Final
Supplemental Environmental Assessment

Falcon I Launch Vehicle Program from SLC-4W

Vandenberg Air Force Base California

6 September 2005

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FINDING OF NO SIGNIFICANT IMPACT

Falcon I Launch Vehicle Program from SLC-4W

Vandenberg Air Force Base, California

Pursuant to provisions of the National Environmental Policy Act (NEPA), 42 U.S. Code 4321 *et seq.*, implementing Council on Environmental Quality (CEQ) Regulations, 40 Code of Federal Regulations (CFR) 1500-1508, and 32 CFR Part 989, Environmental Impact Analysis Process (EIAP), the U.S. Air Force (Air Force) conducted an assessment of the potential environmental consequences of accomplishing refurbishment of Space Launch Complex (SLC)-4W and launching the Falcon I vehicle from said facility on Vandenberg Air Force Base (AFB).

Vandenberg AFB is headquarters to the 30th Space Wing, the Air Force Space Command unit that operates Vandenberg AFB and the Western Range. Vandenberg AFB operates as a missile test base and aerospace center, supporting west coast space launch activities for the Air Force, Department of Defense, National Aeronautics and Space Administration, and commercial contractors.

Vandenberg AFB is located on the south-central coast of California, approximately halfway between San Diego and San Francisco. The 99,099-acre base extends along approximately 35 miles of the Santa Barbara County coastline.

In 2003, Space Exploration Technologies, Inc. (SpaceX) prepared a Final Environmental Assessment (EA) for the Falcon Launch Vehicle Program (Falcon Program), here forward referred to as the Falcon EA (SpaceX 2003), which assessed the potential environmental impacts resulting from the establishment and operation of the Falcon Program at SLC-3W, Vandenberg AFB.

This EA, incorporated by reference in this finding, is intended to supplement and update the previous NEPA evaluation of implementing the Falcon Program as analyzed in the Falcon EA. This EA considers the potential impacts of the Proposed Action on the natural and human environments, both as a solitary action and in conjunction with other similar projects.

PROPOSED ACTION

The Proposed Action consists of performing the following refurbishments in support of capability to launch from SLC-4W, as well as operating the Falcon I Launch Vehicle Program from SLC-4W.

- The launch mount would be modified to accommodate the stool previously residing at SLC-3W.
- Permanent aboveground piping to facilitate the transfer of propellants from the tankers to the launch vehicle would be installed.
- The portable deluge water system previously in place at SLC-3W would be transported and connected to the deluge water line at SLC-4W. The ditch leading to the retention basin would be resealed.
- The launch pad power configuration would be updated to provide 3-phase 480 voltage AC 100 ampere service on the pad surface. The source would be distributed by connection of a power cable (pigtail) to an equipment trailer located a safe distance from the booster to avoid damage during launches. The equipment trailer would contain necessary mini-substation and power distribution to supply power, as well as the required backup power system.
- Five equipment racks and five 120 volt 30 ampere circuits would be installed in the Launch Services Building at SLC-4W.

- Launch pad support systems, such as lighting towers, would be refurbished or replaced if required.
- The generator/distribution would be repaired or a portable generator would be used to restore emergency lighting.
- Pad access stairway steps on the south side of SLC-4W launch pad would be repaired and the missing planks would be replaced.
- SpaceX would install cameras on the existing camera mounts.
- Other minor rechecks, repairs, or modifications would occur as necessary.

Details on the operation of the Falcon Program, including the Falcon I, were described in Section 2 of the Falcon EA, incorporated by reference. One launch of the Falcon I vehicle would occur in 2005, and two launches are planned for 2006. After that time, up to a maximum of two Falcon I launches per year would be scheduled. On a per-mission basis, launch campaigns are expected to last from four to eight weeks. During a launch campaign, an average of 10 to 12 SpaceX employees would be present at SLC-4W, with a peak of 25 personnel for about one week.

Under the No-Action Alternative, the Falcon Program would operate out of SLC-3W. This action was discussed and analyzed in detail as the Proposed Action in the Falcon EA, incorporated by reference.

SUMMARY OF FINDINGS

The analyses of the affected environment and environmental consequences of operation of the Falcon Program completed in the Falcon EA, incorporated by reference, found that there was no impact or less than significant impact to the natural or human environment from the operation of the Falcon Program from SLC-3W. A Finding of No Significant Impact was issued on 17 November 2003 for the operation of the Falcon Program from SLC-3W.

The analyses of the affected environment and environmental consequences of implementing the Proposed Action including refurbishment, as presented in the EA, concluded that no adverse effects would result to Air Quality (Section 4.1), Cultural Resources (Section 4.3), Hazardous Materials/Hazardous Waste Management (Section 4.4), and Water Resources (Section 4.5). In addition, no adverse effects would result to Biological Resources (Section 4.2) from refurbishment activities. Operation of the Falcon I Program from SLC-4W has the potential to result in minor temporary disturbances to special status wildlife species. Measures described in the Biological Opinion for the Titan Space Launch Program from SLC-4 (1-8-95-F/C-29) and NOAA Fisheries Letter of Authorization for incidental harassment of marine mammals, would be implemented for the Falcon I Program from SLC-4W to monitor and minimize impacts to wildlife species. An informal consultation with U.S. Fish and Wildlife Service (USFWS) was completed on 12 August 2005, and the USFWS concurred with the Air Force determination that the Falcon Program at SLC-4W would not be likely to adversely affect listed species in a manner or to an extent not already considered in the Titan Biological Opinion. Finally, cumulative impacts resulting from the operation of the Falcon I Program from SLC-4W, and refurbishment activities at SLC-4W, would be less than significant when considered in conjunction with recent past and future projects within the project area.

FINDING OF NO SIGNIFICANT IMPACT

Based upon our review of the facts and analyses contained in the attached EA, and the 2003 Falcon EA, conducted in accordance with the provisions of NEPA, the CEQ Regulations, and 32 CFR Part 989, we conclude that the Proposed Action should not have a significant environmental impact, either by itself or cumulatively with other ongoing projects at Vandenberg AFB. Accordingly, an Environmental Impact Statement is not required. The signing of this Finding of No Significant Impact completes the environmental impact process.

FINDING OF NO SIGNIFICANT IMPACT
CONCURRENCE PAGE

Supplemental Environmental Assessment for the Falcon I Launch Vehicle Program from SLC-4W, Vandenberg Air Force Base, California

I concur with the Finding of No Significant Impact (FONSI)

Environmental Protection Committee Approval:

JACK WEINSTEIN, Colonel, USAF
Commander, 30th Space Wing
Chairman, Environmental Protection Committee
Vandenberg AFB, CA

10 Sep 05
Date

Judge Advocate Approval:

GARY M. ICRAMER, MAJ, USAF
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Staff Judge Advocate
Vandenberg AFB, CA

7 Sep 05
Date

Squadron Approval:

RICHARD N. COTE, P.E.
Deputy Base Civil Engineer, 30th Civil Engineer Squadron
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6 Sep 05
Date

Final
Supplemental Environmental Assessment

Falcon I Launch Vehicle Program from SLC-4W

Vandenberg Air Force Base
California

Submitted To:

Department of the Air Force
30th Space Wing
Environmental Flight
Vandenberg Air Force Base, California

6 September 2005

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Acronyms and Abbreviations

30 CES/CEVR	30th Civil Engineering Squadron, Environmental Flight, Installation Restoration Program
30 CES/CEVPC	30th Civil Engineering Squadron, Environmental Flight, Cultural Resources
30 SW	30th Space Wing
AFB	Air Force Base
AFI	Air Force Instruction
AFSPC	Air Force Space Command
AOC	Areas of Concern
AOI	Areas of Interest
AST	Aboveground Storage Tank
ATC	Authority to Construct
CAA	Clean Air Act
CAAQS	California Ambient Air Quality Standards
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CO	Carbon monoxide
CSOSA	Commercial Space Operations Support Agreement
DOD	Department of Defense
EA	Environmental Assessment
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FR	Federal Register
H_2S	Hydrogen sulfide
IEEE	Institute of Electrical and Electronics Engineers
IRP	Installation Restoration Program
IWTP	Industrial Wastewater Treatment Plant
LOA	Letter of Authorization
LOX	Liquid oxygen
LSB	Launch Services Building
MBTA	Migratory Bird Treaty Act
MST	Mobile Service Tower
NAAQS	National Ambient Air Quality Standards
NASA	National Aeronautics and Space Administration
NEC	National Electric Code
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NO_2	Nitrogen dioxide
NO_X	Nitrogen oxides
NOAA Fisheries	National Oceanic and Atmospheric Administration Fisheries Service
NRHP	National Register of Historic Places
NRO	National Reconnaissance Office
O_3	Ozone
OSHA	Occupational Safety and Health Act
Pb	Lead
PCE	Perchloroethane
PEL	Permissible Exposure Level
$PM_{2.5}$	Particulate matter 2.5 microns or less in diameter
PM_{10}	Particulate matter 10 microns or less in diameter
ppm	Parts per million
ROC	Reactive Organic Compound
ROI	Region of Influence

RP-1	Rocket propellant - kerosene
SBCAPCD	Santa Barbara County Air Pollution Control District
SLC	Space Launch Complex
SpaceX	Space Exploration Technologies, Inc.
SPCC	Spill Prevention Control and Countermeasures Plan
SO_2	Sulfur dioxide
SO_4	Sulfate
SSI	Spaceport Systems International
SWI	Space Wing Instruction
TCE	Trichloroethene
USC	U.S. Code
USFWS	U.S. Fish and Wildlife Service
UT	Umbilical Tower
VOC	Volatile organic compound
$\mu g/m^3$	Micrograms per cubic meter

Chapter 1. Purpose of and Need for the Proposed Action

1.1 Background

In 2003, Space Exploration Technologies, Inc. (SpaceX) prepared a Final Environmental Assessment (EA) for the Falcon Launch Vehicle Program (Falcon Program), here forward referred to as the Falcon EA (SpaceX 2003), that assessed the potential environmental impacts resulting from the establishment and operation of the Falcon Program at Space Launch Complex–3 West (SLC-3W), Vandenberg Air Force Base (AFB).

SpaceX, a privately held company, developed the Falcon Program as a commercial venture to put small spacecraft into orbit with high reliability and low cost. The Falcon I vehicle is a light-lift, two-stage vehicle that utilizes only liquid fuels.

1.2 Need

The need for implementation of the Falcon Program was described in detail in Section 1.3 of the Falcon EA, incorporated by reference.

The U.S. Air Force (Air Force), 30th Space Wing (30 SW), initiated a review of the feasibility of moving the Falcon I Launch Vehicle Program to Space Launch Complex 4 West (SLC-4W) as a result of National Reconnaissance Office (NRO) concerns regarding a potential anomaly during the initial launch of a new vehicle from a launch pad in close proximity to their national priority asset at SLC-3 East.

The Falcon EA dismissed the use of SLC-4W from consideration due to its use by the Titan II program, and its potential use by the National Aeronautics and Space Administration (NASA) for storage of hydrazine through 2004. In addition, the SLC-4W infrastructure was designed for vehicles larger than the Falcon I, and propellant systems were designed for hypergolic fuels that were not compatible with Falcon I fuels.

However, these considerations are no longer valid constraints for the use of SLC-4W by the Falcon I Program. In 2005, neither the Titan II program nor NASA is using SLC-4. In addition, minor facility modifications and proposed Falcon I Program operational activities, such as tanking-in their fuels, would address infrastructure incompatibilities.

1.3 Purpose

Section 1.3 of the Falcon EA provides detailed information on the purpose of the Falcon Program. This purpose has not changed. The Falcon I Program from SLC-4W is intended to provide launch services to the government and commercial small satellite market.

1.4 Project Location

Vandenberg AFB is headquarters for the 30 SW. The Air Force's primary missions at Vandenberg AFB are to launch and track satellites into space, to train missile and space crews, to test and evaluate America's intercontinental ballistic missile systems, and to support aircraft tests in the Western Range. As a non-military facet of operations, Vandenberg AFB is also committed to promoting commercial space launch ventures. (USAF 2004)

Vandenberg AFB is located on the south-central coast of California, approximately halfway between San Diego and San Francisco (Figure 1-1). The base covers 99,099 acres in western Santa Barbara County (USAF 2004) and occurs in a transitional ecological region that includes the northern and southern distributional limits for many plant and animal species.

SLC-4W is located on South Vandenberg AFB, approximately 4.0 miles south of the Santa Ynez River and one-half mile east of the Pacific Ocean.

Figure 1-1. Location of SLC-4W on Vandenberg AFB.

1.5 Use of Tiering

This EA is tiered under other currently existing National Environmental Policy Act (NEPA) documents. This assessment is intended to supplement and update the previous NEPA evaluation of implementing the Falcon Program as analyzed in the Falcon EA. The Falcon EA was evaluated for its continued applicability of the environmental effects analysis. This review concluded that no new information of changed circumstances exists that would cause a reevaluation of the alternatives or effects analyses included in the Falcon EA. The Falcon EA is available on the World Wide Web (http://ax.losangeles.af.mil/axf/eaapgs/easother.htm).

1.6 Scope of the Environmental Assessment

This EA modifies the scope of previous analyses to include modifications to existing facilities and potential environmental consequences of launching the Falcon I space vehicle from SLC-4W. This EA addresses only the implementation of the Proposed Action and its potential environmental effects within the Region of Influence (ROI).

Consistent with 32 CFR Part 989, and Council on Environmental Quality (CEQ) Regulations (40 Code of Federal Regulations [CFR] 1500-1508), the scope of analysis presented in this EA is defined by the potential range of environmental impacts resulting from the implementation of the Proposed Action and the No-Action Alternative. Resources potentially impacted are considered in more detail in order to provide sufficient evidence and analysis to determine whether or not to prepare an environmental impact statement, pursuant to 40 CFR Part 1501.4(c).

The resources analyzed in this EA include:

- Air Quality (Lower Atmosphere)
- Biological Resources
- Cultural Resources
- Hazardous Materials and Hazardous Waste Management
- Water Resources

The following resource areas were considered but not analyzed in this EA:

Air Quality (Upper Atmosphere). This resource was analyzed in detail in Sections 3.5 and 4.5 of the Falcon EA, incorporated by reference. The refurbishment phase of the Proposed Action would occur within the perimeter fence of SLC-4W, thus no changes would occur to these analyses.

Environmental Justice. The effects of operation of the Falcon Launch Vehicle Program on environmental justice for the region were addressed in Sections 3.14 and 4.14 of the Falcon EA, incorporated by reference. The refurbishment phase of the Proposed Action would occur within the perimeter fence of SLC-4W. No minority or low-income populations reside within this area. Thus the activity is not expected to cause any disproportionately high or adverse impacts to low-income or minority populations.

Geology and Soils. Potential environmental consequences of implementing the Falcon Program were analyzed and discussed in Sections 3.8 and 4.8 of the Falcon EA, incorporated by reference. The proposed construction would occur entirely within previously developed and/or disturbed lands (i.e., confines of SLC-4W). Therefore, geologic features and soil would not be affected.

Health and Safety. Health and safety issues as they relate to operations of the Falcon Program were analyzed in detail in Sections 3.12 and 4.12 of the Falcon EA, incorporated by reference. The proposed refurbishments to SLC-4W are considered minor in nature. Contractors performing the required work would comply with all federal Occupational Safety and Health Act (OSHA) and California OSHA regulations. A review of the analyses completed in the Falcon EA showed that they are still accurate, and circumstances and conditions have not changed in a manner as to require a new analysis

Land Use. Sections 3.1 and 4.1 of the Falcon EA, incorporated by reference, discussed and analyze potential impacts of the Falcon Program on land use. A review of these analyses showed that they are still accurate and circumstances and conditions have not changed in a manner as to require a new analysis. The minor refurbishment of SLC-4W would not result in the conversion of prime agricultural land or decrease in land utilization. The aesthetic quality of the area would not be altered as a result of refurbishment given that activities would occur within an already

developed space launch complex. Coordination with the California Coastal Commission is required for development within the California Coastal Zone. Vandenberg AFB has addressed the Proposed Action with Commission staff and received the California Coastal Commission's concurrence with a Negative Determination.

Noise. Sections 3.2 and 4.2 of the Falcon EA, incorporated by reference, discussed and analyze potential impacts of noise from the Falcon Program. A review of these analyses showed that they are still accurate and circumstances and conditions have not changed in a manner as to require a new analysis. Noise associated with the refurbishment activities to SLC-4W would not be considered of a level to result in any effects on the human environment.

Socioeconomics. The effects of operation of the Falcon Program on socioeconomics of the region were addressed in Sections 3.13 and 4.13 of the Falcon EA, incorporated by reference. The refurbishment phase of the Proposed Action would be of limited duration (approximately three to four months). Therefore, the socioeconomic conditions in the area would not be affected.

Solid Waste Management. Solid Waste Management was discussed in Sections 3.11 and 4.11 of the Falcon EA, incorporated by reference. A review of this analysis showed that it is still accurate and circumstances and conditions have not changed in a manner as to require a new analysis.

Transportation. The Falcon EA, incorporated by reference, described transportation relevant to Vandenberg AFB in Section 3.9, and discussed the impacts of operation of the Falcon Program in Section 4.9. A review of this analysis showed that it is still accurate and circumstances and conditions have not changed in a manner as to require a new analysis.

Utilities. The effects of operation of the Falcon Program on utilities were addressed in Section 3.10 and 4.10 of the Falcon EA, incorporated by reference. Utilities would not be affected with the refurbishments at SLC-4W given that they are already available and in working condition and no new utilities would be required at the site.

A list of acronyms and abbreviations used in this EA is included after the Table of Contents.

1.7 Applicable Regulatory Requirements

Federal and state laws applicable to the Proposed Action and Alternative were previously presented in Section 5 of the Falcon EA, incorporated by reference.

Chapter 2. Description of the Proposed Action and Alternatives

This chapter describes the Proposed Action, and the No-Action Alternative. Descriptions include operational parameters for the Falcon I Launch Vehicle Program and facility modifications for the Proposed Action.

2.1 Proposed Action

The 30 SW proposes that SpaceX operate its Falcon I Launch Vehicle Program from SLC-4W (Figure 2-1) at Vandenberg AFB. Presently, the Falcon Launch Vehicle Program is implemented from SLC-3W. The Falcon I (Figure 2-2) is a two-stage vehicle. The first stage is recoverable and the second stage is not. The Falcon I uses only liquid propellants, including liquid oxygen (LOX) and kerosene (RP-1). Detailed description of the Falcon I vehicle was included in the Falcon EA (SpaceX 2003), incorporated by reference. A comparison of the Falcon I, Titan II and Titan IV vehicle configurations are provided in Table 2-1.

The Falcon I Launch Vehicle Program is designed for minimal vehicle assembly or processing on the launch pad, with most of the vehicle assembly taking place at the SpaceX facilities in El Segundo, California. Payloads (both non-hazardous and hazardous) would be processed at one of the existing payload processing facilities on Vandenberg AFB.

SLC-4W was originally designed with infrastructure to support a larger vehicle than the Falcon I. The propellant systems at SLC-4W were designed for hypergolic fuels and oxidizers that are not compatible with RP-1 and LOX. SpaceX would provide the necessary equipment for RP-1 and LOX use at this site. However, some modifications would need to be made to SLC-4W in order for it to be functional for the Falcon I Launch Vehicle Program.

Refurbishment at SLC-4W and operation of the Falcon I Launch Vehicle Program would comply with all Federal Aviation Administration (FAA), and other federal, state, and local, regulations and requirements, as well as Air Force requirements contained in the *Commercial Space Operations Support Agreement (CSOSA)* (main document plus Annex B) *for the Falcon Launch Vehicle Program Between the United States Air Force Space Command and the 30th Space Wing, Vandenberg Air Force Base, California and Space Exploration Technologies Corporation,* and Air Force Space Command (AFSPC) Manual 91-710, *Range Safety User Requirements*, Volume 5, *Facilities and Structures*.

2.1.1 Operational Phase

The Falcon I launch vehicle, its specifications, launch characteristics, and requirements, as well as the safety systems, and recovery efforts that would be implemented were described in detail in sections 2.1.1.1 through 2.1.1.7 of the Falcon EA (SpaceX 2003), incorporated by reference.

One launch of the Falcon I vehicle would be conducted in 2005, and two launches would be planned for 2006. After that time, up to a maximum of two Falcon I launches per year would be scheduled. SpaceX has a contract with the Air Force for launches of the Falcon I vehicle through 2010. No test flights are planned and all flights are expected to have payloads.

On a per-mission basis, launch campaigns are expected to last from four to eight weeks. During a launch campaign, an average of 10 to 12 SpaceX employees would be present at SLC-4W, with a peak of 25 personnel for about one week.

Ground transportation support during a launch campaign would be minimal, consisting of a fuel truck; LOX truck; nitrogen truck; helium truck; a truck to deliver a crane; a trailer for towing the portable umbilical tower (UT); a delivery truck for the payload, the mobile erector transport for the first and second stages; and a pump truck for deluge water disposal. SpaceX would contract or perform in-house removal of solid waste to an off-base recycling or disposal facility.

Between launch campaigns, three employees would be present at the site. Personal

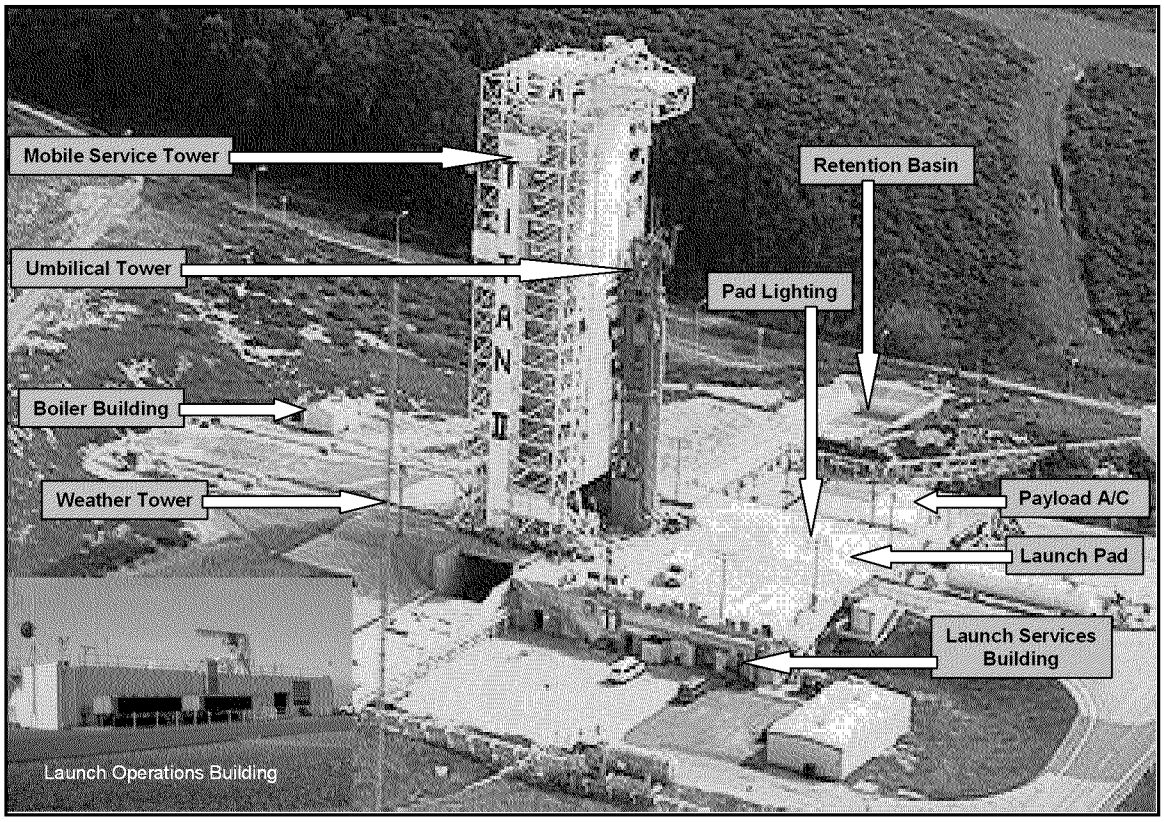

Figure 2-1. Space Launch Complex-4W on Vandenberg AFB.

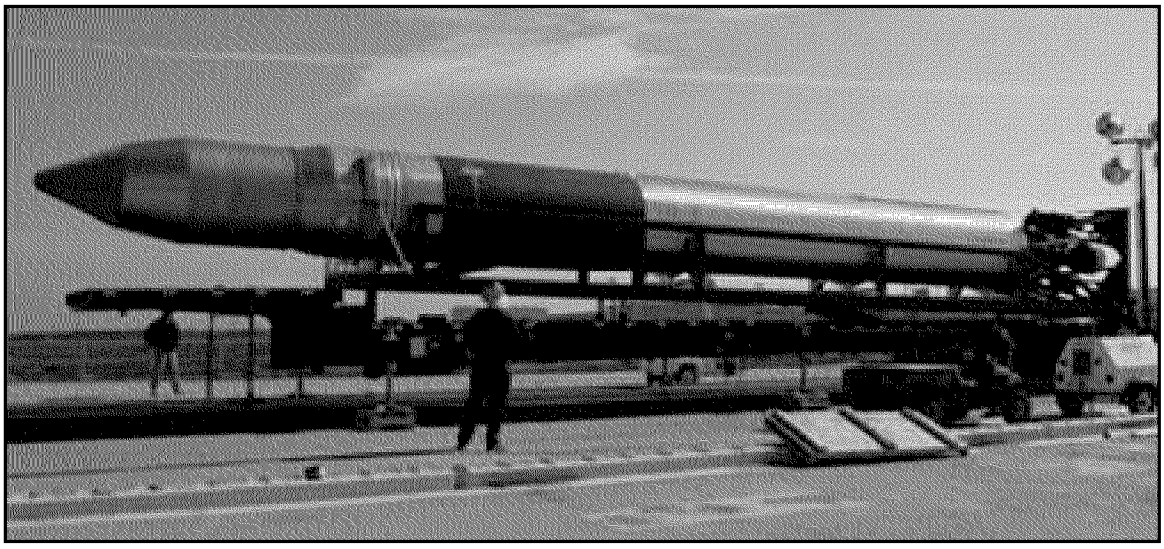

Figure 2-2. Picture of the Falcon I space launch vehicle.

Table 2-1.
Comparison of the configurations of the Falcon I, Titan II and Titan IV launch vehicles.

	Falcon I[1]	Titan II	Titan IV
Vehicle Size Class	Light-lift	Light/Medium-lift	Heavy-lift
Height (feet)	68	98 - 103	144
Weight (lbs)	49,000	330,000	2,074,000
Thrust (lbs)	77,000	474,000	3,300,000
Fuel	Liquids (LOX and RP-1)	Liquid fueled rocket with a small-to-medium weight lift capability. Additional strap-on graphite-epoxy motors solid rocket motors can be added	Liquid fuel core engine and two upgraded solid rocket motors

1. Source: SpaceX 2003

vehicles would be used to commute on- and off-site. Wastewater from launches would be delivered to the Industrial Wastewater Treatment Plant (IWTP) unless it meets the standards that would allow it to be released to grade. Water for drinking and two bathrooms would not exceed 100 gallons on any given day, and would normally not exceed 40 gallons per day.

Non-hazardous payload processing and encapsulation would take place in Building 3000 located in the cantonment area on north Vandenberg AFB, or at one of the other approved payload processing facilities on Vandenberg AFB. Hazardous payloads would be processed at approved payload facilities such as Spaceport Systems International (SSI) or Astrotech Space Operations on Vandenberg AFB, or in other commercial or academic off-base facilities. The encapsulated payload would then be transported to SLC-4W.

The Falcon I would be integrated as three primary assemblies: the first stage assembly, the second stage assembly, and the payload assembly. The first and second stage assemblies would be processed horizontally and integrated at the SpaceX facility in El Segundo, California and then subsequently shipped, horizontally on the mobile erector transport, to the launch facility at SLC-4W.

At SLC-4W, a portable shelter on the pad would function as the vehicle processing and checkout area. This area would be used for all unloading and storage, and the payload and booster mating would occur within the portable shelter. At the site, the launch vehicle would undergo the checkout process. The payload would be rotated horizontally and prepared for integration with the booster. Approved safety procedures for hazardous payloads would be in place at SLC-4W. The encapsulated payload and booster would then be integrated by lifting the payload and placing it on the mobile erector transport's forward platform. The payload would then be positioned and mated to the booster. The payload and booster would then be erected as a single unit, and final connections and installations would be completed (SpaceX 2004). A final systems check would verify full vehicle functionality.

The mobile service tower (MST) and UT previously used by the Titan II Launch Vehicle Program and in place at SLC-4W would be left in place. The MST is located in the park position and is rolled into the position that is furthest from the launch mount. The Falcon Launch Vehicle Program would utilize the platform of the current concrete pad over a flame bucket with a launch mount. The launch mount and MST upper deck would be sandblasted and repainted as needed after each launch.

A portable UT would be used to facilitate the limited integration and payload processing that is required once the vehicle is stacked. It would also provide electrical and data service to the launch vehicle. The portable UT would be brought in via trailer. Immediately prior to the launch, the launch vehicle would be decoupled from the umbilical tower, and the trailer and umbilical tower would leave the launch pad and park a safe distance away.

SpaceX would park LOX and RP-1 tankers on opposite sides of the launch pad in order to provide a safety barrier between the storage and servicing areas. LOX and RP-1 would be separated per requirements. LOX (12,000 gallons) would be stored in the tanker until it was loaded into the Falcon I vehicle, and 6,000 gallons of RP-1 would be stored in its tanker until loaded into the launch vehicle. Permanent piping, which would meet standard rocket loading proof and leak testing requirements, would be installed to facilitate the transfer of the propellants from the tankers into the launch vehicle. Commercially available plastic sheeting would be used to meet propellant containment, and diking and berming requirements.

Gaseous helium contained in a 6-pack tube trailer with 270,000 feet of cubic storage would be parked on the same side of the pad as the LOX, while the liquid nitrogen would be contained in a 6,000-gallon trailer on the same side of the pad as the RP-1. Gaseous nitrogen, as needed, would be generated from the liquid nitrogen via a vaporizer.

The site plan at SLC-4 would be reviewed by the 30th Space Wing Range Safety Office (Range Safety) to ensure proper placement of storage and processing areas.

A temporary trailer would function as the Mobile Launch Control Center and would be used as technical support space for launch operations. This trailer would be located on the SLC-4W pad during pre-launch check out operations, and would then be moved and parked outside of Building 836 on the northernmost part of South Vandenberg AFB during launch.

SpaceX would satisfy security requirements at SLC-4W according to Air Force requirements specified in the CSOSA and contained in Space Wing Instruction (SWI) 31-101, Air Force Instruction (AFI) 31-101, and Department of Defense (DOD) 5220.22M. SpaceX would utilize the existing guard house at SLC-4 and provide for access control and security inside the perimeter fence.

2.1.2 Refurbishment Phase

To provide launch capability for Falcon I vehicles, minor modifications would be made over a period of three to four months to existing equipment and structures at SLC-4W. All modifications would occur in already developed or disturbed areas within the perimeter fence of the complex. Zero acres of ground disturbance would occur. A maximum daily workforce of 10 people would be present at SLC-4W during refurbishment activities. Construction equipment required to complete the work described below would include one forklift for installation of the launch mount.

- The existing MST and UT at SLC-4W would be left in place.
- Permanent aboveground piping to facilitate the transfer of propellants from the tankers to the launch vehicle would be installed.
- The portable deluge water system previously in place at SLC-3W would be transported and connected to the deluge water line at SLC-4W. The ditch leading to the retention basin would be resealed.
- The launch pad power configuration would be updated to provide 3-phase 480 voltage AC 100 ampere service on the pad surface. The source would be distributed by connection of a power cable (pigtail) to an equipment trailer located a safe distance from the booster to avoid damage during launches. The equipment trailer would contain necessary mini-substation and power distribution to supply power, as well as the required backup power system. Installation would be performed in compliance with National Electrical Code (NEC) and Article 496 fire and explosive proofing.
- Five equipment racks and five 120 volt 30 ampere circuits would be installed in the Launch Services Building (LSB) at SLC-4W.

SpaceX would provide the standard interface, such as Ethernet and RS 422 downlink for user communications. SpaceX would perform systems tests in order to revalidate range communications links.

Other Modifications, Rechecks or Repairs

- The pad electrical system would be checked out and an end-to-end certification would be performed to confirm configuration and source reliability.
- An appropriate commercial grounding system contractor would revalidate the grounding system.
- Launch pad support systems, such as lighting towers, would be refurbished or replaced if required.

- The boiler building on SLC-4W houses the generator for the emergency lighting system for the pad area and the LSB. The generator/distribution would be repaired or a portable generator would be used to restore emergency lighting.
- The lightning system on the existing UT would be revalidated and ensured to be compliant with Institute of Electrical and Electronics Engineers (IEEE) 142.
- Pad access stairway steps on the south side of SLC-4W launch pad would be repaired and missing planks would be replaced.
- SpaceX would install cameras on the existing camera mounts.

2.2 No-Action Alternative

Under this alternative the Falcon Program would continue using SLC-3W. The Falcon vehicle has no demonstrated flight experience and employs only a thrust termination system rather than a destruct system for flight termination in the event of an anomaly. The risk to national priority assets essential for national security, which are launched from SLC-3E, would be considered above the traditional acceptance level.

A No-Action Alternative in this analysis implies no refurbishment would occur at SLC-4W nor would the Falcon I vehicle be launched from SLC-4W.

2.3 Alternatives Considered and Dismissed from Further Consideration

The potential use of other launch facilities for the Falcon Launch Vehicle Program was assessed in Sections 2.3.1, 2.3.2, and 2.3.4 of the Falcon EA (SpaceX 2003), incorporated by reference.

2.4 Wildlife Monitoring and Impact Avoidance

- Measures described in the Biological Opinion 1-8-95-F/C-29 issued for the Titan Space Launch Program from SLC-4 by the U.S. Fish and Wildlife Service (USFWS) on May 10, 1996, would be implemented for the Falcon I Program from SLC-4W (see Appendix A).
- Measures described in the Letter of Authorization (LOA) issued by the National Oceanic and Atmospheric Administration Fisheries Service (NOAA Fisheries) on March 4, 2005 would be implemented for the Falcon I Program from SLC-4W (see Appendix A).

Refurbishments are anticipated to occur during the non-breeding season for avian species (August through February), however, if refurbishments occurred during the breeding season, a survey for nesting birds would be accomplished prior to the start of relevant refurbishment efforts and protective measures would be implemented as necessary.

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Chapter 3. Affected Environment

This chapter describes the existing environmental conditions at Vandenberg AFB, within the Region of Influence (ROI) for the Proposed Action. The ROI for the Proposed Action includes the area inside the SLC-4W fence line, and the land and sea below the flight path of the Falcon I vehicle.

The environmental components addressed in this section include relevant natural and human environments that are likely to be affected by the Proposed Action and the No-Action Alternative. As other resources were sufficiently analyzed in the Falcon EA, which is incorporated by reference, the only resources addressed in this chapter are those for which circumstances and conditions have changed in a manner as to require a new analysis.

3.1 Air Quality

Lower atmosphere refers to air up to 3,000 feet in altitude. Air quality in the lower atmosphere that would be affected by emissions from launches under the Falcon Program were discussed and analyzed in Sections 3.5, 4.5 and Appendix C of the Falcon EA, incorporated by reference. A review of that discussion and analysis showed that it is still accurate and circumstances and conditions have not changed in a manner as to require a new analysis.

Likewise, local rules and regulations that would be relevant to the Falcon Program were described in Section 3.5.1.2 of the Falcon EA, incorporated by reference. A review of this analysis showed that it is still accurate, except that the Falcon Program applied for a stationary source designation and was denied. The program is now considered part of the Vandenberg AFB stationary source. No further analysis was determined to be required.

Given the small scale of refurbishment activities that would be accomplished, it is unlikely that these activities within SLC-4W would result in an adverse effect on air quality of the region. However, the air quality of the region is characterized below and potential effects of these emissions are further discussed in Section 4.1 of this EA.

3.1.1 Air Quality and Regulations

Air quality is described by the concentration of pollutants in the atmosphere. These concentrations are expressed in units of parts per million (ppm) or micrograms per cubic meter ($\mu g/m^3$). The type and amount of pollutants emitted into the atmosphere, together with the size and topography of the air basin and the prevailing meteorological conditions, determine air quality. Comparing the concentration to state and federal ambient air quality standards determine the significance of any particular pollutant concentration. These standards represent the maximum allowable atmospheric concentrations that may occur while still providing protection for public health and safety with a reasonable margin of safety.

The Clean Air Act (CAA) required the U.S. Environmental Protection Agency (EPA) to establish ambient ceilings for certain criteria pollutants. Subsequently, the U.S. EPA promulgated regulations that set the National Ambient Air Quality Standards (NAAQS). NAAQS have been established for carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO_2), ozone (O_3), particulate matter 10 microns or less in diameter (PM_{10}), particulate matter 2.5 microns or less in diameter ($PM_{2.5}$), and sulfur dioxide (SO_2). Of these criteria pollutants, only O_3 is a secondary pollutant – i.e., it is not directly emitted, but is formed from the reaction of nitrogen oxides (NO_X) and volatile organic compounds (VOCs). In Santa Barbara County, the term Reactive Organic Compounds (ROC) is used to describe that portion of VOC that readily react in the atmosphere and produce ozone. The definition of ROC found in Santa Barbara County Air Pollution Control District (SBCAPCD) Rule 102, *Definitions*, is identical to the U.S. EPA definition of VOC. They are used synonymously in this analysis. The NAAQS are presented in Table 3-1.

Table 3-1.
Ambient air quality standards.

Pollutant	Averaging Time	CAAQS[1,3]	NAAQS[2,3]	
			Primary[4]	Secondary[5]
Ozone	8-hour	0.070 ppm[6] (137 μg/m^3)	0.08 ppm (157 μg/m^3)	same as primary
	1-hour	0.09 ppm (180 μg/m^3)	0.12 ppm[7] (235 μg/m^3)	
Carbon Monoxide	8-hour	9 ppm (10,000 μg/m^3)	9 ppm (10,000 μg/m^3)	--
	1-hour	20 ppm (23,000 μg/m^3)	35 ppm (40,000 μg/m^3)	--
Nitrogen Dioxide	annual average	--	0.053 ppm (100 μg/m^3) (arith)	same as primary
	1-hour	0.25 ppm (470 μg/m^3)	--	--
Sulfur Dioxide	annual average	--	0.03 ppm (80 μg/m^3)	--
	24-hour	0.04 ppm (105 μg/m^3)	0.14 ppm (365 μg/m^3)	--
	3-hour	--	--	0.5 ppm (1300 μg/m^3)
	1-hour	0.25 ppm (655 μg/m^3)	--	--
PM_{10}	annual mean (arith or geo)	20 μg/m^3 (geo)	50 μg/m^3 (arith)	same as primary (arith mean)
	24-hour	50 μg/m^3	150 μg/m^3	same as primary
$PM_{2.5}$	annual arith mean	12 μg/m^3	15 μg/m^3	same as primary
	24-hour	--	65 μg/m^3	same as primary
Sulfates	24-hour	25 μg/m^3	--	--
Lead	30-day average	1.5 μg/m^3	--	--
	quarterly	--	1.5 μg/m^3	same as primary
Hydrogen Sulfide	1-hour	0.03 ppm (42 μg/m^3)	--	--
Vinyl Chloride	24-hour	0.010 ppm (26 μg/m^3)	--	--
Visibility Reducing Particles	1 observation (8 hours from 8 AM to 6 PM PST)	sufficient amount to produce extinction coefficient of 0.07 per kilometers due to particles when relative humidity <70%.	--	--

1. California Standards for ozone, carbon monoxide, sulfur dioxide (1- & 24-hour), nitrogen dioxide, PM_{10}, $PM_{2.5}$ and visibility reducing particles are not to be exceeded. Sulfate, lead, hydrogen sulfide & vinyl chloride standards are not to be equaled or exceeded.

2. National Standards, (other than ozone, particulate matter, and those based upon annual averages or average arithmetic means) are not to be exceeded more than once a year. The ozone standard is attained when the fourth highest eight-hour concentration in a year, averaged over three-years, is equal to or less than the standard. For PM_{10}, the 24-hours standard is attained when 99% of the daily concentrations, averaged over three years, are equal to or less than the standard. For $PM_{2.5}$, the 24-hours standard is attained when 98% of the daily concentrations, averaged over three years, are equal to or less than the standard.

3. Concentration expressed first in units in which it was promulgated. Equivalent units given in parentheses are based upon a reference temperature and pressure of 25 ^{O} C and 760-mm Hg, respectively. Most measurements of air quality are to be corrected the reference temperature of 25 ^{O} C and reference pressure of 760-mm Hg; ppm in this table refers to ppm by volume or micromoles of pollutant per mole of gas.

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

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

6. Approved by the California Air Resources Board and expected to become effective in early 2006.

7. Not applicable to Santa Barbara County, effective June 15, 2005.

Under the California CAA, California established air quality standards for the state, known as the California Ambient Air Quality Standards (CAAQS). CAAQS are generally more stringent than the NAAQS and there are additional CAAQS for sulfates (SO_4), hydrogen sulfide (H_2S), vinyl chloride, and visibility-reducing particulate matter. The CAAQS are also presented in Table 3-1.

The area affected by the emissions from the Proposed Action includes Vandenberg AFB and surrounding portions of northern Santa Barbara County. For CO, NO_2, PM_{10}, and SO_2, the affected area is generally limited to a few miles downwind of the emission source, while for O_3 it can extend many miles downwind. Because the reaction between ROCs and NO_X usually occurs several hours after they are emitted, the maximum O_3 level can be many miles from the source, therefore, the area affected by Vandenberg AFB-produced O_3 and its precursors could include most of northern Santa Barbara County. In addition, O_3 and its precursors transported from other regions can combine with local emissions to produce high, local O_3 concentrations.

3.1.2 Regional Air Quality

The U.S. EPA classifies air quality within each air quality control region with regard to its attainment of NAAQS. The California Air Resources Board does the same for CAAQS. An area with air quality better than state or federal ambient air quality standards for a specific pollutant is designated as attainment for that pollutant. Any area not meeting those standards is classified as non-attainment. Santa Barbara County is in attainment or unclassified for all the ambient air quality standards except for the state standard for PM_{10} and the state O_3 standards. Currently, Santa Barbara County's air quality is classified as maintenance attainment for the federal one-hour O_3 standard (68 Federal Register [FR] 40789-40791).

The estimated emissions for Santa Barbara County and Vandenberg AFB are presented in Table 3-2. The Santa Barbara County emissions are 2000 daily planning emissions taken from the 2004 SBCAPCD Clean Air Plan, while the Vandenberg AFB emissions are annual emissions taken from the 2001 Comprehensive Emission Inventory Draft Report.

3.2 Biological Resources

3.2.1 Resources Within the Region of Influence of the Falcon I Program

The biological resources on the land and within the sea below the flight path of the Falcon I vehicle were discussed and analyzed in Sections 3.3 and 4.3 of the Falcon EA, incorporated by reference. A review of that analysis indicates that it is still accurate.

The small distance between SLC-3W and SLC-4W, approximately 1.6 miles (Figure 1-1), leads to many of the same species being present

Table 3-2.
Existing emissions.

Source	2000 Emissions			
	Annual (Tons/Year)		Planning Day (Tons/Day)	
	NO_x	ROC	NO_x	ROC
Santa Barbara County				
Stationary Sources	2,096.61	3,666.69	5.5694	10.0551
Area-Wide Sources	350.26	3,064.28	0.4817	7.9368
Mobile Sources	13,803.73	8,687.04	37.8342	23.8465
OCS Sources	12,174.83	3,067.23	33.3674	2.9139
Natural Sources	1,364.58	28,930.40		
Total	**29,790.01**	**47,415.64**	**77.2527**	**44.7523**
Vandenberg AFB Annual [(a)]	***1,133.75***	***229.39***	ND	ND

(a) Emissions are in tons/year. ND = Not determined

at both facilities. For this reason, many of the monitoring requirements for federally listed threatened and endangered species are the same or similar for launches from either site. However, there are slight differences. Launches from SLC-3W would require monitoring for the California red-legged frog (*Rana aurora draytonii*) at Bear Creek while launches from SLC-4W would require water quality monitoring at Canada Honda Creek to determine the effects of the launches on the California red-legged frog, unarmored threespine stickleback (*Gasterosteus aculeatus williamsoni*) and tidewater goby (*Eucyclogobius newberryi*).

Federally listed plants and wildlife species that occur within the ROI of the Falcon I Program at SLC-4W would be the same as those considered in the Biological Opinion issued by the USFWS for the Titan Space Launch Program from SLC-4 (USFWS 1996). As the Falcon I would also be launched from SLC-4, the species listed as being potentially affected by the Titan Program are considered here as being potentially affected by the Falcon I Program. Additional special status species, not covered under the Titan Biological Opinion include those protected under the Marine Mammal Protection Act of 1972, and overseen by NOAA Fisheries.

3.2.2 Resources at SLC-4W

Biological resources in SLC-4W and its vicinity were described in detail in the original Titan II Launch Vehicle Program EA (USAF 1987a), the EA for the Repair and Restoration of SLC-4 (USAF 1987b), the Biological Assessment for the Titan II and Titan IV Space Launch Vehicle Modifications and Launch Operations Programs (USAF 1988a), and the EA for the Titan IV Space Launch Vehicle Modification and Operation (USAF 1988b). At the present time, biological resources within the fence line of SLC-4W, approximately 23 acres, are minimal given the state of development of the complex.

3.2.2.1 Vegetation

Five plant communities occur in the vicinity of SLC-4 including central dune scrub, central coastal scrub, coastal sage-chaparral scrub, Spring Canyon wetlands, and ruderal vegetation (U.S. Air Force 1987a). Of these, only ruderal vegetation, including non-native grasses, is present within the fence line of SLC-4W (U.S. Air Force 1987a). The dominant plant species present within SLC-4W is hottentot fig (*Carpobrotus edulis*), with narrow-leaved iceplant (*Conicosia pugioniformis*) also being common (U.S. Air Force 1987a).

3.2.2.2 Wildlife Species

Wildlife species within the perimeter fence of SLC-4W are restricted due to absence of adequate habitat for many species. Based on the type of habitats present, species likely to occur include various mice of the genus *Peromyscus*, Botta's pocket gopher (*Thomomys bottae*), western fence lizard (*Sceloporus occidentalis*), Brewer's blackbird (*Euphagus cyanocephalus)*, house finch (*Carpodacus mexicanus*), and cliff swallows (*Hirundo pyrrhonota*).

3.2.2.3 Special Status Species

No special status plant species or federal or state listed threatened or endangered wildlife species are known to occur within the fence line of SLC-4W where refurbishment activities would occur. However, the Migratory Bird Treaty Act (MBTA) of 1918, as amended (16 U.S. Code [USC] 703-712), provides federal protection to all native avian species, their nests, eggs, and unfledged young. House finches and cliff swallows are known to occur within the fence line of SLC-4W and nesting was documented in the past in the MST and UT at SLC-4W (N. Francine, pers. comm.).

3.3 Cultural Resources

A general description of cultural resources and relevant laws and requirements were included in Section 3.4 of the Falcon EA, incorporated by reference.

Cultural resources on Vandenberg AFB, and in the SLC-4W vicinity were described in detail in the original Titan II Launch Vehicle Program EA, and the EA for the Repair and Restoration of SLC-4 (USAF 1987a and 1987b). The ROI for the Proposed Action, as it relates to cultural resources, includes the area inside the fence line at SLC-4.

Seven archaeological sites were recorded in the vicinity of SLC-4W as a result of archaeological surveys conducted as part of the SLC-4 repair and restoration. These include CA-SBa-537, -678, -1125, -1127, -1815, -1816, and -1940 (U.S. Air Force 1987b). Site CA-SBa-537 is

mostly contained within the fence line, and is contiguous with -1816, which lies primarily outside the fence line around SLC-4W. In addition, one isolated artifact, VAFB-ISO-300, a chert biface, was found within the fence line (U.S. Air Force, In Progress).

Together, CA-SBa-537 and –1816 encompass six artifact concentrations, four within CA-SBa-537 and two within –1816. Cultural constituents include cores, bifaces, utilized flakes, lithic debitage, ground stone, a tarring pebble, a hammerstone, and an abrader. Radiocarbon analysis indicates the sites were occupied during the Late Period. Both of these sites have been determined eligible for the National Register of Historic Places (NRHP) because they could provide data useful for understanding prehistory (U.S. Air Force, In Progress).

3.4 Hazardous Materials and Hazardous Waste Management

Hazardous materials and hazardous waste management from operation of the Falcon Program was described and analyzed in Sections 3.6 and 4.6 of the Falcon EA, incorporated by reference. With the exception of the discussion regarding the Spill Prevention Control and Countermeasures (SPCC) Plan and aboveground storage tank (AST) registration, a review of this analysis showed that it is still accurate and circumstances and conditions have not changed in a manner as to require a new analysis.

ASTs are no longer planned for use at the launch site for storage, and therefore no AST registration would be completed.

SpaceX would prepare an SPCC Plan pursuant to state and federal regulations if required to address the transfer of propellants from on site tankers to the launch vehicle, and the on-site use of liquid nitrogen and gaseous helium.

Installation Restoration Program

The federal Installation Restoration Program (IRP) was implemented at DOD facilities to identify, characterize, and restore hazardous substance release sites. IRP sites are remediated through the Federal Facilities Site Remediation Agreement, a working agreement between the Air Force; the California Regional Water Quality Control Board, Central Region; and the California Department of Toxic Substances Control (U.S. Air Force 2003).

In addition to IRP sites, there are identified Areas of Concern (AOC), where potential hazardous material releases are suspected; and Areas of Interest (AOI), defined as areas with the potential for use and/or presence of a hazardous material or hazardous waste. The 30th Civil Engineer Squadron, Environmental Flight, Installation Restoration Program Section (30 CES/CEVR) manages the IRP, AOC, and AOI sites on Vandenberg AFB.

SLC-4 lies within IRP Sites 8, 9, and 10. One IRP site, Site 9, is located within the perimeter fence of SLC-4W. Site 9, is part of the Site 8 Cluster, which also includes Site 8 at SLC-4E and Site 10 at Spring Canyon Pond. These sites are treated as a “site cluster” due to shared geologic, biologic and hydrogeologic settings. Site 9 is an aboveground gantry launch facility. Past operations at Site 8 and Site 9 have used and released trichloroethelene (TCE) to the environment, creating a groundwater plume approximately 6,400 feet long and 1,200 feet wide (Tetra Tech 2005). Other contaminants in this area include perchloroethane (PCE) and metals. The area is populated with multiple wells and there is a dual phase extraction system installed.

No other IRP, AOC, or AOI sites exist within the SLC-4W fence line.

3.5 Water Resources

Water resources include groundwater and surface water, as well as physical, chemical, and biological characteristics.

Industrial or hazardous waste management as it applies to water resources was discussed in Sections 3.7 and 4.7 of the Falcon EA, incorporated by reference. A review of that discussion and analysis showed that it is still accurate and circumstances and conditions have not changed in a manner as to require a new analysis.

3.5.1 Surface Water

Surface water quality was discussed in the Falcon EA, Section 3.7.1.2, incorporated by reference. A review of that analysis showed that it is still accurate, except that the State Water Resources has, as of March 2003, updated the

existing general permit for construction activities to also include small construction sites between one and five acres.

Surface water resources in the vicinity of SLC-4W include three small streams of importance: Canada Honda Creek, Bear Creek, and Spring Canyon Creek (USAF 1987b).

Canada Honda Creek, approximately two miles south of SLC-4W, is over eight miles long and discharges into the Pacific Ocean.

Spring Canyon Creek, approximately 0.1 miles south of SLC-4W, originates approximately 1.4 miles inland and flows toward the ocean. This creek only flows in direct response to precipitation (USAF 1987b). Surface flow percolates into the groundwater to pass beneath road embankments and eventually enters the Pacific Ocean (USAF 1987b).

Bear Creek, approximately one mile northeast of SLC-4W, flows year round due to inflow from springs and seep, and drains only a few square miles. Its surface flow does not discharge into the ocean (USAF 1987b). Bear Creek is lined with riparian woodland and leads to Bear Creek Pond. Bear Creek is considered jurisdictional waters of the United States with jurisdictional wetlands located adjacent to the creek (SpaceX 2003).

Jurisdictional Waters of the United States

Section 3.7.1.1 of the Falcon EA, incorporated by reference, discussed jurisdictional waters of the United States, the methods for identifying them and jurisdictional wetlands.

There are no jurisdictional waters of the United States located within the fence line of SLC-4W. Spring Canyon, 0.1 miles to the south of SLC-4 is considered to be jurisdictional waters of the United States, as is Bear Creek, discussed above.

3.5.2 Groundwater

The U.S. Air Force (1977, 1978, 1988a and 1988b) and Stearns Catalytic (1987) previously analyzed groundwater resources in the vicinity of SLC-4. Groundwater is restricted to the shallow surficial sedimentary deposits of the Orcutt Sand, which underlies most of the SLC-4 area, and the overlying Holocene alluvium, which fills the bottom of Spring Canyon. The Spring Canyon aquifer is at much higher elevations than the aquifers to the north. SLC-4 appears to be isolated from the groundwater system in Bear Creek Canyon. Predominant groundwater flow is toward the Pacific Ocean (USAF 1988b).

3.5.3 Water Supply

The water supply for Vandenberg AFB and requirements of the Falcon Program were discussed in Sections 3.7 and 4.7 of the Falcon EA, incorporated by reference. A review of those discussions showed it is still accurate, and circumstances and conditions have not changed in a manner as to require a new analysis.

3.5.4 Domestic Wastewater Management

Sanitary wastewater generated at SLC-4W would be managed via the existing sanitary septic sewer system. The small number of personnel anticipated to be present during the refurbishments and operation of the Falcon I Program would not affect performance of the existing system. Thus, wastewater management is not addressed further in this EA.

3.5.5 Industrial or Hazardous Wastewater Management

Wastewater generated during operation of the launch deluge water system for the Falcon I Program would be contained in the existing retention basin, characterized as either hazardous or non-hazardous, and removed and hauled to an approved off-base disposal facility, unless it meets the standards that would allow it to be released to grade. Operation of the launch deluge water system would be in compliance with AFSPC Manual 91-710, *Range Safety User Requirements*, Volume 5, *Facilities and Structures*.

Chapter 4. Environmental Consequences

This chapter presents the results of the analysis of potential environmental consequences associated with the Proposed Action and the No-Action Alternative.

4.1 Air Quality

The criteria for determining the significance of air quality impacts are based upon federal, state, and Santa Barbara County standards and regulations. Impacts would be considered to be significant if project emissions increase ambient pollutant concentrations from below the NAAQS or CAAQS to above these standards, or if they contribute measurably to an existing or projected ambient air quality standard violation.

In non-attainment or maintenance areas, federal agencies are required to prepare a conformity determination to prevent federal actions from causing an exceedance of a national ambient air quality standard. To reduce the time and resources federal agencies expend in preparing conformity determinations, EPA developed de minimis levels that serve as thresholds for focusing on those actions likely to have the most significant impacts. EPA deemed that emission levels below the de minimis levels were not significant.

As of June 15, 2005, Santa Barbara is in attainment of all federal air quality standards, and federal agencies are no longer required to prepare conformity determinations. However, Vandenberg AFB believes the threshold levels used in conformity determinations are still relevant for use as thresholds for determining if air quality impacts would be significant. The rationale used by EPA to develop the thresholds for non-attainment areas is no less applicable for areas in attainment. Although Vandenberg AFB is no longer required to observe the significance levels required in conformity determinations, their voluntary use of them provides a conservative approach to determining air quality impacts.

Maintenance areas have de minimis levels of 100 tons/year for NO_x. The VOC limits are 50 tons/year for areas inside an ozone transport region and 100 tons/year outside that region. Using a 365-day year, these de minimis levels equate to significance levels of 548 lbs/day of NO_x, and 274 or 548 lbs/day for VOCs for areas inside and outside of an ozone transport region, respectively. Vandenberg AFB will apply the 100 tons/year/548 lb/day VOC significance threshold unless the SBCAPCD becomes part of an Ozone Transport Region under the CAA and Vandenberg AFB decides a readjustment of its VOC significance threshold is warranted. These are the levels Vandenberg AFB will use for determining whether or not air quality impacts are significant.

4.1.1 Proposed Action

For purposes of this analysis, the Proposed Action encompasses the minor infrastructure improvements within SLC-4W and the launch of up to two Falcon I vehicles per year from SLC-4W. During infrastructure improvements of and operation at SLC-4W, SpaceX would be required to comply with, but not limited to, the following SBCAPCD Rules:

- Rule 323 – Architectural Coatings
- Rule 329 – Cutback and Emulsified Asphalt Paving Materials.
- Rule 333 – Control of Emissions from Reciprocating Internal Combustion Engines.
- Rule 337 – Surface Coating of Aircraft or Aerospace Vehicle Parts and Products.
- Rule 342 – Control of Oxides of Nitrogen (NOx) from Boilers, Steam Generators and Process Heaters.
- Rule 351 – Surface Coating of Wood Products.
- Rule 353 – Adhesives and Sealants.
- Rule 360 – Emissions of Oxides of Nitrogen from Large Water Heaters and Small Boilers.

- California Air Resources Board certified blasting media would be used in abrasive blasting operations.
- Any portable equipment, including generators, powered by an internal combustion engine rated at 20 brake-horsepower or greater must be registered in the California State-Wide Portable Equipment Registration Program or have a valid SBCAPCD Permit to Operate.

4.1.1.1 Operational Phase

The potential impacts on air quality from launching Falcon vehicles were estimated as less than significant in the Falcon EA (Section 4.5), incorporated by reference. While the Falcon EA considered SLC-3W as the launch site, the same process would be used to launch from SLC-4W. Because launches and hot fires are discrete, infrequent events, the emissions are expected to only cause short-term impacts on the local air quality with no long-term impacts. With large distance between SLC-4W and the public, the short-term impacts are not expected to exceed applicable standards or Permissible Exposure Limit (PEL) ceilings. The 0.30 tons/year of NO_x and 0.21 tons/year of ROC emissions from mobile sources support would be spread across Vandenberg AFB and Santa Barbara County and would not cause a significant impact to the regional air quality. Since no ambient air quality standards would be exceeded and the estimated emissions are below significance thresholds, the operational phase of the Proposed Action would not be considered to be significant.

Stationary source designation discussions between SpaceX and the SBAPCD resulted in the decision to include SpaceX in the Vandenberg AFB stationary source. SpaceX obtained Authority to Construct (ATC) 11262 for solvent and rocket propellant handling operations. This ATC would be changed to allow operations at SLC-4W.

4.1.1.2 Refurbishments

During this analysis, a detailed equipment list was unavailable to generate a construction emissions inventory. The proposed refurbishments are smaller in size and magnitude than the modifications and installations accomplished on SLC-3W to configure that pad for the Falcon Program. Construction emissions for the SLC-3W modifications were prepared and discussed in the Falcon EA. The refurbishment of SLC-3W was deemed to have less than significant air quality impacts. The total project emissions from that project were estimated to be 3.01 tons of CO, 3.02 tons of NO_x, 11.74 tons of PM_{10}, 0.44 tons of ROC, and 0.29 tons SO_x (see Appendix B). Based on the distribution of emissions across portions of Vandenberg AFB and the duration of the refurbishments construction schedule under the Proposed Action, emissions from this short-term project would not be expected to cause an exceedance of ambient air quality standard. Since no ambient air quality standards would be exceeded and the estimated emissions are below significance thresholds, impacts would not be considered to be significant to the region's air quality.

4.1.2 No-Action Alternative

Section 4.5 of the Falcon EA, incorporated by reference, discussed the potential environmental consequences of implementing the Falcon Program from SLC-3W, the No-Action Alternative in this EA. That analysis concluded that air resources would not be affected or that impacts on resources would be less than significant.

4.2 Biological Resources

Adverse impacts to biological resources can be short- or long-term impacts, for example, short-term impacts from noise and dust during construction, and long-term impacts from the permanent loss of vegetation and, consequently, loss of the capacity of habitats to support wildlife populations. Adverse impacts are considered significant if the project would result in permanent adverse effects, either directly or indirectly, to special status species (federally- or state-listed endangered or threatened species) or their habitats, as designated by federal and state agencies.

Federal agencies are required by Section 7 of the Endangered Species Act (ESA) of 1973, as amended (16 USC 1531 *et seq.*), to assess the effect of any project on federally listed threatened or endangered species. Under Section 7, consultation with the USFWS and NOAA Fisheries is required for federal projects if such actions could directly or indirectly affect listed species or destroy or adversely modify critical habitat.

The U.S. Air Force initiated an informal Section 7 consultation with the USFWS requesting concurrence that the Falcon I Program from SLC-

4W is not likely to adversely affect federally listed threatened and endangered species under Section 7 of the ESA. On August 12, 2005, the USFWS concurred (see Appendix A) with the Air Force determination that the Falcon program is not likely to adversely affect listed species in a manner or extent not already considered in the Titan Biological Opinion.

4.2.1 Proposed Action

4.2.1.1 Operational Phase

The Falcon I vehicle is a smaller space vehicle with a less powerful engine than those launched in the past from SLC-4 (i.e., Titan II and Titan IV launch vehicles). Falcon I launches would result in less impacts on wildlife species than either the Titan II or Titan IV launch vehicles. In addition, given the small distance between SLC-3W and SLC-4W, and that operational aspects of the Falcon I launches would be the same from either launch site, impacts would be similar to those analyzed in Section 4.3 of the Falcon EA (incorporated by reference) for launches from SLC-3W.

A comparison of the federally listed threatened and endangered species requiring monitoring for launches from SLC-3W and SLC-4W is presented in Table 4-1, along with a comparison of potential impacts to listed species from the proposed move.

The U.S. Air Force would implement the monitoring measures described in Biological Opinion for the Titan Space Launch Program from SLC-4 (1-8-95-F/C-29) issued on May 10, 1996 (see Appendix A) to minimize impacts the federally listed species.

Falcon vehicles are included in the NOAA Fisheries LOA to harass seals and sea lions incidental to missile and rocket launches at Vandenberg AFB (NOAA 2005). All measures listed in the LOA would be implemented to monitor and minimize impacts to marine mammals (see Appendix A).

Table 4-1.
Comparison of federally listed threatened and endangered species with monitoring requirements for SLC-3 and SLC-4, and of impacts to these species from the proposed relocation.

Species	SLC-3W Biological Opinion Launch Requirements[1]	SLC-4W Biological Opinion Launch Requirements[2]	Comparison of Falcon I Potential Launch Impacts from Proposed Relocation from SLC-3W to SLC-4W
California least tern	X	X	Noise/disturbance impacts similar or less than SLC-3W Falcon I launches; less than SLC-4W Titan II launches
Southwestern willow flycatcher	X	X	
Western snowy plover	X	X	There is no change in potential impacts from the proposed relocation
California red-legged frog (Bear Creek)	X	No Req.	Launches from SLC-4W would not impact Bear Creek and there is no launch monitoring requirement for launches from SLC-4
California red-legged frog, unarmored threespine stickleback, and tidewater goby (Honda Creek)	No Req.	X	Impacts to listed fish and frogs in Honda Creek are unlikely due to distance from SLC-4W launch site and exhaust components, and there is no launch monitoring requirement for launches from SLC-3
California brown pelican	X	No Req.	There is no launch monitoring requirement for launches from SLC-4
Beach layia	X	X	There is no change in potential impacts from the potential relocation

1. From USFWS 1999.
2. From USFWS 1996.
X = There is a launch monitoring requirement for the listed species within the referenced Biological Opinion.
No Req. = There is no launch monitoring requirement for the listed species within the referenced Biological Opinion

4.2.1.2 Refurbishments

No impacts are anticipated to special status species resulting from the refurbishments of SLC-4W because no listed species or proposed or designated critical habitats occur within the fence line, and no ground disturbing activities would be conducted. Wildlife species expected to occur near the launch site during refurbishment would be expected to move to other locations for foraging and other activities. Because refurbishments would occur within the perimeter fence of SLC-4W where habitat for most wildlife species is poor, and activities would short-term, potential adverse impacts to wildlife species would be minimized.

Potential adverse impacts to birds protected under MBTA resulting from short-term construction and human generated noise include disruption in foraging, roosting, and courtship activities. Birds would be expected to move away from the area of disturbance during construction activities, but would be likely to return to the area once activity ceased. However, because habitat is poor within the SLC-4W fence line, and activities would short-term, potential adverse impacts to wildlife species protected under the MBTA would be minimized. Additionally, refurbishments are anticipated to occur during the non-breeding season for avian species (August through February), thus no impacts are anticipated that would infringe on the protection of native birds under the MBTA. If refurbishments occurred during the breeding season, a survey for nesting birds would be accomplished prior to the start of relevant refurbishments and protective measures would be implemented as necessary.

4.2.2 No-Action Alternative

Section 4.3.1 of the Falcon EA, incorporated by reference, discussed the potential environmental consequences of implementing the Falcon Program from SLC-3W, the No-Action Alternative in this EA. That analysis concluded that impacts on biological resources would be less than significant.

4.3 Cultural Resources

Per federal regulations, cultural resources would be adversely affected if the Proposed Action would cause loss of the value or characteristics that qualify the resource for listing on the NRHP, or if the proposed action substantially alters the natural environment or access to it in such a way that traditional cultural or religious activities are restricted. The criteria used to evaluate the significance of cultural resources and to assess potential adverse project effects are set forth in the National Historic Preservation Act (NHPA) of 1966 (as amended). Associated implementing regulations include 36 CFR 60 and 800.

4.3.1 Proposed Action

4.3.1.1 Operational Phase

Normal operation involving the implementation of the Falcon I Program at SLC-4 would not impact archaeological sites. Due to the low probability of a mishap and subsequent damage to these resources, impacts on these resources due to operation of the Falcon I Program would be less than significant.

Normal operations at SLC-4W may affect access to the general vicinity. Some local Chumash descendants have hunting and gathering privileges on VAFB, and their access to the SLC-4W area would be curtailed during launches. For this reason, on August 29th, 2005, 30th Civil Engineering Squadron, Environmental Flight, Cultural Resources Section (30 CES/CEVPC) personnel consulted with the Tribal Elders and the Santa Ynez Band of Chumash Indians regarding the SpaceX program, and its utilization of the SLC-4 area. The consultation was made to reduce any potential impacts of this launch program that were related to Native American access to less than significant levels. The Chumash Tribal Elders Council had no concerns regarding the Proposed Action (J. Carucci, pers. comm.).

4.3.1.2 Refurbishments

The Proposed Action would comply with all relevant authorities governing cultural resources, including Section 106 of the NHPA and AFI 32-7065. While it is very unlikely that the limited refurbishment activities would lead to encountering previously undocumented cultural resources, if this unlikely event occurred, procedures established in 36 CFR 800.13 would be followed.

As all vehicles necessary for refurbishment activities would be on paved areas, and because the methods described for completing work within the SLC-4W fence line do not include excavation, grading, or any activities that would disturb ground surfaces and cultural resources, the cultural

resources at the site would not be affected during refurbishments at SLC-4W.

4.3.2 No-Action Alternative

Section 4.4.1 of the Falcon EA, incorporated by reference, discussed the potential environmental consequences of implementing the Falcon Program from SLC-3W, the No-Action Alternative in this EA. That analysis concluded that cultural resources would not be affected or that impacts on resources would be less than significant.

4.4 Hazardous Materials and Hazardous Waste Management

4.4.1 Proposed Action

4.4.1.1 Operational Phase

Potential adverse impacts associated with hazardous materials and hazardous waste management were discussed in Section 4.6 of the Falcon EA, incorporated by reference. A review of these analyses showed that they are still accurate and circumstances and conditions have not changed in a manner as to require a new analysis.

4.4.1.2 Refurbishments

Refurbishments are anticipated to generate very small quantities of hazardous waste associated with use of hazardous material required to run and maintain equipment used during refurbishment. Because all applicable federal, state, county, and Air Force regulations would be followed to properly store, handle, and dispose of hazardous waste, refurbishment activities would generate less than significant impacts on hazardous waste management. In addition, hazardous waste streams generated by the Falcon I Program are typical of other hazardous waste streams in California. Therefore, the existing hazardous waste landfills would have sufficient capacity to handle the small amounts of hazardous waste generated under the Proposed Action.

Installation Restoration Program

Contamination would be encountered if digging or trenching activities occurred, which would require training personnel on how to react if contamination was encountered. However, as there would be no ground disturbing activities, including no digging or trenching at SLC-4W during refurbishment, there would be no impacts to IRP Site 9 or contamination at the site.

4.4.2 No-Action Alternative

Section 4.6.1 of the Falcon EA, incorporated by reference, discussed the potential environmental consequences of implementing the Falcon Program from SLC-3W, the No-Action Alternative in this EA. That analysis concluded that impacts resulting from hazardous materials and hazardous waste management would be less than significant.

4.5 Water Resources

Adverse impacts to water resources would occur if the Proposed Action 1) caused substantial flooding or erosion, 2) adversely affected surface water, 3) adversely affected groundwater quantity or quality, or 4) caused a need that exceeded the existing potable supply or wastewater capacity at Vandenberg AFB.

Impacts to jurisdictional waters of the United States and wetlands are considered significant if the project would result in net loss of wetland area or habitat value, either through direct or indirect impacts to wetland vegetation, loss of habitat for wildlife, degradation of water quality, or alterations in hydrological function.

4.5.1 Proposed Action

4.5.1.1 Operational Phase

Section 4.7.1.1 of the Falcon EA, incorporated by reference, discussed the potential adverse effects to surface water, water supply and industrial or hazardous wastewater from implementing the Falcon Program. The analyses found that effects of these resources would be less than significant. A review of these analyses showed that they are still accurate and circumstances and conditions have not changed in a manner as to require a new analysis.

Groundwater would not be affected because deluge water would be retained and transported off base for disposal. Therefore, no impacts on this resource would occur.

4.5.1.2 Refurbishments

Any modification of the deluge water system would follow the requirements of AFSPC Manual 91-710, *Range Safety User Requirements*, Volume 5, *Facilities and Structures*. Because refurbishment activities of this system would comply with Air Force regulations and would not directly affect industrial or hazardous wastewater management, no impacts to this resource would occur.

Jurisdictional Waters of the United States

There are no jurisdictional waters of the United States located on SLC-4W, and the jurisdictional waters that lay to the south of SLC-4 at Spring Canyon would not be affected (deluge water generated during testing and launch operations would be contained in the retention basin and removed and hauled to an approved off-base disposal facility). Therefore, jurisdictional waters of the United States would not be affected.

4.5.2 No-Action Alternative

Section 4.7.1 of the Falcon EA, incorporated by reference, discussed the potential environmental consequences of implementing the Falcon Program from SLC-3W, the No-Action Alternative in this EA. Those analyses concluded that no impacts or less than significant impacts to water resources would occur.

4.6 Cumulative Impacts

Cumulative impacts result from the incremental effect of an action when added to other past, present, and reasonably foreseeable future actions in the vicinity of the proposed project, regardless of what agency undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

A review of the Vandenberg AFB funding and planning document *Sustainment, Restoration, and Modernization Program*, indicates that current and upcoming projects on Vandenberg AFB would occur throughout the base. Therefore, potential impacts from projects would not be localized to a specific area on Vandenberg AFB. General ongoing operations and maintenance projects include paving, roof repairs, corrosion control, demolitions, and general facility maintenance projects. These projects are scheduled annually and have very limited if any impacts to environmental resources. Projects such as renovation of various facilities and launch complexes, and replacement of utilities are common projects that are ongoing on Vandenberg AFB. Future larger projects that are currently projected for the next several years have the greatest potential to result in cumulative impacts. Vandenberg AFB projects contain environmental contract specifications and are individually evaluated for their environmental impacts. Based on the environmental impacts associated with each specific project, environmental protection measures and mitigation requirements are included in the project activities to reduce adverse environmental effects. Thus, individually implemented measures provide cumulative protection reducing overall adverse effects on Vandenberg AFB environmental resources.

Projects for which an EA has been completed, such as the Western Range Command Transmit Site, Landfill Drainage Improvements, SLC-4 to SLC-6 Replacement Waterline, VTRS Fiber Optic Cable Installation on South Base, and Ground-Based Midcourse Defense Initial Defensive Operations Capability, had findings of no significant impact due to the nature of the actions, the protection measures implemented, and/or mitigation measures developed and implemented to reduce their potential environmental impacts to less than significant.

Potential cumulative impacts of the Proposed Action when considered with the past, current and future projects described above, the following cumulative impacts were identified:

Beach Closures

Due to beach closures for several launches on Vandenberg AFB, the Proposed Action would generate cumulative impacts on beaches. Cumulative impacts would only be generated at Ocean Beach County Park and Jalama Beach County Park, the two beaches that may be closed during launches and launch attempts. Beach closures would add to the current yearly average of two closures at Jalama Beach County Park and five closures at Ocean Beach County Park. Closures due to Falcon I launches may also add to current beach closures required during the breeding season for the western snowy plover at Ocean Beach County Park. However, since a maximum of two launches per year are scheduled

for the Falcon I Program, any cumulative impacts on beach access would be less than significant.

Launch Disturbances to Wildlife Species

Repeated noise disturbance on wildlife and heat and fire on the launch pad from all launches may cause cumulative impacts on wildlife to occur and generate a range of behavioral responses in wildlife. Eventually, due to repeated disturbance, wildlife may abandon nests, or relocate from the disturbed areas. Past studies on pinnipeds have shown that some species would not be cumulatively affected by repeated noise disturbances and may acclimate to the noise (Thorson et al. 2000). In addition, because Falcon I launches would be of short duration, infrequent with a maximum of two launches scheduled per year, and have less than significant project-specific impacts on biological resources (as discussed in Section 4.2. of this EA), any cumulative impacts on biological resources would be less than significant. Adding the two launches per year of the Falcon I Program would not cause Vandenberg AFB to exceed the 30 launches per year assumed in the LOA issued by NOAA Fisheries.

Construction

Upcoming projects identified as having the potential to contribute to cumulative impacts located near SLC-4 include those associated with demolition of deactivated Atlas and Titan facilities on Vandenberg AFB, which are presently under evaluation for environmental effects (U.S. Air Force, in progress). Given that the refurbishments associated with the Proposed Action would be minimal with no adverse effects, and that the demolition and abandonment of facilities under the deactivation program would occur over a period of 10 years, also with no resulting adverse effects, no cumulative impacts would occur.

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Chapter 5. Agencies and Persons Consulted

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Chapter 7. Distribution List

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California Native Plant Society, Los Osos, CA

California Regional Water Quality Control Board, Central Coast Region, San Luis Obispo, CA

Environmental Defense Center, Santa Barbara, CA

Federal Aviation Administration, FAA Environmental, 800 Independence Avenue, SW #331, Washington DC 20591

La Purisima Audubon Society, Lompoc, CA

Santa Barbara County Air Pollution Control District, Project Review, Santa Barbara, CA

Santa Barbara Museum of Natural History, Santa Barbara, CA

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University of California, Museum of Systematics & Ecology, Santa Barbara, CA

Lompoc Public Library, Lompoc, CA

Santa Barbara Public Library, Santa Barbara, CA

Santa Maria Public Library, Santa Maria, CA

University of California, Library, Santa Barbara, CA

Vandenberg AFB Library, Vandenberg AFB, CA

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USFWS. 1996. Biological Opinion for the Titan Space Launch Program from Space Launch Complex 4, Vandenberg Air Force Base, California (1-8-96-F/C-29), dated 10 May 1996.

USFWS. 1999. Biological and Conference Opinion for the Atlas Launch Program, Vandenberg Air Force Base, Santa Barbara County, California (1-8-99-F/C-79), dated 15 December 1999.

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APPENDIX A

Biological Opinion for the Titan Program from SLC-4
U.S. Fish and Wildlife Service Concurrence Letter
NOAA Fisheries 2005 Letter of Authorization to 30th Space Wing

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ventura Fish and Wildlife Office
2493 Portola Road, Suite B
Ventura, California 93003

IN REPLY REFER TO:
PAS 1031.1134.4060

August 12, 2005

Beatrice L. Kephart
Acting Chief, Environmental Flight
30 CES/CEV
806 13th Street, Suite 116
Vandenberg Air Force Base, California 93437-5242

Subject: Concurrence Request to Launch Falcon Space Vehicles from Space Launch Complex 4-West (SLC-4W) on Vandenberg Air Force Base, California.

Dear Ms. Kephart:

We have reviewed your letter dated July 26, 2005, and received in our office on July 27, 2005. You requested our concurrence that Falcon space vehicles launched from Space Launch Complex 4-West (SLC-4W) is not likely to adversely affect listed species to an extent or in a manner not already considered in the biological opinion for the Titan launch programs (1-8-96-F/C-29) dated May 10, 1996. The Air Force will ensure that monitoring for Falcon launches is accomplished as described in the Titan biological opinion. Monitoring for the following federally-listed species would occur: beach layia (*Layia carnosa*), California red-legged frog (*Rana aurora draytonii*), brown pelican (*Pelecanus occidentalis*), southwestern willow flycatcher (*Empidonax trailii extimus*), western snowy plover (*Charadrius alexandrinus nivosus*), California least tern (*Sterna antillarum browni*), unarmored threespine stickleback (*Gasterosteus aculeatus williamsonii*), and tidewater goby (*Eucyclogobius newberryi*).

Falcon space vehicles were originally proposed to launch from Space Launch Complex 3-West (SLC-3W). On October 1, 2003, we concurred with the your determination that Falcon launches were not likely to adversely affect federally-listed species in a manner or to an extent not addressed in the biological opinion for the Atlas II launch program (1-8-99-F/C-79).

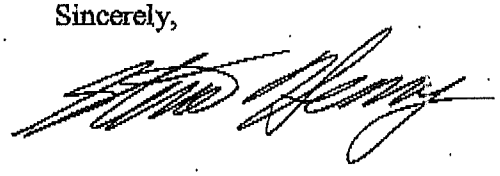
The relocation of the Falcon launch program from SLC-3W to SLC-4W is necessary because Falcon launches at SLC-3W would pose an unacceptable security risk. Constraints that previously precluded use of SLC-4W by the Falcon program no longer apply because the Titan II program is no longer active. Refurbishment of SLC-4W to accommodate Falcon launches would occur on previously developed and disturbed areas. Falcon is much smaller than many other space launch vehicles at Vandenberg, including the Atlas IIAS, Titan II, and Titan IV. Additionally, noise, sonic boom, and exhaust impacts from Falcon launches are expected to be less than that of Titan II and Titan IV launches.

The Falcon program would launch a maximum of three space vehicles per year. The Titan biological opinion addressed the same launch rate plus an additional one to two launches per year of Titan IV vehicles from Space Launch Complex 4-East. The Titan II program has ended and the last Titan IV launch is schedules for late summer or early fall. Therefore, cumulative launch rates are not expected to exceed, and will likely be less than the total number of launches addressed in the Titan biological opinion. No significant impacts have been documented for Titan II or Titan IV. Therefore, Falcon launches from SLC-4W are not expected to result in cumulative impacts to listed species.

The Air Force will ensure that monitoring for Falcon launches is accomplished as described in the Titan biological opinion. In addition, if unanticipated impacts are found during monitoring of Falcon launches, formal consultation would be initiated to ensure impacts not considered in the Titan biological opinion are fully addressed. Therefore, we concur with your determination that the Falcon program is not likely to adversely affect listed species in a manner or to an extent not already considered in the Titan biological opinion.

If you have any questions, please contact Nic Huber of my staff at (805) 644-1766, extension 249.

Sincerely,



Steve Henry
Assistant Field Supervisor
San Luis Obispo/Northern Santa Barbara

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Ecological Services
Ventura Field Office
2493 Portola Road, Suite B
Ventura, California 93003

May 10, 1996

Colonel Louis F. Van Mullem, Jr.
United States Air Force
Chief, Environmental Management
30 SW/ET
806 13th Street, Suite 116
Vandenberg Air Force Base, California 93437-5242

Subject: Biological Opinion for the Titan Space Launch Program from Space Launch Complex 4, Vandenberg Air Force Base, California (1-8-96-F/C-29)

Dear Colonel Van Mullem:

This biological and conference opinion responds to your April 4, 1996 request for formal consultation and conference with the U.S. Fish and Wildlife Service (Service) pursuant to section 7 of the Endangered Species Act of 1973, as amended (Act). At issue are the effects that the Titan Space Launch Program may have on the federally endangered unarmored threespine stickleback (*Gasterosteus aculeatus williamsoni*), tidewater goby (*Eucyclogobius newberryi*), brown pelican (*Pelecanus occidentalis*), California least tern (*Sterna antillarum browni*), American peregrine falcon (*Falco peregrinus anatum*), least Bell's vireo (*Vireo bellii pusillus*), southwestern willow flycatcher (*Empidonax traillii extimus*), bald eagle (*Haliaeetus leucocephalus*), and beach layia (*Layia carnosa*), and the threatened southern sea otter (*Enhydra lutris nereis*) and western snowy plover (*Charadrius alexandrinus nivosus*).

This document also constitutes the Service's conference opinion for the California red-legged frog (*Rana aurora draytonii*), a species proposed for federal listing as endangered. The conference opinion may be adopted as a biological opinion should the California red-legged frog become listed, provided no significant new information is developed and no significant changes to the federal action are made that would alter the content of the opinion. The incidental take statement provided in the conference portion of this opinion relating to the California red-legged frog will not become effective until the Service adopts the opinion once listing is final.

This biological and conference opinion was prepared using information from the following sources: the request for consultation; a biological assessment prepared by Engineering-Science

(1988); Aerospace Report No. TOR-94(4566)-1 (Aerospace 1994); biological opinion 1-6-88-F-53 (Service 1988); informal consultation and conference between our staffs and personnel from Channel Islands National Park; and our files.

Biological and Conference Opinion

It is the opinion of the Service that the proposed project is not likely to jeopardize the continued existence of the unarmored threespine stickleback, tidewater goby, brown pelican, California least tern, American peregrine falcon, least Bell's vireo, southwestern willow flycatcher, bald eagle, beach layia, southern sea otter, western snowy plover, or California red-legged frog. Critical habitat has either not been designated for these species, or lies outside of the area that may be affected by the proposed action.

Description of the Proposed Action

The U.S. Air Force initiated formal section 7 consultation in June, 1988, with regard to modifying Space Launch Complex 4 east and west (SLC-4) and launching Titan II and IV launch vehicles from that location. After issuance of the biological opinion, the tidewater goby, southwestern willow flycatcher, beach layia, and western snowy plover were listed, and the California red-legged frog was proposed for listing as endangered. Six Titan vehicles have been launched since initiation of the Titan Space Launch Program at Vandenberg Air Force Base (Vandenberg). The next Titan launch from SLC-4 is planned for May 1996.

A description of the Titan Space Launch Program and facility modifications at SLC-4 is described in the Engineering-Science (1988) and supplemental information provided to the Service on September 16, 1988. Key project elements of the proposed action described in the documents and the additional information provided with initiation of the formal section 7 process are briefly summarized below.

The Titan II program is designed to use deactivated Intercontinental Ballistic Missiles (ICBM) which were phased out of strategic deterrent service in 1987 as space boosters for small Department of Defense payloads. Thirteen of 56 deactivated ICBMs may be used in support of space missions served by the Titan II program. No more than three launches per year are planned.

The Titan IV program is a continuation of the existing launch program at Vandenberg using modified and upgraded Titan 34D missiles or Complementary Expendable Launch Vehicles. The Titan 34D has been launched from SLC-4 six times between 1983 and 1986, with the most recent launch being in December of 1995. An attempted launch in April 1986 resulted in extensive damage to facilities and surrounding vegetation when the vehicle exploded approximately 800 feet above SLC-4.

Salient features of the Titan launch program include monitoring of listed species with a commitment to mitigate identified adverse effects in coordination with the Service (Service 1988).

Monitoring shall include the additional species listed or proposed since 1988. The U.S. Air Force has committed to the following measures regarding monitoring as part of the updated Titan launch program:

- Sample populations of western snowy plovers will be observed before, during, and after the launch. Primary focus shall be with breeding birds located at Vandenberg.

- American peregrine falcons shall be monitored at nest sites on Vandenberg and San Miguel Island. Pre- and post-launch monitoring shall be conducted at Vandenberg with observations during the launch being conducted at the Hoffman Point eyrie on San Miguel Island. The Hoffman Point falcons shall be observed up to 48 hours following the launch to assess effects from sonic booms.

- Monitoring of California least terns shall be conducted before, during, and following Titan launches. Priority shall be with California least terns nesting at the Santa Ynez River; otherwise the Purisima Point colony shall be monitored.

- Pre- and post-launch monitoring of beach layia shall be conducted for stippling of leaves, necrotic lesions, and for general plant vigor. California croton (*Croton californicus*) and coastal buckwheat (*Eriogonum parvifolium*) shall be monitored in close proximity to SLC-4 and the beach layia population to aid in assessment of impacts to beach layia from exhaust products.

- Exhaust plume monitoring, using strips of pH paper, shall be employed to assess acid cloud effects to beach layia. If monitoring detects changes in pH, direct monitoring of soil pH and buffering capacity shall be conducted during future launches.

- Water quality monitoring shall be conducted in Canada Honda Creek to determine if exhaust products could adversely affect listed fish species or the proposed California red-legged frog.

- If adverse impacts occur, appropriate mitigation measures shall be developed in consultation with the Service. Emphasis will be on direct benefits to the species affected by launches, in proportion to impacts documented from past launches and reasonably foreseeable future launches. If no impacts are observed, the need for further monitoring shall be evaluated in consultation with the Service.

- Monitoring reports shall be provided to the Service withing 60 days following the launch, unless otherwise notified.

Effects of the Proposed Action on Listed Species

Species Accounts

Unarmored Threespine Stickleback

The unarmored threespine stickleback was federally listed as endangered in 1970 (35 *Federal Register* [*FR*] 16047). A recovery plan for this subspecies was prepared in 1977 and revised in 1985 (Service 1985). This recovery plan describes the biology, reasons for decline, and the actions needed for recovery of the unarmored threespine stickleback. Critical habitat for the unarmored threespine stickleback was proposed in 1980; however, designation of critical habitat remains pending (45 *FR* 76012).

The unarmored threespine stickleback is a small stream and river dwelling fish that was historically distributed throughout southern California. Unarmored threespine stickleback adults are believed to live for only one year. Reproduction requires construction of a nest in areas with adequate aquatic vegetation and a gentle flow of water. Habitat requirements for this subspecies are generally defined as including slow flowing water, moderate and faster flowing water with appropriate refugia, and standing water with some inflow; all of the above requirements must be coupled with dense and abundant vegetation.

Unarmored threespine sticklebacks are now restricted to the Santa Clara River in Los Angeles and Ventura Counties, San Francisquito Creek in Los Angeles County, San Antonio Creek on north Vandenberg, and Canada Honda Creek on south Vandenberg. The Canada Honda Creek population is a transplanted population, as is a small population that may persist in San Felipe Creek in San Diego County. Unarmored threespine sticklebacks have been extirpated elsewhere throughout their historical range.

Factors leading to the decline of the unarmored threespine stickleback include habitat destruction as a result of channelization and ground water pumping, and introgressive breeding with other subspecies of threespine stickleback that have been introduced into this subspecies' habitat.

Tidewater Goby

The tidewater goby was federally listed as endangered in February, 1994 (59 *FR* 5494). Critical habitat for the tidewater goby is pending economic analysis of such a designation, as required by 16 U.S.C. 1533(b)(2). A recovery plan for the tidewater goby has not been developed as of the issuance of this biological opinion.

The tidewater goby occurs in tidal streams associated with coastal wetlands in California. Since 1900, the tidewater goby has disappeared from nearly 50 percent of the coastal lagoons within its historic range, including 74 percent of the lagoons south of Morro Bay in central California. Approximately six populations currently exist south of Ventura County. The range of the tidewater goby is from Tillas Slough (mouth of the Smith River) in Del Norte County, south to

Agua Hedionda Lagoon in San Diego County. Approximately 10 percent of the coastal lagoons containing populations of tidewater gobies are under federal management. Over 40 percent of the areas supporting remaining populations are either entirely or partly owned and managed by the State of California, with the remainder being privately owned.

Tidewater gobies rarely exceed 2 inches standard length, and are taxonomically placed in the family Gobiidae. They are characterized by large pectoral fins and a ventral sucker-like disk formed by the complete fusion of the pelvic fins. The tidewater goby was first described from specimens collected in the San Francisco Bay Area, and is the only member of the genus *Eucyclogobius*.

Tidewater gobies occur in loose aggregations of a few to several hundred individuals on the substrate in shallow water less than 3 feet deep, although they have been observed at depths of 4.9 to 7.6 feet. Peak nesting activities commence in late April through early May, when male tidewater gobies dig a vertical nesting burrow 4 to 8 inches deep in clean, course sand. Suitable water temperatures for nesting are 75.6 to 79.6°F with salinities of 5 to 10 parts per thousand. Larval tidewater gobies are found midwater around vegetation until they become benthic. The tidewater goby does not have a marine stage to its life history, which restricts the frequency of genetic exchange between coastal lagoon populations and significantly lowers the potential for natural recolonization of a locality once extirpated.

Factors affecting the tidewater goby and contributing to its listing as an endangered species include: development of coastal marsh and riparian habitat, upstream water diversions that alter downstream flows, drought, groundwater overdrafting, agricultural and sewage discharge, and livestock and feral pig activity that removes riparian vegetation and contributes towards sedimentation. Some predation of tidewater gobies by rainbow trout (*Oncorhynchus mykiss*) has been noted. Predation by non-native species such as crayfish (*Cambarus* spp.), mosquitofish (*Gambusia* spp.), green sunfish (*Lepomis cyanellus*), and largemouth bass (*Micropterous salmoides*) has also contributed to the tidewater goby's decline.

Tidewater gobies are known to occur within Vandenberg's jurisdiction in Canada Honda and San Antonio Creeks. Tidewater gobies have been found in the Santa Ynez River from the estuary upstream to the Floradale bridge near the Bureau of Prisons' Federal Penitentiary.

Southwestern Willow Flycatcher

The southwestern willow flycatcher was federally listed as endangered on February 27, 1995; a recovery plan has not been prepared. The final rule describes the biology and reasons for the decline of the southwestern willow flycatcher (60 *FR* 10694).

The southwestern willow flycatcher, which is approximately 5.75 inches long, occurs in riparian habitats along rivers, streams, or other wetlands, where dense growths of willows (*Salix* spp.), *Baccharis*, arrowweed (*Pluchea* sp.), buttonbush (*Cephalanthus* sp.), tamarisk (*Tamarix* sp.), Russian olive (*Eleagnus* sp.) or other plants are present, often with a scattered overstory of

cottonwood (*Populus* sp.). The southwestern willow flycatcher is present and singing on breeding territories by mid-May, although its presence and status are often confused by the migrating individuals of northern subspecies passing through *E. t. extimus* breeding habitat. The southwestern willow flycatcher builds nests and lays eggs in late May and early June and fledges young in early to mid-July. Some variation in these dates has been observed and may be related to altitude, latitude, and re-nesting.

The breeding range of the southwestern willow flycatcher includes Arizona, New Mexico, the southern portions of California, Nevada, Utah, western Texas, southwestern Colorado, and extreme northwestern Mexico. Loss and modification of riparian habitats and brood parasitism by brown-headed cowbirds (*Molothrus ater*) threaten the existence of the southwestern willow flycatcher.

Southwestern willow flycatchers were found during the 1995 breeding season along portions of the Santa Ynez River near the 13th Street bridge and the Miguelito Channel at the 35th Street bridge site, and have been recorded nesting at the latter site (Holmgren and Collins 1995).

American Peregrine Falcon

The American peregrine falcon was federally listed as endangered in 1970. A recovery plan was prepared by the Pacific Coast American Peregrine Falcon Recovery Team in 1982. This recovery plan describes the biology, reasons for decline, and the actions needed for recovery of peregrine falcons in California, Nevada, Oregon, and Washington (Service 1982).

The American peregrine falcon is the subspecies of peregrine falcon that historically nested from the North American boreal forest south into Mexico. The peregrine falcon is a crow-sized raptor that feeds mostly on birds, is also known to prey on bats, and typically attacks its prey in the air. Peregrine falcons are monogamous and pair bonds persist for the life of either bird. After the loss of a mate, the surviving bird typically remates. In a natural setting, peregrine falcons nest almost exclusively on cliff ledges that are associated with suitable foraging areas. American peregrine falcons have also been observed nesting on man made structures in heavily urbanized areas. Peregrine falcons exhibit nest site fidelity; however, new nest locations are often established if a bird remates.

Prior to World War II, an expanding human population contributed to a gradual decline in this subspecies within the United States. Following World War II, the widespread use of chlorinated hydrocarbon based pesticides, such as DDT, accelerated the American peregrine falcon's decline. Conservative estimates place the pre-World War II American peregrine falcon breeding population in California at 100 pairs. By the mid 1970s, only about 10 breeding pairs were known in California (California Department of Fish and Game 1990). Restrictions on the use of DDT and intensive intervention to augment natural reproduction have restored peregrines in many parts of their historical range, including some areas of California.

Information regarding recent American peregrine falcon reproduction on Vandenberg has been

collected by the Santa Cruz Predatory Bird Research Group and is summarized in a memo from Nancy Read, Vandenberg's Wildlife Biologist (Read 1993). Historical nesting sites on Vandenberg and in the immediate vicinity include Point Arguello, Jalama Beach, and Point Conception. In 1992, a pair of American peregrine falcons nesting at Rocky Point on south Vandenberg produced one fledgling. The male of the pair was identified as a captive-bred bird fledged, or "hacked", in Santa Cruz, California. In 1993 the male was observed with a sub-adult female in the vicinity of Rocky Point. In 1994, this pair established an active eyrie at Point Arguello. Nesting at the same location occurred in 1995, and has been initiated in 1996. An active hacking program in the Sudden Flats area south of Point Arguello has fledged up to 10 falcons. American peregrine falcons have also been active at eyries on San Miguel Island for at least the past three years.

Brown Pelican

The brown pelican was federally listed as endangered in 1970. The recovery plan describes the biology, reasons for decline, and the actions needed for recovery of the California brown pelican (Service 1983).

The brown pelican is a large bird recognized by the long, pouched bill that is used to catch surface schooling fishes. Brown pelicans nest in colonies on small coastal islands that are free of mammalian predators and human disturbance, and are associated with an adequate and consistent food supply. Nesting colonies range from the Channel Islands in the Southern California Bight to the islands off Nayarit, Mexico. Prior to 1959, intermittent nesting was observed as far north as Point Lobos in Monterey County, California. Dispersal between breeding seasons ranges from British Columbia, Canada, to southern Mexico and possibly to Central America. During the non-breeding season brown pelicans roost communally, generally in areas that are near adequate food supplies, have some type of physical barrier to predation and disturbance, and provide some protection from environmental stresses such as wind and high surf.

Brown pelicans experienced widespread reproductive failures in the 1960s and early 1970s. Much of the failure was attributed to eggshell thinning caused by high concentrations of DDE, a metabolite of DDT. Other factors implicated in the decline of this subspecies include human disturbance at nesting colonies and food shortages. Brown pelicans have not nested north of the Channel Islands since the subspecies' decline in the late 1950s and early 1960s; currently brown pelicans do not nest on or in the vicinity of Vandenberg. Brown pelicans are known to roost at a variety of locations along Vandenberg's coastline. Three of these areas are considered to be important roost locations (Jaques and Anderson 1987). These areas are Point Sal/Lion Rock, Purisima Point, and Point Arguello. Studies conducted at Vandenberg indicate that for the time period of January 1995 through December 1995, brown pelican use of Point Arguello, Rocky Point, and Point Pedernales was consistent with previous use described by Jaques and Anderson (1987).

California Least Tern

The California least tern was federally listed as endangered in 1970. Details of the life history, biology, and reasons for decline of the California least tern are contained in the recovery plan (Service 1980a) and are mentioned briefly here. The California least tern is one of 12 recognized subspecies of the least tern, 3 of which inhabit the United States. The breeding range of this subspecies is described as extending along the Pacific Coast from San Francisco Bay, California, to Bahia de San Quintin, Baja California, Mexico. The California least tern is a migratory species which arrives in California by late April to breed and departs to unknown southerly locations by August. It nests on coastal, sandy, open areas, usually around bays, estuaries, and creek and river mouths. Nests are simply scrapes or depressions in the sand that the birds often adorn with small fragments of shell or pebbles. During the average 21-day incubation period, the nest is tended continually. Both adults of a mated pair take turns tending the nest. The adults tend the flightless but quite mobile chicks for approximately three weeks after hatching. After fledging, the young terns do not become fully proficient at capturing fish until after they migrate from the breeding grounds. Adults and fledglings usually leave the breeding colony within about ten days of fledging.

California least terns were once common along the central and southern California coast. The precipitous decline of the California least tern is attributed to prolonged and widespread destruction and degradation of nesting and foraging habitats, and increasing human disturbance to breeding colonies. Conflicting uses of southern and central California beaches during the California least tern nesting season have led to isolated colony sites that are extremely vulnerable to predation from native, feral and exotic species, overwash by high tides, and vandalism and harassment by beach users. Since its classification as a federal and state endangered species, considerable effort has been expended on annual population surveys, protection and enhancement of existing nesting colonies, and the establishment of new nesting locations. Control of predators constitutes one of the most crucial management responsibilities at California least tern nesting sites.

The nesting colonies in Santa Barbara and San Luis Obispo counties are a relatively small portion of the total state-wide population. However, they represent the only currently active breeding areas between Ventura County and San Francisco Bay. Monitoring efforts on Vandenberg have identified a main California least tern nesting colony being consistently located at Purisima Point, with satellite colonies appearing at Beach 2, San Antonio Creek, or the Santa Ynez River. The latter three colonies tend to vary from year to year in the number of nest attempts, and often are not used at all. Predation from coyotes (*Canis latrans*) is believed to be one of the limiting factors affecting reproductive success (Animal Damage Control 1995).

Bald Eagle

The bald eagle was federally listed as endangered on February 14, 1978 in all of the coterminous United States except Minnesota, Wisconsin, Michigan, Oregon, and Washington, where it was classified as threatened. On August 15, 1995, the bald eagle was down-listed to threatened

throughout its range. Critical habitat has not been designated for the bald eagle. The recovery plan for the Pacific population of the bald eagle describes the biology, reasons for decline, and the actions needed for recovery (Service 1986).

The bald eagle is the only North American representative of the fish or sea eagles, and is endemic to North America. The breeding range of bald eagles formerly included most of the continent, but they now nest mainly in Alaska, Canada, the Pacific Northwest states, the Great Lake states, Florida, and Chesapeake Bay. The winter range includes most of the breeding range, but extends primarily from southern Alaska and southern Canada, southward. Small numbers of bald eagles (3-12) regularly overwinter at Lake Cachuma, in Santa Barbara County. Wintering bald eagles at Lake Cachuma are mostly immature birds that arrive as early as October, and can stay as long as early May. During the winter spanning 1993-1994, an immature bald eagle overwintered at the Santa Ynez River estuary on Vandenberg. Single nests have been documented or suspected on the north side of Lake Cachuma from 1989 to 1994 (Lehman 1994).

Habitat loss is the greatest threat to bald eagle recovery. Urban and recreational development, logging, mineral exploration and extraction, and other forms of human activities are adversely affecting the suitability of breeding, wintering, and foraging areas. Shooting continues to be the most frequently recorded single cause of bald eagle mortality, though the rate appears to be declining. Evidence indicates that bald eagle reproduction throughout the species' range has improved since registration of DDT and other organochlorine pesticides in the early 1970s. Some evidence indicates that predator control programs are having an impact on bald eagle mortality. Injuries and mortalities have occurred to bald eagles as a result of accidental trapping and use of poisoned baits. Although electrocutions of raptors has decreased, electrocutions may continue to be an issue for bald eagles on transmission lines that do not meet suggested standards for raptor protection. In areas where bald eagles congregate, collisions with transmission lines may cause more injuries and mortalities that electrocutions.

Least Bell's Vireo

The least Bell's vireo was federally listed as endangered on May 2, 1986 (*51 FR 16474*), with critical habitat being formally designated on February 2, 1994 (*59 FR 4845*). The biology and reasons for the least Bell's vireo's decline are described in the final listing rule, and are briefly summarized below.

The least Bell's vireo is a small, olive-grey migratory songbird that nests and forages primarily in riparian woodland habitats, is almost exclusively insectivorous, and is highly territorial. Typical nesting habitat consists of an understory of dense subshrub or shrub thickets dominated by sandbar willow (*Salix hindsiana*), mule fat (*Baccharis salicifolia*), and saplings of other willow species (*Salix* spp.). Important overstory species include mature arroyo willow (*S. lasiolepis*) and black willow (*S. gooddingii*), occasional cottonwoods (*Populus* spp.), and western sycamore (*Platanus racemosa*). Coast live oak (*Quercus agrifolia*) can be a locally important overstory component, as can mesquite (*Prosopis* spp.). Least Bell's vireos generally arrive on their

breeding grounds by mid to late-March, and depart by late September. Few least Bell's vireos overwinter in California.

Historically least Bell's vireos wintered in Mexico, and ranged as far north Tehama County, California. The current breeding distribution is restricted to a few localities in southern California and northwestern Baja California. Generally least Bell's vireos occupy home ranges that range in size from 0.5 to 4.5 acres, although a few may be as large as 10 acres. Widespread habitat losses have fragmented most remaining populations of least Bell's vireos into small, disjunct, widely dispersed subpopulations. Remaining populations are concentrated in San Diego, Santa Barbara and Riverside counties.

Declines in least Bell's vireo populations has been attributed, in part, to the combined, perhaps synergistic effects of the widespread loss of riparian habitats and brood-parasitism by the brown-headed cowbird (*Molothrus ater*).

Least Bell's vireos have been observed in Barka Slough on north Vandenberg, and were suspected to nest there (Service 1980b). Lehman (1994) reports one least Bell's vireo singing along the Santa Ynez River west of Lompoc May 16-June 16, 1991. This vireo was west of previous records, but was believed to be on territory. Holmgren (pers. comm.) put this record just upstream of the 13th Street bridge on the opposite bank adjacent to Vandenberg's boundary.

Beach Layia

Beach layia was federally listed as endangered on June 22, 1992 (*57 FR 27848*). A recovery plan has not yet been prepared. Critical habitat was not designated at the time of listing. The final rule listing beach layia as endangered describes the biology and reasons for decline.

Beach layia is a member of the sunflower family (Asteraceae), and is a low (5.9 inches), glandular, succulent annual. Highly branched individuals often spread more than 15.7 inches in diameter. The northernmost occurrences of beach layia are in the Humboldt Bay dune system, Humboldt County. The southernmost population of beach layia is the occurrence on South Vandenberg, south of Surf in Santa Barbara County, within 2500 feet of SLC-4.

Beach layia is restricted to the coastal foredunes, coastal dune scrub communities, and adjacent sandy habitats occupied by coastal scrub or coastal prairies of the coastal dunes of northern and central California. Imminent threats facing beach layia and its associated habitats are the ongoing destruction and adverse modification of dune systems by commercial and residential development, off-road vehicle use, trampling by hikers and equestrians, sand mining, and disposal of dredged material from adjacent bays and waterways. European beachgrass (*Ammophila arenaria*) and other exotic vegetation threaten beach layia by occupying its habitat and by becoming a geomorphic agent that builds continuous wall-like foredunes which were not previously characteristic within its range.

Western Snowy Plover

The Pacific coast population of the western snowy plover was federally listed as threatened on March 5, 1993; a recovery plan has not been prepared. The final listing rule describes the biology and reasons for the decline of the western snowy plover (*58 FR 12864*).

The western snowy plover is a small shorebird that forages on invertebrates in areas such as intertidal zones, the wrack line, dry sandy areas above the high tide line, salt pans, and the edges of salt marshes. The Pacific coast population nests near tidal waters along the mainland coast and on offshore islands from southern Washington to southern Baja California, Mexico. Most nesting occurs on unvegetated, or moderately vegetated, dune backed beaches, and on sand spits. Other less common nesting habitats include salt pans, dredge spoils, and salt pond levees. Nest site fidelity is common. Nesting and chick rearing activity generally occurs between March 1 and September 30. During the non-breeding season western snowy plovers may remain at breeding sites or may migrate to other locations. Most winter south of Bodega Bay, California. Many birds from the interior population winter on the central and southern coast of California. Western snowy plover wintering and nesting habitat nearest to SLC-4 is located on the south end of Surf Beach, approximately 2500 feet away from the launch site.

The Pacific coast population of the western snowy plover has experienced widespread loss of nesting habitat and reduced reproductive success at many nesting locations. Factors resulting in loss of nesting habitat include urban development and the encroachment of European beachgrass. Reduced reproductive success is most frequently tied to disturbance from human activities. Activities such as walking, jogging, running pets, horseback riding, and off-road vehicle use frequently crush and destroy the western snowy plover's cryptic nests and chicks. These activities also flush adults off nests and away from chicks, and thus interfere with essential incubation and chick rearing behaviors.

A description of the species' biology and detailed information regarding western snowy plover nesting activity on Vandenberg's beaches during the 1995 nesting season is contained in Persons (1995) and Page and Persons (1995). Vandenberg provides important nesting and wintering habitat for western snowy plovers on 12.4 miles of beach and dune habitat. The breeding population has been estimated at 200 to 225 individuals and 258 western snowy plover nests on Vandenberg's beaches during the 1994 nesting season (Persons 1994), with approximately 251 breeding individuals and 223 nests in 1995 (Persons 1995). A coalition of researchers in 1995 counted 974 adult western snowy plovers at the middle of the breeding season in California coastal areas. The highest regional total was at Vandenberg, which has consistently supported one of the largest concentrations of breeding western snowy plovers along the west coast of the United States (Page and Persons 1995). The combined clutch hatching rate for 1994 and 1995 at Vandenberg was 36.6%, a value at the low end of the central cluster of hatching rates from other locations (Page and Persons 1995). Factors observed to affect the nesting success of western snowy plovers on Vandenberg's beaches include weather, predation, and disturbance and nest destruction as a result of human activities (Fahy and Woodhouse 1995). These factors are also presumed to affect fledgling success at Vandenberg. Winter censuses have counted up to 397

western snowy plovers on Vandenberg's beaches. Observations of individuals, identifiable by color bands, at specific times of year indicate that Vandenberg is used in the winter by western snowy plovers that breed elsewhere.

Southern Sea Otter

The southern sea otter was federally listed as threatened in January of 1977. The original recovery plan was issued in 1982, and was revised in 1991. Critical habitat has not been designated. A relocation program was established to manage southern sea otters, allowing for their removal from the region south of Point Conception (34°26.9' north latitude). The biology of and threats to the southern sea otter are presented in the recovery plan and are summarized below.

Historically, southern sea otters ranged from Oregon, south to Baja California, Mexico. Southern sea otters currently inhabit the area from Ana Nuevo, Santa Cruz County south to Purisima Point, Santa Barbara County. Their occurrence south of the Santa Ynez River is believed to be limited primarily to roaming, non-breeding males. Purisima Point, on north Vandenberg, is the southern most breeding colony of the listed southern sea otter along the mainland coast. A small breeding colony occurs at San Nicolas Island, Ventura County.

Southern sea otters occupy hard and soft sediment habitats from the littoral zone to depths of about 164-328 feet, in protected bays to exposed outer coasts. Most individuals occur between shore and the 65 foot depth contour. Southern sea otters prefer unpolluted waters free from human disturbances containing sufficiently abundant prey to fulfill their energy requirements.

During the 1970s to the mid 1980s, a decline in the southern sea otter population was attributed primarily to entanglement in fishing gear, resulting in mortality. In this century, the population of southern sea otters has never increased at the species' maximum potential of about 20 percent per year. The depressed growth of the California southern sea otter population is largely due to mortality as opposed to reproductive depression or emigration. The cause or causes of the mortality are unclear. Threats to the California population of southern sea otter include habitat degradation from oil spills and other environmental contaminants, shooting, entanglement in fishing gear, and prey depletion by human exploitation.

California Red-legged Frog

The Service published a proposed rule to list the California red-legged frog as endangered on February 2, 1994 (*59 FR 4888*). The biology and threats to California red-legged frogs are described in the Service's proposed rule and are summarized here.

The California red-legged frog is found primarily in wetlands and streams in coastal watersheds of central California. California red-legged frogs have been extirpated from approximately 75 percent of the former range, and are threatened throughout the remaining range by a wide variety of human impacts including urban encroachment, construction of reservoirs and water diversions,

introduction of exotic predators and competitors, and stochastic events. The historical range extended from the vicinity of Point Reyes National Seashore, Marin County, California, coastally and from the vicinity of Redding, Shasta County, California, inland southward to northwestern Baja California, Mexico.

Females typically deposit egg masses on vertical emergent vegetation so that the egg mass floats on the surface of the water. Egg masses contain approximately 2,000 to 5,000 eggs which hatch in 6 to 14 days. California red-legged frogs breed from November to March with earlier breeding records occurring in southern localities. California red-legged frogs found in coastal watersheds are rarely inactive, whereas interior populations may hibernate.

Habitat loss and alteration, combined with overexploitation and introduction of exotic predators, were significant factors in the California red-legged frog decline in the early to mid 1900s. Habitat loss and degradation continue to threaten California red-legged frogs where agriculture and urbanization are found within their range, especially in southern California where much of the remaining habitat is fragmented. Road maintenance projects, off-road vehicle use, and livestock grazing contribute to erosion of stream banks and siltation of streams where California red-legged frog eggs can be smothered. Siltation that occurs during the breeding season can lead to asphyxiation of eggs resulting in small larvae. Exotic predators like the bullfrog (*Rana catesbeiana*), catfish (*Ictalurus* spp.), bass (*Micropterus* spp.), mosquitofish, red swamp crayfish (*Procambarus clarkii*), and signal crayfish (*Pacifastacus leniusculus*) were introduced into California red-legged frog habitat in the 1800s to 1900s, and prey on at least one stage of its development. The most significant mortality factor in the pre-hatching stage is water salinity. On the central California coast, drought may also play a role in decreased reproduction where frogs occur in coastal lagoons. High lagoon salinities in many instances can be attributed to drought.

California red-legged frogs are found in the majority of Vandenberg's wetlands and watersheds, including many vernal pools. California red-legged frogs were not present in Bear Creek during a 1995 survey; however, they were located in the Miguelito Channel along Highway 246, the Santa Ynez River, and Honda Creek (Christopher, pers. comm.).

Analysis of Effects

Biological opinion 1-6-88-F-53 addressed potential effects of facility construction and operation relative to the Titan II and IV programs at SLC-4 relative to the brown pelican, California least tern, bald eagle, American peregrine falcon, least Bell's vireo, unarmored threespine stickleback, and southern sea otter. At the time of the opinion, the potential impacts to threatened and endangered species from cumulative launch programs were unknown. Consequently, monitoring programs were to be developed and implemented as specified by the terms and conditions to assess the effects of noise, light, and exhaust plumes on the species at question. Monitoring programs were not generated or executed. Therefore, an informed assessment of the effects of individual launches and cumulative impacts of the Titan II and IV programs has not been conducted. Some pertinent data have been gathered from other launch programs, acoustical monitoring, and ongoing water quality monitoring; however, data gaps remain.

Launch Noise, Sonic Booms, and Helicopter Overflights

Launch noise and helicopter security overflights are expected to alter southern sea otter behavior and the behavior of listed avian species from Lompoc landing to the boathouse, most likely to a limited degree. Sonic booms produced by the flight of launch vehicles over San Miguel Island may also negatively affect American peregrine falcons, brown pelicans and western snowy plovers. Although none of these sources of impacts are new for Vandenberg projects, a focused sonic boom over San Miguel, Santa Rosa, and Anacapa Islands is more likely as a result of the Titan program because of the low angle of launch trajectories.

Launch noise, noise from helicopter security overflights, or noise caused by explosion of a launch vehicle may affect animals by:

1. causing hearing damage or impairment;
2. triggering a startle response which can:
   a. alter predator/prey interactions by alerting predators to prey locations or by leaving eggs or young temporarily vulnerable to predators;
   b. cause damage to the animal, its eggs, or its young;
3. masking biologically significant sounds such as predators;
4. provoking temporary or permanent emigration;
5. affecting growth and resistance to disease;
6. reducing energetic efficiency;
7. causing mortality; and
8. inducing reproductive failures.

Several studies have been conducted to determine the responses of selected wildlife species to anthropogenic noise. For example, startle responses in marine birds and marine mammals have been found to occur at sound levels as low as 80 to 90 decibels (dB) (Bowles and Stewart 1980). However, the sound level thresholds at which the above effects can be expected to occur for any given species are not well defined.

Table 2 in Aerospace Report No. TOR-94(4566)-1 gives A-weighted and unweighted maximum overall sound pressure levels and sound exposure levels recorded for an August 1993 Titan IV launch (Aerospace Corporation 1994). These data indicate that at Point Arguello, which is approximately 4 miles from SLC-4, noise levels will reach about 133 dB or 109 dBA. This table also reports sound levels at the south end of Surf Beach, which is about 1 to 1.25 miles from SLC-4, at around 142.3 dB or 121.9 dBA. The southwestern willow flycatcher nest site at the Miguelito Channel is approximately the same distance from SLC-4 as one of the acoustic monitoring stations (site 6) is from SLC-4. Therefore, estimated sound levels at the southwestern willow flycatcher nest site are not expected to exceed 133 dB or 109 dBA. Estimated sound levels from SLC-4 presented during the initial formal consultation were 119 dBA at 1.8 miles, 113 dBA at 3.4 miles, 110 dBA at 5.2 miles, 104 dBA at 6.8 miles, and 100 dBA at 11.4 miles.

Engineering-Science (1988) and Service (1988) adequately assess potential effects of launch noise, focused sonic booms, and accidental or triggered explosions of launch vehicles on brown pelicans, California least terns, bald eagles, American peregrine falcons, least Bell's vireos, unarmored threespine sticklebacks, and southern sea otters. The effects of the Titan launch program, including helicopter overflights, on tidewater gobies are expected to be the same as for as unarmored threespine sticklebacks. Sound is expected to be attenuated by water in Canada Honda and San Antonio Creeks, and the Santa Ynez River, reducing the likelihood that tidewater gobies, unarmored threespine sticklebacks, and California red-legged frogs would experience any physiological damage. If California red-legged frogs are out of the water during the launch, they are expected to dive into the nearest available water where sound would be attenuated. California red-legged frogs not able to reach water throughout the duration of the launch may have their hearing affected, either temporarily or permanently, depending on distance from the launch pad. Because most suitable habitat is located away from the launch site, few California red-legged frogs are expected to experience long-term hearing loss or damage. Similarly, western snowy plover and southwestern willow flycatcher habitats are far enough away from SLC-4 that it is unlikely that either species would experience permanent hearing loss from launch noise.

The occurrence of a focused sonic boom over the Channel Islands is partially dependant on launch azimuth, weather conditions, and vehicle altitude and speed. The U.S. Air Force anticipates that the May 1996 Titan IV launch from SLC-4 presents one of the foremost opportunities for a focused sonic boom to occur over the Channel Islands. Theoretical calculations suggest that focused booms may reach 154 dB in a narrow band over the Channel Islands (Engineering-Science 1988). Chappell (1980 in Engineering-Science 1988) estimated the threshold for auditory damage to animals from exposures to single sonic booms lies in the range of 138 dB to 169 dB, depending on the rise-time and species sensitivity, with rise-time being the length of time required for a sound to reach its maximum level.

Startle responses are adequately discussed in Engineering-Science (1988) and Service (1988). Additionally, limited observations of western snowy plovers indicates that they may not flush as part of their response to visual or auditory stimulus. Instead, western snowy plovers appear to depend on cryptic coloration for concealment, and therefore do not flush at noises that would otherwise be expected to result in flushing. Loafing western snowy plovers observed by the Service during low level jet overflights where sound levels were measured up to 95 dB did not visibly respond or exhibit any adverse effects. Data obtained during the launch of a Lockheed Launch Vehicle from SLC-6 at Vandenberg also support other observations that western snowy plovers crouch and observe objects, such as helicopters or launch vehicles that "mimic" avian predators (Lockheed Environmental Systems and Technologies 1995). Four nesting western snowy plovers were observed at Purisima Point, Vandenberg, during an April 1996 Delta launch. All of the observed birds returned to their nests following the launch. Information gathered by observations of the Delta launch did not include whether the western snowy plovers flushed due to the launch, how much time was spent away from the nest, whether the nest was predated during the adult's absence, and whether exposure or exhaust deposition may affect hatching success (Persons. pers. comm.).

Adverse effects are not expected to be greater than those attributed to ongoing recreational use which likely disturbs nesting and wintering western snowy plovers at a frequency in excess of the Titan launch rate. However, the Service is unaware of any studies documenting the physiological effects of noise-related impacts on nesting or wintering western snowy plovers.

Southwestern willow flycatchers are expected to respond in a manner similar to least Bell's vireos and other riparian nesting songbirds. Engineering-Science (1988) and Service (1988) adequately assess the potential effects of launch noise on the least Bell's vireo and thus on the southwestern willow flycatcher.

The Service is unaware of published reports of the effects on diurnal species of anthropogenic noise that is generated at night, such as would occur during a night launch. However, California least terns disturbed by nocturnal predators have been known to readily abandon nesting colonies. Therefore, conducting launches during daylight hours during nesting seasons may reduce the level of effect on listed avian species.

Launch Emissions

The primary constituents of launch emissions are carbon monoxide, hydrogen chloride, aluminum oxide, and nitrogen oxide. Carbon monoxide will oxidize into carbon dioxide and would be harmless as it dissipates into the atmosphere. Hydrochloric acid deposition can change the pH of surface waters causing gill damage and other deleterious effects to listed fish and proposed amphibians. Cumulatively, hydrochloric acid deposition can influence soil pH and plant vigor which, in turn, could harm the population of beach layia. The effects of aluminum chloride are unknown. Data from Titan solid rocket motor test firings show that measured ground-level exposures of aluminum oxide were considerably lower than predicted concentrations. Although the exposure exceeds the time-weighted threshold limit value for nuisance dust, it is not expected to exceed the maximum allowable excursion limit of this standard because it is a short-term occurrence (Engineering-Science 1988).

The ability to flush, the sheltered nature of eyries, and the distances to nesting areas, among other factors, make it unlikely that the listed avian species will be affected by launch emissions. To date, southern sea otters are not known to have been affected by launch emissions.

Canada Honda Creek is approximately 2.25 miles south of SLC-4. Because prevailing winds at Vandenberg are from the north and northwest, most Titan launches will be upwind. However, due to the distance from SLC-4, launch emissions are not likely to reach Canada Honda Creek. If winds do cause exhaust emissions to reach Canada Honda Creek, the cloud is expected to be mostly dispersed and therefore would have low concentrations of potentially hazardous emissions. The Santa Ynez River is approximately five miles from SLC-4. Even slight changes in the pH of Canada Honda Creek would comprise degradation of unarmored threespine stickleback and tidewater goby habitat; however, the buffering capacity of the creek and river waters is expected to dampen any pH changes associated with Titan launch emissions. Additionally, emissions are not expected to reach the Santa Ynez River because of distance and prevailing wind direction.

Launch Vehicle Failure

In the unlikely event that a launch vehicle explodes, wildlife responses to noise are expected to be the same as for a normal launch since launch noise would precede the explosion. As noted previously in this opinion, the responses of listed species to noise generated by the launch would depend on the individual's proximity to the source and other factors.

The occurrence of fire or the explosion of a Titan launch vehicle could result in loss of some vegetation and wildlife in the SLC-4 area. Engineering-Science (1988) addresses expected results of early termination of a Titan launch vehicle. Listed avian species are expected to flush should smoke or fire threaten their location; however, nests with chicks or eggs may be destroyed by fire or be abandoned by attending adults. Beach layia could be affected by fire, though the main population is on the west side of Coast Road opposite of SLC-4, which would serve as a fire line should a fire or explosion occur at SLC-4. In addition, the beach layia population is located upwind from SLC-4 if prevailing winds are active at the time of the fire event. Aquatic species may be adversely affected if riparian vegetation is removed as a result of fire. Temporary warming of Canada Honda Creek and the Santa Ynez River may result with the loss of shade provided by willows and riparian vegetation, albeit th region's generally cool temperatures and the rapid regeneration capacity of willows and associated riparian vegetation would cause these effects to be short-lived. The effects of chemical emissions should not differ significantly from those associated with a normal launch; most fuel would be consumed during the explosion of a launch vehicle.

The Service believes that the impacts described above are not likely to jeopardize the continued existence of the American peregrine falcon, brown pelican, California least tern, southwestern willow flycatcher, least Bell's vireo, western snowy plover, bald eagle, southern sea otter, tidewater goby, unarmored threespine stickleback, beach layia, or California red-legged frog. We present this conclusion for the following reasons:

1. The project will not likely result in mortality or injury of brown pelicans, California least terns, bald eagles, least Bell's vireos, southwestern willow flycatchers, southern sea otters, tidewater gobies, unarmored threespine sticklebacks, beach layia, and California red-legged frogs.

2. The project description includes monitoring measures to determine if temporary or long-term disturbance occurs to western snowy plovers, American peregrine falcons, and beach layia as a result of this project, and includes a commitment by the U.S. Air Force to offset the impacts of any significant adverse effects that are found to occur.

3. Water quality monitoring in Canada Honda Creek would initiate mitigation measures designed to avoid damaging launch influences to tidewater gobies, unarmored threespine sticklebacks, and California red-legged frogs in that watershed.

Cumulative Effects

Cumulative effects are those impacts of future State and private actions that are reasonably certain to occur in the project area. Future Federal actions will be subject to the consultation requirements established in section 7 of the Act and, therefore, are not considered cumulative to the proposed project.

Other proposed projects in the vicinity of the Titan launch program will require the involvement of the U.S. Air Force and will therefore be subject to section 7 consultation. Projects affecting tidewater gobies, unarmored threespine sticklebacks, southwestern willow flycatchers, or least Bell's vireos that are outside of Vandenberg's jurisdiction may often involve the U.S. Army Corps of Engineers and would therefore be subject to section 7 of the Act. The Service is not currently aware of proposed, non-federal projects outside the Titan launch program area that would affect American peregrine falcons, brown pelicans, California least terns, bald eagles, beach layia, western snowy plovers, or southern sea otters.

Incidental Take

Section 9 of the Endangered Species Act prohibits the take of listed species without special exemption. Taking is defined as harassing, harming, pursuing, hunting, shooting, wounding, killing, trapping, capturing, collecting, or attempting to engage in any such conduct. Harm is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Under the terms of sections 7(b)(4) and 7(o)(2) of the Act, taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with this incidental take statement. The measures described below as reasonable and prudent measures and terms and conditions to reduce take are non-discretionary, and must be undertaken by the agency or made a binding condition of any grant or permit, as appropriate.

The Service anticipates the following forms of take:

1. Two (2) adult American peregrine falcons in the form of harassment through disturbance that causes abandonment of an occupied territory.

2. Three (3) American peregrine falcon pairs in the form of harassment through disturbance that causes abandonment of occupied eyries by one or both adults..

3. The eggs or young of three (3) American peregrine falcon nests, in the form of direct mortality through ejection from the nest by an adult startled by launch noise or other Titan related activity, or through indirect mortality from abandonment of an active eyrie by adults startled by launch noise or other Titan related activity.

The adverse impacts on brown pelicans, western snowy plovers, bald eagles, least Bell's vireos, southwestern willow flycatchers, California least terns, southern sea otters, tidewater gobies, unarmored threespine sticklebacks, beach layia, and California red-legged frogs that may result from this project are not expected to result in mortality or injury; therefore, take, through mortality or injury of these species, is not authorized. Harassment of western snowy plovers, brown pelicans, bald eagles, least Bell's vireos, southwestern willow flycatchers, California least terns, southern sea otters, tidewater gobies, unarmored threespine sticklebacks, and California red-legged frogs may occur, but cannot be quantified because the numbers of these species present during launches cannot be accurately predicted. This biological and conference opinion does not authorize any form of take that is not incidental to implementation of the Titan launch program.

If the incidental take authorized by this biological opinion is met, the U.S. Air Force shall immediately notify the Service in writing. If the incidental take authorized by this biological opinion is exceeded, the U.S. Air Force shall immediately cease the activity resulting in take and shall reinitiate formal consultation with the Service.

Sections 7(b)(4) and 7(o)(2) of Act do not apply to the incidental take of listed plant species. Therefore, the following reasonable and prudent measures and terms and conditions do not address the beach layia. Protection of listed plants is provided to the extent that a Federal permit, pursuant to section 10(a)(1)(A) of the Act, is required for removal or reduction to possession of endangered plants from areas under Federal jurisdiction.

Reasonable and Prudent Measures

The Service believes that the following reasonable and prudent measures are necessary and appropriate to minimize incidental take:

1. The impacts of any take, through injury or mortality to American peregrine falcons, resulting from implementation of the Titan launch program shall be minimized by supporting the ongoing efforts to hack or cross-foster American peregrine falcons.

2. The extent and nature of significant adverse effects to western snowy plovers and California least terns, if nesting at or south of the Santa Ynez River, as a result of the implementation of the Titan launch program shall be monitored to determine appropriate means of mitigation or compensation for the impacts of past and future launches.

3. The potential effects of launch emissions on the tidewater goby, unarmored threespine stickleback, and California red-legged frog shall be monitored through water quality sampling in Canada Honda Creek.

4. The effects of the Titan launch program shall be monitored to ensure that unanticipated incidental take does not occur.

The prohibitions against taking listed species found in section 9 of the Act do not apply until the species is listed. However, the Service advises the Air Force to also implement the reasonable and prudent measures that refer to the California red-legged frog. If this conference opinion is adopted as a biological opinion following a listing, the measures, with the implementing terms and conditions, will be non-discretionary.

Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the Act, the Air Force is responsible for compliance with the following terms and conditions, which implement the reasonable and prudent measures described above. Terms and conditions were contained in the U.S. Air Force's description of the proposed action and are modified herein by the Service.

1. To implement reasonable and prudent measure 1, the following terms and conditions are established:

   a. American peregrine falcons shall be monitored at nest sites on Vandenberg and San Miguel Island. Pre- and post-launch monitoring shall be conducted at Vandenberg with observations during the launch being conducted at the Hoffman Point eyrie on San Miguel Island. The Hoffman Point falcons shall be observed up to 48 hours following the launch to assess effects from sonic booms. If the likelihood of a focused sonic boom occurring over the Channel Islands is predicted to be remote, the U.S. Air Force may propose not monitoring the Hoffman Point eyrie subject to Service and National Park Service concurrence.

   b. Ongoing efforts to recover American peregrine falcons on Vandenberg and Channel Islands National Park shall be extended for at least one breeding season beyond existing programs at both locations. Support may include hacking or cross-fostering, or may include support of research that would aid in recovery of the American peregrine falcon recovery.

2. To implement reasonable and prudent measure 2, the following terms and conditions are established:

   a. Sample populations of western snowy plovers shall be observed before, during, and after the launch. Primary focus shall be with breeding birds located at Vandenberg. Wintering western snowy plovers shall be monitored for Titan launches occurring in the non-breeding season. Adverse impacts to western snowy plovers attributed to the Titan launch program shall be mitigated in consultation with the Service. Mitigation shall focus on measures that will have direct benefits to western snowy plovers and shall be in proportion to impacts attributable from past launches and the reasonably foreseeable future. If data indicate that no detrimental effects are incurred by western snowy plovers, the U.S. Air Force may propose discontinuing monitoring subject to Service concurrence.

2. Monitoring of California least terns shall be conducted before, during, and following Titan launches during migration and breeding at Vandenberg. Monitoring priority shall be given to California least terns nesting at the Santa Ynez River; otherwise, the Purisima Point colony shall be monitored. Additionally, California least tern foraging and loafing at the Santa Ynez River estuary shall be monitored relative to Titan launches occurring during the period when California least terns are using that area. Adverse impacts to California least terns attributed to the Titan launch program shall be mitigated in consultation with the Service. Mitigation shall focus on measures that will have direct benefits to California least terns and shall be in proportion to impacts attributable from past launches and the reasonably foreseeable future. If data indicate that no detrimental effects are incurred by California least terns, the U.S. Air Force may propose discontinuing monitoring subject to Service concurrence.

3. To implement reasonable and prudent measure 3, the following term and condition is established:

Vandenberg shall continue water quality monitoring in Canada Honda Creek. Launch related changes in pH or dissolved oxygen shall be evaluated relative to adverse effects on tidewater gobies, unarmored threespine sticklebacks and California red-legged frogs. Adverse impacts to tidewater gobies, unarmored threespine sticklebacks or California red-legged frogs attributed to the Titan launch program shall be mitigated in consultation with the Service. Mitigation shall focus on measures that will have direct benefits to these species, and shall be in proportion to impacts attributable from past launches and the reasonably foreseeable future.

4. To implement reasonable and prudent measure 4, the following term and condition is established:

Sample southwestern willow flycatcher nests shall be monitored to determine the degree to which the Titan launch program disturbs them. If monitoring indicates that the Titan launch program does not unduly disturb southwestern willow flycatchers, monitoring of future Titan launches may be discontinued after discussions with and concurrence of the Service.

Reporting Requirements

Annual reports that provide the following information shall be supplied to the Service by March 30 of each year:

1. results of completed monitoring, including any incidental take that resulted from implementation of the Titan Space Launch Program. Take shall be identified as harassment, injury, or mortality, and shall be broken down by launch;

2. an evaluation of monitoring methodologies shall be presented so that improvements can be incorporated; and

3. reports on changes in water quality and the results of acoustical monitoring of Titan launches shall be supplied to the Service.

Disposition of Sick, Injured, or Dead Specimens

Upon locating a dead, injured, or sick individual of an endangered or threatened species, initial notification must be made within three days to the Service's Division of Law Enforcement in Torrance, California, by facsimile at (310) 328-6307, and by phone to the Ventura Field Office at (805) 644-1766, and to the Service's Vandenberg biologist at (805) 734-8232 extension 5-1709. Written notification must be made within five calendar days and include the date, time, and location of the discovery of the animal, and any other pertinent information. The notification shall be sent to the Service's Torrance office with a copy to the Ventura Field Office and the Service's Vandenberg biologist. Dead animals and crushed eggs may be marked in an appropriate manner, photographed, and left on-site or provided to a museum which holds the appropriate permits. Injured animals should be transported to a qualified veterinarian. The Service must be contacted prior to the final disposition of any injured animals.

Conservation Recommendations

In furtherance of the purposes of sections 2(c) and 7(a)(1) of the Act that mandate Federal agencies to use their authorities to carry out programs for the conservation of listed species, we recommend implementing the following actions:

1. Vandenberg should control exotic plant species in the vicinity of the beach layia population. Control should consist of hand removal of exotic plants.

2. Vandenberg should explore the use of fencing to protect beach layia from non-launch related impacts.

3. To the extent practicable, the Titan launch program should avoid night launches to reduce adverse impacts to brown pelican night roosts at Point Arguello, Rocky Point, and Point Pedernales and to nesting listed species. Launches during the American peregrine falcon, western snowy plover, and southwestern willow flycatcher nesting seasons (generally February 15 through September 30) should be avoided, whenever possible.

4. Alternatives to helicopter security overflights which would have less adverse effect on listed species should by explored by Vandenberg. Consideration should be given to the use of small single engine fixed-winged aircraft, avoidance of biologically sensitive areas, reduction in the number of overflights, and use of increased altitudes.

The Service requests notification of the implementation of any conservation recommendation so we can be kept informed of actions that either minimize or avoid adverse effects or that benefit species or their habitats.

Conclusion

This concludes formal consultation and conference on the Titan space launch program from SLC-4 at Vandenberg Air Force Base. You may ask the Service to confirm the conference as a formal consultation if the California red-legged frog is listed. The request must be in writing. If the Service reviews the proposed action and finds that no significant changes in the action as planned or in the information used during the conference have occurred, the Service will confirm the conference as a formal consultation on the project and no further section 7 consultation will be necessary.

Upon listing of the California red-legged frog, this conference will not be confirmed if: 1) the amount or extent of incidental take is exceeded; 2) new information reveals effects of the agency action that may affect the species in a manner or to an extent not considered in this opinion; 3) the agency action is subsequently modified in a manner that causes an effect to the species that was not considered in this opinion; or 4) a new species is listed or critical habitat designated that may be affected by the action (50 CFR 402.16). Reinitiation of formal consultation on the listed species in this biological opinion would be required if any of the above conditions occur.

The incidental take statement provided in this conference opinion does not become effective until the species is listed and the conference is adopted as the formal consultation. At that time, the project will be reviewed to determine whether any take of the species has occurred. Modification of the biological opinion and incidental take statement may be appropriate to reflect that take. No take of the species may occur between the listing of the California red-legged frog and the adoption of the conference as a formal consultation, or the completion of a subsequent formal consultation.

Any questions or comments should be directed to Jim Watkins of the Service's Ventura Field Office at (805) 734-8232 extension 5-1709.

Sincerely,

Diane K. Noda

Diane K. Noda
Field Supervisor

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UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Silver Spring, MD 20910

MAR 4 2005

Mr. Thomas M. Churan
Chief
Environmental Flight
30th Space Wing
Department of the Air Force
806 13th Street, Suite 116
Vandenberg AFB, CA 93437-5242

Dear Mr. Churan:

Enclosed is a Letter of Authorization (LOA) issued to the 30th Space Wing, U.S. Air Force, under the authority of Section 101(a)(5)(A) of the Marine Mammal Protection Act (16 U.S.C. 1361 et seq.), to harass seals and sea lions incidental to missile and rocket launches, aircraft flight test operations, and helicopter operations at Vandenberg Air Force Base (VAFB), California.

You are required to comply with the conditions contained in the LOA. In addition, you must cooperate with any Federal, State or local agency monitoring the impacts of your activities, and submit a draft report to NMFS' Southwest Regional Office no later than 120 days prior to the expiration of this Authorization. The LOA requires maintaining a minimum distance of 1,000 feet between the flight paths of all aircraft and recognized seal haul-outs and rookeries, monitoring the presence of seals and other marine mammals, reporting any behavioral modifications resulting from this activity as observed by a qualified individual, and continuation of research on affected marine mammals.

If you have any questions concerning the regulations, the LOA or its requirements, please contact Jolie Harrison, Office of Protected Resources, NMFS at (301) 713-2289, ext. 166, or Monica DeAngelis, Southwest Regional Office, NMFS at (562) 980-4023.

Sincerely,

(for) Laurie K. Allen, Director
Office of Protected Resources

Enclosure

DEPARTMENT OF COMMERCE

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

NATIONAL MARINE FISHERIES SERVICE

Letter of Authorization

Contingent upon the following conditions, the 30th Space Wing, U.S. Air Force (the Holder), is hereby authorized under section 101(a)(5)(A) of the Marine Mammal Protection Act (MMPA)(16 U.S.C. 1371(a)(5)(A)), to harass small numbers of those marine mammal species identified in Paragraph 5, incidental to those activities at Vandenberg Air Force Base, California, that are described in Paragraph 6, provided the mitigation, monitoring and reporting requirements identified in Paragraphs 7, 8, and 10 are undertaken:

1. This Authorization is valid for one year after the date of this authorization.

2. This Authorization is valid only for missile, rocket, and aircraft activities at Vandenberg Air Force Base, California.

3. The taking by harassment, injury, or death of any marine mammal other than those species identified in Paragraph 5, or the serious injury or death of those marine mammal species identified in Paragraph 5, is not authorized.

4. The Holder of this Authorization is required to cooperate with the National Marine Fisheries Service and any other Federal, state or local agency monitoring the impacts of the activity on seals, sea lions, or other marine mammals. The Holder must notify the Administrator, Southwest Region, National Marine Fisheries Service, 501 West Ocean Blvd. Suite 4200, Long Beach, California 90802, or the Administrator's representative (telephone: (562) 980-4023), at least 48 hours prior to conducting any launch activities that may result in taking marine mammals by harassment.

5. The marine mammal species approved for takings by incidental harassment are: Pacific harbor seals (*Phoca vitulina*), California sea lions (*Zalophus californianus*), northern elephant seals (*Mirounga angustirostris*), and northern fur seals (*Callorhinus ursinus*).

6. The following activities at Vandenberg Air Force Base are authorized to take, by incidental harassment only, those species of marine mammals identified in Paragraph 5:

(A) Launching up to a total of 30 rockets and missiles from Vandenberg Air Force Base, California.

(B) Launching of no more than 20 of the following missile types:

1. Peacekeeper,
2. Minuteman,
3. Hera,
4. Lance,
5. Patriot As A Target,
6. ERINT,
7. Black Brant,
8. Terrier,
9. SRTYPI II,
10. Castor I,
11. Storm
12. ARIES,
13. Hermes,
14. Ground Based Interceptor Program missiles, and
15. Missile Defense Agency missiles.

(C) Launching of no more than 20 rockets from Vandenberg Air Force Base, California, made up of the following rocket types:

1. Atlas IIAS,
2. Delta II,
3. Minotaur,
4. Taurus,
5. Titan II,
6. Titan IV,
7. Atlas V,
8. Delta IV, and
9. Falcon.

(D) Aircraft flight test operations from Vandenberg Air Force Base; and

(E) Helicopter operations from Vandenberg Air Force Base.

7. Mitigation. Unless constrained by human safety, national security or launch trajectories, the Holder of this Authorization must ensure the least practicable adverse impacts on Pacific harbor seals, California sea lions, northern elephant seals, and northern fur seals, by:

(A) Ensuring that all aircraft and helicopter flight paths maintain a minimum distance of 1,000 ft (305 m) from recognized seal haul-outs and rookeries;

(B) Avoiding, whenever possible, launches during the harbor seal pupping season of March through June; and

(C) Avoiding, whenever possible, launches that will produce a sonic boom over the Northern Channel Islands during the peak pinniped pupping season of April through June.

8. Monitoring.

(A) The Holder of this Authorization must designate at least one observer, approved in advance by the Regional Administrator and trained in marine mammal science, for each pinniped monitoring location in order to record the effects of launches on pinniped populations;

(B) Observer monitoring of harbor seal and other pinniped activity at the nearest occupied haulout(s) in the vicinity of the appropriate launch platform, must commence at least 72 hours prior to any planned launch occurring during the harbor seal pupping season (March 1 through June 30) and continue for a period of time not less than 48 hours subsequent to launching;

(C) Monitoring conducted under condition 8.B. must be supplemented by video recording, during daylight hours, of mother-pup seal responses to launches during the pupping season;

(D) Biological monitoring will be conducted for all launches during the harbor seal pupping season. Follow-up surveys will be made within two weeks of the launch to ensure that there were no adverse impacts on any marine mammals;

(E) Acoustic and biological monitoring must be conducted on new space and missile launch vehicles during at least the first launch, whether it occurs within the pupping season or not;

(F) The first three launches of the Delta IV must be monitored and Auditory Brainstem Response hearing tests of animals in close proximity to the launch must be conducted.

(G) Using prediction models to determine the location of a sonic boom in the vicinity of the Northern Channel Islands, the Holder of this Authorization will monitor the pinniped populations predicted to be subject to a sonic boom greater than 1 lb/ft^2. Monitoring will commence at least 72 hours prior to the launch and continue until at least 48 hours after the launch; and

(H) Monitoring must include multiple surveys each day that record, when possible, the species, number of animals, general behavior, presence of pups, age class, gender, and reaction to launch noise, sonic booms or other natural or human-caused disturbances. Environmental conditions such as tide, wind speed, air temperature, and swell must also be recorded.

9. Activities related to the monitoring described in this Authorization do not require a separate scientific research permit issued under section 104 of the MMPA.

10. Reporting.

(A) Vandenberg Air Force Base must submit a draft report to the Administrator, Southwest Region, National Marine Fisheries Service, 501 West Ocean Blvd., Suite 4200, Long Beach, California 90802, no later than 120 days prior to the expiration of this Authorization. This report must contain detailed information on the following:

1. Date(s) and time(s) of each missile and rocket launch;

2. Results of the monitoring programs described under conditions 8.B. through 8.H. above. This report must provide (i) dates and times of all monitoring activities, (ii) details of all marine mammal sightings, including the number of pinnipeds, by species and haul-out location, that remained ashore and/or fled from the beach because of authorized activities, (iii) the number of seals and sea lions, by species, returning subsequent to the disruption (including estimates of the time it took for pinnipeds to return to haul-outs), and estimates of the amount and nature of all takes, including those by mortality or serious injury;

3. Date(s) and location(s) of any research activities related to monitoring the effects on launch noise and sonic booms on marine mammal populations; and

4. Date(s) and locations(s) of aircraft and helicopter operations and the impacts of the flight operations on marine mammals.

(B) The draft report will be subject to review and comment by the Regional Administrator, National Marine Fisheries Service (NMFS). Prior to acceptance by NMFS, any recommendations made by NMFS within 60 days of its receipt must be addressed in a final report.

11. Research.

During the period of validity of this Authorization, the Holder must continue the research described under Scientific Research Permit No. 859-1680, which expires on January 1, 2008.

12. A copy of this Authorization must be in the possession of each observer or group operating under the authority of this Incidental Harassment Authorization.

MAR 4 2005

Laurie K. Allen
Director
Office of Protected Resources
National Marine Fisheries Service

Date

APPENDIX B

Air Quality Analysis

Appendix B: Air Quality Analysis

Technical Assumptions and Emission Calculations

Proposed Action

Under the Proposed Action, SpaceX would modify the SLC-4W launch pad and launch up to two Falcon I vehicles per year. A detailed equipment list was not available to generate a construction emissions inventory. In the *Final Environmental Assessment for the Falcon Launch Vehicle Program*, emission inventories were prepared and the impacts were assessed for the modification to SLC-3W and for launching of up to six Falcon vehicles (SpaceX 2003). Because an emission inventory could not be prepared for the Proposed Action, a comparative analysis is presented to assess the impacts from Proposed Action.

Launch Effects

Under the Proposed Action, up to two Falcon I vehicles would be launched from SLC-4W. The proposed launch operations at SLC-4W would be almost identical to those previously proposed for launch operations at SLC-3W. One minor difference would be the slight change in launch azimuths due to the changes in launch location (1.6 miles to the southwest). However, the flight profiles for the Falcon I would nearly be identical from either launch complex and emissions and their impacts would be virtually identical. Another minor difference in operations would be the increased trip length. It was estimated the trip length would increase approximately five miles, but this minor increase in mileage would not produce significant changes in emissions from mobile sources associated with the Proposed Action. The operational emissions from launching from SLC-3W, which was based upon six launches per year, are presented in Table B-1. The emissions from the Proposed Action would be less than emissions from operations at SLC-3W.

Table B-1. SLC-3W annual operational emissions.

Emission Source	Annual Emissions (Tons/Year)				
	CO	NO_x	PM_{10}	ROC	SO_x
Vehicle Transport/Preparation	0.05	0.09	0.02	0.01	0.00
Vehicle Fueling	0.02	0.04	0.01	0.00	0.00
Wet Tests	19.80	0.00	0.00	0.00	0.00
Launching	571.32	0.00	0.00	0.00	0.00
Mobile Sources	3.41	0.21	0.02	0.20	0.00
Point Sources	0.12	0.56	0.76	0.13	0.04
Total Emissions	594.72	0.90	0.81	0.34	0.04

Source: SpaceX 2003

Refurbishment Impacts

Under the Proposed Action, SLC-4W will be modified to launch the Falcon I. All activities associated with the proposed facility modifications would occur within the perimeter fence of SLC-4W, in already developed or disturbed areas of the complex. Construction activities would occur over approximately three to four months. Modifications described below would be necessary to accommodate the Falcon I vehicles at SLC-4W:

- Modify the launch mount to accommodate the stool previously used at SLC-3W and water deluge system to accept the deluge system also previously used at SLC-3W;

- Install permanent propellant piping to transfer propellant from tankers to the launch vehicle, cameras using the existing camera mounts, and five equipment racks and five 120 volt 30 ampere circuits in the LSB;
- Seal the ditch leading to the retention basin;
- Update the launch pad power configuration to allow 3-phase 480 voltage AC 100 ampere service on the pad surface through the SpaceX equipment trailer;
- Check and repair, as needed, the pad lighting, emergency generator, and electrical and grounding systems.

These proposed modifications and installations are smaller in size and magnitude to the modifications and installations accomplished at SLC-3W to configure that pad to launch the Falcon I. At SLC-3W, the previous tenant had stripped the launch support building, removed the utilities and access roads, and regraded portions of the facility. As a result of these actions, SpaceX had to dig trenches to install utilities, pave the access roads, and install doors, light fixtures, electrical systems, and communications in the launch support building. Currently at SLC-4W, the utilities are connected to the site and the access roadways are available. Construction emissions for the modifications of SLC-3W were prepared in the *Final Environmental Assessment for the Falcon Launch Vehicle Program*_(SpaceX 2003) and are presented in Table B-2. Because a detailed equipment list was not available to generate a construction emissions inventory for modification of SLC-4W and as previously discussed, the modifications and installations at SLC-4W would not be extensive as those modifications and installations at SLC-3W, it was assumed the emissions from the modifications SLC-4W would be equal to or less than those emissions estimated for the modification of SLC-3W.

Table B-2. Emissions from construction activities.

Emission Source	Emissions (Lbs)				
	CO	NO_x	PM_{10}	ROC	SO_x
Mobile Sources	2,821.03	795.14	140.23	246.26	0.00
Grading	681.68	1560.4	66.16	138.64	157.60
Trenching	731.44	1548.14	95.88	132.86	150.59
Backfill/Compaction	347.12	819.12	33.52	79.76	79.68
Road Paving	249.20	670.00	36.40	77.20	64.56
Concrete	1043.47	288.96	78.31	156.62	104.55
Structure	139.68	356.96	23.28	46.56	31.04
Fugitive Dust	-	-	23,008.03	-	-
Total (Lbs)	6,013.62	6,038.72	23,481.81	877.90	588.02
(Tons)	3.01	3.02	11.74	0.44	0.29

Source: SpaceX 2003

APPENDIX C

Comments Received on Final Draft and Responses

DEPARTMENT OF THE AIR FORCE

30TH SPACE WING (AFSPC)

6 SEP 2005

MEMORANDUM FOR SANTA BARBARA COUNTY AIR POLLUTION CONTROL DISTRICT
ATTN: MS VIJAYA JAMMALAMADAKA

FROM: 30 CES/CEV
806 13th Street, Suite 116
Vandenberg AFB CA 93437-5242

SUBJECT: Environmental Assessment (EA) (Your Ltr, 22 Aug 05)

1. We provide the following responses to your comments on the Final Draft EA for the Falcon I Launch Vehicle Program from SLC-4W:

a. Comment noted. The emission inventory was updated using the 2004 Clean Air Plan.

b. The air quality impacts of the Falcon I launch program at SLC-3W were addressed in the Final Environmental Assessment for the Falcon Launch Vehicle Program (Falcon EA), and they were found to be less than significant. Relocating the Falcon I launches from SLC-3W to SLC-4W will not change the emissions from launch program itself, but will only shift the location of the emissions approximately 1.6 miles further southwest. Therefore, the air quality impacts from launching at SLC-4W would be the same or less than the original SLC-3W launch site since SLC-4W is even further from sensitive receptors. The additional driving distance to reach SLC-4W is so small as to have negligible impact on air quality.

c. Comment noted. As shown in Table B-1, emissions from mobile sources and vehicle transport/preparation would be 0.30 tons of NO_x and 0.21 tons of ROC. When compared to the 13,804 tons of NO_x and 8,687 ton of ROC from mobile vehicles in Santa Barbara County, the mobile source emissions from the Proposed Action are insignificant.

d. The emissions from operation of SLC-4W, presented in Table B-1, were taken from the Falcon EA. The emission sources and methodology used to estimate those emissions can found in Appendix C of that EA.

e. Comment Noted. Any required permits will be obtained.

f. Comment Noted. The environmental enclosure boiler on SLC-4W has been taken out of service and abandoned in place. Currently, SpaceX does not have a requirement for the boiler. If SpaceX decides to use the boiler, SpaceX and VAFB would obtain any required permits.

2. If you have any questions, please contact Ms. Tara Wiskowski at (805) 606-2814.

BEATRICE L. KEPHART, GS-14
Chief, Environmental Flight

GUARDIANS OF THE HIGH FRONTIER

"Go Hawks"

Santa Barbara County
Air Pollution Control District

August 22, 2005

Ms. Tara Wiskowski
30 CES/CEV
806 13th Street, Suite 116
Vandenberg AFB, CA 93437-5242

SUBJECT: Falcon I Launch Vehicle Program from SLC-4W, VAFB

Dear Ms. Wiskowski:

The Santa Barbara County Air Pollution Control District (SBCAPCD) appreciates the opportunity to provide comments on the Final Draft Environmental Assessment (EA) for the above-mentioned project. We have reviewed the air quality-related sections in the EA and we have the following comments:

1. Page 3-3. Please note that the federal one-hour ozone standard has been withdrawn and there no longer is a one-hour ozone standard as of June 15, 2005. The EA shows 1999 emissions taken from the 2001 Clean Air Plan. Please use the most recent emission inventory that is in the 2004 Clean Air Plan.

2. The EA states, in Section 4.1, "The criteria for determining the significance of air quality impacts are based upon federal, state, and Santa Barbara County standards and regulations. Impacts would be considered to be significant if project emissions...contribute measurably to an existing or projected ambient air quality standard violation." Santa Barbara County does not meet the California ozone and particulate matter ambient air quality standards. The SBCAPCD has adopted thresholds of significance (SBCAPCD Environmental Guidelines, Nov. 16, 2000). We recommend that, in the absence of modeling the emissions, these thresholds be used as a gauge of whether the project will contribute measurably to the existing CAAQS violation to determine significance of air quality impacts.

3. Section 4.1.1.1 states that, "emissions from mobile sources support would be spread across Vandenberg AFB and Santa Barbara County and would not cause a significant impact to the regional air quality". Please note ozone is a regional pollutant and any significant increase in ozone precursors emitted from mobile sources could measurably contribute to the regional air quality. Please provide substantiation through emission calculations that the project contribution is or is not significant.

4. As noted in the EA, SpaceX will need to modify their SBCAPCD permit (ATC 11262) to reflect the location change within the stationary source. In order to streamline the permit process, the EA should include a table of operational emissions (solvents, fuel transfers, IC engines, boilers, etc.).

5. The EA mentions a generator used for lighting. The generator may require an SBCAPCD permit.

6. The SLC-4W facility also includes a boiler. Will this be taken out of service? SpaceX had no boiler at SLC-3W.

We look forward to receiving your response and the final EA. If you have questions please call me at (805) 961-8893 or e-mail: VLJ@sbcapcd.org.

Sincerely,

Vijaya Jammalamadaka, AICP
Air Quality Specialist
Technology and Environmental Review Division

cc: TEA Chron File
Phil Sheehan, SBCAPCD

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COMMENT INCORPORATION SUMMARY

COMMENT INCORPORATOR:	DATE: August 22,2005
COMMENTOR: Stacey Zee	ORGANIZATION OF COMMENTOR: FAA/AST
TITLE OF DOCUMENT: Final Draft Supplemental Environmental Assessment: Falcon I Launch Vehicle Program from SLC-4W, Vandenberg AFB, CA	

ITEM NO.	PAGE NO.	RE-VIEWER	RECOMMENDED CHANGES	HOW COMMENT WAS INCORPORATED
1.	General	AST	The Supplemental EA incorporates the original EA by reference and makes this assertion many times throughout the text but does not provide sufficient summarization of the referenced content for the reader to be able to understand the impacts of the proposed action without the original EA in hand. Perhaps the EA could be enhanced with some summary text that would allow the reader to comprehend the issues without having to refer to the incorporated EA.	This EA was designed to be a supplement to the original Falcon EA (FEA) and is intended to be used in conjunction with that document. Use of a supplemental format was selected so that text in the original document would not need to be repeated. This is in accordance with CEQ regulations to reduce excessive paperwork. As stated in Section 1.5 of the Supplemental EA (SEA), the FEA is available via the internet.
2.	1-1	AST	In section 1.1 (background), there should be some discussion regarding the role of the Air Force in this project and the role of the FAA as the licensing agency for commercial launch activities.	The role of the AF and the FAA, as lead and cooperating agencies respectively, as well as the FAA's role as the licensing agency for commercial launches were described in the FEA, Section 1.0. This information has been removed from Section 1.1 of this SEA, as it was adequately covered in the FEA. The AF's role for the SEA, as the initiator of the review to determine the feasibility of using SLC-4W for the Falcon I launch program is described in Section 1.2 of the SEA.
3.	2-1	AST	The headers for sections 2.1 and 2.2 don't need "alternative A" or "alternative B." They should just be "2.1 Proposed Action" and "2.2 No Action Alternative."	This change has been made in the SEA.
4.	2-1	AST	In section 2.1.1 (operational phase), in the second paragraph when the number of launches are being discussed, an end date needs to be placed on the scheduling of launches. Currently, the EA states that after 2006 a maximum of two launches would be scheduled per year; this should be restated in terms of the numbers of launches per year through XXXX year.	While it is not known when the final Falcon I vehicle would be launched from VAFB, the AF does hold a contract with SpaceX for the launching of this vehicle through the year 2010. This information was added to Section 2.1.1 of the SEA.

COMMENT INCORPORATION SUMMARY

ITEM NO.	PAGE NO.	RE-VIEWER	RECOMMENDED CHANGES	HOW COMMENT WAS INCORPORATED
5.	4-2	AST	In the first paragraph of section 4.2.1.1, a comparison is made among the Titan II, Titan IV and Falcon I launches asserting that the Falcon I would pose fewer impacts to wildlife than a Titan vehicle given that it is a smaller vehicle with a less powerful engine. Please further explain *what* the impacts to wildlife are and *why* Falcon I launches would have fewer impacts on wildlife (e.g., propellant type and emissions, noise, other contamination, etc.).	As stated in Section 4.2.1.1 of the SEA, impacts to wildlife at SLC-4W would be similar to those analyzed in Section 4.3 of the FEA. This section of the FEA describes what the impacts are (including noise, generation of an exhaust cloud, heat and fire in the vicinity of the launch pad, and potential launch mishaps) and why they would have a less than significant impact.
6.	4-2	AST	The last sentence of the first paragraph in section 4.2.1.1 references Table 4-1 (which presents a comparison of the monitoring requirements for SLC-3W and SLC-4W). The significance (in terms of impacts) of the table needs to be more clearly stated in the text. The table indicates some of the differences between the actions at SLC-3W and SLC-4W in terms of impacts, but the text needs to correspond to the table and more clearly state how the table relates to overall impacts to biological resources.	In the interest of complying with CEQ direction to reduce excessive paperwork, information that is presented in Table 4-1 has not been repeated in the text of the SEA.
7.	4-2	AST	Remove the second "affect federally listed" from the first sentence of the 2nd paragraph in section 4.2.1.1.	This change has been made.
8.	4-3	AST	Table 4-1 is a little bit unclear. Referring to the comment #6, the information in the table could be presented more clearly. The column headers say "SLC-3W Biological Opinion Launch Requirements" – Are there Biological Opinions for both SLCs? It is also unclear as to what exactly the Xs and the N/As in the table mean.	There are separate Biological Opinions (B.O.) for both launch sites, SLC-3W and SLC-4W. X's have been clarified as meaning there is a requirement in the relevant B.O. for that species, and N/A has been changed to No Req., which means there is no requirement for the species within the reference B.O..
9.	4-4	AST	The second paragraph, section 4.3.1.1, states, "normal operations at SLC-4W have the potential to interfere with current use of the vicinity by Chumash descendants." However, the paragraph gives no explanation as to what the current use might be. This should be clarified and expanded.	Section 4.3.1.1 has been clarified to include discussion on how the Chumash use this area.
10.	4-4	AST	The second paragraph, section 4.3.1.1, states that consultations with the Chumash Indians would take place regarding the use of the site. What are the status and the results of this consultation process? The results should be provided to indicate what steps would be taken to reduce the impacts.	The 30th Space Wing Cultural Resources Office consulted with the Chumash Tribal Elders Council regarding the Proposed Action on 29 Aug 05. The Council has no concerns regarding the Proposed Action. This information was added to Section 4.3.1.1 of the SEA.
11.	4-5	AST	The first paragraph, section 4.5.1.2, states "no ground disturbing activities would occur during refurbishment, therefore there would be no impacts on groundwater or the water supply." Ground disturbing	No refurbishment activities are anticipated to have any impact on groundwater, therefore the text

COMMENT INCORPORATION SUMMARY

ITEM NO.	PAGE NO.	RE-VIEWER	RECOMMENDED CHANGES	HOW COMMENT WAS INCORPORATED
			activities aren't the only thing that could potentially impact water resources. This statement needs to be expanded to more accurately reflect the refurbishment activities that could potentially impact water supply.	referring to groundwater has been removed.
12.	B-1	AST	The paragraph under "Launch Effects" indicates that there would be a slight change in launch azimuths due to the change in launch location. Please clarify the change.	With regard to potential air emission impacts, the slight change in launch azimuths referenced in B-1 related to the move of the origin of the launch approximately 1.6 miles to the southwest. This has been clarified in the text B-1 of the SEA. Exact azimuths for all Falcon I launches are currently unknown, however all launch azimuths would be limited to those approved by the 30th Space Wing Safety Office.