3.1 Air Quality

3.1 AIR QUALITY

3.1.1 Affected Environment

For purposes of this Environmental Impact Statement/Overseas Environmental Impact Statement (EIS/OEIS), the Region of Influence (ROI) for air quality includes the Gulf of Alaska (GOA) Temporary Maritime Activities Area (TMAA). Areas inland from the coastline, including United States (U.S.) Air Force (Air Force) air ranges and U.S. Army (Army) training lands, are addressed in the *Alaska Military Operations Areas EIS* (USAF 1995), *Improvements to Military Training Routes in Alaska Environmental Assessment* (USAF 2007), *Alaska Army Lands Withdrawal Renewal Final Legislative EIS* (Army 1999), and the *Transformation of U.S. Army Alaska Final EIS* (Army 2004).

3.1.1.1 Existing Conditions

Climate

The GOA has a typical maritime climate, being somewhat warmer than adjacent land areas in winter and somewhat cooler than these land areas in summer. The GOA is exposed to storms off the North Pacific Ocean. Consequently, it frequently experiences high winds and precipitation. Coastal southeastern Alaska adjoining the GOA is typically cool and cloudy, with frequent heavy precipitation. Even during the winter, most of the precipitation there falls as rain. The warmest weather is in June, July, and August. The driest months occur from May through August (Naval Research Laboratory 1993).

Winds in the central GOA are primarily from the east or northeast, due to the interaction of the Pacific High with the GOA Low. Wind speeds often exceed 50 miles (mi) per hour (80 kilometers [km] per hour) except during the summer, when winds are relatively calm. Along the coast, this general circulation pattern may be altered locally by downslope surface winds following major river valleys that empty into the GOA, or by winds blowing through gaps in the ranges of mountains that border the GOA.

The GOA is very cloudy throughout the year. During summer, more than 90 percent of observations indicate substantial (5/8 or more) low cloud cover. Cloud bases are normally higher in summer than in other seasons, with cloud tops extending to very high altitudes (Naval Research Laboratory 1993). Visibility in the central GOA is generally low throughout the year, with ceilings of less than 300 feet and visibility less than 1.0 nm occurring about one-third of the time (Naval Research Laboratory 1993).

The continental climate in Alaska's interior, where Air Force air ranges and Army land ranges are located, is characterized by long, very cold winters and short, warm summers. The mean annual temperature in Fairbanks, for example, is 28 degrees Fahrenheit (°F) (-2 degrees Celsius [°C]). Daytime summer temperatures in the interior of Alaska are relatively high, in large part due to the long days, and rain showers are common. Most of southern Alaska, such as the Anchorage metropolitan area, has a climate intermediate between the continental climate of the interior and the maritime climate along the coast.

Regional Emissions

No stationary sources of air pollutant emissions exist within the GOA. Unknown quantities of air pollutants are emitted by commercial and recreational vessels operating in the GOA. Given the low population density of coastal areas in southeastern Alaska and prevailing wind directions, air pollutants generated in adjacent land areas likely have little or no effect on air quality in the GOA.

In mainland Alaska, the Anchorage, Fairbanks, and Juneau urban areas are large area sources of air pollutants, but these pollutants readily disperse during warm weather. In winter, when ground-based inversions are common, air pollutants from urban sources such as wood-burning stoves and automobiles

become concentrated near the ground, where their concentrations may exceed health-based air quality standards. In rural areas, mining, oil extraction and refining, timber harvesting and processing, and other extractive industries are major point sources of air pollutants, as are large wildfires.

Existing Air Quality

The temporary boundaries of the TMAA form a rough rectangle oriented from northwest to southeast, approximately 300 nautical miles (nm) (556 km) long by 150 nm (278 km) wide, situated south of Prince William Sound and east of Kodiak Island. The TMAA is 42,146 square nautical miles (nm^2) (144,556 square kilometers [km^2]) in area.

With the exception of Cape Cleare on Montague Island, located over 12 nm (22 km) from the northern edge of the TMAA, the nearest shoreline (Kenai Peninsula) is located approximately 24 nm (44 km) north of the TMAA's northern boundary. The approximate middle of the TMAA is located 140 nm (259 km) offshore. Therefore, air quality in the TMAA is not monitored. However, the GOA is well ventilated by air masses moving in from the North Pacific Ocean. There are no substantial sources of air pollutants in the GOA, and the frequent precipitation probably scavenges from the air any particulates or other pollutants that might be present. Therefore, the air quality in the GOA is expected to be very good.

Alaskan lands in the study area also should have generally good air quality because there are few industries or urban areas to generate criteria air pollutants. The State is divided into the Cook Inlet, North Alaska, South-Central Alaska, and Southeastern Alaska Intrastate Air Quality Control Regions (40 Code of Federal Regulations [C.F.R.], Part 81). The only portions of the State where air quality is regularly monitored, however, are the three major urban areas– Fairbanks, Anchorage, and Juneau. Monitoring data indicate that the two air pollutants of major concern in Alaska are carbon monoxide (CO) and particulate matter (PM).

In accordance with the federal Clean Air Act (CAA), the State of Alaska has adopted (and the U.S. Environmental Protection Agency [USEPA] has generally approved) a State Implementation Plan (SIP) with provisions to maintain the air quality in attainment areas and to improve the air quality in nonattainment areas. The SIP, however, does not extend to portions of the State designated as Indian Country under federal law (18 United States Code [U.S.C.] 1151); these areas are administered directly by USEPA.

Air quality regions that do not meet the National Ambient Air Quality Standards (NAAQS) for a specific criteria air pollutant are designated as nonattainment areas under the CAA. Anchorage and Fairbanks were designated as nonattainment areas for CO in 1990, but in 2004 were redesignated as CO maintenance areas (Alaska Department of Environmental Conservation [ADEC] 2007). Eagle River, near Anchorage, and Juneau are designated as nonattainment areas for particulates under 10 microns (μm) (PM_{10}), but are in the process of being redesignated as maintenance areas for PM_{10} (ADEC 2009). Concentrations of fine particulates continue to be a concern in developed areas of the State (see below). All other portions of the State are in attainment of the NAAQS, or unclassifiable due to an absence of monitoring data.

USEPA recently updated the NAAQS for PM. USEPA retained the current 24-hour PM_{10} standard of 150 micrograms (μg)/cubic meter (m^3) and eliminated the annual PM_{10} standard. USEPA increased the stringency of the standard for particulates under 2.5 μm ($PM_{2.5}$) by lowering the previous 24-hour standard of 65 $\mu g/m^3$ to 35 $\mu g/m^3$. USEPA left the annual $PM_{2.5}$ standard of 15 $\mu g/m^3$ in place. Until USEPA revised the standard, Alaska had been in compliance with the $PM_{2.5}$ standard. Recent $PM_{2.5}$ monitoring shows Fairbanks North Star Borough (FNSB) exceeding the more stringent revised $PM_{2.5}$

standard. In October 2009, USEPA designated the FNSB as nonattainment for $PM_{2.5}$, with respect to the 24-hour averaging period (USEPA 2009). The Fort Wainwright Main Post is encompassed by the new boundaries of the FNSB $PM_{2.5}$ nonattainment area.

Sensitive Receptors

Air quality is an environmental concern primarily because it affects human health. A secondary concern is its potential effects on vegetation and wildlife. In addition, some air pollutants can damage structures, reduce visibility, or contribute to climate change. On the ocean ranges in the study area, the air pollutants generated by the Proposed Action would mostly affect marine biological resources. Crews of vessels and recreational users of the GOA could also be affected by air pollutants, but such individuals are expected to be few in number and the durations of substantial exposures to these pollutants very limited.

Climate Change

Global warming is the increase in the average temperature of the Earth's near-surface air and oceans since the mid-20th century. Global surface temperatures have increased by an average of about 0.74 °C or by about 1.3 °F during the last century (Intergovernmental Panel on Climate Change [IPCC] 2007). Climate change has been attributed to many factors, including increasing atmospheric concentrations of carbon dioxide (CO_2), nitrous oxide (N_2O), methane (CH_4), and other greenhouse gases (GHG). Most of the observed temperature increase since the mid-20th century is correlated with increasing concentrations of GHGs emitted by human activities, such as combustion of fossil fuels and deforestation (IPCC 2007).

The GHG effect is the process by which absorption and emission of radiation by gases in the atmosphere warm a planet's lower atmosphere and surface. GHGs are transparent to long-wave radiation from the sun; this radiation passes through the atmosphere with little absorption or reflection, and warms the earth's surface. GHGs trap short-wave (infrared) radiation emitted by the earth's surface, however, preventing it from dissipating into space and re-radiating it down to the surface of the earth. The existence of the greenhouse effect is not disputed. The issues are how the strength of the greenhouse effect changes with increases in the concentrations of GHGs in the atmosphere, and the relationships among natural sources and sinks of GHGs, human sources of GHGs, and atmospheric concentrations of GHGs.

CO_2 is the major GHG 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 36% since the mid-1700s (USEPA 2008). This level is much higher than at any time during the last 650,000 years (Neftel et al. 1985). 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.

GHG emissions for a proposed action can be inventoried, based on methods prescribed by state and federal agencies. However, the specific contributions of a particular project to global or regional climate change generally cannot be identified based on existing scientific knowledge, because individual projects typically have a negligible effect. Also, climate processes are understood at only a general level. Cumulative effects on climate change, including estimates of annual GHG emissions under the Preferred Alternative, are addressed in Chapter 4.

3.1.1.2 Current Requirements and Practices

Equipment used by military organizations within the GOA, including ships and other marine vessels, aircraft, and other equipment, are properly maintained in accordance with applicable Navy and Marine Corps requirements. Operating equipment meets federal and state emission standards, where applicable.

3.1.2 Environmental Consequences

As noted in Section 3.1.1, the ROI for air quality includes the TMAA. Navy training activities that occur within the Air Force inland Special Use Airspace and the Army inland training lands were evaluated under previous National Environmental Policy Act (NEPA) documentation (USAF 1995, USAF 2007, Army 1999, Army 2004). These documents are incorporated by reference. Environmental effects in the open ocean beyond the U.S. territorial seas (outside of 12 nm [22 km]) are analyzed in this EIS/OEIS pursuant to Executive Order (EO) 12114.

3.1.2.1 Previous Analyses

Impacts related to air quality were previously evaluated in Sections 3.9, 4.9, and Appendix K of the *Alaska Military Operations Areas EIS* (USAF 1995); Sections 3.2.4 and 4.0 of the *Improvements to Military Training Routes in Alaska Environmental Assessment* (USAF 2007); Sections 3.2, 3.15, 4.2, and 4.15 of the *Alaska Army Lands Withdrawal Renewal Final Legislative EIS* (Army 1999); and Sections 3.2 and 4.2 of the *Transformation of U.S. Army Alaska FEIS* (Army 2004).

3.1.2.2 Regulatory Framework

By regulation, air quality is defined primarily by the ambient air concentrations of seven major air pollutants determined by USEPA to substantially affect the health or welfare of the general public. These "criteria pollutants" are CO, sulfur dioxide (SO_2), nitrogen dioxide (NO_2), ozone (O_3), suspended particulate matter less than or equal to 10 μm in diameter (PM_{10}), fine particulate matter less than or equal to 2.5 μm in diameter ($PM_{2.5}$), and lead. USEPA calls these pollutants "criteria" air pollutants because it regulates them by developing human health or environmental criteria (science-based guidelines) for setting permissible levels.

Ambient air quality is defined by the atmospheric concentrations of criteria air pollutants and other selected chemical compounds at particular locations determined to be generally representative of local or regional conditions. Lower ambient concentrations of these air pollutants indicate higher air quality. Ambient air quality data are generally reported as a mass per unit volume (e.g., $\mu g/m^3$ of air) or as a volume fraction (e.g., parts per million [ppm] by volume). USEPA has established NAAQS for these pollutants (Table 3.1-1). Areas that exceed a NAAQS are designated as "nonattainment" for that pollutant, while areas that are in compliance with a NAAQS are in "attainment" for that pollutant.

USEPA typically delegates the regulation of air quality to local air quality management agencies. The CAA also allows states to establish air quality standards more stringent than the NAAQS. The GOA is located offshore of the State of Alaska in USEPA Region 10; some elements of the Proposed Action occur within the State. Statutory authority for air quality regulation in Alaska is delegated to the Air and Water Quality Division of ADEC. State of Alaska air quality standards generally correspond to federal primary standards. Additional Alaska standards include a 1-hour O_3 standard and an annual PM_{10} standard (Table 3.1-1).

Areas in which ambient air concentrations of a pollutant exceed a NAAQS are designated as "nonattainment" for that pollutant. Nonattainment areas for some criteria pollutants are further classified, depending upon the severity of their air quality problem, to facilitate their management:

- Ozone – marginal, moderate, serious, severe, and extreme;
- Carbon Monoxide – moderate and serious;
- Particulate Matter – moderate and serious.

Nonattainment areas are required to develop and execute plans, known as SIPs, that demonstrate how the area will meet the NAAQS. 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 ambient air quality levels measured at a particular location are determined by the interactions of pollutant emissions, chemical properties and reactions that occur in the atmosphere, and meteorology. Emission considerations include the types, amounts, and locations of pollutants emitted into the atmosphere. Chemical reactions can transform pollutant emissions into criteria pollutants. Meteorological considerations include wind and precipitation patterns affecting the distribution, dispersion, and removal of pollutant emissions.

Table 3.1-1: National and State of Alaska Ambient Air Quality Standards

Pollutant	Averaging Period	NAAQS		Alaska State Standard
		Primary	Secondary	
Ozone (O_3)	1-Hour		Same as Primary Standard	235 µg/m^3
	8-Hour	0.075 ppm (157 µg/m^3)		
Carbon Monoxide (CO)	8-Hour	9.0 ppm (10 milligrams (mg)/m^3)	None	10 mg/m^3
	1-Hour	35 ppm (40 mg/m^3)		40 mg/m^3
Nitrogen Dioxide (NO_2)	Annual Average	0.053 ppm (100 µg/m^3)	Same as Primary Standard	100 µg/m^3
Sulfur Dioxide (SO_2)	Annual Average	80 µg/m^3 (0.03 ppm)	-	80 µg/m^3 (0.03 ppm)
	24-Hour	365 µg/m^3 (0.14 ppm)	-	365 µg/m^3 (0.14 ppm)
	3-Hour	-	1,300 µg/m^3 (0.5 ppm)	1,300 µg/m^3 (0.5 ppm)
Suspended Particulate Matter (PM_{10})	24-Hour	150 µg/m^3	Same as Primary Standard	150 µg/m^3
	Annual Arithmetic Mean	-		50 µg/m^3
Fine Particulate Matter ($PM_{2.5}$)	24-Hour	35 µg/m^3	Same as Primary Standard	35 µg/m^3
	Annual Arithmetic Mean	15 µg/m^3		15 µg/m^3
Lead (Pb)	Calendar Quarter	1.5 µg/m^3	Same as Primary Standard	1.5 µg/m^3

The following notes apply.

NAAQS (other than O_3, particulate matter, and those based on annual averages or annual arithmetic mean) are not to be exceeded more than once a year. The O_3 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 99 percent of the daily concentrations, averaged over 3 years, are equal to or less than the standard. 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. There are both primary and secondary NAAQS:

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

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

Source: 40 C.F.R. Part 50; 18 Alaska Administrative Code, Section 50.010, Ambient Air Quality Standards.

Air pollutants or pollutant precursors are released into the atmosphere (emitted) by air pollutant sources. Pollutant emissions contribute to the ambient air concentrations of criteria pollutants, either by directly affecting the pollutants in the ambient air or by reacting in the atmosphere to form criteria pollutants. Pollutants such as CO, SO_2, lead, and some particulates that are released directly into the atmosphere by emission sources are primary pollutants. Criteria pollutants such as O_3, NO_2, and some particulates are secondary pollutants formed through atmospheric chemical reactions that are influenced by meteorology, ultraviolet light, and other atmospheric processes. Air pollutants that lead to formation of secondary pollutants are termed precursor pollutants.

For example, reactive organic gases (ROG) and oxides of nitrogen (NO_x) are precursors of O_3. In general, emissions of precursors are monitored and regulated to control the ambient levels of their associated criteria pollutants. PM_{10} and $PM_{2.5}$ are primary pollutants emitted by various mechanical processes (e.g., abrasion, erosion, mixing, or atomization) or combustion processes. PM_{10} and $PM_{2.5}$ also can be formed as secondary pollutants by chemical reactions or by condensation of gaseous pollutants into fine aerosols.

Noncriteria air pollutants that can affect human health are categorized as hazardous air pollutants (HAPs) under Section 112 of the CAA. USEPA has identified 188 HAPs. Examples of HAPs include benzene, which is found in gasoline; perchloroethylene, which is emitted from some dry cleaning facilities; and methylene chloride, which is used as a solvent and paint stripper in some industries. HAPs are regulated under the CAA's National Emission Standards for Hazardous Air Pollutants, which apply to specific sources of HAPs, and under the Urban Air Toxics Strategy, which applies to area sources.

3.1.2.3 Approach to Analysis

The air quality impact evaluation requires two separate analyses. Effects of air pollutants emitted by Navy training in the GOA in U.S. territorial seas (i.e., within 12 nm [22 km] of the coast) are assessed under NEPA. Environmental effects of air pollutants emitted by Navy training activities outside of U.S. territorial seas in the GOA (namely those that occur in the TMAA) are evaluated under EO 12114. Waters within 3 nm (5.6 km) of the State are within the jurisdiction of the ADEC; portions of the GOA that lie more than 3 nm (5.6 km) from the coastline are not in any State air quality jurisdiction.

For assessing health-based air quality effects under NEPA, all training activities where aircraft, missiles, or targets operate at or below 3,000 feet (ft) (914 meters [m]) above ground level (AGL) or that involve vessels in U.S. territorial seas were included in the emissions estimates. For assessing health-based air quality effects under EO 12114, only those training activities where aircraft, missiles, or targets operate at or below 3,000 ft (914 m) AGL or that involve vessels outside of U.S. territorial seas were considered in the evaluation. Emissions that do or would occur above 3,000 ft (914 m) AGL are considered to be above the atmospheric inversion layer and, therefore, have no effect on air quality at the earth's surface (USEPA 1995, USEPA 1992). Because the only elements of Navy training in the GOA that occur within 12 nm (22 km) of the coast are aircraft overflights above 3,000 ft (914 m) AGL, a detailed air quality analysis was prepared only for EO 12114 compliance. For assessing effects on global climate change, however, all emissions of GHG from aircraft and vessel activities in the GOA were included because GHG emissions at altitudes above 3,000 ft AGL do have an effect.

The air quality analysis involves estimating the amounts of criteria air pollutants and HAPs emitted by the proposed activities and assessing their potential impacts on air quality. Trace amounts of HAPs would be emitted by combustion sources and ordnance. Potentially hazardous air pollutants, such as rocket motor exhaust and unspent missile fuel vapors, are emitted during missile and target operations. These pollutants would have no adverse effects because of their negligible emissions rates and their distance from potentially sensitive receptors. A quantitative evaluation of HAP emissions is thus not warranted.

The Proposed Action does not include training activities in nonattainment areas, so CAA General Conformity Analysis pursuant to the General Conformity Rule (40 C.F.R. Part 93, Subpart B) is not required. In addition, the General Conformity Rule does not apply to activities outside of U.S. territorial seas because the CAA does not apply to actions outside of the United States. The estimation of pollutants and assessment of potential effects on air quality outside of U.S. territorial seas is performed through the EO 12114 analysis.

Data for the air quality analysis are based, wherever possible, on information from the GOA participants and training requirements. These data were used to estimate the numbers and types of aircraft, surface ships and vessels, submarines, and ordnance that would be involved in training activities under each alternative. Each of these project elements is a potential source of air emissions. Emissions sources and the approach used to estimate emissions under the No Action Alternative (baseline), Alternative 1, and Alternative 2 are presented below.

Emissions Estimates

Aircraft Activities

To estimate aircraft emissions, the operating modes, number of hours of operation, and type of engine for each type of aircraft were evaluated. Aircraft flights are assumed to originate from aircraft carriers offshore. All aircraft are assumed to travel to and from training ranges at or above 3,000 ft (914 m) AGL and, therefore, their transits to and from the ranges do not affect surface air quality. Air Combat Maneuvers (ACM) and Air-to-Air Missile Exercise (A-A MISSILEX) are conducted at altitudes well in excess of 3,000 ft (914 m) AGL and, therefore, are not included in the estimated emissions of criteria air pollutants. All other training activities (Table 3.1-2) are included in the emissions estimates.

The types of aircraft used and the numbers of sorties flown under the No Action Alternative, which include both Navy and U.S. Air Force aircraft, are derived from historical data. For Alternatives 1 and 2, estimates of future aircraft sorties were based on evolutionary changes in the Navy's force structure and mission assignments. Where there were no major changes in types of aircraft, future activity levels were estimated from the distribution of baseline activities.

Time on range (activity duration) under the No Action Alternative was calculated from average times derived from range records. To estimate time on range for each aircraft activity in Alternatives 1 and 2, an average duration was extrapolated from the baseline data. Estimated altitudes of activities for all aircraft were obtained from aircrew members in operational squadrons.

Air pollutant emissions were estimated based on the Navy's Aircraft Environmental Support Office (AESO) Memorandum Reports for individual aircraft categories (Aircraft Emission Estimates: Mission Operations). For aircraft for which AESO emission factors were not available (such as the Learjet aircraft), emission factors were obtained from other published sources.

Surface Ship Activities

Marine vessel traffic in the TMAA includes military ship and boat traffic, including support vessels providing services for military training activities. A number of non-military commercial vessels and recreational vessels also are regularly present in the GOA. These vessels were not evaluated in the air quality analysis because they are not part of the Navy's Proposed Action. The methods for estimating marine vessel emissions involve evaluating the type of activity, the number of hours of operation, the type of propulsion, and the type of onboard generator for each vessel type.

The types of surface ships and numbers of operations for the No Action Alternative are derived from participant data. For Alternatives 1 and 2, estimates of future ship activities were based on anticipated evolutionary changes in the Navy's force structure and mission assignments. Where there were no major changes in types of ships, estimates of future activities were based on the historical distribution of ship operations.

Table 3.1-2: Emission Sources by Training Activity

Training Activity	Emissions Source			
	Aircraft	Vessel	Ordnance	Target/ Flare
Anti-Air Warfare (AAW)				
1 - Aircraft Combat Maneuvers (ACM)	X			
2 - Air Defense Exercise (ADEX)	X	X		
3- Surface-to-Air (S-A) Missile Exercise (MISSILEX)		X	X	X
4 - Surface-to-Air Gunnery Exercise (GUNEX)		X	X	X
5 - Air-to-Air MISSILEX	X		X	X
Anti-Surface Warfare (ASUW)				
6 - Visit, Board Search and Seizure (VBSS)	X	X		
7 - Air-to-Surface MISSILEX	X			
8 - Air-to-Surface Bombing Exercise (BOMBEX)	X		X	X
9 - Air-to-Surface GUNEX	X		X	X
10 - Surface-to-Surface GUNEX		X	X	X
11 - Maritime Interdiction (MI)	X	X		
12 - Sea Surface Control (SSC)	X	X		
13 – Sinking Exercise (SINKEX)	X	X	X	X
Anti-Submarine Warfare(ASW)				
14 - ASW Tracking Exercise (TRACKEX) - Helicopter	X			X
15 - ASW TRACKEX – Marine Patrol Aircraft (MPA)	X			X
16 - ASW TRACKEX- Extended Echo Ranging (EER)	X			X
17 - ASW TRACKEX - Surface Ship		X		X
18 - ASW TRACKEX - Submarine		X		X
Electronic Combat (EC)				
19 - EC Exercises	X	X		
20 - Chaff Exercises	X	X		X
21 - Counter-Targeting Exercises	X	X		
Naval Special Warfare (NSW)				
22 - NSW Training	X	X		
Strike Warfare (STW)				
23 - Air-to-Ground BOMBEX	X		X	X
24 - Personnel Recovery (PR)	X	X		X
Support Operations				
25 - Deck Landing Qualifications (DLQ)	X	X		

For surface ships, the durations of activities were estimated by taking an average over the total number of activities for each type of training. Emissions for baseline activities and for future activities were estimated on the basis of discussions with exercise participants. In addition, information provided by participants was used to develop a breakdown of time spent at each power level used during activities in which marine vessels participated.

Emission factors for marine vessels were obtained from the database developed for Naval Sea Systems Command (NAVSEA) by JJMA Consultants (JJMA 2001). Emission factors were provided for each marine vessel type and operational mode (i.e., power level). The resulting calculations provided information on the time spent at each power level in each part of the TMAA, emission factors for that power level (in pounds [lb] of pollutant per hour), and total emissions for each marine vessel for each operational type and mode.

Submarine Activities

No U.S. submarines burn fossil fuel under normal operating conditions, so no air pollutants are emitted by their training activities.

Naval Gunfire and Missile Ordnance

Naval gunfire, missiles, bombs, and other types of ordnance used in training activities emit air pollutants. To estimate the amounts of air pollutants emitted by ordnance during its use, the numbers and types of ordnance used in each training activity were first totaled. Then generally accepted emissions factors for criteria air pollutants were applied to the total amounts. Finally, the total amounts of air pollutants emitted by each ordnance type were summed to produce total amounts of each criteria air pollutant under each alternative.

Summary of Proposed Action Emission Sources

Table 3.1-2 identifies potential sources of air pollutants for training activities included in the Proposed Action.

3.1.2.4 No Action Alternative

Criteria Air Pollutants

Table 3.1-3 lists criteria air pollutant and precursor emissions in the TMAA by general source category under the No Action Alternative. The air pollutant emitted in the greatest quantity is CO; most of the CO emitted under the No Action Alternative is from Air-to-Surface Bombing Exercise (BOMBEX). Most of the NO_x emissions are from vessel and aircraft activities.

Table 3.1-3: Annual Air Pollutant Emissions under the No Action Alternative

Emission Source	Emissions, tons/year				
	CO	NO_x	HC	SO_x	PM_{10}
Aircraft	3.4	4.2	0.3	0.2	2.7
Marine Vessel	11.3	8.0	1.2	5.9	1.1
Ordnance	1.5	0.0	0.0	0.0	0.0
Total	**16.2**	**12.2**	**1.5**	**6.1**	**3.8**

Notes: HC=hydrocarbons

Under the No Action Alternative, the annual numbers of Navy training activities in the TMAA will remain at baseline levels. Emissions rates will remain constant for those pollutant sources that are not affected by other federal, state, or local requirements to reduce air emissions. Pollutants emitted in the TMAA may be transported ashore, possibly affecting air basins in southern and southeastern Alaska. The contributions of air pollutants generated in the TMAA to the air quality in Alaskan air basins are minor compared to the contributions of existing onshore emission sources because of the distances these offshore pollutants are transported and their substantial dispersion during transport.

Table 3.1-3 shows the total amounts of regulated air pollutants under the No Action Alternative generated by Navy training activities in the TMAA. Considering the low level of air pollutants emitted under the No Action Alternative and the pollutant dispersion that normally occurs during long-range transport, these sources will not substantially affect air quality in the closest State of Alaska air basins. Ambient concentrations of criteria air pollutants in Alaskan air basins will not change under the No Action Alternative.

Hazardous Air Pollutants

The USEPA has listed 188 HAPs that are regulated under Title III (Hazardous Air Pollutants), Section 112(g) of the CAA. HAPs are emitted by several processes associated with the No Action Alternative, including fuel combustion and ordnance detonations. Trace amounts of HAPs are emitted by combustion sources participating in GOA training activities, including aircraft, marine vessels, ground vehicles, ground support equipment, and ordnance. The amounts of HAPs emitted are small compared to the emissions of criteria pollutants; emission factors for most HAPs from combustion sources are roughly three or more orders of magnitude lower than emission factors for criteria pollutants (California Air Resource Board 2007). Emissions of HAPs from ordnance use are smaller still, with emission factors ranging from roughly 10^{-5} to 10^{-15} lb of individual HAP per item for cartridges to 10^{-4} to 10^{-13} lb of individual HAPs per item for mines and smoke canisters (USEPA 2006). The amounts of HAP emissions are roughly proportional to the amounts of criteria air pollutants emitted.

HAP emissions will be distributed over the entire range, and their concentrations will be further reduced by atmospheric mixing and other dispersion processes. Most of the training activities will occur 12 nm (22 km) or more offshore, where no sensitive receptors (i.e., residents, schools, hospitals, etc.) are located, so no health effects are anticipated from emissions of HAPs in the TMAA. Therefore, HAP emissions for the Proposed Action will not be quantitatively estimated in this EIS.

3.1.2.5 Alternative 1

Criteria Air Pollutants

Table 3.1-4 lists the estimated criteria air pollutant and precursor emissions in the TMAA under Alternative 1 by general source category. The air pollutant that would be emitted in the greatest quantity is CO; most of the CO emitted under Alternative 1 would be from Air-to-Surface BOMBEX. Most of the NO_x emissions would be from vessel and aircraft activities. Other than CO from live bombs, ordnance would be an insignificant source of air pollutants.

Table 3.1-4: Annual Air Pollutant Emissions under Alternative 1

Emission Source	Emissions, tons/year				
	CO	NO_x	HC	SO_x	PM_{10}
Aircraft	4.1	6.4	0.4	0.4	3.9
Marine Vessel	12.4	8.8	1.3	6.3	1.2
Ordnance	2.2	0.0	0.0	0.0	0.0
Total	**18.7**	**15.2**	**1.7**	**6.7**	**5.1**
Increase Over No Action Alternative	**2.5**	**3.0**	**0.2**	**0.6**	**1.3**

Under Alternative 1, the annual numbers of various Navy training activities in the TMAA would increase by about 12 percent. Criteria air pollutants would increase slightly, with the largest increases in emissions of CO (2.5 tons per year [TPY]) and NO_x (3.0 TPY). Pollutants emitted in the TMAA may be transported ashore, possibly affecting air basins in southern and southeastern Alaska. The contributions of air pollutants generated in the TMAA to the air quality in terrestrial air basins are minor, however, compared to the contributions of existing onshore emission sources because of the distances these offshore pollutants are transported and their substantial dispersion during transport.

Considering the low level of air pollutants emitted under Alternative 1 and the pollutant dispersion that normally occurs during long-range transport, these sources will not substantially affect the State's air quality. Ambient concentrations of criteria air pollutants in Alaskan air basins will not change under Alternative 1.

Hazardous Air Pollutants

Trace amounts of HAPs are emitted from sources participating in Alternative 1 activities, including aircraft, marine vessels, and ordnance. As noted for the No Action Alternative in Section 3.1.2.4, HAP emissions are not quantitatively estimated, but the increase in HAP emissions under Alternative 1 would be roughly proportional to the increase in emissions of criteria air pollutants. Therefore, the amounts that would be emitted as a result of Alternative 1 activities would be somewhat greater than those emitted under the No Action Alternative, but would remain very small compared to the emissions of criteria air pollutants.

HAP emissions will be distributed over the entire range, would rapidly disperse, and would be diluted through mixing in the atmosphere to a much lower ambient concentration. Most of the training activities would occur 12 nm (22 km) or more offshore, where no sensitive receptors (i.e., residents, schools, hospitals, etc.) are located, so no health effects would result from emissions of HAPs in the TMAA under Alternative 1.

Summary

Training activities in the TMAA under Alternative 1 would emit air pollutants for a few weeks per year. Air pollutant emissions under Alternative 1 would increase relative to the baseline (No Action Alternative) emissions. Air pollutant emissions from training activities would be released to the environment in a remote area with good ventilation and few existing sources of air pollutants. Training emissions would be rapidly dispersed over a large ocean area where few individuals would be exposed to them. Residual air pollutant effects during the large portion of the year when training was not being conducted would be negligible. Based on the estimated levels of air pollutant emissions presented in Table 3.1-4, no substantial air pollutant effects are expected under Alternative 1.

3.1.2.6 Alternative 2

Criteria Air Pollutants

Under Alternative 2, the annual numbers of various Navy training activities in the TMAA would increase by about 123 percent from No Action Alternative (baseline) levels. Air pollutant emissions rates also would increase relative to emissions under the No Action Alternative. Table 3.1-5 lists the estimated criteria air pollutant and precursor emissions in the TMAA by general source category under Alternative 2. The air pollutant that would be emitted in the greatest quantity is CO (27.4 TPY). Most of the CO emitted under Alternative 1 would be from Air-to-Surface BOMBEX, the annual number of which would double under Alternative 2. Under Alternative 2, CO emissions from vessel and aircraft operations in the open ocean (more than 12 nm [22 km] from land) also would increase. Most of the NO_x emissions (22.6 TPY) would be from vessel and aircraft activities, and these emissions also would increase relative to baseline emissions. Other than CO from live bombs, ordnance would be an insignificant source of air pollutants.

Table 3.1-5: Annual Air Pollutant Emissions under Alternative 2

Emission Source	Emissions, tons/year				
	CO	NO_x	HC	SO_x	PM_{10}
Aircraft Operations	8.0	12.5	0.9	0.7	7.6
Marine Vessel Operations	24.8	17.5	2.5	12.3	2.3
Ordnance	4.5	0.0	0.0	0.0	0.0
SINKEX	6.3	4.8	0.5	1.2	0.9
Total	**43.6**	**34.8**	**3.9**	**14.2**	**10.8**
Increase Over No Action Alternative	**27.4**	**22.6**	**2.4**	**8.1**	**7.0**

Pollutants emitted in the TMAA may be transported ashore, possibly affecting air basins in southern and southeastern Alaska. The contributions of air pollutants generated in the TMAA to the air quality in terrestrial air basins are minor, however, compared to contributions from existing onshore emission sources because of the distances these offshore pollutants are transported and their substantial dispersion during transport.

The criteria air pollutants emitted under Alternative 2 would be distributed over a large, well-ventilated area, where their effects on ambient air pollutant concentrations would be minor. Due to the air pollutant dispersion that normally occurs during long-range transport, these sources will not substantially affect the State's air quality. Ambient concentrations of criteria air pollutants in Alaskan air basins will not change under Alternative 2.

Hazardous Air Pollutants

Trace amounts of HAPs are emitted from sources participating in Alternative 2 activities, including aircraft, marine vessels, and ordnance. As noted for the No Action Alternative in Section 3.1.2.4, HAP emissions are not quantitatively estimated, but the increase in HAP emissions under Alternative 2 would be roughly proportional to the increase in emissions of criteria air pollutants. Therefore, the amounts emitted as a result of Alternative 2 activities would be greater than those emitted under the No Action Alternative, but would remain small compared to the estimated emissions of criteria air pollutants under Alternative 2.

HAP emissions will be distributed over the entire range, would rapidly disperse, and would be diluted through mixing in the atmosphere to a much lower ambient concentration. Most of the training activities would occur 12 nm (22 km) or more offshore, where no sensitive receptors (i.e., residents, schools, hospitals, etc.) are located, so no health effects would result from emissions of HAPs in the TMAA under Alternative 1.

SINKEX

Alternative 2 would include SINKEX, in which several aircraft and vessels fire various types of ordnance at a ship hulk until it sinks. Estimated criteria air pollutant emissions from this activity are shown in Table 3.1-5. SINKEX would generate a substantial portion of the total air pollutants emitted under Alternative 2.

Summary

Training activities in the TMAA under Alternative 2 would emit air pollutants for a few weeks per year. The increase in air pollutant emissions under Alternative 2 would represent an increase in air pollutant emissions relative to the baseline (No Action Alternative) emissions. Air pollutant emissions from training activities would be released to the environment in a remote area with good ventilation and few other existing sources of air pollutants. Training emissions would be rapidly dispersed over a large ocean area where few individuals would be exposed to them. Residual air pollutant effects during the large portion of the year when training was not being conducted would be negligible. Based on the estimated levels of air pollutant emissions presented in Table 3.1-5, no substantial air pollutant effects are expected under Alternative 2.

3.1.3 Mitigation

As described in Sections 3.1.2.4 to 3.1.2.6, annual emissions of criteria and hazardous air pollutants produced by the Proposed Action are well below a level that could degrade regional air quality. Therefore, no mitigation measures are required to reduce the impacts on the environment of air emissions from the Proposed Action.

3.1.4 Summary of Effects

Table 3.1-6 summarizes the effects of the No Action Alternative, Alternative 1, and Alternative 2 on air quality under both NEPA and EO 12114.

Table 3.1-6: Summary of Effects by Alternative

Alternative	NEPA (U.S. Territorial Seas, 0 to 12 nm)	EO 12114 (Non-U.S. Territorial Seas, > 12 nm)
No Action Alternative	• Current Navy activities were considered and are consistent with those analyzed in the previous environmental documentation (USAF 1995, USAF 2007, Army 1999, Army 2004). These documents concluded that no significant impacts related to air quality would occur. • Overflights of ocean (0-12 nm) and land areas at altitudes above 3,000 ft AGL would not affect ground-level air quality.	• The No Action Alternative would maintain training activities and associated air pollutant emissions at baseline levels outside of U.S. territory.
Alternative 1	• Under Alternative 1, Navy activities were considered and would be consistent with those analyzed in the previous environmental documentation (USAF 1995, USAF 2007, Army 1999, Army 2004). These documents concluded that no significant impacts related to air quality would occur. • Overflights of ocean (0-12 nm) and land areas at altitudes above 3,000 ft AGL would not affect ground-level air quality.	• Outside of U.S. territory, air pollutant emissions would increase slightly, mainly from increased surface vessel and aircraft activities. • Although Alternative 1 would increase emissions of air pollutants over the No Action Alternative, emissions outside of U.S. territorial seas would not cause an air quality standard to be exceeded.
Alternative 2 (Preferred Alternative)	• Under Alternative 2, Navy activities were considered and would be consistent with those analyzed in the previous environmental documentation (USAF 1995, USAF 2007, Army 1999, Army 2004). These documents concluded that no significant impacts related to air quality would occur. • Overflights of ocean (0-12 nm) and land areas at altitudes above 3,000 ft AGL would not affect ground-level air quality.	• Outside of U.S. territory, air pollutant emissions would increase mainly from increased surface vessel and aircraft activities. • SINKEX would generate a substantial portion of the air pollutants that would be emitted under Alternative 2. • Although Alternative 2 would increase emissions of air pollutants over the No Action Alternative, emissions outside of U.S. territorial seas would not cause an air quality standard to be exceeded.