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4.5 Air Quality

The Clean Air Act and its amendments led to the establishment by the U.S. Environmental Protection Agency (EPA) of National Ambient Air Quality Standards (NAAQS) for six air pollutants: carbon monoxide (CO), sulfur oxide, ozone (O_3), suspended particulate matter (PM_{10}), nitrogen dioxide, and lead (see **Table 4.5-1**). In 1997, EPA added NAAQS for eight-hour O_3 and for very fine particulate matter ($PM_{2.5}$). The one-hour O_3 standard was revoked in 2005.

Table 4.5-1 National Ambient Air Quality Standards

Pollutant	Averaging Time	Primary Standard
Carbon Monoxide	8 hours	9 ppm
	1 hour	35 ppm
Sulfur Oxide	annual	0.030 ppm
	24 hours	0.14 ppm
Ozone	8 hour	0.08 ppm
	1 hour (revoked)	0.12 ppm (revoked)
Particulate Matter <10 µm	annual	50 µg/m^3
	24 hours	150 µg/m^3
Particulate Matter <2.5 µm	annual	15 µg/m^3
	24 hours	65 µg/m^3
Nitrogen Dioxide	annual	0.053 ppm
Lead	quarterly	1.5 µg/m^3

Source: EPA, 2006
ppm - parts per million
µg/m^3 - micrograms per cubic meter
µm - micrometers

Under the Clean Air Act, cities and regions were required to determine their compliance with the NAAQS. In the early 1970s, the Denver metropolitan area was designated a nonattainment area for CO, PM_{10}, and the one-hour O_3 standard. In 2001 and 2002, the Denver area was redesignated as attainment/maintenance for these pollutants. In 2002 and 2003, the Denver region experienced several exceedances of the new eight-hour O_3 standard. In response to these exceedances, the Denver air quality agencies developed an Early Action Compact (EAC) for reducing O_3 and achieving attainment by 2007. The EAC includes strategies for reducing emissions of ozone-forming precursor pollutants (volatile organic compounds and oxides of nitrogen). In April 2004, EPA designated the Denver region as nonattainment for the eight-hour O_3 standard. However, the nonattainment designation is deferred as long as the region meets the milestones of the EAC.

For several decades, there has been a trend of decreasing emissions nationwide from mobile sources, even when allowing for the growing number of vehicle miles of travel (VMT). These improving results are due to a number of successful emission control regulations. On-road sources account for varying amounts of the overall emissions but tend to be declining even though national VMT more than doubled over the past 30 years.

A large portion of Denver regional CO emissions are from vehicles and this is expected to decrease in the future as vehicles emit proportionally less CO. Vehicles are also a major source of PM_{10} and these emissions are actually expected to rise due to more road dust from more VMT. Nitrogen oxides and volatile organic compounds are precursors of O_3 and provide an indication of likely O_3 trends. Vehicles are significant sources of nitrogen oxides and volatile organic compounds, and regional emissions of these pollutants are expected to decrease due largely to improvements in vehicles and fuel controls. Other new or pending regulations, such as Tier 2 and the 2007 heavy duty engine regulations, are expected to continue the trend of improvement and further lower vehicle emissions in the future including tailpipe PM_{10} emissions.

Due to past and present air quality difficulties, infrastructure projects that might exacerbate existing air quality problems must meet certain requirements before they can proceed. In general, projects like the Valley Highway Project must be analyzed with respect to their potential impact on air quality at both the regional and local level. An *Air Quality Impact Assessment Report* (FHU, 2005e; CDOT, 2006) has been prepared and provide additional detail.

4.5.1 Current Conditions

The transportation and circulation system evaluated for air quality impacts consists of the major highways and surface streets within the Valley Highway project area. This includes I-25 from Logan Street to 8th Avenue; US 6 from Osage Street to Knox Court; Broadway/Lincoln Street from Mississippi Avenue to the north side of Alameda Avenue; Santa Fe Drive/Kalamath Street between Mississippi Avenue and Cedar Avenue; Alameda Avenue from Lipan Street to Lincoln Street; and Federal Boulevard from 3rd Avenue to 8th Avenue. Data pertaining to traffic volumes and LOS in this section are drawn from traffic data presented in **Chapter 3**, *Transportation Analysis*. LOS values for the various intersections of interest are listed in **Table 4.5-2.**

Table 4.5-2 Project Intersection Levels of Service

Intersection	Intersection Level of Service (AM/PM)					
	2003	2025 No Action	System 1 2025	System 2 2025	System 3 2025	Preferred Alt 2025
Broadway & Alameda	C/F	D/F	D/F	D/F	D/F	D/F
Lincoln & Alameda	E/C	F/F	F/F	F/F	F/F	F/F
Broadway & Ohio	B/B	D/E	D/F	C/C	C/C	B/C
Broadway & Kentucky	C/D	C/F	D/F	C/F	NA	C/F
Santa Fe & Alameda	D/E	F/F	E/F	C/C[a]	C/D[a]	E/F
Kalamath & Alameda	B/D	D/F	C/F	NA[a]	NA[a]	B/F
Lipan & Alameda	B/B	D/B	F/E	E/D	E/D	F/D
Platte River & Alameda	C/D	F/E	NA	NA	NA	NA
Federal & North Ramp	B/C	B/E	B/D	B/D	B/C[b]	B/C
Federal & South Ramp	A/A	B/B	A/A	B/C	NA[b]	C/C

Source: CDOT, 2006

[a]=Santa Fe and Kalamath join and cross Alameda at a single-point urban interchange

[b]=6th and Federal meet at a single-point urban interchange

NA=not applicable

4.5.1.1 ANALYTICAL APPROACH

Air pollution impacts from transportation generally are considered on both regional and local bases. Regional impacts generally are examined by the responsible metropolitan planning organization (DRCOG) through transportation planning activities such as Regional Transportation Plans (RTPs) and Transportation Improvement Plans (TIPs). Localized impacts were assessed through "hot-spot" computer modeling using procedures developed by EPA. There are no approved procedures for hot-spot modeling or other quantitative analysis for pollutants of interest other than CO, so those pollutants have been assessed qualitatively (see **Section 4.5.2**).

A preliminary evaluation of intersections in the region was conducted to identify intersections that could be CO hot-spots. Generally, the need for hot-spot analysis of intersections is assessed with respect to the following criteria, (40 CFR 93.123):

- The project affects locations identified in the State Implementation Plan as sites of actual or potential violations of the CO NAAQS.
- The project intersection is or will be at LOS D, E, or F.
- The project intersection is one of the top three in the State Implementation Plan with respect to traffic volume or worst LOS.

If an intersection does not meet any of the above criteria, it is unlikely to be a hot-spot and need not be assessed further. If the most congested intersections are found not to produce hot-spot problems, less congested intersections would then not be expected to produce hot-spots.

Several project intersections have a LOS of D or worse (see **Table 4.5-2**), which meet the hot-spot selection criteria. The intersections of Broadway with Alameda Avenue and Alameda Avenue with the I-25 complex (Santa Fe Drive to Lipan Street) were selected for hot-spot modeling. These intersections have the worst LOS values combined with the highest traffic volumes.

CO concentrations at the intersections were modeled using the CAL3QHC computer model at representative receptor locations, as suggested in EPA guidance (EPA, 1992). The CAL3QHC program calculates the hourly CO concentrations for each receptor for multiple wind directions. Years 2003 and 2025 vehicle emission factors from MOBILE6 were obtained from the CDPHE Air Pollution Control Division. Meteorological conditions were simulated by using stability class D and low wind speed (one meter per second). The PM peak hour was modeled in all cases as it tended to have worse congestion than the AM peak hour.

4.5.1.2 MODELED CO CONCENTRATIONS

The CO model results for existing (2003) conditions are shown in **Table 4.5-3**. The maximum one-hour PM peak for CO concentrations in 2003 was 23.0 parts per million (ppm), which is below the NAAQS of 35 ppm. The maximum eight-hour concentration at I-25/Alameda Avenue (11 ppm) is predicted to be above the CO standard of 9 ppm (FHU, 2006d). This result reflects an existing situation that is not due to any proposed actions, and this result represents an approximation of a worst-case condition. A more detailed CO model with true eight-hour meteorological data probably would not provide a result this high. The proposed improvements are intended in part to alleviate the traffic congestion that is contributing to CO at this location.

Table 4.5-3 Maximum Modeled CO Concentrations

Model	1-Hour CO Result (ppm)	8-Hour CO Result (ppm)
Broadway & Alameda (2003)	17.8	8.3
I-25 & Alameda (2003)	23.0	11.3
Broadway & Alameda (2025)	11.0	5.2
I-25 & Alameda-No Action (2025)	14.5	7.1
I-25 & Alameda-Alternative 1 (2025)	14.9	7.3
I-25 & Alameda-Preferred Alternative (2025)	15.2	7.5

Source: CDOT, 2006
ppm - parts per million

4.5.2 Consequences of System Alternatives 1, 2, 3, and the Preferred Alternative

The air quality impact analysis consisted of a regional conformity evaluation and local "hot-spot" modeling for CO (see **Section 4.5.1**). Multiple scenarios were evaluated to assess conditions under the system alternatives, which include System Alternatives 1, 2, 3, and the Preferred Alternative, and No Action Alternative. Several air pollutants were evaluated qualitatively. For more information on the system alternatives, including the Preferred Alternative, see **Chapter 2.**

4.5.2.1 Regional Conformity

The regional evaluation of transportation projects is normally carried out by the responsible metropolitan planning organization, which in this case is DRCOG. This organization models transportation systems and air quality to ensure that, in the aggregate, existing and proposed transportation systems will conform to relevant air quality implementation plans, maintenance plans, and the NAAQS.

Individual projects can demonstrate regional conformity by being part of a conforming fiscally-constrained RTP which looks at longer-range transportation planning, or either a TIP, which includes projects likely to proceed in the next few years, or the road network used to demonstrate conformity (TIP Technical Appendix). The transportation improvements must be included in a conforming and fiscally-constrained RTP to fulfill the regional conformity requirements before a Record of Decision can be issued and the improvements constructed.

The Preferred Alternative will need to be funded and built in phases. Several phases of construction have been identified for the Preferred Alternative and are described in **Chapter 7** *Phased Project Implementation*. Phase 1 will be the first phase constructed, as described in *Chapter 7*. Some but not all of the Phase 1 improvements are included in the current 2030 RTP. CDOT has submitted an RTP amendment to DRCOG that will place all of the Phase 1 improvements in the fiscally-constrained RTP, and the entire Preferred Alternative in the Metro Vision (unconstrained) Plan. DRCOG will also perform air quality model runs with the entire Preferred Alternative to provide an indication of likely conformity for the entire project.

The final determination on conformity of the amended RTP is expected in December 2006. Regional conformity will then be demonstrated for Phase 1 of the Preferred Alternative.

Regional conformity for air quality will need to be demonstrated for each subsequent phase before that phase can be constructed. Subsequent phases must be part of a future conforming RTP (generally through future RTP amendments) before regional conformity for those elements is demonstrated and a Record of Decision can be issued. Preliminary analysis has indicated that the Preferred Alternative will not cause conformity problems.

4.5.2.2 MODELED CO CONCENTRATIONS

Individual projects must also demonstrate that they will not violate the NAAQS in localized hot-spots. The target intersections were modeled for CO using CAL3QHC and the procedures described in **Section 4.5.1**.

Multiple scenarios were evaluated and modeled. Traffic data indicate that conditions at the Broadway/Alameda Avenue intersection would be the same in 2025 for the No Action condition, System Alternatives 1, 2, and 3, and for the Preferred Alternative. Therefore, one model was developed that represents all 2025 alternatives for that intersection. For the I-25/Alameda Avenue/Santa Fe Drive complex, 2025 LOS values of D or worse were predicted for the No Action Alternative, System Alternative 1 and the Preferred Alternative. System Alternatives 2, and 3 included grade separations that significantly improve those LOS values (see **Table 4.5-2**). Therefore, models for the No Action, System Alternative 1, and the Preferred Alternative were developed for the I-25/Alameda Avenue/Santa Fe Drive intersections.

Even with higher traffic volumes, CO concentrations are predicted to decrease in the future at the target intersections (see **Table 4.5-3**), primarily because future vehicles will be emitting less CO. The maximum 2025 one-hour PM peak for CO concentrations is 15.2 ppm, which is below the NAAQS of 35 ppm. The maximum 2025 eight-hour PM peak CO concentration is 7.5 ppm, which is below the NAAQS of 9 ppm. The highest CO concentrations listed are for the Preferred Alternative.

4.5.2.3 PARTICULATE MATTER

Unlike CO pollution, quantitative tools for analysis of PM_{10} pollution have not been developed and approved for mobile sources. Therefore, a qualitative process was used for the analysis.

The air quality monitor nearest the project area is the Gates monitor at 1050 S. Broadway. There have been no exceedences of the PM_{10} NAAQS at any monitor in the Denver region since 1993, which indicates that PM_{10} pollution has been sustainably reduced from previous levels. These reductions included the period from 1995 to 2000 where vehicle miles of travel increased by 8 percent. The most relevant PM_{10} sources for the mobile sources are re-entrained fugitive dust and tailpipe emissions.

The Final Rule redesignating the Denver area from nonattainment to attainment/maintenance status for PM_{10} became effective on October 16, 2002. This redesignation also included approval of a Maintenance Plan for PM_{10} for the Denver area (Colorado Air Quality Control Commission, 2001). These types of plans are required to ensure maintenance of the relevant NAAQS for at least 10 years. The Maintenance Plan included a number of strategies to reduce future PM_{10} emissions to demonstrate maintenance of the NAAQS for 2002 and beyond. These reductions will come mostly from lower tailpipe emissions, better street sanding procedures and ongoing vehicle inspection/maintenance requirements of the AIR Program. Street sanding is controlled by Colorado Air Quality Commission Regulation No. 16 and is expected to be the biggest contributor to PM_{10} control for the Denver area. The Maintenance Plan also includes control of estimated PM_{10} emissions from road construction activities.

Re-entrained road dust from traffic on I-25 has the potential to be the major source of PM_{10} in central Denver. The system alternatives are intended to improve traffic flow on I-25, which by itself could lead to higher PM_{10} emissions. Traffic volumes in the corridor are expected to increase, which also could lead to more PM_{10} emissions. However, PM_{10} is the subject of a comprehensive maintenance plan with PM_{10} control strategies that were designed to ensure continued attainment of the PM_{10} NAAQS throughout the Denver region. Therefore, none of the system alternatives, including the Preferred Alternative, is expected to cause or contribute to violations of the PM_{10} NAAQS. None of the system alternatives are expected to interfere with the maintenance plan or its goals.

4.5.2.4 AIR TOXICS

On February 3, 2006, the FHWA released its interim guidance on when and how to analyze Mobile Source Air Toxics (MSATs) in the NEPA process for highways. The following discussion is in accordance with the interim guidance.

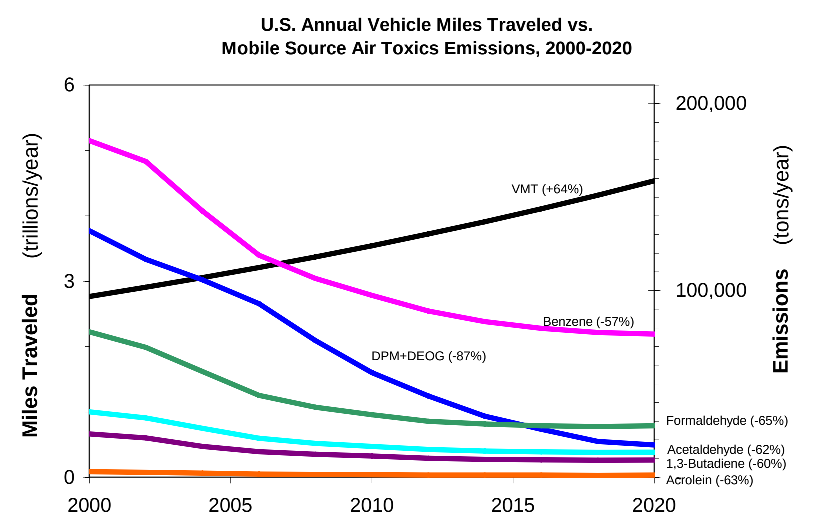
In addition to the criteria air pollutants for which there are NAAQS, EPA also regulates air toxics. Most air toxics originate from human-made sources, including on-road mobile sources, non-road mobile sources (e.g., airplanes), area sources (e.g., dry cleaners) and stationary sources (e.g., factories or refineries). The FHWA has prepared guidance (dated February 3, 2006) on the analysis of mobile source air toxics for highway projects.

MSATs are a subset of the 188 air toxics defined by the Clean Air Act. 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 (EPA, 2000b).

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 (EPA, 2001a). This rule was issued under the authority in Section 202 of the Clean Air Act. Through the rule, EPA examined the impacts of existing and newly promulgated mobile source control programs, including the reformulated gasoline program, the national low emission vehicle standards, the Tier 2 motor vehicle emissions standards and gasoline sulfur control requirements, and the proposed heavy duty engine and vehicle standards and on-highway diesel fuel sulfur control requirements. Through this rule, EPA identified six priority MSATs: acetaldehyde, benzene, formaldehyde, diesel exhaust, acrolein, and 1,3-butadiene (EPA, 2001a).

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 percent to 65 percent, and will reduce on-highway diesel PM emissions by 87 percent (see **Figure 4.5-1**). As a result, EPA concluded that no further motor vehicle emissions standards or fuel standards were necessary to further control MSATs. EPA is preparing another rule under authority of Section 202(l) of the Clean Air Act that will address these issues and could make adjustments to the full 21 and the primary six MSATs.

Figure 4.5-1 Predicted National 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.

Unavailable or Incomplete Information for Project Specific MSAT Impact Analysis

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

Evaluating the environmental and health impacts from MSATs on a proposed highway project would involve several key elements, including emissions modeling, dispersion modeling to estimate ambient concentrations resulting from the estimated emissions, exposure modeling to estimate human exposure to the estimated concentrations, and then final determination of health impacts based on the estimated exposure. Each of these steps faces 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 in the context of highway projects. While MOBILE 6.2 is used to predict emissions at a regional level, it has limited applicability at the project level. MOBILE 6.2 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 MOBILE 6.2 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, MOBILE 6.2 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. 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 use of MOBILE 6.2 to estimate MSAT emissions. MOBILE 6.2 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.

2. *Dispersion: The tools to predict how MSATs disperse are also limited. 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 CO 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 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 EPA's standard 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 emissions 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, EPA conducted the National Air Toxics Assessment 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 best illustrate the levels of various toxics when aggregated to a national or state level.

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.
- 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** 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 (South Coast Air Quality Management District 2000, The Sierra Club 2004, and Environmental Law Institute 2005). Much of this research is not specific to MSATs, but instead surveys the full spectrum of both NAAQS and other pollutants. The FHWA cannot evaluate the validity of these studies, but more importantly, the studies do not provide information that would be useful to alleviate the uncertainties listed above and enable a more comprehensive evaluation of the health impacts specific to this project.

Relevance of Unavailable or Incomplete Information

This section discusses the relevance of unavailable or incomplete information to evaluating reasonably foreseeable significant adverse impacts on the environment, and evaluation of impacts based upon theoretical approaches or research methods generally accepted in the scientific community. Because of the uncertainties described above, FHWA believes assessment of the effects of air toxic emissions on human health cannot be made at the transportation project level. 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."

This air quality analysis provides a qualitative analysis of MSAT emissions relative to the various alternatives, and has acknowledged that all of the project alternatives may result in increased exposure to MSAT emissions in certain locations, although the concentrations and duration of exposures are uncertain. Because of this uncertainty, the health effects from these emissions cannot be estimated.

Project Level MSAT Discussion

As discussed above, FHWA believes 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 transportation project. However, even though reliable methods do not exist to accurately estimate the health impacts of MSATs at the project level, it is possible to qualitatively assess the levels of future MSAT emissions under the Preferred Alternative. Although a qualitative analysis 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 online at: www.fhwa.dot.gov/environment/airtoxic/msatcompare/msatemissions.htm.

For the No-Action Alternative and the Preferred Alternative, the amount of MSATs emitted would be proportional to the VMT, assuming that other variables such as fleet mix are the same for each alternative. The VMT estimated for the Preferred Alternative is slightly higher than that for the No-Action Alternative, because the additional capacity increases the efficiency of the roadway and attracts rerouted trips from elsewhere in the transportation network. The increase in VMT would lead to higher MSAT emissions for the Preferred Alternative along I-25. The emissions increase due to VMT will be offset somewhat by lower MSAT emission rates due to increased speeds; according to EPA's MOBILE6.2 emissions model, emissions of the priority MSATs except for diesel particulate matter decrease as vehicle 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 alternative 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 in the design year than present levels 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 (See **Figure 4.5-1**). 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.

Because of the specific characteristics of the Preferred Alternative, there may be localized areas where VMT would increase and other areas where VMT would decrease. Therefore, corresponding localized increases and decreases in MSAT emissions may also occur. As described above, increased VMT on I-25 would appear to lead to higher MSAT emissions; however, this increase would be offset by lower emission rates due to improved vehicle speeds. Localized decreases in MSAT emissions would likely be most pronounced along Santa Fe Drive and Kalamath Street due to the grade separation of the consolidated mainline railroad. Regardless of the alternative, emissions will be substantially reduced from current levels in the future due to implementation of EPA's vehicle and fuel regulations. Based on this analysis, it is likely that the Preferred Alternative will result in lower MSAT emissions over the No-Action Alternative.

Sensitive Receptors

Air toxics from mobile sources are most likely to affect receptors close to roads as this is where concentrations of air toxics from mobile sources are likely to be highest. Locations where people spend extended periods of time are likely to be the most sensitive receptors. These types of locations include homes, schools and hospitals. There are several of these types of receptors along roads in the project area that may be modified by the Preferred Alternative.

Part of the West Washington Park neighborhood is near I-25 in the Lincoln Street area. Vanderbilt, East Vanderbilt, Habitat and Valverde Parks are in the vicinity of I-25 and/or Santa Fe Drive. Four homes are along Santa Fe Drive/Kalamath Street near Alameda Avenue. There are numerous homes, a motel and three parks near US 6 from approximately Federal Boulevard to the west.

4.5.2.5 COMPARISON OF SYSTEM ALTERNATIVES 1, 2, 3, AND THE PREFERRED ALTERNATIVE

The overall project area is so large and involves such a range of traffic features that simple air quality impact pronouncements to distinguish between alternatives are difficult. In the broadest terms, the future alternatives (System Alternatives 1, 2, 3, the Preferred Alternative, and the No Action Alternative) are not dramatically different from each other in that major highways, streets, and intersections will be in the same general locations with similar volumes and none are expected to cause exceedences of the NAAQS. However, mainline I-25 LOS would be better under any of the build alternatives than the No Action Alternative and this is a major air quality consideration in the project corridor. All of the system alternatives grade separate the consolidated main line railroad tracks from Santa Fe Drive and Kalamath Street, and each would provide comparable air quality benefits over the No Action Alternative by eliminating that traffic obstruction. Consequently, any of the build alternatives would offer some air quality advantages over the No Action Alternative.

None of the system alternatives (1, 2, 3, or the Preferred Alternatives) would offer a clear and universal air quality benefit over the others. Each system alternative has aspects at some locations where it appears to benefit local air quality more than the other alternatives. Overall, the results from modeling potential air quality impacts indicate that none of the alternatives being considered would cause violations of federal air quality standards, so any of them would be acceptable in air quality terms.

4.5.2.6 CONSTRUCTION IMPACTS

Construction of a system alternative has the potential to last several years. Adjoining properties in the project area would be near construction activities when the proposed project is built. More information on phasing is located in **Chapter 7** *Phased Project Implementation*.

Construction emissions differ from regular traffic emissions in several ways:

- Construction emissions last only for the duration of the construction period.
- Construction activities generally are short-term, and depending on the nature of the construction operations, could last from seconds (e.g., a truck passing) to months (e.g., constructing a bridge).
- Construction can involve other emission sources, such as fugitive dust from ground disturbance.
- Construction emissions tend to be intermittent and depend on the type of operation, its location, the function of the equipment, and the equipment usage cycle. Traffic emissions are generally present continuously after construction activities are completed.

Construction emission impacts would be minimized somewhat because very little of the project corridor abuts sensitive areas, such as residences or schools. Even so, employees at neighboring commercial areas could be exposed to construction-related emissions. The proposed project is similar in nature to other highway projects and the construction emissions should be representative of projects of this type and magnitude. To address the temporarily elevated air emissions that may be experienced during construction, standard construction mitigation measures should be incorporated into construction contracts. These include following best management practices and relevant CDOT construction specifications.
The requirement should include:

- Keep engines and exhaust systems on equipment in good working order. Maintain equipment on a regular basis, and subject equipment to inspection by the project manager to ensure maintenance.
- Control fugitive dust systematically through diligent implementation of a dust control plan (this would also control potential exposure to contaminated soil dust).
- Prohibit excessive idling of inactive or unnecessary equipment or vehicles.
- Require construction equipment and vehicles to use higher-grade fuel to reduce pollutant emissions.

- Locate stationary equipment as far from sensitive receivers as possible.

4.5.3 Mitigation Measures

Given that air pollutants are not predicted to exceed the NAAQS in the future as a result of implementing any of the system alternatives, including the Preferred Alternative, mitigation measures for air quality are not necessary for the project. Future emissions from on-road mobile sources will be minimized globally through several federal regulations. The Denver area maintenance plans for CO, O_3 and PM_{10} will serve to avoid and minimize pollutant emissions from I-25 and other project roads. Standard emission minimization measures for construction activities are recommended (see **Section 4.5.2.6**).

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