

# Appendix S

## Clean Air Act Conformity Applicability Analysis for Vandenberg AFB

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### Purpose

The U.S. Air Force is required to perform a formal air conformity applicability analysis to determine whether the Evolved Expendable Launch Vehicle (EELV) program at Vandenberg Air Force Base (AFB), California, complies with the U.S. Environmental Protection Agency (EPA) Final Conformity Rule, 40 Code of Federal Regulations (CFR) 93, Subpart B (for federal agencies) and 40 CFR 51, Subpart W (for state requirements) of the amended Clean Air Act (CAA).

### Background

The U.S. EPA has issued regulations clarifying the applicability of and procedures for ensuring that federal activities comply with the amended CAA. The EPA Final Conformity Rule implements Section 176(c) of the CAA, as amended in 42 U.S. Code (USC) 7506(c). This rule was published in the *Federal Register* on November 30, 1993, and took effect on January 31, 1994.

The EPA Final Conformity Rule requires all federal agencies to ensure that any federal action resulting in nonattainment criteria pollutant emissions conforms with an approved or promulgated state implementation plan (SIP) or federal implementation plan (FIP). Conformity means compliance with a SIP/FIP's purpose of attaining or maintaining the National Ambient Air Quality Standards (NAAQS). Specifically, this means ensuring that the federal action will not: (1) cause a new violation of the NAAQS; (2) contribute to any increase in the frequency or severity of violations of existing NAAQS; or (3) delay the timely attainment of any NAAQS interim milestones, or other attainment milestones. NAAQS are established for six criteria pollutants: ozone (O<sub>3</sub>), carbon monoxide (CO), particulate matter equal to or less than 10 microns in diameter (PM<sub>10</sub>), nitrogen dioxide (NO<sub>2</sub>), sulfur dioxide (SO<sub>2</sub>), and lead (Pb). The current standards apply to federal actions in NAAQS nonattainment or maintenance areas only.

### Status

The proposed EELV program would be implemented at Vandenberg AFB in Santa Barbara County, California. The original EELV program was found to be exempt from general conformity requirements in a conformity applicability analysis provided with the 1998 FEIS. General conformity for the entire EELV program is being re-addressed in this analysis due to proposed changes in some aspects of the EELV program as presented in the FSEIS.

Air quality management in Santa Barbara County is under the jurisdiction of the Santa Barbara County Air Pollution Control District (SBCAPCD), the California Air Resources Board (CARB),

and EPA Region 9. All sections of SBCAPCD's Rule 702 were adopted verbatim from the federal General Conformity regulation (58 Federal Regulation [FR] 63214, November 30, 1993), except for provision 51.860, preambled below.

### 51.860 Mitigation of Air Quality Impact

- (A) Any measures that are intended to mitigate air quality impact must be identified (including the identification and quantification of all emission reductions claimed) and the process for implementation (including any necessary funding of such measures and tracking of such emission reductions) and enforcement of such measures must be described, including an implementation schedule counting explicit timelines for implementation.
- (B) Prior to determining that a federal action is in conformity, the federal agency making the conformity determination must obtain written commitments from the appropriate persons or agencies to implement any mitigation measures that are identified as conditions for making conformity determinations. Such written commitments shall describe such mitigation measures and the nature of the commitment, in a manner consistent with paragraph (A).
- (C) Persons or agencies voluntarily committing to mitigation measures to facilitate positive conformity determinations must comply with the obligations of such commitments.
- (D) In instances where the federal agency is licensing, permitting or otherwise approving the action of another governmental or private entity, approval by the federal agency must be conditioned on the other entity meeting the mitigation measures set forth in the conformity determination, as provided in paragraph (A).
- (E) When necessary because of changed circumstances, mitigation measures may be modified so long as the new mitigation measures continue to support the conformity determination in accordance with 51.858 and 51.859 and this section. Any proposed change in the mitigation measures is subject to the reporting requirements of Section 51.856, and the public participation requirements of Section 51.857.
- (F) After a state revises its SIP to adopt its general conformity rules and EPA approves that SIP revision, any agreements, including mitigation measures, necessary for a conformity determination will be both state and federally enforceable. Enforceability through the applicable SIP will apply to all persons who agree to mitigate direct and indirect emissions associated with a Federal Action for a conformity determination. Adopted 10/20/94.

Other than the above listed, Santa Barbara County is following federal implementation guidelines.

The area of Santa Barbara County containing Vandenberg AFB complies with state and federal standards for SO<sub>2</sub>, NO<sub>2</sub>, CO, and lead. The entire Santa Barbara County is classified as in serious nonattainment for ozone. The classification of nonattainment for PM<sub>10</sub> is by state standards only. The SBCAPCD did not meet its emission goals for moderate nonattainment for ozone. As a result, the district was reclassified to ozone **serious** nonattainment in December 1997.

The EPA Final Conformity Rule requires that total direct and indirect emissions of nonattainment criteria pollutants, including ozone precursors (volatile organic compounds

[VOCs] and nitrogen oxides [NO<sub>x</sub>]), be considered in determining conformity. The rule does not apply to actions where the total direct and indirect emission of nonattainment criteria pollutants do not exceed threshold levels for criteria pollutants established in 40 CFR 93.135(b). Table S-1 presents the de minimis threshold level of nonattainment areas. This analysis compares air emissions totals to both de minimis thresholds to take into consideration the ozone reclassification status of Santa Barbara County from moderate to serious nonattainment.

**TABLE S-1**  
De Minimis Threshold in Nonattainment Areas (tons per year)

Pollutant	Degree of Nonattainment Level	De Minimis <sup>a, b</sup>
Ozone (VOCs and NO <sub>x</sub> )	Moderate	100
	<b>Serious</b>	<b>50</b>
	Severe	25
	Extreme	10
VOCs	Marginal	50
NO <sub>x</sub>	Marginal	100
Carbon Monoxide	All	100
Particulate Matter	Moderate	100
	Serious	70
SO <sub>2</sub> or NO <sub>2</sub>	All	100
Lead	All	25

<sup>a</sup>The de minimis threshold level for ozone in Santa Barbara County was reclassified to 50 tons per year.

<sup>b</sup>The number in bold reflects de minimis threshold used in this analysis.

NO<sub>2</sub> = nitrogen dioxide.

NO<sub>x</sub> = nitrogen oxides.

SO<sub>2</sub> = sulfur dioxide.

VOCs = volatile organic compound.

Source: Santa Barbara County Air Pollution Control District - Regulation VII, Rule 702

In addition to meeting de minimis requirements, a federal action must not be considered a regionally significant action. A federal action is considered regionally significant when the total emissions from the action equal or exceed 10 percent of the air quality control area's emission inventory for any criteria pollutant. If a federal action meets de minimis requirements and is not considered a regionally significant action, then it is exempt from further conformity analyses pursuant to 40 CFR 93.153(c).

## Summary of Air Pollutant Emissions and Regulatory Standards

This section provides a summary of the Santa Barbara County noncompliance pollutant standards, as defined in the 1998 Clean Air Plan for Santa Barbara County (Santa Barbara County, 1998).

As discussed in the air quality sections of both the environmental impact statement (EIS) and the Supplemental EIS (SEIS) for the EELV program, Santa Barbara County is currently in violation of the state PM<sub>10</sub> standard and the state and federal ozone standards. Exceedances of the annual state standard for PM<sub>10</sub> have occurred only at the downtown Santa Maria monitoring station, while the 24-hour PM<sub>10</sub> state standard (50 µg/m<sup>3</sup> for California and 150 µg/m<sup>3</sup> for the federal standard) violations are dispersed throughout the county. Because Vandenberg AFB is located in Santa Barbara County, which does not exceed federal PM<sub>10</sub> standards and is unclassified by federal standards, a PM<sub>10</sub> analysis is not included as part of this Air Conformity Applicability Analysis.

Both the federal CAA and the California State CAA set up a method for classifying areas according to severity of ozone. These classifications determine regulatory requirements and target dates for ozone standard attainment. Five classifications have been mandated for ozone: marginal, moderate, serious, severe, and extreme. The current federal ozone standard is 0.12 parts per million. An area is designated as being in nonattainment if it violates the standard more than three times in 3 years at a single monitoring station. As mentioned in the EIS, the EPA has approved a new ozone standard. The new standard and implementation measures have not yet been approved in the Santa Barbara County Air Quality Management Plan or SIP.

For federal actions, an air conformity applicability analysis and (if needed) a conformity determination are required when the total of direct and indirect emissions of a criteria pollutant in a nonattainment or maintenance area caused by the federal action equals or exceeds the de minimis thresholds. The nonattainment pollutants included in this analysis are the ozone precursors (measured by VOCs and NO<sub>x</sub>).

## Emission Modeling

A total of direct and indirect emissions (increases and decreases) from the EELV program concepts was estimated using methods similar to those presented in the FEIS and FSEIS. The following conformity-related emission sources were considered in the emission estimates: launch emissions, operational direct and indirect emissions, construction-related emissions, and mobile source (direct and indirect) emissions from operations. The emissions estimates for this project were calculated for the following years: construction years 2000, 2001, and 2002; EELV operation years 2001 and 2002 and beyond; Air Quality Management Plan Conformity Growth year 2006; and expected peak launch year 2007. The year 2014 is also presented for consistency with the Air Conformity Applicability Analysis done for the 1998 FEIS. For comparison with the 1998 FEIS it should be noted that EELV construction is no longer scheduled to occur during the years 1998 and 1999. The baseline year is 1995, which is the most recent year for which detailed emissions information was available at the time of the analysis. Emissions were totaled for sources associated with the EELV program; unrelated activities that occur at Vandenberg AFB were not included in the comparison.

Indirect emissions are defined in 40 CFR 93.152 as emissions of a criteria pollutant which: (1) are caused by a federal action, but may occur later in time and/or may be farther removed in distance from the action itself, but are still reasonably foreseeable, and (2) the federal agency can practicably control and will maintain control over because of a continuing program responsibility.

The air quality modeling analysis required under the conformity rule must be based on the applicable air quality model, databases, and other requirements specified in the “Guideline on Air Quality Models (Revised)” (1986), including supplements (EPA Publication No. 450/2-78-027R) and the *Air Force Conformity Guide Handbook*. Models used in this applicability analysis to determine air emissions resulting from the EELV program at Vandenberg AFB include the EMFAC 7G module of the California Air Resources Board’s Motor Vehicle Emission Inventory Model (California Environmental Protection Agency, 1996), the state of California-approved model for motor vehicles, and emission factors of aircraft associated with EELV component deliveries from *Emissions and Dispersion Modeling System* (EDMS, Version 3.0). Emissions of VOCs and NO<sub>x</sub> generated by facility construction activities were projected based on CEQA Air Quality Handbook (South Coast Air Quality Management District, 1993) and AP-42 (U.S. Environmental Protection Agency, 1995) factors. These emission factors have been established for each of the following categories of construction activity:

- Grading Equipment: Emissions in the grading phase are primarily associated with the exhaust from large earth-moving equipment.
- Asphalt Paving: VOC emissions in the asphalt paving phase are released through the evaporation of solvents contained in paving materials.
- Stationary Equipment: Emissions from stationary equipment occur when machinery such as generators, air compressors, welding machines, and other similar equipment are used at the construction site.
- Mobile Equipment: Mobile equipment includes forklifts, dump trucks, excavators, etc.
- Architectural Coatings: VOCs are released through the evaporation of solvents that are contained in paints, varnishes, primers, and other surface coatings.
- Commuter Automobiles: Commuter traffic emissions are generated from commuter trips to and from the work site by construction employees. The average vehicle ridership number (1.5 persons per vehicle) from the California Environmental Quality Act (CEQA) Handbook was applied.

For the purpose of comparison, it should be noted that the Air Conformity Applicability Analysis in the 1998 FEIS used the previous version of EMFAC, version 7F; whereas, as noted above, version 7G has been used here. As noted in its release letter (California Air Resources Board, 1996), for years 2000 and beyond, EMFAC7G will predict lower levels of ROG than did EMFAC7F. This is because EMFAC7G takes into account the effects of the state-mandated use of low-emission vehicles while EMFAC7F did not.

Construction and operational requirements and associated emissions for both the Atlas V and Delta IV programs were re-assessed for this analysis. Construction equipment—and its associated emissions—are accounted for and details are described in Tables S-3 through S-9. The construction schedule for Delta IV facilities was compressed from four years to three and moved from 1998-2001 to 2000-2002. The Atlas V facilities construction schedule remained essentially unchanged. In addition, Delta IV facilities construction analyzed in this analysis expanded slightly to include modifications to the South Vandenberg Boat Dock, dredging, and construction of an open parking area near the dock (see Table S-7).

Both Boeing and Lockheed Martin Corporation (LMC) have revised their estimates of operational staffing from the figures provided in the 1998 FEIS. In particular, estimates of day-to-day staffing, which is present whether or not a launch is occurring, has changed. These changes are presented in Table S-2.

**TABLE S-2**  
 Comparison of FEIS and Current Estimated Day-to-Day Staffing

YEAR(S)	FEIS (1998)		Current	
	LMC	Boeing	LMC	Boeing
2001	115	340	0	100
2002	125	370	200	134
2003	128	400	200	167
2004	130	400	200	200
2005	133	400	200	234
2006	135	400	200	267
2007-2020	135	400	200	300

The reduction in the total day-to-day staffing (especially in the early years of the program) resulted in a reduction in both VOCs and NO<sub>x</sub> from this source. In addition to the day-to-day staffing, emissions calculated on a per launch basis (increased staff, deliveries, maintenance activities, launch vehicle emissions, etc.) also decreased in the early years of the program due to reductions in scheduled launches from four and six in 2001 and 2002 as projected in the FEIS to zero and two, respectively, as currently projected in the FSEIS.

### Tables and Emission Data

Emission calculations for VOCs were performed as consistently as possible. Several information sources identify “ROC,” for reactive organic compounds, instead of “VOC,” for volatile organic compounds. For all practical purposes, these two terms can be considered equivalent. The federal government generally uses the term VOC, which is defined, in part, in 40 CFR 60.2, as “any organic compound which participates in atmospheric photochemical reactions.” The term VOC has been chosen for use in this document. When using emission factors that list emissions as “total hydrocarbons” and “total non-methane hydrocarbons,” the document uses “total non-methane hydrocarbons” as a VOC equivalent. Methane does not participate in atmospheric photochemical reactions and therefore does not fall under the definition of VOC. While there are other hydrocarbons that similarly do not fall under the definition of VOC, the use of “total non-methane hydrocarbons” as a VOC equivalent is considered conservative and appropriate.

The emissions of ozone precursors (VOCs and NO<sub>x</sub>) and other criteria pollutants that would result from construction and implementation of the EELV program are shown in Tables S-3 and S-4.

**TABLE S-3**  
 Comparison of EELV Annual Emission Inventory at Vandenberg AFB (tons/year)

Pollutant	Emission Sources	2000	2001	2002	2006	2007	2014	
VOCs	Construction-Related							
		Grading Equipment and Asphalt Paving	1.3	3.7	0.0			
		Stationary Equipment	7.1	7.1	0.7			
		Mobile Equipment	3.7	7.2	0.2			
		Subtotal for Construction Equipment <sup>(a)(b)</sup>	12.1	17.9	0.9			
		Architectural Coatings						
		(Non-Residential)	1.8	11.0	3.6			
		Commuter Automobile	2.2	1.9	0.3			
		<i>Total Construction-Related Emissions</i>	16.1	30.8	4.8			
		Operation-Related						
		Program Launches		0.0	0.0	0.0	0.0	0.0
		Preparation and Assembly		0.0	1.4	4.2	7.0	5.0
		Mobile Sources <sup>(c)</sup>		1.1	3.3	3.5	3.6	2.1
		Point Sources		0.8	0.8	0.8	0.8	0.8
		<i>Total Operation-Related Emissions</i>		1.9	5.5	8.6	11.5	8.0
	Emission Decreases from FEIS No-Action		(1.5)	(2.7)	(4.1)	(4.8)	(5.1)	
	<b>Total Project Emissions</b>	<b>16.1</b>	<b>31.2</b>	<b>7.7</b>	<b>4.5</b>	<b>6.7</b>	<b>2.9</b>	
NOx	Construction-Related							
		Grading Equipment and Asphalt Paving	11.8	7.6	0.5			
		Stationary Equipment	2.3	3.1	0.0			
		Mobile Equipment	22.2	25.6	1.2			
		Subtotal for Construction Equipment <sup>(a)(b)</sup>	36.4	36.3	1.8			
		Architectural Coatings						
		(Non-Residential)	0.0	0.0	0.0			
		Commuter Automobile	3.9	3.2	0.6			
		<i>Total Construction Emissions</i>	40.3	39.5	2.4			
		Operation-Related						
		Program Launches		0.0	1.9	5.6	8.9	6.0
		Preparation and Assembly		0.0	0.0	0.0	0.0	0.0
		Mobile Sources <sup>(c)</sup>		2.7	8.2	8.9	9.6	6.5
		Point Sources		8.7	8.7	8.7	8.7	8.7
		<i>Total Operation-Related Emissions</i>		11.4	18.8	23.2	27.2	21.2
	Emission Decreases from FEIS No Action		(9.8)	(10.5)	(10.9)	(11.6)	(11.3)	
	<b>Total Project Emissions</b>	<b>40.3</b>	<b>41.1</b>	<b>10.7</b>	<b>12.3</b>	<b>15.6</b>	<b>9.9</b>	

<sup>(a)</sup>Details of Construction Equipment are shown in Tables S-5 and S-6. Construction Equipment added due to additional Boeing construction is shown in Table S-7.

<sup>(b)</sup>Emission Factors used for Construction Equipment are shown in Tables S-8 and S-9.

<sup>(c)</sup>Details of Operation-Related Mobile Sources are shown in Table S-10.

NO<sub>x</sub> = nitrogen oxides

VOC = volatile organic compound

**TABLE S-4**  
Comparison of Pollutant Emissions to Emissions Inventory

Proposed Action	Year	Emissions (tons/year)			
		VOCs	% of Inventory	NOx	% of Inventory
Santa Barbara County Emissions Inventory <sup>a</sup>		44,460		16,589	
	2000	16.1	0.04	40.3	0.24
	2001	31.2	0.07	41.1	0.25
	2002	7.7	0.02	10.7	0.06
	2006	4.5	0.01	12.3	0.07
	2007	6.7	0.02	15.6	0.09
	2014	2.9	0.01	9.9	0.06

(a)1996 Santa Barbara County Planning Emission Inventory (Santa Barbara County, 1998).

NO<sub>x</sub> = nitrogen oxides.

VOCs = volatile organic compounds.

## Analysis

The total of direct and indirect emissions resulting from EELV construction and operational activities is illustrated in Table S-3. The VOC and NOx emissions were estimated based on construction and program information provided by each of the two contractors and revised launch rates provided by the Air Force. Emissions fall below the de minimis threshold of 50 tons for conformity. A formal air conformity determination will not be required for the EELV program, as required by the CAA, 40 CFR Part 93. The analysis for conformity will be in effect for 5 years unless the action changes. Total emissions from the EELV program are less than 10 percent of the Santa Barbara County emission inventory; therefore, the EELV program is not regionally significant.

Changes between Table K-4 in the FEIS and Table S-3 in this Appendix were driven by four primary factors: (1) differences in modeling results due to differences between EMFAC versions 7F (used in the FEIS) and 7G (used in this analysis), (2) changes in operational day to day staffing for Boeing and LMC, especially in the early years of the program, (3) a substantial reduction in launch rates in 2001 and 2002 and (4) a compression and shift of Boeing's construction schedule. Factors one, two, and three tended to reduce VOCs and NOx emitted during the 2000-2002 period while factor four tended to increase the VOC and NOx emissions during the same period. The end result moved the year with the highest NOx levels from 2000 to 2001 and lowered the highest predicted level from 46.4 tons to 41.1 tons.

Several elements of the data presented in Table S-3 are provided in greater detail in the following tables:

- Details of the construction equipment presented in Table S-3 are shown in Tables S-5 and S-6.
- Additional Boeing construction equipment tasks not addressed in the original conformity applicability analysis (boat dock modification, CBC staging area) are shown in Table S-7.
- Emission factors used for construction equipment are shown in Tables S-8 and S-9.
- Details of Operation-Related Mobile Sources are shown in Table S-10.

TABLE S-5

Monthly Operating Hours for Construction Equipment at Vandenberg AFB for LMC (Part 1 of 2)

Equipment Type	Jan '00		Feb '00		Mar '00		Apr '00		May '00		Jun '00		Jul '00		Aug '00		Sep '00		Oct '00		Nov '00		Dec '00		
	No.	Hours	No.	Hours	No.	Hours	No.	Hours	No.	Hours	No.	Hours	No.	Hours	No.	Hours	No.	Hours	No.	Hours	No.	Hours	No.	Hours	
Pickup Trucks (3/4 ton)	13	1560	13	1560	13	1560	28	3360	28	3360	28	3360	33	3960	32	3840	32	3840	32	3840	29	3480	29	3480	
Flat Bed Truck							3	288	3	288	3	288	3	288	3	288	3	288	3	288					
Transportation Vehicles (Vans)	6	432	6	432	6	432	10	720	10	720	10	720	10	720	10	720	10	720	10	720	10	720	10	720	
Semi-Trucks							6	576	6	576	6	576	6	576	6	576	6	576	6	576	6	576	6	576	
Crawler Crane																		1	192	1	192	1	192		
Backhoe-1-1/2 cy Bucket			2	288	2	288	2	288	2	288	2	288													
Backhoe w/Demolition Attachment							2	384	2	384	2	384	2	384	2	384	2	384	2	384	2	384	2	384	
Crane -15T to 35T Capacity									3	288	3	288	3	288	3	288	3	288	3	288	3	288	3	288	
Dozer							2	332	2	200	2	80	2	72							2	152	2	72	
Scraper/Pan							3	498	3	528	3	294	3	294											
Motor Grader									1	176	1	176	1	176	1	176	1	176	1	176	1	176	1	176	
Plate Compactor									1	176	1	176	1	176	1	176	1	176	1	176	1	176	1	176	
Front End Loader							1	88	1	176	1	176	1	176	1	176	1	176	1	176	1	176	1	176	
Roller									1	88	1	88	1	88	1	88	1	88	1	88	1	88	1	88	
Water Truck							1	88	1	88	1	88	1	88	1	88	1	88	1	88	1	88	1	88	
Paving Machine																									
Skip Loader							1	176	1	176	1	176	1	176	1	176	1	176	1	176	1	176	1	176	
Service Truck							1	22	1	22	1	22	1	22	1	22	1	22	1	22	1	22	1	22	
Bucket Truck																									
Line Truck																			1	96	1	96	1	96	
Trencher																	1	120	1	120	1	120	1	120	
Manlift																				2	240	2	240		
750-cfm Air Compressor														2	336	2	336	2	336	2	336	2	336		
375-cfm Air Compressor							1	144	1	144	1	144	1	144	1	144	1	144	1	144	1	144	1	144	
300-amp Welding Machine																				6	864	6	864		
600-amp Welding Machine												12	1728	12	1728	12	1728	12	1728	12	1728	16	2304	16	2304
600-amp Shear Stud Welder																				1	144	1	144		
Forklift								2	240	2	240	2	240	2	240	2	240	2	240	2	240	2	240		

**TABLE S-5**  
 Monthly Operating Hours for Construction Equipment at Vandenberg AFB for LMC (Part 2 of 2)

Equipment Type	Jan '01		Feb '01		Mar '01		Apr '01		May '01		Jun '01		Jul '01		Aug '01		Sep '01		Oct '01		Nov '01		Dec '01		Jan '02	
	No.	Hours	No.	Hours	No.	Hours	No.	Hours	No.	Hours	No.	Hours	No.	Hours	No.	Hours	No.	Hours	No.	Hours	No.	Hours	No.	Hours	No.	Hours
Pickup Trucks (3/4 ton)	31	3720	33	3960	33	3960	33	3960	33	3960	33	3960	29	3480	29	3480	25	3000	25	3000	19	2280	19	2280	9	1080
Flat Bed Truck																										
Transportation Vehicles (Vans)	10	720	10	720	10	720	10	720	10	720	10	720	10	720	10	720	10	720	6	432	6	432	6	432		
Semi-Trucks	6	576	6	576	6	576	6	576	6	576	6	576														
Crawler Crane	1	192	1	192	1	192	1	192	1	192																
Backhoe-1-1/2 cy Bucket																										
Backhoe w/Demolition Attachment																										
Crane -15T to 35T Capacity	3	288	3	288	2	192	2	192	2	192	1	96	1	96	1	96	1	96	1	96	1	96	1	96		
Dozer																										
Scraper/Pan																										
Motor Grader					1	176	1	88	1	88	1	88														
Plate Compactor					1	176	1	176	1	176	1	88														
Front End Loader					1	176	1	176	1	176																
Roller							1	44	1	44																
Water Truck	1	88	1	88	1	88	1	88	1	88	1	88	1	88												
Paving Machine											1	44	1	44	1	44	1	44	1	88	1	88	1	44		
Skip Loader	1	176	1	176	1	176	1	176	1	176	1	176	1	176												
Service Truck	1	22	1	22	1	22	1	22	1	22	1	22	1	22												
Bucket Truck																										
Line Truck	1	96	1	96	1	96	1	96																		
Trencher	1	120	1	120	1	120	1	120	1	120	1	120	1	120	1	120	1	120	1	120	1	120				
Manlift	2	240	2	240	2	240	2	240	2	240	2	240	2	240	2	240	2	240	2	240	2	240	2	240		
750-cfm Air Compressor	2	336	2	336	2	336																				
375-cfm Air Compressor	2	288	2	288	2	288	2	288	2	288	2	288	2	288	2	288										
300-amp Welding Machine	6	864	6	864	6	864	6	864	6	864	6	864														
600-amp Welding Machine	16	2304	16	2304	16	2304	16	2304	16	2304	2	288	2	288	2	288	2	288	2	288						
600-amp Shear Stud Welder	1	144	1	144	1	144	1	144	1	144	1	144														
Forklift	2	240	2	240	2	240	2	240	2	240	2	240	2	240	2	240	1	120	1	120	1	120	1	120		

**TABLE S-6**  
 Monthly Operating Hours for Construction Equipment at Vandenberg AFB for Boeing (Part 1 of 3)

Equipment Type	Feb '00		Mar '00		Apr '00		May '00		Jun '00		Jul '00		Aug '00		Sep '00		Oct '00		Nov '00		Dec '00		
	No.	Hours	No.	Hours	No.	Hours	No.	Hours	No.	Hours	No.	Hours	No.	Hours	No.	Hours	No.	Hours	No.	Hours	No.	Hours	
Trencher (Diesel)	1	134	1	134	1	67	1	134					1	24									
Backhoe (Diesel)	1	67	1	67	1	67	1	134					1	48									
D-B Bull Dozer (Diesel)	1	125	1	125	1	125	1	125						1	40								
977 Front End Loader (Diesel)	1	116	1	116	1	116	2	232	2	232													
12CY Dump Truck (Diesel)	3	174	2	232	3	349	6	697	2	232	2	232											
Plate Compactor (Gas)	1	125	1	125	1	125														2	80		
Sheeps Foot (Diesel)			1	63	1	63	1	125									1	80					
Motor Grader CAT 12G (Diesel)														1	40	1	125	1	125	1	125	1	125
Excavator CAT 235 (Diesel)	1	125	1	125	2	250	2	250	2	250	1	125											
Welding Machines (Gas)	4	533	4	533	4	533	10	1333	10	1333	10	1333	10		10	1333	10	1333	8	1066	8	1066	
125-Ton Crane (Diesel)	1	125	1	125	1	125	2	250	2	250	2	250	2		2	250	2	250	1	125	1	125	
230-Ton Crane (Diesel)					1	63	1	125	1	125	1	125	1		1	125	1	125	1	125	1	125	
45-Ton Cherry Picker (Diesel)	2	250	2	250	3	375	6	750	6	750	6	750	4		4	500	4	500	4	500	4	500	
5-Ton Fork Lift (Gas)	1	115	1	115	1	115	2	230	2	230	2	230	2		2	230	2	230	2	230	2	230	
80-Ft Man Lift (Gas)	1	95	1	95	1	95	2	190	2	190	2	190	2		2	190	2	190	2	190	2	190	
Flat Bed Truck (Diesel)	2	189	2	189	2	189	4	378	4	378	4	378	4		4	378	4	378	4	378	4	378	
Cars, Pick-ups (Gas)	7	543	7	543	7	543	14	1085	14	1085	14	1085	14		14	1085	12	930	12	930	8	620	
Asphalt Paver (Diesel)					1	63	1	125											1	40	1	40	
Water Truck (Diesel)			1	134	1	134	1	134									1	80					
Air Compressor (Gas)			1	125	2	250	4	500	4	500	2	250	2	250	2	250	2	250	2	250	1	125	
Semi-Truck Deliveries (General)	200	400	200	400	200	400	160	320	160	320	160	320	200	400	200	400	201	408	201	408	201	408	
Concrete Trucks							160	320	160	320	160	320	40	80	40	80	40	80	40	80	40	80	
Semi-Truck Deliveries (Steel)	100	200	100	200	100	200	80	160	80	160	80	160	120	240	120	240	120	240	120	240	120	240	
500-HP Dredge (Diesel)																							
750-HP Tugboats (Diesel)																							

**TABLE S-6**  
Monthly Operating Hours for Construction Equipment at Vandenberg AFB for Boeing (Part 2 of 3)

Equipment Type	Jan '01		Feb '01		Mar '01		Apr '01		May '01		Jun '01		Jul '01		Aug '01		Sep '01		Oct '01		Nov '01		Dec '01		
	No.	Hours	No.	Hours	No.	Hours	No.	Hours	No.	Hours	No.	Hours	No.	Hours	No.	Hours	No.	Hours	No.	Hours	No.	Hours	No.	Hours	
Trencher (Diesel)							2	267	2	267	2	267	2	267	2	267	2	267	2	267	2	267	1	133	
Backhoe (Diesel)							1	133	2	397	1	133	2	267	2	267	2	267	2	267	2	267	1	67	
D-B Bull Dozer (Diesel)	1	125	2	250	2	250	1	125	2	257													1	125	
977 Front End Loader (Diesel)	1	116	1	116	2	232	2	232	2	232	2	232	1	116	1	116	1	116	2	232	2	232	1	116	
12CY Dump Truck (Diesel)	2	232	2	232	2	232	4	464	6	728	4	464	2	232	2	232	1	116	1	116	1	116	3	174	
Plate Compactor (Gas)					1	125	2	250	2	250	2	250	2	250	1	125	1	125	1	125	1	125			
Sheeps Foot (Diesel)			2	250	2	250	2	250	2	250	2	250	2	250	1	125	1	125							
Motor Grader CAT 12G (Diesel)			1	125	1	125	1	125	1	125	1	125	1	125	1	125	1	125	1	125	1	125			
Excavator CAT 235 (Diesel)	2	250	2	250	2	250	2	250	2	250	2	250	2	250	2	250	1	125	1	125					
Welding Machines (Gas)	4	533	4	533	6	800	2	267	4	533	4	533	4	533	4	533	4	453	4	453	4	453	4	533	
125-Ton Crane (Diesel)	1	125	1	125	1	125					1	125	2	250	2	250	2	250	1	250	1	250	1	125	
230-Ton Crane (Diesel)	1	125																							
45-Ton Cherry Picker (Diesel)	4	500	2	250	3	375	2	250	3	380	3	380	4	500	4	500	4	500	2	250	2	250	2	250	
5-Ton Fork Lift (Gas)	2	230	1	115	1	115	2	230	2	230	2	230	2	230	2	230	2	230	2	230	2	230	1	115	
80-Ft Man Lift (Gas)	2	190												2	190	2	190	2	190	2	190	2	190	1	95
Flat Bed Truck (Diesel)	4	378	2	190	3	285	1	95	2	190	2	190	4	378	4	378	4	378	4	378	4	378	2	189	
Cars, Pick-ups (Gas)	12	930	12	930	12	930	6	465	6	465	6	465	8	620	8	620	10	775	10	775	12	930	7	542	
Asphalt Paver (Diesel)	1	125	1	125																					
Water Truck (Diesel)					1	134	1	134											1	134	1	134			
Air Compressor (Gas)	1	125							1	125	1	125	1	125	1	125	1	125							
Semi-Truck Deliveries (General)	260	520	260	520	300	600	140	280	140	280	120	240	120	240	120	240	120	240	120	240	120	240			
Concrete Trucks	1	16			160	320	160	320	160	320	80	160	80	160	80	160	80	160	80	160	80	160			
Semi-Truck Deliveries (Steel)	120	240	120	240	160	320	80	160	80	160	60	120	60	120	60	120	60	120	60	120	60	120			
500-HP Dredge (Diesel)							1	264	1	264															
750-HP Tugboats (Diesel)							1	180	1	20															

**TABLE S-6**  
 Monthly Operating Hours for Construction Equipment at Vandenberg AFB for Boeing (Part 3 of 3)

Equipment Type	Jan '02		Feb '02	
	No	Hours	No	Hours
Trencher (Diesel)	1	133	1	67
Backhoe (Diesel)	1	67	1	67
D-B Bull Dozer (Diesel)	1	125	1	125
977 Front End Loader (Diesel)	1	116	1	116
12CY Dump Truck (Diesel)	2	232	3	348
Plate Compactor (Gas)				
Sheeps Foot (Diesel)	1	62	1	62
Motor Grader CAT 12G (Diesel)				
Excavator CAT 235 (Diesel)				
Welding Machines (Gas)	4	533	4	533
125-Ton Crane (Diesel)	1	125	1	125
230-Ton Crane (Diesel)			1	62
45-Ton Cherry Picker (Diesel)	2	250	3	375
5-Ton Fork Lift (Gas)	1	115	1	115
80-Ft Man Lift (Gas)	1	95	1	95
Flat Bed Truck (Diesel)	2	189	2	189
Cars, Pick-ups (Gas)	7	542	7	542
Asphalt Paver (Diesel)			1	62
Water Truck (Diesel)				
Air Compressor (Gas)	1	125	2	250
Semi-Truck Deliveries (General)				
Concrete Trucks				
Semi-Truck Deliveries (Steel)				
500-HP Dredge (Diesel)				
750-HP Tugboats (Diesel)				

**TABLE S-7**  
 Monthly Operating Hours for Additional Construction Equipment at Vandenberg AFB for Boeing Construction Not Addressed in Original 1998 Conformity Applicability Analysis (Subset of Construction Equipment shown in Table S-6)

Equipment Type	Aug '00		Sept '00		Oct '00		Nov '00		Dec '00		Jan '01		Feb '01		Mar '01		Apr '01		May '01	
	No.	Hours	No.	Hours	No.	Hours	No.	Hours	No.	Hours	No.	Hours	No.	Hours	No.	Hours	No.	Hours	No.	Hours
Trencher (Diesel)	1	24																		
Backhoe (Diesel)	1	48																	1	264
D-8 Bull Dozer (Diesel)			1	40															1	132
12CY Dump Truck (Diesel)																			2	264
Plate Compactor (Gas)									2	80										
Sheeps Foot (Diesel)					1	80														
Motor Grader CAT 12G (Diesel)			1	40																
500-HP Dredge (Diesel)																	1	264	1	264
750-HP Tugboats (Diesel)																	1	180	1	20
Asphalt Paver							1	40	1	40										
Water Truck (Diesel)					1	80														
Concrete Trucks											1	16								
Semi-Truck Deliveries					1	8	1	8	1	8										

**TABLE S-8**  
 Emissions Factors for LMC Construction Equipment

Equipment Type	Emission Factors for Criteria Pollutants (lbs/hr and lbs/hp-hr)		Reference (a)	Equipment Class
	ROC	NOx		
Pickup Trucks (3/4 ton)	0.09287	0.4648	AP-42	HDDV @ 1995 Fleet, <4000ft
Flat Bed Truck	0.09287	0.4648	AP-42	HDDV @ 1995 Fleet, <4000ft
Transportation Vehicles (Vans)	0.09287	0.4648	AP-42	HDDV @ 1995 Fleet, <4000ft
Semi-Trucks	0.002	0.021	Table A-9-8-B	Dumpers/Tendors
Crawler Crane	0.003	0.023	Table A-9-8-B	Cranes (D)
Backhoe-1-1/2 cy Bucket	0.003	0.022	Table A-9-8-B	Trctr/Lodr/Bakho (D)
Backhoe w/Demolition Attachment	0.003	0.022	Table A-9-8-B	Trctr/Lodr/Bakho (D)
Crane -15T to 35T Capacity	0.003	0.023	Table A-9-8-B	Cranes (D)
Dozer	0	0	Table A-9-8-A	Wheeled Dozer (D)
Scraper/Pan	0.27	3.84	Table A-9-8-A	Scraper (D)
Motor Grader	0.039	0.713	Table A-9-8-A	Motor Grader (D)
Plate Compactor	0.043	0.004	Table A-9-8-B	Plate Compctr (4 strk) (G)
Front End Loader	0.002	0.023	Table A-9-8-B	Rubber Tired Loader (D)
Roller	0.065	0.87	Table A-9-8-A	Roller (D)
Water Truck	0.002	0.021	Table A-9-8-B	Dumpers/Tendors
Paving Machine	0.002	0.024	Table A-9-8-B	Paving Equip (2/4 strk) (D)
Skip Loader	0.004	0.021	Table A-9-8-B	Skid-Steer Loader (D)
Service Truck	0.002	0.021	Table A-9-8-B	Dumpers/Tendors
Bucket Truck	0.002	0.021	Table A-9-8-B	Dumpers/Tendors
Line Truck	0.002	0.021	Table A-9-8-B	Dumpers/Tendors
Trencher	0.003	0.022	Table A-9-8-B	Trenchers (D)
Manlift	0.003	0.031	Table A-9-8-B	Aerial Lifts (D)
750-cfm Air Compressor	0.054	0.002	Table A-9-8-B	Air Compressor <50 hp (G)
375-cfm Air Compressor	0.002	0.018	Table A-9-8-B	Air Compressor <50 hp (D)
300-amp Welding Machine	0.002	0.018	Table A-9-8-B	Welders <50 hp (D)
600-amp Welding Machine	0.002	0.018	Table A-9-8-B	Welders <50 hp (D)
600-amp Shear Stud Welder	0.054	0.002	Table A-9-8-B	Welders <50 hp (G)
Forklift	0.003	0.031	Table A-9-8-B	Fork Lift (D)

(a) CEQA Air Quality Handbook unless otherwise specified

**TABLE S-9**  
 Emissions Factors for Boeing Construction Equipment

Equipment Type	Emission Factors for Criteria Pollutants (lbs/hr and lbs/hp-hr)		Reference (a)	Equipment Class
	ROC	NOx		
Trencher (Diesel)	0.003	0.022	Table A-9-8-B	Trenchers
Backhoe (Diesel)	0.003	0.022	Table A-9-8-B	Trctr/Lodr/Bakho
D-B Bull Dozer (Diesel)	0	0	Table A-9-8-A	Wheeled Dozer
977 Front End Loader (Diesel)	0.002	0.023	Table A-9-8-B	Rubber Tired Loader
12CY Dump Truck (Diesel)	0.002	0.021	Table A-9-8-B	Dumpers/Tendors
Plate Compactor (Gas)	0.043	0.004	Table A-9-8-B	Plate Compctr (4 strk)
Sheeps Foot (Diesel)	0.065	0.87	Table A-9-8-A	Roller
Motor Grader CAT 12G (Diesel)	0.039	0.713	Table A-9-8-A	Motor Grader
Excavator CAT 235 (Diesel)	0.001	0.024	Table A-9-8-B	Excavator
Welding Machines (Gas)	0.054	0.002	Table A-9-8-B	Welders <50 hp
125-Ton Crane (Diesel)	0.003	0.023	Table A-9-8-B	Cranes
230-Ton Crane (Diesel)	0.003	0.023	Table A-9-8-B	Cranes
45-Ton Cherry Picker (Diesel)	0.003	0.031	Table A-9-8-B	Aerial Lifts
5-Ton Fork Lift (Diesel)	0.003	0.031	Table A-9-8-B	Fork Lift (D)
80-Ft Man Lift (Gas)	0.003	0.031	Table A-9-8-B	Aerial Lifts (G)
Flat Bed Truck (Gas)	0.09287	0.4648	AP-42	HDDV@1995 Fleet <4000ft
Cars, Pick-ups (Gas)	0.09287	0.4648	AP-42	HDDV@1995 Fleet <4000ft
Asphalt Paver (Diesel)	0.001	0.023	Table A-9-8-B	Asphalt Pavers
Water Truck (Diesel)	0.002	0.021	Table A-9-8-B	Dumpers/Tendors
Air Compressor (Gas)	0.054	0.002	Table A-9-8-B	Air Compressor <50 hp
Semi-Truck Deliveries (General)	0.002	0.021	Table A-9-8-B	Dumpers/Tendors
Concrete Trucks	0.002	0.021	Table A-9-8-B	Dumpers/Tendors
Semi-Truck Deliveries (Steel)	0.002	0.021	Table A-9-8-B	Dumpers/Tendors
500-HP Dredge (Diesel)	0.0006	0.0086	Table A-9-3-A	Reciprocating Diesel Engine
750-HP Tugboats (Diesel)	0.0006	0.0086	Table A-9-3-A	Reciprocating Diesel Engine

(a) CEQA Air Quality Handbook unless otherwise specified

**TABLE S-10**  
 Emission Sources for Operation-Related Mobile Sources (Part 1 of 2)

Operation Activity	Emission Source	Description
Infrastructure	Privately Owned Vehicle (POV) traffic	Emissions in Santa Barbara County were calculated using EMFAC7 emission factors and the following assumptions: on-base vehicle speed is 25 mph, off-base vehicle speed is 50 mph, distribution of employee residences same as 1997 socioeconomic study for VAFB, average vehicle ridership is 1.5 (per CEQA Air Quality Handbook), non-work trip length included in total off-base VMT, ratio of non-work trip distance to work trip distance of 0.768, POVs 81.6% light-duty automobiles and 18.4% light-duty trucks, trips occur regardless of whether a launch occurs, and trips occur 360 days per year.
	Delivery Truck Traffic	Emissions in Santa Barbara County were calculated using EMFAC7 emission factors and the following assumptions: on-base vehicle speed is 25 mph, off-base vehicle speed is 50 mph, delivery trucks are a mixture of light-duty and medium-duty trucks, trips occur regardless of whether a launch occurs, and trips occur 360 days per year.
Launch of either an Atlas V or a Delta IV	Launch Related Personnel Traffic	Emissions in Santa Barbara County were calculated using EMFAC7 emission factors and the following assumptions: on-base vehicle speed is 25 mph, off-base vehicle speed is 50 mph, distribution of employee residences same as 1997 socioeconomic study for VAFB, average vehicle ridership is 1.5 (per CEQA Air Quality Handbook), non-work trip length included in total off-base VMT, ratio of non-work trip distance to work trip distance of 0.768, POVs 81.6% light-duty automobiles and 18.4% light-duty trucks, and trips occur on a per launch basis.
	Launch Related Truck Traffic	Emissions in Santa Barbara County were calculated using EMFAC7 emission factors and the following assumptions: on-base vehicle speed is 25 mph, off-base vehicle speed is 50 mph, trucks are a mixture of light-duty and heavy-duty trucks, and trips occur on a per launch basis.
	Aircraft traffic	Emissions in Santa Barbara County were calculated using emission factors from EDMS, and the following assumptions: aircraft are a mixture of C-5s, C-17s, and C-141, and trips occur on a per launch basis.

**TABLE S-10**  
 Emission Sources for Operation-Related Mobile Sources (Part 2 of 2)

Operation Activity	Emission Source	Description
Launch of a Delta IV	Barge traffic	Emissions in Santa Barbara County were calculated using manufacturer-supplied emission factors and the distance traveled within Santa Barbara County. One barge per launch was assumed.
Launch of a Delta IV (5,2)/(5,4)	Transport of Flushing Water	Emissions in Santa Barbara County were calculated using EMFAC7 emission factors for heavy-duty trucks and the distance the traveled within Santa Barbara County. Twelve truck trips per launch were assumed.
Launch of an Atlas V	Transport of Deluge Water	Emissions in Santa Barbara County were calculated using EMFAC7 emission factors for heavy-duty trucks and the distance the traveled within Santa Barbara County. Sixty truck trips per launch were assumed.
Launch of either an Atlas V 500 or a Delta IV (5,2)/(5,4)	Transport of Solid Rocket Motors	Emissions in Santa Barbara County were calculated using EMFAC7 emission factors for heavy-duty trucks and the distance traveled within Santa Barbara County. One truck per solid rocket motor was assumed.

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