3.4 AIR QUALITY

3.4.1 Introduction/Region of Influence

The ROI for air quality issues depends on the pollutant and emission sources under consideration. The ROI for a regional secondary pollutant such as ozone (O_3) would generally be island-wide. The ROI for primary pollutants would be much more limited, depending on the physical size of the emission source, its height above ground, the type and rate of pollutant emissions, and the potential for meteorological conditions that limit pollutant dispersion. In most cases, the ROI for primary pollutants would be an area extending no more than a few miles from the emission source. The ROI for small emission sources with low emission rates may extend less than 1 mile (2 kilometers) from the source.

During the scoping process for this EIS, the public expressed general concerns regarding the potential for hazardous air pollutant emissions (primarily in connection with ordnance use) and fugitive dust from vehicle or helicopter activity.

3.4.2 Air Quality Overview

A background discussion of air pollution terminology and regulatory considerations are presented in Appendix E. The regulatory framework pertinent to MMR and PTA for potential impacts on existing air quality is discussed in the following subsection.

National Ambient Air Quality Standards

The Clean Air Act (CAA) provides the principal framework for national, state, and local efforts to protect air quality. Under the CAA, the Office of Air Quality Planning and Standards (OAQPS) of the EPA is responsible for setting standards, known as National Ambient Air Quality Standards (NAAQS), for pollutants considered harmful to humans and the environment. The pollutants that have NAAQS are ozone, nitrogen dioxide, carbon monoxide, particulate matter (PM_{10} and $PM_{2.5}$), sulfur dioxide, and lead. These pollutants are referred to as "criteria pollutants." OAQPS is also responsible for ensuring that these air quality standards are met, or "attained" (in cooperation with state, tribal, and local governments), through national standards and strategies to control pollutant emissions from automobiles, factories, and other sources (EPA 2002e).

Section 110 of the CAA requires each state to submit a State Implementation Plan (SIP), which provides for the "implementation, maintenance, and enforcement" of primary and secondary ambient air quality standards. Primary standards relate to the protection of public

human health, and secondary standards relate to the protection of welfare, such as effects on crops and animals. SIPs must include enforceable emissions' limitations, provide measures for monitoring, and prohibit emissions that will contribute to the nonattainment of a standard.

Table 3.4-1 shows NAAQS values for the six criteria pollutants. The CAA requires states to monitor ambient levels of these pollutants and to develop air quality management plans that ensure that NAAQS are achieved and maintained. No areas in the State of Hawai'i are classified as nonattainment or maintenance areas. The State has an approved SIP to address the requirements of the CAA. Table 3.4-2 shows changes in ozone and particulate matter standard values.

Table 3.4-1
National Ambient Air Quality Standards (Primary)

Pollutant	Standard Value	Standard Type
Carbon Monoxide (CO)		
8-hour average	9 ppm	Primary
1-hour average	35 ppm	Primary
Nitrogen Dioxide (NO_2)		
Annual arithmetic mean	0.053 ppm	Primary and secondary
Ozone (O_3)		
1-hour average	0.12 ppm	Primary and secondary
Lead (Pb)		
Quarterly average	1.5 $\mu g/m^3$	Primary and secondary
Particulate Matter (PM_{10})		
Annual arithmetic mean	50 $\mu g/m^3$	Primary and secondary
24-hour average	150 $\mu g/m^3$	Primary and secondary
Sulfur Dioxide (SO_2)		
Annual arithmetic mean	0.03 ppm	Primary
24-hour average	0.14 ppm	Primary
3-hour average	0.50 ppm	Secondary

Source: EPA 2002e

ppm = parts per million
$\mu g/m^3$ = micrograms per cubic meter

Table 3.4-2
Changes in Ozone and Particulate Matter Standard Values

Pollutant	Standard Value	Standard Type
Ozone (O_3)		
From: 1-hour average	0.12 ppm (235 µg/m^3)	Primary and secondary
To: 8-hour average	0.08 ppm (157 µg/m^3)	Primary and secondary
Particulate Matter (PM_{10})		
From: Annual arithmetic mean	50 µg/m^3	Primary and secondary
24-hour average	150 µg/m^3	Primary and secondary
To: Annual arithmetic mean	15 µg/m^3	Primary and secondary
24-hour average	65 µg/m^3	Primary and secondary

Source: EPA 2002f

Prevention of Significant Deterioration

The CAA also established the Prevention of Significant Deterioration (PSD) Program to prevent areas that are cleaner than the minimum standards set by the NAAQS from having their air quality degraded, while allowing room for growth. Every new, modified, or expanded major stationary source in an attainment or unclassifiable area is required to use the "best available control technology" for preventing significant degradation of air quality. The PSD Program also establishes maximum allowable increases that limit the overall increase in pollution levels over the baseline concentrations in clean air areas. States are required to abide by the PSD Program to ensure their state's air quality does not degrade.

Hazardous Air Pollutants

Hazardous Air Pollutants (HAPs) are any compounds designated as such under the CAA. Programs regulating hazardous air pollutants focus on substances that alter or damage genes and chromosomes in cells (mutagens); substances that affect cells in ways that can lead to uncontrolled cancerous cell growth (carcinogens); substances that can cause birth defects or other developmental abnormalities (teratogens); substances with serious acute toxicity effects; and substances that undergo radioactive decay processes, resulting in the release of ionizing radiation. Rather than setting ambient exposure standards federal air quality management programs for HAPs focus on setting emission limits for particular industrial processes. Some states have established ambient exposure guidelines for various HAPs and use those guidelines as part of the permit review process for industrial stationary emission sources.

The State of Hawai‘i has adopted ambient concentration guidelines for HAPs. These guidelines are used as part of the permit review process for

stationary emission sources that require state or federal air quality permits. The State's ambient exposure guidelines for HAPs are contained in the state Administrative Rules, Chapter 60.1 (HDOH 2001).

Clean Air Act General Conformity

Section 176(c) of the CAA requires federal agencies to ensure that actions undertaken in nonattainment or maintenance areas are consistent with the CAA and with federally enforceable air quality management plans. The EPA's general conformity rule applies to federal actions occurring in nonattainment or maintenance areas when the total direct and indirect emissions of nonattainment pollutants (or their precursors) exceed specified thresholds.

No areas in the State of Hawai'i are classified as nonattainment or maintenance areas. Consequently, the CAA conformity analysis procedures do not apply to Army actions in the State. Although not applicable in a regulatory context, the conformity rule de minimis levels provide a widely used basis for judging the relative significance of emissions associated with a proposed federal agency action.

3.4.3 Existing Air Quality Conditions Mākua Military Reservation

There are no air quality monitoring stations close to MMR. The closest air quality monitoring stations are in the Barbers Point area, approximately 16 miles (26 kilometers) south of MMR. As there are few permanent facilities at MMR, the primary sources of emissions are intermittent activities, such as vehicle traffic to and from the area used for periodic training activities, low altitude aircraft or helicopter flights, ordnance firing and detonations during live-fire training exercises, limited ordnance demolition activities following training exercises, engineer demolitions training, prescribed burns, and unplanned wildfires.

The Army operates the following three automated weather stations at MMR:

- Mākua Range Station near the office trailer area at the western end of the Mākua Valley;
- Mākua Valley Station in the central part of Mākua Valley at the eastern end of the OB/OD area; and
- Mākua Ridge Station along the northern ridgeline of the Mākua Valley.

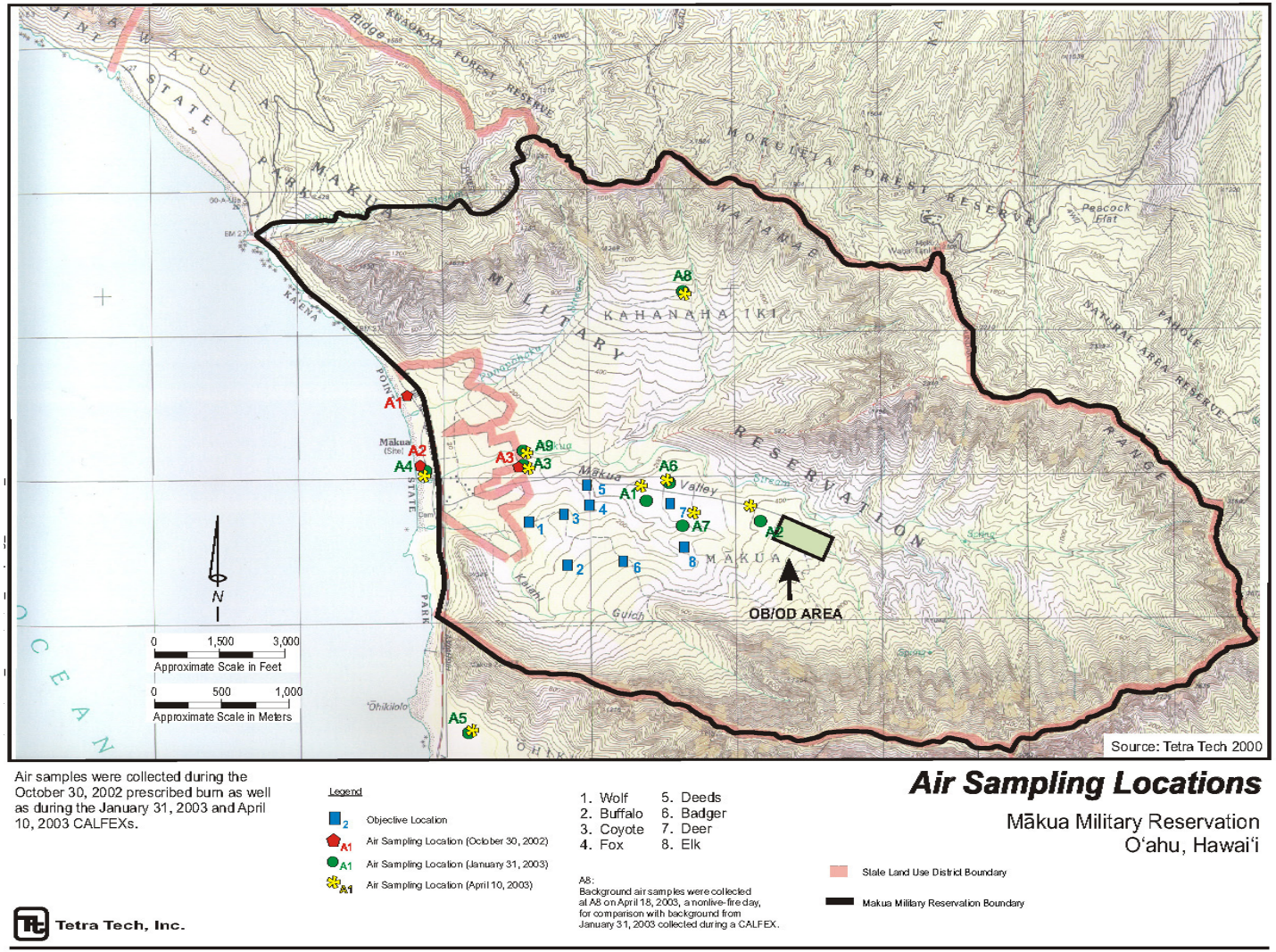
These weather stations are used for monitoring and predicting wildfire hazard conditions. Wind speed frequency distributions for these stations from the past three years of data are provided in Appendix E. Maximum and average wind speeds measured at the station in the central part of Mākua Valley are lower than wind speeds measured near the coast at the Mākua Range Station or on the northern ridgeline at the station. Wind speeds exceeded the typical 15 miles (24 kilometers) per hour threshold for wind erosion about 5 percent of the time at the Mākua Range Station, about 0.2 percent of the time at the Mākua Valley Station, and about 9 percent of the time at the Mākua Ridge Station. High wind speeds cause fugitive dust and smoke generated during exercises to dissipate quickly, resulting in very minor visual, aesthetic, or respiratory localized problems. Meteorological data for MMR air sampling can be found in Appendix G-7.

The Army has conducted prescribed burns in portions of MMR, within the last decade to achieve the following goals:

- A reduction in vegetative fuel loads;
- Minimized risk of potential wildfires caused by military training activities; and
- Improved access for archaeological surveys.

The Army conducted air sampling during the October 30, 2002, prescribed burn. Ambient air samples were collected at two off-range monitoring stations at Mākua Beach (south beach and north beach) and at one on-range monitoring station near Objective Deer (Figure 3.4-1). Winds throughout the burn period generally blew down-valley toward the coast, with periodic directional shifts within the general axis of the valley. Analytical methodology and validated results from this air sampling episode are summarized in Appendix E.

All of the monitoring stations appeared to be qualitatively affected by smoke plumes during some portion of the prescribed burn operation. Data from all three air monitoring stations show that the south beach and on-range monitoring stations received the greatest amount of smoke. However, none of the criteria pollutants were observed at concentration levels above federal and state ambient air quality standards. Thus, these levels complied with human health criteria and hazardous air pollutant criteria. In addition, many of the tested pollutant categories were not detected at any of the air monitoring stations and thus do not appear to represent emission concerns relevant to prescribed burn operations at MMR.



Air samples were collected during the October 30, 2002 prescribed burn as well as during the January 31, 2003 and April 10, 2003 CALFEXs.

Legend

- Objective Location
- Air Sampling Location (October 30, 2002)
- Air Sampling Location (January 31, 2003)
- Air Sampling Location (April 10, 2003)

1. Wolf
2. Buffalo
3. Coyote
4. Fox
5. Deeds
6. Badger
7. Deer
8. Elk

A8:
Background air samples were collected at A8 on April 18, 2003, a nonlive-fire day, for comparison with background from January 31, 2003 collected during a CALFEX.

Air Sampling Locations

Mākua Military Reservation
O'ahu, Hawai'i

State Land Use District Boundary

Makua Military Reservation Boundary

Tetra Tech, Inc.

Figure 3.4-1 Air Sampling Locations

The Army conducted air sampling during CALFEXs on January 31, 2003, and April 10, 2003 (Figure 3.4-1). Ambient air samples were collected at the following locations:

- Two off-range monitoring stations at Mākua Beach and Silva Ranch; and
- Nine on-range monitoring stations, located at the North Firebreak Road, near Objectives Deer and Elk, near the OB/OD area, and near the bivouac area.

Similar to the prescribed burn, winds throughout each of the CALFEXs generally blew down-valley toward the coast, with periodic directional shifts within the general axis of the valley. Analytical methodology and validated results from these CALFEX air sampling episodes are summarized in Appendix E.

None of the criteria pollutants were observed at concentration levels above state and federal ambient air quality standards and thus comply with human health criteria and hazardous air pollutant criteria. In addition, many of the tested pollutant categories were not detected at any of the air monitoring stations and thus do not appear to represent emission concerns relevant to CALFEX operations at MMR.

Pōhakuloa Training Area

There are no permanent air quality monitoring stations close to PTA. The closest permanent air quality monitoring stations are in Hilo and Kona. Both stations are approximately 30 miles (48.2 kilometers) from PTA. The monitoring station in Hilo collects data on sulfur dioxide and PM_{10} levels. The Kona monitoring station in Kealakekua currently collects data on sulfur dioxide levels; PM_{10} monitoring at this station was discontinued in June 2000. Military vehicles, aircraft flight operations (mostly helicopters), and ordnance use represent the major Army emission sources at PTA (US Army and USACE 2004). A package rock crushing facility from SBMR is moved to PTA when needed. There is a full time rock crushing operation at PTA at the quarry in TA 13 that is producing large quantities of aggregate for Saddle Road Realignment Construction.

A rain gauge at BAAF records precipitation data. Annual precipitation averages 16.9 inches (42.9 centimeters) per year, ranging from 1.6 inches (4.1 centimeters) in June to 4.4 inches (11.2 centimeters) in March (WeatherDisc Associates 1990). The Army operates four automated weather stations at PTA, one each in the eastern, southern, north-central,

and western portions of PTA. Data from these stations are used in a real-time context for fire management purposes. Consequently, comprehensive data summaries from these stations are not available. Wind speed data from these stations have been evaluated to assist in evaluation of potential wind erosion conditions. Data from the eastern and western stations are most representative of conditions in areas where troop and vehicle maneuver activity occurs. Three years of data from the eastern station show an average hourly wind speed of 13 miles (20.9 kilometers) per hour and a maximum hourly average wind speed of 33 miles (53.1 kilometers) per hour. Hourly average wind speeds at the eastern station exceeded 8.2 miles (13.2 kilometers) per hour 75 percent of the time and exceeded the 15 miles (24.1 kilometers) per hour threshold commonly associated with wind erosion processes about 35 percent of the time. Three years of data from the western station show an average hourly wind speed of 8.4 miles (13.5 kilometers) per hour and a maximum hourly average wind speed of 44 miles (70.8 kilometers) per hour. Hourly average wind speeds at the western station exceeded 4.7 miles (7.6 kilometers) per hour 75 percent of the time. The low-density silty soils common at PTA are subject to wind erosion at lower wind speeds than most soils. Wind speeds on the western side of PTA exceed the likely wind erosion threshold of 12 miles (19.3 kilometers) per hour about 15 percent of the time (US Army and USACE 2004).

Although the State is in a PM_{10} attainment area under the CAA, the Island of Hawai‘i and the surrounding land at PTA have experienced discrete events in which dust impacts have had adverse effects. PM_{10} emissions are important because they are easily airborne and are small enough to be inhaled deep into the lungs, creating potential adverse health effects. Because of the extremely small particle size of the soils found on Ke‘āmuku Parcel, the particles easily become airborne during high-wind events and other disturbances once vegetation has been removed. In July 1999, a severe dust storm resulted from wind blowing over areas denuded of vegetation by a recent fire. The result was fugitive dust emissions at high enough levels to require temporary evacuation of residences at Waiki‘i Ranch (US Army and USACE 2004).

In January 2006, the Army installed seven air-monitoring stations around PTA (Morrow 2007). The purpose of the monitors was to monitor concentrations of total suspended particulates (TSP) and PM_{10}. TSP was included because it is more representative of fugitive dust than the finer, inhalable PM_{10}.The monitors were installed as close to PTA’s boundaries as access and safety would allow. Between January 29, 2006 and June 30, 2007, the monitors sampled particulate matter following the EPA’s schedule of once every six days.

Analysis of the data collected during the sample period indicates that concentrations of particulate matter at PTA under current activity levels are well within federal and state air quality standards (Morrow 2007). The 24-hour PM_{10} concentrations at the seven sites ranged from 0 to 72 $\mu g/m^3$ with a mean value of 7.2 $\mu g/m^3$ (2.22 parts per billion [ppb]) for all sites. The federal and state standards for PM_{10} are 150 $\mu g/m^3$ (46.15 ppb) (24-hour) and 50 $\mu g/m^3$ (15.39 ppb) (annual average). The 24-hour TSP levels ranged from 1.4 to 132 $\mu g/m^3$ (0.43 to 40.62 ppb) for all sites with an annual mean of 14.4 $\mu g/m^3$ (4.43 ppb) (US Army and USACE 2004). Although there are no longer federal or state standards for TSP, the former standards were the same as the PM_{10} standards cited above.

Sampling PM occurred during training of the 2/25th SBCT in 2007. This training included both maneuver and live fire training (small arms training, and mortars). All 24-hour PM_{10} concentrations from the sampling events were below the federal and state standards for PM_{10} of 150 $\mu g/m^3$ (46.15 ppb) (24-hour) (US Army and USACE 2004).