AIR QUALITY TECHNICAL MEMORANDUM

April 2014

EB I-70 Peak Period Shoulder Lane

CATEGORICAL EXCLUSION

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Acronyms and Abbreviations

Cat Ex	Categorical Exclusion
CDOT	Colorado Department of Transportation
CDPHE	Colorado Department of Public Health and Environment
CFR	Code of Federal Regulation
CH_4	methane
CO	carbon monoxide
EPA	Environmental Protection Agency
FHWA	Federal Highway Administration
GHG	greenhouse gas emissions
HEI	Health Effects Institute
I-70	Interstate 70
IRIS	Integrated Risk Information System
ITS	Intelligent Transportation Systems
MOVES	Motor Vehicle Emissions Simulator
MP	mile post
MPOs	Metropolitan Planning Organizations
MSAT	Mobile Source Air Toxics
N2O	nitrous oxide
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
PEIS	Programmatic Environmental Impact Statement
PM_{10}	10 microns in diameter
PPSL	Eastbound Peak Period Shoulder Lane
SH 103	State Highway 103
ug/m3	micrograms per cubic meter
US 40	United States US Highway 40
USDOT	U.S. Department of Transportation
VMT	vehicle miles traveled

Section 1. Purpose of Memorandum

1.1 Introduction

This technical memorandum was prepared in support of a Categorical Exclusion (Cat Ex) for the proposed Interstate 70 (I-70) Eastbound Peak Period Shoulder Lane (PPSL) project in Clear Creek County, Colorado. The Proposed Action would add a PPSL (Managed Lane) in the eastbound direction, which will be open only during periods of high traffic volume. As planned in this analysis, the Managed Lane will not be used in excess of 20 percent of the annual days per year (73 days) or 7.5 percent of the annual hourly time, and thus will not be considered a permanent configuration. The Managed Lane will be constructed primarily within the existing pavement surface with possible minor widening of I-70 between United States US Highway 40 (US 40) at Empire Junction (mile post [MP] 232) and the East Idaho Springs interchange (MP 241.5) at the western terminus of the Twin Tunnels project (see Figure 1). Improvements to the corridor between MP 230–MP 232 and MP 241.5–MP 243 will require signage only. A connection at the eastern end of the project area with the newly constructed Twin Tunnels project will be completed, including reconstruction of the East Idaho Springs intersection. The Proposed Action would also include resurfacing and restriping I-70 to accommodate the Managed Lane; replacing structure F-14-E, the bridge carrying State Highway 103 (SH 103) over I-70; and constructing various retaining walls throughout the study area. The installation of tolling and Intelligent Transportation Systems (ITS) infrastructure is also planned.

The I-70 Mountain Corridor Programmatic Environmental Impact Statement (PEIS), completed in 2011, represented the Tier 1 environmental process for the entire I-70 mountain corridor (CDOT, 2011). Specific projects which comprise portions of the I-70 Mountain Corridor PEIS Preferred Alternative (of which the PPSL is one) are to undergo Tier 2, or project-specific analysis. This document has been prepared to support the Tier 2 environmental process for the PPSL project.

The PPSL project is located in an area with minimal sources of air pollution, and is considered to be in attainment for air quality, meaning it is not believed to experience or contribute to a violation of National Ambient Air Quality Standards (NAAQS). Thus, conformity regulations and localized air quality modeling requirements do not apply to this project. Per the Colorado Department of Transportation (CDOT) and Federal Highway Administration (FHWA) Guidelines, since the project is located within an air quality attainment area, carbon monoxide (CO) hot-spot modeling will not be required. Recent monitoring results for particulate matter less than 10 microns in diameter (PM_{10}) from the adjacent Twin Tunnels project indicate an average value of less than 20 micrograms per cubic meter (ug/m^3), which is well below the 150 ug/m^3 national standard. Thus conformity will not be triggered, and no hot-spot analyses are required.

For National Environmental Policy Act (NEPA) purposes only, a qualitative discussion of NAAQS criteria pollutants is provided in this report. With regard to Mobile Source Air Toxics (MSAT), FHWA guidelines require a quantitative MSAT analysis for projects in which traffic volumes will routinely exceed 140,000 vehicles per day. As volumes in the study area are much lower than this threshold, a qualitative MSAT analysis is included in this technical memorandum. Finally, a discussion is provided of greenhouse gas emissions (GHG) from Colorado highway projects that may contribute to global climate change, and statewide strategies for mitigation.

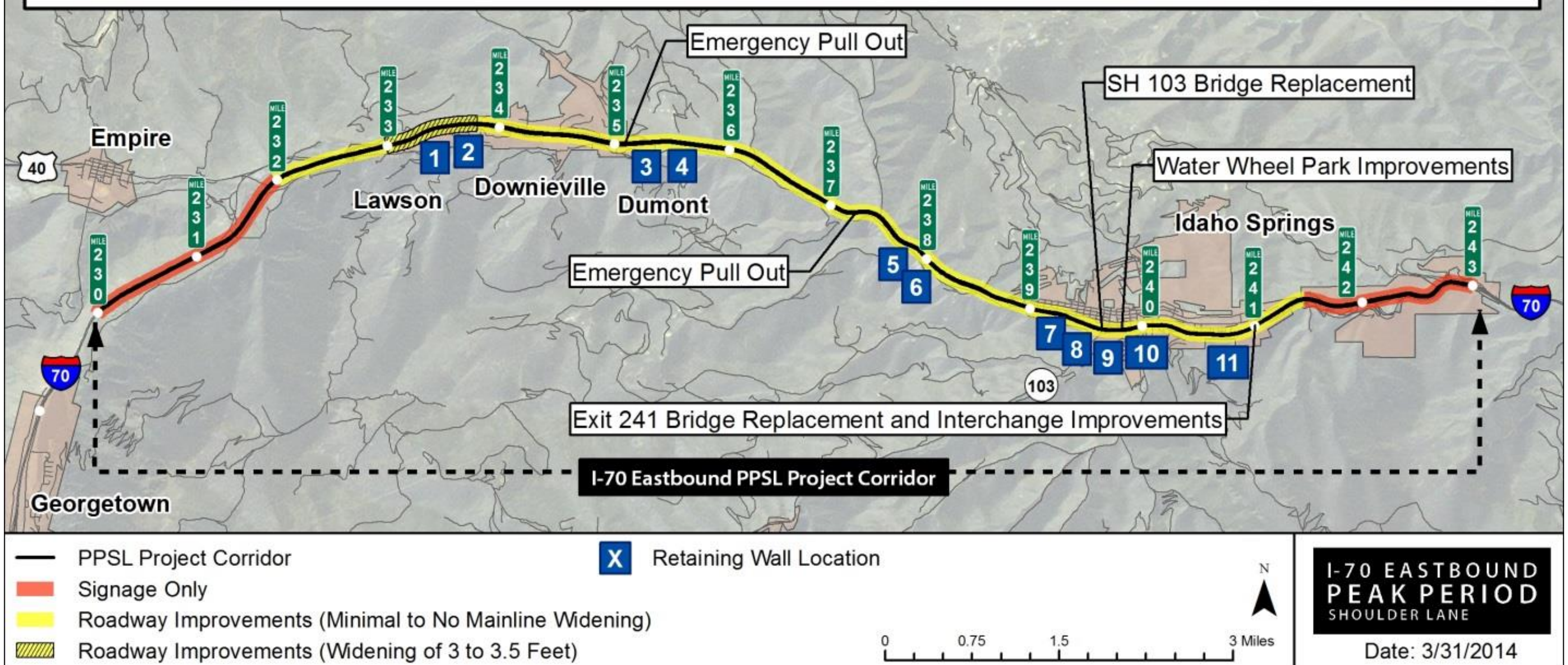
Figure 1. Proposed Improvements

Proposed Improvements

- Widening to accommodate a peak period shoulder lane.
- SH 103 bridge replacement and the Exit 241 bridge replacement and interchange improvements, including a new retaining wall.
- Construction of 10 retaining walls and rehabilitation of an existing retaining wall.
- Construction of 2 emergency pull outs.
- Signage throughout the corridor.
- Up to 14 feet of widening at the SH 103 on-ramp and approximately 4-8 feet of widening at all other on-ramps.
- Improvements to Water Wheel Park.
- Water quality treatment measures throughout the corridor.
- Two areas of rock fall mitigation near milepost 240.

Retaining Wall Summary

	Wall Location Description	Mainline or Ramp Widening	Length Wall (Feet)	Maximum Exposed Wall Height (Feet)
1	Lawson	Mainline	750	4.3
2	East of Lawson	Mainline	375	2.4
3	Dumont On-Ramp	Ramp	275	2.6
4	Between Dumont and Fall River	Mainline	875	2.6
5	Fall River On-Ramp Wall #1	Ramp	325	3.4
6	Fall River On-Ramp Wall #2	Ramp	325	2.9
7	SH 103 Off-Ramp	Ramp	210	5.8
8	SH 103 Off-Ramp (existing wall to be rehabilitated)	Ramp	400	Existing
9	SH 103 On-Ramp	Ramp	TBD	4.0
10	Approach to Bridge over Clear Creek	Ramp	75	2.0
11	Exit 241 Ramp (walls on both sides)	Ramp	500	12.0
			4,110	N/A



Data Source: Clear Creek County,CDOT, HDR Note: TBD=To Be Determined N/A=Not Applicable

Section 2. Criteria Pollutants

2.1 National Ambient Air Quality Standards

The Clean Air Act of 1970 (Act), last amended in 1990, requires the Environmental Protection Agency to set NAAQS for six "criteria" pollutants: CO, ozone (O_3), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), PM_{10}, $PM_{2.5}$ (particulate matter 2.5 micrometer in diameter and smaller), and lead (see Table 1). NAAQS for each criteria pollutant were determined based on the effects of the pollutant on public health and welfare, and are updated periodically to reflect the current state of scientific understanding. Compliance with the NAAQS in the state of Colorado is enforced by the Colorado Department of Public Health and Environment (CDPHE), and transportation projects are expected to conform to these standards.

Table 1. National Ambient Air Quality Standards—Primary Standards

Pollutant	Averaging Time	NAAQS1	
		µg/m3	ppm
Carbon monoxide (CO)	1-hour 8-hour		35 9
Ozone (O_3)	8-hour		0.075
Nitrogen dioxide (NO_2)	1-hour annual		0.100 0.053
Sulfur dioxide (SO_2)	1-hour		0.075
Particulate matter less than 2.5 microns ($PM_{2.5}$)	24-hour annual	35 12	
Particulate matter less than 10 microns (PM_{10})	24-hour	150	
Lead	rolling 3-month average	0.15	

Source: EPA, 2013

[1]µg/m^3 = micrograms per cubic meter

ppm = parts per million

Currently, this area is designated as attainment/unclassified by Environmental Protection Agency (EPA). There are no ambient air quality monitors in the vicinity of the PPSL project, or within Clear Creek County. Air quality in the area is assumed to meet the NAAQS because of the lack of large-scale emission sources in or near the area.

2.2 Qualitative Discussion

The I-70 Mountain Corridor PEIS included an analysis of the anticipated effects of multiple proposed road and travel improvements along the I-70 mountain corridor (including the PPSL project) on emissions of criteria pollutants. Because of tighter regulatory controls on emissions, as well as improvements in vehicle technology, emissions of most criteria pollutants (including $PM_{2.5}$, SO_2, NO_2, and CO) are expected to drop significantly between 2000 and 2035 (see Table 2). This is primarily because of continued improvements in vehicle technology and despite a projected overall increase in vehicle miles traveled (VMT) through the corridor. Emissions of PM_{10}, however, are expected to increase in the future. Driven largely by re-entrained road dust from winter sanding operations and natural windblown dust, these emissions are directly correlated to VMT and, thus, are generally not affected by changes in regulations and vehicle technology. It should be noted, however, that the expected large increase in VMT will result in increased PM_{10} emissions regardless of the Proposed Action or other transportation improvements. The I-70 Mountain Corridor PEIS analysis suggests an increase of approximately 87 percent in PM_{10} emissions for the No Action alternative.

Table 2 Projected change in emissions of criteria pollutants (2000-2035) from the I-70 mountain corridor for the Preferred Alternative

Pollutant	PM_{10}	$PM_{2.5}$	SO_2	NO_2	CO
Emissions increase	78-97 percent				
Emissions decrease		97 percent	98 percent	75-78 percent	36-42 percent

Source: I-70 Mountain Corridor PEIS, pp.3.1-3—3.1-4.

Real-time PM_{10} monitoring during construction of the eastbound tunnel bore at Twin Tunnels in 2013 showed that PM_{10} concentrations along the corridor average less than 20 mg/m^3, which is less than 15 percent of the NAAQS. A 2035 estimated increase of 78 percent to 97 percent in PM_{10} over the current baseline concentration projects to an estimated 36 to 39 mg/m^3, still far below the NAAQS.

For the PPSL project, these same trends are expected to hold true, with emissions of most criteria pollutants decreasing substantially for both the Proposed Action and No Action Alternatives, with the exception of PM_{10}, which will likely increase under either alternative.

Section 3. Mobile Source Air Toxics

3.1 General Discussion

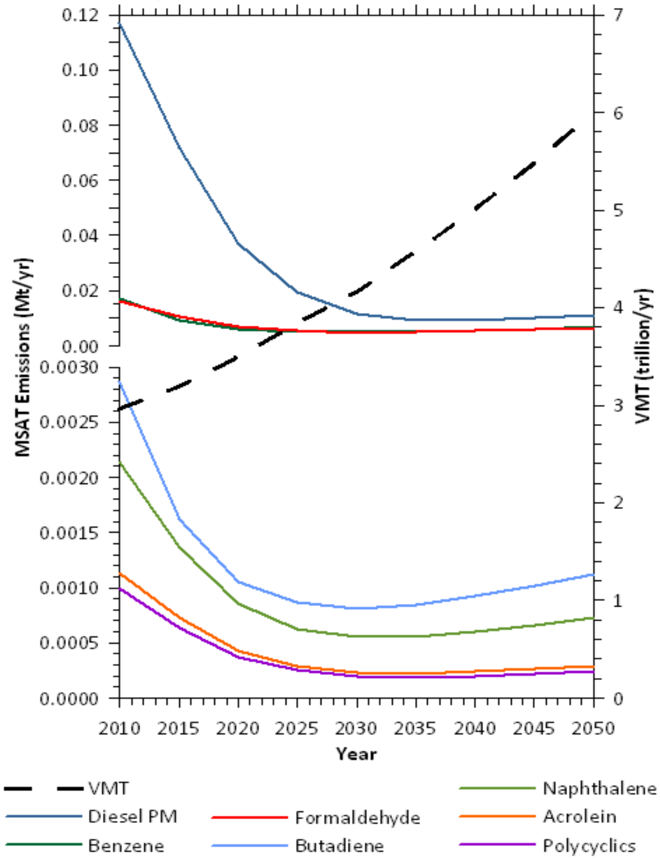
FHWA guidelines suggest that the appropriate approach for addressing MSATs for a project with traffic volumes as found in the PPSL study area is a qualitative discussion. On December 6, 2012, FHWA released updated interim guidance on when and how to analyze MSATs in NEPA documents for highway projects (FHWA, 2012). The interim guidance reflects the current list of priority MSATs.

Controlling air toxic emissions became a national priority with the passage of the Clean Air Act Amendments of 1990, whereby Congress mandated that EPA regulate 188 air toxics, also known as hazardous air pollutants. EPA assessed this expansive list in their latest rule on the Control of Hazardous Air Pollutants from Mobile Sources (Federal Register, Vol. 72, No. 37, page 8430, February 26, 2007) and identified a group of 93 compounds emitted from mobile sources that are listed in their Integrated Risk Information System (IRIS) (URL: http://www.epa.gov/ncea/iris/index.html). In addition, EPA identified seven compounds with noteworthy contributions from mobile sources that are among the national and regional-scale cancer risk drivers from their 1999 National Air Toxics Assessment (URL: http://www.epa.gov/ttn/atw/nata1999/):

1. Acrolein
2. Benzene
3. 1,3-butadiene
4. Diesel particulate matter plus diesel exhaust organic gases (DPM)

5. Formaldehyde
6. Naphthalene
7. Polycyclic organic matter

Figure 2. National MSAT emission trends 1999—2050 for vehicles operating on roadways using EPA's MOVES2010b model.



Source: EPA MOVES2010b model runs conducted during May–June 2012 by FHWA.

Note: Trends for specific locations may be different, depending on locally derived information representing vehicle-miles travelled, vehicle speeds, vehicle mix, fuels, emission control programs, meteorology, and other factors.

While FHWA considers these the priority MSATs, the list is subject to change and may be adjusted in consideration of future Environmental Protection Agency rules. Based on an FHWA-analysis using EPA'S MOVES2010b (Motor Vehicle Emissions Simulator) model, as shown on Figure 2, even if VMT increases by 102 percent as assumed from 2010 to 2050, a combined reduction of 83 percent in the total annual emissions for the priority MSAT is projected for the same time period.

Air toxics analysis is a continuing area of research. While much work has been done to assess the overall health risk of air toxics, many questions remain unanswered. In particular, the tools and techniques for assessing project-specific health outcomes as a result of lifetime MSAT exposure remain limited. These limitations impede the ability to evaluate how the potential health risks posed by MSAT exposure should be factored into project-level decision-making within the context of NEPA.

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

3.2 Qualitative Analysis

A qualitative analysis provides a basis for identifying and comparing the potential differences among MSAT emissions, if any, from the various alternatives. The qualitative assessment presented below is derived in part from a study conducted by 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.

For the No Action and the Proposed Action discussed in the I-70 PPSL Cat Ex, the amount of MSAT emitted would be proportional to the VMT, assuming that other variables such as fleet mix are the same for each alternative. The VMT estimated for the Proposed Action (during the times in which the Managed Lane would be in use) is slightly higher than that for No Action, because the additional capacity increase during peak periods only improves the efficiency of the roadway and may attract rerouted trips from elsewhere in the transportation network or from other times during the day. This slight increase in VMT could lead to temporary increases in MSAT emissions for the Proposed Action along the highway corridor, along with corresponding decreases in MSAT emissions along the parallel route (the frontage road). However, the potential emissions increase is offset by lower MSAT emission rates due to increased speeds and, therefore, decreased vehicle hours traveled. According to EPA's MOVES2010b model, emissions of all of the priority MSAT decrease as speed increases. Thus overall MSAT emissions are expected to be lower in 2035 for the Proposed Action compared to the No Action. Also, regardless of the alternative chosen, emissions will likely be lower than present levels in the design year as a result of EPA's national control programs that are projected to reduce annual MSAT emissions by over 80 percent between 2010 and 2050. 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 lane (during peak period operations only) will only move traffic closer to nearby homes in Lawson and Downieville. In most locations along the corridor, there is no additional pavement and the PPSL operations will be on the inside shoulder, so traffic will not move closer to nearby homes. In the area between Lawson and Downieville, there may be localized areas where ambient concentrations of MSAT could be higher, but only during peak periods (not more than 73 days per year, or 7.5 percent of the annual hourly time). However, the magnitude and the duration of these potential increases compared to No Action cannot be reliably quantified due to incomplete or unavailable information in forecasting project-specific MSAT health impacts. When a highway is widened, the localized level of MSAT emissions for the Proposed Action could be higher relative to the No Action, but this could be offset because of increases in speeds and reductions in congestion (which are associated with lower MSAT emissions). Also, MSAT 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 regionwide MSAT levels to be significantly lower than today.

3.3 40 Code of Federal Regulation (CFR) 1502.223—Incomplete or Unavailable Information

When an agency is evaluating reasonably foreseeable significant adverse effects on the human environment in an environmental impact statement, and there is incomplete or unavailable information, the agency shall always make clear that such information is lacking.

a. If the incomplete information relevant to reasonably foreseeable significant adverse impacts is essential to a reasoned choice among alternatives, and the overall costs of obtaining it are not exorbitant, the agency shall include the information in the environmental impact statement.

b. If the information relevant to reasonably foreseeable significant adverse impacts cannot be obtained because the overall costs of obtaining it are exorbitant, or the means to obtain it are not known, the agency shall include within the environmental impact statement:

   1. A statement that such information is incomplete or unavailable;
   2. A statement of the relevance of the incomplete or unavailable information to evaluating reasonably foreseeable significant adverse impacts on the human environment;
   3. A summary of existing credible scientific evidence which is relevant to evaluating the reasonably foreseeable significant adverse impacts on the human environment; and
   4. The agency's evaluation of such impacts based upon theoretical approaches or research methods generally accepted in the scientific community. For the purposes of this section, "reasonably foreseeable" includes impacts that have catastrophic consequences, even if their probability of occurrence is low, provided that the analysis of the impacts is supported by credible scientific evidence, is not based on pure conjecture, and is within the rule of reason.

c. The amended regulation will be applicable to all environmental impact statements for which a Notice to Intent (40 CFR 1508.22) is published in the Federal Register on or after May 27, 1986. For environmental impact statements in progress, agencies may choose to comply with the requirements of either the original or amended regulation.

3.4 Incomplete or Unavailable Information for Project-Specific MSAT Health Impacts Analysis

In FHWA's view, information is incomplete or unavailable to credibly predict the project-specific health impacts due to changes in MSAT emissions associated with a proposed set of highway alternatives. The outcome of such an assessment, adverse or not, would be influenced more by the uncertainty introduced into the process through assumption and speculation rather than any genuine insight into the actual health impacts directly attributable to MSAT exposure associated with a proposed action.

The EPA is responsible for protecting the public health and welfare from any known or anticipated effect of an air pollutant. They are the lead authority for administering the Clean Air Act and its amendments and have specific statutory obligations with respect to hazardous air pollutants and MSAT. EPA is in the continual process of assessing human health effects, exposures, and risks posed by air pollutants. They maintain the Integrated Risk Information System (IRIS), which is "a compilation of electronic reports on specific substances found in the environment and their potential to cause human health effects" (EPA, https://www.epa.gov/iris/). Each report contains assessments of non-cancerous and cancerous effects for individual compounds and quantitative estimates of risk levels from lifetime oral and inhalation exposures with uncertainty spanning perhaps an order of magnitude.

Other organizations are also active in the research and analyses of the human health effects of MSAT, including HEI. Two HEI studies are summarized in Appendix D of FHWA's *Interim Guidance Update on Mobile source Air Toxic Analysis in NEPA Documents*. Among the adverse health effects linked to MSAT compounds at high exposures are; cancer in humans in occupational settings; cancer in animals; and irritation to the respiratory tract, including the exacerbation of asthma. Less obvious is the adverse human health effects of MSAT compounds at current environmental concentrations (HEI, http://pubs.healtheffects.org/view.php?id=282) or in the future as vehicle emissions substantially decrease (HEI, http://pubs.healtheffects.org/view.php?id=306).

The methodologies for forecasting health impacts include emissions modeling, dispersion modeling, exposure modeling, and then final determination of health impacts—each step in the process building on the model predictions obtained in the previous step. All are encumbered by technical shortcomings or uncertain science that prevents a more complete differentiation of the MSAT health impacts among a set of project alternatives. These difficulties are magnified for lifetime (i.e., 70-year) assessments, particularly because unsupportable assumptions would have to be made regarding changes in travel patterns and vehicle technology (which affects emissions rates) over that time frame, since such information is unavailable.

It is particularly difficult to reliably forecast 70-year lifetime MSAT concentrations and exposure near roadways, to determine the portion of time that people are actually exposed at a specific location, and to establish the extent attributable to a proposed action, especially given that some of the information needed is unavailable.

There are considerable uncertainties associated with the existing estimates of toxicity of the various MSAT, because of factors such as low-dose extrapolation and translation of occupational exposure data to the general population, a concern expressed by HEI (http://pubs.healtheffects.org/view.php?id=282). As a result, there is no national consensus on air dose-response values assumed to protect the public health and welfare for MSAT compounds, and in particular for diesel PM. The EPA (http://www.epa.gov/risk/basicinformation.htm#g) and the HEI (http://pubs.healtheffects.org/getfile.php?u=395) have not established a basis for quantitative risk assessment of diesel PM in ambient settings.

There is also the lack of a national consensus on an acceptable level of risk. The current context is the process used by the EPA as provided by the Clean Air Act to determine whether more stringent controls are required in order to provide an ample margin of safety to protect public health or to prevent an adverse environmental effect for industrial sources subject to the maximum achievable control technology standards, such as benzene emissions from refineries. The decision framework is a two-step process. The first step requires EPA to determine an "acceptable" level of risk due to emissions from a source, which is generally no greater than approximately 100 in a million. Additional factors are considered in the second step, the goal of which is to maximize the number of people with risks less than one in a million due to emissions from a source. The results of this statutory two-step process do not guarantee that cancer risks from exposure to air toxics are less than one in a million. In some cases the residual risk determination could result in maximum individual cancer risks that are as high as approximately 100 in a million. In a June 2008 decision, the U.S. Court of Appeals for the District of Columbia Circuit upheld EPA's approach to addressing risk in its two-step decision framework. Information is incomplete or unavailable to establish that even the largest of highway projects would result in levels of risk greater than deemed acceptable.

Because of the limitations in the methodologies for forecasting health impacts described, any predicted difference in health impacts between alternatives is likely to be much smaller than the uncertainties associated with predicting the impacts. Consequently, the results of such assessments would not be useful to decision-makers, who would need to weigh this information against project benefits, such as reducing traffic congestion, accident rates, and fatalities, plus improved access for emergency response that are better suited for quantitative analysis.

Section 4. Global Climate Change Cumulative Effects

Climate change is an important national and global concern. While the earth has gone through many natural changes in climate in its history, there is general agreement that the earth's climate is currently changing at an accelerated rate and will continue to do so for the foreseeable future. Anthropogenic (human-caused) GHG emissions contribute to this rapid change. Carbon dioxide makes up the largest component of these GHG emissions. Other prominent transportation GHGs include methane (CH_4) and nitrous oxide (N_2O).

Many GHGs occur naturally. Water vapor is the most abundant GHG and makes up approximately two-thirds of the natural greenhouse effect. However, the burning of fossil fuels and other human activities are adding to the concentration of GHGs in the atmosphere. Many GHGs remain in the atmosphere for time periods ranging from decades to centuries. GHGs trap heat in the earth's atmosphere. Because atmospheric concentration of GHGs continues to climb, our planet will continue to experience climate-related phenomena. For example, warmer global temperatures can cause changes in precipitation and sea levels.

To date no national standards have been established regarding GHGs, nor has EPA established criteria or thresholds for ambient GHG emissions pursuant to its authority to establish motor vehicle emission standards for CO_2 under the Clean Air Act. However, there is a considerable body of scientific literature addressing the sources of GHG emissions and their adverse effects on climate, including reports from the Intergovernmental Panel on Climate Change, the U.S. National Academy of Sciences, and EPA and other federal agencies. GHGs are different from other air pollutants evaluated in federal environmental reviews because their impacts are not localized or regional because of their rapid dispersion into the global atmosphere, which is characteristic of these gases. The *affected environment* for CO_2 and other GHG emissions is the entire planet. In addition, from a quantitative perspective, global climate change is the cumulative result of numerous and varied emissions sources (in terms of both absolute numbers and types), each of which makes a relatively small addition to global atmospheric GHG concentrations. In contrast to broad scale actions, such as actions involving an entire industry sector or very large geographic areas, it is difficult to isolate and understand the GHG emissions impacts for a particular transportation project. Presently there is no scientific methodology for attributing specific climatological changes to a particular transportation project's emissions.

Under NEPA detailed environmental analysis should be focused on issues that are significant and meaningful to decision-making.[1] FHWA has concluded, based on the nature of GHG emissions and the exceedingly small potential GHG impacts of the proposed action (as discussed below and shown in Table 3), that the GHG emissions from the proposed action will not result in "reasonably foreseeable significant adverse impacts on the human environment" (40

[1] *See* 40 CFR 1500.1(b), 1500.2(b), 1500.4(g), and 1501.7

CFR 1502.22(b)). The GHG emissions from the Proposed Action will be insignificant and will not play a meaningful role in a determination of the environmentally preferable alternative or the selection of the Proposed Action. More detailed information on GHG emissions "is not essential to a reasoned choice among reasonable alternatives" (40 CFR 1502.22(a)) or to making a decision in the best overall public interest based on a balanced consideration of transportation, economic, social, and environmental needs and impacts (23 CFR 771.105(b)). For these reasons, no alternatives-level GHG analysis has been performed for this project.

Table 3. Statewide and Project Emissions Potential, Relative to Global Totals

	Global CO2 emissions, MMT2	Colorado motor vehicle CO2 emissions, MMT3	Colorado motor vehicle emissions, percent of global total	Project study area VMT, percent of statewide VMT	Percent change in statewide VMT due to project
Current Conditions (2010)	29,670	24.1	0.0813 percent	1,108,928 (0.000023 percent)	0.0000023 percent
Future Projection (2035)	45,500	27.9	0.0612 percent	1,312,691 (0.000027 percent)	0.0000027 percent

Notes: MMT = million metric tons. Global emissions estimates are from International Energy Outlook 2010, data for Figure 104, projected to 2040. Colorado emissions and statewide

The context in which the emissions from the proposed project will occur, together with the expected GHG emissions contribution from the project, illustrate why the project's GHG emissions will not be significant and will not be a substantial factor in the decision-making. The transportation sector is the second largest source of total GHG emissions in the U.S., behind electricity generation. The transportation sector was responsible for approximately 27 percent of all anthropogenic (human caused) GHG emissions in the U.S. in 2010.[4] The majority of transportation GHG emissions are the result of fossil fuel combustion. CO_2 makes up the largest component of these GHG emissions. U.S. CO_2 emissions from the consumption of energy accounted for about 18 percent of worldwide energy consumption CO_2 emissions in 2010.[5]. U.S. transportation CO_2 emissions accounted for about 6 percent of worldwide CO_2 emissions.[6]

While the contribution of GHGs from transportation in the U.S. as a whole is a large component of U.S. GHG emissions, as the scale of analysis is reduced the GHG contributions become quite small. Using CO_2 because of its predominant role in GHG emissions, Table 3 presents the relationship between current and projected Colorado highway CO_2 emissions and total global CO_2 emissions, as well as information on the scale of the project relative to statewide travel

[2] These estimates are from the EIA's *International Energy Outlook 2010*, and are considered the best-available projections of emissions from fossil fuel combustion. These totals do not include other sources of emissions, such as cement production, deforestation, or natural sources; however, reliable future projections for these emissions sources are not available.

[3] MOVES projections suggest that Colorado motor vehicle CO_2 emissions may increase by 15.5 percent between 2010 and 2040; more stringent fuel economy/GHG emissions standards will not be sufficient to offset projected growth in VMT.

[4] Calculated from data in U.S. Environmental Protection Agency, Inventory of Greenhouse Gas Emissions and Sinks, 1990-2010.

[5] Calculated from data in U.S. Energy Information Administration International Energy Statistics, Total Carbon Dioxide Emissions from the Consumption of Energy, http://www.eia.gov/cfapps/ipdbproject/IEDIndex3.cfm?tid=90&pid=44&aid=8, accessed 2/25/13.

[6] Calculated from data in EIA figure 104: http://www.eia.gov/forecasts/archive/ieo10/emissions.html and EPA table ES-3: : http://epa.gov/climatechange/emissions/downloads11/US-GHG-Inventory-2011-Executive-Summary.pdf

activity.

Based on emissions estimates from EPA's MOVES2010b model[7], and global CO_2 estimates and projections from the Energy Information Administration, CO_2 emissions from motor vehicles in the entire state of Colorado contributed less than one-tenth of one percent of global emissions in 2010 (0.0813 percent). These emissions are projected to contribute an even smaller fraction (0.0612 percent) in 2040[8]. VMT in the study area represents 0.000023 percent of total Colorado travel activity; and the project itself would increase statewide VMT by 0.0000023 percent. As a result, based on the build alternative with the highest VMT[9], FHWA estimates that the Proposed Action could result in a potential increase in global CO_2 emissions in 2035 of 0.000002 percent (less than one-thousandth of 1 percent), and a corresponding increase in Colorado's share of global emissions in 2040 of 0.000001 percent. This very small change in global emissions is well within the range of uncertainty associated with future emissions estimates.[10, 11]
VMT estimates are from MOVES2010b.

Mitigation for Global GHG Emissions

To help address the global issue of climate change, the U.S. Department of Transportation (USDOT) is committed to reducing GHG emissions from vehicles traveling on our nation's highways. USDOT and EPA are working together to reduce these emissions by substantially improving vehicle efficiency and shifting toward lower carbon intensive fuels. The agencies have jointly established new, more stringent fuel economy and first ever GHG emissions standards for model year 2012–2025 cars and light trucks, with an ultimate fuel economy standard of 54.5 miles per gallon for cars and light trucks by model year 2025. Further, on September 15, 2011, the agencies jointly published the first ever fuel economy and GHG emissions standards for heavy duty trucks and buses.[12] Increasing use of technological innovations that can improve fuel economy, such as gasoline- and diesel-electric hybrid vehicles, will improve air quality and reduce CO_2 emissions in future years.

Consistent with its view that broad-scale efforts hold the greatest promise for meaningfully addressing the global climate change problem, FHWA is engaged in developing strategies to reduce transportation's contribution to GHGs—particularly CO_2 emissions—and to assess the

[7] http://www.epa.gov/otaq/models/moves/index.htm. EPA's MOVES model can be used to estimate vehicle exhaust emissions of carbon dioxide (CO_2) and other GHGs. CO_2 is frequently used as an indicator of overall transportation GHG emissions because the quantity of these emissions is much larger than that of all other transportation GHGs combined, and because CO_2 accounts for 90-95 percent of the overall climate impact from transportation sources. MOVES includes estimates of both emissions rates and VMT, and these were used to estimate the Colorado statewide highway emissions in Table 3.

[8] Colorado emissions represent a smaller share of global emissions in 2040 because global emissions increase at a faster rate.

[9] Selected to represent a "worst case" for purposes of this comparison; the Preferred Alternative may have a smaller contribution.

[10] For example, Figure 114 of the Energy Information Administration's *International Energy Outlook 2010* shows that future emissions projections can vary by almost 20 percent, depending on which scenario for future economic growth proves to be most accurate.

[11] When an agency is evaluating reasonably foreseeable significant adverse effects on the human environment in an environmental impact statement and there is incomplete or unavailable information, the agency is required make clear that such information is lacking (40 CFR 1502.22). The methodologies for forecasting GHG emissions from transportation projects continue to evolve and the data provided should be considered in light of the constraints affecting the currently available methodologies. As previously stated, tools such as EPA's MOVES model can be used to estimate vehicle exhaust emissions of carbon dioxide (CO_2) and other GHGs. However, only rudimentary information is available regarding the GHG emissions impacts of highway construction and maintenance. Estimation of GHG emissions from vehicle exhaust is subject to the same types of uncertainty affecting other types of air quality analysis, including imprecise information about current and future estimates of vehicle miles traveled, vehicle travel speeds, and the effectiveness of vehicle emissions control technology. Finally, there presently is no scientific methodology that can identify causal connections between individual source emissions and specific climate impacts at a particular location.

[12] For more information on fuel economy proposals and standards, see the National Highway Traffic Safety Administration's Corporate Average Fuel Economy website: http://www.nhtsa.gov/fuel-economy/.

risks to transportation systems and services from climate change. In an effort to assist States and MPOs in performing GHG analyses, FHWA has developed a *Handbook for Estimating Transportation GHG Emissions for Integration into the Planning Process.* The Handbook presents methodologies reflecting good practices for the evaluation of GHG emissions at the transportation program level, and will demonstrate how such evaluation may be integrated into the transportation planning process. FHWA has also developed a tool for use at the statewide level to model a large number of GHG reduction scenarios and alternatives for use in transportation planning, climate action plans, scenario planning exercises, and in meeting state GHG reduction targets and goals. To assist states and Metropolitan Planning Organizations (MPOs) in assessing climate change vulnerabilities to their transportation networks, FHWA has developed a draft vulnerability and risk assessment conceptual model and has piloted it in several locations.

At the state level, there are also several programs underway in Colorado to address transportation GHGs. The Governor's Climate Action Plan, adopted in November 2007, includes measures to adopt vehicle CO2 emissions standards and to reduce vehicle travel through transit, flex time, telecommuting, ridesharing, and broadband communications. CDOT issued a Policy Directive on Air Quality in May 2009. This Policy Directive was developed with input from a number of agencies, including the state of Colorado's Department of Public Health and Environment, EPA, FHWA, the Federal Transit Administration, the Denver Regional Transportation District, and the Denver Regional Air Quality Council. This Policy Directive and implementation document, the CDOT Air Quality Action Plan address unregulated MSATs and GHGs produced from Colorado's state highways, interstates, and construction activities.

As a part of CDOT's commitment to addressing MSATs and GHGs, some of CDOT's program wide activities include:

- Developing truck routes/restrictions with the goal of limiting truck traffic in proximity to facilities, including schools, with sensitive receptor populations.
- Continue researching pavement durability opportunities with the goal of reducing the frequency of resurfacing and/or reconstruction projects.
- Developing air quality educational materials, specific to transportation issues, for citizens, elected officials, and schools.
- Offering outreach to communities to integrate land use and transportation decisions to reduce growth in VMT, such as smart growth techniques, buffer zones, transit-oriented development, walkable communities, access management plans, etc.
- Committing to research additional concrete additives that would reduce the demand for cement.
- Expanding Transportation Demand Management efforts statewide to better utilize the existing transportation mobility network.
- Continuing to diversify the CDOT fleet by retrofitting diesel vehicles, specifying the types of vehicles and equipment contractors may use, purchasing low-emission vehicles, such as hybrids, and purchasing cleaner burning fuels through bidding incentives where feasible. Incentivizing is the likely vehicle for this.
- Exploring congestion and/or right-lane only restrictions for motor carriers.
- Funding truck parking electrification (note: mostly via exploring external grant opportunities)

- Researching additional ways to improve freight movement and efficiency statewide.
- Committing to incorporating ultra-low sulfur diesel for non-road equipment statewide.
- Developing a low-VOC emitting tree landscaping specification.

Even though project-level mitigation measures will not have a substantial impact on global GHG emissions because of the exceedingly small amount of GHG emissions involved, the following measures during construction will have the effect of reducing GHG emissions. The above-identified activities are part of a program-wide effort by FHWA and CDOT to adopt practical means to avoid and minimize environmental impacts in accordance with 40 CFR 1505.2(c).

Summary

This document does not incorporate an analysis of the GHG emissions or climate change effects of each of the alternatives because the potential change in GHG emissions is very small in the context of the affected environment. Because of the insignificance of the GHG impacts, those impacts will not be meaningful to a decision on the environmentally preferable alternative or to a choice among alternatives. As outlined above, FHWA is working to develop strategies to reduce transportation's contribution to GHGs—particularly CO_2 emissions—and to assess the risks to transportation systems and services from climate change. FHWA will continue to pursue these efforts as productive steps to address this important issue. Finally, the CDOT policy generated practices described above represent practicable programmatic-level measures that, while not substantially reducing global GHG emissions, may help reduce GHG emissions on an incremental basis and could contribute in the long term to meaningful cumulative reduction when considered across the Federal-aid highway program.

Section 5. Conclusion and Mitigation

The I-70 PPSL is not considered a project that would cause significant regional air quality impacts from the construction phase of the project. It meets both the project and regional level air quality conformity requirements. The Proposed Action is expected to result in decreased congestion and improve operational efficiency during selected peak traffic hours. Although motor vehicle emissions in the study area may increase, they are unlikely to result in a violation of the NAAQS; therefore, no direct project air quality mitigation is required. However, the construction phase of this project could have several localized diesel emitting sources, which could temporarily affect air quality conditions during construction. Therefore, the project will need to follow the requirements of filing an Air Pollution Emission Notice (APEN) to fulfill EPA's concerns regarding air quality impacts. Additionally, preparation of a Fugitive Dust Control Plan will be required. Adherence to this plan will reduce temporary air pollution resulting from construction.

The air quality mitigation strategies identified in the I-70 Mountain Corridor PEIS were as follows:

"The I-70 Mountain Corridor PEIS indicated that CDOT will support policies and programs, as described below to improve air quality in the Corridor:

- Support local jurisdiction efforts, such as those in Clear Creek County, to secure grants to help develop data that will better inform the air quality measurements and mitigation.
- Support engine idling ordinance to restrict emissions produced from idling auto and commercial vehicles, especially buses, delivery trucks, etc.

- Continue to explore highway maintenance strategies to minimize the amount of sand used for winter maintenance and to remove the sand from the roadway to minimize re-entrained dust.
- Continue to support regional, statewide, and national efforts to reduce air pollutants and comply with current air quality regulations"

The I-70 Mountain Corridor PEIS acknowledged that "some air quality issues, particularly emissions of greenhouse gases, are global issues that are difficult to affect on a project-specific level. As such, the lead agencies are committed to working on these broad issues, as described in Chapter 4 *Cumulative Impacts Analysis* of the PEIS, while also incorporating measures to control air pollutant emissions locally."

The I-70 Mountain Corridor PEIS recognized that fugitive dust was the air pollutant of primary concern along the I-70 Mountain Corridor. It stated that, "Because project alternatives are not anticipated to cause or result in violations of any NAAQS, most mitigation measures for air quality will center on controlling fugitive dust during construction, operations, and maintenance. Table 4 details the mitigation measures for air quality impacts.

Table 4 Mitigation Measures

Activity	Location	Impact	Mitigation
Construction on or adjacent to I-70	Throughout the PPSL study area	Release of diesel and dust emissions, including potential disturbance of mine tailings, from construction equipment	File an Air Pollution Emission Notice (APEN) to fulfill EPA's concerns regarding air quality impacts. The APEN will include a Fugitive Dust Control Plan.
Use of earthmoving equipment and other construction equipment.	Throughout the PPSL study area	Release of diesel emissions from construction equipment	Use the cleanest fuels available at the time in construction equipment and vehicles to reduce exhaust emissions. Keep construction equipment well maintained to ensure that exhaust systems are in good working order.

Section 6. References

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