3.2 AIR QUALITY

3.2.1 INTRODUCTION

3.2.1.1 Overview

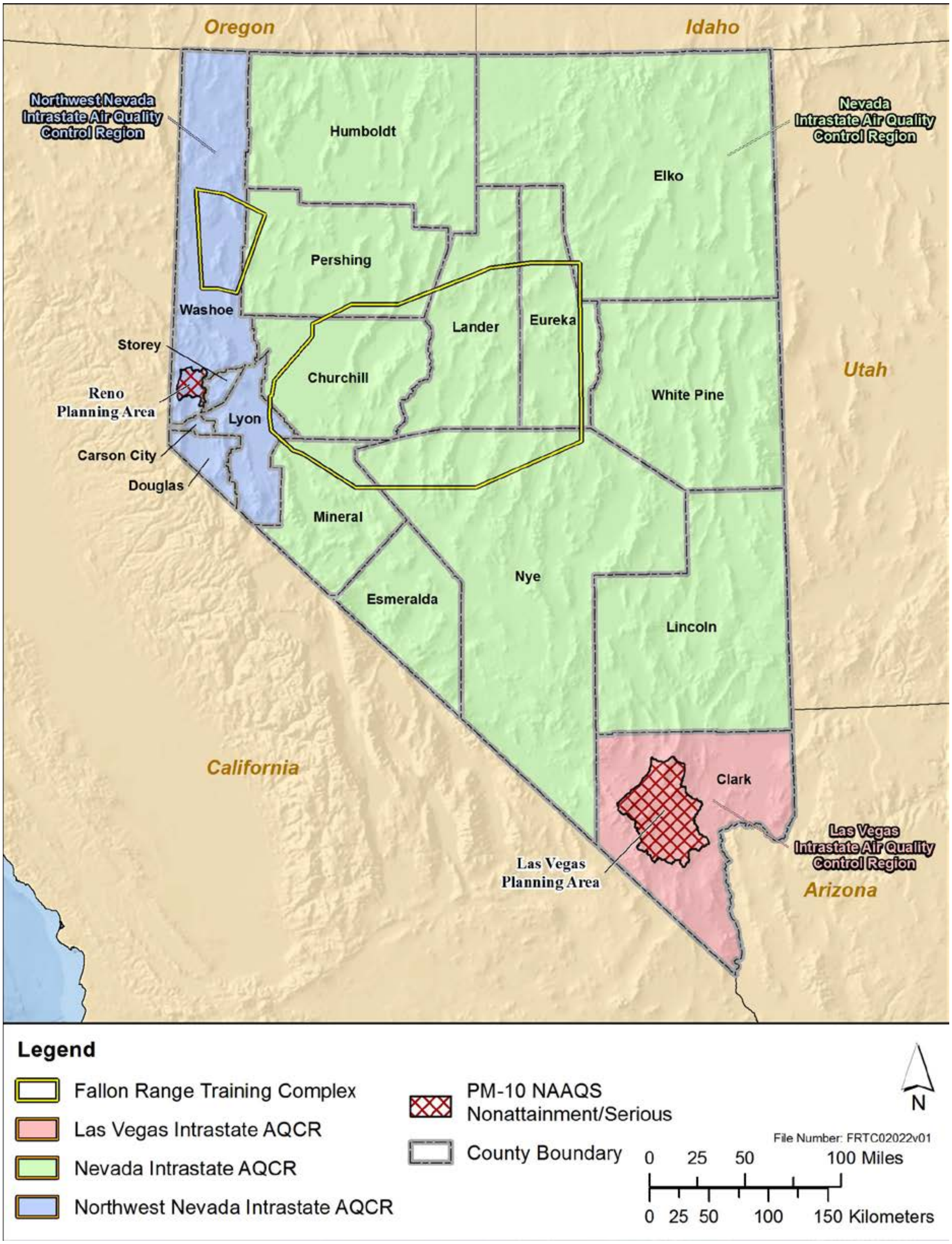
Nevada consists of three air quality control regions: (1) the Nevada Intrastate Air Quality Control Region, (2) the Northwest Nevada Intrastate Air Quality Control Region, and (3) the Las Vegas Intrastate Air Quality Control Region (Figure 3.2-1). These regions are further subdivided into particular air basins for monitoring and management purposes. As shown in Figure 3.2-1, most of the Fallon Range Training Complex (FRTC) Study Area lies within the Nevada Intrastate Air Quality Control Region. A relatively small part of the FRTC Study Area, including most of the Reno Military Operations Area (MOA), is within the Northwest Nevada Intrastate Air Quality Control Region.

Two areas in Nevada are classified as “nonattainment areas” for suspended particulate matter (PM) less than or equal to 10 micrometers (µm) in diameter (PM_{10}) because ambient concentrations of PM_{10} exceed the national ambient air quality standard for this pollutant. These nonattainment areas, which are referred to as the Reno Planning Area and Las Vegas Planning Area, are located outside the FRTC Study Area (Figure 3.2-1). The remainder of Nevada and the entire FRTC Study Area are classified as being in attainment with all national ambient air quality standards (see Section 3.2.1.2, Regulatory Framework and Management Practices, for additional information about national ambient air quality standards).

The study area or region of influence for the air quality analysis includes north central parts of the Nevada Intrastate Air Quality Control Region and the northern segment of the Northwest Nevada Intrastate Air Quality Control Region. The following section provides the regulatory framework for air quality and contains general information and definitions of terms commonly used in this section.

3.2.1.2 Regulatory Framework and Management Practices

The United States (U.S.) Environmental Protection Agency (EPA) is responsible for enforcing the Clean Air Act of 1970 and its 1977 and 1990 amendments (42 United States Code §7401, et seq.). The Clean Air Act’s purposes are to classify air basins as to their attainment status under the national ambient air quality standards (40 Code of Federal Regulations [C.F.R.] §50) (Table 3.2-1), develop schedules and strategies to meet the national ambient air quality standards, and regulate emissions of criteria pollutants and air toxics to protect the public health and welfare. Short-term standards (1-, 3-, 8- and 24-hour periods) are established for pollutants contributing to acute health effects, while long-term standards (quarterly and annual averages) are established for pollutants contributing to chronic health effects.



Notes: AQCR = Air Quality Control Region, PM-10 = Particulate Matter less than 10 micrometers in diameter, NAAQS = National Ambient Air Quality Standards

Figure 3.2-1: Nevada Air Quality Control Regions and Nonattainment Areas

Table 3.2-1: Ambient Air Quality Standards

Pollutant	Averaging Time	NAAQS Primary	NAAQS Secondary	Nevada Standards
O_3	8 hours (2008 standard)	0.075 ppm	Same as primary	Same as NAAQS
O_3 – Lake Tahoe Basin, #90	1 hour	-	-	0.10 ppm
PM_{10}	24 hours	150 µg/m^3	Same as primary	Same as NAAQS
	Annual arithmetic mean	-	-	50 µg/m^3
$PM_{2.5}$	24 hours	35 µg/m^3	Same as primary	-
	Annual arithmetic average	12 µg/m^3	15 µg/m^3	-
CO less than 5,000 ft. below mean sea level	8 hours	9 ppm	-	Same as NAAQS
CO above 5,000 ft. above mean sea level	8 hours	9 ppm	-	6 ppm
CO at any elevation	1 hour	35 ppm	-	Same as NAAQS
NO_2	Annual arithmetic average	53 ppb	Same as primary	Same as NAAQS
	1 hour	100 ppb	-	-
SO_2	3 hours	-	0.5 ppm	Same as NAAQS
	1 hour	75 ppb	-	-
Lead	Rolling 3-month average	0.15 µg/m^3	Same as primary	Same as NAAQS
Hydrogen sulfide	1 hour	-	-	0.08 ppm

Notes: CO = carbon monoxide, ft. = feet, NAAQS = national ambient air quality standards, NO_2 = nitrogen dioxide, O_3 = ozone, $PM_{2.5}$ = fine particulate matter less than or equal to 2.5 micrometers in diameter, PM_{10} = suspended particulate matter less than or equal to 10 micrometers in diameter, ppb = parts per billion, ppm = parts per million, µg/m^3 = micrograms per cubic meter
Sources: Nevada Administrative Code 445B.22097, U.S. Environmental Protection Agency 2012

States may also establish their own ambient air quality standards that are more stringent than those set by federal law. The Nevada Administrative Code (NAC) (Chapter 445B, Section 22097) establishes ambient air quality standards for Nevada. These standards include the national ambient air quality standards as well as Nevada standards, which are used to consider whether to issue a permit for a stationary source by ensuring that the stationary source will not cause the Nevada standards to be exceeded in areas where the general public has access (Nevada Administrative Code 445B.22097). Table 3.2-1 lists the ambient air quality standards enforced by the Nevada Division of Environmental Protection.

Criteria pollutants are carbon monoxide (CO), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), ozone (O_3), PM_{10}, fine particulate matter less than or equal to 2.5 µm in diameter ($PM_{2.5}$), and lead (Pb). In Nevada, for new stationary sources or a renewal of an operating permit for an existing stationary source, hydrogen sulfide is also a regulated air pollutant. Air basins that exceed a national ambient air quality standard are designated as “nonattainment” for that pollutant, while air basins that are in compliance with national ambient air quality standards are in “attainment” for that pollutant. The U.S. EPA requires states to develop and execute a state implementation plan for nonattainment areas, which describes actions that will lead the state into compliance with all federal air quality standards. Areas that have achieved attainment may be designated as “maintenance areas,” which are subject to maintenance plans showing how the area will continue to meet federal air quality standards. The federally enforceable applicable state implementation plan for Nevada is compiled in 40 C.F.R. Part 52 Subpart DD.

Noncriteria air pollutants that can affect human health are categorized as hazardous air pollutants under Section 112 of the Clean Air Act. The U.S. EPA has identified 188 hazardous air pollutants, such as benzene, perchloroethylene, and methylene chloride. Hazardous air pollutants are examined individually where there is a source of these pollutants.

Hazardous air pollutants emitted from mobile sources are called mobile source air toxics. Mobile source air toxics are compounds emitted from highway vehicles and non-road equipment that are known or suspected to cause cancer or other serious health and environmental effects. On March 29, 2001, the U.S. EPA published the first mobile source air toxics rule, which identified 21 compounds as hazardous air pollutants that required regulation (U.S. Environmental Protection Agency 2001). A subset of six of these mobile source air toxics compounds were identified as having the greatest influence on health: benzene, 1,3-butadiene, formaldehyde, acrolein, acetaldehyde, and diesel particulate matter. The U.S. EPA published a second mobile source air toxics rule on February 26, 2007, which generally supported the findings in the first rule and provided additional recommendations of compounds having the greatest impact on health. The rule also identified several engine emission certification standards that must be implemented (U.S. Environmental Protection Agency 2007).

Unlike the criteria pollutants, there are no national ambient air quality standards for benzene and other hazardous air pollutants. The primary control methods for these pollutants for mobile sources involves reducing their content in fuel and altering the engine operating characteristics to reduce the volume of pollutant generated during combustion. Mobile source air toxics would be the primary hazardous air pollutants emitted by mobile sources during proposed training activities. Aircraft operations would result in low levels of emissions of these pollutants in the ambient air below the mixing height (3,000 feet [ft.] [914.4 meters {m}] above ground level [AGL]) and would occur over a widely dispersed area. For these reasons, hazardous air pollutants are evaluated qualitatively in this Environmental Impact Statement (EIS).

The Western Regional Air Partnership Dust Emissions Joint Forum adopted a definition of fugitive dust on October 21, 2004 (Western Governors' Association 2006). Fugitive dust was defined as dust that could not reasonably pass through a stack, chimney, vent, or other functionally equivalent opening. A similar definition is contained in NAC section 445B.075 for this solid airborne particulate matter. Fugitive dust can be generated from agricultural tilling, construction, materials handling, paved travel surfaces, unpaved travel surfaces, minerals products industry, abrasive blasting, livestock husbandry, and wind erosion of exposed areas. Fugitive dust can become a contributor to nonattainment of the National Ambient Air Quality Standards (NAAQS) for PM_{10} or $PM_{2.5}$. The ratios of $PM_{2.5}$ to PM_{10} for fugitive dust sources published in Section 13 of AP-42 typically range from 0.10 to 0.20.

Section 176 (c)(1) of the Clean Air Act, commonly known as the General Conformity Rule, requires federal agencies to ensure that their actions conform to applicable implementation plans for achieving and maintaining national ambient air quality standards for criteria pollutants. To ensure conformity, a federal action must not contribute to new violations of ambient air quality standards, increase the frequency or severity of existing violations, or delay timely state or regional attainment of standards. A conformity review must be completed for every federal action that generates air emissions in nonattainment or maintenance (former nonattainment) areas. The General Conformity Rule does not apply to the Proposed Action because the FRTC Study Area is not within a nonattainment or maintenance area.

Air pollutants are classified as either primary or secondary pollutants. Primary air pollutants are those emitted directly into the atmosphere, such as CO, SO_2, Pb, and PM. Secondary air pollutants, such as O_3, are those formed through atmospheric chemical reactions. Such reactions usually involve primary air pollutants and normal constituents of the atmosphere. Sunlight and meteorological conditions, such as temperature and humidity, can also affect atmospheric chemistry. Air pollutants such as organic gases and particulate matter are a combination of primary and secondary pollutants. PM_{10} and $PM_{2.5}$ are generated as primary pollutants by various mechanical processes (e.g., abrasion, erosion, mixing, or atomization) or combustion processes. However, PM_{10} and $PM_{2.5}$ also can be formed as secondary pollutants, through chemical reactions or by the condensation of gaseous pollutants into fine aerosols.

Compounds that react to form secondary air pollutants, such as O_3, are called pollutant precursors. Precursors for O_3 fall into two broad groups of chemicals: nitrogen oxides (NO_X) and organic compounds. NO_X consists of nitric oxide and NO_2. Organic compound precursors of O_3 are routinely described by various terms, including volatile organic compounds, reactive organic compounds, and reactive organic gases. In this document, the term “reactive organic gases” refers to organic compound precursors of O_3.

Air pollutant emissions refer to the amount (weight or volume) of one or more specific compounds emitted into the atmosphere by a source. Most air pollutant emissions are expressed as a rate (e.g., pounds per hour, pounds per day, or tons per year). Typical measurement units for emission rates on a source activity basis include pounds per thousand gallons of fuel burned, pounds per ton of material processed, and grams per vehicle-mile of travel.

Ambient air quality is determined by the atmospheric concentrations of specific air pollutants at a particular time and location. The ambient air pollutant concentrations measured at a particular location are determined by the pollutant emissions rate, local meteorology, and atmospheric chemistry. Wind speed and direction and precipitation patterns affect the dispersal, dilution, and removal of air pollutant emissions. Ambient air quality data are generally reported as a mass per unit volume (e.g., micrograms per cubic meter [$\mu g/m^3$] of air) or as a volume fraction (e.g., parts per million by volume).

The U.S. EPA has developed guidance to evaluate aircraft operational emissions, which is provided in *The Procedures of Emission Inventory Preparation, Volume IV: Mobile Sources* (U.S. Environmental Protection Agency 1992). Aircraft engines emit pollutants during all phases of operation: climb, approach, and cruise. The altitude of the aircraft is an important factor in determining the potential effects aircraft emissions have on air quality at the ground level. Table 2-6 in this EIS, Annual Estimates of Aircraft Sortie Overflights in the Fallon Range Training Complex Special Use Airspace (SUA), provides the percentage of flight time spent above 3,000 ft. AGL (914 m). This particular altitude is considered the top of the mixing layer. Air within the mixing layer is completely mixed, and pollutants emitted anywhere within the layer will be carried down to ground level (U.S. Environmental Protection Agency 1992). When an aircraft is above the mixing layer, whether on descent or when climbing to cruising altitude, the emissions tend to disperse, rather than being trapped by the inversion, and have no ground level effect. The U.S. EPA recommends a default mixing layer of 3,000 ft. (914 m) be used in aircraft emission calculations.

The Navy incorporates clean air initiatives into tactical vehicle and equipment procurement programs, fuel standards compliance, and vehicle inspection and maintenance procedures.

3.2.1.3 Approach to Analysis

The impact analysis for air quality considers possible changes in ambient air quality that could result from the Proposed Action. Such changes could arise from air pollutant emissions associated with increases in military readiness activities (e.g., combustion emissions from aircraft, vehicles, and equipment). Factors used in determining if impacts to air quality would be significant include whether emissions from the alternatives would be expected to change the national ambient air quality standards attainment status in the Northwest Nevada Intrastate Air Quality Control Region or Nevada Intrastate Air Quality Control Region.

Section 3.2.3 (Environmental Consequences) presents the analysis of potential impacts on air quality within the FRTC Study Area in relation to three air quality stressors:

- Criteria pollutants
- Hazardous air pollutants
- Fugitive dust

3.2.2 Affected Environment

3.2.2.1 Regional and Local Air Quality

As mentioned in Section 3.2.1.1 (Overview), Nevada consists of three air quality control regions: (1) the Nevada Intrastate Air Quality Control Region, (2) the Northwest Nevada Intrastate Air Quality Control Region, and (3) the Las Vegas Intrastate Air Quality Control Region. These regions are further subdivided into particular air basins for monitoring and management purposes. Figure 3.2-1 illustrates the three air quality control regions. As shown in Figure 3.2-1, the FRTC Study Area lies almost exclusively within the Nevada Intrastate Air Quality Control Region. However, the noncontiguous Reno MOA portion of the FRTC Study Area lies partially within the Northwest Nevada Intrastate Air Quality Control Region. As shown in Figure 3.2-1, no nonattainment areas are within the FRTC Study Area.

Nevada has four jurisdictions that independently manage their own air programs as designated by statute: Department of Conservation and Natural Resources, Division of Environmental Protection, Bureau of Air Quality Planning; Washoe County District Health Department, Air Quality Management Division; Clark County Department of Air Quality and Environmental Management; and various tribal agencies (Nevada Division of Environmental Protection 2014). The Ambient Air Quality Monitoring Program of the Bureau of Air Quality Planning operates an ambient air quality monitoring network of gaseous and particulate pollutant monitors throughout rural Nevada, except those areas in Washoe and Clark County (Nevada Division of Environmental Protection 2014). Washoe and Clark County operate and maintain monitoring networks separate from the state and publish their findings independently.

The Nevada Intrastate Air Quality Control Region generally has good air quality, as indicated by the absence of nonattainment areas in the region. Historically, the region had just one nonattainment area (U.S. Environmental Protection Agency 2013), in White Pine County. This area will not be further discussed, as the Steptoe Valley Central area in White Pine County has been in attainment of the national ambient air quality standards for SO_2 for over a decade and is located outside of the FRTC Study Area. The Northwest Nevada Intrastate Air Quality Control Region has one air basin that is currently designated nonattainment for PM_{10}. However, this air basin is located outside the FRTC Study Area.

Nevada Air Pollution Control Program operates a network of monitoring stations across Nevada’s 15 rural counties (Nevada Division of Environmental Protection 2011). The monitors conform to all U.S. Environmental Protection Agency siting criteria and are situated to measure air quality in both rural and urbanized portions of Nevada’s 15 rural counties: Carson City, Churchill, Douglas, Elko, Esmeralda, Eureka, Humboldt, Lander, Lincoln, Lyon, Mineral, Nye, Pershing, Storey, and White Pine. With the exception of the Reno MOA, the FRTC Study Area lies within the rural counties area. Clark (to the south) and Washoe (to the west) Counties operate and maintain monitoring networks separate from Nevada Air Pollution Control Program and publish their findings independently. The following trends were observed for the 15 rural counties area as set forth in the *Air Quality Trend Report 2000–2010* (Nevada Division of Environmental Protection 2011):

- Carbon monoxide: Ambient concentrations of CO have decreased and remained well below the current national ambient air quality standards.
- Ground-level ozone: Ambient concentrations of O_3 have remained steady and below the current 2008 national ambient air quality standards.
- Particulate matter ≤ 2.5 µm in diameter: Ambient concentrations of $PM_{2.5}$ have trended upward in Gardnerville and are close to the national ambient air quality standards in Carson City and Gardnerville. Nevada Air Pollution Control Program is in the process of analyzing samples to determine the cause(s) of the elevated levels. Ambient concentrations of $PM_{2.5}$ have decreased in Fernley.
- Particulate matter ≤ 10 µm in diameter: PM_{10} monitoring conducted in Elko has shown no significant change in ambient concentrations. Monitoring conducted in Pahrump shows that annual concentrations of PM_{10} have decreased in most of the monitored locations and remain well below the annual standard. The 24-hour PM_{10} concentrations in Pahrump remain steady at or near the standard. However, the number of exceedances of the 24-hour standard, most of which occurred during uncontrollable high wind events, have been reduced. As a result, the design values for PM_{10} show no exceedances of the national ambient air quality standards in the past 5 years.

The most recent air emissions inventory data that are available for Nevada (2008) are set forth in Table 3.2-2.

Table 3.2-2: Annual Baseline (2008) Criteria and Precursor Air Pollutant Emissions for Nevada

Geographic Area	Criteria and Precursor Air Pollutant Emissions in Tons/Year[1]					
	CO	NO_x	VOC	SO_x	PM_{10}	$PM_{2.5}$
Nevada	501,162	83,932	92,293	16,813	179,409	25,208

Notes: CO = carbon monoxide, NO_x = nitrogen oxides, SO_x = sulfur oxides, PM_{10} = suspended particulate matter less than or equal to 10 micrometers in diameter, $PM_{2.5}$ = fine particulate matter less than or equal to 2.5 micrometers in diameter, VOC = volatile organic compounds.
Source: U.S. Environmental Protection Agency 2008

As noted, Nevada's rural counties are in attainment of the NAAQS. Included within this status is attainment of the NAAQS for particulate matter, of which fugitive dust can be a contributor. On April 5, 2005, the U.S. Environmental Protection Agency designated all areas within Nevada's 15 Rural Counties as attainment/unclassifiable[1] for the 1997 24-hour and annual $PM_{2.5}$ NAAQS (Nevada Division of Environmental Protection 2011). On 13 December 2009, the U.S. Environmental Protection Agency designated all areas within Nevada's 15 Rural Counties as attainment/unclassifiable for the revised 2006 24-hour $PM_{2.5}$ NAAQS. On November 15, 1990, the U.S. Environmental Protection Agency designated all areas within Nevada's 15 Rural Counties as unclassifiable for PM_{10}.

3.2.2.2 Existing Air Pollutant Emissions

U.S. Department of the Navy (Navy) training-related air pollutant emissions within the FRTC Study Area primarily originate from mobile sources, with the main source being fixed-wing aircraft overflights in the SUA. Other minor sources include helicopters; unmanned aerial systems; military ground vehicles; ordnance; emergency generators; heating, ventilation, and air conditioning units; and burning. Naval Air

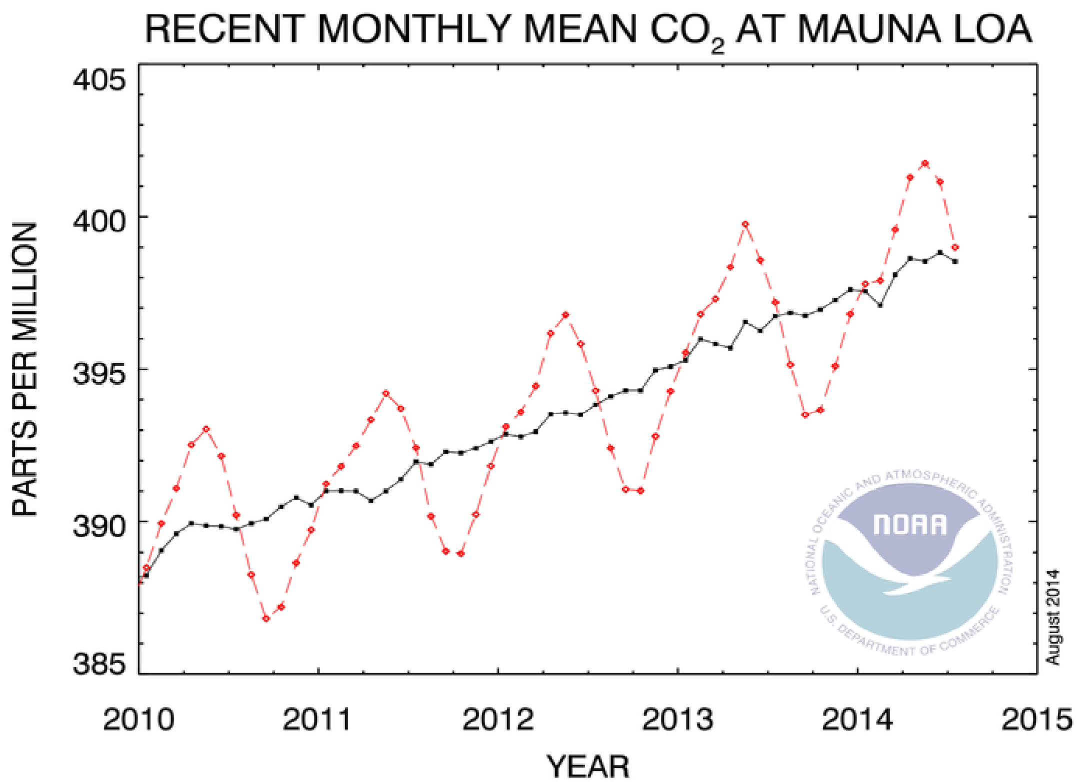
[1] Unclassifiable means any area that cannot be classified on the basis of available information as meeting or not meeting the national primary or secondary ambient air quality standard for the pollutant.

Station (NAS) Fallon has 11 different burn variances from Nevada Bureau of Air Pollution Control, four of which are applicable to FRTC. These allow burning for activities such as weed management, fire training, training exercises, and disposal of materials such as wood and cardboard (associated with training). The state must be notified of any burning 24 hours in advance. On lands designated as Navy-owned, NAS Fallon ensures sound fire management practices and incorporates such practices in a Fire Management Plan specific to these lands. Additionally, there is a Cooperative Fire Protection Agreement between NAS Fallon and Bureau of Land Management (BLM) in Carson City. Existing air pollutant emissions are addressed in more detail in Section 3.2.3 (Environmental Consequences) under the No Action Alternative.

3.2.2.3 Climate Change

Climate change refers to any significant change in the measures of climate lasting for an extended period of time. In other words, climate change includes major changes in temperature, precipitation, or wind patterns, among other effects, that occur over several decades or longer. Global warming refers to the recent and ongoing rise in global average temperature near Earth's surface. Global warming causes climate patterns to change. However, global warming itself represents only one aspect of climate change (U.S. Environmental Protection Agency 2014). Global surface temperatures have increased by an average of about 1.3 degrees Fahrenheit during the last century (Solomon et al. 2007). Global warming and climate change have been attributed to many factors, including increasing atmospheric concentrations of carbon dioxide (CO_2), NO_2, methane, and other greenhouse gases. Figure 3.2-2 illustrates the global increase in CO_2 concentration from 2009 to 2014 (Department of Commerce 2014). Most of the observed temperature increase since the mid-20th century is correlated with increasing amounts of greenhouse gases emitted by human activities such as combustion of fossil fuels and deforestation (Solomon et al. 2007).

The greenhouse gas effect is the process by which certain gases in the atmosphere allow shortwave radiation from the sun in but also keep longwave radiation from the earth from escaping, which then warms the planet’s lower atmosphere and surface. The existence of the greenhouse effect is not disputed. The issues and interrelationship between these issues that are not clearly defined include how the strength of the greenhouse effect changes with different concentrations of greenhouse gases, the relationships among natural sources and sinks of greenhouse gases, human sources of greenhouse gases, and atmospheric concentrations of greenhouse gases. Climate processes are understood at a general level, and more research is needed before impacts may be clearly defined.



Notes: The dashed red line with diamond symbols represents the monthly mean values, centered on the middle of each month. The black line with the square symbols represents the same, after correction for the average seasonal cycle.
Source: Department of Commerce 2014

Figure 3.2-2: Recent Carbon Dioxide Global Trend

CO_2 is the major greenhouse gas emitted by human activities, primarily from the combustion of fossil fuels such as coal, oil, and natural gas. Atmospheric concentrations of CO_2 have increased by 41 percent since the mid-1700s (U.S. Environmental Protection Agency 2013). This level is much higher than at any time during the last 650,000 years (Canadell et al. 2007). Less direct geological evidence indicates that CO_2 values this high were last seen about 20 million years ago (Pearson and Palmer 2000). The burning of fossil fuel has produced about 75 percent of the increase in CO_2 from human activity over the past 20 years. The potential effects of proposed greenhouse gas emissions are by nature global and may result in cumulative impacts, as individual sources of greenhouse gas emissions are not large enough to have any noticeable effect on climate change. Therefore, the impact of proposed greenhouse gas emissions to climate change is discussed in the context of cumulative impacts in Chapter 4 (Cumulative Impacts).

3.2.3 Environmental Consequences

This section evaluates how and to what degree the activities described in Chapter 2 (Description of Proposed Action and Alternatives) could impact air quality within the Study Area. The analysis focuses on potential impacts and overall changes as they relate to air quality associated with implementation of all current and proposed military readiness activities. Table 2-4 presents the baseline and proposed training activities for each alternative. Each stressor is introduced and analyzed by alternative.

Table 3.0-1 shows the warfare areas and associated stressors that were considered for analysis. The stressors vary in intensity, frequency, duration, and location within the Study Area. The following primary stressors are applicable to air quality in the Study Area and are analyzed:

- Air Pollutant Emissions (criteria air pollutants, hazardous air pollutants, and fugitive dust).

The Navy maintains its equipment in top working order so they can train safely and effectively. Well-maintained equipment tends to have lower emissions than poorly maintained equipment. Equipment would be operated intermittently over a large area and would produce regionally insignificant amounts of criteria pollutants and hazardous air pollutants. Additionally, military ground vehicles (e.g., pickup trucks, all-terrain vehicles, Humvees, and mine-resistant ambush-protected vehicles) and ordnance used during training would result in low levels of emissions of criteria pollutants, hazardous air pollutants, and fugitive dust, and would occur over a widely dispersed area.

The main sources of emissions are aircraft; these emissions are quantitatively analyzed in Appendix D (Air Quality Summaries). Given their minor emissions contribution in the attainment area, vehicular mobile emission sources and ordnance emissions are evaluated qualitatively in this EIS. Air station personnel work commutes and transits to and from the air station and ranges are not included in this training EIS. Commutes and transits, along with airfield operations (including flight operations, maintenance runups, construction and equipment emissions, and vehicular emissions) were separately evaluated in the Final Environmental Assessment for Airfield Operations at Naval Air Station Fallon, Nevada (U.S. Department of the Navy 2013). NAS Fallon currently holds a Class II Air Quality Operating Permit. A Class II Permit is for "minor" sources that emit less than 100 tons per year of any regulated pollutant, less than 25 tons per year total hazardous air pollutants, and less than 10 tons per year of any one hazardous air pollutant. NAS Fallon emissions are not part of the Proposed Action, but are considered in Chapter 4 (Cumulative Impacts).

Electronic warfare countermeasures generate emissions of chaff, a form of particulate not regulated under the federal Clean Air Act as a criteria air pollutant. Virtually all radio frequency chaff is 10 to 100 times larger than particulate matter under PM_{10} and $PM_{2.5}$ (Spargo et al. 1999). The types of training that produce chaff emissions (e.g., combat search and rescue activities) may take place throughout the Study Area SUA. The air quality impacts of chaff were evaluated by the Air Force in *Environmental Effects of Self-Protection Chaff and Flares* (U.S. Air Force 1997). The study concluded that most chaff fibers maintain their integrity after ejection. Although some fibers are likely to fracture during ejection, it appears this fracturing does not release particulate matter. Tests indicate that the explosive charge in the impulse cartridge results in minimal releases of particulate matter. A later study at Naval Air Station Fallon found that the release of 50,000 cartridges of chaff per year over 10,000 square miles would result in an annual average PM_{10} or $PM_{2.5}$ concentration of 0.018 $\mu g/m^3$. This was far below the then-national ambient air quality standard of 50 $\mu g/m^3$ for PM_{10} and 15 $\mu g/m^3$ for $PM_{2.5}$ (Agency for Toxic Substances and Disease Registry 2003).[2] Therefore, chaff is not further evaluated as an air quality stressor in this EIS. Potential impacts of chaff expenditure on the FRTC Study Area environment are further assessed in Section 3.1 (Soils) and Section 3.3 (Water Quality).

[2] The current standard for PM_{10} is 150 $\mu g/m^3$ over a 24-hour average time (see Table 3.2-1).

3.2.3.1 No Action Alternative

3.2.3.1.1 Air Pollutant Emissions

Criteria Pollutants

Table 3.2-3 lists criteria air pollutant and precursor emissions in the FRTC Study Area from the No Action Alternative. Emissions are totaled for each major source component (i.e., fixed-wing aircraft, rotary aircraft, and unmanned aircraft systems). Aircraft emissions were calculated for all flight activities below the default mixing height (3,000 ft. AGL [914 m]). The data for percentage of flight time spent above 3,000 ft. AGL [914 m] is contained in Table 2-6. The air pollutants emitted in the greatest quantity are NO_x, PM_{10}, $PM_{2.5}$, and CO, with fixed-wing aircraft contributing the largest amounts. All emissions calculations are provided in Appendix D (Air Quality Summaries).

Table 3.2-3: Annual Criteria and Precursor Air Pollutant Emissions for Training under the No Action Alternative

Emissions Source	Criteria and Precursor Air Pollutant Emissions in Tons/Year					
	CO	NO_x	VOC	SO_x	PM_{10}	$PM_{2.5}$
Fixed-Wing Aircraft	60	483	7	69	220	220
Rotary Aircraft	8	8	1	3	5	5
Unmanned Aircraft Systems	< 1	< 1	< 1	< 1	< 1	< 1
Total All Sources =	**68**	**492**	**8**	**72**	**225**	**225**
No Action Alternative emissions as a percentage of Nevada emissions baseline (2008)	0.01%	0.59%	0.01%	0.43%	0.13%	0.89%

Notes: (1) CO = carbon monoxide, NO_x = nitrogen oxides, PM_{10} = suspended particulate matter less than or equal to 10 micrometers in diameter, $PM_{2.5}$ = fine particulate matter less than or equal to 2.5 micrometers in diameter, SO_x = sulfur oxides, VOC = volatile organic compounds
(2) Includes estimated criteria and precursor air pollutant emissions for all flight activities below the default mixing height (3,000 ft AGL [914 m]).

Other sources of criteria pollutant emissions under the No Action Alternative include those emanating from ground vehicles and munitions detonation. Vehicle use during range activities is very limited in comparison to aircraft use, and therefore aircraft emissions are considered representative of overall training-related emissions. Based on the nature of the detonation process and the very low emission rates that have been published (AP 42, Chapter 15) in studies of munitions firing and open detonations, emission quantities from munitions use are very small. Criteria pollutant emissions associated with munitions use pose very little risk of creating adverse air quality impacts.

Under the No Action Alternative, training activities and associated criteria air pollutant emissions would not change. Air quality in air quality control regions would not change as a result of the No Action Alternative and would still be generally characterized as good. Most aircraft flight training activities across the FRTC Study Area SUA would continue to occur above the mixing layer (average of 3,000 ft. AGL [914 m]). All fixed-wing aircraft training activities (i.e., air combat maneuvers) occurring in the Reno MOA would be conducted above the mixing layer and therefore would have no impact on ground level air quality in the Northwest Nevada Intrastate Air Quality Control Region.

Criteria air pollutant emissions associated with training activities would have a negligible effect on air quality under the No Action Alternative because changes to air quality would not be detectable and would be below or within historical or desired air quality conditions. Criteria air pollutant emissions associated with the No Action Alternative would have no significant impact on air quality.

Hazardous Air Pollutants

The U.S. Environmental Protection Agency has listed 188 hazardous air pollutants regulated under Title III (Hazardous Air Pollutants), Section 112(g) of the Clean Air Act. Hazardous air pollutants are emitted by processes associated with the No Action Alternative, including fuel combustion. Trace amounts of hazardous air pollutants are emitted by combustion sources participating in training activities, including aircraft, ordnance, and military vehicles and equipment. The amounts of hazardous air pollutants emitted are small compared to the emissions of criteria pollutants; emission factors for most hazardous air pollutants from combustion sources are roughly three or more orders of magnitude lower than emission factors for criteria pollutants (California Air Resources Board 2007). Emissions of hazardous air pollutants from munitions use are smaller still, with emission factors ranging from roughly 10^{-5} to 10^{-15} pounds of individual hazardous air pollutants per item for cartridges, to 10^{-4} to 10^{-13} pounds of individual hazardous air pollutants per item for mines and smoke canisters (U.S. Environmental Protection Agency 2009). As examples, 10^{-5} is equivalent to 0.0001, and 10^{-15} is equivalent to 0.00000000000001. Hazardous air pollutant emissions estimates were not calculated because of the small amounts that would be emitted.

Under the No Action Alternative, training activities and associated hazardous air pollutant emissions would not change. Hazardous air pollutants emissions would be intermittent and distributed over the entire FRTC Study Area. Their concentrations would be further reduced by atmospheric mixing and other dispersion processes. After initial mixing, it is unlikely that the No Action Alternative would result in detectable concentrations of hazardous air pollutants. The effects of hazardous air pollutant emissions under the No Action Alternative would be negligible and there would be no significant impacts on air quality.

Fugitive Dust

Ground-based training activities (e.g., convoy operations, tactical ground mobility operations, and ground maneuver tactics training) would be limited under the No Action Alternative, and generation of fugitive dust would be negligible. Past Navy actions (addition of gravel on certain training land trails) has minimized the generation of fugitive dust. Existing conditions have not led to any known violations of state or federal ambient air quality standards. Fugitive dust from training activities would have no significant impact on air quality under the No Action Alternative.

3.2.3.2 Alternative 1

3.2.3.2.1 Air Pollutant Emissions

Criteria Pollutants

Table 3.2-4 lists criteria air pollutant and precursor emissions in the FRTC Study Area from Alternative 1. Emissions are totaled for each major source component (i.e., fixed-wing aircraft, rotary aircraft, and unmanned aircraft systems). Aircraft emissions were calculated for all flight activities below the default mixing height (3,000 ft. AGL [914 m]). The data for percentage of flight time spent above 3,000 ft. AGL [914 m] is contained in Table 2-6. The air pollutants emitted in the greatest quantity are NO_x, PM_{10}, $PM_{2.5}$, and CO, with fixed-wing aircraft contributing the largest amounts. All emissions calculations are provided in Appendix D (Air Quality Summaries).

Table 3.2-4: Annual Criteria and Precursor Air Pollutant Emissions for Training under Alternative 1 Compared to the No Action Alternative

Emissions Source	Criteria and Precursor Air Pollutant Emissions in Tons/Year					
	CO	NO_x	VOC	SO_x	PM_{10}	$PM_{2.5}$
Alternative 1						
Fixed-Wing Aircraft	87	539	7	74	167	167
Rotary Aircraft	8	9	1	3	6	6
Unmanned Aircraft Systems	< 1	< 1	< 1	< 1	< 1	< 1
Alternative 1 Total =	**95**	**548**	**8**	**77**	**172**	**172**
No Action Alternative						
Fixed-Wing Aircraft	60	483	7	69	220	220
Rotary Aircraft	8	8	1	3	5	5
Unmanned Aircraft Systems	< 1	< 1	< 1	< 1	< 1	< 1
No Action Alternative Total =	**68**	**492**	**8**	**72**	**225**	**225**
Summary and Comparison						
Change in emissions from No Action Alternative	28	56	1	5	-53	-53
Alternative 1 emissions as a percentage of Nevada emissions baseline (2008)	0.02%	0.65%	0.01%	0.46%	0.10%	0.68%

Notes: CO = carbon monoxide, NO_x = nitrogen oxides, PM_{10} = suspended particulate matter less than or equal to 10 micrometers in diameter, $PM_{2.5}$ = fine particulate matter less than or equal to 2.5 micrometers in diameter, SO_x = sulfur oxides, VOC = volatile organic compounds

Includes estimated criteria and precursor air pollutant emissions for all flight activities below the default mixing height (3,000 ft AGL [914 m]).

Values may not sum exactly to total because of rounding.

Some criteria and precursor pollutant emissions would increase under Alternative 1 compared to the No Action Alternative. Increases would be attributable to the increased fixed-wing aircraft use (from 41,615 sorties to 44,321 sorties per year). However, due to the anticipated changing mix of aircraft under the Proposed Action, particulate matter emissions would decrease under Alternative 1 compared to the No Action Alternative. The largest increase in criteria pollutant emissions is predicted for NO_x, which is an O_3 precursor that would increase by 56 tons per year. Carbon monoxide emissions are estimated to increase by 28 tons per year under Alternative 1. Other criteria and precursor air pollutant emissions are estimated to either remain nearly constant with existing conditions, or decrease under Alternative 1. Under Alternative 1, FRTC training-related criteria and precursor air pollutant emissions would represent a minor percentage of overall state emissions (less than 0.7 percent for each pollutant), similar in scale to those of the No Action Alternative.

Other sources of criteria pollutant emissions, including those emanating from ground vehicles and munitions detonation, would also increase under the Alternative 1. Vehicle use during range activities is very limited in comparison to aircraft use, and therefore aircraft emissions are considered representative of overall training-related emissions. Based on the very low emission rates, emission quantities from munitions use are very small. Criteria pollutant emissions associated with munitions use pose very little risk of creating adverse air quality impacts under Alternative 1.

As with the No Action Alternative, most aircraft operations under Alternative 1 would be conducted above the average mixing layer of 3,000 ft. (914.4 m) AGL, thus minimizing impacts to local air quality. All fixed-wing aircraft training activities (i.e., air combat maneuvers) occurring in the Reno MOA would be conducted above the mixing layer and therefore would have no impact on ground level air quality in the Northwest Nevada Intrastate Air Quality Control Region. Criteria air pollutant emissions associated with Alternative 1 would have no significant impact on air quality.

Hazardous Air Pollutants

As discussed for the No Action Alternative, hazardous air pollutants are emitted by processes associated with Alternative 1, including fuel combustion. Trace amounts of hazardous air pollutants are emitted by combustion sources participating in training activities, including aircraft, ordnance, and military vehicles and equipment. Hazardous pollutant emissions would increase under Alternative 1, and the increases would be roughly proportional to the increases observed for the criteria air pollutants emitted (see Table 3.2-4).

Hazardous air pollutants emissions would continue to be intermittent and distributed over the entire FRTC Study Area. Their concentrations would be further reduced by atmospheric mixing and other dispersion processes. After initial mixing, it is possible that hazardous pollutants would be measurable, but they would be in very low concentrations and would not affect the air quality in the air quality control regions. The effects of hazardous air pollutant emissions from training activities under Alternative 1 would be long term and localized. There would be no significant impact on air quality.

Fugitive Dust

The potential for fugitive dust to be generated would rise slightly under Alternative 1 in comparison to the No Action Alternative. Under Alternative 1, most range activities would involve no additional ground-based activities (i.e., convoy operations, tactical ground mobility operations, and ground maneuver tactics training) (see Table 2-4). However, ground Light Amplification by Stimulated Emission of Radiation (LASER) targeting would increase under Alternative 1 in comparison to the No Action Alternative. During ground LASER targeting training, fugitive dust is likely to be generated by ground-based military equipment in the Dixie Valley Training Area, Shoal Site, B-16, B-17, and B-19. Fugitive dust emissions ($PM_{2.5}$ and PM_{10}) during ground LASER targeting are expected to be localized and temporary (short-term). No sensitive receptors are located in proximity to areas of localized impacts. Ground-based training activities would be limited under Alternative 1, and generation of fugitive dust would be negligible. Fugitive dust from training activities would have no significant impact on air quality under Alternative 1.

3.2.3.3 Alternative 2 (Preferred Alternative)

3.2.3.3.1 Air Pollutant Emissions

Criteria Pollutants

Table 3.2-5 lists criteria air pollutant and precursor emissions in the FRTC Study Area from Alternative 2. Emissions are totaled for each major source component (i.e., fixed-wing aircraft, rotary aircraft, and unmanned aircraft systems). Aircraft emissions were calculated for all flight activities below the default mixing height (3,000 ft. AGL [914 m]). The data for percentage of flight time spent above 3,000 ft. AGL [914 m] is contained in Table 2-6. The air pollutants emitted in the greatest quantity are NO_x, PM_{10}, $PM_{2.5}$, and CO, with fixed-wing aircraft contributing the largest amounts. All emissions calculations are provided in Appendix D (Air Quality Summaries).

Some criteria and precursor pollutant emissions would increase under Alternative 2 compared to the No Action Alternative. The increases would be attributable to the increased fixed-wing aircraft use (from 41,615 sorties to 48,752 sorties per year). However, due to the anticipated changing mix of aircraft under the Proposed Action, particulate matter emissions would decrease under Alternative 2 compared to the No Action Alternative. The largest increase in criteria pollutant emissions is predicted for NO_x, which is an O_3 precursor that would increase by 111 tons per year. Carbon monoxide emissions are estimated to increase by 37 tons per year under Alternative 2. Other criteria and precursor air pollutant emissions are estimated to either remain nearly constant with existing conditions, or decrease under Alternative 1. Under Alternative 2, FRTC training-related criteria and precursor air pollutant emissions would represent a minor percentage of overall state emissions (less than 0.8 percent for each pollutant), similar in scale to those of the No Action Alternative.

Other sources of criteria pollutant emissions, including those emanating from ground vehicles and munitions detonation, would also increase under the Alternative 2. Vehicle use during range activities is very limited in comparison to aircraft use, and therefore aircraft emissions are considered representative of overall training-related emissions. Based on the very low emission rates, emission quantities from munitions use are very small. Criteria pollutant emissions associated with munitions use pose very little risk of creating adverse air quality impacts under Alternative 2.

As with the No Action Alternative, most aircraft operations under Alternative 2 would be conducted above the average mixing layer of 3,000 ft. (914.4 m) AGL, thus minimizing impacts to local air quality. All fixed-wing aircraft training activities (i.e., air combat maneuvers) occurring in the Reno MOA would be conducted above the mixing layer and therefore would have no impact on ground level air quality in the Northwest Nevada Intrastate Air Quality Control Region. Criteria air pollutant emissions associated with Alternative 2 would have no significant impact on air quality.

Table 3.2-5: Annual Criteria and Precursor Air Pollutant Emissions for Training under Alternative 2 Compared to the No Action Alternative

Emissions Source	Criteria and Precursor Air Pollutant Emissions in Tons/Year					
	CO	NO_x	VOC	SO_x	PM_{10}	$PM_{2.5}$
Alternative 2						
Fixed-Wing Aircraft	95	593	8	82	184	184
Rotary Aircraft	9	10	1	3	6	6
Unmanned Aircraft Systems	< 1	< 1	< 1	< 1	< 1	< 1
Alternative 2 Total =	**105**	**603**	**9**	**85**	**190**	**190**
No Action Alternative						
Fixed-Wing Aircraft	60	483	7	69	220	220
Rotary Aircraft	8	8	1	3	5	5
Unmanned Aircraft Systems	< 1	< 1	< 1	< 1	< 1	< 1
No Action Alternative Total =	**68**	**492**	**8**	**72**	**225**	**225**
Summary and Comparison						
Change in emissions from No Action Alternative	37	111	1	13	-35	-35
Alternative 2 emissions as a percentage of Nevada emissions baseline (2008)	0.02%	0.72%	0.01%	0.50%	0.11%	0.75%

Notes: (1) CO = carbon monoxide, NO_x = nitrogen oxides, PM_{10} = suspended particulate matter less than or equal to 10 micrometers in diameter, $PM_{2.5}$ = fine particulate matter less than or equal to 2.5 micrometers in diameter, SO_x = sulfur oxides, VOC = volatile organic compounds
(2) Includes estimated criteria and precursor air pollutant emissions for all flight activities below the default mixing height (3,000 ft AGL [914 m]).
Values may not sum exactly to total because of rounding.

Hazardous Air Pollutants

As discussed for criteria pollutants, the emissions of hazardous air pollutants under Alternative 2 would increase compared to the No Action Alternative. Hazardous air pollutant emissions would continue to be intermittent and distributed over the entire FRTC Study Area. Their concentrations would be further reduced by atmospheric mixing and other dispersion processes. After initial mixing, it is possible that hazardous pollutants would be measurable, but they would be in very low concentrations and would not affect the air quality in the Nevada air quality control regions. The effects of hazardous air pollutant emissions from training activities under Alternative 2 would be long term and localized. There would be no significant impact on air quality.

Fugitive Dust

The potential for fugitive dust to be generated under Alternative 2 would increase in comparison to the No Action Alternative. Under Alternative 2, additional ground-based activities (e.g., convoy operations [increase of three activities], tactical ground mobility operations [increase of one activity], and ground LASER targeting [increase of 416 activities]) would take place (see Table 2-4). During ground LASER targeting training, fugitive dust is likely to be generated by ground-based military equipment in the Dixie Valley Training Area, Shoal Site, B-16, B-17 and B-19. Fugitive dust emissions ($PM_{2.5}$ and PM_{10}) during ground LASER targeting are expected to be localized and temporary (short-term). No sensitive receptors are located in proximity to areas of localized impacts. Ground-based activities may use all-terrain vehicles, pickup trucks, high-mobility multipurpose wheeled vehicles, and mine-resistant ambush-protected vehicles. Operation of military vehicles on range would generate dust during dry conditions, which would be minimized by adhering to standard operating procedures such as operating on existing roads and two-track trails. Conditions could be evaluated before starting a training event, and water or another dust palliative product could be used to minimize dust, if warranted. Following standard operating procedures and, where warranted, implementing best management practices would ensure that fugitive dust does not result in significant impacts on air quality. Fugitive dust from training activities would have no significant impact on air quality under Alternative 2.

3.2.3.4 Proposed Management Practices, Monitoring, and Mitigation Measures

3.2.3.4.1 Proposed Best Management Practices

The Navy proposes the following best management practices to avoid and minimize impacts to air quality under Alternative 2:

- When warranted, water or another dust palliative product would be used as necessary to minimize generation and downwind migration of fugitive dust, especially on dry, windy days.
- Generation of dust would be minimized by adhering to standard operating procedures to operate vehicles on existing roads and two-track trails (unless otherwise noted in standard operating procedures or in the event of emergency).
- Vehicles participating in training exercises that occur on unpaved surfaces would minimize fugitive dust generation by traveling at slow speeds.
- Aircraft, ground vehicles, and military equipment would be maintained in accordance with engine manufacturer specifications to optimize efficiency and limit emissions.

3.2.3.4.2 Proposed Monitoring

No specific monitoring needs were identified for air quality.

3.2.3.4.3 Proposed Mitigation Measures

No mitigation measures are warranted for air quality based on the analysis presented in Section 3.2.3 (Environmental Consequences) and implementation of existing best management practices.

3.2.3.5 Summary of Effects and Conclusions

Table 3.2-6 lists each stressor analyzed for potential impacts to air quality within the FRTC Study Area. None of the alternatives would result in significant impacts to air quality.

Table 3.2-6: Summary of Impacts on Air Quality

Stressor	Summary of Effects and National Environmental Policy Act Impact Determination
No Action Alternative	
Criteria Air Pollutant Emissions	Negligible. Changes to air quality would not be detectable and would be below or within historical or desired air quality conditions.
Hazardous Air Pollutant Emissions	Negligible. Changes to air quality would not be detectable and would be below or within historical or desired air quality conditions.
Fugitive Dust Emissions	Negligible. Changes to air quality would not be detectable and would be below or within historical or desired air quality conditions.
Impact Conclusion	The No Action Alternative would not result in significant impacts on air quality.
Alternative 1	
Criteria Air Pollutant Emissions	Small increase relative to baseline Nevada emissions. Measurable changes in air quality would be expected locally, but the attainment status in the Northwest Nevada Intrastate Air Quality Control Region and Nevada Intrastate Air Quality Control Region would not be affected.
Hazardous Air Pollutant Emissions	Small increase relative to baseline Nevada emissions. Measurable changes in air quality would be expected locally, but the attainment status in the Northwest Nevada Intrastate Air Quality Control Region and Nevada Intrastate Air Quality Control Region would not be affected.
Fugitive Dust Emissions	Best management practices would minimize dust.
Impact Conclusion	Alternative 1 would not result in significant impacts on air quality.
Alternative 2	
Criteria Air Pollutant Emissions	Small increase relative to baseline Nevada emissions. Measurable changes in air quality would be expected locally, but the attainment status in the Northwest Nevada Intrastate Air Quality Control Region and Nevada Intrastate Air Quality Control Region would not be affected.
Hazardous Air Pollutant Emissions	Small increase relative to baseline Nevada emissions. Measurable changes in air quality would be expected locally, but the attainment status in the Northwest Nevada Intrastate Air Quality Control Region and Nevada Intrastate Air Quality Control Region would not be affected.
Fugitive Dust Emissions	Best management practices would minimize dust.
Impact Conclusion	Alternative 2 would not result in significant impacts on air quality.

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