Air Quality Study Report

Ferguson Slide Permanent Restoration Project

On State Route 140 from 8 miles east of Briceburg to
7.6 miles west of El Portal in Mariposa County, California
District 10-MPA-140-PM 42.0/42.7
Project ID 10-0000-0198

Prepared by the
State of California Department of Transportation

April 24, 2013

Caltrans

Signature Page

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Prepared By: ____________________ Date: April 24, 2013

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Purpose of Air Quality Study Report

This report documents the anticipated air quality effects of the proposed project. Because this document is intended to satisfy the requirements of both the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA), it addresses both state and federal air quality standards.

Project Location, Description, and Alternatives

The project is located on State Route 140 in Mariposa County, from 8 miles east of Briceburg, a small community anchored by a Bureau of Land Management Visitor Center, to 7.6 miles west of El Portal (post miles 42.0 and 42.7) where the Ferguson rockslide covered the highway with 798,000 tons of rock and debris in April 2006. Within the limits of the proposed project and prior to the Ferguson rockslide, State Route 140 was a two-lane, undivided highway. Following the rockslide and the completion of a temporary detour, State Route 140 now bridges across the Merced River, follows an old railroad grade, and then bridges back across the Merced River to bypass the rockslide, as a one-lane road. This bypass route provides for one-directional traffic that is controlled by traffic signals. The Merced River flows alongside the highway within the project area, as it does throughout the Merced River Canyon. There are no other proposed or ongoing projects within the project vicinity.

Purpose and Need

The first rockslides within the Merced River Canyon began on April 29, 2006. Since April 2006, rockslides have damaged and blocked a portion of State Route 140 between Mariposa and El Portal. The Ferguson rockslide closed State Route 140 to traffic from 8 miles east of Briceburg to 7.6 miles west of El Portal.

The purpose of the project is to reopen and restore full highway access between Mariposa and El Portal via State Route 140. Full highway access for this portion of State Route 140 means a two-lane, all-weather highway that would accommodate all types of vehicles with some restrictions on vehicle length. The route would return to its previous status as a California Legal Advisory Truck Route with a 32-foot kingpin-to-rear-axle restriction. Other length restrictions include: 45 feet for single vehicle, 60 feet for a combination vehicle, and 35 feet for a towed vehicle from hitch to rear bumper. Currently, motorists use a temporary, one-lane bypass route to avoid the portion of State Route 140 that was closed by the Ferguson rockslide. This bypass route restricts vehicles over 45 feet total length from traveling along State Route 140. It also requires that traffic stop and queue before entering the one-lane bypass route when the traffic signal indicates the way is clear. Restoration of State Route 140 would eliminate the detour and provide full access to all traffic on State Route 140 between the town of Mariposa and Yosemite National Park. Yosemite National Park and communities in Mariposa County rely heavily on this access for many types of transportation that serve tourism and residents of the area. State Route 140 is an essential link in supplying goods and services to the Mariposa, El Portal and Yosemite communities. Two build alternatives and one no-build alternative are being considered.

Proposed Action

Caltrans proposes to restore full highway access between Mariposa and Yosemite via State Route 140 in Mariposa County, California, by repairing or permanently bypassing the portion of State Route 140 that was blocked and damaged by the Ferguson rockslide.

The existing detour was constructed during a declared emergency and was designed as a temporary solution to the closure of State Route 140. Caltrans has an agreement with the U.S. Forest Service that the pavement and structures used for the detour would be removed once a permanent solution could be constructed. Removing these structures and returning Incline Road to its pre-emergency condition are part of the proposed action. The total length of the project area is 0.7 mile. The following build alternatives are being proposed:

Alternative R (Rockshed/Tunnel)

This alternative would construct a rockshed/tunnel (cut-and-cover tunnel) through the talus (the debris deposited below the slide) of the slide along the existing State Route 140 alignment and grade.

Alternative T-3 (Tunnel under Slide Realignment)

This alternative would realign the highway by constructing a 2,200-foot-long tunnel under the area of the slide.

No-Build Alternative

The No-Build Alternative would leave State Route 140 damaged and blocked by the Ferguson rockslide. As a result of the No-Build Alternative, the temporary detour would continue to function as State Route 140. Either general wear or damage from flooding in a high water year would eventually require the removal of the bridges, supporting structures, and the detour pavement, leading to the permanent closure of State Route 140 at the section damaged by the rockslide.

The No-Build Alternative requires the same environmental analysis as the proposed build alternatives.

Common to Build and No-Build Alternatives

In 2006 and in 2008, Caltrans installed temporary detours around the slide under a state of emergency. Impacts from these emergency projects were identified, and it was agreed that they would be mitigated with the permanent solution.

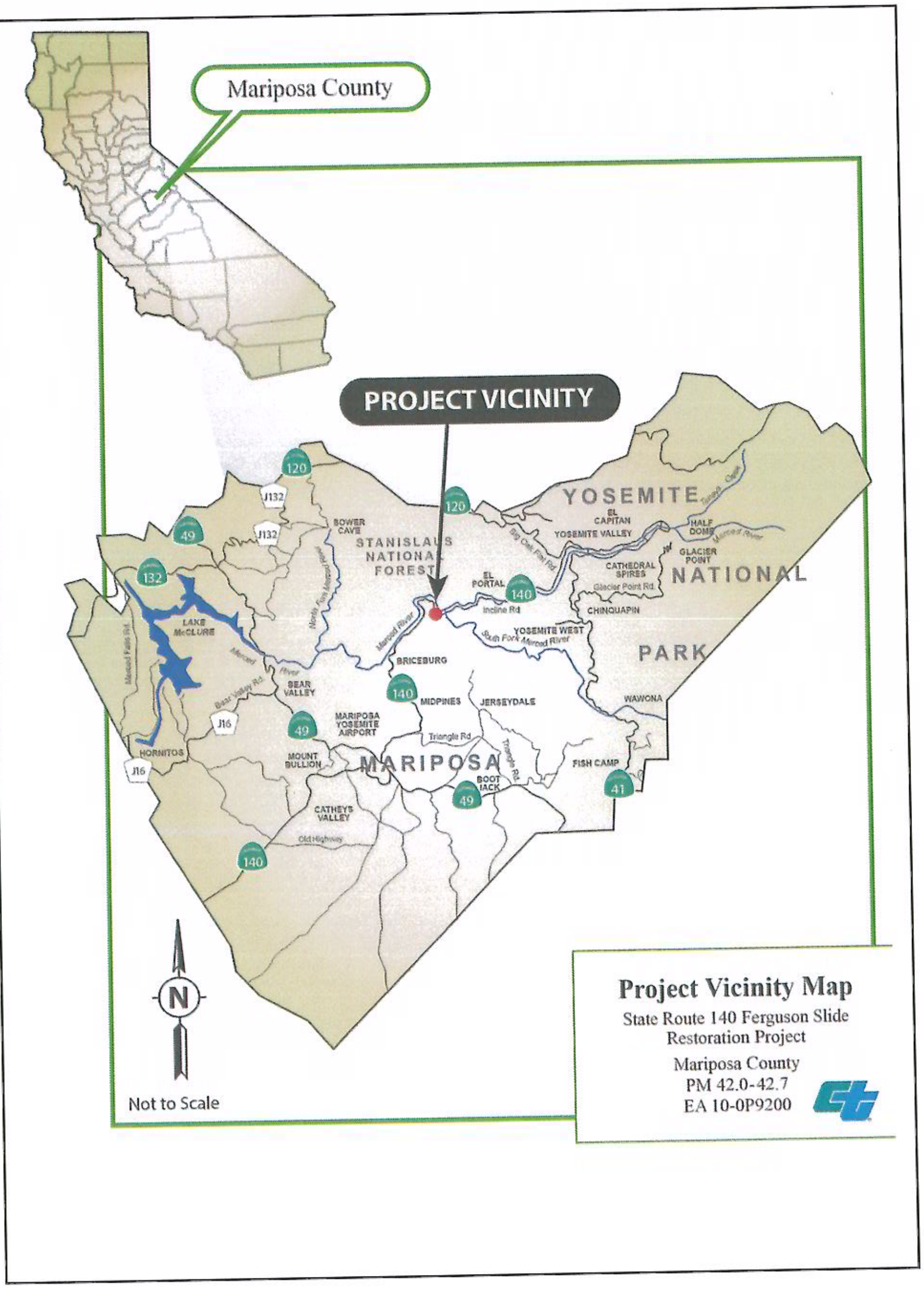


Figure 1. Project Vicinity Map

Federal, State, and Local Regulations

The main legislation that governs federal air quality regulations is the Clean Air Act Amendments of 1990, which delegates primary responsibility for clean air to the U.S. Environmental Protection Agency. The Environmental Protection Agency develops rules and regulations to preserve and improve air quality and delegates specific responsibilities to state and local agencies. Under the Clean Air Act, the Environmental Protection Agency has established the National Ambient Air Quality Standards for six potential air pollutants: carbon monoxide (CO), ozone (O_3), nitrogen dioxide (NO_2), suspended particulate matter (PM_{10} and $PM_{2.5}$), sulfur dioxide (SO_2), and lead (Pb).

The State of California has developed the California Ambient Air Quality Standards (CAAQS). The Air Resources Board (ARB), which is part of the California Environmental Protection Agency (EPA) regulatory agency, develops air quality regulations at the state level. The state regulations mirror federal regulations by establishing industry-specific pollution controls for criteria, toxic, and nuisance pollutants. California also requires that plans and strategies for attaining state ambient air quality standards as set forth in the California Clean Air Act of 1988 be developed throughout the state. ARB also is responsible for developing motor emissions standards for California vehicles.

The project is located within the Mountain Counties Air Basin District in Mariposa County which administers air quality regulations developed at the federal, state, and local levels. These regulations are described below.

1. Air Quality Pollutants and Standards

As stated above, the federal and state governments have established ambient air quality standards for six criteria pollutants: carbon monoxide (CO), ozone (O_3), particulate matter (PM), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), and lead (Pb). (See Table 1). Ozone and particulate matter are generally considered to be regional pollutants because they or their precursors affect air quality on a regional scale. Pollutants such as carbon monoxide, nitrogen dioxide, sulfur dioxide, and lead are considered local pollutants because they tend to accumulate in the air locally. Particulate matter is also considered as a local pollutant. Mobile Source Air Toxics are not currently criteria pollutants but are included in this study. The project lies in Mariposa County in the Mountain Counties Air Basin.

Carbon Monoxide (CO): Carbon monoxide is a public health concern because it combines readily with hemoglobin and thus reduces the amount of oxygen transported in the bloodstream. Effects on humans range from slight headaches to nausea to death. State and federal carbon monoxide standards have been set for both 1-hour and 8-hour averaging times. The state 1-hour standard is 20 parts per million by volume, and the federal 1-hour is 35 parts per million. Both the state and federal standards are 9 parts per million for the 8-hour averaging period. Motor vehicles are the dominant source of carbon monoxide emissions in most areas. High carbon monoxide levels develop primarily during winter when periods of light wind combine with ground-level temperature inversions. These conditions result in reduced dispersion of vehicle emissions. In addition, motor vehicles emit more carbon monoxide in cool temperatures than in warm temperatures.

Table 1. Federal and State Ambient Air Quality Standards

Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards [1]		Federal Standards [2]		
		Concentration [3]	Method [4]	Primary [3,5]	Secondary [3,6]	Method [7]
Ozone (O_3)	1 Hour	0.09 ppm (180 µg/m³)	Ultraviolet Photometry	—	Same as Primary Standard	Ultraviolet Photometry
	8 Hour	0.070 ppm (137 µg/m³)		0.075 ppm (147 µg/m³)		
Respirable Particulate Matter (PM10)	24 Hour	50 µg/m³	Gravimetric or Beta Attenuation	150 µg/m³	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	20 µg/m³		—		
Fine Particulate Matter (PM2.5)	24 Hour	No Separate State Standard		35 µg/m³	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	12 µg/m³	Gravimetric or Beta Attenuation	15.0 µg/m³		
Carbon Monoxide (CO)	8 Hour	9.0 ppm (10mg/m³)	Non-Dispersive Infrared Photometry (NDIR)	9 ppm (10 mg/m³)	None	Non-Dispersive Infrared Photometry (NDIR)
	1 Hour	20 ppm (23 mg/m³)		35 ppm (40 mg/m³)		
	8 Hour (Lake Tahoe)	6 ppm (7 mg/m³)		—	—	—
Nitrogen Dioxide (NO_2)	Annual Arithmetic Mean	0.030 ppm (57 µg/m3)	Gas Phase Chemiluminescence	0.053 ppm (100 µg/m³)	Same as Primary Standard	Gas Phase Chemiluminescence
	1 Hour	0.18 ppm (339 µg/m³)		—		
Sulfur Dioxide (SO_2)	Annual Arithmetic Mean	—	Ultraviolet Fluorescence	0.030 ppm (80 µg/m³)	—	Spectrophotometry (Pararosaniline Method)
	24 Hour	0.04 ppm (105 µg/m³)		0.14 ppm (365 µg/m³)	—	
	3 Hour	—		—	0.5 ppm (1300 µg/m³)	
	1 Hour	0.25 ppm (655 µg/m³)		—	—	—
Lead [8]	30 Day Average	1.5 µg/m³	Atomic Absorption	—	—	—
	Calendar Quarter	—		1.5 µg/m³	Same as Primary Standard	High Volume Sampler and Atomic Absorption
	Rolling 3-Month Average [9]	—		0.15 µg/m³		
Visibility Reducing Particles	8 Hour	Extinction coefficient of 0.23 per kilometer — visibility of ten miles or more (0.07 — 30 miles or more for Lake Tahoe) due to particles when relative humidity is less than 70 percent. Method: Beta Attenuation and Transmittance through Filter Tape.		No Federal Standards		
Sulfates	24 Hour	25 µg/m³	Ion Chromatography			
Hydrogen Sulfide	1 Hour	0.03 ppm (42 µg/m³)	Ultraviolet Fluorescence			
Vinyl Chloride [8]	24 Hour	0.01 ppm (26 µg/m³)	Gas Chromatography			

See footnotes on next page ...

For more information please call ARB-PIO at (916) 322-2990

California Air Resources Board (11/17/08)

1. California standards for ozone, carbon monoxide (except Lake Tahoe), sulfur dioxide (1 and 24 hour), nitrogen dioxide, suspended particulate matter—PM10, PM2.5, and visibility reducing particles, are values that are not to be exceeded. All others are not to be equaled or exceeded. California ambient air quality standards are listed in the Table of Standards in Section 70200 of Title 17 of the California Code of Regulations.
2. National standards (other than ozone, particulate matter, and those based on annual averages or annual arithmetic mean) are not to be exceeded more than once a year. The ozone standard is attained when the fourth highest eight hour concentration in a year, averaged over three years, is equal to or less than the standard. For PM10, the 24 hour standard is attained when the expected number of days per calender year with a 24-hour average concentration above 150 μg/m3 is equal to or less than one. For PM2.5, the 24 hour standard is attained when 98 percent of the daily concentrations, averaged over three years, are equal to or less than the standard. Contact U.S. EPA for further clarification and current federal policies.
3. Concentration expressed first in units in which it was promulgated. Equivalent units given in parentheses are based upon a reference temperature of 25°C and a reference pressure of 760 torr. Most measurements of air quality are to be corrected to a reference temperature of 25°C and a reference pressure of 760 torr; ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.
4. Any equivalent procedure which can be shown to the satisfaction of the ARB to give equivalent results at or near the level of the air quality standard may be used.
5. National Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health.
6. National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.
7. Reference method as described by the EPA. An "equivalent method" of measurement may be used but must have a "consistent relationship to the reference method" and must be approved by the EPA.
8. The ARB has identified lead and vinyl chloride as 'toxic air contaminants' with no threshold level of exposure for adverse health effects determined. These actions allow for the implementation of control measures at levels below the ambient concentrations specified for these pollutants.
9. National lead standard, rolling 3-month average: final rule signed October 15, 2008.

B. **Ozone (O_3):** Ozone is not emitted directly into the air but is formed by a photochemical reaction in the atmosphere. Ozone precursors, which include oxides of nitrogen and reactive organic gases, react in the atmosphere in the presence of sunlight to form ozone. State and federal standards for ozone have been set for a 1-hour averaging time. The state requires that ozone concentration not exceed .09 parts per million of ozone being produced in a given area in 1 hour. The federal 1-hour ozone standard is .12 parts per million, but it does not apply in California. The federal 8-hour ozone standard is .08 parts per million, and the state standard is .07 parts per million.

C. **Particulate Matter (PM_{10}) and ($PM_{2.5}$)**: Particulate matter emissions are generated by a wide variety of sources, including agricultural activities, industrial emissions, dust suspended by vehicle traffic and construction equipment, and secondary aerosols formed by reactions in the atmosphere. The National Ambient Air Quality Standards for particulate matter applies to two classes of particulate: particulate matter 2.5 microns or less in diameter ($PM_{2.5}$) and particulate matter 10 microns or less in diameter (PM_{10}). The state PM_{10} standards are 50 micrograms per cubic meter as a 24-hour average and 20 micrograms per cubic meter as an annual arithmetic mean. The federal PM_{10} standard is 150 micrograms per cubic meter as a 24-hour average. The federal standards for $PM_{2.5}$ are 15 micrograms per cubic meter and 35 micrograms per cubic meter for annual and 24 hours, respectively. The state standard for

$PM_{2.5}$ is 12 micrograms per cubic meter as an annual arithmetic mean. There is no separate state standard for 24-hour $PM_{2.5}$.

D. **Nitrogen Dioxide (NO_2):** Nitrogen dioxide belongs to a family of highly reactive gases called nitrogen oxides (NOx). These gases form when fuel is burned at high temperatures and come principally from motor vehicle exhaust and stationary sources such as electric utilities and industrial boilers. A suffocating, brownish gas, nitrogen dioxide is a strong oxidizing agent that reacts in air to form corrosive nitric acid as well as toxic organic nitrates. It also plays a major role in the atmospheric reactions that produce ground-level ozone (or smog). The Environmental Protection Agency's health-based national air quality standard for nitrogen dioxide is .053 parts per million.

E. **Sulfur Dioxide (SO_2):** Sulfur dioxide belongs to the family of sulfur oxide gases (SOx). These gases are formed when fuel containing sulfur (mainly coal and oil) is burned and during metal smelting and other industrial processes. The Environmental Protection Agency's health-based national air quality standard for sulfur dioxide is .030 parts per million (measured on an annual average) and .14 parts per million (measured over 24 hours).

F. **Lead (Pb):** Lead is a metal found naturally in the environment as well as in manufactured products. The major sources of lead emissions have historically been motor vehicles and industrial sources. Due to the phase-out of leaded gasoline, metal processing is the major source of lead emissions to the air today. The highest levels of lead in the air are generally found near lead smelters. Other stationary sources are waste incinerators, utilities, and lead-acid battery manufacturers.

G. **Other Pollutants:**

Mobile Source Air Toxics (MSATs): These toxics are a subset of the 188 air toxics defined in the Clean Air Act. They are now federally regulated under 40 Code of Federal Regulations 1502.22 by the U.S. Environmental Protection Agency. Mobile source air toxics are 21 compounds emitted from highway vehicles and non-road equipment.

There are six main toxics including diesel exhaust, benzene and formaldehyde. The Federal Highway Administration issued updated interim guidance on September 29, 2009 for analysis in National Environmental Policy Act documents. Currently, available technical tools do not enable us to predict the project-specific health impacts, so only a qualitative analysis is conducted.

Air Quality Conformity

The Federal Clean Air Act requires that all transportation plans and programs pass the air quality conformity test. This process involves forecasting future emissions of air pollution to determine whether the amount of future pollution resulting from the plan or program would be within the allowable limit for motor vehicle emissions.

Transportation conformity must be determined for all nonattainment area pollutants classified as regional pollutants. Transportation projects also generate carbon monoxide, which is considered a localized pollutant. Carbon monoxide micro-scale modeling is required to determine whether a transportation project would cause or contribute to localized violations of carbon monoxide National Ambient Air Quality Standards.

Regional conformity must be determined based on a full study at least every 3 years. In California, it is determined at least every 2 years when the state-required Regional Transportation Plan updates are done. In addition, a new federal Transportation Improvement Program is required every 4 years, for which a conformity determination is required. Amendments to both the Regional Transportation Plan and Transportation Improvement Program between mandated conformity analyses also must have conformity demonstrated, including a full-scale revision of the regional analysis if regionally significant projects are added, deleted, or significantly modified.

Regional conformity is demonstrated by showing that the project is included in a conforming Regional Transportation Plan and Transportation Improvement Program with substantially the same design concept and scope that were used for the regional conformity analysis.

Project-level conformity is demonstrated by showing that it will not cause localized exceedances of carbon monoxide and/or PM_{10} standards, and that it will not interfere with "timely implementation" of Transportation Control Measures called out in the State Implementation Plan.

The March 10, 2006 final conformity rule (71 FR 12468) has the following Key Elements:

- This rule requires that $PM_{2.5}$ hot-spot analyses be performed only for new transportation projects with significant diesel traffic. Examples of such "projects of air quality concern" include intermodal freight or bus terminals, and major highway projects and congested intersections involving significant diesel traffic. No hot-spot analyses will be required for most projects in $PM_{2.5}$ areas because most projects are not an air quality concern. This final rule also streamlines existing PM_{10} hot-spot requirements in a similar way.

- The streamlined approach in this final rule will ensure that transportation and air quality agencies in $PM_{2.5}$ and PM_{10} areas use their resources efficiently, while achieving clean air goals.
- In both $PM_{2.5}$ and PM_{10} areas, a quantitative hot-spot analysis is not required until the Environmental Protection Agency issues a new motor vehicles emissions model capable of estimating local emissions as well as future hot-spot modeling guidance. Qualitative analyses will apply in the interim.
- This rule extends an existing flexibility by allowing the U.S. Department of Transportation to make "categorical hot-spot findings," which waive $PM_{2.5}$ and PM_{10} hot-spot reviews for categories of projects where modeling shows that there is no air quality concern.

Regional Analysis

This project is located in the Mountain Counties Air Basin in Mariposa County. Table 2 below lists federal and state classifications for particulate matter (PM_{10}), ozone, and carbon monoxide (CO) within Mariposa County.

Table 2.

Constituent	Federal Designation	State Designation
PM_{10}	Unclassified/Attainment	Unclassified
$PM_{2.5}$	Attainment/Unclassifiable	Unclassified
Ozone	Non-Attainment	Nonattainment
SO_2	Unclassified	Attainment
H_2S	No Federal Standard	Unclassified
NO_2	Attainment/Unclassified	Attainment
CO	Attainment/Unclassified	Unclassified

Under 40 CFR Section 93.126 (Table 3) this project falls under the category of "Changes in Vertical and Horizontal Alignment" and is exempt from regional emission analysis. The table 3 exemption is a full exemption since the area is unclassified/attainment for all hot-spot-related pollutants. Such projects may proceed toward implementation even in the absence of a conforming transportation plan and Transportation Improvement Program (TIP). This project does not interfere with the implementation of the Traffic Control Measures (TCMs). The project has undergone Interagency Consultation (IAC) requesting that concurrence that the project is fully exempt from conformity analysis. IAC participants concurs with this exemption (see Appendix A).

Project-Level Analysis

A project which is located in a non-attainment or maintenance area for a given pollutant requires additional air quality analysis and reduction measures in regard to the pollutant. Table 2 summarizes the federal and state attainment status of the project. This "hot-spot" analysis is most frequently done for carbon monoxide and particulate matter. Currently, there is no hot-spot procedure for ozone, which is considered a regional pollutant. The project is located in the area which is designated as unclassified/attainment for all hot-spot-related pollutants.

Carbon Monoxide (CO) Analysis

The project is located in Mariposa County, which is in attainment for the federal and state carbon monoxide standards. There is no carbon monoxide monitor near the project or in Mariposa County.

According to the California Almanac of Emissions and Air Quality (2008 edition), California has reduced carbon monoxide concentrations over the past 10 years. It is expected that improved motor vehicle emissions controls and less-polluting fuels will continue this downward trend.

The UC Davis Transportation Project-Level Carbon Monoxide Protocol, dated December 1997, was used to evaluate the potential carbon monoxide impact of this project. The qualitative evaluation flow chart located in Guidelines in Chapters 3 and 4, and of Section 4, Figure 3 were followed. The Protocol Section asks following questions for the basis of deciding if any emission changes are acceptable:

- Does project significantly increase the percentage of vehicles operating in cold start mode? **No.**
- Does project improve traffic flow? **Yes - Levels of service will improve.**
- Does the project move traffic closer to receptors? Yes and **No.**
- Is project suspected of resulting in higher CO concentrations than those existing within the region at the time of attainment demonstration? **No.**
- Does the project involve a signalized intersection at LOS E or F? **NO**
- Does the project involve a signalized intersection worsening it's LOS E, or F? **No , if Built, LOS will improve.**

Conclusion: The project is satisfactory and no further analysis needed.

Particulate Matter Analysis

The Environmental Protection Agency has released guidance on $PM_{2.5}$ and PM_{10} analysis:

- EPA Final Rule defining projects for which $PM_{2.5}$ and PM_{10} Hot Spot Analysis is needed for Conformity
- EPA Guidance Document for performing qualitative $PM_{2.5}$ and PM_{10} Hot Spot Analysis

Qualitative particulate matter hot-spot analysis is required under the Environmental Protection Agency Transportation Conformity rule for projects of air quality concern, as described in the Environmental Protection Agency's Final Rule of March 10, 2006. Project types listed in 40 CFR 93.126 do not require any hot-spot analysis for conformity purposes. All other projects in areas subject to conformity for particulate matter (PM_{10} or $PM_{2.5}$) must have documented consideration with Interagency Consultation and Public Involvement of whether or not they are Projects of Air Quality Concern; if they are in fact Projects of Air Quality Concern, a full qualitative analysis is needed.

The project is located in a federal $PM_{2.5}$attainment area and a federal attainment PM_{10} area.

A qualitative hot spot analysis was submitted to the Model Coordinating Committee in April, 2013. Concurrence that this project was exempt from Regional Emission Analysis. A concurrence from FHWA and USEPA in April 2013. As such, it is expected that this project would not cause an increase in particulate matter violations over the state or federal standard.

The Yosemite Village-Visitor Center, is the nearest monitor measuring PM_{10} and $PM_{2.5}$., and it has not registered any violation of the Federal Standard in the last three years (2009-2011). The traffic and the trucks volumes for the horizon year are well below the threshold (Table 3).

The environmental studies are at the EIR/EIS level. This is mainly because of the scale of the work , a tunnel alternative would involve pretty heavy construction, though not lasting more than 5 years. Other than modest reduction of out-of-direction travel currently happening due to the detour, this project will not affect traffic volumes in any significant way, and would result in a small emission reduction because traffic would no longer back up at the signals controlling one-way traffic on the detour. Even before the slide, AADT on this road was way below any conformity hot spot criteria. See table below for traffic numbers.

Table 3 Annual Average Daily Traffic

Year	AADT Build	No Build	Truck %
2006 (before slide)		1,150	7
2012	1,800	1,800	7
2029	2,000	2,000	7
2039	2,600	2,600	7

Source: Caltrans District 10 Office of Traffic Forecasting, Caltrans Traffic Ops website 2011 Truck AADTs.

Conclusion

The project is not expected to cause or contribute to a violation of the standards.

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).

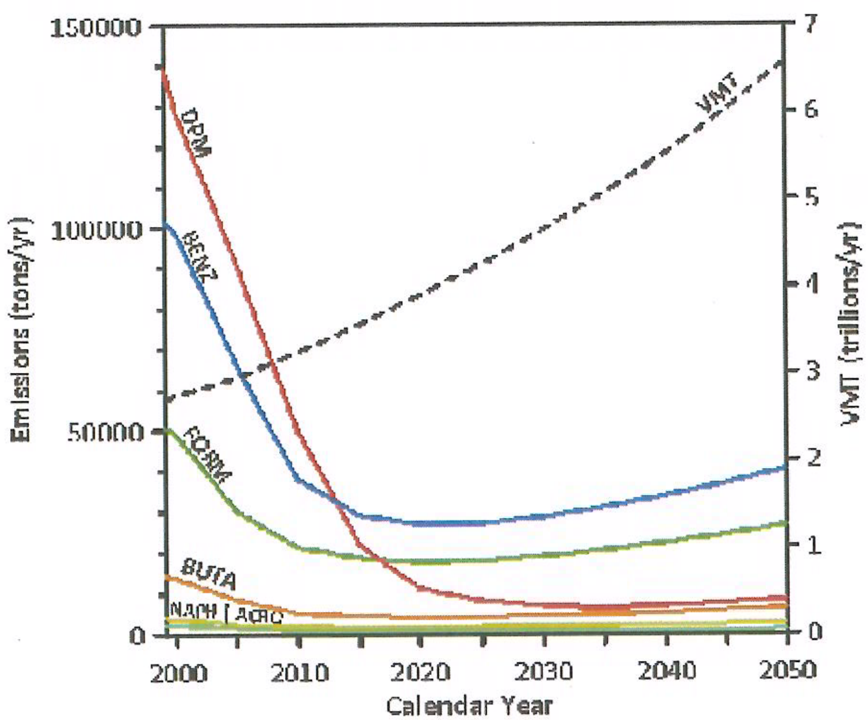
Mobile Source Air Toxics (MSATs) are a subset of the 188 air toxics defined by the Clean Air Act. The MSATs are compounds emitted from highway vehicles and non-road equipment. Some toxic compounds are present in fuel and are emitted to the air when the fuel evaporates or passes through the engine unburned. 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.

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

Toxics Assessment (NATA) (http://www.epa.gov/ttn/atw/nata1999/). These are acrolein, benzene, 1,3-butadiene, diesel particulate matter (diesel PM), plus diesel exhaust organic gases, formaldehyde and acetaldehyde. Naphthalene and polycyclic organic matter (POMs) have been recently removed from the "significant contributions" short list. While FHWA considers these the priority mobile source air toxics, the list is subject to change and may be adjusted in consideration of future EPA rules.

The 2007 EPA rule mentioned above requires controls that will dramatically decrease MSAT emissions through cleaner fuels and cleaner engines. According to an FHWA analysis using EPA's MOBILE6.2 model, even if vehicle activity (vehicle-miles travelled, VMT) increases by 145 percent as assumed, a combined reduction of 72 percent in the total annual emission rate for the priority MSAT is projected from 1999 to 2050, as shown in Figure 2. However, in California, the EMFAC 2011 model is used instead of MOBILE 6.2.

Figure 2. National MSAT Emission Trends 1999 – 2050 for Vehicles Operating on Roadways Using EPA's Mobile 6.2 Model



DPM - Diesel PM
BENZ - Benzene
FORM - Formaldehyde
BUTA - 1,3-Butadiene
VMT - Vehicle-Miles Traveled
NAPH - Naphthalene
ACRO - Acrolein

For projects on an existing alignment, MSATs are expected to decline due to the effect of new EPA engine and fuel standards. Projects that result in increased travel speeds will reduce MSAT emissions per VMT basis, although the effect of speed changes on diesel particulate matter is not accounted for in the MOBILE6.2 model. This speed benefit may be offset somewhat by increased VMT if the more efficient facility attracts additional vehicle trips. California uses the EMFAC 2011 model, not MOBILE6.2, however, and a similar decline in emissions is expected using EMFAC.

For each alternative in this Environmental Assessment, the amount of MSAT emitted would be proportional to the vehicle miles traveled, or VMT, assuming that other variables such as fleet mix are the same for each alternative. The VMT estimated for each of the Build Alternatives is the same as for the No Build Alternative. Table 4 indicates that the emissions will decrease over time and that the Build Alternative will have slightly less or the same estimated emissions as the No Build Alternative. 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 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 annual MSAT emissions by 72 percent between 1999 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.

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 U.S. Environmental Protection Agency (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. The 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, http://www.epa.gov/ncea/iris/index.html). Each report contains assessments of non-cancerous and cancerous effects for individual compounds and quantitative estimates of risk levels from lifetime oral and inhalation exposures with uncertainty spanning perhaps an order of magnitude.

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

Methodologies needed for forecasting health impacts include emissions modeling; dispersion modeling; exposure modeling; and 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 reliable determination of the MSAT health impacts of this project.

The EMFAC 2011 emission model used in California, like U.S. EPA's MOBILE6.2 model used elsewhere in the country, is a regional model and not a project-level model. It is trip-based, where emission factors are projected based on a "typical" trip and vehicle speeds are averaged over the trip. EMFAC 2011, like MOBILE6.2, cannot predict emission factors for a specific vehicle operating condition at a specific location at a specific time. Because of this, it has limited precision when applied at the project level. The implication of this limitation is illustrated and noted by the University of California, Davis (UC Davis) in Figure 1, i.e., "Smooth flow reduces emissions by a factor of nearly 20", which cannot be reflected in existing trip-based or link-based models. Similar results have been found in analyses by UC Riverside (Barth, for CO_2) and North Carolina State (Frey, for multiple pollutants).

MOBILE6.2 and EMFAC 2011 (with the necessary off-model speciation factors for EMFAC) also differ regarding MSAT emissions from a future vehicle fleet. Part of this difference is caused by differing regulatory structures reflected in the models, with California's fuel and vehicle emission standards producing different and usually lower estimates of total organic gases and diesel PM in the future. EMFAC also incorporates results of additional heavy-duty vehicle emission testing compared to MOBILE 6.2, which affects particulate matter (diesel PM) emission factors. The need to use off-model MSAT speciation with EMFAC 2011, rather than having the model directly produce MSAT emission factors, may also contribute to the differences. Figure 2 provides a comparison of emission factors produced by the models for benzene and diesel PM for the 2030 calendar year. In part because of these differences, the U.S. EPA has concluded that (71 FR 12498):

> "we continue to believe that appropriate tools and guidance are necessary to ensure credible and meaningful PM2.5 and PM10 hot-spot analyses. Before such analyses can be performed, technical limitations in applying existing motor vehicle emission factor models must be addressed, and proper federal guidance for using dispersion models for PM hotspot analysis must be issued. With the release of MOBILE6.2, state and local transportation agencies now have an approved model for estimating regional PM2.5 and PM10 emission factors in SIP [State Implementation Plan] inventories and regional emissions analyses for transportation conformity. However, MOBILE6.2 has significant limitations that make it unsatisfactory for use in microscale analysis of PM2.5 and PM10 emissions as necessary for quantitative hot-spot analysis."

The tools to predict how MSATs disperse are also limited. The U.S. EPA's current regulatory microscale line-source dispersion models, CALINE3 and CAL3QHC, and the CALINE4 model typically used in California, were developed and validated with emission rates from the MOBILE4 model more than a decade ago. Based on updated emission rates to MOBILE5, an extensive evaluation of the CAL3QHC model was conducted in an NCHRP study as part of the development of the HYROAD model. The study report documents poor model performance at ten sites across the country, 3 where intensive CO monitoring was conducted plus an additional 7 with less intensive monitoring. The report is available online from the U.S. EPA at www.epa.gov/scram001/dispersion_alt.htm#hyroad. They are commonly used for carbon monoxide (CO) modeling with fair results in the very near-field (within 100 meters or so from the roadway), and they can be used for PM dispersion modeling with some care. However, none of them were developed for use with reactive pollutants such as organic MSATs, and concerns have been raised regarding their performance in other venues such as studies leading to development of the HYROAD model (http://www.epa.gov/scram001/dispersion_alt.htm#hyroad). The primary alternative model, U.S. EPA's AERMOD, does not currently handle continuously-emitting line sources like roads (volume sources must be used to approximate the roadway), is much more cumbersome to use and sensitive to small changes in meteorological assumptions, and has not yet been shown to routinely perform as well as the conventional line-source models for receptors very close to a roadway (UC Davis, 2007).

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 a "safe" or "acceptable" level of risk due to emissions from a source, which is generally no greater than approximately 100 in a million. Additional factors are considered in the second step, the goal of which is to maximize the number of people with risks less than 1 in a million due to emissions from a source. The results of this statutory two-step process do not guarantee that cancer risks from exposure to air toxics are less than 1 in a million; in some cases, the residual risk determination could result in maximum individual cancer risks that are as high as approximately 100 in a million. In a June 2008 decision, the U.S. Court of Appeals for the District of Columbia Circuit upheld 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 safe or acceptable.

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

Due to the limitations cited, a discussion such as the example provided in this Appendix (reflecting any local and project-specific circumstances), should be included regarding incomplete or unavailable information in accordance with Council on Environmental Quality (CEQ) regulations [40 CFR 1502.22(b)]. The FHWA Headquarters and Resource Center staff Victoria Martinez (787) 766-5600 X231, Shari Schaftlein (202) 366-5570, and Michael Claggett (505) 820-2047, are available to provide guidance and technical assistance and support.

> Evaluating the environmental and health impacts from MSATs on a proposed highway project involves several key elements; chief among them is what constitutes an "acceptable level" of risk. Incremental risk levels from a new source which are projected to be less than 1 in 1 million are generally considered to be negligible, while incremental risk levels greater than 100 in 1 million are generally considered to be unacceptable. The U.S. Environmental Protection Agency (EPA) prevailed in a recent U.S. Court of Appeals for the District of Columbia decision (Natural Resources Defense Council v. Environmental Protection Agency, No. 07-1053, June 8, 2008) that its 2006 hazardous organic NESHAPs (National Emission Standards for Hazardous Air Pollutants) rule reduced emissions to levels that present "an acceptable level of risk and protect public health with an ample margin of safety" at risks less than 100 in 1 million. The U.S. EPA's benzene NESHAPs is also based on reducing risks to less than 100 in 1 million. Some State criteria may be more stringent; California, for instance, generally considers risks exceeding 10 in 1 million to be unacceptable in its air toxics-related permitting programs.

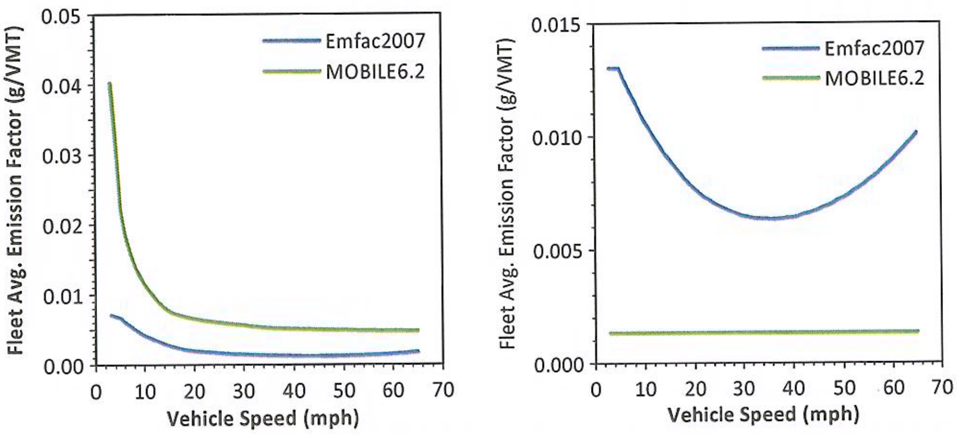


Figure 3. MOBILE6.2/Emfac2007 Comparison of Emissions (Calendar Year 2030)

The MOBILE6.2 limitations noted by the U.S. EPA also apply to diesel PM emission factors.

Exposure Levels and Health Effects. Once emission levels and concentrations of MSATs are predicted, exposure assessment and risk analysis are needed to determine project-specific health impacts. FHWA remains concerned that shortcomings in current techniques for this process preclude meaningful conclusions about project-specific health impacts. it is difficult to reliably forecast long-term concentrations of MSATs near roadways, in part because of significant variations in source strength (emissions) over time, and to determine the portion of time that people are actually exposed to those concentrations at a specific location. These difficulties are magnified for lifetime, 70-year risk assessments, particularly because unsupportable assumptions must be made regarding travel patterns and vehicle technology over that time frame. The assumption often made that there will be no improvements in vehicle technology and fleet emission rates from existing conditions is particularly difficult to support, given continuing vehicle emission control, fuel composition, and fleet emission improvement programs. 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, a concern expressed by the Health Effects Institute.

> "For example, consider the exposure-response relationship for alcoholic beverages. Alcoholic beverages are established causes of cancer in humans; about 3% of all cancers world-wide are thought to be caused by over-consumption of alcoholic beverages. There is a clear dose-response relationship for alcoholic beverages, with risk of cancer death increasing (essentially) linearly for exposures ranging from 2 drinks per day through 6-plus drinks per day. But there is neither evidence nor reason to suppose that, for example, one or a half a drink per day also increase people's risk of cancer death. Indeed, the exposure-response data, interestingly enough, show a "J-shaped" dose response relationship, such that people consuming 1 drink per day are significantly less likely to die of cancer than those who drink no alcoholic beverages. If one were to make the standard "regulatory style" assumption about low-level exposure to alcohol, one would both vastly overestimate the cancer risk, and also miss entirely what turns out to be a low-level protective effect. In such a case, it would hardly be "erring on the side of public health" to estimate that exposures that are orders of magnitude smaller than the 2 drinks-per-day cancer-effect-level put people at risk of cancer. This is not to say, of course, that very-low-level exposures to MSAT emissions prevent cancer; nor is it to assert that such exposures are demonstrably or obviously safe. It is only to point out that extrapolation beyond observable exposures and responses are at best an uncertain business and become increasingly uncertain the farther one strays from the empirical data."

Because of these shortcomings, the calculated difference in health impacts between alternatives is likely to be 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 project benefits, including reducing traffic congestion, 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. Numerous community-based studies also show a statistical association between long-term residence near heavily-used roads, especially those with heavy truck traffic, and adverse health effects including respiratory problems and cancer, though these types of studies generally cannot provide estimates of a dose-response relationship for specific pollutants.

Exposure to toxics has been a focus of a number of U.S. 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 illustrate the levels of various toxics when aggregated to a national or state level.

The U.S. EPA continues to assess the risks of various kinds of exposures to MSATs. The U.S. 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 (from the 2001 EPA regulation) was taken from the IRIS database Weight of Evidence Characterization summaries. This information is taken verbatim from the U.S. 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 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.

Some recent studies have reported that proximity to roadways is related to adverse health outcomes – particularly respiratory problems.[1] Many health studies use an epidemiological approach to relate the possibility of harm due to the proximity to the roadway. FHWA has concerns about reaching conclusions regarding health impacts from highway emissions based on proximity studies in areas known to exceed ambient air quality standards, such as the recent study by Dr. James Gauderman, et al., entitled "Effect of Exposure to Traffic on Lung development from 10 to 18 Years of Age: A Cohort Study". These studies do not measure specific pollutants but only roadway proximity, so any reported negative health impacts may be due to either the criteria pollutants or MSATs. Epidemiological studies suffer from the limitation that they cannot by their very nature establish causality. They may indicate statistical associations, but other confounding factors may be missed and may represent or contribute to the true cause of the impact. Furthermore, not all studies show a negative impact. For example, the "Long term Effects of Traffic-Related Air Pollution on Mortality", Beelen et al., only found weak associations between proximity to major roadways and health effects. This fact was also reported as a major shortcoming in health studies of this nature in, "Does Traffic-Related Air Pollution Contribute to Respiratory Disease Formation in Children", M. Jerritt, ERJ 2007, Vol. 29. In his review, Jerritt also points out another shortcoming in recent health studies dealing with determining the effect of proximity. He points out that most of these studies utilize a basic measure of distance to roadway as a proxy of exposure; however, because of the variable nature of particles and gaseous pollutants, the true variability of air pollutants within the neighborhood scale needs to be captured to identify the health effects of specific components of the air pollution mixture. Additionally, he states "exposures assigned on distance to traffic or traffic counts near the home are prone to . . . errors . . . and biased results".

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[1] South Coast Air Quality Management District, Multiple Air Toxic Exposure Study-II (2000); South Coast Air Quality Management District, Multiple Air Toxic Exposure Study-III (2007); 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.

Because analytical methodologies vary greatly between individual health studies, and all studies have limitations, it is not practical to draw definitive conclusions based solely on individual studies. Rather the total body of literature needs to be consulted before conclusions can be made. To that end, the Health Effects Institute 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 first study was completed and the findings published last year in Special Report 16 – Mobile-Source Air Toxics: A Critical Review of the Literature on Exposure and Health Effects, available online at www.healtheffect.org. For each of the MSATs reviewed, the analysis answers three questions:

1. To what extent are motor vehicles a significant source of exposure?
2. Does it affect human health?
3. Does it affect human health at environmental concentrations?

HEI concludes that exposure to many MSATs comes from sources other than vehicles and that mobile sources are the primary sources of exposure for only a few of the 21 MSATs listed by the U.S. EPA in its 2001 Rule. For many of the MSATs reviewed, HEI concluded that there is insufficient data for an assessment of ambient exposures on human health.

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

Given the uncertainties outlined above, a quantitative assessment of the effects of air toxic emissions impacts on human health at the project level may not be reliable. 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, precision of the current emissions models is limited when applied to smaller projects and relatively short segments of individual roads.) Therefore, the relevance of the unavailable or incomplete information is that it is not possible to make a determination, based on emissions or on an HRA at the current state of the practice, of whether any of the alternatives would have "significant adverse impacts on the human environment."

Caltrans under NEPA process delegation from FHWA has provided a quantitative analysis of MSAT emissions relative to the various alternatives, (or a qualitative assessment, as applicable) and has acknowledged that (some, all, or identify by alternative) the project alternatives may result in increased exposure to MSAT emissions in certain locations. However, the pollutant concentrations and duration of exposures are uncertain, and because of this uncertainty the health effects from these emissions cannot be reliably estimated.

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

Table 4. Summary of Project Mobile Source Air Toxics in Grams Per Year

Year	AADT	Benzene	Acrolein	Acetal-dehyde	Formal-dehyde	Butadiene	Napthalene	POM	Diesel PM	DEOG
2006 (before slide)	1150	22	0.9	5.7	17.7	4.1	1.8	0.3	11.9	31.1
2012 No Build	1800	16.2	0.7	7.2	19.1	3	2.2	0.4	17	71.1
2012 Build	1800	9.8	0.4	3.6	9.8	1.6	1.9	0.3	9.2	35.3
2029 No Build	2600	49.7	4.8	0.2	3.1	7.4	0.7	0.4	5.6	38.6
2029 Build	2600	2.8	<0.1	0.8	2.3	0.4	0.5	<0.1	1.6	8.3

Source: Caltrans Central Region Environmental Engineering

Mobile Source Air Toxics Conclusion

For each alternative in this EIR/EIS, the amount of MSATs emitted would be proportional to the vehicle miles traveled, or VMT, assuming that other variables such as fleet mix are the same for each alternative. The VMT estimated for each of the Build Alternatives is the same as for the No Build Alternative. The VMT is obtained by multiplying the Annual Average Daily Traffic by the project length in miles. According to the ARB's EMFAC 2011 emissions model, emissions of all of the priority MSATs decrease as speed increases, up to about 50 mph. 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 as applied to projects with small amounts of VMT or small VMT differences between alternatives.

The estimated VMT under each of the Alternatives is 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 and ARB's state control programs that are projected to reduce MSAT emissions by 65 to 80 percent between 2005 and 2040. 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 unless VMT more than doubles by 2040.

In summary, the Environmental Protection Agency projections indicate a continuing downward trend of the six primary mobile source air toxics. As discussed above, the study of mobile source air toxics, dose-response effects, and modeling tools are currently in a state where accurate information is incomplete or unavailable. This is relevant to making an accurate prediction of any reasonably foreseeable adverse effects on the human environment. There is currently no specific significance level for receptor exposure. Without a significance level for exposure, one cannot accurately and scientifically predict the effects on the human environment. Studies are currently being conducted to clarify some of these unknowns; however, the information is not available now.

Short-Term Construction Impacts

Construction activity may generate a temporary increase in mobile source air toxics emissions. Project-level assessments that render a decision to pursue construction emission mitigation would benefit from a number of technologies and operational practices that should help lower short-term mobile source air toxics. In addition, SAFETEA-LU has emphasized a host of diesel retrofit technologies in the law's Congestion Mitigation and Air Quality Improvement Program

(CMAQ) provisions—technologies that are designed to lessen a number of mobile source air toxics.

Construction mitigation includes strategies that reduce engine activity or reduce emissions per unit of operating time. Operational agreements that reduce or redirect work or shift times to avoid community exposures can have positive benefits when sites are near vulnerable populations. For example, agreements that stress work activity outside normal hours of an adjacent school campus would be operations-oriented mitigation. Also on the construction emissions front, technological adjustments to equipment, such as off-road dump trucks and bulldozers, could be appropriate strategies. These technological fixes could include particulate matter traps, oxidation catalysts, and other devices that provide an after-treatment of exhaust emissions. The use of clean fuels, such as ultra-low sulfur diesel, also can be a very cost-beneficial strategy.

The Environmental Protection Agency has listed a number of approved diesel retrofit technologies; many of these can be deployed as emissions mitigation measures for equipment used in construction.

During construction, the proposed project would generate air pollutants. The exhaust from construction equipment contains hydrocarbons, oxides of nitrogen, carbon monoxide, suspended particulate matter, and odors. However, the largest percentage of pollutants would be windblown dust generated during excavation, grading, hauling, and various other activities. The impacts of these activities would vary each day as construction progresses. Dust and odors at some residences very close to the right-of-way could probably cause occasional annoyance and complaints.

The project would be subject to a Dust Control Permit from the Mariposa County Air Pollution Control District's rules, ordinances, and regulations. Following the District's Regulation VIII requirements and the Caltrans Non-Standard Special Provisions for Dust should minimize the effect of dust during construction. Mariposa County is not among the counties listed as containing serpentine and ultramafic rock.

The contractor is responsible for complying with the Rules and Regulations of the Air Pollution Control District if structures that may contain asbestos require demolition.

Avoidance, Minimization, and/or Mitigation Measures

This project will include paved shoulders, which will reduce PM10 emissions from re-entrained road dust

This project will be subject to the Mariposa County Air Pollution Control District's rules, ordinances, and regulations. Mitigation options include using a construction fleet that is "cleaner that the California state average" and/or in the form of fees paid to the District. The contractor will be responsible for the Indirect Source Review Air Impact Analysis and any applicable fees.

Caltrans Standard Specifications pertaining to dust control and dust palliative requirement is a required part of all construction contracts and should effectively reduce and control emission impacts during construction. The provisions of Caltrans Standard Specifications, Section 14-9.02 "Air Pollution Control" and Section 14-9.03 " Dust Control" require the contractor to comply with the applicable Air Pollution Control District's rules, ordinances, and regulations.

Appendix A

Conformity Exemption From EPA

Dwivedi, Rajeev L@DOT

From:	OConnor, Karina [OConnor.Karina@epa.gov]
Sent:	Wednesday, April 10, 2013 12:09 PM
To:	Goewert, Terry@DOT
Cc:	Romero, Ken J@DOT; Dwivedi, Rajeev L@DOT; Farris, David D@DOT
Subject:	RE: Answer to Karina Request for Air Conformity exemption for MPA 140 Ferguson Slide Permanent Restoration Project
Attachments:	image001.jpg

Thanks for the additional information. EPA concurs that the Table 3 exemption "Changes in Vertical and horizontal alignment" applies to the Ferguson Slide project, therefore the project is exempt from regional emission analysis.

thanks, Karina

Karina OConnor
EPA, Region 9
Air Planning Office (AIR-2)
(775) 434-8176
oconnor.karina@epa.gov

From: Goewert, Terry@DOT [terry.goewert@dot.ca.gov]
Sent: Wednesday, April 10, 2013 8:40 AM
To: OConnor, Karina
Cc: Romero, Ken J@DOT; Dwivedi, Rajeev L@DOT; Farris, David D@DOT
Subject: Answer to Karina Request for Air Conformity exemption for MPA 140 Ferguson Slide Permanent Restoration Project

Karina
Sorry, the correct one is "Changes in Vertical and Horizontal Alignment"

Thanks, Terry

Terry - I'm not clear on which exemption on Table 3 (projects exempt from Regional Emissions Analysis) you are asking for our concurence on. I don't see one called "relocation". The available exemptions are listed below. Could you be more specific?

thanks, Karina

93.127 - Table 3 - Transportation Conformity rule

Intersection channelization projects.
Intersection signalization projects at individual intersections.
Interchange reconfiguration projects.
Changes in vertical and horizontal alignment.
Truck size and weight inspection stations.
Bus terminals and transfer points.

Terry Goewert
Air Quality Specialist-Associate Environmental Planner
Central Region Environmental Engineering
559.445.6426 phone-----fax: 559.445.6236
Address: 855 M Street, Suite 200, Fresno, CA 93721

Dwivedi, Rajeev L@DOT

From: Goewert, Terry@DOT
Sent: Monday, April 15, 2013 10:19 AM
To: Farris, David D@DOT; Dwivedi, Rajeev L@DOT
Subject: FW: Request for Air Conformity exemption for MPA 140 Ferguson Slide Permanent Restoration Project

For your records..concurrence from Mariposa County

From: Peter Rei [mailto:prei@mariposacounty.org]
Sent: Monday, April 15, 2013 8:55 AM
To: Goewert, Terry@DOT
Subject: RE: Request for Air Conformity exemption for MPA 140 Ferguson Slide Permanent Restoration Project

Terry:

Do you need a formal letter or is an email response sufficient?

Mariposa County is entirely in favor of the repair of the Ferguson Slide Project. We concur that there is no Air Quality Conformity issue that we are aware of and would encourage Caltrans to continue with the design process leading to the re-building of Highway 140 around/through the slide as expediently as possible.

Thank you for the opportunity to comment.
Peter Rei
Executive Director, Mariposa County Local Transportation Commission

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From: Goewert, Terry@DOT [mailto:terry.goewert@dot.ca.gov]
Sent: Friday, April 12, 2013 8:59 AM
To: Peter Rei
Subject: RE: Request for Air Conformity exemption for MPA 140 Ferguson Slide Permanent Restoration Project

Staff level approval is sufficient.

We received concurrence yesterday from Karina at EPA. I can copy you on her message if you wish.

Thank you.Terry Goewert

From: Peter Rei [mailto:prei@mariposacounty.org]
Sent: Thursday, April 11, 2013 4:57 PM
To: Goewert, Terry@DOT
Cc: bcarrier@mariposacounty.org
Subject: RE: Request for Air Conformity exemption for MPA 140 Ferguson Slide Permanent Restoration Project

Mr. Goewert:

What level of approval does Caltrans need from Mariposa County? Do you need a Resolution of Support for this from our Board or is a staff level approval sufficient? I will follow-up with the appropriate response once I know which path I need to take to get you the support you need.

Thanks for your help.

Pete Rei
Director of Public Works/Executive Director of Mariposa County Local Transportation Commission

From: Goewert, Terry T@DOT [mailto:terry.goewert@dot.ca.gov]
Sent: Thursday, March 28, 2013 9:28 AM
To: Peter Rei; DGROSSI@co.tuolumne.ca.us; airpollution@tuolumnecounty.ca.go
Subject: Request for Air Conformity exemption for MPA 140 Ferguson Slide Permanent Restoration Project

Hello,

Caltrans is sending this email is to request an Interagency Consultation via email to concur that this project *is* exempt from a project level conformity analysis. Caltrans believes that the permanent restoration project should be exempt from conformity under 40 CFR 93.126 Table 3 (*Changes in vertical/horizontal alignment*) relocation exemption (same road capacity/character as before but on a locally different alignment). The Table 3 exemption in this case is effectively a full exemption because the area is unclassifiable/attainment for all hot-spot-related pollutants.

Concurrence from EPA, FHWA and the Mariposa County and Tuolumne County APCD is requested.

There was a large landslide in the Merced River canyon below El Portal (route into Yosemite) several years ago that blocked the highway and partially blocked the river. Local commutes can be detoured up to 2.5 hours longer than normal, which affected emergency response times and school and work commutes. Tourism revenue, a main source of income to Mariposa, was decreased by the long wait time at the slide site.

A temporary bypass is currently in place using an old (pre-1940s) railroad roadbed across the river, with a one-lane (controlled 1-way traffic) road with limited-capacity bridges. The detour is unable to handle large vehicles which causes out-of-direction travel by supply trucks and larger buses/RVs that have had to get to Yosemite by other routes (Modesto-Rte 120 and Fresno-Rte 41). See: http://goo.gl/maps/L52hJ

Numerous alternatives have been studied to fix the problem, which include a couple of tunnel alternatives that would go under or behind the slide. All have the common feature that they restore the road to its previous condition - 2 lane conventional highway, with some localized deviation from its original route to deal with continuing activity of the slide.

The environmental studies are at the EIR/EIS level. This is mainly because of the scale of the work , a tunnel alternative would involve pretty heavy construction, though not lasting more than 5 years. Other than modest reduction of out-of-direction travel currently happening due to the detour, this project will not affect traffic volumes in any significant way, and would result in a small emission reduction because traffic would no longer back up at the signals controlling one-way traffic on the detour. Even before the slide, AADT on this road was way below any conformity hot spot criteria. See table below for traffic numbers.

Table of Annual Average Daily Traffic

Year	AADT Build	No Build	Truck %
2006 (before slide)		1,150	7
2012	1,800	1,800	7
2029	2,000	2,000	7
2039	2,600	2,600	7

Source: Caltrans District 10 Office of Traffic Forecasting, Caltrans Traffic Ops website 2011 Truck AADTs.

Once we have received concurrence and addressed all comments from the Interagency Group we will finalize our findings in the Air Quality Study.

Mariposa County is federal ozone (1997 and 2008 standards) nonattainment located in a rural area. In urban areas where there is a Regional Transportation District, Ozone conformity would be addressed as part of the regional conformity analysis. Ozone is typically not analyzed in a project level manner because it is a regional pollutant.

Please respond to all by 5:00 PM on Wednesday April 10, 2013. An Interagency Conference Call be scheduled upon request.

Please contact me with any questions.

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California Environmental Protection Agency
Air Resources Board

Top 4 Summary: Highest 4 Daily 24-Hour PM10 Averages

iADAM

at Yosemite Village-Visitor Center

	2009		2010		2011	
	Date	24-Hr Average	Date	24-Hr Average	Date	24-Hr Average
National:						
First High:	Feb 3	90.2	Feb 13	80.9	Feb 14	58.5
Second High:	Jan 31	74.7	Mar 21	58.7	Aug 25	53.2
Third High:	Oct 10	67.6	Jan 2	48.1	Jan 27	50.6
Fourth High:	Aug 29	53.7	Sep 24	47.2	Feb 9	43.2
California:						
First High:	Feb 3	82.2	Feb 13	74.3	Feb 14	54.3
Second High:	Jan 31	68.7	Mar 21	53.5	Jan 27	46.4
Third High:	Oct 10	60.8	Jan 2	44.5	Aug 25	46.2
Fourth High:	Aug 29	46.4	Jan 14	42.9	Feb 9	40.2
National:						
Estimated # Days > 24-Hour Std:		0.0		0.0		0.0
Measured # Days > 24-Hour Std:		0		0		0
3-Yr Avg Est # Days > 24-Hr Std:		*		*		0.0
Annual Average:		*25.4*		*22.8*		*22.6*
3-Year Average:		*24*		*24*		*24*
California:						
Estimated # Days > 24-Hour Std:		18.5		12.0		*
Measured # Days > 24-Hour Std:		3		2		1
Annual Average:		23.6		20.3		*
3-Year Maximum Annual Average:		24		24		24
Year Coverage:		98		97		90

Notes:

Daily PM10 averages and related statistics are available at Yosemite Village-Visitor Center between 1989 and 2011. Some years in this range may not be represented.

All averages expressed in micrograms per cubic meter.

The national annual average PM10 standard was revoked in December 2006 and is no longer in effect. Statistics related to the revoked standard are shown in *italics* or *italics* .

An exceedance of a standard is not necessarily related to a violation of the standard.

All values listed above represent midnight-to-midnight 24-hour averages and may be related to an exceptional event.

State and national statistics may differ for the following reasons:

State statistics are based on California approved samplers, whereas national statistics are based on samplers using federal reference or equivalent methods. State and national statistics may therefore be based on different samplers.

California Environmental Protection Agency
Air Resources Board

Top 4 Summary: Highest 4 Daily 24-Hour PM2.5 Averages

iADAM

at Yosemite Village-Visitor Center

	2009		2010		2011	
	Date	24-Hr Average	Date	24-Hr Average	Date	24-Hr Average
National:						
First High:		*		*		*
Second High:		*		*		*
Third High:		*		*		*
Fourth High:		*		*		*
California:						
First High:	Aug 28	47.2	Oct 10	61.0	Oct 8	38.7
Second High:	Sep 3	43.0	Nov 26	37.9	Nov 24	28.7
Third High:	Jul 4	38.8	Oct 9	33.8	Aug 23	28.6
Fourth High:	Jul 5	38.4	Apr 7	27.2	Aug 27	28.6
National:						
Estimated # Days > 24-Hour Std:		*		*		*
Measured # Days > 24-Hour Std:		*		*		*
24-Hour Standard Design Value:		*		*		*
24-Hour Standard 98th Percentile:		*		*		*
Annual Standard Design Value:		*		*		*
Annual Average:		*		*		*
California:						
Annual Std Designation Value:		14		*		9
Annual Average:		*		*		8.9
Year Coverage:		*		*		*

Notes:
Daily PM2.5 averages and related statistics are available at Yosemite Village-Visitor Center between 2002 and 2011. Some years in this range may not be represented.
All averages expressed in micrograms per cubic meter.
An exceedance of a standard is not necessarily related to a violation of the standard.
State statistics are based on California approved samplers, whereas national statistics are based on samplers using federal reference or equivalent methods. State and national statistics may therefore be based on different samplers.
Year Coverage indicates the extent to which available monitoring data represent the time of the year when concentrations are expected to be highest. 0 means that data represent none of the high period; 100 means that data represent the entire high period. A high Year Coverage does not mean that there was sufficient data for annual statistics to be considered valid.
* means there was insufficient data available to determine the value.

Available Pollutants:

Top 4 Summary: Highest 4 Daily Maximum 8-Hour Ozone Averages

iADAM

at Yosemite Natl Park-Turtleback Dome

	2009		2010		2011	
	Date	8-Hr Average	Date	8-Hr Average	Date	8-Hr Average
National:						
First High:	Aug 19	0.086	Sep 3	0.085	Sep 3	0.083
Second High:	Aug 20	0.083	Sep 30	0.080	Aug 31	0.079
Third High:	Aug 25	0.079	Sep 29	0.079	Sep 2	0.079
Fourth High:	Aug 11	0.078	Jul 21	0.077	Jun 22	0.078
California:						
First High:	Aug 19	0.086	Sep 3	0.085	Sep 3	0.084
Second High:	Aug 20	0.083	Sep 30	0.081	Aug 31	0.080
Third High:	Aug 25	0.079	Sep 29	0.079	Sep 2	0.079
Fourth High:	Sep 22	0.079	Jul 21	0.077	Jun 22	0.078
National:						
# Days Above the Standard:		8		5		7
Nat'l Standard Design Value:		0.086		0.083		0.077
National Year Coverage:		96		98		97
California:						
# Days Above the Standard:		26		23		23
California Designation Value:		0.098		0.094		0.085
Expected Peak Day Concentration:		0.099		0.095		0.085
California Year Coverage:		95		98		97

Notes:

Eight-hour ozone averages and related statistics are available at Yosemite Natl Park-Turtleback Dome between 1990 and 2011. Some years in this range may not be represented.

All averages expressed in parts per million.

An exceedance of a standard is not necessarily related to a violation of the standard.

Year Coverage indicates the extent to which available monitoring data represent the time of the year when concentrations are expected to be highest. 0 means that data represent none of the high period; 100 means that data represent the entire high period. A high Year Coverage does not mean that there was sufficient data for annual statistics to be considered valid.

* means there was insufficient data available to determine the value.

Available Pollutants:

8-Hour Ozone | Hourly Ozone | PM2.5 | PM10 | Carbon Monoxide | Nitrogen Dioxide | State Sulfur Dioxide | Hydrogen Sulfide