

FINAL

Supplemental Environmental Impact Statement

for the

Evolved Expendable Launch Vehicle Program

ENOVARUM PRAESTARUM
(Affordability Through Innovation)



March 2000

COVER SHEET

FINAL SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT

EVOLVED EXPENDABLE LAUNCH VEHICLE PROGRAM

- a. Responsible Agency: U.S. Air Force
- b. Cooperating Agencies: Federal Aviation Administration (FAA)
National Aeronautics and Space Administration (NASA)
- c. Proposed Action: To allow the addition of up to five strap-on solid rocket motors (SRMs) to the Atlas V lift vehicle and to allow the use of larger SRMs on the Delta IV lift vehicle. Both vehicles are part of the Evolved Expendable Launch Vehicle (EELV) program.
- d. Inquiries on this document should be directed to: Mr. Jonathan D. Farthing, Chief, Environmental Analysis Division, HQ AFCEE/ECA, 3207 North Road, Brooks Air Force Base, Texas, 78235-5363, (210) 536-3668, facsimile number (210) 536-3890.
- e. Designation: Final Supplemental Environmental Impact Statement (FSEIS)
- f. Abstract: This FSEIS has been prepared in accordance with the National Environmental Policy Act (NEPA). Implementation of the EELV program was previously assessed in the April 1998 *Final Environmental Impact Statement, Evolved Expendable Launch Vehicle Program*. The Proposed Action of this FSEIS is to allow the addition of up to five strap-on SRMs to the Lockheed Martin Corporation (LMC) Atlas V launch vehicle and to allow the use of larger SRMs on the Boeing Delta IV launch vehicle, both of which are part of the EELV program. The launch locations for the Atlas V and Delta IV systems are Cape Canaveral Air Force Station in Brevard County, Florida, and Vandenberg Air Force Base, in Santa Barbara County, California. For the analysis in the FSEIS, each contractor is assumed to launch approximately 50 percent of EELV flights involving SRMs (approximately 30 launches per year total). The No-Action Alternative is the previously approved implementation of the EELV program that was analyzed in the 1998 FEIS.

The FSEIS analyzes potential impacts to the local community, land use and aesthetics, transportation, utilities, hazardous materials and hazardous waste management, health and safety, geology and soils, water resources, air quality (upper and lower atmosphere), noise, orbital debris, biological resources, cultural resources, and environmental justice.

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Executive Summary

Background

In 1998, a *Final Environmental Impact Statement, Evolved Expendable Launch Vehicle Program* (1998 FEIS) was prepared to evaluate the impacts associated with the development and operation of the Evolved Expendable Launch Vehicle (EELV) systems. That action included replacing the Atlas IIA, Delta II, and Titan IVB launch vehicles in the National Executable Mission Model. The primary requirement of the EELV program is to provide the capability for lifting medium (2,500 to 17,000 pounds) and heavy (13,500 to 41,000 pounds) satellites into a variety of different orbits. The EELV program is the Department of Defense's (DoD's) source of expendable medium and heavy spacelift transportation to orbit through the year 2020. The EELV program provides the capability to launch unmanned National Security, National Aeronautics and Space Administration (NASA), and commercial payloads into orbit. The Record of Decision (ROD) for the 1998 FEIS was signed on June 8, 1998.

Purpose and Need for Action

Subsequent to the publication of the 1998 FEIS, both EELV program launch vehicle contractors [Lockheed Martin Corporation (LMC) and Boeing] have proposed the use of solid-propellant strap-on rocket motors as an economical way to bridge the gap between their respective medium-lift vehicles (MLVs) and heavy-lift vehicles (HLVs). Boeing's use of solid rocket motors (SRMs) was previously evaluated in the 1998 FEIS. In this Final Supplemental Environmental Impact Statement (FSEIS), Boeing is now proposing to use larger SRMs than previously analyzed in the 1998 FEIS.

The Air Force is addressing the impacts of these proposals in this FSEIS because of the potential use of Air Force facilities and property for the new variants, as well as the potential that these variants could carry Air Force and other government payloads in the future. This FSEIS will support the Air Force's decision whether or not to: (1) allow additional and larger SRMs to be used at Vandenberg Air Force Base (AFB) and Cape Canaveral Air Force Station (CCAFS) for EELV program launches of commercial and/or government payloads, and (2) authorize use of government property for supporting the use of additional and larger SRMs for the EELV program. This FSEIS has been prepared in accordance with the National Environmental Policy Act (NEPA). This FSEIS addresses the potential environmental effects that could result from adding these new launch vehicle configurations to the EELV program.

In accordance with the NEPA requirement for a lead agency, the United States Air Force has prepared this FSEIS to provide information on the potential environmental impacts resulting from the additional use of SRMs on the Atlas V MLVs and larger SRMs on the Delta IV MLVs. Because commercial launches are included in the Proposed Action, the Federal Aviation Administration (FAA) is serving as a cooperating agency in the

preparation of this SEIS. In addition, NASA is also a cooperating agency because of their special expertise and potential mission requirements.

The Proposed Action and Alternatives

The Proposed Action of this SEIS is to allow use of launch vehicles with up to five strap-on SRMs. LMC proposes adding up to five strap-on SRMs to the current Atlas V MLV, while Boeing proposes a Delta IV MLV with two or four SRMs that are larger than those proposed in the 1998 FEIS. For LMC, these SRMs would be in addition to the previously analyzed Atlas V medium-lift vehicles. For Boeing, larger SRMs would be used than were previously analyzed in the 1998 FEIS on the Boeing Delta IV medium-lift vehicles. The Proposed Action would provide an intermediate-lift launch capability between the EELV medium- and heavy-lift variants that would increase the market capture of space launches by EELV vehicles, and could potentially address government mission requirements.

CCAFS in Brevard County, Florida, and Vandenberg AFB in Santa Barbara County, California, are the only two locations in the United States that currently provide space launch capabilities to support the EELV program. Both the Atlas V and Delta IV systems with added SRMs would be designed so that all configurations could be launched from both locations. The Delta IV launches would occur from Space Launch Complex-37 (SLC-37) at CCAFS and from SLC-6 at Vandenberg AFB; the Atlas V launches would occur from SLC-41 at CCAFS and from SLC-3W at Vandenberg AFB.

No-Action Alternative

The No-Action Alternative for this SEIS is the Proposed Action selected in the 1998 FEIS that has been updated to reflect current program status. The EELV program consists of MLVs and HLVs. The Atlas V system is based on a liquid oxygen and kerosene common core booster, while the Delta IV system is based on a liquid oxygen and liquid hydrogen common booster core. Under the No-Action Alternative, the EELV program would continue, except that SRMs would not be added to the Atlas V MLVs and smaller SRMs would be used on Delta IV MLVs. The No-Action Alternative will occur whether or not the Proposed Action is implemented.

Some changes to the EELV program baseline systems have occurred independent of the Proposed Action for this SEIS since the ROD for the 1998 FEIS was signed. The following updates to the EELV program that occurred in the interim between the ROD for the 1998 FEIS and the Notice of Intent (NOI) for this SEIS are incorporated into the No-Action Alternative:

- Increased water usage for Atlas V launches (see Section 3.5, 4.9, and 4.9.2)
- The launch rates have decreased for the No-Action Alternative in this SEIS from the rates assessed in the Proposed Action of the 1998 FEIS (see Section 2.1.3)
- Minor modifications to existing facilities and increased paved area for vehicle turnaround at the Receipt Inspection Shop and Segment Ready Storage at CCAFS (see Section 2.1.3)

- Deletion of certain launch vehicle configurations; for example, the Delta IV small-lift vehicle analyzed in the 1998 FEIS has been removed from the EELV program, and is not included as part of the No-Action Alternative for this SEIS (see Section 2.2.1.2)

With the inclusion of these updated items, the Proposed Action of the 1998 FEIS is incorporated by reference into the description of the No-Action Alternative for this SEIS.

Scope of Study

Analyses of potential impacts to the following areas are evaluated: geology and soils, water resources, air quality, noise, orbital debris, biological resources, cultural resources, population and employment, land use and aesthetics, transportation, utility services, and the current and future management of hazardous materials and health and safety issues. Potential environmental justice impacts to minority and/or low-income populations that could occur as a result of the Proposed Action are also addressed. This SEIS does not preclude or supersede any previously selected action or launch vehicle configuration (with the exception of the Delta IV small-lift vehicle) from the 1998 FEIS.

Summary of Environmental Impacts

The SEIS has analyzed potential impacts to the environment from the Proposed Action and No-Action Alternative in accordance with NEPA. On the basis of the analyses contained in this document, no significant environmental impacts are expected to occur with implementation of either the Proposed Action or the No-Action Alternative, and neither is anticipated to contribute to any cumulative impacts or result in irreversible or irretrievable commitments of resources. The following paragraphs briefly describe environmental areas analyzed for the Proposed Action and the No-Action Alternative. The number in parentheses next to each resource area indicates the location in the SEIS where a more detailed discussion of potential impacts is included. Table ES-1 (included at the end of this Executive Summary) contains a summary of the impacts and mitigation for the Proposed Action and No-Action Alternative.

Community Setting (Section 4.2)

Proposed Action

The Proposed Action would not result in impacts to the local or regional economy, or result in growth-inducing impacts. The employment trends would be the same as those of the No-Action Alternative.

No-Action Alternative

The total number of persons associated with launch activities at both CCAFS and Vandenberg AFB will increase during construction of the EELV program facilities, then will decline until 2007, as other existing government launch programs are phased out. There will be an overall net decline in direct and indirect launch-related employment. This decrease, however, is expected to be small compared to the increases in jobs forecast in both locations.

Land Use and Aesthetics (Section 4.3)

Proposed Action

Land use would be the same as for the No-Action Alternative. The Proposed Action would not be anticipated to result in impacts to regional or local land uses, the coastal zone, recreation, or aesthetics, either separately or in combination.

No-Action Alternative

The No-Action Alternative will be compatible with current land use at both Vandenberg AFB and CCAFS. The EELV program construction and facility modifications were assessed in the 1998 FEIS, and a Coastal Zone Consistency Determination has been prepared for the existing EELV program activities at both installations.

Transportation (Section 4.4)

Proposed Action

The same transportation trends would occur as under the No-Action Alternative. Regional traffic would not be expected to be affected by the addition of SRMs to Atlas V vehicles or the use of larger of SRMs on Delta IV vehicles at either installation.

No-Action Alternative

Under the No-Action Alternative, traffic will increase slightly during construction activities resulting in changes to level-of-service (LOS) for both installations. These changes will be temporary in nature and will not result in significant impacts to local or regional traffic patterns. During the operational phase of the EELV program, project-related traffic is expected to decline, and no impacts to regional traffic patterns are anticipated. The number of truck trips offsite have been revised to reflect corrected quantities of wastewater to be removed from SLC-3W at Vandenberg AFB.

Utilities (Section 4.5)

Proposed Action

Water use, wastewater treatment, solid waste generation, and electrical distribution systems required for the Proposed Action would be no different from the No-Action Alternative requirements.

No-Action Alternative

Under the No-Action Alternative, all utility systems will operate within the capacity of Vandenberg AFB and CCAFS. As a result, no significant impacts will occur.

Hazardous Materials and Hazardous Waste Management (Section 4.6)

Proposed Action

Under the Proposed Action, total hazardous materials and hazardous waste would increase slightly over the No-Action Alternative. These increases would result from the use of additional and larger SRMs and an increase in the total number of launches over the

No-Action Alternative. Generated materials and wastes would be consistent with materials and wastes currently handled at both installations and are the responsibilities of the launch vehicle contractors. All launch activities would be conducted in accordance with applicable regulations for the use, storage, and disposition of hazardous materials. The Proposed Action would stage and temporarily store SRMs onsite or at approved locations nearby. Because wastes from the Proposed Action would be similar to wastes currently handled at the installations, no adverse impacts are anticipated.

No-Action Alternative

Under the No-Action Alternative, there will be no change in the amount of hazardous wastes generated from the analysis conducted for the 1998 FEIS. All launch activities will be conducted in accordance with applicable regulations for the use and storage of hazardous materials. The types of wastes will be consistent with wastes currently handled by both installations. The launch contractors are responsible for storing and disposing of hazardous materials and wastes. No significant impacts are anticipated.

Health and Safety (Section 4.7)

Proposed Action

As a result of implementing safety programs at the installations prior to launch activities, no significant impacts to health and safety would be expected to occur as a result of the Proposed Action. In addition, all hazardous materials would be transported in accordance with U.S. Department of Transportation (DOT) regulations for interstate shipment of hazardous substances.

Launch trajectories would be created and modified to ensure safety on the ground and at sea. These scenarios represent no change from the No-Action Alternative except for the addition of SRM drop zones.

No impacts would be expected as a result of airborne chemicals emitted from the SRMs. A hydrogen chloride (HCl) ground cloud would be larger and would occur more frequently given the increased use of SRMs and increased launch rates compared to the No-Action Alternative. As in the No-Action Alternative, established safety procedures at CCAFS and Vandenberg AFB would prevent or minimize exposure to toxic launch emissions.

No-Action Alternative

The current regional and on-station safety programs described in the 1998 FEIS will remain in effect.

An HCl ground cloud will result from launches of one MLV configuration. Established procedures at CCAFS and Vandenberg AFB will prevent or minimize exposure to toxic launch emissions.

Geology and Soils (Section 4.8)

Proposed Action

There would be additional paving for vehicle turnaround at the Receipt Inspection Shop and at the Segment Ready Storage at CCAFS to transport the SRMs for the Delta IV vehicles. At both CCAFS and Vandenberg AFB, there would be no or less-than-significant impacts to geology and soils.

No-Action Alternative

Construction activities will uncover and disturb soils, increasing the potential for wind and water erosion. As described in the 1998 FEIS, appropriate measures to control soil erosion will be implemented, and no adverse impacts are expected to occur.

Water Resources (Section 4.9)

Proposed Action

Significant adverse impacts to surface water and groundwater are not anticipated. Implementation of the Proposed Action would not affect the quantity of water available to the installations or to the surrounding areas, nor would it increase the amount of water withdrawn from groundwater resources. Therefore, adverse impacts to groundwater resources are not expected, and no mitigation measures would be required.

There would be no changes in the National Pollution Discharge Elimination System (NPDES) requirements for stormwater discharges associated with construction activity. Launch pad deluge and washdown water would be recycled after launches, or discharged and/or disposed of in accordance with applicable industrial wastewater permits and regulations.

The use of additional SRMs would result in increased deposition of HCl into surface waters at both launch installations. Any resulting pH changes would be temporary.

No-Action Alternative

Previously selected EELV program activities will not affect the quantity of water available to the installations or to the surrounding areas, nor will they increase the amount of water withdrawn from groundwater resources.

For Atlas V and Delta IV system launches at CCAFS and at Vandenberg AFB, there will be an increase in deluge and/or launch-pad-washdown water used. In the interim since publication of the 1998 FEIS, total water use per launch has been revised. More definitive design data now indicate a need for additional water, and the increased water use was evaluated. On the basis of the revised water requirements, the quantity of water required by CCAFS on a daily basis from the local municipal water department (City of Cocoa Water Department) is anticipated to change from the quantity forecast in the 1998 FEIS.

Water is delivered to Vandenberg AFB from the central branch of the State Water Project. This increased water use is not expected to exceed the current contractual supply of water available from the State Water Project. Consequently, no impacts to the quantity and availability of local water resources are expected to occur.

No adverse impacts to water resources are expected. Acid deposition could cause short-term changes in water chemistry after launches of SRM-augmented launch vehicle configurations, but any impacts will be temporary and are not expected to be significant.

Air Quality (Lower Atmosphere) (Section 4.10)

Proposed Action

Construction for the Proposed Action would be essentially the same as for the No-Action Alternative. The increased use of SRMs and increased frequency of launches would increase emissions of some criteria pollutants. Neither peak launch nor construction year emissions, however, would be sufficient to jeopardize attainment status of either region. Because Vandenberg AFB is within an area designated by the U.S. Environmental Protection Agency (EPA) to be in nonattainment for ozone, EELV program activities must comply with Clean Air Act (CAA) requirements mandating that federal actions comply with the applicable State Implementation Plan (SIP) to achieve attainment.

Monitoring stations at Vandenberg AFB have not recorded any exceedances of the California State 24-hour PM₁₀ standard from current launch systems (including the much larger Titan IV launch vehicle).

No-Action Alternative

Construction-related activities will generate an increase in local concentrations of particulates, NO_x and other pollutants. These emissions, however, will not jeopardize the attainment status for these pollutants. Applying water during ground-disturbing activities and the efficient scheduling of heavy equipment use will mitigate particulates generated by construction. Launch-vehicle preparation and assembly activities will generate short-term air emissions. Because of the increased number of trucks used to transport wastewater offsite at SLC-3W, the quantities of vehicle emissions were corrected from the 1998 FEIS. Computations indicate that launch operations will not jeopardize the attainment status for the above-referenced pollutants.

Air Quality (Upper Atmosphere) (Section 4.11)

Proposed Action

The increased use of SRMs would generate increased emissions of aluminum oxide, nitrogen oxides, and chlorine compounds into the stratosphere that would affect stratospheric ozone. Temporary local ozone losses would occur more frequently and over larger areas than under the No-Action Alternative. Cumulative global impacts to stratospheric ozone over the lifetime of the EELV program would depend on the future rate of EELV program commercial launches with SRMs. A conservative estimate of the yearly EELV contribution to the total annual global ozone decrease, based on the maximum expected launches of vehicles with SRMs, is less than 0.1 percent of existing conditions. This constitutes an insignificant decrease in global ozone.

No-Action Alternative

Emissions of aluminum oxide, nitrogen oxides, and chlorine compounds into the stratosphere will occur with the launch of only one Delta IV variant. Temporary local ozone

losses will occur with each launch using SRMs. Cumulative global impacts to stratospheric ozone over the lifetime of the EELV program will depend on the future rate of EELV program commercial launches with SRMs. A conservative estimate of the yearly EELV contribution to the total annual global ozone decrease, based on the maximum expected launches of vehicles with SRMs, is less than 0.1 percent of existing conditions. This constitutes an insignificant decrease in global ozone.

Noise (Section 4.12)

Proposed Action

Launch noise would be short term and intermittent, occurring only during launches. No public or structural impacts would be expected. Sonic boom footprints for launches from CCAFS are offshore over the Atlantic Ocean. At Vandenberg AFB, sonic booms could occur over the Channel Islands, as they do now with other launch programs, and as they could with the No-Action Alternative.

No-Action Alternative

Under the No-Action Alternative, only short-term and temporary impacts from noise or sonic booms are expected to occur, as described for the Proposed Action.

Orbital Debris (Section 4.13)

Proposed Action

The Proposed Action would increase the total EELV program launches to 566, from 472 in the revised No-Action Alternative. Given the increased launch rate, there would be a nominal increase in orbital debris from domestic vehicles; however, overall there would be no significant global effect on orbital debris.

No-Action Alternative

There will be a nominal increase in orbital debris attributable to EELV program. This increase will be offset by losses in other launch vehicle programs in a zero-sum equation; therefore, the total number of worldwide launches would remain essentially unchanged. Furthermore, the launch vehicle contractors are required to incorporate debris minimization into system design for upper stages, as described in the 1998 FEIS.

Biological Resources (Section 4.14)

Proposed Action

Minor temporary disturbances would be expected during the small-scale construction activities associated with the Proposed Action. Minor modifications to existing facilities would not affect any critical habitat or jurisdictional wetlands.

There would be larger and more frequent HCl ground clouds from the increased use of SRMs, temporarily affecting flora and fauna at both installations. The effects of HCl and aluminum oxide (Al₂O₃) deposition from SRMs at both installations would be minimal. Plant species are expected to recover from short-term launch impacts. Damaged vegetation

resulting from a launch anomaly would be expected to regrow within the same growing season, because no lingering effects would be present.

Increases in launch rates from the levels assessed in the No-Action Alternative would cause increased frequency of launch noise and associated temporary disturbances of local species. Based on the infrequent and brief occurrence of launch noise resulting from the Proposed Action, however, no significant increases to impacts from the No-Action Alternative would be expected to occur to wildlife. Noise levels associated with the Proposed Action have been predicted to be 2 to 3 dB lower than the noise associated with the HLV previously analyzed in the 1998 FEIS. Sonic booms over the Channel Islands could have the potential to result in temporary disturbances of marine mammals.

No-Action Alternative

Under the No-Action Alternative, there would be minimal effects to biological resources from the deposition of HCl and Al₂O₃ associated with the continued use of SRMs. Other direct effects to vegetation and wildlife will be a result of EELV program construction activities at both installations that were analyzed in the 1998 FEIS. Launch noise and sonic boom disturbances to wildlife would be short term and infrequent.

Cultural Resources (Section 4.15)

Proposed Action

There would be no effects to any National Register of Historic Places (National Register)-listed or -eligible prehistoric or historic archaeological sites, or archaeologically sensitive areas. No traditional resources have been identified in the Area of Potential Effect (APE) at either installation. Impacts would be the same as for the No-Action Alternative.

No-Action Alternative

Construction activities associated with implementation of the EELV program were analyzed in the 1998 FEIS. No National Register-listed or -eligible prehistoric or historic archaeological sites, or archaeologically sensitive areas will be affected at either installation. At CCAFS, concurrence has been obtained from the Florida State Historic Preservation Office (SHPO) that the construction at Hangars C and J (both potentially eligible for listing on the National Register of Historic Places) will have no effect on their historic value.

At Vandenberg AFB, SLC-3W and its associated support facilities are eligible for listing on the National Register of Historic Places under the Cold War historic context. The California SHPO and the Air Force signed a Memorandum of Agreement (MOA) stipulating that adverse effects to the property have been satisfactorily taken into account through the previous completion of Historic American Building Survey/Historic American Engineering Record (HABS/HAER) recordation for SLC-3. The California SHPO also concurred that the potential impacts to a National Register-eligible archaeological site near SLC-6 will be minimal and will not affect any of the characteristics that make it eligible for inclusion in the National Register.

Environmental Justice (Section 4.16)

Activities associated with the Proposed Action and the No-Action Alternative will not result in disproportionately high and adverse impacts to low-income or minority populations as described in the 1998 FEIS.

TABLE ES-1
Potential Environmental Impacts at CCAFS and Vandenberg AFB

Receptor	Location	Proposed Action	No-Action Alternative
Local Community	CCAFS	Same employment trends as No-Action Alternative.	Employment impacts are described in the 1998 FEIS.
	VAFB	Same employment trends as No-Action Alternative.	Employment impacts are described in the 1998 FEIS.
Land Use and Aesthetics	CCAFS	Same land use and coastal zone impacts as No-Action Alternative.	Land use and coastal zone consistency impacts are described in the 1998 FEIS.
	VAFB	Same land use and coastal zone impacts as No-Action Alternative. Coordination required with California Coastal Commission for Coastal Zone Consistency Determination.	Land use and coast zone consistency are described in the 1998 FEIS.
Transportation	CCAFS	Same impacts as No-Action Alternative plus occasional minimal increase in traffic for truck trips to transport SRMs.	Temporary traffic from construction is described in the 1998 FEIS, with no impact to regional traffic.
	VAFB	Same trends as No-Action Alternative plus occasional increase in truck trips to transport SRMs and remove launch-pad washdown water.	Traffic impacts from construction are described in the 1998 FEIS with no impact to regional traffic. The number of truck trips offsite have been revised to reflect corrected quantities of wastewater to be removed from SLC-3W at VAFB.
Utilities	CCAFS	Same as No-Action Alternative.	Consumption data are provided in the 1998 FEIS. All systems will operate within CCAFS capacity.
	VAFB	Same as No-Action Alternative.	Consumption data are provided in the 1998 FEIS. All systems will operate within VAFB capacity.
Hazardous Materials and Hazardous Waste Management	CCAFS	Hazardous waste impacts over the No-Action Alternative would result from increased use of SRMs and increased launch rates. Launch vehicle contractors would be responsible for pollution prevention and storage and disposal of hazardous wastes. Because generated materials and wastes would be consistent with those currently managed in accordance with applicable regulations, no significant impacts are expected.	Launch vehicle contractors are responsible for pollution prevention and for storage and disposal of hazardous wastes. Quantities are provided in the 1998 FEIS.
	VAFB	Hazardous waste impacts over No-Action Alternative would result from increased use of SRMs and increased launch rates. Launch vehicle contractors would be responsible for pollution prevention and storage, management, and disposal of hazardous materials wastes. Because generated materials and wastes would be consistent with those currently managed in accordance with applicable regulations, no significant impacts are expected.	Launch vehicle contractors are responsible for pollution prevention, and for storage management and disposal of hazardous materials and wastes. Quantities are provided in the 1998 FEIS.

TABLE ES-1
Potential Environmental Impacts at CCAFS and Vandenberg AFB

Receptor	Location	Proposed Action	No-Action Alternative
Health and Safety	CCAFS	Same procedures for avoidance and mitigations as No-Action Alternative. HCl ground cloud would be larger and occur more frequently because of increased use of SRMs and increased launch rates. Implementation of established safety procedures would result in insignificant impacts.	HCl ground cloud will occur with one type of MLV, but established procedures will ensure no exposure to the general public, as described in the 1998 FEIS.
	VAFB	Same procedures for avoidance and mitigations as No-Action Alternative. HCl ground cloud would be larger and occur more frequently because of increased use of SRMs and increased launch rates. Implementation of established safety procedures would result in insignificant impacts.	HCl ground cloud will occur with one type of MLV, but established procedures will ensure no exposure to the general public, as described in the 1998 FEIS.
Geology and Soils	CCAFS	Same as No-Action Alternative, plus minor ground disturbance for paving activity for vehicle turnaround at the Receipt Inspection Shop and the Segment Ready Storage facilities. The area to be paved has previously been disturbed, and the potential for erosion would be negligible.	Construction activities will disturb soil, increasing the potential for erosion. Appropriate erosion control measures will be implemented and no adverse impacts are expected, as described in the 1998 FEIS.
	VAFB	Same as No-Action Alternative with no additional ground-disturbing activities beyond the No-Action Alternative.	Construction activities will disturb soil, increasing the potential for erosion. Appropriate erosion control measures will be implemented and no adverse impacts are expected, as described in the 1998 FEIS.
Water Resources	CCAFS	Same water usage as No-Action Alternative. Increased amounts of HCl deposition compared to No-Action Alternative, with no long-term surface water impacts.	Water required for EELV launch activities will not affect the amount of water available to CCAFS or the region. EELV water usage was underestimated in the 1998 FEIS, but corrected for this SEIS. No long-term effects on surface waters are expected as a result of HCl deposition.
	VAFB	Same water usage as No-Action Alternative. Increased amounts of HCl deposition compared to No-Action Alternative, with no long-term surface water impacts.	The amount of water required for EELV launch activities will not affect the amount of water available to VAFB or the region. EELV water usage was underestimated in the 1998 FEIS, but corrected for this SEIS. No long-term effects on surface waters are expected as a result of HCl deposition.

TABLE ES-1
Potential Environmental Impacts at CCAFS and Vandenberg AFB

Receptor	Location	Proposed Action	No-Action Alternative
Air Quality (Lower Atmosphere)	CCAFS	Construction and operational emissions would be the same as for the No-Action Alternative. Increased use of SRMs and increased frequency of launches would increase particulates, NO _x and other pollutants. All predicted concentrations are less than the corresponding standards. Impacts would be less than significant.	Quantities of construction vehicle emissions were corrected from the 1998 FEIS. Mobile source emissions will increase during construction, but will not exceed regulatory standards during any program years.
	VAFB	Construction emissions would be the same as for the No-Action Alternative. Increased use of SRMs and increased frequency of launches would increase particulates, NO _x and other pollutants. All predicted concentrations are less than the corresponding standards. Impacts would be less than significant.	Quantities of construction vehicle emissions were corrected from the 1998 FEIS to account for additional truck trips to remove launch deluge wastewater. Mobile source emissions will increase during construction, but will not exceed regulatory standards during any program years.
Air Quality (Upper Atmosphere)	CCAFS	Increased use of larger SRMs would result in increased chlorine and particulate emissions over the No-Action Alternative. An insignificant increase in ozone losses would occur locally and globally compared to the No-Action Alternative.	Quantities of vehicle emissions for No-Action Alternative were corrected from the 1998 FEIS. Small SRMs on one MLV will emit chlorine substances and particulates, resulting in temporary local ozone loss and small global contributions.
	VAFB	Increased use of larger SRMs would result in increased chlorine and particulate emissions over the No-Action Alternative. An insignificant increase in ozone losses will occur locally and globally compared to the No-Action Alternative.	Quantities of vehicle emissions for No-Action Alternative were corrected from the 1998 FEIS. Small SRMs on one MLV will emit chlorine substances and particulates, resulting in temporary local ozone loss and small global contributions.
Noise and Sonic Booms	CCAFS	Magnitude and location of launch noise and sonic booms would be similar to the No-Action Alternative. Frequency of noise and sonic booms would increase over the No-Action Alternative given the increased launch rate, but would be temporary.	Launch noise will be short term and temporary. Sonic boom footprints will occur over the Atlantic Ocean, as described in the 1998 FEIS.
	VAFB	Magnitude and location of launch noise and sonic booms would be similar to the No-Action Alternative. Frequency of noise and sonic booms would increase over the No-Action Alternative given the increased launch rate, but would be temporary and infrequent.	Launch noise would be short term and temporary. Sonic boom footprints were over the Channel Islands and the Pacific Ocean, as described in the 1998 FEIS.
Orbital Debris	CCAFS	Due to the increased launch rate compared to the No-action Alternative, there would be a nominal increase in orbital debris from domestic vehicles, but overall there will be no significant global effect on orbital debris.	Increased commercial launch rates for all launch vehicles will increase orbital debris over EELV's lifetime. Launch vehicle contractors are required to incorporate debris minimization into system design for upper stages, as described in the 1998 FEIS.
	VAFB	Due to the slight increase in launch rate compared to the No-Action Alternative, there would be a nominal increase in orbital debris from domestic vehicles, but overall there will be no significant global effect on orbital debris.	Increased commercial launch rates for all launch vehicles will increase orbital debris over EELV lifetime. Launch vehicle contractors are required to incorporate debris minimization into system design for upper stages, as described in the 1998 FEIS.

TABLE ES-1
Potential Environmental Impacts at CCAFS and Vandenberg AFB

Receptor	Location	Proposed Action	No-Action Alternative
Biological Resources	CCAFS	Increased launch rates over the No-Action Alternative would cause increased frequency of launch noise and associated temporary startle effects to local species. Larger and more frequent HCI ground clouds would occur from increased use of SRMs, temporarily affecting pad vegetation, birds, and small mammals in the vicinity.	Some construction activities could result in minor and transitory impacts to biological resources, as described in the 1998 FEIS.
	VAFB	Increased launch rates over the No-Action Alternative would cause increased frequency of launch noise and associated temporary startle effects to local species. Increased frequency of sonic booms over the Channel Islands would cause more frequent temporary disturbance of pinnipeds. Larger and more frequent HCI ground clouds would occur from increased use of SRMs, temporarily affecting pad vegetation, birds, and small mammals in the vicinity.	Some construction activities may result in minor and transitory impacts to biological resources, as described in the 1998 FEIS. EELV operations will cause intermittent and temporary noise and sonic booms and associated temporary startle effects to local species. Occasional launches of one vehicle configuration will result in temporary effects on flora and fauna.
Cultural Resources	CCAFS	Same as No-Action Alternative.	Cultural and historic surveys pertaining to EELV construction and activities are described in the 1998 FEIS. No cultural or historic sites will be affected.
	VAFB	Same as No-Action Alternative.	Cultural and historic surveys pertaining to EELV construction and activities are described in the 1998 FEIS. No cultural or historic sites will be affected. Construction activities at SLC-6 will require archaeological and Native American monitoring.
Environmental Justice	CCAFS	Same as No-Action Alternative.	Activities will not cause disproportionately high or adverse impacts to low-income or minority populations, as described in the 1998 FEIS.
	VAFB	Same as No-Action Alternative.	Activities will not cause disproportionately high or adverse impacts to low-income or minority populations, as described in the 1998 FEIS.

CCAFS = Cape Canaveral Air Force Station.
VAFB = Vandenberg Air Force Base.