



Final

Pacific Spaceport Complex Alaska Ballistic Missile Defense Flight Test Support Environmental Assessment

Department of Defense
Missile Defense Agency
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Acronyms and Abbreviations

µg/m ³	micrograms per cubic meter	EEU	electronic equipment unit
AAC	Alaska Aerospace Corporation	EFH	Essential Fish Habitat
ADEC	Alaska Department of Environmental Conservation	EIS	Environmental Impact Statement
ADF&G	Alaska Department of Fish and Game	E-LRALT	Extended Long Range Air Launched Target
AEU	Antenna Equipment Unit	ELTS	Early Launch Tracking System
AL	Air Launched	EMR	electromagnetic radiation
ALTRV	altitude reservation	EO	Executive Order
AMHS	Alaska Marine Highway System	EPP	Electric Power Plant
AN/TPY-2	Army-Navy Transportable Radar Surveillance and Control Model-2	FAA	Federal Aviation Administration
AQCR	Air Quality Control Region	FBM	Forward Based Mode
ARTCC	Air Route Traffic Control Center	FIR	Flight Information Region
BMD	Ballistic Missile Defense	FONSI	Finding of No Significant Impact
BMP	best management practice	FR	Federal Register
BOA	broad ocean area	ft	feet/foot
C2	Command and Control	FTS	Flight Termination System
CAA	Clean Air Act	GHA	Ground Hazard Area
CEQ	Council on Environmental Quality	GHG	greenhouse gas
CEU	Cooling Equipment Unit	GOA	Gulf of Alaska
CFR	Code of Federal Regulations	HALO	High Altitude Observatory
CO	carbon monoxide	HCI	hydrogen chloride
CO ₂	carbon dioxide	HEMTT	Heavy Expanded Mobility Tactical Truck
CWA	Clean Water Act	HTPB	hydroxyl-terminated polybutadiene
dB	decibel(s)	ICAO	International Civil Aviation Organization
dBA	A-weighted decibel(s)	ICC	Information Coordination Center
dBp	decibels peak sound pressure level	IMO	International Maritime Organization
DNL	Day-night Sound Level		
DoD	Department of Defense	IRBM	Intermediate Range Ballistic Missile
DOT	Department of Transportation		
DPS	Distinct Population Segment	KV	kill vehicle
EA	Environmental Assessment	kW	kilowatt
ECS	Engagement Control Station		

LHA	Launch Hazard Area	PM ₁₀	particulate matter less than 10 microns in diameter
L _{eq}	equivalent sound level		
L _{max}	maximum sound level	PPU	Prime Power Unit
LP3	Launch Pad 3	PRST	Pacific Range Support Team
LS	Launching Station	PSCA	Pacific Spaceport Complex Alaska
LSO	Launch Site Operator	PT	Pacific Tracker
MDA	Missile Defense Agency	RCC	Range Commanders Council
MRBM	Medium Range Ballistic Missile	ROD	Record of Decision
MRBM T1/T2	MRBM Types 1 and 2	RSS	Range Safety System
MSFCMA	Magnuson-Stevens Fishery Conservation and Management Act	SEL	Sound Exposure Level
MSL	mean sea level	SPL	Sound Pressure Level
MW	megawatt	SUA	Special Use Airspace
NAAQS	National Ambient Air Quality Standards	SRALT	Short Range Air Launch Target
NEPA	National Environmental Policy Act	TFCC	THAAD Fire Control and Communications
NMFS	National Marine Fisheries Service	TFR	Temporary Flight Restriction
NOTAMs	Notices to Airmen	THAAD	Terminal High Altitude Area Defense
NOTMARs	Notices to Mariners	TM	Terminal Mode
OCA	Oceanic Controlled Airspace	TOS	Tactical Operation Station
OSHA	Occupational Safety and Health Administration	TTS	Transportable Telemetry System
PAC	PATRIOT Advanced Capability	U.S.	United States
PC	Pacific Collector	USAF	U.S. Air Force
PCRSS	Pacific Collector Range Safety System	USCG	U.S. Coast Guard
PM _{2.5}	particulate matter less than 2.5 microns in diameter	USEPA	U.S. Environmental Protection Agency
		USC	United States Code
		USFWS	U.S. Fish and Wildlife Service

1 Purpose of and Need for the Proposed Action

1.1 Introduction

The Missile Defense Agency (MDA) proposes to conduct defensive weapon system flight tests of various Ballistic Missile Defense (BMD) systems from the Pacific Spaceport Complex Alaska (PSCA), formerly called the Kodiak Launch Complex. The PSCA is a commercial launch site currently operated by the Alaska Aerospace Corporation (AAC) under a Federal Aviation Administration (FAA) Launch Site Operator (LSO) license (LSO-03-008).

This Environmental Assessment (EA) has been prepared by the Missile Defense Agency (MDA) to analyze the impacts of performing interceptor flight tests from PSCA with intercepts over the broad ocean area (BOA), generally south of Kodiak Island. The location and vicinity of PSCA are shown in **Figure 1-1**.

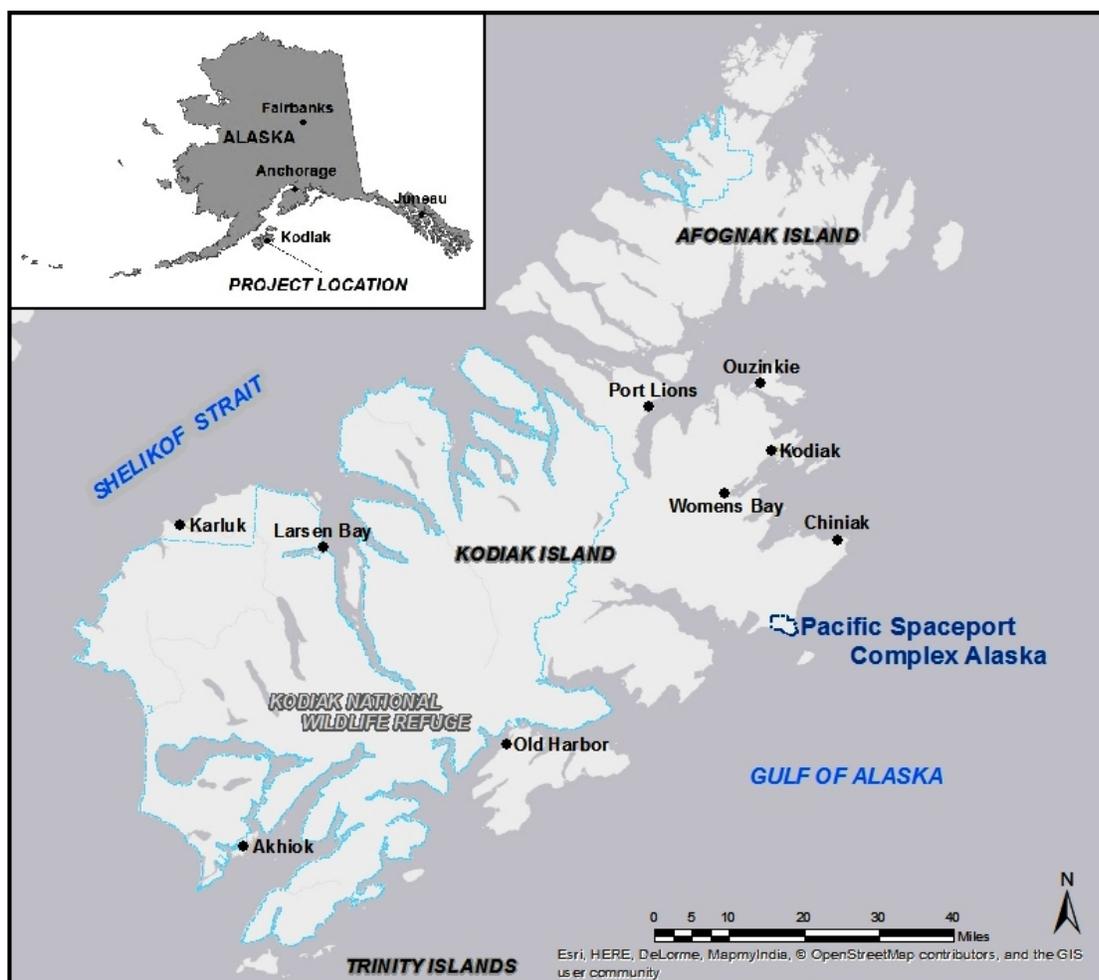


Figure 1-1. Location and Vicinity for Pacific Spaceport Complex Alaska

This EA was prepared in accordance with the National Environmental Policy Act (NEPA) of 1969, as amended (42 United States Code [USC] § 4321 et seq.); the Council on Environmental

Quality (CEQ) regulations for implementing the procedural provisions of NEPA (40 Code of Federal Regulations [CFR] §§ 1500–1508); MDA NEPA Implementing Procedures (79 Federal Register [FR] 46410-46419); Executive Order (EO) 12114, Environmental Effects Abroad of Major Federal Actions; and 32 CFR § 187, *Environmental Effects Abroad of Major Department of Defense Actions*.

1.2 Background

The PSCA is a commercial launch site serving both government and commercial launch customers and is located on Narrow Cape on Alaska's Kodiak Island (**Figure 1-1**). Constructed in 1998, PSCA has hosted 17 solid-propellant launches to date, with an average of about one launch annually (FAA 2016). Two launches have occurred from PSCA in the past 5 years, with the most recent launch occurring in August 2014. The existing LSO license (LSO-03-008) from FAA authorizes PSCA to conduct up to nine small-lift orbital and suborbital class launches per year from the existing launch pads. The PSCA offers downrange launch azimuths over the Pacific Ocean ranging from 110 to 220 degrees. It is the highest latitude, full service launch complex in the United States.

The environmental impacts of constructing and operating PSCA were initially analyzed in FAA's *Environmental Assessment of the Kodiak Launch Complex* (FAA 1996), which resulted in a Finding of No Significant Impact (FONSI). To improve launch operations from those analyzed in the 1996 EA, FAA prepared the *Final Environmental Assessment for the Kodiak Launch Complex Launch Pad 3* (FAA 2016) and FONSI. In this recent document, FAA analyzed the potential environmental impacts of expanding the current small-lift launch capability of PSCA to include medium-lift launch capability, with the addition of new infrastructure necessary to support these types of launches, particularly the construction of Launch Pad 3 (LP3). Future modifications to the current LSO license would authorize PSCA to conduct up to six orbital small-lift and three medium-lift launches per year from the existing launch pads and the new LP3 to be constructed.

In 2004, MDA began using PSCA for the launching of target missiles as part of BMD testing that included intercepts over the BOA. MDA has also previously conducted BMD flight tests at other ranges in the Pacific region, similar to those proposed for PSCA. The NEPA analyses for these earlier BMD tests determined that such activities posed no significant impact to the environment at Pacific Missile Range Facility in Hawaii, United States (U.S.) Army Garrison-Kwajalein Atoll/Ronald Reagan Ballistic Missile Defense Test Site in the Marshall Islands, or at Wake Atoll in the mid-Pacific. Such tests were analyzed in prior NEPA documents that are included in the list of related and supporting documents identified in **Section 1.5**.

1.3 Purpose of and Need for the Proposed Action

The *purpose* of the Proposed Action is to conduct defensive weapon system flight tests of BMD systems from PSCA to validate the ability to engage various short-, medium-, and intermediate-range threat representative target missiles. MDA's test program is structured to improve the missile defense capabilities under development and to ensure the capabilities are operationally effective, suitable, and survivable.

The *need* for MDA's Proposed Action described in this EA is to implement cost-effective flight tests at ranges in the Pacific region.

1.4 Scope of the Environmental Analysis

This EA evaluates the environmental effects that might occur from proposed interceptor flight tests against short-, medium-, and intermediate-range missiles in realistic flight test scenarios.

Impacts could result from pre-flight activities at launch and other support locations, missile launches, radar and sensor operation, intercept and non-intercept events, and post-flight activities. A detailed description of the Proposed Action for conducting the flight tests is provided in **Section 2.1**.

The EA also considers the No Action Alternative, which is described in **Section 2.2**. If the No Action Alternative were chosen, the BMD flight test-associated activities described in the EA would not take place. Activities described in FAA's *Environmental Assessment of the Kodiak Launch Complex* (FAA 1996) and FAA's *Final Environmental Assessment for the Kodiak Launch Complex Launch Pad 3* (FAA 2016), and any PSCA actions for which potential environmental effects have been analyzed and documented would continue.

Consistent with CEQ regulations (40 CFR §§ 1500–1508), the scope of the analysis presented in this EA was defined by the range of potential environmental impacts that would result from implementation of the Proposed Action or the No Action Alternative. Resources that have a potential for impacts were considered in the EA analysis to provide the decision makers with sufficient evidence and analysis for evaluation of the potential effects of the action. For the various environmental resources that could be affected, this EA describes the existing conditions and identifies the potential environmental impacts in terms of nine broad areas of environmental consideration at PSCA (**Chapter 3**) and for three resource topics within the BOA (**Chapter 4**).

1.5 Related and Supporting Environmental Documentation

In addition to the prior FAA NEPA documents for actions at PSCA (see **Section 1.2**), MDA relied on several other NEPA documents in the preparation of this EA. These documents are listed below, are cited in this EA where applicable, and can be accessed on MDA's web page at https://www.mda.mil/news/environmental_reports.html:

- *Air Drop Target System Program Programmatic EA* (BMDO 1998)
- *North Pacific Targets Program EA and FONSI* (BMDO 2001)
- *Development and Demonstration of the Long Range Air Launch Target System EA and FONSI* (MDA 2002a)
- *Theater High Altitude Area Defense Pacific Test Flights* (MDA 2002b)
- *Ground-Based Midcourse Defense Extended Test Range Final Environmental Impact Statement (EIS) and Record of Decision (ROD)* (MDA 2003a)
- *Arrow System Improvement Program EA and FONSI* (MDA 2003b)

- *Test Resources Mobile Sensors EA and FONSI* (MDA 2005)
- *Flexible Target Family EA and FONSI* (MDA 2007)
- *Ballistic Missile Defense System Programmatic EIS and ROD* (MDA 2008)
- *Pacific Missile Range Facility Intercept Test Support EA/OEA and FONSI* (MDA 2010)
- *Gulf of Alaska Navy Training Activities EIS/Overseas EIS* (U.S. Navy 2011)
- *Integrated Flight Tests at U.S. Army Kwajalein Atoll/Ronald Reagan Ballistic Missile Defense Test Site EA and FONSI* (MDA 2012)
- *Integrated Flight Tests at Wake Atoll EA and FONSI* (MDA 2015)
- *Gulf of Alaska Navy Training Activities Supplemental EIS/Overseas EIS* (U.S. Navy 2016).

1.6 Decision to be Made

The decision to be made, based in part on the analysis in this document, is whether to conduct defensive weapon system flight tests from PSCA over the Pacific BOA, including intercept of short-, medium-, and intermediate-range ballistic missile targets launched from aircraft operating within the BOA.

Various test assets also would be used to collect and record critical test data, including but not limited to land-based Army-Navy Transportable Radar Surveillance and Control Model-2 (AN/TPY-2) Forward Based Mode (FBM), Transportable Telemetry Systems (TTSs), Early Launch Tracking System (ELTS) and associated communications equipment; sea-based assets Pacific Collector (PC) and Pacific Tracker (PT); and airborne High Altitude Observatories (HALOs).

The decision maker(s) also could select the No Action Alternative, which would be to not conduct the BMD flight tests from PSCA, and related target launches and intercepts over the BOA, as described in **Section 2.1** of this EA. Ongoing and future actions, whose impacts at PSCA and within the BOA have been previously analyzed and approved, would continue.

1.7 Agency Coordination and Consultations

Interagency coordination is an integral part of the preparation of this EA. As part of early coordination and consultations, MDA notified relevant federal and state agencies of the Proposed Action and alternatives, and provided them with a copy of the *Pacific Spaceport Complex Alaska Ballistic Missile Defense Flight Test Support Coordinating Draft Environmental Assessment* dated September 2016 (MDA 2016) for review and comment. **Appendix A** contains a complete listing of the agencies and officials contacted and MDA's correspondence, along with the responses that were received. Only two agencies responded during the review period and those comments were considered in the preparation of this EA.

For government-to-government consultations under Section 106 of the National Historic Preservation Act, MDA also provided Alaskan Native Tribal Governments historically affiliated with the PSCA region an opportunity to review and comment on the *Pacific Spaceport Complex*

Alaska Ballistic Missile Defense Flight Test Support Coordinating Draft EA dated September 2016 (MDA 2016) and the *Proposed Final Environmental Assessment* dated January 2017 (MDA 2017). **Appendix B** contains a complete listing of the tribal governments contacted and MDA's correspondence, along with the responses that were received. Only one tribal government responded to the reviews, which was followed up with a government-to-government consultation meeting between tribal leaders and MDA representatives that was held in Kodiak, Alaska, on February 1, 2017. A summary of the meeting discussions is also provided in **Appendix B**.

1.8 Public Notification and Review

In accordance with CEQ and MDA regulations and procedures for implementing NEPA, MDA solicited comments on the Proposed Final EA and Proposed FONSI from interested and affected parties. A Notice of Availability for the Proposed Final EA and the Proposed FONSI was published on January 13, 2017, in the following Alaska newspapers:

- *Kodiak Daily Mirror*
- *Alaska Dispatch News*.

A list of those agencies, officials, tribal governments, and libraries that were sent a copy of the Proposed Final EA and Proposed FONSI is provided in **Chapter 10**. Copies of the two documents were also available over the Internet at https://www.mda.mil/news/environmental_reports.html.

During the 30-day public review period, MDA received comments from one private citizen, one organization, and one federal government agency. **Appendix C** of this Final EA contains a summary of the comments received along with MDA's responses to the comments. Comments received were considered prior to a decision being made on whether or not to sign the FONSI.

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2 Description of the Proposed Action and Alternatives

This chapter presents information on the Proposed Action for proposed defensive weapon system flight tests conducted from PSCA. **Section 2.1** provides a detailed description of the Proposed Action (Preferred Alternative), while **Section 2.2** discusses the No Action Alternative.

2.1 Proposed Action

The Proposed Action is to conduct flight tests of various BMD systems from PSCA, to potentially include Terminal High Altitude Area Defense (THAAD), PATRIOT, and similar defensive weapon systems. Flight test events could include various short-, medium-, and intermediate-range target missiles launched from aircraft located in the BOA of the northern Pacific region, with intercepts over the BOA. A comparison of the relative size of the proposed BMD interceptor missiles with prior small-lift launch vehicles and future medium-lift vehicles at PSCA (FAA 2016) is shown in **Figure 2-1**.

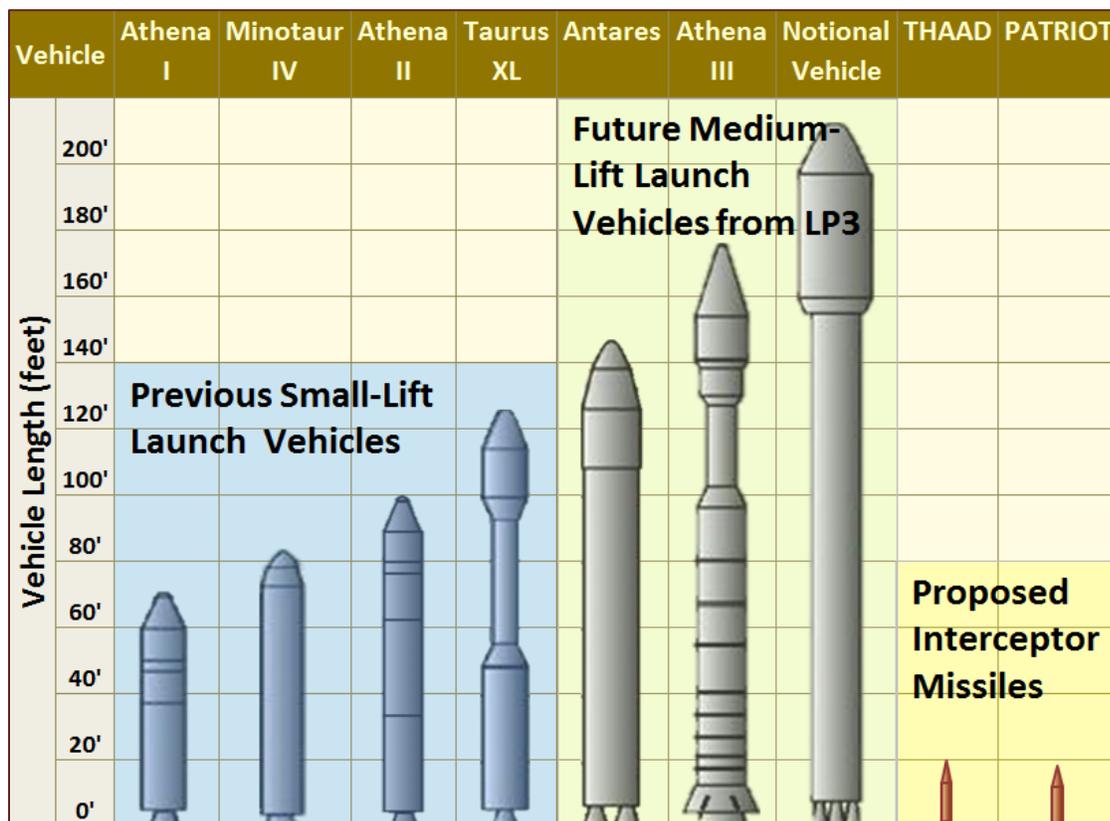


Figure 2-1. PSCA Current/Future Launch Vehicles and Proposed (Notional) Interceptor Missiles

A specific number of BMD-related missile launches conducted from PSCA has not been determined. On average, MDA expects to conduct up to two flight test events per year over the next 10 years, with no more than three flight test events in any given 12-month period. Individual

BMD flight test events may include more than one interceptor missile launch. As a federal government program, MDA's proposed BMD missile flight tests do not fall under the existing LSO license (LSO-03-008) from FAA, which authorizes PSCA to conduct up to nine commercial launches per year. The BMD missile launches would be in addition to any commercial or other government-related launches from PSCA, which have averaged out to about one launch per year in the past. For the preparation of this EA, up to nine interceptor missile launches from PSCA in any given 12-month period was used for analysis purposes.

Defensive weapon system flight tests demonstrating interoperability of two weapon systems operating simultaneously at PSCA may also take place as part of the Proposed Action. One or both of the weapon systems demonstrating interoperability could launch interceptor missiles at target missiles in such tests.

The proposed missile systems and representative test activities are described in the sections that follow. Discussions include defensive weapon system and target missile system transportation to test sites, use of range support facilities, weapon and target system pre-flight activities, flight tests, and post-flight activities.

2.1.1 Representative Flight Test Events

As previously mentioned, MDA expects to conduct up to two flight test events per year over the next 10 years, with no more than three flight test events in any given 12-month period. Each test event may vary in terms of the number of individual missile launches, the defensive weapon system and target systems used, the flight trajectories, angles of intercept, and altitudes of intercept. Individual BMD flight test events may include more than one interceptor missile launch. Descriptions of two flight test events proposed for fiscal year 2017 are provided below.

One flight test proposed to occur in the third quarter of fiscal year 2017 would demonstrate THAAD engagement of a single ballistic missile target. Multiple THAAD interceptors could be launched as part of this test.

A second flight test is also proposed for third quarter of fiscal year 2017. This test is designed to demonstrate an operationally representative intercept of a single ballistic missile target. Multiple THAAD interceptors could be launched as part of this test.

In both of these test events, the THAAD weapon system would be located at PSCA and the target missile would be launched from an aircraft located over the Pacific BOA. A graphical depiction of a notional intercept flight test from PSCA is shown in **Figure 2-2**.

2.1.2 Range Safety and Range Control

While range safety is location-, facility-, and mission-dependent, Department of Defense (DoD) has established advisory standards and protocols to eliminate or acceptably minimize potential health and safety risks/hazards. The DoD Range Commanders Council (RCC) Standards are guidelines that provide definitive and quantifiable measures to protect mission-essential personnel and the general public. These guidelines address flight safety hazards (including inert

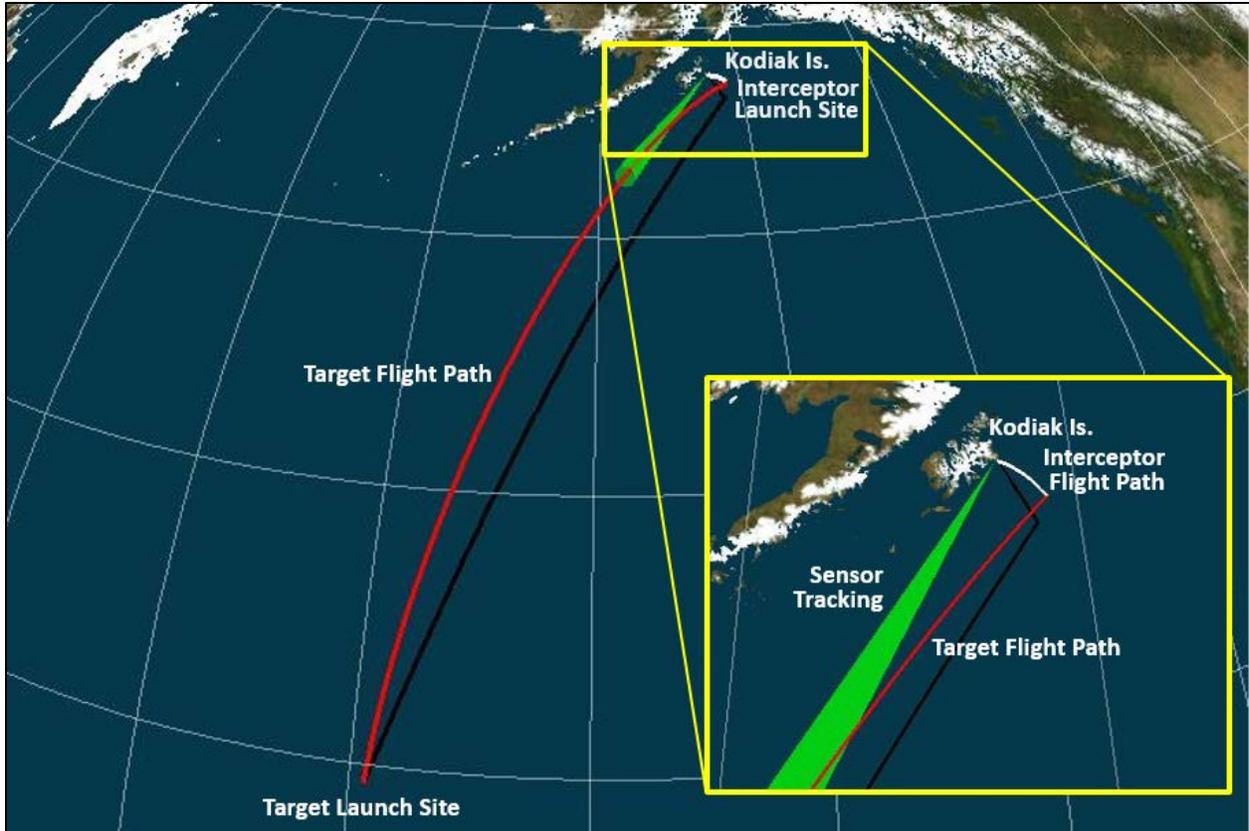


Figure 2-2. Notional Defensive Weapon System Flight Test from PSCA

debris) and consequences potentially generated by range operations. All risks to aircraft generated by testing activities at PSCA are within RCC standards and all testing activities are performed in coordination with the FAA. The four key RCC standards applied for missile launches are as follows:

- RCC Standard 319, *Flight Termination Systems Commonality Standard*
- RCC Standard 321, *Common Risk Criteria Standards for National Test Ranges*
- RCC Document 323, *Range Safety Criteria for Unmanned Air Vehicles*
- RCC Standard 324, *Global Positioning and Inertial Measurements Range Safety Tracking Systems Commonality Standard.*

These documents are regularly updated to reflect advances in research that improve the fidelity of risk assessment and to include developments to new test situations.

Safety regulations are directed at preventing the occurrence of potentially hazardous accidents and minimizing or mitigating the consequences of hazardous events. This is accomplished by employing system safety concepts and risk assessment methods to identify and resolve potential safety hazards.

The range safety process is predicated on risk management, minimization of accident impacts, and protection of population centers. Risk values related to missile launch activities are categorized in two ways: (1) probability of vehicle failure, including all credible failure modes that could lead to debris impact events; and (2) the expected adverse consequences that could result from impact events. The consequence estimation is quantified by two key measures: (1) the probability of individual injury, defined as the probability of a person at a given location being injured; or (2) the expected number of injuries (collective risk), defined as the average number of persons that may be injured in a launch (typically a very small number, such as a few injuries per million operations).

Flight control is accomplished through the following procedures:

- Evaluate mission plans to assess risks and methods to reduce risk
- Establish performance and reliability requirements for the Flight Termination System (FTS) or auto destruct system on the missile which is employed, as required, for safety assurance
- Implement a real-time tracking and control system at the range
- Provide sufficient mission rules to protect people both in and outside the boundaries of the launch facility.

Procedures and analyses to protect the public can be divided into five aspects:

- Ground safety procedures—handling of propellants, ordnance, noise, hazardous operations, toxics, etc.
- Pre-flight mission analysis—vehicle, trajectory, etc.
- FTS/auto destruct system verification
- In-flight safety actions
- Emergency response.

2.1.2.1 FLIGHT CONTROL

The Pacific Range Support Team (PRST), which is represented by several U.S. ranges (i.e., Patrick Air Force Base, Florida; Vandenberg Air Force Base, California; Pacific Missile Range Facility, Hawaii; Naval Air Warfare Center/Patuxent River, Maryland; Naval Air Warfare Center/Point Mugu, California; White Sands Missile Range, New Mexico; Ronald Reagan Ballistic Missile Defense Test Site, Republic of the Marshall Islands; and Sandia National Laboratories, New Mexico), would have the primary responsibility for Flight Control of the additional BMD tests proposed at PSCA. Range users are required to provide specific information about their systems so that a safety analysis of all types of hazards can be completed and appropriate remedial procedures taken before initiation of hazardous activities.

For missile and weapons system tests, PRST establishes criteria for the safe execution of the test operation in the form of Range Safety Annex and Range Safety Operation Directive documents, which are required for all weapon and target systems where PRST provides

assumption of risk. Missile hazards are identified and minimized prior to flight testing as required by applicable military standards. PRST currently uses the RCC risk management criteria previously described.

The target missiles would be flown on trajectories that emulate threat missile flight paths. Trajectories and range vary depending on the test or training exercise scenario.

Protection of the public on the ground, in aircraft, or on sea vessels is accomplished by adhering to the RCC risk management criteria. These criteria require that operations conducted at PSCA maintain a very low probability for any harmful or lethal intercept debris, spent rocket stages, targets, or defensive missiles, to impact outside of pre-established impact zones over the open ocean.

When a missile flight test is planned there are certain prescribed debris impact areas such as the notional ones shown in **Figure 2-3**. Additional areas (i.e., booster drop zones) would be determined prior to program launches. There are other areas where debris may impact if the test does not proceed as planned. In the case of a missed intercept, the missiles would continue on a ballistic path and a whole body impact would occur within controlled areas. These established areas of the test event may be subject to the risk of mishap, such as an explosion or flight termination. An example of this type of area is the over water launch hazard area (LHA). Clearance areas are defined by PRST to encompass the areas where people, ships, or aircraft would be at unacceptable levels of risk should a pre-flight or launch anomaly occur, using computer predictions of the behavior of the missiles. This modeling predicts what the missile may do in a number of situations where the missile, or parts of the missile, may fall to earth. The models incorporate a number of variables such as the missile mass, velocity, trajectory, and altitude that may affect the missile in flight.

The more specific, or accurate, the variables are, the more accurate the prediction of the missile's behavior can be. Modeling that is done during early mission planning takes into account anticipated seasonal weather conditions, including average winds. Modeling done on the day of the test is based on weather measurements made that day. Winds measured on the actual day of the launch/test are used to refine launch predictions/criteria.

Ground hazard areas (GHAs) and LHAs (over water) are established to limit the region that may be impacted by hazardous debris from an early flight termination. The hazard areas are determined by size and flight characteristics of the missile, individual flight profile of each exercise or flight test, and FTS/auto destruct system operations and reaction times should a flight malfunction occur. **Figure 2-4** depicts typical target and defensive missile LHAs, booster drop zones, intercept debris impact zones, and intact target vehicle and defensive missile impact zones. Impact zones are areas in which hardware impacts are planned. The location and dimensions of the impact zones may vary for each flight test scenario. Impact areas for expended boosters, target vehicles, defensive missile debris resulting from a successful intercept, and intact defensive missile payloads (in the event of a failed intercept) would be determined by range safety personnel for each flight based on detailed launch planning and trajectory modeling. This planning and modeling would include analyses and identification of a flight corridor based on a flight failure during any point in the flight trajectory. For nominal flight

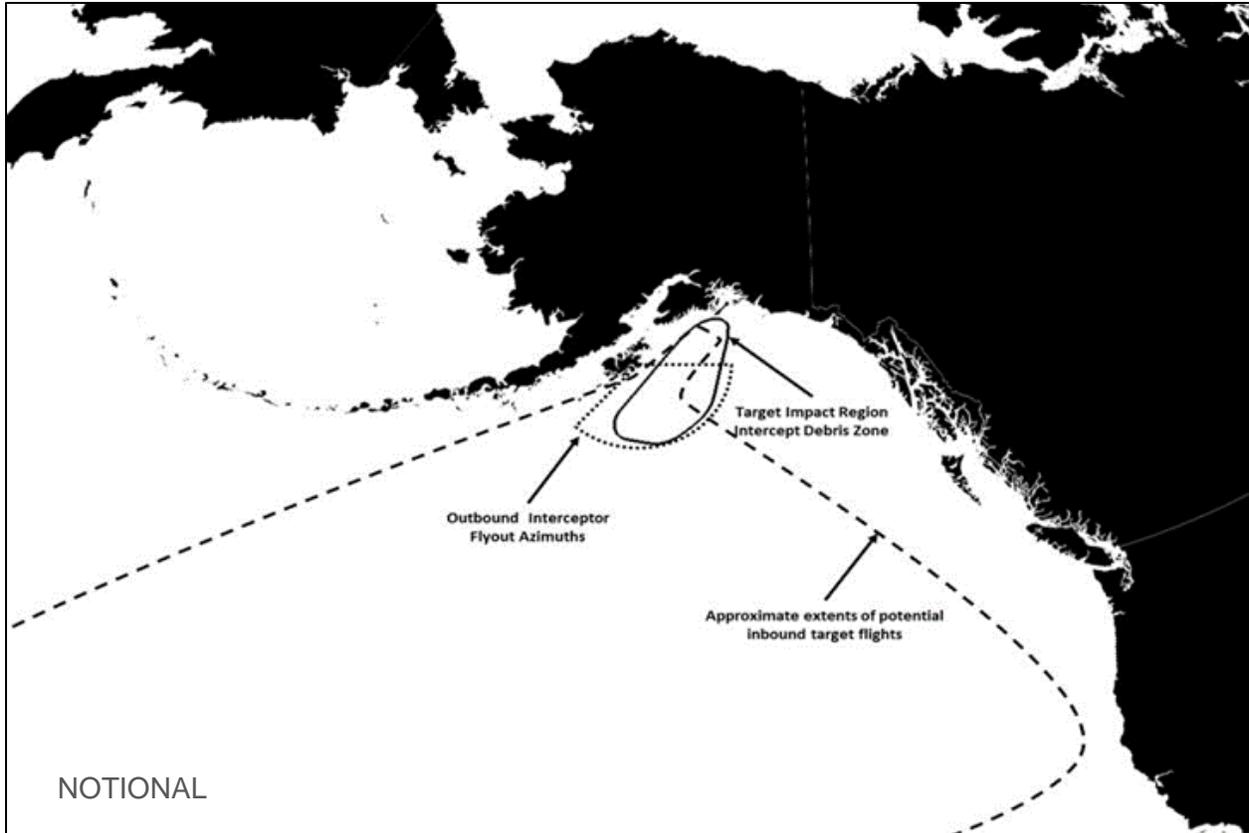


Figure 2-3. Potential Interceptor and Target Debris Zones

tests, target missile and intercept debris would be expected to fall at least 10 nautical miles from any land areas.

PRST is responsible for establishing GHAs, LHAs, and other over water range areas that exclude the public when risks would exceed acceptable levels defined in the safety standard RCC 321, *Common Risk Criteria Standards for National Test Ranges*. If unauthorized personnel or craft are found within a hazard area, an evaluation is made on whether the encroaching parties are exposed to risks beyond what is acceptable according to existing standards, such as RCC 321. If not, the test may still proceed.

Prior to conducting each missile operation, Range Safety officials request the issuing of Notices to Airmen (NOTAMs) from FAA and Notices to Mariners (NOTMARs) from the U.S. Coast Guard (USCG). These notices identify all hazard areas to avoid.

Each flight test is closely monitored, and requires collection and analyses of data on the target, the interceptor, and the intercept event. Tracking data are required for post-exercise or test reconstruction and analysis. Telemetry receivers, optical sensors, and radar support both collection and analyses. Data are transmitted from the target and interceptor to ground stations during flight for recording and analysis. Ground-based optical sensors, radar, and telemetry are supplemented by ship-based and/or airborne sensors.

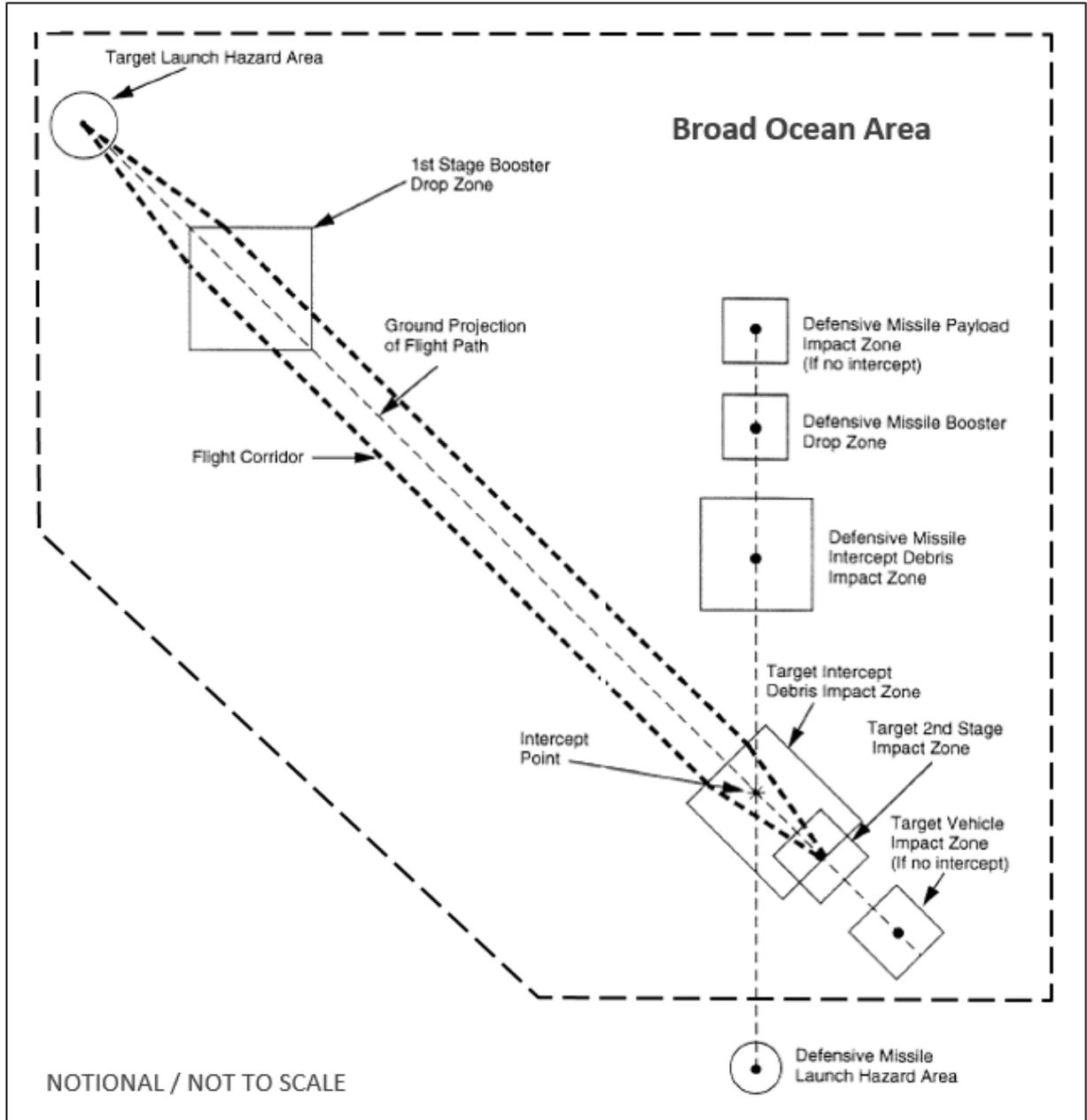


Figure 2-4. Conceptual Missile Impact Zones and Hazard Areas

2.1.2.2 GROUND CONTROL

Range Safety policies and test system procedures require that the public and non-mission-essential personnel be excluded from hazardous areas to protect them in the unlikely event of an early flight termination. Range officials are required by DoD policy to be able to exclude non-participants from hazardous areas. GHAs are established around each launch site to ensure public safety in the event of an unplanned impact of debris on land as a result of missile launch activities. The Ground Safety Officer is responsible for hazard area surveillance and clearance, and the control of all operational areas.

2.1.2.3 RANGE CONTROL

The PSCA Range Control Officer is solely responsible for determining range status and setting RED (no firing) and GREEN (range is clear and support units are ready to begin the event) range firing conditions with input from the Ground Safety Officer. The Range Control Officer communicates with the test directors and all participants entering and leaving the range areas. The Range Control Officer also communicates with other agencies, as required.

2.1.2.4 TEST MISHAPS

Test mishaps for defensive missiles are defined in terms of three scenarios: (1) termination or detonation on the launcher, (2) termination of a flight shortly after liftoff, and (3) termination of a flight after it has exited the vicinity of the launch site.

A test mishap termination of a flight on the launcher/launch pad would be characterized by an explosion or detonation of the missile propellants and explosives, or a scenario in which the missile propellants and explosives burn without detonation or explosion. For the GHA, a keep out zone surrounding the launcher/launch pad would be calculated based on system specific hazards. All hazardous debris resulting from a termination on the launcher/launch pad would be contained within the GHA. The GHA would be cleared of unprotected personnel. Fire suppression, hazardous materials emergency responders, and emergency medical teams would be available during launch operations.

Termination of a missile flight shortly after liftoff would result in all hazardous debris being contained within the LHA. Non-mission-essential personnel are excluded from the LHA during launch operations. Personnel working within the LHA would be protected in blast-resistant buildings, vehicles, or behind berms.

Termination of a missile after it has exited the vicinity of the launcher would occur in the event of an off-course flight. The auto destruct system would destroy the missile inflight or the FTS would be activated to terminate the flight vehicle's forward thrust. The flight vehicle or its debris would then fall into the ocean. As previously discussed, an LHA would be established such that the probability of human casualties or property damage would be extremely low in the event of a missile anomaly. This debris footprint also takes into account all planned missile body impact points and potential intercept debris patterns within the surrounding BOA.

2.1.3 Description of Representative Defensive Weapon Systems

Two of the land-based defensive weapon systems proposed to be tested at PSCA—THAAD and PATRIOT—are described in the following subsections. Although not described, other possible defensive weapon systems with characteristics and functions similar to that of the THAAD and PATRIOT systems could also be tested at PSCA. Due to the similarity of components and size, the potential environmental effects from these other weapon systems are expected to be the same or less than that of the THAAD and PATRIOT systems analyzed in this EA.

2.1.3.1 THAAD WEAPON SYSTEM

The THAAD weapon system provides a globally transportable, rapidly deployable capability to intercept and destroy ballistic missiles inside or outside the atmosphere during their final or terminal phase of flight. The THAAD missile has a potential impact range that exceeds 1,000 kilometers and uses hit-to-kill technology (kinetic energy) to destroy an incoming warhead. For over 10 years, the THAAD weapon system has been successfully used for flight testing at other test ranges without safety-related incidents. The four main components of a THAAD battery are described below:

- *THAAD Missile.* The THAAD missile is transported as a certified round encased in a canister. The missile consists of a single-stage rocket motor and a non-explosive kill vehicle (KV) as shown in **Figure 2-5**. The solid propellant motor is a hydroxyl-terminated polybutadiene (HTPB) composition that is rated as a Class 1.3 explosive (explosives that have a fire hazard and either a minor blast hazard or a minor projection hazard, or both, but not a mass explosion hazard that affects almost the entire load instantaneously). The THAAD missile also contains a small amount of hypergolic propellants (mixed oxides of nitrogen and monomethylhydrazine) located in the divert and attitude control system. For flight safety assurance, the THAAD missile is equipped with an auto destruct system should a flight malfunction occur (see **Section 2.1.2.4**). The missile measures approximately 20 feet (ft) in length and weighs approximately 2,145 pounds at launch. Compared to the previous and future launch vehicles at PSCA (**Figure 2-1**), the THAAD missile is substantially smaller in size.

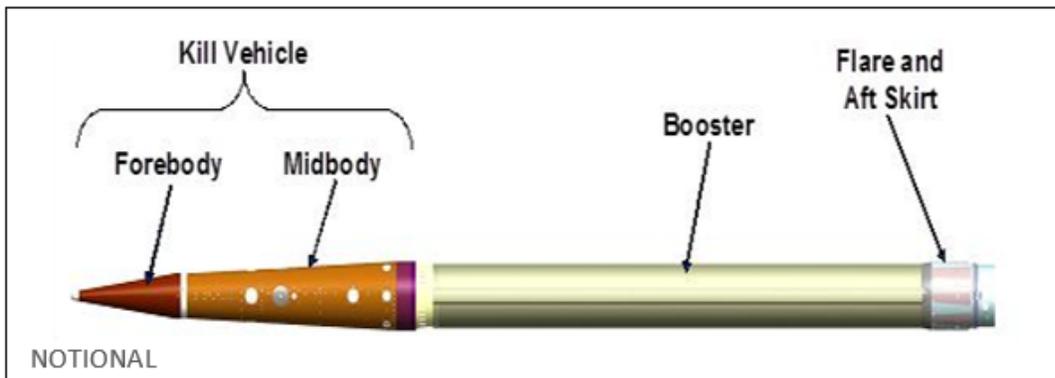


Figure 2-5. Major Components of the THAAD Missile

- *THAAD Launch Platform.* The truck-mounted THAAD launcher (**Figure 2-6**) uses a modified U.S. Army M-1120 Heavy Expanded Mobility Tactical Truck (HEMTT) to perform the functional requirements of the transporter. The THAAD launcher carries a Missile Round Pallet that contains up to eight missiles when fielded.
- *THAAD Radar.* The THAAD radar, AN/TPY-2 Terminal Mode (TM), consists of four main units: an Antenna Equipment Unit (AEU), an electronic equipment unit (EEU), a Cooling Equipment Unit (CEU), and two Prime Power Units (PPUs). A notional THAAD radar layout is depicted in **Figure 2-7**. Note, however, that the equipment would be spaced further apart than shown.



Figure 2-6. THAAD Launch Platform

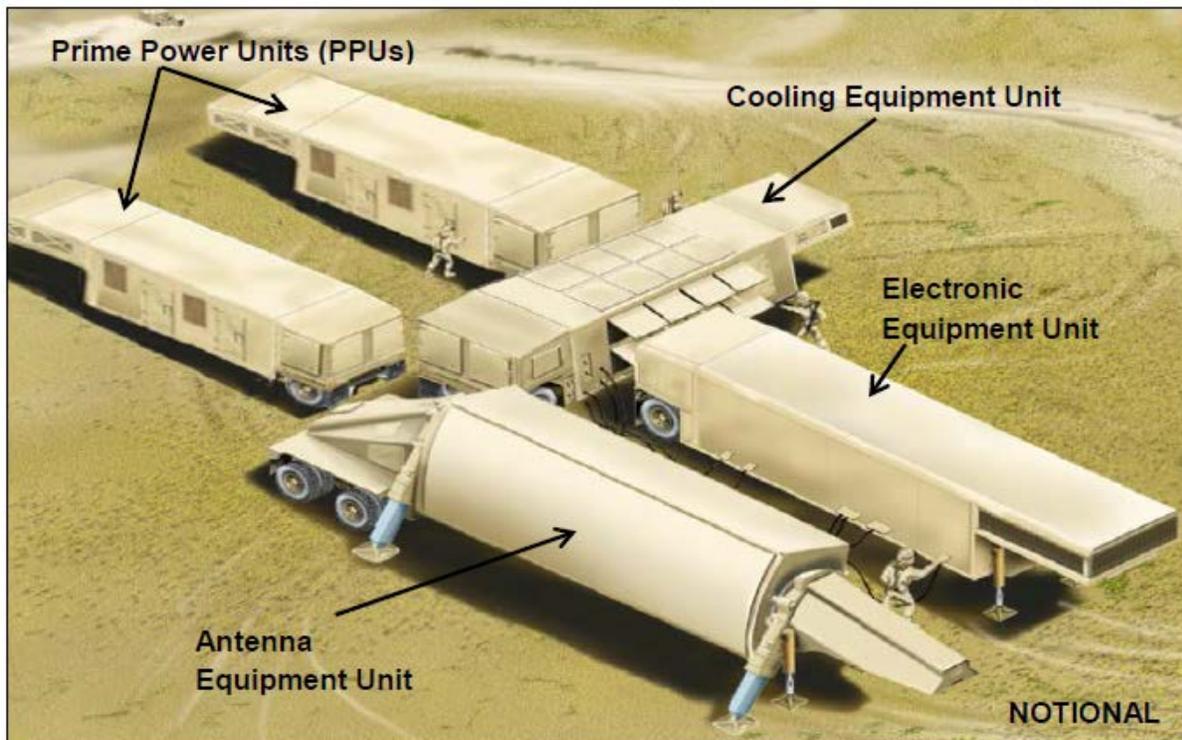


Figure 2-7. Notional THAAD Radar System Layout

The AEU transmits and receives radio frequency energy in the X-band frequency range to support search, track, and communication with the interceptor. The AEU includes all transmitter and beam steering components as well as power distribution and cooling systems. The EEU houses the signal and data processing equipment, operator workstations, and communications equipment. The CEU contains the fluid-to-air heat

exchangers and pumping system to cool the AEU. The CEU fluid-to-air heat exchanger contains a 300-gallon tank of water-propylene glycol mixture along with a 50-gallon reservoir, totaling 350 gallons of coolant in the AEU or CEU at any given time.

The PPU's used to power the THAAD radar system are self-contained trailers in a noise-dampening shroud, each containing two diesel engine-powered generators, governor and associated controls, an internal diesel fuel tank (day-tank), and air-cooled radiators. Each PPU delivers 1.3 megawatts (MW) of electrical power.

AN/TPY-2 (TM) radar operation requires 1.3 MW of electric power, which would be met using two PPU's. This power generation configuration is expected to require approximately 1,000 gallons of diesel fuel per day. Daily operations would be fueled and resupplied using fuel trucks. All cabling and fuel lines would be laid directly on the ground or in protective cable trays. The AEU, CEU and the PPU's would have spill containment barriers.

Operation of the THAAD radar requires the following exclusion zones along +/- 90 degrees of the axis of orientation of the THAAD radar system to avoid injury to personnel and damage to equipment from electromagnetic radiation (EMR) emitted from that radar: 328 ft for personnel, 1,640 ft for equipment, 1.5 miles for civilian aircraft, and 3.4 miles for military aircraft carrying electro-explosive devices (**Figure 2-8**).

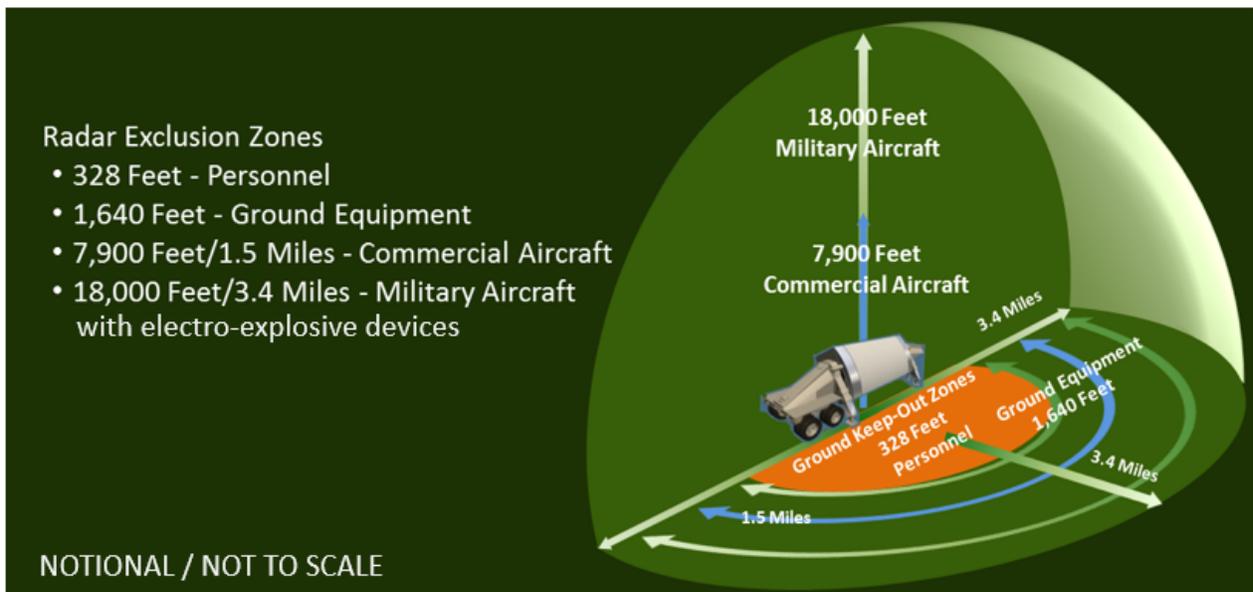


Figure 2-8. THAAD Radar Exclusion Zones

- *THAAD Fire Control and Communications (TFCC)*. The TFCC integrates the launcher and radar components by providing the planning, control, coordination, execution, and communications necessary to fulfill the THAAD missile system Engagement Operations missions. In addition, TFCC is interoperable with other systems and DoD agencies through data and voice communications. For some THAAD tests at PSCA, the TFCC

configuration may be comprised of one Tactical Operation Station (TOS) and one Launch Control Station, with each mounted on a separate Medium Tactical Vehicle. Each group would include a Station Support Group trailer transport and two 30-kilowatt (kW) generators.

2.1.3.2 PATRIOT WEAPON SYSTEM

The only combat-proven hit-to-kill weapon system of the U.S. BMD system is the PATRIOT system, which is operational and fielded by the U.S. Army. The PATRIOT system could be employed in future MDA flight tests at PSCA as a single weapon system or selected elements of the system could be employed to demonstrate interoperability with the THAAD weapon system. Similar to that of the THAAD system, the PATRIOT system primary elements are described in the following:

- *PATRIOT Advanced Capability (PAC) 2 and 3 Missiles.* The PATRIOT system has two interceptor missile systems. To combat against tactical ballistic missiles, cruise missiles, or aircraft, the PAC-2 missile uses a high explosive fragment warhead that detonates in the vicinity of the incoming threat. In contrast, the PAC-3 missile uses hit-to-kill technology similar to that of THAAD for intercepting ballistic missiles. Both missile systems use a conventional solid propellant rocket motor and have a range in excess of 60 miles. For flight safety assurance, the PAC 2 and 3 missiles are equipped with an auto destruct system should a flight malfunction occur (see **Section 2.1.2.4**). The canisterized PATRIOT missiles are smaller than the THAAD interceptor missile, measuring approximately 17 ft in length and weighing approximately 705 pounds.
- *PATRIOT Launching Station (LS).* The LS is a remotely operated, fully self-contained unit that has integral power. Each LS can carry up to four PAC-2 missiles or up to 16 PAC-3 missiles; however, there can be no mixing of PAC-2 and PAC-3 missiles on a single LS. The LS is mounted on an M-860 semi-trailer towed by an M983 HEMTT. LS power is provided by a 15-kW diesel powered generator.
- *PATRIOT Radar.* The radar unit consists of an AN/MPQ-65 multifunction phased array radar mounted on an M860 semi-trailer towed by a HEMTT. The Electric Power Plant (EPP) is the prime power source for the PATRIOT radar and Engagement Control Station (ECS). Each EPP consists of two 150-kW diesel generators that are interconnected through the power distribution unit and are mounted on a M977 HEMTT. Each generator has a 100-gallon fuel tank. During radar operations, an EMR personnel exclusion area is established 395 ft to the front and extending 60 degrees to each side of the radar center.
- *PATRIOT ECS.* The ECS is mounted on either a 5-ton truck or Light Medium Tactical Vehicle and contains the computers, man-machine interfaces, and various data and communication terminals used to accomplish Fire Unit operations. Other PATRIOT elements include the Information Coordination Center (ICC), Tactical Control Station, and Communications Relay Group.

2.1.4 Description of Representative Target Missile Systems

Several target missile systems are proposed for the defensive weapon system intercept flight tests over the BOA. Because most of these target missile systems have been described and analyzed in previous NEPA documentation, they are only briefly described in the following subsections. Additional information describing their pre-flight preparations, transportation, launches, and the resulting environmental effects can be found in the *Integrated Flight Tests at Wake Atoll Final Environmental Assessment* (MDA 2015) and in other NEPA documents identified below, which are accessible on the MDA public website at: https://www.mda.mil/news/environmental_reports.html.

Although not described, other possible target systems with characteristics and functions similar to that of the targets described below could also be used as part of the proposed BMD flight tests. Due to the similarity of components and size, the potential environmental effects from these other target systems are expected to be the same or less than that of the short-, medium-, and intermediate-range ballistic missile class targets previously described and analyzed in other NEPA documents.

2.1.4.1 MEDIUM RANGE BALLISTIC MISSILE (MRBM) TARGET

The MRBM is a multi-stage target vehicle that can be provided in several different configurations with various options depending on mission requirements. Configurations being considered for BMD flight tests include the Extended Long Range Air-Launched Target (E-LRALT) and the MRBM Types 1 and 2 (T1/T2); all configurations would be launched from an aircraft. **Figure 2-9** illustrates these MRBM targets.

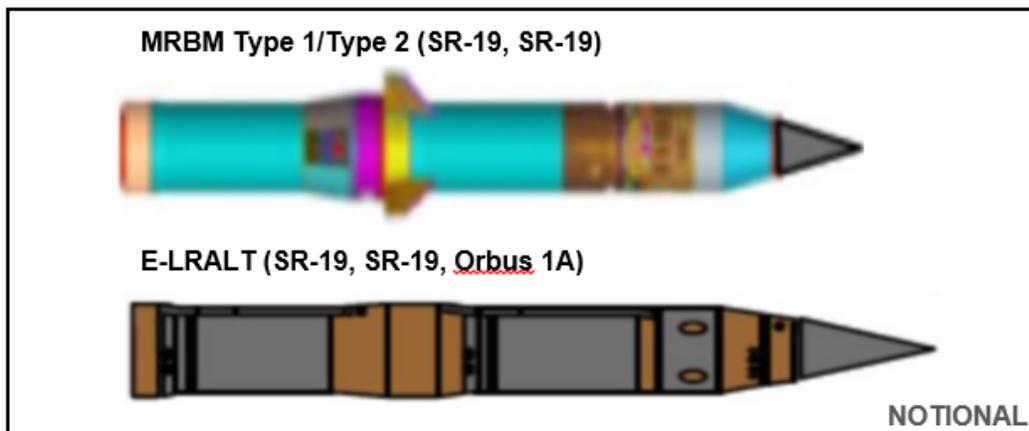


Figure 2-9. Medium Range Ballistic Missile (MRBM) Targets

The E-LRALT and MRBM T1/T2 targets are similar in that both employ SR-19 solid propellant rocket motors for the first and second stages. In addition, the E-LRALT contains a third stage Orbus 1A solid propellant rocket motor. The MRBM T1/T2 and E-LRALT measure approximately 36 and 40 ft in length, respectively, and 5 ft in diameter. The MRBMs have an approximate weight of 33,000 to 37,000 pounds.

The forward staging areas for aircraft launching the MRBM targets would be existing U.S. military installations that routinely handle these types of aircraft operations necessary for deploying the air launched targets.

The MRBM is carried aloft and launched by a U.S. Air Force (USAF) Air Mobility Command C-17 or similar aircraft. The target vehicle would be mounted on a pallet and loaded onto the aircraft through a large aft door that accommodates military vehicles and/or palletized cargo. While in flight, the aft door would be opened, allowing release of the palletized launch vehicle. Following decent by parachute and release from the pallet, the first-stage motor would ignite and begin flight on a pre-set course for intercept over the BOA. **Figure 2-10** illustrates the in-flight launch process.

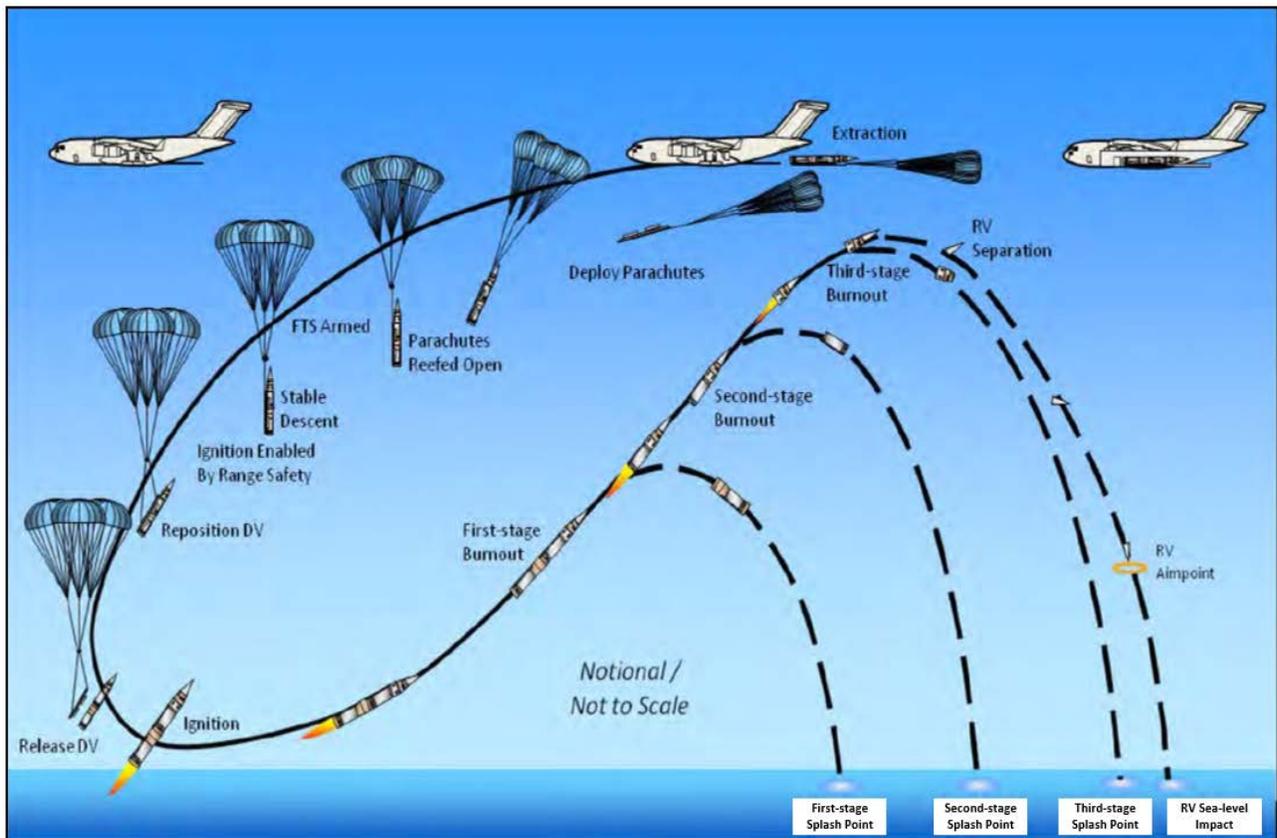


Figure 2-10. Notional Air Launched Target Flight Profile

The MRBM vehicles are equipped with an FTS that is initiated by receipt of a radio command from the missile flight safety officer. The FTS is able to detect a premature separation of the booster stages and initiate thrust termination action. Thrust is terminated by initiation of a linear shaped charge, which splits the motor casing, venting any gases into the atmosphere. If a malfunction occurs following release of the MRBM from the aircraft and descent by parachute, the flight safety officer also could send commands through the FTS, which would inhibit the start of powered flight.

Additional analyses of the MRBM vehicle can be found in the *Development and Demonstration of the Long Range Air Launch Target System EA* (MDA 2002a).

2.1.4.2 SHORT RANGE AIR LAUNCH TARGET (SRALT)

The SRALT is a smaller, single-stage target that consists of a reentry vehicle, a guidance and control module, an interstage assembly, an SR19-AJ-1 solid propellant rocket motor, and an aft skirt assembly. The target vehicle is approximately 33 ft long, has a maximum diameter of approximately 5 ft, and weighs approximately 20,000 pounds. The launch vehicle includes a guidance and control system, an inertial navigation system, a global positioning system receiver, and a telemetry system. The SR19-AJ-1 motor is equipped with a FTS to terminate thrust if unsafe conditions develop during powered flight. The SRALT would be modified to allow for separation of the re-entry vehicle during flight.

Similar to the MRBM targets, the SRALT is also carried aloft and launched from a C-17 or similar aircraft. A more detailed description on the use and analysis of the SRALT system may be found in the *Air Drop Target System Program Programmatic Environmental Assessment* (BMDO 1998).

2.1.4.3 AIR LAUNCHED (AL) INTERMEDIATE RANGE BALLISTIC MISSILE (IRBM) TARGET

The AL IRBM target shown in **Figure 2-11** is similar to the MRBM target in that it is a two-stage solid propellant target missile. The first stage motor is an Orion 50S XLT and the second stage is an Orion 50 XLT with a combined propellant weight of approximately 42,000 pounds. The AL IRBM target would be transported and employed using processes and procedures similar to those described for the MRBM target.

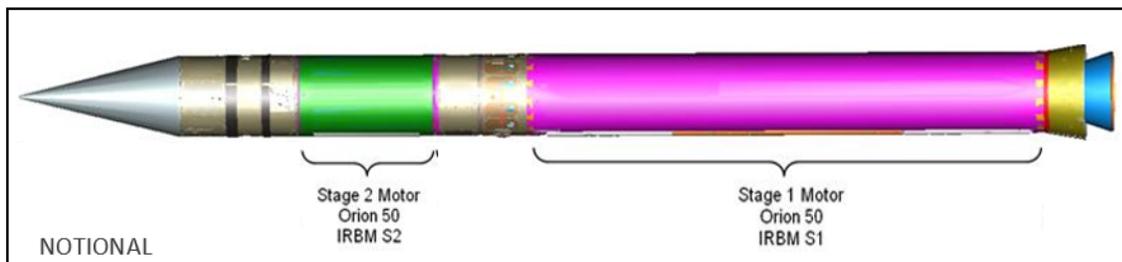


Figure 2-11. Notional Air Launched Intermediate Range Ballistic Missile Target

Transportation, pre-flight activities, flight test activities, and post flight activities would be virtually the same as for MRBM target vehicles.

2.1.5 Description of Other Test Assets

Other ground-based, sea-based, and airborne telemetry and tracking systems that may be used during the BMD flight tests are described in the following subsections.

2.1.5.1 GROUND-BASED SYSTEMS

Army-Navy Transportable Radar Surveillance 2 (Forward Based Mode). The AN/TPY-2 (FBM) is a transportable X-band, high resolution, phased-array radar designed specifically for ballistic missile defense. It is based on the THAAD radar hardware and software design described in **Section 2.1.3.1**. The AN/TPY-2 (FBM) includes modified software algorithms for tracking and discrimination from a forward-based perspective. In this role, the radar acts as advanced “eyes” for the BMD system, detecting ballistic missiles early in their flight and providing precise tracking information for use by the system.

Operation of the AN/TPY-2 (FBM) radar also requires an exclusion zones along +/- 90 degrees of the axis of orientation of the radar system to avoid injury to personnel and damage to equipment from EMR. Similar to the THAAD radar exclusion zones shown in **Figure 2-8**, the AN/TPY-2 (FBM) radar exclusion zone would measure 410 ft for personnel, 1,640 ft for equipment, and 3.4 miles for aircraft.

Land-Based Transportable Telemetry System (TTS). The TTS is a long-range, high data rate telemetry collection, processing, and data transmission system. The TTS is a standalone system capable of supporting flight tests from remote areas with minimal or no test infrastructure. Over-the-horizon voice and data communications are provided through a built-in satellite communications system. Each TTS has a satellite uplink/downlink terminal.

TTSs are planned to support proposed THAAD intercept tests. They may consist of one or two antennas, a telemetry instrumentation trailer, a storage/work trailer, and a generator shelter. Each TTS unit would be transported from the continental United States by air or surface craft and would arrive at PSCA approximately 8 weeks before the test event. Preflight activities would include transportation from their point of arrival to the final support location at PSCA, setting up the antennas, connecting power, communications, and data lines to the shelters, and conducting preliminary tests to confirm proper operations.

During flight tests, each TTS antenna receives and records telemetry streams real-time. The collected data would be transmitted via fiber optic cable or satellite communications to a data center for processing. The TTS would be powered down and disassembled at the conclusion of flight testing and prepared for transport to its normal storage location.

Early Launch Tracking System (ELTS). ELTS consists of two mobile X-band Doppler radars (640W). The system includes a mobile Command and Control (C2) shelter and a power shelter with a 170-kW generator, transfer switch, and two each 40-kVA uninterruptible power supplies. Radar can operate on commercial power or off the power shelter. Each radar trailer has a maximum weight of 7,716 pounds including the radar pedestal and auxiliary equipment, and can fit into a standard 40-ft ISO container. The C2 shelter is a 40-ft ISO container weighing 25,000 pounds; the power shelter weighs 32,000 pounds.

2.1.5.2 SEA-BASED SYSTEMS

Pacific Collector (PC). The *MV Pacific Collector* (PC) vessel hosts the TTS-1 and a Range Safety System (RSS). The PC is owned, operated, and maintained by the U.S. Department of Transportation’s Maritime Administration in support of MDA missions.

The TTS-1 is a long-range, high data rate telemetry collection, processing and data transmission system. Its primary mission area is midcourse and terminal phase telemetry coverage. In a secondary role, TTS may be used to augment the telemetry infrastructure at existing test ranges.

The Pacific Collector Range Safety System (PCRSS) was integrated onto the PC to expand the BMD test architecture with a mobile flight safety platform. The PCRSS processes missile telemetry (S- or L-band) collected by the two 24-ft TTS-1 antennas to provide real-time Time Space Position Information, FTS health and status measurements, and other critical data to onboard Flight Safety personnel. PCRSS contains all of the equipment necessary to maintain positive control over a missile FTS.

Pacific Tracker (PT). The SS *Pacific Tracker* (PT) vessel hosts the XTR-1 dual X/S-band instrumentation radar and the TTS -2 to support MDA test missions at remote sites anywhere along the flight test trajectory (boost phase, mid-course, terminal phase). The Pacific Tracker is owned, operated, and maintained by the U.S. Department of Transportation (DOT) Maritime Administration in support of MDA missions.

TTS-2 system is the same as TTS-1 system on the M/V Pacific Collector. The TTS-2 has its control room below deck housed in two primary telemetry shelters, connected to two 24-ft antennas, and a satellite communications shelter.

2.1.5.3 AIRBORNE SYSTEMS

High Altitude Observatory (HALO) I. HALO-I is a Gulfstream-IIB that consists of four independently pointed optical platform suites. The sensors collect data from the ultra-violet through long-wave infrared bandwidths. HALO-I's mission is to collect electro-optical/infrared photo documentary and calibrated radiometric data on BMD flight tests per integrated master test plan data collection objectives. The data are used to characterize target and interceptor signatures during flight, confirm staging events, assess intercepts, and anomalies.

HALO-II and HALO-IV. HALO-II and HALO-IV's mission is to collect photo documentary and calibrated radiometric data on BMD flight tests. The data are used to characterize target and interceptor signatures during flight, confirm staging events, assess intercepts, and anomalies. The Primary Sensor System consists of a stabilized optical bench in an open port pod on top of the fuselage of a Gulfstream-IIB aircraft.

2.1.6 Test-Related Activities

2.1.6.1 FACILITIES AND INFRASTRUCTURE

To conduct the proposed BMD flight test activities at PSCA, MDA would use facilities and infrastructure (i.e., water, sewer, power, communications, and roadway system) already in place or in the process of being built by PSCA. Several of the primary facilities at PSCA that may be used in support of BMD test activities are listed in **Table 2-1** and shown in **Figure 2-12**. These facilities would be used in a manner intended for their purpose as noted in the table.

Table 2-1. Existing PSCA Facilities Supporting BMD Flight Tests

PSCA Facility	Primary Purpose
Range Control Center	Administration, communication, security, launch control
Maintenance Support Facility	Administration, maintenance, storage
Instrumentation Field	Gravel pad to accommodate instrumentation equipment
Payload Processing Facility	Payload processing, clean room
Rocket Motor Storage Facility	Storage of rocket motors
Launch Service Structure	Launch processing facility
Launch Pad 2	Launch site
Integration and Processing Facility	Processing of rocket motors

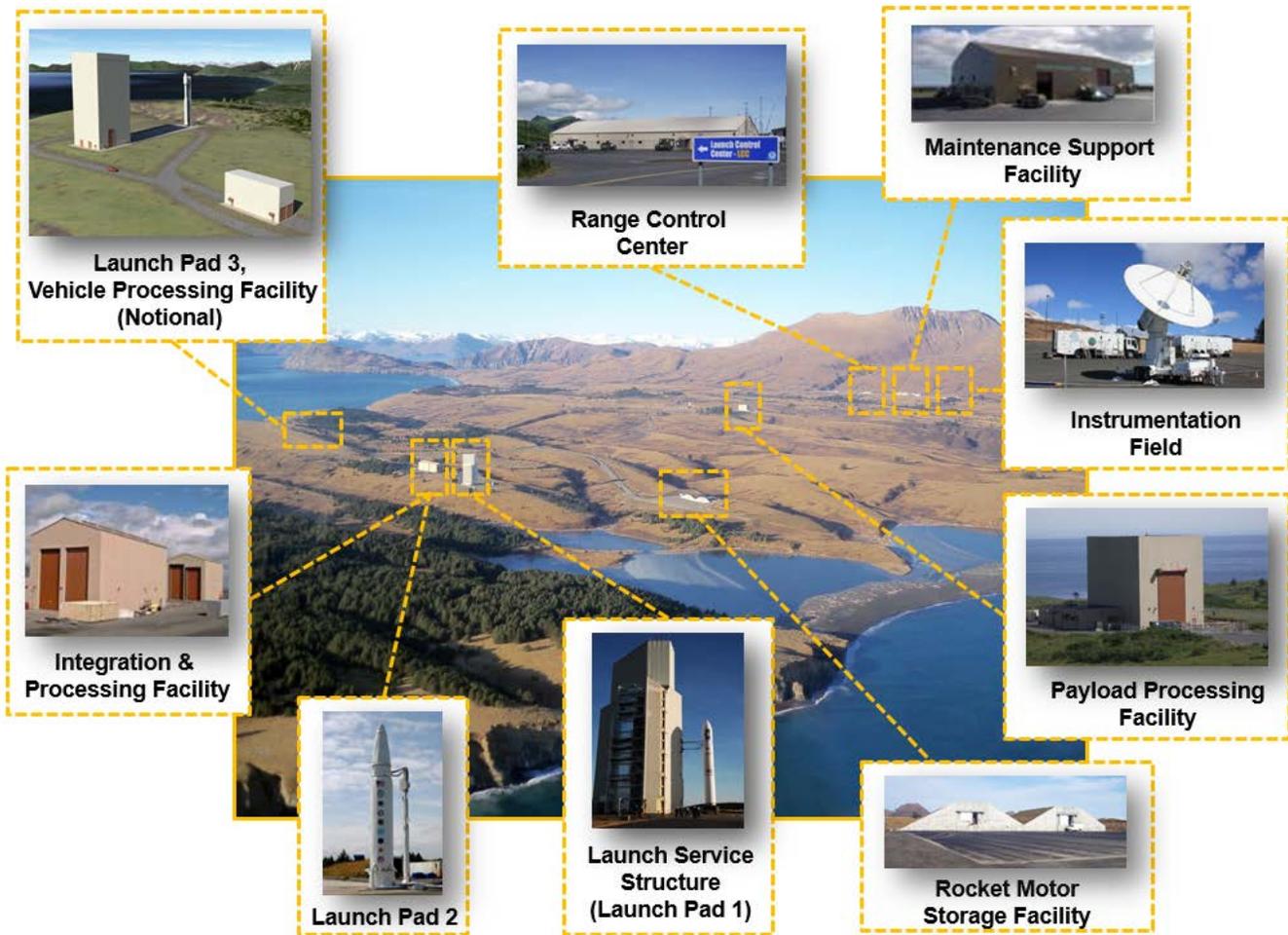


Figure 2-12. PSCA Facilities

For flight tests, the THAAD, PATRIOT, or similar defensive weapon system equipment would temporarily be set up at several optional pad areas shown in **Figure 2-13**. **Table 2-2** describes how each pad area would be used, depending on individual flight test requirements. Missile launchers would only be placed at Area 2, Area 3, or Launch Pad 2. Weapon system radars would be located at Areas 1 or 2. System support equipment would be located at Areas 4 or 5 for storage and test operations, while other ground-based telemetry and tracking system assets (e.g., AN/TPY-2 [FBM] and TTS) could be located near the Instrumentation Field. All pad area surfaces would be paved or covered with gravel.

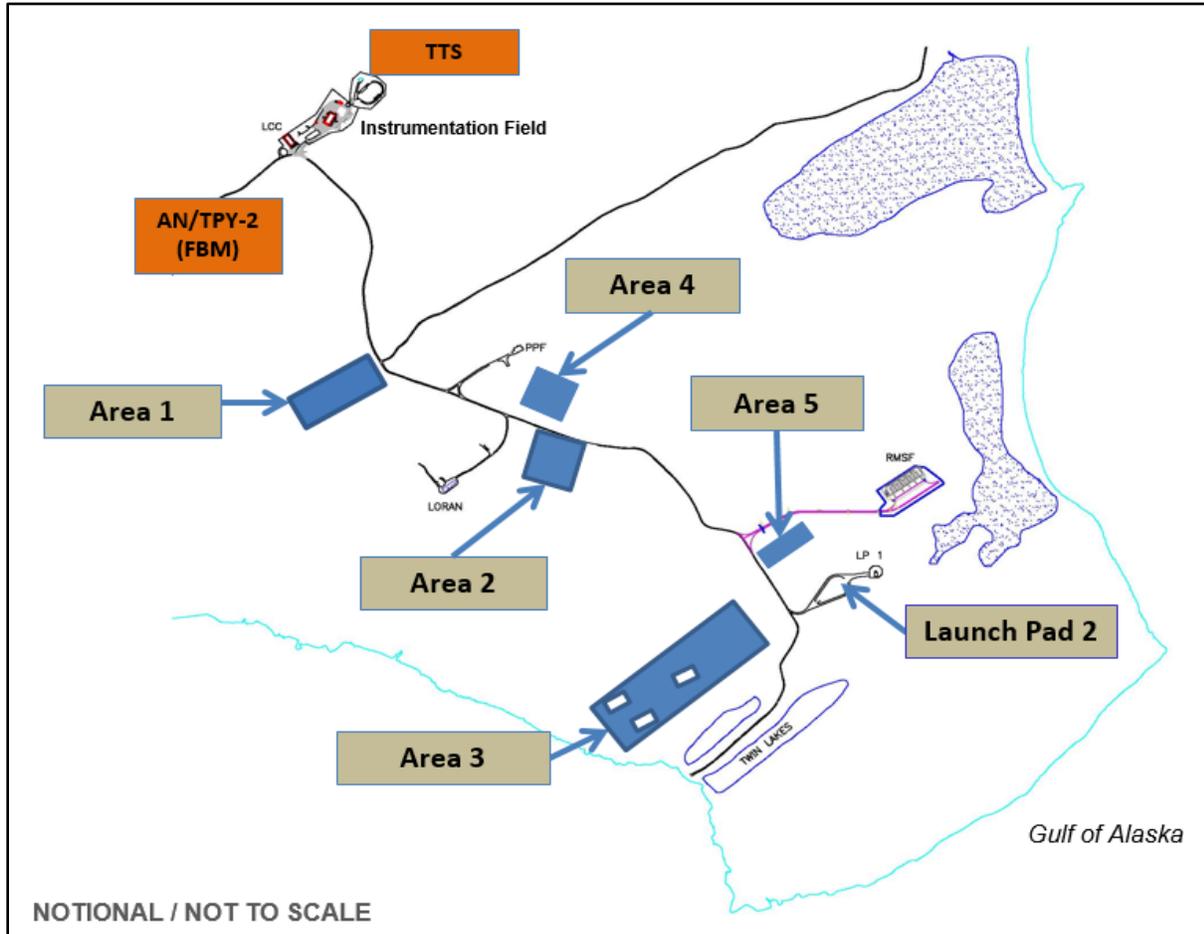


Figure 2-13. Proposed Defensive Weapon System Emplacement sites at PSCA

Table 2-2. Proposed BMD Equipment Locations at PSCA

Launcher Site	Radar Site	Support Equipment
Area 2	Area 1	Areas 4 or 5
Area 3	Areas 1 or 2	Areas 4 or 5
Launch Pad 2	Areas 1 or 2	Areas 4 or 5

2.1.6.2 SYSTEM TRANSPORTATION

The THAAD, PATRIOT, or similar defensive weapon system components would be transported from their home base to a designated air base or port for transport to PSCA. Personnel and supporting equipment would arrive at PSCA approximately 4 to 6 weeks before the actual test date. Materials arriving via aircraft would be received at the Kodiak Airport. Materials arriving via ship or barge would be received at the Port of Kodiak. Test-related materials would be transported over existing roads directly from their point of arrival to PSCA.

All transportation within the U.S. would be performed in accordance with DOT-approved procedures and routing as well as Occupational Safety and Health Administration (OSHA) requirements, U.S. Army safety regulations, and USAF regulations. For aircraft transportation, Air Force Manual 24-204, *Preparing Hazardous Materials for Military Air Shipments*, would be followed. THAAD, PATRIOT, and similar defensive weapon system missiles would be handled in accordance with the appropriate portions of Army Pamphlet 385-64, *Ammunition and Explosive Safety Standards*, and DoD 6055.09-M, *DoD Ammunition and Explosives Safety Standards*. The MDA would comply with applicable Defense Transportation Regulations and any other instructions provided by USAF.

The MDA would comply with all applicable guidelines to minimize safety concerns involved with transporting missiles, which include the transportation of hazardous materials, Class 1.3 explosives (defined in **Section 2.1.3.1**), Class 1.1 explosives (explosives that have a mass explosion hazard), and a small amount of hypergolic propellants (mixed oxides of nitrogen and monomethylhydrazine) located in the divert and attitude control system of the THAAD missile. The missile canister would serve as a limited duration containment barrier for the hypergolic chemicals. The canister would be equipped with passive and active sensors to detect propellant leaks. Should a missile component failure occur within the canister during transportation, the aircraft would land at designated airfields where trained personnel would be standing by to handle the missile component failure.

In the event that defensive weapon system components are transported from outside the continental United States to PSCA for testing, necessary inspections of components by the U.S. Customs and Agriculture Departments would take place at the initial port of entry into the United States. All equipment would be offloaded into a secure area, inspected, cleared, and then prepared for transport to PSCA.

2.1.6.3 PRE-FLIGHT PREPARATIONS

Preflight and testing operations are considered routine activities for PSCA, and no additional permanent range facility personnel would be required. Many of the military and contractor personnel temporarily deployed to PSCA in support of the BMD testing are expected to stay on PSCA using temporary housing or stay at the Narrow Cape Lodge. It is also anticipated that some of the support personnel would use lodging facilities within the City of Kodiak and other rentals local to PSCA.

In preparation for flight test operations, electrical power and communication cables associated with each defensive weapon system would be temporarily laid on the ground, along existing road rights of way or in existing conduits. If cables require additional protection from vehicle and

foot traffic, they would be placed in cable raceways, hardened conduits, or elevated. New or existing grounding systems (e.g., grounding rods and grids) would be used to protect the equipment electrical and electronic systems, and associated communication components.

THAAD Pre-Flight Preparations. THAAD equipment and test personnel would deploy to PSCA 4 weeks before the actual test date to perform pre-test operations and operate the THAAD weapon system. Approximately 200 to 300 personnel would deploy to PSCA temporarily to support each THAAD test event.

Final integration and preflight testing of the THAAD weapon components would occur at the test areas and pads identified in **Section 2.1.6.1**. This integration and testing would begin shortly after the weapons components are emplaced and continue until the test begins. THAAD hardware and equipment that would be located on site include the THAAD launchers, AEU, CEU, EEU, PPU, TFCC, Battery Logistics Operations Center, Spares Transport Shelter, Deployable Rapid Assembly Shelter, THAAD Battery Command Post, and associated fiber-optic and other cabling.

If the passive or active sensors detect a missile component failure during pre-flight activities, the missile would be quarantined until trained personnel arrive to address the situation.

THAAD ground vehicles would use existing vehicle maintenance and fueling facilities to the extent practicable. Although no major maintenance is expected to occur, small quantities of used motor oil and/or coolant could be generated through normal operations. These non-hazardous wastes and any hazardous wastes generated during vehicle maintenance would be handled in accordance with PSCA guidelines for range users.

The THAAD MRP(s) would be mounted on the launcher(s) in preparation for flight test activities. Movement and storage of other MRPs and live THAAD missiles would occur in compliance with existing policy and procedures.

The THAAD radar would require checkout and calibration as part of flight test preparations. Checkout and calibration activities would include observation of targets of opportunity that may occur downrange and by observation of existing overhead satellites. These activities are expected to require up to several days.

PATRIOT Pre-Flight Preparations. PATRIOT personnel and equipment would be transported to PSCA approximately 6 weeks before the actual test date. Approximately 50 PATRIOT soldiers and related test personnel would deploy to perform pre-test operations and operate the AN/MPQ-65 and ICC equipment during flight test activities.

AN/MPQ-65 and ICC equipment would be moved to the Lower Laydown for emplacement and subsequent operations. Approximately 6 to 10 PATRIOT soldiers would be at the emplacement area during set-up, check-out, dry runs, rehearsals, and on firing day.

PATRIOT ground vehicles would use existing vehicle maintenance and fueling facilities to the extent practicable. Although no major maintenance is expected to occur, small quantities of used motor oil and/or coolant could be generated through normal operations. These non-

hazardous wastes and any hazardous wastes generated during vehicle maintenance would be handled in accordance with PSCA user guidelines.

PATRIOT unit integration activities would be conducted before the actual test date to ensure the radar set, ICC, and launchers communicate properly. After unit integration is completed and verified, the PATRIOT unit would conduct range integration activities to verify that the unit can communicate with range safety and the other required communications and control networks.

Fuel and lubricants would be required for PATRIOT LS generators, EPPs, prime movers, and organic vehicles. Specialized support requirements would not be anticipated. PATRIOT tactical generators would require fuel on a daily basis. A reserve fuel pod would be positioned onsite to handle any emergency fuel requirements. The average daily usage for a PATRIOT Fire Unit during a test environment is approximately 300 gallons of fuel per day. PATRIOT refuel operations are normally accomplished with a mobile fueler that is used to refuel equipment in the morning and evening during 24-hour operations. The PATRIOT generators would be used on average, less than 10 hours per day for 60 days.

Other BMD System Pre-Flight Preparations. Pre-flight preparations involving other defensive weapon systems, if used, would be conducted in a similar manner to that of the THAAD and PATRIOT systems.

2.1.6.4 FLIGHT TEST ACTIVITIES

Shortly before launch, all non-mission-essential personnel would be evacuated from the launch site area. During launch, there is a potential for missile malfunction, resulting in explosion, fire, and debris impact in the launch site vicinity. Successful launches involve only small potential hazards, mainly for personnel in the immediate area; these personnel are protected or evacuated from the area and potential hazards are thus controlled.

The establishment of a GHA and LHA by the Range Flight Safety Office is required for each flight test mission to provide protection for the public and non-mission-essential personnel. The GHA and LHA provide a designated area from which personnel are cleared based upon potential hazards from any missile debris that may result from launch or near-launch difficulties. The sizes of the planning GHAs and LHAs for potential launch sites are determined based upon a composite of potential mission profiles; vehicle performance capabilities and limitations; hazards inherent in missile operations and destruct systems; and computation and review of missile trajectories, launch azimuths, intercept debris impact areas, and hazard area dimensions.

Before each BMD missile launch, Range Safety officials would request issuance of NOTAMs and NOTMARs, which would identify areas to remain clear of and the times that such areas are to be avoided. The Range Safety officials would then determine that the areas are clear of both surface vessels and aircraft. If ships or fishing boats are seen in a designated impact area, their cooperation would be requested to leave the area voluntarily. Missile launches would be put on hold until the impact area is clear of surface and air traffic. Range clearance and access control would be in accordance with existing range procedures.

After both the LHA and launch corridors for the interceptor and target are verified clear, the launch command would be given from the launch control area. Standard protective procedures would be followed during test activities to provide hearing protection for workers and minimize any noise impacts associated with launch activities. Missile impact zones would be confined to BOAs. The standard operating and safety procedures mentioned above would be tailored for specific missions as necessary. Implementation of these procedures for missile launching and testing would minimize the risk of adverse health or safety impacts associated with the program.

THAAD Flight Test Activities. The THAAD PPU, launcher generator, and TFCC generators (two each) would require approximately 1,000 gallons of fuel per day of operation on tactical power.

An LHA would be established around the THAAD launcher to comply with safety criteria. Steel plates would be placed behind the launchers to provide blast protection to the ground surface. THAAD activities would adhere to the Standard Operating Procedures at PSCA to protect all persons and property.

As previously mentioned, an EMR hazard exclusion zone would be established for radar operations. For THAAD, the following exclusion zones would be set up along +/- 90 degrees of the axis of orientation of the THAAD radar system to avoid injury to personnel and damage to equipment: 328 ft for personnel, 1,640 ft for equipment, 1.5 mile for civilian aircraft, and 3.4 miles for military aircraft carrying electro-explosive devices. The EEU, CEU, and PPU would be placed behind the AEU's radiating face (**Figure 2-7**). Before activating the radar, a visual and radar survey of the area would be conducted to verify that all personnel, equipment, and aircraft are outside the hazard exclusion zone, and a warning beacon would be illuminated when the radar is operating. The radar main beam would not radiate down to the water or ground, and energy from side lobes would be significantly less than the main beam and close to the equipment.

PATRIOT Flight Test Activities. Flight tests using the PATRIOT weapon system would be conducted in a similar manner to that of the THAAD system. Up to two PATRIOT interceptors could be launched at each target and the launchers would be remotely controlled from the ECS. No personnel are in the launch area hazard zone during launch.

Other BMD System Flight Test Activities. Flight tests involving other defensive weapon systems, if used, would be conducted in a similar manner to that of the THAAD and PATRIOT systems.

2.1.6.5 POST-FLIGHT OPERATIONS

No efforts are planned at this time to recover missile boosters or other missile components that fall into the ocean. Such components are expected to immediately sink to the ocean floor shortly after impact.

After the last flight test of each mission, the mobile equipment brought to PSCA would be dismantled and packed for shipment back to its original location. Any waste materials generated would be disposed of according to applicable regulations and range procedures and policy by PSCA, depending on whether the material is determined to be hazardous or solid waste.

2.2 No Action Alternative

The No Action Alternative would be to not conduct the BMD defensive weapon system flight tests from PSCA as described in **Section 2.1** for the Proposed Action. Activities described in the FAA's EAs (1996, 2016), for which potential environmental effects have been analyzed and approved, would continue.

3 PSCA Affected Environment and Environmental Consequences

This chapter describes the existing environmental conditions within the vicinity of the proposed defensive weapon system flight tests at PSCA, immediately followed by the analysis of potential environmental impacts associated with the Proposed Action described in **Section 2.1**. Under each environmental consequences discussion, the impact analyses are broken out by (1) system transportation and pre-flight preparations; and (2) flight test activities and post-flight operations. The information and data presented in this chapter are commensurate with the importance of the potential impacts to provide the proper context for evaluating impacts. Both direct and indirect impacts¹ are addressed where applicable. Appropriate environmental management and monitoring actions and requirements are also included, where necessary, and are summarized in **Chapter 7**.

Nine broad areas of environmental consideration at PSCA were assessed during the preparation of this EA. These nine areas, which are addressed in detail in the sections that follow, are air quality and climate change, noise, water resources, biological resources, recreational land use, airspace and air traffic, human health and safety, socioeconomics, and hazardous materials and waste.

Regarding cultural resources and historic properties, which were not analyzed in detail, MDA determined that the Proposed Action at PSCA is not the type of activity with the potential to cause direct or indirect effects on historical, architectural, archaeological, or traditional resources. MDA made this determination in accordance with the National Historic Preservation Act and its implementing regulations at 36 CFR § 800. As shown in the correspondence provided in **Appendix A**, the Alaska State Historic Preservation Officer concurred with this finding based on the following:

- Little or no ground-disturbing activities associated with the Proposed Action.
- Analyses of cultural resources at PSCA in prior FAA EAs that resulted in FONSI (FAA 1996, 2016).
- Surveys conducted by the Alaska Department of Natural Resources, Office of History and Archaeology, in 1994 and 2005 that identified no archaeological or historic properties in the project area (FAA 1996, 2016).
- Prior concurrence with the finding of "no historic properties affected" in the 2016 FAA EA.

Other resource topics were not analyzed further at this location because: (1) the Proposed Action is expected to require little or no ground-disturbing activities; therefore, no impacts to soils or geological resources would be expected; (2) the proposed test activities would not tax or exceed the capacities and therefore have little to no effect on local roadways, utilities,

¹ *Direct* impacts are caused by the action and occur at the same time and place. *Indirect* impacts occur later in time or are farther removed in distance, but are still reasonably foreseeable.

communication systems, solid waste management, or other infrastructure; (3) there would be no permanent changes to visual resources at PSCA; and (4) given that the Proposed Action would not have a negative effect on human health, subsistence, or on the environment that is significant, unacceptable, or above generally accepted norms, there would be no disproportionate impacts to minority or low-income populations under EO 12898 (*Federal Actions To Address Environmental Justice in Minority Populations and Low-Income Populations*).

Because the interceptor missiles to be launched from PSCA would be substantially smaller than other small-lift and medium-lift launch vehicles (**Figure 2-1**), the level of impact, particularly for air and noise emissions, is expected to be less in most instances when compared to the launch activities analyzed in the previous FAA EAs (1996, 2016), which identified no significant impacts from launch activities.

3.1 Air Quality and Climate Change

Air quality is measured by the concentration of criteria pollutants in the atmosphere. The air quality in a region is a result not only of the types and quantities of atmospheric pollutants and pollutant sources in an area, but also surface topography, the size of the topological “air basin,” and the prevailing meteorological conditions in that region.

National Ambient Air Quality Standards (NAAQS). The Clean Air Act (CAA), as amended, requires the United States Environmental Protection Agency (USEPA) to set National Ambient Air Quality Standards (NAAQS) for pollutants considered harmful to public health and the environment. The USEPA Region 10 and Alaska Department of Environmental Conservation (ADEC) regulate air quality in Alaska. The CAA (42 USC 7401-7671q), as amended, assigns the USEPA responsibility to establish the primary and secondary NAAQS (40 CFR § 50) that specify acceptable concentration levels of six criteria pollutants: particulate matter (measured as both particulate matter less than 10 microns in diameter [PM_{10}] and particulate matter less than 2.5 microns in diameter [$PM_{2.5}$]), sulfur dioxide, carbon monoxide (CO), nitrogen dioxide, ozone, and lead. Short-term NAAQS (1-, 8-, and 24-hour periods) have been established for pollutants contributing to acute health effects, while long-term NAAQS (annual averages) have been established for pollutants contributing to chronic health effects. While each state has the authority to adopt standards stricter than those established under the federal program, the State of Alaska has accepted the federal standards.

Attainment Versus Nonattainment and General Conformity. USEPA classifies the air quality in a region according to whether the concentrations of criteria pollutants in ambient air exceed the NAAQS. Federal regulations designate Air Quality Control Regions (AQCRs) in violation of the NAAQS as *nonattainment* areas, while AQCRs with concentration levels below the NAAQS are designated as *attainment* areas. An AQCR in *maintenance* indicates that it was previously designated nonattainment, but is now attainment.

The General Conformity Rule applies only to significant federal actions in nonattainment or maintenance areas. This rule requires that any federal action meet the requirements of a State Implementation Plan or Federal Implementation Plan. More specifically, CAA conformity is ensured when a federal action does not cause a new violation of the NAAQS; contribute to an

increase in the frequency or severity of violations of NAAQS; or delay the timely attainment of any NAAQS, interim progress milestones, or other milestones toward achieving compliance with the NAAQS.

Greenhouse Gas (GHG) Emissions. EO 13693, Planning for Federal Sustainability in the Next Decade, outlines policies intended to ensure that Federal agencies evaluate climate-change risks and vulnerabilities, and to manage the short- and long-term effects of climate change on their operations and mission. The EO specifically requires agencies within the DoD to measure, report, and reduce their GHG emissions from both their direct and indirect activities (DoD 2014).

In addition, the CEQ recently released final guidance on when and how Federal agencies should consider GHG emissions and climate change in NEPA analyses (CEQ 2016). The guidance is primarily focused on projects that have large air quality implications. It also emphasizes a netting approach to GHG analysis. Although not specifically identified in the final guidance, the prior draft guidance included a reference point of 27,558 tons per year (25,000 metric tons per year) of CO₂ equivalent emissions for discussion and disclosure of such emissions from larger federal actions that may have appreciable GHG emissions (CEQ 2014). This threshold was carried forward to see if additional quantitative analysis would be required for the Proposed Action within this EA.

3.1.1 Affected Environment

Because air quality is measured and regulated on a regional level, the Region of Influence (ROI) for air quality at PSCA is Kodiak Island and the South Central Alaska Interstate Air Quality Control Region (AQCR 247) (40 CFR § 81.247). The air quality at Narrow Cape can be generally classified as unimpaired. Existing launch activities at PSCA, ranching, and vehicular traffic are the only human activities within the vicinity of Narrow Cape that typically affect background air quality.

USEPA has designated Kodiak Island as in attainment for all criteria pollutants (USEPA 2016). USEPA monitors levels of criteria pollutants at representative sites in each region throughout Alaska; however, no air quality monitoring facilities are in the vicinity of Kodiak Island or Narrow Cape. Because Kodiak Island is located within an attainment area for all criteria pollutants, the General Conformity Rules do not apply to the Proposed Action.

Kodiak Electric Association provides power to the existing PSCA facilities. Backup diesel generators are also available at PSCA. The generators operate as backup for 5 hours during launches, 1 hour per week for testing during non-launch periods, and during commercial power outages (estimated maximum total 262 hours per year). The intermittent usage contributes to annual pollutant emissions far less than the ADEC Title V permitting threshold of 100 tons (FAA 2016).

Changes to the ADEC Air Quality Control Regulations (18 AAC 50) were adopted in October 2004, which affected Pre-Approved Emission Limits (PAELs). As of February 7, 2005, ADEC certified that PSCA was no longer subject to monitoring, record keeping, and reporting requirements established in their PAEL #00485. PAEL #00485 was rescinded at that time because stationary emission sources at PSCA were within ADEC-established thresholds. PSCA is not currently required to operate under a PAEL or Minor Permit. There are low levels of

emissions at and near PSCA because of the sporadic use of generators, the low volume of vehicle traffic, and extremely sparse residential population, which generates low levels of emissions from building heating. There are no rocket engine static tests at PSCA (FAA 2016).

The launching of solid-propellant rockets produces emissions primarily of hydrogen chloride (HCl), CO, CO₂, NO_x, black carbon and aluminum oxide. HCl, NO_x, CO₂ and CO emissions are gaseous; aluminum oxide and black carbon are emitted as particulates as large as 4 millimeters. The primary emissions from liquid-propellant vehicles include CO, CO₂, hydrogen, water vapor, and oxygen. Exhaust plumes are concentrated within the geographic area near the launch pad (known as the near field) where the ground cloud forms and begins its thermal rise process. The far field is considered to be the geographic area where the stabilized and neutrally buoyant cloud material mixes back to the ground. Because of the rapid acceleration of the rocket, the vast bulk of rocket exhaust products are expelled above the mixing layer where they disperse quickly, reducing ground-level impacts.

The most common GHGs emitted from human activities include CO₂, methane, and nitrous oxide; however, because CO₂ emissions account for approximately 92 percent of all energy-related GHG emissions in the United States, they are used for analyses of GHG emissions in this assessment. The U.S. Department of Energy, Energy Information Administration estimates that 2013 gross CO₂ emissions for Alaska and the United States were 36 million metric tons and 5,280 million metric tons, respectively (U.S. EIA 2014). On a larger scale, the rocket emissions of CO₂ and black carbon are greenhouse gases contributing to global climate change and their emissions of HCl can cause short-term localized damage to the stratospheric ozone layer. HCl emitted from launch vehicles remains in the stratosphere and is transported throughout the Northern Hemisphere where it continues to destroy ozone for about 6 years (FAA 2016).

Climatic conditions at Narrow Cape affect the dissipation of exhaust plumes from rocket launches. The climate at Narrow Cape is characterized as maritime, with long, mild winters and short, cool summers. Average annual precipitation is high at approximately 77 inches. The monthly average of precipitation ranges from approximately four to nine inches. The average annual wind speed is 11 miles per hour with prevailing wind directions from the northeast and southwest. Wind speeds are greatest in the winter months, between November and March, and lowest May through September; however even during the summer months the mean wind speed is 5 mph or greater, which is sufficient for good dispersion of air pollutants (FAA 2016).

3.1.2 Environmental Consequences of the Proposed Action

The potential for air quality effects related to launch activities at PSCA also was evaluated in the FAA 2016 EA, which analyzed up to nine annual launches from PSCA, including sub-orbital, small-lift orbital, and medium-lift orbital launches. For analysis purposes in this EA, the environmental impacts of up to nine BMD launches per year are described. In most years, however, MDA expects the total number of BMD launches to be fewer than nine. As shown in **Figure 2-1**, the BMD interceptor missiles would be substantially smaller than the launch vehicles previously analyzed in the prior FAA EAs (FAA 1996, 2016). Therefore, it is expected that the overall level of impacts to air quality associated with the BMD flight tests would be less than previously analyzed.

The General Conformity Rule requires federal agencies to determine whether their action(s) would increase emissions of criteria pollutants above preset threshold levels in nonattainment areas (40 CFR § 93.153). Because Kodiak Island is an attainment area for all NAAQS, the General Conformity Rule does not apply. For purposes of this EA, the least restrictive *de minimis* level of 100 tons per year for each criteria pollutant was used to determine whether the Proposed Action would be significant under NEPA. The total direct and indirect emissions associated with the Proposed Action were estimated, and would not exceed *de minimis* levels (**Table 3-1**). These effects would be minor. Detailed emissions calculations are provided in **Appendix D**.

Table 3-1. Estimated Emissions of Criteria Pollutants for the Proposed Action (Tons per Year)

Activity/Source	CO	NO _x	VOC	SO _x	PM ₁₀	PM _{2.5}
System Transportation and Pre-Flight Preparations	5.8	0.7	0.6	0.0	0.0	0.0
Flight Test Activities¹	1.4	11.0	0.0	0.6	0.2	0.2
Post-Flight Operations	0.1	0.0	0.0	0.0	0.0	0.0
Total Emissions Per Mission	7.2	11.7	0.6	0.6	0.3	0.2
Total Emissions Per Year	14.4	23.4	1.3	1.2	0.5	0.4
De Minimis Thresholds²	100	100	100	100	100	100
Exceeds De Minimis Threshold	No	No	No	No	No	No

¹ PM₁₀ and PM_{2.5} emissions from launch vehicle exhaust are assumed to be 10.3 and 7.2 percent total aluminum oxide (Al₂O₃), respectively.

² The least restrictive *de minimis* level of 100 tons per year was used to determine whether the Proposed Action would be significant under NEPA.

In addition to criteria pollutants, the Proposed Action would introduce some level of GHG emissions. All activities combined would release approximately 6,039 tons of CO₂ per year, most of which (approximately 4,850 tons) would come from generator operations at PSCA (**Table 3-2**). A launch of one THAAD missile would release only 0.07 ton of CO₂. Thus, the annual CO₂ emissions from the Proposed Action combined would amount to approximately 22 percent of the CEQ presumptive effects threshold of 27,558 tons per year. Detailed emission calculations are provided in **Appendix D**.

The nature and overall level of direct and indirect emissions would be similar regardless of the interceptor missile system (i.e., THAAD, PATRIOT, or similar defensive weapon systems). For the purpose of estimating emissions of both criteria pollutants and GHGs, it was assumed that all activities would be compressed into one 12-month period. Therefore, regardless of the ultimate implementation schedule, annual emissions would be less than those specified herein. Small changes in facilities, moderate changes in quantity and types of equipment, and the type of interceptor missile used would not substantially change these emission estimates, and would not change the level of effects under NEPA.

Table 3-2. Estimated Emissions of GHG for the Proposed Action (Tons per Year)

Activity/Source	CO ₂
System Transportation and Pre-Flight Preparations	601
Flight Test Activities	2,411
Post-Flight Operations	7
Total Emissions Per Mission	3,019
Total Emissions Per Year	6,039
CEQ Presumptive Effects Threshold	27,558
Exceeds CEQ Threshold	No

3.1.2.1 SYSTEM TRANSPORTATION AND PRE-FLIGHT PREPARATIONS

Short-term minor adverse effects to air quality would be expected. All direct and indirect emissions of criteria pollutants and GHGs for the system transportation and pre-flight preparations were estimated (refer to **Tables 3-1 and 3-2**). These include emissions from delivery of equipment, supplies, and services, and employee commuting during pre-flight preparations. The nature and overall level of emissions from transportation and pre-flight activities would be similar regardless of the interceptor missile system ultimately selected (i.e., THAAD, PATRIOT, or similar defensive weapon systems), and would not be significant.

Proper tuning and preventive maintenance of support vehicles and equipment would minimize engine exhaust emissions. In addition, preparations for the flight tests would be conducted in compliance with all applicable federal and state air quality rules and regulations.

No fueling of interceptor missiles with liquid, hypergolic propellants would occur as each canisterized missile would be pre-fueled prior to being shipped to PSCA. Thus, there would be no loss or leakage of potential air pollutants associated with these types of materials. No new permanent stationary sources of air emissions would be installed as part of the Proposed Action, and no additional air permits would be required.

3.1.2.2 FLIGHT TEST ACTIVITIES AND POST-FLIGHT OPERATIONS

Short-term, minor adverse effects to air quality would be expected. All direct and indirect emissions of criteria pollutants and GHGs from the launch itself and the use of generators to power the interceptor system were estimated (refer to **Tables 3-1 and 3-2**).

The primary criteria pollutants emitted during launch include CO and particulates in the form of Al₂O₃. In addition to criteria pollutants, the products of combustion would also include aluminum oxide, HCl, hydrogen, nitrogen, carbon dioxide, and water. **Table 3-3** provides a general breakdown of launch emissions for interceptor launches using THAAD as the representative vehicle.

The chemical composition of the exhaust products from the proposed interceptor rockets would be the same when compared to small-lift rockets previously launched from PSCA; however, in smaller quantities. These products of combustion are predominantly inert and not harmful in

Table 3-3. Launch Exhaust Emissions from THAAD Flight Tests

Products of Combustion	Pounds/Launch	Pounds/Year¹	Tons/Year¹
Al₂O₃ (aluminum oxide)	350	3150	1.58
CO (carbon monoxide)	250	2250	1.13
HCl (hydrogen chloride)	200	1800	0.90
N₂ (nitrogen)	100	900	0.45
H₂O (water)	50	450	0.23
H₂ (hydrogen)	50	450	0.23
CO₂ (carbon dioxide)	15	135	0.0675
Cl (chlorine)	5	45	0.0225
CaCl (calcium chloride)	5	45	0.0225
NaCl (sodium chloride)	5	45	0.0225
AlCl (aluminum chloride)	2.5	22.5	0.0113
Other Miscellaneous Constituents	3.8	33.804	0.0169
Total	1,036	9,326.3	4.7

Source: MDA 2002b

¹Note: Emissions represent not-to-exceed values. Actual emission would be less than shown herein. Assumes nine interceptor missile launches in a year.

levels emitted beyond the immediate area of the launch site. One component of concern is HCl, which combines with water in the atmosphere to create hydrochloric acid. In the immediate area of the launch site, HCl concentrations could briefly reach levels above the OSHA permissible exposure limit of 5 parts per million but they would disperse rapidly after launch dropping below the OSHA standard. The potential concentrations that the general public could experience would be much lower due to the large distances between PSCA and areas accessible to the general public. On-site personnel may safely return to the launch pad without air quality concerns as soon as the pad has been visually cleared by the pad safety officer (FAA 2016).

Air quality effects from previous launches at PSCA have been temporary and localized. Short-term effects within the area immediately surrounding the launch pad include high temperature exhaust gas mixtures and elevated carbon monoxide concentrations. Previous observations indicate that ambient air temperature at the launch pad returns to pre-flight conditions within 10 minutes, and so would the pollutant concentrations. The exhaust clouds dissipate after each launch and are generally carried seaward by prevailing winds from the northwest. Security checkpoints on mission day prevent the general public from approaching the launch sites closer than the PSCA boundary, about 2 miles away. The nearest residences, individuals at the property-line, and marine traffic are unlikely to experience pollutant concentrations approaching or exceeding the NAAQS or any other air quality standard (FAA 2016).

During flight, the missile emissions would be rapidly dispersed over a large geographic area by prevailing winds. Because the launches would be short-term, discrete events, the time between launches allows the dispersion of the emissions products. The emissions per launch would be similar for each interceptor, but the atmospheric concentrations would differ depending on local meteorological conditions at the time of launch, such as temperature profiles, atmospheric

stability, wind speeds, and the presence or absence of inversions. It is not anticipated that air quality standards or health-based standards for non-criteria pollutants would be exceeded. These effects would not be significant.

Each of the missile systems would have generators to provide both direct and back-up power during testing. The THAAD system would have two 1.3-MW generators and additional smaller generators operating. The PATRIOT system would have lesser generator requirements. Other defensive weapon systems would have power generation requirements similar to THAAD and PATRIOT. Generator emissions are included within the emissions from launch activities in **Tables 3-1 and 3-2**. For analysis purposes, it was assumed that the total generator capacity for any interceptor system would be less than 3.1-MW (i.e., two 1.3-MW main generators and up to 500 kW of additional generators) and their operation would be limited to no more than 500 hours in a given flight test event.

In the hours and days following the launch, a general safety check and cleanup of the launch site would occur. All direct and indirect emissions of criteria pollutants and GHGs for worker commutes, the removal of equipment from the launch sites, and general refurbishment of launch site facilities were estimated (refer to **Tables 3-1 and 3-2**). These emissions would be similar in nature, but somewhat less than those for pre-flight activities. These effects would not be significant.

3.2 Noise

Sound is a physical phenomenon consisting of vibrations that travel through a medium, such as air, and are sensed by the human ear. Noise is defined as any sound that is undesirable because it interferes with communication, is intense enough to damage hearing, or is otherwise intrusive. Human response to noise varies depending on the type and characteristics of the noise distance between the noise source and the receptor, receptor sensitivity, and time of day. Noise is often generated by activities essential to a community's *quality of life*, such as vehicular traffic.

Sound varies by both intensity and frequency. Sound pressure level, described in decibels (dB), is used to quantify sound intensity. The dB is a logarithmic unit that expresses the ratio of a sound pressure level to a standard reference level. Hertz are used to quantify sound frequency. The human ear responds differently to different frequencies. "A-weighting," measured in A-weighted decibels (dBA), approximates a frequency response expressing the perception of sound by humans. Sounds encountered in daily life and their dBA levels are provided in **Table 3-4**.

The sound pressure level noise metric describes steady noise levels, although very few noises are, in fact, constant; therefore, additional noise metrics have been developed to describe noise including:

- Maximum Sound Level (L_{max}) – L_{max} is the maximum sound level in decibels.
- Equivalent Sound Level (L_{eq}) – L_{eq} is the average sound level in decibels.

Table 3-4. Common Sound Levels

Outdoor	Sound Level (dBA)	Indoor
Motorcycle	100	Subway train
Tractor	90	Garbage disposal
Noisy restaurant	85	Blender
Downtown (large city)	80	Ringling telephone
Freeway traffic	70	TV audio
Normal conversation	60	Sewing machine
Rainfall	50	Refrigerator
Quiet residential area	40	Library

Source: Harris 1998

- Sound Exposure Level (SEL) – SEL is a measure of the total energy of an acoustic event. It represents the level of a 1-second long constant sound that would generate the same energy as the actual time-varying noise event such as a missile launch. SEL provides a measure of the net impact of a single acoustic event, but it does not directly represent the sound level at any given time.
- Day-night Sound Level (DNL) – DNL is the average sound energy in a 24-hour period with a 10-dB penalty added to the nighttime levels. DNL is a useful descriptor for noise because: (1) it averages ongoing yet intermittent noise, and (2) it measures total sound energy over a 24-hour period. DNL provides a measure of the overall acoustical environment, but as with SEL, it does not directly represent the sound level at any given time.

Noise Regulations. The Noise Control Act of 1972 (PL 92-574) directs federal agencies to comply with applicable federal, state, and local noise control regulations. Alaska does not maintain specific not-to-exceed noise regulation, but the Kodiak Island Borough Code (§17.105.060) sets not-to-exceed performance standards for industrial activities to no greater than 90 dBA in any adjacent residential district.

The FAA and DoD land use guidelines for noise exposure are essentially the same as those published by the Federal Interagency Committee on Urban Noise in the June 1980 publication, *Guidelines for Considering Noise in Land-Use Planning and Control* (14 CFR § 150). These guidelines stem from the USEPA *Levels Document* (USEPA 1974), which suggested continuous and long-term noise in excess of DNL 65 dBA are normally unacceptable for noise-sensitive land uses such as residences, schools, churches, and hospitals. **Table 3-5** outlines recommended noise limits for land use planning purposes.

3.2.1 Affected Environment

Existing sources of noise at PSCA include infrequent launch operations, road traffic, boats, and other noises such as bird and animal vocalizations. Background noise levels without launch operations (L_{eq} and DNL) were estimated for the surrounding areas using the techniques specified in the *American National Standard Institute - Quantities and Procedures for Description and Measurement of Environmental Sound Part 3: Short-term measurements with*

Table 3-5. Recommended DNL Noise Limits for Land Use Planning

General Level of Noise	Overall Noise (DNL)	Recommended Uses
Low	< 65 dBA	noise-sensitive land uses acceptable
Moderate	65–75 dBA	noise-sensitive land uses normally not recommended
High	> 75 dBA	noise-sensitive land uses not recommended

Source: 14 CFR § 150

an observer present. **Table 3-6** outlines the land use category and the estimated background noise levels for nearby noise sensitive areas. Notably, the closest noise sensitive receptors are outside the PSCA property boundary and greater than 1 mile from the proposed launch sites.

Table 3-6. Estimated Background Noise Levels

Example Land Use Category	Average Residential Intensity (people per acre)	DNL	L _{eq} (dBA)	
			Daytime	Nighttime
Rural or remote	<2	<49	<48	<42
	2	49	48	42
Suburban residential	4	52	53	47
	4.5	52	53	47

Source: ANSI 2013

Noise levels at PSCA vary greatly depending on the level of work happening at the facility. Launch-related noise effects are infrequent (up to nine times per year) and short lived, with a return to ambient noise levels within 2 minutes of a launch. Based on measured data and the level of activity at PSCA, sound levels are well below 65 dBA DNL for all nearby noise sensitive areas and all nearby land uses are fully compatible with noise from the launch activities (FAA 2016).

3.2.2 Environmental Consequences of the Proposed Action

The potential for noise effects related to launch activities at PSCA was evaluated in the FAA 2016 EA, which analyzed up to nine annual launches from PSCA, including sub-orbital, small-lift orbital, and medium-lift orbital launches. For analysis purposes in this EA, the environmental impacts of up to nine BMD launches in a given year are described in the following sections. In most years, however, MDA expects the total number of BMD launches to be less than nine. The proposed BMD interceptor missiles would be substantially smaller than the launch vehicles previously analyzed (FAA 1996, 2016). Therefore, it is expected that the overall level of impacts to the noise environment associated with the BMD flight tests would be both less than previously analyzed and not significant.

3.2.2.1 SYSTEM TRANSPORTATION AND PRE-FLIGHT PREPARATIONS

There would be no appreciable sources of noise during system transportation and pre-flight preparations. There would be some minor noise from the use of vehicles and from test

equipment operations, primarily from multiple generators. These effects would be negligible and are further discussed below.

3.2.2.2 FLIGHT TEST ACTIVITIES AND POST-FLIGHT OPERATIONS

Launches would generate individual acoustical events that would be very loud near the launch pad, but would attenuate rapidly with distance. These events would be relatively short in duration, lasting approximately 20 seconds each. Noise levels generated by each test would vary, depending on launch location, missile system configuration, trajectory, and weather conditions. In general, noise during the launches and in flight soon after launch would be clearly audible to nearby areas both on and off PSCA.

The best available noise information for a comparable missile system is for the THAAD system. There currently are no noise data or measurements for PATRIOT system missiles. As described in **Section 2.1**, the THAAD is a solid-fuel surface-to-air missile with a launch booster comparable to the PATRIOT and other defensive weapon missile systems. Noise from the THAAD missile has been carried forward as a surrogate to reflect a reasonable upper bound of effects from any of the proposed systems. Sound levels during launch for the THAAD missile are outlined in **Table 3-7**.

Table 3-7. Sound Levels for a THAAD Missile Launch

Distance from Launch Site (ft)	Sound Level		
	Peak [dBP]	Lmax [dBA]	SEL [dBA] ²
97	148.4–155.9	133.6	137.8
275	142.7–146.9	119.7	123.9

Source: U.S. Army 2010

¹Decibels peak sound pressure level = dBP

²SEL approximated to be $L_{max} + 10\log(\text{time in seconds})$; where time is 2.6 seconds.

While sound levels can be characterized as very loud near the launch pad, launches would occur infrequently, be short in duration, and have a minute effect on the overall sound in the area (e.g., DNL). The SEL of a THAAD missile at a distance of 1,000 ft shortly after launch was estimated to be 112 dBA. If there is only one launch per day, DNL can be calculated by subtracting a constant representing 10 times the logarithm of the 86,400 seconds in a 24-hour day, which is 49.4 dB. So, for a single THAAD missile launch at a distance of 1,000 ft (112 dBA SEL), the DNL would be 62.6 dBA. DNL would increase 3 dBA for every doubling of operations, so it would take two launches every day (730 launches per year) to achieve a long-term 65-dBA DNL at 1,000 ft from the launch site. Based upon the limited number of proposed launches the overall sound levels would never exceed 65 dBA DNL.

It is expected that the peak sound level would exceed 140 dBP at a distance of 605 ft from the launch site. Personnel working near the area at the time of launch would be required to wear appropriate hearing protection in accordance with all federal health and safety requirements. In addition, public access areas near the launch sites would be restricted to about 2 miles from the launch sites to ensure public safety and minimize unnecessary exposures.

The only other considerable source of noise during flight testing would be the generators that would continuously supply power to the weapon system and other test assets. The generators would be enclosed with the intake and the exhaust open to the exterior. Generators would be operated during flight testing and a few hours per month for maintenance purposes. Operating at 100 percent load, sound levels from the generators would drop to below the background levels (i.e., 35 dBA) within approximately 2,800 ft of the launch site (Caterpillar 2010). Noise during operation of the generators may be remotely audible by nearby residences during periods of extreme quiet (e.g., still weather at night); however, it would be substantially masked by existing ambient sources of noise particularly in the daytime hours. Noise during operation of the emergency generators would not exceed the Kodiak Island's municipal noise limit of 90 dBA in any nearby residential area.

Noise levels generated during post-launch operations would be similar to those generated during pre-flight preparations, but for a shorter duration. Impacts to the noise environment from these activities would be negligible.

Long-term averages of sound incorporate the long periods of silence between tests; therefore, the DNL both on and off PSCA would not change when compared to existing conditions without any launch activities. The overall levels would remain below 65 dBA DNL for all nearby noise sensitive areas, and all nearby land uses would be fully compatible with noise from the launch activities. Based on this analysis, the action of conducting up to approximately nine BMD launches in a 12-month period from PSCA would have no significant impact on the noise environment. The potential for launch noise effects on protected wildlife species is discussed in **Section 3.4.2.2**.

3.3 Water Resources

For this analysis, water resources include groundwater, surface waters, and wetlands. Groundwater is water that collects or flows beneath the Earth's surface, filling the porous and open spaces in soil, sediment, and rocks. Groundwater can typically be described in terms of its depth from the surface, aquifer or well capacity, water quality, surrounding geologic composition, flow rate and direction, and recharge rate.

Surface water includes natural, modified, and constructed water confinement and conveyance features that may or may not have a defined channel and discernable water flows. These features are generally classified as streams, springs, wetlands, natural and artificial impoundments (e.g., ponds and lakes), and marine waters.

Wetlands generally include swamps, marshes, bogs, and similar areas (33 CFR § 328). The U.S. Army Corps of Engineers defines wetlands as “those areas that are inundated or saturated with ground or surface water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted to life in saturated soil conditions.”

Clean Water Act (CWA). The CWA (33 USC § 1251 et. seq., as amended) requires states to establish water quality standards for water bodies inside their borders and then identify waters

not meeting the standards. USEPA has delegated permitting responsibilities to qualified states under Sections 401 and 402 of the CWA.

Section 401 requires any applicant for a federal permit under the CWA to obtain a State Water Quality Certification. A related statute, the Safe Drinking Water Act, establishes federally delegated state-implemented programs for regulating groundwater quality.

Section 402 authorizes the National Pollutant Discharge Elimination System permitting program to regulate and enforce discharges into U.S. waters. Alaska has been delegated this permitting program authority under the Alaska Pollutant Discharge Elimination System. Ground disturbing construction projects greater than 1 acre in size within Alaska must be authorized under the Alaska Pollutant Discharge Elimination System Construction General Permit.

Wetlands are protected as a subset of the Waters of the United States under Section 404 of the CWA. Under Section 404 of the CWA, the U.S. Army Corps of Engineers issues permits for the discharge of dredged or fill materials into the waters of the United States, including wetlands.

Wetlands are also a natural resource protected by EO 11990, Protection of Wetlands. EO 11990 requires that federal agencies provide leadership and take actions to minimize or avoid the destruction, loss, or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands. Federal agencies are to avoid new construction in wetlands, unless the agency finds there is no practicable alternative to construction in the wetland.

3.3.1 Affected Environment

The ROI for water resources includes PSCA and the near-shore waters that would be affected by the interceptor missile tests. Existing conditions of the land-based and coastal water resources within the ROI are summarized below.

Groundwater. Although surface water is abundant in Alaska, many of the streams, rivers, and lakes are normally covered with ice for much of the year. Accordingly, groundwater is an important source of supply, especially in the zones where permafrost is absent. Bedrock supplies water to a significant number of wells on Kodiak Island. Metamorphic rocks yield water in substantial quantities only where they have been fractured. The slate and metamorphosed volcanic bedrock on Kodiak Island generally yield less than 15 gallons per minute to wells, but locally yield as much as 100 gallons per minute (Miller et al. 1997). The source of water for the public water system at PSCA is classified as groundwater not under the influence of surface water. PSCA is currently entitled to use 335,627 gallons per year of groundwater (FAA 2016).

Surface Water. The entire Kodiak Archipelago is grouped into the Kodiak-Afognak Islands Watershed (HUC 19020701). Numerous streams and lakes are located on Kodiak Island; those that drain in the northwest toward Shelikof Strait tend to be wider and deeper, and flow over longer distances, whereas those that drain to the southeast toward the Pacific Ocean flow from steeper terrain for shorter distances. Numerous ponds and elongated lakes are also scattered throughout Kodiak, typical of glaciated areas. Lakes located within PSCA include West and East Twin Lakes, which are freshwater lakes, and Triple Lakes and Barry Lagoon, which are considered to be salt water-influenced lagoons. The average recharge rates, including runoff

and precipitation into and evaporation from the lakes, for East and West Twin Lakes is approximately 230 and 98 gallons per minute, respectively (FAA 2016).

According to the ADEC-maintained List of Impaired Waters (Section 303(d) list), there are no listed impaired water bodies located within PSCA (ADEC 2016). Previous surface water quality monitoring efforts have been conducted in conjunction with rocket launches and long-term results showed that launch operations were having no effect on local water bodies (FAA 2016).

Wetlands. Wetlands are scattered across the entire PSCA; however, no wetlands have been identified near the test pad areas proposed for use by MDA.

3.3.2 Environmental Consequences of the Proposed Action

The potential for water resource impacts related to launch activities at PSCA was evaluated in the FAA 2016 EA, which analyzed up to nine annual launches from PSCA. Impacts to water resources in the FAA EA were determined to have negligible effects. As noted earlier, previous surface water quality monitoring efforts for rocket launches have shown no effects on local water bodies.

For analysis purposes in this EA, the environmental impacts of up to nine BMD launches per year are described. Specific analyses for the proposed BMD activities at PSCA are provided in the following sections.

3.3.2.1 SYSTEM TRANSPORTATION AND PRE-FLIGHT PREPARATIONS

No impacts on water resources are anticipated as a result of transportation of the weapon systems and supporting equipment. All transportation would be performed in accordance with appropriate DOT approved procedures and routing, as well as OSHA requirements and appropriate DoD safety regulations.

Although no major maintenance is expected to occur, small quantities of used motor oil and/or coolant could be generated through normal operations. These non-hazardous wastes and any hazardous wastes generated during vehicle maintenance would be handled in accordance with PSCA user guidelines and all applicable regulatory requirements. Ground vehicles would use existing vehicle maintenance and fueling facilities to the extent practicable.

Petroleum, oils, lubricants, and coolant (ethylene glycol) used in equipment, and the storage and use of fuels on site, has the potential to introduce contaminants into surface water or groundwater. There would be a minor potential for spills or leaks, particularly for generators and fuel trucks. The use of double walled fuel tanks and/or the application of other secondary containment systems and spill kits, however, would minimize the potential for contaminants to enter soils, surface water, or groundwater. On-site project personnel would be responsible for ensuring that equipment is in good operating order to reduce the potential for leaks, and handle any potential spill in accordance with the PSCA Spill Prevention, Control, and Countermeasure Plan. This plan is in place to ensure that the potential for dangerous chemical spills would be minimized by providing appropriate procedures to contain and clean up spills if they occur. Thus, no significant impacts are expected for surface water or groundwater resources

The up to 300 temporary on-site project personnel supporting pre-flight preparation for each test event would not significantly increase demand for potable water. Withdrawals would be small compared to the recharge rates. Total water usage at PSCA is not anticipated to increase above the previously authorized amount of withdrawal, and therefore no effects to the local groundwater supply are anticipated.

3.3.2.2 FLIGHT TEST ACTIVITIES AND POST-FLIGHT OPERATIONS

Flight Test Activities. Short-term, minor, impacts on water resources would occur as a result of BMD missile launches. Effects from launch operations would occur only during launches as a result of rocket exhaust product deposition. The primary water quality concerns are the potential changes in pH from acid deposition and the potential for accumulation of combustion byproducts in localized surface waters. Exhaust emissions resulting from intercept missile launches include aluminum oxide (Al_2O_3), carbon monoxide, HCl, hydrogen, nitrogen, and water. The principal product of combustion of potential concern is HCl, which combines with water or water vapor to form hydrochloric acid. Aluminum oxide is only a hazard to aquatic biota in acidic environments where Al_2O_3 dissociates (i.e., dissolves) into the free aluminum cation; therefore, the co-deposition of Al_2O_3 during launches is not a concern.

Impacts on water resources from acid deposition are expected to be small and transitory due to the relatively high pH (6.8 to 7.5 in streams and 7.1 to 7.3 in lakes) and buffering capacity of the local streams and lakes. The release of HCl as a result of solid rocket launches would not result in measurable degradation of surface water quality because the exhaust and associated chemical compounds would be dispersed over a large area and immediately diluted and/or neutralized by receiving waters. These effects would be temporary and are not anticipated to affect local water quality. This finding is supported by water chemistry studies conducted at PSCA (FAA 2016), which indicated no adverse water quality effects (including pH, specific conductivity, and aluminum levels) from prior launches of rockets much larger than the proposed BMD interceptor missiles.

Post-flight Operations. No impacts on water resources are anticipated as a result of post-flight operations. Any waste materials generated would be disposed of according to applicable regulations and range procedures and policy by PSCA, and would not impact groundwater, surface waters, or wetlands.

3.4 Biological Resources

Biological resources include native or naturalized plants and animals and the habitats (e.g., wetlands, forests, and grasslands) in which they exist. Protected species include federally-listed (endangered or threatened) and candidate species, and designated critical habitat.

Endangered Species Act (ESA). Under the ESA (16 USC § 1536), an “endangered species” is defined as any species in danger of extinction throughout all or a significant portion of its range. A “threatened species” is defined as any species likely to become endangered in the foreseeable future. Although candidate species receive no statutory protection under the ESA, the U.S. Fish and Wildlife Service (USFWS) advises government agencies, industry, and the public that these species are at risk and might warrant protection under the ESA in the future. Section 7 of the ESA requires that all Federal agencies consult with USFWS or National Marine

Fisheries Service (NMFS), as applicable, before initiating any action that may affect a listed species. Section 7 requires federal agencies to ensure that actions they authorize, fund, or conduct are not likely to "...jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of habitat of such species which is determined to be critical."

Migratory Bird Treaty Act (MBTA). The MBTA of 1918 (16 USC § 703–712) provides protection to migratory birds, their nests, and eggs.

Bald and Golden Eagle Protection Act. Bald eagles (*Haliaeetus leucocephalus*) and golden eagles (*Aquila chrysaetos*) are protected by the Bald and Golden Eagle Protection Act of 1940 (16 USC §§ 668-68d).

Marine Mammal Protection Act (MMPA). The MMPA of 1972 (16 USC §§ 1361 et seq.) provides protection to all marine mammals in U.S. waters; several are also protected under the ESA. The MMPA prohibits the "take" of marine mammals, with certain exceptions, in waters under U.S. jurisdiction and by U.S. citizens on the high seas. Under Section 3 of the MMPA, take is defined as "harass, hunt, capture, kill, or attempt to harass, hunt, capture or kill any marine mammal." The MMPA requires consultations with NMFS if impacts on marine mammals are unavoidable. The incidental, but not intentional, take of a small number of marine mammals may be permitted by NMFS through the issuance of an Incidental Harassment Authorization or Letter of Authorization (LOA).

Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA). The MSFCMA calls for direct actions to stop or reverse the continued loss of fish habitats. Under the MSFCMA, Congress directs NMFS and the eight regional Fishery Management Councils to describe and identify Essential Fish Habitat (EFH) in each Fishery Management Plan; minimize, to the extent practicable, the adverse effects of fishing on EFH; and identify other actions to encourage the conservation of EFH. EFH is defined as those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity. Section 305(b) of the MSFCMA mandates that federal agencies must consult with the Secretary of Commerce on all proposed activities authorized, funded, or undertaken by the agency that might adversely affect EFH.

3.4.1 Affected Environment

The ROI for biological resources includes PSCA, the near-shore waters, and Ugak Island located approximately 3 miles southeast of PSCA. Existing conditions of the terrestrial and coastal biological resources within the ROI are summarized below.

Vegetation. The Kodiak Island region includes portions of two ecoregions. The northern portions of the archipelago and the northern portion of Kodiak Island, where PSCA is located, are within the Coastal Western Hemlock/Sitka Spruce Forest Ecoregion, dominated by Sitka spruce. Plant types and groundcover classifications presented in the Vegetation Inventory and Mapping report from November 1994 and updated by ENRI in 2004, provide an accurate representation of conditions within PSCA. Hairgrass-mixed forb meadows represent the most prevalent plant communities at PSCA, while alder and mixed alder-willow shrublands, lupine meadow, and palustrine wetlands are also present in some areas (FAA 2016).

Fish and Wildlife. The PSCA provides seasonal habitat for over 140 species of terrestrial and marine birds and nearly all of these species are migratory birds. Bird species typically found in the area include loons (*Gavia* sp.), grebes, harlequin ducks (*Histrionicus histrionicus*), belted kingfishers (*Megaceryle alcyon*), glaucous-winged gulls (*Larus glaucescens*), black scoters (*Melanitta americana*), pelagic cormorants (*Phalacrocorax pelagicus*), and sparrows (MDA 2003a). Bald eagles (*Haliaeetus leucocephalus*) are common throughout the year on Kodiak Island and are often seen in the Narrow Cape area. The USFWS performed an aerial nesting bald eagle survey on May 10, 2013, in the area surrounding PSCA. A total of seven bald eagles (six adult and one subadult) and three nests were recorded within 2 miles of the planned Launch Pad 3 (FAA 2016).

Terrestrial wildlife in the Kodiak archipelago have been heavily influenced by their isolation from the mainland. The Narrow Cape area supports 12 species of terrestrial mammals: six native and six introduced. The little brown bat (*Myotis lucifugus*), tundra vole (*Microtus oeconomus*), red fox (*Vulpes vulpes*), brown bear (*Ursus arctos*), short-tailed weasel (*Mustela ermine*), and river otter (*Lutra canadensis*) are common native terrestrial mammals found at PSCA. Other species introduced to Kodiak Island, including snowshoe hares (*Lepus americanus*), red squirrels (*Tamiasciurus hudsonicus*), muskrats (*Ondatra zibethicus*), beaver (*Castor canadensis*), Sitka black-tailed deer (*Odocoileus hemionus sitkensis*), and mountain goats (*Oreamnos americanus*), may also occur in the area (MDA 2003a). Fishery resources on and adjacent to PSCA include freshwater, anadromous, and marine species. Because streams and lakes in the ROI are relatively small and shallow, freshwater fishery resources are limited. Based on ENRI's 1994 survey and information from the Alaska Department of Fish and Game (ADF&G) Fish Resource Monitor, there are three anadromous streams in the vicinity of PSCA. Resident fish populations include stickleback (*Gasterosteus aculeatus* or *Pungitius pungitius*), Dolly Varden char (*Salvelinus malma*), rainbow trout (*Oncorhynchus mykiss*), and sculpin (*Cottus* sp.) (FAA 2016).

ADF&G added spawning coho salmon in 2004 to all three streams and spawning, rearing, and present pink salmon (*Oncorhynchus gorbuscha*) to Burton Creek in 2009. ADF&G Sport Fish Division stocks East Twin Lake with rainbow trout. Additionally, numerous species of fish and invertebrates inhabit near-shore and offshore waters around Kodiak Island. The most common marine fish are salmon (*Oncorhynchus* sp.), flounder (*Paralichthys* sp.), sole, walleye pollock (*Gadus chalcogrammus*), skate, cod (*Gadus* sp.), and halibut (*Hippoglossus stenolepis*). Other marine organisms that inhabit the shallow continental shelf water around Kodiak Island are crabs, scallops, octopus, shrimp, cockles, razor and butter clams, sea anemones, chitons, jellyfish, sea urchins, limpets, snails, mussels, sea cucumber, starfish, and barnacles (FAA 2016).

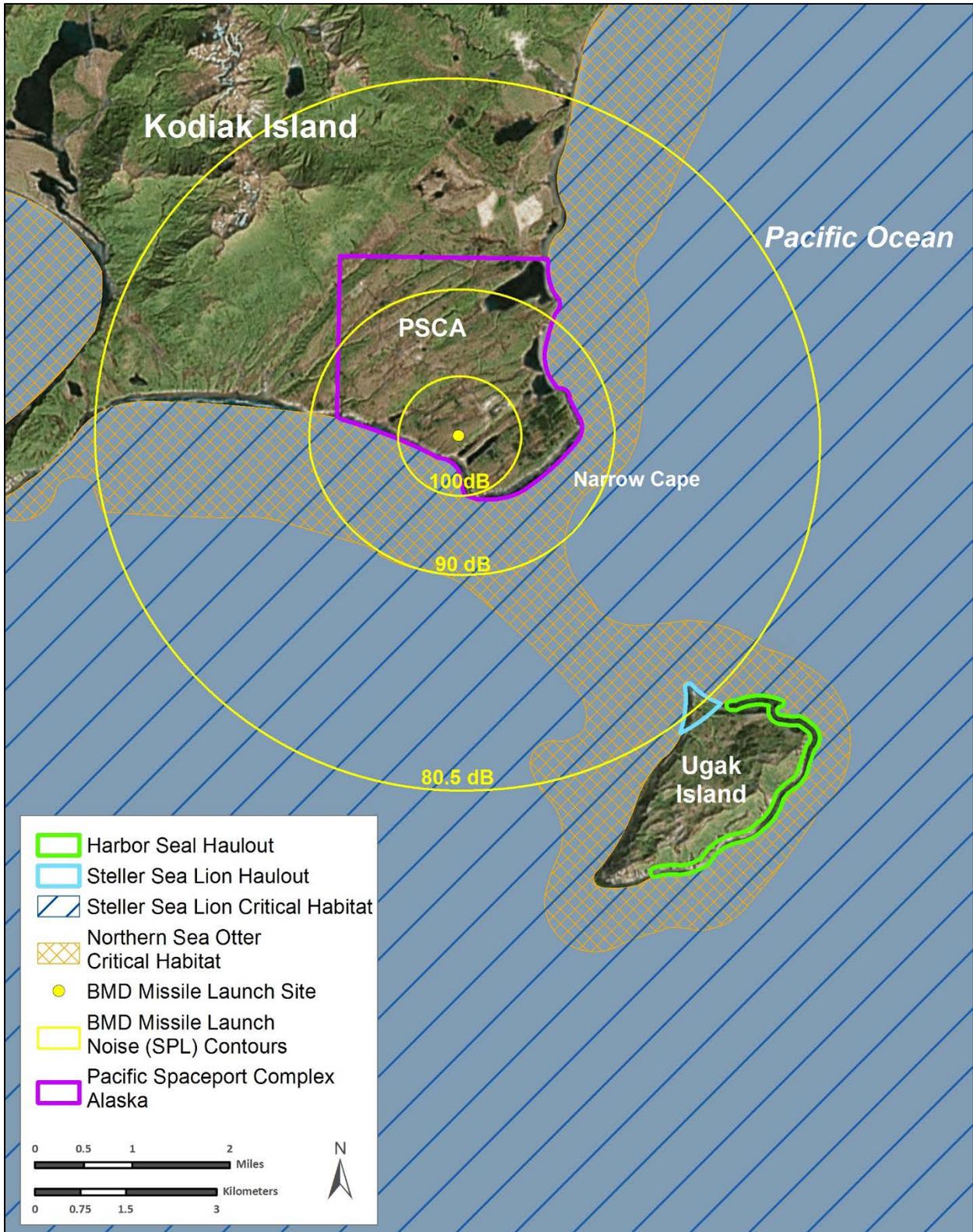
EFH for all life stages (marine immature, maturing adults, and marine juvenile) of chinook, chum, coho, pink, and sockeye salmon is present in marine waters around Narrow Cape and portions of anadromous streams on Narrow Cape. In addition, EFH for all life stages (eggs, larvae, late juvenile, and mature) of over 15 species of groundfish is present in ROI marine waters around Narrow Cape (NOAA 2016a).

Protected Species. Marine mammals that occur in the vicinity of PSCA include the western distinct population segment (DPS) of Steller sea lion (*Eumetopias jubatus*), harbor seal (*Phoca vitulina*), eastern North Pacific DPS of gray whale (*Eschrichtius robustus*), humpback whale (*Megaptera novaeangliae*), southwest Alaska DPS of northern sea otter (*Enhydra lutris*), northern fur seal (*Callorhinus ursinus*), and a number of other cetacean species including Dall's porpoise (*Phocoenoides dalli*), harbor porpoise (*Phocoena phocoena*), and killer whale (*Orcinus orca*) (eastern North Pacific resident and transient stocks). Both gray and humpback whales use the near-shore waters of Narrow Cape and Ugak Island on a regular basis (FAA 2016). The harbor seal is a year-round resident of the area. Based on the aerial survey counts from launch monitoring reports conducted since January 2006, approximately 97 percent of all observed harbor seals are found on the eastern shore of Ugak Island (FAA 2016) (**Figure 3-1**).

In 2011, NMFS issued a final rule to address potential effects on marine mammals from space vehicle and missile launches at PSCA for the 5-year period from 2011 to 2016 (50 CFR § 217). Under the final rule, an annual LOA was issued for the incidental take of marine mammals. The final rule concluded that rocket launches proposed for PSCA could result in the incidental take of a small number of marine mammals (Steller sea lions and harbor seals), but that the total taking would have a negligible impact on the species or stocks (76 FR 16311). In addition, the final rule determined that PSCA launch activities would not reach the level of take for any cetaceans (whales and dolphins) and that any noise that could reach these species would be so low as to be discountable (76 FR 16311). The latest LOA for PSCA, which expired on March 22, 2016, prohibits such rocket launches from May 15 through June 30 during the harbor seal pupping season (NMFS 2015). AAC is in the process of consulting with NMFS on renewing the ruling documentation (FAA 2016).

There are no terrestrial threatened or endangered species within the boundaries of PSCA, but there are several that occur offshore and on Ugak Island (**Table 3-8**). The Steller's eider (*Polysticta stelleri*) is present only in the offshore waters near PSCA during the winter months. The short-tailed albatross (*Phoebastria albatrus*) may also occur in the ROI, primarily during the summer months (MDA 2003a); however, no albatross sightings have been recorded during wildlife surveys conducted for launches at PSCA (FAA 2016). Of the marine mammals that occur in the near-shore waters of the ROI, three species are also protected under the ESA. Steller sea lions haul-out on portions of Ugak Island (**Figure 3-1**); however, no Steller sea lion rookeries have been identified (69 FR 63114-63122; FAA 1996; MDA 2003a; NMFS 2011). Marine mammal surveys have also identified small numbers of northern sea otters (*Enhydra lutris*) within the vicinity of PSCA; maximum sea otter counts ranged between zero and eight individuals in all but one aerial survey (FAA 2016).

The waters off Narrow Cape and around Ugak Island—from the mean high tide line seaward to a water depth of 20 meters (USFWS 2009a)—are designated critical habitat for the southwest Alaska DPS of the northern sea otter (**Figure 3-1**). Steller sea lion (western DPS) critical habitat includes the aquatic areas up to the mean high tide line surrounding Narrow Cape including Ugak Island (FAA 2016). The critical habitat also includes a terrestrial zone that extends 3,000 feet landward from a designated major haulout and an in-air zone that extends 3,000 feet above the terrestrial zone. The haulout on Ugak Island is a designated major haulout (50 CFR § 226.202).



Source: 50 CFR § 226.202, FAA 1996, USFWS 2009b

Figure 3-1. Protected Habitats and Predicted BMD Launch Noise Levels in the PSCA Vicinity

Table 3-8. Federally Endangered and Threatened Species with Potential to Occur within the ROI

Species	ESA Status	Managing Federal Agency	Occurrence in the ROI
Short-tailed albatross <i>(Phoebastria albatrus)</i>	E	USFWS	None sighted in the area during prior surveys
Steller's eider <i>(Polysticta stelleri)</i>	T	USFWS	Occasional visitor to the local offshore waters
Northern sea otter¹ <i>(Enhydra lutris)</i>	T	USFWS	A few individuals have been seen in offshore waters, but not on a regular basis
Steller sea lion² <i>(Eumetopias jubatus)</i>	E	NMFS	Haul out on the northern spit of Ugak Island; no rookeries
Humpback whale <i>(Megaptera novaeangliae)</i>	E	NMFS	Use the near-shore waters of Narrow Cape and Ugak Island on a regular basis

Source: ADF&G 2016, FAA 2016, NMFS 2011

¹ Southwest Alaska DPS of northern sea otter.

² Western DPS of Steller sea lion.

Note: All marine mammals are protected under the MMPA; E = Endangered; T = Threatened

PSCA currently operates in accordance with the NMFS Biological Opinion issued in March 2011 (NMFS 2011), which is valid for 5 years from the date of issuance. Because the western DPS of Steller sea lion is listed as endangered under the ESA, the take permitted under the MMPA also required authorization under the ESA. NMFS conducted internal formal consultation and prepared the necessary Biological Opinion (NMFS 2011) to meet their obligations under the ESA. Subsequent LOAs were then issued for the take of Steller sea lions resulting from non-injurious (Level B) harassment due to launch noise. As previously mentioned, the latest LOA for PSCA has expired; however, AAC is currently in the process of reinitiating consultation with NMFS (FAA 2016).

3.4.2 Environmental Consequences of the Proposed Action

The potential for biological resource impacts related to launch activities at PSCA was evaluated in the FAA 2016 EA, which analyzed up to nine annual launches from PSCA. Impacts to biological resources in the FAA EA were determined to have negligible effects. As noted above, previous monitoring efforts have been conducted in conjunction with rocket launches and long-term monitoring results have shown that launch operations had no significant effect on biological resources (FAA 2016).

For analysis purposes in this EA, the environmental impacts of up to nine BMD launches per year are described. Specific analyses for the proposed BMD flight test activities at PSCA are provided in the following sections.

3.4.2.1 SYSTEM TRANSPORTATION AND PRE-FLIGHT PREPARATIONS

The relatively short-term movement of trucks and other load-handling equipment would not produce substantial levels of noise. It is expected that these activities would have little or no adverse effects on local vegetation and wildlife, including protected species, and critical and

other environmentally sensitive habitats. Overall, short-term, adverse effects as a result of site preparation would be minor.

3.4.2.2 FLIGHT TEST ACTIVITIES AND POST-FLIGHT OPERATIONS

For analysis purposes in this EA, up to nine BMD missile launches in a 12-month period from Area 2, Area 3, and Launch Pad 2 (combined) are assumed and launches could potentially occur at any time of the year. Impacts on biological resources resulting from BMD missile launches would not be significant. Potential issues associated with intercept missile launches include wildlife startle responses, potential injury from excessive noise, and the release of potentially harmful chemicals, in the form of exhaust emissions, thereby affecting vegetation, wildlife, and wildlife habitat. The potential effects of these actions on the biological resources at PSCA and Ugak Island are described in the following paragraphs.

Vegetation. The exhaust heat and atmospheric deposition of emissions during launches has the potential to affect vegetation. Although localized foliar scorching and spotting is possible, such effects from larger launch systems have been shown to be short-term and not of sufficient intensity to cause long-term damage to vegetation (NASA 2002). Additionally, the area immediately around the launch pad is kept clear of most vegetation to minimize the risk of brush fires.

Fish and Wildlife. Wildlife exposure to sudden loud, uncommon, short-term noise, such as occurs during a rocket launch, generally elicits an “alert” or startle response (AAC 2010). Terrestrial animals, such as bison and bears, roam the area on and outside of PSCA and could be impacted by the noise; however, disturbances from launches would be brief and are not expected to have a lasting adverse effect on wildlife.

Monitoring studies conducted along the coastline for seabirds and shorebirds suggest that rocket launches do not have an adverse effect on bird habitat use patterns within the Narrow Cape area. Depending on the type of animal and its proximity to the source, noise associated with the launches can temporarily or permanently affect hearing, as well as injure or kill an animal. However, these effects would not have a significant effect on local populations (FAA 2016).

The atmospheric deposition of launch emissions has the potential to affect nearby surface waters. As discussed in **Section 3.3**, water resources concerns include potential changes in pH from acid deposition and the potential for accumulation of combustion byproducts in localized surface waters. Exhaust emissions resulting from intercept missile launches include aluminum oxide (Al_2O_3), carbon monoxide, HCl, hydrogen, nitrogen, and water. The principal product of combustion of potential concern is HCl, which combines with water or water vapor to form hydrochloric acid. The acidification of surface waters in some of the local streams and wetland areas could present harmful conditions for fish and other aquatic wildlife. However, the results of water quality monitoring have shown that prior launches have not had an effect on basic water chemistry. Sampling analyses have not shown a decrease in pH levels (FAA 2016); therefore, no adverse effects at PSCA are expected. Additionally, no significant impacts to EFH are expected.

No impacts on biological resources are anticipated as a result of post-flight operations. Any waste materials generated would be disposed of according to applicable regulations and range procedures and policy by PSCA, and would not impact wildlife habitat or environmentally sensitive area. The intermittent movement of trucks and any repair/clean-up/waste-handling equipment would not produce substantial levels of noise, and vehicles would remain on paved or gravel areas. Thus, the limited actions associated with post-launch operations would have negligible effects on local vegetation or wildlife, including protected species, and environmentally sensitive areas.

Protected Species. In general, noises with sudden onset or high amplitude relative to the ambient noise level, such as occurs during a rocket launch, may elicit a disruption of behavioral patterns for hauled out pinnipeds, including resting, nursing, and breeding. At the Ugak Island haul out, future medium-lift rocket launches from PSCA's LP3 pad are expected to produce a maximum SEL of 93.4 dBA SEL. Previously, the loudest launch SEL at Ugak Island was 93.5 dBA SEL based on monitoring of a prior small-lift vehicle (Minotaur IV) launch from PSCA (FAA 2016).

As previously mentioned, NMFS issued a final rule in 2011 concluding that space vehicle and missile launches from PSCA could result in the incidental take of a small number of marine mammals (Steller sea lions [western DPS] and harbor seals), but that the total taking would have a negligible impact on the species or stocks (76 FR 16311). For the endangered Steller sea lion, NMFS also conducted internal formal consultation and prepared the necessary Biological Opinion to meet their obligations under the ESA (NMFS 2011). In their opinion, NMFS concluded the proposed action of nine launches per year (on average) from PSCA—including medium-lift, small-lift, and target vehicles—is *not likely to jeopardize* the continued existence of the western DPS of the Steller sea lion at Ugak Island, nor result in the destruction or adverse modification of western DPS Steller sea lion critical habitat around Narrow Cape. NMFS anticipated that the incidental take of Steller sea lions would be in the form of non-injurious harassment due to launch noise greater than 100 dBA SEL. Subsequent LOAs were then issued by NMFS for the take of Steller sea lions and harbor seals resulting from non-injurious (Level B) harassment due to launch noise. The latest LOA issued to PSCA also prohibits such rocket launches from May 15 through June 30 during the harbor seal pupping season (NMFS 2015). As described earlier, the latest LOA for PSCA has expired; however, AAC is currently in the process of reinitiating consultation with NMFS (FAA 2016).

For MDA's Proposed Action analyzed in this EA, the noise and visual stimuli resulting from smaller intercept missiles used during BMD flight tests at PSCA would be much lower than those rockets previously launched and proposed for launch from PSCA (FAA 1996, 2016). Because of limited availability of launch and flight noise data for the BMD missiles (THAAD and PATRIOT defensive weapon systems), data from a comparable but slightly larger Vandal missile² tested in California (NAWCWD 2013) were used for this noise assessment. Thus, for a BMD missile launch from either PSCA Area 3 or Launch Pad 2 (both located approximately 3.4 miles from Ugak Island), the expected maximum SEL at Ugak Island would be approximately

² The Vandal missile has a solid propellant first stage and a ramjet second stage motor. It measures approximately 38 ft in length and weighs approximately 7,800 pounds at launch.

72.5 dBA at Ugak Island. The noise level from missile overflight would be very low (approximately 25 dBA SEL) if it were to pass directly over Ugak Island. Launches from Area 2 (located approximately 4.2 miles from Ugak Island) would result in slightly lower sound levels. The sound from each BMD missile launch would be audible to animals on the island, and then low and distant as the missile travels overhead.

A comparison of launch noise generated by the proposed BMD missile systems, medium-lift vehicles (LP3 rockets for launch from PSCA), and small-lift vehicles (rockets previously launched from PSCA) is provided in **Table 3-9**. Refer to **Figure 2-1** for a comparison of the relative size of these vehicles. As shown in **Table 3-9** and in **Figure 3-1**, BMD missiles launched from PSCA would produce a maximum unweighted sound pressure level (SPL) of approximately 80.5 dB at Ugak Island, which is substantially lower (over 20 dB lower) than the small-lift and medium-lift launch vehicles, and over 9 dB lower than the 90 dB SPL threshold used by NMFS to calculate take (Level B Harassment) of harbor seals (NOAA 2016b). Therefore, it is MDA’s finding that the proposed BMD missile launches would have *negligible impacts* on harbor seals at Ugak Island, including during the May 15 to June 30 harbor seal pupping season, because of the low potential for take by harassment from noise.

Table 3-9. Launch Noise Levels at Ugak Island Compared to Pinniped Thresholds

Launch Vehicle	Launch Noise		Level B Harassment Threshold SPL (dB) ⁵	
	SEL (dBA)	SPL (dB)	Harbor Seals	Other Pinnipeds
Proposed BMD Missile	72.5 ¹	80.5 ¹		
Small-lift Vehicle	93.5 ²	101 ³	90	100
Medium-lift Vehicle	93.4 ⁴	106 ⁴		

¹ Noise levels based on data for a comparable Vandal missile launch (NAWCWD 2013)

² Noise measurement for Minotaur IV launch (FAA 2016, Appendix A, Table 3)

³ Noise level based on monitoring small-lift vehicle launches (NMFS 2011, page 12)

⁴ Noise levels estimated for Athena III launch (FAA 2016, page 4-9)

⁵ In air SPL for comparison with launch noise SPL (NOAA 2016b)

For the western DPS of Steller sea lions and other pinnipeds, NMFS uses an SPL of 100 dB for the maximum allowable threshold used to calculate take (Level B Harassment) (NOAA 2016b). Thus, the expected SPL at Ugak Island from BMD missile launches at PSCA would be substantially lower (over 19 dB lower) than this threshold. The audible sound from BMD missile launches would be very short in duration (approximately 20 seconds) and occur infrequently (up to approximately nine times within a 12-month period). Any effects would be temporary and are considered insignificant. Additionally, during a nominal flight, no missile components are expected to fall on Ugak Island, nor would there be any project-related activities on Ugak Island, along the shoreline, or in nearby waters. Any security surveillance overflights associated with launch activities would comply with AAC measures in avoiding the pinniped haulouts on Ugak Island (NMFS 2011). As a result, MDA determined that the proposed BMD missile launches are *not likely to adversely affect* the western DPS of Steller sea lions and are *not likely to adversely affect* this species’ critical habitat or constituent elements.

Individuals from the federally-threatened southwest Alaska DPS of northern sea otters can be found in the local waters around Narrow Cape. In 2011, USFWS was contacted by AAC to determine if an Incidental Harassment Authorization was required for the northern sea otter under the MMPA. USFWS determined that authorization for incidental take would not be required due to the infrequency of the rocket launches and the temporary disturbances (FAA 2016). In recent analyses, FAA determined that small-lift and medium-lift rocket launches from PSCA are *not likely to adversely affect* this species. A determination of *no effect* was made for the northern sea otter critical habitat in the near-shore waters (FAA 2016). The proposed BMD missile launches would present substantially lower noise and visual stimuli, and have shorter audible launch noise durations than the larger small-lift and medium-lift rocket launch vehicles (**Figure 2-1**). In addition, during nominal flights, no missile components are expected to fall into near-shore waters, nor would there be any project-related activities in these waters. As a result, MDA determined that the proposed BMD missile launches are *not likely to adversely affect* the southwest Alaska DPS northern sea otter, and have *no effect* on this species' critical habitat.

As previously mentioned, NMFS had previously determined that PSCA launch activities would not reach the level of take for any cetaceans (whales and dolphins) and that any noise that could reach these species would be so low as to be discountable (76 FR 16311). NMFS also had previously determined that humpback whales and other endangered whale species are *not likely to be adversely affected* by rocket launches from PSCA (NMFS 2011). During launches, cetaceans are likely to be submerged, and therefore less exposed to launch noise that could temporarily disrupt normal behavioral patterns. The proposed BMD missile launches would have similar effects, but to a lesser extent because of the lower noise levels and shorter duration of noise. Thus, it is MDA's finding that the proposed BMD missile launches would have *negligible impacts* on gray whales. In addition, it is MDA's determination that the proposed BMD missile launches are *not likely to adversely affect* humpback whales.

As previously discussed, rocket launches from PSCA have not had a significant effect on bird habitat use patterns within the Narrow Cape area (FAA 2016). This would include both the federally-threatened Steller's eider, an occasional visitor to the nearby offshore waters, and the endangered short-tailed albatross, which has not been sighted in the area during prior bird surveys. The USFWS determined the increase in noise from medium-lift rockets would have *no effect* on the short-tailed albatross and concurred with the FAA's determination of *not likely to adversely affect* for the Steller's eider (FAA 2016). The proposed BMD missile tests would have lower noise and visual effects, and as such, would have incrementally lower impacts on these two bird species; however, the effect determinations would remain the same. Therefore, it is MDA's determination that the proposed BMD missile launches would have *no effect* on the short-tailed albatross and are *not likely to adversely affect* the Steller's eider.

3.5 Recreational Land Use

3.5.1 Affected Environment

The ROI for recreation resources includes the area that could be closed to public access by activation of the GHA and LHA during pre-flight preparations and flight test activities.

Kodiak Island provides numerous recreation opportunities including hunting, fishing, hiking, sightseeing, surfing, camping, and wildlife viewing. The recreation resource ROI includes recreation resources within the PSCA boundary and the surrounding off-shore waters (**Figure 3-2**). Although there are no formally designated recreation areas within the PSCA boundary, informal recreation is allowed in certain parts of the complex. These informal areas are part of public lands (owned by either the State or Federal government) on Kodiak Island, which are generally open to recreation uses. Specific informal recreation resources within PSCA include (FAA 2016):

- *East Twin Lake.* Fishing is available at East Twin Lake (the southeastern most lake of the two adjacent Twin Lakes, both of which are located within the boundaries of PSCA), which is stocked with rainbow trout. This lake is located approximately 0.2 mile southeast of the proposed launch Area 3 and is accessed by Pasagshak Point Road.
- *Narrow Cape and PSCA.* Narrow Cape is accessed by the island's road network (Pasagshak Point Road) and offers recreation opportunities. The area includes sandy beaches on the eastern coast of Narrow Cape (approximately 0.7 mile east of Launch Pad 2) and Fossil Beach on the west (approximately 0.2 mile south of Area 3 and within PSCA boundaries) where fossilized marine organisms can be dug from the cliffs or found on the beach. Additional activities in the area generally include beachcombing, surfing at Surf Beach (approximately 1.8 miles west of Area 3 and within PSCA boundaries), picnicking, and wildlife sighting of whales, birds and harbor seals and occasionally sea lions and sea otters. Hunting in the Narrow Cape area focuses on Sitka black-tailed deer during the late summer and fall.
- *Waters Near Narrow Cape.* Approximately 3 miles southeast of Narrow Cape, the area around Ugak Island is visited by sport fishing boats in pursuit of halibut, rockfish, and salmon.

Though these sites represent public land used for recreation, none of these properties is used primarily for recreation. This determination is based on State of Alaska legislation regarding the management of these properties. As codified in Alaska Statute 41.23.250, Narrow Cape is managed as a public use area with primary allowable uses of grazing and missile launch activity. Also allowed as additional uses are the land-based recreation pursuits mentioned above. Though recreation pursuits do occur on the lands and water of Narrow Cape, these pursuits are not primary uses, and the lands are not managed specifically for that purpose. In addition, Alaska Statute 41.23.250(e) states that the commissioner may not manage the Kodiak Narrow Cape Public Use Area as a unit of the state park system (FAA 2016).

Although Pasagshak State Recreation Site is just northwest of PSCA, it is outside of the ROI and would not be affected by the Proposed Action.

3.5.2 Environmental Consequences of the Proposed Action

The Proposed Action would reduce recreation opportunities within PSCA and the surrounding waters during final integration and pre-flight testing (pre-flight preparations), and during activation of the GHA and LHA for flight test activities. As explained below, these activities are



Figure 3-2. Recreational Areas in the PSCA Vicinity

expected to have a minor effect on recreation and are similar to what has occurred during previous PSCA launch activities.

3.5.2.1 SYSTEM TRANSPORTATION AND PRE-FLIGHT PREPARATIONS

The BMD defensive weapon systems and related test assets are mobile and transportable using military and commercial trucks. The equipment would be flown into the Kodiak Airport or shipped to the island and transported on public roads. From Kodiak, Rezanof Drive West (also referred to as the Chiniak Highway) and Pasagshak Point Roads would be used to transport the equipment the 40 miles to PSCA. These roads can accommodate the mobile interceptor launch equipment. Vehicles accessing recreation opportunities between Kodiak and PSCA may be temporarily delayed by the slow moving vehicles; however, delays would be infrequent and to the extent possible equipment would be moved during off-peak travel hours.

Routine pre-flight preparation activities would consist of setting up the mobile equipment and testing. During equipment set-up there would be no restrictions to recreation opportunities on PSCA.

During pre-flight preparations for BMD missile launches, a “keep out” zone would be established for safety and public access would be restricted. The establishment of the keep out zone would restrict access along Pasagshak Point Road where it enters PSCA (about 2 miles from the launch sites), which would restrict public access to recreational activities at Twin Lakes, Fossil Beach, Surf Beach, and Narrow Cape.



It is expected there would be up to three flight test events in a 12-month period, and for each flight test event, there would be about two closures of PSCA for pre-flight preparations and one closure on the day of launch (see **Section 3.5.2.2**).



All three of these closures (per individual flight test event) typically would occur over 3 days, with each closure lasting approximately 8 hours. Depending on the amount of time between individual closures, public access to recreational areas on PSCA may be allowed. Assuming up to three flight test events in a 12-month period, a total of approximately 9 days per 12-month period could involve closure of recreational areas on PSCA. Additional occasional closures of less than 8 hours may be required when moving missiles to and within the launch complex.

Overall, the nine restricted public access periods in a 12-month period would be expected to have minor effects given the restriction would be temporary in nature. PSCA would place a notice of intent to restrict public access in the local newspaper and broadcast in local media approximately 1 week in advance of closure times. Radar testing and operations would not restrict access to any recreation areas within PSCA.

3.5.2.2 FLIGHT TEST ACTIVITIES AND POST-FLIGHT OPERATIONS

For public safety, the Narrow Cape area would be closed to the public immediately before and during launch activities, which would close recreation access to PSCA. On the day of launch, a GHA and LHA would be established, requiring closure of Pasagshak Point Road where it enters PSCA, for approximately 8 hours. During these closure periods, Fossil Beach, Surf Beach, Twin Lakes and other state land used for recreation on Narrow Cape are not accessible to the public. In the event of an unusual safety concern, these areas might be controlled for longer periods of time (FAA 2016).

In addition to the closure on PSCA, temporary safety closures to marine waters and airspace would take place concurrently with the LHA. These closures would be temporary (typically 8 hours each) and generally would occur once during each of the three flight test events over a 12-month period.

In the 2016 FAA EA for the operation of LP3, FAA determined that the temporary closure (8 hours for each launch) for up to nine launches per year would not result in a substantial impact to recreation opportunities within PSCA and the surrounding waters (FAA 2016).

During post-flight operations, public access and recreation opportunities within PSCA and adjacent waters would not be restricted.

3.6 Airspace and Air Traffic

Airspace, or that space which lies above a nation and comes under its jurisdiction, is generally viewed as being unlimited. However, it is a finite resource that can be defined vertically and horizontally, as well as temporally, when describing its use for air traffic purposes. The time dimension is a very important factor in airspace management and air traffic control.

Under Public Law (PL) 85-725, Federal Aviation Act of 1958, the FAA is charged with the safe and efficient use of our nation's airspace and has established certain criteria and limits to its use. The method used to provide this service is the National Airspace System. This system is "...a common network of U.S. airspace; air navigation facilities, equipment and services, airports or landing areas; aeronautical charts, information and services; rules, regulations and procedures, technical information and manpower and material."

Airspace over the United States out to the 3-mile limit offshore defines the National Airspace System (NAS). Airspace outside of the 12 nautical mile limit is international airspace governed by the rules of the International Civil Aviation Organization (ICAO). ICAO has designated administration of much of the airspace offshore to the United States through international agreements. The FAA, as the functional level of the United States Government, administers such airspace similar to the NAS. The NAS airspace environment is described in terms of its principal attributes, namely controlled and uncontrolled airspace, special use airspace (SUA), and airways, all of which are described below.

Controlled Airspace. Controlled airspace is a generic term that encompasses the different classifications (Class A, B, C, D, and E) of airspace and defines dimensions within which Air Traffic Control service is provided to flights under instrument meteorological conditions, and to

flights under visual meteorological conditions. All military and civilian aircraft are subject to Federal Aviation Airspace Regulations allowing airspace use by all users.

Uncontrolled Airspace. Uncontrolled or Class G airspace is the portion of airspace that has not been designated as Class A, B, C, D, or E. It is therefore designated uncontrolled airspace. Class G airspace extends from the surface to the base of the overlying Class E airspace. Although Air Traffic Control has no authority or responsibility to control air traffic, pilots should remember there are visual flight rule minimums that apply to Class G airspace.

Special Use Airspace. SUA consists of airspace within which specific activities must be confined, or wherein limitations are imposed on aircraft not participating in those activities. SUA usually consists of prohibited areas, restricted areas, warning areas, military operations areas, alert areas, and controlled firing areas.

Airways. An airway is a legally defined corridor that connects one specified location to another at a specified altitude, along which an aircraft capable of meeting the performance and navigation requirements of the airway may be flown. Airways are defined with segments within a specific altitude block or corridor width between fixed geographic coordinates for satellite navigation systems, or between ground-based radio transmitter navigational aids or the intersection of specific radials of two navigational aids. There are two types of airways: (1) Victor Airways are low-altitude airways established in the United States by the FAA for flights below 18,000 ft mean sea level (MSL) and (2) Jet Routes are designed to serve aircraft operations from 18,000 ft MSL and above. The FAA has also instituted procedures whereby aircraft can fly direct from one location to another using internal navigation. This complicates planning for launches from PSCA somewhat, but providing launch notices to the FAA would prevent air users from filing direct routes through impacted airspace.

3.6.1 Affected Environment

The ROI for airspace at PSCA includes commercial air corridors and the airspace over and surrounding PSCA (**Figure 3-3**). A description of current airport and airspace conditions follows.

Controlled and Uncontrolled Airspace. The closest controlled airspace is approximately 25 miles northeast of PSCA at the Kodiak Airport. Class D and Class E controlled airspace is in effect at Kodiak Airport. Class D is the airspace within a 5 statute mile radius of the airport from the surface to 2,500 feet above ground level. The Kodiak Airport Class D airspace has been modified on one side due to terrain. Class E airspace from 1,200 ft MSL up to flight level (pressure altitude) 18,000 ft surrounds the Kodiak Airport to protect the instrument approaches to that airport. Above 18,000 ft and up to flight level 60,000 ft is Class A controlled airspace. The remainder of the airspace in the vicinity of Kodiak below 18,000 ft is uncontrolled airspace including the airspace over PSCA. The Kodiak Air Traffic Control Tower jurisdiction is only within the Class D airspace above the Kodiak Airport and thus has no control over air traffic at PSCA. The Anchorage Air Route Traffic Control Center (ARTCC) regulates air traffic in the vicinity of PSCA above 18,000 ft in Class A airspace.

Special Use Airspace. PSCA coordinates launches with airspace users through the existing airspace coordination protocol with the FAA. The PSCA issues a Temporary Flight Restriction

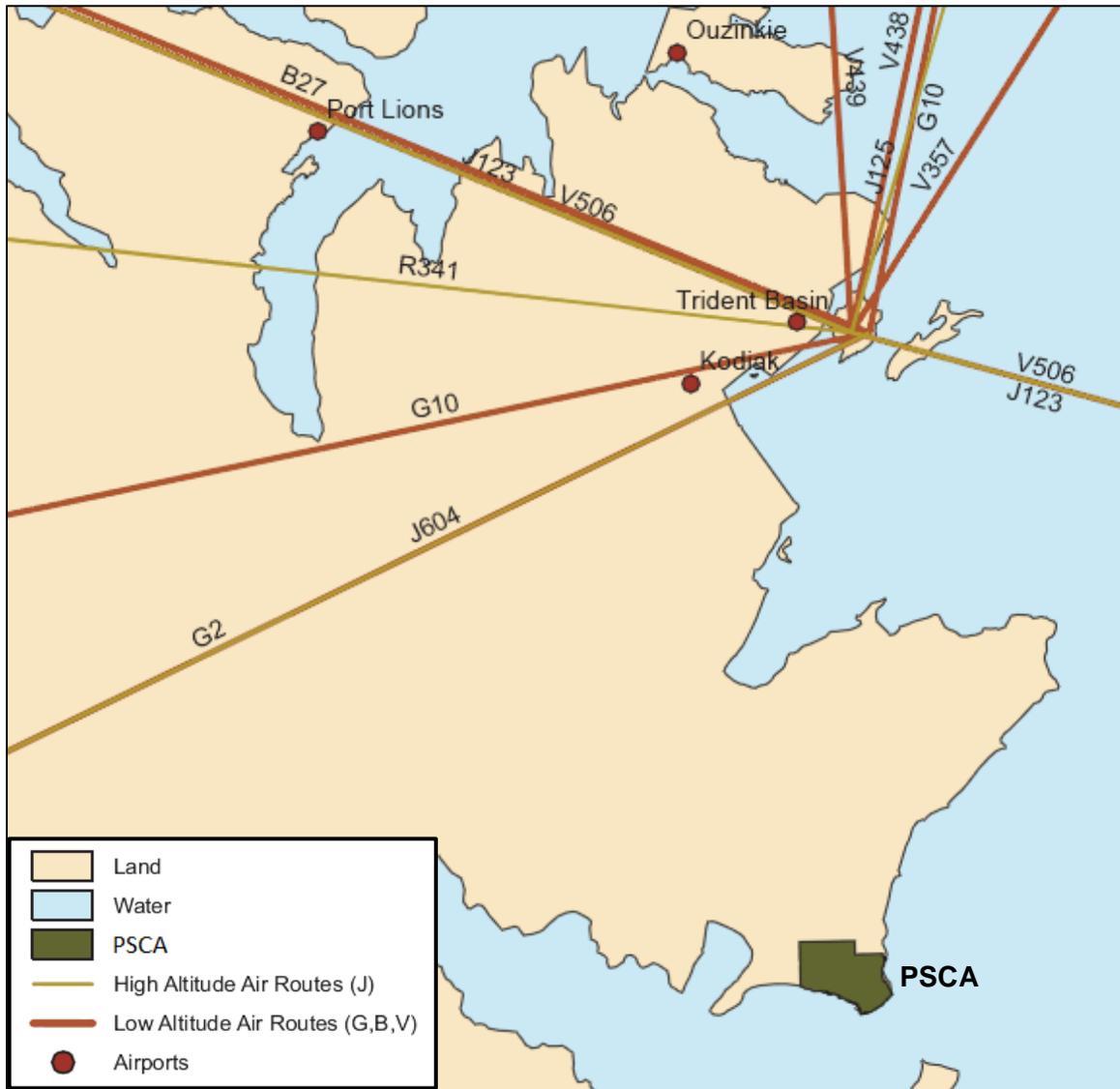


Figure 3-3. Airspace and Airports in the Vicinity of PSCA

(TFR) for the airspace above the complex and the adjacent waters up to 3 miles off shore. The TFR is a notice distributed to aviators by the FAA that a hazard to flight exists in the area of the TFR. Beyond the 3 miles a warning area is established.

Airways. Commercial air corridors enter and exit Kodiak Airport to and from the west, north, and south. Routes include G2 (J604), G10, R341, B27 (J123), V506, V439, V438, and V357, which are all located well north of PSCA (**Figure 3-3**). Corridor V506 is more than 15 miles from the launch area. Although generally north of PSCA, orient-bound aircraft use flexible tracks to transition to the North Pacific route system. These routes are generated based on the prevailing jetstream and their position relative to PSCA may vary. These routes are not depicted on charts. Coordination procedures already in place minimize any potential impacts from launches to aircraft on these routes.

Airports/Airfields. Kodiak Airport is the airport closest to PSCA. It is located approximately 25 miles northeast of the range. It is a state operated regional airport that routinely handles daily passenger and cargo jet service and has accommodated military transport aircraft as large as C-17. The Kodiak Coast Guard Base adjoins the airport and uses the airport runways and taxiways for their operations including regular use by C-130 aircraft.

3.6.2 Environmental Consequences of the Proposed Action

3.6.2.1 SYSTEM TRANSPORTATION AND PRE-FLIGHT PREPARATIONS

System transportation and pre-flight preparations under the Proposed Action are not expected to have any impact on the airports and airspace in the vicinity of PSCA. All aircraft flights and operations in support of these activities would comply with current airport and airspace policies and procedures.

3.6.2.2 FLIGHT TEST ACTIVITIES AND POST-FLIGHT OPERATIONS

Close coordination with the FAA Anchorage ARTCC and Kodiak Air Traffic Control Tower by the launch operations manager would minimize the potential for any adverse impacts on airspace use in the vicinity of Kodiak Island. Aircraft within the region would be subject to a NOTAM to advise avoidance of weapon system radar operations, the launch of interceptors, and missile intercepts. Direct coordination with Air Traffic Control and the USCG would be maintained to verify that there is no air traffic in these areas. In addition, airspace would be monitored by AAC air and surface search radar during launch operations, as well as by USCG aircraft (FAA 2016). Airspace closures would be temporary (lasting approximately 8 hours for each flight test event) and generally would occur three times a year. Thus, impacts on airspace or air traffic by the Proposed Action would be not significant.

3.7 Human Health and Safety

Human health and safety addresses the well-being, safety, and health of members of the public, contractors, and military personnel during the various aspects of the Proposed Action. The health and safety of military and civilian workers, and the public, are safeguarded by numerous regulations and standards issued by DoD, FAA, OSHA, and USEPA.

3.7.1 Affected Environment

At PSCA, the ROI for health and safety is limited to the U.S. transportation network used in the transport of weapon systems to the range, existing on-site facilities supporting the BMD flight test operations, and off-range areas within the missile flight paths and LHA. The health and safety ROI includes AAC and military personnel, contractors, and the general public.

The PSCA Range Safety Manual sets forth the range safety policy and criteria governing all launch support operations conducted at the facility, and is applicable to all AAC personnel, AAC contractors, tenants, experimenters, and range users. Health and safety procedures prescribed by the manual are in accordance with applicable DoD, federal, and state regulations, standards, and procedures, including the following:

- Army Pamphlet 385-64, *Ammunition and Explosive Safety Standards*

- DoD 6055.09-M, *DoD Ammunition and Explosives Safety Standards*
- RCC Standard 321, *Common Risk Criteria Standards for National Test Ranges*.

These and other procedures provide for ground safety, flight safety, range clearance and surveillance, sea-surface area clearance and surveillance, and commercial air traffic control. They include coordination with the FAA and USCG, and the publishing of NOTMARs and NOTAMs.

The Range Control Officer at PSCA oversees day-to-day range activities during mission operations and has the authority to approve the test, maintenance, and uses of the range. Range Safety and Flight Safety for individual missions conducted at PSCA are generally provided through a federal range organization, such as PRST (AAC 2015).

Range Safety determines those areas that require evacuation for each launch to ensure that the public is not exposed to unacceptable levels of risk, that physical security and safety measures can be enforced, and that adverse environmental effects are minimized. The size of the evacuation areas is based upon the potential for variability of the impact resulting from influences of local weather conditions, and small variances in the launch vehicle guidance and engineering systems. Criteria used in determining launch debris hazard risks are consistent with those employed by other national ranges.

To ensure public safety during launch days, PSCA security personnel close Pasagshak Point Road and do not allow unauthorized personnel to enter the GHA. The GHA is under constant surveillance during the day of launch and during any hazardous operations. If the safety GHA would be compromised, launches are delayed until the area is confirmed clear.

PSCA fire support consists of fire detection and protection systems. Fire, ambulance, and medical evacuation coverage is provided by Kodiak Island emergency services organizations, within normal non-service district response times. Additional fire, ambulance, and medical support can be negotiated in the launch services agreement (AAC 2015).

Once rocket and missile systems arrive at Kodiak Airport or the Port of Kodiak, AAC Security normally coordinates road transport of the equipment to PSCA. The AAC can assist in obtaining necessary permits, and in transporting materials and equipment in a safe manner. The City of Kodiak Fire and Police Departments provide as-needed support during these operations.

3.7.2 Environmental Consequences of the Proposed Action

3.7.2.1 SYSTEM TRANSPORTATION AND PRE-FLIGHT PREPARATIONS

All interceptor missiles would arrive on Kodiak Island pre-fueled and canisterized. There would be no fueling operations involving propellants. Whether the missiles and other ordnance are transported by air, sea, or road, the transportation systems used would provide environmental protection and physical security to the components. All transportation and handling requirements for the weapon systems would be accomplished in accordance with DoD, U.S. Army, DOT, and applicable USCG policies and regulations to safeguard the materials from fire or other mishap.

Upon arrival at PSCA, the defensive weapon systems and supporting equipment would be placed at designated pad or storage areas. Prior to the testing and operation of the radar systems, exclusion zones would be established to avoid injury to personnel and damage to equipment from EMR emissions. For each radar system used in the BMD flight tests, appropriate exclusion zones for personnel, equipment, and aircraft would be established in front of the radar systems and monitored during operations. When operating at PSCA, the main beams of the THAAD, PATRIOT, AN/TPY-2 (FBM), and similar defensive weapon system radars would point in a south-southwest direction, would not radiate the ground or surrounding waters, and would be aimed upward no lower than 5 degrees.

By adhering to the established and proven safety standards and procedures described, no significant impacts to health and safety are expected during system transportation and pre-flight preparations.

3.7.2.2 FLIGHT TEST ACTIVITIES AND POST-FLIGHT OPERATIONS

Adherence to the policies and procedures identified in **Sections 2.1.2 and 3.7.1** protect the health and safety of the public and on-site personnel. The establishment of LHAs, impact debris corridors, and road closures, in addition to the NOTMARs and NOTAMs published for mariners and pilots, serves to protect the public health and safety. In support of each mission, a safety analysis would be conducted prior to launch activities to identify and evaluate potential hazards and reduce the associated risks to a level acceptable to the Range Safety Officer. For each missile launch from PSCA, the allowable public risk limit for launch-related debris is extremely low, as the following RCC Standard 321 criteria show:

- Individuals within the general public must not be exposed to a probability of casualty greater than 1 in 1,000,000 for any single mission. Collective risk for the general public (i.e., the combined risk to all individuals exposed to the hazard) must not exceed a casualty expectation of 1 in 10,000 for any single mission.
- Non-mission ships will be restricted from near-shore hazard areas, where the probability of impact of debris capable of causing a casualty exceeds 1 in 10,000 for non-mission ships.
- Non-mission aircraft in near-shore areas will be restricted from hazard volumes of airspace, where the cumulative probability of impact of debris capable of causing a casualty on an aircraft exceeds 1 in 10,000,000 for all non-mission aircraft.

For comparison purposes, the 2005 average annual probability of fatality in the US from non-transportation accidental (unintentional) injuries was 1 in 4,274 (National Safety Council, 2009). This probability record included falls, fire and burns, drowning, electrical shock, and poisoning. Thus, the risk of fatality to the public from a BMD flight test at PSCA would be substantially less than the risk from non-transportation related accidents.

Post-launch clean-up and equipment removal operations at PSCA are considered routine and would comply with all applicable federal, state, and local health and safety requirements. By adhering to the established safety standards and procedures, the level of risk to workers and the general public would be minimal.

Consequently, no significant impacts to human health and safety are expected during flight test and post-flight activities.

3.8 Socioeconomics

3.8.1 Affected Environment

The ROI for socioeconomics includes Kodiak Island and the near-shore waters that would be affected by interceptor missile test.

The retail and service business sectors in the City of Kodiak are fully developed. A wide range of support services is readily available for the fishing and visitor industries, which are main sources of income in the community. Kodiak's role as a center for transportation, governmental offices, timber, and tourism complements its role as one of the Nation's largest producers of seafood. The main economic industries that could be affected by interceptor missile launches are commercial fishing and tourism, which are described in detail below.

Commercial Fishing. Kodiak is one of the Nation's largest producers of seafood. The City of Kodiak has the largest and most diversified fishing port in Alaska and is consistently ranked in the top three largest fishing ports in the U.S. in terms of value landed (FAA 2016). State of Alaska commercial fisheries are located from shore to 3 nautical miles off Kodiak Island, and Federal commercial fisheries extend offshore from 3 to 200 nautical miles. The dates that these fisheries are open vary each year.

Landings to the Port of Kodiak in 2011 were 313 million pounds, with a wholesale value of \$178 million. Salmon is traditionally the largest fishery in Kodiak in terms of wholesale value (Kodiak Chamber of Commerce 2013). The closest salmon stream to Narrow Cape is the Pasagshak River approximately six miles west of PSCA, which has small commercial and subsistence salmon fisheries (FAA 2016). Ground fish (live near the bottom of the body of water) are becoming increasingly important. In 2010, the value of the ground fisheries accounted for 44 percent of the total wholesale (Kodiak Chamber of Commerce 2013).

Overall, area residents hold 863 commercial fishing permits. Kodiak's processing plants employed approximately 1,806 people and had a combined payroll of over \$68 million in 2011 (Kodiak Chamber of Commerce 2013).

Tourism. Tourism, like many other Kodiak industries, is based on natural resources. Tourists come to Kodiak to view the scenic beauty, hike, camp, visit historical and cultural sites, view and photograph wildlife, and hunt and fish. The visitor industry in Kodiak has remained relatively steady for the past five years. As is true elsewhere in Alaska, Kodiak's visitor industry is seasonal, with approximately 76 percent of all visitors arriving during the summer months. According to the Alaska Marine Highway System (AMHS), 11,236 passengers disembarked at Kodiak in 2014 (AMHS 2014). The total annual number of visitors to Kodiak is approximately 30,000 (Kodiak Chamber of Commerce 2013).

3.8.2 Environmental Consequences of the Proposed Action

The proposed action would temporarily restrict commercial and tourist activities to the offshore waters near PSCA, which could reduce commercial fishing and tourism related opportunities (fishing, sightseeing, aircraft trips, hunting). Additionally, some of the project related personnel are expected to use local hotels thus reducing rooms available for tourists.

The 2016 FAA EA analyzed up to nine launches a year from LP3. Impacts to socioeconomic resources in the EA were determined to have negligible socioeconomic effects. The proposed BMD missile launches would be expected to have similar launch and personnel requirements, and impacts on socioeconomics also would be expected to be negligible. A review of the potential socioeconomic effects associated with the Proposed Action is provided below.

3.8.2.1 SYSTEM TRANSPORTATION AND PRE-FLIGHT PREPARATIONS

The interceptor missile and supporting equipment are a mobile platform moved on standard military trucks. The interceptor missile would be flown into the Kodiak Airport or barged to the island and transported on public roads. From Kodiak Rezanof Drive West (also referred to as the Chiniak Highway) and Pasagshak Point Roads would be used to transport the interceptor missile equipment the 40 miles to PSCA. These roads can accommodate the mobile interceptor launch equipment. Commercial and tourist vehicles accessing these roads between Kodiak and PSCA may be temporarily delayed by the slow moving vehicles; however, delays would be infrequent and to the extent possible equipment would be moved during off-peak travel hours.

Routine pre-flight preparation activities would consist of setting up the mobile equipment and testing. These activities would not limit any commercial fishing or tourist activities. During peak project activities, approximately 200 to 300 personnel could be working at PSCA. Many of these personnel would stay on PSCA using temporary housing or stay at the nearby Narrow Cape Lodge, which has 56 rooms. It is also anticipated that some of the support personnel would use lodging facilities within the City of Kodiak and other rentals local to PSCA. As a result, these activities would have a temporary and moderately adverse, but insignificant impact on lodging availability for tourists and other visitors to Kodiak Island.

Kodiak Airport is only serviced by two rental car agencies with a limited number of rentals, so there is the potential that test support personnel could cause a shortage of available rental cars. To help avoid a shortage of rental vehicles, PSCA would contact the rental car agencies regarding additional rental needs well before the flight test events occur. Additionally, alternate means of transportation, such as buses, may be used to transport personnel to and from PSCA.

Overall, pre-flight preparation activities would bring approximately 200 to 300 temporary personnel to Kodiak Island during individual test events, which in comparison to the approximately 30,000 tourists each year (Kodiak Chamber of Commerce 2013), would not be large enough to have a substantial effect on Kodiak community resources or infrastructure.

The up to 300 temporary on-site project personnel that would support pre-flight preparation and flight test activities for each test event would also provide a short-term economic benefit to the island economy in the form of retail and possible tourist activities.

3.8.2.2 FLIGHT TEST ACTIVITIES AND POST-FLIGHT OPERATIONS

For public safety, the Narrow Cape area and off-shore waters near PSCA would be closed to the public immediately before and during launch activities. A GHA would be established around the PSCA test site on the day of launch. Commercial fishing activities could be temporarily disrupted during flight test activities as marine vessel restrictions would be issued prior to all launches. The NOTMAR establishes a closed “safety zone” off-shore of PSCA and Ugak Island, as well as establishes a larger “hazard zone” down range where mariners would be discouraged from entering. The NOTMARs would be issued for a window of time in which a launch may take place and remains in effect until canceled or expired. These closures have the potential to adversely affect local sport, subsistence and commercial fisherman for up to 8 hours on the launch day. Any effects would depend on which fishery was open at the time and where those fishing grounds are located. Kodiak Fish and Game is not aware of any significant fishing activity in the down range hazard areas (FAA 2016). These closures are in effect under the current FAA license for PSCA. PSCA would work with commercial and sports fishermen on a case-by-case basis to minimize the impact of sea lane closure during flight test activities. Because closure during flight tests would be infrequent and temporary (lasting approximately 8 hours for each flight test event) impacts to commercial fishing and tourist related activities would be negligible. To help offset the impacts on fisherman, PSCA would continue (as they have previously) to hire local fishing vessels to serve as boundary boats during the safety closure periods. These boats warn other mariners of the hazard area and notify PSCA and the USCG of any craft within the hazard area (FAA 2016).

A NOTAM would be concurrently issued with the NOTMAR, imposing flight restrictions in the overhead safety and hazard zones. These closures would temporarily affect private pilots and air taxi companies serving both tourism and air travel needs, who wish to transit the Narrow Cape area. Effects could include longer flight paths (to avoid PSCA), scheduled flight delays, and increased use of fuel in aircraft. These effects would be temporary and would not differ from those already permitted at PSCA (FAA 2016). Because most commercial air routes are to the north of PSCA, there would be negligible adverse socioeconomic impacts from launches to commercial air traffic to and from Kodiak Airport.

Commercial fishing and tourist related activities would not be restricted during post-flight operations.

3.9 Hazardous Materials and Waste

Pursuant to 49 CFR § 171.8, hazardous materials include hazardous substances, hazardous wastes, marine pollutants, elevated temperature materials designated as hazardous in the Hazardous Materials Table (49 CFR § 172.101), and materials that meet the defining criteria for hazard classes and divisions in 49 CFR § 173. Transportation of hazardous materials is regulated by DOT. These regulations are codified within 49 CFR §§ 105-180.

Hazardous waste is defined by the Resource Conservation and Recovery Act at 42 USC § 6903(5), as amended by the Hazardous and Solid Waste Amendments, as: “a solid waste, or combination of solid wastes, which because of its quantity, concentration, or physical, chemical, or infectious characteristics may (A) cause, or significantly contribute to, an increase in mortality

or an increase in serious irreversible, or incapacitating reversible, illness; or (B) pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, or disposed of, or otherwise managed.”

3.9.1 Affected Environment

For the analysis of hazardous materials and waste management at PSCA, the ROI is defined as those PSCA facilities and test areas where hazardous materials would be stored and used, and where hazardous wastes would be generated and stored on a short-term basis.

Hazardous material use, storage, and disposal at PSCA are managed in accordance with the Range Safety Policy, Emergency Response Plan, General Compliance Plan for Emergency Planning and Community Right to Know Act, AAC’s Hazardous Communication Program, the Kodiak Area Emergency Operation Plan, the Explosive Site Plan, and applicable state and federal environmental laws, in such a way as to minimize impacts to the environment. A record of specific quantities of hazardous materials at PSCA is maintained by the Operations Manager. All mission specific hazardous wastes, such as propellants and explosives, are removed at the end of each mission by the launch vehicle provider. Additionally, PSCA maintains a Spill Prevention, Control, and Countermeasure Plan covering the fuel/oil storage facilities (FAA 2016).

PSCA currently stores and uses over 18,000 gallons of petroleum products ranging from gasoline and lubricating fluids to diesel fuel. PSCA also is equipped to store up to 550 gallons of hypergolic fuels during launch processing, and is approved by the DoD Explosive Safety Board to store up to 1,190 gallons (FAA 2016).

AAC staff and contract security personnel are HAZWOPER trained at the First Responder Operations Level. In the event of a spill or release to the environment involving a PSCA-related hazardous chemical, AAC staff and security personnel would follow Range Emergency Response Plan procedures. In the event of a spill or release to the environment involving a Range User-related hazardous chemical, AAC staff and security personnel would notify the Range User’s designated Emergency Responder and act to protect the health and safety of nearby persons, following relevant emergency procedures (AAC 2015).

AAC is currently authorized to operate PSCA as a Conditionally Exempt Small Quantity Generator regulated by 40 CFR § 262 (USEPA Standards Applicable to Generation of Hazardous Wastes). With this designation, PSCA can produce no more than 220 pounds of hazardous waste per month (FAA 2016). Only licensed hazardous waste carriers may transport hazardous wastes off site for proper disposal.

There are no existing contamination or cleanup issues associated with the proposed flight test areas.

3.9.2 Environmental Consequences of the Proposed Action

3.9.2.1 SYSTEM TRANSPORTATION AND PRE-FLIGHT PREPARATIONS

During BMD flight test preparations, hazardous materials used and wastes generated as part of routine equipment maintenance would consist primarily of petroleum, oils, and lubricants;

solvents; and coolant (ethylene glycol). The fueling and maintenance activities associated with tactical vehicles, generators, and other equipment can potentially result in accidental release of such materials. However, secondary containment systems would be used and the equipment maintained in good working order to prevent leakage.

Any hazardous wastes generated would be managed and stored in accordance with the PSCA Conditionally Exempt Small Quantity Generator requirements.

All hazardous and non-hazardous wastes would be properly disposed of in accordance with applicable federal, state, and local regulations. Hazardous material and waste-handling capacities would not be exceeded, and management programs would not have to change. Thus, no hazardous materials and waste-related impacts are expected.

3.9.2.2 FLIGHT TEST ACTIVITIES AND POST-FLIGHT OPERATIONS

Flight activities normally would not utilize any hazardous materials or generate any hazardous waste. If a test mishap termination of a flight were to occur on the launcher/launch pad or shortly after launch, actions would immediately be taken for the recovery of unburned propellants and any other hazardous materials that had fallen on the ground or in any of the nearby freshwater streams and wetland areas. Any recovery operations along the shoreline and in deeper waters would be treated on a case-by-case basis. Any waste materials collected would be properly disposed of in accordance with applicable regulations. Consequently, no adverse impacts from the management of hazardous materials and waste are expected.

4 Broad Ocean Area Affected Environment and Environmental Consequences

This chapter describes the existing environmental conditions within the BOA of the northern Pacific Ocean and western portion of the Gulf of Alaska (GOA), where proposed defensive weapon system flight tests would occur, including mobile target launches from aircraft, missile booster drop zones, missile intercepts, and intercept debris. Immediately following the description of existing conditions is an analysis of potential environmental impacts associated with the Proposed Action described in **Section 2.1**. The information and data presented in this chapter are commensurate with the importance of the potential impacts to provide the proper context for evaluating impacts. Both direct and indirect impacts are addressed where applicable. Appropriate environmental management and monitoring actions and requirements are also included, where necessary, and are summarized in **Chapter 7**.

Because most of the proposed target missile systems have been described and well analyzed in previous NEPA documentation, this chapter does not address the effects of pre-flight preparations, and the transportation of target missiles to and from staging areas, which have been shown to have no significant impacts. Detailed analyses of these actions can be found in the *Integrated Flight Tests at Wake Atoll Final Environmental Assessment* (MDA 2015) and in other NEPA documents identified in **Section 2.1.4**, which are accessible on the MDA public website at: https://www.mda.mil/news/environmental_reports.html.

Because of the limited scope of the Proposed Action in the BOA, biological resources, airspace and air traffic, and marine traffic were the only resource topics analyzed. Water quality and noise were also included in the analysis to account for potential impacts on marine life, and human health and safety is addressed under the air and marine traffic sections. Other environmental resources were not evaluated in this chapter because: (1) effects would be limited to the over-ocean areas, thus, there is no potential for impacts to cultural resources, land use, soils, and groundwater; and (2) since the ROI is well removed from population centers, no impacts to socioeconomics, utilities, waste management, or transportation are anticipated, nor are environmental justice (EO 12898) concerns expected.

4.1 Biological Resources

The affected environment for the BOA is described in the following subsections in terms of its environmental setting, threatened and endangered species, and other protected species.

4.1.1 Affected Environment

The average ocean depth within much of the ROI is over 10,000 ft. Marine biological communities in the deep ocean waters can be divided into two broad categories: pelagic and benthic. Pelagic communities live in the water column and have little or no association with the bottom, while benthic communities live within, upon, or are otherwise associated with the bottom. The organisms living in pelagic communities may be drifters (plankton) or swimmers (nekton). The plankton consists of plant-like organisms (phytoplankton) and animals (zooplankton) that drift with the ocean currents, with little ability to move through the water on

their own. The nekton consists of animals that can swim freely in the ocean, such as fish, squids, sea turtles, and marine mammals. Benthic communities are made up of marine organisms that live on or near the sea floor, such as bottom dwelling fish, shrimps, worms, snails, and starfish.

The North Pacific Ocean contains a variety of threatened, endangered, and other protected species, including whales and small cetaceans, pinnipeds, and sea turtles. These are listed in **Table 4-1** for ocean areas within the ROI. Many of these species can be found off the U.S. mainland and Alaskan coasts or near the Hawaiian Islands, but they are sometimes seasonal in occurrence because of unique migration patterns. Some species, particularly the larger cetaceans, can occur hundreds or thousands of miles from land. For most of the BOA, there are no accurate population estimates or migratory routes for listed marine mammal species.

Figure 4-1 shows areas of EFH for pelagic and groundfish species, and several habitat areas of particular concern, occurring within the BOA near Kodiak Island. These include Alaska Seamount Habitat Protection Areas that are EFH protected against bottom contact gear or anchoring, and GOA Slope Habitat Conservation Areas that are EFH protected against bottom trawling fishing activities (50 CFR § 679). Portlock Bank, located northeast of Kodiak Island, is also one of several major fishing grounds in the GOA (Clausen and Heifetz 2002).

In addition to EFH, **Figure 4-1** shows a large area approximately 18 miles south of PSCA that is designated North Pacific right whale critical habitat. This area is one of two critical habitat areas in the North Pacific where right whales are known to concentrate during the spring and summer feeding seasons (73 FR 19000).

4.1.2 Environmental Consequences of the Proposed Action

The proposed BMD flight tests, including target missile launches and intercepts, within the BOA would not have a discernible or measurable impact on benthic or planktonic organisms, because of their abundance, their wide distribution, and the protective influence of the mass of the ocean around them. However, the potential exists for impacts to larger vertebrates in the nekton, particularly those that must come to the surface to breathe (e.g., marine mammals and sea turtles). Potential impacts on these protected species have been considered in this analysis and include the effects of acoustic stimuli produced by launches and sonic booms, and non-acoustic effects (splash-down of launch vehicle stages and sub-orbital payloads, and release of propellants or other contaminants into the water).

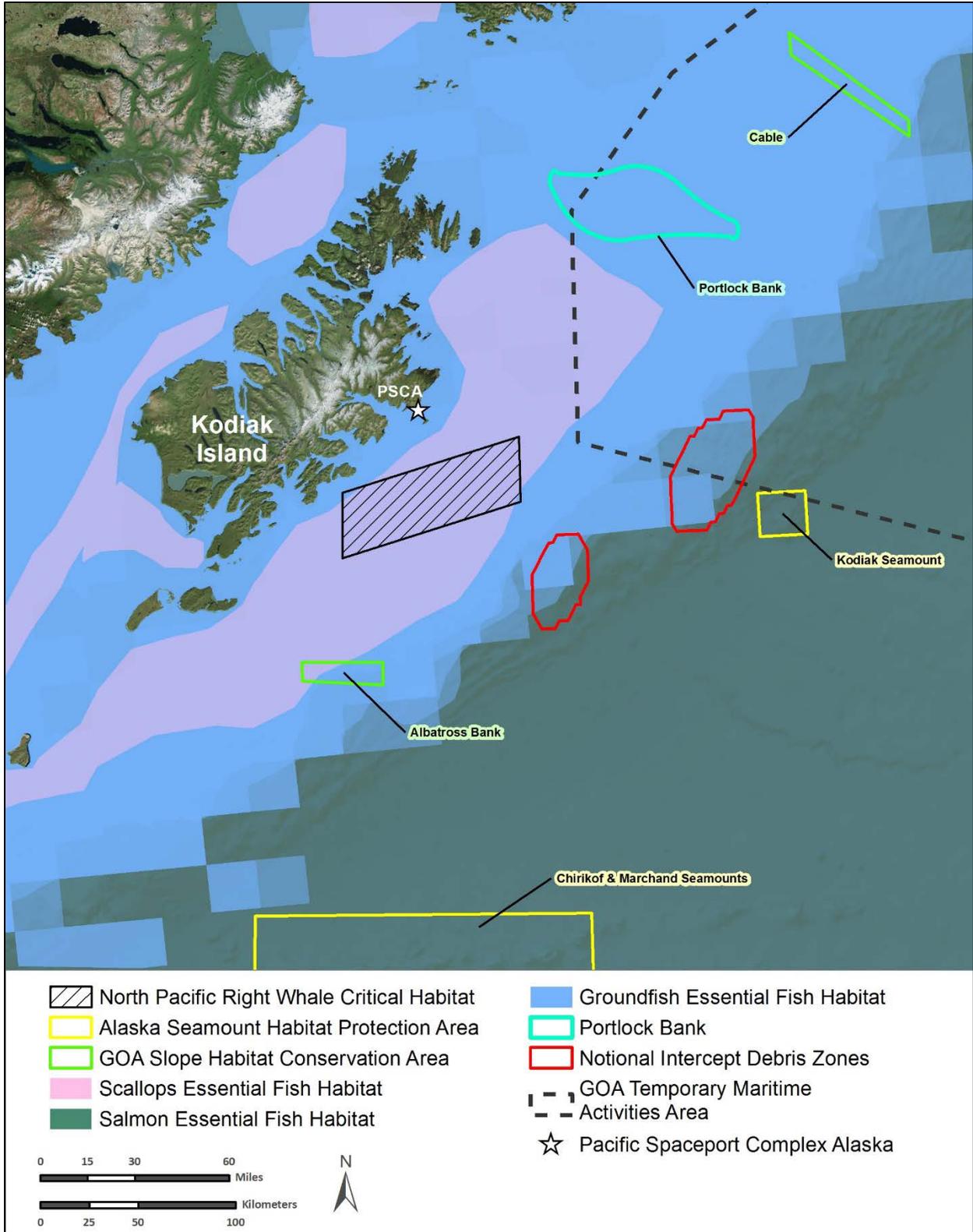
Within the BOA, airborne noise from air-launched target missiles, and associated sonic booms, have the potential to adversely affect marine mammals (primarily cetaceans), sea turtles, and other fauna. The propagation of launch noise and sonic booms underwater could affect the behavior and hearing sensitivity in such animals. Depending on the extent of noise propagation underwater and the level of exposure, this threshold shift in hearing may be temporary or permanent. However, the noise effects of much larger vehicles launched from PSCA and other ranges over BOAs, including Vandenberg Air Force Base in California and the Mid-Atlantic Regional Spaceport in Virginia, have shown such impacts to be insignificant (FAA 2016, NASA 2009, USAF 2010).

Table 4-1. Protected Marine Mammal and Sea Turtle Species Occurring within the North Pacific BOA

Common Name	Scientific Name	ESA Status
Pinnipeds		
Northern fur seal	<i>Callorhinus ursinus</i>	-
Guadalupe fur seal	<i>Arctocephalus townsendi</i>	T
California sea lion	<i>Zalophus californianus</i>	-
Pacific harbor seal	<i>Phoca vitulina richardsi</i>	-
Northern elephant seal	<i>Mirounga angustirostris</i>	-
Steller sea lion	<i>Eumetopias jubatus</i>	E
Hawaiian monk seal	<i>Monachus schauinslandi</i>	E
Small Cetaceans		
Harbor porpoise	<i>Phocoena phocoena</i>	-
Dall's porpoise	<i>Phocoenoides dalli</i>	-
Bottlenose dolphin	<i>Tursiops truncatus</i>	-
Short-beaked common dolphin	<i>Delphinus delphis</i>	-
Spinner dolphin	<i>Stenella longirostris</i>	-
Striped dolphin	<i>Stenella coeruleoalba</i>	-
Northern right whale dolphin	<i>Lissodelphis borealis</i>	-
Risso's dolphin	<i>Grampus griseus</i>	-
Pacific white-sided dolphin	<i>Lagenorhynchus obliquidens</i>	-
Pantropical spotted dolphin	<i>Stenella attenuata</i>	-
Rough-toothed dolphin	<i>Steno bredanensis</i>	-
Short-finned pilot whale	<i>Globicephala macrorhynchus</i>	-
Killer whale	<i>Orcinus orca</i>	-
False killer whale	<i>Pseudorca crassidens</i>	-
Pygmy killer whale	<i>Feresa attenuata</i>	-
Dwarf sperm whale	<i>Kogia sima</i>	-
Pygmy sperm whale	<i>Kogia breviceps</i>	-
Melon-headed whale	<i>Peponocephala electra</i>	-
Beaked Whales		
Cuvier's beaked whale	<i>Ziphius cavirostris</i>	-
Longman's beaked whale	<i>Indopacetus pacificus</i>	-
Blainsville's beaked whale	<i>Mesoplodon densirostris</i>	-
Large Odontocetes and Baleen Whales		
Sperm whale	<i>Physeter macrocephalus</i>	E
Gray whale	<i>Eschrichtius robustus</i>	-
Humpback whale	<i>Megaptera novaeangliae</i>	E
North Pacific right whale	<i>Eubalaena japonica</i>	E
Sei whale	<i>Balaenoptera borealis</i>	E
Blue whale	<i>Balaenoptera musculus</i>	E
Fin whale	<i>Balaenoptera physalus</i>	E
Bryde's whale	<i>Balaenoptera edeni</i>	-
Minke whale	<i>Balaenoptera acutorostrata</i>	-
Sea Turtles		
Green sea turtle	<i>Chelonia mydas</i>	T
Hawksbill sea turtle	<i>Eretmochelys imbricata</i>	E
Loggerhead sea turtle	<i>Caretta caretta</i>	T
Olive ridley sea turtle	<i>Lepidochelys oliveacea</i>	T
Leatherback sea turtle	<i>Dermochelys coriacea</i>	E

Source: ADF&G 2016; NMFS 2016

Notes: All marine mammals are protected under the MMPA; E = Endangered; T = Threatened



Source: 50 CFR § 679; 73 FR 19000; NOAA 2015, 2017, U.S. Navy 2016

Figure 4-1. BOA Marine Habitats and Notional Intercept Debris Zones

During each flight test, missile components, spent rocket motors, and related intercept debris, could impact various locations of the BOA, including the western portion of the GOA depending on the individual test scenario. Notional intercept debris zones for two BMD flight tests are shown on **Figure 4-1**. If a portion of a launch vehicle moving at high velocity was to strike a protected marine mammal or sea turtle near the water surface, the animal would likely be killed. However, considering the low density of such species in deep ocean waters far from coastal areas, the probability of an animal being struck is very remote and can be considered discountable (USAF 2010). In a related example at the Mid-Atlantic Regional Spaceport where an annual rate of 18 rocket launches was assumed, NMFS determined that no letter of incidental take was required because the probability of falling debris hitting marine mammals is extremely unlikely to occur (NMFS 2009).

By the time spent rocket motors and other missile components splash down in the ocean, all of the propellants in them would be consumed. The residual aluminum oxide and burnt hydrocarbon coating the inside of the solid propellant motor casings would not present any toxicity concerns. Although batteries carried onboard the launch vehicles would be spent (discharged) by the time they impact in the ocean, small quantities of electrolyte material would remain in the batteries. The batteries and other materials could mix with the seawater causing localized contamination. The release of such contaminants could potentially harm marine life that comes in contact with, or ingests, toxic levels of these solutions. Previous studies of missile tests, however, concluded that the release of hazardous materials carried onboard rocket systems would not be significant (U.S. Navy 2008). Materials would be rapidly diluted in the seawater and, except for the immediate vicinity of the debris, would not be found at concentrations identified as producing adverse effects. Ocean depths in the ROI reach thousands of feet and, consequently, any impacts from hazardous materials are expected to be insignificant. The area affected by the dissolution of hazardous materials onboard would be relatively small because of the size of the rocket components and the minimal amount of residual materials they contain. Such components are expected to immediately sink to the ocean bottom, out of reach of marine mammals, sea turtles, and most other marine life.

Considering that the proposed BMD flight tests would occur no more than nine times a year, the overall impact of conducting the tests over the BOA would be insignificant for marine mammals, sea turtles, and other marine life.

4.2 Airspace and Air Traffic

The airspace beyond the 12-nautical-mile limit from the coastline is in international airspace. For this reason, the procedures of the ICAO, *Procedures for Air Navigation Services: Air Traffic Management* (ICAO 2007), are followed in this airspace. These ICAO procedures are the equivalent air traffic control manual to the FAA Order JO 7110.65W, *Air Traffic Control* (FAA 2015). However, the ICAO is not an active air traffic control agency, and has no authority to allow aircraft into a particular sovereign nation's airspace, and does not set international boundaries for air traffic control purposes. Rather, the ICAO is a specialized agency of the United Nations, whose objective is to develop the principles and techniques of international air

navigation, and to foster planning and development of international air transport. FAA Air Traffic Service outside U.S. airspace is provided in accordance with Article 12, *Rules of the Air*, and Annex 11, *Air Traffic Regulations and Air Traffic Services*, of the ICAO Convention. FAA acts as the U.S. agent for aeronautical information to the ICAO.

4.2.1 Affected Environment

The ROI is defined as that area that would be potentially affected by the proposed BMD flight tests that would utilize portions of the international and domestic airspace over the northern Pacific Ocean and western portion of the GOA.

The airspace around Alaska, including the GOA, is under the control of the Anchorage Flight Information Region (FIR). South of the Anchorage FIR, the international airspace for the Pacific Region is under the control of the Oakland Oceanic Controlled Airspace (OCA)/FIR. The OCA/FIR controls approximately 21.3 million square miles of airspace that borders the Anchorage FIR to the north, the Tokyo, Japan FIR to the west, the Auckland, Australia FIR to the south, and the coastline of the contiguous United States on the east. Within Oakland OCA/FIR are the Honolulu Control Facility and Guam Center Radar Approach Control, both providing radar control services. In addition, Oakland ARTCC provides arrival and departure services at other island airports including Wake Island and Midway Island.

Oakland Center is unique in that two distinctly different air traffic control functions are handled here. There is the normal en route air traffic control as well as an oceanic air traffic operation that manages the largest volume of international airspace in the world at one facility. The U.S., as a Contracting State to ICAO and a member of the Pacific Region, has been delegated as the Air Navigation Service Provider for that portion of international airspace designated as the Oakland OCA/FIR. In this airspace, Oakland ARTCC is responsible for air traffic control services at flight level 5,500 ft and above, and for flight information and alerting services surface and above.

Established airways for the Pacific Region are shown on **Figure 4-2**. Within the ROI, air traffic over the BOA is managed by the Honolulu, Oakland, and Anchorage ARTCCs.

4.2.2 Environmental Consequences of the Proposed Action

Special Use Airspace. Target missile launches from aircraft, and the intercepts and resulting debris, generally would occur outside already established SUA areas. As such, the Proposed Action would not represent a direct SUA impact. Similarly, the use of altitude reservation (ALTRV) procedures as authorized by the Central Altitude Reservation Function, an air traffic service facility, or appropriate ARTCC (in this case, the Oakland or Anchorage ARTCC) for airspace utilization under prescribed conditions would not impact SUA. According to the FAA Handbook, 7610.44, ALTRVs may encompass certain rocket and missile activities and other special operations as may be authorized by FAA approval procedures.

Within PRST, the primary responsible test range for the BMD tests would coordinate with the Oakland or Anchorage ARTCC military operations specialist assigned to handle such matters using ALTRV request procedures. After receiving the proper information on each flight test, an LHA would be constructed and superimposed on a chart depicting the area of operations.

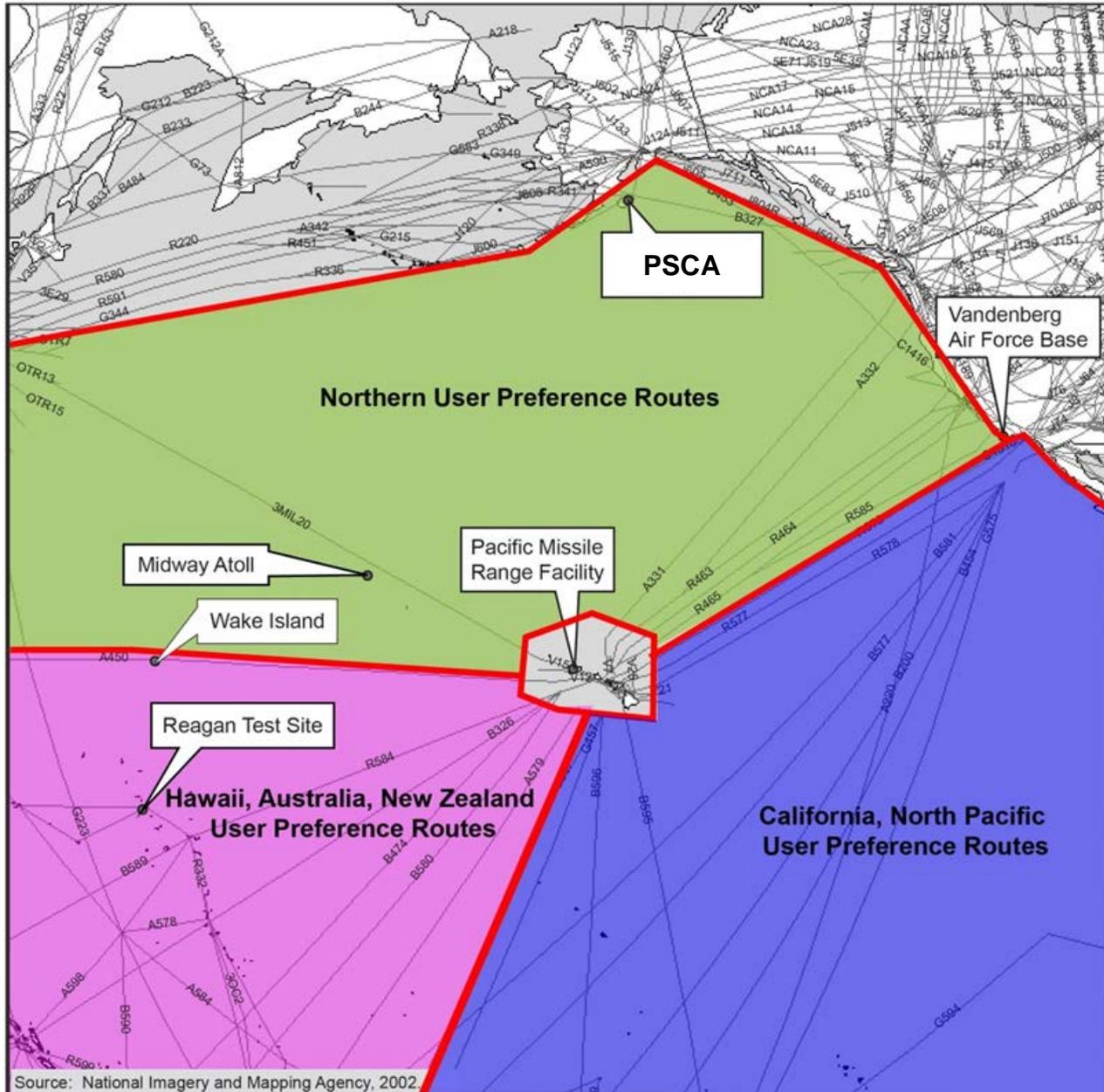


Figure 4-2. High Altitude Jet Routes and User Preference Route Areas

Ensuring that the LHA would not encroach on any land mass, this area is then plotted using minimum points (latitude longitude) to form a rectangular area. This plotted area is then transmitted to the military operations specialist at Oakland ARTCC (and if necessary to the Anchorage ARTCC) requesting airspace with the following information: area point (latitude-longitude); date and time for primary and backup (month, day, year, Zulu time); and altitude. A follow-up phone call would be made after 48 hours to verify receipt. When approval of the request of the airspace is received from the military operations specialist at Oakland ARTCC, the primary responsible test range would submit an ALTRV request to Central Altitude Reservation Function who publishes the ALTRV 72 hours before the flight test.

Airways. The numerous airways (including non-published and User Preferred Routes) and jet routes that crisscross the ROI have the potential to be affected by the Proposed Action. User Preferred Routes were established to allow air carriers to fly routes off airways using alternate means of navigation; for example, no jet routes are published from Anchorage, Alaska, to Hawaii, yet these flights occur multiple times per day. Target and interceptor missile launches, and missile intercepts, would be conducted in compliance with DoD Instruction 4540.01, *Use of International Airspace by U.S. Military Aircraft and for Missile and Projectile Firings*, which states that, "Firing areas must be selected so that trajectories or flight profiles are clear of established oceanic air routes or areas of known surface or air activity." Prior to conducting BMD flight tests, MDA and the PRST would coordinate with the FAA at the Oakland and Anchorage Centers to identify the most used off jet airway routes and define test areas that minimize impacts on air carriers.

Q-routes and T-routes are relatively new types of airways defined by Ground Positioning System waypoints and require an Instrument Flight Rule-capable receiver. They were created to handle the increasing density of air traffic and to take advantage of the widespread availability of Ground Positioning System waypoints. T-routes are low altitude airways and Q-routes are high altitude airways. Q-routes can be flown as low as flight level 18,000 ft. No Q or T routes are currently published for this ROI, but they can be added on relatively short notice and the possibility of their existence should be a consideration when planning BMD flight tests.

Before conducting a missile launch and/or intercept test, NOTAMs would be sent in accordance with the conditions of the directive specified by PRST requirements. In addition, to satisfy airspace safety requirements, the responsible test range would obtain approval from the FAA through the appropriate DoD airspace representative. Provision is made for surveillance of the affected airspace either by radar or patrol aircraft. In addition, safety regulations dictate that hazardous operations would be suspended when it is known that any non-mission aircraft have entered any part of the danger zone until the non-participating entrant has left the area or a thorough check of the suspected area has been performed. PRST would not allow the BMD flight tests to proceed if the calculated risk exceeds the safety standard RCC 321 criteria, which requires that non-mission aircraft will be restricted from hazard volumes of airspace where the cumulative probability of impact of debris capable of causing a casualty on an aircraft exceeds 1 in 10,000,000 for all non-mission aircraft.

In addition to the reasons cited above, minimal adverse impacts to the en route airways and jet routes are identified because of the required coordination with the FAA. Schedules are provided to the appropriate FAA facility (Anchorage and Oakland ARTCCs) as agreed between the agencies involved. Aircraft transiting the open ocean ROI on one of the airways and/or jet routes that would be affected by flight test activities would be notified of any necessary rerouting before departing their originating airport and would therefore be able to take on additional fuel before takeoff. Real-time airspace management involves the release of airspace to the FAA when the airspace is not in use or when extraordinary events occur that require drastic action, such as weather requiring additional airspace.

Because of the safety and notification procedures in place, the limited jet routes within the ROI, and the ability to route air carriers around test areas with minimal impact to flight times, the

proposed BMD flight tests are expected to have no significant impact on airspace and air traffic in the BOA.

4.3 Marine Traffic

A potential transportation issue related to the proposed activities in the BOA is that of marine shipping vessels, which refers to the conveyance of freight, commodities, and passengers via mercantile vessels. The northern Pacific is an important commercial seaway, carrying a substantial proportion of the United States' trade in raw materials and finishing products. The large majority of vessels cross the northern Pacific Ocean to and from the large trading ports of Asia.

There are no regulations or directions obliging commercial vessels to ply specific cross-ocean lanes. Once ships leave the navigation lanes leading out to the open sea, the majority will follow the course of least distance between two ports.

The International Maritime Organization (IMO) is a specialized agency of the United Nations, whose objective is to develop and facilitate the general adoption of the highest practicable standards in matters of ship safety, training, operation, construction, certification, efficiency of navigation, and pollution prevention and control. The Maritime Safety Committee is IMO's senior technical body on safety-related matters. The IMO measures cover all aspects of international shipping to ensure that this vital sector remains safe, environmentally sound, energy efficient and secure (IMO 2016). The USCG also acts as the United States' agent for maritime information to the IMO

4.3.1 Affected Environment

For maritime traffic, the ROI is defined as those ocean waters in the northern Pacific Ocean and western portion of the GOA that would be potentially affected by the proposed BMD flight tests.

Along the coast of Alaska, the AMHS operates as a division of the Department of Transportation and Public Facilities for the State. The Marine Highway is an integral part of the State highway infrastructure, transporting people and vehicles to coastal communities on a year-round basis (U.S. Navy 2011). **Figure 4-3** shows the current routes on the marine highway system, which is north of and generally outside of the ROI for the proposed BMD flight tests.

Near Kodiak Island, marine vessels, large and small, transit the area to several commercial ports including Kodiak, Anchorage, and Valdez. Vessel traffic approaching these ports is managed by the Vessel Traffic Service, which is operated jointly by USCG and the Marine Exchange of Alaska (a nonprofit organization established to serve the Alaska Maritime Community by providing information, communications, and services to ensure safe, secure, efficient, and environmentally responsible maritime operations). The ocean traffic flow in congested waters, especially near coastlines, is controlled by the use of directional shipping lanes for large vessels, including cargo, container ships, and tankers. Traffic flow controls are also implemented to ensure that harbors and ports-of-entry remain as uncongested as possible (U.S. Navy 2011).



Figure 4-3. Alaska Marine Highway System Routes near Kodiak Island

The majority of international trade crossing the Pacific between Asia and North America uses routes of least distance, usually via the great circle route. **Figure 4-4** shows the distribution of ships in the northern Pacific on June 8, 2016, including cargo vessels, tankers, passenger ships, and fishing vessels, and characterizes the random nature of commercial shipping movements in the northern Pacific.

While there is a general adherence to particular routes (such as the great circles of latitude between the United States to Asian ports), commercial vessels plot a diverse range of courses across the northern Pacific. **Figure 4-5** maps the relative density of shipping traffic in 2014 within the northern Pacific Region (Marine Traffic 2014).

The Worldwide Navigational Warning Service is a worldwide radio and satellite broadcast system for the dissemination of Maritime Safety Information to U.S. Navy and merchant ships. The service provides timely and accurate long range and coastal warning messages promoting the safety of life and property at sea and special warnings that inform mariners of potential political or military hazards that may affect safety of U.S. shipping. The USCG Pacific Area Districts 11 (California), 14 (Hawaii), and 17 (Alaska) serve the northern Pacific. Warning Areas are established in international waters to contain activity that may be hazardous and to notify non-participating vessels of the potential danger.

4.3.2 Environmental Consequences of the Proposed Action

The proposed BMD flight tests have the potential to impact coastal and international waters occupied by commercial shipping. The Proposed Action in the BOA would include missile booster drop zones, missile intercepts, and intercept debris. In addition, the launching of mobile sea launch targets and air launch targets could have commercial shipping lane impacts.

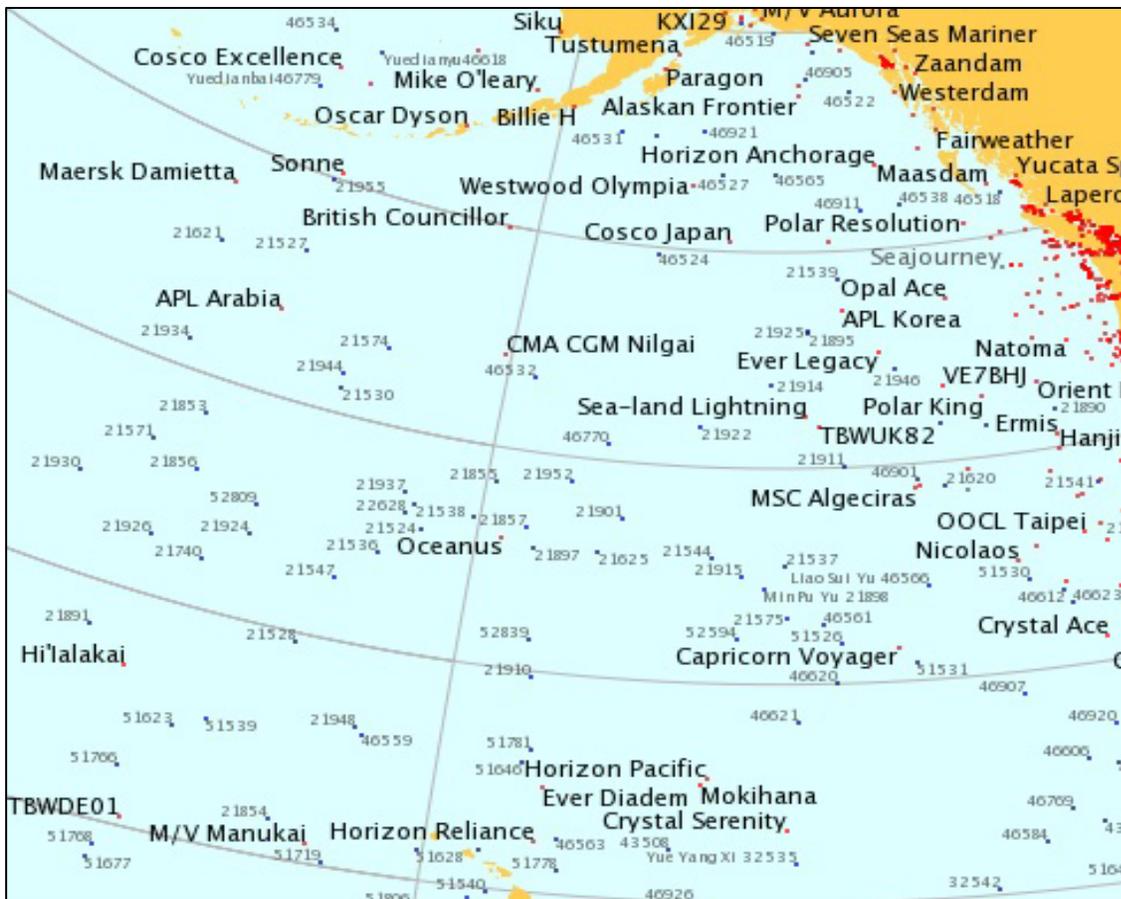


Figure 4-4. Location of Ships in the Northern Pacific on June 8, 2016.

The proposed testing would not impact any AMHS routes. Other marine traffic routes that traverse the GOA could have a short-delay navigating around the closure area east of Kodiak, but given the infrequent testing (up to three flight test events per 12-month period), the impact on any individual ship would be minor and marine traffic can navigate around the closure area.

The majority of international trade crossing the Pacific between Asia and North America uses routes of least distance, usually via the great circle route. Depending upon the individual scenarios, the actual debris impact area would be small and area closure of short-duration (approximately 8 hours for each flight test event). Prior notice of BMD test activities would enable commercial shipping to follow alternative routes away from the test area. The process is simplified by the lack of any formal shipping lanes in the northern Pacific. Ships in route during testing could have a short-delay navigating around the closure area, but given the infrequent testing (up to three flight test events per 12-month period), the impact on any individual ship would be minor.

Safety procedures would be employed to determine that the impact areas are clear of surface vessels to ensure that no impact to ocean transportation would occur. NOTMARs would be issued to notify surface vessels of the testing, and those tests would be conducted in areas that would minimize impacts to marine transportation. Prior to testing, the area would be verified cleared of marine traffic. PRST would not allow the BMD flight tests to proceed if the calculated

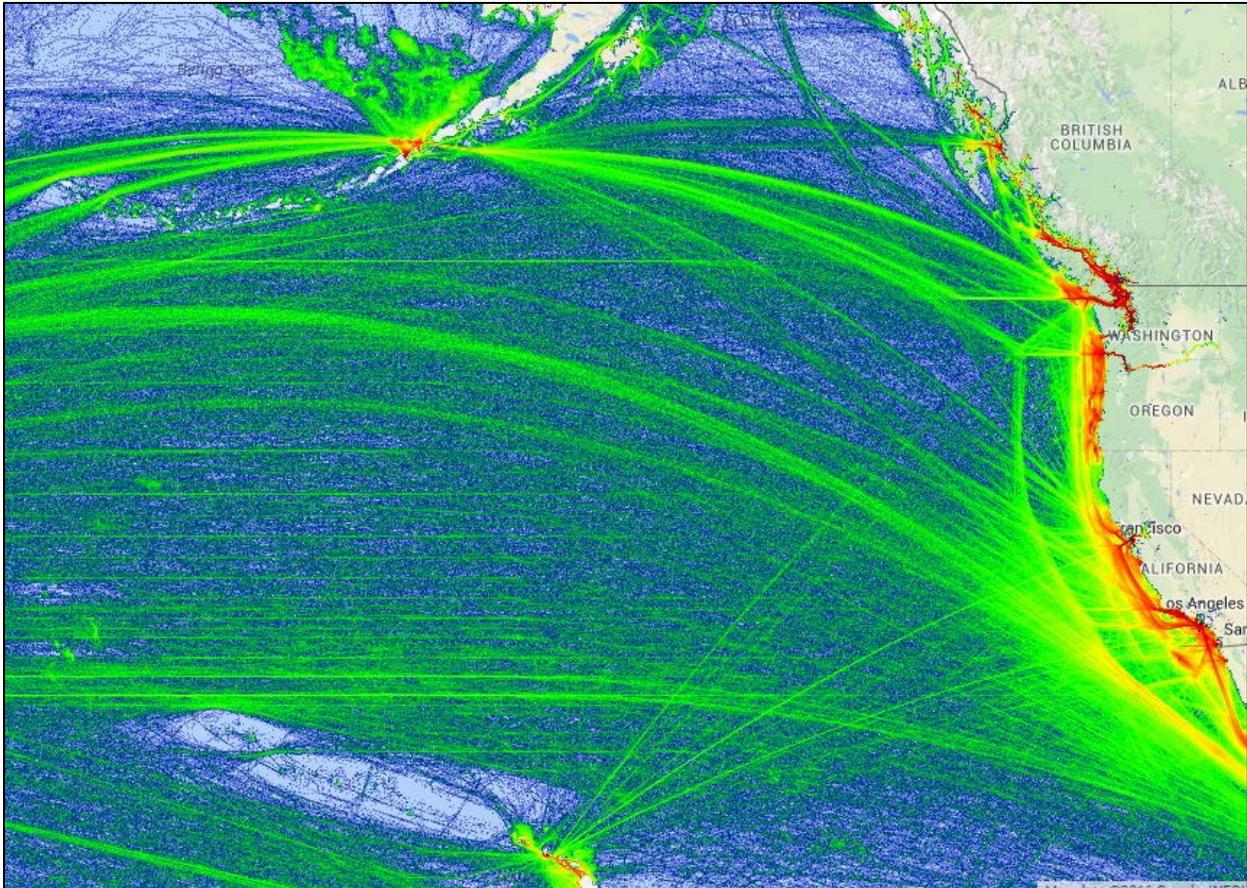


Figure 4-5. 2014 Northern Pacific Ship Density

risk exceeds the safety standard RCC 321 criteria, which requires that non-mission ships will be restricted from hazard areas where the probability of impact of debris capable of causing a casualty exceeds 1 in 500,000 for all non-mission ships.

Because of the safety and notification procedures in place, the relatively small size of the debris impact areas, and with individual closures limited to approximately 8 hours each, only minor impacts to commercial shipping would occur.

5 Cumulative Effects

Cumulative impacts are the incremental impacts of a proposed action when added to the aggregate impacts of other past, present, and reasonably foreseeable future actions. For this analysis, the temporal span is 2017 to 2026. For most resource areas, the present impacts of past actions are now part of the existing environment described in **Chapters 3 and 4**.

In identifying other past, present, and reasonably foreseeable future actions at PSCA with temporal and spatial relevance to the Proposed Action, those actions identified in the 2016 FAA EA were reviewed. As described in the EA, AAC is proposing to expand the launch capabilities of PSCA, a commercial launch site currently operated under FAA LSO license (LSO-03-008) for small-lift operations. The proposed expansion would add medium-lift launch capability at PSCA and new infrastructure to support these launches, including the construction of LP3 and associated facilities. The proposal to expand the launch capabilities is not currently scheduled for construction.

AAC may propose other range improvements projects in the future. Potential environmental impacts resulting from such projects would be considered when the projects are defined well enough for analysis.

The following analysis examines the potential cumulative impacts on the natural and man-made environment that would result from the cumulative impact of the Proposed Action in combination with the other actions described above. The FAA license (LSO-03-008) for PSCA operations allows up to nine commercial launches a year; however, the DoD is not restricted by the number of launches under the FAA license. For analysis purposes of MDA's Proposed Action, up to three BMD flight test events could occur in a 12-month period, and the combination of these test events could involve up to approximately nine individual interceptor missile launches. These proposed BMD missile launches would be in addition to any commercial or other government-related launches from PSCA, which have averaged out to one launch per year in the past.

5.1 Analysis of Potential Cumulative Impacts at PSCA

Based on the assessment of past, present, and reasonably foreseeable future actions at PSCA and in the project area vicinity, the Proposed Action would result in environmental effects from the BMD activities. None of these impacts, however, would be considered significant. Resource topics analyzed for cumulative impacts are air quality and climate change, noise, water resources, biological resources, recreational land use, airspace and air traffic, human health and safety, socioeconomics, and hazardous materials and waste. As discussed in **Chapter 3**, other environmental resource topics were omitted from analysis because of little or no environmental concerns.

Air Quality and Climate Change. The State of Alaska takes into account the effects of all past, present, and reasonably foreseeable emissions during the development of the State Implementation Plan. The state accounts for all significant stationary, area, and mobile emission sources in the development of this plan. Estimated emissions generated by the Proposed Action would be *de minimis* and temporary, and it is understood that activities of this limited size and nature would not contribute significantly to adverse cumulative effects to air quality. Emissions

from rocket launches dissipate after each launch and short-term effects are minor and temporary in nature.

Proposed launch operations would slightly increase CO₂ emissions compared to the No Action Alternative. However, the increase in emissions would be approximately 22 percent of the CEQ presumptive effects threshold of 27,558 tons per year (CEQ 2014). Therefore, the Proposed Action would not be expected to result in a significant contribution to global climate change

Noise. The Proposed Action of up to approximately nine BMD missile launches per year, in addition to other construction activities and launch missions at PSCA, would not have a substantial effect on the overall noise environment. As previously described, the BMD missiles would generate much lower noise levels than the larger small-lift and medium-lift vehicles, and the BMD flight test events would occur infrequently. As stated earlier, when considering proposed activities at PSCA, noise levels at sensitive properties in the vicinity would remain below the 65 dBA DNL criterion. Overall, the Proposed Action would introduce temporary short- and long-term incremental increases in the noise environment from changes in operations at PSCA. These changes would have negligible cumulative effects. No activity has been identified that when combined with the Proposed Action would have significant effects on the noise environment.

Water Resources. Any potential hazardous material that could impact water bodies adjacent to interceptor flight test activities would be minimized by following the PSCA Spill Prevention, Control, and Countermeasure Plan. Surface water quality monitoring efforts have been conducted in conjunction with previous rocket launches from PSCA and long-term results showed that launch operations were having no cumulative effect on local water bodies. The release of HCl as a result of solid propellant rocket launches would not result in measurable degradation of surface water quality because the exhaust and associated chemical compounds would be dispersed over a large area and immediately diluted and/or neutralized by receiving waters. Overall, no cumulative impacts to water quality would occur.

Biological Resources. The primary cumulative impact concern to biological resources is marine mammals in the ocean waters off Narrow Cape and on Ugak Island. In 2011, NMFS issued a final rule to address potential marine mammal effects from rocket launches at PSCA for the 5-year period from 2011 to 2016 (50 CFR § 217). The final rule concluded that rocket launches could result in the incidental take of a small number of marine mammals (Steller sea lions and harbor seals), but that the total taking would have a negligible impact on the species or stocks (76 FR 16311). In addition, the final rule determined that PSCA launch activities would not reach the level of take for any cetaceans (whales and dolphins) and that any noise that could reach these species would be so low as to be discountable (76 FR 16311). At the Ugak Island pinniped haulouts, the proposed BMD missile flight tests would produce a maximum unweighted SPL of approximately 80.5 dB (**Figure 3-1**), which is substantially lower (over 20 dB lower) than the larger small-lift and medium-lift launch vehicles. Additionally, the audible sound from BMD missile launches would have a much shorter duration (approximately 20 seconds versus 2 minutes) and occur infrequently (up to approximately nine times in a 12-month period). Because the launch noise from BMD missile launches would be below in-air thresholds used by NMFS to calculate take (Level B Harassment) of harbor seals and Steller sea lions, no

cumulative increase in the number of takes would occur. Adverse effects to other protected species in the ROI also are unlikely. Therefore, the cumulative impacts on biological resources would not be significant.

Recreational Land Use. In addition to other PSCA activities, the BMD flight test activities could add up to three flight test events (involving up to approximately nine interceptor missile launches) in a given 12-month period. Over the past 15 years, PSCA has averaged about one launch per year, but could have up to nine commercial or other government launches in a given year, consistent with PSCA's existing LSO license (LSO-03-008). Although very unlikely, there could be up to 12 launch events per year (i.e., three MDA flight test events and nine other commercial or other government launches) from PSCA. With BMD pre-flight preparations (up to two pre-flight closures per flight test event for a total of six) and launch restrictions (three for BMD and nine for PSCA), this could result in about 18 closures of recreational activities on PSCA per year. Given the closures would be temporary and most would occur during the work week, the proposed BMD flight test activities, when combined with other PSCA launches, would not result in significant cumulative impact to recreational activities.

Airspace and Air Traffic. Close coordination with the FAA Anchorage ARTCC and Kodiak Air Traffic Control Tower by the launch operations manager would minimize the potential for any adverse impacts on airspace use in the vicinity of Kodiak Island. Airspace closures would be temporary (8 hours for each launch event) and likely would not exceed 12 per year for all BMD and PSCA launch events. Thus, with the advance warning to air traffic and the limited number of closures, impacts on airspace or air traffic by the Proposed Action would result in no significant cumulative impacts.

Human Health and Safety. Cumulative impacts to health and safety could occur as a result of from interceptor flight test in combination with other PSCA activities. However, all operations would follow established safety procedures, therefore, no significant cumulative impacts on health and safety would be expected.

Socioeconomics. Interceptor flight test activities would bring upwards of 300 temporary workers to Kodiak Island during each test event. These actions, in conjunction with other PSCA activities, would increase localized use of the Kodiak economy. However, the number of personnel likely would be below 1,000 per year, which would not be large enough to have a substantially effect on Kodiak community resources or infrastructure as compared to the approximate 30,000 tourists each year. Pre-flight preparation and flight test activities also could provide a short-term economic benefit to the island economy in the form of retail and possible tourist activities. BMD flight tests would be similar to other activities at PSCA, which were determined to have a negligible impact to commercial fishing and tourist related activities (FAA 2016). As no other activities would result in temporary restriction of commercial fishing and tourist activities, little or no cumulative impacts would occur.

Hazardous Materials and Waste. PSCA has a history of supporting military and commercial rocket programs. Similar to past and present programs, all future programs will continue to manage hazardous materials in accordance with all applicable rules and regulations and. The proposed BMD flight test activities would not introduce new hazardous materials and waste or

significantly increase amounts used or generated at the installation. Thus, no significant cumulative impacts from the management of hazardous materials and waste are anticipated.

5.2 Analysis of Potential Cumulative Impacts within the Broad Ocean Area

Based on the assessment of past, present, and reasonably foreseeable future actions in the BOA, the Proposed Action would result in environmental effects from the BMD activities. None of these impacts, however, would be considered significant. Resource topics analyzed for cumulative impacts are biological resources, airspace and air traffic, and marine traffic. As discussed in **Chapter 4**, other environmental resource topics were omitted from analysis because of little or no environmental concerns.

The U.S. Navy's Final Gulf of Alaska Navy Training Activities Supplemental EIS/Overseas EIS (U.S. Navy 2016) details proposed Navy operations in the GOA Temporary Maritime Activities Area about 50 miles east of PSCA (**Figure 4-1**). The document was prepared to supplement the impact analysis contained in the Final Gulf of Alaska Navy Training Activities EIS/Overseas EIS (U.S. Navy 2011). The EISs evaluated over 20 other actions and activities that could occur in the GOA, including ongoing launch activities from PSCA. The cumulative impact analysis below includes data from the Navy's EISs to evaluate potential cumulative impacts in the BOA from defensive intercept support activities.

Biological Resources. The U.S. Navy concluded in the Gulf of Alaska Navy Training Activities EIS/Overseas EIS and Supplemental EIS/Overseas EIS (U.S. Navy 2011, 2016) that the aggregate impacts of past, present actions, and reasonable foreseeable future actions are expected to result in significant impacts on some marine mammal species in the GOA. Most of the impacts are attributed to vessel strikes, bycatch (accidental or incidental catch), and entanglement with fishing gear. The proposed defensive intercept flight test activities would result in small debris impacting the Gulf or open ocean up to nine times a year; however, these tests would be discrete, short-term events, and the likelihood of debris causing marine mammal mortality from a debris strike is remote. Thus the incremental contribution from defensive interceptor support activities would be minor and would not significantly contribute to potential cumulative impacts. Any ship operations to support defensive interceptor support activities would be minimal, occurring no more than approximately nine times a year. Thus, a significant incremental cumulative impact to marine mammals from vessel strikes in the GOA is unlikely.

Airspace and Air Traffic. In addition to other PSCA activities, BMD flight testing would require clearance of various areas of airspace and may cause rerouting or rescheduling of flights for periods of as much as 3 to 4 hours, up to approximately nine times a year. This could result in as much as 36 hours of direct effect on air traffic access per year. Most impacts, however, would be in remote areas that would have little effect on air traffic. Other missile test programs and the Navy GOA Temporary Maritime Activities Area training program could also have similar, minor impacts in the region. The cumulative analysis of airspace and air traffic activities in the GOA found that the incremental contribution of Navy activities to other on-going and planned activities in the GOA, including missile launches from PSCA, would be low (minor) as analyzed in the Navy's EISs (U.S. Navy 2011, 2016).

Therefore, flight tests with intercepts in the vicinity of en route airways and jet routes, when combined with other activities in the GOA, could lead to minor cumulative impacts to airspace in the form of flight delays. The required scheduling process for the use of airspace would help to minimize these potential adverse cumulative impacts.

Marine Traffic. Other activities in the region east of Kodiak, such as naval training in the GOA Temporary Maritime Activities Area (U.S. Navy 2011) could result in temporary marine traffic closures in the Gulf. However, cumulative impacts would be minimized through early notification of surface vessels through NOTMARs, allowing commercial shipping to find alternative routes if necessary. The cumulative analysis of maritime activities in the GOA found that the incremental contribution of Navy activities to other on-going and planned activities in the GOA, including missile launches from PSCA, would be low as analyzed in the Navy's EISs (U.S. Navy 2011, 2016). Therefore, cumulative impacts to marine traffic would not be expected.

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6 Environmental Consequences of the No Action Alternative

If the No Action Alternative is selected, MDA's proposed defensive weapon system flight tests from PSCA, as described in **Section 2.1** for the Proposed Action, would not occur; therefore, no impacts from such tests would occur. Ongoing launch activities at PSCA and those future actions described and analyzed in the Final Environmental Assessment for Kodiak Launch Complex Launch Pad 3 (FAA 2016) would continue.

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7 Summary of Environmental Management and Monitoring Actions

MDA does not expect any significant or major impacts to result from implementation of the Proposed Action. To minimize other adverse effects that might occur, MDA would implement various management controls and engineering systems that are described throughout this EA. As required by federal, state, and DoD environmental, health, and safety regulations, MDA and PSCA would implement these measures through normal operating procedures. These measures are summarized below and include the relevant sections of the EA where they are further described:

1. BMD and target missile systems used for BMD flight tests and intercepts would be equipped with an FTS and/or auto destruct system for safety assurance. (**Sections 2.1.2, 2.1.2.4**)
2. GHAs and LHAs (over water) would be established to limit the region that may be impacted by hazardous debris from an early flight termination. The hazard areas are determined by size and flight characteristics of the missile, individual flight profile of each exercise or flight test, and FTS/auto destruct system operations and reaction times should a flight malfunction occur. (**Sections 2.1.2.1, 2.1.6.4**)
3. Each BMD missile launch from PSCA would be conducted in accordance with RCC Standard 321, *Common Risk Criteria Standards for National Test Ranges*, so as to minimize public risk, including ships and aircraft, from launch-related debris. (**Sections 2.1.2.1, 3.7.2.2, 4.2.2, 4.3.2**)
4. Prior to conducting each missile operation, Range Safety officials request the issuing of NOTAMs from FAA and NOTMARs from the USCG. These notices identify all hazard areas pilots and ship operators are to avoid. (**Sections 2.1.2.1, 2.1.6.4, 3.6.2.2, 3.7.2.2, 3.8.2.2, 4.2.2, 4.3.2**)
5. Radar systems associated with the defensive weapons systems and related test assets would require appropriate exclusion zones to be established and monitored at PSCA to avoid injury to personnel, and damage to equipment and aircraft, from EMR emissions. (**Sections 2.1.3.1, 3.7.2.1**)
6. System transportation within the U.S. would be performed in accordance with DOT-approved procedures and routing as well as OSHA requirements, U.S. Army safety regulations, and USAF regulations. For aircraft transportation, Air Force Manual 24-204, *Preparing Hazardous Materials for Military Air Shipments*, would be followed. THAAD and PATRIOT missiles would be handled in accordance with the appropriate portions of Army Pamphlet 385-64, *Ammunition and Explosive Safety Standards*, and DoD 6055.09-M, *DoD Ammunition and Explosives Safety Standards*. The MDA would comply with applicable Defense Transportation Regulations and any other instructions provided by USAF. (**Section 2.1.6.2**)

7. Applicable missile canisters would be equipped with passive and active sensors to detect liquid propellant leaks. **(Section 2.1.6.2)**
8. In the event that defensive weapon system components are transported from outside the continental United States to PSCA for testing, necessary inspections of components by the U.S. Customs and Agriculture Departments would take place at the initial port of entry into the United States. All equipment would be offloaded into a secure area, inspected, cleared, and then prepared for transport to PSCA. **(Section 2.1.6.2)**
9. Proper tuning and preventive maintenance of support vehicles and equipment would minimize engine exhaust emissions. In addition, preparations for the flight tests would be conducted in compliance with all applicable federal and state air quality rules and regulations. **(Section 3.1.2.1)**
10. To ensure public safety and minimize unnecessary exposures, security checkpoints on mission day would prevent the general public from approaching the launch sites closer than the PSCA boundary, about 2 miles away. **(Sections 3.1.2.2, 3.2.2.2, 3.5.2.1)**
11. Double walled fuel tanks and/or other secondary containment systems and spill kits would be used to control potential spills of petroleum, oils, lubricants, and coolant (ethylene glycol) used in equipment and stored on site. **(Sections 3.3.2.1, 3.9.2.1)**
12. On-site project personnel would be responsible for ensuring that equipment is in good operating order to reduce the potential for leaks, and handle any potential spill in accordance with the PSCA Spill Prevention, Control, and Countermeasure Plan. **(Section 3.3.2.1)**
13. Any security surveillance overflights associated with launch activities would comply with AAC measures in avoiding the pinniped haulouts on Ugak Island. **(Section 3.4.2.2)**
14. PSCA would place a notice of intent—to restrict public access to recreational areas on PSCA—in the local newspaper and broadcast in local media approximately 1 week in advance of closure times. **(Section 3.5.2.1)**
15. Close coordination with the FAA Anchorage ARTCC and Kodiak Air Traffic Control Tower by the launch operations manager would minimize the potential for any adverse impacts on airspace use in the vicinity of Kodiak Island. Direct coordination with Air Traffic Control and the USCG would be maintained to verify that there is no air traffic in designated hazard areas. In addition, airspace would be monitored by AAC air and surface search radar during launch operations, as well as by USCG aircraft. **(Section 3.6.2.2)**
16. When operating at PSCA, the main beams of the THAAD, PATRIOT, AN/TPY-2 (FBM), and similar defensive weapon system radars would point in a south-southwest direction and would not radiate the ground or surrounding waters, but would be aimed upward no lower than 5 degrees. **(Section 3.7 2.1)**

17. To help avoid a shortage of rental vehicles on Kodiak Island, PSCA would contact the rental car agencies at Kodiak Airport regarding additional rental needs well before the flight test events occur. Additionally, alternate means of transportation, such as buses, may be used to transport personnel to and from PSCA. **(Section 3.8.2.1)**
18. All hazardous and non-hazardous wastes would be properly disposed of in accordance with applicable federal, state, and local regulations. **(Section 3.9.2.1)**
19. Target and interceptor missile launches, and missile intercepts, would be conducted in compliance with DoD Instruction 4540.01, *Use of International Airspace by U.S. Military Aircraft and for Missile and Projectile Firings*, which states that “Firing areas must be selected so that trajectories or flight profiles are clear of established oceanic air routes or areas of known surface or air activity.” Prior to conducting BMD flight tests, MDA and the PRST would coordinate with the FAA at the Oakland and Anchorage Centers to identify the most used off jet airway routes and define test areas that minimize impacts on air carriers. **(Section 4.2.2)**

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9 List of Preparers and Contributors

This EA has been prepared under the direction of MDA and SMDC/ARSTRAT. The following individuals were responsible for managing the development of this EA, and/or provided information and technical assistance towards the document preparation:

David Hasley, SMDC/ARSTRAT

Daniel Spiegelberg, MDA/DPFE

Mark Hubbs, SMDC/ARSTRAT

George Wheeler, Mabbett & Associates

This EA was prepared by Teledyne Brown Engineering, Inc. and HDR under the direction of MDA and SMDC/ARSTRAT. Those individuals that contributed to the preparation of this document are listed below:

Karen Charley-Barnes, KFS LLC
EdD Higher Education Admin. Policy and
Management
MS Environmental Sciences & Mgmt
BS Biology
Years of Experience: 26

Anwar Khan, HDR
MS Aquatic Toxicology
MS Marine Zoology
BS Fishery
Years of Experience: 34

Randy Gallien, HDR
BS Industrial Chemistry
Years of Experience: 37

Joseph Kriz, HDR
BS Biology
BA Geoenvironmental Studies
Years of Experience: 31

Megan Gambone, HDR
MS Biology
BS Environmental Science
Years of Experience: 10

Timothy Lavalley, PE, LPES, Inc.
MS Civil and Environmental Engineering
BS Mechanical Engineering
Years of Experience: 23

Shari Clayton Hendrix, PG, Teledyne
Brown Engineering, Inc.
MS Environmental Management
BS Geography and Geology
Years of Experience: 23

Christopher McJetters, HDR
BS English
Years of Experience: 10

Vince Izzo, HDR
BA Geography
Years of Experience: 26

Rick Moon, Teledyne Brown Engineering, Inc.
MS Environmental Management
BS Chemistry and Mathematics
Years of Experience: 32

Nathan Jones, HDR
MS Fish, Wildlife and Conservation Biology
BA Environmental Biology
Years of experience: 12

Cheryl Myers, HDR
AAS Nursing
Years of Experience: 25

Edd Joy, KFS LLC
BA Geography
Years of Experience: 42

Carl Siebe, PE, HDR
BS Engineering Management
Years of Experience: 42

Valerie Whalon, HDR
MS Fishery Sciences
BS Marine Science
Years of Experience: 22

10 Distribution List

The following is a list of agencies, officials, tribal governments, and libraries that were sent a copy of the Proposed Final EA and the Proposed FONSI:

- Federal Aviation Administration, Office of Commercial Space Transportation, Washington, DC
- National Marine Fisheries Service, Juneau, AK
- U.S. Army Corps of Engineers, Kenai Field Office, Soldotna, AK
- U.S. Coast Guard Base Kodiak, Kodiak, AK
- U.S. Environmental Protection Agency, Region 10, Anchorage, AK
- U.S. Fish and Wildlife Service, Alaska Maritime National Wildlife Refuge, Homer, AK
- U.S. Fish and Wildlife Service, Alaska Region, Anchorage, AK
- U.S. Fish and Wildlife Service, Kodiak Island National Wildlife Refuge, Kodiak, AK
- Alaska Department of Environmental Conservation, Juneau, AK
- Alaska Department of Fish and Game, Juneau, AK
- Alaska Department of Natural Resources, Juneau, AK
- Alaska Department of Transportation and Public Facilities, Juneau, AK
- Alaska State Historic Preservation Officer, Anchorage, AK
- Mayor of Kodiak Island Borough, Kodiak, AK
- Mayor of the City of Kodiak, Kodiak, AK
- Kaguyak Village, Akhiok, AK
- Native Village of Afognak, Kodiak, AK
- Native Village of Akhiok, Akhiok, AK
- Native Village of Kanatak, Wasilla, AK
- Native Village of Karluk, Karluk, AK
- Native Village of Larsen Bay, Larsen Bay, AK
- Native Village of Ouzinkie, Ouzinkie, AK
- Native Village of Port Lions, Port Lions, AK
- Pauloff Harbor Village, Sand Point, AK
- Qagan Tayagungin Tribe of Sand Point Village, Sand Point, AK
- Sun'aq Tribe of Kodiak, Kodiak, AK

- Tangirnaq Native Village, Kodiak, AK
- Unga Tribal Council, Sand Point, AK
- Village of Old Harbor, Old Harbor, AK
- Kodiak Public Library, Kodiak, AK
- Z. J. Loussac Public Library, Anchorage, AK



A

Correspondence from
Agency Coordination
and Consultations



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Appendix A

Correspondence from Agency Coordination and Consultations

This appendix identifies the federal and state agencies and officials that were contacted by MDA to review and comment on the *Pacific Spaceport Complex Alaska Ballistic Missile Defense Flight Test Support Coordinating Draft Environmental Assessment*, dated September 2016. Coordination and consultation letters, dated October 13, 2016, were initially sent by MDA to those agencies and officials listed below. Later in November 2016, MDA sent an additional letter to the Alaska State Historic Preservation Office. Representative copies of the letters immediately follow the list.

Only two of the agencies responded during the review period prior to public release of the Proposed Final EA. The written correspondence from these agencies is included towards the end of this appendix, each followed immediately by MDA's response to their comments.

Federal Agencies

Ms. Jennifer Curtis
Environmental Review
USEPA Region 10, Alaska Operations
Office
222 W. 7th Avenue, #19
Anchorage, AK 99503

Mr. Doug Cooper
Branch Chief Ecological Service
U.S. Fish and Wildlife Service, Alaska
Region
605 W 4th Avenue, Room G-61
Anchorage, AK 99501

Mr. Steve Delehanty
U.S. Fish and Wildlife Service
Alaska Maritime National Wildlife Refuge
95 Sterling Highway, Suite 1
Homer, AK 99603

Mr. Tevis Underwood
Deputy Manager
U.S. Fish and Wildlife Service
Kodiak Island National Wildlife Refuge
1390 Buskin River Road
Kodiak, AK 99615

James W. Balsiger, Ph.D.
Administrator
NOAA Fisheries
National Marine Fisheries Service
709 W. 9th Street, Room 420
Juneau, AK 99801

Mr. Robert (Bob) Gray
Environmental Division Chief
Commander USCG Station, Kodiak AK
USCG Base Kodiak
P.O. Box 195025
Kodiak, AK 99619-5025

State Agencies

Mr. Larry Hartig, Commissioner
Alaska Department of Environmental
Conservation
P.O. Box 111800
410 Willoughby Avenue, Suite 303
Juneau, AK 99801-1795

Mr. Sam Cotton
Commissioner
Alaska Department of Fish and Game
P.O. Box 115526
1255 W. 8th Street
Juneau, AK 99811-5526

Mr. Andrew Mack
Commissioner
Alaska Department of Natural Resources
400 Willoughby Avenue, 5th Floor
Juneau, AK 99801

Ms. Judith E. Bittner
State Historic Preservation Office
Office of History and Archaeology
Department of Natural Resources
550 West 7th Avenue, Suite 1310
Anchorage, AK 99501

Mr. Marc Luiken, C.M.
Commissioner
Alaska Department of Transportation and
Public Facilities
3132 Channel Drive
P.O. Box 112500
Juneau, AK 99811-2500



DEPARTMENT OF DEFENSE
MISSILE DEFENSE AGENCY
5700 18TH STREET
FORT BELVOIR, VIRGINIA 22060-5573

OCT 13 2016

Ms. Jennifer Curtis
Environmental Review
USEPA Region 10, Alaska Operations Office
222 W. 7th Avenue #19
Anchorage, AK 99503

Dear Ms. Curtis:

The U.S. Missile Defense Agency (MDA) has prepared the enclosed Pacific Spaceport Complex Alaska (PSCA), Ballistic Missile Defense (BMD) Flight Test Support Coordinating Draft Environmental Assessment (CDEA) in accordance with the National Environmental Policy Act as amended (42 United States Code § 4321 et seq.).

The CDEA examines the potential environmental effects of conducting BMD interceptor flight tests from the PSCA on Kodiak Island, Alaska and intercepting target missiles in the broad ocean area generally south of Kodiak Island. The interceptor missiles being considered are substantially smaller than those rockets previously launched and analyzed for launch at the PSCA.

Your agency is among the several State and Federal resource management and regulatory agencies with responsibilities in Alaska that are involved in this document review. After the agency coordination effort concludes, the MDA intends to revise and publish a public review environmental assessment and draft Finding of No Significant Impact (as appropriate) for an additional 30-day review period. The specific public review period dates will be finalized after resolving comments from all of the coordinating agencies.

The MDA requests and welcomes your comments on the Coordinating Draft EA during this review period, which extends from October 13, 2016 through November 14, 2016. Please send your written responses via e-mail (preferred) to envgrp@mda.mil (preferred) or by regular mail to:

Missile Defense Agency
MDA/DPFE
Attention: Mr. Dan Spiegelberg
5222 Martin Road
Redstone Arsenal, AL 35898

Comments must be received by November 14, 2016, to ensure they are considered and become part of the official record. No comments received will indicate your concurrence with the Proposed Action.

If you have any questions regarding this information, please contact
Mr. Dan Spiegelberg, P.E., at 256-450-2672, or via e-mail at Dan.Spiegelberg@mda.mil, or
Mr. George Wheeler, P.E., PMP at 256-450-5382, or via e-mail at george.wheeler.ctr@mda.mil.

Sincerely,

A handwritten signature in black ink that reads "Martin F. Duke". The signature is written in a cursive style with a large, prominent "M" and "D".

MARTIN F. DUKE
Director
Facilities, Military Construction,
and Environmental Management

Enclosure:
As stated



DEPARTMENT OF DEFENSE
MISSILE DEFENSE AGENCY
5700 18TH STREET
FORT BELVOIR, VIRGINIA 22060-5573

NOV 23 2016

Ms. Judith Bittner
State Historic Preservation Officer
Alaska Department of Natural Resources
550 W. 7th Avenue, Suite 1310
Anchorage, AK 99501

Dear Ms. Bittner:

Our apologies for not being clear in our letter to your office dated October 13, 2016, regarding the Pre-decisional, Coordinating Draft, Pacific Spaceport Complex Alaska (PSCA) Ballistic Missile Defense Flight Test Support Environmental Assessment (EA).

It is the determination of the MDA that no historic properties will be affected by the proposed undertaking (36 CFR § 800.16 (d)(1)). Additionally, the proposed action is not the type of activity that has the potential to cause effects on historic properties. We base our determination on the following:

1. The Proposed Action is expected to require little or no ground-disturbing activities. Therefore, an area of potential effect was not delineated and cultural resources were not evaluated in this EA. Launch sites at PSCA have been analyzed in previous EAs. See below.
2. Cultural resources impacts were analyzed at the PSCA in the Federal Aviation Administration's (FAA) Environmental Assessment of the Kodiak Launch Complex (FAA 1996) and the Final Environmental Assessment for the Kodiak Launch Complex Launch Pad 3 (FAA 2016) and the Finding of No Significant Impact.
3. As part of the above EAs, surveys conducted by the Alaska Department of Natural Resources Office of History and Archeology in 1994 and 2005 identified no archaeological or historic properties in our project area.
4. The Alaska State Historic Preservation Office concurred with the finding of "No Historic Properties Affected" in the 2016 FAA EA.

As stated previously, the proposed action involves the launch of various ballistic missile defense systems from PSCA for flight tests. The MDA expects to conduct up to two defensive weapon system flight test events per year over the next 10 years, with no more than three flight test events in any given 12-month period.

The map attached shows the notional flight test path. Specific ground hazard areas and launch hazard areas (over water) are established to limit the region that may be impacted by debris from an early flight termination. Prior to conducting each missile operation, Range Safety

officials request the issuing of Notices to Airmen from FAA and Notices to Mariners from the U.S. Coast Guard. These notices identify all hazard areas to avoid. For nominal flight tests, target missile and intercept debris would be expected to fall at least 10 nautical miles from any land areas.

A copy of the EA was sent to your office, and other Federal and State agencies, as part of the National Environmental Policy Act process and as a courtesy in case your office has comments or questions regarding cultural resources or any of the affected environments analyzed in the EA.

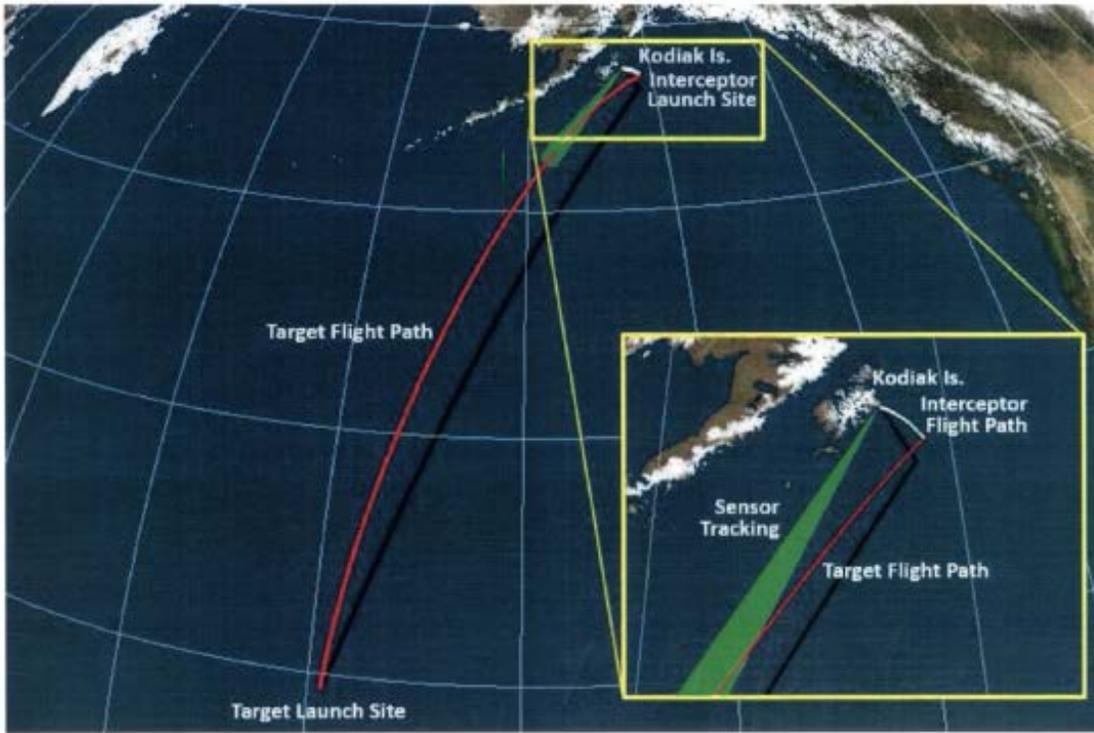
Please comment on the MDA's finding of no historic properties affected in accordance with 36 CFR § 800.16 (d)(1)(i). If we do not hear from your office within 30 days, the MDA will assume concurrence with a determination of no historic properties affected.

If you have any questions regarding this information, please contact Mr. Dan Spiegelberg, P.E., at 256-450-2672, or Dan.Spiegelberg@mda.mil.

Sincerely,



MARTIN F. DUKE
Director
Facilities, Military Construction,
and Environmental Management



Notional Defensive Weapon System Flight Test from PSCA

COMMENTS FROM THE ALASKA DEPARTMENT OF ENVIRONMENTAL CONSERVATION:

-----Original Message-----

From: Mendivil, Gary A (DEC) [<mailto:gary.mendivil@alaska.gov>]

Sent: Monday, November 14, 2016 11:32 AM

To: Environmental E-Mail; Spiegelberg, Daniel L CIV MDA/DPFE

Subject: Pacific Spaceport Complex Environmental Assessment Comments

Mr. Spiegelberg-

The Alaska Department of Environmental Conservation has reviewed the Pacific Spaceport Complex Environmental Assessment (EA) and would like to provide the following clarifications:

1. Page 3-2, line 6: The EA identifies EPA Region 6 as having regulatory authority for Alaska. Please note that EPA Region 10 is the region with authority.
2. Page 3-3, line 19: The reference to the "ADEC-regulated" threshold of 100 TPY is misleading. It would be clearer to refer to the "ADEC Title V permitting threshold" or reference the correct minor permitting thresholds found at 18 AAC 50.502(c), since the department regulates emissions through minor permits at lower TPY thresholds. Please note that the department rescinded the source's Pre-approved Emission Limits (PAEL) to avoid permitting in 2005 after concluding that the back-up generators did not need the limit to restrict potential to emit (PTE).
3. Page 3-3, lines 21-26: While the statements made here are true, it should be understood that the February 7, 2005 letter on which this is based did note that future changes at the source might require permitting. However, nothing in the EA indicates that emissions will change sufficiently to require permitting at this time.
4. Page 3-5, Table 3-1: This table should make it clearer that the de minimis thresholds are NEPA thresholds, since ADEC minor permitting thresholds (which are NAAQS compliance related) are lower for NO_x, SO_x and PM.

Thank you for the opportunity to provide these comments.

MDA'S RESPONSE TO ALASKA DEPARTMENT OF ENVIRONMENTAL CONSERVATION COMMENTS (NOVEMBER 14, 2016):

Response to Comment #1

Section 3.1 of the EA was revised to read "USEPA Region 10."

Response to Comment #2

Section 3.1.1 of the EA was revised to read "ADEC Title V permitting threshold of 100 tons." Additionally, MDA acknowledges the Department's prior action of rescinding the source's Pre-approved Emission Limits.

Response to Comment #3

MDA acknowledges the Department's finding that air emissions associated with the Proposed Actions are not sufficient to require permitting at this time.

Response to Comment #4

The following note was added to Table 3-1 in the EA: "The least restrictive *de minimis* level of 100 tons per year was used to determine whether the Proposed Action would be significant under NEPA."

COMMENTS FROM THE ALASKA STATE HISTORIC PRESERVATION OFFICER:



DEPARTMENT OF DEFENSE
MISSILE DEFENSE AGENCY
5700 18TH STREET
FORT BELVOIR, VIRGINIA 22060-5573

NOV 23 2016

Ms. Judith Bittner
State Historic Preservation Officer
Alaska Department of Natural Resources
550 W. 7th Avenue, Suite 1310
Anchorage, AK 99501

No Historic Properties Affected
Alaska State Historic Preservation Officer
Date: 12.7.16 File No.: 3130-12100
Please review: 36 CFR 800.13 / A.S. 41.35.070(d)

RECEIVED
NOV 28 2016
OHA

Dear Ms. Bittner:

Our apologies for not being clear in our letter to your office dated October 13, 2016, regarding the Pre-decisional, Coordinating Draft, Pacific Spaceport Complex Alaska (PSCA) Ballistic Missile Defense Flight Test Support Environmental Assessment (EA).

It is the determination of the MDA that no historic properties will be affected by the proposed undertaking (36 CFR § 800.16 (d)(1)). Additionally, the proposed action is not the type of activity that has the potential to cause effects on historic properties. We base our determination on the following:

1. The Proposed Action is expected to require little or no ground-disturbing activities. Therefore, an area of potential effect was not delineated and cultural resources were not evaluated in this EA. Launch sites at PSCA have been analyzed in previous EAs. See below.
2. Cultural resources impacts were analyzed at the PSCA in the Federal Aviation Administration's (FAA) Environmental Assessment of the Kodiak Launch Complex (FAA 1996) and the Final Environmental Assessment for the Kodiak Launch Complex Launch Pad 3 (FAA 2016) and the Finding of No Significant Impact.
3. As part of the above EAs, surveys conducted by the Alaska Department of Natural Resources Office of History and Archeology in 1994 and 2005 identified no archaeological or historic properties in our project area.
4. The Alaska State Historic Preservation Office concurred with the finding of "No Historic Properties Affected" in the 2016 FAA EA.

As stated previously, the proposed action involves the launch of various ballistic missile defense systems from PSCA for flight tests. The MDA expects to conduct up to two defensive weapon system flight test events per year over the next 10 years, with no more than three flight test events in any given 12-month period.

The map attached shows the notional flight test path. Specific ground hazard areas and launch hazard areas (over water) are established to limit the region that may be impacted by debris from an early flight termination. Prior to conducting each missile operation, Range Safety

officials request the issuing of Notices to Airmen from FAA and Notices to Mariners from the U.S. Coast Guard. These notices identify all hazard areas to avoid. For nominal flight tests, target missile and intercept debris would be expected to fall at least 10 nautical miles from any land areas.

A copy of the EA was sent to your office, and other Federal and State agencies, as part of the National Environmental Policy Act process and as a courtesy in case your office has comments or questions regarding cultural resources or any of the affected environments analyzed in the EA.

Please comment on the MDA's finding of no historic properties affected in accordance with 36 CFR § 800.16 (d)(1)(i). If we do not hear from your office within 30 days, the MDA will assume concurrence with a determination of no historic properties affected.

If you have any questions regarding this information, please contact Mr. Dan Spiegelberg, P.E., at 256-450-2672, or Dan.Spiegelberg@mda.mil.

Sincerely,


MARTIN F. DUKE
Director
Facilities, Military Construction,
and Environmental Management

**MDA'S RESPONSE TO ALASKA STATE HISTORIC PRESERVATION OFFICER
COMMENTS (DECEMBER 7, 2016):**

MDA acknowledges the Alaska State Historic Preservation Officer's finding that no historic properties would be affected by the proposed flight tests conducted from PSCA.



B

Government-to-
Government
Consultations



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Appendix B Government-to-Government Consultations

This appendix identifies the government-to-government consultations that occurred between MDA and Alaskan Native Tribal Governments during preparation of the *Pacific Spaceport Complex Alaska Ballistic Missile Defense Flight Test Support Environmental Assessment*. Consultations consisted of requests for comments on earlier versions of the EA and a government-to-government consultation meeting between tribal leaders and MDA representatives.

MDA initiated consultations in October and November 2016 with distribution of the Coordinating Draft EA (dated October 13, 2016) to those tribal governments listed below for their review and comment. Later on, in parallel with the public review process described in **Section 1.8** of this EA, MDA distributed copies of the Proposed Final EA (dated January 2017) to the same tribal governments for their review and comment. Representative copies of MDA's transmittal letters from both EA distributions follow the list of recipients. Only one tribal government responded during the EA review periods. Their written correspondence, MDA's responses to their comments, and other follow-on correspondence leading up to the government-to-government consultation meeting are included. Representatives from three other tribal governments participated in the meeting. A summary of the government-to-government consultation meeting held in Kodiak, Alaska, on February 1, 2017 is provided at the end of the appendix.

Mr. David O. Osterback
Qagan Tayagungin Tribe of Sand Point Village
P.O. Box 447
Sand Point, AK 99661

Ms. Jeannine Marsh ¹
Sun'aq Tribe of Kodiak
312 West Marine Way
Kodiak AK, 99615

Mr. William Dushkin, Sr.
Pauloff Harbor Village
P.O. Box 97
Sand Point, AK 99661

Mr. Frank Peterson, Jr. ²
Chairman, Sun'aq Tribe of Kodiak
312 West Marine Way
Kodiak AK, 99615

Mr. John A. Foster
Unga Tribal Council
508 Red Cove Road
Sand Point, AK 99661

President of Native Village of Akhiok ¹
P.O. Box 5030
Akhiok, AK 99615

Ms. Phyllis Amodo
Kaguyak Village
P.O. Box 5078
Akhiok, AK 99615

Secretary of the Native Village of Akhiok ²
P.O. Box 5030
Akhiok, AK 99615

¹ Designated recipient of the Coordinating Draft EA only.

² Designated recipient of the Proposed Final EA only.

Mr. Darik Larionoss
Village of Old Harbor
P.O. Box 62
Old Harbor, AK 99643

Ms. Denise May
Native Village of Port Lions
P.O. Box 69
Port Lions, AK 99550

Ms. Melissa Borton
Native Village of Afognak
323 Carolyn Street
Kodiak, AK 99615

Mr. Joe Delgado
Native Village of Ouzinkie
P.O. Box 130
Ouzinkie, AK 99644-0130

Ms. Audrey Gugel
Tangirnaq Native Village
3449 E. Rezanof Drive
Kodiak, AK 99615

Ms. Mary Nelson
Native Village of Larsen Bay
P.O. Box 50
Larsen Bay, AK 99624-0050

Ms. Alicia L. Reft
Native Village of Karluk
P.O. Box 22
Karluk, AK 99608-0022

Mr. Henry F. Forshey
Native Village of Kanatak
P.O. Box 876822
Wasilla, AK 99687



DEPARTMENT OF DEFENSE
MISSILE DEFENSE AGENCY
5700 18TH STREET
FORT BELVOIR, VIRGINIA 22060-5573

OCT 13 2016

Mr. David O. Osterback
Qagan Tayagungin Tribe of Sand Point Village
P.O. Box 447
Sand Point, AK 99661

Dear Mr. Osterback:

This initiates our government to government consultations under Section 106 of the National Historic Preservation Act. The Missile Defense Agency (MDA) has prepared a Coordinating Draft Environmental Assessment (CDEA) to evaluate the potential environmental impacts associated with conducting Ballistic Missile Defense (BMD) interceptor flight tests from the Pacific Spaceport Complex Alaska (PSCA) on Kodiak Island, Alaska and intercepting target missiles in the broad ocean area (BOA) generally south of Kodiak Island. The interceptor missiles being considered are substantially smaller than those rockets previously launched and analyzed for launch at the PSCA.

The Proposed Action would involve flight tests of various ballistic missile defense systems from PSCA, to potentially include Terminal High Altitude Area Defense (THAAD), PATRIOT, Arrow Weapon System (AWS), or David's Sling Weapon System (DSWS). Flight test events could include various short-, medium-, and intermediate-range target missiles launched from aircraft located in the BOA of the northern Pacific region, with intercepts over the BOA.

A specific number of BMD-related missile launches conducted from PSCA has not been determined. On average, however, the MDA expects to conduct up to two defensive weapon system flight test events per year over the next 10 years, with no more than three flight test events in any given 12-month period.

Defensive weapon system flight tests demonstrating interoperability of two weapon systems operating simultaneously at PSCA may also take place as part of the Proposed Action. One or both of the weapon systems demonstrating interoperability could launch interceptor missiles at target missiles in such tests. The Proposed Action is consistent with PSCAs existing Launch License.

Alternatives evaluated include the Proposed Action at PSCA and the No Action Alternative. The Proposed Action is expected to require little or no ground-disturbing activities; therefore, no impacts to archaeological resources, soils, or geological resources, would be expected. There would be no modifications, changes in use, or other impacts on historical facilities, traditional resource sites, or other cultural resources and there would be no permanent changes to visual resources at PSCA.

Based on the minimal ground disturbance involved, the MDA expects activities described in the Proposed Action will have “No Adverse Effect” on tribal resources. If any such resources are discovered during flight test events, the MDA will notify and consult with you as required.

Your organization is among several Federal and State regulatory and resource management agencies and Alaska Native organizations invited to participate in this document review. Specifically, consistent with Section 106 of the National Historic Preservation Act and its implementing regulations, 36 CFR Part 800, the MDA is also consulting on the EA with the Alaska State Historic Preservation Office (SHPO) and will ask for their concurrence with our “No Adverse Effect” determination. After the agency and organization coordination effort concludes, the MDA intends to revise and publish a public review Environmental Assessment and Draft Finding of No Significant Impact (as appropriate) for an additional 30-day review period. The specific public review period dates will be finalized after resolving comments from all coordinating agencies and organizations.

The MDA requests and welcomes your comments on the Coordinating Draft EA during this review period, which extends from October 13 through November 14, 2016. Please send your written responses via e-mail (preferred) to envgrp@mda.mil (preferred) or by regular mail to:

Missile Defense Agency
MDA/DPFE
Attention: Mr. Dan Spiegelberg
5222 Martin Road
Redstone Arsenal, AL 35898

Comments must be received by November 14, 2016, to ensure they are considered and become part of the official record.

If you have any questions regarding this information, please contact Mr. Dan Spiegelberg, P.E., at 256-450-2672, or via e-mail at Dan.Spiegelberg@mda.mil, or Mr. George Wheeler, P.E., PMP at 256-450-5382, or via e-mail at george.wheeler.ctr@mda.mil.

Sincerely,



MARTIN F. DUKE
Director
Facilities, Military Construction,
and Environmental Management

Enclosure:
As stated



DEPARTMENT OF DEFENSE
MISSILE DEFENSE AGENCY
5700 18TH STREET
FORT BELVOIR, VIRGINIA 22060-5573

NOV 3 0 2016

Ms. Denise May
Native Village of Port Lions
P.O. Box 69
Port Lions, AK 99550

Dear Ms. May:

The Missile Defense Agency (MDA) is considering conducting Ballistic Missile Defense (BMD) interceptor flight tests from the Pacific Spaceport Complex Alaska (PSCA) on Kodiak Island, Alaska and intercepting target missiles in the broad ocean area (BOA) generally south of Kodiak Island. The interceptor missiles being considered are substantially smaller than the rockets previously launched from PSCA.

As documented in the attached Pre-decisional, Coordinating Draft, Pacific Spaceport Complex Alaska (PSCA) Ballistic Missile Defense Flight Test Support Environmental Assessment (EA), the MDA has determined that no historic properties will be affected by the proposed undertaking (36 CFR § 800.16 (d)(1)). Additionally, the proposed action is not the type of activity that has the potential to cause effects on historic properties. We base our determination on the following:

1. The Proposed Action is expected to require little or no ground-disturbing activities. Therefore, an area of potential effect (APE) was not delineated and cultural resources were not evaluated in this EA. Launch sites at PSCA have been analyzed in previous EAs. See below.
2. Cultural resources impacts were analyzed at the PSCA in the Federal Aviation Administration's (FAA) Environmental Assessment of the Kodiak Launch Complex (FAA 1996) and the Final Environmental Assessment for the Kodiak Launch Complex Launch Pad 3 (FAA 2016) and FONSI.
3. As part of the above EAs, surveys conducted by the Alaska Department of Natural Resources Office of History and Archeology in 1994 and 2005 identified no archaeological or historic properties in our project area.
4. The Alaska State Historic Preservation Office concurred with the finding of "No Historic Properties Affected" in the 2016 FAA EA.

The proposed action involves the launch of various ballistic missile defense systems from PSCA for flight tests. The MDA expects to conduct up to two defensive weapon system flight test events per year over the next 10 years, with no more than three flight test events in any given 12-month period.

The map attached shows the notional flight test path. Specific ground hazard areas (GHAs) and launch hazard areas (LHAs) (over water) are established to limit the region that may be impacted by debris from an early flight termination. Prior to conducting each missile operation, Range Safety officials request the issuing of Notices to Airmen (NOTAMs) from FAA and Notices to Mariners (NOTMARs) from the U.S. Coast Guard. These notices identify all hazards areas to avoid. For nominal flight tests, target missile and intercept debris would be expected to fall at least 10 nautical miles from any land areas.

The MDA has also provided the EA to other Federal and State agencies, as part of the National Environmental Policy Act (NEPA) process and as a courtesy in case your office has comments or questions regarding cultural resources or any of the affected environments analyzed in the EA. I apologize for not including you in our earlier transmittal to agencies.

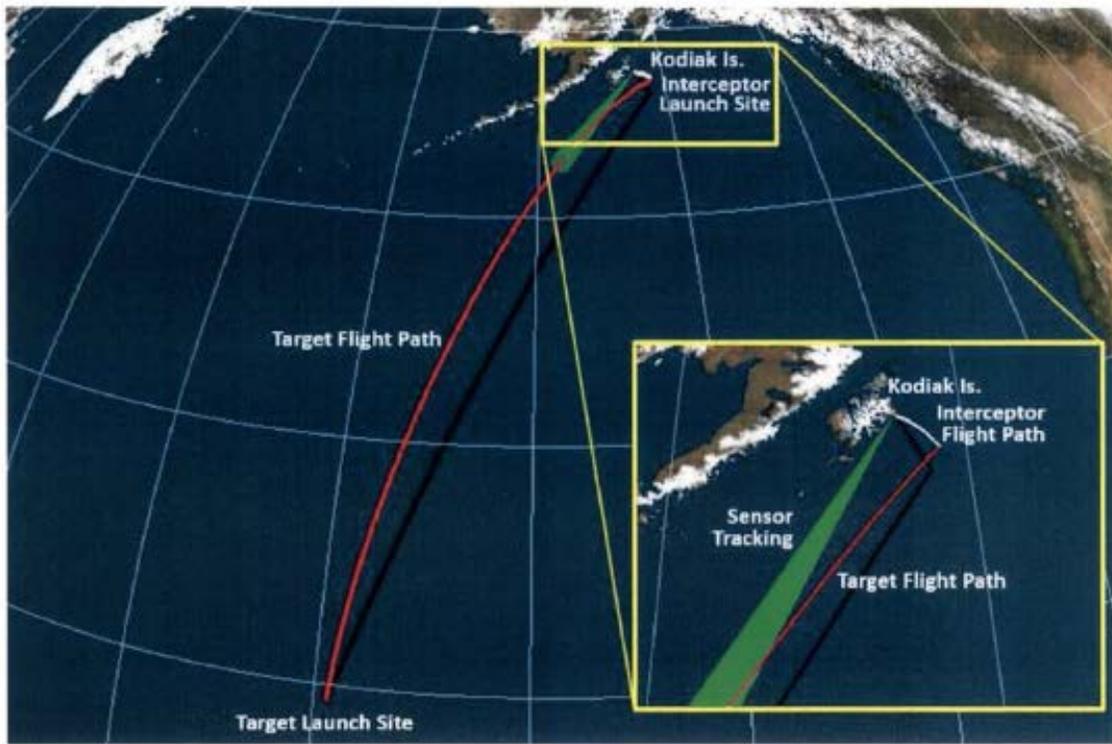
Please comment on MDA's finding of no historic properties affected in accordance with 36 CFR § 800.16 (d)(1)(i). If we do not hear from your office within 30 days, MDA will assume concurrence with a determination of no historic properties affected.

If you have any questions regarding this information, please contact Mr. Dan Spiegelberg, P.E., at 256-450-2672 or Dan.Spiegelberg@mda.mil.

Sincerely,



MARTIN F. DUKE
Director
Facilities, Military Construction,
and Environmental Management



Notional Defensive Weapon System Flight Test from PSCA

COMMENTS FROM THE SUN'AQ TRIBE OF KODIAK:



Sun'aq Tribe of Kodiak

Thomas Johnson, Jr., Council Chairman

Missile Defense Agency, MDA/DPFE
Attention: Mr. Dan Spiegelberg
5222 Martin Road
Redstone Arsenal, AL 35898

14 November 2016

Via Email: envgrp@mda.mil

RE: Predecisional, Coordinating Draft, "Pacific Spaceport Complex Alaska Ballistic Missile Defense Flight Test Support Environmental Assessment" (September 2016)

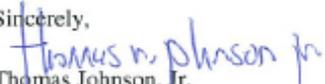
Dear Mr. Spiegelberg,

Thank you for your request to initiate a government to government consultation with Sun'aq Tribe of Kodiak regarding Section 106 of the NHPA. We acknowledge receipt of your letter and the document "Predecisional Coordinating Draft EA" (Pacific Spaceport Complex Alaska Ballistic Missile Defense Flight Test Support Environmental Assessment), but in no uncertain terms do we approve of the "Proposed Action" without additional time to learn more about your projects. We are currently reviewing the draft EA and whether or not a formal government to government consultation is necessary.

Please note that a 30-day comment period set forth by Missile Defense Agency allowing us to assess and respond to your Draft EA (including the week-plus trip your packet took to arrive at Kodiak) demonstrates a lack of understanding how one conducts meaningful and open dialog with Tribal stakeholders on Kodiak Island. In addition, some of our neighboring Tribes have not received any notice from MDA regarding the draft EA.

Our Tribal Council is very concerned about MDA's activities involving ballistic missile flight tests or support operations conducted in the Gulf of Alaska, or from locations based at the Pacific Spaceport Complex Alaska. Your proposed activities may significantly affect our traditional subsistence ways of life, cultural ties to historic and prehistoric resources, and cause harm to terrestrial and marine food resources vital for Tribal Members. There appears to be an unexplained nexus between the Pacific Spaceport Complex, MDA's intentions, and current U.S. Navy and Alaskan Command activities now under scrutiny by Kodiak-area Tribes and other residents of Kodiak Island. These and related concerns must be resolved before further military wargames and weapons testing is approved.

Sincerely,


Thomas Johnson, Jr.
Chairman, Sun'aq Tribe of Kodiak

CC: Jeannine Marsh, STK Administrator (POC)

Sen. Lisa Murkowski

Sen. Dan Sullivan

Cong. Don Young

Lt. Governor Byron Mallott

Nancy Nelson – Native Village of Port Lions

Melissa Borton – Afognak Native Village

Joe Delgado – Native Village of Ouzinkie

Audrey Gugel – Tangirnaq Native Village

file; tl

312 West Marine Way, Kodiak, Alaska 99615
Phone: 907-486-4449 Fax: 907-486-3361 ceo@sunaq.org

MDA'S RESPONSE TO SUN'AQ TRIBE OF KODIAK COMMENTS (NOVEMBER 14, 2016):



**DEPARTMENT OF DEFENSE
MISSILE DEFENSE AGENCY
5700 18TH STREET
FORT BELVOIR, VIRGINIA 22060-5573**

DEC 22 2016

Mr. Thomas Johnson, Jr.
Chairman, Sun'aq Tribe of Kodiak
312 West Marine Way
Kodiak, AK 99615

Dear Mr. Johnson:

Thank you for your letter dated November 14, 2016, regarding the Pre-decisional, Coordinating Draft, Pacific Spaceport Complex Alaska (PSCA) Ballistic Missile Defense Flight Test Support Environmental Assessment (EA), and request for more time to review the EA and also to ensure other Kodiak Tribes receive an opportunity to participate in the EA process. We appreciated hearing from you.

The Missile Defense Agency (MDA) is committed to working with all interested parties to ensure MDA testing plans balance U.S. national security interests and those of local, state and Indian Nation governments. MDA has the utmost respect for your historic and cultural ties to Alaska. In light of your concerns, MDA will provide Tribe officials additional time to review the draft EA, and provide notification and information to the other Kodiak Tribes not previously notified. In order to further our partnership, we request a meeting between MDA and Tribe officials to continue our Government to Government coordination and to address tribal concerns. Please contact Mr. Eric Sorrells or Mr. Dan Spiegelberg so that we may identify a mutually convenient meeting date.

The MDA plans to provide the Proposed Final EA and a Draft Finding of No Significant Impact (FONSI) for a 30-day public review and comment period. At this point, it is the determination of the MDA that no historic properties will be affected by the proposed undertaking (36 CFR § 800.16 (d)(1)). Additionally, the proposed action is not the type of activity that has the potential to cause effects on historic properties. We based our determination on the following:

1. The Proposed Action is expected to require little or no ground-disturbing activities. Therefore, an area of potential effect was not delineated and cultural resources were not evaluated in this EA. Launch sites at the PSCA have been analyzed in previous EAs.
2. Cultural resource impacts were analyzed at the PSCA in the Federal Aviation Administration's (FAA) Environmental Assessment of the Kodiak Launch Complex (FAA 1996) and the Final Environmental Assessment for the Kodiak Launch Complex Launch Pad 3 (FAA 2016) and FONSI.
3. As part of the above EAs, surveys conducted by the Alaska Department of Natural Resources Office of History and Archeology in 1994 and 2005 identified no archaeological or historic properties in our project area.

4. The Alaska State Historic Preservation Office concurred with the finding of "No Historic Properties Affected" in the 2016 FAA EA.

As stated in the coordinating draft EA, the proposed action involves the launch of various smaller ballistic missile defense systems from the PSCA for flight tests. The MDA expects to conduct up to two defensive weapon system flight test events per year over the next 10 years, with no more than three flight test events in any given 12-month period.

The enclosed map shows the notional flight test path. Specific ground hazard areas and launch hazard areas (over water) are established to limit the region that may be impacted by debris from an early flight termination. Prior to conducting each missile operation, Range Safety officials request the issuing of Notices to Airmen from FAA and Notices to Mariners from the U.S. Coast Guard. These notices identify all hazard areas to avoid. For nominal flight tests, target missile and intercept debris would be expected to fall at least 10 nautical miles from any land areas.

A copy of the coordinating draft EA was sent to your office, and other Federal and State agencies offices in October, as part of the National Environmental Policy Act and National Historic Preservation Act processes, in case your office had comments or questions regarding cultural resources or any of the affected environments analyzed in the EA.

We invite you to provide comments on the MDA's determination of no historic properties affected in accordance with 36 CFR § 800.16 (d)(1)(i). As requested, we are extending the time for you to review the EA and provide your input. If we do not hear from your office within 30 days from the date of this letter, we will assume concurrence with a determination of no historic properties affected. The MDA invites input on other environmental issues analyzed in the EA during the public comment period. We are available to discuss your concerns at your convenience.

If you have any questions regarding this information, please contact Mr. Eric Sorrells at 256-450-2677 or email Eric.Sorrells@mda.mil or Mr. Dan Spiegelberg at 256-450-2672 or email Dan.Spiegelberg@mda.mil.

Sincerely,

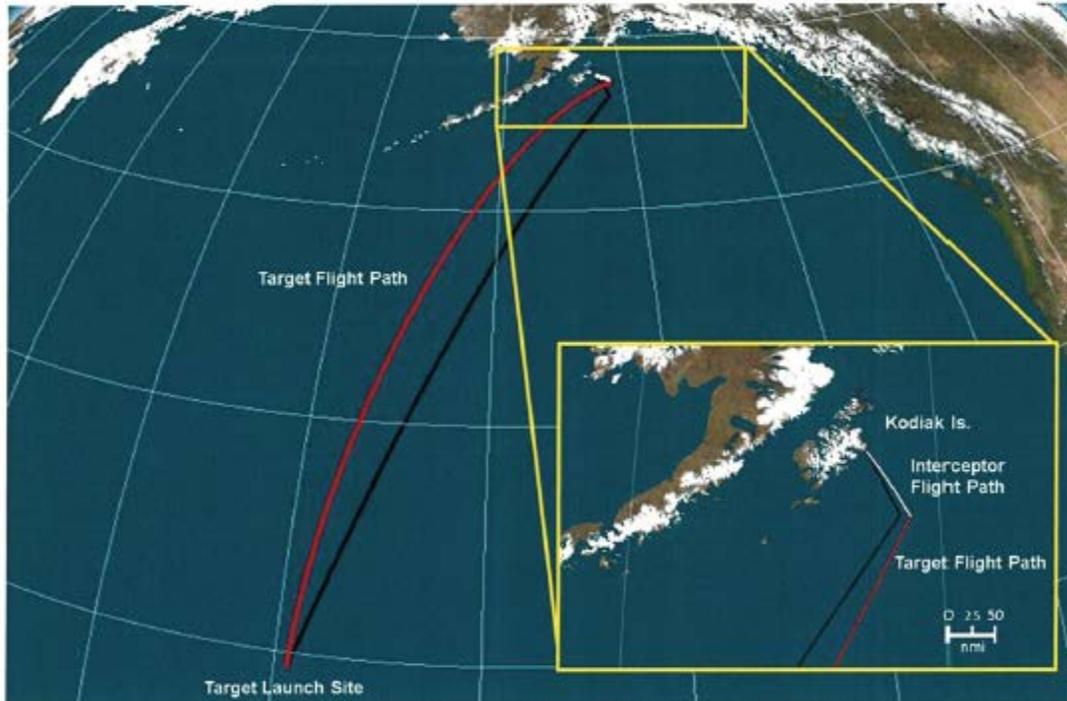


JOHN H. JAMES, JR.
Executive Director

Enclosure:
As stated



DEPARTMENT OF DEFENSE
MISSILE DEFENSE AGENCY
5700 18TH STREET
FORT BELVOIR, VIRGINIA 22060-5573



Notional Defensive Weapon System Flight Test from PSCA

ENCLOSURE

FOLLOW-ON RESPONSE FROM THE SUN'AQ TRIBE OF KODIAK:



Sun'aq Tribe of Kodiak

Frank Peterson, Jr., Council Chairman

Missile Defense Agency

23 December 2016

Mr. John H. James, Jr., Executive Director
Attention: Mr. Dan Spiegelberg or Mr. Eric Sorrells
5700 18th Street
Fort Belvoir, VA 22060-5573

Via Email:

Dan.Spiegelberg@mda.mil

Eric.Sorrells@mda.mil

RE: Response to MDA December 23, 2016 letter to Sun'aq Tribe of Kodiak

Dear Mr. James,

Thank you for your letter dated December 23, 2016, offering to initiate a government to government consultation with Sun'aq Tribe of Kodiak.

As stated in our previous letter dated November 14, 2016, you should not approve of the "Proposed Action" in the Draft PSCA Ballistic Missile Defense Flight Test Support EA without adequate consultation with our Tribe and others. Simply stating that our lack of reply to your 30-day notice indicates our Tribe's concurrence with the finding of your EA is not appropriate. We continue to review the draft EA and will be contacting you soon to establish a time and place for a formal government to government consultation.

Sincerely,

A handwritten signature in blue ink, appearing to read "Frank Peterson, Jr.", written over a horizontal line.

Frank Peterson, Jr.
Chairman, Sun'aq Tribe of Kodiak

CC: Jeannine Marsh, STK Administrator (POC)

file; tl

312 West Marine Way, Kodiak, Alaska 99615
Phone: 907-486-4449 Fax: 907-486-3361 ceo@sunaq.org



DEPARTMENT OF DEFENSE
MISSILE DEFENSE AGENCY
5700 18TH STREET
FORT BELVOIR, VIRGINIA 22060-5573

JAN 12 2017

Mr. Frank Peterson, Jr.
Chairman, Sun'aq Tribe of Kodiak
312 West Marine Way
Kodiak, AK 99615

Dear Mr. Peterson:

Thank you for your December 23, 2016 response to our December 22, 2016 letter. The U.S. Missile Defense Agency (MDA) is committed to working with all interested parties and to resolve any concerns Tribal officials may have regarding our proposed action at the Pacific Spaceport Complex Alaska (PSCA). Since our communications with you over the past few months and our provision of the Coordinating Draft EA to your office and other Federal and State agencies offices in October 2016, we have received comments from interested parties and have incorporated them into the attached Proposed Final PSCA Ballistic Missile Defense Flight Test Support Environmental Assessment (PFEA). In accordance with the National Environmental Policy Act (NEPA) as amended (42 United States Code, § 4321 et seq.) and the National Historic Preservation Act (NHPA) (16 United States Code, §470), we are releasing the PFEA and Proposed Finding of No Significant Impact (FONSI) to the public for review and comment.

The PFEA examines the potential environmental effects of conducting BMD interceptor flight tests from the PSCA on Kodiak Island, Alaska and intercepting target missiles in the broad ocean area generally south of Kodiak Island. The proposed interceptor missiles are substantially smaller than missiles previously launched or analyzed for launch at the PSCA. The MDA expects to conduct up to two flight test events per year over the next 10 years, with no more than three flight test events in any given 12-month period. For nominal flight tests, target missile and intercept debris would be expected to fall in the broad ocean area. Based on the analysis, the MDA has prepared an unsigned Proposed FONSI.

The MDA has made no changes to our proposed action or analysis of impacts from the Coordinating Draft EA provided to you and other interested parties in October 2016. As such our no historic properties affected determination remains the same. We look forward to meeting with you to discuss your concerns at your convenience. We are available to consult with you this month, if possible.

The MDA has provided the PFEA and Proposed FONSI to other federal, state, and local agencies and Alaska Native groups on the attached distribution list. We have advertised availability of the document for public comment as part of the NEPA and NHPA processes. The public comment period extends from January 13, 2017 through February 13, 2017. We invite you to submit any specific comments you might have on the PFEA and Proposed FONSI during the public comment period. Please send your written responses to arrive by the end of the comment period by e-mail (preferred) to envgrp@mda.mil or by regular mail to:

Missile Defense Agency
MDA/DPFE
Attention: Mr. Dan Spiegelberg
5222 Martin Road
Redstone Arsenal, AL 35898

Thank you for your participation. If you have any questions regarding this information, please contact Mr. Dan Spiegelberg, P.E., at 256-450-2672, or via e-mail at Dan.Spiegelberg@mda.mil, or Mr. George Wheeler at 256-450-5382, or via e-mail at george.wheeler.ctr@mda.mil.

Sincerely,



MARTIN F. DUKE
Director
Facilities, Military Construction,
and Environmental Management

Enclosures:

1. PSCA BMD Flight Test Support PFEA
2. PFEA Distribution List



DEPARTMENT OF DEFENSE
MISSILE DEFENSE AGENCY
5700 18TH STREET
FORT BELVOIR, VIRGINIA 22060-5573

Mr. John A. Foster
Unga Tribal Council
508 Red Cove Rd
Sand Point, AK 99661

JAN 12 2017

Dear Mr. Foster:

This letter continues our government to government consultations under Section 106 of the National Historic Preservation Act that we began in October 2016 when we provided the Coordinating Draft Environmental Assessment (CDEA) evaluating the environmental impacts associated with our proposed Ballistic Missile Defense (BMD) interceptor flight tests from the Pacific Spaceport Complex Alaska (PSCA) to your office, other Alaska Native groups, and Federal and State Agencies. Over the past few months we have received comments from government agencies and have incorporated them into the Proposed Final PSCA Ballistic Missile Defense Flight Test Support Environmental Assessment (PFEA). In accordance with the National Environmental Policy Act (NEPA) as amended (42 United States Code, § 4321 et seq.) and the National Historic Preservation Act (NHPA) (16 United States Code, §470), we are releasing the PFEA and Proposed Finding of No Significant Impact (FONSI) to the public for review and comment.

The PFEA examines the potential environmental effects of conducting BMD interceptor flight tests from the PSCA on Kodiak Island, Alaska and intercepting target missiles in the broad ocean area generally south of Kodiak Island. The proposed interceptor missiles are substantially smaller than missiles previously launched or analyzed for launch at the PSCA. The MDA expects to conduct up to two flight test events per year over the next 10 years, with no more than three flight test events in any given 12-month period. For nominal flight tests, target missile and intercept debris would be expected to fall in the broad ocean area. Based on the analysis, the MDA has prepared an unsigned Proposed Finding of No Significant Impact (FONSI).

The MDA has made no changes to our proposed action or analysis of impacts from the Coordinating Draft EA provided to you and other interested parties in October 2016. As such our no historic properties affected determination remains the same. Pursuant to Section 106 of the National Historic Preservation Act, 36 CFR § 800.8 (c)(2)(i), MDA invites your comments on the enclosed PFEA and unsigned Proposed FONSI. Please review the documents and advise the MDA of any concerns or suggestions you may have regarding the Proposed Action and the MDA's finding of no historic properties affected in accordance with 36 CFR § 800.4 (d)(1). We are available to discuss your concerns at your convenience. If we do not hear from you during the public comment period, we will assume concurrence with the MDA's no historic properties affected determination.

The MDA has provided the PFEA and Proposed FONSI to other federal, state, and local agencies and Alaska Native groups on the attached distribution list. We have advertised

availability of the document for public comment as part of the NEPA and NHPA processes. The comment period extends from January 13, 2017 through February 13, 2017. Please send your written responses to arrive by the end of the comment period by e-mail (preferred) to envgrp@mda.mil or by regular mail to:

Missile Defense Agency
MDA/DPFE
Attention: Mr. Dan Spiegelberg
5222 Martin Road
Redstone Arsenal, AL 35898

Thank you for your participation. If you have any questions regarding this information or wish to meet with us, please contact Mr. Dan Spiegelberg, P.E., at 256-450-2672, or via e-mail at Dan.Spiegelberg@mda.mil, or Mr. George Wheeler at 256-450-5382, or via e-mail at george.wheeler.ctr@mda.mil.

Sincerely,



MARTIN F. DUKE
Director
Facilities, Military Construction
and Environmental Management

Enclosures:

1. PSCA BMD Flight Test Support FEA and Proposed FONSI
2. PFEA Distribution List

**Summary of Consultation Meeting
Sun'aq Tribe of Kodiak and Missile Defense Agency
February 1, 2017**

Representatives of the Missile Defense Agency (MDA) and the Sun'aq Tribe of Kodiak (Sun'aq) met at 1:30 p.m. on February 1, 2017 at the Sun'aq Tribal offices to consult about an MDA proposal for flight testing at the Pacific Spaceport Complex, Alaska (PSCA). Representatives from three other Alaska Native Tribes participated at the invitation of the Sun'aq and the MDA.

The Sun'aq delegation was led by Mr. Frank Peterson, Jr., Chairman of the Sun'aq Tribal Council. Sun'aq Tribal Council members Ms. Doreen Anderson, Ms. Sharon Wolkoff and Ms. Nina Gronn were present as was Ms. Jeannine Marsh (Administrator). The following Tribes/Villages were also represented: Tangirnaq Native Village - Mr. Gordon Pullar, Jr., Chair (via telephone), and Ms. Audrey Gugel, Administrator; Native Village of Afognak - Ms. Nancy Nelson, Administrator; and Native Village of Port Lions - Mr. Sean Brester, Environmental Specialist (via telephone).

The MDA delegation was led by Brigadier General William T. Cooley, Program Executive for Programs and Integration. Four MDA personnel and the Alaska Command Tribal Liaison accompanied General Cooley. A complete list of the participants is included in the attachment.

Chairman Peterson opened the meeting and welcomed the participants. After introductions and an exchange of gifts, he asked the MDA delegation to proceed with a description of their proposal. General Cooley thanked the Chairman, Council Members and other tribal representatives for their hospitality and the opportunity to consult with them. The MDA delegation provided a prepared presentation on the proposed action and the results of the analysis of potential impacts, while soliciting comments, concerns, information and questions. The MDA analysis concluded that the testing would have no significant impact on tribal resources or on the environment. Previous similar flight testing in Hawaii, Kwajalein and Wake Island have not resulted in any noticeable or significant impacts.

Following the MDA presentation and a short break, the Sun'aq presented information about their culture, economy and tribal interests. Chairman Peterson solicited comments from the Sun'aq Tribal Council members and the representatives from the other Tribes.

Chairman Peterson encouraged the MDA delegation to return as testing proceeded and to alert him of any future issues or concerns that may affect the Native Alaska tribal interests.

Chairman Peterson noted that by establishing relationships before problems occur, it is much easier to solve problems when they crop up. He thanked the MDA delegation for their participation and friendship.

The consultation meeting was concluded at approximately 3:40 p.m.

The Final Agenda, the list of attendees and a list of questions with answers is provided in the following pages.

Meeting Agenda

**Formal Government-to-Government Consultation for
Proposed Missile Testing at Pacific Spaceport Complex**
(aka, PSC, Kodiak Launch Complex, Alaska Aerospace...)

**Native Village of Afognak, Native Village of Port Lions,
Sun'aq Tribe of Kodiak, Tangirnaq Native Village**

With

Department of Defense – Missile Defense Agency

Date/Time: Wednesday, February 1, 2017, 1:30 PM AKST
Location: Sun'aq Tribe of Kodiak, Large Conference Room, 2nd Flr
312 W. Marine Way, Kodiak, Alaska

Welcome & Opening Prayer

– Sun'aq Tribe of Kodiak, Tribal Council Chairman, Frank Peterson, Jr.

Introductions (self)

– Missile Defense Agency, Alaskan Command, and Staff
– Tribal Councils and Staff

Opening Remarks

– Missile Defense Agency (MDA), General Cooley (USAF)
– Tribal Council Representatives

MDA Presentation

– MDA's Environmental Assessment – Mr. Dan Spiegelberg, Environmental Lead

Tribe Responses

– List of Considerations or Concerns (and Tribal Perspectives by Tom Lance)

Discussion

Adjournment

Supporting Information – Page 2

"List of Participants"

"List of Considerations or Concerns"

“List of Participants”

Tribal Council Representation

- ◆ Native Village of Afognak – Ms. Nancy Nelson (Programs Administrator)
- ◆ Native Village of Port Lions – Mr. Sean Brester (Environmental Specialist) via telephone
- ◆ Sun’aq Tribe of Kodiak – Mr. Frank Peterson, Jr. (Chair)
- ◆ Sun’aq Tribe of Kodiak – Ms. Jeannine Marsh (Administrator)
- ◆ Sun’aq Tribe of Kodiak – Ms. Doreen Anderson (Council Member)
- ◆ Sun’aq Tribe of Kodiak – Ms. Nina Gronn (Council Member)
- ◆ Sun’aq Tribe of Kodiak – Ms. Sharon Wolkoff (Council Member)
- ◆ Tangirnaq Native Village – Mr. Gordon Pullar, Jr. (Chair) via telephone
- ◆ Tangirnaq Native Village – Ms. Audrey Gugel (Administrator)

Federal Agency Representation

- ◆ Brig Gen William Cooley - MDA Senior Official
- ◆ Mr. Kevin Williams - MDA Mission Director
- ◆ Mr. Tom Nuttall - MDA Test Resource Representative
- ◆ Mr. Dan Spiegelberg - MDA Environmental Lead
- ◆ Ms. Cindy Van Rassen - MDA Environmental Specialist
- ◆ Dr. Jerome Montague - USAF US NORTHCOM Tribal Affairs Advisor

Tribal Staff

- ◆ Mr. Thomas Lance – STK Natural Resources Director
- ◆ Ms. Tonya Lee – STK Community Liaison
- ◆ Ms. Kelly Krueger – STK Tribal Biologist
- ◆ Ms. Samantha Heglin – TNV Administrative Assistant

“List of Considerations or Concerns”

1. Will the rockets and missile debris splash down on Portlock Bank?
2. Will “target” rockets and “kill vehicle” missile debris land or drift into fishing grounds and essential fish habitat?
3. What relationship does MDA activity have to “Northern Edge” trainings?
4. What areas with subsistence uses or public access will be closed permanently on Narrow Cape?
5. Same as question #4 above, but just temporally restricted for subsistence uses for hunting, plant gathering, fishing, on Narrow Cape?
6. What research has been conducted at Narrow Cape looking at prehistoric evidence related to Alutiiq/Sugpiaq? Alaska SHPO has not done enough work to characterize area under PSC.
7. The potential subsistence and cultural/archaeological impacts discussed (similar to the concerns we have voiced about the Navy & Alaskan Command “Northern Edge” activities).

“List of Considerations or Concerns”

1. Will the rockets and missile debris splash down on Portlock Bank?

MDA’s Answer: No. MDA has designed the missions such that missile debris would not splash down on/in Portlock Bank. The location of notional debris fields relative to Portlock Bank have been clarified in the Final EA.

2. Will “target” rockets and “kill vehicle” missile debris land or drift into fishing grounds and essential fish habitat?

MDA’s Answer: Limited quantities of the “target” rockets and “kill vehicle” missile debris would land in essential fish habitat areas. Based on the limited amount of debris and the large area over which it would be distributed, the effect is expected to be insignificant.

3. What relationship does MDA activity have to “Northern Edge” trainings?

MDA’s Answer: The MDA testing is not related to “Northern Edge” training. The Northern Edge training is separate and distinct from MDA testing.

4. What areas with subsistence uses or public access will be closed permanently on Narrow Cape?

MDA’s Answer: No areas would be permanently closed on Narrow Cape or elsewhere as a result of MDA’s testing or proposed action at PSCA.

5. Same as question #4 above, but just temporally restricted for subsistence uses for hunting, plant gathering, fishing, on Narrow Cape?

MDA’s Answer: For public safety, Pasagshak Point Road where it enters PSCA and the Narrow Cape area would be temporarily closed to the public immediately before and during launch activities for up to three flight test events per year. Road closures for each event typically would occur over 3 days, with each closure lasting approximately 8 hours. Additional occasional short closures less than 8 hours would be necessary when transporting missiles from the Port of Kodiak to the launch complex or within the launch complex. These closures would NOT affect Pasagshak State Recreational Site.

6. What research has been conducted at Narrow Cape looking at prehistoric evidence related to Alutiiq/Sugpiaq? Alaska SHPO has not done enough work to characterize area under PSC.

MDA’s Answer:

Previously Recorded Sites: There are five historic and two prehistoric sites previously recorded in the area. The prehistoric sites are located along the beaches north/northeast of Pasagshak Road. These sites are unevaluated for the NRHP. The historic sites in the area for the most part are also unevaluated and pertain to WWII and Cold War history in the area.

Previous Surveys: In addition to the 1996 DNR survey, Jacobs conducted a 2015 survey. The report deals only with documentation and evaluation of Cold War structures that were decommissioned in 2010. No additional surveys for prehistoric cultural resources were found.

The MDA's proposed action at PSCA would only involve minor surface disturbance on previously disturbed areas. None of the sites or surveys above would be impacted. The SHPO's determination was based on no significant ground disturbance by MDA's action.

7. The potential subsistence and cultural/archaeological impacts discussed (similar to the concerns we have voiced about the Navy & Alaska Command "Northern Edge" activities).

MDA's Answer: MDA expects possible minor, short-term periods where subsistence might be impacted due to flight test activities. Those periods would amount to a few days per year and each closure would be for approximately 8 hours at a time. No cultural or archaeological impacts are anticipated from the flight test activities.

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C

Comments and
Responses on the
Proposed Final EA
and Proposed FONSI



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Appendix C

Comments and Responses on the Proposed Final EA and Proposed FONSI

During the public review period for the *Pacific Spaceport Complex Alaska Ballistic Missile Defense Flight Test Support Proposed Final Environmental Assessment* (dated January 2017), MDA received comments from one private citizen, one organization, and one federal government agency. This appendix contains a summary of those comments that pertain to clarifying the description of the Proposed Action and the affected environment, and identifying the potential environmental impacts from project implementation. MDA's responses to the individual comments or sets of comments received are provided immediately following each one.

A. Summary of comments received from the Electronic Review for the Environment, Inc., Berkeley, California, via electronic mail on January 24 and February 13, 2017:

1. Impact on marine mammals. The commenter asked several questions about the potential incidental take of marine mammals (take by harassment noise causing disruption in behavior including resting, nursing, and breeding). The commenter also suggested that monitoring and reporting should be addressed in the document.

MDA's Response: As noted in **Section 3.4.1** of the EA, NMFS determined that space vehicle and missile launches at the PSCA would result in the incidental take of small numbers of marine mammals, but that the total taking would have a negligible impact on the affected species or stocks. Additionally, NMFS does not anticipate take of any cetaceans (e.g., gray whales, humpback whales, Dall's porpoises, harbor porpoises, and killer whales) incidental to the specified activity (76 FR 16311).

For Steller sea lions, northern fur seals, and harbor seals that haul out on Ugak Island, the NMFS Level B harassment threshold noise levels identified in Table 3-9 of the EA would apply. In addition, for northern sea otters, USFWS determined that authorization for incidental take would not be required due to the infrequency of the rocket launches and the temporary disturbances at PSCA (FAA 2016).

However, specific to MDAs proposed action, the expected BMD launch noise levels on Ugak Island would be well below the NMFS thresholds. Because the BMD flight tests proposed in this EA would have negligible effects on protected marine mammal species, and are *not likely to adversely affect* threatened and endangered species or critical habitats in the PSCA vicinity or elsewhere, a new biological opinion is not required, nor are wildlife monitoring surveys required or planned. In addition, as described in **Section 5.1** under cumulative effects for biological resources, launch noise from the proposed BMD missile launches would be below in-air thresholds used by NMFS for pinnipeds, thus no cumulative increase in takes would occur.

2. Noise impact to wildlife. The commenter suggested that specific noise data for this type of rocket should be presented and the data should be current.

MDA's Response: As noted in **Section 3.4.2.2**, Vandal missile launch noise data were used for the analysis at PSCA and represents the best available information at this time. The sound levels generated during a Vandal launch would be comparable and likely louder than the proposed BMD missiles, which are smaller.

3. Results of a recent launch failure at PSCA. The commenter asked for information concerning the most recent launch from PSCA in August 2014 and noted that the EA did not explain that a launch failure occurred. The commenter asked that reports and available information be included in an appendix.

MDA's Response: The launch failure that occurred at PSCA in August 2014 was a three-stage test vehicle substantially different from the proposed BMD interceptor missiles and not related to the MDA's mission. The test vehicle was much larger (approximately 48 feet in length) and it did not have the same history of successful flights as those interceptor missiles analyzed in this EA.

The launch failure is not discussed or analyzed in this EA because it is an unrelated program using an unrelated launch vehicle. As such, it is outside the scope of this EA.

The environmental cleanup that occurred following the 2014 launch failure was completed in 2016. For information on cleanup or other emergency operations at PSCA, contact the Alaska Aerospace Corporation at info@akaerospace.com.

4. Critical habitat areas. The commenter asked that additional maps showing critical habitat areas in the vicinity of the proposed action be included in the EA, including a map with noise contours.

MDA's Response: Maps showing critical and protected habitat areas; noise contours applicable to wildlife effects; and notional missile debris impact zones were added to **Sections 3.4 and 4.1**.

5. Additional alternatives and relocating endangered/protected species. The commenter asked that additional alternatives in less environmentally sensitive areas be considered. The commenter also asked about evacuating critical habitat areas or relocating endangered/protected species.

MDA's Response: For MDA to conduct the proposed BMD flight test at a location other than PSCA would not support the agency's need to implement cost-effective system tests. It would also limit the agency's ability to validate BMD weapon system capabilities against various short-, medium-, and intermediate-range threat representative target missiles.

PSCA is a well-established and licensed launch facility that has been previously analyzed and used for rocket launches substantially larger than those proposed for the BMD flight tests. As described in **Section 3.4.2**, the Proposed Action would have negligible effects on protected species and is *not likely to adversely affect*

threatened and endangered species or critical habitats in the PSCA vicinity or elsewhere.

As for evacuating or relocating endangered/protected species such as cetaceans, sea lions, or seals from the test areas, such actions would likely constitute harassment under applicable laws and thus would be prohibited. Additionally, it is not feasible to control the movement of these species.

6. Worst case scenarios. The commenter asked that the discussion on risk management include worst case scenarios for impact events related to endangered species in case an inadvertent launch were to strike a critical habitat area.

MDA's Response: As noted in **Section 2.1.3.1**, the THAAD weapon system in particular has been successfully used for over 10 years for flight testing at other test ranges without safety-related incidents. Because of the flight test success rates, on-board flight destruct systems, and other flight safety requirements described under **Section 2.1** of the EA, the risk of BMD missiles directly impacting land areas or causing underwater explosions is very low. Low probability events such as those mentioned were not addressed in the EA.

7. Hazardous substances. The commenter asked that the EA include a full listing of hazardous substances and asked whether "miscellaneous constituents" included toxic materials (e.g. strategic metals, depleted uranium).

MDA's Response: In addition to the rocket propellants, the majority of missile components and resulting debris are typically composed of aluminum, titanium, steel, carbon fabric, silica, and other alloys that are mostly inert. There are no plans to use depleted uranium on proposed BMD flight tests.

As noted in **Section 4.1.2** of the EA, previous studies of missile tests have concluded that the release of residual hazardous materials carried onboard rocket systems (e.g., propellants and battery electrolytes) would not be significant. Following launch and intercept, such materials would be rapidly diluted in the seawater and, except for the immediate vicinity of the debris, would not be found at concentrations identified as producing adverse effects.

8. Target debris in the ocean. The commenter asked that the EA include the amount (or tonnage) of anticipated waste.

MDA's Response: Incidental deposits of debris or other material into the ocean from military activities, such as debris from missiles and missile intercepts, are not a form of deliberate disposal at sea under the Marine Protection, Research and Sanctuaries Act of 1972 (33 USC § 1401 et seq.). The amount of incidental wastes in the ocean from BMD flight tests would consist primarily of metal components and amount to several tons per year. Such quantities, however, are relatively small compared to other military, research, and commercial launch programs.

9. Emissions from missile launches. The commenter asked for additional discussion and analysis of air emissions from the missile flights, specifically mentioning aluminum, black carbon and hydrochloric acid. The commenter also requested additional information on whether such emissions might impact fish, marine mammals, and habitat.

MDA's Response: The black carbon and aluminum oxide particles, and hydrogen chloride, are released as rocket motor air emissions during missile flight. These emissions would be dispersed over the entire flight and would not be concentrated in any one area. Because the emissions would be widely dispersed and mostly over ocean waters, they would never reach the ground or ocean surface in concentrations that could have adverse effects on humans or wildlife. As noted in **Section 3.3.2.2** of the EA, this finding is supported by water chemistry studies conducted at PSCA (FAA 2016), which indicated no adverse water quality effects (including pH and aluminum levels) from prior launches of rockets much larger than the proposed BMD interceptor missiles.

B. Summary of comments received from a private citizen in Kodiak, Alaska, via electronic mail on February 13, 2017:

The comment concerned avoiding long closures of access to recreational areas at the launch complex and asked for clarification on the number and duration of closures.

MDA's Response: Sections 3.5.2.1 and 3.5.2.2 state that two pre-flight closures and one closure for launch typically would occur during each "flight test event." These sections and elsewhere in the EA have been clarified to state that all three of these closures (per individual flight test event) typically would occur over 3 days, with each closure lasting approximately 8 hours. Depending on the amount of time between individual closures, public access to recreational areas on PSCA may be allowed. MDA expects that there would be up to three flight test events in a 12-month period, therefore a total of approximately 9 days per 12-month period could involve closure of recreational areas on PSCA. Additional occasional closures of less than 8 hours may be required when moving missiles to and within the launch complex.

Note also that each of the three flight test events could involve multiple BMD missile launches. Overall, up to approximately nine BMD missile launches could occur from PSCA in a 12-month period.

C. Summary of comments received from the Federal Aviation Administration, Office of Commercial Space Transportation, Washington, DC, via electronic mail on February 22, 2017:

1. MDA needs to clarify whether any ground-disturbing activity could occur under this proposed action and if so, initiate coordination with the SHPO. From the current description, it is not clear whether use of the optimal pad areas described in the EA would require ground disturbance.

MDA's Response: Other than the installation of new grounding rods (see **Section 2.1.6.3**), there would be little or no ground-disturbing activities associated with the Proposed Action at PSCA (see **Section 3.0**). MDA coordinated with the SHPO in November 2016 and they responded stating no historic properties would be affected by the proposed flight tests conducted from PSCA (see **Appendix A** for correspondence).

2. In **Section 2.1.6.1**, recommend clarifying whether the “optional pad areas” referenced in the text are currently paved, graded, or cleared areas, or whether work would need to be done to prepare these areas to be used for this Proposed Action.

MDA's Response: As mentioned earlier, little or no ground-disturbing activities would occur during implementation of the Proposed Action at PSCA. Per **Section 2.1.6.1**, all optional pad areas to be used are already in place or in the process of being built by PSCA. This section was modified to include the following sentence: “All pad area surfaces would be paved or covered with gravel.”

3. In **Section 2.1.6.4**, should this read, “Shortly before launch, all non-mission-essential personnel would be evacuated...”

MDA's Response: MDA revised **Section 2.1.6.4** of the EA in accordance with FAA's comment.

4. In Section 3.6, replace the definition of “Uncontrolled Airspace” with the following: “Uncontrolled airspace or Class G airspace is the portion of the airspace that has not been designated as Class A, B, C, D, or E. It is therefore designated uncontrolled airspace. Class G airspace extends from the surface to the base of the overlying Class E airspace. Although ATC has no authority or responsibility to control air traffic, pilots should remember there are visual flight rules (VFR) minimums that apply to Class G airspace.”

MDA's Response: MDA revised **Section 3.6** of the EA in accordance with FAA's comment.

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Air Emissions



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Appendix D Air Emissions

Table 1. Emissions Summary

Activity/Source	CO	NO _x	VOC	SO _x	PM ₁₀	PM _{2.5}	CO ₂
System Transportation and Pre-Flight Preparations	5.8	0.7	0.6	0.0	0.0	0.0	601.1
Flight Test Activities	1.7	22.0	0.1	1.2	0.3	0.2	2,411.2
Post-Flight Operations	0.1	0.0	0.0	0.0	0.0	0.0	7.1
Total Emissions Per Test Event	7.5	22.7	0.7	1.2	0.3	0.2	3,019.4
Total Emissions Per Year	15.0	45.4	1.4	2.4	0.6	0.5	6,038.8

Table 2. Delivery of Equipment and Supplies to PSCA

Number of Deliveries Per Day	1						
Number of Trips Per Day	2						
Miles Per Trip	30						
Days of Assembly	90						
Total Miles	5400						
Pollutant	CO	NO _x	VOC	SO _x	PM ₁₀	PM _{2.5}	CO ₂
Emission Factor (lbs/mile)	0.0219	0.0237	0.0030	0.0000	0.0009	0.0007	2.7194
Total Emissions (lbs)	118.53	128.05	16.16	0.14	4.62	3.99	14684.94
Total Emissions (tons)	0.0593	0.0640	0.0081	0.0001	0.0023	0.0020	7.3425

Source: CARB 2015

Example Calculation: Emissions (lbs) = distance [miles/trip] * total trips * emission factor (lbs/mile)

Table 3. Worker Commutes

Number of Workers	200						
Number of Trips Per Day	2						
Miles Per Trip	30						
Days of Prelaunch	90						
Total Miles	1080000						
Pollutant	CO	NO _x	VOC	SO _x	PM ₁₀	PM _{2.5}	CO ₂
Emission Factor (lbs/mile)	0.0105	0.0011	0.0011	0.0000	0.0001	0.0001	1.
Total Emissions (lbs)	11392.31	1191.11	1165.53	11.61	91.86	57.16	1187494.8
Total Emissions (tons)	5.6962	0.5956	0.5828	0.0058	0.0459	0.0286	593.7

Source: CARB 2015

Example Calculation: Emissions (lbs) = total workers * distance [miles/trip] * total trips * emission factor (lbs/mile)

Table 4. Total System Transportation and Pre-Flight Preparation Emissions (tons)

Activity/Source	CO	NO _x	VOC	SO _x	PM ₁₀	PM _{2.5}	CO ₂
Delivery of Equipment and Supplies to PSCA	0.0593	0.0640	0.0081	0.0001	0.0023	0.0020	7.3
Worker Commutes	5.6962	0.5956	0.5828	0.0058	0.0459	0.0286	593.7
Total Emissions	5.8	0.7	0.6	<0.1	<0.1	<0.1	601.1

Table 5. Launch Emissions

Number of Test Events	2		
Number of Launches Per Test Event	4.5		
Number of Launches	9		
	Pounds/Launch	Pounds/Year	Tons/Year
Al ₂ O ₃ (aluminum oxide)	350	3150	1.58
CO (carbon monoxide)	250	2250	1.13
HCl (hydrogen chloride)	200	1800	0.90
N ₂ (nitrogen)	100	900	0.45
H ₂ O (water)	50	450	0.23
H ₂ (hydrogen)	50	450	0.23
CO ₂ (carbon dioxide)	15	135	0.0675
Cl* (chlorine)	5	45	0.0225
CaCl* (1) (calcium chloride)	5	45	0.0225
NaCl (sodium chloride)	5	45	0.0225
AlCl* (2) (aluminum chloride)	2.5	22.5	0.0113
Other Miscellaneous Constituents	3.8	33.804	0.0169
Total	1,036.3	9,326.3	4.7

Source: U.S. Army Space and Missile Defense Command, 2002. Theater High Altitude Area Defense (THAAD) Pacific Test Flights Environmental Assessment, December.

Note: Emissions represent not-to-exceed values. Actual emission would be less than shown herein.

Table 6. Generator Emissions

Pollutant	CO	NO _x	VOC	SO _x	PM ₁₀	PM _{2.5}		CO ₂	
Emission Factor [lb/hp-hr]	2.6E-04	1.1E-02	4.4E-05	5.7E-04	4.4E-05	4.4E-05		1.2E+00	
Generator Rating [kW]	Estimated Run Time (hr/yr)	Annual Power Output [kw-hr/yr]	CO	NO _x	VOC	SO _x	PM ₁₀	PM _{2.5}	CO ₂
1300	500	650000	0.12	4.62	0.02	0.25	0.02	0.02	506
1300	500	650000	0.12	4.62	0.02	0.25	0.02	0.02	506
500	500	250000	0.04	1.78	0.01	0.10	0.01	0.01	194
Total Emissions [tons per test]			0.27	11.02	0.05	0.60	0.05	0.05	1206
Total Emissions [tpy]			0.55	22.04	0.09	1.19	0.09	0.09	2411

Source: USEPA 1995

Note: Emission factors for all pollutants were obtained from U.S. EPA's AP-42, Section 3.4 Large Stationary Diesel And All Stationary Dual-fuel Engines

Example Calculation: Emissions (tons) = power output [kw-hr/yr] * emission factor (lb/hp-hr) * 1.341 [hp/kW] / 2000 [lbs]

Table 7. Total Flight Test Emissions (One Launch) (tons)

Activity/Source	CO	NO _x	VOC	SO _x	PM ₁₀	PM _{2.5}	CO ₂
Launch Emissions	1.1250	0.0000	0.0000	0.0000	0.1622	0.1134	0.07
Generator	0.5500	22.0414	0.0917	1.1939	0.0917	0.0917	2411
Total Emissions	1.7	22.0	0.1	1.2	0.3	0.2	2,411

Source: U.S. Army Space and Missile Defense Command 2002 and USEPA 1995

Note: PM₁₀ and PM_{2.5} emissions from launch vehicle exhaust are assumed to be 10.3 and 7.2 percent total aluminum oxide (Al₂O₃), respectively.

Table 8. Post-Flight Removal of Equipment

Number of Removals	2						
Number of Trips Per Day	2						
Miles Per Trip	10						
Days of Breakdown	10						
Total Miles	400						
Pollutant	CO	NO_x	VOC	SO_x	PM₁₀	PM_{2.5}	CO₂
Emission Factor (lbs/mile)	0.0219	0.0237	0.0030	0.0000	0.0009	0.0007	2.7
Total Emissions (lbs)	8.78	9.49	1.20	0.01	0.34	0.30	1087
Total Emissions (tons)	0.0044	0.0047	0.0006	0.0000	0.0002	0.0001	0.54

Source: CARB 2015

Example Calculation: Emissions (lbs) = distance [miles/trip] * total trips * emission factor (lbs/mile)

Table 9. Post-Flight Worker Commutes

Number of Workers	20						
Number of Trips Per Day	2						
Miles Per Trip	30						
Days of Breakdown	10						
Total Miles	12000						
Pollutant	CO	NO_x	VOC	SO_x	PM₁₀	PM_{2.5}	CO₂
Emission Factor (lbs/mile)	0.0105	0.0011	0.0011	0.0000	0.0001	0.0001	1.1
Total Emissions (lbs)	126.58	13.23	12.95	0.13	1.02	0.64	13194
Total Emissions (tons)	0.0633	0.0066	0.0065	0.0001	0.0005	0.0003	6.6

Source: CARB 2015

Example Calculation: NO_x emissions (lbs) = total workers * distance [miles/trip] * total trips * emission factor (lbs/mile)

Table 10. Total Post-Flight Emissions (tons)

Activity/Source	CO	NO_x	VOC	SO_x	PM₁₀	PM_{2.5}	CO₂
Removal of Equipment	0.0044	0.0047	0.0006	0.0000	0.0002	0.0001	0.5439
Worker Commutes	0.0633	0.0066	0.0065	0.0001	0.0005	0.0003	6.5972
Total Emissions	0.1	0.0	0.0	0.0	0.0	0.0	7.1

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