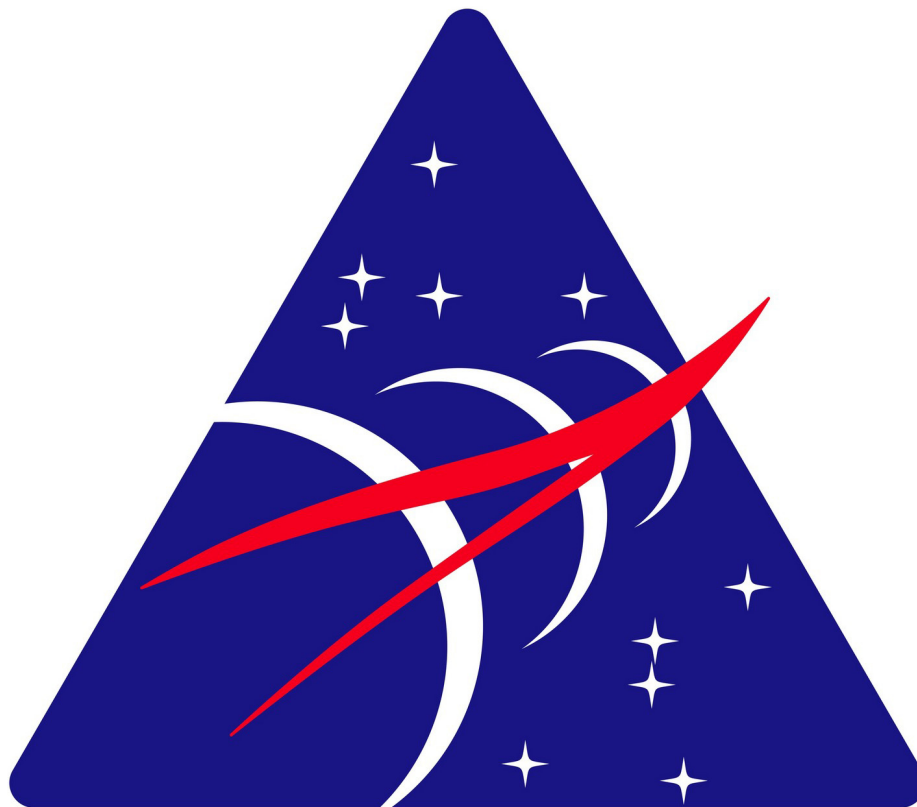


National Aeronautics and Space Administration



January 2008

Final Constellation Programmatic Environmental Impact Statement



CONSTELLATION

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FINAL CONSTELLATION PROGRAMMATIC ENVIRONMENTAL IMPACT STATEMENT

LEAD AGENCY: National Aeronautics and Space Administration (NASA), Washington, DC 20546

PROPOSED ACTION: NASA proposes to continue preparations for and to implement the Constellation Program, a coordinated effort to provide the necessary flight systems and Earth-based ground infrastructure required to enable continued access to space and to enable future crewed missions to the International Space Station, the Moon, Mars, and beyond.

FOR FURTHER INFORMATION: ZA/Environmental Manager
Constellation Program
NASA Lyndon B. Johnson Space Center (JSC)
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LOCATION: Principal locations include Brevard and Volusia Counties, Florida; Hancock County, Mississippi; Orleans Parish, Louisiana; Harris County, Texas; Madison County, Alabama; Cuyahoga and Erie Counties, Ohio; Hampton, Virginia; Santa Clara County, California; Doña Ana and Otero Counties, New Mexico; and Box Elder and Davis Counties, Utah

DATE: January 2008

ABSTRACT: NASA's *Final Constellation Programmatic Environmental Impact Statement* (PEIS) addresses the environmental impacts associated with the Proposed Action (Preferred Alternative) and the No Action Alternative. The purpose of the Constellation Program is to develop the flight systems and Earth-based ground infrastructure required to enable continued access to space and to enable future crewed missions to the International Space Station, the Moon, Mars, and beyond. The Constellation Program would be responsible for development and testing of flight hardware, and for performing mission operations once the infrastructure is sufficiently developed. The environmental impacts of principal concern are those that would result from fabrication, testing, and launching of the Orion spacecraft and the Ares I and Ares V launch vehicles. Under the No Action Alternative, NASA would not implement the Constellation Program and would not build the necessary flight systems and ground infrastructure for human space missions following retirement of the Space Shuttle fleet by 2010.

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ABBREVIATIONS AND ACRONYMS

	A		
ac	acre(s)	dba	decibel(s) (A-weighted)
ACHP	Advisory Council on Historic Preservation	DCE	Dichloroethene
AIHA	American Industrial Hygiene Association	DFRC	Dryden Flight Research Center
Al ₂ O ₃	aluminum oxide	DOD	U.S. Department of Defense
ARC	Ames Research Center	DOE	U.S. Department of Energy
ARF	Assembly and Refurbishment Facility	DOI	U.S. Department of the Interior
ASTF	Aft Skirt Test Facility	DOT	U.S. Department of Transportation
ATK	Alliant Techsystems-Launch Systems Group		E
	C	EA	Environmental Assessment
°C	degree(s) Celsius	EDS	Earth Departure Stage
CAA	Clean Air Act	EIS	Environmental Impact Statement
CAIB	Columbia Accident Investigation Board	EO	Executive Order
CAIL	CEV Avionics Integration Laboratory	EPA	U.S. Environmental Protection Agency
CaLV	Cargo Launch Vehicle	EPCRA	Emergency Planning and Community Right-to-Know Act
CAT	Computer-Aided Tomography	EPRG	Emergency Planning Response Guide(s)
CCAFS	Cape Canaveral Air Force Station	ERD	Environmental Resources Document
CEQ	Council on Environmental Quality	ESA	Endangered Species Act
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act	ESAS	Exploration Systems Architecture Study
CEV	Crew Exploration Vehicle	ESMD	Exploration Systems Mission Directorate
CFC	chlorofluorocarbon	EVA	Extravehicular Activity(ies)
CFR	Code of Federal Regulations		F
Cl	Chlorine (element)	°F	degree(s) Fahrenheit
Cl ₂	Chlorine (gas)	FAC	Florida Administrative Code
CLV	Crew Launch Vehicle	FEIS	Final Environmental Impact Statement
cm	centimeter(s)	FEMA	Federal Emergency Management Agency
CO	carbon monoxide	FONSI	Finding of No Significant Impact
CO ₂	carbon dioxide	FR	Federal Register
CONUS	Continental U.S.	ft	foot (feet)
CRC	Clearfield Refurbishment Center	ft ²	square foot (feet)
CRMP	Cultural Resources Management Plan	ft ³	cubic foot (feet)
CWA	Clean Water Act		G
	D	g	gram(s)
dB	decibel(s)	gal	gallon(s)
		GRC	John H. Glenn Research Center
		GSFC	Goddard Space Flight Center

ABBREVIATIONS AND ACRONYMS (Cont.)

	H		
ha	hectare(s)	MARPOL	marine pollution (treaty abbreviation)
HAP	hazardous air pollutant(s)	mg/m ³	milligram(s) per cubic meter
HCFC	hydrochlorofluorocarbon	mgd	million gallons per day
HCl	hydrogen chloride or hydrochloric acid	mi	mile(s)
HMTA	Hazardous Materials Transportation Act	min	minute(s)
HNO ₃	Nitric acid	MINWR	Merritt Island National Wildlife Refuge
HTPB	hydroxyl terminated polybutadiene	ML	Mobile Launcher
		Mlb	million pounds
		MLP	Mobile Launch Platform
		MPPF	Multi-Payload Processing Facility
	I		
in	inch(es)	MRI	Magnetic Resonance Imaging
Isp	specific impulse	MSFC	George C. Marshall Space Flight Center
		mt, mT	metric ton
JPL	Jet Propulsion Laboratory	MTV	Mars Transfer Vehicle
JSC	Lyndon B. Johnson Space Center		N
		N	Newton(s)
	K	N/m ²	Newton(s) per square meter
kg	kilogram(s)	N ₂ H ₄	hydrazine
kl	kilolitre(s)	N ₂ O ₄	nitrogen tetroxide
km	kilometer(s)	NAAQS	National Ambient Air Quality Standards
kPa	kilopascal(s)	NASA	National Aeronautics and Space Administration
KSC	John F. Kennedy Space Center	NEPA	National Environmental Policy Act
		NHPA	National Historic Preservation Act
	L	NIOSH	National Institute of Occupational Safety and Health
l	liter(s)	nm, nmi	nautical mile(s)
LAFB	Langley Air Force Base	NO	nitrogen oxide
LaRC	Langley Research Center	NO ₂	nitrogen dioxide
lb	pound(s)	NOI	Notice of Intent
lbf	pound(s) force	NOTAM	Notices to Airmen
LC	Launch Complex	NO _x	nitrogen oxides
LCC	Launch Control Center	NPD	NASA Policy Directive
LEO	low Earth orbit	NPDES	National Pollutant Discharge Elimination System
LH	liquid hydrogen	NPR	NASA Procedural Requirements
LLO	low lunar orbit	NRHP	National Register of Historic Places
LOX	liquid oxygen	NTP	Nuclear Thermal Propulsion
LSAM	Lunar Surface Access Module		
		M	
µg/m ³	microgram(s) per cubic meter		
m	meter(s)		
m ²	square meter(s)		
m ³	cubic meter(s)		
MAF	Michoud Assembly Facility		

ABBREVIATIONS AND ACRONYMS (Cont.)

	O		
O&C	Operations and Checkout (building)	SM	Service Module
O ₃	ozone	SO ₂	sulfur dioxide
ODS	Ozone Depleting Substances	SO _x	sulfur oxides
OSF	Ordnance Storage Facility	SRB	Solid Rocket Booster
OSHA	Occupational Safety and Health Administration	SRM	Solid Rocket Motor
oz	ounce(s)	SSC	John C. Stennis Space Center
		SSPF	Space Station Processing Facility
	P		T
1,1,2,2-PCA	1,1,2,2-tetrachloroethane	1,1,1-TCA	1,1,1-Trichloroethane
Pb	lead (metal)	t	ton
PBAN	polybutadiene acrylonitrile	TCA	trichloroethane
PBS	Plum Brook Station	TCE	trichloroethene
PCB	polychlorinated biphenyl	TMDL	total maximum daily load
PCE	tetrachloroethene	TNT	trinitrotoluene
PCT	Polychlorinated terphenyl	TRI	Toxic Release Inventory
PEIS	Programmatic Environmental Impact Statement	TSCA	Toxic Substances Control Act
pH	measure of acidity (log of hydrogen ions)	TSP	Total Suspended Particulates
PICA	Phenolic Impregnated Carbon Ablator		U
PM	particulate matter	U.S.	United States
PPA	Pollution Prevention Act	U.S.C.	United States Code
ppm	parts per million	UNCLOS	United Nations Convention on the Law of the Sea
PRF	Parachute Refurbishment Facility	USAF	U.S. Air Force
PSD	Prevention of Significant Deterioration	USFWS	U.S. Fish and Wildlife Service
psf	pounds per square foot		V
	R	VAB	Vehicle Assembly Building
RCRA	Resource Conservation and Recovery Act	VOC	volatile organic compound(s)
REL	Recommended Exposure Limit	VPF	Vertical Processing Facility
ROD	Record of Decision		W
RPSF	Rotation, Processing, and Surge Facility	WSMR	White Sands Missile Range
RSRB	Reusable Solid Rocket Booster	WSTF	White Sands Test Facility
	S		
sec	second(s)		
scf	standard cubic feet		
SHPO	State Historic Preservation Officer		
SIP	State Implementation Plan		

COMMON METRIC/BRITISH SYSTEM EQUIVALENTS

Length

1 centimeter (cm) = 0.3937 inch (in.)	1 in = 2.54 cm
1 centimeter = 0.0328 foot (ft)	1 ft = 30.48 cm
1 meter (m) = 3.2808 feet	1 ft = 0.3048 m
1 meter = 0.0006 mile (mi)	1 mi = 1609.3440 m
1 kilometer (km) = 0.6214 mile	1 mi = 1.6093 km
1 kilometer = 0.53996 nautical mile (nmi or nm)	1 nmi = 1.8520 km
1 mile = 0.87 nautical miles	1 nmi = 1.15 mi

Area

1 square centimeter (cm ²) = 0.1550 square inch (in ²)	1 in ² = 6.4516 cm ²
1 square meter (m ²) = 10.7639 square feet (ft ²)	1 ft ² = 0.09290 m ²
1 square kilometer (km ²) = 0.3861 square mile (mi ²)	1 mi ² = 2.5900 km ²
1 hectare (ha) = 2.4710 acres (ac)	1 ac = 0.4047 ha
1 hectare = 10,000 square meters (m ²)	1 m ² = 0.0001 ha

Volume

1 cubic centimeter (cm ³) = 0.0610 cubic inch (in ³)	1 in ³ = 16.3871 cm ³
1 cubic meter (m ³) = 35.3147 cubic feet (ft ³)	1 ft ³ = 0.0283 m ³
1 cubic meter = 1.308 cubic yards (yd ³)	1 yd ³ = 0.76455 m ³
1 liter (l) = 1.0567 quarts (qt)	1 qt = 0.9463264 l
1 liter = 0.2642 gallon (gal)	1 gal = 3.7845 l
1 kiloliter (kl) = 264.2 gallon	1 gal = 0.0038 kl

Mass

1 gram (g) = 0.0353 ounce (oz)	1 oz = 28.3495 g
1 kilogram (kg) = 2.2046 pounds (lb)	1 lb = 0.4536 kg
1 metric ton (mt) = 1.1023 tons	1 ton = 0.9072 mt

Pressure

1 newton/square meter (N/m ²) = 0.0208 pound/square foot (psf)	1 psf = 48 N/m ²
1 kilopascal (kPa) = 20.885 pounds/square foot (psf)	1 psf = 0.04788 kPa

Force

1 newton (N) = 0.2248 pound-force (lb-f)	1 lb-f = 4.4478 N
--	-------------------

Energy

1 Joule (J) = 9.478 × 10 ⁻⁴ British thermal units (Btu)	1 Btu = 1,055.05 J
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