**			**Secondary Standard (Public Welfare)**		
	Level	Averaging Time	Form	Level	Averaging Time	Form
8-Hour Ozone	0.08 ppm	8-hour	3-year average of annual fourth highest daily maximum	Same as Primary Standard		
PM10	150 ug/m3	24-hour	3-year average of annual 99th percentiles	Same as Primary Standard		
	50 ug/m3	Annual	Not to be exceeded	Same as Primary Standard		
PM2.5	15ug/m3	Annual	3-year average of annual averages	Same as Primary Standard		
	65 ug/m3	24-hour	3-year average of 98th percentile	Same as Primary Standard		
Carbon Monoxide	35 ppm	1-hour	More than once per year	No secondary standard		
	9 ppm	8-hour				
Sulfur Dioxide	0.14 ppm	24-hour	More than once per year	0/50 ppm	3-hr	More than once per year
	0.03 ppm	Annual	Not to be exceeded			
Nitrogen Dioxide	0.053 ppm	Annual	Not to be exceeded	Same as primary standard		
Lead	1.5 ug/m3	Quarterly	Not to be exceeded	Same as primary standard		

APPENDIX C

FHWA Technical Advisory T6640.8A
October 30, 1987

Excerpt

8. Air Quality Impacts

The draft EIS should contain a brief discussion of the transportation related air quality concerns in the project area and a summary of the project-related carbon monoxide (CO) analysis if such analysis is performed. The following information should be presented, as appropriate.

(A) Mesoscale Concerns: Ozone (O3), Hydrocarbons (HC), and Nitrogen Oxide (NOx) air quality concerns are regional in nature and as such meaningful evaluation on a project-by-project basis is not possible. Where these pollutants are an issue, the air quality emission inventories in the state implementation plan (SIP) should be referenced and briefly summarized in the draft EIS. Further, the relationship of the project to the SIP should be described in the draft EIS by including one of the following statements:

(1) This project is in an area where the SIP does not contain any transportation control measures. Therefore, the conformity procedures of 23 CFR 770 do not apply to this project.

(2) This project is in an area which has transportation control measures in the SIP which was (conditionally) approved by the Environmental Protection Agency (EPA) on (date). The FHWA has determined that both the transportation plan and the transportation improvement program conform to the SIP. The FHWA has determined that this project is included in the transportation improvement program for the (indicate 3C planning area). Therefore, pursuant to 23 CFR 770, this project conforms to the SIP.

Under certain circumstances, neither of these statements will precisely fit the situation and may need to be modified. Additionally, if the project is a transportation control measure from the SIP, this should be highlighted to emphasize the project's air quality benefits.

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

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

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

APPENDIX D

Estimates of Carbon Monoxide Background Concentrations for Texas Cities and Rural Areas

City or Region	One Hour Average Background Concentration (ppm)	Eight-Hour Average Background Concentration (ppm)
Austin	0.7	0.4
Beaumont-Port Arthur	0.6	0.4
Corpus Christi	0.6	0.4
Dallas	3.7	2.3
El Paso	4.9	3.0
Fort Worth	1.8	1.2
Houston-Galveston	4.5	2.8
San Antonio	1.7	1.1
Smaller Cities	0.5	0.3
Rural Areas	0.4	0.3

APPENDIX E

EPA/FHWA Transportation Conformity Guidance for Qualitative Hot-Spot Analyses in $PM_{2.5}$ and PM_{10} Nonattainment and Maintenance Areas

APPENDIX F

FHWA Interim Guidance on Air Toxic Analysis in NEPA Documents