CHAPTER 6

Air Quality

Chapter 6 evaluates potential air quality impacts from LBAM Program implementation. Results of the evaluation are provided at the programmatic level in this chapter. Details of the analyses and results are contained in the Air Quality Technical Report in Appendix C. Section 6.1, Environmental Setting, presents an overview of the Program location, meteorology and climate, and existing air quality, and contains federal, state, and local regulations that are applicable to the Program. Section 6.2, Environmental Impacts and Mitigation Measures, presents the following:

- Environmental concerns and evaluation criteria
- Evaluation methods and assumptions
- Discussion of the air impacts from the No Program and Program alternatives, for mitigation, if required, for those impacts
- Cumulative impacts
- A summary of environmental air quality impacts
- Mitigation measures
- Air quality impacts can result from a regional increase in emissions, a violation of National or California Ambient Air Quality Standards (NAAQS/CAAQS) from sources as a result of a project, or unacceptable increases in health risks at sensitive receptors as a result of airborne emissions from the Proposed Program. In particular, this assessment determined (1) whether the emissions of criteria pollutants (e.g., carbon monoxide [CO] and nitrogen oxides [NO_x]) due to the methods of application and combustion of fuels would result in significant impacts to the environment; and (2) the amount of treatment material (active ingredients and toxics) that exists in the ambient air and that deposits to the ground under the No Program and Program alternatives. This material includes drift from all application methods with special attention paid to aerial spraying.

Greenhouse gas emissions and climate change are addressed in Chapter 13 of this PEIR. Potential human health impacts and ecological impacts due to air emissions are addressed in Chapter 8, Human Health, and Chapter 12, Ecological Health, of this PEIR, respectively.

6.1 ENVIRONMENTAL SETTING

6.1.1 Program Location

As discussed earlier in the PEIR, the LBAM infestation has spread and may continue to spread until full-scale eradication and treatment activities are implemented. For this air quality assessment, the Program location is defined as all areas in California that could become infested with LBAM (see Figure 2-1 in Chapter 2), meaning most of the 58 counties in California, excluding alpine and desert areas and Imperial County, also defined as areas below 5,000 feet mean sea level with temperatures below 90 degrees Fahrenheit for most of the year. For the purposes of this analysis, it was presumed that the specific treatment area boundaries within any infested counties within the state will be determined based on trapping. The detection of 2 or more moths within a 3-mile radius within a time period equal to 1 LBAM life cycle is considered the metric by which an area would be categorized for treatment under the Program alternatives eventually selected.

6.1.2 Meteorology and Climate

As the Program is practically statewide, the meteorology and climate for the state are very generally characterized. As would be expected over such a large area, California's climate varies significantly. Latitude, elevation, and proximity to the coast are the primary factors influencing the climate. The following information on the climate and meteorology were obtained from the Western Regional Climate Center (2009).

California extends between latitude 32.5 degrees and 42 degrees north and constitutes extensive coastline along the Pacific Ocean. The Coast Ranges in the west merge with the Cascade Range in northern California. The Cascades then extend southeastward until they merge into the Sierra Nevada. The Sierra Nevada, which parallels the coast, extends up to 150 miles farther inland. Between the Coast Ranges and Sierra, it forms the Central Valley, a broad, flat valley. The southern end of the Central Valley is then closed off by the southern Sierra Nevada joining the Tehachapi Mountains, which bend southwestward to join the Coast Range. Finally, a series of ranges continue southeastward to the southern border of the California from the point where the Tehachapi and the Coast Range join. These wide ranges of topography create a variety of climates in the state. In addition, the Eastern Pacific High, which is a strong persistent high atmospheric pressure over the Pacific Ocean, is the major influence on the regional climate. The Eastern Pacific High moves northward in summer, and attains its greatest strength that keeps away the storm tracks. Therefore California receives little or no precipitation from this source during that period. In winter, the Pacific high retreats southward and decreases its intensity, which allows storm centers to swing into and across California. These storms bring widespread, moderate precipitation to the state.

The coastal and southern regions of California have a predominately Mediterranean climate that is characterized by warm to hot, dry summers and cool, wet winters. The presence of the Pacific Ocean helps moderate temperatures. The northern coastal area of California is characterized as more of a maritime climate, with narrower temperature ranges and heavier rainfall. Warm winters, cool summers, small daily and seasonal temperature variation, and high relative humidity are characteristic of this area. A more continental climate is experienced further inland resulting in wider temperature ranges during the year. The ranges of mountains to the west form a barrier that keeps the interior from the strong flow of air off the Pacific Ocean. As a result, the winters are colder, the summers are warmer, and precipitation is more on the coastal or western side of the Sierra and the Coast Range and less on the eastern slopes. The low-lying inland valleys, in particular the Central Valley, have subtropical temperatures with a dry summer season and cool and foggy rainy season, similar to a hot Mediterranean climate. The desert regime east of the ranges in southeastern California experiences a low relative humidity and high temperature during the summer. Death Valley and Mojave Desert are the hottest part of California.

Since the dispersion of the air pollutants is highly associated with wind speed and wind direction, the general wind pattern in California is discussed. California lies within the zone of westerly prevailing wind along with the high pressure area over the northeast Pacific Ocean on the east side. The wind generally blows from the west or northwest during most of the year. However, due to the mountain chains within the state as discussed above, wind direction would be deflected and is likely to be more a product of local terrain than it is of prevailing circulation. The Sacramento and San Joaquin Valleys have winds from the north due to the compressed heating of air flowing out of the Great Basin, which creates pronounced heat waves in summer. In winter the result is usually a rather mild temperature accompanied by a dry, persistent wind. The Central Valley and the Southeastern Desert area experience the typical northwest wind of summer reinforced by the dynamics of the thermal low-pressure area located over these areas. The Santa Ana Wind is the wind flowing out of the Great Basin into the Central Valley, the Southeastern Desert Basin, and the South Coast. The air is typically very dry. The winds are strong and gusty, particularly near the mouth of canyons oriented in the direction of airflow. In the San Francisco Bay area a diurnal pattern of the wind helps to carry locally produced air pollutants away from the Bay Area, but creates problems for the regions immediately south and east of the source area. In the Los Angeles area, the Basin is almost completely surrounded by mountains on the north and east. Coupled with the inversion of the atmosphere, this topography causes a fairly regular daily reversal of wind direction – offshore at night and onshore during the day. This circulation pattern tends to accumulate air pollutants in the basin.

As the climate and meteorology associated with each region of California is very different, generic, screening-level meteorological information was utilized in the air quality assessments. The screening meteorological data contain combinations of all the relevant meteorological parameters (e.g., wind direction, wind speed, and temperature, etc.). The multiple combinations should be representative of the different meteorological regions throughout the state and produce conservative results.

6.1.3 Criteria Air Pollutants and Potential Health Impacts

A brief summary of the adverse health effects of the six criteria pollutants is presented below. In addition, this section contains a brief discussion of the relationship of asthma incidence and exacerbation to ambient air pollution levels.

6.1.3.1 Ozone

Ozone (O_3) is formed by photochemical reactions between NO_x and reactive organic gases (ROGs), rather than being directly emitted. O_3 is a pungent, colorless gas that is a component of Southern California smog. Elevated O_3 concentrations can result in reduced lung function, particularly during vigorous physical activity. This health problem can be particularly acute in sensitive receptors such as the sick, elderly, and young children. O_3 levels peak during the summer and early fall months.

6.1.3.2 Carbon Monoxide

CO is formed by the incomplete combustion of fossil fuels, almost entirely from automobiles. It is a colorless, odorless gas that can cause dizziness, fatigue, and impairment to central nervous system functions. CO passes through the lungs into the bloodstream, where it interferes with the transfer of oxygen to body tissues.

6.1.3.3 Nitrogen Oxides

NO_x contributes to other pollution problems, including a high concentration of fine particulate matter (PM), poor visibility, and acid deposition. Nitrogen dioxide (NO_2), a reddish-brown gas, and nitric oxide, a colorless, odorless gas, are formed from fuel combustion under high temperature or pressure. These compounds are referred to collectively as NO_x. NO_x is a primary component of the photochemical smog reaction. NO_2 can decrease lung function and may reduce resistance to infection.

6.1.3.4 Sulfur Dioxide

Sulfur dioxide (SO_2) is a colorless, irritating gas formed primarily from incomplete combustion of fuels containing sulfur. Industrial facilities also contribute to gaseous SO_2 levels within California. SO_2 irritates the respiratory tract, can injure lung tissue when combined with fine PM, and reduces visibility and the level of sunlight.

6.1.3.5 Reactive Organic Gases

Reactive organic compounds (ROCs), or ROGs, are formed from combustion of fuels and evaporation of organic solvents. ROCs are the fraction of volatile organic compounds (VOCs) that are a prime component of the photochemical smog reaction. Individual ROCs can be toxic air contaminants.

6.1.3.6 Particulate Matter

PM is the term used for a mixture of solid particles and liquid droplets found in the air. Particles larger than 2.5 microns and less than 10 microns in diameter come from a variety of sources, including windblown dust and grinding operations. Fine particles (less than 2.5 microns in diameter, or $PM_{2.5}$) often come from fuel combustion, power plants, and diesel buses and trucks.

Respirable particulates less than 10 microns in diameter (PM_{10}) can accumulate in the respiratory system and aggravate respiratory health problems. The USEPA's scientific review concluded that fine particles ($PM_{2.5}$), which penetrate deeply into the lungs, are more likely than larger PM_{10} particles to contribute to the health effects listed in a number of recently published community epidemiological studies. These health effects include: premature death, increased hospital admissions, and emergency room visits (primarily the elderly and individuals with cardiopulmonary disease); increased respiratory symptoms and disease (children and individuals with cardiopulmonary disease); decreased lung functions; and alterations in lung tissue, lung structure, and respiratory tract defense mechanisms.

6.1.4 Relationship of Ambient Air Pollution to Asthma

Asthma is a chronic disease characterized by an inflammatory response and subsequent hyper-reactivity of the airways. Whether asthma is caused by air pollution or whether existing asthma is exacerbated by air pollution has been evaluated.

Little evidence suggests that asthma is caused by air pollution. About 80 percent of asthma patients show evidence of allergic sensitization (Platts-Mills et al. 1999). Both allergic and nonallergic asthma have been associated with several different genes (Sullivan et al. 2001). If air pollution caused asthma, then one might expect the incidence of asthma to increase with increasing air pollution. However, the incidence of asthma has not changed in several cities whose air pollution has increased over time (Bumm and Hertzstein 2003), and asthma incidence has increased in some areas that have experienced substantial improvements in air quality (Platts-Mills et al. 1999).

The relationship between ambient air pollution and the exacerbation of asthma symptoms is less clear. Various symptom triggers exist for susceptible individuals with either allergic or nonallergic type disease, including exposure to airborne irritants, infections, and participation in exercise. Common outdoor air pollutants such as O_3, SO_2, and PM are known to be respiratory irritants and asthma prevalence has been correlated with air quality in some locations (Peden and Boehlecke 1999; U.S. Department of Health and Human Services 2009).

To the extent that exposure to particulate air pollution may initiate symptoms in sensitive individuals, it appears that certain components of the particulates, specifically acidic particles (sulfates) and/or products of combustion, are implicated; crustal particles appear not to exert the same effects as other components of PM (USEPA 2001; Peden and Boehlecke 1999; Laden et al. 2000.; Tsai et al. 2000). Correlations among air quality, components of PM, and disease outcomes, however, are based on epidemiological studies that have inherit uncertainties (Valberg 2003).

Although the National Heart Lung and Blood Institute classifies odor as an "irritant" in the context of asthma triggers (National Heart Lung and Blood Institute 2008), a few studies have been conducted to evaluate odor as a possible asthma trigger in its own right, with mixed results and using methods with varying levels of rigor (Shim and Williams 1986; Eriksson et al.1987; Ames and Stratton 1991; Beach et al. 1997; Baldwin et al. 1999; Caccappolo et al. 2000; Engvall et al. 2001; Fielder et al. 2001). Among these, three experimental studies are considered least subject to bias (Shim and Williams 1986; Beach et al. 1997; Caccappolo et al. 2000); their results, too, were contradictory, and all were based on small groups of volunteers (16, 17, and 4 volunteers, respectively) recruited from pulmonology clinics and asthma registries. Suggested mechanisms explaining the possible effect of odors include respiratory hyper-reactivity of asthmatics (Eriksson et al.1987; Engvall et al. 2001) and psychological factors (Fielder et al. 2001). Although indications exist that odor may trigger asthma, the scientific literature is contradictory on that point.

6.1.5 Existing Air Quality

Air quality impacts can occur over broad regions such as an air basin (e.g., California's San Joaquin Valley) or within local microclimates (e.g., the area surrounding a particular spray treatment). Due to the Program's statewide nature, only regional air quality is discussed as part of this assessment. Monitoring stations are located throughout the state and are used to determine the air quality of each region. A basic measure of air quality is whether an air basin is meeting the NAAQS and CAAQS. Areas that are designated as attainment do not exceed standards, areas that are designated as nonattainment exceed standards, and areas that are designated unclassified have insufficient data for a determination and are neither attainment nor nonattainment. Table 6-1 is a summary of the NAAQS attainment status for the five air basins chosen to represent the air quality throughout the LBAM Program Area within California (CARB 2006). The five air basins include:

- San Francisco Bay Area
- North Central Coast
- San Joaquin Valley
- South Coast
- Sacramento Valley

In cases where differences may occur between local and regional air quality, an air basin may be subdivided into different portions, often along county lines, as is the case in both the Sacramento and San Joaquin valley air basins. A summary of the NAAQS attainment status of all California air basins is provided in Appendix C2, Section C4, Current Air Quality.

In addition, Table 6-2 summarizes the CAAQS attainment status for the representative California air basins (CARB 2006). A summary of the CAAQS attainment status of all California air basins is provided in Appendix C2, Section C4, Current Air Quality. As was previously mentioned, all air basins of the state are either unclassified or in attainment of the NAAQS and CAAQS for CO, NO_x, sulfur oxide (SO_x), and lead. Some air basins are classified as nonattainment areas for the NAAQS and CAAQS for O_3, PM_{10}, and $PM_{2.5}$. In addition, a few air basins have been classified as nonattainment for hydrogen sulfide under the CAAQS.

Table 6-1 National Ambient Air Quality Standards Attainment Status

Air Basin	Attainment Status					
	8-Hour Ozone	PM_{10}	$PM_{2.5}$	CO	NO_2	SO_2
SF BAY AREA AIR BASIN	N	U	U/A	U/A	U/A	A
NORTH CENTRAL COAST AIR BASIN	U/A	U	U/A	U/A	U/A	U
SOUTH COAST AIR BASIN	N	N	N	U/A	U/A	A
SACRAMENTO VALLEY AIR BASIN	--	--	U/A	U/A	U/A	U
Butte County	N	U	--	--	--	--
Glenn County	U/A	U	--	--	--	--
Colusa County	U/A	U	--	--	--	--
Shasta County	U/A	U	--	--	--	--
Sacramento Metro Area (2)	N	--	--	--	--	--
Sacramento County	--	N	--	--	--	--
Solano County (SVAB portion)	--	U	--	--	--	--
Sutter County	--	U	--	--	--	--
Sutter County (Sutter Buttes)	N	--	--	--	--	--
Remainder of North Sutter County	U/A	--	--	--	--	--
Tehama County	U/A	U	--	--	--	--
Yolo County	N	U	--	--	--	--
Yuba County	U/A	U	--	--	--	--
SAN JOAQUIN VALLEY AIR BASIN	N	A	N	U/A	U/A	
Fresno County	--	--	--	--	--	U
Kern County (SJVAB portion)	--	--	--	--	--	A
Kings County	--	--	--	--	--	U
Madera County	--	--	--	--	--	U
Merced County	--	--	--	--	--	U
San Joaquin County	--	--	--	--	--	U
Stanislaus County	--	--	--	--	--	U
Tulare County	--	--	--	--	--	U

Unclassified (U): a pollutant is designated unclassified if the data are incomplete and do not support a designation of attainment or nonattainment. ·

Attainment (A): a pollutant is designated attainment if the state standard for that pollutant was not violated at any site in the area during a 3-year period. ·

Nonattainment (N): a pollutant is designated nonattainment if at least one violation of a state standard for that pollutant occurred in the area. ·

Nonattainment / Transitional (NT): is a subcategory of the nonattainment designation. An area is designated nonattainment / transitional to signify that the area is close to attaining the standard for that pollutant.

Table 6-2 California Air Basin CAAQS Attainment Status

Air Basin	Attainment Status									
	Ozone	PM_{10}	$PM_{2.5}$	CO	NO_2	SO_2	lead	Visibility Reducing PM	Sulfates	Hydrogen Sulfide
SF BAY AREA AIR BASIN	N	N	N	A	A	A	A	U	A	U
NORTH CENTRAL COAST AIR BASIN	N	N	A		A	A	A	U	A	U
Monterey County	--	--	--	A	--	--	--	--	--	--
San Benito County	--	--	--	U	--	--	--	--	--	--
Santa Cruz County	--	--	--	U	--	--	--	--	--	--
SOUTH COAST AIR BASIN	N	N	N	--	A	A	A	U	A	U
Los Angeles County (SoCAB portion)	--	--	--	A	--	--	--	--	--	--
Orange County	--	--	--	A	--	--	--	--	--	--
Riverside County (SoCAB portion)	--	--	--	A	--	--	--	--	--	--
San Bernardino County (SoCAB portion)	--	--	--	A	--	--	--	--	--	--
SACRAMENTO VALLEY AIR BASIN	--	N	--	--	A	A	A	U	A	U
Butte County	--	--	N	A	--	--	--	--	--	--
Glenn County	NT	--	--	U	--	--	--	--	--	--
Colusa County	NT	--	--	U	--	--	--	--	--	--
Placer County (SVAB Portion)	--	--	N	A	--	--	--	--	--	--
Remainder of Air Basin (1)	N	--	U	--	--	--	--	--	--	--
Shasta County	--	--	--	U	--	--	--	--	--	--
Sacramento County	--	--	N	A	--	--	--	--	--	--
Solano County (SVAB portion)	--	--	--	A	--	--	--	--	--	--
Sutter County	--	--	--	A	--	--	--	--	--	--
Tehama County	--	--	--	U	--	--	--	--	--	--
Yolo County	--	--	--	U	--	--	--	--	--	--
Yuba County	--	--	--	U	--	--	--	--	--	--
SAN JOAQUIN VALLEY AIR BASIN	N	N	N	--	A	A	A	U	A	U
Fresno County	--	--	--	A	--	--	--	--	--	--
Kern County (SJVAB portion)	--	--	--	A	--	--	--	--	--	--
Kings County	--	--	--	U	--	--	--	--	--	--
Madera County	--	--	--	U	--	--	--	--	--	--
Merced County	--	--	--	U	--	--	--	--	--	--
San Joaquin County	--	--	--	A	--	--	--	--	--	--
Stanislaus County	--	--	--	A	--	--	--	--	--	--
Tulare County	--	--	--	A	--	--	--	--	--	--

(1) AB 3048 (Olberg) and AB 2525 (Miller) signed into law in 1996, made changes to Health and Safety Code, Section 40925.5.

One of the changes allows nonattainment districts to become nonattainment-transitional for ozone by operation of law. Similarly, nonattainment-transitional districts revert back to nonattainment by operation of law. Unclassified (U): a pollutant is designated unclassified if the data are incomplete and do not support a designation of attainment or nonattainment. ·Attainment (A): a pollutant is designated attainment if the state standard for that pollutant was not violated at any site in the area during a 3-year period. ·Nonattainment (N): a pollutant is designated nonattainment if at least one violation of a state standard for that pollutant occurred in the area. Nonattainment / Transitional (NT): is a subcategory of the nonattainment designation. An area is designated nonattainment / transitional to signify that the area is close to attaining the standard for that pollutant.

6.1.6 Regulatory Framework

This section contains a discussion of the federal, state, and local air quality regulations, plans, and policies potentially applicable to the Program. Federal, state, and local authorities have adopted rules and regulations that govern the emissions of air pollutants. The local and federal authorities each have specific criteria for the evaluation of sources of air emissions, and if necessary, permitting, and recordkeeping and reporting requirements. The Program is a temporary but statewide effort, and therefore is more similar to a construction project than an industrial source in terms of the duration of the emissions. However, neither of those traditional source types typically encompasses projects with statewide emissions. This section focuses on current air quality regulations and their applicability to the Proposed Program.

6.1.6.1 Federal

The federal Clean Air Act (CAA) and Clean Air Act Amendments (CAAA) regulations (42 USC 7401 et seq., as amended in 1977 and 1990, and 40 CFR Parts 50 through 99) serve as the basis regulating air pollution in the U.S. The following federal requirements have been reviewed for applicability to the Program:

- National Ambient Air Quality Standards (NAAQS)
- Title V operating permits
- New Source Performance Standards (Naps)
- National Emission Standards for Hazardous Air Pollutants (NESHAPS)
- New Source Review (NSR)/Prevention of Significant Deterioration (PSD)
- Chemical accident prevention provisions (Risk Management Plans)
- General Conformity Rule (for emissions not subject to NSR)
- USEPA Aircraft Emission Regulations

National Ambient Air Quality Standards

Pursuant to the federal CAA of 1970, the USEPA established the NAAQS. The NAAQS were established for six major pollutants, termed “criteria” pollutants. Criteria pollutants are defined as those pollutants for which the federal and state governments have established AAQS for outdoor concentrations to protect public health. The NAAQS are two tiered: primary, to protect public health; and secondary, to prevent degradation of the environment (e.g., impairment of visibility, damage to vegetation and property, etc.).

The six federal criteria pollutants are O_3, CO, particulate matter (which includes both $PM_{10}$and $PM_{2.5}$), NO_2, SO_2, and lead. The federal primary standards for these criteria pollutants, as well as the California standards for criteria pollutants, are shown in Table 6-3. The potential health effects from exposure to the criteria pollutants are described under Criteria Air Pollutants and Potential Health Impacts. Ambient air data collected at permanent monitoring stations are used by the USEPA to classify regions as “attainment” or “nonattainment” depending on whether the regions meet the requirements stated in the primary NAAQS. Additional restrictions as required by the USEPA are imposed on nonattainment areas in an effort to reach attainment.

Table 6-3 Federal and California Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards[1]	Federal Primary Standards[2,3]
		Concentration[4]	Concentration[4]
Ozone (O_3)	1-Hour	0.09 ppm (180 µg/m³)	--
	8-Hour	0.070 ppm (137 µg/m³)	0.08 ppm (157 µg/m³)
Respirable Particulate Matter (PM_{10})	24-Hour	50 µg/m³	150 µg/m³
	Annual Arithmetic Mean	20 µg/m³	--
Fine Particulate Matter ($PM_{2.5}$)	24-Hour	--	35 µg/m³
	Annual Arithmetic Mean	12 µg/m³	15 µg/m³
Carbon Monoxide (CO)	8-Hour	9.0 ppm (10 mg/m³)	9 ppm (10 mg/m³)
	1-Hour	20 ppm (23 mg/m³)	35 ppm (40 mg/m³)
Nitrogen Dioxide (NO_2)	Annual Arithmetic Mean	--	0.053 ppm (100 µg/m³)
	1-Hour	0.25 ppm (470 µg/m³)	--
Lead	30-day average	1.5 µg/m³	--
	Calendar Quarter	--	1.5 µg/m³
Sulfur Dioxide (SO_2)	Annual Arithmetic Mean	--	0.030 ppm (80 µg/m³)
	24-Hour	0.04 ppm (105 µg/m³)	0.14 ppm (365 µg/m³)
	3-Hour (Secondary)	--	0.5 ppm (1300 µg/m³)
	1-Hour	0.25 ppm (655 µg/m³)	--
Visibility Reducing Particles	8-Hour	Extinction coefficient of 0.23 per kilometer – visibility of 10 miles of more – due to particles when the relative humidity is less than 70 percent.	NO FEDERAL STANDARDS
Sulfates	24-Hour	25 µg/m³	
Vinyl Chloride	24-Hour	0.01 ppm (26 µg/m³)	
Hydrogen Sulfide	1-Hour	0.03 ppm (42 µg/m³)	

Source: California Air Resources Board (5/17/06)

[1] California standards for O_3, CO, SO_2 (1- and 24-hour), NO_2, PM_{10}, $PM_{2.5}$, and visibility reducing particles, are values that are not to be exceeded. All others are not to be equaled or exceeded.

[2] National standards (other than O_3, PM_{10}, $PM_{2.5}$ and those based on annual averages or annual arithmetic mean) are not to be exceeded more than once a year. The ozone standard is attained when the fourth highest 8-hour concentration in a year, averaged over 3 years, is equal to or less than the standard. For PM_{10}, the 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 1. For $PM_{2.5}$, the 24-hour standard is attained when 98 percent of the daily concentrations, averaged over 3 years, are equal to or less than the standard.

[3] National Primary Standards: The levels of air quality necessary, with an adequate margin of safety, to protect the public health.

[4] Concentration expressed first in units in which it was promulgated. Equivalent units given in parentheses are based upon a reference temperature of 25°C and a reference pressure of 760 torr. Most measurements of air quality are to be corrected to a reference temperature of 25°C and a reference pressure of 760 torr; ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.

The CAAA of 1990 identifies specific emission reduction goals and requires states with nonattainment areas to achieve the NAAQS by developing a State Implementation Plan (SIP). The SIP must be approved by the USEPA and serves as the state’s commitment to actions that will reduce or eliminate air quality problems. An important aspect of the SIP is to designate a planning organization that will promulgate rules and implement strategies to achieve the NAAQS.

As per the California Air Resources Board (CARB) website (CARB 2009a):

> *“SIPs are not single documents, rather they are a compilation of new and previously submitted plans, programs (such as monitoring, modeling, permitting, etc.), district rules, state regulations and federal controls. Many of California’s SIPs rely on the same core set of control strategies, including emission*

standards for cars and heavy trucks, fuel regulations and limits on emissions from consumer products. State law makes ARB the lead agency for all purposes related to the SIP. Local air districts and other agencies, such as the Bureau of Automotive Repair, prepare SIP elements and submit them to ARB for review and approval. ARB forwards SIP revisions to USEPA for approval and publication in the Federal Register. The Code of Federal Regulations Title 40, Chapter I, Part 52, Subpart F, Section 52.220 lists all of the items which are included in the California SIP. Many additional California submittals are pending USEPA approval."

Title V

Under CAA Title V it is required that air operating permit programs are developed by individual states. The Title V permitting requirements are a codified in 40 CFR Part 70. In California Title V permitting is frequently regulated by the local air quality management district. Since the Program emission sources are classified as mobile, nonroad, offroad, and/or portable, they do not meet the criteria of being stationary sources. Therefore, the Program will not be subject to Title V permitting.

New Source Performance Standards

NSPSs, authorized in CAA Section 111, and promulgated in 40 CFR Part 60, determine the requirements for new, modified, and reconstructed sources. The NSPSs dictates emission limits for specific types of stationary sources. Requirements have also been established for monitoring, record keeping and reporting. While the NSPS categories are focused on stationary equipment, the emission sources associated with this Program include combustion sources that are offroad, nonroad, mobile and/or portable. Since the Program emission sources are classified as mobile, nonroad, offroad, and/or portable, they do not meet the criteria of being stationary sources. Therefore, the Program will not be subject to NSPSs.

National Emissions Standards for Hazardous Air Pollutants

Hazardous Air Pollutants (HAPs) emissions are regulated by the NESHAPs. The NESHAPs are contained in two CFR parts, Part 61, promulgated prior to the 1990 CAAA, and Part 63, promulgated as part of the CAAA in 1990. Part 61 regulates only eight HAPs, benzene, coke oven emissions, vinyl chloride, asbestos, beryllium, inorganic arsenic, mercury and radionuclides. Although some of the proposed treatment options for the Program do contain compounds that have a benzene ring (ethylbenzene and 1,2,4-trimethylbenzene), they are structurally and toxicologically different from benzene. Part 63 was promulgated as a result of the 1990 CAAA, which established a list of 189 additional HAPs. The maximum achievable control technology standards of Part 63 regulate major sources of HAPs as well as specific sources of HAPs. Ethylbenzene is considered a HAP. A major source is defined as having the potential to emit 10 tons per year of a single HAP or 25 tons per year of a combination of HAPs. None of the Program alternatives emit HAPs in excess of the major source thresholds (see Section 6.2.2.1 under Treatment Compound VOC and PM Emissions). In addition, the Program is not covered by any of the specific source categories of the NESHAP.

New Source Review and Prevention of Significant Deterioration

In 1977, as part of the CAAA, Congress passed the NSR. Two important purposes are served by this preconstruction permitting program. First, NSR assures that new emissions do not slow progress toward cleaner air in areas with poor air quality as defined by being in nonattainment of the NAAQS. In addition, the NSR program assures that any large new or modified industrial source follow advances in pollution control and install the best available control technology. NSR permits are legal documents that the facility owners/operators must abide by. The permit specifies what construction is allowed, what emission limits must be met, and often how the emissions source must be operated.

Second, NSR ensures that new or modified sources of emissions do not significantly degrade air quality in attainment areas. Special emphasis is placed on especially pristine areas, like National Parks. The PSD regulations would apply if construction or modification of a major stationary source would result in emissions greater than 250 tons per year. Since the Program emission sources are classified as mobile, nonroad, offroad, and/or portable, they do not meet the criteria of being stationary sources. Therefore, the Program will not be subject to either NSR or PSD.

Chemical Accident Prevention Provisions

40 CFR Part 68 contains the chemical accident prevention provisions. The provisions regulate a specific list of substances and contain a list of threshold quantities for determining applicability for stationary sources. The regulations are codified to prevent the accidental release of hazardous materials and to minimize the potential impacts in the event an accidental release does occur. Since all of the emission sources for the Program do not meet the definition of stationary source, these provisions do not apply.

General Conformity Rule

The USEPA promulgated the General Conformity Rule in 1993 to implement the conformity provision of CAA Title I, Section 176(c)(1). Under the General Conformity Rule, federal agencies are required to ensure that proposed projects conform to the applicable SIP. In brief, the regulations apply to Program-wide emissions if:

- The project area is designated as nonattainment.
- The project is not subject to NSR.
- The project emissions are greater than significance thresholds.

Several criteria allow a federal agency to make a positive conformity determination for a proposed project, including:

- The SIP attainment or maintenance demonstration specifically identifies and accounts for the project emissions, or
- The project emissions are fully offset so that no net increase would occur in emissions of the pollutant by a revision to the SIP or other enforceable emission reduction measure.

Otherwise, a general conformity analysis is required for emissions from a project lead by a federal agency that would occur in nonattainment areas that were not subject to NSR. Since the Proposed Program is being run by the CDFA, with funding assistance provided by the USDA, which is a federal agency, the general conformity rule will apply.

USEPA Aircraft Emissions Regulation

The CAA authorizes the USEPA to regulate the emissions from aircraft. The Control of Air Pollution from Aircraft and Aircraft Engines: Emissions Standards and Test Procedures (codified in 40 CFR Part 87) was first issued in 1973. It has been updated several times since then, with the most recent update in 2007 promulgating updated NO_x emission standards. The regulations cover all types of engines; although turboprop engine standards are limited to controlling smoke, and even then, only if the engine’s rated output is greater than 1,000 kilowatts. Because the turboprop engines on the aircraft used in the Program have a rated output less than 1,000 kilowatts, the regulations do not apply.

6.1.6.2 State

California Clean Air Act

The State of California initiated its own air quality standards, California Ambient Air Quality Standards (CAAQS), in 1969 under the mandate of the Mulford-Carrell Act and signed the California Clean Air Act (CCAA) into law in 1988. The CAAQS are goals for air quality within the state. The CAAQS are generally more stringent than the NAAQS. In addition to the six criteria pollutants covered by the NAAQS, CAAQS standards exist for sulfates, hydrogen sulfide, vinyl chloride, and visibility-reducing particles. These standards are listed in Table 6-3. The CCAA provides the state with a comprehensive framework for air quality planning regulation.

Both state and federal air pollution control programs in California are coordinated and overseen by CARB. CARB oversees activities of local air quality management agencies and is responsible for incorporating Air Quality Management Plans for local air basins into a SIP for USEPA approval. CARB also regulates motor vehicles and fuels.

CARB has divided the state into 15 air basins. Significant authority for air quality control has been given to local air pollution control districts or air quality management districts, which regulate stationary source emissions and develop local attainment plans. The CCAA provides the air quality management districts with the authority to manage transportation activities at indirect sources as well as regulate stationary source emissions. Indirect sources of pollution are generated when minor sources collectively emit a substantial amount of pollution (e.g., the motor vehicles at an intersection, a mall, or a highway).

The CCAA requires nonattainment areas in the state to prepare attainment plans. The attainment plans are required to achieve a minimum 5 percent annual reduction in the emissions of nonattainment pollutants unless all feasible measures have been implemented. All air basins of the state are either unclassified or in attainment of the NAAQS and CAAQS for CO, NO_x, SO_x, and lead. Some air basins are classified as nonattainment areas for the NAAQS and CAAQS for O_3, PM_{10}, and $PM_{2.5}$. In addition, a few air basins have been classified as nonattainment for hydrogen sulfide under the CAAQS.

Truck and Bus Regulation

On December 12, 2008, CARB approved a new regulation to significantly reduce emissions from existing onroad diesel vehicles operating in California. The regulation requires affected trucks and buses to meet performance requirements between 2011 and 2023. For most fleets, the first performance requirement for PM begins at January 1, 2011 followed by engine replacement requirements to reduce NO_x emissions starting January 1, 2013. For fleets with three or fewer affected vehicles, none of the performance requirements begin until January 1, 2014. By January 1, 2023, all vehicles must have a 2010 model year engine or equivalent. Affected vehicles included onroad heavy-duty diesel fueled vehicles with a gross vehicle weight rating great than 14,000 pounds. Therefore trucks used for vendor delivery of compounds/supplies to Program sites for LBAM are subject to this new truck and bus regulation.

Commercial Vehicle Idling Requirements

On October 20, 2005, CARB approved the Airborne Toxic Control Measure to limit diesel-fuel commercial motor vehicle idling. This regulation requires that 2008 and newer model year heavy-duty diesel engines are equipped with a nonprogrammable engine shutdown system that automatically shuts down the engine after 5 minutes of idling or optionally meet a stringent oxides of nitrogen idling emission standard (i.e., 30grams/hour). The in-use truck requirements require operators of both in-state and out-of-state registered sleeper berth equipped trucks to manually shut down their engine when idling more than 5 minutes at any location within California beginning in 2008. Affected vehicles included diesel fueled commercial vehicles with a gross vehicle weight rating greater than 10,000 pounds. Therefore trucks used for vendor delivery of compounds/supplies to Program sites for LBAM eradication activities are subject to the commercial vehicle idling requirements.

On-Board Diagnostic System Requirements

In 2004, CARB adopted a regulation requiring diagnostic systems on all 2007 and subsequent model year heavy-duty engines and vehicles (i.e., vehicles with a gross vehicle weight rating greater than 14,000 pounds) in California. CARB recently adopted a comprehensive on-board diagnostic regulation for 2010 and subsequent model year heavy-duty vehicles. Therefore trucks used for vendor delivery of compounds/supplies to LBAM Program sites are subject to the commercial vehicle idling requirements.

Heavy-Duty Vehicle Inspection Program

This program requires heavy-duty trucks and buses to be inspected for excessive smoke and tampering, and engine certification label compliance. Any heavy-duty vehicle (i.e., vehicles with a gross vehicle weight rating greater than 6,000 pounds) traveling in California, including vehicles registered in other states and foreign countries, may be tested. Tests are performed by CARB inspection teams at border crossings, California Highway Patrol (CHP) weigh stations, fleet facilities, and randomly selected roadside locations. Owners of trucks and buses found in violation are subject to minimum penalties starting at $300 per violation. Transportation trucks to transport ground-based and vehicle-based application crews and trucks used for vendor delivery of compounds/supplies to Program sites would be subject to the inspection.

California Standards for Vehicular Diesel Fuel

The California Diesel Fuel Regulations require that diesel fuel with sulfur content of 15 ppm or lower (by weight) should be used for all diesel-fueled vehicles operated in California.

State Portable Engine Airborne Toxic Control Measure

The California Portable Engine Airborne Toxic Control Measure is designed to reduce the particulate matter emissions from portable diesel fueled engines rated at 50 brake horsepower or larger. Since backpack sprayer engines are assumed to be gas-powered and the vehicle-mounted pump engines are assumed to be smaller than 50 brake horsepower, they are exempt from the State Portable Engine Airborne Toxic Control Measure. No other portable engines would be utilized for implementation of the Program.

Portable Equipment Registration Program

This statewide program establishes a system to uniformly regulate portable engines and portable engine-driven equipment units. Once registered in this program, engines and equipment units may operate throughout the State of California without the need to obtain individual permits from local air districts. Owners or operators of portable engines and certain types of equipment can voluntarily register their units under this program to operate their equipment anywhere in the state. Engines less than 50 brake horsepower are exempt from this program; therefore, the engines associated with the application equipment in the Program alternatives are exempt.

California Standards for Nonvehicular Diesel Fuel

Similar to vehicular diesel fuel standards, this regulation requires that diesel fuel with sulfur content of 15 ppm or lower (by weight) should be used for all diesel-fueled nonvehicular engines operated in California.

6.1.6.3 Local

California has 35 air districts, each with their own set of rules and regulations covering permitting and operational control of sources of air pollution. It was beyond the scope of this assessment to review and identify the potentially applicable regulations in all 35 air districts. Rather, a few representative air districts were chosen to assess. They were selected in an attempt to cover different regions of the state and to include those districts most likely to be impacted by the Program. The air districts selected include the Bay Area Air Quality Management District (BAAQMD), Monterey Bay Unified Air Pollution Control District (MBUAPCD), Sacramento Metropolitan Air Quality Management District (SMAQMD), San Joaquin Valley Air Pollution Control District (SJVAPCD), and South Coast Air Quality Management District (SCAQMD).

None of the air districts had rules or regulations pertaining to the permitting or operation of the application Program or its equipment primarily due to the various mobile sources utilized in the Program being regulated by state and federal agencies rather than local agency regulations.

6.2 ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

The air quality impacts evaluation is provided below. The evaluation qualitatively and quantitatively compares probable air quality impacts against the evaluation criteria presented in Section 6.2.1 below. Evaluation methods and assumptions are explained in Section 6.2.2. In the remainder of the Sections 6.23 through 6.2.10, impacts and their significance under CEQA are explained for each alternative where one or more potential impacts were identified. Section 6.2.11 provides additional information on mitigation measures and monitoring.

6.2.1 Evaluation Concerns and Criteria

Given the Program’s statewide and temporary nature, the California CEQA Guidelines was the initial guiding framework for identifying the evaluation criteria for the Program. In addition, CEQA guidance from several air quality management districts was reviewed to identify any further guidance or evaluation criteria. The five air management districts selected were the same as those chosen for local air regulation review, which include:

- BAAQMD
- MBUAPCD
- SMAQMD
- SJVAPCD
- SCAQMD

Overall, general agreement existed regarding what would constitute a “potentially significant impact.” As stated in CEQA Guidelines, Appendix G, a project is deemed to have a “potentially significant impact” on air quality if it could:

- Violate any air quality standard or contribute to an existing or projected air quality violation,
- Result in cumulatively considerable net increase of any criteria pollutant for which the project region is in nonattainment under an applicable NAAQS or CAAQS (including releasing emissions that exceed quantitative thresholds for O_3 precursors),
- Conflict with or obstruct implementation of the applicable air quality plan,

- Expose sensitive receptors to substantial pollutant concentrations, or
- Create objectionable odors affecting a substantial number of people.

Each of the evaluation criteria is discussed in the following sections. In particular, the methodology that will be used to assess significance is presented.

VIOLATE AIR QUALITY STANDARDS

According to the CEQA Guidelines, a project is considered to have a significant impact if the emissions associated with it are predicted to cause or contribute to a violation of any NAAQS or CAAQS. Given the Program's short-term and statewide character, the CDFA has not established quantitative significance thresholds for such a project. As a result, significance would be determined on a case by case basis looking at daily emissions of the applicable NAAQS and CAAQS pollutants. Significance thresholds used by the air districts listed were used to put the daily emissions into context.

To provide a basis for the Program's significance determination, the CEQA guidance for a representative group of air districts was surveyed. The selected districts represent a diverse set of ecological regions and represented the areas where the largest LBAM impacts were expected to occur. The CEQA Air Quality Handbooks for each air district contains similar, but slightly different, thresholds of significance for different operations. Often thresholds are separate for industrial source operations and construction projects. Because most thresholds are for either industrial source operations or construction projects, and the Program is neither, it was decided that the Program is closer in nature to a construction project than an industrial source. This selection is based on the limited duration of the Program as well as the more dispersed nature of the emissions (more comparable to fugitive emissions and mobile source emissions from a construction site than point source emissions from industrial stacks). The information on available construction significance thresholds from the different air districts are summarized in Table 6-4.

Table 6-4 Comparative Criteria Using AQMD Construction Significance Thresholds

	CO		NOx		ROGs/VOCs		SOx		PM_{10}		$PM_{2.5}$	
Lead Agency	value	units	value	units	value	units	value	units	value	units	value	units
SCAQMD[1]	550	lbs/day	100	lbs/day	75	lbs/day	150	lbs/day	150	lbs/day	55	lbs/day
BAAQMD[2]	BAAQMD only considers PM_{10} emissions to be potentially significant during construction. Their level of significance is based only on the control measures to be implemented											
SJVAPCD[3]	No quantitative guidelines. Significance based on meeting district rules and regulations. Assessed on an individual basis.											
SMAQMD[4]			85	lbs/day								
MBUAPCD[5]									82	lbs/day		

References:
[1] SCAQMD 2009
[2] BAAQMD 1999
[3] SJVAPCD 2002
[4] SMAQMD 2004
[5] MBUAPCD 2008

For a comparative analysis of the potential impacts from the Program, the most conservative (i.e., lowest) significance thresholds from the five districts were chosen. Only a few districts have established quantitative thresholds for construction projects. Most lead agencies do not establish quantitative thresholds for construction projects due to their temporary nature. Instead they rely on limiting the emissions due to temporary construction projects using the air district rules and standardized mitigation measures. It is recognized that this application of the construction thresholds is not direct, but given the Program's short-term nature and statewide area of impact, this method does give a reasonable approach to evaluate the relative magnitude of the Program impacts.

To compare emissions to the related criteria, the emissions would need to be determined for each Program alternative in pounds per day. In addition, since the values are on an air quality management district level, emission rates for a single air district would need to be estimated from the total statewide Program emissions. The number of statewide units (trucks, airplanes, ground crews, etc.) for each method of application for each Program alternative was used to estimate statewide emissions. The maximum number of units that would be within any individual air district was used to scale the statewide emissions down to the air-district-level emissions. The emissions are linearly proportional to the number of units, so the air district emissions are the statewide emissions multiplied by a ratio of the air district units to the statewide units. The maximum number of units in any one air district on a given day is one-half the total statewide number of units (Schnabel, pers. comm., 2009). Therefore, 50 percent of the daily statewide emissions for the applied treatment formulations were assumed to be able to occur in one air district on any given day.

RESULT IN CUMULATIVELY CONSIDERABLE INCREASE IN NONATTAINMENT POLLUTANTS

A project may have a significant impact if it results in a cumulatively considerable net increase of any criteria pollutant for which the project region is in nonattainment under an applicable NAAQS or CAAQS. Since the Program is statewide, some air basins would be impacted that are in nonattainment status for O_3, PM_{10}, and $PM_{2.5}$, and hydrogen sulfide NAAQS and CAAQS, although hydrogen sulfide is not emitted from the Program equipment and is not a pollutant of concern. NO_x and VOCs are precursors to O_3. As with the assessment of the ambient air quality standards in Section 6.2.1, significance would be determined on a case by case basis looking at daily emissions of the applicable NAAQS and CAAQS pollutants. Significance thresholds of the air districts listed were used to put the daily emissions into context. The majority of air districts assume that if project-level emissions are less than significance thresholds, then a project will not have a cumulatively considerable impact. The significance thresholds and method of evaluation are described in the previous section.

POTENTIAL CONFLICT WITH APPLICABLE AIR QUALITY PLANS

As discussed previously in Section 6.1.1.1 under National Ambient Air Quality Standards, the California SIP is a compilation of plans, procedures, regulations, and controls developed and submitted to the USEPA over the course of several years to comply with the federal CAA. Although the Program is essentially statewide, it was not feasible to review and assess the SIPs for every air district in California. Rather a more general approach to assessing the potential to conflict with air quality plans was developed. Significance was determined by assessing whether the Program emissions were included in the SIP emission inventories and whether the Program emission sources would comply with applicable regulations.

The potential conflict with air quality plans was assessed through a review of the purpose and typical content of the SIPs. As part of SIP development, most air districts, in conjunction with CARB, develop a district-wide emission inventory of all the emissions they predict will be emitted in the upcoming years. Emissions from the LBAM Program are not specifically covered in the SIP since it is a new project. However, the emissions from the LBAM Program are generally covered in the following emission categories:

- **Agricultural/Structural Pesticides.** Covers emissions due to the application of the various Program alternative formulations;
- **Agricultural Aircraft.** Covers the emissions due to fuel combustion;
- **Onroad Mobile Sources.** Covers the emissions from the Program onroad sources, such as the ground application spray trucks as they drive from site to site; and
- **Offroad Equipment.** Covers the emissions from the compressors used on the hydraulic spray trucks.

The agricultural/structural pesticide application portion of the SIP area source emissions inventory pertains to all agricultural and structural pesticide application in the state. According to CARB emission methodology guidance, this source category includes all sources required to report to the DPR.

> *"This includes applications to parks, golf courses, rangeland, pastures, cemeteries, and along roadside and railroad rights-of-way. In addition, all postharvest pesticide treatments of agricultural commodities must be reported, along with all pesticide treatments in poultry and fish production and some livestock related applications. Commercial pesticide applications including structural fumigation, pest control, and turf applications must also be reported. Consumer application of pesticides is not tracked by DPR but the Air Resources Board (ARB) estimates volatile organic compound (VOC) emissions for these pesticides."*

The pesticide application proposed under the LBAM Program is a combination of several of those categories and is therefore covered by the SIP general emissions from agricultural/structural pesticide application.

The Agricultural Aircraft area source emissions from the CARB emission inventory pertains to crop dusting (i.e., the application of pesticides). This category is limited to the combustion emissions from commercial aircraft. It focuses on emissions from certain aircraft/engines, including the Pratt & Whitney PT6A-34 (based on the PT6A-27), which is very similar to the P&W engine used by the Program aircraft (Beechcraft King Air A90, PT6A-20). This emission category is a better fit than the General Aviation Aircraft, Piston category since the emissions are typically closer to the ground and involve many small, quick changes in elevation and direction.

The onroad emissions inventory "is an estimation of the total emissions contributed by the over 24,000,000 onroad motor vehicles" in California (CARB 2009b). The emissions are typically calculated using the Emission FACtors (EMFAC) model and the vehicle categories include all those that would be utilized as part of the LBAM Program, including everything from passenger vehicles to light-heavy duty trucks. Details of the types of vehicles that will be utilized in the Program and the estimates of their emissions using EMFAC are briefly discussed in Section 6.2.2.2 under Mobile Sources and in more detail in Appendix C2, Section C6.2, Onroad Sources: EMFAC Model. The Program would not significantly increase the number of vehicles, as only 50 to 60 vehicles would be utilized statewide for the application of the different Program alternative formulations.

The offroad emissions inventory is "an estimate of the population, activity, and emissions estimate of the varied types of offroad equipment. The major categories of engines and vehicles include agricultural, construction, lawn and garden and offroad recreation, and includes equipment from hedge trimmers to cranes (CARB 2009c). The OFFROAD Model estimates the relative contribution of gasoline, diesel, compressed natural gas, and liquefied petroleum gas-powered vehicles to the overall emissions inventory of the state" (CARB 2009d). The compressors used on the hydraulic spray trucks are examples of the types of equipment covered by the offroad emissions inventory and the OFFROAD Model, as discussed in Section 6.2.2.2 under Offroad Sources.

The final portion of the significance assessment for the potential to conflict with air quality plans is the compliance with applicable air quality regulations. A full discussion of the federal, state, and local regulations, including the applicability and compliance status of the Program equipment and operations, is provided in Section 6.1.1.

EXPOSE SENSITIVE RECEPTORS TO SUBSTANTIAL POLLUTANT CONCENTRATIONS

The CEQA Guidelines state that a project may be significant if it will expose sensitive receptors to substantial pollutant concentrations. Substantial pollutant concentrations are generally defined as levels exceeding air quality standards or cancer or noncancer risk thresholds. The analyses for air concentrations and deposition rates for toxic compounds can be found in Section 6.2.2.1, and the estimates of cancer or noncancer risks are presented in Chapter 8, Human Health. The significance thresholds and impacts associated with the human health risks, including the cancer and noncancer risks, are presented in Section 8.2.

For the air quality analysis, the exposure of sensitive receptors to substantial pollution concentrations is therefore limited to the criteria pollutants. As mention previously, substantial pollutant concentrations are generally defined as levels exceeding the air quality standards (NAAQS or CAAQS). The significance thresholds and method of evaluation for determining if the Program alternatives would violate air quality standards are described above.

OBJECTIONABLE ODORS

The remaining evaluation criterion to be assessed is the potential for a proposed project to cause a public nuisance by subjecting a substantial number of people to objectionable odors for a substantial period of time. A review of the Material Safety Data Sheet (MSDS) and product labels for each treatment alternative determined the characteristic odor and a qualitative description of its strength for each alternative. Different people react differently to odors and very few of the ingredients of the formulations have odor thresholds established (e.g., 1,2,4-trimethylbenzene (USEPA 1994), and ethylbenzene (USEPA 2000a). Based on the information available, a qualitative significance assessment was completed for odor for each Program alternative as well as the No Program Alternative.

6.2.2 Evaluation Methods and Assumptions

The methodology, assumptions, and results of the air quality impact evaluation for Program alternatives are provided below. The evaluation is presented in two parts, the first is for the active ingredients and toxics associated with the application compounds (Section 6.2.2.1) and the second is for the criteria pollutants associated with the application equipment and operations (Section 6.2.2.2). In addition, the details of the evaluations are discussed in full in Appendix C, Air Quality Technical Report.

6.2.2.1 Air Toxics

One of the objectives of the air quality analysis (Appendix C) was to determine the ambient air concentrations and deposition rates associated with the chemical treatment alternatives. These treatment alternatives would cover most of California and would be applied in different environmental settings. Different scenarios were developed to assess the various environmental settings and the maximum values for the different scenarios were determined using conservative screening analyses. In most cases, the distance could be estimated to the maximum concentrations and depositions. The distance that drift particles or gases could travel was not assessed. That is, the distance to the maximum concentrations or deposition rates was estimated, but concentrations or depositions beyond a few hundred meters were not assessed. When possible, concentrations and deposition rates were estimated both inside the spray area and outside the spray/treatment area. The maximum concentrations and deposition rates were used in both the Human Health Risk Assessment (HHRA, Appendix D) and the Ecological Health Risk Assessment (ERA, Appendix F) to determine exposure. Using the maximum concentration and deposition rates for all exposure estimates is conservative since the majority of the exposure would be less than the maximum.

The primary focus of this assessment was the active ingredients of the various chemical treatment alternatives and options. Each treatment option contains an active ingredient that is responsible for controlling the LBAM population. The treatment options and their active ingredients are summarized in Table 6-5. In addition, the various mechanisms of applying each treatment option, and whether the volatilization release mechanism was applicable, are also summarized.

Table 6-5 Chemical Treatment Alternatives/Options and Active Ingredients

Treatment	Active Ingredient	%	Aerial	Ground Application: Hydraulic Spray	Ground Application: Pod Gun	Ground Application: Spray Gun	Ground Application: Caulk Gun	Volatilization
No Program Alternative								
Entrust	Spinosad A, Spinosad D	80%		●				
Warrior	Lambda-cyhalothrin	11.4%		●				
Duraguard ME	Chlorpyrifos	20%		●				●
Dursban 4E	Chlorpyrifos	44.9%		●				●
Permethrin E-Pro	Permethrin	36.8%		●				
DiPel DF	Bacillus thuringiensis kurstaki	54%		●				
Mating Disruption (Alternatives MD2 – ground and MD3 – aerial)								
SPLAT	(E)-11-Tetradecen-1-yl Acetate	9.50%	●			●	●	●
	(E,E)-9,11-Tetradecen-1-yl Acetate	0.50%	●			●	●	●
Hercon	(E)-11-Tetradecen-1-yl Acetate	10.48%	●		●			●
	(E,E)-9,11-Tetradecen-1-yl Acetate	0.52%	●		●			●
Twist Ties (Alternative MD-1)								
Isomate	(E)-11-Tetradecen-1-yl Acetate	63.88%						●
	(E,E)-9,11-Tetradecen-1-yl Acetate	2.64%						●
Male Moth Attractant (Alternative MMA)								
Permethrin E-Pro	Permethrin	6.0%				●		
Pheromone	(E)-11-Tetradecen-1-yl Acetate	0.95%				●		●
	(E,E)-9,11-Tetradecen-1-yl Acetate	0.050%				●		●
Organically Approved Insecticides (Alternatives Btk and S)								
DiPel DF, DiPel DF PRO	*Bacillus thuringiensis kurstaki*	54%		●				
Entrust	Spinosad A, Spinosad D	80%		●				

Note that a modified formulation of the Hercon Bio-Flake is being considered for use in the Program alternatives rather than the formulation analyzed in these assessments and listed above. This change is due to the ongoing evolution of the Program and refinements to the pheromone formulations and application methods. The modified formulation has a higher percentage of pheromone (15 percent versus 11 percent) but uses the same application rate of active ingredient (mass per area of pheromone) as the formulation assessed. Therefore, the emission rate will not be any different, as emissions were based on the application rate. However, the revised formulation will likely have a slightly different particle size distribution and a slightly different volatilization rate. Overall, these differences are expected to be minor and to roughly balance out (e.g., a slightly higher particle size may decrease air concentrations while a slightly higher volatile content may increase air concentrations). The amount of uncertainty due to this change in formulation is not expected to significantly change the resulting concentrations or deposition values, nor is it expected that the different formulation would change the conclusions regarding the significance of the environmental impacts.

A secondary aspect of this assessment was to calculate the ambient air concentration and deposition rates of the other toxics contained in the various treatment options (other than the active ingredients). Only one treatment option considered as part of the LBAM Program contains additional toxic ingredients: Alternative MMA. (Several of the No Program treatments contain toxic ingredients (inert), but these were not part of the scope of work for this air quality analysis.) The Alternative MMA treatment and its inert toxic ingredients are summarized in Table 6-6. The information was obtained from the product labels and MSDSs. In addition, the various mechanisms of applying each treatment option and the volatilization release mechanism are also summarized.

Table 6-6 Treatment Options and Toxic Ingredients

Treatment	Toxic Ingredient	Percent	Aerial	Ground Application				Volatilization
				Hydraulic Spray	Pod Gun	Spray Gun	Caulk Gun	
Male Moth Attractant								
Permethrin E-Pro	1,2,4-trimethylbenzene	0.65%				•		•
	ethylbenzene	0.0049%				•		•
Pheromone	NA	NA						

The release mechanisms and emission sources are discussed in Section 6.2.2.1 under Emission Sources. The results are summarized in Section 6.2.2.1 under Treatment Compound VOC and PM Emissions and the key assumptions and uncertainties are presented in Section 6.2.2.1 under Summary of Results.

Emission Sources

For the air analyses, three different mechanisms were identified that would result in pollutants being released to the ambient air. The three release mechanisms were:

- **Aerial Application.** The treatment compounds would be sprayed from a plane for coverage in essentially unpopulated areas.
- **Ground Application.** For populated areas, several options were assessed for applying the treatment compounds using ground-based equipment such as hydraulic spraying and dose-delivery systems.
- **Volatilization of Applied Compounds.** After the treatment compounds had been applied, either aerially or by ground-based means, volatile pollutants would continue to volatilize over time.

Each of the different release mechanisms results in pollutants being dispersed in distinct ways due to the different physical properties of each. As a result, different analysis methods were developed for each release mechanism to estimate the 1-hour maximum ambient air concentrations and deposition values. These methods are summarized in Section 6.2.2.1 under Dispersion Model 1-Hour Maximums During Application.

The 1-hour maximum model results were converted to longer-term averages using a variety of techniques. These are summarized in Section 6.2.2.1 under Long-Term Values. In addition, as multiple applications of a treatment option will likely occur in each area (three treatments were assumed to be required for all Program alternatives), these release mechanisms overlap to generate the final worst-case exposures. For example, while the second application of an aerial treatment is being applied, exposure to the volatilizing compounds from the first application would also occur. Another example is the deposition from the second and third application adding to the deposition from the first application. The combined impacts of multiple applications on the ambient air concentrations and deposition rates are discussed in Section 6.2.2.1 under Long-Term Values.

The effects of environmental degradation and transformation on the long-term deposition rates are accounted for. These effects are only considered period averages, details of which are provided in Section 6.2.2.1 under Addition and Removal Processes. Section 6.2.2.1 under Summary of Results contains a summary of the ambient air concentrations and depositions. A summary of the daily total statewide emissions are presented in Section 6.2.2.1 under Treatment Compound VOC and PM Emissions.

Dispersion Model 1-Hour Maximums during Application

As mentioned previously, the primary outputs from the LBAM Air Quality Analysis were the maximum ambient air concentrations and deposition rates associated with the LBAM treatment options. When possible, concentrations and deposition rates were estimated both inside the spray/treatment area and outside the spray/treatment area. For the ground and aerial application concentrations and deposition rates, the values represent the maximum 1-hour averages during the actual application period. The conditions that result in high concentrations usually are opposite of those that result in high deposition. However, for this analysis, the maximum values for concentration and deposition were estimated separately but were assumed to be able to occur at the same time. This event is unlikely and should overestimate the overall impacts determined in the HHRA and ERA.

AERIAL APPLICATION

Aerial application of mating disruption pheromones is Alternative MD-3. Aerial application involves an aircraft; for the LBAM Program it would be a Beechcraft A90 Airplane, spraying the treatment compounds as it flies over the treatment areas. The CDFA supplied several key pieces of information about the aerial application methods, including:

- Aerial application would only occur over essentially unpopulated areas.
- The airplane would fly at an altitude of 300 to 500 feet above ground level (91 to 152 meters) as it sprayed. To be conservative, all flights were assumed to occur at the lowest altitude (i.e., 300 feet or 91 meters). This assumption is conservative since the droplets will have less time and distance to disperse. The resulting maximum concentrations and deposition rates should be greater than spraying at higher altitudes.
- Aerial spraying would not occur if wind speeds exceeded 10 miles per hour. This wind speed was assumed to be measured at 6.5 feet (2 meters) aboveground.
- Aerial spraying would not occur if precipitation fell (actual threshold is 50 percent or greater chance of precipitation within 24 hours of scheduled spraying).
- Only pheromone treatment compounds would be aerially applied.

The analysis for the aerial application was accomplished by making use of a Lagrangian model that tracks the movement of the spray particles. The AGricultural DISPersal model, or AGDISP, was first created for the U.S. Forest Service and the U.S. Army in 1979 by Continuum-Dynamics Inc. for the purpose of predicting gravitational settling and soil deposition of spray clouds. It has been refined over time and its algorithms are the primary tool used in assessing the air dispersion from aerial application of pesticides. The methods used by the model take into account aircraft vortices, engine propulsion, and propeller turbulence as well as evaporation and canopy effects.

This model was chosen for this assessment because of the range of application scenarios that it can model. AGDISP requires inputs of very specific information regarding canopy type, airplane model and make, nozzle fixtures, material specifications, and meteorological data. Because it is not feasible to model every specific location in all the counties in California where spraying may occur, the objective was to generate representative worst-case concentrations and deposition rates for several different modeling scenarios. These scenarios could then be used to conservatively estimate the worst-case concentrations and deposition rates at any of the individual spray locations across the state. A worst-case analysis is appropriate for environmental impact analyses under CEQA.

Based on CDFA's guidance, the two treatment options that would be applied aerially under Alternative MD-3 were assumed to be Hercon Disrupt Bio-Flake® LBAM or SPLAT. The final resulting ambient air concentrations and deposition values out of all the different scenarios assessed based on the aerial modeling are presented in Table 6-7.

In addition to the maximum ambient air concentrations and deposition, spray drift was calculated up to 800 meters away from the leeward edge of the spray block. This distance was not determined by the analysis but rather represents the maximum distance away from the spray block that AGDISP can calculate. The Hercon Bio-Flake resulted in no fraction of sprayed material remaining aloft past the extent of the model. For SPLAT, maximum deposition of all the scenarios modeled occurred at 274 feet from the leeward edge of the spray block. In this scenario, the fraction aloft (or drift) was approximately 30 percent of the applied material. However, since the maximum was found 274 feet (84 meters) out from the block it is clear that the deposition would become substantially smaller as the fraction aloft moves past the 800-meter mark. It is also important to note that this fraction aloft value occurred during a model run with a limited leaf area index profile applied therefore conservatively assuming that a very small canopy interception was present in a Coastal ecoregion, which is unlikely. The fraction aloft at the 800-meter mark was approximately 30 percent for this ecoregion. It should be noted that health and ecological risks were evaluated using the maximum deposition and concentration values and that any drift further from the maximums would have lower impacts.

GROUND APPLICATION

Several different methods exist for applying treatment compounds using ground-based equipment. The methods identified by the CDFA include:

- Hydraulic Spraying – a medium to course spray is continuously applied by either truck-based equipment or backpack-based equipment. This type of application would only be used for the No Program insecticides or Btk and spinosad. The target vegetation would be trees or shrubs on private or public land.
- Caulk Gun – a dollop of treatment compound (almost a toothpaste consistency) is squeezed onto the target. The target would either be trees and shrubs or telephone poles on private or public land. The SPLAT pheromone treatment may be applied by this method. No drift is associated with this method.
- Measured Dose Spray – depending on the treatment compound, a different delivery method may be used. For all methods, a predetermined amount of treatment compound is applied per "shot."
  - Pod Gun – is used for Hercon pheromone treatment. A pod gun is backpack-based and uses compressed air to shoot a very sticky mixture of Hercon and glue into trees and shrubs. Very little, if any, drift is associated with this application method. Applications could occur on either public or private land.
  - Backpack Dose Spray Gun – is used for SPLAT pheromone treatment. This delivery system also uses compressed air and operates with a nozzle, with negligible drift. This method would be used on public and private lands and target trees, shrubs, and structures like telephone poles.
  - Truck Dose Spray Gun – is very similar to the backpack dose spray gun except the treatment compound and compressed air system are mounted in the back of a light duty truck. This method will be used to drive public streets and apply the treatment compound about 8 feet aboveground onto trees

and poles that border the street. It is a quicker method of application since it only targets public lands and the vehicle only has to stop for a few seconds to apply the target dose.

These various application methods can be grouped into two primary categories, hydraulic spraying (which has drift) and other ground application methods (which do not have drift).

HYDRAULIC SPRAY

Hydraulic spraying would be used for both the No Program treatments and Alternatives Btk and S. As noted above, only the hydraulic spraying delivery method has any drift associated with it. As such, the hydraulic spraying was modeled differently than the other ground-based application methods. Because this method will be utilized all over the state, the modeling was conducted using very conservative screening-level methods. The USEPA-developed Industrial Source Complex Short Term (ISCST) model was used in a screening mode.

Although ISCST is no longer the USEPA approved dispersion model, it was the standard air dispersion model used by both government agencies and private enterprise for many years. The primary benefit of ISCST over the current approved dispersion model (AERMOD) is that ISCST can be run in a screening mode to predict worst-case concentrations and deposition rates. ISCST is a steady-state Gaussian plume model that can be used to assess pollutant concentrations from a wide variety of sources. The model can account for settling and dry deposition of particles; point, area, line, and volume sources; plume rise as a function of downwind distance; and limited terrain adjustment. ISCST predicts air concentrations at the receptor locations using the physical specifications of the sources of emissions, including location of each source, release height, temperature, and exhaust rate of emissions. Additional parameters, such as particle density and particle size distribution are required for deposition calculations.

The active ingredients of the five treatment compounds that could be applied using hydraulic spraying under the No Program Alternative are spinosad, Btk, chlorpyrifos, lambda-cyhalothrin, and permethrin. Under the Proposed Program, the active ingredients of the two treatment compounds that would be applied using hydraulic spraying under the Organically Approved Insecticides (Alternatives Btk and S) are Btk and spinosad.

The hydraulic spraying was modeled as a ground-based (1-meter elevation) area source. American Society of Agricultural Engineers standard particle size distributions were assumed. All of the treatment options are water-based and a specific gravity of 1 was assumed for all treatment options. Chemical degradation was assumed to be negligible. Evaporation and the respirable fraction of the droplet spray were taken into account for the No Program Alternative and Alternatives Btk and S. To account for evaporation and the respirable fraction, the American Society of Agricultural Engineers droplet size distributions were assumed to evaporate such that some of the droplets were reduced to PM_{10}. These estimates are discussed under Treatment Compound VOC and PM Emissions, as well as in Appendix C2, Section C8.2, PM_{10} Emission Methodology. The conservative estimates predict that approximately 10 to 20 percent of the mass applied would evaporate to droplets 10 microns or less in diameter. A unit emission rate was assumed and the maximum ambient air concentrations and deposition rates were calculated using the emission rates for each pollutant.

The emission rate for hydraulic spraying was based on the maximum application rate from the product label to determine the maximum mass per area (e.g., grams per acre of application). The maximum application rate was then adjusted to account for the fraction of the area that would actually be treated. For example, trees and shrubs would be treated, but buildings, gardens, and lawns would not. The common assumption for CDFA spraying is that only 25 to 35 percent of a plot would actually have treatment applied. As a result, all maximum application rates are multiplied by 35 percent to achieve the actual maximum application rate.

It was assumed that the hydraulic spraying for both the No Program Alternative and Alternatives Btk and S would only occur during daylight hours. As such, a limited set of meteorological data was used, representing conditions that occur during daylight hours. In particular, the most stable atmospheric conditions that only occur at night were excluded from the analyses because the Proposed Program excludes spraying at night.

The final resulting ambient air concentrations and deposition values out of all the different scenarios assessed based on the hydraulic spray modeling are presented in Table 6-7.

OTHER METHODS

A different modeling approach was used for the other ground-based application methods since drift would be negligible. Box models were used to estimate the hourly ambient concentrations of the pollutants for Alternatives MD and MMA. As a result of the drift being negligible, simple and conservative methods were developed to estimate the concentration and deposition associated with these alternatives. A box model is a simple air dispersion model. It assumes homogenous mixing inside the box. Thus, the concentration within a box is uniform. It also assumes no decay of the pheromone within the box. A box model basically employs the principle of mass balance.

The box sizes were estimated based on the dimensions of the application targets. For example, a larger box was used for applying pheromone to a large tree versus a telephone pole. In addition, it was assumed that between 10 and 50 percent of the active ingredients are volatile during the 1-hour application. This assumption is conservative since the formulations are designed to last for weeks or months, not hours, and it is highly unlikely that up to one-half of the active ingredient would volatilize in 1 hour. It was also assumed that the application would occur during very light winds. Because wind speeds are set to 0.5 meters per second, it reduces the volume in which pollutants are allowed to mix and produces more conservative ambient concentrations. The wind speed selected is one-half the minimum wind speed used in screening level models such as ISCST and SCREEN3.

To estimate the deposition rate of the pheromone, no dispersion model was used. Instead, 100 percent of the active ingredient was conservatively assumed to be deposited during the application. The total deposition was divided up between the application target (e.g., a tree or telephone pole) and the surrounding vegetation and soil based on input from the CDFA (Rains and Schnabel, pers. comm., 2008). It was assumed that 80 percent of the material was deposited on the target and the remaining fraction would be deposited equally on the soil and other plants or vegetation. The caulk guns were an exception and the application from the caulk guns was assumed to be deposited only on the target.

The overall methodology is very conservative because it double counts the mass of each material sprayed. Up to 50 percent of the material is assumed to volatilize and contribute to the ambient air concentration and 100 percent of the material is assumed to be deposited.

The two treatment options that would be applied using ground application equipment under Alternative MD-2 are Hercon Bio-Flake, and SPLAT. The worst-case 1-hour ambient air concentrations and deposition values out of all the different scenarios assessed are presented in Table 6-7. The ingredients of the two treatment compounds that would be applied using hydraulic spraying under Alternative MMA are pheromone and permethrin (along with the 1,2,4-trimethylbenzene and ethylbenzene contained in the permethrin formulation). The final resulting ambient air concentrations and deposition values out of all the different scenarios assessed based on the other ground application methods are presented in Table 6-7.

Volatilization

To characterize the long-term impact of the treatment compounds, the volatilization of the materials after they are applied to the designated targets was also looked at. The estimated ambient air concentrations would be appropriate to determine exposure after the treatment compounds have been applied. For example, if a person entered an area that had been sprayed the previous week, they would be exposed to the concentrations of the compounds in the air that resulted from volatilization, and that exposure could last for an hour, 24 hours, or longer (i.e., if the compound had not fully volatilized from the preceding treatment).

Once the materials have been deposited (by air or ground) or applied via twist tie, any volatile components would evaporate, or volatilize, over time. For the twist ties (Alternative MD-1), volatilization is the only route of exposure. Many of the materials are designed to volatilize over time so that the active ingredient is released and is present at sufficient concentrations in the air as to be an effective LBAM deterrent. The product labels and the CDFA determined how frequently the different treatment options would be reapplied. It was assumed that the treatment options would be applied at their maximum rate as stated in the product labels and that 100 percent of the volatile ingredients volatilize between applications. This assumption likely overestimates the amount of material that volatilizes as some is likely to degrade or transform and some material may not evaporate that rapidly. The volatilization rate was assumed to be constant between applications.

The treatment compounds and their ingredients were categorized as volatile, nonvolatile, or semivolatile based on the vapor pressure and Henry’s Constant (details are contained in Appendix C1, Section C6.2, Volatility of Compounds), as follows:

VOLATILE

- The active ingredient pheromones ((E)-11-Tetradecen-1-yl Acetate and (E,E)-9,11-Tetradecen-1-yl Acetate) in SPLAT, Hercon Bio-Flake, and Isomate
- 1,2,4-trimethylbenzene
- ethylbenzene

NONVOLATILE

- Lambda-cyhalothrin
- Permethrin
- Spinosad
- Btk

SEMI-VOLATILE

- Chlorpyrifos

Based upon both the vapor pressure and Henry’s Constant, chlorpyrifos is slightly volatile (or semivolatile). As a semivolatile, it was treated as a nonvolatile during application. Application is a short-term event and any volatilization during the short term would be negligible. However, over the long term, chlorpyrifos is treated like a volatile compound and is assumed to volatilize completely between applications.

As with the hydraulic spray modeling, the USEPA-developed ISCST model was used in a screening mode. The volatilization was modeled as a ground-based (zero elevation) area source. A unit emission rate was assumed and the maximum ambient air concentrations and deposition rates were calculated using the emission rates for each pollutant. Since ISCST was run in screening mode, only 1-hour maximum concentrations could be estimated. Longer-term concentrations were estimated using USEPA conversion factors.

The final resulting ambient air concentrations for all the different compounds and scenarios assessed for volatilization are presented in Table 6-7.

Long-Term Concentrations

For each treatment alternative, the 1-hour maximum and the 8-hour, 24-hour, and application period averages of both concentration and deposition were estimated. These are the averaging periods that are utilized in the HHRA and the ERA to determine the impacts to human health and the ecosystems. The methods presented up to this point predicted the maximum 1-hour concentrations and deposition. Due to the conservative screening-level methods used to calculate and model the treatment options, the 8-hour, 24-hour, and application period averages of both concentration and deposition were calculated based on the 1-hour maximums. Different methods were used for estimating the values due to application (Section 6.2.2.1 under Dispersion Model 1-Hour Maximums During Application) and due to volatilization (Section 6.2.2.1 under Volatilization).

To estimate the 8-hour, 24-hour, and period concentrations and deposition rates due to application the 1-hour maximums were multiplied by a scaling factor. Depending on the length of time for the application, the concentrations and deposition rates were either estimated using the USEPA developed conversion factors (USEPA 1992) or using straight time-weighted factors (e.g., for converting a 1-hour application to an 8-hour average, the maximum 1-hour concentration was multiplied by $1/8^{th}$). The technical report in Appendix C1, Section C8, Longer-Term Averaging Periods, contains the conversion factors and equations used for each averaging period. All formulation application periods were assumed to occur over 8 hours with the exception of the aerial spraying (Alternative MD-3) and the No Program Alternative, which were assumed to occur over 1 hour.

For volatile compounds, the modeling conducted to predict the ambient air concentrations due to volatilization generated 1-hour averages. The 8-hour, 24-hour, and period average concentrations were calculated from the 1-hour maximum concentration using USEPA developed conversion factors (USEPA 1992). The volatilization values represent the ambient air concentration after the actual application has occurred and all particle drift has either settled or volatilized (e.g., what one might encounter walking through the area 1 week after the application). The technical report in Appendix C1, Section C8, Longer-Term Averaging Periods, contains the conversion factors and equations used for each averaging period.

Addition and Removal Processes

Several factors and processes would affect the predicted concentrations and deposition values after the treatment compounds have been applied, either by adding or removing material. One of the effects, volatilization and its impacts on concentrations, has already been discussed in Section 6.2.2.1 under Volatilization. However, volatilization will also impact the long-term deposition values, which will be discussed further in this section. The other two primary processes are multiple applications and environmental degradation. Multiple applications will impact all averaging periods by adding material and will be discussed first, while volatilization and degradation will only impact the period averages by removing material over time.

MULTIPLE APPLICATIONS

To determine the number of applications for each treatment alternative, the Program calls for up to two life cycles without LBAM being detected before treatment is halted. However, it was necessary to quantify this value in more precise terms to perform the modeling and post-processing calculations; it was assumed that each treatment alternative would be applied 3 times. Because of the three discrete applications, the worst-case averages would reflect the cumulative impact of the multiple applications. The applications would occur over different time frames for each treatment alternative as discussed in Chapter 2. To estimate the concentration due to multiple applications, the concentration due to a single application is added to the concentration due to the volatilization. This addition accounts for a second application occurring at the end of the spray period when ambient air concentrations are present from the volatilization of the first application. The deposition due to multiple applications is simply the sum of the deposition values for each application (that is, the total deposition for three applications is 3 times the deposition for a single application).

VOLATILIZATION

Volatilization will impact the concentrations and deposition for the volatile compounds by removing mass over time. It was assumed the volatilization is constant over time and that the material volatilizes completely between applications. The impact of volatilization on the concentrations was already discussed in Section 6.2.2.1 under Volatilization and how it effects multiple applications is discussed above. The effect of volatilization on deposition is discussed in the remainder of this paragraph. Volatilization as a removal mechanism was conservatively assumed only to be significant after 24 hours, thus, the 1-hour, 8-hour, and 24-hour depositions would not be affected. The period deposition would be the average amount of material that was deposited over the spray period recognizing that the deposited volatiles would evaporate between applications. Therefore, within the spray period, at three separate periods of time the deposition starts at the amount deposited during application and reduces to zero just before the next application.

ENVIRONMENTAL DEGRADATION

Environmental degradation affects the deposition rates of the nonvolatile compounds (since the volatile compounds are assumed to have evaporated between applications). Once released in the environment, the treatment compounds undergo degradation and transformation. The rates at which these processes occur vary depending on the media (air, water, soil, etc.) and the conditions (temperature, pH, etc.). Degradation information was utilized in the air analyses by applying an environmental half-life to the nonvolatile treatment compounds that were deposited during application. The long-term quantities of materials deposited depended on the number and frequency of applications but also on the rate of degradation and transformation. The degradation mechanisms and the equation used to account for environmental degradation are discussed in Appendix C1, Section C9.3, Environmental Degradation. In brief, a half-life is applied to the amount of material deposited after each application. Thus, less material will be present at the end of the period from the first application than the second application because the first material has had longer to degrade in the environment. Total deposition is the sum of the amount deposited for each application less the amount degraded from each application.

Summary of Results

The overall results from the air toxics analysis are presented in Table 6-7 for the 1-hour, 8-hour, 24-hour, and period averaging periods. The values in the table represent the ambient air concentrations and depositions that account for multiple applications as well as volatilization and environmental degradation. These results were used in both the HHRA and the ERA, which are discussed in Chapters 8 and 12.

Table 6-7 Concentrations and Deposition Rates After Multiple Applications Volatilization, and Environmental Degradation

		Application Rate	1-Hour		8-Hour		24-Hour		Period	
			Conc	Dep	Conc	Dep	Conc	Dep	Conc	Dep
Formulation	Ingredient	(g/m²)	(µg/m³)	(g/m²)	(µg/m³)	(g/m²)	(µg/m³)	(g/m²)	(µg/m³)	(g/m²)
Truck-based Hydraulic Spraying (No Program)										
Entrust	Spinosad A, Spinosad D	1.68E-03	3.24E-01	1.67E-03	4.05E-02	1.67E-03	1.35E-02	1.67E-03	9.64E-04	2.05E-03
Warrior	Lambda-cyhalothrin	1.60E-03	3.08E-01	1.59E-03	3.85E-02	1.59E-03	1.28E-02	1.59E-03	9.16E-04	2.58E-03
Duraguard ME	Chlorpyrifos	3.78E-02	1.43E+01	3.75E-02	5.80E+00	3.75E-02	3.10E+00	3.75E-02	7.20E-01	1.88E-02
Dursban 4E	Chlorpyrifos	1.77E-02	6.68E+00	1.76E-02	2.71E+00	1.76E-02	1.45E+00	1.76E-02	3.37E-01	8.78E-03
Permethrin E-Pro	Permethrin	7.82E-03	1.51E+00	7.76E-03	1.89E-01	7.76E-03	6.28E-02	7.76E-03	4.49E-03	1.84E-02
Backpack Hydraulic Spraying (No Program)										
Entrust	Spinosad A, Spinosad D	1.68E-03	1.39E-01	1.74E-03	1.74E-02	1.74E-03	5.80E-03	1.74E-03	4.15E-04	2.14E-03
Warrior	Lambda-cyhalothrin	1.60E-03	1.32E-01	1.65E-03	1.66E-02	1.65E-03	5.52E-03	1.65E-03	3.94E-04	2.69E-03
Duraguard ME	Chlorpyrifos	3.78E-02	1.01E+01	3.92E-02	5.28E+00	3.92E-02	2.92E+00	3.92E-02	7.07E-01	1.96E-02
Dursban 4E	Chlorpyrifos	1.77E-02	4.73E+00	1.83E-02	2.47E+00	1.83E-02	1.37E+00	1.83E-02	3.31E-01	9.17E-03
Permethrin E-Pro	Permethrin	7.82E-03	6.49E-01	8.10E-03	8.11E-02	8.10E-03	2.70E-02	8.10E-03	1.93E-03	1.92E-02
Aerial Application (MD-3)										
SPLAT	(E)-11-Tetradecen-1-yl Acetate	7.04E-03	2.50E+01	9.39E-03	3.47E+00	9.39E-03	1.26E+00	9.39E-03	9.45E-02	4.70E-03
	(E,E)-9,11-Tetradecen-1-yl Acetate	3.71E-04	1.32E+00	4.94E-04	1.83E-01	4.94E-04	6.62E-02	4.94E-04	4.97E-03	2.47E-04
Hercon	(E)-11-Tetradecen-1-yl Acetate	5.88E-03	6.81E+00	1.11E-02	1.14E+00	1.11E-02	4.65E-01	1.11E-02	5.94E-02	5.57E-03
	(E,E)-9,11-Tetradecen-1-yl Acetate	2.92E-04	3.38E-01	5.53E-04	5.67E-02	5.53E-04	2.31E-02	5.53E-04	2.95E-03	2.76E-04
Pod Gun (MD-2)										
Hercon	(E)-11-Tetradecen-1-yl Acetate	5.88E-03	3.38E+02	4.70E-03	2.36E+02	2.63E-02	7.89E+01	2.63E-02	2.67E+00	1.32E-02
	(E,E)-9,11-Tetradecen-1-yl Acetate	2.92E-04	1.68E+01	2.33E-04	1.17E+01	1.31E-03	3.91E+00	1.31E-03	1.33E-01	6.53E-04
Caulk Gun (MD-2)										
SPLAT	(E)-11-Tetradecen-1-yl Acetate	7.04E-03	1.42E+03	7.04E-03	9.94E+02	3.94E-02	3.32E+02	3.94E-02	5.55E+00	1.97E-02
	(E,E)-9,11-Tetradecen-1-yl Acetate	3.71E-04	7.48E+01	3.71E-04	5.23E+01	2.08E-03	1.74E+01	2.08E-03	2.92E-01	1.04E-03
Metered Spray Gun (MD-2)										
SPLAT	(E)-11-Tetradecen-1-yl Acetate	7.04E-03	4.04E+02	5.63E-03	2.83E+02	3.15E-02	9.44E+01	3.15E-02	1.60E+00	1.58E-02
	(E,E)-9,11-Tetradecen-1-yl Acetate	3.71E-04	2.13E+01	2.97E-04	1.49E+01	1.66E-03	4.97E+00	1.66E-03	8.43E-02	8.30E-04
Truck-based Spray Gun (MD-2)										
SPLAT	(E)-11-Tetradecen-1-yl Acetate	7.04E-03	6.32E+02	5.63E-03	4.42E+02	3.15E-02	1.47E+02	3.15E-02	2.49E+00	1.58E-02
	(E,E)-9,11-Tetradecen-1-yl Acetate	3.71E-04	3.32E+01	2.97E-04	2.33E+01	1.66E-03	7.76E+00	1.66E-03	1.31E-01	8.30E-04
Twist Ties (MD-1)										
Isomate	(E)-11-Tetradecen-1-yl Acetate	1.21E-02	3.09E-01		2.16E-01		9.79E-02		1.59E-02	
	(E,E)-9,11-Tetradecen-1-yl Acetate	5.00E-04	1.28E-02		8.94E-03		4.04E-03		6.55E-04	

Table 6-7 Concentrations and Deposition Rates After Multiple Applications Volatilization, and Environmental Degradation

		Application Rate	1-Hour		8-Hour		24-Hour		Period	
			Conc	Dep	Conc	Dep	Conc	Dep	Conc	Dep
Formulation	Ingredient	(g/m²)	(µg/m³)	(g/m²)	(µg/m³)	(g/m²)	(µg/m³)	(g/m²)	(µg/m³)	(g/m²)
Truck-based Spray Gun (MMA)										
Pheromone	(E)-11-Tetradecen-1-yl Acetate	2.20E-05	9.87E-01	1.76E-05	6.91E-01	9.86E-05	2.31E-01	9.86E-05	3.93E-03	4.93E-05
	(E,E)-9,11-Tetradecen-1-yl Acetate	1.16E-06	5.20E-02	9.27E-07	3.64E-02	5.19E-06	1.21E-02	5.19E-06	2.07E-04	2.59E-06
Permethrin E-Pro	Permethrin	1.39E-04	1.25E+00	1.11E-04	8.72E-01	6.23E-04	2.91E-01	6.23E-04	4.85E-03	7.21E-04
	1,2,4-trimethylbenzene	1.51E-05	1.35E+00	1.21E-05	9.48E-01	6.77E-05	3.16E-01	6.77E-05	5.33E-03	3.38E-05
	ethylbenzene	1.13E-07	1.02E-02	9.07E-08	7.11E-03	5.08E-07	2.37E-03	5.08E-07	4.00E-05	2.54E-07
Truck-based Hydraulic Spraying (Btk and S)										
Entrust	Spinosad A, Spinosad D	1.68E-03	3.24E-01	1.67E-03	2.27E-01	9.34E-03	7.56E-02	9.34E-03	5.40E-03	1.15E-02
DiPel DF	*Bacillus thuringiensis kurstaki*	4.24E-02	8.17E+00	4.20E-02	5.72E+00	2.35E-01	1.91E+00	2.35E-01	1.36E-01	1.36E-01
DiPel DF PRO	*Bacillus thuringiensis kurstaki*	4.24E-02	8.17E+00	4.20E-02	5.72E+00	2.35E-01	1.91E+00	2.35E-01	1.36E-01	1.36E-01
Backpack Hydraulic Spraying (Btk and S)										
Entrust	Spinosad A, Spinosad D	1.68E-03	1.39E-01	1.74E-03	9.75E-02	9.74E-03	3.25E-02	9.74E-03	2.32E-03	1.20E-02
DiPel DF	*Bacillus thuringiensis kurstaki*	4.24E-02	3.51E+00	4.39E-02	2.46E+00	2.46E-01	8.20E-01	2.46E-01	5.85E-02	1.42E-01
DiPel DF PRO	*Bacillus thuringiensis kurstaki*	4.24E-02	3.51E+00	4.39E-02	2.46E+00	2.46E-01	8.20E-01	2.46E-01	5.85E-02	1.42E-01

Treatment Compound VOC and PM Emissions

While the impacts resulting from the concentrations and deposition values of Program materials are discussed in Chapter 8, Human Health, and Chapter 12, Ecological Health, the impacts of the VOC and PM_{10} emissions are used in assessing the impacts on air quality in this section. The PM_{10} emissions are discussed first followed by the VOC emissions.

Based on the information received and the analyses conducted, no PM_{10} emissions are due to the application of Alternative MD or MMA compounds. However, PM_{10} emissions would be due to hydraulic spraying of both the No Program and Alternative Btk and S compounds. As previously discussed (Section 6.2.2.1 under Dispersion Model 1-Hour Maximums During Application) for the ground application options for both Alternatives MD and MMA, no drift is associated with the application process. For the aerial application, the Hercon Bio-Flake is much larger than PM_{10} (approximately $1/8^{th}$ of an inch by $1/16^{th}$ of an inch) and the initial SPLAT droplet distribution does not have any droplets less than 10 microns in size. The AGDISP model used to estimate concentration and deposition accounts for evaporation from the droplets. Based on the initial distribution, the amount of volatile and nonvolatile material, it estimated the final distribution of the SPLAT material and found the smallest droplet size to be 26 microns with less than 2 percent of the applied material. Thus, no PM_{10} would result from the SPLAT spraying according to the AGDISP model.

The initial droplet size distribution for the hydraulic spray does not have any droplets less than 10 microns. However, since the spray is primarily water, some of the droplets will evaporate and reduce in size. By assuming an average spray height of 5 meters and that the droplets are almost pure water, screening-level estimates of the post-evaporation droplet size distribution predict approximately 19 percent of the mass is PM_{10}. This amount was multiplied by the total and daily amount of treatment compound applied to determine PM_{10} emissions for the entire state, which is very conservative because it includes the mass of the volatile water in the PM_{10} estimates.

The DPR provided the VOC content of several of the treatment compounds and in the absence of a specific value, VOC content, was estimated using the MSDS of each treatment compound. This content was multiplied by the total and daily amount of treatment compound applied to determine VOC emissions. Since not all the material would volatilize in 24 hours, another factor was used to estimate the daily emissions. Using the same assumption as for the air dispersion modeling volatilization estimates, it was assumed that 100 percent of the material volatilized between applications. Therefore the amount that volatilized is simply one divided by the frequency of application.

Table 6-8 summarizes the statewide emissions due to application of the treatment compounds. The statewide daily emissions and the estimated annual emissions are presented. Based on the potential statewide area that may need to be treated, it was conservatively assumed that emissions may occur every day for an entire year (while this assumption may be true for VOCs due to volatilization of applied compounds, it likely overestimates PM emissions). Detailed emission estimates are provided in Appendix C2, Section C8, Criteria Pollutant Emissions from Treatment Application.

Table 6-8 VOC and PM_{10} Emissions Due to Application Compounds

					Content		Emission Factors		Statewide Emissions		Statewide	Statewide Emissions	
Formulation	Ingredient	Application Rate (g/m^2)	Coverage Rate m^2/day per unit	Number of Units[2]	VOC %	PM_{10} %	VOC %/day	PM_{10} %	VOC lbs/day	PM_{10} lbs/day	days/yr[1]	VOC tons/yr	PM_{10} tons/yr
No Program													
Entrust	Spinosad	2.10E-03	1.21E+04	12	0.0%	100%	7.1%	19.3%	0	0.13	365	0	0.024
Warrior	Lambda-cyhalothrin	1.40E-02	1.21E+04	12	89%	100%	7.1%	19.3%	0.28	0.87	365	0.052	0.16
Duraguard ME	Chlorpyrifos	1.89E-01	1.21E+04	12	75.0%	100%	7.1%	19.3%	3.3	12	365	0.59	2.1
Dursban 4E	Chlorpyrifos	3.94E-02	1.21E+04	12	100.0%	100%	7.1%	19.3%	0.90	2.4	365	0.17	0.45
Permethrin E-Pro	Permethrin	2.13E-02	1.21E+04	12	63.2%	100%	7.1%	19.3%	0.31	1.3	365	0.056	0.24
Aerial Application (MD-3)													
SPLAT	Pheromones	7.41E-02	5.83E+07	4	10.0%	0.0%	3.3%	0.0%	127	0	365	23	0
Hercon	Pheromones	5.61E-02	5.83E+07	4	11.0%	0.0%	3.3%	0.0%	106	0	365	19	0
Pod-Gun (MD-2)													
Hercon	Pheromones	5.61E-02	1.21E+04	12	11.0%	0.0%	3.3%	0.0%	0.066	0	365	0.012	0
Caulk Gun (MD-2)													
SPLAT	Pheromones	7.41E-02	1.21E+04	12	10.0%	0.0%	1.7%	0.0%	0.040	0	365	0.0072	0
Metered Spray Gun (MD-2)													
SPLAT	Pheromones	7.41E-02	1.21E+04	12	10.0%	0.0%	1.7%	0.0%	0.040	0	365	0.0072	0
Truck-based Spray Gun (MD-2)													
SPLAT	Pheromones	7.41E-02	2.59E+06	12	10.0%	0.0%	1.7%	0.0%	8.5	0	365	1.5	0
Truck-based Spray Gun (MMA)													
MMA	Pheromones	2.32E-03	2.59E+06	12	1.0%	0.0%	1.7%	0.0%	0.026	0	365	0.0048	0
	VOC	2.32E-03	2.59E+06	12	11.7%	0.0%	1.7%	0.0%	0.31	0	365	0.057	0
	Ethylbenzene	2.32E-03	2.59E+06	12	0.005%	0.0%	1.7%	0.0%	0.00013	0	365	0.000024	0

Table 6-8 VOC and PM_{10} Emissions Due to Application Compounds

					Content		Emission Factors		Statewide Emissions		Statewide	Statewide Emissions	
Formulation	Ingredient	Application Rate (g/m²)	Coverage Rate m²/day per unit	Number of Units[2]	VOC %	PM_{10} %	VOC %/day	PM_{10} %	VOC lbs/day	PM_{10} lbs/day	days/yr[1]	VOC tons/yr	PM_{10} tons/yr
Organic Approved Insecticides (Btk and S)													
Entrust	Spinosad	2.10E-03	1.21E+04	12	0.0%	100%	7.1%	19.3%	0	0.13	365	0	0.024
DiPel DF	Btk	7.85E-02	1.21E+04	12	0.0%	100%	7.1%	19.3%	0	4.9	365	0	0.89
DiPel DF PRO	Btk	7.85E-02	1.21E+04	12	0.0%	100%	7.1%	19.3%	0	4.9	365	0	0.89
Twist-Ties (MD-1)													
Isomate	Pheromones	3.71E-02	1.21E+04	12	0.0350	0			0.010	0	365	0.0018	0

Notes:

[1] Days per year for treatment across the entire state based on the assumed total area to be treated and the coverage rate. It was conservatively assumed that emissions could occur 365 days per year, which may be appropriate for VOCs (due to continued volatilization), but likely overestimates the PM emissions which would only occur during application.

[2] Number of units represents the pieces of application equipment or crews statewide.

Primary Assumptions and Uncertainties

Every attempt was made to overcome uncertainty with conservatism. The resulting ambient air concentrations and depositions likely overestimate the actual values that would be anticipated. A summary of the primary assumptions and uncertainties and their impact on the results are presented below. A more thorough discussion of the assumptions and uncertainties are contained in Appendix C1, Section C10, Uncertainties.

- **Model Selection.** Either very conservative screening-level models were used (e.g., box models) or more refined models were used in a screening-mode (e.g., industrial source complex using screening level meteorology). The models were run in this manner so the results would be applicable statewide. As a result, the estimated concentrations and depositions are likely higher than what a more refined model would predict for a specific location using site-specific information.
- **Assumed the Maximum Concentrations and Depositions Could Occur at the Same Time.** The maximum concentration and maximum deposition were estimated in separate model runs because the environmental conditions and application characteristics that result in maximum airborne concentrations tend to minimize the amount of material that deposits and vice versa. It is therefore unlikely that the maximum concentration and maximum deposition would occur at the same time and assuming exposure to both would overpredict the impacts.
- **Utilized Maximum Application Rates.** The emission rates for each treatment formulation were calculated based on the maximum application rate and the fraction of the active ingredients obtained from the product labels. Often application rates range for each treatment formulation for different pests and application settings. In those situations, the most conservative of the potentially applicable application rates was used. It is anticipated that the emissions used in the analyses likely overestimate the true emissions.
- **Overestimated the Quantity of Material that Would Likely Volatilize.** For volatile compounds and for certain methods of application (e.g., pod guns and metered jet guns) estimates of the amount of material that would volatilize or be present as drift were required. With different environmental conditions likely to be encountered across the state and different application methods, conservative assumptions regarding volatilization were made. These assumptions include, but are not limited to, assuming 100 percent of the volatile materials volatilize between applications and that 10 percent of the permethrin applied would

either volatilize or be present in drift for Alternative MMA, even though it is likely nonvolatile. Thus, the resulting concentration estimates likely over predict the actual concentrations.

- **Assumed Three Applications Per Treatment Option.** To determine the number of applications for each treatment alternative, the Program calls for up to two life cycles without LBAM being detected before treatment is halted. However, it was necessary to quantify this value in more precise terms to perform the modeling and post-processing calculations and it was assumed that each treatment alternative would be applied 3 times. If the number of applications increases or decreases, then the resulting concentrations and depositions would also increase or decrease.
- **Assumed that the Hydraulic Spraying for Both the No Program Alternative and Alternatives Btk and S Would Only Occur During Daylight Hours.** As such, a limited set of meteorological data was used, representing conditions that occur during daylight hours. In particular, the most stable atmospheric conditions that only occur at night were excluded from the analyses. This assumption would underestimate concentrations if spraying were to occur at night.
- **Assumed Impacts to Maximum Receptors for Most of the Program Alternatives Were for up to 8 Hours per Day.** However, for the No Program Alternative Options, a more reasonable assumption was used when converting the 1-hour maximums to longer-term averages. The No Program Alternative was assumed to impact the maximum receptors for 1 hour per day. If this assumption was modified, the resulting ambient air concentrations and deposition rates would likely increase for the No Program Alternative.

6.2.2.2 Criteria Pollutants

Criteria pollutants come from the combustion of fuels during the application of treatment options and due to the transportation of the workers to and from work and during the work day. The combustion of the fuels results in criteria pollutants, which are defined for this analysis as NO_x, SO_x, PM_{10}, $PM_{2.5}$, VOCs, and CO. This section of the report will provide a summary of methods used in developing the criteria emissions, assumptions and uncertainties encountered, and the results of the criteria emissions estimation. Emissions were estimated in terms of pounds per day, pounds per treatment, and pounds per year for the state of California.

As previously discussed, the criteria pollutant emissions will be compared to construction significance thresholds in an effort to determine their relative impacts. The CEQA significance determination will be made on a case-by-case basis accounting for the relative magnitude of the emissions and the implementation of any mitigation measures (see Section 6.2.11).

Emission Sources

Potential criteria emission sources likely to result from Program implementation were identified and are assessed in the remainder of this section. Criteria emissions from "business as usual" operations—such as building generators or water cooling systems for the CDFA and all of its contractors and maintenance activities for equipment associated with the Program—are not included in this assessment, as these are assumed to occur regardless of Program implementation.

As indicated in Table 6-9, criteria emission sources associated with the Program and assessed in this analysis include:

OFFROAD SOURCES

- Compressor mounted on hydraulic spray vehicles

ONROAD SOURCES

- Passenger vehicles for workers commuting to and from central congregation points
- Transportation trucks to transport ground-based and vehicle-based crews to and from Program sites
- Trucks used in vehicle-based treatment applications (including the SPLAT spray vehicles and the hydraulic spray trucks)
- Trucks used for vendor delivery of compounds/supplies to Program sites

AERIAL SOURCES

- Airplanes used for spraying of mating disruption pheromones
- Airplanes used for sterile insect releases

Table 6-9 Program Alternatives: Application Methods and Corresponding Criteria Emissions Sources

	Application Method								
	Aerial			Vehicle			Ground		
Criteria Pollutant Emissions Source	Spray	Populated Release	Hydraulic	SPLAT	Hydraulic Backpack	Caulk Gun	Pod Gun	Twist Ties	Index Cards
Worker Commute[1]	●	●	●	●	●	●	●	●	●
Vendor Delivery Vehicles[2]	●	●	●	●	●	●	●	●	●
Worker Transportation Vehicles[3]					●	●	●	●	●
Spray Vehicles[4]			●	●					
Airplanes	●	●							
Portable Offroad Equipment			●						
Program Alternative									
Mating Disruption[5]									
Twist Ties (MD-1)[6]								●	
Ground Application (MD-2)[7]				●		●	●		
Aerial Application (MD-3)	●								
Male Moth Attractant (MMA)				●					
Organically Approved Insecticides (Alternatives Btk and S)[8]			●		●				
Sterile Insect Technique (Alternative SIT)		●							
Inundative Parasitic Wasp Releases (Alternative Bio-P)									●

Notes:

[1] Worker commute includes workers traveling to/from home to a specific location, such as an airport or congregation point for worker transport vehicles.
[2] Vendor delivery vehicles include transportation of materials/supplies (such as treatment compound, parasitic wasps, sterile insects, etc.) to job sites.
[3] Worker transportation vehicles include transportation of ground-based crews from central congregation points to job sites.
[4] Spray vehicles include transportation of vehicle-based crews from central congregation points to job sites as well as vehicle usage for treatment application.
[5] Portable offroad equipment includes backpack sprayer engines and vehicle-mounted pump engines.
[6] Twist ties are a separate alternative. However, because they were assumed to use the same vehicles and crews as other ground-based application methods (such as the pod gun), they were assumed to have the same criteria emissions and were not calculated separately.
[7] For Program alternatives that include both vehicle and ground application methods (Alternatives MD-1, MD-2, Btk, and S), only one will be used if the alternative is chosen. The combination with the higher emissions is conservative.
[8] As Alternative MD-2, for alternatives that include both vehicle and ground-crew application methods, only the worst-case method will be chosen for assessment.

To determine which criteria emission source would be assessed for each treatment option, refer to Table 6-9. For example, Alternative MD-1 has a check mark in the twist ties column. Following that column upward indicates the criteria emission sources to be assessed include the worker commute vehicles, the vendor delivery vehicles, and the worker transportation vehicles. Alternatively, for Alternative MD-3, the worker commute vehicles, the vendor delivery vehicles, and the airplanes were included in the criteria emission estimates.

This assessment focuses on the criteria pollutant emissions associated with treatment options that may be implemented by the CDFA. As such, all of the treatment alternatives, except the No Program Alternative, are included in this analysis. It should be noted that criteria pollutant emissions would be associated with all treatment applications in the No Program Alternative. However, due to the large amount of uncertainty regarding what treatments may be applied, the methods of application, and most importantly the type of equipment that would be used and their fuel consumption, it was not possible to quantitatively assess the criteria pollutant emissions for the No Program Alternative. Instead, it was assumed the No Program Alternative would use similar equipment and spray rates as Alternatives Btk and S. The emissions from the No Program Alternative are based on the emissions from Alternatives Btk and S.

Offroad Sources

The Program is expected to have emissions from gas-powered, portable offroad equipment, including spray pumps mounted on hydraulic spray vehicles. The OFFROAD model was employed to estimate criteria emissions. The CARB developed the OFFROAD model to estimate the relative contribution of gasoline, diesel, compressed natural gas, and liquefied petroleum gas-powered vehicles to the overall emissions inventory of the state (CARB 2009d). The equipment modeled for criteria pollutants includes gas-powered truck-mounted pumps. Since OFFROAD incorporates default assumptions about horsepower, engine load, operating time, and equipment population, the output of the model was scaled to account for Program-specific information for these parameters. The values used for these variables are located in Appendix C2, Section C7.1, Offroad Equipment Emissions, along with the OFFROAD specific equipment source category codes. Table 6-10 represents the calculated emissions from the truck-mounted pumps assumed for use with Alternatives Btk and S in terms of pounds per day and pounds per year statewide. The pounds per day emissions are based on the area that could be covered throughout the state in a day and the pounds per year emissions are based on the total statewide area to be treated. Based on the potential statewide area that may need to be treated, it was conservatively assumed that emissions may occur 6 days a week for an entire year. Details for these calculations are provided in Appendix C2, Section C7.1, Offroad Equipment Emissions.

Table 6-10 Summary of Offroad Equipment Statewide Criteria Emissions

		LBAM Criteria Pollutant Statewide Emissions									
		[lbs/day]					[lbs/year]				
Program Alternative	Application Method	ROGs	CO	NO_x	SO_2	PM_{10}	ROGs	CO	NO_x	SO_2	PM_{10}
Organically Approved Insecticides (Alternatives Btk and S)	Vehicle-Based Hydraulic Spraying*	3.8	145	2.4	0.006	1.9	1,196	45,335	754	1.8	594

Note:
*Due to the motor and compressor on the hydraulic spray truck.

Mobile Sources

The Program has onroad mobile source emissions from:

- Passenger vehicles for workers commuting to and from congregation points
- Transportation trucks to transport ground-based and vehicle-based application crews to and from Program sites
- Trucks used in vehicle-based treatment applications (including the SPLAT spray vehicles and the hydraulic spray trucks)
- Trucks used for vendor delivery of compound/supplies to Program sites

Mobile source emissions were modeled based on assumed activity and the EMFAC modeled emission factors (CARB 2009e). The EMFAC model was developed by CARB to calculate emission rates from a large variety of onroad vehicles, including but not limited to light duty vehicles, light duty gas and diesel trucks, heavy-duty trucks, buses, motorcycles, and others. The model input considers a variety of variables for optimal scenario modeling.

Vehicle speeds and distances traveled were determined using a combination of default and site specific values. When Program-specific data were unavailable, default values for all four types of onroad sources were obtained from the URBan EMISsions model (URBEMIS; CARB 2007a), which draws upon compiled trip data taken from within California. URBEMIS was developed by the SCAQMD. However, site-specific values were used to estimate trip length and vehicle speed for the trucks used in vehicle-based treatment applications once the trucks have reached the Program site. Distances traveled by the hydraulic spray trucks and the ground application crew trucks and SPLAT vehicles during a day of application were estimated using the vehicle-based application coverage rates, provided by the CDFA, and a typical urban block size assumed to be traveled by the vehicles. The vehicles were assumed to travel at a much slower rate to accommodate the application of the compounds.

With the exception of hydraulic spray vehicles and transport vehicles associated with the ground-based application crews (using hydraulic backpacks, caulk guns, pod guns, twist ties, and index cards), all vehicles are assumed to have two starts per round-trip. Based on the assumption that hydraulic spray vehicles and vehicles used to transport ground-based application crews travel to approximately 6 to 10 properties per day, these vehicles were assumed to start approximately 10 times per round-trip. The startup emission factor depends on the settling period before driving, with longer settling periods generally resulting in higher emissions due to cold starting of the engine.

Table 6-11 provides the emission estimates in terms of pounds per year and pounds per day sorted by Program alternative. The pounds per day emissions are based on the area that could be covered throughout the state in a day and the pounds per year emissions are based on the total statewide area to be treated. Based on the potential statewide area that may need to be treated, it was conservatively assumed that emissions may occur 6 days a week for an entire year. Details for these calculations are provided in Appendix C2, Section C7.2, Onroad Equipment Emissions.

Table 6-11 Summary of Mobile Statewide Criteria Emissions

Program Alternative	Statewide Criteria Pollutant Emissions (lbs)									
	ROGs		CO		NO_x		SO_2		PM_{10}	
	[lbs/yr]	[lbs/day]	[lbs/yr]	[lbs/day]	[lbs/yr]	[lbs/day]	[lbs/yr]	[lbs/day]	[lbs/yr]	[lbs/day]
Mating Disruption										
Twist Tie (MD-1)	483	1.7	8,963	31	1,295	6.4	7.7	0.029	72	0.31
Road Application (MD-2)	251	1.0	4,108	16	1,346	6.6	6.1	0.024	51	0.24
Ground Application (MD-2)	443	1.6	7,988	28	1,202	6.1	6.7	0.026	62	0.28
Aerial Application (MD-3)	84	0.33	1,995	7.1	230	1.4	2.1	0.0081	21	0.091
Male Moth Attractant (MMA)	262	1.0	4,204	16	1,340	6.6	6.1	0.024	51	0.24
Organically Approved Insecticides (Alternatives Btk and S)										
Vehicle Application	444	1.6	7,766	27	1,499	7.1	6.7	0.026	65	0.29
Backpack Application	443	1.6	7,988	28	1,202	6.1	6.7	0.026	62	0.28
Sterile Insect Technique (Alternative SIT)	84	0.33	1,995	7.1	230	1.4	2.1	0.0081	21	0.091
Inundative Parasitic Wasp Releases (Bio-P)	483	1.7	8,963	31	1,295	6.4	7.7	0.029	72	0.31

Aerial Sources

In conjunction with Volpe National Transportation Systems Center, the Massachusetts Institute of Technology, and the Logistics Management Institute the FAA developed the System for Assessing Aviation's Global Emissions (SAGE) (FAA 2005). The model was produced to predict aircraft emissions and fuel burn throughout the world in a given year. The FAA has provided publicly available results for a global emission inventory between the years 2000 and 2004. The data provided within the inventory include individual aircraft emissions for CO, NO_x, SO_x, and HC in grams per kilogram of fuel burned. Within the individual aircraft emission inventory the Pratt & Whittney PT6A-20 engine is included. The PT6A-20 is the engine mounted on the Beechcraft King Air A90 used for the Program.

The second edition of the EPA's AP-42 (USEPA 1973) was used to determine the particulate emissions from the PT6A-20 engine. The AP42 cites the PT6A as the engine for which general aviation turboprop aircraft emissions are modeled. Emissions rates from the guidance document are described in weight of pollutant per hour. Combining these emission rates with the AP42 fuel burn rates provides an emission rate in grams per kilogram of fuel burned, which matches the emission factor units of the SAGE model data.

To estimate emissions from the airplanes, the airplanes were assumed to consume 64 gallons per hour, which represents an average fuel consumption rate provided by Dynamic Aviation (2005) for the PT6A-20 Pratt & Whitney engines. The airplanes were further assumed to operate for 8 hours per day. 4 airplanes were assumed to be available per day for aerial spraying over the entire state and the aerial sterile insect release would also utilize 4 airplanes per day.

Table 6-12 provides the emission estimates in terms of pounds per year and pounds per day for the two aerial application alternatives. The pounds per day emissions are based on the area that could be covered throughout the state in a day and the pounds per treatment emissions are based on the total statewide area to be treated. Based on the potential statewide area that may need to be treated, it was conservatively assumed that emissions may occur 6 days per week for an entire year. Details for these calculations are provided in Appendix C2, Section C7.3, Aerial Sources Emissions.

Table 6-12 Summary of Airplane Statewide Criteria Emissions

Program Alternative	Application Method	Statewide Criteria Emissions									
		Daily Emissions					Annual Emissions				
		ROGs*	NO_x	CO	SO_x	PM_{10}	ROGs*	NO_x	CO	SO_x	PM_{10}
		[lbs/day]					[lbs/yr]				
Mating Disruption (Alternative MD-3)	Aerial - Spray	2.0	96	43	0.00001	40	625	30,031	13,510	0.0035	12,635
Sterile Insect Technique (Alternative SIT)	Aerial - Populated Release	2.0	96	43	0.00001	40	625	30,031	13,510	0.0035	12,635

Note:
*ROG emissions calculated using HC emission factor. HC and ROGs are assumed to be equivalent for these calculations.

Summary of Results

Once the modeling of all the sources for each treatment option was complete the emissions were combined on a treatment option basis to represent emissions expected. A summary of emissions from the combined results are provided below in Table 6-13. The table represents the total annual statewide emissions and the statewide emissions on a daily. Based on the potential statewide area that may need to be treated, it was conservatively assumed that emissions may occur for an entire year. A more detailed discussion of the results in provided in the Evaluation of Criteria Emissions Technical Report found in Appendix C2, Section C7.4, Total Emissions from Program Equipment and Vehicles.

Table 6-13 Summary of Statewide Criteria Emissions from Equipment (Combustion)

Program Alternative	Statewide Equipment Criteria Pollutant Emissions (lbs)									
	ROGs		CO		NO_x		SO_2		PM_{10}	
	[lbs/yr]	[lbs/day]	[lbs/yr]	[lbs/day]	[lbs/yr]	[lbs/day]	[lbs/yr]	[lbs/day]	[lbs/yr]	[lbs/day]
Mating Disruption										
Twist Tie Application (MD-1)	483	1.7	8,963	31	1,295	6.4	7.7	0.029	72	0.31
Vehicle-based Application (MD-2)	251	1.0	4,108	16	1,346	6.6	6.1	0.024	51	0.24
Ground-based Application (MD-2)	443	1.6	7,988	28	1,202	6.1	6.7	0.026	62	0.28
Aerial Application (MD-3)	709	2.3	15,505	50	30,260	98	2.1	0.0081	12,655	41
Male Moth Attractant (Alternative MMA)	262	1.0	4,204	16	1,340	6.6	6.1	0.024	51	0.24
Organically Approved Insecticides (Alternatives Btk and S)										
Vehicle Application	1,640	5.4	53,101	173	2,253	9.5	8.5	0.032	660	2.2
Backpack Application	443	1.6	7,988	28	1,202	6.1	6.7	0.026	62	0.28
Sterile Insect Technique (Alternative SIT)	709	2.3	15,505	50	30,260	98	2.1	0.0081	12,655	41
Inundative Parasitic Wasp Releases (Alternative Bio-P)	483	1.7	8,963	31	1,295	6.4	7.7	0.029	72	0.31

In addition, the total emissions due to both the application of treatment compounds themselves and the equipment used to apply them are summarized in Table 6-14, essentially the sum of Table 6-8 (emissions due to the treatment compounds) and Table 6-13 (emissions due to the application equipment). The statewide pounds per year estimates were converted to tons per year.

Table 6-14 Summary of Statewide Criteria Emissions for Application and Equipment

Project Treatment Alternative	Statewide Criteria Pollutant Emissions									
	ROG		CO		NO_x		SO_2		PM_{10} [2]	
	[tons/yr]	[lbs/day]	[tons/yr]	[lbs/day]	[tons/yr]	[lbs/day]	[tons/yr]	[lbs/day]	[tons/yr]	[lbs/day]
No Program[1]	1.4	8.7	27	173	1.1	9.5	0.0043	0.032	2.5	14
Mating Disruption										
Twist Tie Application (MD-1)	0.25	1.8	4.5	31	0.65	6.4	0.0039	0.029	0.036	0.31
Vehicle-based Application (MD-2)	1.7	9.5	2.1	16	0.67	6.6	0.0030	0.024	0.026	0.24
Ground-based Application (MD-2)	0.23	1.7	4.0	28	0.60	6.1	0.0034	0.026	0.031	0.28
Aerial Application (MD-3)	24	129	7.8	50	15	98	0.0010	0.0081	6.3	41
Male Moth Attractant (MMA)	0.19	1.3	2.1	16	0.67	6.6	0.0030	0.024	0.026	0.24
Organic-Approved Insecticides (BT and S)										
Vehicle Application	0.82	5.4	27	173	1.1	9.5	0.0043	0.032	1.2	7.1
Backpack Application	0.22	1.6	4.0	28	0.60	6.1	0.0034	0.026	0.92	5.1
Sterile Insect Technique (SIT)	0.35	2.3	7.8	50	15	98	0.0010	0.0081	6.3	41
Inundative Parasitic Wasp Releases (Bio-P)	0.24	1.74	4.5	31	0.65	6.4	0.0039	0.029	0.036	0.31

Notes:

[1] No Program alternative assumes the same emissions from the application equipment as the Organic-Approved Insecticides. Both are applied via hydraulic spraying and have the same coverage rate.

[2] PM2.5 is conservatively assumed to be the same as PM10.

The total statewide estimates were converted to estimates emitted in any given air district by assuming emissions were proportional to the number of units (planes, ground crews, spray trucks, etc.). In this case, it was assumed that no more than 50 percent of the total statewide units would operate in any one air district on a single day (Rains and Schnabel, pers. comm., 2009). Therefore, 50 percent of the statewide emissions were assumed to be able to occur in one air district on a daily basis. When multiple compounds or multiple application methods exist, the most conservative values were used. Estimates of the maximum emissions from any individual air district are presented in Table 6-15.

Table 6-15 Summary of Criteria Emissions for Application and Equipment – Individual Air District

Program Alternative	Criteria Pollutant Emissions – Individual Air District[3]									
	ROGs/VOCs		CO		NO_x		SO_2		PM_{10} [2]	
	[tons/yr]	[lbs/day]	[tons/yr]	[lbs/day]	[tons/yr]	[lbs/day]	[tons/yr]	[lbs/day]	[tons/yr]	[lbs/day]
No Program[1]	0.71	4.3	13	86	0.56	4.7	0.0021	0.016	1.2	7.0
Mating Disruption										
Twist Tie Application (MD-1)	0.12	0.87	2.2	16	0.32	3.2	0.0019	0.015	0.018	0.16
Vehicle-based Application (MD-2)	0.84	4.7	1.0	7.8	0.34	3.3	0.0015	0.012	0.013	0.12
Ground-based Application (MD-2)	0.12	0.84	2.0	14	0.30	3.1	0.0017	0.013	0.016	0.14
Aerial Application (MD-3)	12	65	3.9	25	7.6	49	0.00052	0.0041	3.2	20

Table 6-15 Summary of Criteria Emissions for Application and Equipment – Individual Air District

Program Alternative	Criteria Pollutant Emissions – Individual Air District[3]									
	ROGs/VOCs		CO		NO_x		SO_2		PM_{10} [2]	
	[tons/yr]	[lbs/day]	[tons/yr]	[lbs/day]	[tons/yr]	[lbs/day]	[tons/yr]	[lbs/day]	[tons/yr]	[lbs/day]
Male Moth Attractant (Alternative MMA)	0.094	0.67	1.1	7.9	0.34	3.3	0.0015	0.012	0.013	0.12
Organically Approved Insecticides (Alternatives Btk and S)										
Vehicle Application	0.41	2.7	13	86	0.56	4.7	0.0021	0.016	0.61	3.5
Backpack Application	0.11	0.80	2.0	14	0.30	3.1	0.0017	0.013	0.46	2.6
Sterile Insect Technique (Alternative SIT)	0.18	1.2	3.9	25	7.6	49	0.00052	0.0041	3.2	20
Inundative Parasitic Wasp Releases (Alternative Bio-P)	0.12	0.87	2.2	16	0.32	3.2	0.0019	0.015	0.018	0.16

Notes:

[1] The No Program Alternative assumes the same emissions from the application equipment as Alternatives Btk or S. Both are applied via hydraulic spraying and have the same coverage rate.

[2] $PM_{2.5}$ is conservatively assumed to be the same as PM_{10}.

[3] Pounds per day per air district (for comparison to construction significance thresholds) and tons per year per air district. Per air district values are calculated by multiplying the statewide pounds by a fraction of the number of units in a single air district to the number of units statewide (0.5 for all alternatives).

Assumptions and Uncertainties

The primary assumptions and uncertainties associated with the criteria pollutant emissions assessment include the definition of the Program boundary and the assumptions required to determine the types and number of equipment used in the application processes. The first level of uncertainty lies in the selection of which sources to include in the criteria pollutant emissions assessment, also known as defining the Program boundary. Potential criteria pollutant emissions sources likely to result from Program implementation were identified as noted above. Criteria pollutant emissions from “business as usual” operations—such as building generators or cooling systems for the CDFA and all of its contractors and maintenance activities for equipment associated with the Program—are not included in this assessment, as these are assumed to occur regardless of Program implementation. The boundary for the various Program alternatives was set according to the best information available and best applicable methodology. However, either expanding or contracting the boundary (including or excluding emission sources) would change the magnitude of the estimated emissions and the resulting impacts.

In addition, several assumptions were made in determining the source characteristics and parameters. No specific information was available from the CDFA, so conservative assumptions were required. These assumptions are discussed in detail in Appendix C2, Section C10, Uncertainties. Some of the key assumptions regarding parameters include:

- The precise number of work crews and equipment that would be used statewide is uncertain. The CDFA provided upper-bound estimates of the statewide equipment and crews, but the exact number used will depend on the extent of the area to be treated. It was assumed that up to 12 units would be available for the Program alternatives involving ground application (e.g., MD-1, MD-2, MMA, Btk, and S). In addition, four spray planes were assumed to be available throughout the state on any given day to conduct aerial applications. If these values were adjusted up or down, corresponding changes would occur to the criteria pollutant emissions.
- No equipment specifications (other than some information on the airplanes) were provided so assumptions were made to determine the type, size, and fuel consumption of various sources. For

example, all work vehicles were assumed to be light heavy-duty trucks (8,501 to 10,000 pounds) while the hydraulic spray truck was modeled as a slightly heavier light heavy-duty truck (10,001 to 14,000 pounds). If the actual equipment is significantly different than that assumed for this assessment, the criteria pollutant emissions would be affected, although it is not possible to determine if the resulting emissions would be higher or lower.

- Vehicle speeds and distances traveled were determined using a combination of default and site specific values. When Program-specific data were unavailable, default values for all four types of onroad sources were obtained from the URBEMIS, which draws upon compiled trip data taken from within California. Distances traveled by the hydraulic spray trucks, the ground application crew trucks, and SPLAT vehicles during a day of application were estimated using the vehicle-based application coverage rates, provided by the CDFA, and a typical urban block size assumed to be traveled by the vehicles.
- Emissions were assumed to be proportional to the number of units within the area of interest. In this assessment, it was assumed that no more than 50 percent of the total statewide units would operate in any one air district on a single day. Therefore, 50 percent of the statewide emissions were assumed to be able to occur in one air district. In reality, it is possible that more or less of the state’s resources may be in place in any given air district, depending on the severity of the infestation and the area to be treated. Since even the resulting statewide daily emissions (as opposed to the individual district daily emissions) are less than the construction significance thresholds used as a relative comparison (except for VOCs for Alternative MD-3), it is unlikely that the conclusions would be affected by changes to this assumption.

6.2.3 No Program Alternative

The No Program Alternative would continue and expand quarantine and detection and inspection activities but without the application of the pheromone or any other insecticides on an area wide basis by the USDA or CDFA.

The No Program Alternative would use hydraulic spraying, defined as a medium to coarse spray continuously applied by either truck-based equipment or backpack-based equipment, of the No Program insecticides by farm and nursery operators (and their registered pesticide applicators). The target vegetation would be trees, shrubs, or crops on private land.

6.2.3.1 Violates Air Quality Standards

The No Program Alternative has the potential to emit NAAQS and CAAQS pollutants, including O_3 (VOCs and NO_x), CO, NO_x, SO_2, PM_{10}, and $PM_{2.5}$. The daily emissions of each of these pollutants from the No Program Alternative with the maximum emissions (Table 6-14) are less than the values used for relative comparison (Table 6-4). Based on the estimated daily emissions for each criteria pollutant, the No Program Alternative would not violate an ambient air quality standard. **Impacts would be less than significant.**

6.2.3.2 Result in Cumulatively Considerable Increase in Nonattainment Pollutant

The focus of this evaluation criterion is on the NAAQS and CAAQS pollutants for which some air basins statewide are in nonattainment. This nonattainment includes the following pollutants for the No Program Alternative: O_3 (VOCs and NO_x), $PM_{10,}$ and $PM_{2.5}$. The daily emissions of each of these pollutants from the No Program Alternative with the maximum emissions (Table 6-14) are less than the values used for relative comparison (Table 6-4).

Based on the estimated daily emissions for each criteria pollutant, the No Program Alternative would not result in a cumulatively considerable increase in nonattainment pollutants. **Impacts would be less than significant.**

6.2.3.3 Potential Conflict with Applicable Air Quality Plans

The emission source categories associated with the No Program option include onroad, offroad (hydraulic compressor), and pesticide application. As discussed in Section 6.2.3.3, these emission sources are included in the SIP emission inventory. In addition, it is assumed the No Program Alternative emission sources would comply with the regulations identified in Section 6.1.1 (although the CDFA will not have any control over whether the No Program sources comply with applicable regulations). Taken together, these considerations indicate the No Program option should not conflict with applicable air quality plans.

Based on the general inclusion of the No Program emissions in the SIP emission inventory and the assumed compliance with applicable air regulations, the No Program Alternative would not conflict with applicable air quality plans. **Impacts would be less than significant.**

6.2.3.4 Exposes Sensitive Receptors to Substantial Pollutants

As discussed above in Section 6.2.3.1 the No Program Alternative has the potential to emit NAAQS and CAAQS pollutants, including O_3 (VOCs and NO_x), CO, NO_x, SO_2, PM_{10}, and $PM_{2.5}$. The daily emissions of each of these pollutants from the No Program Alternative with the maximum emissions (Table 6-14) are less than the values used for relative comparison (Table 6-4). Based on the estimated daily emissions for each criteria pollutant, it is expected that the NAAQS and CAAQS would not be exceeded due to No Program emissions. Therefore, the No Program Alternative would not expose sensitive receptors to substantial pollutants. **Impacts would be less than significant.**

6.2.3.5 Expose People to Objectionable Odors

Information from the MSDS of each treatment compound was reviewed to assess the potential impacts from odor. A summary of the information is presented in Table 6-16.

Table 6-16 No Program Odor MSDS Information

Treatment	Ingredient	Odor from MSDS
Entrust	Spinosad A, Spinosad D	latex odor
Warrior	Lambda-cyhalothrin	not determined
Duraguard ME	Chlorpyrifos	characteristic Chlorpyrifos odor
Dursban 4E	Chlorpyrifos	hydrocarbon/mercaptan odor

In addition, chlorpyrifos is considered a volatile compound and both Duraguard and Dursban contain a number of volatile inert ingredients. The No Program Alternative treatments would be applied using hydraulic spraying, which would result in drift of spray droplets.

Based on the characteristically strong odor associated with chlorpyrifos and its volatility, it could subject people to objectionable odors in the treatment area. Although it would not be expected to impact a substantial number of people, information is not available on how long chlorpyrifos odor may persist in the treatment area and, therefore, it may impact people over a substantial period of time. In addition, the screening-level dispersion estimates demonstrate drift. Therefore, **impacts would be potentially significant.**

6.2.4 Mating Disruption (Alternative MD)

The LBAM pheromone would be used to disrupt the moth's mating activities. The three mating disruption methodologies under consideration include twist ties, ground application of pheromones, and aerial application of pheromones.

6.2.4.1 Twist Ties (Alternative MD-1)

Plastic ties infused with LBAM pheromone are to be used in small isolated infestations (at least 5 miles from a regulated area or separated from a regulated area by a physical barrier, such as a largely uninhabited area or mountain range). Twist ties would be used as a stand-alone treatment or in conjunction with larval treatments of Btk or spinosad.

Violates Air Quality Standards

Alternative MD-1 has the potential to emit NAAQS and CAAQS pollutants, including O_3 (VOCs and NO_x), CO, NO_x, SO_2, PM_{10}, and $PM_{2.5}$. The daily emissions of each of these pollutants from Alternative MD-1 (Table 6-15) are less than the values used for relative comparison (Table 6-4). Even the emission closest to the comparison value (NO_x) is more than 25 times lower than the related comparison value.

Impact AQ-1: Based on the estimated daily emissions for each criteria pollutant, Alternative MD-1 would not violate an ambient air quality standard. Impacts are less than significant, and mitigation is not required.

Mitigation Measures: None required; however, the CDFA and its contractors may implement several mitigation measures on a voluntary basis to lessen any air quality impacts even further. As these mitigation measures are voluntary, no attempt has been made to quantify the effects of the mitigation measures on the air quality impacts. See Section 6.2.11 for voluntary measures.

Result in Cumulatively Considerable Increase in Nonattainment Pollutant

The focus of this evaluation criterion is on the NAAQS and CAAQS pollutants for which some air basins statewide are in nonattainment. This nonattainment includes the following pollutants for Alternative MD-1: O_3 (VOCs and NO_x), PM_{10}, and $PM_{2.5}$. The daily emissions of each of these pollutants from Alternative MD-1 (Table 6-15) are less than the values used for relative comparison (Table 6-4). Even the emission closest to the comparison value (NO_x) is more than 25 times lower than the related comparison value.

Impact AQ-2: Based on the estimated daily emissions for each criteria pollutant, Alternative MD-1 would not result in a cumulatively considerable increase in nonattainment pollutants. Impacts would be less than significant, and mitigation is not required.

Mitigation Measures: None required; however, see Section 6.2.11 for optional mitigation.

Potential Conflict with Applicable Air Quality Plans

The emission source categories associated with Alternative MD-1 include onroad and pesticide application. As discussed in Section 6.2.3.3, these emission sources are included in the SIP emission inventory. In addition, Alternative MD-1 emission sources and operations would comply with the applicable regulations identified in Section 6.1.1. Taken together, these considerations indicate that Alternative MD-1 should not conflict with applicable air quality plans.

Impact AQ-3: Based on the general inclusion of Alternative MD-1 emissions in the SIP emission inventory and the compliance with applicable air regulations, Alternative MD-1 would not conflict with applicable air quality plans. Impacts would be less than significant, and mitigation is not required.

Mitigation Measures: None required; however, see Section 6.2.11 for optional mitigation.

Exposes Sensitive Receptors to Substantial Pollutants

As discussed above in Section 6.2.4.1 under Violates Air Quality Standards, Alternative MD-1 has the potential to emit NAAQS and CAAQS pollutants, including O_3 (VOCs and NO_x), CO, NO_x, SO_2, PM_{10}, and $PM_{2.5}$. The daily emissions of each of these pollutants from Alternative MD-1 (Table 6-15) are less than the values used for relative comparison (Table 6-4). Even the emission closest to the comparison value (NO_x) is over 25 times lower than the related comparison value. It is expected that the NAAQS and CAAQS would not be exceeded due to Program emissions. Therefore, Alternative MD-1 would not expose sensitive receptors to substantial pollutants.

Impact AQ-4: Based on the estimated daily emissions for each criteria pollutant, Alternative MD-1 would not expose sensitive receptors to substantial pollutant concentrations. Impacts would be less than significant, and mitigation is not required.

Mitigation Measures: None required; however, see Section 6.2.11 for optional mitigation.

Objectionable Odors

Information from the MSDS of the treatment compound was reviewed to assess the potential impacts from odor. Isomate (and its primary ingredients, the pheromones) is described as having a mild, waxy sweet odor. The active ingredients are considered volatile and no odor threshold has been determined. The density of application is approximately 250 twist ties per acre in small isolated regions more than 5 miles from a general infestation. During application of the twist ties, no droplets would be formed so no drift would occur. The number of people potentially exposed to odors from each treatment would be minimal.

Impact AQ-5: Based on the mild odor associated with Isomate and its active ingredients and the limited means of exposure to the volatilized pheromones with Alternative MD-1, it would not subject a substantial number of people to objectionable odors. Impacts would be less than significant, and mitigation is not required.

6.2.4.2 Ground Application (Alternative MD-2)

Several different methods exist for applying treatment compounds using ground-based equipment. For Alternative MD-2, none of the ground treatment methods would generate droplets that would lead to drift.

Violates Air Quality Standards

Alternative MD-2 has the potential to emit NAAQS and CAAQS pollutants, including O_3 (VOCs and NO_x), CO, NO_x, SO_2, PM_{10}, and $PM_{2.5}$. The daily emissions of each of these pollutants from Alternative MD-2 (Table 6-15) are less than the values used for relative comparison (Table 6-4). Even the emission closest to the comparison value (VOCs) is more than 15 times lower than the related comparison value.

Impact AQ-6: Based on the estimated daily emissions for each criteria pollutant, Alternative MD-2 would not violate an ambient air quality standard. Impacts would be less than significant, and mitigation is not required.

Mitigation Measures: None required; however, see Section 6.2.11 for optional mitigation.

Result in Cumulatively Considerable Increase in Nonattainment Pollutant

The focus of this evaluation criterion is on the NAAQS and CAAQS pollutants for which some air basins statewide are in nonattainment. This nonattainment includes the following pollutants for Alternative MD-2: O_3 (VOCs and NO_x), PM_{10}, and $PM_{2.5}$. The daily emissions of each of these pollutants from Alternative MD-2 (Table 6-15) are less than the values used for relative comparison (Table 6-4). The daily emission closest to the comparison value (VOCs) is more than 15 times lower than the related comparison value.

Impact AQ-7: Based on the estimated daily emissions for each criteria pollutant, Alternative MD-2 would not result in a cumulatively considerable increase in nonattainment pollutants. Impacts would be less than significant, and mitigation is not required.

Mitigation Measures: None required; however, see Section 6.2.11 for optional mitigation.

Potential Conflict with Applicable Air Quality Plans

The emission source categories associated with Alternative MD-2 include onroad and pesticide application. As discussed in Section 6.2.3.3, these emission sources are included in the SIP emission inventory. In addition, Alternative MD-2 emission sources and operations would comply with the applicable regulations identified in Section 6.1.1. Taken together, these considerations indicate that Alternative MD-2 should not conflict with applicable air quality plans.

Impact AQ-8: Based on the general inclusion of the Alternative MD-2 emissions in the SIP emission inventory and the compliance with applicable air regulations, Alternative MD-2 would not conflict with applicable air quality plans. Impacts would be less than significant, and mitigation is not required.

Mitigation Measures: None required; however, see Section 6.2.11 for optional mitigation.

Exposes Sensitive Receptors to Substantial Pollutants

As discussed above in Section 6.2.4.2 under Violates Air Quality Standards, Alternative MD-2 has the potential to emit NAAQS and CAAQS pollutants, including O_3 (VOCs and NO_x), CO, NO_x, SO_2, PM_{10}, and $PM_{2.5}$. The daily emissions of each of these pollutants from Alternative MD-2 (Table 6-15) are less than the values used for relative comparison (Table 6-4). Even the emission closest to the comparison value (VOCs) is more than 15 times lower than the related comparison value. It is expected that the NAAQS and CAAQS would not be exceeded due to Program emissions. Therefore, Alternative MD-2 would not expose sensitive receptors to substantial pollutants.

Impact AQ-9: Based on the estimated daily emissions for each criteria pollutant, Alternative MD-2 would not expose sensitive receptors to substantial pollutant concentrations. Impacts would be less than significant, and mitigation is not required.

Mitigation Measures: None required; however, see Section 6.2.11 for optional mitigation.

Objectionable Odors

Information from the MSDS of the two treatment compounds was reviewed to assess the potential impacts from odor. SPLAT (and its primary ingredients, the pheromones) is described as having a slightly waxy floral odor. Hercon's odor was simply described as mild. The active ingredients are considered volatile and no odor threshold has been determined. During ground application from Alternative MD-2 equipment, no droplets would be formed so no drift would occur. The number of people potentially exposed to odors for each treatment would be minimal.

Impact AQ-10: Based on the mild odors associated with SPLAT and Hercon and their active ingredients in addition to considering the limited means of exposure to the volatilized pheromones under Alternative MD-2, it would not subject a substantial number of people to objectionable odors. Impacts would be less than significant, and mitigation is not required.

6.2.4.3 Aerial Application (Alternative MD-3)

Aerial applications of pheromone for mating disruption would be used to treat denser LBAM populations. The area for aerial applications is a 1.5-mile radius around each location where LBAM is detected in an undeveloped area.

The use of aerial release of pheromones is on hold while (1) the CDFA completes this PEIR, and (2) the OEHHA and DPR, in consultation with the DPH, finish a review of possible formulations in late 2009 or early 2010. After that time, aerial application of the pheromone in undeveloped and essentially unpopulated areas may be considered where ground applications of the pheromone are not feasible.

Violates Air Quality Standards

Alternative MD-3 has the potential to emit NAAQS and CAAQS pollutants, including O_3 (VOCs and NO_x), CO, NO_x, SO_2, PM_{10}, and $PM_{2.5}$. The daily emissions of each of these pollutants from Alternative MD-3 (Table 6-15) are less than the values used for relative comparison (Table 6-4). The emission closest to the comparison value (VOCs) is almost 15 percent lower than the related comparison value.

Impact AQ-11: Based on the estimated daily emissions for each criteria pollutant, Alternative MD-3 would not violate an ambient air quality standard. Impacts would be less than significant, and mitigation is not required.

Mitigation Measures: None required; however, Section 6.2.11 for optional mitigation.

Result in Cumulatively Considerable Increase in Nonattainment Pollutant

The focus of this evaluation criterion is on the NAAQS and CAAQS pollutants for which some air basins statewide are in nonattainment. This nonattainment includes the following pollutants for Alternative MD-3: O_3 (VOCs and NO_x), PM_{10}, and $PM_{2.5}$. The daily emissions of each of these pollutants from Alternative MD-3 (Table 6-15) are less than the values used for relative comparison (Table 6-4). The daily emission closest to the comparison value (VOCs) is almost 15 percent lower than the related comparison value.

Impact AQ-12: Based on the estimated daily emissions for each criteria pollutant, Alternative MD-3 would not result in a cumulatively considerable increase in nonattainment pollutants. Impacts would be less than significant, and mitigation is not required.

Mitigation Measures: None required; however, see Section 6.2.11 for optional mitigation.

Potential Conflict with Applicable Air Quality Plans

The emission source categories associated with Alternative MD-3 include onroad, agricultural aircraft, and pesticide application. As discussed in Section 6.2.3.3, these emission sources are included in the SIP emission inventory. In addition, Alternative MD-3 emission sources and operations would comply with the applicable regulations identified in Section 6.1.1. Taken together, these considerations indicate that Alternative MD-3 should not conflict with applicable air quality plans.

Impact AQ-13: Based on the general inclusion of the MD-3 emissions in the SIP emission inventory and the compliance with applicable air regulations, Alternative MD-3 would not conflict with applicable air quality plans. Impacts would be less than significant, and no mitigation is required.

Mitigation Measures: None required; however, see Section 6.2.11 for optional mitigation.

Exposes Sensitive Receptors to Substantial Pollutants

As discussed above in Section 6.2.4.3 under Violates Air Quality Standards, Alternative MD-3 has the potential to emit NAAQS and CAAQS pollutants, including O_3 (VOCs and NO_x), CO, NO_x, SO_2, PM_{10}, and $PM_{2.5}$. The daily emissions of each of these pollutants from Alternative MD-3 (Table 6-15) are less than the values used for relative comparison (Table 6-4). The emission closest to the comparison value (VOCs) is almost 15 percent lower than the related comparison value. It is expected that the NAAQS and CAAQS would not be exceeded due to Program emissions. Therefore, Alternative MD-3 would not expose sensitive receptors to substantial pollutants.

Impact AQ-14: Based on the estimated daily emissions for each criteria pollutant, Alternative MD-3 would not expose sensitive receptors to substantial pollutant concentrations. Impacts would be less than significant, and no mitigation is required.

Mitigation Measures: None required; however, see Section 6.2.11 for optional mitigation.

Objectionable Odors

Information from the MSDS of the two treatment compounds was reviewed to assess the potential impacts from odor. SPLAT (and its primary ingredients, the pheromones) is described as having a slightly waxy floral odor. Hercon’s odor was simply described as mild. The active ingredients are considered volatile and no odor threshold has been determined. During aerial application from the Alternative MD-3 equipment, large droplets and particulates would be used and some drift would occur. Given that Alternative MD-3 is only going to be used in essentially unpopulated areas, the number of people potentially exposed to odors for each treatment would be minimal.

Impact AQ-15: Based on the mild odors associated with SPLAT and Hercon and their active ingredients and the application being limited to essentially unpopulated areas, Alternative MD-3 would not subject a substantial number of people to objectionable odors. Impacts would be less than significant, and no mitigation is required.

6.2.5 Male Moth Attractant (Alternative MMA)

Alternative MMA involves ground treatment with the LBAM-specific pheromone combined with permethrin to attract and kill male moths. The treatment area consists of a 1.5-mile radius around any detection site. Treatments may occur on street trees and utility poles, 8 feet aboveground. Male attractant treatment sites would be out of reach of the general public. The method of application would be the same as that discussed for the ground application of SPLAT using truck-based spraying.

6.2.5.1 Violates Air Quality Standards

Alternative MMA has the potential to emit NAAQS and CAAQS pollutants, including O_3 (VOCs and NO_x), CO, NO_x, SO_2, PM_{10}, and $PM_{2.5}$. The daily emissions of each of these pollutants from Alternative MMA (Table 6-15) are less than the values used for relative comparison (Table 6-4). The emission closest to the comparison value (NO_x) is more than 25 times lower than the related comparison value.

Impact AQ-16: Based on the estimated daily emissions for each criteria pollutant, Alternative MMA would not violate an ambient air quality standard. Impacts would be less than significant, and no mitigation is required.

Mitigation Measures: None required; however, see Section 6.2.11 for optional mitigation.

6.2.5.2 Result in Cumulatively Considerable Increase in Nonattainment Pollutant

The focus of this evaluation criterion is on the NAAQS and CAAQS pollutants for which some air basins statewide are in nonattainment. This nonattainment includes the following pollutants for Alternative MMA: O_3 (VOCs and NO_x), PM_{10}, and $PM_{2.5}$. The daily emissions of each of these pollutants from Alternative MMA (Table 6-15) are less than the values used for relative comparison (Table 6-4). The emission closest to the comparison value (NO_x) is more than 25 times lower than the related comparison value.

Impact AQ-17: Based on the estimated daily emissions for each criteria pollutant, Alternative MMA would not result in a cumulatively considerable increase in nonattainment pollutants. Impacts would be less than significant, and no mitigation is required.

Mitigation Measures: None required; however, see Section 6.2.11 for optional mitigation.

6.2.5.3 Potential Conflict with Applicable Air Quality Plans

The emission source categories associated with Alternative MMA include onroad and pesticide application. As discussed in Section 6.2.3.3, these emission sources are included in the SIP emission inventory. In addition, Alternative MMA emission sources and operations would comply with the applicable regulations identified in Section 6.1.1. Taken together, these considerations indicate Alternative MMA should not conflict with applicable air quality plans.

Impact AQ-18: Based on the general inclusion of the Alternative MMA emissions in the SIP emission inventory and the compliance with applicable air regulations, Alternative MMA would not conflict with applicable air quality plans. Impacts would be less than significant and no mitigation is required.

Mitigation Measures: None required; however, see Section 6.2.11 for optional mitigation.

6.2.5.4 Exposes Sensitive Receptors to Substantial Pollutants

As discussed above in Section 6.2.5.1, Alternative MMA has the potential to emit NAAQS and CAAQS pollutants, including O_3 (VOCs and NO_x), CO, NO_x, SO_2, PM_{10}, and $PM_{2.5}$. The daily emissions of each of these pollutants from Alternative MMA (Table 6-15) are less than the values used for relative comparison (Table 6-4). The emission closest to the comparison value (NO_x) is more than 25 times lower than the related comparison value. It is expected that the NAAQS and CAAQS would not be exceeded due to Program emissions. Therefore, Alternative MMA would not expose sensitive receptors to substantial pollutants.

Impact AQ-19: Based on the estimated daily emissions for each criteria pollutant, Alternative MMA would not expose sensitive receptors to substantial pollutant concentrations. Impacts would be less than significant, and no mitigation is required.

Mitigation Measures: None required; however, see Section 6.2.11 for optional mitigation.

6.2.5.5 Objectionable Odors

Information from the MSDS of the two treatment compounds utilized for Alternative MMA was reviewed to assess the potential impacts from odor. The pheromones were assumed to have the same odor as SPLAT, which is described as having a slightly waxy floral odor. The active ingredients are considered volatile and no odor threshold has been determined. According to the MSDS, permethrin has a faint, mild, petroleum odor. Permethrin contains other ingredients, such as ethylbenzene and 1,2,4-trimethulbenzene, for which odor thresholds have been developed (Section 6.2.1 under Objectionable Odors). As with the ground application equipment for Alternative MD-2, during application no droplets would be formed so no drift would occur. The number of people potentially exposed to odors for each treatment would be minimal.

Impact AQ-20: Based on the mild odors associated with the pheromones and permethrin and their active ingredients, in addition to considering the limited means of exposure to the volatilized pheromones under Alternative MMA, it would not subject a substantial number of people to objectionable odors. Impacts would be less than significant, and no mitigation is required.

6.2.6 Organically Approved Insecticides (Alternatives Btk and S)

Application methods for Alternatives Btk and S would include hydraulic spraying, where a medium to coarse spray is continuously applied by either truck-based equipment or backpack-based equipment. The target vegetation would be trees or shrubs on private or public land.

6.2.6.1 Violates Air Quality Standards

Alternatives Btk and S have the potential to emit NAAQS and CAAQS pollutants, including O_3 (VOCs and NO_x), CO, NO_x, SO_2, PM_{10}, and $PM_{2.5}$. The daily emissions of each of these pollutants from Alternatives Btk and S (Table 6-15) are less than the values used for relative comparison (Table 6-4). Even the emission closest to the comparison value (CO) is more than 6 times lower than the related comparison value.

Impact AQ-21: Based on the estimated daily emissions for each criteria pollutant, Alternatives Btk and S would not violate an ambient air quality standard. Impacts would be less than significant, and no mitigation is required.

Mitigation Measures: None required; however, see Section 6.2.11 for optional mitigation.

6.2.6.2 Result in Cumulatively Considerable Increase in Nonattainment Pollutant

The focus of this evaluation criterion is on the NAAQS and CAAQS pollutants for which some air basins statewide are in nonattainment. This nonattainment includes the following pollutants for Alternatives Btk and S: O_3 (VOCs and NO_x), PM_{10}, and $PM_{2.5}$. The daily emissions of each of these pollutants from Alternatives Btk and S (Table 6-15) are less than the values used for relative comparison (Table 6-4). Even the emission closest to the comparison value ($PM_{2.5}$) is more than 15 times lower than the related comparison value.

Impact AQ-22: Based on the estimated daily emissions for each criteria pollutant, Alternatives Btk and S would not result in a cumulatively considerable increase in nonattainment pollutants. Impacts would be less than significant, and no mitigation is required.

Mitigation Measures: None required; however, see Section 6.2.11 for optional mitigation.

6.2.6.3 Potential Conflict with Applicable Air Quality Plans

The emission source categories associated with Alternatives Btk and S include onroad, offroad, and pesticide application. As discussed in Section 6.2.3.3, these emission sources are included in the SIP emission inventory. In addition, Alternative Btk and S emission sources and operations would comply with the applicable regulations identified in Section 6.1.1. Taken together, these considerations indicate Alternatives Btk and S should not conflict with applicable air quality plans.

Impact AQ-23: Based on the general inclusion of Alternative Btk and S emissions in the SIP emission inventory and the compliance with applicable air regulations, Alternatives Btk and S would not conflict with applicable air quality plans. Impacts would be less than significant, and no mitigation is required.

Mitigation Measures: None required; however, see Section 6.2.11 for optional mitigation.

6.2.6.4 Exposes Sensitive Receptors to Substantial Pollutants

As discussed above in Section 6.2.6.1, Alternatives Btk and S have the potential to emit NAAQS and CAAQS pollutants, including O_3 (VOCs and NO_x), CO, NO_x, SO_2, PM_{10}, and $PM_{2.5}$. The daily emissions of each of these pollutants from Alternatives Btk and S (Table 6-15) are less than the values used for relative comparison (Table 6-4). Even the emission closest to the comparison value (CO) is more than 6 times lower than the related comparison value. It is expected that the NAAQS and CAAQS would not be exceeded due to Program emissions. Therefore, Alternatives Btk and S would not expose sensitive receptors to substantial pollutants.

Impact AQ-24: Based on the estimated daily emissions for each criteria pollutant, Alternatives Btk and S would not expose sensitive receptors to substantial pollutant concentrations. Impacts would be less than significant, and no mitigation is required.

Mitigation Measures: None required; however, see Section 6.2.11 for optional mitigation.

6.2.6.5 Objectionable Odors

Information from the MSDS of the two treatment compounds utilized for Alternatives Btk or S were reviewed to assess the potential impacts from odor. Spinosad is described as having a latex odor. According to the MSDS, Btk has a faint, organic/malt odor. The active ingredients of both treatments are considered nonvolatile and no odor threshold has been determined. Alternative Btk and S treatments would be applied using hydraulic spraying, which would result in drift of spray droplets. However, the screening-level dispersion estimates predict maximum air concentrations close to the spray area, so the likely number of people potentially exposed to the odors from each spray application would be minimal.

Impact AQ-25: Based on the mild odors associated with spinosad and Btk and considering the potential exposure would be limited to any drift of spray droplets due to their nonvolatile nature, Alternatives Btk and S would not subject a substantial number of people to objectionable odors. Impacts would be less than significant, and no mitigation is required.

6.2.7 Inundative Parasite Wasp Releases (Alternative Bio-P)

Inundative *Trichogramma* species (stingless parasite wasp) releases may be made in areas with more than 50 LBAM detections. This form of biological control would use native, commercially available parasitic wasps.

The estimated number of the native wasp species (*Trichogramma platerni* and *T. pretiosum*) to be released is 1,000,000 per square mile (based on release rates used in commercial agriculture for the same insects). Wasp eggs are attached to index cards with Elmer's® glue and then attached to foliage where LBAM has been detected.

6.2.7.1 Violates Air Quality Standards

Alternative Bio-P has the potential to emit NAAQS and CAAQS pollutants, including O_3 (VOCs and NO_x), CO, NO_x, SO_2, PM_{10}, and $PM_{2.5}$. The daily emissions of each of these pollutants from Alternative Bio-P (Table 6-15) are less than the values used for relative comparison (Table 6-4). Even the emission closest to the comparison value (NO_x) is more than 25 times lower than the related comparison value.

Impact AQ-26: Based on the estimated daily emissions for each criteria pollutant, Alternative Bio-P would not violate an ambient air quality standard. Impacts would be less than significant, and no mitigation is required.

Mitigation Measures: None required; however, see Section 6.2.11 for optional mitigation.

6.2.7.2 Result in Cumulatively Considerable Increase in Nonattainment Pollutant

The focus of this evaluation criterion is on the NAAQS and CAAQS pollutants for which some air basins statewide are in nonattainment. This nonattainment includes the following pollutants for Alternative Bio-P: O_3 (VOCs and NO_x), PM_{10}, and $PM_{2.5}$. The daily emissions of each of these pollutants from Alternative Bio-P (Table 6-15) are less than the values used for relative comparison (Table 6-4). Even the emission closest to the comparison value (NO_x) is more than 25 times lower than the related comparison value.

Impact AQ-27: Based on the estimated daily emissions for each criteria pollutant, Alternative Bio-P would not result in a cumulatively considerable increase in nonattainment pollutants. Impacts would be less than significant, and no mitigation is required.

Mitigation Measures: None required; however, see Section 6.2.11 for optional mitigation.

6.2.7.3 Potential Conflict with Applicable Air Quality Plans

The emission source category associated with Alternative Bio-P is onroad sources. As discussed in Section 6.2.3.3, these emission sources are included in the SIP emission inventory. In addition, Alternative Bio-P emission sources and operations would comply with the applicable regulations identified in Section 6.1.1. Taken together, these considerations indicate Alternative Bio-P should not conflict with applicable air quality plans.

Impact AQ-28: Based on the general inclusion of the Alternative Bio-P emissions in the SIP emission inventory and the compliance with applicable air regulations, Alternative Bio-P would not conflict with applicable air quality plans. Impacts would be less than significant, and no mitigation is required.

Mitigation Measures: None required; however, see Section 6.2.11 for optional mitigation.

6.2.7.4 Exposes Sensitive Receptors to Substantial Pollutants

As discussed above in Section 6.2.7.1, Alternative Bio-P has the potential to emit NAAQS and CAAQS pollutants, including O_3 (VOCs and NO_x), CO, NO_x, SO_2, PM_{10}, and $PM_{2.5}$. The daily emissions of each of these pollutants from Alternative Bio-P (Table 6-15) are less than the values used for relative comparison (Table 6-4). Even the emission closest to the comparison value (NO_x) is more than 25 times lower than the related comparison value. It is expected that the NAAQS and CAAQS would not be exceeded due to Program emissions. Therefore, Alternative Bio-P would not expose sensitive receptors to substantial pollutants.

Impact AQ-29: Based on the estimated daily emissions for each criteria pollutant, Alternative Bio-P would not expose sensitive receptors to substantial pollutant concentrations. Impacts would be less than significant, and no mitigation is required.

Mitigation Measures: None required; however, see Section 6.2.11 for optional mitigation.

6.2.7.5 Objectionable Odors

No sources of objectionable odors have been identified for Alternative Bio-P.

Impact AQ-30: No objectionable odors would be associated with Alternative Bio-P and it would have no impacts with respect to odors. Therefore, no mitigation is required.

6.2.8 Sterile Insect Technique (Alternative SIT)

SIT will be the primary tool for LBAM eradication in California when it becomes fully operational. The Program would release sterile moths into the environment to disrupt mating and eradicate the population. The USDA has already accelerated the process of developing large-scale mass-rearing capabilities in support of LBAM eradication. The goal is to produce and release a minimum of 20 million sterile male moths per day at full capacity.

The equipment used for aerial application is a Beechcraft twin engine A90, flying at a minimum of 300 feet with an average projected altitude of about 2,000 feet during daylight hours. The actual altitudes will be set by the FAA.

It is expected that equipment and activity would be at a particular location no more than 3 hours, and for individual over flights or "passes" in the seconds, with a 14-pass operation taking no more than 15-30 minutes. Any subsequent events at a particular location, if necessary, would be approximately every 30 to 60 days.

6.2.8.1 Violates Air Quality Standards

Alternative SIT has the potential to emit NAAQS and CAAQS pollutants, including O_3 (VOCs and NO_x), CO, NO_x, SO_2, PM_{10}, and $PM_{2.5}$. The daily emissions of each of these pollutants from Alternative SIT (Table 6-15) are less than the values used for relative comparison (Table 6-4). Even the emission closest to the comparison value ($PM_{2.5}$) is almost 3 times lower than the related comparison value.

Impact AQ-31: Based on the estimated daily emissions for each criteria pollutant, Alternative SIT would not violate an ambient air quality standard. Impacts would be less than significant, and no mitigation required.

Mitigation Measures: None required; however, see Section 6.2.11 for optional mitigation.

6.2.8.2 Result in Cumulatively Considerable Increase in Nonattainment Pollutant

The focus of this evaluation criterion is on the NAAQS and CAAQS pollutants for which some air basins statewide are in nonattainment. This nonattainment includes the following pollutants for Alternative SIT: O_3 (VOCs and NO_x); PM_{10}; and $PM_{2.5}$. The daily emissions of each of these pollutants from Alternative SIT (Table 6-15) are less than the values used for relative comparison (Table 6-4). Even the emission closest to the comparison value ($PM_{2.5}$) is almost 3 times lower than the related comparison value.

Impact AQ-32: Based on the estimated daily emissions for each criteria pollutant, Alternative SIT would not result in a cumulatively considerable increase in nonattainment pollutants. Impacts would be less than significant, and no mitigation required.

Mitigation Measures: None required; however, see Section 6.2.11 for optional mitigation.

6.2.8.3 Potential Conflict with Applicable Air Quality Plans

The emission source categories associated with Alternative SIT include onroad and agricultural aircraft. As discussed in Section 6.2.1 under Potential Conflict with Applicable Air Quality Plans, these emission sources are included in the SIP emission inventory. In addition, Alternative SIT emission sources and operations would comply with the applicable regulations identified in Section 6.1.1. Taken together, these considerations indicate Alternative SIT should not conflict with applicable air quality plans.

Impact AQ-33: Based on the general inclusion of the Alternative SIT emissions in the SIP emission inventory and the compliance with applicable air regulations, Alternative SIT would not conflict with applicable air quality plans. Impacts would be less than significant, and no mitigation required.

Mitigation Measures: None required; however, see Section 6.2.11 for optional mitigation.

6.2.8.4 Exposes Sensitive Receptors to Substantial Pollutants

As discussed above in Section 6.2.8.1, Alternative SIT has the potential to emit NAAQS and CAAQS pollutants, including O_3 (VOCs and NO_x), CO, NO_x, SO_2, PM_{10}, and $PM_{2.5}$. The daily emissions of each of these pollutants from Alternative SIT (Table 6-15) are less than the values used for relative comparison (Table 6-4). Even the emission closest to the comparison value ($PM_{2.5}$) is almost 3 times lower than the related comparison value. It is expected that the NAAQS and CAAQS would not be exceeded due to Program emissions. Therefore, Alternative SIT would not expose sensitive receptors to substantial pollutants.

Impact AQ-34: Based on the estimated daily emissions for each criteria pollutant, Alternative SIT would not expose sensitive receptors to substantial pollutant concentrations. Impacts would be less than significant, and no mitigation required.

Mitigation Measures: None required; however, see Section 6.2.11 for optional mitigation.

6.2.8.5 Objectionable Odors

No sources of objectionable odors have been identified for Alternative SIT.

Impact AQ-35: No objectionable odors would be associated with Alternative SIT and it would have no impacts with respect to odors. Therefore, mitigation is not required.

6.2.9 Cumulative Impacts

Impacts to air quality from all of the Program alternatives are less than significant. The cumulative impacts due to the criteria pollutant emissions are discussed in this section. The majority of air districts assume that if project-level emissions do not exceed significance thresholds, and no closely related project exists, then a project would not have a cumulatively considerable impact on air quality. In most of the areas likely to be treated for LBAM infestations, related projects would be those to control mosquitoes (by special districts) and to control gypsy moths by the CDFA. These projects would not occur at the same time (day) and same location. All of the Program alternative emissions would be below the significance thresholds for criteria pollutant emissions. The incremental impacts on air quality from the LBAM Program are not individually significant nor are they cumulatively considerable. Therefore, cumulative impacts to air quality are less than significant.

6.2.10 Environmental Impacts Summary

Table 6-17 is a summary comparison of all of the potential air quality impacts, including no impacts, associated with the No Program and Program alternatives in comparison to existing conditions. The number of each statement correlates to its number in the text.

Table 6-17 Summary Comparison of Impacts of Alternatives

Impact Statement	No Program	MD-1	MD-2	MD-3	MMA	Btk and S	Bio-P	SIT
Conflict with Applicable Regulations								
Violate Air Quality Standards	LS	LS	LS	LS	LS	LS	LS	LS
Impact AQ-1: Based on the estimated daily emissions for each criteria pollutant, Alternative MD-1 would not violate an ambient air quality standard.	na	LS	na	na	na	na	na	na
Impact AQ-6: Based on the estimated daily emissions for each criteria pollutant, Alternative MD-2 would not violate an ambient air quality standard.	na	na	LS	na	na	na	na	na
Impact AQ-11: Based on the estimated daily emissions for each criteria pollutant, Alternative MD-3 would not violate an ambient air quality standard.	na	na	na	LS	na	na	na	na
Impact AQ-16: Based on the estimated daily emissions for each criteria pollutant, Alternative MMA would not violate an ambient air quality standard.	na	na	na	na	LS	na	na	na
Impact AQ-21: Based on the estimated daily emissions for each criteria pollutant, Alternatives Btk and S would not violate an ambient air quality standard.	na	na	na	na	na	LS	na	na
Impact AQ-26: Based on the estimated daily emissions for each criteria pollutant, Alternative Bio-P would not violate an ambient air quality standard.	na	na	na	na	na	na	LS	na
Impact AQ-31: Based on the estimated daily emissions for each criteria pollutant, Alternative SIT would not violate an ambient air quality standard.	na	na	na	na	na	na	na	LS
Result in Cumulatively Considerable Increase in Nonattainment Pollutant	LS	LS	LS	LS	LS	LS	LS	LS
Impact AQ-2: Based on the estimated daily emissions for each criteria pollutant, Alternative MD-1 would not result in a cumulatively considerable increase in nonattainment pollutants.	na	LS	na	na	na	na	na	na
Impact AQ-7: Based on the estimated daily emissions for each criteria pollutant, Alternative MD-2 would not result in a cumulatively considerable increase in nonattainment pollutants.	na	na	LS	na	na	na	na	na
Impact AQ-12: Based on the estimated daily emissions for each criteria pollutant, Alternative MD-3 would not result in a cumulatively considerable increase in nonattainment pollutants.	na	na	na	LS	na	na	na	na
Impact AQ-17: Based on the estimated daily emissions for each criteria pollutant, Alternative MMA would not result in a cumulatively considerable increase in nonattainment pollutants.	na	na	na	na	LS	na	na	na
Impact AQ-22: Based on the estimated daily emissions for each criteria pollutant, Alternatives Btk and S would not result in a cumulatively considerable increase in nonattainment pollutants.	na	na	na	na	na	LS	na	na
Impact AQ-27: Based on the estimated daily emissions for each criteria pollutant, Alternative Bio-P would not result in a cumulatively considerable increase in nonattainment pollutants.	na	na	na	na	na	na	LS	na
Impact AQ-32: Based on the estimated daily emissions for each criteria pollutant, Alternative SIT would not result in a cumulatively considerable increase in nonattainment pollutants.	na	na	na	na	na	na	na	LS

Table 6-17 Summary Comparison of Impacts of Alternatives

Impact Statement	No Program	MD-1	MD-2	MD-3	MMA	Btk and S	Bio-P	SIT
Potential Conflict with Applicable Air Quality Plans	LS	LS	LS	LS	LS	LS	LS	LS
Impact AQ-3: Based on the general inclusion of Alternative MD-1 emissions in the SIP emission inventory and the compliance with applicable air regulations, Alternative MD-1 would not conflict with applicable air quality plans.	na	LS	na	na	na	na	na	na
Impact AQ-8: Based on the general inclusion of the Alternative MD-2 emissions in the SIP emission inventory and the compliance with applicable air regulations, Alternative MD-2 would not conflict with applicable air quality plans.	na	na	LS	na	na	na	na	na
Impact AQ-13: Based on the general inclusion of the MD-3 emissions in the SIP emission inventory and the compliance with applicable air regulations, Alternative MD-3 would not conflict with applicable air quality plans.	na	na	na	LS	na	na	na	na
Impact AQ-18: Based on the general inclusion of the Alternative MMA emissions in the SIP emission inventory and the compliance with applicable air regulations, Alternative MMA would not conflict with applicable air quality plans.	na	na	na	na	LS	na	na	na
Impact AQ-23: Based on the general inclusion of Alternative Btk and S emissions in the SIP emission inventory and the compliance with applicable air regulations, Alternatives Btk and S would not conflict with applicable air quality plans.	na	na	na	na	na	LS	na	na
Impact AQ-28: Based on the general inclusion of the Alternative Bio-P emissions in the SIP emission inventory and the compliance with applicable air regulations, Alternative Bio-P would not conflict with applicable air quality plans.	na	na	na	na	na	na	LS	na
Impact AQ-33: Based on the general inclusion of the Alternative SIT emissions in the SIP emission inventory and the compliance with applicable air regulations, Alternative SIT would not conflict with applicable air quality plans.	na	na	na	na	na	na	na	LS
Expose Sensitive Receptors to Substantial Pollutants	LS	LS	LS	LS	LS	LS	LS	LS
Impact AQ-4: Based on the estimated daily emissions for each criteria pollutant, Alternative MD-1 would not expose sensitive receptors to substantial pollutant concentrations.	na	LS	na	na	na	na	na	na
Impact AQ-9: Based on the estimated daily emissions for each criteria pollutant, Alternative MD-2 would not expose sensitive receptors to substantial pollutant concentrations.	na	na	LS	na	na	na	na	na
Impact AQ-14: Based on the estimated daily emissions for each criteria pollutant, Alternative MD-3 would not expose sensitive receptors to substantial pollutant concentrations.	na	na	na	LS	na	na	na	na
Impact AQ-19: Based on the estimated daily emissions for each criteria pollutant, Alternative MMA would not expose sensitive receptors to substantial pollutant concentrations.	na	na	na	na	LS	na	na	na
Impact AQ-24: Based on the estimated daily emissions for each criteria pollutant, Alternatives Btk and S would not expose sensitive receptors to substantial pollutant concentrations.	na	na	na	na	na	LS	na	na
Impact AQ-29: Based on the estimated daily emissions for each criteria pollutant, Alternative Bio-P would not expose sensitive receptors to substantial pollutant concentrations.	na	na	na	na	na	na	LS	na

Table 6-17 Summary Comparison of Impacts of Alternatives

Impact Statement	No Program	MD-1	MD-2	MD-3	MMA	Btk and S	Bio-P	SIT
Impact AQ-34: Based on the estimated daily emissions for each criteria pollutant, Alternative SIT would not expose sensitive receptors to substantial pollutant concentrations.	na	na	na	na	na	na	na	LS
Expose People to Objectionable Odors	PS	LS	LS	LS	LS	LS	N	N
Impact AQ-5: Based on the mild odor associated with Isomate and its active ingredients and the limited means of exposure to the volatilized pheromones with Alternative MD-1, it would not subject a substantial number of people to objectionable odors.	na	LS	na	na	na	na	na	na
Impact AQ-10: Based on the mild odors associated with SPLAT and Hercon and their active ingredients in addition to considering the limited means of exposure to the volatilized pheromones under Alternative MD-2, it would not subject a substantial number of people to objectionable odors.	na	na	LS	na	na	na	na	na
Impact AQ-15: Based on the mild odors associated with SPLAT and Hercon and their active ingredients and the application being limited to essentially unpopulated areas, Alternative MD-3 would not subject a substantial number of people to objectionable odors.	na	na	na	LS	na	na	na	na
Impact AQ-20: Based on the mild odors associated with the pheromones and permethrin and their active ingredients, in addition to considering the limited means of exposure to the volatilized pheromones under Alternative MMA, it would not subject a substantial number of people to objectionable odors.	na	na	na	na	LS	na	na	na
Impact AQ-25: Based on the mild odors associated with spinosad and Btk and considering the potential exposure would be limited to any drift of spray droplets due to their nonvolatile nature, Alternatives Btk and S would not subject a substantial number of people to objectionable odors.	na	na	na	na	na	LS	na	na
Impact AQ-30: No objectionable odors would be associated with Alternative Bio-P and it would have no impacts with respect to odors.	na	na	na	na	na	na	N	na
Impact AQ-35: No objectionable odors would be associated with Alternative SIT and it would have no impacts with respect to odors.	na	na	na	na	na	na	na	N

Key:
LS = Less-than-significant impact
N = No impact
na = Not applicable
PS = Potentially significant impact (Applies to No Program only. Program alternatives have either feasible mitigations or unavoidable impacts.)
SM = Potentially significant but mitigable impact
SU = Potentially significant and unavoidable impact

6.2.11 Mitigation and Monitoring

No potentially significant air quality impacts associated with the Program alternatives were identified in this assessment. However, the CDFA and its contractors may implement several mitigation measures on a voluntary basis to reduce any air quality impacts even further. As these mitigation measures are voluntary, no attempt has been made to quantify the effects of the mitigation measures on the air quality impacts. The mitigation measures are grouped in two categories, those aimed at reducing the criteria pollutant emissions due to the combustion of fuel and those aimed at reducing the concentration and deposition of the applied materials outside the intended area of application.

6.2.11.1 Mitigation for Criteria Pollutant Emissions

The CDFA and its contractors may choose to implement the following voluntary measures to reduce criteria pollutant emissions from fuel combustion due to employee commuting:

- **Mitigation Measure AQ-1:** Provide storage and parking facilities for bicycles.
- **Mitigation Measure AQ-2:** Subsidize costs for workers to take public transportation or participate in ride-sharing programs.
- **Mitigation Measure AQ-3:** Offer preferential parking for electric, hybrid, or alternative low-carbon fuel vehicles.

The CDFA and its contractors may implement the following measures to reduce criteria pollutant emissions from fuel combustion in the Program vehicles:

- **Mitigation Measure AQ-4:** Check and reinflate tires at regular intervals.
- **Mitigation Measure AQ-5:** Use engine retrofits to remove emissions such as diesel particulate matter filters with diesel oxidation catalysts where feasible.
- **Mitigation Measure AQ-6:** Encourage ride-sharing when transporting work crews from the base of operations to the job site.
- **Mitigation Measure AQ-7:** Limit idling time of all vehicles and equipment.
- **Mitigation Measure AQ-8:** Service and maintain equipment according to manufacturer’s instructions to remain in good working order.

In addition, the CDFA and its contractors may implement the following measure to reduce criteria pollutant emissions from portable offroad sources (hydraulic compressors):

- **Mitigation Measure AQ-8:** See Mitigation Measure AQ-8 above.

6.2.11.2 Mitigation Measures for Applied Compounds

The CDFA and its contractors may choose to implement the following voluntary measures to reduce drift from the ground and aerial application of treatment compounds:

- **Mitigation Measure AQ-9:** Use precision pesticide application technology to reduce spray drift and the total amount of pesticide applied. This measure can include:
  - Precision guidance systems that reduce ground or aerial spray overlap to less than 12 inches (e.g., Global Positioning Systems [GPS] and Real Time Kinetics [RTK])

  - Computer-guided application systems that integrate real time meteorological data and computer model guidance to reduce pesticide drift from aerial application (e.g., AIMMS, Wingman™GX, and NextStar™ Flow Control)

- **Mitigation Measure AQ-10:** Use GPS data loggers that document site-specific compliance with all label requirements for drift mitigation

- **Mitigation Measure AQ-11:** Maintain appropriate buffer zones between the spray area and sensitive locations when possible for the application of the treatment compounds, especially true for aerial applications.

SCAQMD	South Coast Air Quality Management District
SJVAPCD	San Joaquin Valley Air Pollution Control District
SMAQMD	Sacramento Metropolitan Air Quality Management District
SO_2	sulfur dioxide
SO_x	sulfur oxide
URBEMIS	URBan EMISsions model
VOCs	volatile organic compounds