National Aeronautics and Space Administration

Final Environmental Impact Statement

Sounding Rockets Program at Poker Flat Research Range

Volume II
Appendices A-K

July 2013

In Cooperation with:
Bureau of Land Management
U.S. Fish and Wildlife Service
University of Alaska Fairbanks

www.nasa.gov

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Cover image: *The February 18, 2012 launch of the Magnetosphere-Ionosphere Coupling in the Alfvén Resonator (MICA) sounding rocket mission from Poker Flat Research Range, Alaska.*

FINAL ENVIRONMENTAL IMPACT STATEMENT FOR THE SOUNDING ROCKETS PROGRAM AT POKER FLAT RESEARCH RANGE

VOLUME II

APPENDICES A THROUGH K

Sounding Rockets Program Office
National Aeronautics and Space Administration
Wallops Island, VA 23337

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LIST OF ABBREVIATIONS AND ACRONYMS

°C	degrees Celsius
°F	degrees Fahrenheit
Σ	sigma, absolute dispersion
ACHP	Advisory Council on Historic Preservation
ADEC	Alaska Department of Environmental Conservation
ADF&G	Alaska Department of Fish and Game
ADNR	Alaska Department of Natural Resources
AGL	above ground level
AK	Alaska
Al	aluminum
ANCSA	Alaska Native Claims Settlement Act
ANILCA	Alaska National Interest Lands Conservation Act
AP/AL	ammonium perchlorate/aluminum
APE	area of potential effect
ASRC	Arctic Slope Regional Corporation
ATV	all-terrain vehicle
BA	Biological Assessment
BB	Black Brant
BEA	U.S. Bureau of Economic Analysis
BLM	U.S. Bureau of Land Management
C	carbon
Ca	calcium
CAA	Clean Air Act
CAAA	Clean Air Act and its Amendments
CAH	Central Arctic Herd
CBS	Chukchi/Bering Seas
Cd	cadmium
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	*Code of Federal Regulations*
Cl	chlorine

LIST OF ABBREVIATIONS AND ACRONYMS (*Continued*)

Cm	curium
Co	cobalt
CO_2	carbon dioxide
CPCRW	Caribou-Poker Creeks Research Watershed
Cu	copper
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
D	distance(s)
dB	decibels
dBA	decibels A-weighted
DEW-Line	Distant Early Warning-Line
DOD	U.S. Department of Defense
Draft Revised Arctic CCP	*Arctic Refuge Draft Revised Comprehensive Conservation Plan*
EA	Environmental Assessment
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
EJIP	Environmental Justice Implementation Plan
EM	electromagnetic
EPA	U.S. Environmental Protection Agency
ERD	Environmental Resources Document
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FB	Fairbanks, Alaska
Fe	iron
FEIS	Final Environmental Impact Statement
FLPMA	Federal Land Policy and Management Act
FMP	Fishery Resource Management Plan
FR	*Federal Register*
FY	fiscal year
GDP	gross domestic product

LIST OF ABBREVIATIONS AND ACRONYMS (*Continued*)

GMU	Game Management Unit
GPS	global positioning system
GRN	Sondre Stromfjord, Greenland
GSFC	Goddard Space Flight Center
H	hydrogen
HANLC	high altitude noctilucent clouds
HFEF	high frequency electron flux
HMTA	Hazardous Material Transportation Act
HSWA	Hazardous and Solid Waste Act
Hz	hertz
IR	infrared
kg	kilogram(s)
km	kilometer(s)
kNm	kilo-Newton-meters
kPa	kilopascal(s)
KWAJ	Kwajalein, Marshall Islands
LC	launch complex(es)
Li	lithium
LVI	launch vehicle impact
Mg	magnesium
MISTI	mesospheric ionization structure and turbulence investigation
mm	millimeter(s)
MMPA	Marine Mammals Protection Act
MOA	Memorandum of Agreement
MOTR	Multi-Object Tracking Radar
MS	mass spectrometer
MSA	Magnuson-Stevens Fishery Conservation and Management Act
MSDS	Material Safety Data Sheet
MSFCMA	Magnuson-Stevens Fishery Conservation and Management Act
msl	mean sea level

LIST OF ABBREVIATIONS AND ACRONYMS (*Continued*)

N	nitrogen
NAAQS	National Ambient Air Quality Standards
NACA	National Advisory Committee for Aeronautics
NASA	National Aeronautics and Space Administration
NC/NG	nitrocellulose/nitroglycerin
NCA	National Conservation Area
NEPA	National Environmental Policy Act
NFSAM	Nuclear Flight Safety Assurance Manager
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NOA	Notice of Availability
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
NO_x	oxides of nitrogen
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NRA	National Recreation Area
NRHP	National Register of Historic Places
NSROC	NASA Sounding Rocket Operations Contract
NWR	National Wildlife Refuge
NWRSAA	National Wildlife Refuge System Administration Act
OCS Oil and Gas Draft PEIS	*Outer Continental Shelf Oil and Gas Leasing Program:2012–2017 Draft Programmatic Environmental Impact Statement*
OHV	off-highway vehicle
OSHA	Occupational Safety and Health Administration
OSSA	Office of Space Science and Applications
Pb	lead
PCH	Porcupine Caribou Herd
PFRR	Poker Flat Research Range
PFRR EIS	*Environmental Impact Statement for the Sounding Rockets Program at Poker Flat Research Range*

LIST OF ABBREVIATIONS AND ACRONYMS (*Continued*)

pH	the negative logarithm of the effective hydrogen ion concentration in gram equivalents per liter, used in expressing both acidity and alkalinity
PM_n	particulate matter with an aerodynamic diameter less than or equal to *n* micrometers
psi	pounds per square inch
QE	quadrant elevation or launch angle
RCRA	Resource Conservation and Recovery Act
RIMS II	Regional Input-Output Modeling System
RMP	Resource Management Plan
RMR	Radioactive Materials Report
RNA	Research Natural Area
ROD	Record of Decision
ROI	region of influence
RS	Radioactive source
RSO	Range Safety Officer
S	sulfur
SBS	Southern Beaufort Sea
SEC, sec	second(s)
SEIS	Supplemental Environmental Impact Statement
SHPO	State Historic Preservation Office
SIC	sea ice concentration
SO	stratospheric ozone
Sr	strontium
SRP	Sounding Rockets Program
SRP EIS	*Final Environmental Input Statement for Sounding Rocket Program*
SRP SEIS	*Final Supplemental Environmental Impact Statement for Sounding Rocket Program*
S-T	stratosphere - troposphere
STS	Space Transportation System (Space Shuttle)
T	threatened

LIST OF ABBREVIATIONS AND ACRONYMS (*Continued*)

T-IO	Terrier-Improved Orion
TLV	threshold limit values
TMA	trimethylaluminium
TMDL	Total Maximum Daily Load
TSCA	Toxic Substances Control Act
U.S.	United States
U.S.C.	*United States Code*
UAF	University of Alaska Fairbanks
USDOI	U.S. Department of the Interior
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
UV	ultraviolet
VA	Virginia
VRM	Visual Resource Management
WFF	Wallops Flight Facility
WI	Wallops Island, Virginia
WMH	White Mountains Herd
WSA	Wilderness Study Area
WSMR	White Sands Missile Range

COMMON METRIC/BRITISH SYSTEM EQUIVALENTS

Length

1 centimeter (cm) = 0.3937 inch	1 inch = 2.54 cm
1 centimeter = 0.0328 foot (ft)	1 foot = 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)	1 nmi = 1.8520 km
	1 mi = 0.87 nmi
	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 (ha) = 10,000 square meters (m^2)	1 ft^2 = 0.000022957 ac

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 (m^3) = 1.308 cubic yards (yd^3)	1 yd^3 = 0.76455 m^3
1 cubic meter (m^3) = 0.000811 acre-ft	1233 m^3 = 1 acre-ft
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 gal	1 gal = 0.0038 kl

Mass/Weight

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 metric ton

Energy

1 joule = 0.0009 British thermal unit (BTU)	1 BTU = 1054.18 joule
1 joule = 0.2392 gram-calorie (g-cal)	1 g-cal = 4.1819 joule

Pressure

1 newton/square meter (N/m^2) = 0.0208 pound/square foot (psf)	1 psf = 48 N/m^2

Force

1 newton (N) = 0.2248 pound-force (lbf)	1 lbf = 4.4478 N

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