

FES 12-41

Proposed Land Use Plan Amendments for Allocation of Oil Shale and Tar Sands Resources on Lands Administered by the Bureau of Land Management in Colorado, Utah, and Wyoming and Final Programmatic Environmental Impact Statement

November 2012

Volume 5: Appendices K–M and Comment Response Document

U.S. Department of the Interior
Bureau of Land Management



BLM Mission Statement

It is the mission of the Bureau of Land Management to sustain the health, diversity, and productivity of the public lands for the use and enjoyment of present and future generations.

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NOTATION

The following is a list of acronyms and abbreviations, chemical names, and units of measure used in this document. Some acronyms used only in tables may be defined only in those tables.

GENERAL ACRONYMS AND ABBREVIATIONS

ACEC	Area of Critical Environmental Concern
AGR	aboveground retort
AIRFA	American Indian Religious Freedom Act
AMSO	American Shale Oil, LLC
ANFO	ammonium nitrate and fuel oil
APE	Area of Potential Effects
API	American Petroleum Institute
APLIC	Avian Power Line Interaction Committee
APP	Avian Protection Plan
AQRV	air quality–related value
ARCO	Atlantic Richfield Company
ATP	Alberta Taciuk Process
ATSDR	Agency for Toxic Substances and Disease Registry
AWEA	American Wind Energy Association
AZGFD	Arizona Game and Fish Department
BA	biological assessment
BCD	barrels per calendar day
BLM	Bureau of Land Management
BMP	best management practice
BO	biological opinion
BOR	U.S. Bureau of Reclamation
BPA	Bonneville Power Administration
BSD	barrels per stream day
BTEX	benzene, toluene, ethylbenzene, and xylenes
CAA	Clean Air Act
CAPP	Canadian Association of Petroleum Producers
CARB	California Air Resources Board
CASTNET	Clean Air Status and Trends Network
CBOSC	Cathedral Bluffs Oil Shale Company
CCR™	Conduction, Convection, and Reflux
CCW	coal combustion waste
CDC	Centers for Disease Control and Prevention
CDOT	Colorado Department of Transportation
CDOW	Colorado Division of Wildlife (now Colorado Parks and Wildlife)

CDPHE	Colorado Department of Public Health and Environment
CEQ	Council on Environmental Quality
CFR	<i>Code of Federal Regulations</i>
CHAT	Critical Habitat Assessment Tool
CHL	combined hydrocarbon lease
CIRA	Cooperative Institute for Research in the Atmosphere
CNHP	Colorado Natural Heritage Program
COGCC	Colorado Oil and Gas Conservation Commission
CPC	Center for Plant Conservation
CPW	Colorado Parks and Wildlife (formerly Colorado Division of Wildlife)
CRBSCF	Colorado River Basin Salinity Control Forum
CRD	Comment Response Document
CRSCP	Colorado River Salinity Control Program
CRWQIP	Colorado River Water Quality Improvement Program
CSS	cyclic steam stimulation
CSU	Controlled Surface Use
CWA	Clean Water Act
CWCB	Colorado Water Conservation Board
CWS	Canadian Wildlife Service
DoD	U.S. Department of Defense
DOE	U.S. Department of Energy
DOI	U.S. Department of the Interior
DOL	U.S. Department of Labor
DOT	U.S. Department of Transportation
DRMS	Division of Reclamation Mining & Safety (Colorado)
DRUA	Dispersed Recreation Use Area
EA	environmental assessment
EGL	EGL Resources, Inc.
EIA	Energy Information Administration
E-ICP	bare electrode in situ conversion process
EIS	environmental impact statement
EMF	electric and magnetic field
E.O.	Executive Order
EOR	enhanced oil recovery
EPA	U.S. Environmental Protection Agency
EPRI	Electric Power Research Institute
EQIP	Environmental Quality Incentives Program
ESA	Endangered Species Act of 1973
FAA	Federal Aviation Administration
FLPMA	Federal Land Policy and Management Act of 1976
FONSI	Finding of No Significant Impact
FR	<i>Federal Register</i>

Final OSTIS PEIS

FTE	full-time equivalent
FY	fiscal year
GCR	gas combustion retort
GHG	greenhouse gas
GIS	geographic information system
GPO	Government Printing Office
GSENM	Grand Staircase–Escalante National Monument
HAP	hazardous air pollutant
HAZCOM	hazard communication
HFC	hydrofluorcarbon
HMA	Herd Management Area
HMMH	Harris Miller Miller & Hanson, Inc.
I-70	Interstate 70
IARC	International Agency for Research on Cancer
ICP	in situ conversion process
IEC	International Electrochemical Commission
IM	Instructional Memorandum
IPPC	Intergovernmental Panel on Climate Change
ISA	Instant Study Area
ISWS	Illinois State Water Survey
IUCNNR	International Union for Conservation of Nature and Natural Resources
JMH CAP	Jack Morrow Hills Coordinated Activity Plan
KOP	key observation point
KSLA	Known Sodium Leasing Area
LAU	Lynx Analysis Unit
L _{dn}	day-night average sound level
L _{eq}	equivalent sound pressure level
LETG	Laramie Energy Technology Center
LM	Office of Legacy Management (DOE)
LPG	liquefied petroleum gas
LWC	lands having wilderness characteristics
M&I	municipal and industrial
MFP	Management Framework Plan
MIG, Inc.	Minnesota IMPLAN Group, Inc.
MIS	modified in situ recovery
MLA	Mineral Leasing Act
MMC	Multi Minerals Corporation
MMTA	Mechanically Mineable Trona Area
MOU	Memorandum of Understanding

MPCA	Minnesota Pollution Control Agency
MSDS	Material Safety Data Sheet
MSHA	Mine Safety and Health Administration
MSL	mean sea level
MTR	military training route
NAAQS	National Ambient Air Quality Standards
NADP	National Atmospheric Deposition Program
NAGPRA	Native American Graves Protection and Repatriation Act
NCA	National Conservation Area
NCDC	National Climate Data Center
NEC	National Electric Code
NEPA	National Environmental Policy Act of 1969
NESHAP	National Emission Standards for Hazardous Air Pollutants
NFS	National Forest Service
NHPA	National Historic Preservation Act of 1966
NLCS	National Landscape Conservation System
NMFS	National Marine Fisheries Service
NNHP	Nevada Natural Heritage Program
NOA	Notice of Availability
NOI	Notice of Intent
NORM	naturally occurring radioactive materials
NOSR	Naval Oil Shale Reserves
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NRA	National Recreation Area
NRHP	<i>National Register of Historic Places</i>
NSC	National Safety Council
NSO	No Surface Occupancy
NTSA	National Trails System Act
NTT	National Technical Team
NWCC	National Wind Coordinating Committee
NWR	National Wildlife Refuge
OHV	off-highway vehicle
OOSI	Occidental Oil Shale, Inc.
OPEC	Organization of Petroleum Exporting Countries
OSEC	Oil Shale Exploration Company
OSEW/SPP	Oil Sands Expert Workgroup/Security and Prosperity Partnership
OSHA	Occupational Safety and Health Administration
OSTS	oil shale and tar sands
OTA	Office of Technology Assessment
PA	Programmatic Agreement
PADD	Petroleum Administration for Defense District
PAH	polycyclic aromatic hydrocarbon

PCB	polychlorinated biphenyl
PEIS	programmatic environmental impact statement
PFC	perfluorocarbons
PFYC	Potential Fossil Yield Classification
PILT	payment in lieu of taxes
P.L.	Public Law
PM	particulate matter
PM _{2.5}	particulate matter with an aerodynamic diameter of 2.5 µm or less
PM ₁₀	particulate matter with an aerodynamic diameter of 10 µm or less
PPE	personal protective equipment
PPH	Preliminary Priority Habitat
PRLA	preference right lease area
PSD	Prevention of Significant Deterioration
R&D	research and development
R&I	relevance and importance
RBOSC	Rio Blanco Oil Shale Company
RCRA	Resource Conservation and Recovery Act of 1976
RD&D	research, development, and demonstration
RF	radio frequency
RFDS	reasonably foreseeable development scenario
RMP	Resource Management Plan
ROD	Record of Decision
ROI	region of influence
ROS	Recreation Opportunity Spectrum
ROW	right-of-way
SAGD	steam-assisted gravity drainage
SAMHSA	Substance Abuse and Mental Health Services Administration
SDWA	Safe Drinking Water Act of 1974
SFC	Synthetic Fuels Corporation
SHPO	State Historic Preservation Office(r)
SIP	State Implementation Plan
SMA	Special Management Area
SMP	suggested management practice
SPR	Strategic Petroleum Reserve
SRMA	Special Recreation Management Area
SSI	self-supplied industry
STSA	Special Tar Sand Area
SWCA	SWCA, Inc., Environmental Consultants
SWPPP	Stormwater Pollution Prevention Plan
SWWRC	States West Water Resources Corporation
TDS	total dissolved solids
THAI	toe to head air injection
TIS	true in situ recovery

TL	timing limitation
TMDL	Total Maximum Daily Load
TOSCO	The Oil Shale Corporation
TSCA	Toxic Substances Control Act of 1976
TSDf	treatment, storage, and disposal facility
UDEQ	Utah Department of Environmental Quality
UDNR	Utah Department of Natural Resources
UDWR	Utah Division of Wildlife Resources
UGS	Utah Geological Survey
UIC	underground injection control
ULP	Uranium Leasing Program
USACE	U.S. Army Corps of Engineers
USC	<i>United States Code</i>
USDA	U.S. Department of Agriculture
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGCRP	U.S. Global Change Research Program
USGS	U.S. Geological Survey
VCRS	Visual Contrast Rating System
VOC	volatile organic compound
VRI	Visual Resource Inventory
VRM	Visual Resource Management
WDEQ	Wyoming Department of Environmental Quality
WEQC	Wyoming Environmental Quality Council
WGFD	Wyoming Game and Fish Department
WRAP	Western Regional Air Partnership
WRCC	Western Regional Climate Center
WRI	World Resources Institute
WRSOC	White River Shale Oil Corporation
WSA	Wilderness Study Area
WSR	Wild and Scenic River
WTGS	wind turbine generator system
WYCRO	Wyoming Cultural Records Office
WYNDD	Wyoming Natural Diversity Database

CHEMICALS

CH ₄	methane	H ₂ S	hydrogen sulfide
CO	carbon monoxide		
CO ₂	carbon dioxide	NH ₃	ammonia
CO ₂ e	carbon dioxide equivalent	NO ₂	nitrogen dioxide

Final OSTs PEIS

N ₂ O	nitrous oxide	SF ₆	sulfur hexafluoride
NO _x	nitrogen oxides	SO ₂	sulfur dioxide
		SO _x	sulfur oxides
O ₃	ozone		
Pb	lead		

UNITS OF MEASURE

ac-ft	acre foot (feet)	kPa	kilopascal(s)
		kV	kilovolt(s)
bbl	barrel(s)	kWh	kilowatt-hour(s)
Btu	British thermal unit(s)		
		L	liter(s)
°C	degree(s) Celsius	lb	pound(s)
cfs	cubic foot (feet) per second		
cm	centimeter(s)	m	meter(s)
		m ²	square meter(s)
dB	decibel(s)	m ³	cubic meter(s)
dba	A-weighted decibel(s)	mg	milligram(s)
		mi	mile(s)
°F	degree(s) Fahrenheit	mi ²	square mile(s)
ft	foot (feet)	mJ	megajoule(s)
ft ³	cubic foot (feet)	mm	millimeter(s)
		MMBtu	million Btus
g	gram(s)	mph	mile(s) per hour
gal	gallon(s)	MW	megawatt(s)
GJ	gigajoule(s)		
gpd	gallon(s) per day	ppb	part(s) per billion
gpm	gallon(s) per minute	ppm	part(s) per million
GW	gigawatt(s)	ppmv	part(s) per million by volume
GWh	gigawatt hour(s)	psi	pound(s) per square inch
h	hour(s)	rpm	rotation(s) per minute
ha	hectare(s)		
hp	horsepower	s	second(s)
Hz	hertz	scf	standard cubic foot (feet)
in.	inch(es)	yd ²	square yard(s)
		yd ³	cubic yard(s)
K	degree(s) Kelvin	yr	year(s)
kcal	kilocalorie(s)		
kg	kilogram(s)	µm	micrometer(s)
km	kilometer(s)		

ENGLISH/METRIC AND METRIC/ENGLISH EQUIVALENTS^a

The following table lists the appropriate equivalents for English and metric units.

Multiply	By	To Obtain
<i>English/Metric Equivalents</i>		
acres	0.4047	hectares (ha)
cubic feet (ft ³)	0.02832	cubic meters (m ³)
cubic yards (yd ³)	0.7646	cubic meters (m ³)
degrees Fahrenheit (°F) -32	0.5555	degrees Celsius (°C)
feet (ft)	0.3048	meters (m)
gallons (gal)	3.785	liters (L)
gallons (gal)	0.003785	cubic meters (m ³)
inches (in.)	2.540	centimeters (cm)
miles (mi)	1.609	kilometers (km)
miles per hour (mph)	1.609	kilometers per hour (kph)
pounds (lb)	0.4536	kilograms (kg)
short tons (tons)	907.2	kilograms (kg)
short tons (tons)	0.9072	metric tons (t)
square feet (ft ²)	0.09290	square meters (m ²)
square yards (yd ²)	0.8361	square meters (m ²)
square miles (mi ²)	2.590	square kilometers (km ²)
yards (yd)	0.9144	meters (m)
<i>Metric/English Equivalents</i>		
centimeters (cm)	0.3937	inches (in.)
cubic meters (m ³)	35.31	cubic feet (ft ³)
cubic meters (m ³)	1.308	cubic yards (yd ³)
cubic meters (m ³)	264.2	gallons (gal)
degrees Celsius (°C) +17.78	1.8	degrees Fahrenheit (°F)
hectares (ha)	2.471	acres
kilograms (kg)	2.205	pounds (lb)
kilograms (kg)	0.001102	short tons (tons)
kilometers (km)	0.6214	miles (mi)
kilometers per hour (kph)	0.6214	miles per hour (mph)
liters (L)	0.2642	gallons (gal)
meters (m)	3.281	feet (ft)
meters (m)	1.094	yards (yd)
metric tons (t)	1.102	short tons (tons)
square kilometers (km ²)	0.3861	square miles (mi ²)
square meters (m ²)	10.76	square feet (ft ²)
square meters (m ²)	1.196	square yards (yd ²)

^a In general in this PEIS, only English units are presented. However, where reference sources provided both English and metric units, both values are presented in the order in which they are given in the source. Where reference sources provided only metric units, only those units are presented.