Please adjust your screen reader settings to recognize underline and strikethrough text.

## Air Quality

This section describes existing air quality conditions within the treatable landscape and identifies regulations applicable to the types of emissions-generating activities that could occur in the CalVTP. It presents an analysis of potential air quality impacts associated with implementation of the CalVTP and describes feasible mitigation measures to reduce potentially significant impacts to air quality.

Comments on the Notice of Preparation related to air quality included concerns about cumulative impacts to air quality and smoke impacts from prescribed burning (see Appendix A). These topics are addressed in Section 3.4.3, “Environmental Impacts and Mitigation Measures.” Cumulative air quality impacts are addressed in Impacts AQ-1 and AQ-2; and smoke impacts from prescribed burning are addressed in Impacts AQ-2 and AQ-3.

### Regulatory Setting

Air quality in California, including within the treatable landscape, is regulated by federal, state, regional, and local government agencies. These agencies work to improve air quality through legislation, planning, policy-making, education, and a variety of programs. The regulations of the agencies responsible for improving air quality in the treatable landscape are discussed below.

#### Federal

##### Clean Air Act

The U.S. Environmental Protection Agency (EPA) is responsible implementing national air quality programs. EPA’s air quality mandates draw primarily from the federal Clean Air Act (CAA), which was enacted in 1970, and the major amendments made by Congress in 1990. EPA’s air quality efforts address both criteria air pollutants and hazardous air pollutants (HAPs). EPA regulations concerning criteria air pollutants and HAPs are presented in greater detail below. The CAA is applicable to the CalVTP, because treatment activities have the potential to generate criteria air pollutant and HAP emissions through use of off-road equipment, machine-powered hand tools, helicopters, vehicles for worker commute, trucks for materials delivery and hauling, and prescribed burning.

###### Criteria Air Pollutants

The CAA required EPA to establish national ambient air quality standards (NAAQS) for six common air pollutants found all over the U.S., referred to as criteria air pollutants. EPA has established primary and secondary NAAQS for the following criteria air pollutants: ozone, carbon monoxide (CO), nitrogen dioxide (NO2), sulfur dioxide (SO2), respirable particulate matter with aerodynamic diameter of 10 micrometers or less (PM10) and fine particulate matter with aerodynamic diameter of 2.5 micrometers or less (PM2.5), and lead. Criteria air pollutants (or precursors) would be generated by treatment activity implemented under the CalVTP. The NAAQS are shown in Table 3.4-1. The primary standards protect public health and the secondary standards protect public welfare. The CAA also required each state to prepare a State Implementation Plan (SIP) for attaining and maintaining the NAAQS. The federal Clean Air Act Amendments (CAAA) of 1990 added requirements for states with nonattainment areas to revise their SIPs to incorporate additional control measures to reduce air pollution. California’s SIP is modified periodically to reflect the latest emissions inventories, planning documents, and rules and regulations of the air basins as reported by their jurisdictional agencies. The map in Figure 3.4-1 shows the locations of air basins in California. EPA is responsible for reviewing all SIPs to determine whether they conform to the mandates of the CAA and its amendments, and whether implementation will achieve air quality goals. If EPA determines a SIP to be inadequate, EPA may prepare a federal implementation plan that imposes additional control measures. If an approvable SIP is not submitted or implemented within the mandated time frame, sanctions may be applied to transportation funding and stationary air pollution sources in the air basin.

Table 3.4-1 National and California Ambient Air Quality Standards

| Pollutant | Averaging Time | California (CAAQS) a, b | National (NAAQS)c Primary b,d | National (NAAQS)c Secondary b,e |
| --- | --- | --- | --- | --- |
| Ozone | 1-hour | 0.09 ppm (180 μg/m3) | –e | Same as primary standard |
|  | 8-hour | 0.070 ppm (137 μg/m3) | 0.070 ppm (147 μg/m3) |  |
| Carbon monoxide (CO) | 1-hour | 20 ppm (23 mg/m3) | 35 ppm (40 mg/m3) | Same as primary standard |
|  | 8-hour | 9 ppmf (10 mg/m3) | 9 ppm (10 mg/m3) |  |
| Nitrogen dioxide (NO2)  | Annual arithmetic mean | 0.030 ppm (57 μg/m3) | 53 ppb (100 μg/m3) | Same as primary standard |
|  | 1-hour | 0.18 ppm (339 μg/m3) | 100 ppb (188 μg/m3) | — |
|  | 24-hour | 0.04 ppm (105 μg/m3) | — | — |
| Sulfur dioxide (SO2) | 3-hour | — | — | 0.5 ppm (1300 μg/m3) |
|  | 1-hour | 0.25 ppm (655 μg/m3) | 75 ppb (196 μg/m3) | — |
| Respirable particulate matter (PM10) | Annual arithmetic mean | 20 μg/m3 | — | Same as primary standard |
|  | 24-hour | 50 μg/m3 | 150 μg/m3 |  |
| Fine particulate matter (PM2.5) | Annual arithmetic mean | 12 μg/m3 | 12.0 μg/m3 | 15.0 μg/m3 |
|  | 24-hour | — | 35 μg/m3 | Same as primary standard |
|  | Calendar quarter | — | 1.5 μg/m3 | Same as primary standard |
| Lead f | 30-Day average | 1.5 μg/m3 | — | — |
|  | Rolling 3-Month Average | – | 0.15 μg/m3 | Same as primary standard |
| Hydrogen sulfide | 1-hour | 0.03 ppm (42 μg/m3) |  |
| Sulfates | 24-hour | 25 μg/m3 | No |
| Vinyl chloride f | 24-hour | 0.01 ppm (26 μg/m3) | national |
| Visibility-reducing particulate matter | 8-hour | Extinction of 0.23 per km | standards |

Notes: CAAQS = California ambient air quality standards; NAAQS = national ambient air quality standards; µg/m3 = micrograms per cubic meter; km = kilometers; ppb = parts per billion; ppm = parts per million.

a California standards for ozone, carbon monoxide, SO2 (1- and 24-hour), NO2, particulate matter, 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.

b Concentration expressed first in units in which it was promulgated. Equivalent units given in parentheses are based on a reference temperature of 25 degrees Celsius (°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.

c National standards (other than ozone, particulate matter, and those based on annual averages or annual arithmetic means) are not to be exceeded more than once a year. The ozone standard is attained when the fourth highest 8-hour concentration in a year, averaged over three years, is equal to or less than the standard. The PM10 24-hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 μg/m3 is equal to or less than one. The PM2.5 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 the U.S. Environmental Protection Agency for further clarification and current federal policies.

d National primary standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health.

e National secondary standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

f The California Air Resources Board has identified lead and vinyl chloride as toxic air contaminants with no threshold 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.

Source: CARB 2016a



Source: Data downloaded from CARB in 2018

Figure 3.4-1 California Air Basins, Air Districts, and the CalVTP Treatable Landscape

###### Toxic Air Contaminants and Hazardous Air Pollutants

Toxic air contaminants (TACs), or in federal parlance, hazardous air pollutants (HAPs), are a defined set of airborne pollutants that may pose a present or potential hazard to human health. TACs would be generated by treatment activities implemented under the CalVTP. A TAC is defined as an air pollutant that may cause or contribute to an increase in mortality or in serious illness, or that may pose a hazard to human health. TACs are usually present in minute quantities in the ambient air; however, their high toxicity or health risk may pose a threat to public health even at low concentrations.

A wide range of sources, from industrial plants to motor vehicles, emit TACs. The health effects associated with TACs are quite diverse and generally are assessed locally, rather than regionally. TACs can cause long-term health effects such as cancer, birth defects, neurological damage, asthma, bronchitis, or genetic damage; or short-term acute health effects such as eye watering, respiratory irritation (a cough), running nose, throat pain, and headaches.

For evaluation purposes, TACs are separated into carcinogens and non-carcinogens based on the nature of the physiological effects associated with exposure to the pollutant. Carcinogens are assumed to have no safe threshold below which health impacts would not occur. This contrasts with criteria air pollutants for which acceptable levels of exposure can be determined and for which the ambient standards have been established (Table 3.4-1). Cancer risk from TACs is expressed as excess cancer cases per one million exposed individuals, typically over a lifetime of exposure.

EPA regulates HAPs through its National Emission Standards for Hazardous Air Pollutants. The standards for a particular source category require the maximum degree of emission reduction that the EPA determines to be achievable, which is known as the Maximum Achievable Control Technology standards. These standards are authorized by Section 112 of the [CAA](https://en.wikipedia.org/wiki/Clean_Air_Act_%281970%29) and the regulations are published in 40 [Code of Federal Regulations (CFR](https://en.wikipedia.org/wiki/Code_of_Federal_Regulations%22%20%5Co%20%22Code%20of%20Federal%20Regulations)) Parts 61 and 63.

##### Federal Advisory Committee Act

Established through a charter, the purpose of the Federal Advisory Committee Act (FACA) Wildland Fire Issues Group was to provide EPA recommendations for revising its policies for implementing the current NAAQS for PM10 and any new NAAQS for PM2.5, with respect to prescribed burns and their impact. Although the Charter for the FACA for Ozone, Particulate Matter, and Regional Haze has expired, the findings of the Wildland Fire Issues Group pertain to prescribed burn in relation to air quality. Most importantly, the *Interim Air Quality Policy on Wildland and Prescribed Burns* was produced by the group and is the national standard when local guidelines have not been established. The document outlines the following: Smoke Management Programs; who is accountable when a prescribed burn results in exceedances of the NAAQS; and overall objectives for prescribed burns in relation to air quality (EPA 1998). Treatment activities implemented under the CalVTP would include prescribed burns. Although local guidelines have been established and are discussed below, the *Interim Air Quality Policy on Wildland and Prescribed Burns* is included to provide context on how prescribed burns are regulated at the federal level.

##### Prescribed Burn Smoke Management Guide

The National Wildfire Coordinating Group was originally chartered by the U.S. Secretaries of the Interior and Agriculture in 1976. In 2001, NWCG’s Fire Use Working Team sponsored the creation of the *Smoke Management Guide for Prescribed and Wildland Fire* (NWCG 2018). The guide outlines why fire is important to the ecosystem, regulations that impact smoke management, best management practices for reducing emissions during prescribed burn, and ways to monitor air quality during prescribed burns. The EPA advises that this guide be consulted when calculating emissions for prescribed burn. Treatment activities implemented under the CalVTP would include prescribed burns; thus, the NWCG’s *Smoke Management Guide for Prescribed and Wildland Fire* was consulted for emissions calculations, as detailed in Appendix AQ-1.

#### State

##### California Clean Air Act

The Mulford-Carrell Air Resources Act of 1968 created the California Air Resources Board (CARB) and required it to adopt statewide air quality standards, which are referred to as the California Ambient Air Quality Standards (CAAQS). CARB is the agency responsible for coordination and oversight of state and local air pollution control programs in California and for implementing the California Clean Air Act (CCAA). The CCAA, which was adopted in 1988, required local air districts to develop and implement plans to achieve the CAAQS. The CAAQS are presented with the NAAQS in Table 3.4-1.

As shown in Table 3.4-1, CARB has established CAAQS for sulfates, hydrogen sulfide, vinyl chloride, visibility-reducing particulate matter, and the above-mentioned criteria air pollutants. For most criteria air pollutants, the CAAQS are more stringent than the NAAQS. Differences in the standards are generally explained by the health effects studies considered during the standard-setting process and the interpretation of the studies. In addition, the CAAQS incorporate a margin of safety to protect sensitive individuals.

The CCAA requires that all local air districts in the state endeavor to attain and maintain the CAAQS by the earliest date practical. The CCAA specifies that local air districts should focus attention on reducing the emissions from transportation and area-wide emission sources. The CCCA also provides air districts with the authority to regulate indirect sources. The CCAA and CAAQS are applicable to the CalVTP, because treatment activities would generate criteria air pollutants and precursors that could affect the attainment status of air basins. The map in Figure 3.4-1 show the locations of air districts in California, as well as air basins, and the treatable landscape.

##### Tanner Air Toxics Act of 1983 and Air Toxics Hot Spots Information and Assessment Act of 1987

TACs in California are regulated primarily through the Tanner Air Toxics Act (Assembly Bill [AB] 1807, Chapter 1047, Statutes of 1983) and the Air Toxics Hot Spots Information and Assessment Act of 1987 (AB 2588, Chapter 1252, Statutes of 1987). TACs would be generated by treatment activities conducted under the CalVTP. The Tanner Air Toxics Act sets forth a formal procedure for CARB to designate substances as TACs. Research, public participation, and scientific peer review are required before CARB can designate a substance as a TAC. CARB has adopted all EPA-identified HAPs as TACs and identified 21 additional substances as TACs, including particulate matter exhaust from diesel engines (diesel PM) (CARB 2011a).

After a TAC is identified, CARB then adopts an airborne toxics control measure for sources that emit that particular TAC. If a safe threshold exists for a substance at which there is no toxic effect, the control measure must reduce exposure below that threshold. If no safe threshold exists, the measure must incorporate best available control technology for toxics to minimize emissions.

The Hot Spots Act requires that existing facilities that emit toxic substances above a specified level prepare an inventory of toxic emissions, prepare a risk assessment if emissions are significant, notify the public of significant risk levels, and prepare and implement risk reduction measures.

CARB has adopted diesel exhaust control measures and more stringent emissions standards for various transportation-related mobile sources of emissions, including off-road diesel equipment (e.g., tractors, generators). Over time, the replacement of older vehicles and equipment will result in a vehicle and equipment fleet that produces substantially lower levels of TACs than under current conditions. Mobile-source emissions of TACs (e.g., benzene, 1-3-butadiene, diesel PM) have been reduced significantly over the last decade and will be reduced further in California through a progression of regulatory measures (e.g., Low Emission Vehicle/Clean Fuels and Phase II reformulated gasoline regulations) and control technologies. With implementation of CARB’s Risk Reduction Plan, it is expected that diesel PM concentrations will be 85 percent less in 2020 than they were in 2000 (CARB 2000). Adopted regulations are also expected to continue to reduce formaldehyde emissions emitted by cars and light-duty trucks. As emissions are reduced, it is expected that risks associated with exposure to the emissions will also be reduced. CARB diesel exhaust control measures and mobile-source emission reduction regulatory measures are applicable to the CalVTP because treatment activities include the use of diesel-powered equipment and would result in mobile-source emissions of TACs.

##### California Code of Regulations Title 17

Title 17 of the California Code of Regulations (CCR) addresses public health issues. Division 3 of Title 17 specifically addresses issues related to air resources. Topics most relevant to treatment activities conducted under the CalVTP would include: Air Basins and Air Quality Standards (Subchapter 1.5), Smoke Management Guidelines for Agricultural and Prescribed Burning (Subchapter 2), Toxic Air Contaminants (Subchapter 7), and Asbestos (Subchapter 7.5). These topics are relevant because treatment activities could result in criteria air pollutant and TAC emissions that affect air quality and health, include prescribed burning, and could occur in areas where naturally-occurring asbestos (NOA) is present.

CARB oversees California’s Smoke Management Program, which addresses potentially harmful smoke impacts from agricultural, forest, and rangeland management burning operations. The legal basis of the program is found in 17 CCR Section 80100 et. seq., *Smoke Management Guidelines for Agricultural and Prescribed Burning,* adopted by CARB in 2000 (CARB 2011b). Under these guidelines, air districts implement a daily burn authorization system under which they specify the amount, timing, and location of burns for the purposes of minimizing smoke impacts on sensitive areas, avoiding cumulative smoke impacts, and preventing public nuisances from occurring. Through the burn authorization system, air districts authorize no more burning on a daily basis than is appropriate considering meteorological and air quality conditions (CARB 2000).

Adoption of the amendments to the Smoke Management Guidelines for Agricultural and Prescribed Burning by CARB in 2000 triggered a CEQA analysis. CARB concluded that adoption of these guidelines would not cause significant adverse environmental impacts. CARB further concluded, in regard to air quality impacts, that compliance with the guidelines should result in reduced smoke impacts, improved air quality, and progress towards achievement of CAA and CCAA requirements, and also posited that potential benefits from the program may accrue from a reduction in risk of wildland fires due to increased prescribed burning activities (CARB 2000).

##### Prescribed Fire Incident Reporting System

The Prescribed Fire Incident Reporting System (PFIRS) was developed in response to Title 17 of the CCR and serves as an interface between air quality regulators, land management agencies and individuals that conduct prescribed burning in California. The system facilitates communications by providing access to a database containing information on burn planning, burn approvals and emissions information. PFIRS enables individuals involved in prescribed burning the ability to view this information on a statewide level. The majority of air districts in the state use PFIRS. CARB is working to enroll more air districts in the use of PFIRS. CAL FIRE is providing information to PFIRS for all prescribed burns.

##### Senate Bill 1260, Statutes of 2018

SB 1260 was adopted in September 2018 in response to the devastating California wildfires, and seeks to address wildfire prevention by increasing the use of prescribed burning as a vegetation treatment tool. SB 1260 directs CAL FIRE to work cooperatively with nonprofits and others on planning and implementing prescribed burning on federally and privately-owned property in the state. Additionally, the bill establishes training standards for personnel authorized to conduct prescribed burns and clarifies liability for landowners operating under a CAL FIRE permit. The bill also mandates that CAL FIRE and CARB, in coordination with local air pollution control and air quality management districts, develop a program to enhance air quality and smoke monitoring and to provide a public awareness campaign regarding prescribed burns. In response, CARB and CAL FIRE have established a joint monitoring program that couples air quality measurements taken near prescribed burns with on-site measurements of short-and long-term effects on fire hazard and ecological characteristics. Additionally, SB 1260 specifically identifies this PEIR, when certified, to serve as the programmatic environmental document for prescribed burns initiated by a third party.

##### 2016 Mobile Source Strategy

CARB adopts mobile source strategies as part of each SIP submitted to the EPA, as required by the CAA. On May 16, 2016, CARB released the updated *Mobile Source Strategy*, which addresses exhaust emissions from on-road light-duty and heavy-duty vehicles, off-road federal and international sources (i.e., aircraft, locomotives, and ocean-going vessels), and off-road equipment. The strategy is pertinent to the types of on-road vehicles and off-road equipment that would be used in treatment activity conducted under the CalVTP. The strategy demonstrates how the state can simultaneously meet air quality standards, achieve greenhouse gas emission reduction targets, decrease health risk from transportation-related emissions, and reduce petroleum consumption over the next 15 years. The strategy provides the reductions necessary from mobile sources to achieve federal health-based air quality standards for ozone in 2023 and 2031, reduce greenhouse gas emissions from on-road vehicles by over 40 percent below 1990 levels by 2030, decrease regional and near-source health-risk from exposure to toxic air contaminants, and reduce transportation-related petroleum use by up to 50 percent by 2030 statewide.

CARB staff developed the mobile source strategy using a multi-pollutant scenario planning tool that quantifies changes in ozone and PM2.5 precursor emissions, greenhouse gas emissions, diesel toxics emissions, and petroleum usage as various technologies become widespread in vehicle and equipment fleets. CARB’s analysis illustrates a scenario for meeting the state’s public health, climate, and petroleum reduction goals through cleaner vehicle technologies, energy sources, and fuels. The strategy consists of actions to establish regulatory requirements for cleaner technologies, deploy these technologies, require cleaner fuels, and ensure in-use performance. For off-road equipment, actions include increasing the use of renewable fuels, increasing worksite efficiencies, reducing emissions from small off-road equipment such as logging equipment, cleaner engine technology, and deployment of zero-emission vehicle technologies into target equipment categories such as forklifts and airport ground support equipment (CARB 2016b:11). The 2016 Mobile Source Strategy serves as the basis for emission reduction commitments that CARB has included in two adopted SIPs: the 2016 Air Quality Management Plan for Ozone and PM2.5 in the South Coast Air Basin and the Coachella Valley, and the San Joaquin Valley 2018 Plan for the 1997, 2006, and 2012 PM2.5 Standards (CARB 2016b:2, 22–23).

##### California Air Districts

There are currently 35 air districts across California, all of which include some portion of the treatable landscape of the CalVTP and regulate emissions of air pollutants within their jurisdiction. The CCAA requires that all local air districts in the state work towards achieving and maintaining the CAAQS by the earliest practical date. The act specifies that local air districts should focus particular attention on reducing the emissions from transportation and area-wide emission sources. It also provides districts with the authority to regulate indirect sources. Area wide sources have emissions spread out over wide areas. Prescribed burning is categorized by CARB as an area wide source under the miscellaneous processes category and is managed through the local districts burn authorization system. The CCAA provides districts with the authority to regulate indirect sources.

Air districts attain and maintain air quality conditions in their respective jurisdictions through a comprehensive program of planning, regulation, enforcement, technical innovation, and promotion of the understanding of air quality issues. The clean air strategy implemented by air districts includes the preparation of plans for the attainment of CAAQS and NAAQS, adoption and enforcement of rules and regulations concerning sources of air pollution, and issuance of permits for stationary sources of air pollution. Air districts also inspect stationary sources of air pollution and respond to citizen complaints, monitor ambient air quality and meteorological conditions, and implement programs and regulations required by the CAA, CAAA, and the CCAA.

###### Mass Emissions Thresholds of Significance

Most California air districts recommend mass emission thresholds for determining whether a project’s emissions of criteria air pollutants and precursors would be significant under CEQA and result in, or contribute to, an increase in the ambient concentrations of criteria pollutants to levels that exceed the NAAQS and/or CAAQS. A summary of the mass emission thresholds recommended by air districts in California is provided in Table 3.4-2.

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Table 3.4-2 California Air District Mass Emissions Thresholds for Criteria Air Pollutants

| Air District | ROG Construction | ROG Operational | NOX Construction | NOX Operational | PM10 Construction | PM10 Operational | PM2.5 Construction | PM2.5 Operational | SOX Construction | SOX Operational | CO Construction | CO Operational |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Amador County APCD |  |  |  |  |  | No thresholds |  |  |  |  |  |  |
| Antelope Valley APCD\* (North Los Angeles County) | 137 lb/day or 25 tpy | 137 lb/day or 25 tpy | 137 lb/day or 25 tpy | 137 lb/day or 25 tpy | 82 lb/day or 15 tpy | 82 lb/day or 15 tpy | 65 lb/day or 12 tpy | 65 lb/day or 12 tpy | 137 lb/day or 25 tpy | 137 lb/day or 25 tpy | 548 lb/day or 100 tpy | 548 lb/day or 100 tpy |
| Bay Area AQMD (Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Southern Sonoma, and Southwest Solano County) | 54 lb/day | 54 lb/day10 tpy | 54 lb/day | 54 lb/day or 10 tpy | 82 lb/day (exhaust)BMPs for fugitive dust | 82 lb/day or 15 tpyNone for fugitive dust | 54 lb/day (exhaust)BMPs for fugitive dust | 54 lb/day or 10 tpyNone for fugitive dust | No threshold | No threshold | No threshold | 9.0 ppm (8-hour average, 20.0 ppm (1‑hour average) |
| Butte County AQMD | 137 lb/day or 4.5 tpy | 25 lb/day | 137 lb/day or 4.5 tpy | 25 lb/day | 80 lb/day | 80 lb/day | 80 lb/day | 80 lb/day |  | No threshold |  |  |
| Calaveras County ACPD | 150 lb/day | 150 lb/day | 150 lb/day | 150 lb/day | 150 lb/day | 150 lb/day |  |  | No thresholds |  |  |  |
| Colusa County APCD |  |  |  |  |  | No thresholds |  |  |  |  |  |  |
| Eastern Kern APCD | No threshold | 137 lb/day (mobile source emissions) | No threshold | 137 lb/day (mobile source emissions) |  |  |  | No thresholds | No thresholds |  |  |  |
| El Dorado County AQMD\* | 82 lb/day | 82 lb/day | 82 lb/day | 82 lb/day |  |  |  | No thresholds | No thresholds |  |  |  |
| Feather River AQMD (Sutter and Yuba County) | 25 lb/day multiplied by project length; not to exceed 4.5 tpy | 25 lb/day | 25 lb/day multiplied by project length; not to exceed 4.5 tpy | 25 lb/day | 80 lb/day | 80 lb/day |  |  | No thresholds | No thresholds |  |  |
| Glenn County APCD |  |  |  |  |  | No thresholds |  |  |  |  |  |  |
| Great Basin Unified APCD (Inyo, Mono, and Alpine County) |  |  |  |  |  | No thresholds |  |  |  |  |  |  |
| Imperial County APCD | Implement mitigation | 137 lb/day | Implement mitigation | 137 lb/day | Implement mitigation | 150 lb/day | Implement mitigation | 550 lb/day | Implement mitigation | 150 lb/day | Implement mitigation | 550 lb/day |
| Lake County AQMD |  |  |  |  |  | No thresholds |  |  |  |  |  |  |
| Lassen County APCD |  |  |  |  |  | No thresholds |  |  |  |  |  |  |
| Mariposa County APCD | 100 tpy | 100 tpy | 100 tpy | 100 tpy | 100 tpy | 100 tpy | 100 tpy | 100 tpy | 100 tpy | 100 tpy | 100 tpy | 100 tpy |
| Mendocino County AQMD1 | No threshold | 40 tpy (stationary) | No threshold | 40 tpy (stationary) |  |  |  | No thresholds |  |  |  |  |
| Modoc County APCD |  |  |  |  |  | No thresholds |  |  |  |  |  |  |
| Mojave Desert AQMD\* (North Eastern San Bernardino and Eastern Riverside County) | 137 lb/day or 25 tpy | 137 lb/day or 25 tpy | 137 lb/day or 25 tpy | 137 lb/day or 25 tpy | 82 lb/day or 15 tpy | 82 lb/day or 15 tpy | 65 lb/day or 12 tpy | 65 lb/day or 12 tpy | 137 lb/day or 25 tpy | 137 lb/day or 25 tpy | 548 lb/day or 100 tpy | 548 lb/day or 100 tpy |
| Monterey Bay Unified APCD (Santa Cruz, Monterey, and San Benito County) | No threshold | 137 lb/day | No threshold | 137 lb/day | 82 lb/day | 82 lb/day | No thresholds |  | No threshold | 150 lb/day | No threshold | 550 lb/day |
| North Coast Unified AQMD (Del Norte, Humboldt, and Trinity County) |  |  |  |  |  | No thresholds |  |  |  |  |  |  |
| Northern Sierra AQMD\* (Nevada, Sierra, and Plumas County) | <24 lb/day (Level A)24-136 lb/day (Level B) >136 lb/day (Level C) | <24 lb/day (Level A)24-136 lb/day (Level B) >136 lb/day (Level C) | <24 lb/day (Level A)24-136 lb/day (Level B) >136 lb/day (Level C) | <24 lb/day (Level A)24-136 lb/day (Level B) >136 lb/day (Level C) | <79 lb/day (Level A)79-136 lb/day (Level B) >136 lb/day (Level C) | <79 lb/day (Level A)79-136 lb/day (Level B) >136 lb/day (Level C) |  |  | No thresholds |  |  |  |
| Northern Sonoma County AQMD |  |  |  |  |  | No thresholds |  |  |  |  |  |  |
| Placer County APCD | 82 lb/day | 55 lb/day | 82 lb/day | 55 lb/day | 82 lb/day | 55 lb/day |  |  | No thresholds |  |  |  |
| Sacramento Metropolitan AQMD | No threshold | 65 lb/day | 85 lb/day | 65 lb/day | 80 lb/day or 14.6 tpy (following application of all feasible BMPs) | 80 lb/day or 14.6 tpy (following application of all feasible BMPs) | 82 lb/day or 15 tpy (following application of all feasible BMPs) | 82 lb/day or 15 tpy (following application of all feasible BMPs) | Concentrations below CAAQSfor SOX | Concentrations below CAAQS for SOX | Concentrations below CAAQS for CO | Concentrations below CAAQS for CO |
| San Diego County APCD\* | 75 lb/day or 13.7 tpy | 75 lb/day or 13.7 tpy | 25 lb/hour, 250 lb/day, or 40 tpy | 25 lb/hour, 250 lb/day, or 40 tpy | 100 lb/day or 15 tpy | 100 lb/day or15 tpy | 55 lb/day or 10 tpy | 55 lb/day or 10 tpy | 25 lb/hour, 250 lb/day, or 40 tpy | 25 lb/hour, 250 lb/day, or 40 tpy | 100 lb/hour, 550 lb/day, or 100 tpy | 100 lb/hour, 550 lb/day, or 100 tpy |
| San Joaquin Valley APCD (San Joaquin, Stanislaus, Merced, Madera, Fresno, Kings, Tulare, and Western Kern County) | 10 tpy | 10 tpy | 10 tpy | 10 tpy | 15 tpy | 15 tpy | 15 tpy | 15 tpy | 27 tpy | 27 tpy | 100 tpy | 100 tpy |
| San Luis Obispo County APCD2 | 137 lb/day or 2.5 tons per quarter | 137 lb/day or 2.5 tons per quarter | 25 lb/day or 25 tpy | 25 lb/day or 25 tpy | No threshold | 25 lb/day or 25 tpy |  |  | No thresholds | No thresholds |  | 550 lb/day |
| Santa Barbara County APCD | No threshold | >25 lb/day from mobile sources | No threshold | >25 lb/day from mobile sources |  |  |  | No thresholds | No thresholds |  |  |  |
| Shasta County AQMD\* | 25 lb/day (Level A) or 137 lb/day (Level B) | 25 lb/day (Level A) or 137 lb/day (Level B) | 25 lb/day (Level A) or 137 lb/day (Level B) | 25 lb/day (Level A) or 137 lb/day (Level B) | 80 lb/day (Level A) or 137 lb/day (Level B) | 80 lb/day (Level A) or 137 lb/day (Level B) |  |  | No thresholds |  |  |  |
| Siskiyou County APCD |  |  |  |  |  | No thresholds |  |  |  |  |  |  |
| South Coast AQMD (Southwest San Bernardino, South Los Angeles, Orange, and Western Riverside County) | 75 lb/day | 55 lb/day | 100 lb/day | 55 lb/day | 150 lb/day | 150 lb/day | 55 lb/day | 55 lb/day | 150 lb/day | 150 lb/day | 550 lb/day | 55 lb/day |
| Tehama County APCD\* | ≤25 lb/day (Level A/MND or ND)>25 lb/day (Level B/MND or EIR) >137 lb/day (Level C/EIR) | ≤25 lb/day (Level A/MND or ND)>25 lb/day (Level B/MND or EIR) >137 lb/day (Level C/EIR) | ≤25 lb/day (Level A/MND or ND)>25 lb/day (Level B/MND or EIR) >137 lb/day (Level C/EIR) | ≤25 lb/day (Level A/MND or ND)>25 lb/day (Level B/MND or EIR) >137 lb/day (Level C/EIR) | ≤80 lb/day (Level A/MND or ND)>80 lb/day (Level B/MND or EIR) >137 lb/day (Level C/EIR) | ≤80 lb/day (Level A/MND or ND)>80 lb/day (Level B/MND or EIR) >137 lb/day (Level C/EIR) |  |  | No thresholds |  |  |  |
| Tuolumne County APCD\* | 1,000 lb/day or100 tpy | 1,000 lb/day or 100 tpy | 1,000 lb/day or 100 tpy | 1,000 lb/day or 100 tpy | 1,000 lb/day or 100 tpy | 1,000 lb/day or 100 tpy |  | No thresholds |  |  | 1,000 lb/day or100 tpy | 1,000 lb/day or100 tpy |
| Ventura County APCD\* | 25 lb/day (Ventura County minus Ojai and Simi Valley planning areas)5 lb/day (Ojai planning area) 13.7 tpy (Simi Valley) | 25 lb/day (Ventura County minus Ojai and Simi Valley planning areas)5 lb/day (Ojai planning area) 13.7 tpy (Simi Valley) | 25 lb/day (Ventura County minus Ojai and Simi Valley planning areas)5 lb/day (Ojai planning area) 13.7 tpy (Simi Valley) | 25 lb/day (Ventura County minus Ojai and Simi Valley planning areas)5 lb/day (Ojai planning area) 13.7 tpy (Simi Valley) |  |  |  | No thresholds |  |  |  |  |
| Yolo-Solano AQMD\* (Yolo and Eastern Solano County) | 10 tpy | 10 tpy | 10 tpy | 10 tpy | 80 lb/day | 80 lb/day |  | No thresholds |  |  | Violation of CAAQS for CO | Violation of CAAQS for CO |

Notes: ROG = reactive organic gases; NOX = oxides of nitrogen; PM10 = respirable particulate matter; PM2.5 = fine particulate matter; SOX = sulfur oxide; CO = carbon monoxide; APCD = air pollution control district; AQMD = air quality management district; tpy = tons per year; lb/day = pounds per day; ppm = parts per million; BMP = best management practice; CAAQS = California ambient air quality standards; MND = mitigated negative declaration; ND negative declaration; EIR = environmental impact report.

\* Thresholds of Significance within these air districts are not specific to construction or operational emissions of criteria air pollutants. Thresholds of significance may apply to both activities.

1 Mendocino County AQMD thresholds for ROG and NOX only apply to stationary sources of criteria air pollutants and would not apply to treatment activities under CalVTP.

2 San Luis Obispo County APCD also lists a threshold of significance for operational diesel PM of 1.25 lb/day

Sources: AVAQMD 2016, BAAQMD 2017, BCAQMD 2014, Calaveras County 2018, EDCAPCD 2002, FRAQMD 2010, ICAPCD 2017, KCAPCD 1996, MCAQMD 2013, Mariposa County [No Date], MDAQMD 2016, MBUAPCD 2008, NSAQMD 2009, PCAPCD 2016, SBCAPCD 2015, San Diego County 2007, SLOCAPCD 2012, SCAQMD 2015, SJVAPCD 2015, SMAQMD 2015, Tehama County APCD 2015, Tuolumne County APCD, VCAPCD 2003, YSAQMD 2007

###### Burn Day Designations and Smoke Management Plans

Each air district maintains its own specific regulations regarding open burning, including the types of prescribed burns that would be implemented under the CalVTP. Open burning regulations encompass both agricultural burning and prescribed wildland burning. Prescribed burning falls under the category of “Agricultural Burning” in the California Health and Safety Code Section 39001. Each air district controls emissions by regulating the amount, timing and location of burn events to minimize air quality impacts from smoke. All open burning is restricted to permissive burn days, marginal burn days, or through variances permitted by local air districts. CARB and local districts use information about existing air quality conditions and meteorological predictions to determine whether to allow burning, and if so, the volume and locations of burning on any given day. Each air district, fire control agency, or burning permit agency has the authority to be more restrictive than CARB to avoid or minimize impacts to air quality. Land managers who seek to conduct prescribed burns must register yearly or seasonally with their local district and, when applicable, submit a smoke management plan (SMP) for approval prior to burning (see Appendix PD-2 for an example burn plan and SMP). Even on otherwise permissive burn days, land managers (or his/her designee conducting the prescribed burn) must ensure that all conditions and requirements agreed to in the approved SMP are met on the day of the burn event prior to ignition ([17 CCR Section 80160(j)]).

Under the California Smoke Management Program, each air district is required to regulate prescribed burning through adoption of its own Smoke Management Program that adheres to the overall objectives and goals of the California Smoke Management Program. Each air district’s smoke management program must include procedures for public notification and education, including the appropriate signage at burn sites, and for reporting smoke complaints (17 CCR Section 80160). Prior to obtaining district permission to burn, a burn manager must register their burn with the local air district, obtain an air district and/or fire agency burn permit, submit an SMP to the air district, and obtain air district approval of the SMP.

The SMP specifies the “smoke prescription,” which is a set of air quality, meteorological, and fuel conditions that must exist before burn ignition may be allowed. SMPs for prescribed burns greater than 10 acres in size or estimated to produce more than one ton of particulate matter are required to include the following information: location, types, and amounts of material to be burned; expected duration of the burn; the contact information of responsible personnel; and identification of all nearby smoke-sensitive areas. SMPs for burn treatments greater than 100 acres or estimated to produce more than 10 tons of particulate matter are required to include the following additional information: meteorological conditions necessary for burning; projections of where the smoke is expected to disperse during both daytime and nighttime conditions; and contingency actions to be taken if smoke impacts occur or meteorological conditions deviate from those specified in the SMP. SMPs for burns greater than 250 acres in size or near smoke-sensitive areas must also include a monitoring component (17 CCR Section 80160). Regardless of the size of the burn, if smoke from a burn may impact smoke sensitive areas, SMPs must be prepared and include an appropriate monitoring component for the following types of projects: projects that will continue burning or producing smoke overnight, projects conducted near smoke sensitive areas, or as otherwise required by the air district.

After the applicable local air district approves all burn planning requirements, including the burn permit and SMP, the burn manager may begin making the final preparations to conduct the burn. Preparation includes mobilizing the equipment and staff resources needed to conduct the burn, notifying the public about the planned timing and specifics of the burn, and obtaining a final authorization to burn from the air district. The burn manager works with the local air district and CARB to obtain forecasts of meteorology and air quality that are needed to safely conduct the burn. CARB and larger air districts determine permissive burn, marginal burn, and no burn days based on smoke dispersal conditions (as specified in statute) and the risk of a burn escape. The responsibility of properly conducting a prescribed burn and managing the risk of a burn escape is the responsibility of the burn manager.

Air district authorization to conduct a prescribed burn is provided to the burn manager no more than 24 hours prior to the burn. The burn manager is responsible for assuring that all conditions in the SMP and burn permit are met throughout the burn. It is through this real time, site-specific burn authorization system and associated SMP that prescribed burning is treated differently from other potential treatment activities that would be performed under the CalVTP. The local air district is the ultimate arbiter of whether a burn can occur as proposed, or in a limited capacity, or must be postponed based on the predicted transport and placement of pollutants from the activity relative to sensitive receptors that may be impacted by smoke.

In addition to obtaining authorization from the local air district, the burn manager must ensure that the prescribed burn meets the conditions set forth in the approved SMP before the burn is ignited. That is, even with authorization from the local air district to conduct the prescribed burn, ignition is prohibited if the conditions and requirements of the SMP are not met on-site (17 CCR Section 80160[j]). After the burn is ignited, the burn manager must make all reasonable efforts to ensure that the burn stays within the prescription of its SMP. If the burn fails to stay within the prescription, or if adverse smoke impacts are observed, the burn manager shall implement smoke mitigation measures as described in the SMP. A comprehensive study of prescribed burns nationally indicate that 99 percent of burns were accomplished within the prescription and did not report escapes or near misses (Dether 2005).

#### Local

When state agencies, including CAL FIRE, are conducting governmental activities under the authority of state law or the State Constitution, in this case, treatments implemented under the CalVTP, they are exempt from local government plans, policies, and ordinances (unless a constitutional provision or statute directs otherwise). Nonetheless, CAL FIRE voluntarily seeks to operate consistently with local governance to the extent feasible. Given its statewide extent and the possible number of local and regional responsible agencies, this PEIR does not identify potentially applicable local government plans, policies, and ordinances. Types of local policies relevant to air quality may include general plan measures that require coordination with the local air district to achieve state and federal air quality standards, implementation of fugitive dust control measures, and reductions of vehicle miles traveled (VMT) and associated air pollutant emissions. This PEIR assumes that any vegetation treatments proposed by local or regional agencies under the CalVTP would be consistent with local plans, policies, and ordinances to the extent the project is subject to them, as required by SPR AD-3. However, most cities and counties in California do not have rules or regulations that specifically address emissions generated by equipment that would be used in treatment activities or emissions generated by prescribed burns.

### Environmental Setting

Vegetation treatments conducted under the CalVTP would occur in a portion of each of California’s 15 air basins. The ambient concentrations of air pollutant emissions within these basins are determined by the amount of emissions released by the sources of air pollutants and the atmosphere’s ability to transport and dilute such emissions. Natural factors that affect transport and dilution include terrain, wind, atmospheric stability, and sunlight. Therefore, existing air quality conditions within the treatable landscape are determined by such natural factors as topography, meteorology, and climate, in addition to the amount of emissions released by existing air pollutant sources. Air pollution can also move freely within and between air basins; therefore, air pollution generated in one basin made degrade the quality of air within an adjacent basin.

#### Climate, Meteorology, and Topography

California includes a wide range of geophysical features such as oceans, valleys, mountains, and deserts. The Pacific Ocean forms the state’s western boundary, spanning over 1,200 miles. The Central Valley is located within the middle of the state and is enclosed by various mountain ranges, including multiple coastal mountain ranges to the west, the Sierra Nevada to the east, the Cascade Range to the north, and the Tehachapi Mountains to the south. The boundary between California and Nevada is generally defined by the Sierra Nevada.

California also has expansive deserts, such as the Mojave Desert located in southern California, and vast forests of redwood and Douglas fir located in the northwest portion of the state. Major rivers include the Sacramento, San Joaquin, and Colorado Rivers. Major lakes include Lake Tahoe, Salton Sea, and Clear Lake. Elevation varies greatly in California from Mount Whitney at 14,494 feet (the highest elevation point in the contiguous 48 states) to 282 feet below sea level at Death Valley (the lowest elevation point in the United States).

These landform features affect direction of air flow and, thus, directly affect the distribution of air pollutants. For example, air above low-lying lands surrounded by mountains is often more atmospherically stable, which can result in the accumulation of more pollutants.

California features a Mediterranean climate characterized by hot, dry summers and cool, rainy winters, with some portions of the state experiencing more extreme temperature difference that others. Coastal portions of the state often experience summer fog as a result of the cool marine currents from the Pacific Ocean, and more moderate temperatures, whereas inland portions of the state, such as the high desert, southern San Joaquin Valley, or northern Sacramento Valley experience more extreme temperature differences. Precipitation in California generally occurs in the winter months and, on average, about two thirds of the state’s total rainfall occurs in the north.

#### Criteria Air Pollutants

Concentrations of criteria air pollutants are used to indicate the quality of the ambient air. A brief description of key criteria air pollutants is provided below. Table 3.4-3 summarizes the emission source type and the foreseeable health impacts that result from exposure to concentrations of criteria air pollutants that exceed the applicable CAAQS and NAAQS.

Table 3.4-3 Sources and Health Effects of Criteria Air Pollutants

| Pollutant | Sources | Acute1 Health Effects | Chronic2 Health Effects |
| --- | --- | --- | --- |
| Ozone | secondary pollutant resulting from reaction of ROG and NOX in presence of sunlight. ROG emissions result from incomplete combustion and evaporation of chemical solvents and fuels; NOX results from the combustion of fuels | increased respiration and pulmonary resistance; cough, pain, shortness of breath, lung inflammation | permeability of respiratory epithelia, possibility of permanent lung impairment |
| Carbon monoxide (CO) | incomplete combustion of fuels; motor vehicle exhaust | headache, dizziness, fatigue, nausea, vomiting, death | permanent heart and brain damage |
| Nitrogen dioxide(NO2) | combustion devices; e.g., boilers, gas turbines, and mobile and stationary reciprocating internal combustion engines | coughing, difficulty breathing, vomiting, headache, eye irritation, chemical pneumonitis or pulmonary edema; breathing abnormalities, cough, cyanosis, chest pain, rapid heartbeat, death | chronic bronchitis, decreased lung function |
| Sulfur dioxide (SO2) | coal and oil combustion, steel mills, refineries, and pulp and paper mills | Irritation of upper respiratory tract, increased asthma symptoms | There is insufficient evidence linking SO2 exposure to chronic health impacts. |
| Respirable particulate matter (PM10), Fine particulate matter (PM2.5) | fugitive dust, soot, smoke, mobile and stationary sources, construction, fires and natural windblown dust, and formation in the atmosphere by condensation and/or transformation of SO2 and ROG | breathing and respiratory symptoms, aggravation of existing respiratory and cardiovascular diseases, premature death | alterations to the immune system, carcinogenesis |
| Lead | metal processing | reproductive/ developmental effects (fetuses and children) | numerous effects including neurological, endocrine, and cardiovascular effects |

Notes: NOX = oxides of nitrogen; ROG = reactive organic gases.

1 Acute health effects refer to immediate illnesses caused by short-term exposures to criteria air pollutants at fairly high concentrations. An example of an acute health effect includes fatality resulting from short-term exposure to carbon monoxide levels in excess of 1,200 parts per million.

2 Chronic health effects refer to cumulative effects of long-term exposures to criteria air pollutants, usually at lower, ambient concentrations. An example of a chronic health effect includes the development of cancer from prolonged exposure to particulate matter at concentrations above the national ambient air quality standards.

Sources: EPA 2018

##### Ozone

Ozone is a photochemical oxidant (a substance whose oxygen combines chemically with another substance in the presence of sunlight) and the primary component of smog. Ozone is not directly emitted into the air but is formed as a secondary pollutant through complex chemical reactions between precursor emissions of reactive organic gases (ROG) and oxides of nitrogen (NOX) in the presence of sunlight. ROG are volatile organic compounds that are photochemically reactive. ROG emissions result primarily from incomplete combustion and the evaporation of chemical solvents and fuels. NOX are a group of gaseous compounds of nitrogen and oxygen that result from the combustion of fuels.

Emissions of the ozone precursors ROG and NOX have decreased over the past several years because of more stringent motor vehicle standards and cleaner burning fuels. Emissions of ROG and NOX decreased from 2000 to 2010 and are projected to continue decreasing from 2010 to 2035 (CARB 2013).

##### Nitrogen Dioxide

Nitrogen dioxide (NO2) is a brownish, highly reactive gas that is present in all urban environments. The major human-made sources of NO2 are combustion devices, such as boilers, gas turbines, and mobile and stationary reciprocating internal combustion engines. Combustion devices emit primarily nitric oxide (NO), which reacts through oxidation in the atmosphere to form NO2. The combined emissions of NO and NO2 are referred to as NOX and are reported as equivalent NO2. Because NO2 is formed and depleted by reactions associated with photochemical smog (ozone), the NO2 concentration in a particular geographical area may not be representative of the local sources of NOX emissions (EPA 2012).

##### Particulate Matter

Respirable particulate matter with an aerodynamic diameter of 10 micrometers or less is referred to as PM10. PM10consists of particulate matter emitted directly into the air, such as fugitive dust, soot, and smoke from mobile and stationary sources, construction operations, fires and natural windblown dust, and particulate matter formed in the atmosphere by reaction of gaseous precursors (CARB 2013). Fine particulate matter (PM2.5) includes a subgroup of smaller particles that have an aerodynamic diameter of 2.5 micrometers or less. PM10 emissions in the treatable landscape are dominated by emissions from area sources, primarily fugitive dust from vehicle travel on unpaved and paved roads, farming operations, construction and demolition, and particles from residential fuel combustion.

Direct emissions of PM10 in California have increased slightly over the last 20 years, and are projected to increase very slightly through 2035. Emissions of PM2.5 are dominated by several of the same sources as emissions of PM10, but are more greatly influenced by combustion sources (CARB 2013).

Table 3.4-4 shows the attainment status for each criteria air pollutant with respect to the CAAQS and the NAAQS in each county that is part of the treatable landscape.

Table 3.4-4 Attainment Designations for Criteria Pollutants by County, Statewide

| County | OzoneCAAQS | OzoneNAAQS | Carbon MonoxideCAAQS | Carbon MonoxideNAAQS | NO2CAAQS | NO2NAAQS | SO2CAAQS | SO2NAAQS | PM10CAAQS | PM10NAAQS | PM2.5CAAQS | PM2.5NAAQS | LeadCAAQS | LeadNAAQS | SulfatesCAAQS | SulfatesNAAQS | Hydrogen SulfideCAAQS | Hydrogen SulfideNAAQS | Visibility Reducing Particles CAAQS | Visibility Reducing ParticlesNAAQS  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Alameda | N | N | A | UA | A | UA | A | UA | N | U | N | N | A | UA | A |  | U |  | U |  |
| Alpine | U | AU | U | UA | A | UA | A | UA | N | U | A | UA | A | UA | A |  | U |  | U |  |
| Amador | N | N | U | UA | A | UA | A | UA | U | U | U | UA | A | UA | A |  | U |  | U |  |
| Butte | N | N | A | UA | A | UA | A | UA | N | U | N | UA | A | UA | A |  | U |  | U |  |
| Calaveras | N | N | U | UA | A | UA | A | UA | N | U | U | UA | A | UA | A |  | U |  | U |  |
| Colusa | A | AU | U | UA | A | UA | A | UA | N | U | A | UA | A | UA | A |  | U |  | U |  |
| Contra Costa | N | N | A | UA | A | UA | A | UA | U | U | N | N | A | UA | A |  | U |  | U |  |
| Del Norte | A | AU | U | UA | A | UA | A | UA | A | U | A | UA | A | UA | A |  | U |  | U |  |
| El Dorado1 | A/N | N/AU | U | UA | A | UA | A | UA | N | U | A/U | N/UA | A | UA | A |  | U |  | U |  |
| Fresno | N | N | A | UA | A | UA | A | UA | N | A | N | N | A | UA | A |  | U |  | U |  |
| Glenn | A | AU | U | UA | A | UA | A | UA | N | U | A | UA | A | UA | A |  | U |  | U |  |
| Humboldt | A | AU | A | UA | A | UA | A | UA | N | U | A | UA | A | UA | A |  | A |  | U |  |
| Imperial | N | N | A | UA | A | UA | A | UA | N | N | A | UA | A | UA | A | No Federal Standard | U | No Federal Standard | U | No Federal Standard |
| Inyo2 | N | AU | A | UA | A | UA | A | UA | N | A/N/U | A | UA | A | UA | A |  | A |  | U |  |
| Kern3 | N | N | A | UA | A | UA | A | UA | N | A/N/U | A/U | N/UA | A | UA | A |  | U |  | U |  |
| Kings | N | N | U | UA | A | UA | A | UA | N | A | N | N | A | UA | A |  | U |  | U |  |
| Lake | A | AU | A | UA | A | UA | A | UA | A | U | A | UA | A | UA | A |  | A |  | A |  |
| Lassen | A | AU | U | UA | A | UA | A | UA | U | U | A | UA | A | UA | A |  | U |  | U |  |
| Los Angeles4 | N | N | A | UA | A | UA | A | UA | N | A/U | N | N/UA | A | N | A |  | U |  | U |  |
| Madera | N | N | U | UA | A | UA | A | UA | N | A | N | N | A | UA | A |  | U |  | U |  |
| Marin | N | N | A | UA | A | UA | A | UA | N | U | N | N | A | UA | A |  | U |  | U |  |
| Mariposa | N | N | U | UA | A | UA | A | UA | U | U | U | UA | A | UA | A |  | U |  | U |  |
| Mendocino | A | AU | U | UA | A | UA | A | UA | N | U | A | UA | A | UA | A |  | U |  | U |  |
| Merced | N | N | A | UA | A | UA | A | UA | N | A | N | N | A | UA | A |  | U |  | U |  |
| Modoc | A | AU | U | UA | A | UA | A | UA | U | U | A | UA | A | UA | A |  | U |  | U |  |
| Mono | N | AU | A | UA | A | UA | A | UA | N | N | A | UA | A | UA | A |  | A |  | U |  |
| Monterey | N | AU | A | UA | A | UA | A | UA | N | U | A | UA | A | UA | A |  | U |  | U |  |
| Napa | N | N | A | UA | A | UA | A | UA | N | U | N | N | A | UA | A |  | U |  | U |  |
| Nevada | N | N | A | UA | A | UA | A | UA | N | U | U | UA | A | UA | A |  | U |  | U |  |
| Orange | N | N | A | UA | A | UA | A | UA | N  | A | N | N | A | UA | A |  | U |  | U |  |
| Placer5 | A/N | N/AU | A | UA | A | UA | A | UA | N | U | A/U | N/UA | A | UA | A |  | U |  | U |  |
| Plumas | U | AU | A | UA | A | UA | A | UA | N | U | A/U | UA | A | UA | A |  | U |  | U |  |
| Riverside6 | N | N/AU | A | UA | A | UA | A | UA | N | A/N/U | A/N/U | N/UA | A | UA | A |  | U |  | U |  |
| Sacramento | N | N | A | UA | A | UA | A | UA | N | A | A | N | A | UA | A |  | U |  | U |  |
| San Benito | N | AU | U | UA | A | UA | A | UA | N | U | A | UA | A | UA | A |  | U |  | U |  |
| San Bernardino7 | N | N/AU | A | UA | A | UA | A | UA | N | N | A/U | UA | A | UA | A |  | U |  | U |  |
| San Diego | N | N | A | UA | A | UA | A | UA | N | U | N | UA | A | UA | A |  | U |  | U |  |
| San Francisco | N | N | A | UA | A | UA | A | UA | N | U | N | N | A | UA | A |  | U |  | U |  |
| San Joaquin | N | N | A | UA | A | UA | A | UA | N | A | N | N | A | UA | A |  | U |  | U |  |
| San Luis Obispo  | N | N | A | UA | A | UA | A | UA | N | U | A | UA | A | UA | A | No Federal Standard | A | No Federal Standard | U | No Federal Standard |
| San Mateo | N | N | A | UA | A | UA | A | UA | N | U | N | N | A | UA | A |  | U |  | U |  |
| Santa Barbara | N-T | AU | A | UA | A | UA | A | UA | N | U | U | UA | A | UA | A |  | A |  | U |  |
| Santa Clara | N | N | A | UA | A | UA | A | UA | N | U | N | N | A | UA | A |  | U |  | U |  |
| Santa Cruz | N | AU | U | UA | A | UA | A | UA | N | U | A | UA | A | UA | A |  | U |  | U |  |
| Shasta | N | AU | U | UA | A | UA | A | UA | A | U | A | UA | A | UA | A |  | U |  | U |  |
| Sierra | U | AU | U | UA | A | UA | A | UA | N | U | U | UA | A | UA | A |  | U |  | U |  |
| Siskiyou | A | AU | U | UA | A | UA | A | UA | A | U | A | UA | A | UA | A |  | U |  | U |  |
| Solano | N | N | A | UA | A | UA | A | UA | N | U | N | N | A | UA | A |  | U |  | U |  |
| Sonoma8 | A/N | N/AU | A | UA | A | UA | A | UA | A/N | U | A/N | N/UA | A | UA | A |  | U |  | U |  |
| Stanislaus | N | N | A | UA | A | UA | A | UA | N | A | N | N | A | UA | A |  | U |  | U |  |
| Sutter | N | AU | A | UA | A | UA | A | UA | N | U | A | UA | A | UA | A |  | U |  | U |  |
| Tehama | N | AU | U | UA | A | UA | A | UA | N | U | U | UA | A | UA | A |  | U |  | U |  |
| Trinity | A | AU | U | UA | A | UA | A | UA | A | U | A | UA | A | UA | A |  | U |  | U |  |
| Tulare | N | N | A | UA | A | UA | A | UA | N | A | N | N | A | UA | A |  | U |  | U |  |
| Tuolumne | N | N | A | UA | A | UA | A | UA | U | U | U | UA | A | UA | A |  | U |  | U |  |
| Ventura | N | N | A | UA | A | UA | A | UA | N | U | A | UA | A | UA | A | No Federal Standard | U | No Federal Standard | U | No Federal Standard |
| Yolo | N | N | A | UA | A | UA | A | UA | N | U | U | N | A | UA | A |  | U |  | U |  |
| Yuba | N | AU | U | UA | A | UA | A | UA | N | U | A | UA | A | UA | A |  | U |  | U |  |

Notes: NO2 = nitrogen dioxide; SO2 = sulfur dioxide; PM10 = respirable particulate matter; PM2.5 = fine particulate matter; CAAQS = California ambient air quality standards; NAAQS = national ambient air quality standards; A=Attainment, N=Nonattainment, N-T=Nonattainment/Transitional, U=Unclassified (CAAQS), UA=Unclassified/Attainment (NAAQS)

1. The eastern portion of El Dorado County (Lake Tahoe Air Basin) is in attainment for the CAAQS and NAAQS for ozone, PM2.5, and PM10; however, the western portion (Mountain Counties Air Basin) is in nonattainment for ozone and unclassified for PM10. A fraction of the County located in the Mountain Counties Air Basin is also in nonattainment for the PM2.5 NAAQS.

2. Owen’s Valley in Inyo County is designated as nonattainment for the PM10 NAAQS, the Coso Junction portion of Inyo County is in attainment for the PM10 NAAQS, and the remainder of Inyo County is unclassified.

3. The eastern portion of Kern County (Mojave Air Basin) is unclassified for the CAAQS for PM2.5; however, the western portion (San Joaquin Valley Air Basin) is in nonattainment. The Mojave Air Basin portion is both classified as nonattainment and unclassified for the PM10 NAAQS and the San Joaquin Valley Air Basin is in attainment for the PM10 and PM2.5 NAAQS.

4. The northern portion of Los Angeles County (Mojave Air Basin) is unclassified and unclassified/attainment for the PM2.5 CAAQS and NAAQS, respectively; however, the southern portion (South Coast Air Basin) is in nonattainment for both the CAAQS and NAAQS.

5. The eastern portion of Placer County (Lake Tahoe Air Basin) is in attainment for the CAAQS and NAAQS for ozone; however, the western portion (Sacramento Valley Air Basin and Mountain Counties Air Basin) is in nonattainment for ozone. The far western portion (Sacramento Valley Air Basin) and far eastern portion (Lake Tahoe Air Basin) is in attainment the PM2.5 CAAQS, and the middle portion (Mountain Counties Air Basin) is designated unclassified for the PM2.5 CAAQS. The far western portion (Sacramento Valley Air Basin) is also in nonattainment for the PM2.5 NAAQS.

6 The western portion of Riverside County (South Coast Air Basin) is in nonattainment for the PM2.5 CAAQS and NAAQS and the ozone NAAQS, the middle portion of Riverside County (Salton Sea Air Basin) is designated as unclassified for PM2.5 for the CAAQS and nonattainment for the ozone NAAQS, and the eastern portion (Mojave Desert Air Basin) is designated as attainment for PM2.5 for the CAAQS and the ozone NAAQS.

7. The northeastern portion of San Bernardino is designated as unclassified for PM2.5 for the CAAQS and the “County Portion of Federal Ozone AQMA” of San Bernardino is in attainment for the CAAQS PM­2.5.

8. The northwest portion of Sonoma County (North Coast Air Basin) is in attainment for the CAAQS and NAAQs for ozone, PM2.5, and PM10; however, the southeast portion (San Francisco Bay Area Air Basin) is in nonattainment for these pollutants for the CAAQS and NAAQS.

Source: CARB 2018a

##### Ultrafine Particulate Matter

More recently, ultrafine particulate matter (UFP) has become a topic of greater concern. UFP refers to a subfraction of currently regulated PM2.5 and PM10 size particles. UFP is most often defined as particles with an aerodynamic diameter of 0.1 microns or smaller. Although UPF consists of only a small fraction of total PM emissions, UFP supports a large surface area and is often heavily concentrated. Because of its small size, a given mass of UFP contains thousands to tens of thousands more particles. Moreover, also because of its size, UPF is highly penetrative to human tissues as compared to PM10 and PM2.5. Observed human health effects in selected studies include lung function changes, airway inflammation, enhanced allergic responses, vascular thrombogenic effects, altered endothelial function, altered heart rate and heart rate variability, accelerated atherosclerosis, and increased markers of brain inflammation (Health Effects Institute 2013:3, 36, 39, 45, and 65). The predominant source of UFP is combustion by on-road vehicles, off-road vehicles, stationary sources, and vegetation burning (Health Effects Institute 2013:1, CARB 2006:3, Kleeman et al. 2007:1, and Black et al. 2017a).

##### Criteria Air Pollutant Emissions from Wildfires and Prescribed Burns

Wildfires and prescribed burns have occurred and currently continue to occur through the treatable landscape. Both produce smoke, which is composed of a complex mixture of CO2, water vapor, CO, particulate matter, hydrocarbons and other organic chemicals, ROG, NOX, and trace minerals. There are thousands of individual compounds present in smoke. Smoke composition can vary widely and depends on multiple factors, including how efficiently a fuel burns, the fuel type and moisture content, the fire temperature, wind conditions, and other weather-related influences. Different types of wood and vegetation are composed of varying amounts of cellulose, lignin, tannins and other polyphenols, oils, fats, resins, waxes, and starches, which produce different compounds that are released as smoke when burned (CARB and CDPH 2016).

The primary criteria air pollutant of concern from smoke is PM2.5, a criteria air pollutant for which a NAAQS and CAAQS have been established. As compared to PM10, PM2.5 (including UFP) is transported farther from a burn site and can cause more severe, adverse health impacts because of its ability to penetrate more deeply into lung tissue. Emergency visits for respiratory symptoms increase in wildfire smoke–affected areas; specifically, patients are more likely to visit the emergency room for asthma, bronchitis, dyspnea, and symptoms of chronic obstructive pulmonary disease (Black et al. 2017a). Typically, wildfire smoke produces proportionately more PM2.5 and UFP compared to PM10 (Black et al. 2017b).

The open burning of organic materials produces a higher mass of ROG, as compared to the combustion of fossil fuels. However, NOX and SOX emissions are comparatively lower (Black et al. 2017a). ROG emissions may oxidize with NOX emissions from fire and other sources to contribute to spikes in ground-level ozone (NCAR 2008). Exposure to ozone may result in acute and chronic health impacts including coughing, pulmonary distress, lung inflammation, shortness of breath, and permanent lung impairment.

CO is another pollutant of concern generated by incomplete combustion of wood or other organic materials. Exposure to CO-containing smoke does not pose a significant hazard, except to some sensitive individuals and to individuals very close to the fire (e.g., firefighters). Individuals with cardiovascular disease may experience chest pain or cardiac arrhythmias from lower levels of CO exposure. CO exposure can cause headache, weakness, dizziness, confusion, nausea, disorientation, visual impairment, coma, and death, even in otherwise healthy individuals (CARB and CDPH 2016).

Although the same types of criteria air pollutants are generated by wildfires and prescribed burns, the characteristics of their smoke plumes can differ. Prescribed burns are controlled events that are carefully planned to reduce smoke-related impacts. Wildfires, however, burn under uncontrolled and unplanned circumstances. It is difficult to manage when wildfires burn, how much smoke is generated, where smoke travels, and their duration. Wildfire frequency is typically highest during summer months when fuels are driest and the likelihood of adverse weather conditions (i.e., high temperatures, low relative humidity, and sustained wind speeds) are present. Under these conditions, wildfires consume more vegetation on a per-acre basis than prescribed burns, resulting in more smoke emissions (Berger et al. 2018). Wildfires also have a long smoldering phase, because wildfire containment strategies focus on extinguishing the flame phase on the perimeter of the burned areas to protect life and property, while the smoldering phase within the burned area is left to burn out, sometimes for months after a fire is contained (Graham et al. 2004). The smoldering phase of wood burning is associated with higher output of particulate matter and can account for a large proportion of the total emissions from a wildfire event (Black et al. 2017a). Recent major wildfires have created hazardous air pollution conditions requiring health advisories and “spare the air” days far from the site of the fire. For instance, during the Camp Fire in Butte County, air quality became hazardous not only in Chico near the fire, but also more than one hundred miles away in more heavily populated communities, such as in Sacramento, Modesto, and San Francisco (Rowan 2018). Moreover, a Stanford University study found that children experienced greater health impacts, including asthma and cardiovascular events, when exposed to wildfire smoke than smoke generated by prescribed burns (Prunicki et al. 2019). Thus, wildfires are generally far more likely to result in adverse air quality and public health impacts than prescribed burns (Berger et al. 2018).

#### Monitoring Station Data and Attainment Designations

Criteria air pollutant concentrations are measured at monitoring stations throughout the state. The data collected at these locations inform the attainment or nonattainment designation of counties and air basins. Vegetation treatment activities implemented under the CalVTP would occur within every air basin in the state and, as such, there would be a high degree of variation in how the emissions of treatments would affect the ambient concentrations of criteria air pollutants within an air basin. For the reasons stated above (e.g., topography, meteorology, emissions sources, location), ambient concentrations of criteria air pollutants differ between air basins.

#### Toxic Air Contaminants

According to the *California Almanac of Emissions and Air Quality* (CARB 2013), the majority of the estimated health risks from TACs can be attributed to relatively few compounds, the most prevalent being diesel PM. Diesel PM differs from other TACs in that it is not a single substance, but rather a complex mixture of hundreds of substances. Although diesel PM is emitted by diesel-fueled internal combustion engines, the composition of the emissions varies depending on engine type, operating conditions, fuel composition, lubricating oil, and whether the engine includes an emissions control system. Unlike the other TACs, no ambient monitoring data are available for diesel PM because no routine measurement method currently exists. However, CARB has made preliminary concentration estimates based on a particulate matter exposure method. This method uses CARB’s emissions inventory’s PM10 database, ambient PM10 monitoring data, and the results from several studies to estimate concentrations of diesel PM. In addition to diesel PM, the TACs for which data are available that pose the greatest existing ambient risk in California are benzene, 1,3-butadiene, acetaldehyde, carbon tetrachloride, hexavalent chromium, para-dichlorobenzene, formaldehyde, methylene chloride, and perchloroethylene. Diesel PM poses the greatest health risk among these 10 TACs mentioned.

##### Naturally Occurring Asbestos

Asbestos is the common name for a group of naturally occurring fibrous silicate minerals that can separate into thin but strong and durable fibers. NOA was identified as a TAC in 1986 by CARB. NOA is located in many parts of California, and is commonly associated with ultramafic rocks and serpentinite, according to a special publication published by the California Geological Survey (Churchill and Hill 2000). Ultramafic rocks form in high-temperature environments well below the surface of the earth. By the time they are exposed at the surface by geologic uplift and erosion, ultramafic rocks may be partially to completely altered into a type of metamorphic rock called serpentinite. Sometimes the metamorphic conditions are right for the formation of chrysotile asbestos or tremolite-actinolite asbestos in the bodies of these rocks, along their boundaries, or in the soil. Except for a few counties in the southeast portion of the state, most counties in California contain some amount of ultramafic rock. Some areas within the treatable landscape contain serpentinite or other ultramafic rock and soil that could potentially contain NOA.

Asbestos could be released from serpentinite or ultramafic rock if the rock is broken or crushed. Asbestos could also be released into the air due to vehicular traffic on unpaved roads on which asbestos-bearing rock has been used as gravel. Additionally, soil derived from asbestos-bearing rock could contain asbestos entrained into the air from new recreational uses added to route surfaces with exposed asbestos. At the point of release, asbestos fibers can become airborne, causing air quality and human health hazards. Natural weathering and erosion processes act on asbestos bearing rock and soil, increasing the likelihood for asbestos fibers to become airborne if disturbed (California Geological Survey 2002:22). The California Geological Survey has published guidance for geologists involved in conducting or reviewing NOA investigations. These guidelines describe general procedures for use by geologists to determine the presence, type, distribution, and amount of asbestos minerals at the site (California Geological Survey 2002).

##### Toxic Air Contaminants from Wildfire and Prescribed Burns

In addition to criteria air pollutants, which are discussed above, smoke from wildfires and prescribed burns also contains TACs such as aldehydes (including formaldehyde and acrolein) and organic compounds such as polycyclic aromatic hydrocarbons (PAHs) and benzene. Aldehydes are volatile organic compounds that are detectable by their distinctive odor. Formaldehyde and acrolein are the two most potent aldehydes found in smoke that cause eye and respiratory irritation and potentially exacerbate asthma. Chronic exposure to formaldehyde is associated with nasal cancer (NWCG 2018). PAHs and benzene are also carcinogenic, and long-term exposure could result in elevated cancer-risk.

Although there are many similarities between smoke produced from wildfires and prescribed burns, there are key differences that affect the types and quantities of TACs produced. As discussed under “Criteria Air Pollutants from Wildfire and Prescribed Burns,” prescribed burns are controlled events, whereas wildfires burn under uncontrolled and unplanned circumstances. Prescribed burns are generally short in duration whereas wildfires may last for weeks or even months, potentially resulting in a longer exposure of receptors to TACs from smoke emissions. Most critically, wildfires have a much greater potential to burn built structures in addition to vegetation. Built structures contain plastics, chemically-treated wood, and other artificial materials which produce TACs when combusted. For example, chlorinated plastics (polyvinyl chloride) and those materials treated with flame retardants would create a wider array of chlorinated and other toxic compounds that could cause adverse health effects when inhaled (NWCG 2018). These toxic compounds are not typically present in smoke from prescribed burns.

TAC emissions may also be generated if vegetation treated with herbicides is burned. Herbicides have not been detected in prescribed burns occurring within months of their application (NWCG 2018). Studies conducted on herbicides (Bush et al. 1998, McMahon and Bush 1998) indicate that intense heat induced by flames quickly degrades most herbicides, whereas smoldering fires have the potential to volatize small quantities of certain herbicides over the duration of the smoldering phase. However, exposure analyses indicate that even under conditions of smoldering fires, no significant human health risks from herbicides where present. Naturally occurring chemical by-products of combustion (e.g., PM2.5, CO, formaldehyde, acrolein) are a far greater risk to human health than combustion of herbicides (Bush et al. 1998).

#### Existing Levels of Emissions Generated by Wildfires

As discussed in Section 1.1, “Purpose of CalVTP,” fires are a natural component of California’s ecosystems. However, wildfires can pose a threat to human communities. Wildfire events cause direct physical harm to humans, and damage to structures and natural resources, as well as contribute to global climate change and air quality degradation. During the second half of the 20th century, California’s wildfires were less severe, burned fewer acres, and/or destroyed fewer structures by factors of two and three, respectively, when compared with modern fire statistics (CAL FIRE 2018a). Climate change is exacerbating wildfire conditions, and fire seasons have been extending further into the winter months since 2000. The catastrophic wildfires in October and December of 2017 serve as prime examples of the expanding fire season (CAL FIRE 2018b). Fifteen of the state’s 20 most destructive wildfires have occurred since 2003 (CAL FIRE 2019).

To highlight the significance of emissions from burning in the United States, wildfire, agricultural burning, and prescribed burning for wildfire prevention made up 32 percent of the nation’s annual fine particulate emissions according to the 2011 National Emissions Inventory (EPA 2014); science supporting new emission factors has increased that number to 48 percent (NWCG 2018:6). This category (burning) has grown in importance, considering its increased prevalence, when compared to other pollution sources.

Wildfire-generated air pollutant emissions are not considered by CARB to be anthropogenic sources and, as a result, are not included in CARB’s statewide emissions inventory. Table 3.4-5 summarizes CARB’s discrete estimation of PM10 and PM2.5 emissions as well as total acres burned from wildfire between 2007 and 2017 (CARB 2019a). As shown in the table, the level of acres burned and particulate matter emitted from wildfires across the state vary year to year with a statewide average of 0.69 million acres burned and 261 and 221 thousand tons for PM10 and PM2.5, respectively, during the 2007–2017 period. This does not account for the wildfires that occurred during 2018, which were the largest and most destructive on record. Thus, it is likely that particulate matter emissions from 2018 wildfires would exceed the numbers shown for 2008, which was the highest year in the past 10 years.

Table 3.4-5 Annual PM Emissions and Acres Burned from Wildfire, 2007–20171

| **Year** | **PM10 (thousand tons per year)1** | **PM2.5 (thousand tons per year)2** | **Acres Burned (million)** |
| --- | --- | --- | --- |
| 2007 | 219 | 186 | 1.04 |
| 2008 | 675 | 572 | 1.35 |
| 2009 | 101 | 86 | 0.43 |
| 2010 | 15 | 13 | 0.09 |
| 2011 | 43 | 36 | 0.20 |
| 2012 | 226 | 191 | 0.75 |
| 2013 | 277 | 235 | 0.56 |
| 2014 | 333 | 282 | 0.53 |
| 2015 | 320 | 272 | 0.79 |
| 2016 | 195 | 166 | 0.55 |
| 2017 | 467 | 397 | 1.34 |

Notes: PM10 = respirable particulate matter, PM2.5 = fine particulate matter

1 There are large uncertainties associated with mapped vegetation types, fuel loading, fuel moisture, burned area, modeled fuel consumption in flaming and smoldering phases, and emission factors. The emission estimates may have an uncertainty of between a factor of 2 to 3 (CARB 2019b). CARB has not yet released estimates for 2018.

2 In this table, a ton represents 2,000 pounds rather than a metric ton, which totals 2,205 pounds or 1,000 kilograms.

Source: CARB 2019a

As shown in Table 3.4-5, the majority of particulate matter emissions from wildfires are composed of PM2.5, which is of greater concern than PM10 due to its smaller aerodynamic diameter size and ability to penetrate deep into the lungs and even the circulatory system. The emissions estimates displayed in Table 3.4-5 do not account for emissions associated with the combustion of petroleum fuels during wildfire response (firefighting). Jet fuel is combusted to operate aircrafts and helicopters that transport equipment, water, fire retardant, and crews to wildfire locations. Depending on the terrain, diesel-powered wildland fire engines may be used. Additional emissions would occur from the operation of gasoline and diesel-fueled automobiles to transport firefighters locally, regionally, and statewide. These activities are discussed in greater detail in Section 3.9, “Energy.”

#### Existing Levels of Emissions Generated by vegetation Treatments

As described in Chapter 1, “Introduction” and Section 2.3.1, “Past and Current Treatments,” vegetation treatment currently occurs around the state under several other wildfire risk reduction programs implemented by various federal, state, and local agencies. In 2017–2018, CAL FIRE treated approximately 33,000 acres in California using the same treatment activities as proposed under the CalVTP. Criteria pollutant and precursor emissions are generated by existing treatment activities. Emissions are currently generated by mechanical equipment, hand tools, worker commute and haul trips, and from prescribed burning.

#### Odors

Odors are generally regarded as an annoyance rather than a health hazard. However, manifestations of a person’s reaction to foul odors can range from psychological (e.g., irritation, anger, or anxiety) to physiological (e.g., circulatory and respiratory effects, nausea, vomiting, and headache).

With respect to odors, the human nose is the sole sensing device. The ability to detect odors varies considerably among the population and overall is quite subjective. Some individuals can smell very minute quantities of specific substances; others may not have the same sensitivity but may have sensitivities to odors of other substances. In addition, people may have different reactions to the same odor; an odor that is offensive to one person may be perfectly acceptable to another (e.g., smells from fast food restaurants). It is important to also note that an unfamiliar odor is more easily detected and is more likely to cause complaints than a familiar one. This is because of the phenomenon known as odor fatigue, in which a person can become desensitized to almost any odor and recognition only occurs with an alteration in the intensity. Odor sources of concern include wastewater treatment plants, sanitary landfills, composting facilities, recycling facilities, petroleum refineries, chemical manufacturing plants, painting operations, rendering plants, and food packaging plants. The odor associated with smoke generated by the burning of vegetative biomass on agricultural lands, forested areas, park and open space lands, and wildlands is also considered to be objectional.

#### Sensitive receptors

Sensitive receptors generally include those land uses where exposure to pollutants could result in health-related risks to sensitive individuals, such as children or the elderly. Residential dwellings, schools, hospitals, playgrounds, and similar facilities are of primary concern because of the presence of individuals particularly sensitive to pollutants and/or the potential for increased and prolonged exposure of individuals to pollutants.

Additionally, under the Smoke Management Program, smoke-sensitive areas are defined as populated areas and other areas where an air district determines that smoke and air pollutants can adversely affect public health. These areas include, but are not limited to, towns and villages, campgrounds, trails, populated recreational areas, hospitals, nursing homes, schools, roads, airports, public events, and shopping centers.

For the purposes of this PEIR, smoke-sensitive areas are considered sensitive receptors. Although the treatable landscape is generally in less populated, rural, or undeveloped areas, sensitive receptors are present throughout the treatable landscape.

### Environmental Impacts and Mitigation Measures

#### Methodology

The air quality analysis focuses on the potential for treatment activities under the CalVTP to result in substantial emissions of air pollutants that would affect regional and/or localized air quality such that human health would be adversely affected. Significance determinations account for the influence of relevant SPRs, which are incorporated into treatment design.

* **SPR AD-4 Public Notifications for Prescribed Burning**: One to three days prior to the commencement of prescribed burning operations, the project proponent will: 1) post signs along the closest public roadway to the treatment area describing the activity and timing, and requesting persons in the area to contact a designated representative of the project proponent (contact information will be provided with the notice) if they have questions or smoke concerns; 2) publish a public interest notification in a local newspapers or other widely distributed media source describing the activity, timing, and contact information; 3) send the local county supervisor and county administrative officer (or equivalent official responsible for distribution of public information) a notification letter describing the activity, its necessity, timing, and measures being taken to protect the environment and prevent prescribed burn escape. This SPR applies only to prescribed burn treatment activities and all treatment types, including treatment maintenance.
* **SPR AQ-1 Comply with Air Quality Regulations:** The project proponent will comply with the applicable air quality requirements of air districts within whose jurisdiction the project is located. This SPR applies only to prescribed burning treatment activities and all treatment types, including treatment maintenance.
* **SPR AQ-2 Submit Smoke Management Plan:** The project proponent will submit a smoke management plan for all prescribed burns ~~greater than 10 acres or estimated to produce more than 1 ton of particulate matter~~ to the applicable air district, in accordance with 17 CCR Section 80160. Pursuant to this regulation a smoke management plan will not be required for burns less than 10 acres that also will not be conducted near smoke sensitive areas, unless otherwise directed by the air district. Burning will only be conducted in compliance with the burn authorization program of the applicable air district(s) having jurisdiction over the treatment area. Example of a smoke management plan is in Appendix PD-2. This SPR applies only to prescribed burning treatment activities and all treatment types, including treatment maintenance.
* **SPR AQ-3 Create Burn Plan**: The project proponent will create a burn plan using the CAL FIRE burn plan template for all prescribed burns. The burn plan will include a fire behavior model output of First Order Fire Effects Model and BEHAVE or other fire behavior modeling simulation and that is performed by a qualified fire behavior technical specialist that predicts fire behavior, calculates consumption of fuels, tree mortality, predicted emissions, greenhouse gas emissions, and soil heating. The project proponent will minimize soil burn severity from broadcast burning to reduce the potential for runoff and soil erosion. The burn plan will be created with input from a qualified technician or certified State burn boss. This SPR applies only to prescribed burning treatment activities and all treatment types, including treatment maintenance.
* **SPR AQ-4 Minimize Dust**: To minimize dust during treatment activities, the project proponent will implement the following measures:
* Limit the speed of vehicles and equipment traveling on unpaved areas to 15 miles per hour to reduce fugitive dust emissions, in accordance with the California Air Resources Board (CARB) Fugitive Dust protocol.
* If road use creates excessive dust, the project proponent will wet appurtenant, unpaved, dirt roads using water trucks or treat roads with a non-toxic chemical dust suppressant (e.g., emulsion polymers, organic material) during dry, dusty conditions. Any dust suppressant product used will be environmentally benign (i.e., non-toxic to plants and will not negatively impact water quality) and its use will not be prohibited by ARB, EPA, or the State Water Resources Control Board (SWRCB). The project proponent will not over-water exposed areas such that the water results in runoff. The type of dust suppression method will be selected by the project proponent based on soil, traffic, site-specific conditions, and air quality regulations.
* Remove visible dust, silt, or mud tracked-out on to public paved roadways where sufficient water supplies and access to water is available. The project proponent will remove dust, silt, and mud from vehicles at the conclusion of each workday, or at a minimum of every 24 hours for continuous treatment activities, in accordance with Vehicle Code Section 23113.
* Suspend ground-disturbing treatment activities, including land clearing and bulldozer lines, when there is visible dust transport (particulate pollution) outside the treatment boundary, if the particulate emissions may “cause injury, detriment, nuisance, or annoyance to any considerable number of persons or to the public, or that endanger the comfort, repose, health, or safety of any of those persons or the public, or that cause, or have a natural tendency to cause, injury or damage to business or property,” per Health and Safety Code Section 41700.

This SPR applies to all treatment activities and treatment types, including treatment maintenance.

* **SPR AQ-5 Avoid Naturally Occurring Asbestos:** The project proponent will avoid ground-disturbing treatment activities in areas identified as likely to contain naturally occurring asbestos (NOA) per maps and guidance published by the California Geological Survey, unless an Asbestos Dust Control Plan (17 CCR Section 93105) is prepared and approved by the air district(s) with jurisdiction over the treatment area. Any NOA-related guidance provided by the applicable air district will be followed. This SPR applies to all treatment activities and treatment types, including treatment maintenance.
* **SPR AQ-6: Prescribed Burn Safety Procedures.** Prescribed burns planned and managed by non-CAL FIRE crews will follow all safety procedures required of CAL FIRE crew, including the implementation of an approved Incident Action Plan (IAP). The IAP will include the burn dates; burn hours; weather limitations; the specific burn prescription; a communications plan; a medical plan; a traffic plan; and special instructions such as minimizing smoke impacts to specific local roadways. The IAP will also assign responsibilities for coordination with the appropriate air district, such as conducting onsite briefings, posting notifications, weather monitoring during burning, and other burn related preparations. This SPR applies only to prescribed burning treatment activities and all treatment types, including treatment maintenance.

Qualifying treatments implemented under the CalVTP could result in an incremental increase in emissions of criteria air pollutant and precursors. The potential for mobile-source emissions of criteria air pollutants and precursors to exceed, or contribute to exceedances of, the NAAQS and CAAQS is examined by comparing treatment-related emissions to mass emission thresholds recommended by air districts in California. Emissions were estimated for each treatment activity being conducted in tree, shrub, and grass fuel types in the treatable landscape. Treatment-generated emissions were estimated on a per-acre basis. Emissions generated by off-road equipment were estimated using emission factors from CARB’s web-based OFFROAD2017 model (CARB 2017a). Emissions generated by on-road vehicle trips were estimated using emission factors from the Emission Factor 2017 model (EMFAC2017, Version 1.0.2) (CARB 2017b). Detailed calculations and assumptions are provided in Appendix AQ-1. The emissions intensity of treatment activities could vary widely according to multiple factors including, but not limited to, the amount of vegetation removed or treated per acre, the maturity of the vegetation, the number of workers and equipment needed for each treatment project, and the types of equipment available. For these reasons, all assumptions involved in the emissions calculations are included in Appendix AQ-1 and all emissions estimates are approximations.

Treatment-related TAC emissions are also discussed qualitatively based on the potential for projects to result in increased exposure of sensitive receptors (e.g., populated areas, residences, schools) to high concentrations of TACs. This discussion addresses the types of TAC-emitting activities that could occur such as diesel PM emitted by diesel-powered off-road equipment, NOA-containing fugitive dust emissions from ground disturbing activities, and TACs contained in smoke emissions from prescribed burning.

The potential for treatments implemented under the CalVTP to create objectionable odors affecting a substantial number of people is also discussed qualitatively with a focus on the types of odor sources, their intensity, smoke prevention measures, and the proximity of treatment activity to people.

#### Thresholds of Significance

Thresholds of significance are based on Appendix G and Section 15065 of the State CEQA Guidelines, professional judgment, and CEQA case law. As stated in Appendix G, the significance criteria established by air districts, including quantitative thresholds, may be relied upon to make significance determinations. Multiple air districts in California have published CEQA guidance with recommended quantitative thresholds for determining whether emissions from individual projects would be considered significant in the context of CEQA (also called mass emissions thresholds). Mass emission thresholds are the emission increments that would result in a cumulatively considerable net increase of any criteria pollutant or precursor that would exceed, or contribute to, the nonattainment status with respect to the CAAQS and NAAQS. Given the extensive geographic scope of the CalVTP’s treatable landscape, which is partially within every air district in California, the CAAQS and NAAQS thresholds are appropriate.

A treatment implemented under the proposed CalVTP would result in a significant regional and/or localized air quality impact such that human health would be adversely affected if emissions-generating treatment activity would:

* conflict with or obstruct implementation of the applicable air quality plan; specifically:
* conflict with or obstruct implementation of CARB’s State Implementation Plan, region-specific documents that demonstrate how each region can meet air quality standards;
* result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard; an increase would be cumulatively considerable if it would:
* generate emissions of criteria air pollutants and precursors that would exceed or contribute to exceedances of the CAAQS or NAAQS;
* expose sensitive receptors to substantial pollutant concentrations; specifically:
* result in an incremental increase in cancer risk greater than 10 in million and/or incremental increase in noncarcinogenic Hazard Index greater than 1.0; or
* result in the exposure of people to NOA
* result in other emissions (such as those leading to odors) adversely affecting a substantial number of people.

According to the California Supreme Court, lead agencies, in preparing EIRs, must make “a reasonable effort to substantively connect a project’s air quality impacts to likely *health consequences*.” (*Sierra Club v. County of Fresno* (2018) 6 Cal.5th 502, 510 [italics added].) Stated another way, the lead agency must make “a reasonable effort to discuss relevant specifics regarding the connection between… the general health effects associated with a particular pollutant and the estimated amount of that pollutant the project will likely produce.” (*Id*. at p. 521.) Where air quality effects are determined to be significant, “there must be a reasonable effort to put into a meaningful context the conclusion that the air quality impacts will be significant[,]” expressed in terms of “the nature and magnitude of the ‘health and safety problems caused by the physical changes’ resulting from the Project.” (*Id*. at p. 522.)

The court recognized, however, that in some instances, making the desired connection may not be scientifically feasible. “[I]f it is not scientifically possible to do more than has already been done to connect air quality effects with potential human health impacts, the EIR itself must explain why, in a manner reasonably calculated to inform the public of the scope of what is and is not yet known about the Project’s impacts.” (*Id*. at p. 520.)

Under State CEQA Guidelines section 15065, subdivision (a)(4), the environmental effects of a project are significant where they “will cause substantial adverse effects on human beings, either directly or indirectly.” (See also *California Building Industry Assn. v. Bay Area Air Quality Management Dist.* (2015) 62 Cal.4th 369, 799.) For purposes of this PEIR, “substantial adverse effects on human beings” means emitting criteria air pollutants or precursors that could result in in, or contribute to, an exceedance of the NAAQS or CAAQS in an air basin or at any location where people may be present; the exposure of people to a dose of TACs that results in an incremental increase in cancer risk greater than 10 in one million or a Hazard Index for acute or chronic risk greater than 1.0; exposure of people to airborne NOA; or exposing a substantial number of people to objectionable odors.

#### ISSUES NOT Evaluated FURTHER

All issues identified in State CEQA Guidelines Appendix G and listed above under Thresholds of Significance are discussed below.

#### Environmental Impacts and Mitigation Measures

Impact AQ-1: Generate Emissions of Criteria Air Pollutants and Precursors during Treatment Activities that Would Exceed CAAQS or NAAQS and Conflict with Regional Air Quality Plans

Emissions of criteria air pollutants and precursors generated by mechanical and manual treatments, prescribed herbivory, herbicide application, and prescribed burns under the CalVTP would likely exceed air district–established mass emission thresholds and, therefore, result in, or contribute to, the nonattainment status with respect to the NAAQS and CAAQS in one or more air basins. In addition, treatment activity–related emissions could result in, or contribute to, localized exceedances of NAAQS and CAAQS for CO, PM10, and PM2.5 in areas where people reside and work, thereby also conflicting with the air quality planning efforts of regional air districts, including those that comprise the SIP. This could result in health complications experienced by receptors, which, if it occurred, would be a **potentially** **significant** impact.

Treatment activities implemented under the CalVTP would result in emissions of criteria air pollutants and precursors from several sources, including:

* exhaust generated by off-road equipment, machine-powered hand tools, and helicopters;
* exhaust from on-road vehicle trips associated with worker commutes and transport of equipment, as well as the hauling and processing of biomass;
* fugitive PM10 and PM2.5 dust emissions generated by ground disturbance activities and vehicle travel on unpaved roads; and
* smoke generated by the combustion of vegetation during prescribed burns.

Mechanical treatments would be performed with heavy-duty off-road equipment such as wheeled tractors, crawler-type tractors, excavators, feller/bunchers, skidders, chippers, masticators or other specially designed tractors with attached implements designed to selectively cut, uproot, crush/compact, or chop target vegetation.

Manual treatments are typically conducted by one or two hand crews (i.e., 20–40 crew members) using four to eight chainsaws. Masticators and chippers may also be used at some manual treatment sites to assist with biomass disposition.

The vegetative debris produced by mechanical or manual treatments may be processed into several products: electricity, soil additives and amendments, engineered/composite wood, firewood, paper, densified wood, and potentially biofuels. This could result in additional haul truck trips to processing facilities, which would generate additional emissions of both exhaust and fugitive dust. Emissions would also be generated by equipment used to process the raw vegetative debris.

Prescribed herbivory may require intermittent use of an all-terrain vehicle or utility vehicle for herding livestock or transporting temporary fencing. On-road trucks would be used to haul livestock to and from sites where prescribed herbivory would be conducted.

Herbicide application may require all-terrain vehicles or tractors. However, few pieces of emission-generating equipment would be required, because herbicides would most frequently be applied by hand (manual application of herbicides).

Prior to implementing a prescribed burn, heavy-duty off-road equipment such as bulldozers, bulldozer transports, and masticators or track chippers may be used to create a fire containment (fuel break) perimeter. Fire engines and water trucks would be stationed on-site for safety. Hand tools to ignite the prescribed burn could include drip torches and Terra torches, which contain a blend of diesel fuel and gasoline. A helicopter with a helitorch may also be used when a large area needs to be burned or in an area with terrain that provides limited accessibility. Combustion of vegetation from prescribed burns would produce emissions of criteria air pollutants. The combustion of vegetation produces smoke, which is composed of a complex mixture of compounds, including criteria air pollutants and precursors.

Worker commute trips associated with all treatment activities would generate exhaust emissions of criteria air pollutants and precursors. If large crews are required, they would generally carpool to the site on a crew bus, which would also generate exhaust emissions. In addition, worker trips and truck trips on unpaved roads would result in fugitive PM10 and PM2.5 dust emissions.

As discussed in Chapter 2, “Program Description,” treatment activities would be selected based on several parameters including site-specific characteristics (e.g., types and maturity of vegetation, soil characteristics, terrain, proximity to sensitive areas, topography), weather conditions, treatment objectives, cost and available funding, and input from communities. Furthermore, the treatable landscape encompasses many different vegetation types, which can be grouped into three broad categories: tree, shrub, and grass. Given this wide variability over an expansive geographic area, there is no set of “typical” treatment characteristics that can be used to represent each type of treatment activity under the CalVTP. For instance, mechanical treatments conducted in a grass fuel type environment may use mowers, whereas mechanical treatments conducted in a tree fuel type environment may use feller/bunchers. Even the same treatment activity in the same fuel type could also vary. For instance, a mechanical treatment for a WUI fuel reduction treatment in a tree fuel type environment where biomass may be masticated and left in place may use chippers and masticators, whereas a mechanical treatment to establish a fuel break in a tree fuel type environment may use feller/bunchers, skidders, or cut-to-length systems to fell and remove select trees.

To provide a general sense of the scale of emissions that may be associated with treatment activities, the rates of emissions associated with each treatment activity (i.e., mechanical treatment, manual treatment, prescribed herbivory, herbicide application, and prescribed burning) in each fuel type (i.e., tree, shrub, and grass) are estimated on a per-acre basis using assumptions about the types and number of equipment that would be used by a treatment crew, as well as the number of workers per treatment crew. Treatment activities are subdivided by type because the types of equipment that could be used within each fuel type are distinct. These emission rates are summarized in Table 3.4-6. See Appendix AQ-1 for ~~and~~ detailed input parameters and assumptions. Exact emissions for treatment activities conducted under the CalVTP may differ from these hypothetical treatment scenarios because equipment, crew size, and area treated per day could vary widely. However, these scenarios are intended to provide a reasonable approximation of the emissions such activities would generate because they are based on past vegetation treatment projects conducted in California.

The emission rates presented in Table 3.4-6~~3.8-3~~ do not include emissions generated by trucks hauling equipment or livestock to and from treatment sites at the beginning and end of each treatment because the emissions associated with the transport of equipment and livestock would vary considerably depending on the size of a treatment site, trip distance, and the number of crews working at each site. The emission rates presented in Table 3.4-6 also do not include emissions associated with any hauling or processing of biomass, which may occur as part of some manual and mechanical treatment activities as conditions warrant. As discussed in Section 2.5.2, “Description of Treatment Activities,” the percentage of vegetation hauled to biomass facilities for energy generation is expected to increase over time. These emissions are not quantified due to the high level of uncertainty about what types of processing-related activities would occur and the distances feedstock would be hauled. Additionally, new biomass processing facilities that would require a discretionary decision from a lead agency would be subject to its own CEQA review.

The potential for treatment-related emissions of criteria air pollutants and precursors to contribute to regional air quality impacts and the potential for these emissions to result in high localized concentrations of criteria air pollutants are discussed separately below.

Table 3.4-6 Emissions of Criteria Air Pollutants and Precursors Associated with a Single Treatment Crew During a One-Acre Treatment

|  | Emissions per Acre Treated (lb/acre) ROG | Emissions per Acre Treated (lb/acre) NOX | Emissions per Acre Treated (lb/acre) PM10 | Emissions per Acre Treated (lb/acre) PM2.5 |
| --- | --- | --- | --- | --- |
| Prescribed Burning1 |  |  |  |  |
| Tree Fuel Type | 2,186.6 | 166.0 | 1,421.3 | 1,421.3 |
| Shrub Fuel Type | 352.8 | 44.4 | 142.1 | 142.1 |
| Grass Fuel Type | 166.4 | 21.9 | 84.5 | 84.5 |
| Mechanical Treatment |  |  |  |  |
| Tree Fuel Type | 3.0 | 5.3 | 0.3 | 0.2 |
| Shrub Fuel Type | 0.7 | 4.1 | 0.5 | 0.3 |
| Grass Fuel Type | 0.4 | 0.8 | 0.2 | 0.2 |
| Manual Treatment |  |  |  |  |
| Tree Fuel Type | 43.8 | 4.3 | 0.8 | 0.2 |
| Shrub Fuel Type | 18.0 | 2.6 | 0.6 | 0.2 |
| Grass Fuel Type | 0.1 | 0.1 | 0.05 | <0.1 |
| Prescribed Herbivory |  |  |  |  |
| Tree Fuel Type | 0.4 | 0.9 | 0.1 | 0.1 |
| Shrub Fuel Type | 0.8 | 1.8 | 0.2 | 0.2 |
| Grass Fuel Type | 0.8 | 1.8 | 0.2 | 0.2 |
| Herbicide Application |  |  |  |  |
| Tree Fuel Type | 0.5 | 1.6 | 0.2 | 0.1 |
| Shrub Fuel Type | 0.3 | 0.8 | 0.1 | 0.1 |
| Grass Fuel Type | 0.1 | 0.2 | <0.1 | <0.1 |

Notes: lb/acre = pounds per acre; ROG = reactive organic gases; PM10 = respirable particulate matter with an aerodynamic diameter of 10 microns or less; PM2.5 = fine particulate matter with an aerodynamic diameter of 2.5 microns or less; NOX = oxides of nitrogen.

1  The emissions estimates for prescribed burning, which may consist of broadcast burning or pile burning, consist of the emissions that would be generated by the combustion of vegetative fuels. Other treatment activities may be performed on the same lands prior to broadcast burning or pile burning being conducted.

Source: See Appendix AQ-1 for detailed calculations

###### Regional Air Quality

As described in Section 3.4-1, “Regulatory Setting,” air districts recommend mass emission thresholds to determine whether a project would result in a cumulatively considerable net increase of any criteria pollutant or precursor that would exceed, or contribute to the nonattainment status with respect to the NAAQS and/or CAAQS, which represent concentration limits of criteria air pollutants needed to adequately protect human health.

As described in Chapter 2, “Program Description,” the CalVTP would treat approximately 250,000 acres annually within the 20.3-million-acre treatable landscape. The relative distribution of treatment activities is reasonably expected to be 50 percent prescribed burning, 10 percent manual treatments, 20 percent mechanical treatments, 10 percent herbicide treatments, and 10 percent prescribed herbivory. However, it is not feasible to precisely describe the location, size, or timing of specific treatments during any particular year, or any single day, in this programmatic evaluation. Depending on the number of acres that would undergo treatment on the same day (or same year) within the same air basin, the levels of criteria air pollutants and precursors emitted by treatment activities could exceed the mass emissions thresholds recommended by local air districts. For instance, as shown in Table 3.4-6, one acre of prescribed burning would generate 166 pounds per day (lb/day) of NOX. This level would exceed the applicable daily mass emissions thresholds established by every air district in California, which are shown in Table 3.4-2. As shown in Table 3.4-6, mechanical treatment of tree-dominated fuels, manual treatment of tree-dominated fuels, and mechanical treatment of shrub-dominated fuels, would generate NOX emissions at rates of 5.3 lb/acre, 4.3 lb/acre, and 4.1 lb/acre, respectively. If 20 acres underwent these types of treatment in a single day in the same air district the associated emissions would amount to approximately 106 lb/day, 86 lb/day, and 82 lb/day, respectively. These daily levels would exceed applicable daily mass emission threshold in most air districts. Also as shown in Table 3.4-6, prescribed herbivory in tree-, shrub-, and grass-dominated fuels would generate NOX emissions at rates of 0.9 lb/acre, 1.8 lb/acre, and 1.8 lb/acre, respectively. If 100 acres underwent these types of treatment in a single day in the same air district the associated emissions would amount to approximately 90 lb/day, 180 lb/day, and 180 lb/day, respectively. These daily levels would exceed applicable daily mass emission threshold in many air districts. Moreover, combinations of different treatment activities taking place in the same air district at the same time could also result in exceedances of applicable daily mass emission thresholds. Some air districts recommend annual mass emission thresholds, expressed in tons per year, which could also be exceeded by treatment activity. Because treatment activities implemented under the CalVTP would generate levels of criteria air pollutants and precursors that exceed air district thresholds, these emissions could result in, or contribute to, exceedances of the NAAQS and CAAQS for ozone, PM10, and PM2.5, thereby also conflicting with the air quality planning efforts of regional air districts, including those that comprise the SIP.

###### Localized Concentrations of Criteria Air Pollutants

In addition to regional air quality concerns, emissions of some criteria air pollutants from treatment activities could result in localized concentrations of criteria air pollutants that exceed NAAQS and CAAQS and expose nearby receptors to associated adverse health effects. This discussion focuses on the formation of ground-level ozone from the oxidation of ROG and NOx, fugitive PM10 and PM2.5 dust emissions from travel on unpaved roads and ground disturbing activities, and smoke emissions from prescribed burning.

Ozone

As summarized in Table 3.4-3, “Sources and Health Effects of Criteria Air Pollutants,” ground-level ozone is a secondary pollutant derived from the oxidation of ROG and NOx in the presence of sunlight. Ozone is not a pollutant of localized concern. Portions of the treatable landscape are designated as non-attainment with respect to the NAAQS and CAAQS for ozone, as shown in Table 3.4-4. Therefore, treatment activity-related emissions of ROG and NOx could exacerbate this existing adverse condition in these areas.

However, given the many factors (e.g., topography, meteorology, emissions sources) that contribute to the formation and dispersion of ozone, it is not scientifically possible to predict with a meaningful level of accuracy the number of days when ozone concentrations would exceed the NAAQS or CAAQS or the locations where exceedances would occur. Current models cannot determine the locations of, or the specific concentrations of, ozone from ROG or NOx precursors because of the complex physical factors that contribute to the chemical reactions necessary to convert precursors to ground-level ozone (i.e., sun, temperature, wind, topography). Any meaningfully accurate prediction in site-specific ozone concentrations using currently available ozone models would require precursor emissions to be sufficiently substantial as to change the regional inventory of pollutants, which would not occur with a singular prescribed burn project. Therefore, such predictions for treatments conducted under the CalVTP would not be scientifically possible. Nonetheless, because precursor emission levels would likely exceed mass emissions thresholds established by local air districts, as discussed above, it is reasonably foreseeable that treatment activity–related emissions could contribute to an increase in the number of days when the NAAQS and CAAQS for ozone are exceeded in some portions of the air basins in which the ozone is formed.

As summarized in Table 3.4-3, human exposure to ozone may result in acute and chronic health effects including coughing, pulmonary distress, lung inflammation, shortness of breath, and permanent lung impairment. Mass emission thresholds are considered by air districts to be the levels that constitute a cumulatively considerable contribution to an exceedance of the CAAQS and NAAQS, which have been established to protect human health. Because emissions of ROG and NOX generated by the CalVTP would exceed the mass emissions thresholds of local air districts, it is foreseeable that the aforementioned adverse health effects associated with ozone exposure could be exacerbated by treatment activity–related emissions of criteria air pollutants and precursors.

Fugitive PM10 and PM2.5 Dust Emissions

Some parts of the treatable landscape can only be accessed by unpaved roads. Travel on unpaved surfaces generates fugitive PM10 and PM2.5 dust emissions. Depending on the number of vehicle trips, the proximity of people, the silt content of soil, travel on unpaved roads could result in, or contribute to, an exceedance of the 24-hour CAAQS of 50 µg/m3 for PM10, the 24-hour NAAQS of 150 µg/m3 for PM10, and/or the 24-hour NAAQS of 35 µg/m3 for PM2.5 at nearby receptors. As summarized in Table 3.4-3, human exposure to fugitive dust emissions may cause acute and chronic health impacts including breathing and respiratory symptoms, premature death, and carcinogenesis. Several SPRs address fugitive dust and would be implemented to minimize fugitive dust emissions. SPR AQ-4, AQ-5, and AQ-6 would limit vehicle speeds on unpaved roads, require that vehicles be cleaned prior to leaving treatment sites to reduce the inadvertent transport of dust from unpaved areas onto paved roads, and require the suspension of ground disturbing activities when they result in visible dust transport outside the boundary of treatment areas. Furthermore, SPR AQ-4 requires treatment crews to wet unpaved roads if excessive dust is created during road use, using water trucks or non-toxic chemical dust suppressants. Implementation of these SPRs would minimize the contribution of treatment activities to localized concentrations of PM10 and PM2.5. Nonetheless, if ambient background concentrations are high and multiple treatment crews generate new vehicle trips on the same unpaved roadway on the same day, resultant concentrations of PM10 and PM2.5 from fugitive dust could exceed applicable NAAQS and CAAQS at roadside residences and other places where people are present and expose affected receptors to adverse health effects.

Smoke Emissions from Prescribed Burns

As discussed in Section 3.4.2, “Environmental Setting,” the primary pollutant of localized concern from prescribed burning is PM2.5, which includes UFP. Emissions of PM2.5 generated by prescribed burns could result in, or contribute to, exceedances of the CAAQS and NAAQS for PM2.5 where people are present. In terms of localized impacts, studies have shown that exposure of workers implementing prescribed burns to PM2.5 can substantially exceed occupational exposure limits (OELs) established by the California Division of Occupational Safety and Health (Cal/OSHA) and the National Institute for Occupational Safety and Health (NWCG 2018), as well an Air Quality Index (AQI) of 150 for PM2.5, which is the criterion used in Cal/OSHA’s emergency regulation to protect outdoor workers from wildfire smoke (Cal/OSHA 2019). Inhalation of particulate matter can cause short-term breathing and adverse respiratory symptoms, aggravation of existing respiratory and/or cardiovascular conditions, premature death, exposure to carcinogens, and compromised immune function.

In addition to PM2.5, smoke emissions contain CO, which at high concentrations can cause dizziness, nausea, and impaired mental function. CO levels are highest during the smoldering stages of a fire, and resultant concentrations are especially high in areas close to the fire. CO disperses rapidly with distance such that fire-generated CO will not adversely affect nearby receptors unless a large fire occurs and inversion conditions trap the CO in areas where people are present.

Localized exposure to smoke from prescribed burns, like other emissions, is dependent on proximity to the source. Those workers implementing the prescribed burn are at greatest risk for smoke exposure because they would be in or adjacent to active burn areas. CAL FIRE employs safety measures to protect fire personnel when implementing prescribed burns, including respirators and goggles that meet occupational safety and health standards. CAL FIRE also requires approval of an Incident Action Plan (IAP) that identifies medical personnel and procedures and requires all personal protective equipment to be worn during fire operations (see Appendix AQ-2 for a sample IAP). These safety measures would provide real-time monitoring of smoke conditions, reduce the potential for adverse smoke effects, and reduce inhalation hazards for fire personnel. Although these prescribed burning planning efforts are specific to CAL FIRE, each agency that plans and implements prescribed burns has its own set of agency-specific planning tools, planning and safety documents, public notification protocols, and best management practices to reduce risks related to safety, human health, and the environment. Moreover, SPR AQ-6~~8~~ requires prescribed burns conducted by non-CAL FIRE crews to follow all CAL FIRE safety procedures, including an approved IAP, which would minimize worker exposure to smoke.

To protect the public from smoke emissions, emissions from prescribed burns are regularly controlled through reduction techniques, such as burning only when fuels have a prescribed moisture content, reducing fuels before ignition, and scheduling burns before new fuels appear. According to the National Wildfire Coordinating Group, if emission reduction techniques are optimally used, emissions from prescribed burns around the U.S. could potentially be reduced by 20–25 percent without interfering with land management objectives (NWCG 2018). Furthermore, several SPRs address prescribed burning and would be implemented to minimize smoke emissions and potential exposure of people. SPR AD-4 requires adequate public noticing and signage about prescribed burns including timing, contact information, and description of the activity. The public would be restricted from areas where active burns would take place. SPR AQ-2 requires burn managers to submit and obtain approval for their SMPs, which would identify the locations where people may be present and specify the smoke prescription to reduce their exposure to smoke. Additionally, SPR AQ-3 requires completion of a burn plan. Contents of a prescribed burn plan also include the date, location, and description of the area in detail, prescriptive weather requirements, fire behavior modeling, the ignition plan (including technique, time of day, and mop-up), a contingency plan, the smoke management plan (SMP), public notification plan, a go/no go checklist, and contact information for the burn boss and others in charge of the prescribed burn. Burn plans reduce the potential for public exposure to smoke by requiring the activity to be designed in a way that prioritizes public safety, and by identifying the specific conditions under which a safe prescribed burn can commence and proceed. Specific to prescribed burns implemented by CAL FIRE, one crew member is typically assigned to report weather conditions to the Incident Commander every 30 minutes to make sure the burn is staying within its prescription. If conditions deviate from the burn plan, crews transition from active burning activities to patrolling and/or extinguishing. In the event a prescribed burn extends beyond the perimeter of its planned area, on-site hand crews are deployed to control the escape.

However, despite adherence to an SMP, IAP, and other precautionary measures, meteorological conditions may change during some prescribed burns and the quantity of smoke generated and the direction and height of its dispersion may not occur as predicted. During these instances unanticipated people could be exposed to smoke. The concentrations of CO, PM10, and PM2.5 contained in the smoke could exceed, or contribute to, a localized exceedance of, the NAAQS and CAAQS for CO, PM10, and PM2.5 and expose receptors to adverse health effects such as breathing and adverse respiratory symptoms, aggravation of existing respiratory and/or cardiovascular conditions in the short-term, and in the long term, premature death, exposure to carcinogens, and compromised immune function. Such events could occur more frequently under the CalVTP simply because more prescribed burns would be performed each year, compared to existing conditions.

###### Summary

Emissions of criteria air pollutants and precursors associated with treatment activity performed by qualifying projects under the CalVTP would likely exceed air district–established mass emission thresholds and, therefore, result in, or contribute to, the nonattainment status with respect to the NAAQS and CAAQS in one or more air basins, thereby conflicting with the air quality planning efforts of regional air districts, including those that comprise the SIP. In addition, treatment activity–related emissions could result in, or contribute to, localized exceedances of NAAQS and CAAQS in areas where people reside and work. Such localized exceedances could result from fugitive PM10 and PM2.5 dust emissions generated by travel by workers and haul trucks on unpaved roads and from prescribed burns that generate smoke containing CO, PM10, and PM2.5. Because of these possible adverse effects to air quality on both a regional level and local level and the resulting health effects that could be experienced by exposed receptors, this impact, if it occurred, would be **potentially** **significant**.

While implementation of the CalVTP would result in emissions of criteria air pollutants and precursors from on- and off-road equipment, vehicle travel, and prescribed burns that may exceed the mass emission thresholds of local air districts, it is also reasonable to expect that the treatment activities conducted under the CalVTP would result in some degree of long-term reduction in emissions of criteria air pollutants and precursors from wildfires by reducing the intensity of wildfires in treated landscapes, limiting wildfire spread, and slowing the progress of some fires to allow for more rapid containment. As described in Chapter 2, “Program Description,” a primary purpose of the CalVTP is to reduce wildfire risk in California. Emergency response for firefighting efforts requires mobilizing and deploying significant human and equipment resources from throughout the state, and in some cases nationally and internationally. Furthermore, when wildfires destroy structures, large volumes of debris are generated, which must be removed by haul trucks. This major surge in the use of on-road vehicles and off-road equipment during wildfire response results in an increase of emissions also unaccounted for by the air quality planning efforts of air districts. Wildfire itself, through the combustion of vegetative and non-vegetative fuels also results in increased and unforeseen emissions. As discussed in Section 3.4.2, “Environmental Setting,” recent major wildfires have created hazardous air pollution conditions requiring health advisories and “spare the air” days far from the site of the fire. Thus, wildfires are generally far more likely to result in adverse air quality and public health impacts than prescribed burns. Given the unpredictability of wildfire, the variability in emission characteristics of wildfire fuels (i.e., grass-type, shrub-type, tree-type, built structures), and the possible variability in emissions from treatment activities under the CalVTP, evaluating the net effect of the CalVTP on emissions associated with wildfire and wildfire response is not possible, nor is it pertinent to determining the significance of the emissions from treatment activities under CEQA. This information is presented to explain the broader context for consideration of fire-related emissions in California, including both treatment emissions and wildfire emissions.

Mitigation Measures

Mitigation Measure AQ-1: Implement On-Road Vehicle and Off-Road Equipment Exhaust Emission Reduction Techniques

Where feasible, project proponents will implement emission reduction techniques to reduce exhaust emissions from off-road equipment. It is acknowledged that due to cost, availability, and the limits of current technology, there may be circumstances where implementation of certain emission reduction techniques will not feasible. The project proponent will document the emission reduction techniques that will be applied and will explain the reasons other techniques that could reduce emissions are infeasible.

Techniques for reducing emissions may include, but are not limited to, the following:

* Diesel-powered off-road equipment used in construction will meet EPA’s Tier 4 emission standards as defined in 40 CFR 1039 and comply with the exhaust emission test procedures and provisions of 40 CFR Parts 1065 and 1068. Tier 3 models can be used if a Tier 4 version of the equipment type is not yet produced by manufacturers. This measure can also be achieved by using battery-electric off-road equipment as it becomes available. Prior to implementation of treatment activities, the project proponent will demonstrate the ability to supply the compliant equipment. A copy of each unit’s certified tier specification or model year specification and operating permit (if applicable) will be available upon request at the time of mobilization of each unit of equipment.
* Use renewable diesel fuel in diesel-powered construction equipment. Renewable diesel fuel must meet the following criteria:
* meet California’s Low Carbon Fuel Standards and be certified by CARB Executive Officer;
* be hydrogenation-derived (reaction with hydrogen at high temperatures) from 100 percent biomass material (i.e., non-petroleum sources), such as animal fats and vegetables;
* contain no fatty acids or functionalized fatty acid esters; and
* have a chemical structure that is identical to petroleum-based diesel and complies with American Society for Testing and Materials D975 requirements for diesel fuels to ensure compatibility with all existing diesel engines.
* Electric- and gasoline-powered equipment will be substituted for diesel-powered equipment.
* Workers will be encouraged to carpool to work sites, and/or use public transportation for their commutes.
* Off-road equipment, diesel trucks, and generators will be equipped with Best Available Control Technology for emission reductions of NOX and PM.

###### Significance after Mitigation

Mitigation Measure AQ-1 would reduce the mass emissions of criteria air pollutants and precursors generated by use of on-road vehicles and off-road equipment during treatment activities. Given the potential infeasibility of implementing specific emission reduction techniques and the uncertainties associated with treatment activity location, size, and timing, the emission reductions from implementation of Mitigation Measure AQ-1 cannot be meaningfully quantified. Thus, depending on the number of acres that would undergo treatment on the same day (or same year) within the same air basin, the potential remains that levels of criteria air pollutants and precursors emitted by treatment activities could still exceed the mass emissions thresholds recommended by local air districts, thereby resulting in, or contributing to, exceedances of the NAAQS and CAAQS in air basins.

Mitigation Measure AQ-1 would not reduce to a less than significant level the potential for treatment-related vehicle travel on unpaved roads to result in, or contribute to, localized concentrations of PM10 and PM2.5 that exceed applicable NAAQS and CAAQS.

While implementation of Mitigation Measure AQ-1 would reduce emissions and the resultant exposure to potential health effects, the amount of the reduction cannot be determined because of the variables described above; therefore, the potential remains that localized exceedances of the NAAQS and CAAQS for CO, PM10, and PM2.5 and associated adverse health effects to exposed people could occur and this impact would remain **potentially** **significant and unavoidable**.

Impact AQ-2: Expose People to Diesel Particulate Matter Emissions and Related Health Risk

Because of the short duration of treatment activities and because treatment activity would not take place near the same people for an extended period of time, diesel PM generated by treatment activities would not expose any person to an incremental increase in cancer risk greater than 10 in one million or a Hazard Index of 1.0 or greater. This impact would be **less than significant**.

Implementation of treatments under the CalVTP would result in exhaust emissions of diesel PM from off-road equipment and haul truck trips associated with treatment activities. Mechanical treatments of forested lands (tree fuel type) would generally involve the greatest number of large, heavy-duty off-road diesel equipment such as harvesters, forwarders, masticators and chippers in comparison to other treatment activities in other fuel types. Some diesel-powered equipment may also be used in manual treatments and herbicide application treatments, such as machine powered hand tools and applicators, and the preparation of prescribed burn areas may include bulldozing and chaining to loosen vegetation and for clearing vegetation to establish control lines. Diesel-powered on-road trucks would also be used to haul equipment and workers to and from treatment sites, and to haul livestock to sites where prescribed herbivory would be conducted.

As described in the Regulatory Setting (Section 3.4.1), diesel PM is a TAC. It is estimated that about 70 percent of total known cancer risk related to air toxics in California is attributable to diesel PM (CARB 2019c). The potential cancer risk from inhaling diesel PM is greater than the potential for all other diesel PM–related health impacts (i.e., noncancer chronic risk, short-term acute risk) and health impacts from other TACs (CARB 2003:K-1). Based on the emissions calculations summarized under Impact AQ-1 and presented in Appendix AQ-1, the level of diesel PM exhaust that would be emitted by a single crew performing mechanical treatment in tree-dominated fuel types would be approximately 1.4 lb/day and this level would be higher than for any other treatment activity in any other fuel type.

The dose to which receptors are exposed is the primary factor used to determine health risk (i.e., potential exposure to TAC emission levels that exceed applicable standards). Dose is a function of the concentration of a substance or substances in the environment and the duration of exposure to the substance. Dose is positively correlated with time, meaning that a longer exposure period would result in a higher exposure level for the maximally exposed individual (the hypothetical individual who receives the greatest possible projected dose in the area of highest TAC concertation levels over a specified period of time). Thus, the risks estimated for a maximally exposed individual are higher if a fixed exposure occurs over a longer period of time. According to the Office of Environmental Health Hazard Assessment, health risk assessments, which determine the exposure of people to TAC emissions, should be based on a 30- or 70-year exposure period, depending on whether the analysis is for a maximally exposed individual or population-wide impacts. However, such assessments should be limited to the period/duration of activities that generate TAC emissions (OEHHA 2015).

Treatment activities would progress across treatment sites such that diesel PM generated by treatment activities would not take place near any single sensitive receptor for an extended period. For example, mechanical treatment of forested lands by a single treatment crew progresses at a rate of approximately 5 acres per day (California Tahoe Conservancy 2018:3-13). Thus, the diesel PM-emitting activities associated with treatment activities would not take place in the same approximate 5-acre area for more than one day. This means the period during which a single person could be exposed to diesel PM emissions from a treatment activity would be short relative to the 30- or 70-year exposure timeframe recommended for health risk assessments. In addition, diesel PM dissipates rapidly from the source, and exposure concentrations would decline with distance from these activities (Zhu et al. 2002:1032). Furthermore, SPR HAZ-1 requires that all diesel and gasoline-powered equipment be properly maintained to comply with all state and federal emissions requirements, which would prevent excessive emissions of diesel PM due to poorly functioning equipment. Also, SPR NOI-4 requires vegetation treatment activities and staging areas be located as far as possible from human receptors and SPR NOI-5 restricts equipment idling time.

Regarding treatment activities in forested areas, an emerging set of research of diesel PM generated by roadway traffic (i.e., on-road vehicles) indicates that vegetation removes particulates from the air. It does so through the direct absorption of gaseous pollutants through leaf stomata and by dissolving water soluble pollutants onto moist leaf surfaces (Islam et al. 2012:2, Zhang 2015:14). Evergreen trees are particularly effective because the leaves are not shed during the winter, when air quality is usually worst due to lower inversion heights (Islam et al. 2012:1). The research demonstrates that the presence of trees between vehicles and receptors further reduce potential exposure to diesel PM along roadways. Thus, treatment activities in the tree fuel type would experience the same mitigating effect on diesel PM emitted by equipment, because the remaining stands of trees provide the same buffering condition identified in the research. For the reasons stated above, it is expected that the cancer risk associated with diesel PM generated by treatment activities implemented under the CalVTP would be less than 10 in one million. Therefore, qualifying projects under the CalVTP would not result in the exposure of any individuals to an incremental increase in cancer risk greater than 10 in one million or a Hazard Index of 1.0. Impacts would be **less than significant**.

Moreover, implementation of Mitigation Measure AQ-1 would reduce the emissions of diesel PM generated by use of on-road vehicles and off-road equipment during treatment activities.

##### Mitigation Measures

No mitigation is required for this impact.

Impact AQ-3: Expose People to Fugitive Dust Emissions Containing Naturally Occurring Asbestos and Related Health Risk

Treatment activities implemented under the CalVTP could involve ground disturbing activities in areas where NOA is present. However, multiple SPRs would limit exposure of people to NOA-containing fugitive dust emissions generated by treatment activities implemented under the CalVTP. This impact would be **less than significant**.

As discussed in Section 3.4.2, “Environmental Setting,” some areas within the treatable landscape contain serpentinite or other ultramafic rock and soil that could potentially contain NOA. These types of rock and soil contain thin veins of asbestos fibers that can become airborne when disturbed.

Treatment activities implemented under the CalVTP could involve ground disturbing activities such as vehicle travel on unpaved roads and use of tractors in areas where NOA is present, which may result in NOA becoming airborne. Treatment activities could also include prescribed burning in areas where NOA is present. The potential for fires in serpentine rock areas to release asbestos particles was investigated after the Chips Fire in August 2012, which burned over 75,000 acres in Plumas and Lassen National Forest Lands. Collected air samples indicated that no harmful levels of airborne asbestos particles were present in the smoke from this fire. The U.S. Forest Service (USFS) concluded that working or firefighting in the Chips Fire serpentine rock areas presented no asbestos exposure danger. USFS found that while there was no need for firefighters to wear high-efficiency particulate air respirators while performing duties in the area, it was worth considering reasonable safety precautions such as dust minimization measures (USFS 2013).

Multiple SPRs would limit exposure of people to fugitive dust emissions generated by treatment activities implemented under the CalVTP. SPR AQ-5~~7~~ requires project proponents to avoid ground-disturbance in areas identified as likely to contain NOA as indicated on maps and guidance published by the California Geological Survey, unless an Asbestos Dust Control Plan (17 CCR Section 93105) is prepared and approved by the applicable local air district. SPR AQ-5~~7~~ also requires treatment crews to follow any NOA-related guidance provided by the applicable local air district, reducing the risk of encountering NOA or generating airborne NOA emissions. Additionally, SPR AQ-4 requires treatment crews to wet unpaved roads using water trucks or treat roads with a non-toxic chemical dust suppressant (e.g., emulsion polymers, organic material) during dry, dusty conditions, which would reduce the risk of airborne NOA emissions. Implementation of SPRs AQ-4 and AQ-5~~7~~ would minimize the potential for people to be exposed to NOA. As a result, this impact would be **less than significant**.

##### Mitigation Measures

No mitigation is required for this impact.

Impact AQ-4: Expose People to Toxic Air Contaminants Emitted by Prescribed Burns and Related Health Risk

Prescribed burns conducted under the CalVTP could result in the short-term exposure of people to concentrations of TACs and associated levels of acute health risk with a Hazard Index greater than 1.0. This would be a **potentially** **significant** impact.

The primary air pollutant of concern from smoke generated by prescribed burning is PM2.5. PM2.5 is a criteria air pollutant, subject to the health-based NAAQS and CAAQS (exceedance of NAAQS and CAAQS for PM2.5 is discussed in Impact AQ-1).

As discussed in Section 3.4.2, “Environmental Setting,” smoke from prescribed burning generates small concentrations of TACs, such as aldehydes (including formaldehyde and acrolein), and organic compounds, such as PAHs and benzene. Smoke from prescribed burns also contains CO, which is identified as a TAC as well as a criteria pollutant. Although the concentrations of TACs within smoke generated by prescribed burns are much lower than concentrations of PM2.5, TACs emitted by prescribed burning have the potential to expose people to adverse short- and long-term health effects (CARB and CDPH 2016). Risk factors published for these TACs indicate that they can expose receptors to short- and/or long-term health effects depending on the dose of exposure (CARB 2018b). The potential for receptors located near prescribed burn sites to be exposed to short- and long-term health effects are addressed below. Published research has studied worker (i.e., firefighter) exposure to TACs during burning; the results of these studies are used to inform the analysis of the effects of human exposure in general to TACs from prescribed burns.

###### Exposure to Short-Term Acute Health Effects

Exposure to the types of TACs found in smoke could result in acute short-term health impacts such as eye and respiratory irritation and exacerbated asthma symptoms. Studies evaluating exposure of firefighters to smoke from prescribed burns have compared measured exposure levels at or next to burn sites to the Permissible Exposure Limits (PEL) established by the U.S. Occupational Safety and Health Administration’s (OSHA) and to more stringent OELs established by Cal/OSHA and the National Institute for Occupational Safety and Health. Although studies have not found the time-weighted average TAC exposure levels that would exceed OSHA’s PELs, up to 14 percent of firefighters evaluated in the studies were exposed to short-term respiratory irritant levels above the more stringent OELs (NWCG 2018, Reinhardt et al. 2000). Studies also found that the level of acute health risk experienced by firefighters from short-term exposure to formaldehyde, acrolein, benzene, and CO exceeded a Hazard Index of 1.0 (NWCG 2018). The highest levels of exposure to TACs occurred when burn personnel were maintaining prescribed burns within designated containment lines and performing direct attack of spot fires that crossed containment lines. These events and the associated smoke exposures occur more frequently during stronger winds, which hamper fire management and can carry the convective plume of smoke into the breathing zone of firefighters (Reinhardt and Ottmar 2004).

As discussed under Impact AQ-1, prescribed burn smoke exposure, like other emissions, is dependent on proximity to the source. The studies describe above focused on exposure of firefighters, which are by necessity the nearest receptor to smoke during prescribed burning. The general population would be further from smoke than firefighters but may also be exposed. However, because smoke generally disperses over distance any nearby people would experience lower concentrations of TAC-containing smoke than fire personnel working within or adjacent to burn areas.

CAL FIRE and other agencies that plan and implement prescribed burns have agency-specific planning tools, planning and safety documents, public notification protocols, and best management practices to reduce safety risks and protect workers and the general population from excessive smoke exposure. CAL FIRE also requires approval of an Incident Action Plan (IAP) which, among other things, requires real-time monitoring of smoke conditions, reduces the potential for smoke exposure, and reduces inhalation hazards. SPR AQ-6~~8~~ requires prescribed burns conducted by non-CAL FIRE crews to follow all CAL FIRE safety procedures, including developing and implementing an approved IAP. For safety reasons, the public would be restricted from areas where active burns would take place, which would also avoid and minimize smoke exposure. SPR AD-4 requires adequate public notice and signage about prescribed burns including timing, contact information, and description of the activity. This would alert the public to planned burns and give them adequate notice to take precautionary measures such as using respirators, closing windows, or temporarily vacating the area. Additionally, per SPR AQ-2 and as discussed in Section 3.4.1, “Regulatory Setting,” burn managers must submit and obtain approval for each SMP, which would identify nearby locations where people spend time and specify the prescription to reduce smoke exposure. CAL FIRE typically assigns one crew member to report weather conditions to the Incident Commander every 30 minutes to make sure the burn is staying within its prescription. If conditions ever deviate from the burn plan, the burn is rescheduled, and crews transition from managing active burning activities to patrolling and/or extinguishing the burn. In the event a prescribed burn extends beyond the perimeter of its planned area, hand crews are onsite to control the escape.

The prescription in the burn plan, best management practices, safety protocols, and SPRs discussed above are intended to ensure that burns stay within their prescription and minimize the exposure of the public to smoke. However, despite adherence to an SMP, IAP, and other precautionary measures, there is no guarantee that smoke from every burn will behave as predicted and that people would not be exposed to TACs from smoke. Common reasons that prescribed burns have gone out of prescription are abnormal weather conditions, greater fuel loading than anticipated, and unexpected winds (Dether 2005). Furthermore, the CalVTP would increase the number of acres that are treated through prescribed burning annually over existing vegetation treatment regimes. Despite the best efforts to control burns, the increase in the number of prescribed burns performed each year could result in a greater number of instances when prescribed burns go out of prescription than under existing conditions. Therefore, prescribed burns implemented under the CalVTP would have the potential to expose people to a short-term dose of TAC concentrations that exceeds a Hazard Index greater than 1.0 for acute health risk.

###### Exposure to Long-Term Chronic Health Effects

Exposure to the types of TACs contained in smoke generated by prescribed burns could result in chronic long-term health risk, including elevated cancer-risk. The long-term public health impacts of prescribed burning are not well studied; however, a human health risk assessment conducted on wildland firefighters found that the levels of PAHs wildland firefighters were exposed to in smoke were not found to be the major contributors to their overall level of cancer risk (NWCG 2018). Short-term elevated exposures (i.e., over days to weeks) to carcinogens found in wildfire smoke were found to be small relative to total lifetime exposures to carcinogens in other, more common combustion sources (CARB and CDPH 2016).

As discussed in Impact AQ-2, the dose to which receptors are exposed is the primary factor used to determine health risk (i.e., potential exposure to TAC emission levels that exceed applicable standards). Dose is a function of concentration over time. Prescribed burns typically last 1 day and may occur up to 1 week in any given location and most do not go out of prescription and result in the movement of smoke plumes to areas where residences or other people are present. Thus, it is not anticipated that the dose resulting from the increase in the number of prescribed burns that would occur under the CalVTP would expose any people to a level of chronic, noncarcinogenic risk that exceeds a Hazard Index of 1.0 or to an incremental increase in cancer risk that exceeds 10 in one million.

###### Summary

In summary, the increase in prescribed burn activity under the CalVTP would not result in the long-term exposure of TAC-containing smoke to residences or other places where people spend time and, therefore, is not anticipated to expose any people to a level of chronic, noncarcinogenic risk that exceeds a Hazard Index of 1.0 or to an incremental increase in cancer risk that exceeds 10 in on million. However, despite adherence to all the safety measures in the SMP and IAP, unpredictable changes in weather can occur during prescribed burns; if this occurred, it could result in the short-term exposure of residences and places where people spend time to concentrations of TACs and associated levels of acute health risk with a Hazard Index greater than 1.0. This would be a **potentially** **significant** impact.

As discussed in Section 3.4.2, “Environmental Setting,” wildfires are a large source of TACs, and represent a greater public health concern than prescribed burns due to their uncontrolled nature and longer duration. Wildfires may last for weeks or even months, potentially resulting in a longer exposure of receptors to TACs from smoke emissions over a broad geography. Most critically, wildfires often burn structures in addition to vegetation, releasing a wider array of chlorinated and other toxic compounds not present in prescribed burns that could cause adverse health effects when inhaled (NWCG 2018). Given the unpredictability of wildfire, the variability in TAC emission characteristics of wildfire fuels (i.e., grass-type, shrub-type, tree-type, structures), and the possible variability in TAC emissions during prescribed burns under the CalVTP, evaluating the net effect of the CalVTP on TAC exposure associated with wildfire and wildfire response is not possible, nor is it pertinent to determining the significance of short-term exposure to TACs under CEQA. This information is presented to explain the broader context for consideration of fire-related emissions in California, within which treatment emissions would occur.

##### Mitigation Measures

The Board and CAL FIRE have incorporated all feasible measures to prevent and minimize smoke emissions as part of the precautionary measures required in Smoke Management Plans, pursuant to SPR AQ-2, and in Incident Action Plans and other burn safety procedures, pursuant to SPR AQ-6, for the unintended occurrence of when a prescribed burn may go out of prescription and adversely affect offsite receptors. Additionally, SPR AD-4 will alert the public to planned prescribed burns and give them adequate notice to take precautionary measures such as using respirators, closing windows, or temporarily vacating the area to reduce the potential for exposure; considering actions taken by the public to reduce exposure to smoke from prescribed burns are voluntary, there are no additional feasible methods to compel the public to reduce its exposure. Although all feasible precautions and notifications have been included in standard project requirements, the potential remains that short-term exposure to TACs from unpredictable weather changes could occur. Therefore, this impact would be **potentially** **significant and unavoidable**.

Impact AQ-5: Expose People to Objectionable Odors from Diesel Exhaust

While the use of diesel-powered equipment during treatment activities performed under the CalVTP could result in temporary emissions of odorous diesel exhaust, it is not anticipated that this the levels of diesel exhaust would be excessive, nor would it affect a substantial number of people. This would be a **less-than-significant** impact.

The occurrence and severity of odor impacts depends on numerous factors, including: the nature, frequency, and intensity of the source; wind speed and direction; and the proximity and sensitivity of exposed individuals. The CalVTP would not introduce any new operational sources of odors to the treatable landscape or any new locations where people spend time that could be exposed to existing odor sources. Diesel-powered equipment used for treatments implemented under the CalVTP could result in short-term odorous diesel exhaust emissions.

As discussed in Impact AQ-2, diesel exhaust emissions would be temporary, would not be generated at any one location for an extended period, and would dissipate rapidly from the source with an increase in distance. Additionally, treatment activities are generally in less populated, rural, or undeveloped areas, where human receptors are sparse. Furthermore, SPR HAZ-1 requires that all diesel and gasoline-powered equipment be properly maintained to comply with all state and federal emissions requirements, which would prevent the occurrence of higher emissions of diesel exhaust due to poorly functioning equipment. Also, SPR NOI-4 requires vegetation treatment activities and staging areas be located as far as possible from noise-sensitive receptors (e.g., residential land uses, schools, hospitals, places of worship) and SPR NOI-5 restricts equipment idling time. These SPRs would reduce exposure of receptors to diesel exhaust odors because they require diesel-powered equipment to be located away from receptors and also reduce the amount of time that engines would be idling and producing odorous emissions. Accordingly, treatment activities conducted under the CalVTP would not create objectionable odors affecting a substantial number or people. This impact would be **less than significant**.

##### Mitigation Measures

No mitigation is required for this impact.

Impact AQ-6: Expose People to Objectionable Odors from Smoke During Prescribed Burning

Prescribed burns conducted under the CalVTP could result in the short-term exposure of a substantial number of people to odorous smoke. This would be a **potentially** **significant** impact.

Prescribed burns and pile burning conducted under the CalVTP could result in temporary odorous smoke emissions, which could be perceived as objectionable depending on the frequency and intensity of the resultant smoke, wind speed and direction, and the proximity and sensitivity of exposed individuals.

Per SPR AQ-2, and as discussed in Section 3.4.1, “Regulatory Setting,” prescribed burning implemented under the CalVTP would be conducted in accordance with local air district regulations regarding open burning and in accordance with requirements of the California Smoke Management Program. SMPs are intended to reduce smoke impacts from prescribed burning and must include basic information such as the location, types, and amounts of material to be burned; expected duration of the fire; identification of responsible personnel; and identification of all smoke-sensitive areas. Larger burns require additional information such as meteorological conditions necessary for burning, projections of where the smoke is expected to travel (both day and night), contingency actions to be taken if smoke impacts occur or meteorological conditions deviate from those specified in the SMP, and monitoring. Additionally, treatments implemented under the CalVTP would generally be in less populated, rural, or undeveloped areas, where people are sparse. Furthermore, as discussed in Section 2.5.2, “Description of Treatment Activities,” prescribed burns could be conducted at 10- to 15-year intervals to maintain low fuel hazard dependent on vegetation type, climate type, and soil type. Therefore, exposure of the same people in any given location to odorous smoke emissions would occur infrequently over a period of a few days to weeks, with the possibility of recurring every 10- to 15-years. As discussed in Impact AQ-4, when in prescription, prescribed burns would not expose receptors to smoke and associated odors.

However, despite adherence to an SMP, low likelihood of substantial numbers of people near prescribed burns, and infrequent occurrence of prescribed burns, there is no guarantee that smoke from every prescribed burn would behave as predicted and that a substantial number of people would not be exposed to smoke odors. Therefore, prescribed burns implemented under the CalVTP have the potential to expose a substantial number of people to odorous smoke emissions. Thus, this impact would be **potentially** **significant**.

As discussed in Section 3.4.2, “Environmental Setting,” wildfires are a large source of smoke, and represent a greater odor source due to their uncontrolled nature and longer duration. Wildfires may last for weeks or even months, potentially resulting in a longer exposure of receptors to objectionable odors from smoke. Most critically, wildfires often burn structures in addition to vegetation, releasing a wider array of odorous emissions not present in prescribed burns that only combust vegetation. Given the unpredictability of wildfire, evaluating the net effect of the CalVTP on odors associated with wildfire is not possible, nor is it pertinent to determining the significance of short-term exposure to smoke-related odors under CEQA.

##### Mitigation Measures

The Board and CAL FIRE have incorporated all feasible measures to prevent and minimize smoke emissions as part of the precautionary measures the Board/CAL FIRE will require in Smoke Management Plans, pursuant to SPR AQ-2, and in Incident Action Plans and other burn safety procedures, pursuant to SPR AQ-6, for the unintended occurrence of when a prescribed burn may go out of prescription and adversely affect offsite receptors. Additionally, SPR AD-4 will alert the public to planned prescribed burns and give them adequate notice to take precautionary measures such as closing windows or temporarily vacating the area to reduce the potential for exposure to odors; considering actions taken by the public to reduce exposure to odors from prescribed burns are voluntary, there are no additional feasible methods to compel the public to reduce its exposure. Although all feasible precautions and notifications have been included in standard project requirements, the potential remains that short-term exposure to odorous smoke emissions from unpredictable weather changes could occur. Therefore, this impact would be **potentially** **significant and unavoidable**.

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