SH 7

Cherryvale Rd. to 75th St.

Environmental Assessment

CDOT No. STA 0072-013

AIR QUALITY ANALYSIS TECHNICAL MEMORANDUM

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CHAPTER 1: PROJECT DESCRIPTION

1.1 Study Area

The study area extends along the SH 7 (Arapahoe Road) corridor from Cherryvale Road in the city of Boulder through its intersection with 75th Street in Boulder County, Colorado. The study area is predominantly in unincorporated Boulder County. SH 7 is a principal east-west arterial roadway serving as a commuter and intra-regional facility (see **Figure 1**). This important arterial roadway serves the communities of Lafayette, Louisville, Erie, and Boulder, as well as other communities to the east. The west end of the study area is predominantly characterized by urban residential, commercial, and light industrial uses. The middle segment is characterized by open space and vacant land. Finally, the east end is characterized by rural residential and commercial uses at the 75th Street intersection. The highway provides direct public access at intersections with Cherryvale Road, 62nd Street, 63rd Street, Westview Drive, Valtec Lane, and 75th Street. Direct access to abutting land serving residential, commercial, industrial, and public use is prevalent in the study area. In addition to SH 7, South Boulder Road, Baseline Road, and Valmont Road provide east-west travel options serving the eastern communities of Boulder County and the city of Boulder.

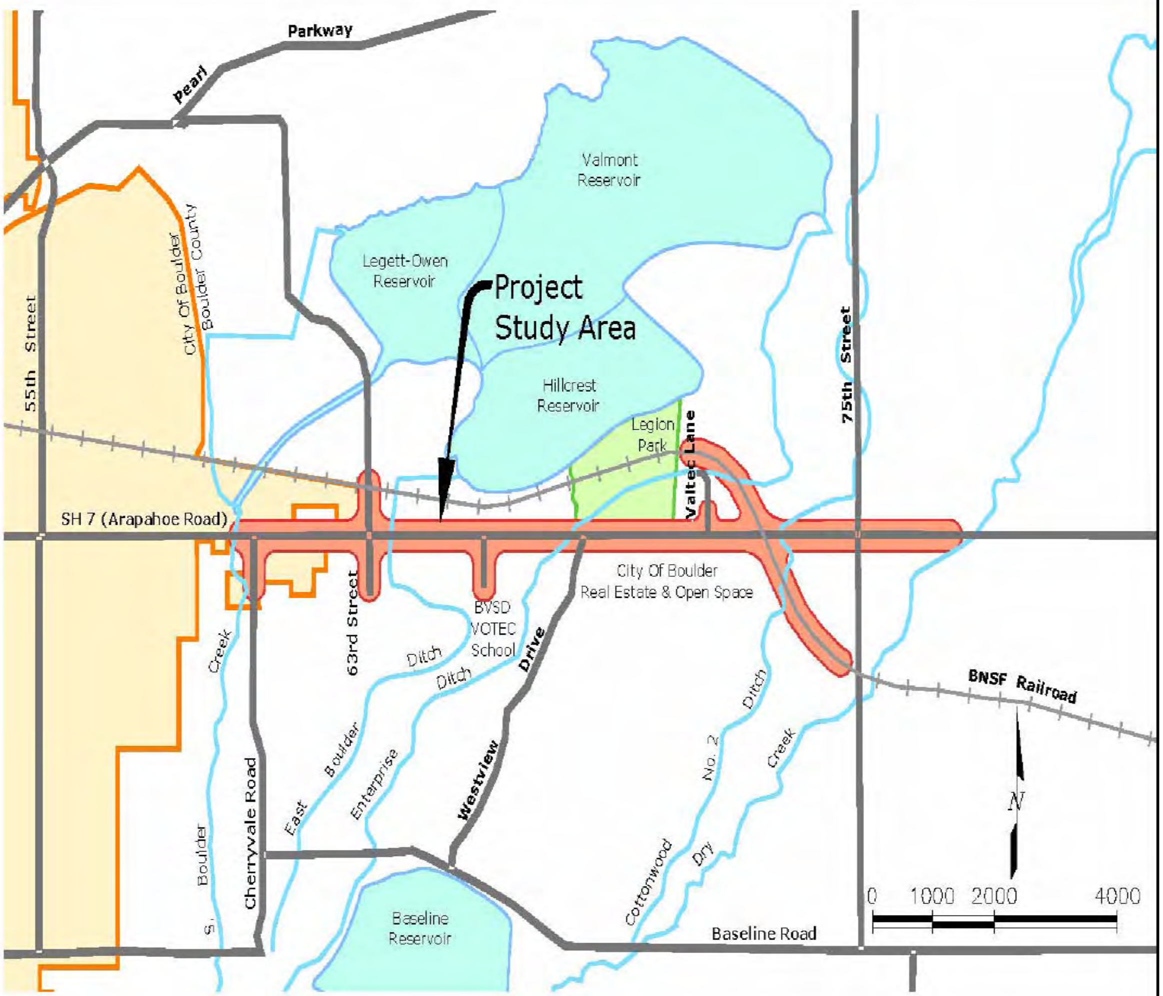
A Burlington Northern Santa Fe (BNSF) railroad line crosses SH 7 with an overpass in the study area. The existing railroad bridge structure only allows for a restricted roadway section, consisting of two travel lanes and minimal (two- to three-foot) shoulders. Modifications to the BNSF alignment are evaluated in this EA because changes to SH 7 precipitate impacts to the railroad crossing. Improvements to the safety and capacity of the BNSF railway are not included in this study.

1.2 Alternatives

1.2.1 No Action Alternative

The No Action Alternative includes no transportation improvements beyond the programmed improvements at the intersection of SH 7 and 75th Street. The SH 7 and 75th intersection has committed funds, is designed and cleared as a Categorical Exclusion and is anticipated to be constructed in 2006. This intersection project would include four through lanes of traffic along SH 7 with on-street bike lanes and sidewalks. The build alternatives would tie to the western extents of the intersection project. In addition, the City of Boulder has funding for intersection improvements for transit operations along SH 7 from Cherryvale Road to east of 63rd Street. These improvements include queue jump lanes, sidewalks, and connections to transit stops. The FHWA and the Federal Transit Administration (FTA), in cooperation with CDOT and RTD, are jointly conducting the U.S. 36 EIS identifying multimodal transportation improvements between Denver and Boulder. As part of this study, improvements including commuter rail are being considered along the existing BNSF railroad corridor that crosses SH 7. In addition to possible commuter rail service, a potential park-n-Ride is being considered in the vicinity of the SH 7 and 63rd Street intersection.

Figure 1
Study Area Location Map



1.2.2 Preferred Alternative

The Preferred Alternative is the Four-Lane Alternative that consists of two through-traffic lanes in each direction from Cherryvale Road to 75th Street. The roadway is an urban section with curb and gutter except between Westview Drive and Valtec Lane, which is a rural 4-lane section with 10-foot shoulders. The section of roadway between Cherryvale Road and 63rd Street, at the Boulder Valley School District access, and the 75th Street approaches will have 2- to 4-foot wide, raised center medians. The remainder of SH 7 will utilize a center turn lane.

CHAPTER 2: AIR QUALITY DISCUSSION

2.1 Introduction

The Clean Air Act of 1970 required the Environmental Protection Agency (EPA) to establish National Ambient Air Quality Standards (NAAQS) for pollutants which pose a risk to public health. The EPA has established standards for six pollutants: carbon monoxide (CO), ozone, particulate matter (PM_{10} and $PM_{2.5}$), nitrogen dioxide, sulfur dioxide, and lead. Areas where monitored values of any pollutant exceed the NAAQS are designated by EPA as nonattainment areas. Air quality monitoring in Colorado is conducted by the Air Pollution Control Division (APCD) of the Colorado Department of Public Health and Environment. Nonattainment areas are required to prepare implementation plans for attaining the standard for each pollutant where there are violations of the NAAQS. Once an area has attained the standard, a maintenance plan must be prepared to demonstrate that the standard will be maintained in the future. After the maintenance plan is approved by the EPA, the area is re-designated an attainment/ maintenance area.

The study area for State Highway 7 (SH 7) Cherryvale to 75th Street has been re-designated attainment/maintenance for carbon monoxide, PM_{10} and the 1-hour ozone standard. In 2004 the EPA designated the Denver metropolitan area as nonattainment for the 8-hour ozone standard. However, the nonattainment designation is deferred as long as the milestones in the Early Action Compact for Ozone are met. The Early Action Compact is an air quality implementation plan that includes control measures to reduce emissions of ozone precursors (volatile organic compounds and oxides of nitrogen) and timelines for complying with the 8-hour ozone standard by July 31, 2007, and maintaining the standard into the future.

The most significant federal air quality regulation that applies to transportation projects is the transportation conformity rule. The purpose of this rule is to implement section 176(C) of the Clean Air Act, which requires all transportation plans, transportation improvement programs and transportation projects to: (a) conform to an implementation plan's purpose of eliminating or reducing the severity and number of violations of the NAAQS and achieving expeditious attainment of such standards; and (b) insure that these transportation activities will not:

(i.) Cause or contribute to any new violation of any standard;
(ii.) Increase the frequency or severity of any existing violation of any standard; and
(iii.) Delay timely attainment of any standard or any required interim emissions reductions.

All projects in nonattainment or attainment/maintenance areas must have a project-level conformity determination unless they fit into the list of Exempt Projects of the conformity rule. Air quality issues must be addressed as part of the project environmental clearance process.

2.2 Existing Conditions

Air quality issues along the SH 7 study corridor include visibility and gaseous pollutant levels related to motor vehicle emissions and street sanding sources.

2.2.1 Traffic

The transportation and circulation system evaluated for air quality impacts consists of major intersections of 63rd Street, Boulder Valley School District Road, and 75th Street with SH 7. Data pertinent to traffic volumes and level of service (LOS) in this section are drawn from traffic data presented in Appendix A *Traffic Analysis*. LOS values for the various intersections of interest are listed in **Table 1**. Project level air quality analyses are typically completed for signalized intersections demonstrating deficient levels of service, LOS D or worse.

Table 1

Project Intersection Level of Service

Intersection	Existing	No Action	Preferred Alternative
75th Street and SH 7	E/E	E/E	C/C
Boulder Valley School District Road and SH 7	B/B	D/D	B/B
63rd Street and SH 7	C/C	E/D	B/B
Cherryvale and SH7	C/C	C/D	C/D

Weekday daily traffic volumes on SH 7 range from near 18,500 vehicles per day (vpd) at the east end of the project near 75th Street, and 25,000 vpd at the west end near Cherryvale Road. The existing daily traffic of 18,500 vpd produces an almost two-hour peak traffic period in the morning and another two-hour peak traffic period in the evening. The 75th Street intersection currently controls the peak hour traffic in the SH 7 corridor due to its intersection laneage restrictions. The existing AM and PM peak hour level of service for the 75th Street intersection is classified as level of service (LOS) E, a congested level of operation. The existing LOS for the AM and PM peak hour for the two-lane corridor segment from 63rd Street to 75th Street is classified as LOS E, with travelers experiencing significant delays and reduced travel speeds. Six levels of service are defined from A to F, with LOS A representing the best operating conditions and LOS F the worst. LOS E is generally considered to correspond to maximum capacity.

Traffic volumes are projected to increase in the future. The daily traffic forecast of 25,000 in 2030 is anticipated to result in at least three congested hours in each peak period. No improvements to the corridor will result in increasing congestion in the AM peak and PM peak periods in 2030. As traffic volumes increase, the two-lane corridor segments are anticipated to experience increasing congestions and to approach LOS F during the peak hours.

The programmed SH 7 and 75th Street intersection improvements will alleviate some of the congestion at the 75th Street intersection, resulting in a design year (2030) intersection LOS C.

2.2.2 National Ambient Air Quality Standards

The state of Colorado has adopted the NAAQS for these criteria pollutants as shown in **Table 2**. Geographic areas that violate a particular NAAQS pollutant standard are considered nonattainment areas for that pollutant. Violations are determined by a prescribed number of exceedances of the particular standard.

Table 2
National Ambient Air Quality Standards for Criteria Pollutants

Pollutant/Averaging Time	Primary Standard	Secondary Standard
Particulate Matter less than 10 microns (PM_{10})		
Annual	50 ug/m³	50 ug/m³
24-hour	150 ug/m³	150 ug/m³
Particulate Matter less than 2.5 microns ($PM_{2.5}$)		
Annual*	15 ug/m³	15 ug/m³
24-hour*	65 ug/m³	65 ug/m³
Sulfur Dioxide (SO_2)		
Annual	80 ug/m³ (0.03ppm)	--
24-hour	365 ug/m³ (0.14ppm)	--
3-hour	--	1300 ug/m³ (0.5ppm)
Nitrogen Dioxide (NO_2)		
Annual	100 ug/m³ (0.053ppm)	100 ug/m³ (0.053ppm)
Ozone (O_3)		
1-hour	235 ug/m³ (0.12ppm)	235 ug/m³ (0.12ppm)
8-hour	157 ug/m³ (0.08ppm)	157 ug/m³ (0.08ppm)
Carbon Monoxide (CO)		
8-hour	10,000 ug/m³ (9 ppm)	--
1-hour	40,000 ug/m³ (35 ppm)	--
Lead (Pb)		
Calender Quarter	1.5 ug/m3	--

*The ozone 8-hour standard and the PM2.5 standards are included for information only. These standards are currently not in use.
ug/m3 = micrograms per cubic meter ppm = parts per million

Because of monitored violations of the 8-hour ozone standard in 2002 and 2003, state and regional air quality agencies in Denver metropolitan area have developed a plan for achieving this standard by December 31, 2007. The Early Action Compact for Ozone includes specific milestones that must be met to achieve the standard by July 31, 2007. The EAC was submitted to the EPA in July 2004. EPA has deferred nonattainment designation for the region as long as the area meets the milestones in the EAC.

New standards were instigated in 1997 for particulate matter less than 2.5 microns in diameter ($PM_{2.5}$). The APCD completed installation of $PM_{2.5}$ monitors in 2000 and the Denver metropolitan area including Boulder County is in attainment. The APCD also monitors for pollutants that do not have a national standard established. These "non-criteria" pollutants include nitric oxide, total suspended particulate, cadmium, arsenic, sulfates, and visibility.

Greenhouse gases (water vapor, carbon dioxide, methane, and nitrous oxide) and emissions are discussed in the 1998 CDPHE report, *Climate Change & Colorado—A Technical Assessment* and the November 2000 supplement. The APCD has developed several CO_2 reduction strategies and will be considering regional programs to reduce stationary, area and mobile CO_2 sources.

2.2.3 Climate and Meteorology

The study corridor is situated within the Colorado Front Range at an average elevation of 5,250 feet above sea level at SH 7 and 75th Street. The climate is moderate with average temperatures ranging from 36°F in January to 75°F in July, with low relative humidity. The average annual precipitation is 15 to 20 inches with annual snowfall averaging 79 inches since 1961. The predominant winds are from the southeast. Wind speeds can be highly variable. Gusty system front-generated winds over 50 mph are not uncommon.

2.2.4 Air Pollution Sources

The SH 7 study corridor contains neither industrialized areas nor power generating plants. Emission sources for this study corridor are generated from re-entrained dust and motor vehicle emissions.

2.2.5 Air Quality Monitoring

There are six monitoring stations near the general SH 7 study corridor. The monitoring station types are highlighted in **Table 3**. There are no monitors within the actual study corridor.

Table 3
Air Quality Monitoring Stations near the Study Corridor

Monitoring Station	Monitored Critical Pollutants			
	CO	O_3	PM_{10}	$PM_{2.5}$
2150 28th Street, Boulder	X			
1405 ½ South Foothills, Boulder		X		
2102 Athens Street, Boulder				X
2440 Pearl Street, Boulder			X	X
3rd Avenue, Longmont			X	X
440 Main Street, Longmont	X			

2.2.6 Class I and II Visibility Areas

The EPA has designated a number of areas in the state of Colorado as Mandatory Class I Federal Areas where visibility is an important value. Generally, these areas contain wilderness areas greater than 5,000 acres or National Parks greater than 6,000 acres that are determined to require special air quality. There are no Class I areas within the study corridor. The 263,138 acre Rocky Mountain National Park located 40 miles northwest of the study area is the closest Class I Federal Area.

There is one Class II wilderness areas within 30 miles west of the study corridor: the Indian Peaks Wilderness Area. Class II refers to EPA designated wilderness, park, scenic, or wildlife refuge areas that lack the critical air quality status of a Class I area.

2.2.7 State Implementation Plans and Air Quality Conformity

Boulder County was historically classified as a moderate non-attainment area for PM_{10} but was re-designated by the EPA for PM_{10} attainment in August 2002. The EPA re-designated Boulder County as in attainment for CO in January 2002 for ozone in September 2001. The area is currently under approved maintenance implementation plans for all three pollutants. There are no non-attainment areas within the project study corridor, and no violations of the NAAQS in the project Area of Influence have been reported for since 1991.

The federal Clean Air Act requires states to submit plans, known as State Implementation Plans (SIP) to demonstrate how the state will meet the NAAQS for which they are designated non-attainment. As a part of the SIP development process, an emissions budget is established for non-attainment and maintenance areas to maintain the NAAQS. Because Boulder County is classified as a maintenance area for PM_{10}, for ozone and CO, projected emissions of these pollutants resulting from transportation improvement plans (TIP) and RTPs (long-range plan) must not exceed the emissions budgets set forth in the SIP. Regional conformity for this project has already been determined by inclusion in the current conforming long-range plan and TIP.

In addition, the Colorado Air Quality Control Commission sets the requirements for air quality analysis for regional and "hot-spot" air quality on a project level. This includes the requirements for modeling and screening analysis of the selected project. These requirements have been incorporated in the air quality analysis for the SH 7 study area.

The Colorado Air Quality Control Commission on April 19, 2001 adopted the current PM_{10} Re-designation Request and Maintenance Plan for the Denver Metropolitan area.

Re-entrained dust from road sanding is a prime contributor to PM_{10}. CDOT reduces street sanding emissions through the use of alternative de-icing compounds such as magnesium chloride, lower temperature “M-Caliber 1000 and 2000”, and “Ice-slicer” and rapid sand clean up. Transportation control measures (TCM) have been proposed in the SIP to induce reduction of PM_{10} emissions from mobile sources.

2.3 Environmental Consequences

The study area is located in Boulder County which is included in the Denver metropolitan attainment/maintenance area for carbon monoxide (CO), ozone, and particulate matter (PM_{10}). Therefore, the conformity provisions of the federal Clean Air Act apply. The impacts of motor vehicle emissions in the study area on concentrations of CO, ozone, and PM_{10} were analyzed for the Preferred Alternative. Pollutant concentrations, rather than total emissions, are a better indicator of project level air quality impacts because they can be compared to the federal standards that were established to protect public health.

2.3.1 Carbon Monoxide

Carbon monoxide concentrations in the study area were calculated for future (2025) traffic conditions for the build alternatives (see **Table 4**). CO concentrations were modeled using 2025 peak hour traffic volumes and motor vehicle emission rates at the 75th Street intersection which has the same configuration and same general traffic volume for both build alternatives. CO modeling at SH 7 and 75th Street results in a 5.5 ppm concentration, well below the CO NAAQS of 9ppm. Traffic volumes consistent with the most recent RTP, the Metro Vision 2030 Regional Transportation Plan, are slightly lower than the estimates used in the 2025 modeling. Because emission rates have been consistently decreasing from 2025 to 2030 plans, the original CO modeling for this intersection represents the most conservative calculation of CO concentrations likely at this location. The numbers shown are “worst-case” CO concentrations for receptors located near the edge of the highway shoulder within 10 to 12 feet from the travel lane. CO concentrations at buildings and sensitive resources near the highway would be lower because most of the buildings are at least 40 feet from the highway and vehicle related emissions would experience some dispersion by wind and turbulence.

Table 4
Carbon Monoxide Concentrations by Alternative

Alternative	2025 Traffic Volume (vpd)	2030 Traffic Volume (vpd)	NAAQS 8-hour CO	Maximum 8-hour CO concentration
Preferred	24,800	23,700	9 ppm	5.5 ppm
Optional	24,800	23,700	9 ppm	5.5 ppm

2.3.2 PM_{10}

Motor vehicle related PM_{10} emissions are the primary source of PM_{10} in the study corridor. About 80 to 90 percent of vehicle related PM_{10} is due to re-entrained dust associated with winter sanding operations. The remainder is due to exhaust, brake, and tire wear. Maximum PM_{10} concentrations are based upon comparison with regional PM_{10} modeling. The sixth highest PM_{10} average daily concentration over a five-year period is typically used for comparison. The nearest point of comparison from the 2030 Denver regional attainment/maintenance PM_{10} model with a similar or higher VMT is at I-25 near SH 7. This regional grid receptor (#155) for 2030 PM_{10} concentrations provides a value of 89 ug/m^3. The federal 24 hour PM_{10} standard is 150 ug/m^3. This suggests that PM_{10} concentrations within the study corridor would remain below the federal standard.

2.3.3 Ozone

Ozone is not directly emitted by motor vehicles; it is an indirect by-product of motor vehicle emissions. Ozone is created by the reaction of nitrogen oxides (NOX) and volatile organic compounds (VOCs), primarily on hot summer days. Since ozone formation depends on the dispersion and reaction of the NOX and VOCs and occurs over several hours, ozone is predominantly a regional pollutant and cannot be quantified at the project level. Regional modeling for the Denver ozone attainment/maintenance plan demonstrates continued attainment of the federal 1-hour ozone standard in the future. During the summer of 2004, there were no exceedances of federal 8-hour ozone standard.

2.3.4 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.

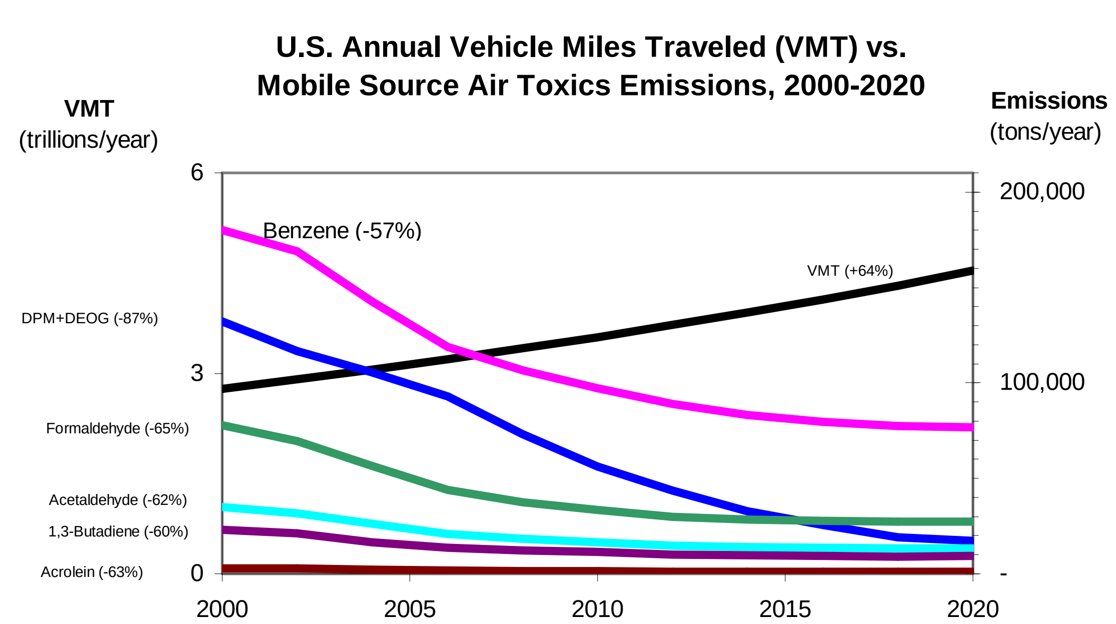
The EPA is the lead Federal Agency for administering the Clean Air Act and has certain responsibilities regarding the health effects of MSATs. The EPA issued a Final Rule on Controlling Emissions of Hazardous Air Pollutants from Mobile Sources. 66 FR 17229 (March 29, 2001). This rule was issued under 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 percent to 65 percent, and will reduce on-highway diesel PM emissions by 87 percent, as shown in **Figure 2**.

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.

2.3.5 Unavailable Information for Project Specific MSAT Impact Analysis

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

Figure 2
Graph of VMT versus 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.

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 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. Also, the emissions rates used in MOBILE 6.2 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 MOBILE 6.2 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.

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.

- 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 noncancer 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[1]. 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 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 outlined above, a quantitative assessment of the effects of air toxic emissions impacts on human health cannot be made at the 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."

In this document, FHWA has provided a qualitative analysis of MSAT emissions relative to the various alternatives, and has acknowledged that 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.

2.3.6 Project Level MSAT

As discussed above, 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. 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 project. 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 at: www.fhwa.dot.gov/environment/airtoxic/msatcompare/msatemissions.htm.

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[1] South Coast Air Quality Management District, Multiple Air Toxic Exposure Study-II (2000); Highway Health Hazards, The Sierra Club (2004) summarizing 24 Studies on the relationship between health and air quality); NEPA's Uncertainty in the Federal Legal Scheme Controlling Air Pollution from Motor Vehicles, Environmental Law Institute, 35 ELR 10273 (2005) with health studies cited therein.

For the Preferred Alternative in the 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 Preferred Alternative is slightly higher than that for the No Action, 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 action alternative along the highway corridor; along with a corresponding decrease in MSAT emissions along the parallel routes (see **Table 4**). 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 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 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.

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, under each alternative there may be localized areas where ambient concentrations of MSATs could be higher under the build alternatives than the No Build Alternative. The localized increases in MSAT concentrations would likely be most pronounced along the expanded SH 7 roadway sections that would be built between Cherryvale Drive and 75th Street under the Preferred Alternative. However, as discussed above, 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 over time cause substantial reductions that, in almost all cases, will cause region-wide MSAT levels to be significantly lower than today.

2.4 Mitigation

Motor vehicle emissions in the study corridor will not result in any exceedance of the NAAQS; therefore, no direct project air quality mitigation is necessary.

Dust emissions should be minimized by including techniques to control fugitive dust, such as watering construction areas, into construction plans and specifications, and implementing these measures during construction.

2.5 Coordination

A request has been made to include all proposed improvements in an amendment to the DRCOG 2030 fiscally-constrained, conforming RTP. This must be completed prior to FHWA adoption of the final Decision Document. This project has been coordinated with CDOT and the APCD of the CDPHE. APCD concurrence was received January 19, 2006. The signed concurrence letter from the APCD is attached as Appendix B.

APPENDIX A
TRAFFIC DATA

(Included In Full Technical Report)

APPENDIX B
CORRESPONDENCE

DEPARTMENT OF TRANSPORTATION

4201 East Arkansas Avenue
Denver, Colorado 80222
(303) 757-9011

DEPARTMENT OF TRANSPORTATION

January 10, 2006

Margie Perkins
Director, Air Pollution Control Division
Colorado Department of Public Health and Environment
4300 Cherry Creek Drive South
Denver, CO 80222

Re: SH-7, Cherryvale Road to 75th Street Environmental Assessment

Dear Ms. Perkins:

The Colorado Department of Transportation is preparing an environmental assessment for proposed improvements to State Highway 7 (Arapahoe Road) between Cherryvale Road and 75th Street east of Boulder (see attached project vicinity map). Alternatives being evaluated include widening the existing segment of SH-7 to four lanes and intersection improvements (see attached project alternatives map).

The results of the traffic analysis showed that for any of the build alternatives, the two signalized intersections in the area included in the project improvements under the preferred alternative would operate at level of service (LOS) C or better in the year 2030 (please see attached traffic analysis summary). EPA modeling guidance states that intersections that operate at LOS C or better are not likely to cause a violation of the federal 8-hour average carbon monoxide (CO) standard. Thus, CO hotspot modeling for these intersections is not required.

One of the intersections reported in the EA, the intersection of 75th Street and SH-7, is projected to operate at LOS D with the preferred alternative. This intersection, however, was improved under a separate action and will not be changed with the preferred alternative for this project. Cleared under a categorical exclusion in 2002-2003 (please refer to the attached clearance letter prepared for this analysis in 2002), this intersection was modeled at that time, using estimated volumes for the 2025 future year. The resulting worst case 8-hour CO concentration was 5.5 ppm, which is below the 9.0 ppm standard. The traffic volumes that were used for that analysis were compared to the most recent projections developed for this EA to ensure that the 2002 analysis would still be appropriate. It was determined that the traffic volumes used for the previous analysis were higher than the most recent projections, thus the previous analysis represents a worst-case scenario that demonstrates that the CO standard will not be exceeded with the current project.

This project was originally included in the conforming 2025 Interim Denver Regional Transportation Plan (RTP) and the DRCOG 2003-2008 (now 2005-2010) Transportation Improvement Program (TIP #1997-033, STIP-ID# DR2072).

Pursuant to the conformity provisions of the Clean Air Act Amendments of 1990, this project will not:

(i) cause or contribute to any new violation of any standard;
(ii) increase the frequency or severity of any existing violations of any standard;
(iii) delay timely attainment of any standard or any required interim emission reductions.

If you concur with the results of the air quality analysis and the conclusions regarding conformity of this project, please sign below and return this letter by February 10, 2006.

Thank you.

Very truly yours,

Bradley J. Beckham
Manager
CDOT Environmental Programs Branch

I Concur: Margie M. Perkins ____________________ 1-19-06 ____________________
Margie Perkins, Director Date

APPENDIX C
HOT SPOT MODELING DATA

(Included In Full Technical Report)