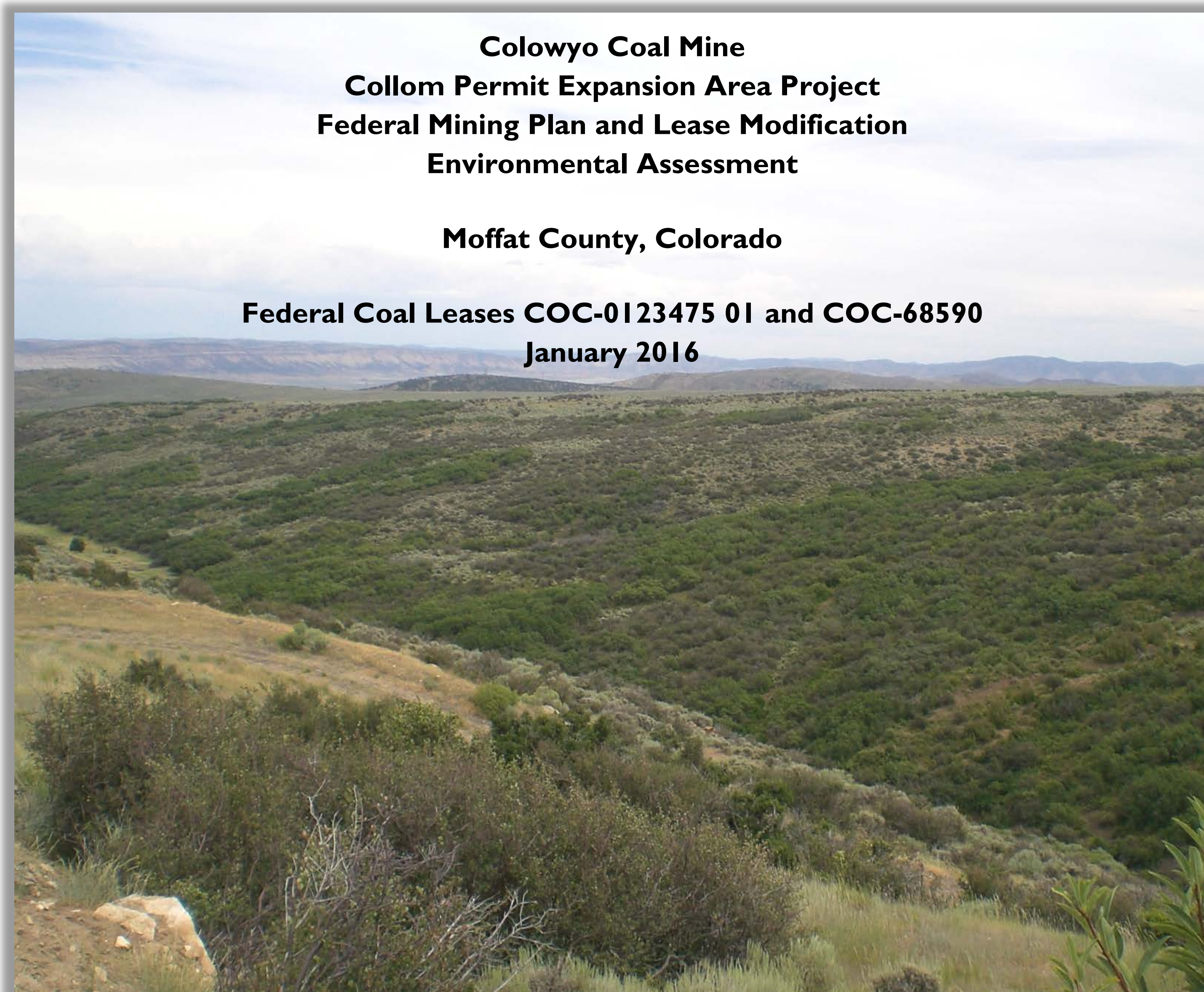
UNITED STATES DEPARTMENT OF THE INTERIOR
OFFICE OF SURFACE MINING RECLAMATION AND ENFORCEMENT
&
BUREAU OF LAND MANAGEMENT

Colowyo Coal Mine
Collom Permit Expansion Area Project
Federal Mining Plan and Lease Modification
Environmental Assessment

Moffat County, Colorado

Federal Coal Leases COC-0123475 01 and COC-68590
January 2016



U.S. Department of the Interior
Office of Surface Mining Reclamation and Enforcement
Program Support Division
1999 Broadway, Suite 3320
Denver, CO 80202
PH: 303-293-5000
FAX: 303-293-5032

U.S. Department of the Interior
Bureau of Land Management
Little Snake Field Office
455 Emerson Street
Craig, CO 81625
PH: 970-826-5000
FAX: 970-826-5002

Table of Contents and Acronyms

Table of Contents

List of Tables

List of Figures

Abbreviations and Acronyms

°F	degrees fahrenheit
1989 LSRMP-ROD	1989 Little Snake Resource Management Plan – Record of Decision
2011 LSRMP-ROD	2011 Little Snake Resource Management Plan – Record of Decision
AADT	average annual daily traffic
ACHP	Advisory Council on Historic Preservation
AERMAP	AERMOD Mapping Program
AERMET	AERMOD Meteorological Preprocessor
AERMOD	American Meteorological Society/Environmental Protection Agency Regulatory Model
af/yr	acre-feet per year
amsl	above mean sea level
ANFO	ammonium nitrate fuel oil
AOC	approximate original contour
APCD	Air Pollution Control Division
APE	Area of Potential Effect
APEN	Air Pollution Emission Notice
APLIC	Avian Power Line Interaction Committee
AQCR	Air Quality Control Region
AQRV	Air Quality Related Values
ARMP	Approved Resource Management Plan
ARMPA	Approved Resource Management Plan Amendments
ASLM	Assistant Secretary, Land and Minerals Management
AUM	animal unit month

AVF	alluvial valley floor
BART	Best Available Retrofit Technology
BATFE	Bureau of Alcohol, Tobacco, Firearms, and Explosives
BCC	Birds of Conservation Concern
bcy	bank cubic yards
bhp	brake horsepower
BLM	Bureau of Land Management
BMP	Best Management Practices
CAA	Clean Air Act
CARMMS	Colorado Air Resources Management Modeling Study
CCIA	Colorado Commission of Indian Affairs
CCRs	coal combustion residuals
CDPHE	Colorado Department of Public Health and Environment
CDPS	Colorado discharge permit system
CDRMS	Colorado Division of Reclamation Mining and Safety
CEQ	Council on Environmental Quality
CFC	chlorofluorocarbon
cfs	cubic feet per second
CFR	Code of Federal Regulations
CH_4	methane
CGSSC	Colorado Greater Sage-Grouse Steering Committee
CIAA	cumulative impact analysis area
CNHP	Colorado Natural Heritage Programs
CO	carbon monoxide

CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
COA	Conditions of Approval
Colowyo	Colowyo Coal Company
CPW	Colorado Parks and Wildlife
CSU	Controlled Surface Use
cv	coefficient variation
CWA	Clean Water Act
cy	cubic yards
DAU	Data Analysis Unit
dB	decibel
dBA	decibel-A weighted
DM	Departmental Manual
DNR	Department of Natural Resources
DOI	Department of Interior
DOT	Department of Transportation
DPF	diesel particulate filter
DQO	data quality objectives
dv	deciview
EA	Environmental Assessment
EER	Exceptional Events Rule
EGU	electric generating unit
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency

ERMA	extensive recreation management area
ERPI	Electric Research Policy Institute
ESA	Endangered Species Act
FCLAA	Federal Coal Leasing Amendments Act
FEL	front end loader
FEM	federal equivalent method
FEMA	Federal Emergency Management Agency
FHA	Federal Housing Administration
FCLAA	Federal Coal Leasing Amendments Act
FLPMA	Federal Land Policy and Management Act
FNCA	Federal Noise Control Act
FONSI	Finding of No Significant Impact
FRAN	upper limit on the meander factor
FRM	federal reference method
ft	feet
FWPCA	Federal Water Pollution Control Act
GHG	greenhouse gas
GHGRP	Greenhouse Gas Reporting Program
GHMA	general habitat management area
gpm	gallons per minute
GRSG	greater sage-grouse
GSGWG	Greater Sage-Grouse Working Group
GWP	global warming potential
GRP	gross regional product

H	height
HAP	Hazardous Air Pollutant
HCFC	hydrochlorofluorocarbon
HDPE	High Density Polyethylene
HPA	High Potential Area
Hr	hour
IMPROVE	Interagency Monitoring of Protected Visual Environments
IPCC	Intergovernmental Panel on Climate Change
km	kilometer
kV	kilovolt
lbs	pounds
Leq	equivalent sound level
LOWWIND2	low wind speed option 2
LSFO	Little Snake Field Office
LSRMP	Little Snake Resource Management Plan
LUP	Land Use Plan
MATS	Mercury and Air Toxics Standards
MBTA	Migratory Bird Act
MD	management decision
MDN	mercury deposition network
MFP	Management Framework Plans
Mg/L	milligrams per liter
MLA	Mineral Leasing Act
MLRB	Mined Land Reclamation Board

MMPA	Mining and Minerals Policy Act
mmt	million metric tons
MOU	Memorandum of Understanding
MPDD	mining plan decision document
MSHA	Mine Safety and Health Act
mt	metric ton
mtpy	million tons per year
m/s	meters per second
MW	megawatt
N	north
NAAQS	National Ambient Air Quality Standards
NAD83	North American Datum 1983
NAGPRA	Native American Graves Protection and Repatriation Act
NCDC	National Climate Data Center
NED	National Elevation Dataset
NEI	National Emission Inventory
NEPA	National Environmental Policy Act
NESHAP	National Emissions Standards for Hazardous Air Pollutants
NHPA	National Historic Preservation Act
NO_2	nitrogen dioxide
NO_3-	nitrate
NO_x	nitrogen oxide
N_2O	nitrous oxide

NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NSO	No Surface Occupancy
NSPS	New Source Performance Standards
NWI	National Wetlands Inventory
O_3	ozone
OHV	off-highway vehicle
OHWM	ordinary high water mark
OSAC	Office of the State Archaeologist at History Colorado
OSHA	Occupational Safety and Health Administration
OSMRE	Office of Surface Mining Reclamation and Enforcement
PAH	polycyclic aromatic hydrocarbon
PAP	Permit Application Package
PBO	programmatic biological opinion
PCE	primary constituent element
PDF	preferred design features
PEL	permissible exposure limit
PERA	Prescribed Ecological Reclamation Approach
PFYC	Potential Fossil Yield Classification
PHMA	preliminary habitat management area
PM	prime meridian
$PM_{2.5}$	particulate matter 2.5 microns
PM_{10}	particulate matter 10 microns

ppb	parts per billion
ppm	parts per million
PR	Permit Revision
PSD	Prevention of Significant Deterioration
QAPP	Quality Assurance Project Plan
R	Range
R2P2	Resource Recovery and Protection Plan
RCRA	Resource Conservation and Recovery Act
RFD	reasonably foreseeable development
RIPRAP	Recovery Implementation Program Recovery Action Plan
RMP	Resource Management Plan
ROD	Record of Decision
SCC	social cost of carbon
SCR	Selective Catalytic Reduction
SDWA	Safe Drinking Water Act
SEM	Scanning Electron Microscopy
SHPO	State Historic Preservation Office
SIP	State Implementation Plan
SLB	State Land Board
SMCRA	Surface Mining Control and Reclamation Act
SNCR	Selective Non-Catalytic Reduction
SO_2	sulfur dioxide
SO_4^{2-}	sulfate
SPCC	spill prevention, control, and countermeasures

SRMA	special recreation management area
T	Township
T&E	threatened and endangered
TDS	total dissolved solids
tpy	tons per year
TRI	Toxic Release Inventory
TSCA	Toxic Substances Control Act
TSS	total suspended solids
TWA_8	8 hour time-weighted average
µg/g	microgram per gram
µg/l	microgram per liter
µg/m3	micrograms per cubic meter of air
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USDI	U.S. Department of Interior
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
V	vertical
VER	valid existing rights
VMT	vehicle miles traveled
VOC	volatile organic compound
VRI	visual resource inventory
VRM	Visual Resource Management
W	west

WOTUS	Waters of the U.S.
WYBC	western yellow-billed cuckoo

CHAPTER 1 PURPOSE AND NEED

1.1 INTRODUCTION

This Environmental Assessment (EA) has been prepared by the Office of Surface Mining Reclamation and Enforcement (OSMRE), Western Region Office, Department of the Interior (DOI) and the Bureau of Land Management (BLM), Little Snake Field Office (LSFO), DOI in cooperation with the State of Colorado, Department of Natural Resources (DNR). The EA analyzes the potential environmental effects of a mining plan modification (the Project) proposed by the Colowyo Coal Company L.P. (Colowyo) to surface mine federally leased coal within the Colowyo Coal Mine Collom Permit Expansion Area at the Colowyo Coal Mine. The EA also analyzes the potential environmental effects of a lease modification proposed by Colowyo to add 27.84 acres of unleased federal land to federal coal lease COC-0123475 01. Access to those lands would be necessary for implementation of the Project. The Colowyo Coal Mine is located approximately 26 miles (41.8 kilometer [km]) southwest of Craig, Colorado and 22 miles (35.4 km) north-northeast of Meeker, Colorado, west of Colorado Highway 13/789 in southwest Moffat and northern Rio Blanco Counties, Colorado (**Figure 1-1**).

The National Environmental Policy Act (NEPA) of 1969 requires federal agencies to disclose to the public the potential environmental impacts of projects they authorize. NEPA also requires agencies to consider and analyze reasonable alternatives to projects that are proposed. Lastly NEPA requires agencies to make a determination as to whether the analyzed actions would "significantly" impact the environment. "Significantly" is defined by NEPA and is found in regulation 40 Code of Federal Regulations (CFR) 1508.27. If OSMRE and/or BLM determine that this Project would have significant effects following the analysis in the EA, then an Environmental Impact Statement (EIS) would be prepared for the Project. If the potential effects are not determined to be "significant", a "Finding of No Significant Impact" (FONSI) statement would document the reason(s) why implementation of the selected alternative would not result in significant environmental effects. An EA provides evidence for determining whether to prepare an EIS or a FONSI statement.

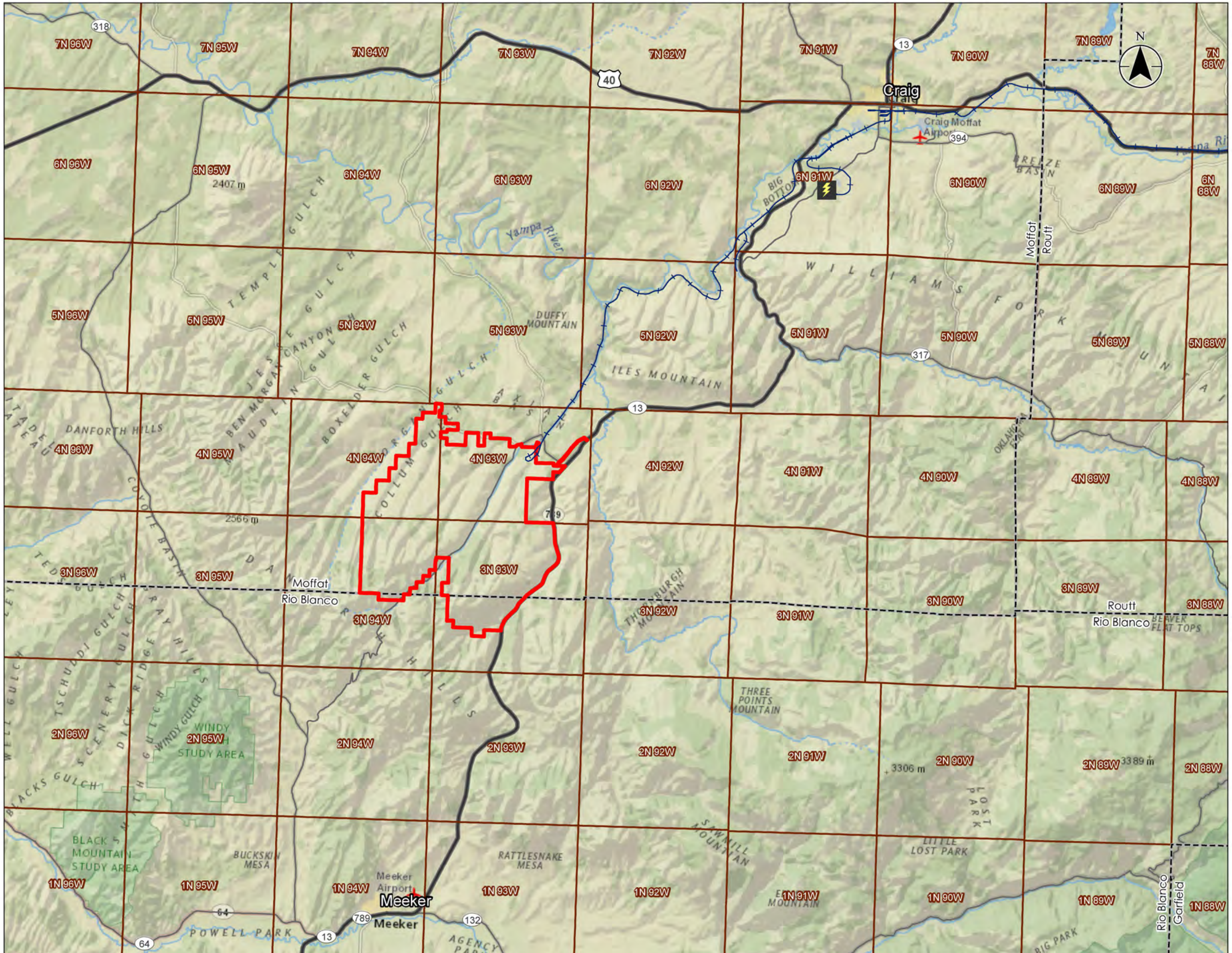
This EA analyzes the potential effects of approving both a federal coal lease modification and a surface mining plan modification that would authorize mining activities to produce up to 5.1 mtpy of coal from Colowyo's federal coal leases, COC-0123475 01 and COC-68590. A decision on the lease modification is a separate federal action from a decision on the mining plan modification. However, because there would be no need for the lease modification without the proposed mining plan modification, and the mining plan modification as proposed could not be approved without the prior approval of the lease modification, both federal actions are analyzed together in the EA. In addition, the lease modification action is not analyzed distinctly in the EA; instead, the impacts of the proposed changes to the mining plan, which include use of the lease modification tract, are analyzed as a whole and disclosed in the document.

This Project EA has been prepared in accordance with NEPA and the Council on Environmental Quality (CEQ) regulations for implementing NEPA (40 CFR 1500-1508); the Surface Mining Control and Reclamation Act (SMCRA) of 1977; the 1989 Little Snake Resource Management Plan (LSRMP) – Record of Decision (ROD) (1989 LSRMP-ROD) (BLM 1989); the BLM 2011 LSFO RMP and ROD (2011 LSFO RMP-ROD) (BLM 2011); the BLM 2015 Northwest Colorado Approved RMP Amendment for the Rocky Mountain Region Greater Sage-grouse Sub-Regions (BLM 2015); the BLM National Environmental Policy Act Handbook H-1790-1 (BLM 2008); and OSMRE guidance on implementing NEPA, including the OSMRE Handbook on Procedures for Implementing the National Environmental Policy Act (OSMRE 1989). Information gathered from federal, state, and local agencies, Colowyo, and publicly available literature, as well as in-house OSMRE sources such as Colowyo's Permit Application Package (PAP), were used in the preparation of this EA.

1.2 BACKGROUND

Coal has been mined on a commercial scale in the Colowyo Coal Mine area for over 100 years. Coal was mined by underground mining techniques continuously until 1974 when the underground mines closed. Then in 1977, Colowyo initiated its first surface mining operation at the Colowyo Coal Mine, to access thinner coal seams located closer to the surface than the seams historically developed through underground mining. Colowyo subsequently obtained rights to the additional federal coal leases and a state lease to expand its coal reserve base and ensure continuity of mining.

This Project is an expansion of the existing Colowyo Coal Mine. Colowyo, operator of the Colowyo Coal Mine, is a limited partnership, which is indirectly owned by Western Fuels – Colorado. Western Fuels - Colorado is owned by Tri-State Generation & Transmission Association, Inc. Colowyo currently operates the Colowyo Coal Mine on Federal Coal Leases COC-29225 and COC-29226 and is producing coal from the South Taylor Pit. Colowyo operates the existing Colowyo Coal Mine under Coal Mining Permit number C-1981-019 issued by the Colorado Division of Reclamation Mining and Safety (CDRMS) in accordance with their approved Colorado State Coal Regulatory Program (30 CFR Part 906) issued under SMCRA. Currently, the Colowyo Coal Mine produces approximately 2.3 million tons per year (mtpy) and provides coal primarily to the Craig Generation Station located in Craig, Colorado. However, the mine has produced coal at a maximum rate of 6.4 mtpy in the past (2004) and sold coal on the open market to several organizations including, but not limited to, Arizona Electric Power Cooperative, American Electric Power, Celanese, City of Colorado Springs, Coleto Creek, Coors Energy, Entergy, Public Service Company of Colorado, and the Salt River Project. Colowyo has also responded to numerous requests for smaller samples of coal to conduct test burns for possible future contracting. Colowyo is actively marketing its coal and if a contract is secured would ship to other users. The Colowyo Coal Mine ships coal to customers via an on-site rail spur connected to a Union Pacific main rail line that can accommodate coal shipments to anywhere in the country.



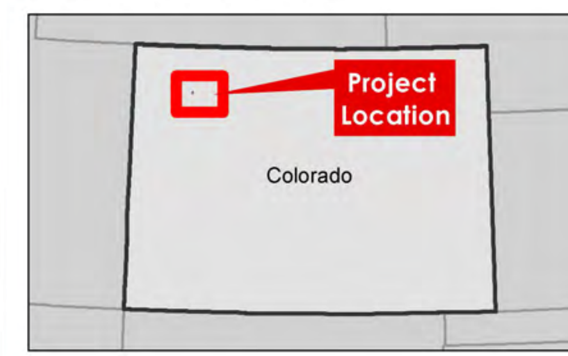
- Approved SMCRA Permit Boundary
- Generating Station
- Railroad
- Road
- Highway
- Township Boundary
- County Boundary

0 4 8 miles

1:253,440 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 13N
2. Basemap: Content may not reflect National Geographic's current map policy. Sources: National Geographic, Esri, DeLorme, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp.



Project Location
Rio Blanco & Moffat Counties
Colorado

203713557
Prepared by NF on 2015-01-05
Technical Review by NL on 2015-01-05
Independent Review by GB on 2015-01-05

Client/Project
Office of Surface Mining Reclamation & Enforcement
Colowyo Coal Mine: Collom Permit Expansion Area
Project Mining Plan Environmental Assessment

Figure No.
1-1

DRAFT

Title
Regional Overview

In order to timely plan for the depletion of coal reserves in the current mining area and ensure continued mining operations, on January 26, 2009, Colowyo submitted an application for a permit revision to CDRMS to expand the boundary approved in their existing SMCRA permit. The revision proposed adding approximately 16,824.8 acres of a combination of private, federal and state surface lands and subsurface mineral estate to the previously approved permit area of 12,250.95 acres, also comprised of a mixture of private, federal and state surface lands and mineral estate, and proposed surface mining in 2 new pits. On May 29, 2013, CDRMS approved Colowyo's Permit Revision No. 3 (PR 03) for the Collom Permit Expansion Area. The Permit Expansion Area includes all or portions of Colowyo's federal coal leases, COC-29225, COC-0123475 01, COC-0123476 01, and COC-68590, the Jubb State Lease 257-13s, private lands owned by Colowyo, and the unleased federal lands. Within the Collom permit expansion area, 637.0 acres of surface and associated mineral estate are owned by the State of Colorado; 2,525.18 acres of surface estate and 5,743.50 acres of mineral estate in the federal coal leases are managed by the BLM; and 13,662.61 (surface and mineral estate) acres are privately owned by Colowyo. The proposed Project is located within a portion (4,823 acres) of the overall Permit Expansion Area that includes two of the federal leases, COC-0123475 01 and COC-68590, 27.84 acres of unleased federal land (both surface and mineral estate) located in Township (T) 4 North (N), Range (R) 94 West (W), 6th Prime Meridian (PM), Section 26 Lot 3, E½, SE ¼; the Jubb State Lease 257-13s; and additional Colowyo owned private surface and coal lands.

The Federal Coal Leasing Amendments Act of 1976 (FCLAA) amended the Mineral Leasing Act of 1920 (MLA) to generally require all federal coal leases to be offered competitively either by regional leasing, under which BLM selects the tracts, or through a lease by application process, under which the public nominates coal tracts for competitive leasing.. In 1979, BLM completed the Final EIS for the Federal Coal Management Program and the Secretary of the Interior adopted a new regional leasing program for the management of coal resources on federal lands. The program established twelve Regional Coal Leasing Teams throughout the United States. Colorado and Wyoming were included in the Green River/Hams Fork Regional Coal Team. The potential environmental impacts of leasing federal coal resources in Colorado and Wyoming were analyzed in the Final Green River - Hams Fork Regional Coal EIS (BLM 1980). The regional coal leasing process required BLM to select tracts for competitive coal leasing based on a number of factors including land use planning, expected coal demand, and the potential environmental and economic impacts. This process worked well while new coal mines were being developed, but once most new mines were developed, demand for new coal leases focused on extensions of existing mines, rather than on new mining areas. To address this shift, BLM moved to the lease by application process, under which all current federal coal leasing is conducted in accordance with BLM regulations at 43 CFR 3425 – Leasing on Application.

In May 1982, BLM issued lease COC-0123475 01 to Utah International under BLM's Preference Right Lease Application process. That lease was assigned to Colowyo in 1994. And then in 2004, Colowyo submitted a Lease-by-Application to the BLM to lease the federally owned coal in the Collom Lease tract through a competitive leasing process. In 2006, BLM completed their evaluation of the site specific potential environmental impacts of the proposal to lease the Collom Tract in the "Environmental Assessment for Lease-by-Application, Collom Lease Tract" (2006 BLM EA). As a reasonably foreseeable future action of lease issuance, the 2006 BLM EA analyzed the potential environmental impacts of a conceptual surface mine plan to produce 6 million tons per year of coal, nearly 1 mtpy year higher than proposed for the Collom Project. The conceptual mine plan analyzed in the 2006 BLM EA included the same mining method, mine facilities, and access route as is analyzed in this EA. Based on the 2006 BLM EA, BLM reached a FONSI and issued federal coal lease COC-68590 to Colowyo in July 2007, with lease stipulations. Lease stipulations are in addition to the standard terms and conditions of a lease and describe specific requirements for the lessee to protect and/or minimize potential impacts on other resource values and/or other public land uses.

The Proposed Action (Alternative A) is to mine coal approximately three miles (4.8 km) northwest of Colowyo's existing mining operations in the South Taylor Pit. The proposed mining plan modification would involve developing two mine pits, the Collom Lite Pit and the Little Collom X Pit, using truck/shovel, dragline and highwall surface mining techniques as well as constructing haul roads and mine support facilities. The mined coal would be trucked to a primary crusher and then transported northeast along the west fork and main stem of Jubb Creek for approximately six miles (9.7 km) to the existing Gossard loadout. An action alternative (Alternative B) is also analyzed that proposes mining only the Collom Lite Pit, designs several mine components (e.g. facilities, topsoil stockpiles, and the temporary overburden stockpile) to enhance protection of Greater sage-grouse (GRSG) and its habitat, and includes specific additional measures not included in Alternative A to protect GRSG and its habitat. The approval of the lease modification would be necessary to implement both Alternative A and Alternative B. Chapter 2 includes detailed descriptions of the alternatives analyzed in this EA.

Of the 16,824.79 acres currently contained within the CDRMS approved permit revision area, approximately 2,090.5 acres would be disturbed under Alternative A over the anticipated 20 to 40 year life of the Project. Under Alternative B, approximately 2,637 acres would be disturbed over the anticipated shorter 16 to 36 year life of the Project when compared to Alternative A. Under both action alternatives, reclamation operations would begin as soon as possible after initiation of coal removal and continue until after mining has been completed and all requirements have been successfully accomplished. Reclamation would include but not be limited to backfilling of the mine pits, grading of all disturbed areas to handle erosion and restore the landscape to the approximate original contour (AOC) of the pre-mining topography, replacement of topsoil, and revegetation using suitable approved species. Colowyo's post-mining land use goal is the re-establishment and enhancement of multiple-use Rangeland/Fish and Wildlife Habitat focused on improved range condition and the creation of wildlife habitat specific to Greater sage grouse (GRSG) brood-rearing habitat.

1.2.1 Statutory and Regulatory Background

For new mining plans, OSMRE prepares a mining plan decision document (MPDD) in support of its recommendation to the Assistant Secretary for Land and Minerals Management (ASLM), delegated by the Secretary of the DOI (Secretary). For existing approved mining plans that are proposed to be modified, as is the case here, OSMRE prepares a MPDD for a mining plan modification. The ASLM reviews the MPDD and decides to approve, disapprove or conditionally approve the mining plan modification. Pursuant to 30 CFR 746.13, OSMRE's recommendation is based, at a minimum, upon:

- The PAP;
- Information prepared in compliance with NEPA, including this EA;
- Documentation assuring compliance with the applicable requirements of Federal laws, regulations and executive orders other than NEPA;[1]
- Comments and recommendations or concurrence of other Federal agencies and the public;
- Findings and recommendations of the BLM with respect to the Resource Recovery and Protection Plan (R2P2), Federal lease requirements, and the MMLA;
- Findings and recommendations of the CDRMS with respect to the mine permit application and the Colorado State program; and,
- The findings and recommendations of the OSMRE with respect to the additional requirements of 30 CFR Chapter VII, Subchapter D.

In addition, access to any unleased federal land proposed to be disturbed would require prior BLM approval. BLM regulations at 43 CFR Subpart 3432 provide lessees the opportunity to apply for approval of a "lease modification" to add less than 960 acres of unleased lands to an existing lease, which would grant right of entry to the lands to the lessee for the purpose of developing federal coal resources. Although Colowyo has determined that there are no economically recoverable, federal coal resources within the lease modification parcel, disturbance of the surface of those lands would be necessary under both Alternative A and Alternative B for reclamation activities or for the placement of mine components respectively, both of which would directly facilitate the development of coal resources on leases COC-0123475 01 and COC-68590. Upon BLM approval of a lease modification, mining and/or related operations could be approved by the ASLM on those lands under the mining plan modification.

1.3 PURPOSE AND NEED

As described at §1502.13 (40 CFR 1500-1508) the purpose and need statement shall briefly specify the underlying purpose and need to which the agency is responding in proposing the alternatives including the proposed action.

Purpose: The purpose of the action is established by the MLA and the SMCRA, which requires the evaluation of Colowyo's proposed mining plan modification for the Collom Permit Expansion Area before Colowyo may conduct surface mining and reclamation operations to

[1] In order to assist with assuring compliance with other Federal laws, regulations, and executive orders, OSMRE also reviews, at a minimum, the following documents to make its recommendation to the ASLM: information/correspondence concerning the U.S. Fish and Wildlife Service Section 7 consultation for threatened and endangered species potentially affected by the proposed mining plan modification under the Endangered Species Act of 1973) (USFWS 2006 and 2007), and the National Historic Preservation Act of 1966 "Section 106" consultations for the affected area (CHS 2007).

develop Federal Coal Leases COC-0123475 01 and COC-68590. OSMRE is the agency responsible for making a recommendation to the ASLM to approve, disapprove or approve with conditions the proposed mining plan modification. The ASLM will decide whether the mining plan modification is approved, disapproved, or approved with conditions.

The purpose of the action also arises from BLM's responsibility under the MLA as amended and the FCLAA, which requires evaluation of Colowyo's application to modify federal Lease COC-0123475 01 by adding approximately 27.84 acres of unleased public lands to that lease. This additional acreage will provide Colowyo with the access necessary to conduct activities in support of mining on the existing federal coal leases. BLM is the agency responsible for making a decision on the lease modification application. BLM will decide whether to approve all or part of the lands in the application, or to disapprove the application in its entirety.

Need: The need for the action is to provide Colowyo the opportunity to exercise its valid existing rights (VER) granted by BLM under federal coal leases COC-0123475 01 and COC-68590 to access and mine undeveloped federal coal resources located in the Collom Permit Expansion Area at the Colowyo Coal Mine. The need is also to provide Colowyo access to public lands not currently leased by BLM in order to conduct activities that would support mining of the undeveloped coal resources on the existing federal coal leases.

1.4 RELATIONSHIP TO STATUTES, REGULATIONS AND OTHER AGENCY PLANS

1.4.1 Statutes and Regulations

The following key laws, as amended, establish the primary authorities, responsibilities, and requirements for developing federal coal resources:

Mineral Leasing Act of 1920

National Historic Preservation Act of 1966 (NHPA)

National Environmental Policy Act of 1969 Mining and Minerals Policy Act of 1970 (MMPA)

Clean Air Act of 1970 (CAA)

Clean Water Act of 1972 (CWA)

Endangered Species Act of 1973 (ESA)

Colorado Surface Coal Mining Reclamation Act of 1973

Federal Land Policy and Management Act of 1976 (FLPMA)

Federal Coal Leasing Amendments Act of 1976 (FLCAA)

Surface Mining Control and Reclamation Act of 1977

The MLA and FCLAA provide the legal foundation for the leasing and development of federal coal resources. BLM is the federal agency delegated the authority to offer federal coal resources for leasing and to issue leases. The MMPA declares that it is the continuing policy of the federal government to foster and encourage the orderly and economic development of domestic mineral resources. In that context, BLM complies with FLPMA to plan for multiple uses of public lands and determine those lands suitable and available for coal leasing and development. Through preparation of land use plans and/or in response to coal industry proposals to lease federal coal, BLM complies with NEPA to disclose to the public the potential impacts from coal leasing and development, and also complies with the NHPA, CAA, CWA, ESA and other environmental laws to ensure appropriate protection of other resources. BLM then makes the lands that are determined suitable for coal development available for leasing. BLM is also responsible for ensuring that the public receives fair market value for the leasing of federal coal. Once a lease is issued, BLM ensures that the maximum economic recovery of coal is achieved during the mining of those federal leases and ensures that waste of federal coal resources is minimized. BLM implements its responsibilities for leasing and oversight of coal exploration and development under its regulations at CFR, Title 43, Public Lands, Subtitle B, Chapter II, BLM, Department of the Interior, Subchapter C – Minerals Management, Parts 3400 – 3480 (43 CFR Parts 3400-3480).

SMCRA provides the legal framework for the federal government to regulate coal mining by balancing the need for continued domestic coal production with protection of the environment and ensuring the mined land is returned to beneficial use when mining is finished. OSMRE was created in 1977 under SMCRA to carry out and oversee those federal responsibilities. OSMRE implements its MLA and SMCRA responsibilities under regulations at CFR Title 30 - Mineral Resources, Chapter VII - Office of Surface Mining Reclamation and Enforcement, Department of the Interior, Subchapters A-T, Parts 700-955.

As provided for under SMCRA, OSMRE has worked with coal producing states to develop their own regulatory programs to permit coal mining with OSMRE in an oversight role. CDRMS manages its own coal regulatory program under SMCRA and the Colorado Surface Coal Mining Reclamation Act of 1979. CDRMS has the authority and responsibility to make decisions to approve SMCRA mine permits and regulate coal mining under Regulations of the Colorado Mined Land Reclamation Board for Coal Mining (revised 09/14/2005).

1.4.2 Other Agency Plans

The BLM LSFO manages approximately 1.3 million surface acres and an additional 1.1 million acres of mineral estate in northwest Colorado, including BLM managed surface and mineral estate located in the Project Area. As required by FLPMA, BLM periodically prepares and revises land use plans (i.e. RMPs) to determine those uses that are suitable and compatible on specific portions of the public lands, and under what conditions those uses would be authorized to mitigate potential impacts on other resource values and protect human health and safety. The RMP, which was in effect when the federal leases were issued and which guides the BLM decisions for proposals on the subject coal leases, is the 1989 LSRMP-ROD, signed on April, 26 1989, and published in June, 1989. The 1989 LSRMP-ROD documents BLM's resource analysis and land management decisions and states the following specific objectives for coal:

- Maximize the availability of the federal coal estate for exploration and development; and,
- Facilitate orderly, economic, and environmentally-sound exploration and development of the coal resource within the principles of balanced multiple use management.

The subject federal coal leases are located within the 1989 LSRMP-ROD Management Unit 1: Eastern Yampa River, which contains the majority of the in-place coal resources (6.1 billion tons within 3,000 feet of the land surface) within the coal planning area for the 1989 LSRMP-ROD. This management unit has the following specific management objective:

- The management objectives of this unit are to realize the potential for development of coal, oil, and gas resources (BLM 1989).

Development and mining of federal coal resources on the subject federal coal leases under both the Alternative A and Alternative B is in conformance with the general coal management objectives of the 1989 LSRMP-ROD and the specific objectives of the LSRMP-ROD Management Unit 1: Eastern Yampa Management Unit.

In accordance with the 1989 LSRMP-ROD, development of federal coal resources would also be subject to the following management action for wildlife habitat:

- Wildlife habitat will be maintained or improved through mitigation or restrictions applied to all wildlife habitat disturbing activities (BLM 1989).

Further, the Eastern Yampa Management Unit objectives for wildlife state:

- Wildlife habitats, including threatened and endangered species habitats, will be protected by limits or restrictions placed on the development of federal coal, as the result of the application of the coal unsuitability criteria (see appendices 1 and 2) (BLM 1989).

Appendix 2 of the 1989 LSRMP-ROD (Federal Lands Review, Methodology Used In Identifying Areas Acceptable For Further Coal Leasing Consideration) identifies a stipulation that requires the lessee to mitigate for mule deer, elk, antelope, and Greater sage and sharp-tailed grouse habitat loss where applicable and the resultant loss or displacement of these species as key indicator species due to surface coal mining operations. The stipulation was attached to the subject leases when they were issued. In compliance with this stipulation for the Proposed Action, Colowyo developed the following plans as part of its application for revision of its SMCRA PAP (PR 03), which identify specific mitigation actions for the protection and replacement of GRSG and other wildlife species habitats: 1) Reclamation Plan (**Appendix A**); and 2) Fish and Wildlife Plan (**Appendix B**, pg. 6). Implementation of the Reclamation Plan is designed to result in an increase in GRSG habitat post-mining when compared to pre-mining. These plans were reviewed by CPW and BLM, approved by CDRMS, and incorporated as required mitigation measures under approved PR 03.

Alternative B includes the CDRMS approved GRSG and other wildlife mitigation requirements in **Appendices A** and **B** that comply with the lease stipulation, and includes additional proposed mitigation specifically for the protection of GRSG, described in more detail in Chapter 2. In general, the additional mitigation would: 1) relocate surface disturbance to a minimum distance of at least 0.9 mile (1.5 km) from the closest active GRSG lek; 2) ensure the preservation in perpetuity of GRSG habitat located outside the permit area, of similar type and equivalent acreage to that which would be disturbed both directly and indirectly by mining operations; and 3) provide funding to conduct monitoring of the potential impacts of surface coal mining on the GRSG.

Both Alternative A and Alternative B would be in conformance with the 1989 LSRMP-ROD management action to protect wildlife habitat through compliance with the associated lease stipulation.

In October 2011, the LSFO approved a new RMP and associated ROD (2011 LSFO RMP-ROD) (BLM 2011) for the public lands under its jurisdiction. Colowyo's leases were issued by BLM in conformance with the decisions of the1989 LSRMP-ROD and therefore were established as VER prior to approval of the new RMP. As is recognized and stated in the 2011 LSFO RMP-ROD, an existing lease conveys certain rights of development to the leaseholder and a stipulation cannot be added after the lease is issued without the consent of both the lessee and lessor. Conditions of Approval (COA) and/or Best Management Practices (BMPs) required by BLM in accordance with the 2011 LSFO RMP-ROD would need to be consistent with the VER granted in existing leases. Since Colowyo's leases were issued under the 1989 RMP, are in conformance with that RMP and are VER, Alternative A and Alternative B for the mining plan are not required to be in conformance with the 2011 RMP. However, COAs and BMP's identified in the 2011 RMP that are consistent with the VER of Colowyo's leases could be required by BLM.

The 2011 LSFO RMP-ROD also balances protection of other key resources and habitats, recreation opportunities and multiple uses, including coal mining, and sets the following goal and objectives for coal (page RMP-36):

> ***Goal C (Coal and Oil Shale):***
>
> *Allow for the availability of the federal coal and oil shale estate for exploration and development.*
>
> *Objectives for achieving these goals include:*
>
> > *- Identify and make available the federal coal and oil shale estate for exploration and development, consistent with appropriate suitability studies, to increase energy supplies.*
> >
> > *- Facilitate reasonable, economical, and environmentally sound exploration and development of the federal coal and oil shale estate.*
> >
> > *- Promote the use of BMPs, including implementation of sound reclamation standards.*

Alternatives A and B are consistent with, and the proposed Lease Modification is in conformance with the above general goal and objectives for coal in the approved 2011 LSFO RMP-ROD.

The 2011 LSFO RMP-ROD also contains Management Actions for Allowable Uses and Actions for a number of other resources that could be considered for application to the Project such as Fish and Wildlife Habitat (pages RMP-18 - RMP-22). These management actions would impose controlled surface use (CSU), timing limitations, and no surface occupancy (NSO) limitations on oil and gas and other surface disturbing activities. The Lease Modification would be subject to the appropriate management actions. However, as described above, as applied to the existing leases under Alternatives A and B, these management actions would need to be consistent with the VER.

On September 22, 2015, BLM issued the ROD and Approved Resource Management Plan Amendments (ARMPA) and Approved Resource Management Plans (ARMP) for the Rocky Mountain Region Greater Sage-Grouse (GRSG) Sub-Regions (BLM 2015). The ARMPAs and ARMPs resulted from a landscape–level management strategy to conserve GRSG habitat on public lands that was developed by the BLM in coordination with the U.S. Forest Service. The ARMPs and ARMPAs include a suite of management actions, such as establishing disturbance limits, GRSG habitat objectives, mitigation requirements, monitoring protocols, and adaptive management triggers and responses. They also include other conservation measures that apply throughout designated habitat management areas. Objective MR-7 of the Northwest Colorado GRSG ARMPA indicates that the solid mineral programs should be managed to avoid, minimize, and compensate for adverse impacts to GRSG habitat to the extent practical under the law and BLM jurisdiction (BLM 2015). The ARMPA also recognizes VER and only those management actions that are consistent with the VER of Colowyo's leases could be required by BLM. For existing coal leases, the ARMPA, Management Decision (MD) MR-23 encourages lessees to voluntarily follow Preferred Design Features (PDF) to reduce or mitigate any potential impacts to GRSG. PDFs are listed in Appendix C, Table C-1 of the ARMPA (BLM 2015). Alternative A (Proposed Action) incorporates design features to protect and/or enhance GRSG habitat and Alternative B incorporates both those design features and additional such design features collaboratively developed by Colowyo, BLM, OSMRE, CPW, and USFWS.

The lands included in the proposed Lease Modification are not subject to VER and are managed by BLM under the objectives and management actions for GRSG of the 2015 Northwest Colorado ARMPA. The proposed Lease Modification would be a key component of both Alternative A and Alternative B to allow access for location of mine components that would facilitate exercise of VER and development of Colowyo's existing federal coal leases. For Alternative B, the proposed Lease Modification would also facilitate reducing potential impacts on a GRSG lek (lek SG 4) by allowing access for a redesign of mine components that would result in relocating mine operations a minimum of 0.9 miles (1.5 km) from lek SG 4.

MD MR-23 of the 2015 Northwest Colorado ARMPA at page 2-18 provides for the following regarding expansion of existing leases:

"To authorize expansion of existing leases, the environmental record of review must show no significant direct disturbance, displacement, or mortality of GRSG based on these criteria:

- Important GRSG habitat areas as identified by factors, including, but not limited to, average male lek attendance and/or important seasonal habitat
- An evaluation of the threats affecting the local population as compared to benefits that could be accomplished through compensatory or off-site mitigation
- An evaluation of terrain and habitat features. For example, within 4 miles (6.4 km) from a lek, local terrain features such as ridges and ravines may reduce the habitat importance and shield nearby habitat from disruptive factors."

This EA considers the criteria above.

Appendix B of the Northwest Colorado ARMPA identifies the minimum buffer distances for which BLM will assess and address impacts for various types of disturbances or activities. One of the types of activities and associated lek buffer distances is as follows:

- "Surface disturbance (continuing human activities that alter or remove the natural vegetation) within 3.1 miles (5.0 km) of leks"

A portion of Alternative A would disturb and remove vegetation from the surface of lands within 0.6 mile (1.0 km) of a lek site (lek SG 4) and continuing human activities would also occur on those lands. Alternative A would not conform to the 3.1 mile (5.0 km) lek buffer distance described above and application of the buffer distance to Alternative A would preclude Colowyo from mining Colowyo's existing northern federal lease. However, since the ARMPA recognizes VER, Alternative A would be in conformance with the ARMPA.

Under Alternative B there would be no surface disturbance within 0.9 mile (1.5 km) of lek SG 4. However, since the ARMPA recognizes VER, Alternative B would be in conformance with the ARMPA.

The proposed Lease Modification, if approved by BLM, would not authorize any on-the-ground surface disturbing activities. Approval of the Lease Modification would administratively add the lands included in the Lease Modification to existing Colowyo federal coal lease COC-0123475 01. Authorization of mine operations and surface disturbing activities on the Lease Modification area would be through OSMRE approval of the mining plan modification, which is also being analyzed in this EA.

1.5 AUTHORIZING ACTIONS

Two separate approvals are needed for a coal mine operator to conduct mining operations on federal coal leases: 1) an approved SMCRA mine permit by the regulatory authority, in this case CDRMS; and 2) an approved mining plan, or modification of a previously approved mine plan, by the ASLM. The SMCRA mine permit approval by CDRMS provides the basis for the Secretary's decision on the mining plan or mining plan modification. On April 10, 2013, CDRMS issued a proposed decision to approve with conditions PR 03 for the Project, and a finding of compliance with the Colorado Surface Coal Mining Reclamation Act, for the Colowyo Coal Mine (Permit No.C-1981-019). Then on May 29, 2013, CDRMS approved Colowyo's SMCRA PR 03, with conditions, including the requirement that the ASLM must approve a mining plan modification before mining of federally leased coal can begin, in conformance with the MLA.

In accordance with 30 CFR 746.13, OSMRE will prepare and submit to the ASLM a MPDD recommending approval, disapproval, or conditional approval of the mining plan modification. Prior to developing and submitting the MPDD to the ASLM, OSMRE will consult with federal and state agencies, Native American Tribes, local governments and the public; prepare this EA to disclose the potential environmental effects of the Project to the public, consider alternatives; determine whether the potential effects of the Project and alternatives considered are significant; and comply with other applicable federal laws and executive orders.

BLM must approve a Lease Modification before unleased public lands can be added to a federal coal lease, and operations supporting mining can be authorized and initiated on those lands. In accordance with BLM regulations at 43 CFR Subpart 3432 Lease Modifications, a federal coal lessee may apply for a lease modification to the BLM State Office having jurisdiction, in this case the Colorado State Office. In order to approve a modification that includes all or part of the lands applied for, BLM will review the reasons for the modification. BLM must determine that the modification serves the interests of the United States, that there is no competitive interest in the lands and that the lands proposed to be added cannot be developed as part of another independent operation. If BLM determines that the proposed Lease Modification application does not meet the above requirements, BLM may disapprove the application.

1.6 OUTREACH AND ISSUES

Public comments were initially solicited by publishing a Legal Notice in the Rio Blanco Herald Times and the Craig Daily Times on September 26 and 27, 2013, respectively. The Notice described the Project in summary form, informed the public that a public outreach meeting for the EA was scheduled for October 10, 2013 at the BLM LSFO and that public comments would be accepted until October 31, 2013. The Notice was also posted at various public locations in Craig and Meeker, Colorado. OSMRE created a Project website, http://www.wrcc.osmre.gov/initiatives/colowyo.shtm, which provided the notice and other Project and comment opportunities available on the website. An outreach letter describing the Project, announcing the public outreach meeting, and soliciting comments was mailed on September 26, 2013 to 45 recipients including BLM, Native American Tribes, state agencies, city and county governments, adjacent landowners, and other interested parties.

The uncertainty in the length of the federal government shutdown beginning October 1, 2013 required that the public outreach meeting originally scheduled for October 10, 2013 be postponed. A letter announcing the outreach meeting postponement was mailed to the original 45 recipients on October 1, 2013, and on October 2 and 3, 2013, Legal Notices about the postponement were published in the Craig Daily Times and Rio Blanco Herald Times, respectively and also posted at public places in Craig and Meeker, Colorado. After the federal government resumed operation on October 17, 2013, a new outreach meeting date was determined, November 7, 2013. On October 22, 2013, an outreach letter was mailed to the 45 original recipients announcing the new meeting date and that the public comment period was extended to November 14, 2013. Legal Notices containing the same information were published in the Rio Blanco Herald Times on October 24 and 31, 2013 and in the Craig Daily Times on October 25 and November 1, 2013. The new Legal Notices were also posted at public locations in Craig and Meeker, Colorado and the BLM LSFO posted a notice on the Field Office website about the outreach meeting and created a link to the OSMRE Project website.

The public outreach meeting was held on November 7, 2013 at the BLM LSFO from 4:00 PM until 8:00 PM. Sixty-five people attended and six submitted comment forms onsite. A total of 19 comment forms or email comments were received by the end of the comment period. Most of the comments were in favor of approving the mining plan and 558 people signed a petition on the Change.org website in favor of the mining plan approval. These comments were generally based on: 1) benefit to and reliance of the local economy on continued coal mining; 2) the Project itself has measures built into it that already adequately protect the environment; 3) other public and private projects in the area have greater impacts on the resources than the Project; 4) Colowyo is a good environmental steward; and 5) the Project will provide high quality fuel to power generation plants.

Several comments raised concerns about potential adverse impacts including: 1) additional traffic on county roads; 2) increased dust on adjacent private lands; 3) potential impacts on the quality of domestic water wells and livestock and wildlife watering structures adjacent to the mine; and 4) potential increases in noise levels on adjacent private lands.

One commenter raised several concerns including: 1) the need to complete an EIS under NEPA to analyze this Project; 2) the direct and indirect surface impacts of mining the lease including impacts to rare imperiled fish, wildlife, and plants; surface water quality; air quality; and climate change; 3) connected actions and impacts that need to be addressed, at least as indirect impacts, including the operation of the Craig Station; coal handling, hauling, and transport; infrastructure maintenance and improvements; and water diversion and water transport to the mine and power plants; 4) the need for cumulative impacts of other activities to be analyzed and assessed such as oil and gas development, other coal fired power plants in the region, other coal mines in the region, and off-road vehicle use; and 5) that a range of reasonable alternatives must be rigorously explored and objectively evaluated including alternative mining levels; underground mining; use of low or no pollutant emitting mining equipment and other air quality mitigation alternatives; undertaking actions to limit or reduce other greenhouse gas emissions; and offsite mitigation or compensation for the impacts in other ways. All comments received have been considered in the preparation of this document.

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CHAPTER 2 PROPOSED ACTION AND ALTERNATIVES

2.1 INTRODUCTION

This chapter provides background information on Colowyo's existing operations at the Colowyo Coal Mine, and describes Colowyo's Alternative A (Proposed Action), Alternative B (Reduced Mining), Alternative C (No Action), and alternatives that were considered, but eliminated from detailed analysis. The description of Alternative A and much of the description of Alternative B are based on the PAP and the PR03 submitted by Colowyo to the CDRMS on January 26, 2009 and approved by the CDRMS on May 29, 2013 (CDRMS 2013a). Readers desiring greater detail can review the additional descriptions, maps, and drawings contained in the PAP, which is available at the Colowyo Mine Administration Office at 5731 State Highway 13 Meeker, CO 81641, the BLM LSFO at 455 Emerson Street Craig, CO 81625, the Colorado Division of Reclamation Mining and Safety at 1313 Sherman Street Denver, CO 80203, and the Office of Surface Mining Reclamation and Enforcement at 1999 Broadway, Suite 3320 Denver, CO 80202.

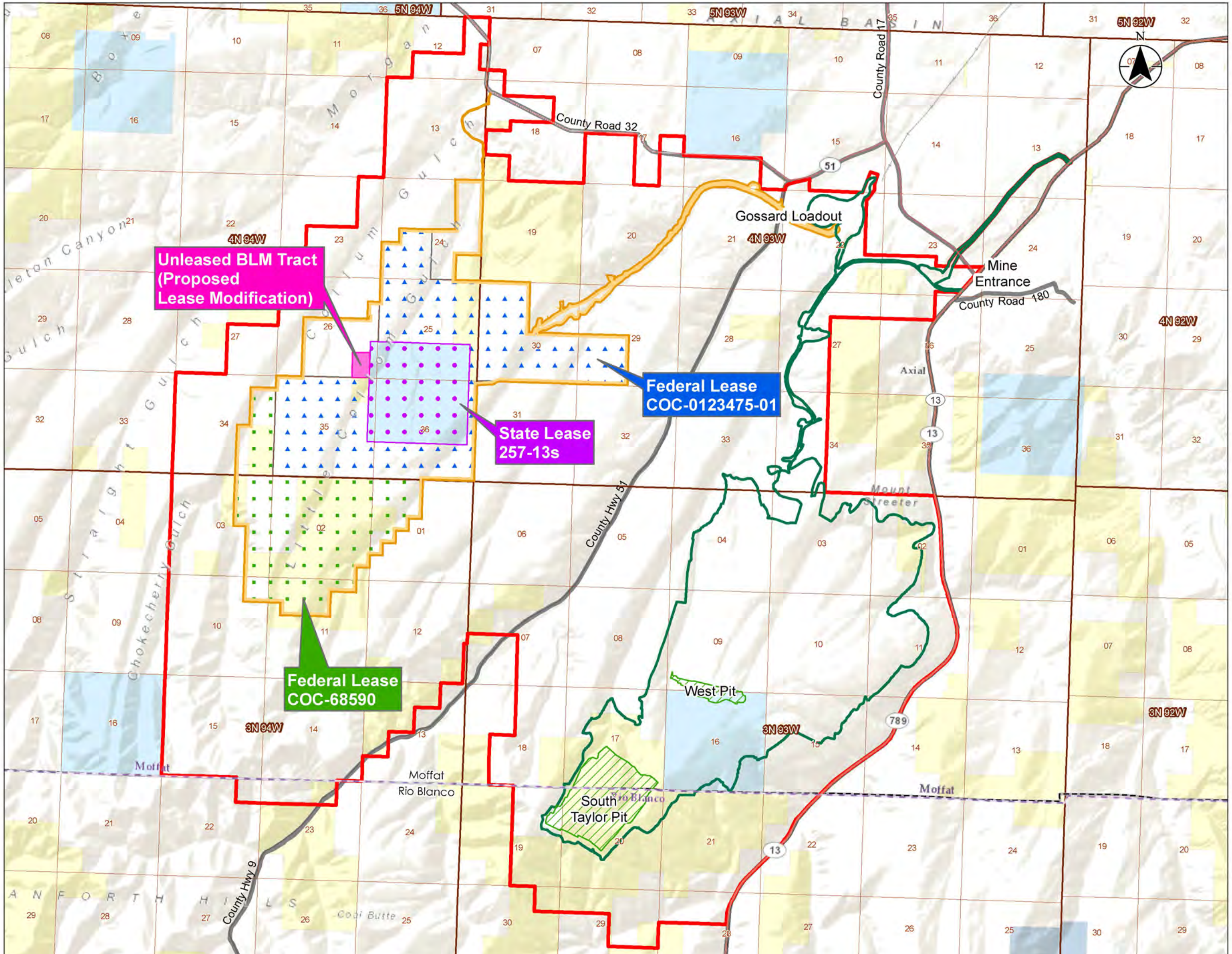
2.2 EXISTING OPERATIONS

Colowyo commenced surface mining in 1977 and has mined from four distinct pits during the life of the existing operation. The East Pit was the first pit opened and where mining concluded in 2006. The East Pit is in the final stages of reclamation and will be completely reclaimed in 2016. Mining commenced in the Section 16 Pit in 1992 and continued until 2002. Mining in the Section 16 Pit was a single seam operation, whereas, the other pits at Colowyo have required the mining of multiple seams. Reclamation on a majority of the Section 16 Pit occurred from 1993 to 1998. The remaining acres of the Section 16 Pit that have not been reclaimed are supporting ongoing mining activities, and they will be reclaimed with the South Taylor Pit. Mining began in the West Pit in 1994 and mining was concluded in 2014. Currently, the West Pit is in various stages of reclamation. In 2007, CDRMS approved PR02 and the ASLM approved the associated mining plan modification which approved mining operations in the South Taylor Pit and accepted the new maximum production rate of 6 mtpy. In 2008, Colowyo opened the South Taylor Pit and this pit is the current mining location. The South Taylor Pit (**Figure 2-1**) has since produced on average approximately 2.3 mtpy of coal by utilizing truck/shovel, dragline and highwall mining techniques. On September 2, 2015, the ASLM approved a new mining plan modification for PR02. The approval included a condition that mining within leases COC-29225 and COC-29226 (i.e. the South Taylor Pit) will not exceed 4 mtpy. Based on the 2014 production rate of 2.48 mtpy, operations in the South Taylor Pit are expected to continue until approximately 2019 (dependent on production levels), with reclamation operations continuing concurrently and several years beyond 2019. All mining that has occurred at the Colowyo Coal Mine has occurred on privately owned surface parcels and coal resources as well as on BLM and State of Colorado owned surface parcels and coal resources within federal leases COC-29225, COC-29226, COD-034365, and State Lease 257-13S. The CDRMS approved SMCRA permit boundary for the current operations encompasses 12,251 acres. As of the end of the year in 2014, a total of 3,786 acres of disturbance has occurred over the life of the operation.

SMCRA, CSCMRA, and the associated federal and state regulations require that disturbance from coal mining be reclaimed as closely as possible to the AOC and to either pre-mining land uses or to approved alternate land uses. The laws and the regulations further require that reclamation efforts, including but not limited to backfilling, grading, topsoil replacement, and revegetation, on all land that is disturbed by surface mining activities shall occur as contemporaneously as practicable with mining operations. Under the laws and regulations, coal operators are required to submit a reclamation plan as part of their SMCRA permit or permit revision application that includes establishing in increments, the period of time between removal of coal and completion of backfilling and grading of the mined areas. However, coal mining is a continually evolving process over time, subject to changes in coal market demands, mining technology, geologic knowledge, and the regulatory environment. All of those change agents can result in the need for coal mine operators to apply to CDRMS and as appropriate, OSMRE, for approval to revise mining and reclamation plans and mine permits, including for changes in the timing of reclamation. It is possible that coal mine operators may request approval to re-disturb areas that have begun to be reclaimed under an existing permit approval for mine components proposed under a subsequent permit revision application. The laws and regulations and associated permitting processes recognize~~s~~ the dynamics of coal mining and the associated reclamation activities, and provide~~s~~ for approval of changes to reclamation requirements, including the reclamation timetable as appropriate. Of the 3,786 acres of land at the Colowyo Coal Mine that has already been disturbed by mining, 2,422 acres, or about 64 percent, have already been reclaimed to varying degrees.

Prior to initiating coal mining, the laws and regulations also require coal mine operators to post a bond of sufficient amount that, in the case that the coal mine operator defaults on its obligations, the CDRMS could then fully complete the required reclamation. The bonds are adjusted over time as needed to reflect changes due to CDRMS approved mining permit revisions and increases in reclamation costs due to inflation or cost increases. CDRMS releases acreage that has undergone reclamation from bond liability when the agency determines that various levels (Phase I; Phase II; Phase III) of reclamation requirements have been met, including successful revegetation. This is an incremental process since reclamation is initiated on mined areas at different CDRMS approved times and the time to achieve successful revegetation is dependent on the variables of weather and climate. To date, 980 acres have been fully released from bond liability back to the landowner by CDRMS for the Colowyo Coal Mine.

Historically and currently, coal is mined from the pits and hauled to a primary crusher. Once it is sized at the primary crusher it is then hauled along the existing haul road to the north northeast approximately 3.9 miles (6.3 km) to the Gossard Loadout. Once coal arrives at the Gossard Loadout it is sized accordingly again, and then loaded on a train for shipment.



- Approved SMCRA Permit Boundary
- Project Area
- Reclaimed and Existing Mine Operation Boundary
- Existing Mine Area

Leases Associated with Proposed Mining

- Federal Lease COC-0123475-01
- Federal Lease COC-68590
- State Lease 257-13s
- Unleased BLM Tract (Proposed Lease Modification)

Land Status

- Bureau of Land Management
- Private
- State
- State Park
- Road
- Highway
- Township Boundary
- County Boundary

0 1 2 Miles

1:63,360 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 13N
2. Basemap: Sources: Esri, DeLorme, USGS, NPS
   Sources: Esri, USGS, NOAA

Project Location
Rio Blanco & Moffat Counties
Colorado

203713557
Prepared by NF on 2015-01-22
Technical Review by NL on 2015-01-05
Independent Review by GB on 2015-01-05

Client/Project

Office of Surface Mining Reclamation & Enforcement
Colowyo Coal Mine: Collom Permit Expansion Area
Project Mining Plan Environmental Assessment

Figure No.

2-1

DRAFT

Title

Project Area and Existing Operations

2.3 ALTERNATIVE A (PROPOSED ACTION)

2.3.1 Proposed Project Area and Mining Plan Components

The Project Area for the proposed mining plan for the Collom Permit Expansion Area is located approximately 3 miles (4.8 km) northwest of the current mining operations. The Project Area includes Federal Coal Leases COC-0123475 and COC-68590, State Lease 257-13s, and private lands owned by Colowyo which includes the proposed route for the access/haul road to the existing Gossard Loadout (**Figure 2-1**). The Project Area encompasses 4,823 acres and includes all or portions of:

T3N, R94W, 6th PM, Sections 1, 2, 3, 10, and 11

T4N, R94W 6th PM, Sections 24, 25, 26, 34, 35, and 36

T4N, R93W 6th PM, Sections 20, 21, 29, 30, and 31

The proposed mining plan would generally include the following components and facilities:

- Two open pits, the Collom Lite Pit and Little Collom X Pit, to access the coal seams;
- A temporary overburden stockpile area to store overburden removed prior to mining for use in backfilling open pits during reclamation;
- Mine facilities including administrative buildings (office, warehouse, machine shop, vehicle maintenance shop, coal quality lab), a primary crusher, explosives storage area and a potable water treatment plant;
- Dispersed facilities necessary to conduct mining operations including:
  - Access and haul road along the West Fork of Jubb Creek from the Gossard loadout with no public access;
  - Temporary light use roads;
  - Temporary topsoil stockpile areas to store topsoil removed from disturbed areas for use in reclamation;
  - 69 kV power line and associated power poles within the area of mining operations that will be periodically moved as the dragline is moved;
  - Fiber optic line;
  - Temporary berms and screens;
  - Waterlines;
  - Ditches;
  - Construction staging areas.
- A 69 kV power line located adjacent to the Jubb Creek access/haul road that will not be moved during the life of the mine; and,
- Stormwater/sediment ponds, impoundments, and diversions.

Dispersed facilities within the disturbance footprint may be moved on a regular basis based on the mining sequence and would not create additional acres of disturbance. Dispersed facilities would be sited to avoid disturbances to cultural resources, wetlands, floodplains, stream channels, and intact sagebrush stands wherever possible.

Each of these components and facilities are further described in the sections below and the location of the Project Area and the associated Project components and facilities are shown on **Figure 2-2**. The components of the Project would disturb a total of 2,090.5 acres of the Project Area as described in **Table 2.3-1**.

Table 2.3-1 Acreage Disturbed by Project Component

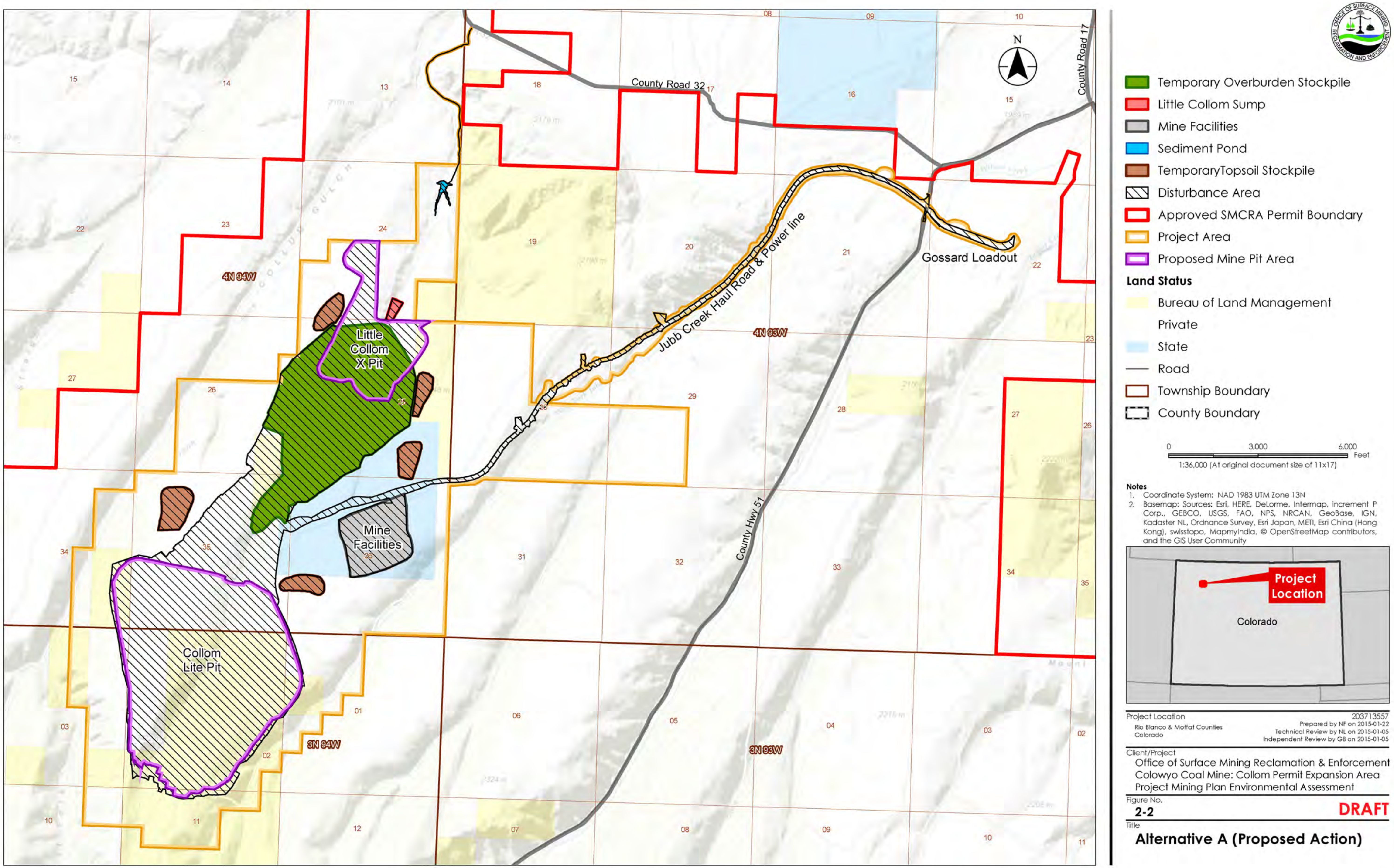
Project Component	Acres Disturbed
Collom Haul Road/Power Line	123.60
Mine Facilities	110.0
Little Collom X Pit	213.16
Collom Lite Pit	880.00
Temporary Overburden Stockpile	490.89
Collom Sump	4.73
Sediment Pond & Access Road	4.45
Temporary Topsoil Stockpiles	110.90
Other Areas*	278.21
Sub-Total Disturbance	2,215.94
Minus Overlap between the Little Collom X and Temporary Overburden Stockpile Area	-125.44
Total Disturbance	2,090.50

*Includes area between the Collom Lite Pit crest and the toe of the out-of-pit stockpile, and other areas adjacent to footprints listed above but included within the disturbance boundary.

2.3.2 Mining Methods

Colowyo proposes to continue to utilize the truck/shovel, dragline and highwall surface mining techniques it has successfully used in other parts of the mine since 1977 and is currently using in the South Taylor Pit. In general, the following mining operations sequence would be followed although some activities may occur concurrently or overlap:

- Construct sediment ponds and diversions;
- Strip and stockpile topsoil from areas to be disturbed;
- Construct the Jubb Creek access/haul road and adjacent power line;
- Construct the mine facilities;
- Begin removing overburden from the Little Collom X Pit area;
- Develop a temporary overburden stockpile in Little Collom Gulch;
- Begin removing overburden from the Collom Lite Pit area;
- Transition and overlap from mining coal in the Little Collom X Pit to mining coal in the Collom Lite Pit;
- Begin contemporaneous reclamation during mining operations;
- Complete mining of the Collom Lite Pit; and
- Complete reclamation.



Notes

1. Coordinate System: NAD 1983 UTM Zone 13N
2. Basemap: Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

Project Location
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203713557
Prepared by NF on 2015-01-22
Technical Review by NL on 2015-01-05
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Client/Project
Office of Surface Mining Reclamation & Enforcement
Colowyo Coal Mine: Collom Permit Expansion Area
Project Mining Plan Environmental Assessment

Figure No.
2-2

DRAFT

Title
Alternative A (Proposed Action)

While the following is a summary description of the mine operation and methods, the activities may not necessarily follow the sequence described and multiple operations may occur simultaneously.

Initially, Colowyo would strip and stockpile topsoil along the Jubb Creek haul/access road and install the associated sediment control and drainage structures. The road surface itself would then be constructed as well as the power line that would be included within the disturbance corridor. Colowyo would then construct the downstream sediment control pond and the sump near the eventual toe of the proposed temporary overburden stockpile in order to establish sediment control in the area.

Topsoil would then be stripped from the initial footprints of the Little Collom X and Collom Lite pits, the initial temporary overburden pile footprint, and the corridor for construction of the temporary overburden stockpile underdrain. Construction of the temporary overburden stockpile underdrain would commence in the valley bottom progressing upstream from the southernmost limit of the Little Collom X Pit and also progressing downstream toward the Little Collom X Sump.

Explosives would be used to fragment the overburden. Blasting would be conducted in accordance with the procedures and specifications presented in the approved SMCRA permit. Fragmented overburden would be loaded and transported to the temporary overburden stockpile or to the adjoining mined-out pit. After removal of the overburden, the coal seams would be exposed. As the coal seams are exposed, debris from the overburden would be removed using heavy equipment, then the coal seams would be drilled and shot with explosives, or broken up with heavy equipment to prepare the coal for loading and removal.

When explosives are needed, the drilling would be performed by an auger drill. The drill hole pattern would generally be spaced approximately 12 feet by 12 feet, though dependent upon the actual coal seam or overburden thickness. Drill holes would be loaded with either ammonium nitrate/fuel oil (ANFO) or a waterproof explosive (if the holes are wet). At the proposed maximum production rate of 5.1 mtpy, approximately 60 million pounds of explosives may be utilized per year.

Once the coal has been fragmented, a front-end loader or excavator would load the coal into haulage trucks. These haulage trucks would then transport the coal along the haul roads to the primary crusher to be located approximately 0.5 mile (0.8 km) west of the mine facilities area shown on **Figure 2-2**. The coal would then be dumped directly into the truck dump hopper, or stockpiled and fed into the hopper by front-end loaders. The primary crusher would reduce the coal to less than 8 inches in size. Following primary crushing, the coal would be discharged onto a conveyor belt that would transport the coal to a storage bin.

The coal would then be gravity discharged into highway trucks and hauled to the secondary crusher facility at the Gossard loadout on a single access/haul road along the west fork of Jubb Creek. The current vehicle fleet of 13 haul trucks would continue to be utilized for the Proposed Action. At the proposed maximum production rate of 5.1 mtpy, Colowyo estimates approximately 752,734 vehicle miles travelled (VMT) (1,211,408 km) per year by the haul trucks.

At the Gossard loadout, an existing coal stockpile would be utilized for storage of the coal hauled from the primary crusher facility. Depending on the amount of coal in the active stockpile and/or the operating status of the secondary crusher, coal could be placed in temporary storage or directly discharged into the crusher's truck dump. The secondary crusher would reduce the coal to an approximate 1 1/2 inch maximum diameter or lesser size. After secondary crushing, the coal would be transported on a conveyor belt and discharged through a stacking tube into the crushed coal stockpile. The coal would then be fed by gravity directly into train cars which pass through a corrugated steel tunnel located beneath the crushed coal stockpile. The existing Gossard loadout currently operates in the same manner as described above for coal transferred and mined from the South Taylor Pit and no expansion or modifications to the Gossard loadout would be needed under Alternative A.

As soon as possible after mining starts and sufficient room is available for back-filling, reclamation would begin. In general, rough backfilling would be completed by the overburden shovel, loader and trucks, bulldozers, scrapers and/or a dragline. Final grading would be performed to recreate a post mining topographic expression that would be similar to the pre-mining topography. At the completion of the final grading, topsoil would be redistributed over the regraded overburden and revegetated in accordance with Colowyo's approved reclamation plan (CDRMS 2013a).

Noxious plants would be managed in accordance with the "Weed Management Plan" (**Appendix A**). If insects become a problem to the point where they endanger the successful establishment of the seeded vegetation on the reclaimed area, they will also be controlled using methods suggested by the Colorado State University Extension Service. All herbicides and pesticides utilized will be those that are approved by the appropriate state and federal governmental agencies responsible for the approval and distribution of such agents. Any application of herbicide on BLM surface requires application for and approval of an active Pesticide Use Proposal every 3 years and annual reporting of applications made.

2.3.3 Topsoil

Prior to any mining related disturbances, topsoil would be removed from planned disturbance areas and redistributed or stockpiled as necessary to satisfy the needs of the CDRMS approved reclamation timetable. Topsoil would be removed from areas primarily during the summer and fall months to allow for mining to continue advancing. Topsoil would be moved directly to areas undergoing reclamation or would be stored for future use in stockpiles. Topsoil would be stockpiled in accordance with CDRMS rules and requirements. The stockpiling or direct haulage of topsoil would continue until all pit development has progressed to its maximum extent. Topsoil stockpiles would disturb a total of approximately 111 acres. Topsoil stockpiles would be constructed with outside slopes no steeper than 3 horizontal (H):1 vertical (V). After mining and regrading operations have ceased, all stockpiled topsoil would be used to reclaim the remaining pit and other disturbance areas.

2.3.4 Temporary Overburden Stockpile

Once the topsoil is stripped and stockpiled, then the overburden would be removed and stockpiled for use in backfilling the pits. The temporary overburden stockpile that would be built would be placed in a stable location that would not exceed a 33 percent slope to ensure stability. The initial development of the temporary overburden stockpile would be anticipated to begin during the first year of mining along with the excavation of the initial box cuts and continue over approximately five years of operation. Following this approximate period, mine pit advancement would allow for placement of mined overburden into the original box cut area. Once the boxcut was completed, and mining progressed to the south, overburden material from each successive cut would be backfilled into the previously mined areas. Once enough overburden material is placed in the backfilled area development of the approved post mine topography would commence.

The temporarily stockpiled overburden would be used to fill and recontour the final pit sequence in the final years of mining activities. Stored overburden material would be used in the construction of the post mine topography. Approximately 250 million cubic yards of storage capacity for the temporary overburden stockpile would be needed with a disturbance footprint of approximately 490.9 acres.

The temporary overburden stockpile would be constructed in 50 to 100 foot lifts by use of end dump trucks, dozers, and loaders. The primary method used to build the temporary overburden stockpile would be by end dump truck supported by dozers. Initially, each lift would be dumped at angle of repose and subsequently spread by dozer. The side slope of the active dump would not exceed a 33 percent slope and would be maintained during active times of operation. The overall slope ratio of less than 3:1 (33 percent slope) would be maintained for the entire stockpile. Maintenance techniques on the temporary overburden stockpile would consist of blading of roads and ramps, along with the use of dust control during active times of operation.

Complete construction of the stockpile would be expected to take about 7 to 10 years. As such, the lower portions of the stockpile would be completed and stabilized before the top would be completed. To ensure that a water table would not develop within the stockpile during its life, a rock drain would be installed at the base of the fill along its entire length. The overburden stockpile would be confined by the valley slopes on both sides. The stockpile would remain in place until the last few years of mining and would have a life of about 15-20 years depending on production rates.

Following the completion of mining, this temporary overburden stockpile would be removed and the stored material placed back into the open pits. The area that was disturbed in conjunction with this stockpile would be reclaimed in accordance with the procedures outlined in the CDRMS approved reclamation plan (CDRMS 2013a).

2.3.5 Access and Haul Roads

A haul road would be constructed to convey mine traffic from the primary crusher to the Gossard load out facility located approximately 5.9 miles (9.5 km) northeast of the proposed pits. This haul road would be constructed to meet state specifications and standards. The proposed haul road would be constructed with a crown, and constructed upon the most stable available slope to minimize erosion. Overall grade of the road would not exceed a slope ratio of 10:1 (10 percent grade) with a horizontal alignment consistent with the existing topography. Ditches, erosion controls, and culverts would be used to minimize impacts to surrounding areas, and would be designed in such a manner to safely pass peak runoff from a 10 year, 24 hour precipitation event. The road would have an overall width of 106 feet, with a 24 foot paved running surface. The road length would be about 29,000 feet (5.5 miles or 8.9 km) and would disturb approximately 123.6 acres.

Asphalt pavement specifications would be based on a 30 year design life utilizing 50 ton coal haul trucks. A ditch would be installed at the toe of all cut slopes. Temporary erosion control measures would be implemented during construction to minimize sedimentation and erosion until permanent control measures can be established.

There are two main out of pit haul roads that would be built to haul overburden materials from the pits to the temporary overburden stockpile. These roads would be contained within the disturbance footprint of the temporary overburden stockpile. These roads are designated as the Central and East haul roads. A section of the East Haul Road would also be used to haul coal from the pit to the truck dump. Both roads would be designed with an overall width of 120 feet. The Central haul road would be about 6,200 feet in length and would have a maximum sustained slope of 8.3 percent. The East haul road would be about 5,200 feet in length with a maximum slope of 5.8 percent.

Drainage from the haul roads would be directed to the pit(s) wherever possible. A ditch would be installed at the toe of all cut slopes. If needed, temporary erosion control measures would be implemented during construction to minimize sedimentation and erosion until permanent control measures can be established. Such temporary and permanent control measures would include silt fences, straw bales, straw wattles, rock check dams, or other measures such as downstream sediment ponds.

Many in pit truck routes would be constructed within the Collom disturbance area. These roads would be exempt from any construction specifications, since roadways within the immediate mining pit area are not included within the Colorado Regulations definition of "road" (Rule 1.04(111)). Typical truck routes would be from 80 feet to 120 feet wide, would be built with a crown, would be ditched on either side for proper drainage, and would have berms on outside (down slope) exposures. Roads would be constructed to meet the Mine Safety and Health Administration (MSHA) standards for safety.

In order to obtain access from existing County Road 32 to the Little Collom X Sediment Pond, an existing two track road would be upgraded to a width of 12 feet for approximately 6,600 feet in length and would be designed to meet the applicable requirements of CDRMS Rule 4.03.2 for Access Roads. Use of this road would only be for routine environmental monitoring and occasional pond maintenance. Typical road use would consist of one trip per week by a light use vehicle. Routine road maintenance would consist of occasional blading and drainage control. Any out slopes created from the construction of this access road would be seeded with the seed mix listed in the approved Reclamation Plan (CDRMS 2013a).

2.3.6 Power Lines

Since Colowyo utilizes many electric-powered mining machines, electric power lines would be located in the permit area to supply electricity to the equipment. A new main power line would be a 69 kilovolt (kV) line approximately 41,000 feet (7.8 miles or 12.6 km) in length. This power line would follow and be constructed within the disturbance footprint of the Collom Haul Road shown in **Figure 2-2** and described above from the Gossard loadout area to the mine facilities, the Collom Lite Pit, the temporary overburden pile, and the Little Collom X Pit. The power line would also be constructed within the disturbance footprints of these areas and therefore would not increase the total disturbance of Alternative A. Powerlines would be constructed in accordance with avian protection standards (e.g. perch deterrents). The major pieces of equipment that would be powered by electricity in the Collom area would be the shovel and dragline. Therefore, during the life of the mine it would be necessary to periodically move the power line loop to accommodate the changing locations of the shovel and dragline and associated advancement of the pit.

2.3.7 Mine Facilities

Development of the Collom expansion area would include the construction of new mining support facilities closer to the proposed pit locations than the existing facilities that support the current mining operation (**Figure 2-2**). The new facilities would include an office building, machine shop, warehouse and parking lot all located on state land in Section 36, T4N, R94W 6th PM. Colowyo would also construct and maintain a welding shop, tire bay, wash bay, maintenance shop, and fuel storage area in Section 36. A warehouse yard (outside fenced storage) would also be constructed and would provide storage of the larger heavy equipment parts. Additional structures in the complex would include a diesel and gasoline fueling station for both the large mobile mine equipment and the mine pickup truck fleet, a tank farm building, a potable water treatment plant, and a temporary hazardous waste storage facility. The disturbance footprint of the proposed support facilities area would be approximately 110 acres. Finally, an explosives magazines storage area and ANFO storage bins would be located west of the facilities area describe above, but within the W1/2, Section 36, T4N, R94W 6th PM.

The coal crushing and loadout facilities would include two separate facilities: (1) a new primary crusher situated within the Collom expansion area; and (2) an existing secondary crusher and train loadout at the Gossard loadout area. The new primary crusher facility would be located in the W1/2, Section 35, T4N, R94W 6th PM. This facility would include a raw coal stockpile area, a truck dump, a primary crusher, a covered conveyor, a storage bin, and a truck load-out.

The existing, secondary crusher and train load-out facility that would be utilized for the Collom coal production is known as the Gossard loadout and is located in Section 22, T4N, R93W 6th PM. Included in the Gossard loadout facility are a coal stockpile area, a truck dump, a secondary crusher, a covered conveyor, a crushed coal stockpile, and a train load-out. Construction was completed on this facility in 1979 and in 1987 a covered reclaim conveyor was added. No new facilities would be added at the Gossard loadout under Alternative A.

2.3.8 Ponds, Impoundments, Diversions

Colowyo's approved SMCRA Permit (CDRMS 2013a) includes a required Erosion and Sedimentation Control Plan to control runoff, and protect surface and ground water quality through construction of several new sedimentation structures and diversion ditches. Prior to disturbing the Project area, Colowyo would construct a downstream sediment control pond and sump near the eventual toe of the proposed temporary overburden spoil pile in order to establish sediment control in the area. A system of temporary ditches would be used to divert runoff from disturbed areas to sediment ponds. Facilities to control sediment would typically be installed in areas above (upstream) and/or below (downstream) the planned sites of disturbance. Upstream facilities, such as temporary diversion ditches and check dams upslope from the mining activities, would serve to divert normal surface runoff away from the disturbed areas. Because the Collom Lite Pit mining activities extend nearly to the top of the drainages, no upstream facilities are proposed in these areas. Upstream diversions are proposed for portions of the Little Collom X Pit. Diversion ditches located downstream would help collect runoff from disturbed areas and route it into the sedimentation ponds.

During active mining, the mining areas would aid in retaining sediment within the disturbed areas by catching water in pits, small depressions, and dozer basins, etc. This captured water and sediment would not leave the mining areas. Once reclaimed, the basins would be returned to a similar topographic profile and would drain as they did prior to mining activities (i.e., historic drainage patterns would be re-established).

Temporary diversions would be constructed to pass, at a minimum, the runoff from the precipitation event with a two-year recurrence interval. Topsoil stockpile areas constructed outside the confines of engineered sediment control structures would be required to have a perimeter ditch and berm constructed around the entire footprint of the stockpile sufficient to capture and retain any rainwater/snowmelt that would be generated from the stockpile area to preclude loss and/or contamination of the topsoil resource.

The drainage and sediment control measures presented in the approved Erosion and Sedimentation Control Plan would also provide for diversion or relocation of three ephemeral surface drainages within the permit area. No perennial streams would be diverted for the proposed project. Stream channel diversions would be constructed to pass at a minimum the runoff from the 100-year, 24-hour precipitation event. The only stream channel that would be impacted by the Collom Lite Pit is the main stream of Little Collom Gulch, an ephemeral stream draining less than 1 square mile at the proposed upstream pit boundary. It would not be diverted at the upstream boundary due to the small upstream drainage area, low runoff production potential, and the impracticality and land disturbance associated with constructing a diversion along steep canyon slopes. It would be channelized further downstream, alongside the haul road leading from the Collom Lite Pit to the proposed overburden stockpile, where it drains greater than 1 square mile. This section of the reconstructed Little Collom Gulch would be constructed to pass at a minimum the runoff from a 100-year, 24-hour precipitation event.

The eastern lobe of the Little Collom X Pit would intersect two small tributaries of Little Collom Gulch, which collectively drain approximately 1 square mile. These tributaries would be diverted around the pit in a ditch designed for the 100-year event. In addition, two small ephemeral tributary gullies located east of the proposed overburden stockpile would also be affected by operations. They would not be diverted and would instead flow into gravity sorted material under the proposed overburden stockpile.

The sump and pond would remain in place until the entire disturbance footprint area reporting to these structures is reclaimed and vegetation is adequate to control erosion to pre-mining levels. Prior to removal of the sump and pond the reclaimed area would be verified through the CDRMS Phase II bond release process. This would take a minimum of 10 years after the final reclamation block is seeded within this drainage area which is currently anticipated to occur in 2033. Therefore, the earliest anticipated removal of the sump and pond structures would be in 2043.

2.3.9 Water Source

Water used for dust control on haul roads may be obtained from the Wilson Reservoir located in Section 13, T4N, R93W 6th PM, from runoff water pumped from the pits or discharge from dewatering wells. Colowyo would need to acquire the appropriate permits from the Colorado State Engineer's office to do so. Colowyo is a large surface water rights owner in the Upper Yampa area (Water District 44) of Colorado Water Division 6. Several diversions on Good Spring Creek, into which Jubb Creek ultimately flows, are included in the rights controlled by Colowyo. Colowyo also owns water rights to diversions along Jubb Creek, Milk Creek, Morgan Gulch, Taylor Creek, Wilson Creek, Williams Fork, and the Yampa River (CDWR 2009). The appropriation dates on many diversions owned by Colowyo are prior to the 1890's, making them the most senior rights on their respective waterways. Therefore, any reduction in base flow could be offset by Colowyo not exercising their water rights in the amount of the reduction of the base flow, if it was determined to be necessary. The potential diminution that may result during mining is within the water rights held by Colowyo. Colowyo may need to utilize water from alternative sources, such as dewatering wells to serve as the alternative water supply. Again, the appropriate permits from the State Engineer's Office would be acquired before doing so.

2.3.10 Open Pits

The area to be mined within the Collom Lite Pit would cover an area of two long ridge lines at about 7,900 feet in elevation which is bisected by a 100 to 200 feet deep valley formed by the stream channel of Little Collom Gulch. Ultimately the Collom Lite Pit would cover 880 acres and would be approximately 650 feet deep in places. A total of 9 seams would be mined in the Collom Lite Pit. Coal production from the Collom Lite Pit would build from about 1.2 million tons in in the first year up to an average rate of 2.3 million tons per year with a maximum rate of 5.1 million tons. A total overburden/interburden volume of 498,381,818 cubic yards and coal tonnage of 79,110,000 tons is estimated to be generated and produced, respectively, from the Collom Lite Pit.

The Little Collom X Pit would be located approximately 1.5 miles (2.4 km) north of the Collom Lite Pit and 600 feet lower in elevation. Similar to the Collom Lite Pit area, the area to be mined within the Little Collom X Pit would cover an area of two long ridge lines at about 7,000 feet in elevation which is bisected by a 100 foot deep valley formed by the stream channel of

Little Collom Gulch. Ultimately the Little Collom X Pit would cover approximately 213 acres and would be approximately 100 feet deep in places. There would be two seams mined in the Little Collom X Pit and mining would proceed generally in a southward direction into the hillside along the bedding plane beneath the existing coal seam. Approximately 2,550,000 tons of coal would be removed from the Little Collom X Pit.

2.3.11 Hazardous Materials

An explosives storage facility would be constructed near the western perimeter of the Plant Facilities area and would meet or exceed all MSHA and Bureau of Alcohol, Tobacco, Firearms, and Explosives (BATFE) regulations. The planned configuration of this facility (high explosive magazines area) would mirror the construction, magazine orientation, and relative configuration of the approved existing facility for the current operation. The configuration of the ammonium nitrate, emulsion, and Type V magazine storage area would be very similar to the existing structures currently in use at the existing South Taylor operation i.e. large elevated storage tanks for ammonium nitrate, a tank storing emulsion, and a designated area to park the Type V magazines-semi trailers. As these structures contain blasting materials and not high explosives, specific requirements governing their management are different and as such are separated by location from the high explosives storage area.

Oil and fuel would be stored in the mine facilities area and would be protected from spilling into other areas by earthen, concrete, or HDPE lined structures surrounding each storage facility. A state approved Spill Prevention, Containment and Control Plan for the Project is required and would be obtained prior to commencement of operations.

2.3.12 Mine Personnel

Currently 238 personnel are employed at the Colowyo Coal Mine. At an average production rate of 2.3 mtpy that number would be expected to stay fairly constant throughout the life of mining in the Collom Expansion Area. At the permitted maximum production rate of 5.1 mtpy, the number of mine personnel would be expected to grow by approximately 55-105.

2.3.13 Rail Transport

Coal would be transported to coal markets by rail in unit trains, i.e. "a railway train that transports a single commodity directly from producer to consumer" (Merriam-Webster 2015) as is currently accomplished from the Gossard loadout. Coal is transported from the Colowyo Coal Mine to the Craig Generating station on an approximate 27 mile long rail line with the unit trains operated by Union Pacific. Approximately 18 miles of the rail road line from the mine towards Craig is owned and maintained by Colowyo. Union Pacific owns and maintains the remainder of the line to the Craig Station. At a current average production rate of 2.3 mtpy, coal is shipped on approximately 250 unit trains per year. At the proposed maximum production rate of 5.1 mtpy, approximately 554 unit trains per year would be needed to transport the coal to markets.

2.3.14 Reclamation

As soon as possible after coal mining begins and sufficient room becomes available for back-filling, reclamation would begin. Colowyo's reclamation objective is to restore the mined area to a land use capability that would be equal to or better than what existed pre-mining based on post-mine land use goals. As a required part of its PAP, Colowyo submitted and CDRMS approved a detailed Reclamation Plan (CDRMS 2013a) (see **Appendix A** of this EA). Additional reclamation details are also contained in the PAP at Rule 4 - Performance Standards, also included in **Appendix A**.

Reclamation would focus on the re-establishment of the pre-mining joint land uses: 1) rangeland (grassland for domestic livestock with wildlife benefit); and 2) fish and wildlife habitat (specifically targeting greater sage-grouse [GRSG] brood-rearing habitat, but also providing benefit to the other endemic wildlife species in the area). The re-establishment of these two land use subcomponents would be accomplished by re-establishing two primary vegetation communities: 1) grassland and 2) sagebrush steppe, respectively.

The following summarizes some of the key components of the approved Reclamation Plan:

Prior to any mining-related disturbances in the Collom Permit Expansion Area, all available topsoil would be removed from the site to be disturbed and would be redistributed to active reclamation sites or stockpiled as necessary to satisfy the needs of the reclamation timetable. As described above, once the topsoil was removed, the overburden would be removed and placed in the temporary overburden stockpile area for use in the backfilling phase of reclamation. A large, temporary out of pit stockpile of approximately 250 million cubic yards would be needed during the initial years of mining through the boxcut. Once the boxcut was completed, and mining progressed to the south, overburden material from each successive cut would be backfilled into the previously mined out areas. Once enough overburden material is placed in the backfilled area development of the approved post-mine topography would commence. At that time, overburden regrading and subsequent reclamation activities would accelerate. The backfilled mining areas would be graded to establish a stable post mine topography that blends into the undisturbed areas outside the mining limits. The final surface would approximate the overall pre-mining topography. The regrading plan would re-establish cover on south facing slopes for wintering big game populations, and small drainages suitable as future location of stock ponds necessary to achieve the post-mining land use.

Topsoil would normally be reapplied by hauling, in trucks, from topsoil stockpiles or from areas where topsoil has been removed for the advancement of the pit, to the re-graded overburden areas and then redistributed with dozers and/or scrapers. Following the re-topsoiling of an area, any necessary fertilization, surface preparation, berm development, construction of contour furrows, and seeding of the reclamation would take place.

The re-vegetation philosophy that would be utilized is a "prescribed ecological reclamation approach" (PERA) (CDRMS 2013a). The principal basis of PERA is to rebuild the foundation conditions of target vegetation communities taking into account the appropriate aspects, slopes, and topographic features of the reclaimed landscape. PERA would be applied to the Collom Permit Expansion Area to facilitate creation of a wildlife habitat favorable vegetation community (sagebrush steppe) among the more dominant grasslands necessary for livestock grazing and erosion control. Re-vegetation would specifically target livestock grazing (with wildlife benefit) and GRSG brood rearing habitat. Areas designed to target livestock grazing (and utilization by wildlife) would comprise approximately 60 percent to 80 percent of the reclaimed landscapes. These areas would principally occupy more steeply sloping ground (>10 percent slope) where the grassland community is necessary to preclude excessive erosion, especially from snowmelt. The remaining approximately 37 percent of the reclaimed landscape would exhibit flat or gently sloping surfaces (<10 percent slope) with reduced exposure to erosion. It is on the majority of these less exposed more gentle slopes whereby development of wildlife favorable habitats (sagebrush steppe) would be attempted. Establishing sagebrush communities and specifically GRSG brood-rearing habitat would be targeted on approximately 30 percent (or more) of the reclaimed landscape. Application of PERA would include management and re-vegetation specifications (e.g., shrub species in the seed mix) for use on the "grassland" targeted areas that would facilitate additional shrub establishment when climatic or other conditions are favorable. In this manner, small and/or scattered patches of additional shrub land may be established that would provide improved habitat diversity, especially for GRSG.

Areas to be re-vegetated would be seeded with mixtures approved in the reclamation seed mixture for areas targeting grassland (and erosion control), as shown in **Table 2.3-2**. The reclamation seed mixture for areas targeting sagebrush steppe (wildlife habitat – sage grouse brood rearing habitat) is shown in **Table 2.3-3**. Should one or more of the species in **Table 2.3-2** or **Table 2.3-3** be unavailable or proven ineffective and with the prior approval of CDRMS, substitutes from this list in **Table 2.3-4** would be selected in the priority stated. They would be placed in the seed mix at the rate specified in the priority stated. Planting and seeding methods would vary depending on degree of slopes, reapplied topsoil depth, new techniques, and targeted community among others; however, the same planting sequence would be used in most cases. Seeding would occur during the fall, immediately prior to the average first permanent snowfall event (typically mid to late October). If seeding could not be completed prior to seasonally permanent snowfall, additional broadcast seeding may occur in the spring as soon as ground conditions would allow. Components of the proposed seed mixes that would normally be applied via drill seeder would be applied at double the seeding rate identified on the seed mix tables for these spring season efforts and in cases where a drill seeder can't be used safely to apply the mixes.

Following seedbed preparation, grassland targeted areas would be drill seeded with a heavy duty rangeland drill with depth bands using the perennial mixture as shown on **Table 2.3-2**, Reclamation Seed Mixture - Grassland. At times, broadcast seeding may be required on steeper areas, wet areas, very rocky areas, or simply on areas that were missed by the drill seeding equipment.

For sagebrush steppe targeted areas, following seedbed preparation, these areas would be seeded with one of three scenarios using the perennial mixture as shown in **Table 2.3-3**, Reclamation Seed Mixture – Sagebrush Steppe. The first scenario would be identical to grassland targeted areas whereby a heavy duty rangeland drill with depth bands would be used for taxa to be drill seeded along with a mounted broadcaster and light tine harrow (for those taxa indicated for broadcast seeding). This process would facilitate a "one-pass" seeding procedure. The second scenario would be separation of the drill seeding and broadcast equipment that would require a "two-pass" seeding procedure. The third scenario (preferred) would involve use of equipment such as a "Trillion" cultipacker type broadcast seeder (or dribbler) to plant the entire mix indicated on **Table 2.3-3** in a single pass. Research into the use of these techniques, especially with "brillion" style seeders in Wyoming and Idaho has indicated substantially elevated probabilities for success of sagebrush establishment at, or greater than, the desired densities.

Table 2.3-2 Reclamation Seed Mixture - Grassland

App.	Species	Common Name	Origin	Life Form	Seeds/lb.	Rec. PLS lbs./acre	Avg. seeds / sq. foot
Drilled							
	Agropyron dasystachyum	Thickspike wheatgrass	N	Grass	154,000	1.25	4.4
	Agropyron smithii	Western wheatgrass	N	Grass	110,000	1.50	3.8
	Agropyronspicatum inerme	Beardless bluebunch wheatgrass	N	Grass	117,000	2.00	5.4
	Agropyron trachycaulum	Slender wheatgrass	N	Grass	159,000	0.75	2.7
	Bromus marginatus	Mountain brome	N	Grass	90,000	1.00	5.1
	Elymus cinereus	Great Basin wildrye	N	Grass	130,000	0.50	1.5
	Stipa viridula	Green needlegrass	N	Grass	181,000	0.75	3.1
	Astragalus cicer	Cicer milkvetch	I	Forb	145,000	0.30	1.0
	Linum lewisii	Lewis flax	N	Forb	293,000	0.25	1.7
	Atriplex canescens	Fourwing saltbrush	N	Shrub	52,000	1.60	1.9
	Symphoricarpos rotundifollius	Mountain snowberry	N	Shrub	75,000	0.75	1.3
Subtotal =						10.65	28.87
Broadcast							
	Festuca saximontana	Rocky Mountain fescue	N	Grass	680,000	0.50	7.8
	Achillea millifolium	Western yarrow	N	Forb	2,770,000	0.10	6.4
	Penstemon strictus	Rocky Mountain penstemon	N	Forb	592,000	0.25	3.4
	Artemisia tridentata vaseyana	Mountain big sagebrush	N	Shrub	2,500,000	0.50	28.7
Subtotal =						1.35	46.26
TOTAL						12.00	75.13

The temporary out of pit overburden stockpile is expected to remain in place until the final two years of mining activities. At that time, this material would be needed to fill the final pit void. Final reclamation of the Little Collom X and Collom Lite Pits would continue through 2033.

The 27.84 acre lease modification would be disturbed during the final stages of reclamation. Disturbance of those lands would be necessary for the final contour grading to tie in the natural topography with the adjacent areas to the north, east, and south that was previously covered by the temporary overburden stockpile.

Table 2.3-3 Reclamation Seed Mixture – Sagebrush Steppe

App.	Species	Common Name	Origin	Life Form	Seeds/lb.	Rec. PLS lbs./acre	Avg. seeds / sq. foot
Drilled or broadcast (with Trillion or similar)							
	Agropyron spicatum inerme	Beardless bluebunch wheatgrass	N	Grass	117,000	0.50	1.3
	Agropyron trachycaulum	Slender wheatgrass	N	Grass	159,000	0.20	0.7
	Bromus marginatus	Mountain brome	N	Grass	90,000	0.30	0.6
	Elymus cinereus	Great Basin wildrye	N	Grass	130,000	0.20	0.6
	Stipa viridula	Green needlegrass	N	Grass	181,000	0.20	0.8
	Artemisia ludoviciana	Louisiana sagewort	N	Forb	33,600	0.50	0.4
	Astragalus cicer	Cicer milkvetch	I	Forb	145,000	0.30	1.0
	Linum lewisii	Lewis flax	N	Forb	293,000	0.20	1.3
	Atriplex canescens	Fourwing saltbrush	N	Shrub	52,000	1.25	1.5
	Purshia tridentate	Bitterbrush	N	Shrub	15,000	3.00	1.0
	Rosa woodsii	Wood's rose	N	Shrub	45,300	0.50	0.5
	Symphoricarpos rotundifollius	Mountain snowberry	N	Shrub	75,000	1.00	1.7
Subtotal =						8.15	11.62
Broadcast (with Trillion or similar)							
	Poa ampla	Big bluegrass	N	Grass	882,000	0.20	4.0
	Festuca saximontana	Rocky Mountain fescue	N	Grass	680,000	0.20	3.1
	Achillea millifolium	Western yarrow	N	Forb	2,770,000	0.10	6.4
	Penstemon palmeri	Palmer penstemon	N	Forb	610,000	0.10	1.4
	Penstemon strictus	Rocky Mountain penstemon	N	Forb	592,000	0.20	2.7
	Artemisia cana	Silver sagebrush	N	Shrub	850,000	0.75	14.6
	Artemisia tridentata vaseyana	Mountain big sagebrush	N	Shrub	2,500,000	2.00	114.8
	Chrysothamnus nauseous	Rubber rabbitbrush	N	Shrub	400,000	0.30	2.8
Subtotal =						3.85	149.82
TOTAL						12.00	161.44

Table 2.3-4 Reclamation Seed Mixture – Contingency Substitutions

Priority	Species	Common Name	Origin	Life Form	Seeds/lb.	Rec. PLS lbs./acre	Avg. seeds / sq. foot
2	Agropyron spicatum	Bluebunch wheatgrass	N	Grass	140,000	0.5-2.0	1.3-5.4
1	Bromus ciliates	Nodding brome	N	Grass	80,000	0.3-1.0	0.6-1.8
4	Festuca idahoensis	Idaho fescue	N	Grass	450,000	0.2-0.5	2.1-5.2
5	Orysopsis hymenoides	Indian ricegrass	N	Grass	141,000	0.50	1.6
3	Poa sandbergii	Sandberg bluegrass	N	Grass	925,000	0.20	4.2
2	Helianthelia uniflora	Oneflower sunflower	N	Forb	103,000	0.30	0.7
1	Heliomeris multiflora	Goldeneye	N	Forb	1,055,000	0.30	7.3
3	Sanguisorba minor	Small burnet	I	Forb	55,000	0.25	0.3
4	Vicia Americana	American vetch	N	Forb	33,000	0.30	0.2
1	Artemisia cana	Silver sagebrush	N	Shrub	850,000	0.50	9.8
2	Chrysothamnus viscidiflorus	Douglas rabbitbrush	N	Shrub	782,000	0.30	5.4
4	Rhus trilobata	Skunkbrush sumac	N	Shrub	20,300	0.50	0.2
3	Symphoricarpos rotundifolius	Snowberry	N	Shrub	75,000	0.75-1.0	1.3-1.7
TOTAL						4.9-7.65	35.0-43.8

2.3.15 Life of Operation

Coal production from the Little Collom X Pit would take place in the first year and would occur concurrently with development of the Collom Lite Pit. The Little Collom X Pit is estimated to produce a coal tonnage of 2,552,000 tons, and would have an approximately four year mine life, including reclamation. Coal production from the Collom Lite Pit would build from about 1.2 million tons in the first year and increase up to a maximum of about 5.1 million tons per year in approximately five years, and would remain fairly constant thereafter. A total estimated coal tonnage of 79,110,000 tons would be mined from the Collom Lite Pit. The overall life of mining operations for the Collom project is estimated to be 19 years, with an additional two years to complete final reclamation operations, including activities such as pit backfill, final grading, placement of topsoil, and seeding. Following final reclamation, there would be a 10 year bond liability period during which the progress and success of revegetation is monitored.

Although reclamation would begin as soon as possible after the coal is removed from the mining area and sufficient room is made available for back-filling, reclamation operations would continue for some years after mining has ceased. Final reclamation of the Little Collom X and Collom Lite Pits, when seeding of the final reclamation block would be anticipated, would continue through 2033 as approved by DRMS in PR 03. However, preparation of this EA to support a decision on the mining plan modification has taken a longer period of time to complete than originally anticipated. Mining did not begin in 2012 as originally proposed under PR 03 and would be delayed by about 4 years if the mining plan modification is ultimately approved. In that case, reclamation would not be completed in 2033 as approved by DRMS in PR 03. Colowyo would need to apply to DRMS for a revision to the reclamation timeframes in PR 03. The sump and pond would be the last structures removed at the end of reclamation activities. They would remain in place until such time as the entire watershed reporting to these structures is reclaimed and granted CDRMS bond release, typically under Phase II. The removal of these structures is estimated to occur about five to seven years after the final reclamation block is seeded in the watershed reporting to these structures.

2.3.16 Project Design Features

The surface mining permitting process under the State of Colorado's coal regulatory program requires applicants to incorporate design features into their mining proposals to protect or minimize impacts to a wide variety of environmental resources (CDRMS 1980). Examples of such environmental resources include water, air, fish, and wildlife. Each PAP submitted to CDRMS for a new or revised mining permit is required to contain a number of resource specific plans. The resource specific plans describe the proposed mine's (or proposed mine revision's) design features for reducing or eliminating the potential impacts to various resources or how those resources will be restored to pre-mining conditions after mining is complete. CDRMS reviews the PAP, which includes the required resource specific plans, design features, and associated performance standards. If the PAP meets the state standards, CDRMS approves the PAP. The CDRMS approval commits the applicant to implementing the design features contained in the PAP. It is important to note that the design features of the original permit also apply to the newly revised permit, unless CDRMS approves any changes to the revised permit that would replace older design features.

In Colowyo's case, CDRMS approved Colowyo's original surface mining permit in 1982 (C-1981-019). PR01 for the West Pit was approved in July 1992, PR02 for the South Taylor/Lower Wilson Permit Expansion Area was approved in June 2007, and PR03 for the Collom Permit Expansion Area was approved in May 2013. The PAP for PR03 incorporated new design features, as well as retained design features that were included in the original permit approval and those included in the PR01 and PR02 approvals. A summary of the project design features to reduce or eliminate potential impacts to environmental resources that were incorporated in PR03, and are included in the analysis of Alternative A, are included in **Table 2.3-5.** A more detailed description of the design features is included in **Appendix B**.

Table 2.3-5 Summary of Principal Project Design Features

Resource Area	Measure
Topography	Restore the area to approximate original contours (AOC). Grade backfilled mining areas to establish a stable post mine topography that blends into the undisturbed areas outside the mining limits. Grade final slopes to not exceed the approximate original pre-mining slope grade. Grade all final slopes so that overall grades do not exceed 33%. Blend the highwall into the backfilled material to result in a natural and gradual slope change. For a more detailed description of design features, refer to the Reclamation Plan (**Appendix B**).
Air Quality	Water haul roads as necessary to control fugitive dust. Obtain a CDPHE Air Pollution Control Division Construction Permit (modification to current permit) (Note: Approval conditions are included in Colowyo's Air Pollution Control Division permit – such as the Fugitive Dust Control Plan (as an appendix to the permit). For a more detailed description of design features, refer to the Air Quality Control Plan (**Appendix B**).
Water Resources	Construct new sedimentation structures and diversion ditches to control runoff, avoid erosion and an increased contribution of sediment load to runoff, and protect surface and ground water quality. Control and monitor the quantity and quality of any discharges from the permit area in compliance with the CPDS Permit (Number CO-0045161 issued by the CDPHE). Designate stream buffer zones and install sedimentation ponds on the drainages from disturbed areas feeding into surface water features. Retain drainage off the "in-pit" roads in the pit or divert to drainage and sediment control structures. Line channels with rock riprap and install energy dissipaters when necessary. Seed the entire embankment of all sedimentation ponds, including the surrounding areas disturbed by construction, after the embankment is completed. Design sedimentation ponds to treat the theoretical 10-year, 24-hour storm event and contain the theoretical 25-year, 24-hour storm event. Construct small impoundments on reclaimed areas to collect surface runoff from precipitation events and snowmelt from reclaimed areas. Where practicable, use diversion methods to change the flow of water from undisturbed areas so as to bypass the disturbed areas rather than using treatment facilities. Direct all surface runoff from the disturbed areas through sedimentation ponds. For a more detailed description of design features, refer to the Protection of the Hydrologic Balance Section and Performance Standards 4.05 Hydrologic Balance (**Appendix B**).
Vegetation	Manage livestock grazing to select against grasses resulting in increased shrubs and forbs. Use elk-proof fencing to preclude access into large blocks of maturing shrub populations, especially core areas. In concert with Colorado Parks and Wildlife (CPW), use hunting pressure to reduce elk utilization of new reclamation areas where it can be incorporated in a safe manner given proximity to active mining. Use orchard grass (*Dactylis glomerata*) in key reclamation locations to encourage elk to move

Resource Area	Measure
	away from maturing shrub populations. Implement procedures for micro-habitat development whereby snow catchment is encouraged and shrub heavy mixes can be applied. Interseed shrubs (as necessary as a normal husbandry practice) in areas not exhibiting satisfactory establishment of shrubs, but with opportunities (micro-niches) for shrub establishment. Fence reclaimed areas as appropriate, if necessary, to manage grazing or browsing by livestock or wildlife. For a more detailed description of design features, refer to the Reclamation Plan (**Appendix B**).
Fish and Wildlife	Revegetate for big game benefit/use. Construct power lines to Avian Power Line Interaction Committee (APLIC) standards. Implement construction guidelines for retrofitting existing power poles to protect raptors. Limit vehicle speeds in the mine area to reduce the likelihood of collisions with wildlife. Provide topographic relief for wildlife habitat. Reestablish escape cover, south facing slopes for wintering big game populations and small drainages suitable as future location of stockponds, necessary to achieve the post-mining land use. For a more detailed description of features, refer to the Fish and Wildlife Plan (**Appendix B**).
T&E Species	Continue the established practice of clearing areas of thick brush and decadent stands of the mountain shrub vegetation within and adjacent to the lease area as part of the big game mitigation program production of succulent herbaceous vegetation and provide more forage for the GRSG brood population. Continue collaboration with CPW for GRSG studies. Implement measures required as part of the Endangered Fish Recovery Agreement with USFWS.
Cultural Resources	Features included in the Cultural Resources Protection Plan (**Appendix D**)
Visual Resources	Restore disturbed areas to AOC. For a more detailed description of design features, refer to the Reclamation Plan (**Appendix B**).
Soils	Construct a drainage control bench or furrow, where necessary, to slow water flow on the longer slopes and minimize erosion. Provide a buffer zone between the area disturbed by mining and the area where topsoil has not been removed. Restrict non-essential vehicular traffic from undisturbed area. Construct topsoil stockpiles with outside slopes no steeper than 3h:1v. Locate topsoil stockpiles to avoid erosion from wind and water and additional compaction or contamination. Protect topsoil stockpiles from wind erosion by planting a perennial mixture as soon as conditions allow. No topsoil stockpiles will be placed in a drainage bottom where external erosion might pose a potential threat.

Resource Area	Measure
	Mark all topsoil stockpiles with identifying signs.
	If soil compaction is a problem, rip the soil with a dozer to minimize compaction, assure stability, and minimize slippage after topsoil replacement.
	Develop concave landforms (to encourage snow entrapment) on a case-by-case basis.
	Leave reapplied topsoil in a rough condition to help control wind and water erosion prior to seeding.
	For more detailed description of design features, refer to the Reclamation Plan (**Appendix B**).

2.4 ALTERNATIVE B - REDUCED MINING ACTIVITY AND ADDITIONAL GREATER SAGE GROUSE PROTECTION

2.4.1 Background

NEPA and the CEQ regulations at 40 CFR 1502.14 (a) direct agencies to evaluate and develop appropriate and reasonable alternatives to proposals that involve unresolved resource conflicts. "Reasonable alternatives include those that are practical or feasible from the technical and economic standpoint and using common sense, rather than simply desirable from the standpoint of the applicant" (Question 2a, CEQ, Forty Most Asked Questions Concerning CEQ's NEPA Regulations, March 23, 1981). The BLM NEPA Handbook (BLM 2008) identifies that only those alternatives that would have lesser potential impacts than the proposed action need to be analyzed.

The objective of Alternative B would be to reduce environmental impacts while meeting the purpose and need of Alternative A. Public scoping comments identified concerns about the direct and indirect surface impacts of Alternative A on species listed under the Endangered Species Act as threatened, endangered, proposed, or candidate. Scoping comments also identified the need for OSMRE to consider an alternative that would reduce environmental impacts by limiting the amount of coal tonnage and/or acreage to be mined to lower levels than are currently proposed. Further, through internal consideration of Alternative A, OSMRE and BLM identified concerns about the potential impact of Alternative A on GRSG, and their habitat. At the request of OSMRE and BLM and in coordination with the Cooperating Agencies, Colowyo developed Alternative B as a reasonable alternative to Alternative A, which would minimize and/or reduce potential impacts to high priority GRSG habitat components such as active leks and brood rearing habitat, and incorporate GRSG habitat protection measures in addition to those already included as part of Alternative A. Alternative B would be feasible both technically and from an economic standpoint for the operation of the mine. Selection and implementation of Alternative B would require prior CDRMS approval of a revision to Colowyo's SMCRA permit under state regulations. On March 16, 2015, Colowyo submitted a PAP for PR 04 to CDRMS which would be consistent with Alternative B.

2.4.2 Reduced Mining Activity

Alternative B proposes mining only the Collom Lite Pit a modification of Alternative A that would eliminate the development and mining of the Little Collom X Pit (**Figure 2-3**).

Elimination of mining at the Little Collom X Pit would reduce active mining by six months to a year, depending on the production level, and would reduce the overall life of the mine, including final reclamation operations, by approximately four years. Elimination of the Little Collom X pit would reduce the overall amount of coal produced by approximately 2,550,000 tons.

In addition, mining the Little Collom X Pit under Alternative A would disturb about 213 acres, an area which would not be disturbed under Alternative B. Further, the Little Collom X Pit under Alternative A would be located within approximately 320 feet of active GRSG lek SG 4, which had been previously reported to be inactive. The BLM LSFO RMP (page RMP-24) under Management Actions: Allowable Uses and Actions (BLM 2011), prescribes that no surface disturbing activities should occur with 0.6 mile (1.0 km) of an active lek. Elimination of mining the Little Collom X Pit under Alternative B would have the added benefit of ensuring that there would be no surface disturbance for a pit within the 0.6 mile (1.0 km) radius of a lek requirement.

The elimination of mining the Little Collom X Pit under Alternative B would also result in changes to the location of the haul roads and other access routes. Under Alternative B, as for Alternative A, there would be two main haul roads to haul overburden materials from the pit to the temporary overburden stockpile. While these roads would be contained within the disturbance footprint of the Collom Lite Pit and the temporary overburden stockpile, their location would be shifted to the south when compared with the haul road location for Alternative A. This relocation would have the associated benefit of moving mining noise and activity further away from lek SG4 than for Alternative A.

2.4.3 Greater Sage Grouse Protection Project Design Features

Alternative B would incorporate Project design features in addition to those already incorporated in Alternative A (see **Section 2.3.14** above and **Appendices A and B**), to reduce or eliminate potential impacts to GRSG and its habitat, as well as to enhance the protection of habitat and the understanding of GRSG behavior and reactions to mining operations. The additional Project design features were collaboratively developed by Tri-State, Colowyo, OSMRE, BLM, Colorado Parks and Wildlife (CPW) and USFWS during numerous meetings held at the CPW office in Meeker, Colorado, between January 23, 2014, and October 23, 2014. A final Project design feature proposal was preliminarily agreed upon on October 23, 2014, and formally agreed to in a Memorandum of Understanding (MOU) between the agencies and Tri-State. The Project design feature proposal agreed to would include the following items:

1. Design the temporary overburden stockpile to locate proposed new surface disturbances for the stockpile to a minimum distance of 0.9 mile (1.5 km) from GRSG lek SG4.

2. Donation to CPW of 4,543 acres of Priority Habitat Management Area (PHMA, formerly referred to as Preliminary Priority Habitat - PPH) (breeding and winter with some summer habitat), for GRSG in five distinct parcels currently owned and managed by Colowyo to preserve the PHMA in perpetuity.

3. Transfer of all mineral rights and grazing preference held by Colowyo on those parcels to CPW, as well as the water rights to any stock watering structures located on those parcels.

4. Monitoring of GRSG by CPW in the vicinity of the Colowyo mine funded by a donation of at least $150,000 from Tri-State to CPW.

A discussion of each facet of the GRSG Project design feature proposal is presented below.

2.4.3.1 Location of the Temporary Overburden Stockpile and Ponds

Alternative B would propose to design the temporary overburden stockpile so that it would be constructed no closer than approximately 0.9 mile (1.5 km) from the GRSG lek SG4. The 27.84 acre lease modification parcel would be an integral part of the design and placement of the temporary overburden stockpile and use of the surface of those lands would be necessary to achieve the 0.9 mile (1.5 km) surface disturbance buffer distance from GRSG lek SG-4. The parcel would lie within the northwest portion of the stockpile and would be completely covered by the stockpile. While some ancillary mining features would remain within a 1 mile (1.6 km) buffer of the lek, Colowyo would agree to construct these features outside of the lekking and early brood rearing seasons (March 15 – May 15 and May 15 – July 15, respectively). Increasing the distance between the active lek and the disturbance footprint would also take advantage of existing topographic screening in the area to further lessen impacts to GRSG.

The number and location of sediment ponds and their associated access would also be different for Alternative B in comparison to Alternative A and for the benefit of GRSG. Alternative B would include three sediment ponds along the northern edge of the temporary overburden stockpile (**Figure 2-3**). Access roads would be constructed to access the Section 26 Sediment pond, the Section 30 Sediment pond, and the Section 25 Sediment pond within the Alternative B disturbance boundary. These access roads would be designed to meet the applicable portions of CDRMS Rule 4.03.2 for Access Roads. Typical road use would consist of one trip per week by a light use vehicle at slow speeds to conduct environmental monitoring. The Section 26 and Section 30 sediment ponds would be located more than 1 mile (1.6 km) from GRSG lek SG4 and the Section 25 sediment pond would be located approximately 0.7 mile (1.1 km) from the lek. By comparison, the Collom Sump for Alternative A (**Figures 2-1 and 2-4**) would be located only 1,750 feet (0.33 mile or 0.5 km) from lek SG4 and the northern sediment pond would be 3,630 feet (0.68 mile or 1.1 km) from the lek.

2.4.3.2 Land Donation

During the series of meetings between the agencies, Tri-State and Colowyo, it was determined that of the 2,636.73 acres of total disturbance under Alternative B, there would potentially be direct impacts to approximately 2,133 acres of mapped PHMA for GRSG from the proposed mining operations. The remaining 503.73 acres of Alternative B's disturbance footprint would directly impact Preliminary General Habitat (PGH) for GRSG. In addition to the direct impacts to PHMA, consultation with CPW, BLM and USFWS biologists determined that indirect impacts would potentially occur up to 900 meters (2,953 feet) from the edge of disturbance. This distance was determined using several years of monitoring data from the Axial Basin where the currently operating mine occurs and a number of years of recorded GRSG locations near the existing mining operations obtained through radio telemetry by CPW in cooperation with Colowyo. Based on the 900 meter distance, it was determined that there would be 2,180 acres of PHMA potentially indirectly impacted. In total, there would be 4,313 acres of PHMA potentially impacted both directly and indirectly by Alternative B. To offset both the direct and indirect potential impacts to GRSG PHMA, Tri-State would donate a total of 4,543 acres of land within PHMA but outside of the permitted mine boundary in five non-contiguous parcels to CPW (**Figure 2-4**). This land would be managed by CPW for the preservation and maintenance of GRSG habitat in the Axial Basin in perpetuity. The five parcels are located between 2 and 5 miles (3.2 to 8.1 km) north of the mine boundary (**Figure 2-4**). A Land Donation Agreement would be signed between Tri-State and CPW and would include details for the land donation, when the donation would occur, and a legal description of the area.

2.4.3.3 Grazing, Water, and Mineral Rights

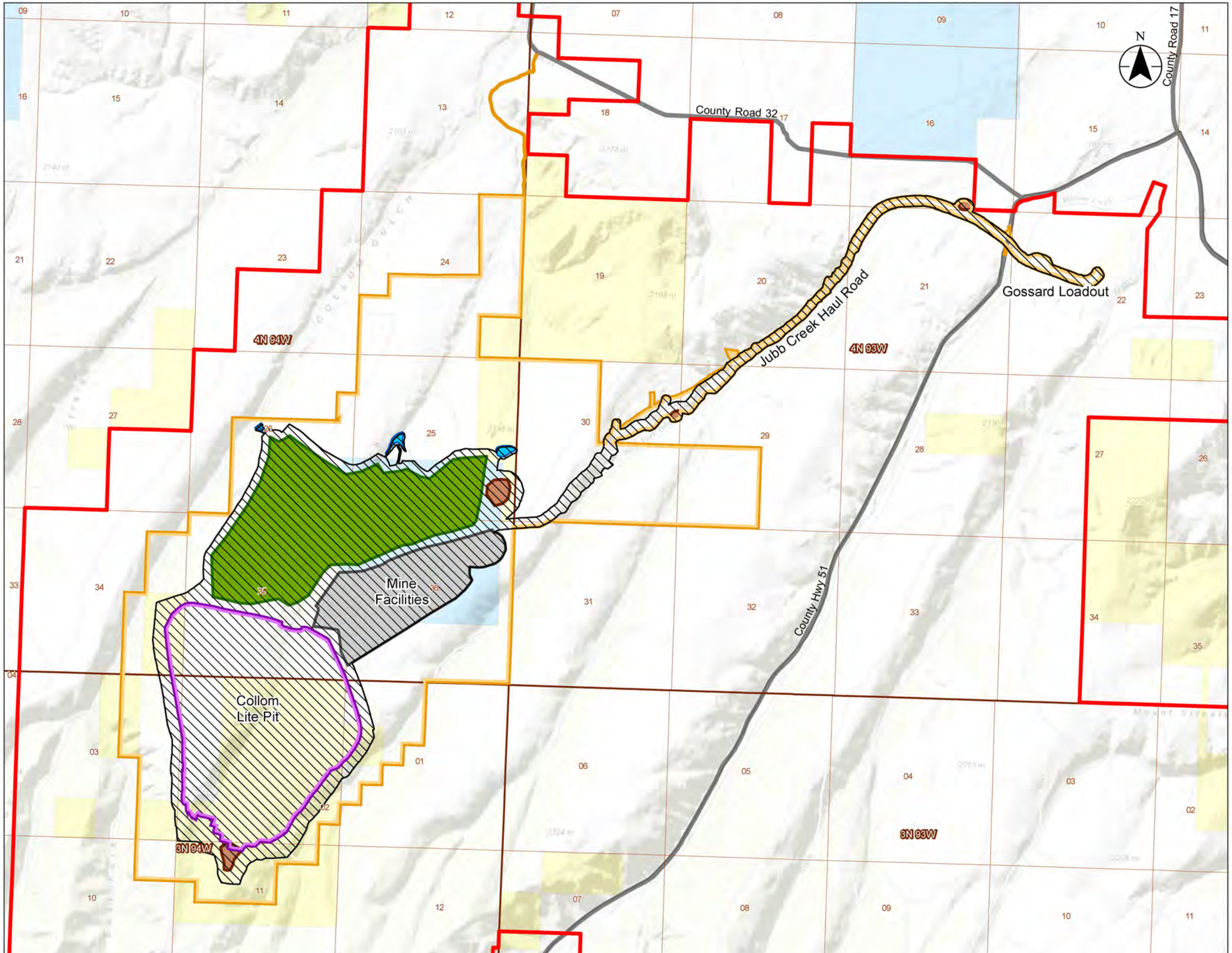
In addition to donation of the 4,543 acres of land to CPW, Tri-State and Colowyo would be transferring their BLM grazing preference to CPW. CPW could then lease the base property and with BLM approval, the grazing preference could be transferred to that qualified applicant. CPW has indicated that they would lease their grazing preference to a qualified applicant to allow for continued grazing in those areas. CPW would also lease the base property to the qualified applicant and the BLM grazing permit would remain in the qualified applicant's name.

Tri-State and Colowyo would also transfer all mineral rights they own associated with the donated lands to CPW, as well as any water rights that Tri-State holds for any stock watering facilities on those parcels. Control of these rights by CPW would allow for greater management flexibility by CPW for the ultimate benefit to GRSG. CPW GRSG Monitoring Program Funded by Tri-State

2.4.3.4 GRSG Monitoring by CPW Funded by Tri-State

CPW would conduct a GRSG monitoring program near the Project Area, funded by a $150,000 donation from Tri-State, to determine the impacts on GRSG from the initiation of coal mining in an area that previously has had few impacts from land disturbance. During the series of meetings with the agencies, it was identified that there has been no previous detailed monitoring of the impacts from coal mining on GRSG populations from prior to initial surface disturbance and throughout all phases of mine development and mining. It is intended that the donation of the $150,000 would be used to monitor potential changes in GRSG habitat use from the initiation of mining in an area that previously has had few impacts from land disturbance.

BLM reviewed the Northwest Colorado GRSG Resource Management Plan Amendment (RMPA) and indicated that the conservation measures proposed in the MOU are in agreement with the requirements of the RMPA.



Temporary Overburden Stockpile
Mine Facilities
Sediment Pond
Temporary Topsoil Stockpile
Disturbance Area
Approved SMCRA Permit Boundary
Project Area
Proposed Mine Pit Area

Land Status

Bureau of Land Management
Private
State
Road
Township Boundary
County Boundary

0 3,000 6,000 Feet
1:39,000 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 13N
2. Basemap: Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

Project Location
Rio Blanco & Moffat Counties
Colorado

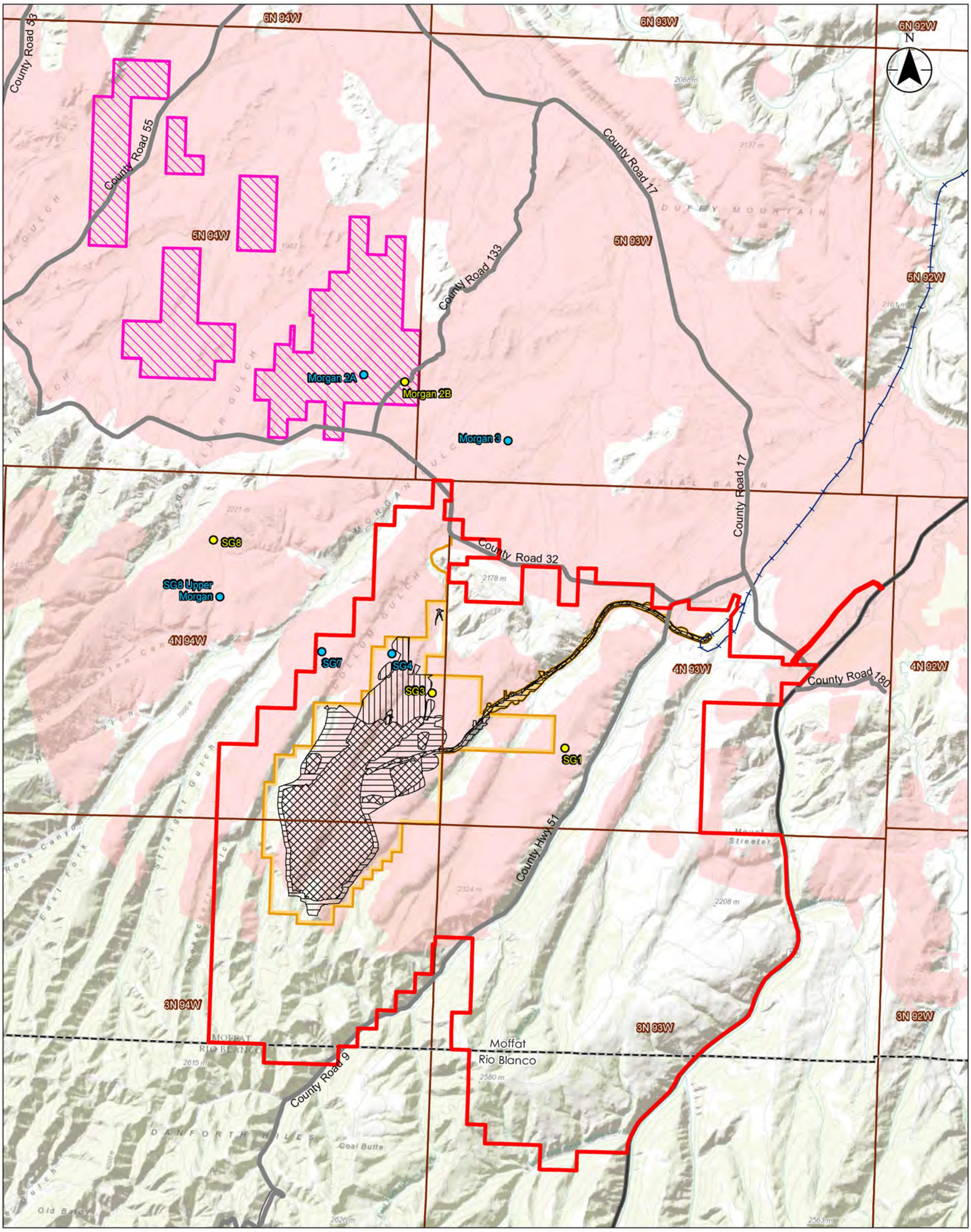
203713557
Prepared by NF on 2015-01-22
Technical Review by NL on 2015-01-05
Independent Review by GB on 2015-01-05

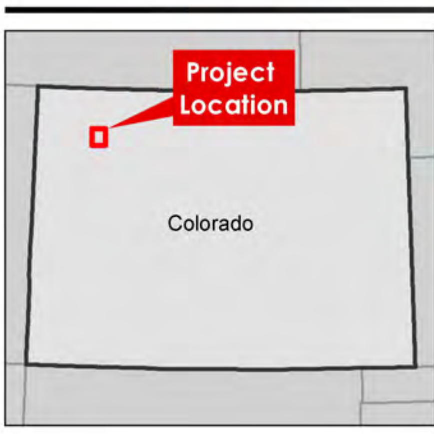
Client/Project
Office of Surface Mining Reclamation & Enforcement
Colowyo Coal Mine: Collom Permit Expansion Area
Project Mining Plan Environmental Assessment

Figure No.
2-3

DRAFT

Title
Alternative B (Reduced Mining)





- Sage-Grouse Lek - Active
- Sage-Grouse Lek - Inactive
- Proposed Greater Sage-Grouse Habitat Donation Land
- Priority Habitat Management Area (PHMA)

Disturbance

- Alternative A Disturbance Only
- Alternative B Disturbance Only
- Both Alternative A and Alternative B Disturbance

- Approved SMCRA Permit Boundary
- Project Area
- Railroad
- County Road
- County Boundary
- *Township Boundary*

0 1 2 miles

1:86,637 (At Original document size of 11x17)

Project Location
Rio Blanco & Moffat Counties
Colorado

203713557
Prepared by CG on 2015-02-05
Technical Review by NL on 2015-02-05
Independent Review by GB on 2015-02-05

Client/Project

Office of Surface Mining Reclamation & Enforcement
Colowyo Coal Mine: Collom Permit Expansion Area
Project Mining Plan Environmental Assessment

Figure No.
2-4

DRAFT

Title

Greater Sage-Grouse Mitigation

Notes

1. Coordinate System: NAD 1983 UTM Zone 13N
2. Basemap: Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance

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2.4.4 Other Mine Components and Associated Project Design Features

Alternative B is a modification of Alternative A and incorporates most of the mine components and Project design features of Alternative A. This section identifies those mine components and associated Project design features that were also included in Alternative A, but that would be changed under Alternative B, other than the temporary overburden stockpile and sediment ponds described in **Sections 2.4.3** and **2.4.3.1** above.

2.4.4.1 Collom Haul Road

The length of the Collom Haul Road for both Alternatives would be the same, about 29,000 feet (5.5 miles or 8.9 km). However, in order to effectively address engineering design considerations for known, and potential unknown, terrain and geotechnical issues, cut and fill slopes, and allow a reasonable contingency for unanticipated construction issues related to these factors, the disturbance width for Alternative B would be approximately 100 feet wider on both sides of the center alignment for than for Alternative A. This would allow for construction and disturbance within this boundary but not all areas within this boundary would be disturbed. This additional contingency disturbance width was not considered in the previous design of the haul road under Alternative A (i.e. PR 03). All reasonable efforts would be made to construct the haul road within this corridor. However, if unanticipated geotechnical conditions reasonably preclude construction in the described location, minor adjustments to the alignment may be made, but there would not be an increase in the surface disturbance for the haul road construction. If the entire width of the corridor were disturbed, this would result in disturbing approximately 202 acres for construction of the Collom Haul Road under Alternative B, approximately 78 acres more than under Alternative A. Furthermore, once construction of the Collom Haul Road is complete, the surface disturbance created by the construction, but not part of the road itself, would be immediately reclaimed with the approved CDRMS seed mixture during the same construction season.

The additional disturbance width for the Collom Haul Road under Alternative B, when compared with Alternative A, would result in disturbance within 100' of both Jubb Creek and Wilson Creek. Rule 4.05.18 of the Regulations of the Colorado Mined Land Reclamation Board for Coal Mining (CDRMS 2005) requires CDRMS approval for disturbance within 100' of a perennial, intermittent or ephemeral stream with a drainage area of greater than one square mile. No stream buffer zones were identified for either Wilson Creek or Jubb Creek under Alternative A because of the narrower disturbance width. Colowyo has identified stream buffer zones along both Wilson Creek and Jubb Creek extending out 100' on either side of the streams. The Collom Haul Road would cross both Wilson Creek and Jubb Creek and would also parallel Jubb Creek, where there would be a 140 foot section of the haul road where disturbance would be within 100 feet of the stream. The following design features are incorporated into the PAP for PR04, and therefore Alternative B, and would be employed prior to any disturbance occurring within these areas:

- For the stream crossings, during construction, Colowyo would install a bottomless culvert, and would employ proper best management practices (BMPs) during the construction phase in accordance with Colowyo's approved stormwater management plan, Section 401 certification, and US Army Corps of Engineers 404 permit. Once construction of the road is completed, all surface water runoff from the Collom Haul Road would be directed to BMPs prior to being released.

- During construction of the Collom Haul Road, ditches, erosion controls, and culverts would be used to minimize impacts to surrounding areas and would be designed in such a manner to safely pass peak runoff from a 10 year, 24-hour precipitation event. Also during construction of the road, the field engineer would determine the need for erosion control measures. Such temporary and permanent control measures would include silt fences, straw bales, straw wattles, rock check dams, or other measures such as downstream sediment ponds.

- Once the road construction is complete, any areas that can be reclaimed would be completed as soon as possible.

2.4.4.2 Power Line

Under Alternative B, the power line supplying electricity to the mine facilities and draglines would be reconfigured, when compared to Alternative A, into a separate corridor and would not necessarily follow the haul road as is the case for Alternative A. The reconfiguration of the power line would be required because after further analysis of the topographical and engineering constraints of the area, placing the power line along the haul road is not practical or feasible from a safety or engineering standpoint. While the exact placement of the power line is not known at this time, the line is anticipated to be approximately 6.4 miles (10.3 km) in length and would travel from the existing Axial Basin substation near the mine entrance and would be routed west to the Alternative B disturbance footprint. In general, the placement of the power line would be south of the Collom Haul Road. Once within the disturbance footprint, the line would periodically be moved to account for the movement of the draglines. The power line would be constructed within a 30 foot corridor, all disturbances would be contained within that corridor, and if all of the corridor were disturbed, a maximum of 23.4 acres would be disturbed.

While the placement of the power line is not known, Colowyo would construct the line with the following GRSG mitigation: 1) The power line would be sited outside of mapped GRSG PHMA to the extent possible; 2) A brush hog would be used to clear vegetation rather than blading in order to retain the seed bank and retain rootstock in those areas; 3) To the extent possible, the power line would be constructed outside of the sensitive seasons of the year for GRSG; and, 4) constructed in accordance with avian protection standards (e.g. perch deterrents).

2.4.4.3 Water Pipeline from Wilson Reservoir to Collom

Colowyo would require raw water for the development of the Collom Mine. To provide this water, Colowyo would construct a new, roughly eight mile long water pipeline from Colowyo's Wilson Reservoir, located about two miles east-northeast of the Gossard Loadout, to the Collom Mine area. Colowyo would also need to construct one or more pumping stations. The new pipeline would be constructed within the existing CDRMS approved pipeline corridor from the Wilson Reservoir to near the Gossard Loadout. This existing approved corridor has already been disturbed for the construction of pipelines previously approved by CDRMS that are currently buried in the corridor. For this portion of the pipeline route, the new pipeline would be constructed parallel to the existing pipelines. From approximately the Gossard Loadout, the new pipeline would generally and to the extent feasible, follow the proposed route and disturbance area of the Collom Haul Road to the Collom Facilities Area (**Figure 2-3**). However, due to engineering and/or geologic factors, it may be necessary to construct portions of the pipeline and/or pumping station(s) outside the delineated Collom Haul road disturbance area.

While the exact engineering design and construction methodology of the pipeline is not known at this time, it would meet all required and needed engineering protocols and criteria. In general, for the majority of the proposed route, the pipeline would be buried to an appropriate depth in a trench. Other engineering methodologies, such as boring, would be utilized as and where needed and approved by CDRMS (e.g. road and stream crossings). One or more pumping stations, including ancillary support equipment and structures, would be placed in locations at the Wilson Reservoir and somewhere along the Collom Haul road portion of the route as required. The amount of surface disturbed by these installations would be minimized to the extent practical. The total amount of surface disturbed for the pipeline and pump station(s) combined along the Collom Haul road portion of the route would be included as part of, and not exceed, the ten percent overage for ancillary facilities acreage (239.7 acres total) identified in **Table 2.4-1**. The pipeline would be constructed in advance of when it would be needed to supply water to the Collom mining operation in as expedient a manner as possible, adhering to all safety criteria and proper engineering protocols. To the extent possible, pipeline construction timing only for that section of pipeline adjacent to Sage Grouse Lek "Gossard/SG12" would take place outside the GRSG lekking season (mid-March through May).

2.4.5 Alternative B Disturbance Footprint

Under this Alternative, there would be a total disturbance footprint of 2,636.7 acres. **Table 2.4-1** depicts the disturbance from each Project component. Compared to Alternative A, this is an increase of 546.2 acres (26.1 percent). **Table 2.4-2** shows the differences in the disturbance acreages between the Alternative A and Alternative B. There are several factors that contribute to the larger surface disturbance area. Below is a discussion of five key factors that account for the majority of the increase:

A) The design and layout of the temporary overburden stockpile would change substantially from the design and layout under Alternative A. Under Alternative A, the temporary overburden stockpile would be located further north and closer to the Little Collom X Pit, within the Little Collom Gulch. By placing material in the gulch it allows for material to be placed in a thicker cross section over a smaller surface area. Under Alternative B, the Little Collom X Pit is not developed and the temporary overburden stockpile is relocated further south closer to the Collom Lite Pit to create a greater distance from the GRSG lek SG4. Alternative B does not provide as much void space in the gulch to hold material; therefore, it is necessary to increase the footprint of the stockpile to hold the amount of material that would be necessary for mining. Alternative B would still place material into Little Collom Gulch, but material would also be placed on the flatter topography to the east and west of Little Collom Gulch with sloping faces on its flanks, which increase the surface footprint. The resulting

Table 2.4-1 Acreage Disturbed under Alternative B by Project Component

Project Component	Acres Disturbed (Alternative B)
Collom Haul Road	202.32
Collom Lite Pit	880.00
Temporary Overburden Stockpile	629.35
Sediment Pond & Access Road	7.70
Temporary Topsoil Stockpiles	47.40
Other disturbance for equipment accesses, facilities, haul roads, ditches, and other sediment control features	630.26
Sub-Total Disturbance	2,397.03
10 percent overage for ancillary facilities (power line, fiber optics, ponds, ditches, topsoil piles)	239.70
Total Disturbance	2,636.73

Table 2.4-2 Comparison of Disturbance Acreages

Project Component	Alternative A	Alternative B	Difference for Alt B
Collom Haul Road/Power Line[1]	123.60	202.32	+78.72
Collom Lite Pit	880.00	880.00	0
Little Collom X Pit	213.16	0	(213.16)
Temporary Overburden Stockpile	490.89	629.35	138.46
Sediment Pond and access road	4.45	7.70	+3.25
Temporary Topsoil Stockpile	110.90	47.40	(63.50)
Mine Facilities[2]	110.00	0	(110.00)
Collom Sump	4.73	0	(4.73)
Other Areas[3]	278.21	630.26	352.05
Minus Overlap between the Little Collom X Pit and temporary overburden stockpile	-125.44	NA	0
10 percent overage for ancillary facilities [4]	0	239.70	239.70
Total	2090.50	2,636.73	+546.23

1. Under Alternative B, the power line would be placed in a separate corridor.
2. Under Alternative B, mine facilities are included in the "Other Areas"
3. "Other Areas" for Alternative A includes the area between the Collom Lite Pit and the toe of the temporary overburden stockpile, and other areas adjacent to other category disturbance footprints. For Alternative B, Other Areas include disturbance for equipment access, facilities, secondary haul roads, ditches, and sediment control features including areas around the Collom Lite Pit.
4. The 10 percent overage is included to allow Colowyo the ability to adjust the size and/or number of these features, if needed, based on geological or engineering constraints encountered during construction.

stockpile footprint for Alternative B, while containing a smaller volume of material, would be approximately 139 acres larger than that for Alternative A because it would not be located in a geomorphic depression as the stockpile for Alternative A.

B) The disturbance area associated with the Collom Lite Pit under Alternative B, but outside the actual 880 acre mined area, includes approximately 157 additional acres of disturbance when compared with Alternative A. The additional disturbance is necessary to make adjustments to surface water diversion ditches and access roads that need to be redesigned and relocated to support Alternative B or were not previously included in Alternative A. Alternative B includes additional sediment ponds due to the reconfiguration of the temporary overburden stockpile that were not necessary under Alternative A. The diversion ditch structures are required under the Regulations of the Colorado Mined Land Reclamation Board for Coal Mining to ensure compliance with applicable rules related to surface water runoff from disturbed mining areas. To ensure compliance with the applicable rule and transport water to the appropriate sediment control structures from mining areas, ditch locations and alignments had to be redesigned to ensure that redirected surface water runoff went to the new sediment ponds. Under Alternative A the Little Collom X access road (1.8 acres of disturbance) would have provided access for environmental monitoring and cleanout activities related to the Little Collom X Sediment Pond. Due to the revised configuration of the temporary overburden stockpile and the necessity to have additional sediment control structures, additional roads are required to access these structures for routine environmental monitoring and maintenance. Alternative B also adds access roads around the crest of the Collom Lite Pit, when compared with Alternative A, which would be necessary to support mining activities throughout the life of the mine. The size of the actual mined area for the Collom Lite Pit in Alternative B would not increase over the actual size of the Collom Lite Pit in Alternative A.

C) Alternative B includes approximately 124 additional acres inside the surface disturbance boundary for the facilities identified in Alternative A and for additional facilities including a water pipeline, coal stockpiles, explosives magazine storage, fuel islands, sediment control structures, holding ponds, and ANFO storage. The siting of the additional facilities should not disturb all of the additional acres, but the disturbance boundary could not be further limited and still provide for adequate siting of these facilities should unanticipated field conditions during construction require these facilities to be relocated within the additional disturbance area in Alternative B.

D) The Collom Haul Road in Alternative B would be modified from Alternative A to more effectively accommodate the terrain and rock outcroppings along the route and the required cuts and fills that would be necessary during construction. In addition, in order to accommodate unanticipated design changes due to geology and unforeseen engineering constraints, the proposed disturbance width for the construction of the road would be increased by approximately 100 feet along both sides of the alignment when compared to Alternative A. This increased width would add approximately 79 acres to the disturbance area for Alternative B when compared to Alternative A. Once construction of the haul road is complete, the majority of these additional acres would be reclaimed immediately during the same construction season.

E) The proposed route for the power line for Alternative B would be located south of the Collom Haul Road instead of adjacent to it as it is defined in Alternative A. The power line route would be approximately 6.4 miles (10.3 km) long and would be contained within a 30-foot wide disturbance area. When compared to Alternative A, the Alternative B power line route would add approximately 23.4 acres of surface disturbance.

2.4.6 Summary Comparison between Alternative A and Alternative B

In summary, when compared with Alternative A, Alternative B proposes mining only the Collom Lite Pit (**Figure 2-3**), a modification of Alternative A that would eliminate the development and mining of the Little Collom X Pit. In comparison with Alternative A, Alternative B would also result in the following: 1) reduce the amount of overburden needing storage in the temporary overburden stockpile by 43,600,000 cubic yards or about 28 percent; 2) re-design and relocate the footprint of the temporary overburden stockpile further south and upslope in Collom Gulch as shown in **Figure 2-3**, to maintain a no surface disturbance distance of 3,820 feet from the perimeter of GRSG lek SG4; 3) maintain a no surface activity distance of 1 mile (1.6 km) from the GRSG lek SG4 during the lekking and early brood rearing season; 4) relocate the power line alignment away from the Collom Haul Road further to the south and further from GRSG lek SG4; 5) mine approximately 2,550,000 tons less coal thereby reducing the overall mine life, including final reclamation operations, by about four years; 6) reduce the amount of explosives used by 14,754,325 lbs.; and 7) reduce water usage by approximately 120,000,000 gallons. **Table 2.4-3** shows a comparison of the acres disturbed by each Alternative for the different combinations of surface and coal ownership.

Table 2.4-3 Comparison of Acres Disturbed By Surface and Coal Ownership

Surface and Coal Ownership	Acres Disturbed under Alternative A	Acres Disturbed under Alternative B	Acreage Difference for Alternative B
Federal surface and federal coal	592.6	706.9	+114.3
Private surface and federal coal	1,113.6	1,261.9	+148.3
Private surface and private coal	47.1	104.2	+57.1
State surface and state coal	337.2	563.7	+226.5
Total	2,090.5	2,636.7	+546.2

Overall, Alternative B would disturb about 26 percent more acreage (546.2 acres) than Alternative A due to the nature of the terrain over which the temporary topsoil stockpile would be placed. Under Alternative A, that stockpile would be placed primarily within Little Collom Gulch. Under Alternative B, the stockpile would be spread over a wider area of flatter terrain when compared with Alternative A. Alternative B would also disturb more federally owned surface over federally owned coal and privately owned surface over federally owned coal than Alternative A.

All other mining aspects of Alternative B would be the same as described above for Alternative A.

2.5 ALTERNATIVE C – NO ACTION ALTERNATIVE

Under this alternative, neither the proposed mining plan modification nor the proposed lease modification would be approved, federal coal reserves in the Collom Expansion Area would not be recovered, and production at the Colowyo Mine could cease around 2019 or before, once coal reserves in the South Taylor Pit are mined out. Final reclamation operations would continue after mining ceased.. Under the No Action Alternative, there would be no surface disturbance, removal of coal, air quality impacts or any other effects associated with mining or reclamation operations in the Collom Permit Expansion Area.

2.6 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM FURTHER ANALYSIS

If an alternative is considered during the EA process but the agency decides not to analyze the alternative in detail, the agency must identify those alternatives and briefly explain why they were eliminated from detailed analysis (40 CFR 1502.14). An action alternative may be eliminated from detailed analysis if:

- it is ineffective (does not respond to the purpose and need);
- it is technically or economically infeasible (consider whether implementation of the alternative is likely given past and current practice and technology);
- it is inconsistent with the basic policy objectives for the management of the area (such as, not in conformance with the land use plan [LUP]);
- its implementation is remote or speculative;
- it is substantially similar in design to an alternative that is analyzed; and,
- it would have substantially similar effects to an alternative that is analyzed.

2.6.1 Underground Mining Alternative

An alternative to require Colowyo to utilize underground mining methods to extract the coal was considered by OSMRE and eliminated from detailed analysis for the following reasons. CDRMS has approved a SMCRA permit for this project utilizing surface mining techniques; underground mining is inconsistent with the approved permit. The scope of the Purpose and Need for this EA is predicated upon review of a surface mining plan in accordance with the approved SMCRA Permit. An Underground Mining Alternative would be inconsistent with the scope of the Purpose and Need for this action.

This alternative is also economically infeasible at current permitted production rates, and the economics of initiating an underground longwall mining operation in the Collom Expansion Area are not cost effective. The facilities and equipment needed for underground mining are different from surface mining. Since the infrastructure for underground mining is not in place at the Colowyo mine, new infrastructure for underground mining would need to be constructed. The capital expenditure to develop an underground mine would be prohibitive. All new surface facilities would need to be constructed such as, but not limited to, conveyors, coal stock piles, a wash plant, and maintenance and support facilities. In addition, all new underground mining equipment would need to be purchased such as, but not limited to, a long wall miner, several continuous miners, shuttle cars and a roof bolter.

In addition, approval of a new SMCRA permit application by CDRMS would be required to authorize underground mining. The process for Colowyo to design and engineer a new underground mine and for CDRMS to process a new permit application would take a number of years. The timeline for these processes would exceed the projected life of current surface mining at the South Taylor Pit and the revenue generation to allow investment in new infrastructure at the Colowyo mine. These factors would also result in this being an economically unreasonable alternative to consider.

In summary, this alternative was not brought forward for analysis because underground mining does not respond to the scope of the Purpose and Need for this EA and in addition, the economic burden to shift to underground mining would be unreasonable.

2.6.2 Air Quality Mitigation Alternatives

One commenter suggested that OSMRE consider alternatives that mitigate air quality impacts, specifically by imposing more stringent emission limits at the Craig Generating Station and by requiring oil and gas operators in the region to reduce their emissions. These proposals are not actual alternatives to the mining operation. OSMRE has determined that, under NEPA, activities at the Craig Generating Station and nearby oil and gas operations are not dependent on the action alternatives considered here, do not meet the regulatory definition of a connected action (40 CFR 1508.25 (a) 1.), and do not fall within the scope of the Purpose and Need. However, the effects of coal combustion are analyzed in Alternatives A and B, as well as in Alternative C (No Action) because they are considered to be indirect effects. CEQ regulations at 40 CFR 1508 (b) define "indirect effects" as those which are caused by the proposed action and are later in time or farther removed in distance, but are still reasonably foreseeable. These indirect effects would occur as a result of burning the coal that is mined.

Requiring additional emission control measures at the Craig Generating Station and nearby oil and gas operations would be outside the scope of OSMRE's authority. The Colowyo Mine is required to comply with the requirements of the Clean Air Act of 1970, as revised, and to obtain approval of an air quality permit from the Colorado Department of Health and Environment (CDPHE), under the requirements of the Colorado Air Pollution Prevention and Control Act that would incorporate measures that address the issues raised. Both Alternative A and Alternative B incorporate an Air Pollution Control Plan approved by CDRMS as part of the surface mining permit approval that incorporates design features committed to by Colowyo. As such, specific air quality mitigation under a separate and specific alternative would have substantially similar effects to that analyzed for Alternatives A and B.

CHAPTER 3 AFFECTED ENVIRONMENT

3.1 GENERAL SETTING

The CEQ regulations state that NEPA documents "must concentrate on the issues that are truly significant to the action in question, rather than amassing needless detail" (40 CFR 1500.1(b)). While many issues may arise during scoping, not all of the issues raised warrant analysis in an EA. Issues will be analyzed if: 1) an analysis of the issue is necessary to make a reasoned choice between alternatives, or 2) if the issue is associated with a significant direct, indirect, or cumulative impact, or where analysis is necessary to determine the significance of the impact. **Table 3.1-1** lists the resources considered and the determination as to whether they require additional analysis.

Table 3.1-1 Resources and Determination of Need for Further Analysis

Determination[1]	Resource	Rationale for Determination
PI	Topography	See discussion in **Section 3.2**.
PI	Air and Climate Resources	See discussion in **Section 3.3**.
PI	Geology and Minerals	See discussion in **Section 3.4**.
PI	Water Resources	See discussion in **Section 3.5**.
PI	Vegetation (includes invasive species and upland vegetation)	See discussion in **Section 3.6**.
PI	Wetlands and Riparian Zones	See discussion in **Section 3.7**.
PI	Fish and Wildlife Resources	See discussion in **Section 3.8**.
PI	Special Status Species (includes animal and plant species)	See discussion in **Section 3.9**.
PI	Cultural and Historic Resources	See discussion in **Section 3.10**.
PI	American Indian Concerns	See discussion in **Section 3.11**.
PI	Socioeconomics	See discussion in **Section 3.12**.
NP	Environmental Justice	See discussion in **Section 3.13**.
PI	Visual Resources	See discussion in **Section 3.14**.

Determination[1]	Resource	Rationale for Determination
PI	Recreation	See discussion in **Section 3.15**.
PI	Paleontology	See discussion in **Section 3.16**.
PI	Access and Transportation	See discussion in **Section 3.17**.
PI	Solid or Hazardous Waste	See discussion in **Section 3.18**.
PI	Noise	See discussion in **Section 3.19**.
PI	Livestock Grazing	See discussion in **Section 3.20**.
PI	Soils	See discussion in **Section 3.21**.
NP	Prime Farmlands	See discussion in **Section 3.22**.
NP	Alluvial Valley Floors	See discussion in **Section 3.23**.
PI	Public Involvement	See discussion in **Chapter 6**.
NP	Wild Horses	No wild horse Herd Management Areas are located within or near the Project Area.
NP	Floodplains	No FEMA[2]-designated floodplains are located within the Project Area.
NI	Wildfire Management	There would be no impact to fire management.
NP	Forest Management	No portion of the Project Area is managed for commercial timber operations.
NP	Areas of Critical Environmental Concern	No designated Areas of Critical Environmental Concern are located within or near the Project Area.
NP	Wild and Scenic Rivers	No Wild and Scenic Rivers are located within or near the Project Area.
NI	Realty Authorizations	None of the alternatives would impact existing realty authorizations. There are no proposed changes to land tenure in the Project Area.
NP	Special Use Authorization	As the mine permit area is closed to the general public, no special use authorizations are available in the Project Area.
NP	Inventoried Roadless Areas	There are no Inventoried Roadless Areas located within or near the Project Area.
NP	Wilderness Areas	There are no Wilderness Study Areas or lands that meet the criteria for wilderness characteristics located within or near the Project Area.
NP	Scenic Byways	There are no Scenic Byways located within or near the Project Area.

[1] NP = Not present in the Project Area. NI = Present, but not affected to a degree that detailed analysis is required. PI = Present with the potential for impact analyzed in this EA.
[2] Federal Emergency Management Agency

The Project Area is located approximately 22 miles (35.4 km) north of Meeker, Colorado in Moffat County (**Figure 1-1**). Nearby Moffat County communities include Axial, Maybell, Hamilton, and Craig.

The climate is semi-arid shrub steppe (shrub steppe) with a mean annual precipitation of approximately 14 to 16 inches per year. The growing season is approximately 90 days. Prevailing winds are westerly. Vegetative communities in this landscape include sagebrush-perennial grass, and other shrub/woodland types such as Gambel oak (*Quercus gambelii*), snowberry (*Symphoricarpos albus*), serviceberry (*Amelanchier* sp.), mountain mahogany (*Cercocarpus ledifolius*), pinyon (*Pinus monophylla*), juniper (*Juniperus monosperma*), and aspen (*Populus tremuloidies*). Vegetation cover ranges between 35 and 75 percent. Scattered aspen groves grow at the higher elevations and scattered juniper trees occur in the Project Area. Wetlands occur along the fringes of both Wilson and Jubb creeks and their tributaries (BLM 2006).

3.2 TOPOGRAPHY

The Project Area is located on the southern edge of the Yampa River Basin northwest of the Danforth Hills. Elevations range from approximately 8,100 feet above mean sea level (amsl) on the southern end of the Project Area to 6,900 feet on the north. The area consists of gently sloping interfluvial ridges divided by deeply entrenched gulches and drainage valleys. Major drainages include Jubb Creek, various forks of the Collom Gulch and Little Collom Gulch, and Straight Gulch. All drainages flow northeast and ultimately to the Yampa River. The ridge surfaces are characterized by shallow tan to gray-brown silts or silty loams locally covered with sandstone slabs and angular gravels. Large bedrock outcrops also occur in some locations. Valley bottoms are generally narrow with very steep canyon walls. Ridgetops are wide and gently sloping.

3.3 AIR AND CLIMATE RESOURCES

3.3.1 Airshed for Analysis

The regional airshed (approximately 4,000 square miles [12,360 km^2]) was defined using a topographic/airshed approach. An assessment was conducted to determine the reasonable airshed where regional impacts could occur. The assessment utilized topography to define the likely region of influence; boundaries were defined by topographic features. Meeker represents the southwest corner of the airshed. Heading northwest along Route 64, the western edge is defined by Sagebrush Draw, Elk Spring Ridge, and Cross Mountain. The northwest corner runs through Ninemile Basin just northwest of Godiva Rim. The boundary follows the Little Snake River northeast until approximately Shaffer's Draw. The northern boundary extends east across the Great Divide ridge, past State Highway 13 and the Elkhead Mountains. Sand Mountain represents the northeast corner of the air boundary and heads southeast to the town of Clark. The eastern edge is Steamboat Springs. The southeastern edge heads south through the town of Yampa and into Garfield County. Big Ridge and Oak Ridge, and back to Meeker, encompasses the southern boundary (**Figure 3-1**).

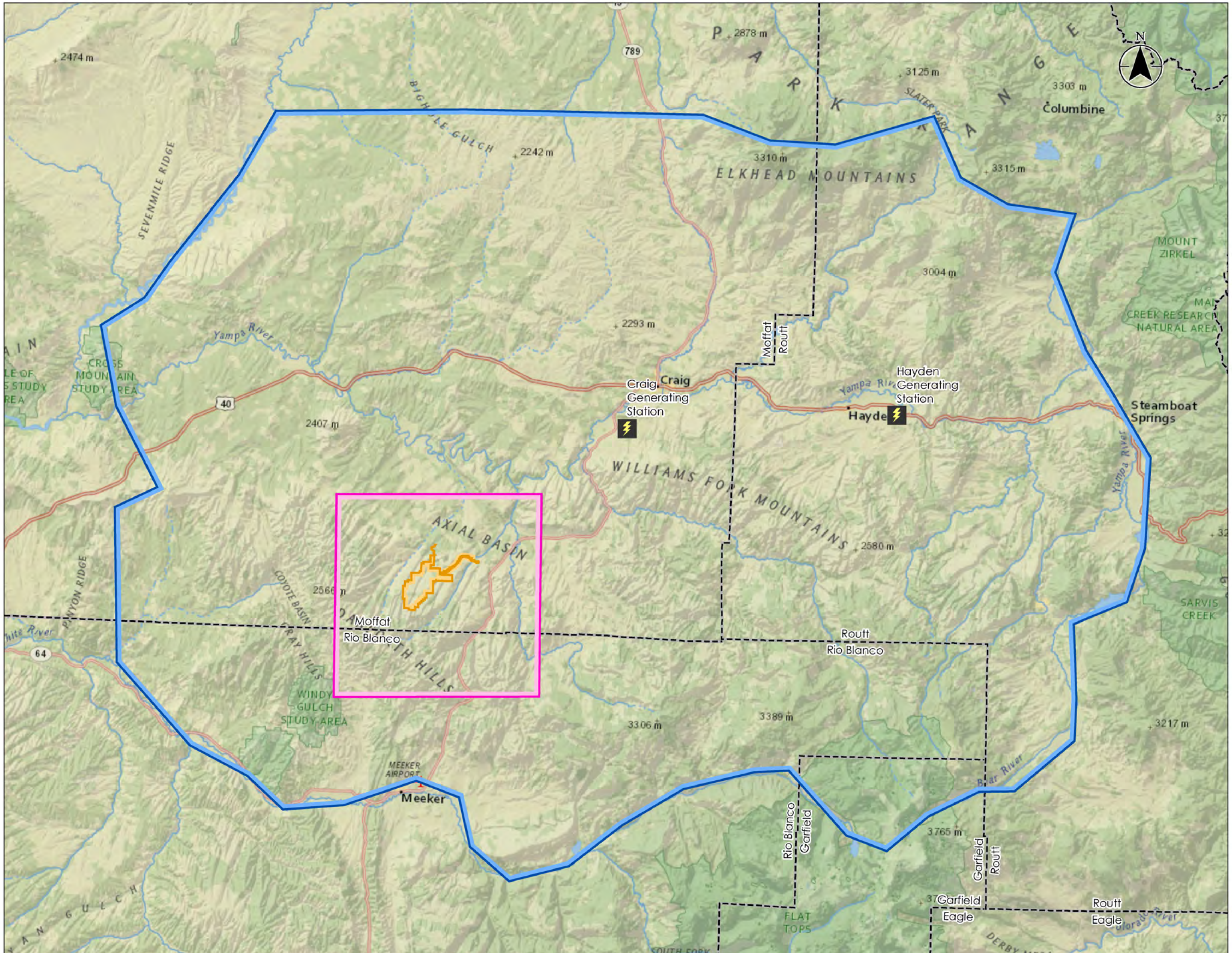
3.3.2 Regional Climate

The climate of the area is typical of a semi-arid, continental, mid-latitude region: warm summers and cold winters are characterized by high diurnal and seasonal temperature variations. The flow of Pacific air dominating the climate descends into the area as a warming and drying mass after depositing most of its moisture over the western slopes of the Sierra Nevada and Cascade Mountains. This generally creates a large rain shadow effect over Nevada, Utah, and western Colorado. Typically, severe storms and low pressure systems bypass the region by deflecting north or south over lower elevations of the Rocky Mountains in Wyoming and New Mexico. The predominant air mass over the Rocky Mountains during the winter is usually continental polar and produces cold, dry air during storm-free periods. High pressure systems that result in fine, light, powdery snow tend to become established in winter over the region which lies within the mean winter storm track. During the summer months, the air masses are generally maritime polar. This region is usually south of the main storm track in the summer; however, localized thundershowers do occur primarily during the afternoon, if a moisture supply is available either locally or in the air mass (BLM 2006).

3.3.3 Local Climate and Meteorology

Two onsite meteorological towers exist at the mine (**Figure 3-2**). The North Site was installed in 1997 and was brought back into service in 2008. The Gossard Site was installed in 2011. The North Site is approximately 3 miles (5 km) northeast of the center of the South Taylor Pit, at an elevation of 7,395 feet amsl, and the Gossard Site is located near the mine's rail load-out approximately 6 miles (10 km) north of the center of the South Taylor Pit at an elevation of 6,325 feet amsl. Each site collects data for temperature, relative humidity, wind speed and direction, barometric pressure and solar radiation. Data from these sites is provided to the CDPHE on a quarterly basis. Data for each site was reviewed from installation through the end of 2013 (OSMRE 2016). The onsite data was also reviewed in the context of other regional meteorological monitoring sites at Craig and Meeker to develop a climatological summary of the region.

The data from Craig was collected at the Craig Airport (Station ID 24046). The station is located at 40.4930°, -107.5239° at approximately 6,191 feet amsl. The site records temperature, barometric pressure, relative humidity, precipitation, and wind speed and direction. The National Climate Data Center (NCDC) provides data for this site from September 1996 through the present and the University of Utah's Mesowest provides data for this site since January 1997 through the present (OSMRE 2016).



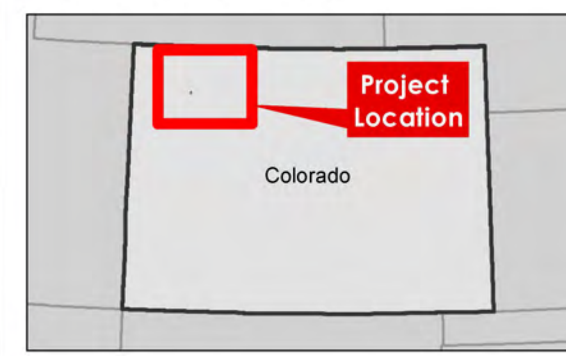
- Project Area
- Air Quality Analysis Area
- Regional Airshed Boundary
- Generating Station
- County Boundary

0 8 16 miles

1:506,880 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 13N
2. Basemap: Content may not reflect National Geographic's current map policy. Sources: National Geographic, Esri, DeLorme, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp.



Project Location

Rio Blanco & Moffat Counties
Colorado

Project

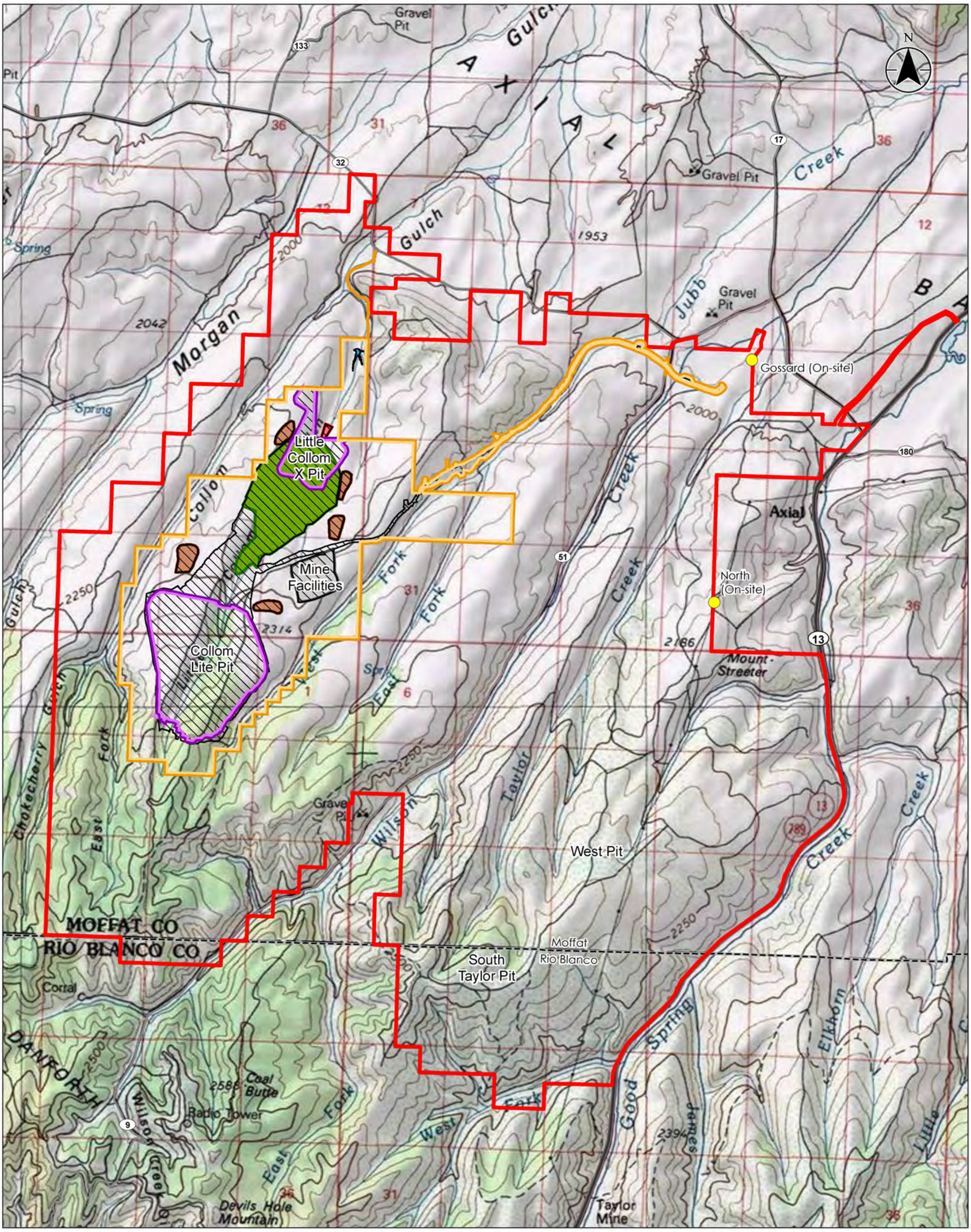
Office of Surface Mining Reclamation & Enforcement
Colowyo Coal Mine: Collom Permit Expansion Area
Project Mining Plan Environmental Assessment

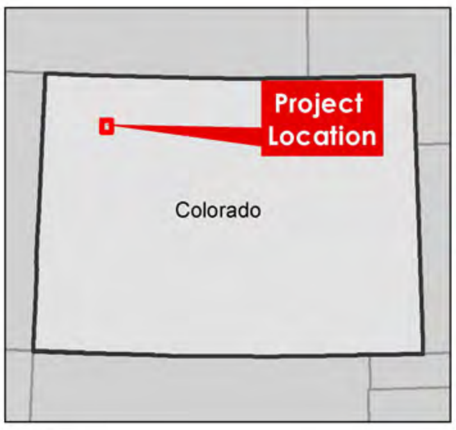
Figure No.

3-1

Title

Air Quality Region





- Air Quality Monitoring Site
- Project Area
- Disturbance Area
- Temporary Overburden Stockpile
- Little Collom Sump
- Mine Facilities
- Sediment Pond
- Temporary Topsoil Stockpile
- Proposed Mine Pit Area
- Approved SMCRA Permit Boundary
- County Road
- Highway
- County Boundary

0 4,000 8,000 Feet
1:64,000 (At Original document size of 11x17)

Notes
1: Coordinate System: NAD 1983 UTM Zone 13N
2: Service Layer Credits: Copyright:© 2013 National Geographic Society, i-cubed

Project Location
Rio Blanco & Moffat Counties
Colorado

Project
Office of Surface Mining Reclamation & Enforcement
Colowyo Coal Mine: Collom Permit Expansion Area
Project Mining Plan Environmental Assessment

Figure No.
3-2

Title
Onsite Meteorological Monitoring

The data from Meeker was collected at the Meeker Airport (Station ID 28801). The station is located at 40.0444° -107.8883° at approximately 6,365 amsl. The site records temperature, barometric pressure, relative humidity, precipitation, and wind speed and direction. The NCDC provides data for this site from June 1, 1997 through the present and the University of Utah's Mesowest provides data for this site from April 1997 through the present (OSMRE 2016).

The highest mean monthly temperatures occur in July, and range from 66.9 degrees Fahrenheit (°F) to 69.2 °F. The lowest mean monthly temperatures occur in January and range from 9.4 °F to 20.3 °F. Regional winds are affected by both synoptic events and orographic influences that cause wind patterns to predominately flow from southwest to northeast. Wind patterns atop the mountain ranges exhibit a stronger west to east flow pattern, while locally in the Project Area wind patterns are predominately from the west-southwest direction. The local topography also influences wind patterns; the Project Area terrain generally descends from south to north with some micro-scale terrain channeling of wind. The northern end of the Project Area runs along an east-west axis to the south of the Yampa River Valley and the south end of the Project Area is characterized by higher mountainous terrain, with more complex topographic features. Wind speeds are generally more moderate in the daylight hours and lighter in the evening and night time hours. The mean monthly wind speeds ranged from 1.45 to 5.0 m/s. Mean monthly wind speeds are generally lowest in January and highest during the four month period of March through June.

Regional precipitation averages approximately 1.25 inches per month with the highest monthly precipitation totals occurring during the spring and fall. Annual precipitation amounts averaged from 2005 to 2013 were 13.8 inches in Craig and 16.2 inches in Meeker.

3.3.4 Regulatory Requirements

The regulatory framework for air quality includes both federal and state rules, regulations, and standards promulgated by the EPA and implemented by the CDPHE. The Clean Air Act (CAA) established the NAAQS for seven criteria pollutants. The criteria pollutants include carbon monoxide (CO), lead, nitrogen dioxide (NO_2), ozone, particulate matter 10 microns (PM_{10}) or less in diameter, particulate matter 2.5 microns ($PM_{2.5}$) or less in diameter, and sulfur dioxide (SO_2) (**Table 3.3-1**).

Pursuant to the CAA, the EPA has developed classifications for distinct geographical regions known as Air Quality Control Regions (AQCR). In Colorado, the state has been divided into eight multi-county areas that are generally based on topography and have similar airshed characteristics. The Project Area airshed analysis area (**Section 3.3.1**) lies in the Western Slope Air Pollution Control Region as designated by the State of Colorado. The EPA designates whole or partial counties as Attainment, Non-Attainment, or Maintenance for each criteria air pollutant. Regions classified as in Attainment are areas in which the pollutant has not exceeded the NAAQS. A Non-Attainment classification represents an area in which the pollutant has exceeded the NAAQS. The Maintenance designation is used when monitored pollutants have been reduced from the Non-Attainment to the Attainment levels. Moffat County has been designated as Attainment for all criteria pollutants based on monitoring results that were below the applicable NAAQS (all Colorado communities are currently in attainment of all NAAQs except the Front Range ozone control area, which is in nonattainment for the eight-hour ozone standard).

Table 3.3-1 National Ambient Air Quality Standards

Pollutant		Primary/ Secondary	Averaging Time	National Standard	Form
Carbon Monoxide (CO)		Primary	8-hour	9 ppm	Not to be exceeded more than once a year
			1-hour	35 ppm	
Lead		Primary and secondary	Rolling 3 month average	0.15 μg/m³	Not to be exceeded
Nitrogen Dioxide (NO_2)		Primary	1-hour	100 ppb	98th percentile of 1-hour daily maximum concentration, averaged over 3 years
		Primary and secondary	Annual	53 ppb	Annual Mean
Ozone		Primary and secondary	8-hour	0.070 ppm	Annual fourth-highest daily maximum 8-hr concentration, averaged over 3 years
Particle Pollution	$PM_{2.5}$	Primary	Annual	12 μg/m³	Annual mean, averaged over 3 years
		Secondary	Annual	15 μg/m³	Annual mean, averaged over 3 years
		Primary and Secondary	24-hour	35 μg/m³	98th percentile, averaged over 3 years
	PM_{10}	Primary and secondary	24-hour	150 μg/m³	Not to be exceeded more than once per year on average over 3 years
Sulfur Dioxide (SO_2)		Primary	1-hour	75 ppb	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		Secondary	3-hour	0.5 ppm	Not to be exceeded more than once per year
		n/a	3-hour*	700 μg/m³	Not to be exceeded more than once in any twelve month period

Source: http://www.epa.gov/air/criteria.html as of October, 2015
μg/m³ = micrograms per cubic meter of air
ppm = parts per million, ppb = parts per billion
*State standard established by the Colorado Air Quality Control Commission

The CAA also divides areas where air quality is already cleaner than required by federal standards into three classes, and specifies the increments of SO_2, NO_2 and particulate pollution allowed in each class as regulated by the Prevention of Significant Deterioration (PSD) regulations (40 CFR 52.21). Class I areas include international and national parks, wilderness, and other pristine areas; allowable increments of new pollution in these areas are very small. Class II areas include all attainment and not classifiable areas, which are not designated as Class I; allowable increments of new pollution in these areas are modest. Class III represents selected areas that states may designate for development; allowable increments of new pollution are large (but not exceeding NAAQS). No Class III areas are designated in Colorado.

All areas not designated as Class I are initially designated as Class II areas. The Project Area is located in a Class II area as codified in the Colorado State PSD permitting rules[1].

The PSD regulations are applicable to a source pollutant if the source has the potential to exceed the major source thresholds, of either 100 or 250 tons per year (tpy) of a regulated New Source Review pollutant, depending on the type of source pollutant that it is. For stationary source categories listed in the regulation, the threshold is 100 tpy. For source categories that are not listed, such as surface mining operations, the threshold is 250 tpy. The potential to emit calculation does not include fugitive emissions for the purpose of determining if the facility exceeds the 250 tpy threshold. Fugitive emissions are defined by EPA as "those emissions that could not reasonably pass through a stack, chimney, vent, or other functionally-equivalent opening." The Project is classified under the CAA as a PSD minor source of air quality emissions and would not exceed these thresholds under the PSD regulations because the majority of the Project emissions sources are fugitive in nature and as such are not included in the determination of PSD applicability for a non-listed source category such as coal mining. Project emissions estimates are included in **Chapter** 4. Therefore, PSD regulations and preconstruction monitoring would not be applicable to the mine. It should be noted that minor sources while not subject to PSD regulations can affect increments, but emissions remain below increment thresholds.

Stationary sources in the vicinity of the Project Area that are regulated under PSD include the Craig Generating Station and the Hayden Generating Station outside of Craig and Hayden, Colorado, respectively.

Federal PSD regulations limit the maximum allowable increase in ambient pollutant concentration in Class I, Class II, and Class III areas (**Table 3.3-2**). The nearest Class I areas to the Project Area are the Flat Top Wilderness, 22 miles (35 km) southeast; Mount Zirkel Wilderness, 50 miles (80 km) northeast; and the Maroon Bells-Snowmass Wilderness and Eagle's Nest Wilderness, 62 miles (100 km) south/southeast and southeast, respectively (**Figure 3-3**). It should also be noted that Class II areas such as Dinosaur National Monument and Colorado National Monument are treated as Class I areas with regard to SO_2 concentrations under Colorado state law.

The CAA also enacted the New Source Performance Standards (NSPS) and National Emissions Standards for Hazardous Air Pollutants (NESHAP) for specific types of equipment located at new or modified stationary pollutant sources. NSPS regulations limit emissions from source categories to minimize the deterioration of air quality. Stationary sources are required to meet these limits by installing newer equipment or adding pollution controls to older equipment that reduce emissions below the specified limit. The Project Area would include equipment that is subject to various NSPS and NESHAP regulations. NSPS and NESHAP standards also apply to the locations of final coal combustion.

[1] 5 CCR 1001-05, Regulation Number 3, Part D, Concerning Major Stationary Source New Source Review and Prevention of Significant Deterioration

Table 3.3-2 Federal Prevention of Significant Deterioration Limits

Pollutant	Averaging Time	Maximum Allowable Increase (μg/m³)		
		Class I Area	Class II Area	Class III Area
$PM_{2.5}$	Annual	1	4	8
	24-hour	2	9	18
PM_{10}	Annual	4	17	34
	24-hour	8	30	60
SO_2	Annual	2	20	40
	24-hour	5	91	182
	3-hour	25	512	700
NO_2	Annual	2.5	25	50

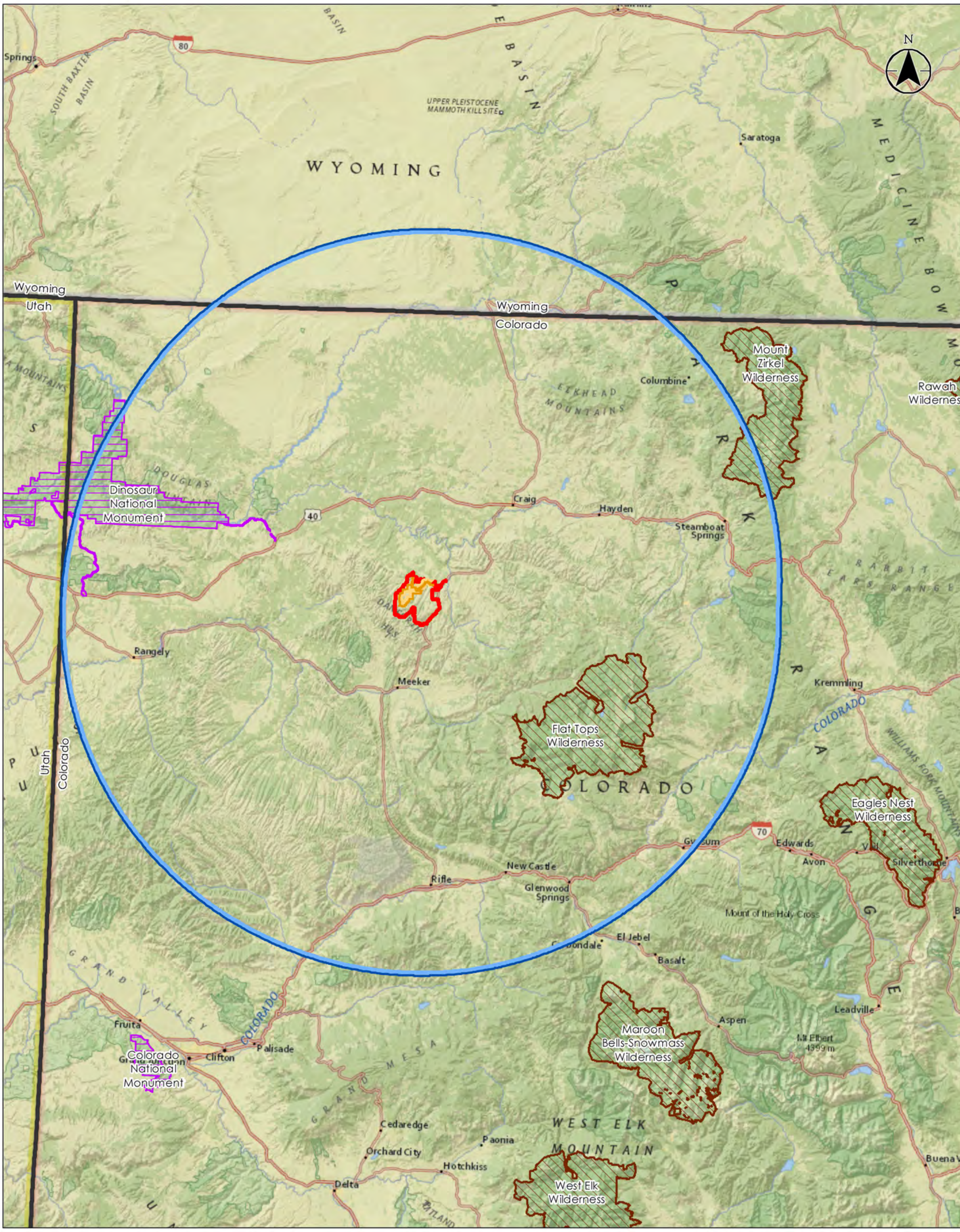
μg/m³ = Micrograms Per Cubic Meter of Air

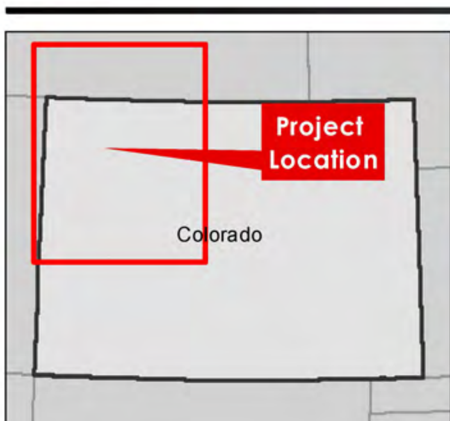
The CAA Amendments of 1990 introduced a new facility-wide Federal Operating Permit program. Federal Operating Permits, also known as Title V permits, are required for facilities with the potential to emit more than 100 tpy of a regulated pollutant, 10 tpy of any single hazardous air pollutant (HAP), or 25 tpy of any combination of HAPs and considered to be major sources of air quality emissions. No NAAQS exist for HAPs; instead emissions of these pollutants are regulated by a variety of laws (e.g., NESHAPs) that target the specific source class and industrial sectors for stationary, mobile, and product use/formulations. However, Title V permitting is still required if HAP emissions rise above the defined thresholds.

The mine's potential to emit is below the requirements to obtain a Federal Operating Permit and, therefore, it would not be subject to Title V permitting. Title V operating permit requirements are typically applicable for the locations of final coal combustion. Both the Craig and Hayden Generating Stations have Title V permit applicability.

In addition to the permitting of criteria pollutants and HAPs, regulations exist for the control of mercury and air toxics, acid deposition, visibility impacts, and regional haze.

The final location of coal combustion is often regulated under numerous environmental regulations. Until 2011, the Craig Generating Station and other generating facilities had no federal standards that required them to limit their emissions of toxic air pollutants such as mercury, arsenic, and metals. On December 16, 2011, the EPA finalized the first national standards to reduce mercury and other toxic air pollution from coal and oil-fired power plants. These rules set technology-based emissions limitation standards for mercury and other toxic air pollutants, reflecting levels achieved by the best-performing sources currently in operation. The final rule sets standards for all HAPs emitted by coal- and oil-fired electric generating units (EGUs) with a capacity of 25 megawatts or greater. All regulated EGUs are considered Title V major under the final rule. EPA did not identify any size, design, or engineering distinction between major and area sources. Existing sources generally have up to four years if they need





- Project Area
- Project Area 100-km Buffer
- Approved SMCRA Permit Boundary
- USFS Class I Area
- National Monument
- State Boundary

0 18 36 Miles

1:1,140,480 (At Original document size of 11x17)

Notes

1: Coordinate System: NAD 1983 UTM Zone 13N

2: Service Layer Credits: Content may not reflect National Geographic's current map policy. Sources: National Geographic, Esri, DeLorme, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp.

Project Location

Rio Blanco & Moffat Counties
Colorado

Project

Office of Surface Mining Reclamation & Enforcement
Colowyo Coal Mine: Collom Permit Expansion Area
Project Mining Plan Environmental Assessment

Figure No.

3-3

Title

Class I Areas

it to comply with the Mercury and Air Toxics Standards (MATS)[2]. The emissions limits associated with the MATS rule are presented in **Table 3.3-3**. Based on the facility's mercury emission rates, the Craig Generating Station is required to comply with the MATS rule. The Craig Generating Station attained compliance with MATS for Units 1 and 2 at the facility previously and Unit 3 attained compliance in April of 2015. Each unit at the Hayden Generating Station is considered a Low Emitter, emitting no more than 29 lbs of mercury per year (Colorado Regulation No. 6, Part B, Section VIII.B.10). Low Emitters are exempted from the technology-based emissions standards of the Colorado Utility Mercury Reduction Program. In addition, by emitting less than 29 lbs of mercury per year, the units met the emissions standards required by the MATS rule.

Table 3.3-3 MATS Emission Requirements

		Subcategory	Mercury Emission Limit (lbs/GWh)
Coal and Oil Fired Units	Existing	Regular Coal	0.013
		Designed for Low Rank Coal[1]	0.12 or 0.040
		IGCC (Gasified Coal)	0.03
		Solid-oil Derived & Continental Liquid Oil	0.002
		Non-continental Liquid Oil	0.004
	New	Regular Coal	0.0002
		Designed for Low Rank Coal	0.04
		IGCC (Gasified Coal)	0.003
		Solid-oil Derived	0.002
		Continental Liquid Oil	0.0001
		Non-continental Liquid Oil	0.0004

Source: EPA MATS final rule, pp. 347-351, http://www.epa.gov/mats/pdfs/20111216MATSfinal.pdf
lbs/GWh = pounds of pollutant per gigawatt hour – electric output
[1] Most of these units burn lignite coal

The PSD regulations described previously also regulate the degradation of Air Quality Related Values (AQRV) in Class I areas. The authority to protect AQRVs in federally mandated Class I areas is to be done as part of the preconstruction permitting process of major sources. AQRVs include all resources sensitive to changes in air quality and typically include visibility degradation, pollutant deposition on vegetation and water bodies, and acidification of sensitive water bodies. AQRV impact review during permitting is applicable to both the Craig and Hayden Generating Stations.

[2] The Supreme Court recently held that the EPA did not properly consider the costs of the MATS rule. *See Michigan v. EPA*, ___ U.S.___, 192 L. Ed. 2d 674 (June 29, 2015). On December 1, 2015, USEPA published a "Proposed Supplemental Finding and Request for Comment" in the *Federal Register*, which states that consideration of cost does not alter the USEPA's previous conclusion that the MATS is appropriate and necessary under the Clean Air Act. 80 FR 75025. Although this regulatory and legal process is ongoing,, for purposes of this EA, the analysis includes the MATS rule in effect because the primary emitters have already complied with those standards and because the USEPA has proposed to retain those standards.

In addition to PSD AQRV analyses, visibility impacts are also included under a State Implementation Plan (SIP) for the reduction of Regional Haze. This regulation is used to reduce the visibility impacts from existing facilities and introduce additional emissions controls to a standard known as Best Available Retrofit Technology (BART).

The Craig Generating Station has two units that are BART eligible (Units 1 and 2). These two units, along with Unit 3, are included in the current Regional Haze SIP. As a result, Units 1 and 2 are required to meet specific NOx standards. To help meet applicable standards, Selective Catalytic Reduction (SCR) systems are being or will be installed to control NOx emissions. They have also installed wet lime scrubbers for SO_2 control, which have been operational since the end of 2004. According to modeling prepared as part of the BART analysis, NO_x controls will improve visibility by 1.01 deciview (dv; a unit of visibility impairment) for Unit 1 and 0.98 dv for Unit 2. Unit 3 is considered to be eligible for "Reasonable Progress"[3]. The Colorado SIP includes a determination for Unit 3 stating that it is reasonable to include a Selective Non-Catalytic Reduction (SNCR) for NOx, which will improve visibility by 0.32 dv.

Similarly, the Hayden Generating Station has two units identified as BART eligible in the SIP. Both are using lime spray dryers to control SO_2. Unit 1 improves visibility by 0.10 dv and Unit 2 by 0.21 dv. Hayden also controls NO_x using SCR. Visibility improvements are estimated at 1.12 dv and 0.85 dv for Units 1 and 2, respectively.

The controls being implemented by the two power stations are helping to greatly improve the visibility in the region surrounding the Mount Zirkel Wilderness. In addition, the U.S. Forest Service has stated that their concerns regarding visibility (originally noted in a letter to the State in 1993) within the wilderness have been resolved. The State of Colorado is also in agreement that control measures taken by the two facilities are sufficient in resolving the U.S. Forest Service concerns[4].

3.3.5 Regional Air Quality

The Project Area and vicinity is currently in Attainment or unclassified for all criteria pollutants. Monitoring of criteria pollutants in the region is located near population centers or areas of specific interest. In the late 1990s, the EPA allowed monitoring to cease where pollutants were less than 60 percent of the NAAQS, and as a result the data collected for this analysis is regionally representative but often monitored at some distance from the Project Area. All Colorado communities are currently in attainment of all NAAQs (except the Front Range ozone control area, which is in nonattainment for the eight-hour ozone standard); therefore, regional monitoring data from 2014 provide an accurate representation of air quality in the Project region.PM_{10} data from two monitoring locations, one in Steamboat Springs, 55 miles (89 km) east-northeast of the Project Area, and one in Parachute, 58 miles (94 km) south of the Project Area, were reviewed for 2014 (**Figure 3-4**). Data from 2014 are also available for Rifle and Grand Junction. The highest 24-hr concentration for Parachute was 39 micrograms per

[3] CDPHE Regional Haze SIP Craig Station https://www.colorado.gov/pacific/sites/default/files/AP_PO_Craig-Power-Plant_0.pdf

[4] Colorado SIP Mount Zirkel Technical Support Document https://www.colorado.gov/pacific/sites/default/files/AP_PO_Mount-Zirkel-Wilderness_0.pdf

cubic meter of air (μg/m^3); the highest concentration for Steamboat was 84 μg/m^3; and the highest concentrations for Rifle and Grand Junction were 47 μg/m^3 and 46 μg/m^3, respectively. All values were below the NAAQS (150 μg/m^3) (**Table 3.3-4**).

Additional recent PM_{10} data are available for rural northwest Colorado locations at the Greasewood Hub (33 miles southwest) and the Williams Willow Creek Gas Plant (38 miles southwest). Monitoring at Greasewood was conducted from 2009–2010 with the second highest 24-hour value being 101 μg/m^3, which included impacts from employee vehicles using a nearby dirt parking lot. Williams had a 24-hour second high value of 119 μg/m^3 for 2012. Colowyo collected PM_{10} data at its western monitoring site, located in a valley west of the mine from 1997–1998. The second-highest 24-hour value of 23 μg/m^3 is considered to represent PM_{10} levels in the absence of the mine.

3.3.5.1 NO_2

The nearest representative NO_2 data is collected at the USDA Upper Colorado Environmental Plant Center in Meeker, 16 miles (25 km) south of the Project Area. The highest hourly background at the site during 2014 was 6.1 parts per billion (ppb), which is below the NAAQS (100 ppb). NO_2 data is also collected at Rangely, the Greasewood Hub, the Williams Willow Creek Gas Plant, and at the Oxy Conn Creek facility. Rangely showed a highest 1-hr value of 20 ppb in 2014 and the Greasewood Hub recorded a 1-hr second high of 42 ppb in 2009–2010, which included facility impacts. In 2012 the Williams Willow Creek Gas Plant had a 1-hour second high of 11 ppb and from 2011-2012 the Oxy Conn Creek facility (60 miles south-southwest of the Project Area) recorded a 1-hour second high of 43 ppb.

3.3.5.2 $PM_{2.5}$

The nearest representative $PM_{2.5}$ data is collected in Rangely, 53 miles (85 km) west of the Project Area. The highest 24-hr concentration recorded at Rangely in 2014 was 17.8 μg/m^3. The highest 24-hr concentration background at the site during 2014 was 17.8μg/m^3, which is below the NAAQS (35 μg/m^3). $PM_{2.5}$ data is also collected in Grand Junction as well as at the Greasewood Hub and Williams Willow Creek. $PM_{2.5}$ monitoring in Grand Junction showed a maximum 24-hr concentration of 21.7 μg/m^3 in 2014. The 98th percentile monitored value at the Greasewood Hub was 12 μg/m^3 from 2009 – 2010; the 98th percentile monitored value at Williams Willow Creek was14 μg/m^3 in 2012. The Greasewood and Williams' data are considered to be representative of background levels in rural areas of northwest Colorado.

3.3.5.3 Ozone

The nearest representative ozone data is collected at Lay Peak (17 miles [27 km] northwest of the Project Area). The highest 8-hr concentration measured at the site during 2014 was 0.067 parts per million (ppm), which is below the NAAQS (0.070 ppm).

Ozone data is also collected in Rifle, Palisade, Meeker, Rangely, and Walden. In 2014 the highest 8-hr value at Rifle was 62 ppb. Palisade recorded an 8-hr highest value of 64 ppb for 2014. The highest recorded values in 2014 for Meeker and Rangely were 63 ppb and 66 ppb, respectively. Walden, in Jackson County, showed a highest 8-hr concentration of 63 ppb. Monitoring at Greasewood Hub showed an 8-hr fourth maximum of 72 ppb for 2009 – 2010, while Oxy Conn Creek recorded an 8-hr fourth maximum of 59 ppb during 2011-2012. Williams Willow Creek Gas facility had 8-hour fourth maximum of 68 and 63 ppb in 2012 and 2013, respectively. Attainment of the 8-hr ozone standard is assessed via the three-year average of the fourth highest 8-hr concentration for each year. All of the monitors listed above show compliance with the 8-hr ozone standard (70 ppb), with the exception of the Rangely site. A fourth maximum of 91 ppb observed at the Rangely site in 2013 has led to a 3-year average above 70 ppb for this site.

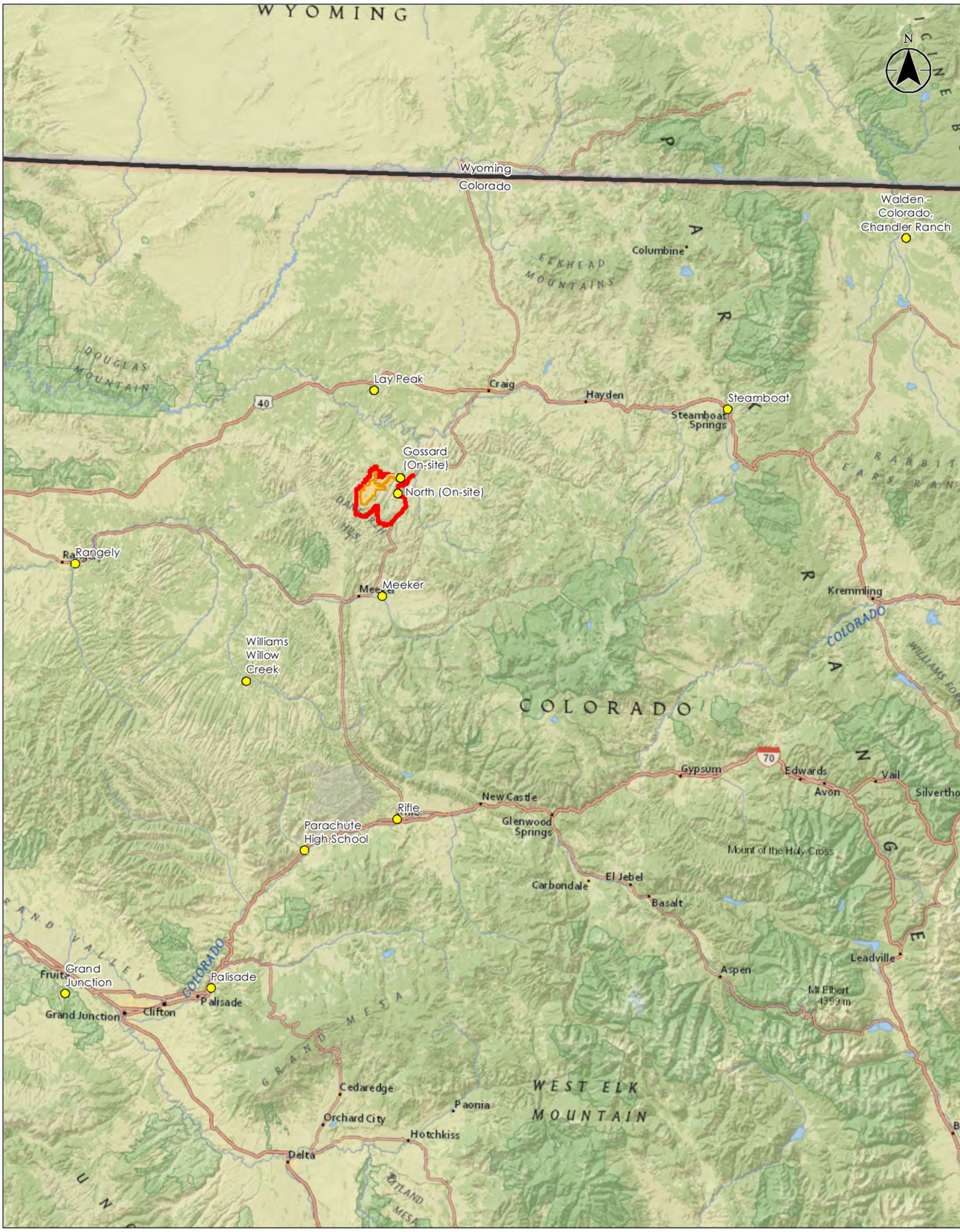
3.3.5.4 SO_2 and CO

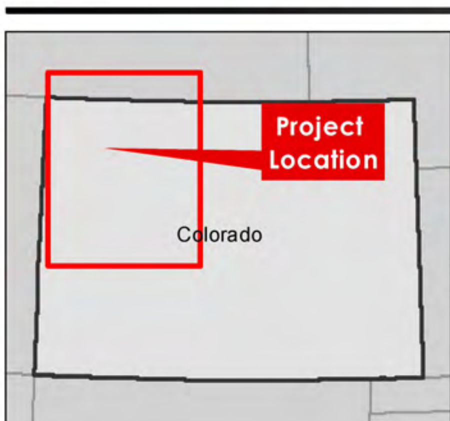
The Williams Willow Creek station, which is operated by the Williams Field – Willow Creek Gas Plant, monitors both SO_2 and CO, and is within 38 miles (61 km) of the Project Area. In 2012, measured second maximum concentrations of SO_2 were 1.0 ppb for the 1-hr, 3-hr, and 24-hr averaging periods; measured maximum concentrations of CO were 1.0 ppb in 2012 for the 1-hr and 8-hr averaging period. Both SO_2 and CO are highly affected by local sources of combustion and are typically low in the rural Project Area. For similar mining projects in the western U.S.[5], backgrounds of zero have been used when no monitoring data exists. The nearest government-operated monitoring station for SO_2 and CO is at the Chandler Ranch in Walden, Colorado, 90 miles (145 km) from the Project Area. For 2014, the highest SO_2 1-hr, 3-hr, and 24-hr backgrounds at the site were 1.0, 0.5, and 0.3 ppb, respectively. The highest 1-hr and 8-hr CO backgrounds were 0.25 and 0.3 ppb, respectively. Both SO_2 and CO were below the NAAQS.

3.3.6 Hazardous Air Pollutants

HAPs are those pollutants that are known or suspected to cause cancer or other serious health effects, such as reproductive effects or birth defects, or adverse environmental effects. The majority of HAPs originate from stationary sources (e.g., factories, refineries, power plants) and mobile sources (e.g., cars, trucks, buses), as well as indoor sources (building materials and cleaning solvents). The majority of HAPs emitted from the Project would be the result of vehicle use. The major source threshold for HAPs is 10 tpy of any one HAP or 25 tpy of aggregate HAPs. The Colowyo Coal Mine would not be categorized as a major source for HAPs because the mine produces approximately 2 tpy of total HAPs. Emissions calculations are included in **Chapter 4**.

[5] Draft EIS for the Gold Rock Mine Project Volume 2 BLM/NV/EL/ES/15-05+1793 February, 2015.





Air Quality Monitoring Site

Project Area

Approved SMCRA Permit Boundary

State Boundary

0 16 32 Miles

1:1,013,760 (At Original document size of 11x17)

Notes

1: Coordinate System: NAD 1983 UTM Zone 13N

2: Service Layer Credits: Content may not reflect National Geographic's current map policy. Sources: National Geographic, Esri, DeLorme, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp.

Project Location

Rio Blanco & Moffat Counties
Colorado

Project

Office of Surface Mining Reclamation & Enforcement
Colowyo Coal Mine: Collom Permit Expansion Area
Project Mining Plan Environmental Assessment

Figure No.

3-4

Title

Regional Air Quality Monitoring

Table 3.3-4 2014 Regional Air Quality Monitoring Conditions

Monitor	Location	Active Since	Monitoring Agency	Annual Samples	Elevation (ft.)	1-hr Highest Value, 2014	3-hr	8-hr Highest Value, 2014	24-hr Highest Value, 2014
PM_{10} (µg/m^3)									
Rifle	51 mi (82 km) south in Rifle, CO	2005	CDPHE	120					47
Grand Junction	93 mi (148 km) southwest in Grand Junction , CO	2004	CDPHE	118					46
Parachute High School	58 mi (94 km) southwest in Parachute, CO	2001	CDPHE	119	5,100				39
Steamboat	56 mi (89 km) northeast in Steamboat, CO	1987	CDPHE	346	7,400				84
Colowyo Onsite	Colowyo Existing Facility	Detailed discussion in Section 3.3.7 "On-site Air Quality"			7,100	Detailed discussion in Section 3.3.7 "On-site Air Quality"			
NO_2 (ppb)									
Rangely[1]	51 mi (82 km) southwest near Rangely, CO	2011	BLM	8,592		19.6			
Meeker	18 mi (28 km) south in Meeker, CO	2011	BLM	8,584	6,500	6.1			
SO_2 (ppb)									
Walden - Colorado, Chandler Ranch	91 mi (145 km) northeast, north of the Project Area	2012	USFS	4,452 (inadequate recovery rate)	7,930	1			0.5
CO (ppm)									
Walden - Colorado, Chandler Ranch	91 mi (145 km) northeast, north of the Project Area	2013	USFS	4,330 (inadequate recovery rate)	7,930	0.3		0.3	

Monitor	Location	Active Since	Monitoring Agency	Annual Samples	Elevation (ft.)	1-hr	3-hr	8-hr	24-hr
$PM_{2.5}$ (µg/m3)									
Grand Junction	93 mi (148 km) southwest in Grand Junction, CO	2003	CDPHE	363					29.3
Rangely	51 mi (82 km) west in Rangely, CO	2011	BLM	325	5,500				17.8
Ozone (ppm)									
Rifle	51 mi (82 km) south near Rifle, CO	2009	CDPHE	192 days out of 214 required				0.062	
Palisade	83 mi (132 km) southwest near Palisade, CO	2009	CDPHE	212 days out of 214 required				0.064	
Meeker	17 mi (27 km) southwest in Meeker, CO	2010	BLM	206 days out of 214 required				0.063	
Rangely	51 mi (82 km) southwest near Rangely, CO	2011	BLM	203 days out of 214 required				0.066	
Lay Peak	17 mi (27 km) northwest, west of Craig, CO	2012	CDPHE	6,516	6,250			0.067	

µg/m³ = micrograms per cubic meter of air; ppm = parts per million; ppb = parts per billion

[1] The sites are operated under a contract and reported through the National Park Service data system.

3.3.7 Onsite Air Quality

The North and Gossard air monitoring stations are equipped with Rupprecht & Patashnick Model 1400a continuous PM_{10} samplers and R.M. Young AQ Model 05305 prop-vane anemometers. The station locations were selected with direction and approval from the Colorado Air Pollution Control Division (APCD), and were designed to monitor the maximum PM_{10} impacts at the Colowyo Coal Mine property line. The monitoring stations are operated according to separate Quality Assurance Project Plans (QAPPs) for the meteorological and the PM_{10} measurements. The EPA requirements for format and content have been followed in each QAPP and each has been approved by the APCD.

The monitors provide hourly and daily PM_{10} concentrations. A summary of each monitor's high concentration events is provided below and in **Table 3.3-5**.

- North Site: July 29, 2008 through present. There have been 12 high concentration PM_{10} events recorded during this period.
- Gossard: July 17, 2011 through present. There has been one high concentration PM_{10} event recorded during this period.

Note that for comparisons of PM_{10} data to the NAAQS, the resulting concentration must be greater than 155 $\mu g/m^3$ in order to be considered an exceedance. The PM_{10} NAAQS is a probabilistic standard and is defined as a level not to be exceeded more than once per year and is averaged over a three year period. As such, an exceedance of the level of the standard does not directly equate to a violation of the standard (or a non-attainment determination).

Table 3.3-5 Colowyo Coal Mine Network High PM_{10} Concentration Events

Event	Number Date	North Site Daily Value of PM_{10}, $\mu g/m^3$	Gossard Daily Value of PM_{10}, $\mu g/m^3$	Calendar Quarter
1	11/02/08	288	-	4
2	03/04/09	237	-	1
3	03/22/09	167	-	1
4	07/06/09	157	-	3
5	09/29/09	291	-	3
6	09/30/09	180	-	3
7	12/04/09	193	-	4
8	05/28/10	198	-	2
9	01/14/12	156	-	1
10	05/26/12	192	167	2
11	01/29/14	174	-	1
12	01/05/15	186	-	1

The monitoring of high concentration PM_{10} (**Table 3-3.5)** was addressed by CDPHE. The result was the development of a Colowyo Coal Mine PM_{10} mitigation plan and modeling report (Colowyo 2010a). The report addressed Events 1-8 and identified that the PM_{10} sources for these events were: 1) an active coal pile (identified as 'R3') located close to the property boundary, 2) a parking area, 3) a maintenance area, and 4) an area referred to as the 'boneyard' that is used to store old vehicles and salvageable materials. The report demonstrated that the boneyard and R3 coal pile contributed 64 percent and 14 percent, respectively, of the PM_{10} source impact. Since the time of that report, an updated Colowyo Coal Mine Air Quality Mitigation Plan (Colowyo 2010a) called for the following: 1) increased dust controls at the boneyard, and 2) the relocation of the R3 coal pile to a previously mined area that is below the level of the surrounding terrain. In October 2012, the R3 coal stockpile was relocated and the area was reclaimed and vegetated as a further dust mitigation measure.

The final four daily high value events occurred in 2012 through 2015 (**Table 3-3.5**). Events 9 and 10 are potentially associated with natural or exceptional high wind events (Colowyo 2013b, Colowyo 2013c, and Colowyo 2013d). The January 29, 2014 and January 5, 2015 events (Events 11 and 12) are currently being evaluated; site data indicates these events may also qualify as a natural or exceptional event. It should be noted however, that the State of Colorado has not reviewed the documentation regarding the 2012 through 2015 events and no documentation has been submitted to EPA. These reports detail the classification of a high concentration PM_{10} event as an event that should not be included in compliance determinations, due to its classification as natural or exceptional, based on EPA guidelines for such events. This conclusion is supported by regional meteorological and air quality data from the event periods.

3.3.8 Existing Air Pollutant Emission Sources

There are a total of 163 permitted air quality emission sources that are currently located within 31 miles (50 km) of the Project Area. The region is generally rural and the emissions sources are dominated by mining, power generation, oil and gas production, and aggregate (sand and gravel) processing (CDPHE 2015a; OSMRE 2016). CDPHE (2015a) includes in its permits all sources of air quality emissions that are required by law to acquire a state air quality permit. Sources such as dust from dirt roads, agricultural operations, recreational activities, and automobile use are not included because they are not regulated as stationary industrial sources but have the capacity to produce air quality emissions regionally.

3.3.9 Existing Coal Combustion Environment

Two existing coal fired electrical generating facilities are currently operating in the vicinity of the Project Area. The Craig Generating Station is located 4 miles (6 km) southwest of Craig and 20 miles (32 km) northeast of the center of the Project Area. The Craig Generating Station is operated by Tri-State. It consists of three coal fired steam driven electric generating units (Units 1, 2, and 3). Total net electric generating capacity is 1,264 MW. The Hayden Generating Station, owned and operated by the Public Service Company of Colorado, is located 4 miles (6 km) east of Hayden and 39 miles (63 km) northeast of the center of the Project Area. It consists of two coal fired steam driven electric generating units (Units 1 and 2). Unit 1 is rated at 205 MW and Unit 2 is rated at 300 MW. Both facilities receive their coal from a variety of sources. Each facility operates under a PSD major source permit issued by CDPHE.

CDPHE requires the submission of actual emissions data for each facility on an annual basis (**Table 3.3-6**).

Table 3.3-6 Regional Coal Fired Generating 2014 CDPHE Reported Actual Emissions Summary[6]

Location	2014 APENs Annual Actual Pollutant Emissions (tpy)						
	PM_{10}	$PM_{2.5}$	CO	NO_2	SO_2	VOC[1]	HAPS
Craig Generating Station	172.2	121.1	1,232.8	12,091.0	3,261.0	62.2	52.26
Hayden Generating Station	148.3	67.5	385.1	6,483.6	2,330.7	49.2	15.08

[1] volatile organic compound

Colowyo has historically provided coal to a variety of end users, both regionally and nationally. Since 1977, the beginning of coal sales records, Colowyo has provided coal to approximately ninety different end users all over the nation (OSMRE 2016). In recent years, 2007 to present, Colowyo has sold between 41 percent and 99 percent of their coal to the Craig Generating Station. The average annual sales to the Craig Generating Station between 2007 and 2014 were 2.3 million tpy. This represents approximately 48 percent of the coal required for the Craig Generating Station's annual coal needs.

Colowyo has provided the Hayden Generating Station with coal in the past, but only in small amounts ranging from below 100 tpy to a maximum of approximately 500 tpy. Colowyo has not provided any coal to the Hayden Generating Station since 2005.

The trend towards supplying coal exclusively to the Craig Generating Station seen from 2007 to present is a deviation from historical coal sales within which Colowyo sold coal to a much wider array of end users. The coal distribution may become more consistent with the longer historical sales record as the Colowyo Coal Mine continues to pursue additional clients.

3.3.10 Climate Change

The primary natural and synthetic greenhouse gases (GHGs) in the Earth's atmosphere are water vapor, carbon dioxide (CO_2), methane, nitrous oxide, and fluorinated gases. GHGs allow heat from the sun to pass though the upper atmosphere and warm the earth by blocking some of the heat that is radiated from the earth back into space. As GHG concentrations increase in our atmosphere they impact the global climate by further decreasing the amount of heat that is allowed to escape back into space. Many GHGs are naturally occurring in the environment; however, human activity has contributed to increased concentrations of these gases in the atmosphere. Carbon dioxide is emitted from the combustion of fossil fuels (i.e., oil, natural gas, and coal), solid waste, trees and wood products, and also as a result of other chemical reactions (e.g., manufacture of cement). Methane results from livestock and other agricultural practices and by the decay of organic waste in municipal solid waste landfills. Methane is also emitted during the production and transport of coal, natural gas, and oil. Nitrous oxide is emitted during agricultural and industrial activities, as well as during combustion of fossil fuels and solid waste. Fluorinated gases, while not abundant in the atmosphere, are powerful GHGs

[6] CDPHE APENS Reporting for 2014, provided electronically by CDPHE.

that are emitted from a variety of industrial processes and are often used as substitutes for ozone-depleting substances (e.g., chlorofluorocarbons, hydrochloroflourocarbons, and halons).

The EPA tracks GHG emissions in the U.S. by source sector (e.g., industrial, land use, electricity generation, etc.), fuel source (e.g., coal, natural gas, geothermal, petroleum, etc.), and economic sector (e.g., residential, transportation, commercial, agriculture, etc.) (**Table 3.3-7**). With so many GHG emission sources nationally, from cattle to vehicles to electric power generators, no single source is likely to represent a significant percentage of national emissions (**Table 3.3-7**). Nevertheless, GHG emissions for the U.S. are provided here in several ways. **Table 3.3-7** shows GHG emissions (in CO_2 equivalent [CO_2e]) by economic sectors for 1995, 2000, and 2007. **Table 3.3-8** shows total U.S. emissions in 1995, 2000, and 2007 by gas and source and by CO_2e; only the largest sources/sinks are shown for each gas. Note that, for CO_2, "Land Use, Land-Use Change, and Forestry" represents a sink rather than a source, and is therefore in parentheses.

Table 3.3-7 U.S. Greenhouse Gas Emissions Allocated to Economic Sectors

Implied Sectors	1995 (million metric tons [mmt] CO2e)	2000 (mmt CO2e)	2007 (mmt CO2e)
Electric Power Industry	1,989.0	2,329.3	2,445.1
Transportation	1,685.2	1,919.7	1,995.2
Industry	1,524.5	1,467.5	1,386.3
Agriculture	453.7	470.2	502.8
Commercial	401.0	388.2	407.6
Residential	368.8	386.0	355.3
U.S. Territories	41.1	47.3	57.7
Total Emissions	6,463.3	7,008.2	7,150.1
Land Use, Land-Use Change, and Forestry (Sink)	(851.0)	(717.5)	(1,062.6)
Net Emissions (Sources and Sinks)	**5,612.3**	**6,290.7**	**6,087.5**

Source: EPA (2010)

Table 3.3-8 U.S. Greenhouse Gas Emissions and Sinks

Gas/Source	1995 (mmt CO2e)	2000 (mmt CO2e)	2007 (mmt CO2e)
CO_2	**5,407.9**	**5,955.2**	**6,103.4**
Fossil Fuel Combustion	5,013.9	5,561.5	5,735.8
Non-Energy Use of Fuels	137.5	144.5	133.9
Iron and Steel Production and Metallurgical Coke Production	103.1	95.1	77.4
Cement Manufacture	36.8	41.2	44.5
Natural Gas Systems	33.8	29.4	28.7
CH_4	**615.8**	**591.1**	**585.3**
Enteric Fermentation	143.6	134.4	139.0
Landfills	144.3	122.3	132.9
Natural Gas Systems	132.6	130.8	104.7
Coal Mining	67.1	60.5	57.6
Manure Management	34.5	37.9	44.0
N_2O	**334.1**	**329.2**	**311.9**
Agricultural Soil Management	202.3	204.5	207.9
Mobile Combustion	53.7	52.8	30.1
Nitric Acid Production	22.3	21.9	21.7
Stationary Combustion	13.3	14.5	14.7
Manure Management	12.9	14.0	14.7
HFCs, PFCs, and SF6	**105.5**	**132.8**	**149.5**
Substitution of Ozone Depleting Substances	28.5	71.2	108.3
HCFC-22 Production	33.0	28.6	17.0
Electrical Transmission and Distribution	21.6	15.1	12.7
Total Emissions	**6,463.3**	**7.008.2**	**7,150.1**
Land Use, Land-Use Change, and Forestry (Sink)	(851.0)	(717.5)	(1,062.6)
Net Emissions (Sources and Sinks)	**5,612.3**	**6,290.7**	**6,087.5**

Source: EPA (2010)

Secondary GHGs do not have a direct atmospheric warming effect, but indirectly affect terrestrial radiation absorption by influencing the formation and destruction of tropospheric and stratospheric ozone, or in the case of SO_2, the absorptive characteristics of the atmosphere.

Additionally, some of these gases may react with other chemical compounds in the atmosphere to form compounds that are GHGs. For example, the roasting of molybdenite in ore processing is among the sources of indirect GHG emissions to the atmosphere, specifically SO_2. Sulfur dioxide emissions are listed in **Table 3.3-9**. Levels of sulfur dioxide emissions have decreased since 1995 somewhat due to reductions in electricity generation, but primarily due to increased consumption of low sulfur coal from surface mines in the western states.

Table 3.3-9 U.S. Sulfur Dioxide (Indirect GHG) Emissions

Gas/Source	GHG 1995 (mmt)	GHG 2000 (mmt)	GHG 2007 (mmt)
SO_2	16.89	14.83	11.73
Energy (combustion, etc.)	15.77	13.80	10.89
Industrial Processes	1.12	1.03	0.84
Chemical manufacturing	0.26	0.31	0.23
Metals processing	0.48	0.28	0.19
Other	0.37	0.37	0.29

NAAQS do not exist for GHGs. In its Endangerment and Cause or Contribute Findings for Greenhouse Gases under Section 202(a) of the CAA (FR EPA-HQ-OAR-2009-0171), the EPA determined that GHGs are air pollutants subject to regulation under the CAA. GHGs' status as pollutants are due to the added long-term impacts they have on the climate because of their increased concentrations in the earth's atmosphere. Ongoing scientific research has identified that anthropogenic GHG emissions impact the global climate. Industrialization and the burning of fossil fuels have contributed to increased concentrations of GHGs in the atmosphere. GHGs are produced from both the direct process of coal mining as well as from the combustion of the mined coal. The amount of GHG emissions associated with both of these processes varies greatly based on mining techniques and combustion methodologies used.

The EPA has taken action to regulate six key GHGs - CO_2, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. Because CO_2 is the most prevalent of the regulated GHGs, the EPA references the potential impact of GHG emissions in terms of their equivalence to CO_2 or CO_2e. In addition to the EPA estimates, the International Energy Agency estimated global emissions of CO_2e to be 29,000 mmt in 2008. On a regional scale, CDPHE (2014) estimated the total CO_2e emissions in 2010 to be 130 mmt for the State of Colorado.

The EPA has promulgated rules to regulate GHG emissions and the industries responsible under the Mandatory Reporting Rule (74 FR 56260, 40 CFR 98) and the Tailoring Rule (70 FR 31514, 40 CFR 51, 52, 70, 71). Under the EPA's GHG Mandatory Reporting Rule, coal mines subject to the rule are required to report emissions in accordance with the requirements of Subpart FF. Subpart FF is applicable only to underground coal mines and is not applicable to surface coal mines. Under the provisions of the Tailoring Rule (and a subsequent Supreme Court decision[7]), a facility would be subject to PSD permitting if it has the potential to emit GHGs in excess of 100,000 tpy of CO_2e and the facility exceeded the PSD major source threshold for a criteria pollutant. For existing facilities this review would take place during any subsequent modifications to the facility. Based on emissions estimates for the Colowyo Coal Mine, no GHG reporting or permitting would apply to the facility; however, GHG reporting and permitting will apply to both the Craig and Hayden Generating Stations.

[7] *Utility Air Regulatory Group v. EPA*, U.S., 134 S. Ct. 2427 (June 23, 2014)

The first EPA regulation to limit emissions of GHGs imposed CO_2 emission standards on light-duty vehicles, including passenger cars and light trucks. EPA is gathering detailed GHG emission data from thousands of facilities throughout the U.S. and will use the data in order to develop an improved national GHG inventory, as well as to establish future GHG emission control regulations. The EPA proposed regulations for GHG emissions from new and existing fossil fuel fired electric utility generating units in 2014 and finalized the Clean Power Plan rule on August 3, 2015. The rule applies to affected power plants that began construction on or before January 8, 2014 and is designed to reduce carbon emissions on a rate and mass basis. The rule is currently being legally challenged by a consortium of 24 states but GHG emissions from fossil fuel fired power plants are likely to be increasingly regulated in the future.

3.3.11 Black Carbon

Black carbon is a by-product of incomplete combustion of fossil fuels, biofuels, and biomass. It can be emitted when coal is burned, as well as through tailpipe emissions from engines that use diesel fuel (such as diesel trucks and locomotives). Black carbon is a likely by-product that is emitted from haul trucks used during coal mining operations. Black carbon is an unregulated pollutant; however, the EPA does regulate diesel fuel quality, such that in recent years diesel fuel quality has been improved.

Black carbon emissions associated with coal combustion occur at the facility where the coal is burned, not where it is being mined. Black carbon is an unregulated pollutant; as such, black carbon emissions from the Craig and Hayden Generating Stations are not quantified or regulated. According to the 2012 Report to Congress on Black Carbon, the bituminous and sub-bituminous coal categories, both of which primarily represent electricity generating units but may also reflect small contributions from commercial and institutional sources, represent relatively small contributions to black carbon emissions in the U.S. (slightly more than 1 percent each)[8]. At the mine, black carbon occurs as a result of the use of diesel vehicles. Black carbon is a component of the anthropogenic climate phenomenon; however, it is very short-lived, staying in the atmosphere only a few days to a few weeks. Although short lived, while in the atmosphere black carbon is the most strongly light-absorbing component of particulate matter[9]. Black carbon can absorb a million times more energy than carbon dioxide. Black carbon is a major component of "soot", a complex light-absorbing mixture that also contains some organic carbon.

3.4 GEOLOGY

The Project Area is located in the northern-central portion of the Danforth Hills coal field in the Rocky Mountain Coal Province of Tully (USGS 2008). This area is situated in the Wyoming Basin physiographic province, which is characterized by north- and east-trending ridges separated by steep canyons on the north, and to the south and west by steeply dipping, long and narrow hogbacks (CGS 2011, USGS 2008). Geologic maps and stratigraphic sections can be found in various references (e.g., CGS 2015; USGS 2008; Colowyo 2007 (Figure 2.04.6-1,

[8] USEPA 2012, Report to Congress on Black Carbon March 2012, Department of the Interior, Environment, and Related Agencies Appropriations Act, 2010. EPA-450/R-12-001

[9] http://www.epa.gov/blackcarbon/basic.html

2.04.6-2, Map 7); KEC 2005). General elevations for the Project Area range from 6,000 to 8,500 feet amsl.

The Project Area lies within a region that is deformed by several major folds, indicating that various seams have folded over and split. The Project Area occurs on the southern and northern limbs of the generally southeast-trending asymmetrical Collom Syncline and extends east toward the north-northeast-trending Elkhorn Syncline (KEC 2005, USGS 2008). The complex structures seen in the Project Area are overlain by younger sedimentary sequences that reflect upward-diminishing deformation. Periodic movements along the ancestral Axial Fault located north of the Danforth Hills coal field are believed to have been the source of the major deformation seen presently in the Project Area. The latest movement along the fault was during the Laramide Uplift, a Tertiary orogenic event (35-70 million years ago), which led to the uplift of the modern Rocky Mountains. This episode of uplift was a compressional event that eventually formed faults and major folds, such as the Collom and Elkhorn Synclines, and the prominent Axial Basin Anticline, the axis of which occurs in the basin north of the Project Area (BLM 2006).

3.4.1 Minerals

The coal seams in the Project Area are contained within the Upper Cretaceous Williams Fork Formation of the Mesaverde Group (BLM 2006, USGS 2008). The Mesaverde Group generally consists of a thinly to thickly interbedded succession of shale, siltstone, and sandstone that was deposited largely in a terrestrial environment. The Mesaverde Group is categorized into two formations: the overlying Williams Fork Formation, and the underlying Iles Formation (USGS 2008).

The Williams Fork Formation has been subdivided into five stratigraphic units. In ascending order, these are the Fairfield coal group, barren interval, Goff coal group, Lion Canyon Sandstone, and Lion Canyon coal group. The Iles Formation has been subdivided into three stratigraphic units: in ascending order, these are the Lower coal group, the Black Diamond coal group, and the Trout Creek Sandstone Member (USGS 2008). The Williams Fork and Iles Formations comprise a sedimentary rock sequence that originated from a deltaic and marginal marine depositional environment. The Trout Creek Sandstone Member consists of thick marine sandstone that represents the marine facies (beach) of the delta front. The high-quality, low-sulfur coal seams present in the Project Area occur within the Fairfield coal group of the Williams Fork Formation, which conformably overlies the Trout Creek Sandstone Member of the Iles Formation. Local occurrences of Quaternary alluvium, colluvium, alluvial fan deposits, and landslide deposits unconformably overlie the Williams Fork Formation, particularly in stream valleys within the Project Area (BLM 2006).

A total of 13 coal seams occur within the Project Area. In descending order (the order in which they would be mined) they are: X3, X4, D1, D2, D12, FA, FB, G7, G8, G9, GA, and GB. These coal seams have been categorized into five composite units: X34, D12, FAB, G789, and GAB. The X34 unit occurs within the top portions of the ridges at the Collom Pit and averages approximately nine feet thick. The D12 unit averages approximately 11 feet thick. The FAB and G789 units are thick seams that constitute a large percentage of the coal in the Project

Area. The GAB unit resides at the base of the proposed mining sequence, with variable thickness (KEC 2005).

3.5 WATER RESOURCES

3.5.1 Surface Water

The Project Area is located in the Lower Yampa River basin, which is part of the Colorado River system. Specifically, the mining operations, road and utility corridors, and surface facilities would be located within three small drainage basins. From west to east, they are Collom Gulch, Little Collom Gulch, and West Fork Jubb Creek (**Figure 3-5**). In addition, the northeast end of the proposed haul road and power line corridor would be located in the Jubb Creek and Wilson Creek basins, and would connect the existing Colowyo Coal Mine operations to the Project.

All of these tributaries flow generally northeast through narrow, steep-sided valleys on their way to ultimately join the Yampa River. Collom and Little Collom gulches flow into Morgan Gulch several miles north of the Project Area; Morgan Gulch then joins the Yampa River. Jubb Creek combines the flows from its East and West Forks, and joins Wilson Creek north of the Project Area. In turn, Wilson Creek flows into Milk Creek and then into the Yampa River upstream of its confluence with Morgan Gulch.

The morphology of the Project Area's surface water features is strongly influenced by geologic materials and geologic structure. The southern limb of the Collom Syncline dips gently to the north through the Project Area, and the pattern and orientation of the small tributary channels reflect this dip. These channels are relatively straight, having incised into the narrow valley fills and in some areas into bedrock associated with the Williams Fork Formation. Some of the upper reaches are bedrock controlled (Colowyo 2011). As is common with incised channels, many reaches have unstable cut banks and recently-slumped surfaces, although some riparian vegetation is also present. Near the northern end of the Project Area, in the vicinity of the axis of the syncline, the valleys become less confined.

Streamflows that are in and near the Project Area result from watershed runoff contributions and/or interaction with groundwater (including seeps and springs). Monitoring records show that flows vary seasonally, with peaks generally snowmelt-based. For example, the U.S. Geological Survey (USGS) monitored stream flows in Jubb and Wilson creeks north of the Project Area during separate time frames, but both stations exhibited a wide range of measured flows. At the Jubb Creek station (#9250610), with a drainage area of about 7.5 square miles (19.4 km^2), flow rates ranged from 0 cubic feet per second (cfs) to 5.6 cfs over a four-year period in the late 1970s. The Wilson Creek station (#9250507), with a drainage area of about 20 square miles (51.8 km^2), had streamflows ranging from 0 to 352 cfs between 1981 and 1992. Both streams were determined to have a base flow of 1.0 cfs or less, based upon a study that took place between 1978 and 1981 (Colowyo 2011).

From December 2004 through May 2006, tributary stream flows were monitored at various other locations in and near the Project Area (Colowyo 2011). In 2011, Colowyo began monitoring these streams quarterly, with data collection continuing to date (Colowyo 2015).

These two combined data sets are summarized in **Table 3.5-1**. **Figure 3-5** shows site locations. The data reflect the non-perennial flow regimes, the small contributing watershed areas, and the headwater nature of these Project Area surface water resources. Small stock ponds located on both the East and West forks of Jubb Creek partially control downstream flows, and small stock ponds in Little Collom Gulch collect and at times store runoff. There is a loss of stream flow to the valley fill between the upstream and downstream Collom Gulch stations during spring snowmelt, with a probable reemergence that contributes to stream flow farther downstream later in the season (BLM 2006).

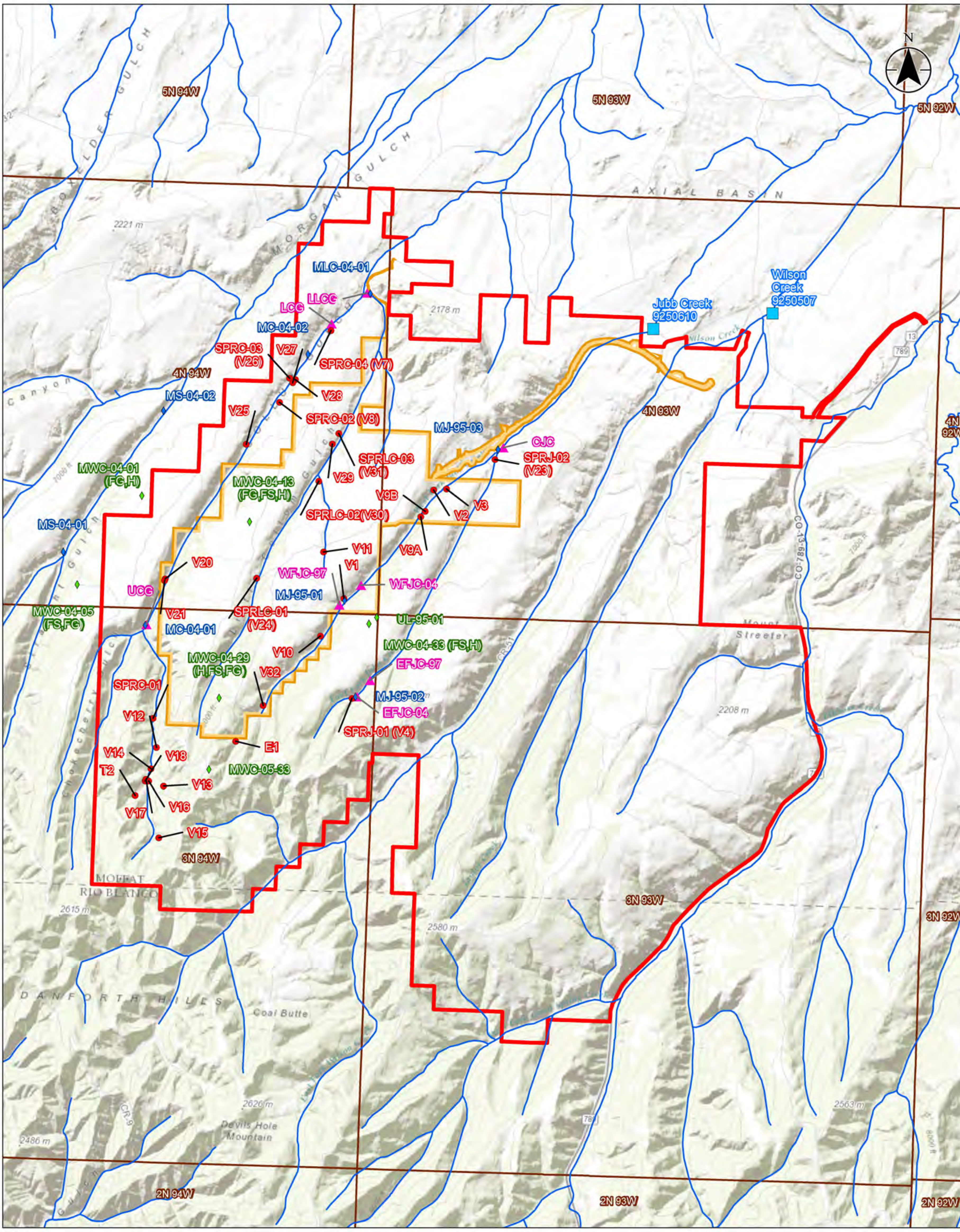
Table 3.5-1 Stream Flow Data (cfs)

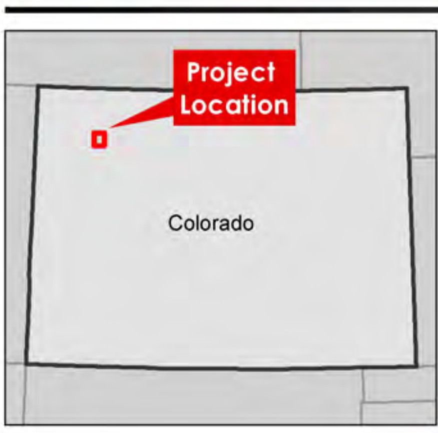
Site ID[1]	Sampling Period 2004-2006				Sampling Period 2011-2014			
	N[2]	Average	Minimum	Maximum	N[2]	Average	Minimum	Maximum
CJC	14	0.07	Dry	0.25	16	0.09	0.02	0.22
WFJC	12	0.04	Dry	0.30	15	0.04	0.01	0.13
EFJC	15	N/A	Dry	No Flow	N/A			
LLCG	13	Dry	Dry	Dry	N/A			
UCG	13	0.54	Frozen	3.5	15	0.24	0	1.23
LCG	15	0.47	0.004	3.5	16	0.35	0.04	1.57

[1]See **Figure 3-5** for locations
[2]n=number of observations

The flow data, as well as other physical measurements, were used to characterize most of the tributary streams within the Project Area as ephemeral or intermittent (BLM 2006). One exception is Wilson Creek, which is a perennial stream at the proposed haul road/power line crossing. The lower reaches of Collom Gulch and Jubb Creek downstream of its forks are perennial (Colowyo 2011). In the upper reaches of these tributary channels, some stream flow likely infiltrates into the valley fill and recharges the groundwater system. Further downstream, groundwater discharges may support stream flows.

Local seeps and springs are the result of groundwater discharge that may also contribute to surface water flows within the Project Area. However, based upon measured flow rates obtained during baseline monitoring in the mid-2000s, these do not represent substantial groundwater discharge areas (Colowyo 2011). **Figure 3-5** shows the locations of these seeps and springs, most of which are located in and along the sides of the stream valleys. They appear to indicate discharge of perched groundwater from the discontinuous bedrock units. The baseline monitoring data is discussed below (none of these sites are currently being monitored by Colowyo).





- USGS Station (discontinued)
- Bedrock Monitoring Well
- Valley Fill Monitoring Well
- Seep & Spring Monitoring Site
- Surface Water Monitoring Site
- Streams
- Approved SMCRA Permit Boundary
- Project Area
- Township Boundary

0 1 2 miles

1:70,000 (At Original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 13N
2. Basemap: Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance

Project Location
Rio Blanco & Moffat Counties
Colorado

203713557
Prepared by CG on 2015-02-05
Technical Review by NL on 2015-02-05
Independent Review by GB on 2015-02-05

Client/Project
Office of Surface Mining Reclamation & Enforcement
Colowyo Coal Mine: Collom Permit Expansion Area
Project Mining Plan Environmental Assessment

Figure No.
3-5

DRAFT

Title
Hydrology

Eight seep and spring locations were identified and monitored along the axis of West Fork of Jubb Creek, and two additional locations were identified along East Fork Jubb Creek (**Figure 3-5**). Some of these sites lacked sufficient flows to collect samples, although some field parameters were obtained in most of those cases. Based upon these limited data (from one to three measurements per site), the lowermost spring in East Fork Jubb Creek (SPRJ-02) appears to convey the largest flows of all of the springs in those two forks, with the maximum observed being 0.060 cfs. The five identified spring or seep sites in Little Collom Gulch (with two to four measurements per site) also occur in and/or along the stream channel; they are located within the proposed Collom Lite pit boundaries. The largest flow in that group was measured at the middle spring (SPRLC-02), with a maximum rate of 0.25 cfs. Numerous small seep or spring discharges occur along the East Fork of Collom Gulch; one of the larger ones had a maximum measured flow of 0.15 cfs. In addition, eight springs or seeps were identified along the mainstem of Collom Gulch, three of which had maximum flows that were greater than 0.04 cfs.

The maximum (i.e., spring season) aggregate potential for these sources to contribute to stream flows, based upon the collected data, is as follows: 0.75 cfs to Collom Gulch; 0.17 cfs in Jubb Creek; and 0.32 cfs in Little Collom Gulch. The contributions to the latter are apparently absorbed into valley fill or retained in stock ponds at some point upstream of stream flow sampling location LLCG, which was dry during all sampling attempts during the baseline data collection. Minimum (summer/fall) spring/seep flow contributions ranged from 0.02 cfs to 0.07 cfs for these streams (Colowyo 2011).

Water quality data for streams and seeps/springs were also collected during baseline monitoring, where flows were sufficient to do so. Only four of the stream sites had enough water to collect samples: two sites located in Collom Gulch (UCG and LCG), one site located on the mainstem of Jubb Creek (CJC) and one located on its West Fork (WFJC). Further, as indicated in **Table 3-5.1**, the latter two only had sufficient flow for sampling during two of the monitoring events over the baseline period. Similarly, only about half of the seep and spring sites had enough water to collect samples. Data from these sites (both the streams and the springs) were all of a mixed type, in which there was no single dominant cation or anion at any of the sites. While data for both of the drainages indicate increasing total dissolved solids (TDS) concentrations in the downstream direction, the Collom Gulch samples (average of 450 mg/L [milligrams per liter] at the upper site and 729 mg/L at the lower) have much lower TDS than the Jubb Creek samples (average of 1,055 mg/L at the upstream site and 1,785 mg/L at the downstream site). The TDS at springs and seeps was also variable, ranging from an average of 400 mg/L at SPRJ-01 up to an average of 1,700 mg/L at SPRJ-02; both of these sites are in East Fork Jubb Creek. More recent data (Colowyo 2015) from the four aforementioned stream sites show similar results (**Table 3.5-2**).

Iron, mercury, and selenium are specific trace constituents of local or regional interest in regard to surface water quality. Iron concentrations have been elevated in the Yampa River downstream of Craig for a number of years, and as a result the lower Yampa is on the State's 303(d) list of impaired waters (CDPHE 2012a). EPA's Effluent Limitations Guidelines for coal mining (40 CFR Part 434) include iron, but note that high concentrations of total iron can be found in western coal regions. The development document (EPA 2001) notes that "…in natural undisturbed conditions, surface water samples in the arid/semiarid western United States can register values for total iron as high as 40,000 mg/L (or 4 percent), due to the sediment that is collected as part of the water sample."

Mercury is one of the pollutants conveyed in the atmosphere that can deposit directly into waterbodies or onto upland land surfaces and in turn be carried in runoff to waterbodies. This deposit and conveyance can degrade water quality, even at great distances from the source or the airborne pollutant. Unlike many other pollutants, the primary source of mercury in streams is likely to be via atmospheric deposition (USGS 2015a). EPA's latest published National Emissions Inventory (NEI) (EPA 2014) indicates that coal-fired electricity generation units were the largest source of mercury emissions in 2011. The common way of assessing a potential mercury problem in surface waters is using fish tissue, because mercury bioaccumulates. This is discussed in more detail in **Section 4.9.1**, including the fact that fish tissue analyses within the Yampa River watershed have shown elevated levels. Water quality data collected from the Yampa River below Craig (USGS Station 09247600) between 1991 and 2003 (52 sampling occurrences) showed that the majority of values were reported at less than the laboratory reporting limits, and the maximum reported was 0.10 micrograms per liter (µg/L) (USGS 2015b). The State of Colorado chronic aquatic life water quality standard for mercury is 0.01 µg/L (0.00001 mg/L) (CDPHE 2012b).

Selenium is another constituent of interest in the region's surface waters. The chronic aquatic life standard for total selenium is 4.6 µg/L (0.0046 mg/L) (CDPHE 2012b). Current monitored selenium levels in surface waters surrounding the Project Area range between 5 and 15 µg/L, which is below the EPA's maximum contaminant level goal of 50 µg/L (0.05 mg/L) for human consumption, and the Colorado Water Quality Control Commission's acute standard for dissolved selenium of 18.4 µg/L and chronic standard of 4.6 µg/L for aquatic life protection.

Colowyo's baseline monitoring in Collom and Jubb creeks includes mercury and selenium. Data (Colowyo 2015) are summarized in **Table 3.5-2.** Colowyo's reporting of data that are less than the laboratory reporting limits as values, rather than as non-detects, affects the interpretation of some of these results. Notably, all mercury values were reported as 0.001 mg/L, but in actuality were almost certainly non-detects, i.e., less than 0.001 mg/L.

Table 3.5-2 Surface Water Quality Quarterly Monitoring Data (2011-2014)

Site ID[1]	N[2]	Total Dissolved Solids (TDS), mg/L			Iron (Fe) (dissolved), mg/L				Mercury (Hg) (dissolved), mg/L				Selenium (Se) (dissolved), mg/L			
		Average	Min	Max	N[2]	Average	Min	Max	N[2]	Average	Min	Max	N[2]	Average	Min	Max
CJC	16	1,520	670	1,820	16	0.30	0.05	1.61	16	0.001	0.001	0.001	16	0.008	0.005	0.015
WFJC	16	920	770	1,450	16	0.42	0.05	3.57	16	0.001	0.001	0.001	16	0.011	0.006	0.015
UCG	15	499	290	820	15	1.39	0.05	6.87	15	0.001	0.001	0.001	15	0.006	0.005	0.012
LCG	16	701	550	860	16	0.81	0.05	3.32	16	0.001	0.001	0.001	16	0.005	0.005	0.009

[1]See **Figure 3-5** for locations
[2]n=number of observations

3.5.2 Groundwater

Geologic structure and composition in the vicinity of the proposed Project are responsible for the location and presence of groundwater and as noted above, groundwater is present in or near the surface within the Project Area at a few locations (e.g., gaining reaches of streams, seep and springs). The most notable structural feature is the Collom Syncline, mentioned above in the surface water section and discussed further in **Section 3.4**. The beds on the northern limb of the syncline dip toward the south at up to 40°, whereas the beds on the southern limb dip from 2° to 8° to the north. Although faults are not prevalent in the area, there are two joint sets that were determined to contribute to directionally-dependent permeabilities.

The area's upper-most aquifer of regional extent is generally considered to be the Trout Creek Sandstone, which is a member of the Iles Formation. However, there is little or no use of this groundwater in close proximity to the proposed mining activities. The closest known and registered/permitted domestic or commercial wells that are not owned by Colowyo Coal Company are located approximately 2 miles (3.2 km) south and southeast of the Project Area, in the SW1/4, Section 7, T3N, R93W (Colowyo 2011).

Overlying the Iles Formation is the Williams Fork Formation. It is up to 1,200-feet thick and consists of interbedded coal, shale, sandstone, siltstone, and mudstones. Some of these beds contain localized groundwater (notably the coal seams) and others serve as confining units (notably the KM Layer). The KM Layer (also known as the Yampa Bed) is a laterally-continuous, low-permeability clay bed that was formed from altered volcanic ash. It is present about 200 feet above the base of Williams Fork Formation. Of the coal seams that would be mined, the lowermost coal seam is located about 200 feet above the KM Layer. With a bed thickness ranging from about 0.5 foot to 5 feet, it serves as an aquitard separating the beds within the coal sequence to be mined and the underlying rocks including the lowest part of the Williams Fork Formation and the Trout Creek Sandstone. The valley fill found along area streams also generally contains and transmits groundwater.

Groundwater recharge areas within the Collom synclinal basin, containing the Project Area, are bounded by Trout Creek Sandstone outcrops around its periphery; the geology also isolates this portion of the aquifer from that associated with the Trout Creek Sandstone outside the synclinal basin. In addition to these outcrops, saturated valley fill in the stream channels and seepage from overlying units also contribute to recharge. While recharge is thought to be greater in the southern part of the area, discharge is more prevalent on the north side, where groundwater appears to surface in the valley fill of the incised drainages. The valleys also provide drainage for the perched small groundwater zones that are associated with the coal and sandstone units associated with the Williams Fork Formation. Thus, area groundwater generally flows northward, following the dip of the syncline, but lateral flow also occurs locally where intercepted by the adjacent stream drainages. At the northern, downgradient boundary of the Collom permit expansion area, the bedrock aquifers do not continue north past the north limb of the syncline, thus nearly all groundwater outflow from the Project Area occurs through the valley-fill aquifers. According to modeling (Colowyo 2011), about two-thirds of this outflow is assumed to be through the valley-fill aquifers with the remaining via stream base-flow.

The regional hydrogeologic model was developed for the Project Area and surrounding environment using a water balance approach. It estimated that the total flux of groundwater through the valley fill and bedrock units above the KM bed within the Collom Gulch and Jubb Creek drainages was estimated to be about 31,000 cfs (11 percent of the total groundwater flux) with the remaining thought to occur in the nearby Morgan/Straight Gulch, Wilson Creek, and Good Springs Creek drainages.

Various monitoring wells have been established in the area to track groundwater elevation and water chemistry. The data indicate that groundwater in the Trout Creek sandstone is confined in at least some locations in and near the Project Area. Within the proposed Collom Lite Pit area, unconfined conditions transition to confined conditions, with the saturated water table/piezometric surface at approximately 7,150 feet elevation. In the northern portion of the proposed Collom Lite Pit, bedrock is thought to be saturated below a depth of approximately 300 feet below ground surface. Water levels in valley-fill aquifer wells are typically 10 to 15 feet below ground level and exhibit greater seasonal trends than do the bedrock wells.

Groundwater quality data indicates that groundwater chemistry in the area varies with the geologic source (Colowyo 2011). **Figure 3-5** shows the monitoring well locations. The Williams Fork Formation tends to produce calcium- or sodium-bicarbonate water type, and a moderate concentration of TDS (ranging from 440 to 1,000 mg/L). The Trout Creek Sandstone groundwater data varies more in regard to water type (ranging from sodium-sulfate, sodium-bicarbonate type, to mixed-cation-bicarbonate with equal percentages of calcium, magnesium, and sodium, but exhibits a narrower TDS range (600 to 710 mg/L). While water quality in the bedrock aquifers does not appear to substantially vary seasonally, spatial variation is seen. Downdip wells show a gradual evolution towards sodium-bicarbonate rich water. Groundwater produced in the alluvial valley fill has varying water quality, but is generally typed as magnesium-sulfate or magnesium- and/or calcium-bicarbonate. TDS varies seasonally with moderate to high concentrations ranging from 420 to 3,780 mg/L. More recent TDS data from some of the monitoring wells completed in alluvial valley fill show similar results (Colowyo 2015) (**Table 3.5-3**). Colowyo does not currently monitor bedrock wells in this area.

Table 3.5-3 TDS in Alluvial Groundwater (2011-2014)

Site ID[1]	N[2]	TDS, mg/L		
		Average	Minimum	Maximum
MC-04-01	16	690	600	830
MC-04-02	16	930	820	1,010
MLC-04-01	16	886	220	1,100
MJ-95-01	16	860	740	940
MJ-95-03	16	1,794	1,660	1,920

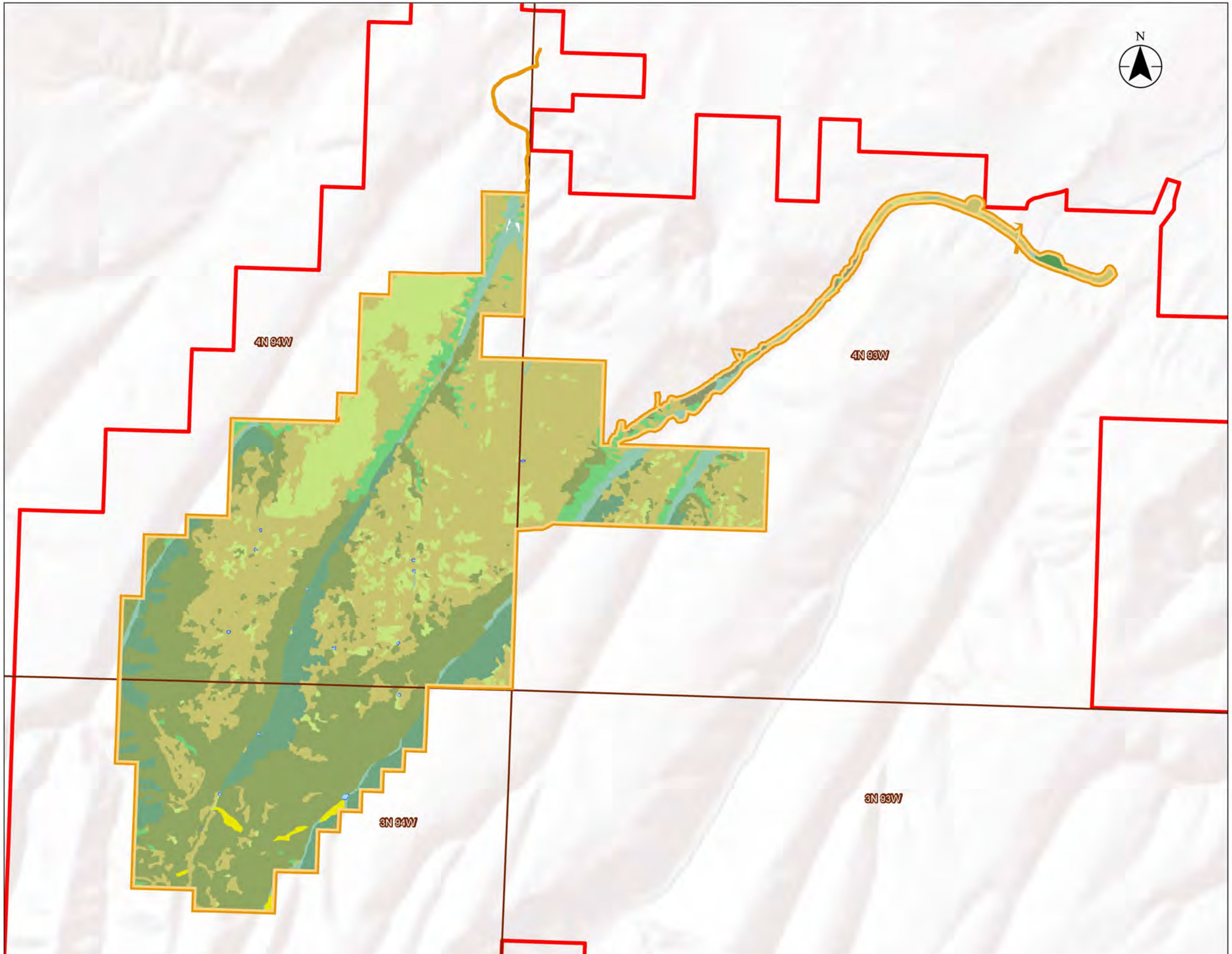
[1]See **Figure 3-5** for locations
[2]n=number of observations

Pollutants contained in the residuals from the combustion of coal in power plants and disposed of through burial can be conveyed into groundwater aquifers. Colowyo's coal is transported from the mine by rail to coal markets, including the Craig Generating Station located approximately 26 miles (42 km) northeast of the Colowyo Coal Mine. Coal combustion residuals (CCRs) generated as part of the coal combustion process at the Craig Generating Station include boiler fly ash, boiler bottom ash, and scrubber sludge. These CCRs produce leachate that contains elevated levels of aluminum, barium, chromium, boron, and molybdenum (Koehler 2002). Some of these CCRs are disposed of in a disposal site at the Trapper Mine located approximately 1 mile (1.6 km) from the Craig Generating Station. The disposal site is under the jurisdiction of SMCRA and is approved to receive CCRs under a Certificate of Designation from Moffat County, with regulatory oversight from CDPHE.

SMCRA and CDPHE monitoring and reporting requirements apply to the Trapper Mine disposal site. CCRs generated at the Craig Generating Plant and disposed of at the Trapper Mine disposal site must be placed at least 10 feet above the projected post-mining groundwater saturation zone. The CCRs are covered with 6 feet of cover (5 feet of overburden and 1 foot of topsoil) and any reconstructed permanent surface water drainage is located a minimum of 50 horizontal feet from the CCRs (Koehler 2002). Modeling of the site has been conducted to provide data associated with cross-stratal migration of CCR leachate, travel time of the CCR leachate, and groundwater/surface water interaction associated with the disposal site; the studies indicated that the low permeability of the CCRs and the low infiltration rate of precipitation should limit the risk of water movement through and from the CCRs (Kaldenbach et al. 2001, Koehler 2002). A groundwater monitoring network is in place to ensure that the placement of CCRs in the disposal site is effective in isolating or immobilizing leachate from the CCRs. The results of the monitoring indicate that the water quality downgradient of the CCR disposal site is similar to the water quality in other areas of the Trapper Mine that are not associated with CCR disposal; only low levels of the contaminants of concern were detected as a result of the final sampling in 2002 (Koehler 2002).

3.6 VEGETATION

In 2006, the revised mine permit area and a 2 mile (3.2 km) buffer were surveyed (vegetation survey area) to determine what vegetation communities are present. The results of that survey as it relates to the Project Area are depicted in **Table 3.6-1**. The location of the vegetation communities is shown in **Figure 3-6**. A discussion of each vegetation community is presented below and taken from the PAP (Colowyo 2011). Additionally, the Axial Basin Coordinated Resource Management Plan (BLM 1994) describes several vegetation projects that have occurred north of the Project Area.



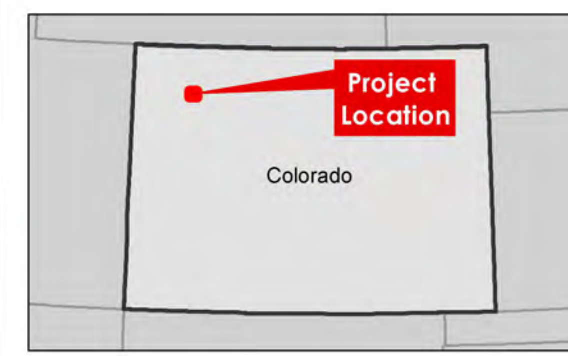
Project Area
Approved SMCRA Permit Boundary
Township Boundary

Vegetation Type

- Unmapped
- Aspen
- Bottomland
- Cultivated Fields
- Grassland
- Juniper Scrub
- Mountain Scrub (Mesic)
- Mountain Scrub (Xeric)
- Ponds/Wetlands
- Sagebrush (Mesic)
- Sagebrush (Xeric)

0 3,000 6,000 Feet
1:38,366 (At original document size of 11x17)

Notes
1. Coordinate System: NAD 1983 UTM Zone 13N
2. Basemap: Copyright:© 2014 Esri



Project Location
Rio Blanco & Moffat Counties
Colorado

203713557
Prepared by CG on 2015-02-05
Technical Review by NL on 2015-02-05
Independent Review by GB on 2015-02-05

Client/Project
Office of Surface Mining Reclamation & Enforcement
Colowyo Coal Mine: Collom Permit Expansion Area
Project Mining Plan Environmental Assessment

Figure No.
3-6

DRAFT

Title
Vegetation

Table 3.6-1 Vegetation Communities in the Vicinity of the Project Area

Vegetation Community	Acres	Percent of Total
Sagebrush (Xeric and Mesic)	2,218.3	46.0
Mountain Shrub (Xeric and Mesic)	1,853.0	38.4
Grassland	522.4	10.8
Bottomland	148.1	3.1
Aspen	23.6	0.5
Juniper Shrub	40.9	0.9
Cultivated Fields	11.6	0.2
Disturbed Areas	4.9	0.1
TOTALS	**4,822.8**	**100.0**

3.6.1 Sagebrush Community

The sagebrush vegetation community covers approximately 2,218.3 acres, or 46.0 percent of the Project Area. This community is principally found at lower elevations occupying the relatively flat uplands or benches, some steeper north-facing slopes (mesic sub-types), and steeper southeast-facing slopes (xeric sub-types). A total of 93 plant species were found in the sagebrush community during surveys. Common shrub species include mountain big sagebrush (*Atremisia tridentata ssp. vaseyana*), Wyoming big sagebrush (*Atremisia tridentata ssp. wyomingensis*), mountain snowberry (*Symphoricarpos oreophilus*), snakeweed (*Gutierrezia* sp.), and low rabbitbrush (*Chrysothamnus viscidiflorus*). Grasses and forbs found in these areas include western wheatgrass (*Pascopyrum smithii*), Sandberg bluegrass (*Poa sanbergii*), crested wheatgrass (*Agropyron desertorum*), and the non-native/invasive species Japanese brome (*Bromus japonicus*).

A majority of the sagebrush community found within the upper elevations of the Project Area is a relative monoculture of overly mature, dense, and decadent sage brush, which is not as ecologically beneficial. Colowyo has mechanically treated approximately 60 acres of sagebrush community to reduce the density of sagebrush as well as create pockets of grassland and young stands of sagebrush. At lower elevations with somewhat drier conditions the return of sagebrush to dominance appears to be much slower and grasses and seral shrub species, such as snakeweed and low rabbitbrush, are still dominant.

3.6.2 Mountain Shrub Community

The mountain shrub community covers approximately 1,853.0 acres, or 38.4 percent of the Project Area. This community is primarily found at higher elevations occupying the relatively flat uplands, steep southern-facing slopes (xeric sub-types), and steep northern-facing slopes (mesic sub-type). A total of 102 plant species were found in the mountain shrub community during surveys. Dominant shrub species found in the community include mountain snowberry, Gambel oak, serviceberry (*Amelanchier alnifolia*), and mountain big sagebrush. Grasses and forbs found in this community include bluegrass (*Poa* spp.), tailcup lupine (*Lupinus caudatus*), and the non-native/invasive species cheatgrass (*Bromus tectorum*). In more mesic sites, aspen (*Populus tremuloides*) may intergrade with this community.

Besides the occasional road and small pockets within larger stands of sagebrush that are subject to mechanical treatment, the mountain shrub community exhibits no evidence of disturbance in the recent past. Where this community is over-mature, it is largely impenetrable to larger wildlife such as deer and elk.

3.6.3 Grassland Community

The grassland community covers approximately 522.4 acres, or 10.8 percent of the vegetation in the Project Area. This community is predominately an early-seral community found in the flat uplands where natural burns have removed the sagebrush or mountain shrub overstory vegetation and the usually sub-dominant grasses have flourished. Occasional small patches of the grassland community can be found along high elevation ridges and summits where thin soils and high winds have inhibited shrub densities. The dominant plant species observed in the grassland community include western wheatgrass, Sandberg bluegrass, prairie pepperweed (*Lepidium densiflorum*), and the non-native/invasive species cheatgrass and Japanese brome. Shrubs that may be present in low amounts include holly grape (*Mahonia repens*), low rabbitbrush, mountain snowberry, and mountain big sagebrush.

The grassland community type in the Project Area has been divided into two subtypes based on whether or not the area was subject to a recent mechanical treatment (sagebrush reduction area), or is naturally lacking a shrub component or was naturally burned in the past (Grassland). The sagebrush reduction areas are generally located on the relatively flat upland areas surrounded by overmature stands of mountain sagebrush and just north of the transition zone between mountain shrub and sagebrush zones. Most of the older sagebrush reduction areas now contain enough reinvading sagebrush to be classified as sagebrush, but the more recent areas exhibit only a few plants and therefore, can still be classified as grassland. The naturally occurring grasslands are scattered throughout the Project Area in small patches. Some of these patches are located along high-elevation, wind-swept ridgelines and summits where thin soils favor grass and forb development over shrubs. Annual bromes have invaded some of the past natural burn areas (especially at lower elevations) and have slowed the re-invasion of sagebrush into these areas.

3.6.4 Bottomland Community

The bottomland community covers approximately 148.1 acres, or 3.1 percent of the Project Area. This community is largely a physiographic type that exhibits an aggregate of vegetation sub-types (wetland, sagebrush, riparian bottom, grassland, and occasionally mountain shrub) that are found in the relatively flat alluvial / colluvial deposits along the numerous drainages within the Project Area. The bottomland community generally has deep soils with higher moisture levels due to the external contributions from slope outwash, flood flows, lateral subirrigation, and the occasional seeps and springs. During field surveys, a total of 92 species were observed in this community. Dominant shrubs include rubber rabbitbrush (*Chyrsothamnus nauseosus*), basin big sagebrush (*Artemisia tridentata var. tridentata*), mountain snowberry, and silver sage (*Artemisia cana*). Grasses and forbs that may be present include western wheatgrass, thickspike wheatgrass (*Agropyron dasystachyum*), Japanese brome, and cheatgrass.

3.6.5 Aspen Woodland Community

The aspen woodland community covers approximately 23.6 acres, or 0.5 percent of the Project Area. This community is commonly located on high elevation, steep slopes, and drainage bottoms that generally have northeast to northwest aspects. During surveys, a total of 63 plant species were found in this community. Along with aspens, common species include mountain brome (*Bromus marginatus*), blue wild rye (*Elymus glaucus*), bluegrass (*Poa agassizensis*), and nettleleaf giant hyssop (*Agastache urticifolia*), mountain snowberry, and chokecherry (*Prunus virginiana*).

The aspen community appears to have been noticeably affected by the recent drought. A high percentage of mature aspen trees have recently died leading to a lower live tree density and a dense understory of chokecherry and mountain snowberry. The aspen stands in more mesic sites are healthy, whereas stands that occupy or have expanded to more xeric sites have lost most of their mature overstory. Young aspen seedlings and saplings are found in these areas and will likely see a return to a denser more normal aspen tree overstory in the near future. Elk wallows (some up to an acre in size) were found in nearly all of the dense aspen stands south of the Project Area.

3.6.6 Juniper Shrub Community

The juniper shrub community covers approximately 40.9 acres, or 0.9 percent of the Project Area. This community is located on the steeper slopes in the drier, rockier, and skeletal soil that cover the northern portions of the Project Area. The dominant species occurring in this community include junipers (*Juniperus spp.*, mostly *monosperma*), Wyoming big sagebrush, mountain big sagebrush, mountain snowberry, crested wheatgrass, cheatgrass, Sandberg wheatgrass, and western wheatgrass.

The juniper shrub community is visually dominated by healthy juniper trees with assorted shrubs, grasses, and forbs occupy the areas between the trees. Most of this community is located on steep, relatively barren and erodible soils along the drier, northern edge of the Project Area. A small portion of this community can be found on the flat tops on the slopes where it intergrades into the sagebrush dominated uplands. The juniper trees are expanding into both the mesic and xeric sagebrush areas that are adjacent to this community type.

3.6.7 Other Communities

The remaining mapped vegetation communities (cultivated fields, disturbed areas, and improved pastures) cover a total of 16.5 acres, or 0.3 percent of the Project Area. These areas have been generally altered from their natural state. As such, many non-native species may occur in these areas as well as some native vegetation.

3.6.8 Noxious Weeds

Noxious weeds are those species that have been determined by the State of Colorado as detrimental to the environment or agriculture. Since 1990, the State's natural and agricultural resources have been protected by the Colorado Noxious Weed Act (35-5.5 CRS). The noxious weed list is prioritized into three categories, A, B, and C. List A plants are designated for elimination on all county, state, federal, and private lands. List B includes plants whose continued spread should be stopped. List C plants are selected for recommended control methods. There are currently 76 species on the State's noxious weed list (CWMA 2015). The Moffat County Board of County Commissioners adopted the Moffat County Undesirable Plant Management Plan on November 25, 1991 to formalize weed control procedures within the County (Moffat County 2001). This plan details methods of Integrated Plant Management to implement weed management within the County. Since the late 1990s, there has been a weed management partnership that includes Moffat County Weed and Pest Department, Colowyo, and several other agencies and individuals (J. Comstock, personal communication, July 5, 2015).

During vegetation surveys in 2005, a total of seven noxious weed species were observed. Those species include lesser burdock (*Arctium minus*), whitetop (*Cardaria draba*), musk thistle (*Carduus nutans*), field bindweed (*Convolvulus arvensis*), houndstongue (*Cynoglossum officinale*), and common mullein (*Verbascum thaspsus*). In general, when these species were observed, their densities were low and were only occasionally in sufficient quantities to be detected by ground cover sampling. In one instance where quantities were high enough to be detected, the species present was Canada thistle within a wetland community.

3.7 WETLANDS AND RIPARIAN ZONES

Wetlands and riparian areas serve an important role in the environment. Often, these areas are used by wildlife as refuge, and they increase the biodiversity in a given area by increasing habitat diversity. Surveys for wetlands and riparian areas were conducted within the vegetation Project Area (**Section 3.6**). The results of those surveys are presented below.

3.7.1 Wetlands

Management of wetlands is generally under the jurisdiction of the U.S. Army Corps of Engineers (USACE). To be considered a jurisdictional wetland, an area must meet three criteria: hydric vegetation, hydric soil indicators, and the presence (or evidence) of inundation. Surveys conducted for wetlands followed the USACE Corps of Engineers Wetlands Delineation Manual, Arid West Supplement (USACE 2008). A total of nine jurisdictional wetlands were found within the vegetation Project Area, totaling approximately 47.9 acres. The size of these wetlands ranged from less than 0.5 acres in size to over 6 acres (Cedar Creek 2006). Wetlands mapped as part of the National Wetlands Inventory within the Project Area totaled 20.3 acres.

Streamside wetlands form the bulk of the wetland acreage across the Project Area. Excluding the 19.8 acres comprised of the six largest wetlands, streamside wetlands account for a total of 28.0 acres. Of this, 3.4 acres consist of narrow, linear streamside wetlands typically found higher in the Project Area watershed. Larger, more expanded streamside wetlands typically found lower in the Project Area occupy a total of 24.7 acres.

The wetlands along the Project Area stream courses are typical of Colorado mountain valley wetlands ranging from moist and wet meadows (within alluvial deposition areas) to heavily vegetated herbaceous strips (along stream banks). These wetlands are typically heavily vegetated herbaceous meadows to moist meadow communities because they receive moisture from later subirrigations along the stream channel. On occasion, wetlands developing along the margins of older, more stable stock tanks exhibit emergent wetland communities.

3.7.2 Waters of the U.S.

During surveys for wetlands, Waters of the United States (WOTUS) were also noted and delineated. WOTUS are defined under 40 CFR 230.3[10] as the following:

1. *All waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide;*
2. *All interstate waters including interstate wetlands;*
3. *All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, the use, degradation or destruction of which could affect interstate or foreign commerce including any such waters:*
    1. *Which are or could be used by interstate or foreign travelers for recreational or other purposes; or*
    2. *(From which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or*
    3. *Which are used or could be used for industrial purposes by industries in interstate commerce;*
4. *All impoundments of waters otherwise defined as waters of the United States under this definition;*
5. *Tributaries of waters identified in paragraphs (s)(1) through (4) of this section;*
6. *The territorial sea;*
7. *Wetlands adjacent to waters (other than waters that are themselves wetlands) identified in paragraphs (s)(1) through (6) of this section; waste treatment systems, including treatment ponds or lagoons designed to meet the requirements of CWA (other than cooling ponds as defined in 40 CFR 423.11(m) which also meet the criteria of this definition) are not waters of the United States.*

Waters of the United States do not include prior converted cropland. Notwithstanding the determination of an area's status as prior converted cropland by any other federal agency, for the purposes of the Clean Water Act, the final authority regarding Clean Water Act jurisdiction remains with EPA.

WOTUS include channels that show evidence of conveying flowing water on at least an average annual basis and have the presence of a defined bed and banks. According to the wetland survey and the definitions provided above, WOTUS exist in several drainages that occur within the Project Area. West Fork Jubb Creek, East Fork Jubb Creek, and Little Collom Gulch account for a total of 5.9 miles (9.5 km) of preliminary WOTUS in the Project Area.

[10] The definition of WOTUS was revised in 40 CFR 328.3 which was effective August 28, 2015. However, due to pending litigation in a number of states, including Colorado, the USACE is continuing to implement 40 CFR 230.3 and that rule's definition of WOTUS.

Dredge and fill activities within jurisdictional areas are regulated by the USACE. If wetlands are present adjacent to a WOTUS, USACE jurisdiction extends beyond the ordinary high water mark (OHWM) of the waters to the limit of the adjacent wetlands. Wetlands located along the creeks were identified based on field surveys.

3.8 FISH AND WILDLIFE RESOURCES

The wildlife habitat located within the Project Area is predominately (75 percent) composed of sagebrush and mountain shrub vegetation communities. Other common habitat types include aspen woodland, grassland, juniper scrub, and bottomland types found in drainages and basins. Minor habitat types that encompass 0.5 percent or less of the Project Area include disturbed areas, cultivated land, improved pasture, and wetlands. Wildlife commonly found in the Project Area are discussed below.

3.8.1 Mammals

Many mammal generalist species occur in the Project Area. Common predators include coyote (*Canis latrans*), red fox (*Vulpes vulpes*), mountain lion (*Puma concolor*), bobcat (*Lynx rufus*), and black bear (*Ursus americanus*). Medium sized mammals include porcupine (*Erethizon dorsatum*), striped skunk (*Mephitis mephitis*), and American badger (*Taxidea taxus*). Other small mammals that may occur in the project are include desert cottontail (*Sylvilagus audubonii*), mountain cottontail (*S. nuttallii*), white-tailed jackrabbit (*Lepus townsendii*), white-tailed prairie dog (*Cynomys leucurus*), golden-mantled ground squirrel (*Spermophilus lateralis*), northern pocket gopher (*Thomomys talpoides*), least chipmunk (*Tamias minimus*), and deer mouse (*Peromyscus maniculatus*) (Colowyo 2011).

Habitat for bat species is present in the Project Area and includes trees, shrubs, and rocky outcrops. While no focused bat surveys have been completed, several species of bats have the potential to occur. Those species include western small footed myotis (*Myotis ciliolabrum*), little brown myotis (*M. lucifugus*), and silver haired bat (*Lasionycteris noctivagans*) (Colowyo 2011).

3.8.2 Big Game

Elk (*Cervus elephus*) and mule deer (*Odocoileus hemionus*) are regularly found in the Project Area. Aerial surveys for elk and mule deer are conducted annually by CPW. The results from the most recent surveys are summarized below, in addition to descriptions of seasonal big game habitat within the Project Area. Other big games species that occur in the Project Area include pronghorn antelope (*Antilocapra americana*) and moose (*Alces alces*).

3.8.2.1 Elk

Elk within the Project Area are part of the White River herd (DAU 6) as defined by CPW. The population of the White River elk herd has grown steadily beginning in the early 1980s, and CPW has been attempting to reduce the herd size. As a result, the herd exhibited a declining trend from 2001 to 2005, though the population remained well within the 2005 management goal of 32,000 to 39,000 animals (Colowyo 2007). In 2007, the herd was estimated to be 43,870 animals. In 2014, the total herd population was estimated at 39,900 animals, and represents the largest elk herd in Colorado (CPW 2015a).

A five-year average of annual aerial winter counts (January 2004 to January 2008) resulted in a population estimate of approximately 500 elk located specifically in the Collom Gulch area (D. Finley, CPW, personal communication). This average includes counts from both severe and mild winters, and should not be considered a total count of the elk that winter in the area at any specific time. Elk abundance and distribution in this region can vary dramatically depending on the severity of the winter.

Elk seasonal ranges within the Project Area include winter concentration areas, production areas, and areas that resident elk may use year-round (**Figure 3-7**). CPW data indicate that the entire Project Area is both summer and winter range for elk. Resident elk range is located on the south side of the Project Area and totals 1,121.1 acres (23.3 percent of the Project Area). Elk production areas within the Project Area overlap the resident elk range and have the same total acreage. There were no summer concentration areas mapped by CPW, but there are areas of winter concentrations in the northern portion in the Project Area, which totals approximately 2,461.6 acres (51.0 percent of the Project Area). There is also approximately 1,263.1 acres of elk severe winter range within the Project Area (26.2 percent of the Project Area) in the west, north, and east. Seasonal use of the Project Area would be dependent on snow levels, which vary from year to year. The larger geographic region from the Danforth Hills to the Axial Basin is considered an elk migration area.

Elk are known to heavily use areas of the existing mine that have been reclaimed as grasslands throughout most of the year, but they are prevalent in the winter and spring. Elk wallows have been noted in most of the dense aspen stands in the area, up to one acre in size (Cedar Creek 2006).

3.8.2.2 Mule Deer

Mule deer within the Project Area are part of the White River mule deer herd (Data Analysis Unit [DAU] 7), which is the largest mule deer herd in Colorado. The total herd population was estimated to be 71,380 animals in 2007 and 37,530 in 2014 (CPW 2015a). The herd population exhibited an increasing trend from 2001 to 2005. The decrease between 2007 and 2014 may be due to a series of severe winters and droughts, which affected the area.

A five-year average of annual aerial winter counts (December 2003 to December 2007) resulted in a population estimate of approximately 300 mule deer located specifically in the Collom Gulch area (D. Finley, CPW, personal communication). This average includes counts from both severe and mild winters, and should not be considered a total count of the deer that winter in the area at any specific time. Based on the CPW estimates, fewer mule deer winter in the area compared to elk. However, like elk, deer abundance and distribution in this region can vary dramatically year-to-year depending on the severity of the winter.

Three types of mule deer range occur within the Project Area (**Figure 3-7**). All of the Project Area is mule deer summer range. Mule deer winter range is located on the middle and upper two-thirds of the Project Area and totals approximately 4,051.6 acres (84.0 percent of the Project Area). The northern half of the Project Area contains approximately 2,812.2 acres (58.3 percent of the Project Area) of winter concentration area. Seasonal use of the Project Area would be dependent on snow levels, which vary from year to year. There are no major mule deer migration corridors in the Colowyo expanded permit boundary area, but there is one area to the northeast. Unlike elk, mule deer do not concentrate in particular areas when fawning; therefore, no production habitat is delineated.

Mule deer use the area in and around the Project Area year-round, though use of sites in winter is dependent on snow depths. South-facing slopes with sagebrush are more likely to be used in winter. Deer are known to heavily use previously mined areas that have been reclaimed as grasslands (Colowyo 2011).

3.8.2.3 Pronghorn Antelope and Moose

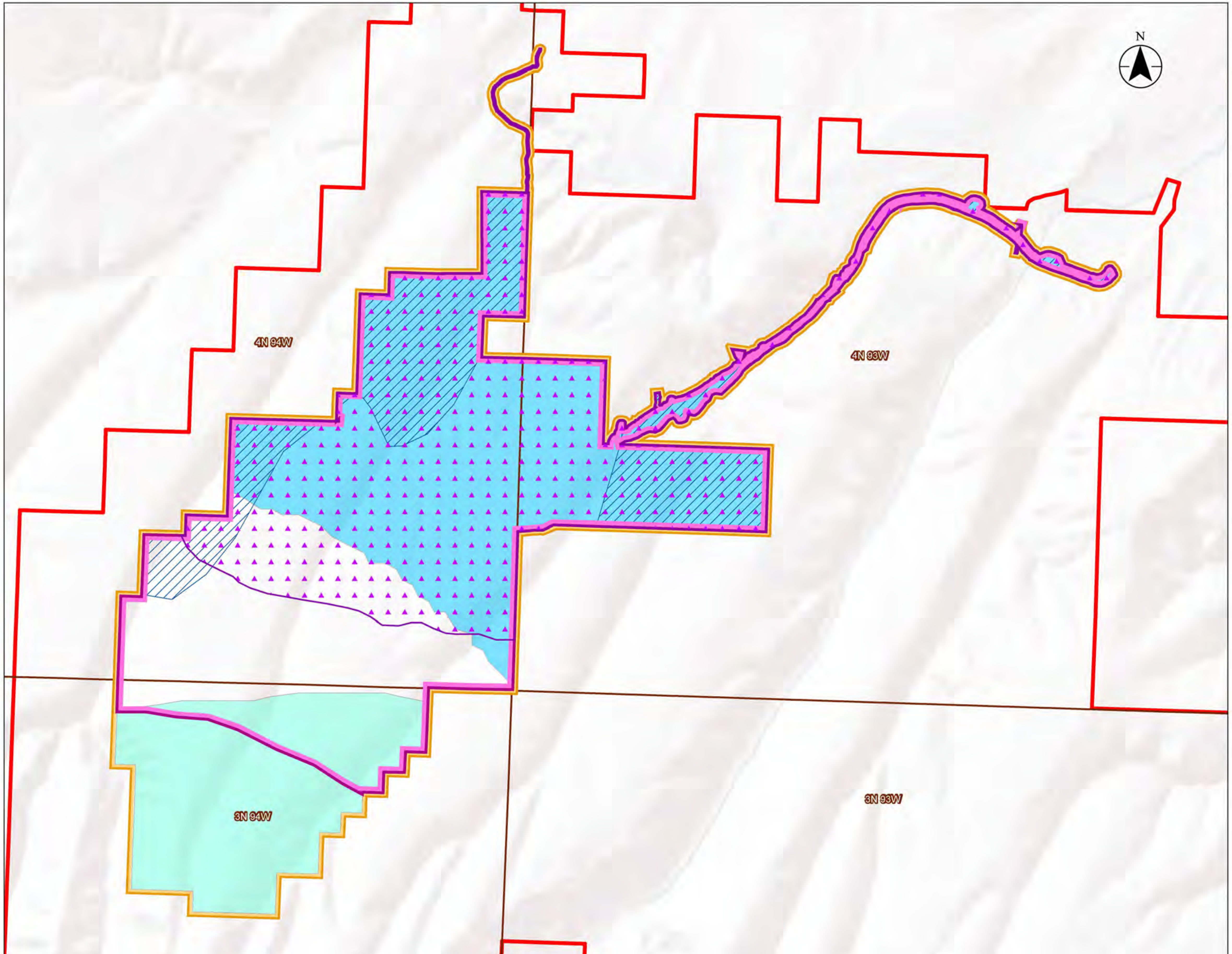
The Project Area occurs within the A-34 unit for pronghorn antelope. In 2014, this unit had an estimated population of 330 individuals, or approximately 0.6 percent of the statewide population (CPW 2015a). Of the mapped habitat for this species, approximately 1,991.1 acres (41.8 percent of the Project Area) is designated as year round habitat.

The Project Area does not occur within any mapped unit for moose, nor is there any designated habitat for this species within the Project Area.

3.8.3 Migratory Birds

The Migratory Bird Treaty Act (MBTA) makes it illegal for anyone to take, possess, import, export, transport, sell, purchase, barter, or offer for sale any migratory bird, or the parts, nests, or eggs of such a bird except under the terms of a valid permit issued pursuant to Federal regulations. The MBTA (916 USC 703-711) provides protection for 1,007 species of native migratory birds. The USFWS Birds of Conservation Concern (BCC) document lists a total of 24 species that are of the highest priority for the Northern Rockies and Southern Rockies/Colorado Plateau Bird Conservation Regions and that may occur in the Project Area (USFWS 2008). The purpose of the BCC list is to identify those species in greatest need of conservation action, outside of those species already listed by the USFWS as threatened or endangered. A total of ten species on the BCC list have been, or could be, observed in or near the Project Area (**Table 3.8-1**).

As the majority (84 percent) of the Project Area is either sagebrush or mountain shrub habitat, the migratory birds found in the Project Area are generally representative of those habitats. A total of 70 species of birds have been observed in the Project Area with many other species potentially occurring. In sagebrush areas, common species include Brewer's sparrow (*Spizella breweri*), brown-headed cowbird (*Molothrus ater*), chipping sparrow (*Spizella passerina*), horned lark (*Eremophila alpestris*), lark sparrow (*Chondestes grammacus*), loggerhead shrike (*Lanius ludovicianus*), mountain bluebird (*Sialia currucoides*), sage sparrow (*Amphispiza belli*), and sage thrasher (*Oreoscoptes montanus*). In the mountain shrub habitat, common species include American robin (*Turdus migratorius*), black-capped chickadee (*Poecile atricapillus*), dark-eyed junco (*Junco hyemalis*), and green-tailed towhee (*Pipilo chlorurus*) (BLM 2006).



Project Area
Approved SMRCA Permit Boundary
Township Boundary

Mule Deer

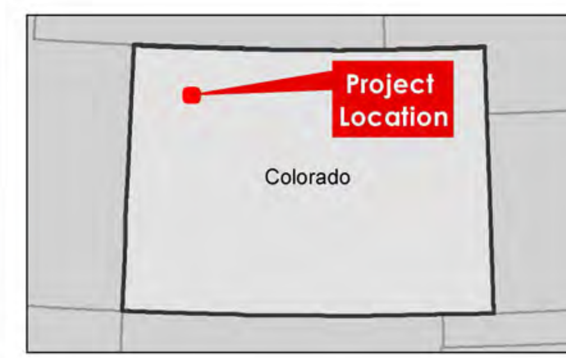
Mule Deer Winter Range
Mule Deer Winter Concentration Area

Elk

Elk Resident Population Area
Elk Severe Winter Range
Elk Winter Concentration Area

0 3,000 6,000 Feet
1:38,366 (At original document size of 11x17)

Notes
1. Coordinate System: NAD 1983 UTM Zone 13N
2. Basemap: Copyright:© 2014 Esri



Project Location
Rio Blanco & Moffat Counties
Colorado

203713557
Prepared by CG on 2015-02-05
Technical Review by NL on 2015-02-05
Independent Review by GB on 2015-02-05

Client/Project
Office of Surface Mining Reclamation & Enforcement
Colowyo Coal Mine: Collom Permit Expansion Area
Project Mining Plan Environmental Assessment

Figure No.
3-7

DRAFT

Title
Big Game

Table 3.8-1 BCC Species that have the Potential to Occur

Common Name	Scientific Name	Habitat	Potential to Occur
American Bittern	*Botaurus lentiginosus*	Freshwater wetlands dominated by tall dense vegetation	Limited
Bald Eagle[1]	*Haliaeetus leucocephalus*	Breeds near reservoirs and rivers. Winters in semideserts and grasslands	Limited
Black Swift	*Cypseloides niger*	Cliffs, bare rock	Yes
Brewer's Sparrow[1]	*Spizella breweri*	Shrublands with average canopy cover over 1.5 meters	Yes
Brown-capped Rosy-finch	*Leucosticte australis*	Open areas, fields and brushy areas	Yes
Burrowing Owl[1]	*Athene cunicularia*	Grasslands with prairie dogs colonies or other fossorial mammals	Yes
Cassin's Finch	*Carpodacus cassinii*	Open coniferous forests and in deciduous woodlands	Limited
Ferruginous Hawk[1]	*Buteo regalis*	Grasslands, semi-desert shrublands and	Yes
Fox Sparrow	*Passerella liaca*	Dense thickets in coniferous and mixed woodlands	Limited
Golden Eagle	*Aquila chrysaetos*	Open and semi-open prairies, sagebrush and barren areas	Yes
Greater Sage-grouse[1]	*Centrocercus urophasianus*	Sagebrush	Yes
Juniper Titmouse	*Baeolophus ridgwayi*	Pinyon juniper woodlands	Limited
Lewis's Woodpecker	*Melanerpes lewis*	Open forests and woodland	Limited
Loggerhead Shrike	*Lanius ludovicianus*	Open areas with scattered trees and shrubs	Yes
Olive-sided Flycatcher	*Contopus cooperi*	Forests and woodland	Limited
Peregrine Falcon[1]	*Falco peregrinus*	Open spaces with cliffs and bluffs overlooking bodies of water.	Yes
Pinyon Jay	*Gymnorhinus cyanocephalus*	Pinyon-juniper woodland	Limited
Prairie Falcon	*Falco mexicanus*	Open areas, steppe, plains, and prairies	Yes
Sage Thrasher	*Oreoscoptes montanus*	Sagebrush plains in arid and semi-arid areas.	Yes
Short-eared Owl	*Asio flammeus*	Winters communally in sheltered areas near feeding sites	Yes
Swainson's Hawk	*Buteo swainsoni*	Savanna, open woodlands, and cultivated lands	Yes
Veery	*Catharus fuscescens*	Swampy forests with shrubby understory	Limited
Williamson's Sapsucker	*Sphyrapicus thyroideus*	Middle to high elevation coniferous forests. Mixed deciduous-coniferous forests with aspen	Limited
Willow Flycatcher	*Empidonx traillii*	Thickets of willow associated with wet areas.	Limited

[1]Discussed in detail in **Section 3.9**

Grassland species that may occur include horned lark, bobolink (*Dolichonyx oryzivorus*), mountain plover (*Charadrius montanus*), and vesper sparrow (*Pooecetes gramineus*). Scattered forested areas (aspen and pinyon-juniper woodlands) occur in the Project Area. Species that may occur in these areas include black-capped chickadee, hermit thrush (*Catharus guttatus*), northern flicker (*Colaptes auratus*), orange-crowned warbler (*Vermivora celata*), and pinyon jay (*Gymnorhinus cyanocephalus*). There is limited habitat for wetland bird species to occur. Potential species that may occur include Bell's vireo (*Vireo bellii*), Abert's towhee (*Pipilo aberti*), black swift (*Cypseloides niger*), and yellow warbler (*Dendroica petechia*). Given the general lack of habitat, there is no nesting habitat (e.g., cottonwood trees) for riparian-dependent species such as the WYBC (*Coccyzus americanus*) (Colowyo 2011).

3.8.4 Raptors

Raptor surveys have been conducted in the Project Area in 2006, 2007, 2008, and 2011. In those surveys, the following species were identified as nesting within or near the Project Area (Figure 15B in the PAP): Cooper's hawk (*Accipiter cooperii*), golden eagle (*Aquila chrysaetos*), great horned owl (*Bubo virginianus*), long-eared owl (*Asio otus*), prairie falcon (*Falco mexicanus*), red-tailed hawk (*Buteo jamaicensis*), and turkey vulture (*Cathartes aura*). Other raptors that have the potential to occur include sharp-shinned hawk (*Accipiter striatus*), American kestrel (*Falco sparverius*), northern harrier (*Circus cyaneus*), and Swainson's hawk (*Buteo swainsoni*) (Cedar Creek 2011).

Bald and golden eagles are protected under the MBTA and the Bald and Golden Eagle Protection Act. CPW recommends no surface occupancy (NSO) (beyond that which historically occurred in the area) within a 0.25 mile (0.4 km) radius of an active golden eagle nest. CPW also recommends seasonal restriction to human encroachment within a 0.5 mile (0.8 km) radius of active nests from December 15 through July 15.

Nesting habitat for raptors is present throughout the Project Area and surrounding area. The most common areas for raptor nesting occur in rocky outcrops and trees along the drainages in the area. Additionally, the aspen forests located south of the Project Area represent suitable nesting habitat for raptor species. The majority of the Project Area is classified as sagebrush or mountain shrub vegetation communities. These areas are likely used as foraging areas for the various raptor species. During the surveys mentioned above the number of occupied raptor nests within the entire Colowyo Coal Mine boundary have ranged between 6 in 2007 (Cooper's hawk, golden eagle, and red-tailed hawk) and 12 in 2006 (Cooper's hawk, golden eagle, great horned owl, long-eared owl, red-tailed hawk, and turkey vulture). The number of unoccupied nests have ranged between 56 (2007) and 80 (2008) (Cedar Creek 2011). A total of eight nests have been identified within the Project Area, although none were active in 2011. The nearest active nest is located approximately 1,900 feet southeast of the Project Area and was used by a red-tailed hawk.

3.8.5 Reptiles and Amphibians

The Project Area and surrounding area have an estimated seven reptile and four amphibian species that may be present. Common reptiles that may be found include northern sagebrush lizard (*Sceloporus graciosus*), wandering garter snake (*Thamnophis elegalas vagrans*), and western rattlesnake (*Crotalus oreganus*). Amphibian species that have the potential to occur include boreal chorus frog (*Pseudacris triseriat maculata*) and northern leopard frog (*Rana pipiens*).

3.8.6 Fisheries

The Project Area does not contain perennially flowing waters and therefore does not support any fisheries. The nearest perennial water is Wilson Creek, which is a perennial stream at the proposed haul road/power line crossing. Wilson Creek has not been identified as a fishery stream. The Yampa River is the nearest waterbody with fisheries and is located approximately 7 miles (11.3 km) north of the mine boundary. Fish present in the Yampa River are discussed in **Section 3.9.1.1.**

3.9 SPECIAL STATUS SPECIES

Several sources of information were searched to identify sensitive species that have the potential to occur in the Project Area: the USFWS Federally Listed Endangered Species for Colorado (USFWS 2015) for federally listed species, Colorado Natural Heritage Program's (CNHP) Species Tracking Lists (CNHP 2015) for state and BLM sensitive species, consultations with local BLM and CPW resource specialists, and the Biological Assessment (BA) and resulting Biological Opinion (BO) for PR02 as approved in 2007. **Table 3.9-1** lists the federal, state, and BLM sensitive species that are recorded for Moffat County.

Table 3.9-1 Federal, State, and BLM Sensitive Species in Moffat County

Group	Common Name	Scientific Name	Federal Status	State Status	BLM Sensitive
Amphibians	Boreal toad	*Anaxyrus boreas*		SE	Yes
	Northern leopard frog	*Lithobates pipiens*		SC	Yes
	Great Basin spadefoot	*Spea intermontana*			Yes
Birds	Mexican spotted owl	*Strix occidentalis*	Threatened	SE	
	WYBC	*Coccyzus americanus*	Threatened	SC	
	Ferruginous hawk	*Buteo regalis*		SC	Yes
	Greater sage-grouse	*Centrocercus urophasianus*		SC	Yes
	Mountain plover	*Charadrius montanus*		SC	Yes
	Greater sandhill crane	*Grus canadensis tabida*		SC	
	Bald eagle	*Haliaeetus leucocephalus*		SC	Yes
	Long-billed curlew	*Numenius americanus*		SC	Yes
	Columbian sharp-tailed grouse	*Tympanuchus phasianellus columbianus*		SC	Yes
	Northern Goshawk	*Accipter gentilis*			Yes
	Burrowing owl	*Athene cunicularia*		ST	Yes
	American Peregrine Falcon	*Falco peregrinus anatum*		SC	Yes

Group	Common Name	Scientific Name	Federal Status	State Status	BLM Sensitive
	White faced ibis	*Plegadis chihi*			Yes
	American white pelican	*Pelecanus erythrorhynchos*			Yes
	Brewer's sparrow	*Spizella berweri*			Yes
Fish	Bonytail	*Gila elegans*	Endangered		
	Humpback chub	*Gila cypha*	Endangered	ST	
	Roundtail chub	*Gila robusta*		SC	Yes
	Colorado River cutthroat trout	*Oncorhynchus clarkii pleuriticus*		SC	Yes
	Colorado pikeminnow	*Ptychocheilus lucius*	Endangered	ST	
	Razorback sucker	*Xyrauchen texanus*	Endangered	SE	
	Bluehead sucker	*Catostomus discobolus*			Yes
	Flannelmouth sucker	*Catostomas latipinnis*			Yes
	Mountain sucker	*Catostomas platyrhychus*		SC	Yes
Mammals	Canada lynx	*Lynx canadensis*	Threatened	SE	
	White-tailed prairie dog	*Cynomys leucurus*			Yes
	Spotted bat	*Euderma maculatum*			Yes
	Swift Fox	*Vulpes velox*		SC	Yes
	Black-footed ferret	*Mustela nigrips*	Endangered	SE	
Plants	Ute Ladies'-tresses	*Spiranthese diluvalis*	Threatened		

SE - State endangered
ST - State threatened
SC - State species of concern

3.9.1 Threatened, Endangered, and Candidate Species

As required by Section 7 of the ESA, Colowyo conducted formal consultation with the USFWS on September 4, 2012, to determine the potential effects of the proposed Project on threatened and endangered species. The resulting BO from the USFWS issued on October 30, 2012, (**Appendix C**) stated that the Proposed Action would have no effect on the following species: Mexican spotted owl, western yellow-billed cuckoo (WYBC), North American wolverine, Canada lynx, black-footed ferret, or Ute ladies'-tresses. No circumstances have changed between PR03 and PR04 that would alter these conclusions; as such, these species will not be discussed further with the exception of the WYBC. Reinitiation of Section 7 consultation with the USFWS has been initiated and includes the Colorado River fish species and the WYBC. Although there is no habitat for the WYBC in the Project Area, there is the potential for indirect effects on this species.

3.9.1.1 Colorado River Fish

Four species of fish listed as endangered under the ESA are commonly referred to as the Colorado River fish and include the Colorado pikeminnow, razorback sucker, humpback chub, and bonytail. They are historically found in the Colorado River and its tributaries. Information on these four species is summarized from the BA developed for PR02 in 2012 with a final BO issued in 2012, and from the formal consultation conducted in 2015 for the South Taylor/Lower Wilson expansion submitted in 2015(OSMRE 2012 and USFWS 2015).

The Colorado pikeminnow is endemic to the Colorado River basin, where it was once widespread and abundant in warm-water rivers and tributaries. Wild populations of Colorado pikeminnow are found only in the upper basin of the Colorado River (above Lake Powell). Three wild populations of Colorado pikeminnow are found in about 1,090 miles (1,754.2 km) of riverine habitat in the Green River, upper Colorado River, and San Juan River subbasins. It thrives in swift flowing muddy rivers with quiet, warm backwaters and is primarily piscivorous, but smaller individuals also eat insects and other invertebrates. These fish spawn between late June and early September and when they are five to six years old and at least 16 inches long. Spawning occurs over riffle areas with gravel or cobble substrate. The eggs are randomly splayed onto the bottom and usually hatch in less than one week.

The razorback sucker is found in deep clear to turbid waters of large rivers and some reservoirs over mud, sand, or gravel and like most suckers, feeds on both plant and animal matter. Razorback suckers can spawn as early as age three or four, when they are 14 or more inches long. Breeding males turn black up the lateral line, with brilliant orange extending across the belly. Depending on water temperature, spawning can take place as early as November or as late as June. In the upper Colorado River basin, razorbacks typically spawn between mid-April and mid-June.

Adult humpback chubs are dark on top and light below and fins rarely have yellow-orange pigment near the base. Adults usually range from 12 to 16 inches long and weigh 0.75 to 2 pounds. This species historically occurred in the mainstream Colorado River preferring slower eddies and pools downstream to below the Hoover Dam site; however, present populations are restricted to areas in, and upstream, of the Grand Canyon.

The bonytail is a highly streamlined fish often appearing dark in clear water and pale in more turbid waters. It prefers eddies and pools and is not often found in swift currents. Adults of seven years of age can reach 14 inches long and weigh more than one pound. Found historically throughout the Colorado River drainage, in recent years bonytails have only been taken from the Green River in Utah and lakes Havasu and Mohave.

The nearest critical habitat for the four Colorado River fish species is found within the Yampa River (**Figure 3-8**). In relation to the Project Area, critical habitat for the Colorado pikeminnow occurs approximately 11 miles (18 km) north. For the razorback sucker, critical habitat is 30 miles (48 km) northwest of the Project Area. For the bonytail and humpback chub, critical habitat is designated within Dinosaur National Monument 37 miles (60 km) northwest of the Project Area. These species do not and are not likely to occur within the Project Area given the lack of suitable habitat (i.e., perennial rivers or streams).

A Recovery Implementation Program for Endangered Fish Species in the Upper Colorado River Basin was initiated on January 22, 1988. The Recovery Program was intended to be the reasonable and prudent alternative for individual projects to avoid the likelihood of jeopardy to the endangered fishes from impacts of depletions to the Upper Colorado River Basin. In order to further define and clarify the process in the Recovery Program, a Section 7 agreement was implemented on October 15, 1993 by the Recovery Program participants. Incorporated into this agreement is a Recovery Implementation Program Recovery Action Plan (RIPRAP), which identifies actions currently believed to be required to recover the endangered fishes in the most expeditious manner. On January 10, 2005, the USFWS issued a final programmatic BO (PBO) on the *Management Plan for Endangered Fishes in the Yampa River Basin* (USFWS 2005). The USFWS has determined that projects that fit under the umbrella of the Yampa River PBO would avoid the likelihood of jeopardy and/or adverse modification of critical habitat for depletion impacts (USFWS 2005). The Yampa River PBO states that in order for actions to fall within the umbrella of the PBO and rely on the RIPRAP to offset its depletion, the following criteria must be met.

1. A Recovery Agreement must be offered and signed prior to conclusion of Section 7 consultation.

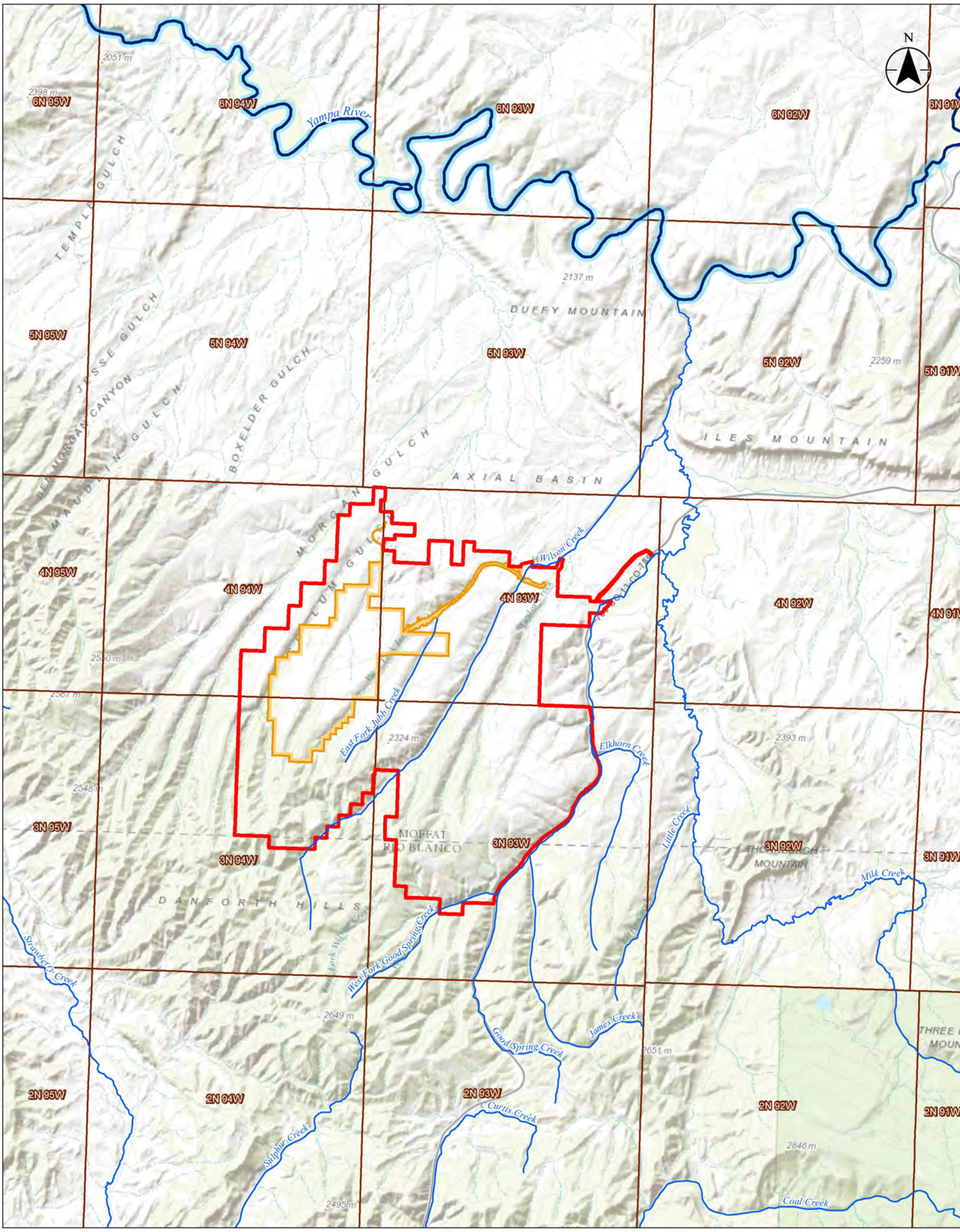
2. A fee to fund recovery actions will be submitted as described in the proposed action for new depletion projects greater than 100 acre-feet/year. The 2007 fee is $17.24 per acre-foot and is adjusted each year for inflation.

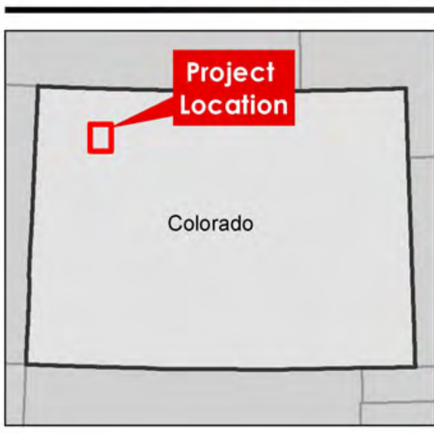
3. Re-initiation stipulations will be included in all individual consultations under the umbrella of this programmatic BO.

4. USFWS and project proponents will request that discretionary federal control be retained for all consultations under this programmatic BO.

3.9.1.2 Western Yellow-billed Cuckoo

The WYBC is a medium-sized bird about 12 inches (30 cm) in length, and weighing about 2 ounces (57 grams [g]). The species has a slender, long-tailed profile, with a fairly stout and slightly downcurved bill, which is blue-black with yellow on the basal half of the lower mandible. Plumage is grayish-brown above and white below, with rufous primary flight feathers (USFWS 2011a).





Stream

River

Colorado River Fish Habitat

Approved SMCRA Permit Boundary

Project Area

Township Boundary

0 2 4 miles

1:140,000 (At Original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 13N
2. Basemap: Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance

Project Location
Rio Blanco & Moffat Counties
Colorado

203713557
Prepared by CG on 2015-02-05
Technical Review by NL on 2015-02-05
Independent Review by GB on 2015-02-05

Client/Project

Office of Surface Mining Reclamation & Enforcement
Colowyo Coal Mine: Collom Permit Expansion Area
Project Mining Plan Environmental Assessment

Figure No.
3-8

DRAFT

Title

Colorado River Fish

WYBCs breed in large blocks of riparian habitats, particularly woodlands with cottonwoods (*Populus fremontii*) and willows (*Salix* spp.). Dense understory foliage appears to be an important factor in nest site selection, while cottonwood trees are an important foraging habitat in areas where the species has been studied in California. In the Lower Colorado River, this species occupies riparian areas that have higher canopies, denser cover in the upper layers of the canopy, and sparser shrub layers when compared to unoccupied sites. Although this species is generally associated with breeding and nesting in large wooded riparian areas dominated by cottonwood trees, they have been documented nesting in salt cedar between Albuquerque and Elephant Butte Reservoir and along the Pecos River in southeastern New Mexico. At the landscape level, the amount of cottonwood-willow-dominated vegetation cover in the landscape and the width of riparian habitat appeared to influence WYBC distribution and abundance (USFWS 2011a).

Nesting sites are generally selected in locations near water. Clutch size is usually two or three eggs, and development of the young is very rapid, with a breeding cycle of 17 days from egg-laying to fledging of young. Although WYBCs usually raise their own young, they are facultative brood parasites, occasionally laying eggs in the nests of other WYBCs or of other bird species (USFWS 2011a). Currently it is not known if WYBCs show breeding site fidelity. In some instances, individuals in Arizona and California returned to the same sites in successive years. Conversely, dramatic fluctuations in breeding pair numbers at long-term study sites indicate that pairs of WYBCs will use different breeding areas (78 FR 61621).

The diet of this species consists of caterpillars, moths and butterflies, beetles, ants, and spiders. They also take advantage of the annual outbreaks of cicadas, katydids, and crickets, and will forage for small frogs and lizards. In summer and fall, WYBCs forage on small wild fruits, including elderberries, blackberries, and wild grapes. In winter, fruit and seeds become a larger part of the diet.

On October 3, 2014, the Western U.S. Distinct Population Segment of WYBC was formally listed as a threatened species under the ESA (79 FR 59991). To date, the last known sighting of the WYBC along the Yampa River occurred in 2008 and was within the proposed critical habitat. No information is available to indicate if the birds observed were nesting in the area or in the process of migration (C. Clayton, personal communication, July 28, 2015).

There is no habitat for the WYBC in the Project Area. Critical habitat for the WYBC was proposed in 2014 and includes a portion of the riparian area around the Yampa River between Craig and Hayden (79 FR 48548). The critical habitat is located approximately 16 miles (26 km) northeast of the Colowyo Coal Mine and 1.3 miles (2 km) north of the Craig Generating Station.

3.9.2 State Listed and BLM Sensitive Species

Colorado state species of concern are those species identified by CPW as declining or appearing to be in need of conservation. BLM sensitive species are those species that require special management consideration to avoid potential future listing under the ESA.

3.9.2.1 Boreal Toad

The boreal toad is a state-endangered amphibian species that is typically found in spruce-fir and aspen forests. Within these habitats, breeding is restricted to beaver ponds, lakes, streams, marshes, wet meadows, and bogs with sunny exposure and shallow water (BLM 2006). Given the lack of suitable habitat within the Project Area, it is unlikely that this species would occur. Therefore, it will not be discussed further.

3.9.2.2 Northern Leopard Frog

The northern leopard frog is a state species of special concern as well as listed by the BLM as a sensitive species. This species is found in heavily vegetated areas in a variety of aquatic habitats, including wet meadows, banks and shallows of marshes, ponds, lakes, reservoirs, streams and irrigation ditches (BLM 2006). Given the lack of suitable habitat in the Project Area, it is unlikely that this species would occur. Therefore, it will not be discussed further.

3.9.2.3 Great Basin Spadefoot

This species is listed by the BLM as sensitive. It is found in pinyon-juniper woodlands, sagebrush flats, and semidesert shrublands. It commonly uses the bottom of rocky canyons, broad dry basins, and stream floodplains (BLM 2006). This species has the potential to occur, based on the habitat types that are found within the Project Area; however, there have been no reported sightings in the Project Area.

3.9.2.4 Ferruginous Hawk

Ferruginous hawks are listed as a species of concern in Colorado as well as a BLM sensitive species. It breeds in grasslands, semidesert shrublands, and the ecotone between shrublands and pinyon-juniper woodlands. Nests are found on elevated sites, such as rock outcrops, power poles, or isolated trees. Winter concentrations are found around prairie dog towns (BLM 2006). While the CNHP lists this species as rare in Moffat County, there is suitable habitat present within the Project Area for this species to occur. There have been no reported sightings in the Project Area.

3.9.2.5 Greater Sage-grouse

The GRSG is the largest grouse in North America. Males often weigh in excess of four to five pounds and hens weigh two to three pounds. Immature birds (less than one year) can be distinguished from adults by their light yellowish green toes (adults have dark green toes). The birds are found at elevations ranging between 4,000 feet to over 9,000 feet and are highly dependent on sagebrush for cover and food.

The largest number of GRSG in Colorado occurs in the northwestern portion of the state, with Moffat County supporting the majority of breeding populations within the region (GSGWG 2008). The population in northwest Colorado exhibited an increasing population trend from 1997-2005; however, from 2007 to 2010 the population was generally steady with some slight declines in numbers at some leks. Despite this small regional decline, populations in Colorado have been generally increasing for the past 17 years and breeding populations have not declined for the last 39 years (BLM 2015a). GRSG use of reclaimed mine areas in Colorado has been slow to develop because of the species reliance on big sagebrush, which can be difficult to establish through reclamation efforts (GSGWG 2008).

GIS data (CPW 2008) indicate that GRSG production areas exist throughout the Project Area, and brooding habitat occurs in the northern portion of the area and encompasses approximately 82 percent of the Project Area (3,950.7 acres). Winter GRSG range occurs across the northern and northwestern portions of the Project Area and accounts for 84.9 percent (4,094.0 acres) of the Project Area. Severe winter range is delineated to the north, outside of the Project Area and mine permit boundary. In addition to these habitat designations, approximately 3,892 acres of the Project Area (80.7 percent) has been designated as Priority Habitat Management Area (PHMA) and 934.6 acres (19.3 percent) is designated as General Habitat Management Area (GHMA) (**Figure 3-9**). PHMA areas are defined as "Areas that have been identified as having the highest conservation value to maintaining sustainable GRSG populations; including, breeding, late brood-rearing, and winter concentrations areas." GHMA areas are defined as, "Areas of seasonal or year-round habitat outside of priority habitat" (BLM 2011)

A total of seven sage-grouse leks have been documented within or near the Project Area. Of these seven, four are located within the mine permit boundary (Leks SG1 and 2, SG3, SG4, and SG7) and three are outside the boundary (leks SG5, SG8, and SG12). Leks SG1 and 2 have been combined into one location given their relative closeness to each other. Further, two leks (SG3 and SG4) are located within the Project Area. In 2015, three of the leks were active (i.e., at least one individual present within the last five years) and four were inactive. **Table 3.9-2** depicts the seven leks and their status between 2010 and 2015 (survey years).

Table 3.9-2 GRSG Lek Counts In/Near Project Area

Lek Name	Males 2010	Males 2011	Males 2012	Males 2013	Males 2014	Males 2015
Axial Basin/SG5	0	0	0	0	0	0
Gossard/ SG12	3	4	0	0	12	63
SG1 and 2/Upper Wilson[1]	0	0	0	0	No Count	0
SG3/ Collom 1[1,2]	0	0	0	0	0	0
SG4/ Collom 2[1,2]	9	15	27	26	39	48
SG7/Burn[1]	5	4	0	0	5	1
SG8/Upper Morgan	0	0	0	0	0	0

Source: CPW 2015a
[1] Located within mine permit boundary
[2] Located within Project Area

The Project Area and the Colowyo Coal Mine as a whole is located within the Axial Basin population of GRSG. This population is one of the most studied populations within Colorado. From 2001 to 2008 a number of studies were conducted in the Axial Basin. These studies followed up to 280 radio-collared GRSG to determine their locations and habitat use. Analysis of these data showed that the ridges on the eastern and western portions of the Project Area were visited at least once by approximately 25 percent of all marked GRSG. If the ridges, located approximately 3,900 feet (1,200 meters) to the east and west of the Project Area are included, then approximately 46 percent of all marked birds have visited the area. Further analysis of the data collected shows that GRSG typically use the habitat in and around the Project Area during the breeding (March 1 to July 31) and summer (August 1 to September 30) seasons. Most GRSG will migrate north to lower elevations for the winter (B. Holmes, CPW, personal communication, February 20, 2015)

3.9.2.6 Mountain Plover

The mountain plover is listed as a species of concern in Colorado as well as a BLM sensitive species. It breeds in short, sparse grasslands, rangeland, and agriculture fields, such as where grazed by livestock or prairie dogs (BLM 2006). Given the lack of this type of habitat in the Project Area, the probability for this species to occur is low. There have been no reported sightings in the Project Area.

3.9.2.7 Greater Sandhill Crane

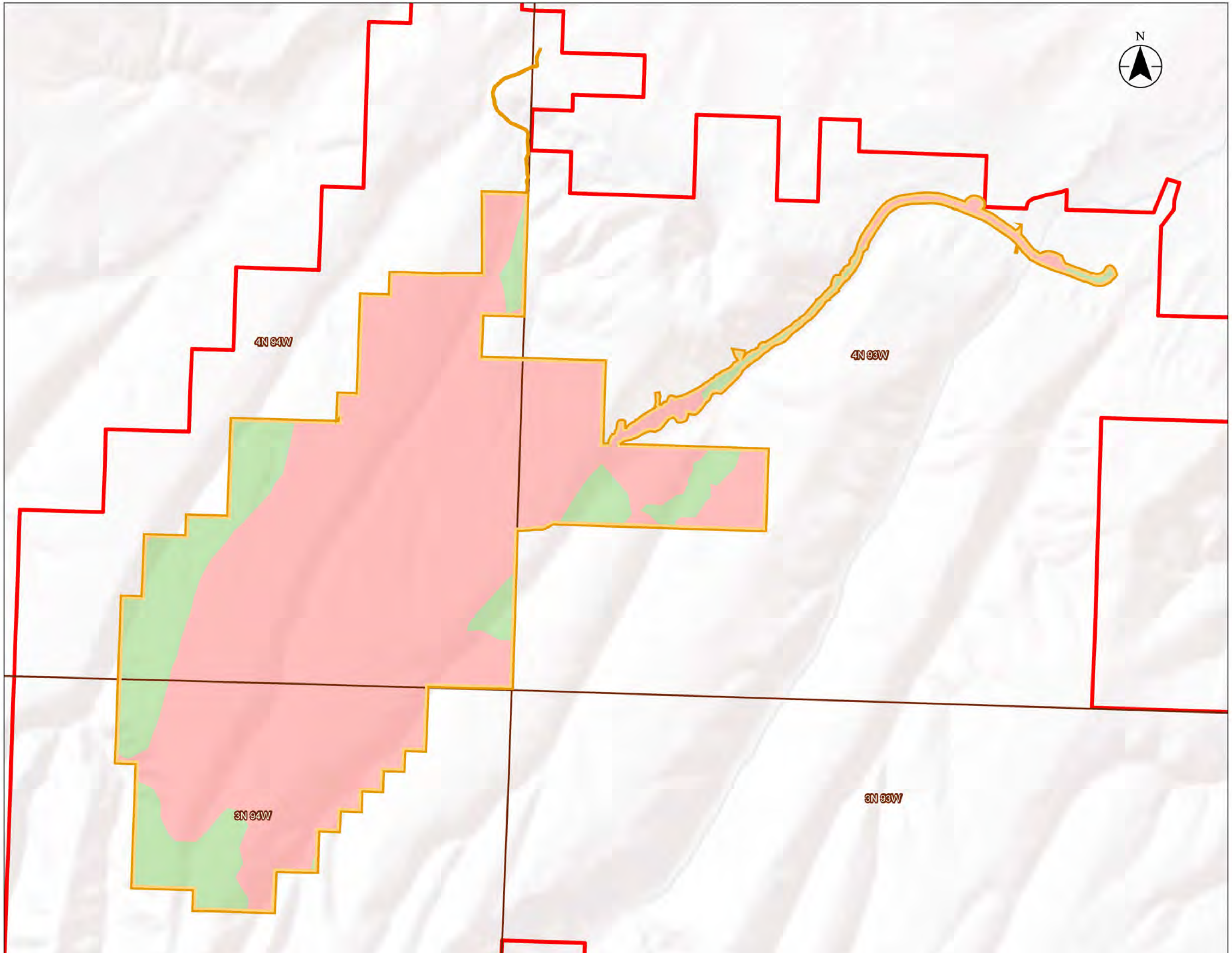
This species is listed as a species of concern for Colorado. The greater sandhill crane breeds in marshes, wet grasslands, and near beaver ponds or natural ponds lined with willow or aspens. Migrating birds forage along mudflats on reservoirs, moist meadows, and agricultural areas (BLM 2006). Habitat for this species is not present in the Project Area and therefore, this species is not expected to occur and it will not be discussed further.

3.9.2.8 Bald Eagle

The bald eagle was previously listed under the ESA but was delisted in 2007. It is currently listed as a species of concern in Colorado as well as a BLM sensitive species. The bald eagle breeds near reservoirs and rivers. In winter they may occur locally in semideserts and grasslands, especially near prairie dog colonies. It is unlikely that the bald eagle would occur in the Project Area; however, one pair was observed in 2005 near the Project Area (BLM 2006).

3.9.2.9 Long-billed Curlew

The long-billed curlew is currently listed as a species of concern for Colorado as well as a BLM sensitive species. It breeds in short, sparse grasslands, or more rarely in wheat fields or fallow fields. Most nesting occurs close to standing water. It may use shorelines, meadows, and fields during migration (BLM 2006). Given the lack of suitable habitat for this species, it is not anticipated to occur in the Project Area and therefore will not be discussed further.



- Project Area
- Approved SMCRA Permit Boundary
- Township Boundary

Greater Sage-Grouse Habitat

- General Habitat Management Area (GHMA)
- Priority Habitat Management Area (PHMA)

0 3,000 6,000 Feet
1:38,366 (At original document size of 11x17)

Notes
1. Coordinate System: NAD 1983 UTM Zone 13N
2. Basemap: Copyright:© 2014 Esri

Project Location
Rio Blanco & Moffat Counties
Colorado

203713557
Prepared by CG on 2015-02-05
Technical Review by NL on 2015-02-05
Independent Review by GB on 2015-02-05

Client/Project
Office of Surface Mining Reclamation & Enforcement
Colowyo Coal Mine: Collom Permit Expansion Area
Project Mining Plan Environmental Assessment

Figure No.
3-9

DRAFT

Title
Greater Sage-Grouse Habitat

3.9.2.10 Columbian Sharp-tailed Grouse

The Columbian sharp-tailed grouse is currently listed as a species of concern for Colorado as well as a BLM sensitive species. It is found where deciduous shrubs (Gamble oak and serviceberry) are interspersed with bunch grasses, sagebrush, aspen, irrigated meadows, wheat fields, or alfalfa fields. Display grounds are on knolls or ridges (BLM 2006). This species is known to occur within the Project Area. Two active leks and one inactive lek exist within the Project Area and several other leks are located within 2 kilometers (1.25 miles) of the boundary (**Table 3.9-3**). In addition to known lek locations, the entire Project Area is mapped as Columbian sharp-tail grouse range. There is also approximately 3,530.3 acres of production habitat and 4,726.3 acres of winter range for this species within the Project Area (73.2 and 98.0 percent of the Project Area, respectively)

Table 3.9-3 Columbian Sharp-tailed Grouse Lek Counts in the Vicinity of the Project Area

Lek Name	2006 Male Count	2007 Male Count	2008 Male Count	2011 Male Count
Leks within the Project Area				
STLek 1	1	Inactive	Inactive	Inactive
STLek 1a	0	0	0	12
STLek 2	2	Inactive	Inactive	Inactive
STLek 5				25+
Leks outside of the Project Area				
STLek 4				6
Burn	17	12	12	25
Burn 2				30+
Jubb	Inactive	Inactive	Inactive	Inactive
Jubb 2	11	7	1	Inactive
Jubb 3				10+
Wilson	Inactive	Inactive	Inactive	Inactive
Wilson 2	12	7	11	31+

3.9.2.11 Northern Goshawk

The northern goshawk is currently listed as a BLM sensitive species. This species is found in boreal and temperate forests. Nesting tends to occur in mature coniferous forests in the West. This species is not likely to nest or forage in or near the Project Area given the lack of forested areas. Therefore, this species will not be discussed further.

3.9.2.12 Burrowing Owl

The burrowing owl is currently listed as a BLM sensitive species in Colorado. This species is commonly found in prairie dog towns throughout Colorado. It requires either prairie dog, badger, or other fossorial mammal burrows for nesting. This species has the potential to occur within the Project Area; however, there have been no reported sightings in the Project Area.

3.9.2.13 American Peregrine Falcon

The peregrine falcon is a state species of concern as well as a BLM sensitive species. This species is found in open spaces associated with cliffs and bluffs overlooking rivers and open bodies of water. While there are no known occurrences of this species within the Project Area, habitat does exist and this species may occur; however, there have been no reported sightings in the Project Area.

3.9.2.14 White-faced Ibis

The white faced ibis is currently listed as a BLM sensitive species in Colorado. This species primarily inhabits freshwater wetlands, particularly cattail and bulrush marshes. It feeds in flooded hay meadows, agricultural fields and estuarine wetlands. Given the lack of suitable habitat within the Project Area, it is not likely for this species to occur and therefore will not be discussed further.

3.9.2.15 American White Pelican

The American white pelican is a BLM sensitive species in Colorado. This species is most commonly seen foraging at open bodies of water, shallow marshes, and rivers. While some suitable habitat exists in the vicinity of the Project Area, none actually occurs within the Project Area; therefore, this species will not be discussed further.

3.9.2.16 Brewer's Sparrow

The Brewer’s sparrow is a BLM sensitive species in Colorado. It forages and nests in shrublands with an average canopy height greater than 1.5 meters. It is most commonly found in landscapes dominated by big sagebrush. Abundant habitat exists both within and in the vicinity of the Project Area; however, there have been no reported sightings in the Project Area.

3.9.2.17 Roundtail Chub

The roundtail chub is currently listed as a species of concern for Colorado as well as a BLM sensitive species. It occurs in large rivers with quiet water adjacent to fast moving water. The largest populations are found in habitats with a wide range of annual flows (i.e., high peaks and low base flows) and high sediment loads (BLM 2006). Given the lack of perennial water in the Project Area, this species would not occur and therefore, will not be discussed further.

3.9.2.18 Colorado River Cutthroat Trout

The Colorado River cutthroat trout is a subspecies of cutthroat trout and is currently listed as a species of concern for Colorado as well as a BLM sensitive species. It is found in cool, clear water of high elevation streams and lakes (BLM 2006). Given the lack of perennial water in the Project Area, this species would not occur and therefore, will not be discussed further.

3.9.2.19 Bluehead Sucker, Flannelmouth Sucker, and Mountain Sucker

The bluehead, flannelmouth, and mountain suckers are all BLM sensitive species in Colorado. These species are found in the river basins of northwest Colorado including the Yampa and White River basins. They are typically found in rivers and streams with gravel, sand, and mud bottoms. Given the lack of perennial water in the Project Area, these species would not occur, and will not be discussed further.

3.9.2.20 Townsend's Big-eared Bat

The Townsend's big-eared bat is currently listed as a species of concern for Colorado as well as a BLM sensitive species. It roosts in mines, caves, and structures. It forages on insects over adjacent pinyon-juniper woodlands, open montane forests, and semidesert shrublands (BLM 2006). While the availability of roosting habitat is unknown in the Project Area, this species may forage in the area.

3.9.2.21 White-tailed Prairie Dog

The white-tailed prairie dog is a BLM sensitive species in Colorado. This species is found in open shrublands, semidesert grasslands, and mountain valleys in northwestern Colorado. This species is known to occur within the vicinity of the Project Area.

3.9.2.22 Swift Fox

The swift fox is listed as a BLM sensitive species in Colorado. This species is most commonly found in shortgrass and midgrass prairies in eastern Colorado. While habitat for this species exists within and near the Project Area, there are no known sightings of this species in the vicinity.

3.10 CULTURAL AND HISTORIC RESOURCES

Cultural resources are defined as any definite location of past human activity identifiable through field survey, historical documentation, and/or oral evidence. Cultural resources include archaeological or architectural sites, structures, or places, and places of traditional cultural or religious importance to specified groups whether or not represented by physical remains. Cultural resources have many values and provide data regarding past technologies, settlement patterns, subsistence strategies, and many other aspects of history.

The Proposed Action is considered an undertaking subject to compliance with Section 106 of the National Historic Preservation Act (NHPA). The NHPA, as amended, and its implementing regulations (36 CFR 60 and 800) require that federal agencies take into account the effects of their undertakings on important archaeological and historic sites in the area of potential affect (APE). In the terminology of NHPA, important sites are those that are determined to be eligible to the National Register of Historic Places (NRHP). Some sites require more information to determine eligibility; therefore they are designated as unevaluated or need data sites. In the case of archaeological sites, this is usually provided through test excavation. Needs data sites are managed as though they are eligible for the NRHP until further evaluated. If these “need data” sites are to be affected by the undertaking, test excavation determines if salvage excavation is necessary or if no further work is needed.

Under NEPA, federal agencies have broad responsibilities to be concerned about the impacts of their activities on the environment, including cultural resources. NEPA requires federal agencies to take into account cultural resources, including evaluation of potential impacts and mitigation measures, during the environmental analysis process. Regulations allow federal agencies to comply with Section 106 of NHPA through the use of the NEPA process and documentation, so long as the steps and standards of Section 800.8(c) of the Advisory Council on Historic Preservation's (ACHP's) regulations are met.

3.10.1 Cultural Context

The culture history of northwestern Colorado is presented among several recent context studies. Reed and Metcalf's (1999) study of the Northern Colorado River Basin provides applicable prehistoric and historic overviews as compiled by F.J. Athearn (1982) and M.B. Husband (1984). Recorded archaeological sites within the region date throughout the known time span of occupation by native peoples and document ways of life based on hunting and gathering along with some reliance on horticulture during more recent times. The oldest sites are over 11,000 radiocarbon years in age (BLM 2014). Sites types include common lithic scatters and campsites. Lithic scatters are often denoted by a scattering of stone tools and stone debris from tool manufacture. Campsites often have such a scattering of stone artifacts but also have some evidence of habitation, such as fire hearths or, less commonly, tipi rings or pithouses. Among the less common kinds of sites are rock art sites, tool stone quarry sites, and burials.

Athearn (1982) presents a history of northwest Colorado in which he discusses various historical periods and themes, including the fur trade, exploration, settlement, confrontation with native people, development of the livestock industry, mining, construction of railroads, etcetera. A document that discusses historical sites in Colorado in general and suggested research to better understand the historic era through archaeology is provided by Church et al. (2007).

Furthermore, a regional overview of cultural resources administered by the BLM-LSFO has been completed (McDonald and Metcalf 2006), in addition to valuable contextual data provided by synthesis reports of archaeological investigations conducted for a series of large pipeline projects in the BLM-LSFO management area (Metcalf and Reed 2011; Rhode et al. 2010; Reed and Metcalf 2009).

3.10.2 Project Specific Inventory

As required by the NHPA, intensive archeological field investigations were conducted on the Project Area (TRC Mariah 2006a; WAS 2014). However, within the southern portion of the Mine Plan Disturbance Area, five relatively small areas have not been surveyed. These all are areas of steeply sloping terrain and were not surveyed as the likelihood of encountering sites on such terrain is low. The previous inventories recorded a total of 124 sites (TRC Mariah 2006a; WAS 2014). Of the 124 sites, 4 are eligible for the NRHP and 10 need more data to determine their NRHP eligibility (SHPO 2013). The majority (110) of the sites were recommended as not eligible for inclusion on the NRHP and need no further management. Only the NRHP-eligible and "needs data" sites are carried forward in the analysis in **Section 4.10**.

3.11 AMERICAN INDIAN CONCERNS

During the consultation at the start of this EA process, the following groups were formally contacted for this project: Eastern Shoshone Tribe, Ute Mountain Ute Tribe, Ute Indian Tribe, and the Southern Ute Tribe. The only response came from Southern Ute Indian Tribe and they stated that the proposed project would have no effect to properties of religious or cultural significance. A follow up consultation letter was sent on January 15, 2015 to the same tribes. No response was received.

Within this area of Colorado, Native American consultations on a variety of project types have revealed several site types of concern. These include prehistoric and historic Native American rock art, eagle traps, vision quests, prehistoric cairns, and prehistoric trails.

3.12 SOCIOECONOMICS

The Project Area is located approximately 30 miles (48 km) southwest of Craig and 22 miles (35 km) north of Meeker. These communities in Moffat and Rio Blanco counties, respectively, are the most likely to be affected by mining in the Project Area. **Table 3.12-1** shows the populations of these counties; ethnic distribution is discussed in **Section 3.13**.

Table 3.12-1 Population Estimates

County	2000 Census	2010 Census	2014 Estimate
Moffat	13,184	13,795	12,928
Rio Blanco	5,986	6,666	6,707

Source: Census 2014, CensusViewer 2015

Per capita income for the two counties has risen between 29 and 59 percent between 2000 and 2013 while throughout the State of Colorado it has risen 29 percent (**Table 3.12-2)**. The mean household income for the two counties has risen between 50 and 88 percent, compared to the state average of 66 percent between 2000 and 2013 (**Table 3.12-3**) (Census 2000, Census 2013a). From 2008 to 2014, Colowyo contributed an average of $29 million per year to the local economy through gross wages, insurance premiums paid for employees, and retirement fund contributions (Tri-State 2015a).

Table 3.12-2 Per Capita Personal Income

County	2000 Estimate	2013 Estimate	Percent Change
Moffat	$18,540	$24,577	33
Rio Blanco	$17,344	$27,586	59
State of Colorado	$24,049	$31,109	29

Source: Census 2000, Census 2013a

Table 3.12-3 Mean Household Income

County	2000 Estimate	2013 Estimate	Percent Change
Moffat	$41,528	$62,411	50
Rio Blanco	$37,711	$71,206	88
State of Colorado	$47,203	$78,383	66

Source: Census 2000, Census 2013a

In 2013, the largest employment industries for the two counties were educational and health care service; forestry, mining and oil and gas extraction (13 and 24 percent for Moffat and Rio Blanco counties, respectively); retail trade; arts; entertainment; recreation; accommodation; and food services. For comparison, in Colorado the largest employment industries are educational services, health care, and social assistance (Census 2013b).

The unemployment rate for Moffat and Rio Blanco counties is 5.4 percent and 6.1 percent, respectively. The unemployment rate is slightly above the Colorado unemployment rate of 4.3 percent (BLS 2015).

Housing in the two communities of Craig (Moffat County) and Meeker (Rio Blanco County) is generally available. The housing market in the area has been on a steady growth cycle (**Table 3.12-4**).

Table 3.12-4 Housing Characteristics

Community	2000 Median Home Price	2010 Median Home Price	Percent Change	2000 Median Rent	2010 Median Rent	Percent Change
Craig	$101,900	$160,100	57	$450	$739	64
Meeker	$104,500	$186,900	78	$382	$685	79
State of Colorado	$166,600	$236,600	42	$671	$833	24

Source: Census (2003), American FactFinder (2015)

The top three private industry sectors by employment and income in Moffat County are mining, public administration, and retail trade (YVDP 2015). The Colowyo Coal Mine employs 220 people, of which the large majority live in Moffat and Rio Blanco counties, mostly in the surrounding areas of Meeker and Craig. Tri-State pays over $25 million dollars in wages annually, which get spent largely in Moffat and Rio Blanco counties (EDCC 2015).

Many businesses that directly or indirectly support the Colowyo Coal Mine in Moffat and Rio Blanco counties exist because of the mining industry and include welding, fabrication, and equipment rental businesses. Even tertiary businesses depend heavily on Colowyo, most notably the hotel and restaurant businesses in Meeker and Craig. This equates to annual purchases in northwestern Colorado (Moffat, Rio Blanco, and Routt counties) of $19,768,000 and regional purchases (northwestern Colorado and southwestern Wyoming) of $39,934,000 (Tri-State 2015b).

Nearly 350,000 tons of coal was produced in Moffat County in September 2013, a 19 percent decline in coal production from the previous September (YVDP 2015). The 12-month average for coal production in Moffat County was 340,000 tons, a decline from 2012 when the 12-month average production was 410,000 tons. According to the 2014-2015 Community Indicators Report, year-to-date coal production through November 2013 was down almost 20 percent in Moffat County and 31 percent statewide. Nationally, coal production for the first half of 2013 was roughly 21 million tons, down about 4 percent from the same period in 2012 (YVDP 2015).

Another study conducted in 2015, the *Measurement of Economic Activity for Coal Industry and Electrical Power Generation Industry in the Yampa-White River Region of Northwest Colorado* (EDCC 2015), summarizes the impact of the coal mining industry in Moffat County, Rio Blanco County, Routt County, and the Yampa-White River Region. The coal mining industry in the region directly employs 4.6 percent of the total employees and accounts for 17.4 percent of the region's direct output (EDCC 2015). Specifically, Moffat County's coal mining sector contributes about $229 million to the direct gross regional product (GRP), which is 31 percent of the $742 million GRP for the county. There are 776 direct employees in the industry, with total direct wages of about $61 million. The total impact of the coal mining industry in the county is 1,144 workers, $75 million in wages, and $283 million in output (EDCC 2015). Rio Blanco County's coal mining sector contributes slightly less than $55 million to the direct GRP or 14 percent of the $397 million for the county. There are 183 direct employees in the industry, with total direct wages greater than $14 million. The total impact of the coal mining industry in Rio Blanco County is 241 workers, $16 million in wages, and $61 million in output (EDCC 2015).

In 2014, Colowyo paid $1,402,538 in property taxes. Of that, $1,259,907 was paid to Moffat County, and $142,630 was paid to Rio Blanco County (Tri-State 2015b).

Federal coal lease royalty rates are 12.5 percent of the value of the coal removed from a surface mine (43 CFR 3473). Money collected through federal mineral leases and state severance taxes are distributed differently in Colorado: 51 percent of the federal mineral lease royalties are distributed to the federal government while 49 percent are returned to Colorado. Of the 49 percent returned to Colorado, 40 percent is used in the Local Impact Program managed by the Department of Local Affairs. That money is split between the local counties and a grant program that counties may apply for. From 2010 to 2014 the federal treasury collected an average of $9.5 million per year in royalties from Colowyo for the Project Area leases (Tri-State 2015b). Fifty percent of these royalties were returned to the State of Colorado for planning, construction, and maintenance of public facilities and services in the affected counties ($4.77 million per year).

Of the money collected through state severance taxes, 50 percent is distributed to the Department of Natural Resources' State Trust fund and 50 percent is distributed to the Department of Local Affairs Local Impact fund. The Local Impact fund money is used in grant programs as well as distributed back to local jurisdictions where the mining takes place. In 2014, Colowyo paid $1,285,287 in severance taxes (Tri-State 2015b). The State of Colorado collected $245,087,355 in severance revenue in 2014 (CDOR 2014).

3.13 ENVIRONMENTAL JUSTICE

Executive Order 12898 on Environmental Justice was issued on February 11, 1994. The purpose of the Order is to identify and address, as appropriate, disproportionally high and adverse human health and environmental effects of programs, policies, or activities on minority populations, low-income populations, and indigenous peoples. Relevant census data for Moffat and Rio Blanco Counties were collected to determine whether populations residing in the counties that are in the vicinity of the Project Area constituted "environmental justice populations." According to the CEQ and EPA guidelines established to assist federal and state agencies, a minority population is present in a project area if:

- The minority population of the affected area exceeds 50 percent; or,
- The percentage of the minority population in the affected area is meaningfully greater than the percentage in the general population.

For Moffat County, 82.6 percent of the population is Caucasian, 14.1 percent is Hispanic or Latino, 1.4 percent is American Indian, 0.7 percent is Asian, and 0.5 percent is African American; the data for Rio Blanco County is nearly identical (Census 2015). This data indicates that there is not a minority population present in the Project Area that would be disproportionally affected by the Project.

The U.S. Census Bureau estimates poverty levels using a set of income thresholds that vary by family size and composition. If a household's income is below income thresholds, the family and all the individuals of that household are considered to be in poverty. Using this criterion, the Census Bureau provides estimates of the percentage of individuals that fall below the poverty level for each county in the United States. Within Moffat and Rio Blanco counties, the 2013 poverty rate was 11.5 and 10.7 percent, respectively. These are below the 12.9 percent poverty level for the State of Colorado (Census 2014). This data indicates that there is not a low-income population that would be disproportionally affected by the Project.

Because there are no environmental justice populations present, environmental justice will not be discussed further.

3.14 VISUAL RESOURCES

The BLM utilizes Visual Resource Management (VRM), which is a system to help identify visual (scenic) values and minimize visual impacts to landscape character of public lands. The VRM system process involves inventorying scenic values, establishing management objectives for those values, and evaluating proposed activities to analyze effects and develop mitigations to meet established VRM objectives (BLM 1986).

3.14.1 Visual Resource Inventory

A visual resource inventory (VRI) is a systematic process designed to determine the extent and quality of visual resources in a given area. The inventory provides a means to determine visual values on public lands. The inventory process consists of scenic quality evaluation, viewer sensitivity level analysis, and delineation of distance zones. Scenic quality is a measure of the visual appeal of a parcel of land. Sensitivity measures the level of public concern for scenic quality. Distance zones describe the relative visibility of an area in terms of foreground, middle ground, and background based on the relative proximity of the landscape to a viewer at a fixed point. Based on a combination of these three categories, BLM lands fall into one of four VRI classes. Areas with high scenic quality and visual sensitivity in the foreground or middle ground are classified the highest. As scenic quality and/or sensitivity decline, and/or views are at a greater distance (in the background or seldom seen areas), areas are classified lower (BLM 1986).

3.14.2 VRM Classes

VRM Classes are assigned to lands during the land use planning process by considering the VRI for an area in conjunction with the present and/or planned future use of an area. VRM class objectives define the level of change in the visual quality of the landscape that the management of an area would allow for. VRM class objectives are defined as follows:

- ***Class I Objective***: To preserve the existing character of the landscape. The level of change to the characteristic landscape should be very low and must not attract attention.
- ***Class II Objective***: To retain the existing character of the landscape. The level of change to the characteristic landscape should be low.
- ***Class III Objective***: To partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate.
- ***Class IV Objective***: To provide for management activities that require major modification of the existing character of the landscape. The level of change to the characteristic landscape can be high.

3.14.3 Project Area Visual Resources

<u>VRM Classes</u>

The BLM LSFO RMP (BLM 2011) classified all public lands within the Project Area as VRM Class IV, which allows for major modification of the existing character of the landscape.

<u>Description of Visual Resources of the Project Area</u>

The Project Area is an area of rolling hills and low mesas incised by streams. In drainage bottoms, the view is enclosed and vegetated with low grasses and shrubs in varying shades of greens, golds, greys, and browns with softer textures. Mesa slopes and hillsides are steep and sparsely vegetated with coarse darker green shrubs and grasses surrounding light tan to red rock outcrops in the foreground and middle ground. In areas where the view is more open and panoramic, low mesas are soft and slightly rounded in shades of light green and tan to brown, creating gently undulating lines at the skyline. Low mesas in the distance at the horizon are darker shades of green and brown to black. Visible man-made features are road surfaces.

<u>Night Skies</u>

Night sky resources include stars, constellations, comets, meteor showers, and other similar astronomical features or phenomena that are typically best viewed during nighttime hours. Urban sky glow, a type of light pollution, which brightens the night sky, is responsible for diminishing the ability to observe night sky resources in inhabited areas or areas with excessive lighting. Light that is emitted upward and laterally from outdoor artificial lights scatters through the atmosphere and causes a loss in night sky visibility.

The Colowyo Coal Mine is the only source of light visible at night in the area. The mine utilizes lights on trucks and at the facilities area, Gossard loadout, South Taylor pit parking lot, and employee building seven nights per week, all night long. Mine lighting is visible from several locations along Highway 13 and Moffat County Roads 17, 51, and 32, and would also be visible from the air and from surrounding elevations that are higher than the mine.

Sensitive Viewers

Potential sensitive viewers of the Project would be travelers on roadways in the vicinity of the Project. Public access in the vicinity of the Project Area is via Moffat County Road 51 east of the Project Area and Moffat County Roads 17, 32, and 133 north of the Project Area. Most of these access routes are located in drainage bottoms, which result in enclosed views and limited visibility of the surrounding landscape; but occasionally the landscape opens up to more panoramic views of the area. However, the Project Area is located on a mesa top at a higher elevation than viewers traveling on the roadways in the vicinity. Therefore, the Project Area is generally not visible from the roadways.

Other sensitive viewers in the area would be recreationists who travel off-road. For the most part these would be hunters who would be in locations at higher elevations where the Project Area would be visible. Hunters would be traveling into areas with views of the Project Area at specific times of the year during hunting season. Recreational use of public lands in the vicinity of the Project Area other than hunting would be possible, but likely infrequent.

3.15 RECREATION

The Project Area includes both public and private lands. Recreation on BLM administered lands is managed in accordance with the LSFO RMP (BLM 2011), which defines a variety of dispersed recreational activities in Moffat County. In the LSFO RMP, seven special recreation management areas (SRMAs) were identified within the BLM LSFO management area. Areas that are not designated as SRMAs are by default extensive recreation management areas (ERMAs), for which minimal capital investments are to be made. The Project Area and surrounding lands are designated as an ERMA where recreation use is dispersed and requires minimal management. OHV use is one of the fastest growing recreation activities on public lands (BLM 2011). In the LSFO RMP, off-road vehicle (OHV) use on BLM land in the Project Area is limited to existing roads and trails.

The RMP defines a variety of dispersed recreational activities in Moffat and Rio Blanco Counties. The dominant recreational activity in rural Moffat County, and the Project Area, is hunting. Camping and OHV use are commonly associated with hunting. Hunting is primarily archery and rifle hunting for deer, pronghorn, and elk and shotgun hunting for birds and small mammals. In recent years, land owners adjacent to the permit area have been leasing their lands to hunters in increasing numbers. This trend may continue on lands adjacent to the Project Area, but the possibility for recreation on the Project Area, as long as mining activities are on-going, is highly unlikely due to public safety concerns. Touring, photography, bird watching, and other more passive recreational pursuits are also popular.

Within the Colowyo Coal Mine boundary and the Project Area, no public hunting is allowed although Colowyo allows its employees and their families to hunt on certain parcels owned by Colowyo within the permit boundary. In general, publicly owned lands (i.e., USFS or BLM-administered federal lands and state school sections) are open to hunting if legal access is available. Within the Project Area, all BLM-administered parcels are surrounded by Colowyo-owned land and no access is available. Due to safety concerns, however, public surface lands contained within an active mining area are closed to everyone, further limiting recreational use.

3.16 PALEONTOLOGY

Paleontological resources comprise a fragile and nonrenewable scientific record of the history of life on earth. The Colorado State Paleontology Program Policy establishes guidelines for the management and protection of paleontological resources on public lands. Paleontological resources, such as fossil plant or animal remains, are discovered frequently in western U.S. coal mines where fresh, fossil-bearing rocks are exposed. The Cretaceous Williams Fork Formation where the Project Area is located is rated by the State as having a high potential for discovery of fossils (Armstrong and Wolney 1989). Dinosaurs and other vertebrates, as well as fossil tracks and plants, have been found in the Williams Fork Formation.

The BLM has implemented a Potential Fossil Yield Classification (PFYC) system for classifying paleontological resources on public lands. Under the PFYC system, geologic units are classified from Class 1 to Class 5 based on the relative abundance of vertebrate fossils or uncommon invertebrate or plant fossils and their sensitivity to adverse impacts. A higher classification number indicates a higher fossil yield potential and greater sensitivity to adverse impacts. The Williams Fork formation is classified as PFYC Class 5. The potential for abundant vertebrate fossils or scientifically significant invertebrate or plant fossils in the Project Area is high.

3.17 ACCESS AND TRANSPORTATION

Access to the Colowyo Coal Mine and Project Area is generally from Craig in Moffat County to the north, and Meeker in Rio Blanco County to the south. Both communities lie along State Highway 13, which serves as the primary road leading north and south between Craig and Meeker. Approximately 11 miles (18 km) north of the mine entrance (near Hamilton), the average annual daily traffic (AADT) count for State Highway 13 in 2013 was 1,800 vehicles. Of this, 330 vehicles (18.3 percent) were truck traffic. Approximately 20 miles (32 km) south of the mine entrance (near Meeker), the AADT count in 2013 was 1,700 vehicles, of which 290 vehicles (17.5 percent) were truck traffic (CDOT 2015). From State Highway 13, the Project Area is accessed by County Road 51. County Road 51 traverses through the Project Area in a northeast-southwest direction. County roads 17 and 32 access the north end of the Project Area from the north and northwest, respectively.

State and county roads are usually constructed to higher standards than local or BLM roads and provide the primary arterial and collector road systems for access to and through private and BLM lands. While other roads lead into the mine from other directions along county roads, that access is through locked gates and generally does not account for a large amount of traffic. Mine use of public roadways occurs primarily when shifts change at the mine. Administrative staff generally works from 7:30 am to 4:00 pm, maintenance staff work in two shifts from 7:00

am to 7:00 pm and 7:00 pm to 7:00 am, and production staff work in two shifts from 8:00 am to 8:00 pm and 8:00 pm to 8:00 am.

Coal is currently transported from the mine (at the Gossard loadout) to coal markets by rail (**Figure 2-1**) in unit trains, i.e. "a railway train that transports a single commodity directly from producer to consumer" (Merriam-Webster 2015). At current production rates, coal is shipped on approximately 250 unit trains per year. The mine is connected to a main rail line via a private rail spur that connects to the coal load out facility at the mine and runs north to two east-west rail lines 80 miles (129 km) southeast of Craig in Eagle County. The mine's spur connects into the Moffat Tunnel line. Coal heading east of this intersection would pass through the Moffat Tunnel and deliver coal to the eastern slope of Colorado. Coal heading west of this intersection would join with a major east-west rail line that delivers coal throughout the country.

3.18 SOLID OR HAZARDOUS WASTE

No designated or illegal sites for solid or hazardous wastes have been identified within the Project Area. Field surveys that have been conducted have not identified any waste disposal practices that would cause deterioration of the environment.

As there is no coal preparation facility or mining activity within the Project Area, no CCRs are generated. Non-coal, nonhazardous solid waste, such as garbage, used tires, etc., is stored in a controlled manner associated with the current Colowyo Coal Mine, outside of the Project Area in various waste receptacles and waste locations.

Colowyo's status as a conditionally exempt small quantity generator of hazardous materials under the Resource Conservation and Recovery Act essentially indicates that Colowyo generates negligible amounts of hazardous waste. Hazardous wastes produced by current mining activities at the mine are also handled in compliance with regulations promulgated under the Federal Water Pollution Control Act (CWA), Safe Drinking Water Act, Toxic Substances Control Act, Mine Safety and Health Act, Department of Transportation, and the CAA. Mining operations must also comply with all state rules and regulations relating to hazardous material reporting, transportation, management, and disposal.

3.19 NOISE

Noise is an unwanted sound occurrence. A noise's attributes (pitch, loudness, repetitiveness, vibration, variation, duration, and the inability to control the source) determine how it affects a receptor. To properly assess the noise resources for any area, consideration of the topography, climate, flora, and current ambient noise is required. The affected environment for noise impacts for wildlife is usually limited to a distance of 880 yards from the source (Fletcher 1980). However, if residential housing has the potential to be impacted, the affected environment includes the distance from the source of the noise to the residence.

The unit of sound level measurement (i.e. volume) is the decibel (dB), expressed as dBA (A-weighted decibel). The dBA measure is used to evaluate ambient noise levels and common noise sources. Sound measurements in dBA give greater emphasis to sound at the mid- and high- frequency levels, which are more discernible to humans. The dB is a logarithmic measurement; thus, the sound energy increases by a factor of 10 for every 10 dBA increase.

Generally, natural noise levels will be around 35 dBA in rural areas away from communities and roads. Within a rural community, the man-made noise level ranges from 45 dBA to 52 dBA (Noise Effects Handbook 1998). The day-night sound level of residential areas should not exceed 55 dBA to protect against activity interference and annoyance (Noise Effects Handbook 1998). **Table 3.19-1** presents typical sound levels in dBA and subjective descriptions associated with various noise sources.

The Federal Noise Control Act of 1972 established a requirement that all federal agencies administer their programs to promote an environment free of noise that jeopardizes public health or welfare. Although the Occupational Safety and Health Administration (OSHA) has the most extensive regulations in regard to noise pollution, these standards are only for noise levels within the workplace.

Table 3.19-1 Sound Levels Associated With Ordinary Noise Sources

Noise Source	Noise Level	Subjective Description
Commercial Jet Take-Off	120 dBA	Deafening
Road Construction Jackhammer	100 dBA	Deafening
Busy Urban Street	90 dBA	Very loud
Standard For Hearing Protection 8-Hour Exposure Permissible Exposure Limit (PEL) Action Level within Active Mining Facilities	90 dBA 85 dBA	Very loud Loud - to very loud
Construction Equipment at 50 feet	80-75 dBA	Loud
Freeway Traffic at 50 feet	70 dBA	Loud
Noise Mitigation Level for Residential Areas Federal Housing Administration (FHA)	67 dBA	Loud
Normal Conversation at 6 feet	60 dBA	Moderate
Noise Mitigation Level for Undisturbed Lands (FHA)	57 dBA	Moderate
Typical Office (interior)	50 dBA	Moderate
Typical Residential (interior)	30 dBA	Faint

EPA identifies outdoor noise limits to protect against effects on public health and welfare by an equivalent sound level (Leq), which is an A-weighted average measure over a given time. Outdoor limits of 55 dBA Leq have been identified as desirable to protect against speech interference and sleep disturbance for residential areas and areas with educational and healthcare facilities. Sites are generally acceptable to most people if they are exposed to outdoor noise levels of 65 dBA Leq or less, potentially unacceptable if they are exposed to levels of 65 – 75 dBA Leq, and unacceptable if exposed to levels of 75 dBA Leq or greater (Noise Effects Handbook 1998). Mine Safety and Health Act (MSHA) regulations require a mine operator to assure that no miner is exposed during any work shift to noise that exceeds the permissible instantaneous exposure level of 115 dBA, or an 8 hour time-weighted average sound level (TWA_8) of 85 dBA (or equivalently a dose of 50 percent, integrating all sound levels from 80 dBA to at least 130 dBA) (30 CFR 62.130).

Ambient noise levels across the Project Area generally include natural sources such as wind, wildlife, and livestock grazing in the area. At times, noise could potentially be heard associated with the adjacent active mining operation to the east, including blasting, coal loading/conveyance, crushing, and vehicle noise. Gun shots may be heard during hunting season or from target practice, as well as vehicles traveling on the nearby county or private roads.

3.20 LIVESTOCK GRAZING

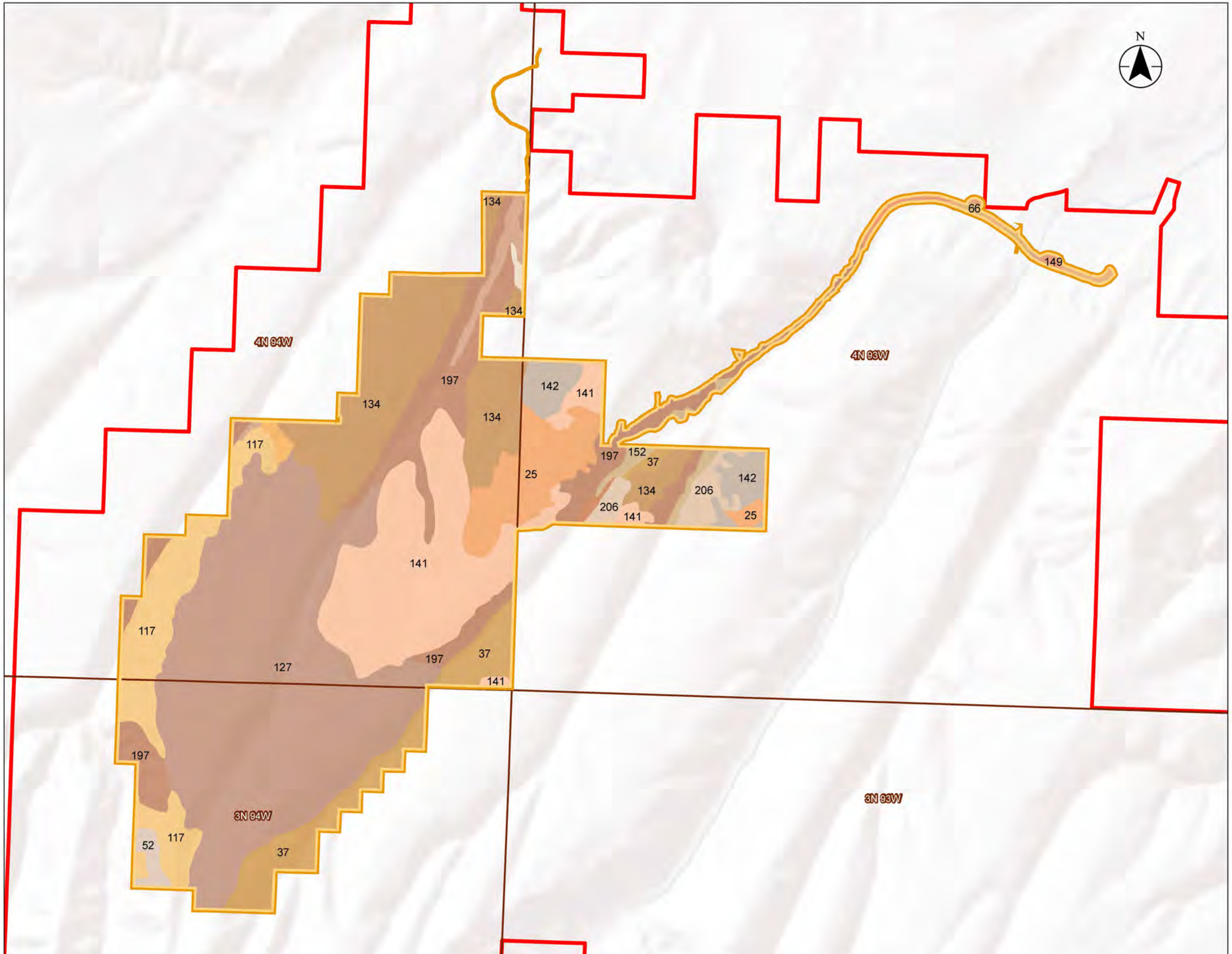
Public rangelands administered by the BLM are used for livestock grazing and wildlife habitat. The Project Area overlaps 4,704 acres of the 35,572-acre Colowyo Common grazing allotment. Animal unit months (AUMs) are allocated to each grazing allotment; AUMs are defined as the amount of forage required to support one cow and her calf (if under six months) or five sheep and their lambs (if under six months) for one month. Approximately 22 percent of the Colowyo Commons Allotment is public land administered by the BLM that provide 520 AUMs. There are 68 of these AUMs within the Project Area. Grazing management must adhere to the BLM's Standards for Public Land Health and Guidelines for Livestock Grazing Management in Colorado (BLM 1995). Colowyo holds the BLM grazing permit but subleases the grazing rights to a third party.

3.21 SOILS

Soils within the Project Area are variable, depending on the combination of parent materials, slope, microclimate, aspect, location and stability of the slopes, age, and their history of use. The dominant soil types were formed primarily from alluvium, colluvium, or in place residuum of sandy, silty, or clayey bedrock. Alluvial soils are located in drainages derived from the transport of upslope materials by water processes. Colluvial soils are derived from materials transported from upslope positions by gravity. Relatively unweathered bedrock exposures are also observed, where soil development processes do not keep up with the tendency of the rock to erode from water or wind processes.

The soils of the Project Area are typical of soils found in the cold, semi-arid region of northwest Colorado. The soils range from shallow (less than 20 inches to bedrock) and moderately deep (20-40 inches) to deep (greater than 40 inches thick), and are developing in weathered, interbedded sandstone, siltstone, and shale, as well as in local colluvium, slopewash, and stream-laid alluvium. Plant rooting depth corresponds with soil depth. Most soils are moderately well drained to well drained. Soils support mostly native vegetation used for livestock grazing and wildlife habitat. The soil survey for Moffat County was completed by the USDA Natural Resources Conservation Service (NRCS) and is used to describe the various mapping units below (NRCS 2005).

A total of 20 soil types were mapped within the Project Area (**Figure 3-10**). Only the top 10 soil types are described below. These 10 soil types account for approximately 97 percent of the Project Area.



Project Area
Approved SMCRA Permit Boundary
Township Boundary

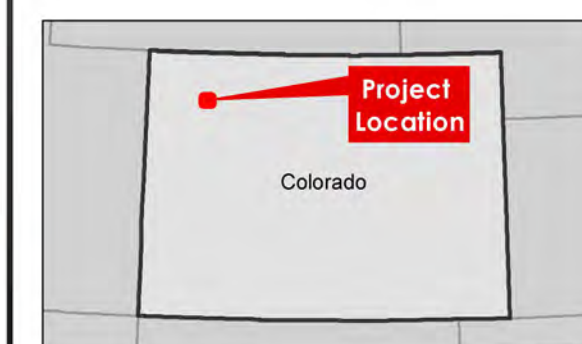
Soil Type

- 10: Battlement fine sandy loam, 0 to 3 percent slopes
- 112: Kemmerer-Moyerson complex, 20 to 40 percent slopes
- 113: Kemmerer-Yamo complex, 5 to 30 percent slopes
- 117: Lamphier-Jerry complex, 25 to 65 percent slopes
- 127: Maudlin-Duffymont complex, 3 to 15 percent slopes, very stony
- 134: Morapos loam, 3 to 12 percent slopes
- 141: Nortez, cool-Morapos complex, 3 to 12 percent slopes
- 142: Nortez, cool-Morapos complex, 12 to 25 percent slopes
- 149: Pinelli loam, 3 to 12 percent slopes
- 152: Pinridge loam, 1 to 12 percent slopes
- 194: Tolman-Duffymont complex, 10 to 30 percent slopes, extremely stony
- 197: Torriorthents-Rock outcrop, sandstone complex, 25 to 75 percent slopes
- 206: Ustorthents, frigid-Borolls complex, 25 to 75 percent slopes
- 216: Yamo loam, 3 to 15 percent slopes
- 217: Yamo loam, 15 to 30 percent slopes
- 25: Campspass fine sandy loam, 3 to 12 percent slopes
- 26: Campspass fine sandy loam, 12 to 25 percent slopes
- 37: Cochetopa loam, 12 to 25 percent slopes
- 52: Danavore-Waybe complex, 5 to 30 percent slopes
- 66: Evanot loam, 1 to 12 percent slopes
- 70: Fluvaquents and Haplaquolls soils, frequently flooded

0 2,000 4,000 Feet
1:38,366 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 13N
2. Basemap: Copyright:© 2014 Esri



Project Location
Rio Blanco & Moffat Counties
Colorado

203713557
Prepared by CG on 2015-02-05
Technical Review by NL on 2015-02-05
Independent Review by GB on 2015-02-05

Client/Project
Office of Surface Mining Reclamation & Enforcement
Colowyo Coal Mine: Collom Permit Expansion Area
Project Mining Plan Environmental Assessment

Figure No.
3-10

DRAFT

Title
Soils

Map Unit 25 - Campspass fine sandy loam, 3 to 12 percent slopes

The elevation for this mapping unit is 6,800 to 7,600 feet amsl. Annual precipitation is 16 to 18 inches and the frost free period is 65 to 85 days. Campspass and similar soils make up 90 percent in the mapping unit with minor components making up the remaining 10 percent. The parent material is residuum, derived from sandstone and shale. This soil type is well drained. The minor soils are rock outcrops and Morapos and similar soils.

Map Unit 37 - Cochetopa loam, 12 to 25 percent slopes

The elevation for this mapping unit is 7,200 to 8,300 feet amsl. Annual precipitation is 18 to 20 inches and the frost-free period is 50 to 75 days. Eighty-five percent of the mapping unit is Cochetopa soil with 15 percent minor component. The fine, montmorillonitic Argic Pachic Cryoborolls has residuum derived from sandstone and shale parent material and is a deep, well-drained soil. The minor soils are Jerry and similar soils, and Routt and similar soils.

Map Unit 117 - Lamphie-Jerry Complex, 25 to 65 percent slopes

The elevation for this mapping unit is 7,200 to 8,600 feet amsl. Annual precipitation is 18 to 20 inches and the frost-free period is 50 to 75 days. Forty-five percent of the mapping unit is Lamphier and similar soils; 30 percent is Jerry and similar soils, and 25 percent minor components. Lamphier soils are fine-loamy, mixed Pachic Cryoborolls, while Jerry soils are fine, montmorillonitic Argic Cryoborolls derived from colluvium and residuum derived from sandstone. Both soils are well-drained and deep. The minor soils are moderately deep soils and similar soils, Skyway and similar soils, Danavore and similar soils, and rock outcrop.

Map Unit 127 - Maudlin-Duffymont complex, 3 to 15 percent slopes, very stony

The elevation for this mapping unit is 6,500 to 8,000 feet amsl. Annual precipitation is 16 to 18 inches and the frost-free period is 65 to 85 days. Fifty percent of the mapping unit is Maudlin and similar soils, 30 percent is Duffymont and similar soils, and 20 percent are minor components. Maudlin soils are fine-loamy, mixed Typic Argiborolls and Duffymont soils are loamy-skeletal, mixed Lithic Haploborolls. Both soils are well drained and moderately deep to shallow. The minor soils are Tolman and similar soils, Hesperus and similar soils, Nortez and similar soils, and Morapos and similar soils.

Map Unit 134 - Morapos loam, 3 to 12 percent slopes

The elevation for this mapping unit is 6,400 to 7,600 feet amsl. Annual precipitation is 16 to 18 inches and the frost free period is 65 to 85 days. Morapos and similar soils make up 85 percent of this mapping unit with minor components making up the remaining 15 percent. Morapos soils are derived from shale and in loess. This soil type is well drained. The minor soils are Nortez and similar soils, and Campspass and similar soils.

Map Unit 141 - Nortez, cool-Morapos complex, 3 to 12 percent slopes

The elevation for this mapping unit is 6,400 to 7,600 feet amsl. Annual precipitation is 16 to 18 inches and the frost free period is 65 to 85 days. Nortez and similar soils account for 50 percent of this soil type while Morapos and similar soils account for 40 percent, and minor components accounting for 10 percent. Nortez soils are derived from interbedded sandstone and shale while Morapos soils are derived from shale. This soil type is well drained. The minor components of this unit include rock outcrop, Mauslin and similar soils, Duffymont and similar soils, and Iles and similar soils.

Map Unit 142 - Nortez, cool-Morapos complex, 12 to 25 percent slopes

The elevation for this mapping unit is 6,400 to 7,600 feet amsl. Annual precipitation is 16 to 18 inches and the frost free period is 65 to 85 days. Nortez and similar soils account for 50 percent of this soil type while Morapos and similar soils account for 40 percent, and minor components accounting for 10 percent. Nortez soils are derived from interbedded sandstone and shale while Morapos soils are derived from shale. This soil type is well drained. The minor components of this unit include rock outcrop, Mauslin and similar soils, Duffymont and similar soils, and Cochetopa and similar soils.

Map Unit 152 - Pinridge loam, 1 to 12 percent slopes

The elevation for this mapping unit is 6,400 to 7,200 feet amsl. Annual precipitation is 13 to 15 inches and the frost free period is 75 to 95 days. Pinridge and similar soils account for 90 percent of this unit while minor components account for 10 percent. Pinridge soil is derived from sedimentary rock and is well drained. The minor components include Lander and similar soils and Battlement and similar soils.

Map Unit 197 - Torriorthents-Rock outcrop, Sandstone complex, 25 to 75 percent slopes

The elevation for this mapping unit is 6,000 to 8,000 feet amsl. Annual precipitation is 9 to17 inches and the frost-free period is 75 to 105 days. Fifty-five percent of the map unit is Torriorthents and similar soils, 35 percent are rock outcrop, and 10 percent minor components. Torriorthent soils are shallow and well-drained. The minor soil is Deep Loamy Soils and similar soils.

Map Unit 206 - Ustorthents, frigid-Borolls complex, 25 to 75 percent slopes

The elevation from this mapping unit is 7,000 to 8,500 feet amsl. Annual precipitation is 16 to 20 inches and the freeze free period is 50 to 85 days. Ustorthents and similar soils account for 55 percent of this unit while Borolls and similar soils account for 35 percent with the remaining 10 percent are minor components. Both Ustorthents and Borolls soils are derived from sedimentary rocks and are well drained. Minor components include Abor and similar soils, and Rencot and similar soils.

3.22 PRIME FARMLANDS

CDRMS has determined that no prime farmlands exist within the Project Area (CDRMS 2013a). This determination was based on: 1) a December 18, 1980 letter from the NRCS, which documented that no prime farmland mapping units are located within the permit area; 2) Colowyo consultation with NRCS in 2002 and again in 2011 confirmed that no soil units meeting the regulatory definition of Prime Farmland are located within the Project Area; and 3) CDRMS review of the following NRCS Web Soil Survey website: http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx.

Therefore, Prime Farmlands will not be discussed further in this EA.

3.23 ALLUVIAL VALLEY FLOORS

Pursuant to the SMCRA and in accordance with federal regulations at 30 CFR 785.19 a. (2) i., an alluvial valley floor (AVF) is defined as a valley: 1) that is located in the arid or semi-arid regions of the U.S.; 2) that contains deposits laid down by one or more streams; 3) where at least one stream currently exists; and 4) where there is sufficient water available to support agriculture. Pursuant to the Colorado Surface Coal Mining Reclamation Act (34-33-101 et seq., C.R.S. 1973 as amended) and the Regulations of the Colorado Mined Land Reclamation Board (MLRB) for Coal Mining (2-CCR 407-2), "alluvial valley floors" means "the unconsolidated stream-laid deposits holding streams with water availability sufficient for subirrigation or flood irrigation agricultural activities but does not include upland areas, which are generally overlain by a veneer of colluvial deposits composed chiefly of debris from sheet erosion, deposits formed by unconcentrated runoff or slope wash, together with talus, other mass movement accumulations and windblown deposits. "Unconsolidated stream-laid deposits holding streams" is further defined by the MLRB's Regulations as meaning "all flood plains and terraces located in the lower reaches of valleys, which contain perennial or other streams with channels that are greater than three feet in bankfull width and greater than 0.5 feet in bankfull depth". Because AVFs are critical for agriculture in arid and semi-arid regions, the SMCRA requires the regulatory authority (CDRMS in Colorado) to determine if AVFs exist within or adjacent to a proposed surface coal mining area. If CDRMS determines one or more AVFs do exist, the SMCRA requires that CDRMS then determine whether the proposed mining operations may affect the AVF, or the waters that supply it. If the AVFs or associated water sources may be affected, CDRMS may then require the mining permit applicant to comply with specific performance criteria to eliminate or mitigate the potential effects on the AVFs or their water sources.

The Collom leasing EA (BLM 2006) summarized and evaluated the studies available up to that time that were relevant to determining whether AVF's existed in the area potentially affected by the Collom lease. While the EA concluded the studies would provide useful information in support of such a determination, the EA also concluded that additional information and documentation would be needed to make a final determination (BLM 2006).

As a part of CDRMS' Proposed Decision and Findings of Compliance for the Colowyo Coal Mine C-1981-019 Permit Revision No. 3 issued on April 10, 2013, CDRMS determined that portions of three drainages are considered AVFs within or adjacent to Colowyo's proposed mining operations. One of the drainages is located outside the permit area and CDRMS determined it would not be affected by Colowyo's proposed mining operations. CDRMS also found that Colowyo's proposed surface mining operations: 1) would not interrupt, discontinue or preclude farming on the AVFs that are irrigated or naturally sub-irrigated; 2) would not materially damage the quantity or quality of water in the surface or ground water system described above; and 3) would comply with the requirements of the Colorado Surface Coal Mining Reclamation Act of 1973 and state regulations with respect to AVFs. Further, CDRMS found that Colowyo's proposed mining and reclamation operations would be conducted in a manner that would preserve the essential hydrologic functions of the AVF outside the permit area, and that would also reestablish those functions for those AVFs within the affected area (CDRMS 2013a).

Since CDRMS, as the regulatory authority, has issued a decision that agricultural activities on identified AVFs would not be interrupted, discontinued or precluded by Colowyo's proposed mining operations, and also that the quantity and quality of the waters that supply the AVFs would not be materially damaged by those proposed operations, AVFs will not be considered further in this EA.

CHAPTER 4 ENVIRONMENTAL CONSEQUENCES (DIRECT AND INDIRECT IMPACTS)

4.1 INTRODUCTION

This chapter discusses the potential physical, biological, cultural, and socioeconomic direct and indirect effects[1,2] of Alternative A (Proposed Action), Alternative B (Reduced Mining), and Alternative C (No Action) as described in **Chapter 2**. Direct impacts are defined as those impacts which are caused by the action and occur at the same time and place. Indirect impacts are those that are caused by the action and occur later in time or are farther removed in distance, but are still reasonably foreseeable. Impacts may also be short term (also referred to as temporary) or long term. Short-term impacts generally occur for a short period during a specific point in the mining process. Long-term impacts would generally last the life of the Project and beyond. Finally, impacts are described by their level of significance (i.e., major, moderate, minor, negligible, or no impact). An impact is considered to be major if it would result in a substantial change to the environment. An impact is considered moderate or minor if it would not result in a substantial environmental change but could still have some effect. The determination of whether an impact is moderate or minor varies for each resource and the context of the specific proposed action. In contrast to no impact, a negligible impact is one that would occur but at the lowest limits of detection of an effect. The analysis applies quantitative thresholds when available, to determine the level of significance. Other issues have been analyzed qualitatively where necessary.

Under Alternative A, mining would occur in the Little Collom X and Collom Lite Pits in accordance with the approved mine plan (PAP and PR03 (Colowyo 2011] approved by CDRMS in 2013). Construction of new mine facilities, access roads, and other associated disturbances would occur. This would allow mining operations to occur at the Colowyo Coal Mine for an additional 19 years. Final reclamation operations, including activities such as pit backfill, final grading, placement of topsoil, and seeding, would need to be completed by 2033. Following completion of final reclamation operations, there is a 10 year bond liability period during which the progress and success of revegetation is monitored.

Alternative B consists of PR03 with modifications (PR04). Alternative B would not include mining at the Little Collom X Pit, redesigns the temporary overburden stockpile associated with the Collom Lite Pit, and incorporates further GRSG Project design features. Eliminating

[1] Environmental Justice, Prime Farmlands, and Alluvial Valley Floors are not discussed in Chapter 4 because these resources do not occur in the Project Area.
[2] Cumulative impacts are discussed in Chapter 5.

the Little Collom X Pit from the Project reduces the life of the Project, including final reclamation operations, by four years. As under Alternative A, reclamation and revegetation monitoring would continue for 10 years after the completion of final reclamation operations, during the bond liability period.

Under Alternative C, mining would not be approved at either of the two pits, mining operations at the Colowyo Coal Mine would cease in about 2019 and final reclamation operations would then be completed. There would be no additional impacts to the environment from the mining or reclamation operations of the Project under Alternative C.

4.1.1 Summary Comparison of Direct and Indirect Environmental Impacts

Table 4.1-1 summarizes and compares the potential environmental direct and indirect impacts associated with the alternatives (cumulative impacts are discussed in **Chapter 5**).

Table 4.1-1 Comparison of Direct and Indirect Impacts

Resource	Alternative A	Alternative B	Alternative C
Topography	After reclamation, impacts to topography would be negligible.	Same as Alternative A.	No impacts.
Air and Climate Resources			
Direct mining criteria emissions	Negligible impact on Colorado (0.005 to 1.74%) and U.S. (0.00004 to 0.03%) emissions. Moderate to high impact on regional emissions (0.1 to 43%), but region would remain in attainment.	Negligible impact on Colorado (0.004 to 1.3%) and U.S. (0.00003 to 0.02%) emissions. Moderate to high impact on regional emissions (0.03 to 31.6%), but region would remain in attainment.	No impacts.
Direct GHG emissions	Negligible impact on Colorado (0.40%) and U.S. (0.023%) total annual GHG emissions.	Negligible impact on Colorado (0.298%) and U.S. (0.0173%) total annual GHG emissions.	No impacts.
Indirect coal combustion criteria emissions	Negligible indirect impact on U.S. (0.0008 to 0.1314%) NEI[1]. Moderate indirect impact on total Colorado (0.11 to 12.17%) and moderate to high regional (0.05 to 100%) emissions, but region would remain in attainment of the NAAQS. The highest pollutant percentage increase was for CO.	Negligible indirect impact on U.S. (0.00024 to 0.12141%) NEI. Moderate indirect impact on total Colorado (0.03 to 12.17%) and moderate to high regional (0.05 to 45.3%) emissions, but region would remain in attainment of the NAAQS. The highest pollutant percentage increase was for CO.	No impacts.

Resource	Alternative A	Alternative B	Alternative C
Indirect combustion GHG emissions	Negligible indirect impact on U.S. (0.196%) and global (0.041%) annual GHG emissions.	Negligible indirect impact on U.S. (0.196%) and global (0.041%) annual GHG emissions.	No impacts.
Indirect coal combustion mercury deposition impacts	Minor percentage (4.4%) of the total mercury generated in Colorado.	Negligible to minor percentage (0.092%) of the total mercury generated in Colorado.	No impacts.
Ozone	Ozone NAAQS would not be exceeded.	Same as Alternative A.	No impacts.
Geology	Negligible to minor, long-term impact on the geological column.	Same as Alternative A.	No impacts.
Water Resources			
Hydrologic balance	No change.	Same as Alternative A.	No impacts.
Surface water quantity	Minor, long-term impact on stream flow by reduction in contribution of spring/seep flows.	Same as Alternative A	No impacts.
Surface water quality	Negligible impacts related to runoff or spills. Impacts related to TSS, iron, mercury, or selenium controlled via the existing NPDES and CDPS permits.	Same as Alternative A.	No impacts.
Groundwater impacts	Negligible impacts to groundwater.	Same as Alternative A.	No impacts.
Indirect iron, mercury, and selenium impacts from coal combustion	Negligible iron loadings. Incremental but unquantifiable addition to baseline mercury concentrations. Incremental but unquantifiable addition to baseline selenium concentrations.	Same as Alternative A.	No impacts.
Indirect coal combustion impacts to groundwater	Negligible indirect impact to groundwater related to CCRs.	Less than Alternative A but still negligible.	No impacts.
Vegetation	Negligible to moderate short-term impacts to vegetation on 43.3% of the Project Area. Reclamation would replace vegetation to approved reclamation plan (or improved) conditions.	Negligible to moderate short-term impacts to vegetation on 54.7% of the Project Area. Reclamation would replace vegetation to approved reclamation plan (or improved) conditions.	No impacts.

Resource	Alternative A	Alternative B	Alternative C
Wetlands	Major, long-term impact to 1.1 acres of jurisdictional wetlands. Moderate, long-term impact to 0.38 acres of WOTUS.	Major, long-term impact to 1.3 acres of jurisdictional wetlands. Moderate, long-term impact to 0.24 acres of WOTUS.	No impacts.
Wildlife			
Big game	Short-term minor to moderate impact on game range until reclamation replaced habitat to approved reclamation plan (or improved) conditions.	Same as Alternative A.	No impacts.
Migratory birds, raptors, reptiles, and amphibians	Negligible to minor impacts.	Same as Alternative A.	No impacts.
Fisheries	No direct impacts to fisheries. See Special Status Species below for indirect effects to Colorado River fish.	Same as Alternative A.	No impacts.
Special Status Species	Indirect impacts to the Colorado River fish from mercury and selenium impacts would be moderate. Indirect impacts to the WYBC would be minor. There would not be any direct effects to Colorado River fish or WYBC. Impacts to state-listed and sensitive species, except GRSG, would be short term and negligible to moderate until successful reclamation, when reclamation goals would prioritize the replacement of wildlife habitat. Impacts to GRSG as a result of disturbance to 1,829.4 acres of PHMA would be short term and major. This habitat would be available to GRSG again after reclamation. There would be moderate indirect impacts to access to brood-rearing habitat. There would be moderate to severe impacts to lek SG4 due to its proximity to the Little Collom X Pit and likely abandonment.	Indirect effects to Colorado River fish, WYBC, and state-listed and sensitive species, except GRSG, would be the same as Alternative A. There would be more acreage of PHMA disturbed, which would be short term and major until reclamation made the habitat available again for GRSG. The indirect effects to access to brood-rearing habitat would be reduced to a minor impact. The impact to lek SG4 would be reduced to a minor impact. With the increased distance from lek SG4 to the edge of proposed disturbance, the shortened life of the Project, and the inclusion of additional design features, the impacts to GRSG under Alternative A would be minor to moderate and would be substantially less than under Alternative A.	No impacts.

Resource	Alternative A	Alternative B	Alternative C
Cultural and Historic Resources	No impacts.	Same as Alternative A.	Same as Alternative A.
American Indian Concerns	No impacts.	Same as Alternative A.	Same as Alternative A.
Socioeconomics	Nineteen additional years of approximately $35 million per year in annual payroll, insurance, retirement, local expenditures, taxes, and royalty payments to the area.	Four less years (approximately $140 million less) of annual payroll, insurance, retirement, local expenditures, taxes, and royalty payments to the area compared to Alternative A.	Cessation of the annual payroll, insurance, retirement, local expenditures, taxes, and royalty payments to the area in four years (2019).
Visual Resources	Minor short-term and long-term impacts that would still meet Class IV objectives.	Same as Alternative A.	No impacts.
Recreation	Negligible to minor, short-term impacts to recreation until reclamation.	Same as Alternative A.	No impacts.
Paleontology	The significance of the potential damage and removal of fossils during removal of the geological column, as well as the beneficial impact of increasing the potential for discovery of scientifically significant fossils, would depend upon the significance of the fossil.	Same as Alternative A, but due to the lesser removal of the geological column the potential impacts would be less.	No impacts.
Access and Transportation	Minor, short-term increase in traffic due to increased production rate.	No impacts.	No impacts.
Solid or Hazardous Waste	No impacts.	No impacts.	No impacts.
Noise	Minor, short-term increase in noise due to increased production rate. It is unlikely the increased noise would reach residences located near the Project Area boundary.	The amount of noise would be the same as under Alternative A, but the elimination of the Little Collom X Pit would reduce potential noise effects to the public to negligible.	No impact.
Livestock Grazing	Minor, long-term impact on the availability for grazing.	The impacts on grazing would be the same as those under Alternative A, but grazing would be reinstated four years later than under Alternative A.	No impact.
Soils	Minor impacts related to erosion and fertility loss.	Same as Alternative A.	No impact.

[1] National Emissions Inventory

4.2 TOPOGRAPHY

4.2.1 Alternative A (Proposed Action)

Under Alternative A, impacts to the local topography would occur but would vary greatly. Disturbance would occur over approximately 2,090.5 acres within the Project Area. The access road and mine facility areas are generally situated in areas with little topographical relief. Construction in those areas would generally be limited to leveling the area. Therefore, impacts to the topography from these components would be minor and short term until reclamation restored these areas to their approved post-mining topographies.

The impacts to topography would be greatest where the Little Collom X and Collom Lite Pits would occur. These areas account for approximately 1,694 acres of the total disturbance (Maps 18B and 19C, [Colowyo 2011]). The mine pits themselves would alter the topography by lowering the overall elevation. This short-term impact would likely only be noticeable near the pits themselves and would be minor. Conversely, areas where topsoil and overburden material are stored would increase the elevation in those areas. This change in the elevation would be more visible from a distance and would be short term and moderate.

As part of reclamation, the pits would be backfilled using the overburden stored in the temporary overburden stockpile. All areas disturbed by mining would be backfilled, if appropriate, then graded to their approved post-mining topographies. Surfaces would be recontoured to their approved conditions and surface drainage patterns would be established per the approved reclamation plan. The final surface configuration (Post-mining Topography Map [Map19B], **Appendix B**) also would provide topographic relief for wildlife habitat. The regrading plan would re-establish escape cover, south facing slopes for wintering big game populations, and small drainages suitable as future location of stock ponds necessary to achieve the post-mining land use. After reclamation has been completed, the impacts to topography would be negligible.

4.2.2 Alternative B (Reduced Mining)

Impacts to the topography under Alternative B would be similar to those under Alternative A. However, the elimination of the Little Collom X Pit from the Project and the redesign of the temporary overburden stockpile for the Collom Lite Pit would change the location and the acreage of the impacts. Eliminating the Little Collom X Pit would result in no impacts to the topography of the northern portion of the Project Area. However, there would be an additional 546.2 acres of disturbance to topography under Alternative B compared to Alternative A due to increased disturbance associated with the redesign of the temporary overburden stockpile, Collom Lite Pit, and the Jubb Creek haul road configurations. These impacts to topography would be short term and moderate. After reclamation has been completed, as described for Alternative A, the impacts to topography would be negligible.

The elimination of the Little Collom X Pit would reduce the life of the Project by approximately four years. Therefore, the area would be returned to pre-disturbance conditions and topography four years sooner than under Alternative A.

4.2.3 Alternative C (No Action)

Under Alternative C, no mining would occur in the Project Area. Therefore, there would be no impacts to topographical features in the Project Area.

4.2.4 Mitigation Measures

No mitigation measures were necessary for topography.

4.3 AIR AND CLIMATE RESOURCES

4.3.1 Introduction

4.3.1.1 Air Quality Modeling

The preparation of this EA began in September 2013 and a decision to conduct modeling of the potential air quality impacts of mining was made in December 2013. In order to start developing input data for the model, an assumption was made that the mining plan modification for PR03 would be approved by the ASLM in early to mid-2015. Assumptions were then also developed for mine production rates and for the life of the mine. These assumptions resulted in the timeframe of 2014 to 2021 for which the model would calculate mine related emissions to ensure that all existing and proposed operations would be in compliance with NAAQS within the Project Area.

Emissions would be calculated for the mining and reclamation operations ongoing in late 2013 that would be expected to continue into 2014 and beyond. At that time, mining in the East Pit had terminated and reclamation operations were underway there. For the purposes of the modeling, reclamation activity in the East Pit would occur through 2016. In addition, the West and South Taylor Pits were actively being mined in late 2013, although mining in the West Pit was declining as the coal reserves were being depleted. Again, for the purposes of the modeling, mine production from the West and South Taylor pits would be maximized during 2014 and 2015 respectively, with all reclamation activity ending in 2019 and 2021, respectively. The Little Collom X and Collom Lite Pits were proposed to be mined as described under Alternative A. Alternative A operations would begin in 2015 with construction of the Collom haul road and subsequent development and mining of the Little Collom X Pit. Then the Collom Lite Pit would be developed and production ramped up to 5.1 mtpy within a year.

The collection of data relative to all of these existing and proposed operations for input to the air model was initiated in early 2014 and modeling began in mid-2014. Eleven scenarios of equipment allocation were analyzed and modeled for the time period 2014 to 2018, each as a hypothetical real-life situation that could occur on any given day. Similarly, ten scenarios were analyzed for 2019, three for 2020, and one for 2021. Daily and annual activity rates were derived from the number of trucks, bulldozers, scrapers, etc. that the mine currently has available for work onsite, and based on a 5.1 mtpy maximum production rate. All modeling runs were completed by August 2015.

4.3.1.2 Discrepancies between the Assumed Modeling Timeframes and the Actual Timeframes

The modeling data presented in the following sections was based in part on the operations ongoing at the time this EA was initiated, as well as on projected assumed timeframes for both the ongoing and proposed operations. Delays in the preparation of the EA have resulted in discrepancies between the assumed timeframes for certain operations in the model and their actual or potential future timeframes. For instance, the model assumed that construction of the Collom haul road would begin by mid-2015. In reality that work would not start until mid-2016 at the earliest if the mining plan modification is approved. As another example, the model assumes that the South Taylor Pit would maximize production in 2015 and would be gradually replaced by production from the Little Collom X Pit starting in 2015, followed shortly by increasing production from the Collom Lite Pit. However, production at the South Taylor Pit would need to continue well into 2016 and possibly into 2017, as long as coal reserves can be accessed, pending a decision on the mining plan modification for PR03. In order to maintain consistency with the assumed timeframes in the model calculations, all mine activities are discussed below in the context of their associated model assumptions, and not their actual or potential future timeframes. Therefore, the reader needs to be aware that there may be discrepancies between the assumed timeframes and the actual or potential future timeframes for the operations and activities described. Regardless of the timeline discrepancies, the modeling results were not affected.

4.3.2 Alternative A (Proposed Action)

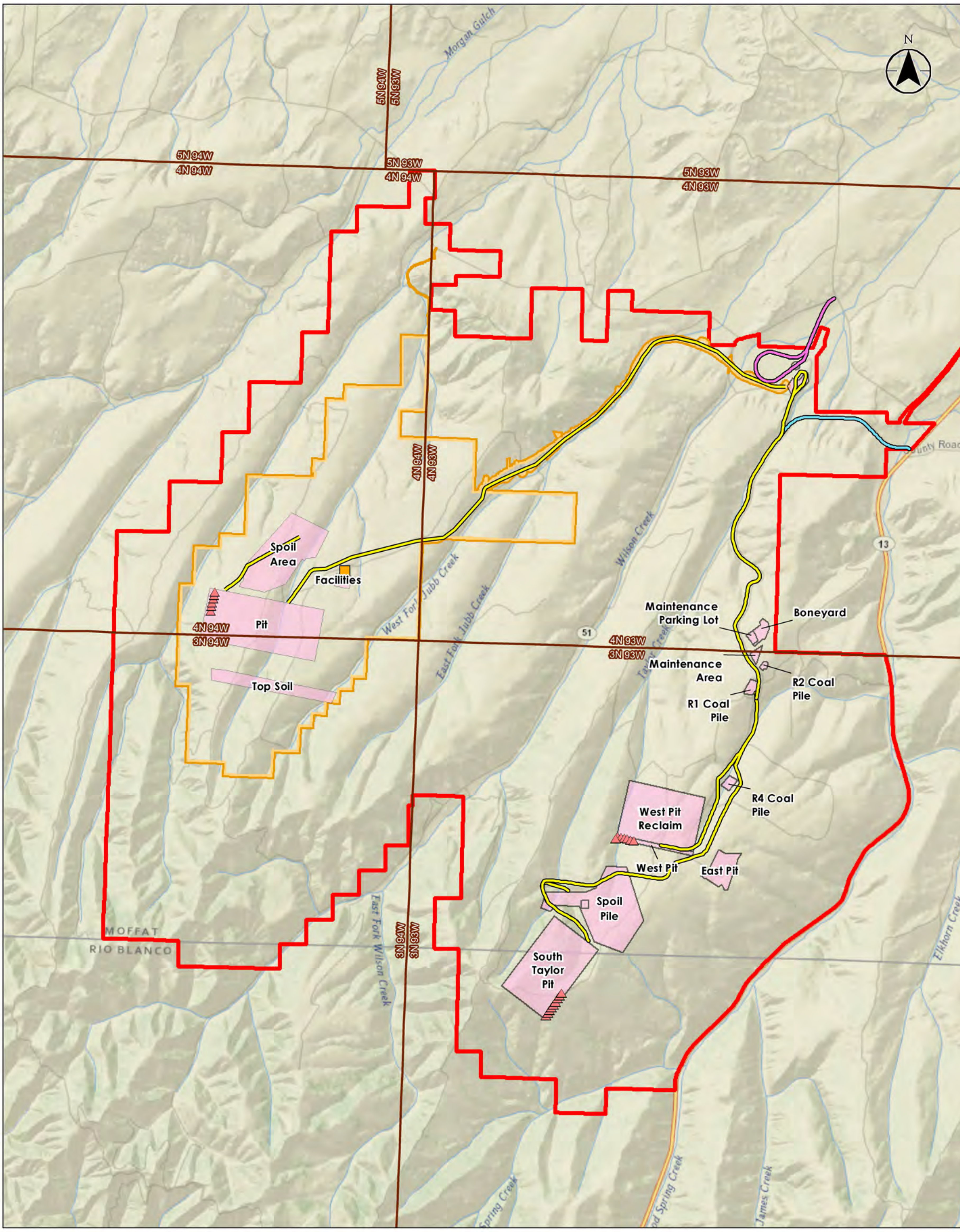
4.3.2.1 Direct Mining Criteria Pollutant Impacts

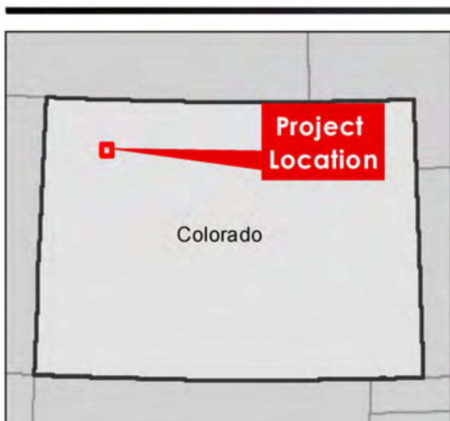
All emission sources are divided into three primary categories: fugitive emissions, process emissions, and tailpipe emissions. Fugitive emissions include excavation, haulage, and reclamation activities. Process emissions are associated with loading and unloading of coal to hoppers or haul trucks, primary and secondary crushing, conveying to storage areas, railcar loading, and rock crushing and screening. Tailpipe emissions are associated with the combustion of fuel in mine vehicles.

For purposes of the modeling analysis, mining operations under Alternative A would begin in 2015 with development of the Little Collom X Pit and production would increase through 2021 as the Collom Lite Pit comes into full production. Collom Lite production would be maintained at 5.1 mtpy going forward through the life of the mine. Simultaneously, the combined production from the West and South Taylor pits would be maximized during 2014 and 2015 and end in 2019 and 2021, respectively. Reclamation of the East pit would be conducted through 2016.

In-Pit Fugitive Emissions Sources

Within the West, South Taylor, Little Collom X, and Collom Lite pits (**Figure 4-1**), there would be numerous mining activities that would continue to, or would in the future, contribute to fugitive particulate emissions. These would include the use of shovels, a dragline, front end loaders for overburden and coal removal, and drilling holes for explosives. Fugitive emissions





- Blasting
- Crusher
- Access Road
- Blasting
- Haul Road
- Rail Loop
- Polygon Sources
- Project Area
- Approved SMCRA Permit Boundary
- Township Boundary

0 3,200 6,400 Feet

1:63,360 (At Original document size of 11x17)

Notes

1: Coordinate System: NAD 1983 UTM Zone 13N

2: Service Layer Credits: Content may not reflect National Geographic's current map policy. Sources: National Geographic, Esri, DeLorme, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp.

Project Location

Rio Blanco & Moffat Counties
Colorado

Project

Office of Surface Mining Reclamation & Enforcement
Colowyo Coal Mine: Collom Permit Expansion Area
Project Mining Plan Environmental Assessment

Figure No.

4-1

Title

Geographic Project Emissions Sources

would also occur from the use of explosives for blasting to break apart overburden for removal. Mobile sources would consist of dozers (both overburden and coal), graders, water trucks, and haul trucks.

All pit areas except the East Pit would have a blasting component associated with them. Each blast within the South Taylor pit would utilize 700,000 pounds of ANFO and the Little Collom X, and Collom Lite pits would utilize 800,000 pounds or 400 tons of ANFO, unless restricted to ensure compliance with the NAAQS. The maximum number of annual blasts in each pit would be as follows: 106 blasts per year in the West Pit, 476 blasts per year in the Little Collom X Pit, and 850 blasts per year in the Collom Lite Pit.

Other Fugitive Sources

There are additional potential sources of fugitive emissions at the mine. These include several coal storage piles at various locations on the mine property (**Figure 4-1**), which would contribute windblown dust to fugitive emissions. Also, bulldozers are utilized on all of the coal piles at various times, an activity which would release additional windblown dust. General particulates would also be attributable to travel on both unpaved and paved haul roads, as well as in the maintenance parking lot and boneyard.

Other fugitive emission sources would result from the construction of the Collom haul road, the facilities complex, and the Collom sump and sediment pond (**Figure 4-1**), all of which would be constructed in the first year of the Project before mining actually begins. For the purposes of the modeling, all such one-time, construction-related fugitive emissions were factored into the 2015 potential emissions.

Process Emission Sources

The Colowyo Coal Mine includes several sources of process emissions. The mine utilized both primary and secondary coal crushing facilities for the South Taylor Pit and the emissions from these facilities are included in the model for the period that pit would be mined. Another primary crusher would be used for both of the Collom pits. The South Taylor and Collom crushers each would provide multiple sources of particulate emissions including: loading of coal into hoppers, crushing the coal; conveying coal into storage bins; and loading coal into dump trucks. In addition, coal crushing and screening operations and loading coal onto railcars for transport would contribute to overall particulate emissions and are factored into the model.

Tailpipe Emissions Sources

Tailpipe emissions result from the travel of a variety of vehicle types over the mine's roads. The mine includes an existing 1.4 mile (2.3 km) paved access road and a 3.7 mile (6.0 km) paved haul road for South Taylor and West pits. Alternative A would add a 5.3 mile (8.5 km) paved haul road for the Project. The mine access road is primarily used by employees coming to and from the mine using typical passenger vehicles, and occasional deliveries by different types of trucks. The paved haul roads are used by all trucks hauling coal, as well as occasionally by employee vehicles and delivery trucks. For the purposes of the modeling and to be conservative with this analysis, all vehicles are assumed to travel the entire length of the road for each roundtrip, which would lead to an over-estimate of the emissions generated.

Maximum emissions are estimated at an equivalent of 150 car, 75 pickup truck, and 25 delivery vehicle roundtrips per day for 305 operating days per year. It was also assumed that for 305 operating days at the South Taylor Pit there would be 606, 50 ton haul truck roundtrips per day, and for the combined Collom pits there would be 829 roundtrips. The larger 240 ton haul truck emissions are calculated based on average distances traveled within each pit, to the temporary spoil piles from the pits and return, and from the pits to the R1, R4, and Collom coal storage piles.

Water trucks, scrapers, graders, and dozers also release tailpipe emissions within the active mining pits. Additionally, dozers are operated on the G1/G2 and R1, R4, and Collom stockpiles. All emissions are included in the modeling calculations as open pit and area sources, respectively.

Hazardous Air Pollutant Emission Estimates

A HAP is defined in 40 CFR part 61 as a pollutant that causes or may cause cancer or serious health effects such as birth defects. There are currently 187 listed HAPs (http://www.epa.gov/ttnatw01/188polls.html).

The action of combustion results in the emission of some HAPs. Similar to other gaseous pollutants associated with the mine, HAPs are a result of tailpipe emissions, blasting, and drilling activities. Diesel equipment engine characteristics, including make and model, were used to establish emissions for graders, scrapers, and dozers. Fuel consumption rates were utilized to determine drilling HAP emissions.

Combustion HAP emission factors for on-road vehicles are based on VOC emissions. Appropriate mass fractions were applied to VOC emission factors for on-road vehicles to obtain each HAP factor, based on EPA's published findings regarding the speciation of toxic VOCs and polycyclic aromatic hydrocarbons (PAH) associated with haul trucks pre and post 2007 (MOVE 2014). Blasting emission factors were based on Amatol (50% ANFO and 50% TNT) from the EPA Open Burn/Open Detonation Dispersion Model database.

4.3.2.2 Alternative A Direct Emission Calculations

Utilizing the assumptions and processes described above, emissions were calculated for criteria pollutants and HAPs (**Table 4.3-1**).

Table 4.3-1 Criteria Pollutant and HAP Emission Estimates (tpy), Alternative A

Source	PM_{10}	$PM_{2.5}$	NO_x	CO	VOC	SO_2	HAPs
Fugitive	7,156	759	3,820	24,147	0.8	2.2	5.8E-03
Process	5.2	0.8	0	0	0	0	0
Tailpipe	5.6	4.8	728	458	88.2	0.5	13.4
Total	7,167	765	4,548	24,605	89.0	2.7	13.4

When comparing gaseous criteria pollutants to state and national totals from the 2011 National Emissions Inventory (NEI)[3], Alternative A would have a negligible impact. On a percentage basis, Alternative A would range from 0.005 percent to 1.74 percent when compared to state totals; SO_2 would be the lowest and CO emissions would be the largest. On a national scale the percentage relative to the NEI would range from 0.00004 percent to 0.03 percent. SO_2, again, would contribute the least, and CO would have the highest percentage. All contributions would be insignificant in comparison. A more regional comparison of gaseous pollutants to four surrounding counties was also conducted. These counties included Garfield, Moffat, Rio Blanco, and Routt. Comparisons would range from 0.1 percent to 43.0 percent.

Particulate emissions would be similar. With fugitive emissions included, Alternative A would contribute 0.75 percent of the statewide $PM_{2.5}$ emissions. PM_{10} emissions associated with Alternative A would be 2.18 percent of the statewide total with fugitive emissions included. National percentages would be even less at 0.013 percent and 0.035 percent. Direct particulate emissions associated with Alternative A would be insignificant in comparison to Colorado and nationally. The surrounding county comparison showed that Alternative A would be a maximum of 32.1 percent of the region's particulate emissions.

The county maximum HAPs comparison of Alternative A would be 15.5 percent of the EPA 2011 NEI. The maximum HAPs emissions contributed by Alternative A would be 0.007 percent of the total HAPs emitted by the State of Colorado per the EPA 2011 NEI. Nationally, 9.05 million tons of HAPs were emitted in 2011 and Alternative A would contribute 0.0001 percent. The amount attributed to Alternative A would be insignificant by comparison.

While there would be a moderate to high contribution of emissions from Alternative A to the region, Moffat County has consistently maintained its designation of attainment. Dispersion modeling for the region supports this designation (**Section 4.3.3.3** and **Section 5.4.2.5**).

Onsite (North and Gossard) Particulate Monitoring Data

In addition to emissions data, the mine has collected ambient air quality concentration data for atmospheric particulates smaller than 10 microns. Data is collected at two sites, known as the Gossard and North sites (**Section 3.3**) using federal equivalent method (FEM) monitors. FEM monitors onsite are not used for attainment/nonattainment determination by CDPHE and the EPA. Therefore, the data obtained by these monitors is not directly used for NAAQS compliance purposes. The following discussion outlines the monitored high value events and their comparison to the standard. However, note that a high monitored value does not correlate to a NAAQS violation.

[3] The NEI is a comprehensive estimate of air emissions from all air emission sources in the U.S.

The Gossard location particulate monitoring data is provided from July 2011 through December 2013. The North location particulate monitoring data was split into five, three-year segments for evaluation against the NAAQS standard (**Table 4.3-2**) as the standard is based on a three year averaging period of concentrations.

Table 4.3-2 Monitoring Station Potential High Values, Alternative B

Station	3-Year Timeframe	Total Daily Values ≥ 154.4 µg/m3
North	Aug 2008-July 2011	8
	Aug 2009-July 2012	4
	Aug 2010-July 2013	2
	Aug 2011-July 2014	3
	Aug 2012-July 2015	3
Gossard	July 2011-Dec 2013	1

Between August 2010 and July 2013, 24-hr PM_{10} concentrations at the North monitor show high values two times; three times between August 2011 and July 2014; and three times from August 2012 through July 2015. Between July 2011 and December 2013, concentrations at the Gossard monitor were elevated once. However, the NAAQS standard allows for one exceedance per year on average over the three year period. Therefore, because the total number of exceedances was less than three for each of the above mentioned segments, those are not considered NAAQS violations.

The August 2008 through July 2011 and August 2009 through July 2012 North monitoring segments have an overlapping time period of two years (August 2009 - July 2011). As a result, any exceedances that occurred between August 2009 and July 2011 were double-counted. There were a total of eight high values between August 2008 and July 2011 (**Table 4.3-3**). Therefore, before August 2010, the number of monitored high values was greater than the allowed standard of no more than one exceedance per year averaged over three years. Colowyo addressed this situation by revising the mine's dust control plan.

Table 4.3-3 High Value Dates

Station	Date of Exceedance	24 Hr Average ($\mu g/m^3$)
North	11/2/2008	288
	3/4/2009	237
	3/22/2009	167
	7/6/2009	157
	9/29/2009	291
	9/30/2009	180
	12/4/2009	193
	5/28/2010	198
	5/26/2012	192
	1/29/2014	174
	1/5/2015	186
Gossard	5/26/2012	167

During review of particulate emission sources at the mine site, two primary direct causes of these high values were discovered. On each of the days a high value occurred, operational activities occurred in close proximity to the R3 coal stockpile. The nine exceedances between August 2008 and July 2013 also coincided with climatic conditions conducive to excessive fugitive dust formation.

The main contributors of particulates to the high values at the North monitor were likely the activities associated with the R3 coal stockpile. Scanning Electron Microscopy (SEM) analysis of the North monitor filter resulted in approximately 25.2 percent of the particulate mass on the filter being comprised of carbon-based material, suggesting coal dust as the particulate source. This confirmed the assumption that dust from the R3 coal stockpile significantly contributed to the high values at the North monitor. In order to prevent further air quality issues Colowyo developed a Dust Mitigation Plan (Colowyo 2010a), aimed at minimizing future particulate emissions.

Since implementation of the Dust Mitigation Plan only one high value event has been recorded at the North monitor. In addition, many of the monitored high values associated with the mine can possibly be attributed to an exceptional event. An exceptional event is determined by the EPA and can include natural phenomena such as high winds and wildfires, which may apply to the Colowyo Coal Mine. On March 22, 2007, the EPA promulgated the current Exceptional Events Rule (EER, 40 CFR 50 and 51). According to this rule, exceptional events are unusual or naturally occurring events that can affect air quality, but are not reasonably controllable or preventable using approved mitigation techniques that state and local air quality agencies have implemented in order to attain and/or maintain the NAAQS. These unusual or naturally occurring events are flagged as exceptional events and are not used in the determination of NAAQS attainment status. Colowyo has submitted documentation of these events are exceptional; however CDPHE has not yet reviewed the mine's exceptional events documentation nor has EPA formally approved it.

Elevated PM_{10} Events at North Site

The eight exceedance events (**Table 4.3-3**) were addressed by Colowyo in a Mitigation Modeling Report issued in June 2010 (Colowyo 2010b). Although it was determined that the primary contributor to the eight high values that occurred between 2008 and 2010 were coal dust emissions from the R3 stockpile and fugitive dust from the maintenance/parking area, three of those events could possibly be considered exceptional events.

High Concentration Days Evaluation

Table 4.3-4 illustrates a summary of the three 24-hr PM_{10} high value days which can potentially be identified as exceptional events. The table identifies the average and maximum wind speed on the days the exceedances occurred.

Table 4.3-4 High Wind Days

Station	Date of Exceedance	Average Wind Speed (m/s[1])	Maximum Wind Speed (m/s)
North	11/2/2008	8.2	12.5
	9/29/2009	7.3	9.2
	9/30/2009	8.2	14.6

[1] meters/second

The EPA guidance for exceptional events identifies a wind speed threshold of 11.2 m/s (25 mph). The maximum wind speeds for November 2, 2008 and September 30, 2009 exceed the 11.2 m/s threshold (**Table 4.3-4**). This occurred for two of the six hours when the NAAQS were exceeded during November 2, 2008 and three of the six hours during September 30, 2009. The hours with highest wind speed correlate with the time when the highest concentrations were observed for November 2008. The correlation does not hold true for September 2009, but during the highest wind hours, the air quality monitor malfunctioned. Had that not occurred, it is likely that the concentrations would have been high. Additionally, all hours for which data was recorded showed a wind speed of greater than the 95th percentile of the EPA threshold for September 30, 2009 and for a third of the hours for November 2, 2008. Therefore, it is possible that for those two days of high values, an exceptional event had occurred.

The data suggest some variation for September 29, 2009. The maximum hourly wind speeds do not meet the 11.2 m/s threshold, nor do any exceed the 95th percentile. However, unlike the other two events that were evaluated, there was not a significant variance and standard deviation of the wind speeds. Both November 2, 2008 and September 30, 2009 were relatively calm days with only a handful of hours with very high winds, while September 29, 2009 had consistent winds for the entirety of the day.

With the mitigation now in place and the removal of stockpile R3 and chemical stabilization of the maintenance parking lot and boneyard, the direct emissions associated with Alternative B would be less likely to produce any high values in the future unless there is a regional exceptional event.

Direct Greenhouse Gas Emission Estimates

Direct GHG emissions sources from onsite mining are in two main categories: the emissions (methane) released by the exposure of the coal seams to the atmosphere and the combustion emissions from mining equipment. The combustion emission component includes gaseous emissions and particulate emissions (black carbon).

Methane Emissions from Coal Extraction

Methane (CH_4) is the predominant GHG emitted from direct surface coal extraction and post-extraction handling of coal. The final methods used to determine methane emissions from coal mining and handling are included in the Intergovernmental Panel on Climate Change (IPCC) Guidelines (Irving et al 2001). One approach is the Tier 1 approach or Global Average Method. It requires the use of emission factors-based characteristics of coal from regional studies. It should be used when basin specific data is unavailable. Tier 2 is the "Country or Basin Specific Method". Both methods are recommended by the IPCC for surface mining estimates.

A Tier 2 methodology was used to determine methane emissions estimates from extraction for both Alternative A and Alternative B. In addition to methane estimates from coal extraction, post-mining estimates were also determined. Tier 2 methodologies were used because emission factors associated with Rocky Mountain coal were available.

Alternative A assumes 5.1 mtpy (4.63 million metric tons [mmt]). The IPCC has supplied default emission factors for surface mining with a range of 0.3 to 2.0 m^3 CH_4/metric ton (mt) of coal. Basin specific factors are derived from the in-situ factors, which are based on geologic regions of the U.S. The Colowyo Coal Mine falls into the Rocky Mountain region with an in-situ basin methane emission factor for coal of 0.4 m^3 CH_4/mt. The second component of total surface mining methane emissions is the methane content of the surrounding strata. Total surface mining emissions typically produce twice as much methane as in-situ coal (EPA 2006). The surrounding strata are assumed to also have an emission factor of 0.4 m^3 CH_4/mt resulting in a total factor of 0.8 m^3 CH_4/mt. A factor of 0.67 Gg/10^6 m^3 was implemented as part of the conversion from cubic meters to metric tonnes.

Post-mining coal handling also contributes to overall methane emissions. Again, the in-situ emission factor is applied, but, to avoid overestimates, only the percentage of gas released is included in the calculation. On average, western U.S. coal retains 72 percent of the methane (Kirchgessner et al. 1996). Therefore, 28 percent is released during the post-mining handling process.

After aggregating the two processes (extraction and post-mining) and assuming 4.63 mmt/year coal extraction, the total methane emitted is 2,827 metric tonnes annually. Additionally, the extraction of all 74.1 mmt (81.7 million short tons) would generate approximately 49,922 metric tonnes of methane.

Mining Combustion Gaseous GHG Emissions

The EPA regulates several GHGs, which primarily include carbon dioxide (CO_2), CH_4, and nitrous oxide (N_2O). There are several other regulated GHGs, such as refrigerants, that are not emitted by the mine. CO_2, CH_4, and N_2O are byproducts of incomplete combustion and are emitted via tailpipe, blasting, and drilling. Each regulated GHG has an associated global warming potential (GWP). GWP was developed to allow for direct comparisons of global warming impacts of different gases. CO_2 is used as the reference gas and therefore has a GWP of 1. According to the EPA, CH_4, and N_2O have GWPs over 100 years of 25 and 298, respectively. All associated GHG emissions are multiplied by each applicable GWP and aggregated together to obtain a final value of carbon dioxide equivalent (CO_2e) in units of metric tons.

Utilizing EPA emissions factors and the maximum mining rate of 5.1 mtpy, the direct GHG emissions associated with Alternative A are detailed **Table 4.3-5**. In 2011, 2,245 mmt of CO_2e were emitted throughout the U.S. according to the EPA NEI database. Also, 130 mmt were emitted within Colorado as stated by the 2014 Colorado Greenhouse Gas Inventory Update. Alternative A would contribute 0.40 percent of the statewide total and 0.023 percent nationwide. In comparison, the amount associated with Alternative A would be insignificant. The emissions contributable to Alternative A would be much smaller when compared to the statewide and national GHG emissions.

Black Carbon Emission Estimates

Black carbon is a significant component of particulate emissions related to incomplete combustion. Haul trucks and locomotive use of diesel fuel are sources of black carbon. As of 2005, 93 percent of all mobile source black carbon emissions came from diesel engines (EPA 2012). Black carbon directly absorbs light and reduces the reflection of heat off snow and ice as it gets deposited. Black carbon has been linked to climate impacts such as increased temperatures and accelerated ice and snow melt.

All haul truck types were evaluated for their contribution of black carbon as a percentage of overall particulate (**Table 4.3-6**). All 240T trucks were assumed 830E Komatsu haul trucks, which all have a “2007-plus” engine. The 50T haul trucks are “pre-2007” engines. The EPA has determined black carbon to be a higher percentage of particulate matter when emitted from engines constructed prior to 2007. There is a drastic reduction for newer engines because of better design and use of diesel particulate filters (DPFs). The carbon black percentage of pre-2007 trucks is 78.97 percent compared to 9.98 percent for post-2007 trucks (MOVE 2014). Passenger vehicles also contribute to black carbon emissions, but it is approximately an order of magnitude less.

Table 4.3-5 Direct GHG Emissions (metric tons/yr), Alternative A

Activity	CO_2	CH_4	N_2O	CO_2e
Scrapers[5]	2,993	0.17	0.08	3,020
Drills[8]	26,103	1.05	0.20	26,191
Dozers[3]	25,171	1.41	0.64	25,398
Graders[4]	131,812	7.37	3.36	132,999
Haul Trucks (240T)[6]	50,375	1.26E-02	0.01	50,379
STA Haul Trucks (50T)[7]	2,484	2.6E-03	2.4E-03	2,485
Collom Haul Trucks (50T)[7]	6,312	6.6E-03	6.2E-03	6,314
Water Trucks[1]	14,916	0.015	0.01	14,921
Blasting[2]	185,053	6.54	1.63	185,704
Access Road	62	3.58E-03	7.30E-03	64
Rail Maintenance	602	0.04	6.85E-03	605
Methane Release	--	2,827	--	70,675
Total	**445,885**	**2,844**	**6.0**	**518,754**

[1] All water trucks use the same engine as the 793C haul trucks; assumes 10 mph speed

[2] Blasting assume 400 tons of ANFO per blast

[3] Assumes an average of 25 gal/hr fuel consumption from Caterpillar Performance Handbook edition 42 - D-11 T tractors medium consumption rate

[4] Assumes an average of 15 gal/hr fuel consumption from Caterpillar Performance Handbook edition 42 - 24 M graders medium consumption rate

[5] Assumes an average of 24 gal/hr fuel consumption from Caterpillar Performance Handbook edition 29 - 637E scrapers medium consumption rate; also average speed of 8 mph

[6] Assumes an average of 50 gal/hr fuel consumption from Komatsu Application Handbook Edition 30 - 830E haul truck high consumption rate; also average speed of 25 mph (real time fleet data)

[7] Weststar 6900XD; average speed of 25 mph; 120 gallon tank assumed to be filled after each 10 hr shift - 12 gal/hr fuel consumption

[8] Assumes 1,200 gal diesel consumed per day

Table 4.3-6 Black Carbon Emissions (tpy) from Haul Trucks, Alternative A

Haul Truck	Black Carbon $PM_{2.5}$	Black Carbon PM_{10}
50 Ton	0.056	0.066
240 Ton	0.302	0.329
Access Road	5.39E-04	5.82E-04

4.3.2.3 Air Quality Environmental Controls for Direct Emissions from the Mine Roads

The Colowyo Coal Mine employs a dust suppression program for in-pit roads and other unpaved roads, which primarily involves periodic watering. As needed, mine water trucks spray water along the roadway to mitigate dusty conditions. During the dryer months of the year, the water trucks wet down active roadways a minimum of two or three times per shift. If watering of the roadways is not adequate to control dust, a chemical dust suppressant may be applied to the primary in-pit roads to aid in dust suppression during the dryer months. Colowyo surfaces in-pit roads with crushed rock; in-pit roads would not be paved with asphalt. The out-of-pit haul roads are paved with asphalt to provide for dust control.

Per the mine's DRMS Permit, a strict speed limit of 45 mph is implemented for all roads to control dust and to provide for safe operation of the equipment. All heavy equipment is limited to 25 mph or less for safety and dust control. This includes haul trucks, scrapers, water trucks, etc. Travel of unauthorized vehicles is prohibited onto the mine property, and overburden haul equipment is restricted to roads with appropriate capacity and structure for the equipment size and weight. In addition, most haul road embankment slopes and adjacent areas are mechanically stabilized and seeded with a reclamation seed mixture. Mechanical stabilization consists of furrowing, chiseling, "cat tracking", and mulch, depending on accessibility to the slopes, and prevents dust formation from erosion and wind exposure.

Coal Crushing Facility

The coal crushing and conveying operations at the primary crusher and the Gossard loadout have been equipped with water spraying systems at all coal transfer points. Water sprays have been installed at the primary crusher to prevent excessive dust emissions. The secondary crusher at the Gossard Loadout has a baghouse to control coal dust emissions. A stacking tube with metal doors is also used to minimize coal dust emissions at the 100,000-ton crushed coal stockpile. These air quality control measures at the coal crushing handling and loadout facilities have been approved by the CDPHE.

The Colowyo Coal Mine maintains several areas for coal storage near the in-pit crusher and also near the Gossard Loadout. Inactive storage piles have been sloped and compacted to prevent wind erosion and spontaneous combustion. If coal dust becomes a problem in the active coal storage piles, a mobile water truck with a high pressure pump and nozzle is available for dust suppression.

Disturbance

The Colowyo Coal Mine, to the extent practical, minimizes the area of land disturbed at any one time. Topsoil is removed only to the extent necessary to accommodate the mining operations. The re-handling of both topsoil and spoil material is kept to a minimum. Reclamation of disturbed areas commences as contemporaneously as possible. As necessary, a mobile water truck is assigned to work in topsoil or spoil removal areas to keep any dusty conditions under control.

4.3.2.4 Dispersion Modeling Impact Analysis

Due to the time required to complete a dispersion modeling assessment, dispersion modeling to ensure NAAQS compliance for Alternative A was not completed because Alternative A was determined to have the potential for significant impacts (for non-air resources) and as such was not likely to be selected for mine planning. Dispersion modeling was completed for Alternative B (**Section 4.3.3.3**).

4.3.2.5 Indirect Combustion Criteria Impacts

The number and location of coal customers for the mine has varied annually and over time. Coal is a commodity, and the use of the coal from the mine would depend on a number of factors including demand, price, quality, and transportation, among others.

The Colowyo Coal Mine has historically provided coal to a variety of end users, both regionally and nationally. Since 1977 (the beginning of coal sales records), Colowyo has provided coal to approximately ninety different end users all over the nation. In recent years (2009 to present), Colowyo has sold between 66 percent and 99 percent of their coal to the Craig Generating Station. The average annual sales to the Craig Generating Station between 2007 and 2014 were 2.3 mtpy. This represents approximately 48 percent of the 4.8 mtpy required for the Craig Generating Station's annual average combustion needs.

The trend towards supplying coal exclusively to the Craig Generating Station seen in the 2007 to present timeframe is a deviation from historical coal sales within which Colowyo sold coal to a much wider array of end users. Although ongoing coal sales to the Craig Generating Station is likely to continue in the future, with increased coal mining rates as proposed under Alternative A, the relative percentage of Colowyo Coal Mine coal being shipped to the Craig Generating Station would be reduced and a coal distribution more consistent with the longer historical sales record would likely return.

The Colowyo Mine is connected to a main rail line via a private rail spur that connects to the coal load out facility at the mine and runs north to Craig where it intersects with the Moffat Tunnel line. The latter line then connects to two east-west rail lines 80 miles southeast of Craig in Eagle County. Coal heading east of this intersection will pass through the Moffat Tunnel and deliver coal to the eastern slope of Colorado. Coal heading west of this intersection will join with a major east-west rail line that delivers coal throughout the country.

The mine has an existing contract based on MMBTU or quality of coal with the Craig Generating Station to which provides approximately 2.3 mtpy; this contract expires in 2017. For the reasons listed above, it is difficult to project exactly how much coal from the mine would be burned at any particular power plant at any given time in the future.

In addition to the reasonably foreseeable combustion of coal at the Craig Generating Station, coal provided by the mine is particularly economically viable for regional generating facilities due to the reduced cost of transport. As a result, the Hayden Generating Station is also a reasonably foreseeable future user of coal from the Colowyo Coal Mine. Using the Craig and Hayden Generating Stations as reasonably foreseeable locations for the combustion of coal produced at the mine, criteria pollutant emissions from coal combustion at these facilities (**Table 4.3-7**) can be used to calculate emissions associated with coal from the Colowyo Coal Mine. Power plant emissions are analyzed and regulated by state and tribal governments to determine whether impacts will cause or contribute to violations of federal and state/tribal ambient air quality standards. Federal and state rules for power plant emissions address hazardous and toxic air pollution from power plants to protect public health and the environment.

Table 4.3-7 Reporting Year 2013 Criteria Emissions Data

Facility	2014 (reported year) Annual Actual Pollutant Emissions (tpy)					
	PM_{10}	$PM_{2.5}$	CO	NO_2	SO_2	VOC
Craig Generating Station	172.2	121.1	1,232.8	12,091.0	3,261.0	62.2
Hayden Generating Station	148.3	67.5	385.1	6,483.6	2,330.7	49.2

Source: APENS

The maximum coal produced under Alternative A would be 5.1 mtpy, so this maximum production was used to conservatively estimate annual criteria pollutant emissions (**Table 4.3-8**). Emissions were also calculated for the current maximum contracted coal tonnage. These rates may vary significantly from year to year, but are useful for determining a general estimate of criteria pollutant emissions. Emissions are calculated based on the highest regional emission factor (regional maximum), the average regional emissions factor (regional average), and using the Craig Generating Station emissions factors. Specifically, emissions factors were calculated by dividing the annual emissions total for each pollutant by the facility's total maximum firing rate (high heating value in MMBTU). This was completed for the Craig Station and Hayden Station, respectively. On a pollutant by pollutant basis, the maximum (for either location), average (average of Hayden and Craig) and Craig Station only emissions factors were then determined in lb/MMBTU. The emissions presented in **Table 4.3-8** were then calculated by multiplying the coal combustion rate in tons by the high heating value for western coal and the maximum, average, and Craig Station only emission factors.

Table 4.3-8 Predicted Criteria Emissions Data (tpy)

Emissions Method	Coal Combustion Rate (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy	CO (tpy)	NO_2 (tpy)	SO_2 (tpy)	VOC (tpy)
Regional Maximum							
Maximum Mining	5,100,000	431.45	196.48	1,544.59	18,867.09	6,782.27	143.17
Contracted Rate	2,300,000	194.57	88.61	696.58	8,508.69	3,058.67	64.57
Regional Average							
Maximum Mining	5,100,000	323.61	174.09	1,332.61	17,008.02	5,434.01	110.54
Contracted Rate	2,300,000	145.94	78.51	600.98	7,670.28	2,450.63	49.85
Craig Generating Station Only							
Maximum Mining	5,100,000	215.77	151.70	1,544.59	15,148.96	4,085.75	77.92
Contracted Rate	2,300,000	97.31	68.41	696.58	6,831.88	1,842.59	35.14

The Hayden Generating Station emission factors were higher on a lb/MMBTU basis for PM_{10}, $PM_{2.5}$, SO_2, VOC, and NOx emission rates while the Craig Generating Station produced the higher emission factor for CO. **Table 4.3-9** presents the relative percentage of the 2011 EPA NEI for Colorado that the predicted emissions represent. Emissions for all sources in Colorado were compared to the emissions presented above.

Emissions at the maximum mining rate would range from 0.03 percent to 12.17 percent of the Colorado total NEI emissions using the regional maximum emissions factors and from 0.02 percent to 9.75 percent based on regional average emissions factors (**Table 4.3-9**). It should be noted that these values are highly conservative and would exceed the annual coal combustion rate at either the Craig or Hayden Generating Stations, which are approximately 4.8 and 2.0 mtpy, respectively. Emissions at the maximum mining rate would range from 0.0008 percent to 0.1314 percent of the national total NEI emissions and from 0.006 percent to 0.1184 percent based on regional average emissions calculations (**Table 4.3-9**). The emissions would be considered insignificant relative to the national emissions totals and moderate emissions relative to the Colorado emissions total.

Emissions at the maximum mining rate when compared to the four surrounding counties would range from 0.11 percent to 100.5 percent. As stated above, the assumed 5.1 mtpy is a very conservative combustion rate and not representative of current rates at either generating station. Emissions under the contracted rate of 2.3 mtpy would range from 0.05 percent to 45.3 percent of the surrounding county total emissions. These would be substantial contributions associated with the two generating stations, but the regional designation regarding NAAQS compliance would not change and remain in attainment. As described in **Section 4.3.2.4**, the values from the state monitoring network are well under NAAQS compliance levels when natural exceptional events are excluded. Additionally, monitoring for PM_{10} at Colowyo has shown compliance with the PM_{10} NAAQS since January 2010. This is because the PM_{10} standard allows up to three exceedances in a 3-year period.

Table 4.3-9 Predicted Criteria Emissions Data (% NEI)

Emissions Method	Coal Combustion Rate (tpy)	PM_{10} (% of 2011 Colorado NEI)	$PM_{2.5}$ (% of 2011 Colorado NEI)	CO (% of 2011 Colorado NEI)	NO_2 (% of 2011 Colorado NEI)	SO_2 (% of 2011 Colorado NEI)	VOC (% of 2011 Colorad o NEI)
Regional Maximum							
Maximum Mining	5,100,000	0.13%	0.19%	0.11%	6.20%	12.17%	0.03%
Contracted Rate	2,300,000	0.06%	0.09%	0.05%	2.80%	5.49%	0.01%
Regional Average							
Maximum Mining	5,100,000	0.10%	0.17%	0.09%	5.59%	9.75%	0.02%
Contracted Rate	2,300,000	0.04%	0.08%	0.04%	2.52%	4.40%	0.01%
Craig Only							
Maximum Mining	5,100,000	0.07%	0.15%	0.11%	4.98%	7.33%	0.01%
Contracted Rate	2,300,000	0.03%	0.07%	0.05%	2.25%	3.31%	0.01%

Indirect Coal Combustion GHG and Climate Change Impacts

In 2010, in an attempt to assess GHG emissions on a facility, regional and national level, the EPA introduced the Greenhouse Gas Reporting Program (GHGRP). The program collects GHG data from forty-one source categories. GHGRP data includes direct emissions from large stationary sources, accounting for approximately half of total U.S. GHG emissions, and also data from suppliers of materials that would result in GHG emissions when those materials are burned or released. Most industries began reporting for 2010; additional industries began reporting for 2011. The regulations that introduce the GHGRP also provided a standardized means to assess and calculate GHG emissions. These calculation methods were codified in 40 CFR Part 98. For the calculation of combustion emissions the methods are included in subpart C of that regulation. These emissions calculations are an approved method for tabulating GHG pollutant emissions for the most common GHG pollutants. The emissions are not dependent on emissions location or combustion type and provide both speciated and CO_2e emissions. CO_2e is a quantity that describes, for a given mixture and amount of GHG, the amount of CO_2 that would have the same GWP, when measured over a specified timescale (generally, 100 years). CO_2e thus reflects the time-integrated radiative forcing of a quantity of emissions or rate of GHG emission—a flow into the atmosphere—rather than the instantaneous value of the radiative forcing of the stock (concentration) of GHGs in the atmosphere.

The CO_2e for a gas is obtained by multiplying the mass and the GWP of the gas. According to EPA, CH_4 and N_2O have GWPs over 100 years of 25 and 298, respectively. This means that emissions of 1 million metric tonnes of methane and nitrous oxide respectively is equivalent to emissions of 25 and 298 million metric tonnes of CO_2.

The USEPA provides prepopulated spreadsheets for the calculation of stationary fuel combustion, which are based on their approved methodologies for GHG reporting. For Alternative A, these spreadsheets were used to assess the total GHG emissions associated with combusting the coal produced by the mine both in terms of the maximum annual rate of mining and the maximum total coal recovery.

The following GHG emissions would be generated from the coal mining rates under Alternative A (**Table 4.3-10**).

Table 4.3-10 GHG Coal Combustion Emissions, Alternative A

Coal Combusted (Short Tons)		CO_2 Emissions (Metric Tonnes)	CH_4 Emissions (Metric Tonnes)	Total CH_4 in CO_2e (Metric Tonnes)	N_2O Emissions (Metric Tonnes)	Total N_20 in CO_2e (Metric Tonnes)	Total CO_2e (Metric Tonnes)
81,650,000	Proposed Total Mine Tonnage	189,874,658	22,391	559,772	3,257	970,543	191,404,973
5,100,000	Proposed Maximum Annual Mine Tonnage	11,859,899	1,399	34,964	203	60,622	11,955,485

The values detailed in **Table 4.3-10** represent two separate components. The first presents the total GHG emission impacts from the combustion of all coal under Alternative A. These emission impacts would occur over the life of the mine until 2017. The second represents the maximum annual emissions assuming that all mined coal (at the maximum mining rate) is combusted in one year.

Based on maximum annual GHG emission impacts, the GHG emissions associated with coal combustion under Alternative A would represent 0.041 percent of estimated global emissions and 0.196 percent of estimated U.S. net emissions at the maximum mine rate; these emissions would be negligible. It should be noted that these rates exceed the historical utilization rate of Colowyo coal at the Craig Generating Station and as such exceed the emissions historically generated. Finally, given that the causal link between an individual GHG emissions source and global climate change impact is not a direct relationship, the results of these emissions on final climate change impacts is unknown.

Regardless of the accuracy of those emission estimates, predicting the degree of impact that any single emitter of GHGs may have on global climate change, or on the changes to biotic and abiotic systems that accompany climate change, is not possible at this time. No tools or scientifically defensible analysis methods exist to describe the degree to which any observable changes can, or would be, attributable to Alternative A. As such, the extent of impact that emissions resulting from continued mining may have on global climate change, as well as the accompanying changes to natural systems, cannot be accurately quantified (US GCRP 2009).

To provide some additional context, the EPA has recently modeled global climate change impacts from a model source emitting 20 percent more GHGs than a 1,500 MW coal-fired steam electric generating plant (approx. 14,132,586 metric tons per year of CO_2, 273.6 metric tons per year of NO, and 136.8 metric tons per year of methane). The model included an estimate of a hypothetical maximum mean global temperature value increase resulting from such a project. The results ranged from 0.00022 and 0.00035 degrees Celsius occurring approximately 50 years after the facility begins operation. The modeled changes are extremely small, and any downsizing of these results from the global scale would produce greater uncertainly in the predictions. The EPA concluded that even assuming such an increase in temperature could be downscaled to a particular location, it "would be too small to physically measure or detect" (Letter from Robert J. Meyers, Principal Deputy Assistant Administrator, Office of Air and Radiation re: "Endangered Species Act and GHG Emitting Activities (October 3, 2008)). The Project emissions are a fraction of the EPA's modeled source and are shorter in duration, and therefore it is reasonable to conclude that the Project would have no measurable impact on the climate.

Although it is impossible to connect a single emitter of GHGs to the degree of impact that emitter may have on global climate change, EPA (2015b) has predicted that Colorado will experience the following general trends related to climate change:

- The region will experience warmer temperatures with less snowfall.
- Temperatures are expected to increase more in winter than in summer, more at night than in the day, and more in the mountains than at lower elevations.
- Earlier snowmelt will result in earlier peak stream flows, weeks before the peak needs of ranchers, farmers, recreationalist, and others. In late summer, rivers, lakes, and reservoirs will be drier.
- More frequent, more severe, and possibly longer-lasting droughts will occur.
- Crop and livestock production patters could shift northward; less soil moisture due to increased evaporation may increase irrigation needs.
- Drier conditions will reduce the range and health of ponderosa and lodge pole pine forests, and increase the susceptibility to fire.
- Grasslands and rangelands could expand into previously forested areas.
- Ecosystems will be stressed and wildlife such as the mountain lion, black bear, long-nose sucker, marten, and bald eagle could be further stressed.

Social Cost of Carbon

The EPA and other federal agencies use the social cost of carbon (SCC) to estimate the climate benefits of rulemakings. The SCC protocol was also developed for use in cost-benefit analyses of proposed regulations that could impact cumulative global emissions (Shelanski and Obstfeld 2015). The SCC is an estimate of the economic damages associated with an increase in CO_2 emissions. This is typically expressed as 1 mt in a single year. This dollar cost figure from this calculation represents the value of damages avoided for an associated carbon emissions reduction.

The SCC is meant to be an estimate of climate change damages and includes, but is not limited to, changes in net agricultural productivity, human health, and property damages from increased flood risk. However, given current modeling and data limitations, it cannot include all damages or benefits.

Based on emission estimates for coal combustion, SCC calculations can quickly rise to large values; however, specific threshold levels for the determination of significance can vary depending on numerous project factors. NEPA does not require a cost-benefit analysis or the presentation of the SCC cost estimates quantitatively. Without a complete monetary cost-benefit analysis, which includes the social benefits of energy production, inclusion solely of a SCC analysis would be misleading. Therefore, OSMRE did not apply the SCC protocol in this analysis. GHG coal combustion emissions are quantified and contextualized against global and national GHG emissions above.

Ozone Impacts

Ozone (O_3) can be found in the earth's atmosphere at both ground level and the upper regions. Upper atmospheric ozone is also known as the ozone layer, and protects earth's surface from the sun's rays. Ground level ozone is the main component of smog and is considered a harmful pollutant.

Ground level ozone is not emitted directly into the air but is created by chemical reactions between NOx (NO and NO_2) and VOCs in the presence of heat and sunlight (EPA 2015). The most significant chemical reaction driving the formation of ground level ozone is photolysis of nitrogen dioxide (NO_2); however, this process is reversed by the reaction of NO with ozone. Therefore, the formation of ozone due to NOx is dependent on the NO_2 to NO ratio and, by itself, would result in very low levels of ozone formation. The net effect of the nitrogen cycle is neither to generate nor destroy ozone molecules. Moreover, for ozone to accumulate, an additional pathway is needed to convert NO to NO_2; one that will not destroy ozone. The photochemical oxidation of VOCs, such as hydrocarbons and aldehydes, provides that pathway (CARB 2015). When VOCs are present, they form radicals that convert NO to NO_2 and, thus, increase the formation of ozone.

The relative amounts of VOCs and NOx at a particular location, in addition to climatological conditions, will determine whether the NOx behaves as a net ozone generator or a net ozone inhibitor. When the VOC/NOx ratio in the ambient air is low, NOx tends to inhibit ozone formation. In such cases, the amount of VOCs tends to limit the amount of ozone formed, and the ozone formation is called "VOC-limited". When the VOC/NOx ratio is high, NOx tends to generate ozone. In such cases, the amount of NOx tends to limit the amount of ozone formed, and ozone formation is called "NOx -limited" (CARB 2015).

Precursors of ozone including NOx and VOCs are generated by both direct and indirect sources. The vast majority of precursor emissions are derived from coal combustion and to a lesser degree, onsite blasting. Based on the combustion at the Craig Generating Station at either the Alternative A maximum coal mining rate (5.1 mtpy) as well as at the reasonably foreseeable contracted coal combustion rate (2.3 mtpy), conservative estimates of ozone precursors are included in **Table 4.3-11**.

Table 4.3-11 Predicted Ozone Precursor Emissions Rates Based on 2013 Craig Generating Station Factors and Blasting Emissions, Alternative A

Emissions Method	Coal Combustion Rate (tpy)	NO_2 (tpy)	VOC (tpy)
Craig Max Mining Rate	5,100,000	15,148.96	77.92
Craig Station Firing Rate	2,300,000	6,831.88	35.14
Blasting	N/A	3,820.24	0.81

Although ozone precursor emissions from the combustion of coal and direct onsite blasting can be significant, current rates of coal combustion from regional generating facilities and other sources of ozone precursors have not resulted in ambient ozone concentrations that have exceeded the NAAQS.

Regional Ozone Compliance

CDPHE provides statewide annual air quality reports for NAAQS comparison and subsequent attainment/nonattainment designation. Prior to 2012, Colorado was divided into five multi-county areas that were generally based on topography. These include: the Eastern Plain, the north Front Range, the Southern Front Range, the Mountain Counties and the Western Counties. The divisions are groupings of monitoring sites with similar characteristics. The area most similar and geographically-near the Project Area is the Western Counties. The Western Counties generally contain smaller towns located in fairly broad river valleys. Ten counties comprise the Western Counties. The counties geographically from north to south are: Moffat, Rio Blanco, Garfield, Mesa, Delta, Montrose, San Miguel, Dolores, Montezuma, and La Plata. Starting in 2012, Montezuma and La Plata counties were removed and integrated into a new monitoring area (Southwestern).[4] The remaining eight counties and Ouray County are now part of the Western Slope monitoring area. All annual reports from 2007 to 2014 were evaluated for potential regional NAAQS exceedances and/or violations. The 2014 report has not yet been completed, but 2014 ozone data was provided by CDPHE.

Direct combustion rates at both the Craig and Hayden Generating Stations are not proposed to change in the foreseeable future. Therefore, the most recent regional monitoring data

[4]See Figure 1 of the Colorado Annual Monitoring Network Plan 2015: Colorado Air Pollution Control Division: http://www.colorado.gov/airquality/tech_doc_repository.aspx?action=open&file=2015AnnualNetworkPlan.pdf

(2014) is representative of Alternative A. **Table 4.3-12** outlines the regional ozone concentrations at three monitoring sites. The current ozone standard is 0.070 ppm.

Table 4.3-12 2014 Western Slope Ozone Monitor Concentrations

Site Name	Location	Ozone 8-hr Avg (ppm)		
		1st Maximum	4th Maximum	3-yr Avg of 4th Max. (2012-2014)
Garfield County				
Rifle	195 14th St.	0.062	0.061	0.063
Mesa County				
Palisade Water Treatment	865 Rapid Creek Dr.	0.064	0.062	0.066
Moffat County				
Lay Peak	17820 CR 17	0.067	0.062	0.064

Ozone standards are based on the 4th high value averaged over a three year period for the 8-hr averaging period. For all monitor locations operated by CDPHE, the ambient concentration values indicate that the region is in compliance with the ozone NAAQS suggesting that reasonably foreseeable rates of coal combustion emissions for Alternative A would not produce exceedances of the NAAQS. This includes compliance with the 2015 revised 2015 ozone NAAQS.

There have been ozone exceedances (at non-CHPHE sites) of the new 0.070 ppm standard regionally. These exceedances have occurred in Rio Blanco County at the Rangely site (operated by BLM). CDPHE believes these exceedances are related to other regional source categories, such as oil and gas, not to the Craig or Hayden generating stations. The combustion rates of the Craig and Hayden Generating Stations are not proposed to change in the foreseeable future. Although their precursor emissions are high it does not equate to the creation of a regional ozone compliance issue. The regional ozone reaction is limited by VOC emissions; without large VOC emissions, even large amounts of NOx emissions do not lead to higher ozone concentrations. Although the emission rates for NOx from the coal combustion are substantial, if the regional ozone reaction is limited by VOC emissions, even large amounts of NOx emissions from the power plants do not lead to higher ozone concentrations.

Indirect Mercury Impacts

Description of Potential Mercury Emissions Generated by Coal Combustion

In order to describe the total potential mercury emissions that can be generated by mined coal, one must have representative data for the quality and characteristics of the coal as well as the control strategies and equipment utilized at the final combustion location. In the period from 2007 to present, Colowyo has provided most of their mined coal to the Craig Generating Station. During the period from 2007 to present, the Craig Generating Station has provided actual mercury emissions from all onsite atmospheric emission sources via the USEPA's Toxic Release Inventory (TRI) program.

TRI tracks the release of certain toxic chemicals that may pose a threat to human health and the environment. U.S. facilities in different industry sectors must report annually how much of each chemical is released to the environment and/or managed through recycling, energy recovery, and treatment.

Mercury emissions for the Craig Generating Station were reported by the facility for all atmospheric emissions sources. **Table 4.3-13** presents the actual mercury emissions that were reported by the facility.

Table 4.3-13 TRI Reported Atmospheric Emissions for the Craig Generating Station

Reporting Year	Hg Emissions (lbs/year)
2007 TRI	130
2008 TRI	130
2009 TRI	30
2010 TRI	43
2011 TRI	43
2012 TRI	44
2013 TRI	42.4

Emissions for the Craig Generating Station have changed significantly throughout the period from 2007 to 2013. This is a result of the installation of mercury emissions controls at the facility.

Using the reported TRI emissions and the coal combusted at the Craig Generating Station reported during that period, an emissions factor can be calculated for a pound of mercury per ton of coal combusted. Based on the calculated emissions factors mercury emission impacts vary significantly between the emissions controls in place in 2007 at the Craig Generating Station and the emissions controls in place in 2013. The resultant mercury emissions impacts are provided in **Table 4.3-14**.

Table 4.3-14 Potential Coal Combustion Mercury Emissions Using Craig Generating Station TRI Actual Emissions, Alt. A

Coal Production	Emission Factor (Derived from 2007 TRI)	Emission Factor (Derived from 2013 TRI)	Total Predicted Hg Emissions (Derived from 2007 TRI)	Total Predicted Hg Emissions (Derived from 2013 TRI)
81.7 MT (Project Total)	2.58292E-05 (lbs/ton combusted)	9.20858E-06 (lbs/ton combusted)	2,108.95 (lbs Hg)	751.88 (lbs Hg)
5.1 mtpy (Maximum Annual Production)	2.58292E-05 (lbs/ton combusted)	9.20858E-06 (lbs/ton combusted)	131.73 (lbs Hg/year)	46.96 (lbs Hg/year)

Based on data available from the TRI data explorer, the electrical generation sector in Colorado generated approximately 1,070 lbs of mercury emissions for reporting year 2013. The Craig Generating Station emissions would represent approximately 4.4 percent of the state mercury emissions if 5.1 mt of Colowyo Coal Mine coal was combusted in one year. This rate exceeds the maximum firing rate at the Craig Generating Station. The 2011 NEI information for electric generating coal facilities in Colorado indicates that 745.8 lbs (0.37 tons) of mercury were emitted from coal facilities. The 46.96 lbs/yr described above from the 2013 TRI is 6.3 percent. The more recent emission rate is representative into the future because of MATS compliance. The national mercury total is 25.6 tons; thus the Craig Generating Station would contribute 0.092 percent.

Finally, a mercury deposition network (MDN) monitoring site is located adjacent to the air quality study area in Routt County just east of Steamboat Springs. This site has provided data to the MDN since 2007. The MDN site measures mercury deposition from all sources and does not have the ability to specify the particular source of mercury. Based on mapped mercury deposition products from the MDN, the regional air quality study area has seen little change in total average mercury wet deposition during the period from 2007 through 2013. Given that regional coal combustion is not likely to increase as a result of Alternative A, the total deposition would be likely to remain consistent with the mapped data from 2013. It should be noted, however, that deposition monitoring values for total wet deposition at the Routt Monitoring Station increased approximately 2 $\mu g/m^2$ from 7.8 $\mu g/m^2$ in 2008 to 9.8 $\mu g/m^2$ in 2013 even in the face of declining regional mercury emissions. The cause of the increased deposition is not fully understood but long range mercury transport from national or international sources is one possible cause.

Based on a review of the percentage of mercury being generated by the combustion of Colowyo coal and the review of regional and national monitoring data, the effect to indirect coal combustion mercury impacts is predicted to be insignificant.

4.3.2.6 Regional NAAQS Compliance

The following section outlines regional monitoring data from 2007 through 2013 associated with CDPHE. Unlike the onsite Colowyo monitors, those associated with CDPHE are FRM monitors rather than FEM. The EPA has defined FRMs for the measurement of various criteria pollutants, such as carbon CO, O_3, NO_2, PM_{10}, and $PM_{2.5}$. These methods are described in detail in 40 CFR 50. For both PM_{10} and $PM_{2.5}$, the FRM is based upon manual sampling techniques where a pre-weighed filter is installed into a sampling device, ambient air is sampled for 24 hours, and then the filter is retrieved, equilibrated and reweighed in order to determine the concentration of particulate on the filter. Only the measurement techniques defined in 40CFR 50 can be FRMs. The EPA also allows the use of equivalent methods (FEMs) for air quality surveillance.

One requirement for FEM monitors is that they meet all EPA data quality objectives (DQO). DQOs are developed by the EPA to support primary objectives for each criteria pollutant and are statements that define the appropriate type of data that should be collected. They also specify the tolerable levels of potential errors that are used as a basis for establishing the quality and quantity of data. FEM monitors must also meet appropriate EPA requirements regarding measurement standards. Each pollutant has a specific uncertainty measurement. .

Both the North monitor and Gossard monitor are FEM monitors and are considered to represent localized conditions at the mine, but are not operated as FEM monitors due to the fact that they do not meet all EPA-defined DQOs. As a result, the data from the monitors may not be used for attainment/nonattainment area determination, and as such, the data from the North and Gossard monitors submitted to CDPHE is not included in the EPA's national database of ambient air quality monitoring data.

The monitored data discussed below are FRMs operated by CDPHE geared toward evaluating NAAQS compliance. Particulate matter, CO, and ozone data is shown and discussed in a regional NAAQS compliance context.

2013 Compliance

The Western Slope monitors remained unchanged from 2012 and results were similar to the previous year (**Table 4.3-15**).

Table 4.3-15 2013 Western Slope Particulate Monitor Concentrations

Site Name	Location	PM_{10} (µg/m³)			$PM_{2.5}$ (µg/m³)			
		Annual Avg.	24-hr Max	3-yr Avg Exceedances[1]	Annual Avg.	3-yr Weighted Avg.[1]	24-hr Max	3-yr Avg 98th %ile[1]
Delta County								
Delta	560 Dodge St.	21.3	64	0	--	--	--	--
Garfield County								
Parachute	100 E. 2nd Ave	14.5	29	0	--	--	--	--
Rifle	144 E. 3rd Ave	17.5	46	0	--	--	--	--
Mesa County								
Grand Junction – Powell	650 South Ave	19.2	55	0.33	--	7.7	--	28.8
Clifton	Hwy 141 & D Road	17.6	109	0	--	--	--	--
San Miguel County								
Telluride	333 W. Colorado Ave	14.6	58	0	--	--	--	--

[1] Three year averaging period is representative of 2011-2013.
-- No applicable data available

CO monitored maximums do not exceed 1.5 ppm and 0.9 ppm. Palisade showed a maximum O_3 4th high of 0.066 ppm and a three-year average 4th high value of 0.067 ppm (**Table 4.3-16**).

Table 4.3-16 2013 Western Slope Ozone Monitor Concentrations

Site Name	Location	Ozone 8-hr Avg (ppm)		
		1st Maximum	4th Maximum	3-yr Avg of 4th Max. (2011-2013)
Garfield County				
Rifle	195 14th St.	0.065	0.062	0.065
Mesa County				
Palisade Water Treatment	865 Rapid Creek Dr.	0.068	0.066	0.067
Moffat County				
Lay Peak	17820 CR 17	0.067	0.065	<3-yr data

Since the mine began operations within the Project Area, there has not been a change in the regional attainment designation from the Western Slope counties for $PM_{2.5}$, PM_{10}, and CO. The exceedances that have occurred either at the mine or regionally were primarily due to localized sources or natural phenomena outside the control of Colowyo or other facilities.

As discussed in **Section 4.3.2.4** under "Regional Ozone Compliance", there are no CDPHE reported ozone exceedances regionally of the current 0.070 ppm standard. The combustion rates of the Craig and Hayden Generating Stations are not proposed to change in the foreseeable future. Although the precursor emissions are high it does not equate to a regional ozone compliance issue. The regional ozone reaction is limited by VOC emissions; even large amounts of NOx emissions do not lead to higher ozone concentrations. Although the emissions rates for NO_x are substantial from the coal combustion, if the regional ozone reaction is limited by VOC emissions, even large amounts of NO_x emissions do not lead to higher ozone concentrations.

There have been ozone exceedances of the new 0.070 ppm standard regionally. These exceedances have occurred in Rio Blanco County at the Rangely site (operated by BLM). CDPHE believes these exceedances are related to other regional source categories, such as oil and gas, not to the Craig and Hayden generating stations. The combustion rates of the Craig and Hayden Generating Stations are not proposed to change in the foreseeable future. Although their precursor emissions are high it does not equate to the creation of a regional ozone compliance issue. The regional ozone reaction is limited by VOC emissions; without large VOC emissions, even large amounts of NOx emissions do not lead to higher ozone concentrations. Although the emission rates for NOx from the coal combustion are substantial, if the regional ozone reaction is limited by VOC emissions, even large amounts of NOx emissions from the power plants do not lead to higher ozone concentrations.

4.3.2.7 Indirect Railroad Emission Estimates

Coal Transporting

Coal transportation emissions were calculated for the indirect effect of coal movement via rail. The maximum emissions from railroad coal transportation are based on an annual shipping rate of 5.1 mtpy. The mass of coal per railcar is 100 tons, and a coal train is normally comprised of approximately 110 railcars. That equates to 11,000 tons of coal per rail shipment. The estimated maximum number of annual shipments is 464. An engine load was estimated from the force required to move the total train weight (4 engines per train and 4,000 brake horsepower (bhp)/engine). Each engine is Tier 4 compliant.

Locomotives also contribute to black carbon emissions similar to the haul trucks discussed in **Section 4.3.1.2**. Explicit PM_{10} black carbon emissions associated with rail operations are included in **Table 4.3-17.**

The one-way haul distance is 28 miles (45 km) with an assumed maximum allowable speed of 80 mph for freight trains. Emissions were calculated for the round trip assuming this distance each direction. This distance represents a conservative estimate of the length of the mine's rail spur, which is the only portion that can be accurately estimated. Based on that scenario, the maximum annual operating hours of the train is 325. Emissions are determined by the annual power usage of 5.2 million bhp-hours. **Table 4.3-17** outlines the criteria pollutant emissions, HAP emissions, and GHG emissions associated with coal transportation by rail.

Railroad Maintenance

In addition to transport, railroad maintenance activities also produce indirect emissions. Each railroad maintenance action typically occurs once per year and runs for a duration of approximately four weeks. During the four week maintenance period each piece of equipment ranges in usage from six days to three weeks. All equipment is operated by diesel engines each of which are EPA Tier certified ranging from Tier 1 to Tier 4. **Table 4.3-17** outlines the emissions that would be associated with a four week maintenance project under Alternative A.

Table 4.3-17 Railroad Coal Transportation and Railroad Maintenance Emission Estimates (tpy)

Source	PM_{10}	$PM_{2.5}$	NO_x	CO	VOC	SO_2	HAPs	GHG[1]	Black Carbon[2]
Coal Transportation	0.1	0.1	5.7	7.3	0.2	0.03	0.02	2,792	0.07
Railroad Maintenance	0.1	0.1	0.5	0.5	0.1	0.1	1.5E-02	605	0
Total	0.2	0.2	6.2	7.8	0.3	0.1	0.04	3,397	0.07

[1] Greenhouse gas emissions are presented as CO_2e metric tonnes per year.
[2] Black carbon is a component of particulate. Therefore, total PM_{10} and $PM_{2.5}$ would equate to 0.2 and 0.27 tpy, respectively with black carbon included.

All criteria pollutants and HAP emissions associated with railroad activities were compared to the county data from the 2011 NEI. Alternative A would contribute a maximum of 0.0141 percent of all criteria pollutants and 0.0405 percent of all HAPs emitted within Garfield, Moffatt, Rio Blanco, and Routt counties. The indirect emissions from railroad activities under Alternative A would be insignificant when compared to total HAPs emitted in the surrounding counties.

4.3.3 Alternative B (Reduced Mining)

Alternative B is similar to Alternative A with the exception of the Little Collom X Pit not being mined to eliminate potential GRSG concerns. Ambient air quality analysis conducted for 2014 through 2021 with an assumed maximum annual coal throughput of 5.1 mtpy beginning in 2021. South Taylor operations continue through 2019, but are reduced each year from beginning in 2014. Eleven actual operational scenarios were simulated to demonstrate all foreseeable realistic equipment combinations from 2014-2018. Operating scenarios are reduced in 2019 to ten; three in 2020 and only one in 2021.

4.3.3.1 Direct Mining Criteria Pollutant Impacts

Emission Estimates

Emission potentials are evaluated for all years from 2014 through 2021. All subsequent years are assumed to be identical to 2021. It was determined that maximum emissions are established in 2019. Therefore, all emissions described in the following sections are based off of 2019 operating scenarios.

All emission sources within Alternative B are similar to those described in **Section 4.3.2.1**. This includes fugitive, process, and tailpipe emission categories. Little Collom X Pit removal from emissions (2.6 mtpy) is the primary difference between Alternative A and B.

4.3.3.2 Alternative B Direct Emission Calculations

Utilizing the assumptions and processes described above, emissions were calculated for criteria pollutants and HAPs (**Table 4.3-18**).

Table 4.3-18 Criteria Pollutant & HAP Emission Estimates (tpy), Alternative B

Source	PM_{10}	$PM_{2.5}$	NO_x	CO	VOC	SO_2	HAPs
Fugitive	2,770	275.5	2,811	17,768	0.6	1.6	4.2E-03
Process	6.0	0.9	0	0	0	0	0
Tailpipe	3.2	2.8	577	311	63.5	0.4	8.0
Total	2,779	279	3,388	18,079	64.1	2.0	8.0

When comparing gaseous criteria pollutants to state and national totals from the 2011 NEI, Alternative B would have a negligible impact. On a percentage basis, Alternative B would range from 0.004 percent to 1.3 percent when compared to state totals; SO_2 would be the lowest and CO emissions would be the largest. On a national scale the percentage relative to the NEI would range from 0.00003 percent to 0.02 percent. SO_2, again, would contribute the least, and CO would have the highest percentage. A more regional comparison of gaseous pollutants to four surrounding counties was also conducted. These counties included Garfield, Moffat, Rio Blanco, and Routt. Comparisons would range from 0.03 percent to 31.6 percent. All comparisons are either less than 1.0 percent, demonstrate modeling compliance (**Section**

4.3.3.3), or regional monitoring data does not show a NAAQS violation. Therefore, emissions are considered insignificant.

Particulate emissions would be similar. With fugitive emissions included, Alternative B would contribute 0.30 percent of the statewide $PM_{2.5}$ emissions. PM_{10} emissions associated with Alternative B would be 0.84 percent of the statewide total with fugitive emissions included. National percentages would be even less at 0.005 percent and 0.013 percent. Direct particulate emissions associated with Alternative A would be insignificant in comparison to Colorado and nationally. The surrounding county comparison showed that Alternative B would be a maximum of 12.4 percent of the region's particulate emissions. All comparisons are either less than 1.0 percent, demonstrate modeling compliance (**Section 4.3.3.3**), or regional monitoring data does not show a NAAQS violation. Therefore, emissions are considered insignificant.

The county maximum HAPs comparison of Alternative B would be 9.3 percent of the EPA 2011 NEI. The maximum HAPs emissions contributed by Alternative B would be 0.004 percent of the total HAPs emitted by the State of Colorado per the EPA 2011 NEI. Nationally, 9.05 million tons of HAPs were emitted in 2011 and Alternative B would contribute 0.00009 percent. The amount attributed to Alternative B would be insignificant by comparison.

While there would be a moderate to high contribution of emissions from Alternative B to the region, Moffat County has consistently maintained its designation of attainment with current monitoring well under NAAQS levels (**Section 4.3.2.4**).

Onsite (North and Gossard) Particulate Monitoring Data

The onsite monitoring data presented under Alternative A (**Section 4.3.2.2**) is appropriate for describing the ambient conditions under Alternative B. Additionally, because fugitive dust controls under both alternatives remain the same, the impacts for Alternative A and B will be consistent.

Direct Greenhouse Gas Annual Emissions

Emissions for GHGs were calculated for the mine activities proposed to occur in 2019 as that year is expected to produce the greatest impact (**Table 4.3-19**). These emissions are based on the worst case emissions operating scenario for 2019. The emissions calculations utilized activity rates that were provided by Colowyo for the mining that would occur during that year.

Table 4.3-19 Maximum Emission Estimates (metric tonnes/yr)

Emission Unit	CO_2	CH_4	N_2O	GHG[1]
Scrapers	4,592	0.26	0.12	4,634
Drilling	22,374	0.90	0.18	22,449
Dozers	15,466	0.87	0.39	15,606
Graders	42,455	2.38	1.08	42,837
Haul Trucks (240T OB/Coal)	19,570	4.90E-03	4.61E-03	19,572
STA Haul Trucks (50T)	3,422	3.57E-03	3.36E-03	3,423
Collom Haul Trucks (50T)	7,656	7.98E-03	7.51E-03	7,659
Water trucks	13,052	1.31E-02	1.23E-02	13,056
Blasting	136,171	4.81	1.20	136,650
Access Road	62	3.58E-03	7.30E-03	64
Rail Maintenance	602	0.04	0.01	605
Methane Release	--	2,728	--	70,675
Total	**265,423**	**2,737**	**3.0**	**337,231**

Direct Black Carbon Emissions

All haul truck types under Alternative B were evaluated for their contribution of black carbon as a percentage of overall particulate (**Table 4.3-20**).

Table 4.3-20 Black Carbon Emissions (tpy) from Haul Trucks, Alternative B

Haul Truck[1]	$PM_{2.5}$	PM_{10}
50 Ton	0.038	0.044
240 Ton[2,3]	0.029	0.031
Access Road[4]	5.39E-04	5.82E-04

1 Based on the length of the road, a percentage of the total VMTs are allocated to the paved road and in-pit road, respectively; speed is 25 mph.

2 Is assumed to only be spoil material through 2010 until the 170T trucks were removed. Assumed speed of 25 mph.

3 Starting in 2011 240T trucks hauled both spoil material and coal. A percentage of the total VMT are allocated to the paved and in-pit roads.

4 59/41% ratio between cars and trucks; model year 2000 cars/trucks assumed.

4.3.3.3 Dispersion Modeling Impact Analysis

The 2014-2021 calendar years were modeled to ensure NAAQS compliance for all years of active mining and reclamation activities within the Project Area. The South Taylor, West pit, East pit, and Collom Lite pits mining and/or reclamation activities were included as part of this analysis. Eleven scenarios of equipment allocation were analyzed and modeled, each as hypothetical real-life situations that could occur on any given day (2014-2018). Ten scenarios were analyzed for 2019; three for 2020, and one for 2021. Daily and annual activity rates were derived from the number of trucks, dozers, scrapers, etc. that the mine currently has onsite, initially based on a 5.1 mtpy mine plan. The following section describes the methodology used in preparing model inputs and assumptions made within the model itself.

Modeling Inputs

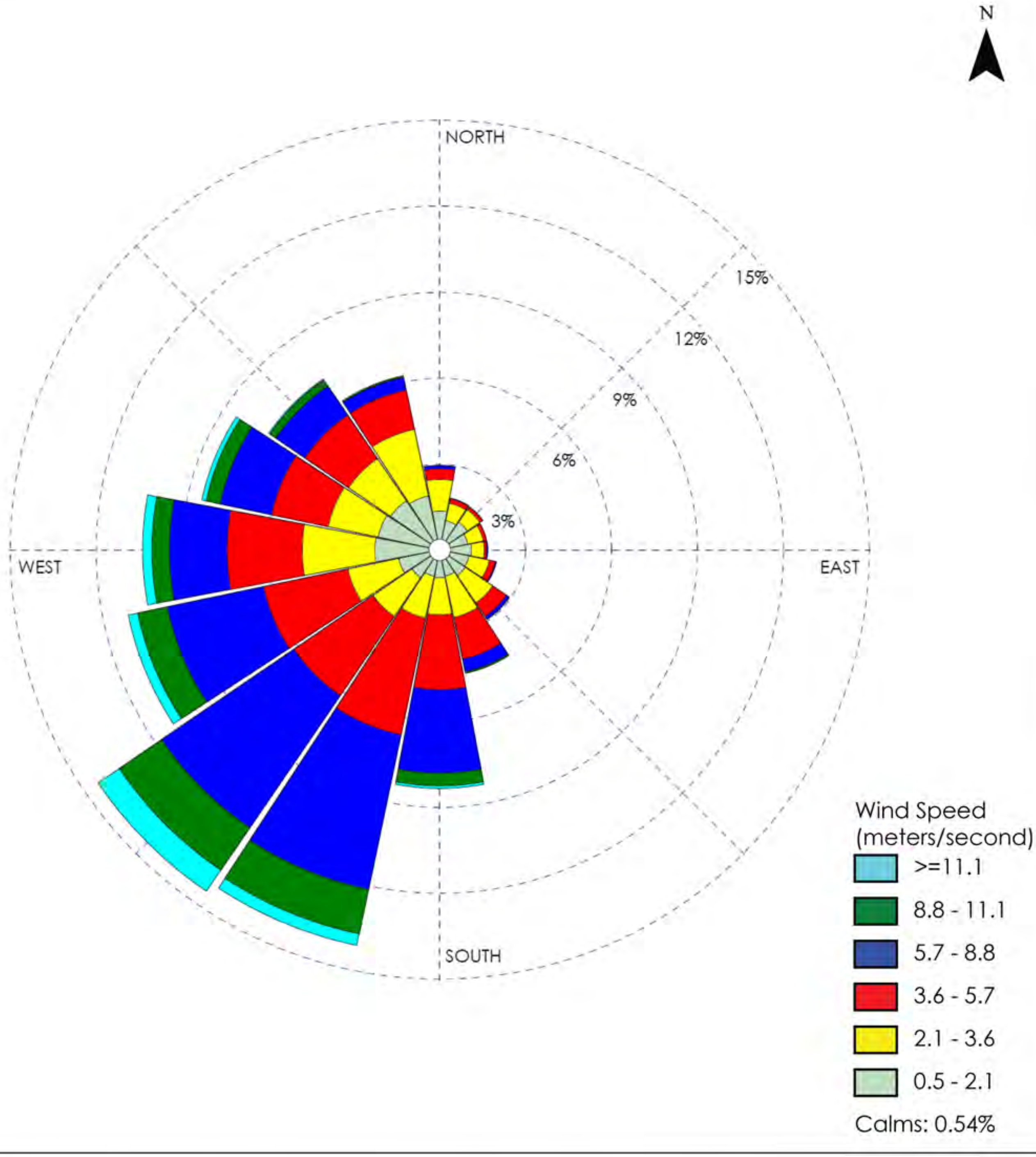
AERMOD utilizes several input parameters to simulate emissions and their corresponding dispersion characteristics. Colowyo collects meteorological data from the North onsite meteorological station located at the following NAD 83 coordinates: 40° 16' 22.8" N, 107° 48' 36" W, elevation 7395 feet. These North Station data were used as an input following validation by CDPHE modeling personnel. Gossard Station meteorological data were not used, as the North Station is believed to be more representative of overall site conditions. The North Station is on a ridge-top, while Gossard is in a more sheltered location near the coal load-out. North Station data beginning in July 2008 to June 2011 and July 2012 to June 2013 were accepted by CDPHE and used in the analysis. A year-to-year data comparison showed consistency in the average wind speeds and directions and indicated that meteorological data was consistently collected. Wind directions had a strong tendency toward west/southwest directionality. Speeds varied somewhat; however, they tended to be strongest from the southwest and west. A wind rose of the data collected from July 1, 2008 through June 31, 2013 is presented as **Figure 4-2**.

Two beta options are available in AERMOD to address concerns regarding model performance under low wind speed conditions. One of these options, the low wind speed option 2 (LOWWIND2), was employed for the modeling analyses. This option has been shown to enhance model accuracy during periods of low wind speeds and was selected to ensure the most accurate model outputs. The LOWWIND2 option increases the minimum value of sigma-v from 0.2 to 0.3 m/s, and incorporates the meander component, with some adjustments to the algorithm, including an upper limit on the meander factor (FRAN) of 0.95. Default values of sigma-v of 0.3 m/s and upper limit meander factor of 0.95 were utilized in the analyses.

Modeled Pollutants and Assumptions

Dispersion modeling was conducted to estimate the potential future air quality impacts from the following criteria air pollutants for the indicated regulatory time periods. All modeled concentrations are applicable at any point of public access.

- PM_{10} – 24 hour
- $PM_{2.5}$ – 24 hour and Annual
- NO_2 – 1 hour and Annual
- SO_2 – 1 hour
- CO – 1 hour and 8 hour



Data Period:
Start Date: 7/1/2008 - 00:00
End Date: 6/30/2013 23:00

Calm Winds:
0.54%

Average Wind Speed:
4.54 meters/second

Total Count:
34763 hours

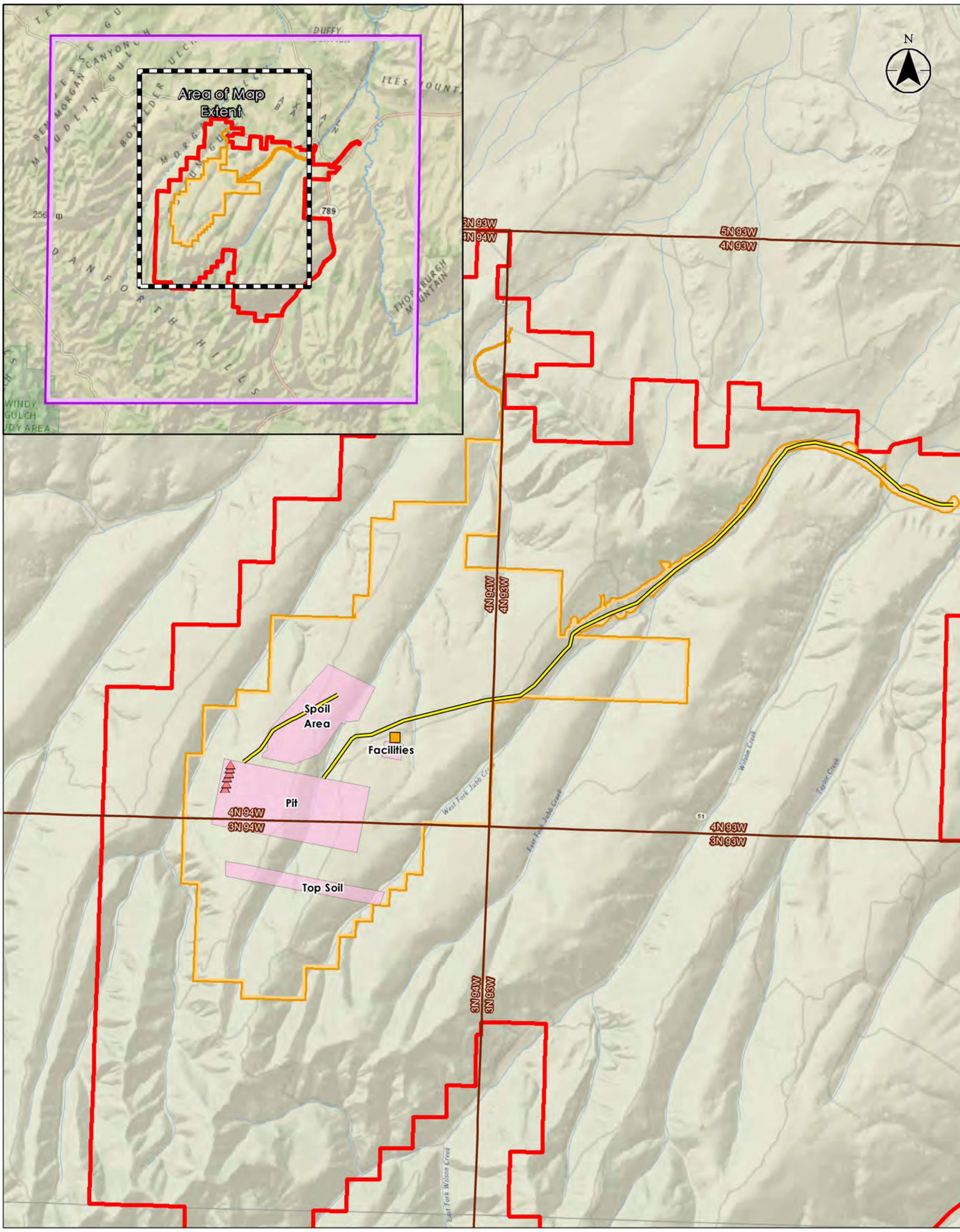
Date:
2/2/2015

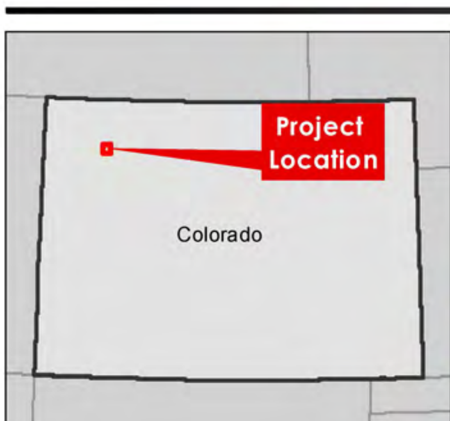
Project Location
Rio Blanco & Moffat Counties
Colorado

Project
Office of Surface Mining Reclamation & Enforcement
Colowyo Coal Mine: Collom Permit Expansion Area
Project Mining Plan Environmental Assessment

Figure No.
4-2

Title
Modeled Period Windrose





Blasting

Crusher

Haul Road

Polygon Sources

Project Area

Approved SMCRA Permit Boundary

Receptor Boundary (Inset Map)

Township Boundary

0 3,200 6,400 Feet

1:50,000 (At Original document size of 11x17)

Notes

1: Coordinate System: NAD 1983 UTM Zone 13N

2: Service Layer Credits: Content may not reflect National Geographic's current map policy. Sources: National Geographic, Esri, DeLorme, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp.

Project Location

Rio Blanco & Moffat Counties
Colorado

Project

Office of Surface Mining Reclamation & Enforcement
Colowyo Coal Mine: Collom Permit Expansion Area
Project Mining Plan Environmental Assessment

Figure No.

4-3

Title

Geographic Location of Modeled Sources

Compliance with the NAAQS was demonstrated by averaging the hourly and the annual modeled values for each pollutant, as specified in 40 CFR Part 51 Appendix W. Note that the EPA is currently proposing an update to the guidance outlined in Appendix W. These include enhancements to the scientific formulation of AERMOD to address technical concerns expressed by the stakeholder community and improve model performance. These improvements are not expected to significantly change the results presented in this section. The pollutants were modeled without background concentrations. The modeled concentrations for each pollutant were added to background concentrations for comparison to the NAAQS.

Source Types

The Colowyo Coal Mine consists of several types of emission sources. In general these include: point sources, surface area sources, volume sources (comprise all road sources, blasting, and railcar emissions), open pit sources (in-pit mining activities) and tailpipe emissions. **Figure 4-3** provides a general geographic representation of all modeled sources within the Project Area and relative distance to the outermost level of receptors. Model receptors were placed throughout the region from the orange boundary to the purple square. Additionally, receptors were placed along County Road 51 within the Project Area.

Background Concentrations

To evaluate the potential impacts of emissions from the Project, the dispersion modeling evaluation considered the existing background concentrations of pollutants in the area where impacts are being evaluated. The background concentration of a given pollutant is added to the modeled impact, and the result is compared to the EPA's NAAQS. The NAAQS are allowable concentration limits applied at the public access boundary.

The CDPHE (APCD via letter) provided background concentrations that could be used for permitting at the mine. These background values were selected for use in this analysis (**Table 4.3-21**).

Table 4.3-21 Background Concentration Values

Pollutant	Averaging Period	Background Concentration (μg/m³)
$PM_{2.5}$	24-hr	14
	Annual	3
PM_{10}	24-hr	23
SO_2	1-hr	3
NO_2	1-hr	20
	Annual	2
CO	1-hr	1,145
	8-hr	1,145

Modeled Operating Scenarios

South Taylor coal extraction is maximized during 2014 operations at 4 mtpy, while Collom coal extraction is maximized in 2021 operations at 5.1 mtpy. South Taylor mining operations are expected to continue through 2019. All subsequent years (2015-2019) are expected to have less than 4 mtpy of coal extracted. Collom haul road development is modeled during the 2015 model year. The 2016 model year includes the addition of the facilities construction. Note that because the facilities construction produces a greater amount of emissions than the ditch pond development and those two would not be constructed simultaneously, the pond is excluded from the modeling analysis. In order to account for operational uncertainty, multiple operational scenarios were modeled. These scenarios correspond with differing proposed onsite activities in various geographic regions, such as reclamation activities in one area versus another or differing equipment utilization. Each operations scenario was developed cooperatively with Colowyo staff and is based on fleet limitation and operational goals. Sixty-nine operational scenarios were applied.

The dispersion modeling of all scenarios indicates that the emissions under Alternative B would not exceed the NAAQS for the pollutants modeled. This suggests that Alternative B at the proposed future maximum mining rate would not cause a significant impact to the NAAQS. **Table 4.3-22** illustrates that all potential operational scenarios would be compliant with all NAAQS when implementing the maximum foreseeable mining rate of 4 mtpy and 5.1 mtpy for the South Taylor and Collom Project pits, respectively. The 1-hour NO_2 is the closest standard to being exceeded at 97.1 percent. The $PM_{2.5}$ and PM_{10} standards are also close to being exceeded at 94.6 and 95.8 percent, respectively.

Table 4.3-22 Minimum and Maximum Impacts 2014-2021 Ambient Analysis

Pollutant	Averaging Period	Background Concentration (μg/m³)	Minimum Model Results (μg/m³)	Maximum Model Results (μg/m³)	Total Range (μg/m³)[6]	NAAQS (μg/m³)	Percent of Standard Range
$PM_{2.5}$[1]	24-hr	14	9	19	23-33	35	64.9-94.6%
	Annual	3	2	7	5-10	12	40.3-80.7%
PM_{10}[2]	24-hr	23	48	121	71-144	150	47.3-95.8%
SO_2[3]	1-hr	3	0.77	3.27	4-6	196	1.93-3.20%
NO_2[1,5]	1-hr	20	123	163	143-183	188	75.9-97.1%
	Annual	2	5.6	10.4	7.6-12.3	100	7.6-12.4%
CO[4]	1-hr	1,145	9,235	18,361	10,380-19,506	40,000	26.0-48.8%
	8-hr	1,145	1,304	4,390	2,449-5,535	10,000	24.5-55.4%

[1] 8th high value
[2] 5th high over 4 years, deposition applied
[3] 4th high value
[4] 2nd high value, standard not to be exceeded more than once per year
[5] Use of OLM
[6] Total Range represents the summation of background concentrations and modeling results

4.3.3.4 Indirect Combustion Criteria Impacts

As described for Alternative A, emissions for criteria pollutants have been calculated for the combustion of mined coal. For Alternative B, emissions were for the maximum proposed future mining rate and the current coal contract rate for the Craig Generating Station (potential impacts). As with Alternative A, the emissions were calculated using the regional maximum emission factor, the average regional emissions factor, and the Craig Generating Station emission factor. The resultant emissions are presented in **Table 4.3-23**.

Table 4.3-23 Predicted Criteria Emissions Data Based on Regional Maximum, Average, and Craig Generating Station Only Emissions Rates, Alternative B

Emissions Method	Coal Combustion Rate (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)	CO (tpy)	NO_2 (tpy)	SO_2 (tpy)	VOC (tpy)
Regional Maximum							
Maximum Mining	5,100,000	431.45	196.48	1,544.59	18,867.09	6,782.27	143.17
Contract Rate	2,300,000	194.57	88.61	696.58	8,508.69	3,058.67	64.57
Regional Average							
Maximum Mining	5,100,000	323.61	174.09	1,332.61	17,008.02	5,434.01	110.54
Contract Rate	2,300,000	145.94	78.51	600.98	7,670.28	2,450.63	49.85
Craig Only							
Maximum Mining	5,100,000	215.77	151.70	1,544.59	15,148.96	4,085.75	77.92
Contract Rate	2,300,000	97.31	68.41	696.58	6,831.88	1,842.59	35.14

The Hayden Generating Station emission rates were higher on a lb/MMBTU basis and produce the highest PM10, PM2.5, SO2, VOC, and NOx emission rates of the two facilities. The Craig Generating Station produced the higher emission rate for CO.

Emissions at the maximum Alternative B annual mining rate would range from 0.03 percent to 12.17 percent of the total Colorado NEI emissions based on the Craig Generation Station only emission rate and would range from 0.02 percent to 9.75 percent of the total Colorado NEI emissions based on regional average emissions factor calculations (**Table 4.3-24**). It should be noted that these calculations over predict the amount of emissions that would reasonably occur as they would exceed the annual contracted coal delivery rate of 2.3 mtpy.

As compared to the national NEI emissions totals, the maximum mining rates emissions represent between 0.00024 percent and 0.121 percent based on the worst case regional emissions factors and between 0.00013 percent and 0.0975 percent based on the Craig Generating Station emissions factors.

Emissions at the 5.1 mtpy mining rate when compared to the four surrounding counties would range from 0.11 percent to 100.5 percent. There would be significant contributions associated with the two generating stations, but the regional designation regarding NAAQS compliance would not change and would remain in attainment. As described in **Section 4.3.2.4**, the state monitoring network has shown compliance with the NAAQS when natural exceptional events are excluded.

Based on the maximum mining rate emissions impacts, Alternative B would be the same as Alternative A, however, the total coal recovery rate would be approximately 3 percent lower than those for Alternative A due to a longer duration of mining under Alternative A. All comparisons are either less than 1.0 percent, demonstrate modeling compliance (**Section 4.3.3.3**), or regional monitoring data does not show a NAAQS violation. Therefore, emissions would be considered to produce an insignificant impact.

Table 4.3-24 Predicted % Criteria Emissions Data Based on Regional Maximum, Average, and Craig Generating Station Only Emissions Rates, Alternative B

Emissions Method	Coal Combustion Rate (tpy)	PM_{10} (% of Colorado State 2011 NEI)	$PM_{2.5}$ (% of Colorado State 2011 NEI)	CO (% of 2011 Colorado State NEI)	NO_2 (% of Colorado State 2011 NEI)	SO_2 (% of Colorado State 2011 NEI)	VOC (% of Colorado State 2011 NEI)
Regional Maximum							
Maximum Mining	5,100,000	0.13%	0.19%	0.11%	6.20%	12.17%	0.03%
Contract Rate	2,300,000	0.06%	0.09%	0.05%	2.80%	5.49%	0.01%
Regional Average							
Maximum Mining	5,100,000	0.10%	0.17%	0.09%	5.59%	9.75%	0.02%
Contract Rate	2,300,000	0.04%	0.08%	0.04%	2.52%	4.40%	0.01%
Craig Only							
Maximum Mining	5,100,000	0.07%	0.15%	0.11%	4.98%	7.33%	0.01%
Contract Rate	2,300,000	0.03%	0.07%	0.05%	2.25%	3.31%	0.01%

Indirect Coal Combustion GHG and Climate Change Impacts

Similar to Alternative A, GHG emissions were calculated for the coal combustion associated with Alternative B (**Table 4.3-25**).

Table 4.3-25 GHG Coal Combustion Emissions, Alternative B

Coal Combusted (Short Tons)		CO_2 Emissions (metric tonnes)	CH_4 Emissions (Metric Tonnes)	Total CH_4 in CO2e (Metric Tonnes)	N_2O Emissions (Metric Tonnes)	Total N_2O in CO2e (Metric Tonnes)	Total CO_2e (Metric Tonnes)
79,100,000	Proposed Total Mine Tonnage	183,944,709	21,692	542,290	3,155	940,232	185,427,230
5,100,000	Proposed Mine Rate Maximum	11,859,899	1,399	34,964	203	60,622	11,955,485

The values detailed in the table represent emissions calculated for the combustion of all coal at the proposed annual maximum mining rate and total GHG emissions from the combustion of all coal to be mined under Alternative B. The future GHG emissions (potential impact) under Alternative B would account for 0.041 percent of estimated annual global emissions and 0.196 percent of estimated annual U.S. net emissions. This represents a negligible potential impact under Alternative B.

Social Cost of Carbon

Due to the reduction in total coal mined from Alternative A (81.7 mt) to Alternative B (79.1mt) total Project CO_2e emissions would be reduced from 191,404,973 to 185,427,230 metric tons. As previously noted, specific threshold levels for the determination of significance or benefit can vary depending on numerous project factors. NEPA does not require a cost-benefit analysis. Presenting the SCC cost estimates quantitatively, without a complete monetary cost-benefit analysis that includes the social benefits of energy production, would be misleading. For this reason the SCC protocol was not applied for this assessment. GHG coal combustion emissions are quantified and contextualized against global and national GHG emissions above.

Ozone Precursor Emissions Impacts

Based on maximum onsite blasting and the combustion at the Craig Generating Station at either the Alternative B maximum rate as well as at the reasonably foreseeable contracted rate, conservative estimates of ozone precursors are included in **Table 4.3-26**. The emissions were calculated in a fashion consistent with the method described for Alternative A.

Table 4.3-26 Predicted Ozone Precursor Emissions Rates Based on 2013 Craig Generating Station Factors and Blasting Emissions, Alternative B

Emissions Method	Coal Combustion Rate (tpy)	NO_2 (tpy)	VOC (tpy)
Craig Max Mining Rate	5,100,000	15,148.96	77.92
Craig Station Firing Rate	2,300,000	6,831.88	35.14
Blasting	N/A	2,811.12	0.60

Although these values represent large amounts of ozone precursors, emissions from the Craig Generating Station, as well as all other regional sources of precursor emissions, have not produced significant ozone impacts as indicated by regional ozone monitoring and Moffat County's current attainment with the ozone NAAQS. A detailed description of the monitoring data for all criteria pollutants from 2007 through present is described in the following sections. The ozone component of these descriptions demonstrates that ozone impacts would not exceed the NAAQS and would therefore not be considered significant.

Indirect Mercury Emissions

During the period from 2007 to present, the Craig Generating Station has provided actual mercury emissions from all onsite atmospheric emission sources via the USEPA's TRI program. Mercury emission for the Craig Generating Station from 2007 to 2013 was reported by the facility for all atmospheric emissions sources (**Table 4.3-27**).

Table 4.3-27 TRI Reported Atmospheric Mercury Emissions for the Craig Generating Station

Reporting Year	Hg Emissions	Units
2007 TRI	130	lb/year
2008 TRI	130	lb/year
2009 TRI	30	lb/year
2010 TRI	43	lb/year
2011 TRI	43	lb/year
2012 TRI	44	lb/year
2013 TRI	42.4	lb/year

Based on the reported TRI emissions and the coal consumed at the Craig Generating Station reported during that period, an emissions factor can be calculated for a pound of mercury per ton of coal combusted. Based on the calculated emissions factors derived from the TRI, mercury emission impacts can vary significantly between the 2007 emissions controls in place at the Craig Generating Station and the 2013 emissions controls in place. The resultant mercury emissions impacts are detailed in **Table 4.3-28**.

Table 4.3-28 Potential Coal Combustion Mercury Emissions Using Craig Generating Station TRI Actual Emissions, Alt. B

Coal Production	Emission Factor (Derived from 2007 TRI)	Emission Factor (Derived from 2013 TRI)	Total Predicted Hg Emissions (Derived from 2007 TRI)	Total Predicted Hg Emissions (Derived from 2013 TRI)
79.1 MT (Project Total)	2.58292E-05 (lb/ton combusted)	9.20858E-06 (lbs/ton combusted)	2,043.09 (lbs Hg)	728.40 (lbs Hg)
5.1 mtpy (Maximum Annual Production)	2.58292E-05 (lbs/ton combusted)	9.20858E-06 (lbs/ton combusted)	131.73 (lbs Hg/year)	46.96 (lbs Hg/year)

Using annual mine rates and the annual emission rates calculated from the TRI mercury emissions data, the contribution of emissions from Alternative B were calculated (**Table 4.3-29**).

Table 4.3-29 Approximate Mercury Emissions from the Craig Generating Station Based on TRI Actual Emissions, Alternative B

Reporting Year	Hg Emissions (lbs/yr)
2007 TRI	1.0
2008 TRI	30.5
2009 TRI	8.4
2010 TRI	12.3
2011 2011 TRI	17.1
2012 TRI	11.8
2013 TRI	15.5
Total	96.8

As can be seen by comparing **Table 4.3-27** and **Table 4.3-29**, mercury emissions from 2007 to 2013 were significantly below those that would occur at the maximum mining rate.

If all mercury emissions from the combustion of coal are calculated using the Craig Generating Station 2013 TRI emissions factor, the total mercury emissions that would be generated by burning the 79.1 million tons of coal mined under Alternative B would result in 728.40 lbs of mercury. This value is approximately 3.2 percent lower mercury emissions than those estimated by the same calculation for the coal mined under Alternative A.

Additionally, based on data available from the TRI data explorer, the electrical generation sector in Colorado generated approximately 1,070 lbs of mercury emissions for reporting year 2013. The contribution of Alternative B coal combustion emissions was approximately 4.4 percent of that total for 2013 based on the total mercury generated in Colorado under the Alternative B maximum mining rate (5.1 mtpy) if all of the coal was sent to the Craig Generating Station. When compared to the national mercury total of 25.6 tons, as reported in the 2011 NEI would be 0.092 percent. This represents a negligible to minor percentage of the total mercury generated both in Colorado and nationally.

4.3.3.5 Regional NAAQS Compliance

The regional NAAQS compliance presented under Alternative A (**Section 4.3.2.6**) is appropriate for describing the ambient regional conditions under Alternative B. Additionally, Alternative B presents dispersion modeling data to verify ongoing NAAQS compliance when the direct project emissions are introduced **(Section 4.3.2.2).**

4.3.3.6 Indirect Railroad Emissions

Railroad emissions associated with the Colowyo-owned rail spur were determined for a maximum shipping scenario of annual coal tonnage. The emissions are based on the maximum number of annual round trips made by the train. It is expected that the maximum annual amount of coal shipped would be 5.1 million tons. **Table 4.3-30** outlines the maximum criteria pollutant emissions, GHG emissions, and HAP estimated emissions that result from rail transport and maintenance from the Colowyo Coal Mine.

Table 4.3-30 Railroad Coal Transport and Maintenance Emission Estimates (tpy)

Source	PM_{10}	$PM_{2.5}$	NO_x	CO	VOC	SO_2	HAPs	GHG[1]	Black Carbon[2]
Coal Transport	0.1	0.1	5.7	7.3	0.2	0.03	0.02	2,792	0.07
Maintenance	0.1	0.1	0.5	0.5	0.1	0.1	1.5E-02	605	0
Total	0.2	0.2	6.2	7.8	0.3	0.1	0.04	3,397	0.07

[1] Greenhouse gas emissions are presented as CO_2e metric tonnes per year.
[2] Black carbon is a component of particulate. Therefore, total PM_{10} and $PM_{2.5}$ would equate to 0.2 tons/yr, respectively with black carbon included.

Rail emissions were also calculated for combustion rates of 2.3 and 5.1 mtpy to account for potential future emissions. Criteria pollutant emissions for the lower bound (2.3 mtpy) range from 0.01 to 3.30 tons/yr. The range of emissions for the upper bound (5.1 mtpy) is 0.03-7.3 tons/yr. Rail maintenance emissions will remain unchanged. Therefore, the maximum emissions will be CO at 7.8 tons/yr.

All criteria pollutants and HAP emissions associated with railcar activities were compared to the county data from the 2011 NEI. Alternative B would contribute a maximum of 0.013 percent of all criteria pollutants and 0.023 percent of all HAPs emitted within Garfield, Moffatt, Rio Blanco, and Routt counties. In comparison, the direct emissions from Alternative B would be insignificant.

Railroad emissions are far less than many other emissions-generating activities previously described. As a result all emissions would be insignificant when compared to statewide totals. Colorado emitted 195,455 tons of HAPs in 2011 (based on the EPA NEI); therefore, the percentage associated with the railcars would be 0.00001 percent.

4.3.4 Alternative C (No Action)

4.3.4.1 Direct Emissions Impacts

Alternative C assumes that mining would not occur for the Little Collom X or Collom Lite pits if the Project was not approved. All direct emissions would occur from active mining within the South Taylor pit and reclamation in the West and East pits. Emissions would be based on 4.0 mtpy with operation ceasing following 2019. Following 2019, an insignificant amount of criteria emissions associated with reclamation activities would continue to occur until reclamation is complete (OSMRE 2015).

4.3.4.2 Indirect Combustion Criteria Emissions Impacts

Under Alternative C, criteria pollutant emissions from coal combustion at the Craig Generating Station would remain consistent with the current emissions rates. The mine would continue to provide coal to the Craig Generating Station. As the coal from South Taylor begins to decline, the station would have to source coal from the broader coal market. If this occurred, the total generating rate at the Craig Generating Station would remain unchanged. As such, the emissions from the Craig Generating Station through 2019 would remain consistent with those reported to CDPHE for 2013 (reported in 2014), without considering future emission reductions to comply with federal and state regulations and plans (**Table 4.3-31**).

Table 4.3-31 Criteria Pollutant Emissions Rates

Location	2013 (reporting year) APENS Annual Actual Pollutant Emissions (tpy)					
	PM_{10}	$PM_{2.5}$	CO	NO_2	SO_2	VOC
Craig Generating Station	172.2	121.1	1,232.8	12,091.0	3261.0	62.2
Hayden Generating Station	148.3	67.5	385.1	6,483.6	2,330.7	49.2

4.3.4.3 Indirect Coal Combustion GHG and Climate Change Impacts

Under Alternative C, GHG emissions from the Craig Generating Station would remain consistent with the current emissions rates. The mine would continue to provide coal to the Craig Generating Station. As the coal from South Taylor begins to decline, the station would have to source coal from the broader coal market. If this occurred, the total generating rate at the Craig Generating Station would remain unchanged.

The Craig Generating Station would produce the GHG emissions detailed in **Table 4.3-32**. The calculations assume that the maximum 2013 coal combustion at the Craig Generating Station would be a reasonably foreseeable level of combustion. Additionally, the table outlines the amount of GHG emissions generated from the contracted amount of coal that historically was provided by the Colowyo Coal Mine.

Table 4.3-32 GHG Coal Combustion Emissions, Alternative C

Coal Combusted (Short Tons)		CO_2 Emissions (Metric Tonnes)	CH_4 Emissions (Metric Tonnes)	Total CH_4 in CO_2e (Metric Tonnes)	N_2O Emissions (Metric Tonnes)	Total N_20 in CO_2e (Metric Tonnes)	Total CO_2e (Metric Tonnes)
4,604,403	2014 Coal Combustion	10,707,403	1,263	31,567	184	54,731	10,793,700
2,300,000	Current Colowyo Contract Annual Maximum	5,348,582	631	15,768	92	27,339	5,391,689

These values represent the calculated GHG emissions that occurred for the actual combustion activities at the Craig Generating Station during 2014 as well as the emissions attributable to coal provided from the Colowyo Coal Mine. Under Alternative C, the emissions from the Craig Generating Station would remain consistent with these current levels of emissions assuming that the same amount of coal is provided from another source than the Colowyo Coal Mine. These emissions account for approximately 0.037 percent of estimated global emissions and between 0.48 percent of estimated U.S. net emissions. A statewide comparison equates to 8.3 percent. These levels are less than those that would be generated under Alternatives A (9.6% of state) and B (9.5% of state).

4.3.4.4 Social Cost of Carbon

For Alternative C, indirect GHG and carbon emissions from coal combustion at the Craig Generating Station and other regional combustion sources would remain unchanged from current emissions levels. As a result, there would be no net change to SCC for Alternative A.

4.3.4.5 Ozone Impacts

With Alternative C, precursors of ozone including NOx and VOCs would still be generated by the combustion of coal. Precursor emissions would be generated at Craig Generating Station in a manner and at a rate consistent with current facility emissions, assuming that the same amount of coal is provided from another source than the Colowyo Coal Mine.

Table 4.3-33 presents the ozone precursor emissions that were reported for the Craig Generating Station to CDPHE for the 2013 reporting year.

Table 4.3-33 Ozone Precursor Emissions Rates Based on the 2013 Craig Generating Station CDPHE Reported Emissions

Coal Combustion Rate (tpy)	NO_2 (tpy)	VOC (tpy)
4,604,403	12,091.0	62.2

Although the emissions rates for NOx are substantial from the coal combustion, if the regional ozone reaction is limited by VOC emissions, even large amounts of NOx emissions do not lead to higher ozone concentrations. There would be no emissions factor change (increase or decrease) in the production of ozone precursors from any of the alternatives.

4.3.4.6 Indirect Mercury Emissions

Under Alternative C, the Craig Generating Station would continue to operate as currently permitted by the State of Colorado and EPA. No change in the electrical generating capacity or resultant emissions is anticipated as a result of the No Action Alternative. However, the Craig Generating Station would be required to source coal from the broader coal market to replace the coal currently provided by the Colowyo Coal Mine to the future.

Mercury emissions for the Craig Generating Station were reported by the facility for all atmospheric emissions sources as presented in **Table 4.3-10**.

As previously described, emissions for the Craig Generating Station have changed significantly throughout the period since 2007 and the most recent TRI emissions available. This change is a result of the changing regulatory requirements for the facility. Emissions at the Craig Generating Station under the No Action Alternative would continue at annual rates similar to those detailed in **Table 4.3-10**. Based on data available from the TRI data explorer, the electrical generation sector in Colorado generated approximately 1,070 lbs of mercury emissions for reporting year 2013. The contribution of Craig Generating Station to the statewide mercury emissions is approximately 3.9 percent, a rate that would remain unchanged under Alternative C, assuming that the same amount of coal is provided from another source than the Colowyo Coal Mine.

4.3.4.7 Rail Car Emissions Impacts

Under Alternative C, less coal would be transported from the mine. As a result, fewer emissions would be generated by rail travel or maintenance associated with coal transport from the mine. Following 2019, the emissions would cease.

4.3.5 Mitigation Measures

As part of Construction Permit No. 95MF1040 and No. 06RB131, Colowyo is required to submit an Air Quality Dust Mitigation Plan to the state. Colowyo has submitted a Dust Mitigation Plan and its receipt was acknowledged by APCD and approved on May 27, 2010. The plan is pending approval of a permit revision based on an ongoing ambient air quality analysis. Dust control practices currently utilized at Colowyo include, but are not limited to:

- Watering of topsoil and overburden material during the removal process as necessary to control fugitive dust.
- Topsoil stockpiles re-vegetated within one year.
- Vehicle speed on unpaved haul roads is limited to a maximum of 45 mph. Speed limits signs are posted.
- Unpaved haul roads are watered as often as needed to control fugitive dust.
- Magnesium chloride or other similar suppressants are applied to unpaved haul roads for fugitive dust control.
- Hood and/or water spray units are utilized during overburden and coal drilling to minimize dust.
- In response to elevated readings of PM_{10} at the TEOM continuous monitors, the mine site institutes operational shutdown procedures. Operational shutdown will remain in effect until climatic conditions improve.

4.4 GEOLOGY

4.4.1 Alternative A (Proposed Action)

Alternative A would result in the removal of the recoverable coal in the Little Collom X and Collom Lite Pits. Coal seams that would be mined via truck/shovel, dragline, and highwall miner techniques include the X3, X4, D1, D2, D12, FA, FB, G7, G8, G9, GA, and GB seams. Colowyo anticipates mining a maximum of approximately 5.1 mtpy with operations occurring 24 hours a day. Removal of the coal in the Project Area via surface mining techniques would result in the removal of the geological column as coal is mined out and the area is subsequently backfilled and reclaimed. This would occur to the overall depth of the proposed mining pits and would be a permanent impact. However, the Colowyo Coal Mine coal removal would only remove a small portion of the geologic column and coal reserves associated with the Danforth Hills coal field, and an even smaller portion of the Rocky Mountain Coal Province of Tully, which contains the Danforth Hills coal field. Therefore, the effect would be negligible to minor to that area as a whole.

4.4.2 Alternative B (Reduced Mining)

Under Alternative B, impacts to geology would be similar to those under Alternative A. However, the Little Collom X Pit would not be mined under this alternative so the overall impacts to the geologic column would be less but still negligible to minor. The same mining techniques would be used as under Alternative A and the same coal seams would be mined.

4.4.3 Alternative C (No Action)

Under Alternative C, no mining would occur within the Project Area. Therefore, there would be no impacts to the geological resources.

4.4.4 Mitigation Measures

No mitigation measures would be necessary for geology.

4.5 WATER RESOURCES

4.5.1 Alternative A (Proposed Action)

4.5.1.1 Surface Water

The Collom Lite Pit, the Little Collom X Pit, the temporary overburden stockpile, the Little Collom sump, and the sediment control pond would each physically disrupt the stream channel in Little Collom Gulch. Physical disruption to approximately 3.5 miles of the main channel would occur through excavation or fill placement, rendering the channel nonfunctional in those locations. No flows were reported in this ephemeral channel during the baseline monitoring period (**Section 3.6**). Although at times runoff may report to the Gulch, a diversion ditch would not be placed at the proposed upstream pit boundary where the contributing watershed area is less than one square mile. Farther downstream, where potential runoff peak flows increase and where there is physically more room to construct a stable diversion, a diversion capable of passing the 100-year storm flow would be placed alongside the haul road. Two small tributaries of Little Collom Gulch would be intercepted by the Little Collom X Pit; their runoff would be diverted around the pit in a ditch designed for the 100-year storm event. In addition, the west boundaries of both pits would encroach into the East Fork Collom Gulch and mainstem Collom Gulch drainage areas (i.e., catchments or watershed areas, but would not directly disturb either stream channel). Similarly, the east boundary of the Collom Lite Pit would encroach into West Fork Jubb Creek's drainage area. The area pad for the facilities would disrupt a tributary to Little Collom Gulch; its flows, as well as drainage from the entire pad, would be directed to a storage pond.

The potential effects of these alterations offset each other. Precipitation that falls within the confines of pits and ponds is not available to continue downstream as surface flows. Similarly, neither is up-gradient runoff that is directed to these areas. This generally has the effect of reducing peak flows associated with a given runoff event as well as reducing annual flow or watershed yield. Conversely, earth disturbances in general, and diversions in particular, tend to increase runoff and peak flows. This is due, in part, to vegetation removal, soil compaction, flow path alteration, and time-of-concentration increases; these effects have been well established by observation, literature, and research. Therefore, the net effect of the Project's pits and ponds on downstream flows or channel morphology would likely be negligible, in large part due to the ephemeral nature of the streams at these locations as well as the headwater locations with small contributing watershed areas upstream of the Project disturbances. Flooding and stream flow regime do not appear to have been affected by past mining operations in similar settings at the existing Colowyo Coal Mine (Colowyo 2011).

Stream flows may also be marginally affected by a reduction in contribution of spring/seep flows. Five seeps or springs within the Little Collom Gulch drainage area (SPRLC-01, SPRLC-02, SPRLC-03, V11, and V29) would be eliminated by mining. Additionally, flows from V1, V10, and V32 (**Figure 3-1**), all within the West Fork of Jubb Creek, may be diminished due to the elimination of portions of their likely recharge areas. However, these surface expressions of groundwater contribute a very small portion of downstream flows (Colowyo 2011). Any disruption or diminution would affect the springs themselves and any ecological benefits that they may support. This would be a long-term, minor impact.

The retention of the large majority of runoff produced on mine-related disturbances serves to protect downstream water quality. In part, the storage pond that would be constructed within the facilities area would serve to retain any inadvertently spilled or leaked fluids (such as hydrocarbons) as well as any coal fines, dissolved salts, or sediments transported by runoff. Other BMPs in the facilities area (e.g., lined structures, spill training, berms) would reduce the potential for such incidents to occur in the first place. Additionally, runoff from the primary crusher facility would be directed into the Collom Lite Pit. Runoff produced on haul roads would also be directed to one of the mining pits to the extent possible or to the sediment control pond. These and other measures such as creating small depressions, dozer basins, and sediment traps would serve to minimize runoff that could potentially carry coal fines or non-coal sediments entering downstream waters. Some measures, such as silt fences and straw bales, may be used on a temporary basis during construction; others such as ditches and culverts may be used throughout operations, and would be designed for precipitation events of higher frequency than the larger sump and sediment pond structures. Ongoing inspections and maintenance would ensure their functionality. Overall, the combination of structural and non-structural BMPs would reduce potential surface water quality impacts due to spills and erosion to negligible levels.

The sump and the sediment control pond would be incorporated into Colowyo's existing NPDES permit as additional outfalls. This permit allows release of collected water from outfalls for events greater than the structure's design capacity and sets effluent limitations for such discharges. As such, this would provide additional regulatory oversight to further ensure that impacts to downstream water quality do not occur. For example, the Colowyo Coal Mine would have to comply with all effluent limits in their CDPS permit for all discharges from the disturbed areas and these limits would most certainly include iron limits as well as TSS limits. Management and/or treatment of TSS (e.g., via sediment ponds) and retention of storm water would help to ensure that iron bound within soil/sediment particles would not be released to receiving waters in concentrations exceeding limitations. Should iron-impacted waters be generated and need to be released, effluent limits would have to be met and if sediment ponds or other passive treatment measures are not effective Colowyo would be required to implement treatment. The Craig Generating Station would also be required to comply with their CDPS effluent limits for any discharges, and these limits currently include iron.

As part of the Colorado Discharge Permit System (CDPS) permitting process for any new outfalls, CDPHE would determine through a Reasonable Potential analysis whether or not there is a reasonable potential for any of the constituents (iron, mercury, and selenium) discussed in **Section 3.6** to become elevated in the Colowyo Coal Mine's discharge water and potentially creating adverse effects on downstream waters and aquatic life. If so, effluent limits would be imposed in the permit to ensure that aquatic life and downstream water quality would be protected for its designated beneficial uses. This reasonable potential analysis is typically done as a matter of course for all CDPS permit renewals, and for permit modifications where relevant. CDPHE's CDPS Regulations (CDPHE 2012c) includes this requirement, as discussed in part at Section 61.8(2)(b)(i). The goal is to ensure that effluent limitations included in a given permit will provide sufficient controls such that water quality standards will be met. The reasonable potential analysis can be done using water quality modeling, existing effluent data, toxicity testing, etc. to make the determination. When the analysis shows "*…that a discharge causes, has the reasonable potential to cause, or measurably contributes to an in-stream excursion above the allowable ambient concentration of a numeric water quality standard for an individual pollutant, the permit must contain effluent limits for that pollutant*" (Section 61.8(2)(b)(i)(C)).

Based upon the existing mining operations and these CDPS permitting requirements, it is likely that iron, mercury, or selenium limitations would be established at the Collom Coal Mine. The Craig Generating Station would also be required to comply with their CDPS effluent limits for any discharges, and these limits currently include iron. Additionally, airborne mercury deposition can come from multiple sources, natural and human-caused, near and far. It is not possible to determine, with the information at hand, the proportion of mercury in Project Area streams or in the Yampa River that has or would result from this alternative directly or indirectly considering the Craig Generating Station.

Runoff and sediment control measures would be implemented prior to other ground disturbances, providing water quality protection from the initial construction stages of the Project. While some would be removed over time, others would be left in place as needed until reclamation, including revegetation, is completed and successful. Over the long term, final reclamation would further reduce the potential for water quality impacts. Pits that have been backfilled after mining would result in surfaces that approximate the pre-mining topography and that are topsoiled, benched as needed, and revegetated. Once reclaimed, historic drainage patterns would be re-established.

Another mechanism that could potentially impact surface water quality is changes in groundwater quality with subsequent reemergence in downstream channels. However, the PAP (Colowyo 2011) also described the potential for a marginal impact to water quality in the Collom Gulch, Little Collom Gulch, and Jubb Creek drainages. As evaporation of water collected within the pit occurs and further dissolves pit floor and wall surfaces, TDS may negligibly increase. This in turn could increase loading of dissolved solids to shallow groundwater down-gradient of the pit, which in turn may eventually enter the surface water system. This would not be likely to occur in any measurable degree, because accumulated pit water would be collected and used for dust control, etc.

Overall, the impact to surface water quantity and quality under Alternative A would be negligible or minor.

4.5.1.2 Groundwater

The potential loss of springs and/or spring flow was described above under surface water. Additionally, within the Collom Lite Pit area, groundwater is expected to be present in limited perched zones in the upper coal seams and sandstone units. As mining progresses through these zones, perched water may seep out and into the pit. Within the existing Colowyo Coal Mine pits, these seeps primarily occur within the uppermost coal seams and normally drain within a few weeks as these very small aquifers are depleted. Sustained seeps recharged by upgradient drainages also occur within the existing Colowyo Coal Mine pits, with a total discharge of approximately 15 to 25 gpm. Both of these types of groundwater discharge may require removal from the Collom Lite Pit by pumping so as not to interfere with mining. Perched groundwater is less likely to be encountered while mining the Little Collom X Pit, in part due to its dip toward Little Collom Gulch. If encountered, it would be expected to be of very limited quantity and areal extent, but also may require pumping.

In addition, saturated conditions are expected to be present below about 7,150 feet elevation, which would affect the lower third of the sequence to be mined. If this saturated zone is not dewatered, the northern (down dip) portion of the Collom Lite Pit would likely accumulate groundwater, hindering mining. Colowyo proposes to dewater ahead of mining by installing several wells designed to locally drop the groundwater level in the vicinity of the pit in a timely manner. The wells would be placed within approximately 500 feet of the projected pit outline and would be completed between 50 and 100 feet below the pit floor. Once the first cuts are mined, dewatering would not likely be needed for the remainder of the mining, due to the higher pit floor. However, dewatering would likely continue for at least the first seven years of mining. Pumping beyond that time would depend on the degree of desaturation and depressurization accomplished at that point in time. The floor of the Little Collom X Pit would be well above the saturated water zone, thus no dewatering wells would be necessary at this location.

There would be no potential for pit dewatering to impact the nearest non-Colowyo domestic or commercial wells, as they are located more than two miles away and are topographically, stratigraphically, and structurally lower than the Collom Lite Pit location (Colowyo 2011). Further, there would be no potential for impacts to other areas of the regional aquifer associated with the Trout Creek Sandstone. It would not be intercepted by the dewatering wells or the pits, and is separated from these mining features by various low permeability beds, including the aquiclude associated with the KM bed located about 200 feet beneath the planned pit bottom. Additionally, any operational use of this water (or other water from another source) would only occur under an appropriate water right, for which the Colorado State Engineer would have assessed as not impacting other users.

Once dewatering stops, the piezometric surface would be reestablished. Ground water from the pit walls below an elevation of 7,150 feet would come into contact with the backfill much faster than any other ground (or surface) water source. This level would be established before mining ceases in Collom, so all possible pit backfill recharge would occur above (on top of) this level. Seepage would occur through the pit walls in a northerly direction due to the hydraulic gradient in the area. This flow would be predominantly through the coal, and to a lesser extent via sandstones and fracture planes. The groundwater would not be expected to discharge either to the valley alluvium or to the surface in Little Collom Gulch (Colowyo 2011).

If a backfill aquifer develops, which is possible but unlikely (Colowyo 2011), and establishes hydrologic connectivity between the valley alluvium and the backfill recharge, down-gradient spring flow would be possible. Under these conditions, backfill aquifer discharge of up to 0.45 cfs from the Collom Lite Pit into the Little Collom Gulch valley fill is possible. This water would then flow down Little Collom Gulch to Collom Gulch. The soonest that the flow would reach Collom Gulch in Section 13, T4N, R94W would be 150 years from the time pit dewatering stops (Colowyo 2011).

Major changes to water quality are not expected from any movement of saturated groundwater that has contacted overburden while moving through the backfilled pit walls. No significant acid-forming materials exist within the overburden soil or coal seams to be mined and no special overburden handling procedures would be needed. This water would be in contact with overburden that is not geologically or chemically different from the surrounding in situ material. However, some potential for a localized increase in TDS exists. Meteoric water would contact an increased surface area of soil in the vadose zone and thereby theoretically increasing the mass of dissolved solids entering shallow groundwater. These dissolved solids in shallow groundwater may eventually enter the surface water system, with a theoretical increase in dissolved solids in the surface water. This increase is calculated to be small enough to have no impact on the current or projected surface water uses in the Collom Gulch, Little Collom Gulch, and Jubb Creek drainages (Colowyo 2011). Thus, the impact would be negligible.

A portion of the CCRs generated at the Craig Generating Station as part of the coal combustion process are placed into a CCR disposal site at the Trapper Mine. The disposal site is under the jurisdiction of SMCRA and is approved to receive CCRs under a Certificate of Designation from Moffat County, with regulatory oversight from CDPHE. The disposal site, CCR placement requirements, design features, operating criteria, monitoring and corrective action; closure and post-closure monitoring standards; and record-keeping and reporting requirements are regulated under SMCRA and CDPHE. Groundwater monitoring of the site has determined that metals of concern are present in low levels; however, limited permeability and infiltration has kept these concentrations to those observed elsewhere at the mine. Therefore, the potential indirect impact to groundwater as a result of the disposal of CCRs at the Trapper Mine is negligible.

Overall, impacts to groundwater quantity and quality under Alternative A would be negligible to minor.

4.5.2 Alternative B (Reduced Mining)

4.5.2.1 Surface Water

As with Alternative A, physical disruption to the main channel of Little Collom Gulch would occur through excavation or fill placement, rendering the channel nonfunctional in those locations. However, the reduction would be approximately 2.25 miles of linear channel distance, compared to 3.5 miles under Alternative A. Alternative B would also have less of a disruption to small tributary channels to Little Collom Gulch, because Little Collom X Pit would not be constructed (though fills would encroach upon portions of these channels). In addition to the west boundary of the Collom Lite Pit encroaching into the mainstem Collom Gulch drainage areas, the western portions of the external fills would also encroach into the watershed area; neither would directly disturb the Collom Gulch stream channel itself. Overall, the degree of surface water effects due to these aspects of Alternative B would be similar to Alternative A (i.e., negligible to minor).

Out of the five seeps or springs within the Little Collom Gulch drainage area that would be eliminated by mining under Alternative A, only three (SPRLC-02, SPRLC-03, and V29) would be eliminated under Alternative B. However, the overall diminishment of stream flows due to reductions in these or other surface expressions of groundwater would be similar to Alternative A, as their contributions are considered to be minimal.

As with Alternative A, the combination of structural and non-structural BMPs under Alternative B would reduce potential surface water quality impacts due to spills and erosion to a negligible effect. While neither the sump nor the sediment control pond that are proposed under Alternative A would be used under Alternative B, three smaller sediment ponds would be constructed. Thus, Colowyo's CDPS permit would be amended or a new permit would be obtained, and the additional outfalls would be permitted according to state regulations.

Other aspects of surface water resource effects that were described above for Alternative A, such as TDS accumulation and reclamation activities, would be similar to those under Alternative B. Thus, as under Alternative A, Alternative B would also likely have overall negligible or minor effects on downstream surface water flows or water quality.

4.5.2.2 Groundwater

The potential loss of springs and/or spring flow under Alternative B was described above in the surface water subsection. Other impacts to groundwater, such as the interception of perched water or a more extensive saturated zone, and the resultant need for dewatering, would be similar to those under Alternative A (i.e., negligible to minor).

4.5.3 Alternative C (No Action)

Under Alternative C, there would be no disruption of Project Area stream channels, and no effects to downstream flows or quality. Similarly, there would be no loss of springs or interception of groundwater and no impacts to downstream water users, aquifers, or groundwater quality.

4.5.4 Mitigation Measures

No mitigation measures would be necessary for water resources.

4.6 VEGETATION

4.6.1 Alternative A (Proposed Action)

Under Alternative A, the removal of topsoil and overburden would result in the gradual loss of plant communities on 2,090.5 acres (43.3 percent of the Project Area) (**Table 4.6-1**) associated with clearing for the proposed pits, temporary overburden stockpile, mine facilities, and along the proposed haul road. Impacts would be short term and would range from negligible (aspen type) to moderate (mountain shrub type) until reclamation replaced vegetation to the approved reclamation plan (or improved) conditions.

Table 4.6-1 Vegetation Disturbance under Alternative A

Vegetation Type[1]	Acres Disturbed	Percent of the vegetation type disturbed within the Project Area
Sagebrush	903.6	38.0
Mountain Shrub	866.1	45.6
Grassland	269.9	42.1
Bottomland	17.9	12.1
Aspen	7.9	33.5
Juniper Scrub	17.7	43.3
Cultivated Fields	4.9	42.2
Disturbed Areas	2.5	51.0
Total	2,090.5	

[1] Vegetation types include vegetation as well as other land cover classifications.

Impacts to vegetation would be lessened by the implementation of design features (**Section 2.3.16**). These measures would include restoration of disturbed areas to the approved reclamation plan conditions, which include targets for improvement beyond existing conditions for other resources (e.g., wildlife or GRSG habitat [**Section 4.9.2**]). Several growing seasons would be needed for revegetated areas to be restored to the PR03 vegetation standards (Section 4.15 in Colowyo [2011]). Colowyo would continue to monitor reclaimed areas until they are released from bond liability.

Implementation of these measures would limit the potential impacts from the establishment of noxious or invasive species to negligible to minor with the continued application of herbicides as described in the weed control plan in PR03 (Colowyo 2011). Additionally, design features include protection afforded to vegetation resources from potential fugitive dust or spills of petroleum or other fluids from equipment, which would reduce these impacts to negligible.

4.6.2 Alternative B (Reduced Mining)

Impacts to vegetation resources would be similar to impacts under Alternative A. However, under this alternative, the Little Collom X Pit would not be mined. The temporary overburden stockpile and disturbance footprint would be redesigned resulting in an increase of 546.2 acres of disturbance to vegetation (54.7 percent of the Project Area) (negligible to moderate, short-term impacts) **(Table 4.6-2)**. Other impacts to vegetation would be similar to those described under Alternative A.

Table 4.6-2 Vegetation Disturbance under Alternative B

Vegetation Type	Acres Disturbed	Percent of the vegetation type disturbed within the Project Area	Acreage increased or (decreased) from Alternative A
Sagebrush	1,261.4	56.7	357.8
Mountain Shrub	1,051.8	55.6	185.7
Grassland	235.5	43.2	(34.4)
Bottomland	38.7	26.1	20.8
Aspen	9.4	39.8	1.5
Juniper Scrub	25.4	62.1	7.7
Cultivated Fields	11.6	100	6.7
Disturbed Areas	2.9	59.2	0.4
Total	2,636.7		546.2

Additionally, under Alternative B the life of the Project would be reduced by four years. Reduction in the life of the Project would result in the final reclamation of the area occurring sooner than under Alternative A. Reclamation under Alternative B would occur according to the Reclamation Plan (**Appendix A**) approved under PR04 in the same manner as Alternative A.

4.6.3 Alternative C (No Action)

Under Alternative C, no surface disturbance would occur and there would be no impacts to the vegetation in the Project Area.

4.6.4 Mitigation Measures

No mitigation measures would be necessary for vegetation.

4.7 WETLANDS AND RIPARIAN ZONES

4.7.1 Alternative A (Proposed Action)

Under Alternative A, approximately 1.1 acres of jurisdictional wetlands would be directly disturbed and removed by development of the proposed pits, temporary overburden stockpile, mine facilities, and along the proposed haul road. This would be a major, long-term impact to jurisdictional wetlands.

Additionally, alterations in the surface hydrology as a result of Alternative A would have the potential to affect downstream wetlands. Any disruptions to the streams that support wetlands would have the potential to dewater those areas. Any sediment runoff would have the potential to accumulate in downstream wetlands as a result of Alternative A, resulting in adverse impacts. However, these impacts are anticipated to be minor as the streams leading to these wetlands are intermittent and not likely to support these wetlands throughout the year.

Additionally, design features (**Section 2.3.16**) would reduce the potential for sedimentation. See **Section 4.6** for further discussion on impacts from sedimentation.

In addition to impacts to wetlands, Alternative A would impact a total of 16,485.1 linear feet (3.12 miles) of ephemeral channels (WOTUS) within the Little Collom Gulch and its unnamed tributaries. These channels have been preliminarily identified as jurisdictional. During the surveys conducted in 2006 and 2012, it was determined that the Little Collom Gulch has an average width of one foot for indicators. Therefore, under Alternative A, a total area of 0.38 acres of WOTUS would be impacted in addition to impacts to wetlands. This would be a moderate effect on WOTUS within the Project Area

Colowyo has initiated the Section 404 permitting process with the USACE for jurisdictional wetlands and other WOTUS that cannot be avoided and that would be impacted within the Project Area.

4.7.2 Alternative B (Reduced Mining)

Impacts to wetlands under Alternative B would be similar to impacts under Alternative A. Under this alternative, a total of 1.3 acres of jurisdictional wetlands would be impacted. This is an increase of 0.2 acres beyond that of Alternative A. While there would be an increase in the overall amount of wetlands directly impacted under this alternative, there would potentially be fewer impacts to wetlands outside of the Project Area by eliminating disturbance to streams on the northern end of the Project Area. This would increase the sediment travel distance between disturbance and downstream wetlands.

In addition to impacts to jurisdictional wetlands, Alternative B would impact a total of 10,425.6 linear feet (1.97 miles) of ephemeral channels (WOTUS) within the Little Collom Gulch and its unnamed tributaries. During surveys conducted in 2006, these areas were determined as potentially jurisdictional under the CWA. Using an average of one foot width of the WOTUS channels, Alternative B would impact 0.24 acres of WOTUS in addition to impacts to wetlands.

4.7.3 Alternative C (No Action)

Under Alternative C, no ground disturbing activities would occur. Therefore, there would be no impacts to wetlands or other WOUS in the Project Area.

4.7.4 Mitigation Measures

For jurisdictional wetlands and other WOTUS that cannot be avoided and that would be impacted within the Project Area, Colowyo has initiated the Section 404 permitting process with the USACE. Mitigation for the loss of wetlands and WOTUS would be coordinated and determined through the 404 permitting process and could be in the form of mitigation wetland credits or creation/enhancement of new wetlands.

4.8 FISH AND WILDLIFE RESOURCES

4.8.1 Alternative A (Proposed Action)

Design features (**Section 2.3.16**) would provide wildlife protection and habitat restoration during reclamation. To reduce impacts related to future mining related disturbance (grubbing and topsoil removal), Colowyo would implement an avian protection plan that outlines mitigation requirements for migratory birds. The plan would outline how the Colowyo Coal Mine addresses active nests found in future disturbance areas, a protocol on nest location, and consultation with the appropriate state authorities. Measures in the avian protection plan would include:

- No ground disturbing activities, including grubbing and topsoil removal, would occur from December 15 to July 15 to avoid the nesting season for migratory birds.
- Prior to commencement of grubbing and topsoil removal (after July 15), a nesting survey would be conducted no sooner than 72 hours prior to initiation of operations by a qualified biologist to identify active breeding pairs or potential nesting locations. Should the qualified biologist identify active nest(s) in the proposed mining disturbance area, ground disturbing activities within the CPW recommended buffer zone would not occur and Colowyo would immediately contact CPW to coordinate proper mitigation measures.

Short-term impacts to wildlife would occur primarily through gradual loss of habitat and disturbance by mining and human presence. These impacts, as described below, would be minor to moderate. Areas of habitat that are lost due to mining and related activities within the Project Area would be reclaimed as soon as those areas are out of production. At the end of the Project, all wildlife habitat would be restored in accordance with the approved reclamation plan, which includes goals to replace or improve wildlife habitat. At the end of the Project, disturbance to wildlife as a result of noise and human activity would cease.

4.8.1.1 Mammals

Under Alternative A, impacts to mammals would occur primarily from the loss of habitat. Approximately 2,090.5 acres of potential habitat would be lost from the two pits, mine facilities, new haul road, and other disturbances. Given the relatively small area that is proposed to be disturbed, and the amount of similar undisturbed habitat that is available adjacent to the Project Area both within and outside the mine boundary, this impact would be minor as there would be other areas for these species to displace and move into.

Mortality to smaller, burrowing mammal species may occur during construction and mining activities if individuals retreated underground rather than leaving the area. Additionally, some mortality would potentially occur from vehicle operations along the Project roads. This impact would be negligible to minor and short term.

Impacts to habitat for mammals would be offset by reclamation that would be continuing in areas of the current mining operation. Therefore, while new areas are being disturbed, previously disturbed areas would be reclaimed and become available again for mammal use.

4.8.1.2 Big Game

Impacts to big game species would potentially result from the construction of the two pits, mine facilities, and the 5.5 mile access road, displacement during mining operations, loss of forage on 2,090.5 acres of disturbed lands, noise from vehicles and equipment, and potential mortality from vehicle collisions.

Elk, pronghorn, and mule deer can be found in the Project Area in the summer and winter. Mapped mule deer and elk concentration areas, elk severe winter areas, and elk production areas would have minor to moderate, short-term impacts under Alternative A (**Table 4.8-1**). Although big game would tend to be displaced from disturbed areas and away from active mining activities, based on observations at the existing mining operations within the mine boundary, both elk and deer have been shown to acclimate to the disturbance from mining operations (Colowyo 2011). Herds are commonly found on previously reclaimed areas that are adjacent to active mining operations, including during calving season. Additionally, impacts from displacement would be offset given the overall amount of similar habitat available outside of the Project Area.

Table 4.8-1 Big Game Habitat Directly Impacted by Alternative A

Big Game Habitat	Acres Impacted	Percent of Mapped Range disturbed within the Project Area
Elk Resident Range	562.4	50.2
Elk Winter Concentration Area	853.2	34.7
Elk Winter Range	2,090.5	43.3
Elk Severe Winter Range	318.5	25.2
Elk Production Area	562.4	50.2
Mule Deer Winter Concentration	1,044.0	37.1
Mule Deer Winter Range	1,672.0	41.3

4.8.1.3 Migratory Birds

Impacts to migratory birds within the Project Area could include destruction of nests and eggs in unidentified nests if clearing activities occur during nesting seasons and those nests are not found and subsequently avoided; design features (**Section 2.3.16**) would reduce this to a negligible to minor impact. Approximately 2,090.5 acres of land would be disturbed under Alternative A. Of this, most of the area would provide some habitat for migratory birds, including nesting habitat. However, these habitats are available outside the Project Area, and therefore, this impact would be minor.

In addition to the loss of habitat, the construction of a new 5.5 mile haul road would have an impact on migratory birds. Inglefinger (2001) found evidence that densities of sage-brush obligate songbirds declined within 100 meters of natural gas access roads, even under light traffic volumes (less than 12 vehicles per day), although horned lark abundance increased within 100 meters of roads, where they may forage on windblown seeds that collect in the road.

Sutter et al. (2000) found numerous species of grassland birds (e.g., Sprague's pipit [*Anthus spragueii*], Baird's sparrow [*Ammodramus bairdii*]) to be less abundant along roads than trails. However, these habitats are available outside the Project Area, and therefore, this impact would be a minor impact on migratory birds.

Noise produced by mining operations would also have the potential to impact migratory birds. Noise can interfere with establishment of breeding territories for songbirds that vocalize during breeding, or interfere with alarm calls of birds and mammals (Larking 1996, USDI 2003). These impacts would be minor.

The proposed construction of the power line associated with Alternative A would have the potential to impact migratory birds. While most species of migratory birds are not large enough to touch two energized parts of the line, and thereby be electrocuted, some mortality may occur from birds colliding with the line. Additionally, power lines are features that provide perches where perches do not naturally occur. These perch sites may allow for hunting advantages for birds of prey, particularly in habitats devoid of tall features, such as trees or rock outcrops. Habitats lacking natural perches would likely have the most effect from the artificial perches. Within these communities some species may avoid the habitats where the perches occur, or they may sustain predation, but it is not expected to impact enough individuals of one particular species including migratory birds to result in population level viability effects. This impact would be considered a negligible to minor long-term impact. However, the potential for increased predation is not expected to reduce or expand a species' existing distribution.

4.8.1.4 Raptors

Impacts to raptors could result from vehicle strikes and collisions with power lines; these impacts would be lessened from the implementation of design features (**Section 2.3.16**) to a negligible to minor impact. Therefore, the primary impacts that may result to raptors under this alternative would be from loss of habitat and disturbance to individuals. Potential future nesting locations and foraging habitat within 2,090.5 acres would be removed. Noise and human presence has the potential to disturb individuals that forage in the area. Given the amount of similar habitat outside the Project Area, this impact would be minor.

Nesting raptors are often sensitive to disturbance from human related activities. Raptors may often abandon nests with eggs or young increasing the potential for mortality from nest predation or intolerance to high or low temperatures. The amount of disturbance that an individual raptor will tolerate varies among species and individuals (CPW 2003). Impacts to nesting raptors could extend beyond the actual disturbance area up to 0.5 miles (0.8 km) away (CPW 2003). While no active nests are located within the Project Area, two nests previously occupied by red-tailed hawk and common raven [*Corvus corax*]) in 2011 are located within 0.5 mile of the proposed access road. Four previously inactive nests are located within the disturbance footprint and would be removed. The species associated with these inactive nests included Cooper's hawk, long-eared owl, and common raven. An additional 17 inactive nests have been located within 0.5 mile of the disturbance footprint. Any nests would be checked for activity status prior to their removal and if any are active, they would be lawfully removed after the young had fledged. These measures would result in negligible impacts to nesting raptors.

Mortality to raptor species from the Project is not likely to occur as most species are highly mobile and are able to leave the area. However, some species that feed on carrion or roadkill would be at risk of vehicle collisions along the haul road and other mine roads although this has not been reported to have occurred at the mine.

The proposed power line would also have the potential to impact raptors. Power lines have been implicated in the electrocution of avian species, particularly large birds such as golden eagles. Avian electrocutions can occur when a bird completes an electric circuit by simultaneously touching two energized parts or an energized part and a grounded part of the electrical equipment. However, no impacts from electrocution hazard are anticipated from construction of the Project because the Colowyo Coal Mine would build the transmission line with perch deterrents (**Section 2.3.16**).

4.8.1.5 Reptiles and Amphibians

Impacts to reptiles and amphibians would be similar to the impacts described in **Section 4.8.1.1**. In addition to the 2,090.5 acres of habitat lost, some mortality may occur from construction, mining activities, and vehicle operation. The loss of approximately 1.1 acres of wetlands would impact amphibian populations in the Project Area. Overall, the amount of similar habitat available to reptiles and amphibians outside the Project Area would offset the impacts from displacement resulting in negligible to minor impacts.

4.8.1.6 Fisheries

As there are no perennial streams within the Project Area, no direct impacts to the fisheries near the Project Area are anticipated to occur. Implementation of design features (**Section 2.3.16**) would reduce the likelihood of sediment or a spill of petroleum products or hazardous materials from reaching fish-bearing streams. Potential indirect impacts to fisheries are provided in **Section 4.9**, specifically to the federally listed Colorado River fish. The nearest habitat for these species is located in the Yampa River approximately 11 miles (18 km) from the Project Area and 17 miles (27 km) from the proposed surface disturbance.

4.8.2 Alternative B (Reduced Mining)

4.8.2.1 Mammals

Impacts to mammals under this alternative would be similar to Alternative A. However, the elimination of the Little Collom X Pit and the redesign of the temporary overburden stockpile and disturbance footprint would increase the surface disturbance by 546.2 acres and reduce the life of the Project by approximately four years. This would result in a slightly greater increase of impacts to mammals from the loss of habitat, as well as increasing the potential for mortality to occur; the severity of these impacts would still be the same as under Alternative A. The reduction in the life of the Project would reduce other potential impacts to mammals by approximately four years from mining related activities.

4.8.2.2 Big Game

Impacts to big game species under this alternative would be similar to Alternative A. However, the elimination of the Little Collom X Pit and the redesign of the temporary overburden stockpile and disturbance footprint would increase the surface disturbance by 546.2 acres and reduce the life of the Project by approximately four years; the severity of these impacts would still be the same as under Alternative A. The reduction in the life of the Project would reduce other potential impacts to big game by approximately four years from mining related activities. The Little Collom X Pit and redesign area would affect mapped big game habitat as shown in **Table 4.8-2**.

Table 4.8-2 Big Game Habitat Impacted under Alternative B

Habitat Type	Acres Impacted	Percent of mapped range impacted in the Project Area	Percent increase/(decrease) from Alternative B
Elk Resident Range	688.4	61.4	22.4
Elk Concentration Area	854.7	34.7	0.2
Elk Winter Range	2,636.7	54.7	26.1
Elk Severe Winter Range	235.4	18.6	(26.1)
Elk Production Area	688.4	61.4	22.4
Mule Deer Winter Concentration	1,186.6	42.2	13.7
Mule Deer Winter Range	1,949.5	48.1	13.6

4.8.2.3 Migratory Birds

Impacts to migratory birds under this alternative would be similar to Alternative A. However, the elimination of the Little Collom X Pit and the redesign of the temporary overburden stockpile and its disturbance footprint would increase the surface disturbance by 546.2 acres, and the life of the Project would be reduced by approximately four years. This increase in surface disturbance would result in slightly greater impacts to migratory birds when compared to Alternative A; the severity of these impacts would still be the same as under Alternative A. However, the reduction in the life of the Project would reduce other potential impacts to migratory birds by approximately four years from mining related activities.

4.8.2.4 Raptors

Impacts to raptors under this alternative would be similar to Alternative A. However, the elimination of the Little Collom X Pit and the redesign of the temporary overburden stockpile and disturbance footprint would increase the surface disturbance by 546.2 acres, and the life of the Project would be reduced by approximately four years. This increase in surface disturbance would result in a slight increase in impacts to habitat for raptors; the severity of these impacts would still be the same as under Alternative A.. However, the reduction in the life of the Project would reduce the impacts to raptors. Under this alternative, the same two active nests that occur within 0.5 mile of the access road would be impacted, as under Alternative A. However, the elimination of the Little Collom X Pit would maintain the four inactive nests that would be directly impacted under Alternative A and would reduce the number of inactive nests in the 0.5 mile buffer to eight (17 under Alternative A). Reducing the number of nests impacted would reduce the overall impacts to raptors in the Project Area (negligible) under Alternative B when compared with Alternative A.

4.8.2.5 Reptiles and Amphibians

Impacts to reptiles and amphibians under this alternative would be similar to Alternative A. However, the elimination of the Little Collom X Pit and the redesign of the temporary overburden stockpile and disturbance footprint would increase the surface disturbance by 546.2 acres and the life of the Project would be reduced by approximately four years. This increase in surface disturbance would result in slightly greater impacts to reptiles and amphibians; the severity of these impacts would still be the same as under Alternative A. However, the reduction in the life of the Project would reduce the impacts to reptiles and amphibians by allowing the area to be returned to potential habitat sooner than for Alternative A.

4.8.2.6 Fisheries

The Project Area does not contain perennially flowing waters and therefore does not support any fisheries; therefore, there would not be any impacts to fisheries.

4.8.3 Alternative C (No Action)

Under Alternative C, surface disturbing activities would not occur in the Project Area and there would be no impacts to wildlife resources in or near the Project Area.

4.8.4 Mitigation Measures

No mitigation would be necessary for wildlife.

4.9 SPECIAL STATUS SPECIES

4.9.1 Alternative A (Proposed Action)

Design features (**Section 2.3.16**) would be implemented to reduce the impacts to special status species. Areas of habitat that would be lost due to mining and related activities within the Project Area would be reclaimed as soon as those areas are out of production. At the end of the Project, all special status species habitat would be restored in accordance with the approved reclamation plan, which includes goals to replace or improve wildlife habitat. Disturbance to special status species as a result of noise and human activity would cease. Overall, the impacts to special status species are expected to be minor under Alternative A.

4.9.1.1 Threatened, Endangered, and Candidate Species

<u>Colorado River Fish</u>

The nearest habitat for the Colorado River fish species is the Yampa River, approximately 11 miles (18 km) from the Project Area (17 miles [27 km] from any proposed disturbance). Due to the design features (**Section 2.3.16**) associated with Alternative A, it is unlikely that these species would be impacted by sediment or spills.

Water depletion for mine operations under Alternative A is anticipated to be approximately 36 acre-feet per year. This depletion would result in adverse impacts to the Colorado River fish species (USFWS 2012). The USFWS BO for PR03 (**Appendix C**) contains the following discussion on impacts to the Colorado River Fish from water depletions:

> "A recovery Implementation Program for Endangered Fish Species in the Upper Colorado River Basin was initiated on January 22, 1988. The Recovery Program was intended to be the reasonable and prudent alternative for individual projects to avoid the likelihood of jeopardy to the endangered fishes from impacts of depletions to the Upper Colorado River Basin. In order to further define and clarify the process in the Recovery Program, a Section 7 agreement was implemented on October 15, 1993, by the Recovery Program participants. Incorporated into this agreement is a Recovery Implementation Program Recovery Action Plan (RIPRAP), which identifies actions currently believed to be required to recover the endangered fishes in the most expeditious manner.
>
> On January 10, 2005, the USFWS issued a final programmatic biological opinion (PBO) on the *Management Plan for Endangered Fishes in the Yampa River Basin*. The USFWS has determined that projects that fit under the umbrella of the Yampa River PBO would avoid the likelihood of jeopardy and/or adverse modification of critical habitat for depletion impacts. The Yampa River PBO states that in order for actions to fall under the umbrella of the PBO and rely on the RIPRAP to offset its depletion, the following criteria must be met:
>
> 1. A Recovery Agreement must be offered and signed prior to conclusion of Section 7 consultation.
> 2. A fee to fund recovery actions will be submitted as described in the Proposed Action for new depletion projects greater than 100 acre-feet per year (af/yr).
> 3. Re-initiation stipulations will be included in all individual consultations under the umbrella of this programmatic.
> 4. The USFWS and project proponent will request that discretionary federal control be retained for all consultations under this programmatic.
>
> The Recovery Agreement was finalized by the USFWS and the mine on March 3, 2007 in conjunction with the previous Section 7 consultation for the mine. As this project would deplete less than 100 af/year, no recovery fees are necessary. OSMRE has previously agreed to condition their approval documents to retain jurisdiction should Section 7 consultation be reinitiated. Therefore, the USFWS concluded that the Proposed Action meets the criteria to rely on the RIPRAP to offset depletion impacts and is not likely to jeopardize the continued existence of the species and is not likely to destroy or adversely modify designated critical habitat."

In addition to impacts from water depletions, the Colorado River fish may be indirectly impacted from the combustion of coal at local power generation stations. The nearest of these stations is the Craig Generating Station located along the Yampa River in Craig. Combustion of coal releases mercury into the atmosphere, which may be deposited into habitat for the Colorado River fish directly, or onto adjacent land and subsequently washed into the river. Mercury is a concern primarily to longer-lived fish species (e.g., Colorado pikeminnow) because it bioaccumulates within the tissue of individuals. Therefore, the longer an individual lives and absorbs mercury, the higher the levels within their tissues over time. Mercury can affect an individual's central nervous system, alter their behaviors (e.g., reduced predator avoidance), and disrupt the endocrine system resulting in reduced reproductive success (Lusk 2010). While the specific effects of mercury and other heavy metals on pikeminnow are known, the role these contaminants play on suppressing populations of the Colorado River fish are not well understood (USFWS 2011b).

Beckvar et al. (2005) suggested a threshold-effect level of ≤ 0.2 micrograms per gram (μg/g) wet weight mercury in whole body fish as being generally protective of juvenile and adult fish. The USFWS reported that 78 percent of the Colorado pikeminnow individuals collected in Colorado had levels of mercury above the 0.2 μg/g level, including within the Yampa River Basin (Osmundson and Lusk 2012). Samples taken from pikeminnow in the Yampa River in 2006 had levels of mercury between 0.42 and 0.68 μg/g (CDPHE 2015c). Osmundson and Lusk (2012) found a range of 0.39 to 0.58 μg/g with a mean level of 0.48 μg/g in Yampa River pikeminnow. The mercury levels reported above are lower than what was reported for pikeminnow that were captured in 1960s from the Yampa River (Lusk 2010). In that study, archived fish samples from museums were tested using similar methods as the pikeminnow captured recently and compared to what was reported by Osmundson and Lusk (2012). That information was presented to the San Juan Recovery Program and indicated that fish collected in 1960 had mercury levels of approximately 0.62 μg/g, approximately 0.10 μg/g higher than current levels. It should be noted that due to the limited number of fish in the Yampa River, sample size for these studies is generally low (less than 10). Therefore, additional study is needed to be able to make an overall statement as to how mercury is currently affecting these species.

In addition to impacts to individual Colorado River fish, impacts would also potentially occur to those species designated critical habitats in the region. As with any other listed species with designated critical habitat, the critical habitat for the four fish species all contain the primary constituent elements (PCEs) that are required to be present and are determined to be necessary for the survival and recovery of the species. All four species' critical habitat contains the following PCEs (50 CFR 13378):

1. Water: This includes a quantity of water of sufficient quality (i.e., temperature, dissolved oxygen, lack of contaminants, nutrients, turbidity, etc.) that is delivered to a specific location in accordance with a hydrologic regime that is required for the particular life stage for each species;
2. Physical Habitat: This includes areas of the Colorado River system that are inhabited or potentially habitable by fish for use in spawning, nursery, feeding, and rearing, or corridors between these areas. In addition to river channels, these areas also include bottom lands, side channel, secondary channels, oxbows, backwaters, and other areas in the 100-year floodplain, which when inundated provide spawning, nursery, feeding and rearing habitats, or access to these habitats;

3. Biological Environment. Food supply, predation, and competition are important elements of the biological environment and are considered components of this constituent element. Food supply is a function of nutrient supply, productivity, and availability to each life stage of the species. Predation and competition, although considered normal components of this environment, are out of balance due to introduced nonnative fish species in many areas.

Mercury from the combustion of Colowyo Coal Mine coal at the Craig Generating Station that is deposited either directly or indirectly into the designated critical habitat for these species would have the potential to adversely impact the critical habitat. This would occur primarily by increasing the amount of contaminates present in those areas (PCE #1). It is difficult to quantify the level of this impact of Alternative A on critical habitats given the lack of information on where the mercury in the analysis area originates from. However, if it is assumed that only five percent of the mercury generated at the local generating stations is deposited into the analysis area (EPRI 2014), the impact indirectly from Alternative A may be minor. However, when added to the other regional and global sources of mercury deposited into the area, Alternative A may result in cumulatively adverse impacts (**Section 5.4.8**).

Emissions of mercury related to combustion at the Craig Generating Station dropped from 130 lbs/year in 2008 to 30 lbs/year in 2009 due to the installation of improved environmental controls at the Craig Generating Station; mercury emissions from 2010 to 2013 ranged between 42 and 43 lbs/year (**Section 4.3**). Given the amount of mercury that is present in the coal mined at the Colowyo Coal Mine and the existing controls at the Craig Generating Station, an average amount of 47 lbs. of mercury would be emitted annually from the Station including the Colowyo Coal Mine coal mined under Alternative A. While the prevailing winds would generally result in the deposition of the emitted mercury east of the Craig Generating Station and away from habitat for the Colorado River fish, it is probable that some of the mercury would be deposited in the Yampa River and have the potential to indirectly impact these species. Given that the current levels of mercury in pikeminnow in the Yampa River are above the 0.2 ug/g threshold for detrimental effects, these depositions would have an indirect impact on these species.

Of the amount of mercury annually deposited in the analysis area (as well as the larger Yampa and White River Basins), it is reasonable to assume that some portion would deposit directly or indirectly into the Yampa or White Rivers or their tributaries. Some of this mercury would be converted into methyl mercury and thereby has the potential to adversely affect the Colorado River fish. However, because of a lack of data or modeling it is not possible to quantify the amount of mercury that would enter the Yampa and White Rivers, or be converted to methyl mercury. Therefore, at this time it is not possible to accurately predict the impact to the Colorado River fish or their habitat.

Due to the uncertainties in how mercury is potentially affecting the Colorado River fish species, it is difficult to draw a conclusion to impacts from Alternative A as some of the data appears to be contradictory. In a recent study, pikeminnow populations in the Yampa River were reported to be declining but had low mercury concentrations compared to other river segments (Osmundson and Lusk 2012). It should be noted that mercury levels in the Yampa

River were still above the: human consumption advisory level of 0.3 µg/g wet weight set by the EPA; toxicity threshold of 0.2 µg/g wet weight (Beckvar et al. 2005); and, the 0.1 µg/g wet weight for the protection of fish eating birds and mammals (Yeardley et al. 1989). Conversely, pikeminnow in the White River had high levels of mercury concentrations but the population was increasing (Osmundson and Lusk 2012). The increase in the pikeminnow population in the White River was attributed to upstream movement of juvenile pikeminnow that originated in downstream Green River reaches during 2006 and 2007 and not from reproduction occurring in the White River itself (Bestgen et al. 2010). Further studies are required to determine how mercury is affecting species in the Yampa and White Rivers before a conclusion may be drawn between Alternative A and impacts to the Colorado River fish and their critical habitats.

In addition to mercury, impacts to the Colorado River fish from increases in selenium from the combustion of coal at the Craig Generating Station could occur. Selenium, a trace element, is a natural component of coal and soils in the area and can be released to the environment by the irrigation of selenium-rich soils and the burning of coal in power plants with subsequent emissions to air and deposition to land and surface water. Contributions from anthropogenic sources have increased with the increases of world population, energy demand, and expansion of irrigated agriculture. Selenium, abundant in western soils, enters surface waters through erosion, leaching, and runoff. While required in the diet of fish at very low concentrations (0.1 µg/g) (Sharma and Singh 1984), it is unknown if selenium is adversely affecting endangered fish in the Yampa Basin. Excess dietary selenium causes elevated selenium concentrations to be deposited into developing eggs, particularly the yolk (Buhl and Hamilton 2000). If concentrations in the egg are sufficiently high, developing proteins and enzymes become dysfunctional or result in oxidative stress, conditions that may lead to embryo mortality, deformed embryos, or embryos that may be at higher risk for mortality.

Reporting limits for selenium in water is generally one µg/L while the EPA has set the maximum contaminant level goal of 0.05 mg/L (50 µg/L) for human consumption. During sampling of the Yampa River between 1997 and 1998, levels between less than one and 4.8 µg/L were found near Craig, between less than one and 4.9 µg/L near Maybell, and less than one and 3.6 µg/L near Deerlodge Park (USGS 2001). The peak reported levels for these sites all occurred in March, possibly during the beginning of the snow runoff. Concentrations were less than 1 µg/L during May through October. However, it should be noted that selenium in water may be less important than dietary exposure when determining the potential for chronic effects to a species (USFWS 2014).

Of the four Colorado River fish species, selenium would disproportionately affect the razorback sucker more than the other three species. As with all sucker species, the razorback sucker is a bottom feeder and more likely to ingest selenium that has precipitated to the river bottoms.

While the reportable limit of selenium in water is 1 µg/L, the safe level of selenium for protection of fish and wildlife in water is considered to be below 2 µg/L and chronically toxic levels are considered to be greater than 2.7 µg/L (USFWS 2014). Excess selenium in fish have been shown to have a wide range of adverse effects including mortality, reproductive impairment, effects on growth, and developmental and teratogenic effects including edema and finfold, craniofacial, and skeletal deformities.

Combustion of coal at the Craig Generating Station could result in some amount of selenium being emitted and subsequently deposited. However, as it is not monitored as it is emitted, unlike mercury, there is no information as to how much is released. When selenium is present in flue gas, it tends to behave much like sulfur and is removed to some extent via SO_2 air scrubbers in place and also absorbs onto alkaline fly ash that is subsequently removed by a fabric filter baghouse (EPRI 2008). Therefore, due to the lack of information available, it is unknown if selenium is impacting Colorado River fish species in the Yampa and White Rivers.

Although formal Section 7 consultation with USFWS was conducted for Alternative A, that consultation did not include the impacts for mercury or selenium. Consultation with USFWS for Alternative B did include those potential impacts. In general, indirect impacts to the Colorado River fish from mercury and selenium under Alternative A would be moderate.

Western Yellow-billed Cuckoo

Because there is no habitat in the Project Area for WYBCs, impacts would be limited to indirect impacts resulting from Colowyo coal combustion and subsequent mercury emission at the Craig Generating Station. For the WYBC, as with other riparian birds, mercury is accumulated through the ingestion of aerial insects emerging from benthic life stages in aquatic environments containing mercury or from associated predatory spiders (Cristol et al. 2008; Edmonds et al. 2012; Evers et al. 2012; Buckland-Nicks et al. 2014; Gann et al. 2014). Dietary total mercury concentrations associated with adverse effects to birds are generally greater than 0.1 mg/kg wet weight (DOI 1998). Once ingested, mercury rapidly moves into the bird's central nervous system, resulting in behavioral and neuromotor disorders (Tan et al. 2009; Scheuhammer et al. 2007, 2012). Therefore, adverse indirect effects are described for the eggs, embryos, nestlings, and/or fledglings associated with elevated mercury burdens in the female parent and due to foraging.

No information is available on the levels of mercury in Yampa River invertebrates within the region. However, it could be assumed that given the levels of mercury that currently exist in the Yampa River (the analysis area for this species related to the potential indirect impacts from the Project), that the aquatic invertebrates may contain elevated levels of mercury. Any WYBCs present in the analysis area would be at risk for mercury contamination. Therefore, Alternative A would have the potential to adversely indirectly affect this species through the combustion of Colowyo coal. However, that risk would be low considering that the primary food sources for the WYBC are generally not aquatic. Given the lack of sightings of this species within the analysis area since 2008, it is unknown how many individuals would have the potential to be affected. It is difficult to determine the level of impact to the species as a whole given there is no threshold information for WYBCs as to what may be an acceptable amount of mercury in their systems without adverse symptoms. Information is also lacking on current, actual amounts of mercury in WYBCs that inhabit the region. Given the low numbers of WYBCs that are thought to reside in the area, it would be difficult to obtain this data.

The WYBC may not return to the same breeding areas in successive years, therefore it is possible that if any individuals were impacted by mercury in one year, they may travel to a new location in subsequent years that are not impacted by mercury generated from the Craig Generating Station. Similarly, as WYBCs are migrants, they would not be present in the analysis area year-round, further reducing the potential for mercury contamination.

In addition to impacts to individual WYBCs, the proposed critical habitat for this species may also be impacted by Alternative A. The USFWS has designated critical habitat for the western yellow billed WYBC along the Yampa River in the analysis area that contain the following PCEs (79 FR 48554):

1. Riparian woodlands;
2. Adequate prey base; and,
3. Dynamic riverine processes

Alternative A may have the potential to indirectly impact critical habitat through adverse impacts to the WYBC's prey base. Different orders of invertebrates often react to mercury differently although in general insects in the larval stages are most susceptible to mercury. Levels of 1 to 10 µg/L normally cause acute toxicity for the most sensitive developmental stage of many different species of aquatic invertebrates (Boening 2000).

As stated above, Alternative A would indirectly result in some level of mercury deposition in the analysis area. Some of this mercury may affect the invertebrates that make up the WYBC's prey base, thereby affecting the proposed critical habitat (PCE #2). It should be noted, however, that aquatic insects and amphibians are not the primary food source for WYBCs. It is not known how much of the mercury deposited would be generated from Colowyo Coal Mine coal burned at the Craig Generating Station. Therefore, it is not possible to determine the severity of this indirect impact to the proposed critical habitat.

Mercury is not anticipated to affect the cottonwoods or other riparian vegetation that comprises the majority of habitat for this species as wood plants are generally insensitive to the harmful effects of mercury (Boening 2000).

Overall, Alternative A would have minor indirect impacts to the WYBC.

4.9.1.2 State Listed and BLM Sensitive Species

<u>Great Basin Spadefoot</u>

The primary impact to this species would occur from a loss of 1,787.4 acres of habitat. In addition to lost habitat, direct mortality could occur from Project activities e.g., vehicle strikes and earth moving. There is a large amount of suitable habitat for this species outside of the Project Area; therefore, Alternative A would result in minor short-term impacts until successful reclamation, when reclamation goals would prioritize the replacement of wildlife habitat.

Ferruginous Hawk

Impacts to ferruginous hawks from Alternative A would occur primarily through a loss of 1,153.7 acres of foraging habitat. While there are no known nest sites within or near the Project Area, mining activities have the potential to prevent ferruginous hawks from nesting in the area. This species is known to be sensitive to human disturbance up to approximately 0.5 mile (0.8 km) (CPW 2003). There is a large amount of suitable and undisturbed foraging habitat for this species outside of the Project Area; therefore, Alternative A would result in minor short-term impacts until successful reclamation, when reclamation goals would prioritize the replacement of wildlife habitat.

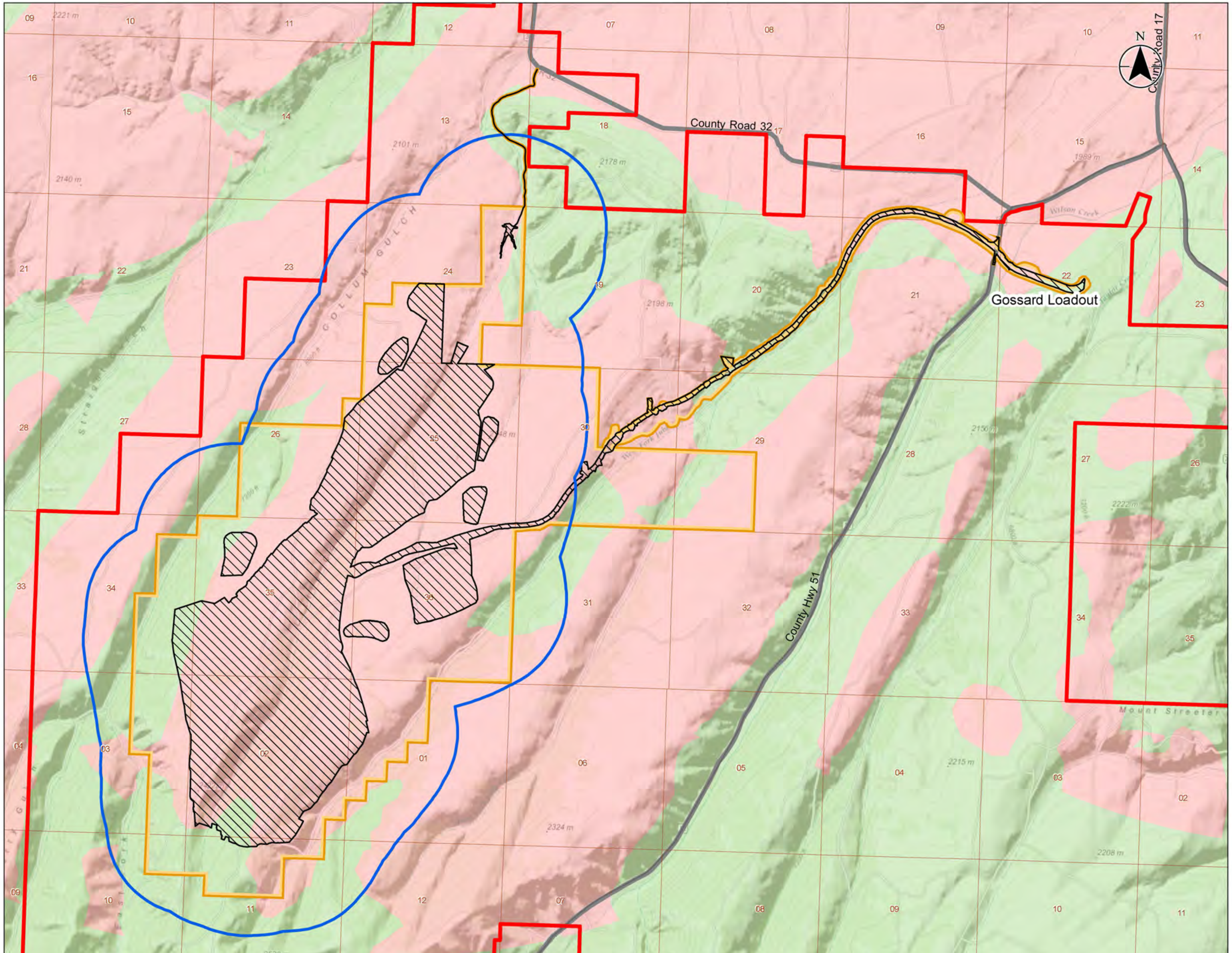
Greater Sage-grouse

The primary impact to GRSG under Alternative A would occur from direct disturbance, displacement of individuals, direct loss of habitat, and a potential increase of predation from attracting mammalian predators (CGSSC 2008). The use of perch deterrents on the power line would limit the potential for an increase in avian predation on this species.

Alternative A would impact approximately 1,829.4 acres of mapped PHMA, which would be a major impact. The majority of the habitat is located within sagebrush or shrubland vegetation types. A minor amount of GHMA habitat would be impacted by comparison (98 acres). In addition to the direct impacts, consultation with CPW, BLM, and USFWS biologists determined that indirect impacts would occur out to 900 meters (2,953 feet) from the edge of disturbance (B. Holmes, CPW, personal communication June 25, 2014). This distance was determined based on several years of monitoring data from the Axial Basin, where the Colowyo Coal Mine is located and GRSG occur near existing mining. **Table 4.9-1** outlines the GRSG habitat classifications potentially impacted by Alternative A including production, brooding, and winter habitat (**Figures 4-4** and **4-5**). Reclamation would focus on improving GRSG habitat, including boosting available GRSG forage and brood production, in disturbed areas. This would be a long-term benefit to GRSG and would lessen the impact to PHMA.

The following design features (**Section 2.3.16**) would specifically benefit GRSG:

- Colowyo would incorporate the utilization of marking flags on perimeter fences in the Project Area to minimize incidents of GRSG mortality through bird/fence collisions.
- Colowyo would treat NPDES discharge ponds for mosquitos to reduce the potential of West Nile Virus transmission to local GRSG populations if this treatment is not specifically precluded by CDPHE regulation of the Colowyo Coal Mine's discharge ponds.



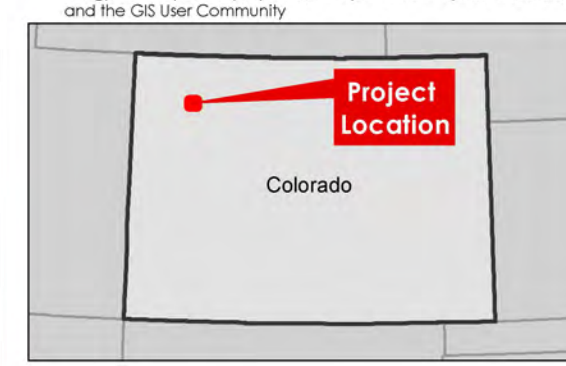
- Road
- Disturbance Area
- Approved SMCRA Permit Boundary
- Project Area

Greater Sage-Grouse

- Indirect Impact Area (900 Meter Buffer)
- General Habitat Management Area (GHMA)
- Priority Habitat Management Area (PHMA)

0 2,000 4,000 Feet
1:40,000 (At original document size of 11x17)

Notes
1. Coordinate System: NAD 1983 UTM Zone 13N
2. Basemap: Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community



Project Location
Rio Blanco & Moffat Counties
Colorado

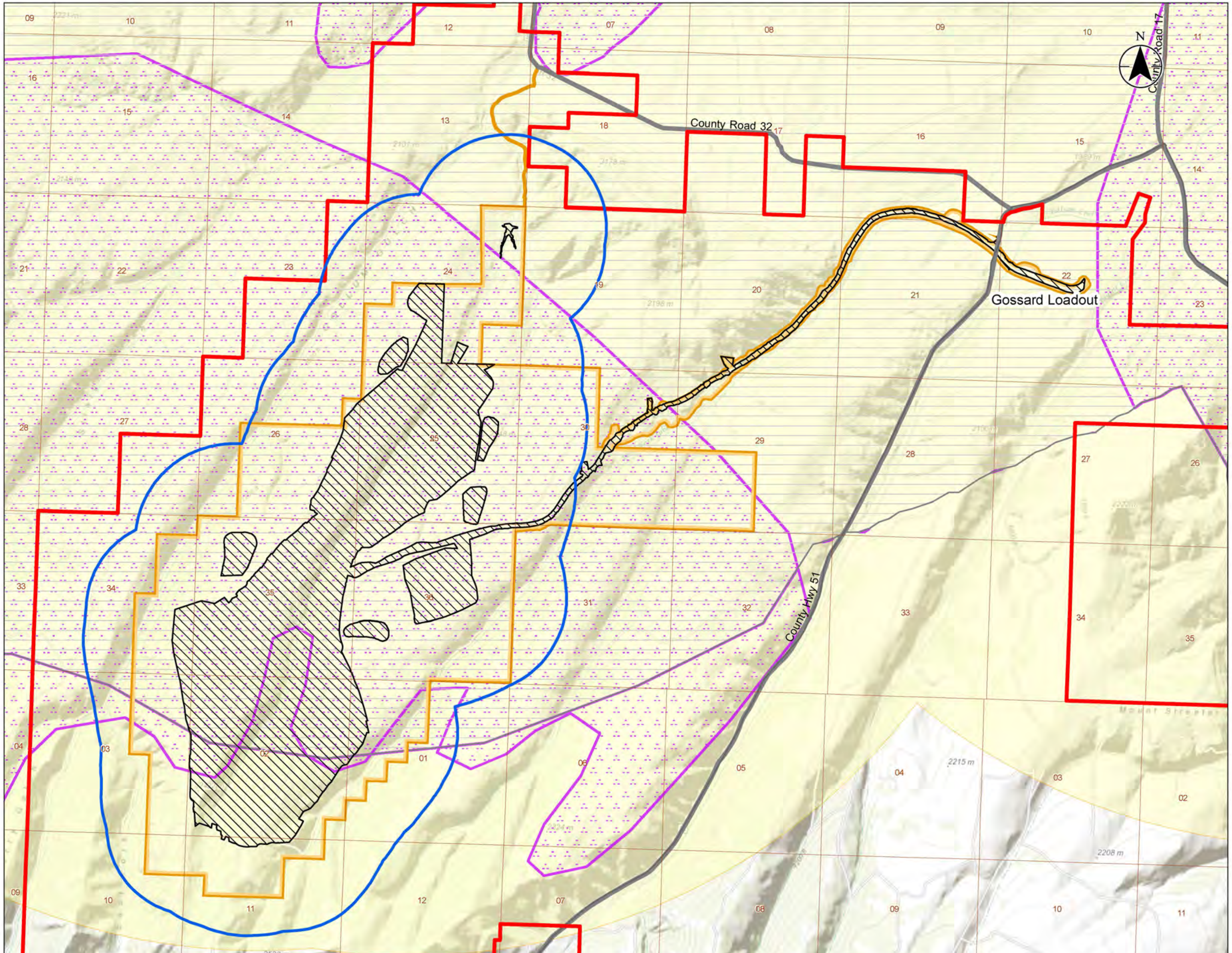
203713557
Prepared by NF on 2015-01-22
Technical Review by NL on 2015-01-05
Independent Review by GB on 2015-01-05

Client/Project
Office of Surface Mining Reclamation & Enforcement
Colowyo Coal Mine: Collom Permit Expansion Area
Project Mining Plan Environmental Assessment

Figure No.
4-4

DRAFT

Title
Alternative A, GSG Preliminary Priority and General Habitat Impact Analysis Area



- Road
- Disturbance Area
- Project Area
- Approved SMCRA Permit Boundary

Greater Sage-Grouse

- Indirect Impact Area (900 Meter Buffer)

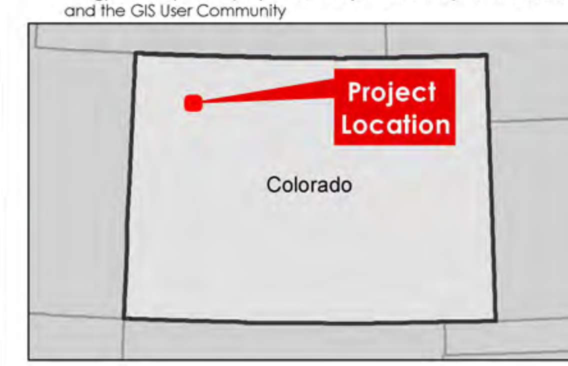
Other GSG Habitat Types

- Sage-Grouse Winter Range
- Sage-Grouse Brood Areas
- Sage-Grouse Production Areas

0 2,000 4,000 Feet
1:40,000 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 13N
2. Basemap: Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community



Project Location
Rio Blanco & Moffat Counties
Colorado

203713557
Prepared by NL on 2015-02-05
Technical Review by NL on 2015-01-05
Independent Review by GB on 2015-01-05

Client/Project
Office of Surface Mining Reclamation & Enforcement
Colowyo Coal Mine: Collom Permit Expansion Area
Project Mining Plan Environmental Assessment

Figure No.
4-5

DRAFT

Title
**Alternative A,
Other Habitat
Impact Analysis Area**

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Table 4.9-1 Disturbance to GRSG Habitat Types under Alternative A

Habitat Designation	Acres Directly Disturbed	Percent of total habitat type directly disturbed in the Project Area	Acres Indirectly Disturbed within a 900 meter buffer[1,2]	Total Acres Disturbed (Direct & Indirect)
PHMA	1,829.4	47.0	3,022.4	4,851.8
GHMA	98.0	10.5	61.7	159.7
Production Area	2,090.5	43.3	4,556.0	6,646.5
Brooding Habitat	1,610.5	40.8	3,054.6	4,665.1
Winter Range	1,634.2	39.9	3,628.5	5,262.7

[1] Indirect impacts acreage does not include the access road, as data in the Axial Basin has shown that GRSG in the region do not avoid roads (B. Holmes, CPW, personal communication, June 25, 2014).
[2] The buffer distance of 900 meters was determined based on telemetry data from marked GRSG in the Axial Basin. The data show that GRSG typically remain this distance from mining operations (B. Holmes, CPW, personal communication, June 25, 2014).

Short-term and long-term direct impacts would occur by habitat removal, through construction of the Project, and through noise during construction and mining activities. Lek SG4 is located approximately 320 feet from the Little Collom X Pit. Though construction impacts would be transitory, there is the potential for minor to moderate impacts should these activities occur during the breeding season or when nesting and brood-rearing hens are in close proximity to these activities. Fences have been implicated in direct mortality to GRSG as a result of collision or indirectly by providing perches for raptors, leading to increased predation (Knick et al. 2011). Also, the presence of roads and power lines may provide easy travel corridors to terrestrial GRSG predators (Chesness et al. 1968, Mankin and Warner 1992). Communication towers and electrical distribution lines have been implicated as collision hazards to many birds including GRSG (Wisdom et al. 2011, APLIC 2012, CGSSC 2008). Furthermore, for hens seeking brood-rearing habitat within the Project Area, the mining areas, associated facilities, and increased human presence may impede access to this habitat by preventing the hens from travelling along established routes. These effects may be minor to moderate and long-term depending on how hens move from nesting to brood-rearing habitat and whether the individuals acclimate to human presence or relocate to other habitat during the life of the mine. After reclamation is complete, GRSG would be able to reestablish use in these areas.

Any disturbance to GRSG that would preclude birds from attending the lek or limit access to habitat (i.e., PHMA, GHMA, etc.) would be considered moderate. However, major impacts to the population are not considered likely as the Axial Basin has one of the highest population levels of GRSG in Colorado. Lek counts during the 2015 season within the Basin, and Moffat County in general, were higher than in previous years (CPW 2015b). The Axial Basin population occurs within the CPW Management Zone 5 for GRSG. In 2015, leks occurring on or near Colowyo land in this zone had a total lek count of 625 males, of which 48 were on lek SG4. In addition, within the region, there were seven other leks that had equal to or similar numbers of males attending in 2015. Therefore, impacts to this lek would not likely affect the entire population of GRSG in this zone. Within the vicinity of the Project Area, direct and indirect impacts from Alternative A have the potential to affect approximately 46 percent of the tracked birds in the Axial Basin population to some degree (B. Holmes, CPW, personal communication February 20, 2014).

Short- and long-term noise-related impacts would occur at lek SG4 and could reduce numbers at the lek or preclude lek attendance, potentially causing SG4 to become inactive. These impacts would be considered a moderate impact during the life of the Project given the fact that an estimated 10 percent of the GRSG in the Axial Basin have visited this lek (B. Holmes, CPW, personal communication, February 20, 2014).

Several design features have been identified for GRSG (**Section 2.3.16**). However, given the proximity of lek SG4 to the Little Collom X Pit and the likelihood that this lek would be abandoned under Alternative A, impacts to GRSG would be moderate to severe.

Mountain Plover

Impacts to the mountain plover would occur primarily through a loss of 274.8 acres of potentially suitable habitat. However, mountain plovers are known to be tolerant of human activities and use disturbed areas for breeding and foraging (CPW 2003). This would be a negligible impact on this species.

Bald Eagle

Mining within the Project Area would disturb 2,090.5 acres of foraging habitat for bald eagles. This is not likely to affect the carrying capacity for bald eagles in the region given the large amount of similar habitat that remains in the vicinity of the Project Area. However, mining may displace big game, small mammals, and other food sources in some areas, which may impact the bald eagle's ability to feed in and near the Project Area. Bald eagles may also be displaced from the Project Area due to noise and an increase in human presence; however, bald eagles have been observed using the area adjacent to the mine haul road. Design features (**Section 2.3.16**) would be employed that reduce the potential for impacts to eagles from power lines. Activities under Alternative A would be likely to affect individual bald eagles through loss of foraging habitat, but are not likely to adversely affect nesting or roosting individuals and pairs given the lack of presence in the Project Area. Therefore, the impact to bald eagles would be minor to moderate until successful reclamation, when reclamation goals would prioritize the replacement of wildlife habitat.

Columbian Sharp-tailed Grouse

Impacts to the Columbian sharp-tailed grouse in the Project Area would occur in several ways, including loss of habitat, increased mortality, and loss of leks.

Primarily, Alternative A would result in the removal of 2,052.5 acres of habitat. Of the mapped habitat within the area, Alternative A would remove approximately 1,888.4 acres of mapped winter habitat and 1,247.9 acres of production habitat. This is approximately 40.0 percent and 35.3 percent of the mapped winter and production habitat within the Project Area, respectively. However, Alternative A would only directly disturb 4.9 percent and 7.1 percent of the mapped winter and production habitat, respectively within the vicinity of the Project Area. This disturbance would occur over the life of the Project, approximately 20 to 40 years. Overall, this impact is anticipated to be minor given the large amount of similar suitable habitat that is present in the vicinity of the Project Area for Columbian sharp-tailed grouse.

In addition to lost habitat for this species, Alternative A would impact Columbian sharp-tailed grouse leks within the vicinity of the Project Area. While no leks would be directly removed, the 11 leks that occur in and within two kilometers of the Project Area may be impacted. Of these 11 leks, seven were active at the last count in 2011. Increased noise and human activity in the area would have the potential to cause some of these leks to be abandoned. Leks closest to the disturbance area would be at the greatest risk of abandonment while those farther away would be less susceptible due to attenuation of noise and topographic screening in the form of high ridgelines and steep valleys.

The increase of human activity and disturbance in a relatively undisturbed area would also have the potential to increase mortality for Columbian sharp-tailed grouse. Increased vehicle traffic would increase the potential for vehicle-grouse strikes. Increased human presence may draw in known predators such as foxes, skunks, crows, and owls (Hoffman and Thomas 2007). Finally, the construction of a power line and fence lines would increase the risk of collisions between grouse and these features (APLIC 1994, Pattern et al. 2005).

This loss of habitat would be offset by ongoing reclamation efforts at the current mining areas and by contemporaneous reclamation that would occur at the new mining areas. This species is considered to have a moderate tolerance for human disturbance (Hoffman and Thomas 2007) and they have been observed using reclaimed mining lands at the Colowyo Coal Mine (T. Tennyson, personal communication 2014). Proper disposal of refuse would limit the potential for predators to increase in the area, and marking the transmission line and fence lines would aid in reducing mortality.

Burrowing Owl

Impacts to burrowing owls would occur primarily through a loss of 2,039.6 acres of habitat that may contain holes for burrowing owls. Design features (**Section 2.3.16**) would be employed that reduce the potential for impacts related to power lines. There is a large amount of suitable undisturbed habitat for this species outside of the Project Area; therefore, Alternative A would result in minor short-term impacts until successful reclamation, when reclamation goals would prioritize the replacement of wildlife habitat.

American Peregrine Falcon

Impacts to peregrine falcons would occur primarily through a loss of 2,090.5 acres of foraging habitat. There is a large amount of suitable foraging habitat for this species outside of the Project Area; therefore, Alternative A would result in minor short-term impacts until successful reclamation, when reclamation goals would prioritize the replacement of wildlife habitat. As this species nests in cliffs and bluffs overlooking waterbodies, there would not be a loss of nesting habitat because these areas do not occur in or near the Project Area.

Brewer's Sparrow

Impacts to the Brewer's sparrow would occur primarily through a loss of 1,769.7 acres of shrubland habitat. In addition to loss of habitat, any individuals nesting in the disturbance area could potentially suffer mortality if unknown active nests were inadvertently impacted. There is a large amount of suitable undisturbed habitat for this species outside of the Project Area;

therefore, Alternative A would result in minor short-term impacts until successful reclamation, when reclamation goals would prioritize the replacement of wildlife habitat.

Townsend's Big-eared Bat

Impacts to the Townsend's big-eared bat would occur from a loss of 1,795.3 acres of foraging habitat. There is a potential for increased mortality to this species from vehicle collisions under Alternative A. Because work would occur 24-hours a day, insects may be attracted to the lights used during night-time operations. This in turn could draw in foraging Townsend's big-eared bats and place them at risk from collisions with facilities or vehicles. Implementation of design features (**Section 2.3.16**) would limit vehicle speeds to minimize impacts to this species. There is a large amount of suitable foraging habitat for this species outside of the Project Area; therefore, Alternative A would result in minor short-term impacts until successful reclamation, when reclamation goals would prioritize the replacement of wildlife habitat.

White-tailed Prairie Dog

Impacts to white-tailed prairie dogs would occur primarily through a loss of 2,039.6 acres of habitat. In addition to a loss of habitat, individual white-tailed prairie dogs within the disturbance footprint could be killed during surface disturbing activities. There is a large amount of suitable foraging habitat for this species outside of the Project Area; therefore, Alternative A would result in minor short-term impacts until successful reclamation, when reclamation goals would prioritize the replacement of wildlife habitat.

4.9.2 Alternative B (Reduced Mining)

Overall, impacts to special status species under Alternative B would be similar to Alternative A. The elimination of the Little Collom X Pit and the redesign of the Collom Lite Pit would result in an increase of 546.2 acres of disturbance to a total of 2,636.7 acres. This represents an increase of approximately 26 percent of disturbance to special status species habitat, which would be a moderate effect.

However, under this alternative, the elimination of mining at the Little Collom X Pit would reduce the life of the mine by approximately four years. This would have an overall benefit to special status species by allowing final reclamation of the area to occur and the Project Area to return to pre-disturbance conditions four years sooner than under Alternative A.

Specific differences to special status species under Alternative B compared to Alternative A are described below. If a species is not listed in this section that is present in **Section 4.9.1**, there would be no change to the impacts previously described other than those listed above.

4.9.2.1 Threatened, Endangered, and Candidate Species

Colorado River Fish Species

Under Alternative B, the elimination of the Little Collom X Pit would eliminate the disturbance at the northern portion of the Project Area. This would reduce the potential for sedimentation and degradation of the intermittent streams in the Project Area from being delivered downstream to the Yampa River where these species occur.

Impacts from mercury and selenium would be similar to those described under Alternative A. However, as less coal would be mined under Alternative B, impacts from Colowyo coal would be reduced because there would be less mercury and selenium emitted from the combustion of Colowyo coal at the Craig Generating Station. Colowyo has committed to fund a monitoring program in support of a study on mercury deposition. Formal consultation with the USFWS on potential impacts to the Colorado River fish from mercury and selenium is ongoing.

Overall, impacts to the Colorado River fish species would be less than those under Alternative A given the greater distance to the Yampa River from the proposed disturbance and less coal being mined.

4.9.2.2 State Listed and BLM Sensitive Species

Greater Sage-grouse

Impacts to GRSG under Alternative B would be reduced compared to those under Alternative A. Primarily, the reduced impact would occur from the elimination of the Little Collom X Pit and the redesign of the temporary overburden stockpile. This redesign would locate surface disturbance at least approximately 0.9 mile away from lek SG4 in comparison to 320 feet for Alternative A, which would reduce the impact to lek SG4 to a minor impact. While the nearest disturbance would occur approximately 0.9 mile from this lek, that disturbance would be limited to the temporary overburden stockpile and sediment control features (i.e. pond and sump), but not active mining. The temporary overburden stockpile would receive less human disturbance and noise than where mining occurs at the Collom Lite Pit. Under Alternative B, the Collom Lite Pit would be approximately two miles away from lek SG4.

Based on local and regional data collected by CPW in the Axial Basin, it is anticipated that with a 0.9 mile buffer, male attendance at lek SG4 is more likely to persist throughout the life of the Project (B. Holmes, CPW, personal communication, February 20, 2014).

Alternative B would result in an increase in the amount of land disturbed compared to Alternative A by 546.2 acres to a total of 2,636.7 acres; however this disturbance would occur approximately 0.9 mile from lek SG4. **Table 4.9-2** depicts the impacts to the mapped GRSG habitat from this alternative. These habitats are shown on **Figures 4-6** and **4-7**.

Under Alternative B, there would be an increase in the overall amount of GRSG mapped habitat directly impacted. While most of this disturbance would occur from the redesign of the temporary overburden stockpile, approximately 78 acres would result from construction of the haul road. Under Alternative B, a 100 foot disturbance buffer on either side was factored in to the haul road. As GRSG are known to occur near county roads in the Axial Basin, this buffer is anticipated to account for any indirect impacts to birds in the vicinity of the road. With the exception of GHMA, there would be fewer acres of mapped GRSG habitat impacted (direct plus indirect) under Alternative B when compared to Alternative A.

Table 4.9-2 Disturbance to Other GRSG Habitat Types under Alternative B

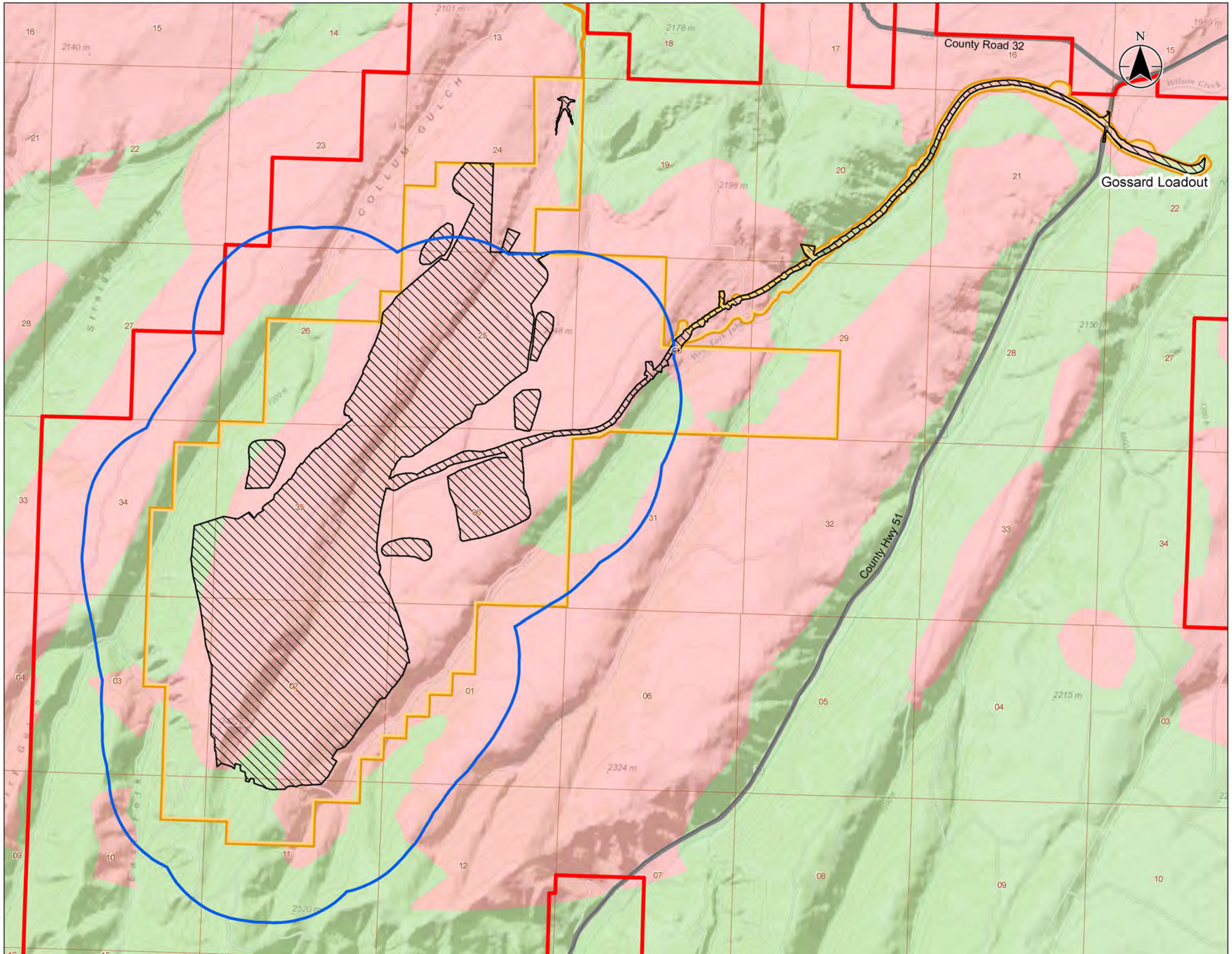
Habitat Designation	Acres Directly Disturbed	Percent of total habitat type Directly Disturbed in the Project Area	Acres Indirectly Disturbed within a 900 meter buffer[1,2]	Total Acres Disturbed (Direct and Indirect)	Total acreage increased/(decreased) from Alternative A
PHMA	2,133.0	54.8	2,180.0	4,313.0	(538.8)
GHMA	271.9	29.1	58.6	330.5	170.8
Production Area	2,405.0	49.9	3,664.0	6,069.0	(577.5)
Brooding Habitat	1,794.5	45.4	2,557.1	4,351.6	(313.5)
Winter Range	2,013.8	49.2	2,465.4	4,479.2	(783.5)

[1] Indirect impacts acreage does not include the access road, as data in the Axial Basin has shown that GRSG in the region do not avoid roads (B. Holmes, CPW, personal communication, June 25, 2014).
[2] The buffer distance of 900 meters was determined based on telemetry data from marked GRSG in the Axial Basin. The data show that GRSG typically remain this distance from mining operations (B. Holmes, CPW, personal communication, June 25, 2014).

Under Alternative B, the life of the mine would be reduced four years. This would result in reclamation occurring sooner than under Alternative A and the disturbance area becoming available for GRSG use sooner than under Alternative A.

Other impacts as described for Alternative A would be similar under this alternative. However, under Alternative B, several design features specific to GRSG would be enacted to further avoid, minimize, and reduce the potential impacts to GRSG. A detailed discussion of these features is presented in **Section 2.4** and summarized below.

The primary feature is the redesign of the temporary overburden stockpile under Alternative B to increase the distance between the disturbance footprint and lek SG4 to approximately 0.9 mile. The 2011 LSFO ROD and approved RMP require NSO for surface disturbing activities within 0.6 mile of a lek (BLM 2011). Similarly the Northwest Colorado Greater Sage-Grouse Approved RMP Amendment and Rocky Mountain Region ROD will also require NSO within 0.6 mile of a GRSG lek (BLM 2015a). Increasing the distance between the disturbance footprint and lek SG4 to 0.9 mile under Alternative B would exceed the NSO radius required under the 2011 RMP and the approved GRSG RMP Amendment by about 50 percent. Note that Colowyo's federal coal leases were issued prior to the 2011 RMP and as VER, are not subject to the management decisions of the 2011 RMP or GRSG Amendment, except for the required lease modification (**Section 1.4.2)**. Alternative B would substantially reduce the amount of indirect disturbance to this lek when compared with Alternative A, and would increase the likelihood of this lek remaining active during mining operations.



- Road
- Disturbance Area
- Approved SMCRA Permit Boundary
- Project Area

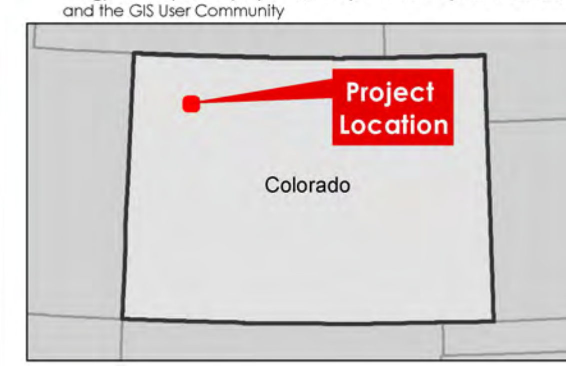
Greater Sage-Grouse

- Indirect Impact Area (900 Meter Buffer)
- General Habitat Management Area (GHMA)
- Priority Habitat Management Area (PHMA)

0 2,000 4,000 Feet
1:36,000 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 13N
2. Basemap: Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community



Project Location
Rio Blanco & Moffat Counties
Colorado

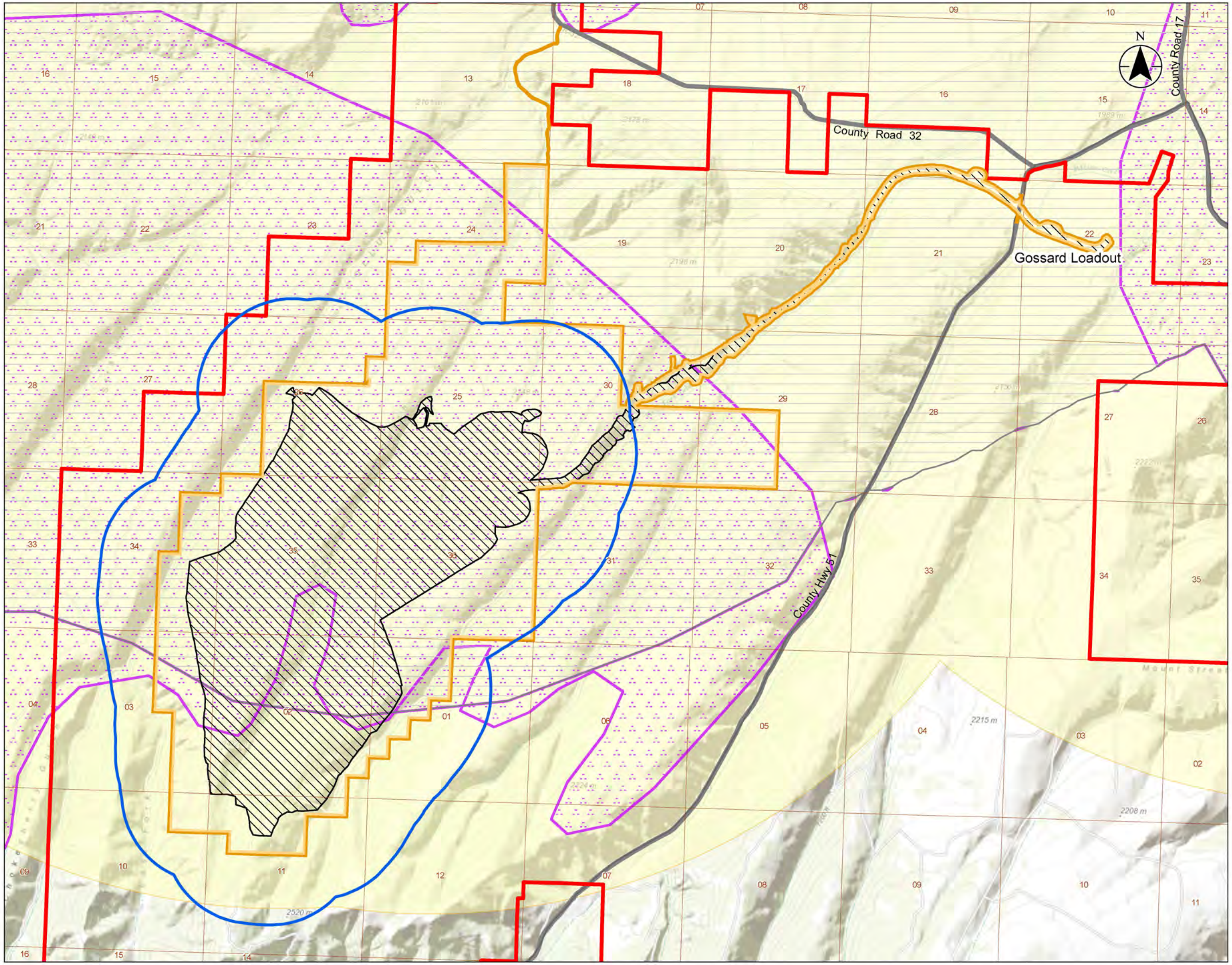
203713557
Prepared by NL on 2015-02-05
Technical Review by NL on 2015-01-05
Independent Review by GB on 2015-01-05

Client/Project
Office of Surface Mining Reclamation & Enforcement
Colowyo Coal Mine: Collom Permit Expansion Area
Project Mining Plan Environmental Assessment

Figure No.
4-6

DRAFT

Title
Alternative B,
GSG Preliminary Priority and General Habitat Impact Analysis Area



- Road
- Project Area
- Disturbance Area
- Approved SMCRA Permit Boundary

Greater Sage-Grouse

- Indirect Impact Area (900 Meter Buffer)

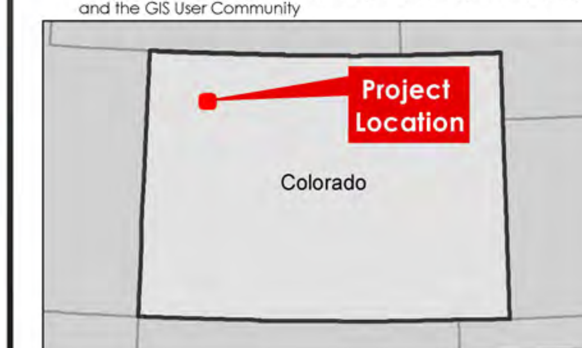
Other Greater-Sage Grouse Habitat Types

- Sage-Grouse Winter Range
- Sage-Grouse Brood Areas
- Sage-Grouse Production Areas

0 2,000 4,000 Feet
1:40,000 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 13N
2. Basemap: Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community



Project Location
Rio Blanco & Moffat Counties
Colorado

203713557
Prepared by NL on 2015-02-05
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Client/Project
Office of Surface Mining Reclamation & Enforcement
Colowyo Coal Mine: Collom Permit Expansion Area
Project Mining Plan Environmental Assessment

Figure No.
4-7

DRAFT

Title
Alternative B, Other Greater-Sage Grouse Habitat Impact Analysis Area

Under Alternative B, Colowyo would schedule construction of the sediment retention and erosion control structures outside the lekking and early brood-rearing seasons (March 15 to July 25) in order to reduce potential indirect impacts on GRSG. Colowyo would also manage construction and development of the redesigned temporary overburden stockpile, to the extent operationally feasible, so as to minimize activities on that portion of the stockpile closest to lek SG4 during the brooding season. These actions would contribute to reducing indirect impacts on GRSG.

In addition to relocating disturbance away from lek SG4, Colowyo would donate 4,543 acres of land in five parcels to CPW for the preservation of GRSG habitat in perpetuity and enhanced management of GRSG in the Axial Basin. This would result in a minor to moderate, beneficial long-term impact on GRSG. The parcels are located between 1.9 and 7 miles north of the Project Area (**Figure 2-4**). All of the donated parcels are located within mapped GRSG PHMA. The amount of land donated was based on the amount of direct and indirect disturbance to PHMA under Alternative B (**Table 4.9-2**). A distance of 900 meters from the surface disturbance boundary was used to determine the indirect impact area to GRSG and is based on CPW telemetry data that shows GRSG typically remain this distance from mining operations. After mining has ceased and the area is reclaimed to pre-disturbance conditions, there would be a net increase in the amount of PHMA for GRSG in the region, thereby resulting in a beneficial impact to GRSG in the long-term.

The donated parcels occur in similar habitat to what would be disturbed by mining and mining related activities. Approximately 93 percent (4,203 acres) of the parcels are classified as sagebrush and approximately 5 percent (238 acres) are grasslands. The remainder of the parcels are other shrublands, juniper, or disturbed. The primary land use in these areas is livestock grazing.

The donated parcels are known to include at least one active and one inactive GRSG lek. Without the donation of these lands, decisions by Colowyo or future owners could result in changes in surface use, such as for agriculture or real estate development, which would potentially result in adverse impacts on the leks and GRSG. Colowyo would also transfer the BLM grazing preference associated with these parcels to CPW. Permanent donation of the lands containing those leks to CPW would protect the leks from all future potential adverse land use impacts and improve the sustainability of GRSG in the Axial Basin.

The purpose of donating the five parcels and the transfer of the grazing preference to CPW would be to provide compensatory mitigation to offset the amount of PHMA that would be both directly and indirectly disturbed under Alternative B. The intent of the donation is to provide a greater than 1:1 ratio of GRSG habitat protected in perpetuity to habitat disturbed. Protection of those areas would provide permanent habitat protection for this species in the Axial Basin. The use of compensatory mitigation for Alternative B is in accordance with the guidelines put forth by USFWS for GRSG (USFWS 2014) as described below:

1. Observe an appropriate mitigation sequence. The redesign of proposed mining operations under Alternative B would avoid and minimize potential impacts to GRSG in the area at the outset of the Project. Minimizing operations on the redesigned

temporary overburden stockpile during lekking and early brood-rearing seasons to the extent feasible would help reduce potential indirect impacts to GSG during mining. Successful completion of reclamation under the state approved Reclamation Plan would create new GRSG PHMA where it currently does not exist and increase the total areal extent of PPH in the Axial Basin. Donation of 4,543 acres of PHMA to CPW would ensure that habitat could be protected and managed in perpetuity for the benefit of GRSG.

2. Attain net conservation gain. Colowyo would donate a greater amount of acreage to CPW for the conservation of GRSG than would be directly and indirectly disturbed. Additionally, after successful reclamation under Colowyo's existing, CDRMS approved Reclamation Plan, there would be a net increase of GRSG PHMA habitat in the Axial Basin.

3. Use a landscape-scale approach to inform mitigation. The mitigation proposed under Alternative B would be in accordance with the proposed Northwest Colorado Greater Sage Grouse Draft RMP Amendment and EIS.

4. Ensure transparency, consistency, and participation. The mitigation under Alternative B was developed collaboratively with USFWS, CPW, BLM, OSMRE, and Colowyo.

5. Base mitigation decisions in science. Regional GRSG data was collected through telemetry and other methods in the Axial Basin by CPW and analyzed in research studies over several years. In addition, Colowyo has been working collaboratively with CPW over a number of years to permit CPW to collect local GRSG data within the SMCRA permit boundary on Colowyo owned lands through telemetry and other scientific methods. The Axial Basin GRSG population is the most studied GRSG population in Colorado (B. Holmes, CPW, personal communication February 25, 2014). Both regional and local scientific data and studies were used in developing the mitigation measures.

Along with the donation of the 4,543 acres in five parcels to CPW, Colowyo would relinquish the grazing and mineral rights in these areas to CPW. Additionally, Colowyo would relinquish the water rights it holds for any stock watering facilities on those parcels. CPW would then be able to control and manage grazing on the donated parcels with goals of protecting and benefiting GRSG. Relinquishment of Colowyo's mineral rights in those parcels to CPW would reduce the potential for future impacts on GRSG from energy and mineral exploration and development on those parcels. CPW acquisition of the grazing preference, stock water structure, and Colowyo's mineral rights in the 4,543 acres of donated land would substantially strengthen their ability to control land uses and users and manage the donated lands specifically for the protection of GRSG and its habitat in perpetuity. This would result in reduced impacts on the Axial Basin's GSG population and PHMA.

The land donation would occur and CPW would assume ownership of the donation parcels if PR04 is approved by CDRMS and all periods for administrative and judicial reviews and appeals have expired.

Finally, CPW would conduct a GRSG monitoring program near the Project Area to determine the impacts on GRSG from the initiation of coal mining in an area that previously has had few impacts from land disturbance. The results of such a scientific monitoring program would assist in developing effective GRSG mitigation measures that would be applied to similar future mining operations, and thereby contribute to reducing future potential impacts on GRSG. Colowyo would donate $150,000 to CPW to fund the monitoring program. CPW would be responsible for determining and controlling the nature and extent of the monitoring program, the scientific methodologies used, as well as how the donated funds would be expended. This program would have a minor to moderate, beneficial long-term impact on GRSG.

Scientific data on GRSG movement within the SMCRA permit area, and specifically within the Project Area has been collected by CPW over a number of years in cooperation with Colowyo. This data has established a baseline of GRSG behavior prior to any surface disturbance. While much of the literature for GRSG has studied impacts from other types of disturbance more extensively (e.g., oil and gas development), information on the impacts from the development of a coal mine on GRSG is scarce. CPW's monitoring program would fill this gap in GRSG knowledge.

With the increased distance from lek SG4 to the edge of proposed disturbance, the shortened life of the Project, and the inclusion of the additional design features, the impacts to GRSG under this alternative would be minor to moderate and would be substantially less than under Alternative A.

Columbian Sharp-tailed Grouse

Impacts to Columbian sharp-tailed grouse would be similar to those under Alternative A. However, with the elimination of the Little Collom X Pit and the redesign of the Collom Lite Pit and temporary overburden stockpile, there would be an increase of 546.2 acres of disturbance to a total of 2,636.7 acres. This alternative would directly disturb 2,316.4 acres of winter habitat and 1,563.7 acres of production habitat. This is an increase of 428 acres of disturbance to winter habitat and 318.8 acres of disturbance to production habitat when compared to Alternative A. It is anticipated that this increase in disturbance would still result in minor impacts to this species due to the large amount of similar habitat outside the Project Area.

In addition to the increase of disturbance to habitat, the redesign of the temporary overburden stockpile would directly remove three of the leks in the Project Area. Leks STLek 1 and STLek 2 were inactive and lek STLek 1a was active in 2011. Lek STLek 1a accounted for 12 of the 139 (8.6 percent) males that were counted during the 2011 monitoring season. While the individuals that would normally use these leks would be displaced, this impact would be relatively minor as there are other leks available in the area.

4.9.3 Alternative C (No Action)

Under Alternative C, there would be no disturbance to the Project Area. Therefore, there would be no impacts to the special status species that may occur there.

4.9.4 Mitigation Measures

No mitigation measures would be necessary for special status species.

4.10 CULTURAL AND HISTORIC RESOURCES

The Area of Potential Effect (APE) for cultural resources includes the entire SMCRA permit boundary, which covers the area outside of the direct footprint area of the Collom Lite and Little Collom X pits. This also includes all associated mine-related facilities including the Little Collom sump and the haul road to the load out facility. This APE ensures coverage of all areas of proposed disturbance within the permit boundary and provides a large buffer zone around the disturbance areas to encompass potential indirect and cumulative effects (**Figure 2-1**).

NRHP-eligible (i.e., historic properties) or "needs data" cultural resource sites may be directly or indirectly impacted by surface disturbing activities or the construction of associated infrastructure. Needs data sites are managed as though they are eligible for the NRHP until further evaluated. Indirect impacts may include increased soil erosion and gullying, vibration from blasting, and dust from operations. In addition, there would be increased potential for unlawful artifact collection and/or vandalism of cultural resources. Other indirect impacts may include degradation of the site setting, thereby detracting from the viewshed and historic feeling of nearby cultural resource sites.

Table 4-10.1 summarizes the eligible and "needs data" sites within the APE (i.e., permitted mine boundary). The *Cultural Resource Protection Plan for the Collom Mine Expansion* (SHPO 2013), as required under approved PR03, presents the protocol and protection measures for cultural resources within the permitted mine boundary (**Appendix D**).

Table 4.10-1 NRHP-Eligible and "Need Data" Cultural Resource Sites within the APE

Site Number	Site Type	Cultural Affiliation	NRHP Evaluation	Within area of proposed disturbance?
5MF969	Bison kill site	Prehistoric	Eligible	Adjacent
5MF1652	Open camp	Prehistoric	Needs Data	Outside
5MF3996	Open camp	Prehistoric	Eligible	Outside
5MF4003	Open camp	Prehistoric	Needs Data	Adjacent
5MF4006	Cairn	Unknown	Needs Data	Outside
5MF4008	Homestead	Historic	Eligible	Outside
5MF4010	Lithic scatter	Prehistoric	Needs Data	Outside
5MF5417	Cairn	Prehistoric	Needs Data	Outside
5MF5418	Cairn	Prehistoric	Needs Data	Outside
5MF5419	Cairn	Prehistoric	Needs Data	Outside
5MF6098	Open camp	Prehistoric	Needs Data	Outside
5MF6116	Cairn	Prehistoric	Needs Data	Outside
5MF6128	Homestead	Historic	Eligible	Outside
5MF6130	Lithic scatter	Prehistoric	Needs Data	Outside

4.10.1 Alternative A (Proposed Action)

Of the 14 NRHP-eligible or "needs data" sites within the APE, none would be directly impacted by Alternative A. However, sites 5MF969 and 5MF4003 are adjacent to areas of proposed disturbance. Any impacts to these sites would constitute an adverse effect. If future mining operations cannot avoid NRHP-eligible site 5MF969, a mitigation plan would be written, approved by BLM in consultation with SHPO, and implemented prior to planned mining activities. Further, a formal testing and data recovery plan (TRC Mariah 2006b) was completed that details the implementation of the excavations and report of findings for needs data site 5MF4003 if it cannot be avoided. The plan is part of the approved PR03.

Archaeological sites are important for their potential to yield information providing a better understanding of prehistory; therefore, NRHP-eligible archaeological sites that cannot be avoided by the Project would be mitigated through conducting excavations intended to retrieve archaeological material and associated information. Reports would then be produced that summarize the excavations conducted at a site, interpret the activities performed on the site, and explain how investigation of the site has contributed to a better understanding of prehistory.

Sites that are outside the proposed disturbance areas but within the permitted mine boundary would be avoided. For the sites that occur outside the area of proposed disturbance, there would be no adverse effect from the undertaking as currently proposed. If any of these sites cannot be avoided, a testing program would be initiated to determine their NRHP eligibility.

With implementation of the Cultural Resource Protection Plan stipulations, approved by the Colorado SHPO (**Appendix D**), there would be no adverse effect to cultural resources.

4.10.2 Alternative B (Reduced Mining)

Impacts would be similar to Alternative A. Of the 14 NRHP-eligible or "needs data" sites within the APE, none would be within the Alternative B disturbance area. Similarly, sites 5MF969 and 5MF4003 are adjacent to areas of proposed disturbance. Any impacts to these sites would constitute an adverse effect. If future mining operations cannot avoid NRHP-eligible site 5MF969, a mitigation plan would be written, approved by BLM in consultation with SHPO, and implemented prior to planned mining activities. Further, a formal testing and data recovery plan (TRC Mariah 2006b) was completed and is part of approved PR03 that details the implementation of the excavations and report of findings for needs data site 5MF4003 if it that cannot be avoided.

4.10.3 Alternative C (No Action)

Under Alternative C, there would be no surface disturbance and therefore no impacts to cultural resources.

4.10.4 Mitigation Measures

No mitigation measures are necessary for cultural resources.

4.11 AMERICAN INDIAN CONCERNS

4.11.1 Alternative A (Proposed Action)

A letter describing the proposed Project was sent to the Eastern Shoshone Tribal Council, Ute Mountain Ute Tribal Council, Ute Indian Tribe Tribal Council, and the Southern Ute Tribal Council on September 26, 2013. An additional consultation letter was sent on January 15, 2015. No concerns were raised regarding any specific religious site, sacred site, or traditional cultural property. No impacts to American Indian concerns have been identified related to Alternative A.

4.11.2 Alternative B (Reduced Mining)

As noted above, letters describing the proposed Project including Alternative B were sent to the Eastern Shoshone Tribal Council, Ute Mountain Ute Tribal Council, Ute Indian Tribe Tribal Council, and the Southern Ute Tribal Council on September 26, 2013 and January 15, 2015. No concerns were raised regarding any specific religious site, sacred site, or traditional cultural property. No impacts to American Indian concerns have been identified related to Alternative B.

4.11.3 Alternative C (No Action)

Under Alternative C, no disturbance within the Project Area would occur. Therefore there would be no impacts to American Indian concerns.

4.11.4 Mitigation Measures

No mitigation measures are necessary for American Indian concerns.

4.12 SOCIOECONOMICS

4.12.1 Alternative A (Proposed Action)

Under Alternative A, mining may continue with the same number of personnel (238), mining rate, and equipment as is currently being used for the existing mining operation. Therefore, the current social and economic conditions in the area would continue for an additional 19 years under this scenario. No additional demand for housing or municipal services would be anticipated. Mining operations would be extended throughout the life of the Project. The extension of mining operations would also extend the annual payroll, local expenditures, and taxes and royalty payments of approximately $35 million per year to the area for an additional 19 years, which would be a moderate to major impact on the economics of the area. The direct economic benefits associated with mining at the Colowyo Coal Mine would continue. For the relatively small communities near the Project Area, the sources of revenue directly related to the mining operation at Colowyo represent a large portion of the revenue coming into the area. Indirectly, secondary businesses such as grocery stores, retail shops, restaurants, and hotels benefit from these sources of revenue to employees. The Craig Generating Station, which burns Colowyo Coal Mine coal, has an indirect effect on the socioeconomics of the area by also contributing wages, insurance, taxes, retail spending, housing requirements, etc.

However, under Alternative A, the mining production rate could reach a maximum approved rate of 5.1 mtpy, more than double the current production rate. At this maximum production rate, 55 to 105 additional personnel would need to be employed and additional equipment operated. This would increase demand for housing and services in the area and improve the economic conditions in the area. Annual payroll, local expenditures, taxes and royalty payments would increase and the direct economic benefits associated with mining at the Colowyo Coal Mine would increase.

These effects would be moderate to major, short-term, beneficial impacts on socioeconomics for an additional 19 years. After closure begins, there would be approximately 18 employees remaining to conduct closure and reclamation, but the economic contribution directly or indirectly related to the Project Area would be much less than during active mining operations. The area has become relatively dependent on the economic contribution of the mine, so the loss of this portion of the economy would be acute and adverse unless the Colowyo Coal Mine expands to an area outside the Project Area. Further, the area's demand and expansion of housing, social services, schools, and businesses have largely been driven by the development of the mine since 1977. Once all active mining operations both inside and outside the Project Area have ceased, this same level of services would not be needed, leaving an excess of housing and likely cuts to social services such as police, fire, and health care.

Once all active Colowyo Coal Mine operations have ceased, federal coal lease royalty payments would not be collected from Colowyo and 49 percent of those funds would not be dispersed to the State of Colorado and the affected counties (negligible impact on Colorado, minor to moderate long-term impact on the affected counties). The State of Colorado would not collect severance taxes from Colowyo (a loss of 0.5 % of the total 2014 Colorado severance revenue; a negligible impact).

4.12.2 Alternative B (Reduced Mining)

Under this alternative, impacts to the social and economic conditions would be similar to Alternative A. However, under this alternative, the Little Collom X Pit would not be mined and this would shorten the life of the mine by approximately four years. This would result in $140 million less revenue being collected in annual payroll, local expenditures, and taxes and royalty payments as compared to Alternative A.

4.12.3 Alternative C (No Action)

Under Alternative C, no new mining would occur at the Colowyo Coal Mine and active mining would cease in four years. Mining of coal at the existing pits would continue until the available coal reserves are depleted (approximately 2019). Approximately 220 direct jobs and associated salaries would be lost if no additional mining takes place. The housing market in Craig and Meeker would decline as many of the current Colowyo Coal Mine employees would need to leave the area to find job opportunities elsewhere. This would also reduce the amount of local expenditures by mine employees and their families and taxes in these communities that would create further job losses to secondary businesses. Finally, with no additional mining, there would be no royalties paid to the federal, state, and local governments and decreased funding to local governments from the State Department of Local Affairs for infrastructure maintenance and development.

4.12.4 Mitigation Measures

No mitigation measures are necessary for socioeconomics.

4.13 VISUAL RESOURCES

Over the course of mining operations in the Project Area, impacts to visual resources would occur through observable changes in the topography, color, and texture of the lands in the Project Area, and through indirect visibility of mining operations by the presence of dust. Most of the disturbance in the Project Area (ground level disturbance and pit disturbance) would not be visible to the majority of viewers who are traveling on area roads, either because topography surrounding the Project Area blocks views of the Project Area or because the Project Area is at a higher elevation than viewers. Viewers at a higher elevation than the mine, such as from an airplane or recreating in the surrounding area, would generally not observe dust due to the dust mitigation measures employed at the mine. Dust may be visible from higher elevations during high wind events, but this would be relatively infrequent and of short duration.

Viewers on Moffat County Road 51 south of and parallel to the Project Area would not be able to see mining disturbance because the highways follow drainages and are lower in elevation than the Project Area; topography blocks views of the mine. Similarly, because viewers on the highways are in an enclosed landscape, dust from the mining operation may not be visible or noticeable.

4.13.1 Alternative A (Proposed Action)

Views from Moffat County Roads 17, 32, and 133 north of the Project Area are open and panoramic; however, intervening topography blocks views of most of the ground level disturbance in the Project Area, so mining and reclamation are only intermittently visible to viewers in these locations. Because the views north of the Project Area tend to be more open and panoramic, dust rising from the mining operation or reclamation may be noticeable and attract the attention of viewers traveling on these roads.

As a result of mining in the Project Area, there would be a temporary overburden stockpile and four temporary topsoil stockpiles that would be created over time. At maximum height under Alternative A, the temporary overburden stockpile would be 7,675 feet amsl. The four temporary topsoil stockpiles would range from approximately 7,050 to 7,425 feet amsl.

A viewshed analysis was conducted to determine the visibility of the temporary overburden and topsoil stockpiles under Alternative A (**Section 4.13.1.1** and **Section 4.13.1.2**).

4.13.1.1 Short-term Visual Impacts

Viewers traveling on Moffat County Road 32 would have brief intermittent views of the temporary stockpiles just north of the Project Area, looking south. Viewers traveling on Moffat County road 17 north and State Highway 13 east of the Project Area would have extended but intermittent views of the stockpiles. Views of the temporary stockpiles would be a part of a panoramic landscape, looking in a southerly direction from distances ranging from 6 to 12 miles (10 to 19 km) away. Viewers would see the tops of the stockpiles, which may appear to have a form, or be of a color or texture that is not consistent with the surrounding undisturbed lands, making them noticeable. Dust rising from the mine may attract attention when visible. At higher speeds, the amount of time the stockpiles are visible would be lessened, but intermittent. Frequent travelers along these routes may notice changes in the landscape as the stockpiles come into view and as they increase in elevation. Transient travelers may find the visible disturbance and dust noticeable. Because of the panoramic nature of the views and the ability of the landscape to absorb the changes that are of limited scope, the impact to visual resources would be minor and would meet Class IV objectives. At night, the mine lighting would generally appear the same, and from the same locations, as it does currently; there would not be any change apparent to viewers of night skies.

4.13.1.2 Reclamation and Permanent Visual Impacts

During the reclamation process, the material in the temporary overburden stockpile would be used to backfill the pits over a several year period. Similarly, the material in the temporary topsoil stockpiles would be used over a several year period as cover material during reclamation. Over that time, the stockpiles would be gradually reduced in size and existing impacts to visual resources from the visibility of the stockpiles would be gradually reduced until the temporary stockpiles are no longer visible. Frequent travelers on the routes that are accustomed to seeing the stockpiles may notice the change in the landscape as they decrease in size and it may attract attention, as would ongoing dust generated by ground-disturbing activities associated with reclamation. Transient travelers may find the visible disturbance and dust noticeable. Upon completion of reclamation, hunters or recreationists in close proximity to the reclaimed mine would continue to see obvious and noticeable disturbance to visual resources, despite the fact that post-mine topography would be developed in accordance with the approved reclamation plan and the area would be revegetated. However, the overall impact to visual resources would be minor and meet Class IV objectives.

4.13.2 Alternative B (Reduced Mining)

Under Alternative B, the impacts to visual resources would be generally similar to those under Alternative A. However, there would be two less temporary topsoil stockpiles. The two remaining stockpiles would have greater overall maximum heights (7,185 and 8,135 feet amsl), but would still have the same visibility as that described for Alternative A. Also, the elimination of the Little Collom X Pit and the redesign of the Collom Lite Pit would increase the disturbance footprint to 2,636.7 acres, an increase of 546.2 acres. The redesign of the Collom Lite Pit would not be visible from any public roadway. Therefore, there would not be any additional impacts from this alternative. Finally, the life of the Project without the Little Collom

X Pit would be reduced by approximately four years, thereby restoring the areas to their pre-disturbance character four years sooner than for Alternative A. Alternative B would be also be in compliance with the BLM's VRM objectives for Class IV areas. At night, the mine lighting would generally appear the same, and from the same locations, as it does currently; there would not be any change apparent to viewers of night skies.

4.13.3 Alternative C (No Action)

Under Alternative C, no surface disturbance would occur in the Project Area, and there would be no impacts to visual resources in the Project Area.

4.13.4 Mitigation Measures

No mitigation measures are necessary for visual resources.

4.14 RECREATION

4.14.1 Alternative A (Proposed Action)

Camping, OHV use, touring, bird watching, hiking, and other recreational pursuits would not be allowed in the Project Area due to safety concerns and conflicts with mining operations. Under Alternative A, hunting opportunities would likely decrease due to the increase in disturbance of approximately 2,090.5 acres within the Project Area. Hunting in these areas would be discontinued for the safety of the employees and recreationists. This would be a long-term minor impact. Additionally, hunting success in areas adjacent to the Project Area may decrease in the short-term as big game animals are displaced. However, this impact would likely be negligible as big game animals have become accustomed to mining activities in other portions of the mine and re-enter areas readily once mining and reclamation activities are complete (Colowyo 2011). At the end of the Project, the disturbance area would be reclaimed to pre-disturbance topography, and vegetation and hunting levels would likely return to existing levels. Recreation would be allowed on public lands within the Project Area, but private land would remain closed to the public. Impacts to recreation would be long-term but minor given the overall amount of land available for recreational pursuits outside of the Project Area.

4.14.2 Alternative B (Reduced Mining)

Impacts to recreational opportunities under Alternative B would be similar to Alternative A. However, with the elimination of the Little Collom X Pit and the redesign of the Collom Lite Pit, there would be an increase of 546.2 acres of disturbance under this alternative. This increase in disturbance would result in greater displacement of big game species and less area remaining open to hunting. However, Colowyo would donate 4,543 acres to CPW for GRSG mitigation, which could be used for recreation and hunting. This would result in a beneficial effect on recreation and hunting availability. The elimination of the Little Collom X Pit would reduce the life of the Project by approximately four years; therefore, the Project Area would be reclaimed to its pre-disturbance condition four years earlier. Impacts to recreation would be long term but minor given the overall amount of land available for recreational pursuits outside of the Project Area.

4.14.3 Alternative C (No Action)

Under Alternative C, no surface disturbance would occur in the Project Area, and there would be no impacts to recreational opportunities.

4.14.4 Mitigation Measures

No mitigation measures are necessary for recreation.

4.15 PALEONTOLOGY

4.15.1 Alternative A (Proposed Action)

Under Alternative A, a total of 2,090.5 acres would be disturbed. As the Project Area lies within a PFYC Class 5 zone, there is a potential that the ground disturbing activities would adversely affect fossils. However, disturbance to potential paleontological resources would only occur where disturbance would occur below the surface (i.e., pits and facilities). Therefore, the total acreage of disturbance that may impact fossils would be approximately 1,203.1 acres. If any such fossils of paleontological interest are located, ground disturbing activities could damage the fossils and the information that could have been gained from them would be lost. The significance of this impact would depend upon the significance of the fossil. Alternative A could also constitute a beneficial impact to paleontological resources by increasing the chances for discovery of scientifically significant fossils. The potential for discovery of fossils would be greatest in the pit areas were digging would occur to a greater depth. No significant or unique paleontological resources have been recorded within the Project Area. Surface coal mining and related activities could have a permanent impact on paleontological resources beneath the surface, assuming such resources are present. Paleontological resources not identified and removed prior to or during mining operations would be permanently lost. No such incidents within the existing Colowyo Coal Mine have occurred. Impacts to paleontological resources are anticipated to be none to minor and long term.

4.15.2 Alternative B (Reduced Mining)

Impacts to paleontological resources under Alternative B would be similar to those under the Alternative A. Under this alternative, there would a total of 2,636.7 acres of total disturbance, an increase of 26.1 percent over the Proposed Action. However, under this alternative the Little Collom X pit would not be mined. Therefore, only 990 acres of below surface disturbance would have the potential to damage fossils, a decrease of 17.7 percent from the Proposed Action. Impacts to paleontological resources are anticipated to be none to minor and long term.

4.15.3 Alternative C (No Action)

Under Alternative C, no ground disturbing activities would take place. Therefore, there would be no impacts to paleontological resources.

4.15.4 Mitigation Measures

No mitigation measures are necessary for paleontological resources..

4.16 ACCESS AND TRANSPORTATION

4.16.1 Alternative A (Proposed Action)

Under Alternative A, a new 5.5 mile haul road would be constructed from the proposed pits and mine facilities within the Project Area to the existing Gossard (rail line) load out. This new haul road would carry all mining related traffic. It is anticipated that the majority of all new traffic would occur within the Project Area and revised mine boundary. Roads that would be constructed in the actual mining areas would constantly change as the operation progresses. The "in-pit" roads would be maintained by a motor grader and regularly wetted to minimize dust as required by the air quality permit.

No haul truck would travel on public roadways outside of the SMCRA permit boundary with one exception. Where the haul road crosses County Road 51 in the permit boundary, haul trucks would be on a public road for a short period. Otherwise, only mine pickup trucks, SUVs, etc. would travel on public roads. All coal is removed from the mine via trains.

If the current mining production rate of 2.1 mtpy continues under Alternative A then no additional personnel are anticipated to be employed by the Colowyo Coal Mine. Workers at the currently active South Taylor Pit would transition over to the Collom Lite Pit as the current pit is mined out. As there is no anticipated increase in personnel or vehicles used, the overall amount of traffic both within the mine boundary and on public roads outside the mine boundary would remain the same as current levels. No impacts to public roads are therefore anticipated.

However, under Alternative A the mining production rate could reach a maximum CDRMS approved rate of 5.1 mtpy, more than double the current production rate. At this maximum production rate, 55 to 105 additional personnel would need to be employed and additional equipment would need to be operated. At the maximum production rate, there would be an increase in the overall traffic both within the mine boundary and on public roads outside the mine boundary. However, considering the fluctuating use levels of those roads due to seasonal variations from hunting and tourism, the potential additional impacts to public safety and road maintenance would be minor and short term.

4.16.2 Alternative B (Reduced Mining)

Impacts to access and transportation under this alternative would be similar to Alternative A. No additional traffic is anticipated to occur as there would be no increase in personnel or vehicles used. Additionally, the elimination of the Little Collom X Pit under this alternative would reduce the life of the mine by four years. Therefore, traffic on public roads would be reduced four years sooner than under Alternative A.

4.16.3 Alternative C (No Action)

Under Alternative C, mining would not occur in the Project Area and mining at Colowyo Coal Mine would cease by about 2019. This would result in lower traffic along the public roads leading to the mine and decreased impacts to public safety and road maintenance.

4.16.4 Mitigation Measures

No mitigation measures are necessary for access and transportation.

4.17 SOLID OR HAZARDOUS WASTE

4.17.1 Alternative A (Proposed Action)

Under Alternative A, impacts to the environment from the potential release of hazardous or solid waste are not anticipated to occur. Solid or hazardous waste that may be used or created during the coal mining process would be limited to petroleum products (gasoline and diesel fuel, oil, lubricants) and ANFO used for blasting. CCRs, generated as a part of the coal combustion process, are discussed in **Sections 3.5.2** and **4.5.1**.

The potential for impacts from substances released depend on the responsible use of chemicals; a SPCC plan (Colowyo 2012b) is in place at the mine to ensure immediate containment and adequate cleanup in the event of an unintentional release. The potential for exposure to petroleum products, or hazardous or solid wastes would be low but would last for the remainder of the life of the mine. Spill kits would be located onsite, which would be used in the case of accidental releases to assist in rapid clean up. Additionally, appropriate secondary containment would be used for all hazardous chemicals storage. No additional chemicals would be used under Alternative A that are not already being used at the current mining operation.

Construction sites and all facilities would be maintained in a sanitary condition at all times. Regulated waste materials would be disposed of promptly at an appropriate off-site waste disposal facility, including all discarded matter including, but not limited to, trash, garbage, refuse, oil drums, petroleum products, ashes, and equipment. Colowyo would, as permitted under CDRMS Rule 4.11.4, dispose of non-coal wastes onsite. Colowyo would dispose of general house hold-type trash in a solid waste facility. Human waste water would be disposed of through a leach field and/or aeration ponds.

As part of closure/reclamation, all petroleum products not necessary for closure or reclamation activities would be removed from the Project Area. Facility structures, including but not limited to concrete foundations, would be demolished in-place and covered with a minimum of six feet of suitable material. The area would be regraded to blend with the surrounding topography followed by topsoil and seeding as described in the reclamation plan. All demolition materials (e.g., culverts, fencing) related to sedimentation ponds would be placed within the ponds and covered with a minimum of six feet of suitable material or transported to the pit area during the reclamation process. Noncoal, nonhazardous solid waste is regulated under the Moffat County Special Use permit.

4.17.2 Alternative B (Reduced Mining)

The direct impacts related to solid and hazardous waste in future mining and reclamation operations would be the same as under Alternative A. CCRs are discussed in **Sections 3.5.2** and **4.5.1**.

4.17.3 Alternative C (No Action)

Under Alternative C, no mining would occur in the Project Area and there would be no impacts from solid or hazardous wastes.

4.17.4 Mitigation Measures

No mitigation measures are necessary for solid or hazardous waste.

4.18 NOISE

4.18.1 Alternative A (Proposed Action)

Under Alternative A, noise would increase in areas where noise has generally been lacking in the western portion of the mine permit boundary. The construction, drilling operations (including blasting), and vehicle use would increase noise levels over historically low levels. These impacts would occur on a 24-hour basis as mining activity occurs throughout the day. However, Alternative A would not increase the overall level of mining activity within the mine boundary if it remained at the current production levels. Instead, it would relocate where the noise is produced. The Project Area is located approximately three miles west of the current mining operations. There would likely be some increase of noise overall during the period when mining is transitioned to the new pits. This impact is anticipated to occur over a five to seven year period. Therefore, there would be a slight increase in the overall area affected by mining noise, but this would be a temporary, minor impact until mining would be fully transitioned to the new area and overall noise levels at the mine return to current conditions.

If the mining rate increased to a maximum of 5.1 mtpy, there would be a minor increase in noise from blasting activities and from vehicles. However, the noise generated would occur in the same general location. If the rate of production increases, the number of trains per year required to transport coal would increase (see **Section 2.3.13**). The increase in number of trains would increase noise produced along the rail line.

While no homes occur within the Colowyo permit area, several homes are located just outside the boundary, which would experience negligible to minor noise effects. The nearest homes occur approximately 1.6 to 2.8 miles from the proposed disturbance area to the south and southeast. Given the topography and vegetation between the disturbance areas and these homes, it is likely that most noise would attenuate before reaching these residences. Additionally, the homes nearest to the Project Area are approximately 1.2 miles (0.4 mile closer) from current mining operations at the Colowyo Coal Mine. Therefore, once mining is transitioned to the new pits, there would be less noise noticed at these homes.

4.18.2 Alternative B (Reduced Mining)

Under this alternative, the Little Collom X Pit would not be mined. This would eliminate noise from mining activities occurring in that proposed pit area. However, the intensity of mining operations would not change within the mine boundary but would be focused in the Collom Lite Pit area. The elimination of the Little Collom X Pit would reduce the life of the mine by four years, thereby reducing the overall amount of noise produced by the mine throughout the life of the Project. Additionally, the elimination of the Little Collom X Pit and redesign of the temporary overburden pile would move noise disturbance away from the mine permit boundary. This would decrease the potential for noise to affect the public outside the mine boundary to a negligible effect.

4.18.3 Alternative C (No Action)

Under Alternative C, no new mining would occur in the Project Area and there would be no impacts from noise.

4.18.4 Mitigation Measures

No mitigation measures are necessary for noise.

4.19 LIVESTOCK GRAZING

4.19.1 Alternative A (Proposed Action)

Under Alternative A, Colowyo would no longer sublease the grazing rights within the Project Area to prevent conflicts between the mining operations and livestock grazing. Therefore, the AUMS available in the Colowyo Common Allotment would be reduced from 520 to 452 AUMs; a 13 percent reduction. This would be a minor, long-term impact on the availability of grazing on the Colowyo Common Allotment. At the end of the life of the mine and when reclamation is successful and complete, grazing would be reinstated. Prior to any reintroduction of grazing to the area, final bond release of the disturbed area would be required. Post-reclamation grazing would be sustained at 60 percent of the carrying capacity to encourage the continued success of reclaimed vegetation. Therefore, there would be a negligible impact remaining to the Colowyo Common Allotment post-reclamation.

4.19.2 Alternative B (Reduced Mining)

Under Alternative B, the impact to livestock grazing would be similar to that under Alternative A. However, as the projected life of the mine would end approximately four years sooner than under Alternative A, grazing would be allowed to resume in the area four years earlier.

4.19.3 Alternative C (No Action)

Under Alternative C, there would be no ground disturbing activity and grazing would be allowed to continue at current levels.

4.19.4 Mitigation Measures

No mitigation measures are necessary for livestock grazing.

4.20 SOILS

4.20.1 Alternative A (Proposed Action)

Under Alternative A, there would be minor impacts to soil resources including erosion and fertility losses as a result of mining and reclamation activities. Direct impacts would occur on approximately 2,090.5 acres (**Table 4.20-1**). Topsoil would be removed from the mining area and used to rehabilitate existing disturbed sites or stockpiled for future need in accordance with federal and state regulations. Areas where topsoil would be removed include facility areas, access roads, mining pits, and other areas to be disturbed. Colowyo does not plan to use overburden material for topsoil substitutes or to supplement topsoil.

Salvaged topsoil would be stockpiled for later use to reclaim disturbed sites. Stockpiled topsoil would be placed in five locations on stable sites and protected from compaction, wind and water erosion, and contaminants. Topsoil stockpiles would be seeded to minimize erosion. The availability of suitable topsoil and erosion control are important factors in the overall reclamation success. Topsoil removal and stockpiling may reduce attributes for plant growth such as soil microbial activity, organic matter content, fertility, and water holding capacity. Topsoil used during the reclamation process would follow the methods outlined in the approved Reclamation Plan under PR03 (Colowyo 2011).

Across the Project Area, impacts to soils may occur from accidental spills or leaks of petroleum products and hazardous materials used during construction, mining activities, and long-term operation of the mine. These events would cause soil contamination and may decrease the soil fertility and revegetation potential. The SPCC plan would reduce the frequency and impacts related to these events to a negligible effect.

4.20.2 Alternative B (Reduced Mining)

Impacts to soil resources under Alternative B would be similar to those under Alternative A. Under this alternative, there would be a total of 2,636.7 acres disturbed (**Table 4.20-1**), so the effects to soils described for Alternative B would occur on 546.2 more acres than Alternative A; the severity of effect would be the same.

Reclamation and soil stockpiling would occur in the same manner under Alternative B as under Alternative A.

Table 4.20-1 Disturbance to Common Soil Types in the Project Area

Soil Unit	Alternative A Disturbance (Acres)	Alternative B Disturbance (Acres)
Campspass fine sandy loam, 3 to 12 percent slopes	22.3	84.5
Cochetopa loam, 12 to 25 percent slopes	14.9	41.5
Lamphie-Jerry Complex, 25 to 65 percent slopes	16.6	65.3
Maudlin-Duffymont complex, 3 to 15 percent slopes, very stony	1,125.3	1,387.1
Morapos loam, 3 to 12 percent slopes	309.8	102.9
Nortez, cool-Morapos complex, 3 to 12 percent slopes	305.6	471.5
Nortez, cool-Morapos complex, 12 to 25 percent slopes	1.9	6.1
Pinridge loam, 1 to 12 percent slopes	0.2	11.7
Torrioerhents-Rock outcrop, Sandstone complex, 25 to 75 percent slopes	182.5	135.9

4.20.3 Alternative C (No Action)

Under Alternative C, no ground disturbing activities would take place. Therefore, there would be no impact to soil resources.

4.20.4 Mitigation Measures

No mitigation measures are necessary for soils.

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5.0 CUMULATIVE IMPACTS

5.1 INTRODUCTION

Cumulative impacts are those impacts that result from incremental effects of an action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or other entity undertakes such other actions.

5.2 PAST AND PRESENT ACTIONS

Past and present actions in the general area include past coal mining, ranching, recreation, and oil and gas development.

Past coal mining in the area began in 1908 with the underground Collom Mine (later renamed the Mount Streeter Mine). Underground coal mining occurred continuously in the area until 1974 when those mines closed. In 1977, Colowyo initiated its first surface mining operations at the Colowyo Coal Mine with the East Pit, and was a multi-seam operation with eight coal seams. Extraction from the East Pit was terminated in 2006, and extraction from the multi-seam West Pit was initiated. Mining in the West Pit ceased in 2014 and the Section 16 Pit was active until 2013, but with very limited production. Active mining is currently occurring at the South Taylor Pit. In 2014, the Colowyo Coal Mine produced approximately 2.48 mt of coal (Mines.findthedata.com 2015) and employed 220 people. Currently there are approximately 4,750 acres of past and present mining disturbance associated with the Colowyo Coal Mine, and Colowyo owns approximately 75,570 acres of land in this area. The nearest active coal mine to the Project Area is the Trapper Mine, located approximately 16 miles (26 km) to the northeast. In 2014, the Trapper Mine produced approximately 2.3 mt of coal (Tri-State 2015b) and employed 190 people (Mines.findthedata.com 2015). Other active coal mines in northwest Colorado include three underground mines, the Foidel Creek Mine (also known as the Twentymile Mine) (Routt County), the Peabody Sage Creek Mine (not currently in operation or producing coal; Routt County), and the Deserado Mine (Rio Blanco County). Other active mining operations within 20 miles (32 km) of the Colowyo Coal Mine (**Figure 5-1**) include seven gravel pits, 22 sand and gravel operations, one limestone operation, and one sandstone pit (CDRMS 2014). In addition to these resources, historically there has also been uranium, oil shale, and dimension stone mining operations in the vicinity of the Project Area. Mining has the potential to affect many resources through increased disturbance, both on the surface and subsurface. Mining also increases the number of people in the area.

There are two power plants in the general vicinity of the Project Area: the Craig Generating Station and the Hayden Generating Station. The Craig Generating Station, located southwest of Craig, is operated by Tri-State; approximately 300 people work at the 1,303-megawatt plant (Tri-State 2015b). Plant construction began in 1974 with the first operating unit completed in 1979. The plant site covers 1,120 acres. Its main water source is the Yampa River with supplemental allocations from nearby reservoirs. The Craig Generating Station receives its coal supply primarily from two sources: Trapper Mine, located 1 mile (1.6 km) south of the plant and the Colowyo Coal Mine located about 30 miles (48.3 km) southwest of the station. The

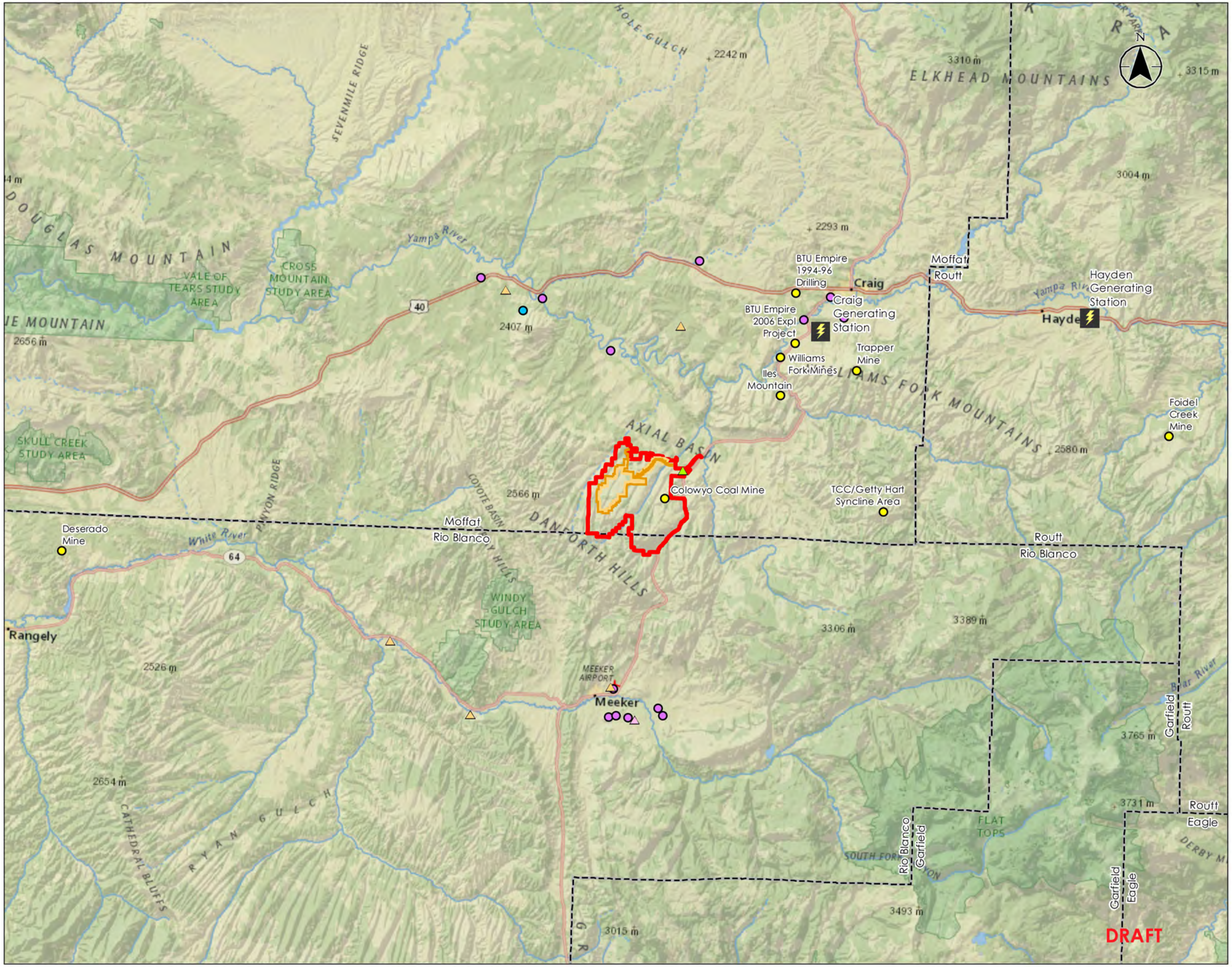
Trapper Mine delivers coal to the plant via 100-ton haul trucks from the mine site. The Colowyo Coal Mine delivers coal to the Craig Generating Station by train. The station also augments these two sources of coal with spot coal purchases from other mines in northwestern Colorado.

The Hayden Generating Station, located 4 miles (6.4 km) east of Hayden (Routt County), is a 446 megawatt plant owned and operated by Xcel Energy. Construction began in 1962 with operation of Unit 1 in 1965 and a second unit in 1976 (Xcel Energy 2015). Ninety people are currently employed at the plant. The Hayden Generating Station receives its coal from the Peabody Coal's Twentymile Mine and occasionally the Colowyo Coal Mine (CDPHE 2015b). Coal is delivered to the station via train (Newcomer and Pierce 2013) and by road.

Historically, the Project Area and the vicinity have been used for livestock ranching, in particular cattle and sheep. Grazing within the Project Area occurs on both private and public lands outside of mining areas. Livestock ranching can impact water resources, wetlands, and vegetation and may potentially create competition for resources with big game species. Colowyo and various other land owners manage privately owned cattle ranches and also hold BLM grazing preferences on federal lands throughout the area. For example, the Morgan Creek Ranch runs cattle and sheep and includes approximately 30,265 acres, with 25,156 acres of Colowyo deeded land and 5,109 acres of BLM land.

There is limited agricultural land in the vicinity of the Project Area. Colowyo manages 68.5 acres of wheat fields (dry-land cropland minor vegetative community) located in the northeast corner of the SMCRA permit area next to the coal loadout and railroad loop. Areas of irrigated agricultural lands are located just east and northeast of the SMCRA permit boundary and State Highway 13. Dry and irrigated agricultural activities can contribute to air pollution through generation of dust and also may impact water sources.

In addition to ranching, the area also supports wildlife including big game species. Hunting is the primary recreational activity in the area. Adjacent to the Project Area, on Colowyo private land holdings, employees are allowed to hunt. No hunting is allowed in active mining areas or within the Project Area. Outside of the Colowyo owned lands, hunting and other recreational activities are open to the general public on public lands or with the approval of private land owners. No developed recreation sites exist in the vicinity of the Project Area. Dispersed recreation generally has few impacts outside of an increased amount of noise and people to an area. Other existing developments in the vicinity of the Project Area include State Highway 13 located immediately east of and running from the northeast to the southwest along the mine's eastern SMCRA permit boundary. This is the main highway connecting Craig with Meeker and Rifle. Moffat County Road 51, a gravel road, traverses the SMCRA permit area from northeast to southwest roughly along the eastern boundary of PR 03. In addition, Moffat County Road 32, also a gravel road, traverses roughly east to west along the northern portion of the SMCRA permit boundary. Various unmaintained dirt roads and two tracks also crisscross the Project Area and vicinity. Use of roads increase noise impacts due to traffic, as well as increase dust impacts through use of gravel and dirt roads. Vehicles also present a danger to wildlife through wildlife/vehicle collisions although the sparse use of the County and smaller roads in the area would have very low mortality impacts on wildlife. State Highway 13, which is a paved high speed road, would contribute higher impact levels for wildlife mortality.



Mine Permits

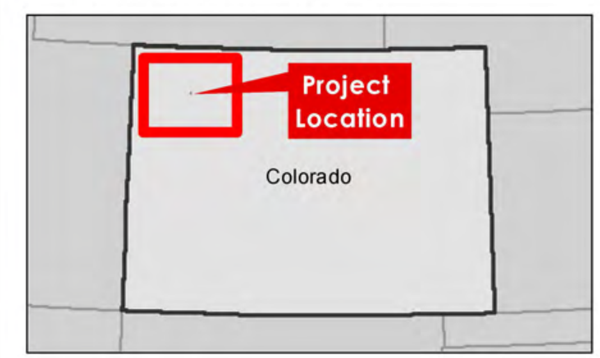
- Coal
- Gravel
- Limestone (general)
- Sand
- Sand and gravel
- Sandstone (silica, stone, quartzite)
- Project Area
- Approved SMCRA Permit Boundary
- Generating Station
- County Boundary

0 8 16 miles

1:506,880 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 13N
2. Basemap: Content may not reflect National Geographic's current map policy. Sources: National Geographic, Esri, DeLorme, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp.



Project Location

Rio Blanco & Moffat Counties
Colorado

Project

Office of Surface Mining Reclamation & Enforcement
Colowyo Coal Mine: Collom Permit Expansion Area
Project Mining Plan Environmental Assessment

Figure No.

5-1

DRAFT

Title

CDRMS Active Mine Permits

The Colowyo railroad spur connects the Colowyo loadout located at the northeast corner of the SMCRA permit boundary with the Union Pacific main line in Craig. Use of the spur for regular coal train traffic results in dispersed impacts on air quality from diesel engine emissions and limited impacts from coal dust. In addition, electric transmission lines of various capacities traverse the vicinity of the Project Area. Electric lines pose electrocution hazards to raptors unless designed specifically to minimize such impacts. Wilson Reservoir is located approximately 8 miles (13 km) northeast of the Colowyo Coal Mine along State Highway 13. Water storage reservoirs impact downstream flows for fisheries and riparian vegetation.

Oil and gas operations have been occurring in the vicinity of the Project Area since the 1920s. To date, within a 20 mile (32 km) radius of the Colowyo Coal Mine, there are 755 well locations. Of these, 552 locations are no longer producing and are abandoned, and 131 locations are producing oil or gas. Another 14 wells have been or are in the process of being drilled and completed (COGCC 2014). Impacts from oil and gas development are similar in nature to those from mining, although usually more dispersed over a larger area than for mining operations.

5.3 REASONABLY FORESEEABLE FUTURE ACTIONS

Reasonably foreseeable future actions in the general vicinity of the Project Area include additional coal mining, continued ranching and recreational activities, and ongoing oil and gas operations.

Given that coal seams exist outside the mine boundary and in the vicinity, it is reasonable to assume that coal mining may occur in the future. This may occur either as an extension of current mining operations or in new areas. However, no coal lease by applications have been filed with BLM in the area, and no SMCRA permit application packages have been filed with CDRMS that would be available and allow assessment of the potential effects of future mining. While it could be speculated that mining methods utilized for new mines would be similar to those utilized at the Colowyo and Trapper surface mines and that the effects would also be similar in nature and magnitude, it is also possible that new mining technology may be developed prior to mining these coal resources.

The BLM LSFO is processing a lease modification application from Peabody Energy to add 310 acres and about 340,000 tons of federal coal to the Foidel Creek Mine. This is an underground mine located approximately 45 miles (72 km) southeast of Craig. The mine produces from a mix of private, state, and federal coal resources and in 2014 produced 7.1 million tons. If approved, the mine would not start mining this added federal coal until about 2022. The Foidel Creek Mine provides coal to the Hayden Generating Station, as well as other facilities throughout the country, and if all the coal from the lease modification were shipped to Hayden, it would provide about 78 days of the power plant's coal needs.

CDRMS is currently processing PR07 for the Trapper Mine (owned by Trapper Mining Inc.) that, if approved, would add approximately 775 acres to the permit boundary. PR07 only increases the permit boundary and updates the sediment control plan. The Trapper Mine has been permitted by CDRMS, through permit renewal PR06, to continue mining up to 2017 at a production rate of about 2.6 mtpy.

The Deserado Mine, operated by Blue Mountain Energy, Inc., is an underground coal mine located approximately 50.5 miles (81 km) west of the Colowyo Coal Mine. CDRMS has no pending permit actions for this mine. The BLM LSFO has no pending lease modifications or lease by applications for this mine.

The Peabody Sage Creek Mine, owned by Peabody Energy and operated by Sage Creek Mining, LLC, is another underground mine located approximately 38 miles (61 km) northeast of the Colowyo Coal Mine near Hayden, CO. Mining began briefly at Sage Creek in May of 2012, but is suspended until market conditions improve. While CDRMS considers it to be active, the mine is not producing.

Supplies of coal to the Craig and Hayden Generating Stations from the mines described above are not exclusive contracts. The power plants would continue operating even if those mines stopped supplying them coal and would purchase coal from other suppliers. No other coal lease applications that would supply the Craig or Hayden Generating Stations with coal have been filed with BLM, and no SMCRA permit application packages have been filed with CDRMS.

Ranching operations in the area are expected to continue at current levels for the reasonably foreseeable future. Additionally, hunting and other recreational activities are also likely to continue at current levels into the reasonably foreseeable future.

The BLM's Colorado State Office conducts quarterly competitive lease sales to sell available oil and gas lease parcels. The act of leasing does not authorize any development or use of the surface of lease lands, without further application by the lessee and approval by the BLM. Oil and gas operations are anticipated to continue in the future in the vicinity of the Project Area; however, the exploration and development of new facilities may be limited because much of the vicinity is designated GRSG habitat. There are currently 24 permitted locations within a 20 mile (32 km) radius of the mine (COGCC 2014). In 2014, 112 parcels comprising 86,423.66 acres within the LSFO were nominated for the February 2015 Competitive Oil and Gas Lease Sale (BLM 2014). In support of this, the BLM LSFO completed an EA for this oil and gas lease sale that included parcels in the vicinity of the Project Area. Some of these lease sales may result in oil and gas development. After completion of coal mining and reclamation of the current and proposed mining areas is completed, oil and gas operations may potentially begin in these areas.

5.4 CUMULATIVE IMPACTS

The following section describes potential cumulative impacts to resources in the vicinity of the Project Area from the past, present, and future actions in conjunction with Alternatives A and B. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (40 CFR Part 1508.7). The cumulative impacts analysis area (CIAA) varies by resource. It may be restricted to the immediate Project Area (e.g., for soil impacts) or an entire watershed (e.g., for water resources). For the analysis of the cumulative impacts, it is assumed that all design features would be implemented.

5.4.1 Topography

The CIAA for topography is the Project Area. Additional mining at the Colowyo Coal Mine under either Alternative A or B would have short-term effects on topography while mining is active until the reclamation is completed. Within the SMCRA permit boundary, a total of 2,422 acres have been reclaimed previously. General pre-mining topography would be approximated through implementation of the Reclamation Plan approved under PR 03 (**Appendix A**). In conjunction with other past, present, and future activities, cumulative effects on topography would be negligible as these other activities generally do not change the overall topographic features of an area and reclamation would return the land to pre-disturbance contours. Mining and reclamation under Alternative C (No Action) would conclude when the available coal reserves are depleted at the existing mine (approximately 2029). Consequently, cumulative impacts under the No Action are considered less than negligible.

5.4.2 Air and Climate Resources

5.4.2.1 Temporal and Geographic Scope

The CIAA for air and climate resources (approximately 4,000 square miles [12,360 km^2]) was defined using a topographic/airshed approach. An assessment was conducted to determine the reasonable airshed where cumulative impacts could occur. The assessment utilized topography to define the likely region of influence; boundaries were defined by topographic features. Meeker represents the southwest corner of the airshed. Heading northwest along Route 64, the western edge is defined by Sagebrush Draw, Elk Spring Ridge, and Cross Mountain. The northwest corner runs through Ninemile Basin just northwest of Godiva Rim. The boundary follows the Little Snake River northeast until approximately Shaffer's Draw. The northern boundary extends east across the Great Divide ridge, past Highway 13 and the Elkhead Mountains. Sand Mountain represents the northeast corner of the air boundary. It heads southeast to the town of Clark. The eastern edge is Steamboat Springs. Heading south through the town of Yampa and into Garfield County is the southeastern edge. Big Ridge and Oak Ridge back to Meeker encompasses the southern boundary. **Figure 5-2** depicts the CIAA for Air and Climate Resources.

5.4.2.2 Surrounding APEN Sources

The CDPHE website provides all criteria pollutant emissions data. All APEN applicable (permitted) sources that fall within the airshed boundary were analyzed. There are 128 sources of VOCs within the airshed boundary, the most of any criteria pollutant. However NO_x contributes the most emissions at an aggregated total of 19,147 tpy, the majority of which originates from the Craig and Hayden Generating Stations. **Table 5.4-1** provides the total criteria pollutants from APEN sources within the airshed boundary on a tons per year basis. Note that as of June 21, 2015 there were no sources of lead reported to CDPHE.

Table 5.4-1 Criteria Pollutant APEN Annual Emissions within the CIAA

Pollutant	Total (tpy)[1]
$PM_{2.5}$	837
PM_{10}	3,462
SO_2	5,609
NO_2	19,147
CO	3,550
VOC	2,798

1. Values are current as of June 21, 2015
   http://www.colorado.gov/airquality/ss_map_wm.aspx

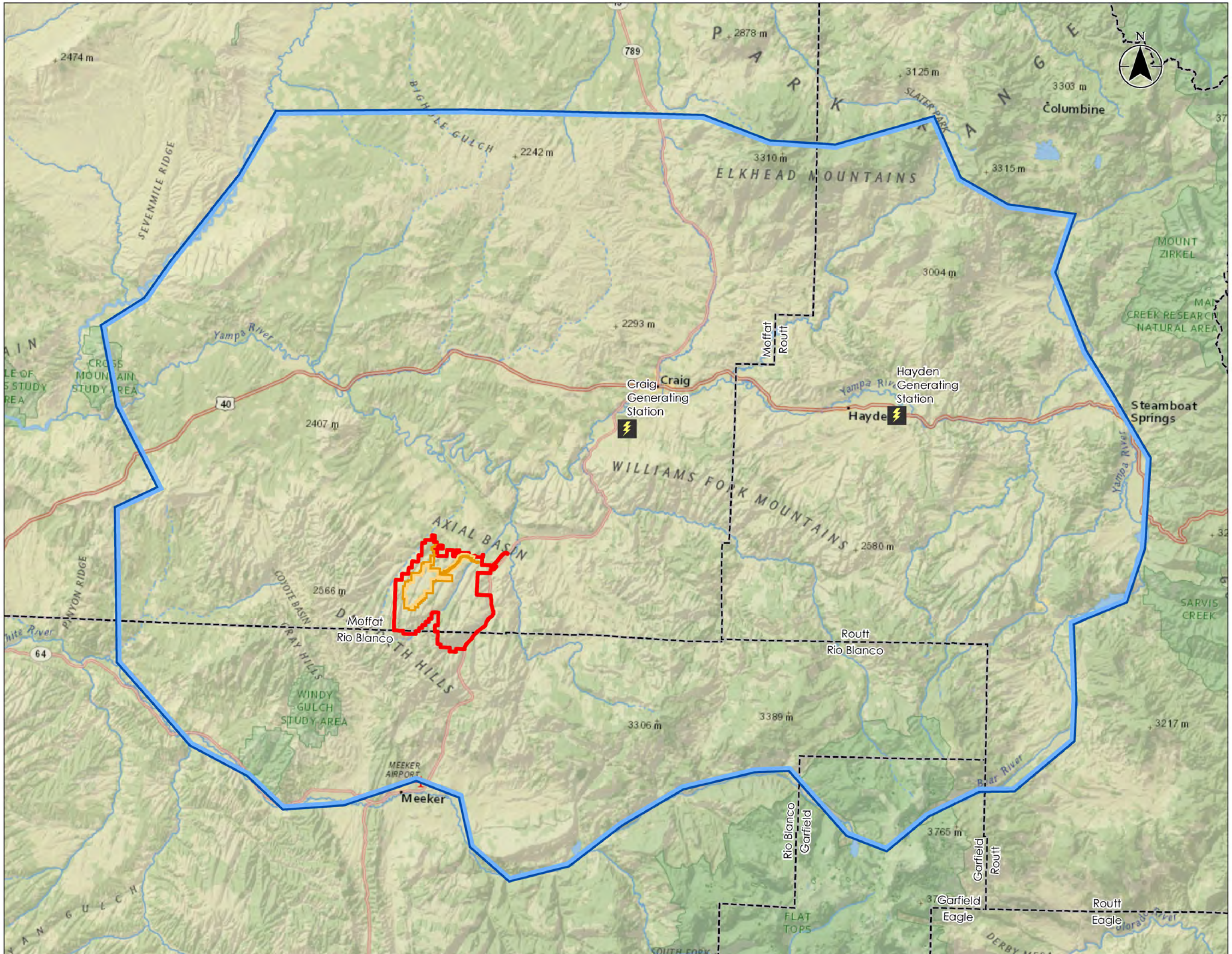
5.4.2.3 2011 National Emissions Inventory Total Regional Emissions

The 2011 EPA NEI data was used to perform a comparison analysis on all cumulative emission impacts related to Alternative A and Alternative B and **Table 5.4-2** provides the criteria pollutants by county for 2011.

Table 5.4-2 2011 Criteria Pollutants by County (tpy)[1]

County	CO	NO_x	PM_{10}[2]	$PM_{2.5}$[2]	SO_2	VOC
Garfield	25,325	16,123	4,170	1,210	187	91,075
Moffat	8,188	15,308	5,243	1,351	3,978	5,618
Rio Blanco	6,497	4,810	5,091	1,128	339	26,960
Routt	17,218	7,732	7,856	2,126	2,243	3,758
Total	**57,228**	**43,974**	**22,359**	**5,814**	**6,746**	**127,411**

1. Emissions represent all 14 Tier I Categories as defined by the EPA within the NEI database: Fuel Combustion (Electric Utility, Industrial, Other), Chemical & Allied Product Manufacturing, Metal Processing, Other Industrial Processes, Solvent Utilization, Storage and Transport, Waste Disposal and Recycling, highway vehicles, Off Highway Vehicles and miscellaneous sources.
2. Values include both filterable and condensable particulate matter



Project Area

Approved SMCRA Permit Boundary

Cumulative Effects Airshed Boundary

Generating Station

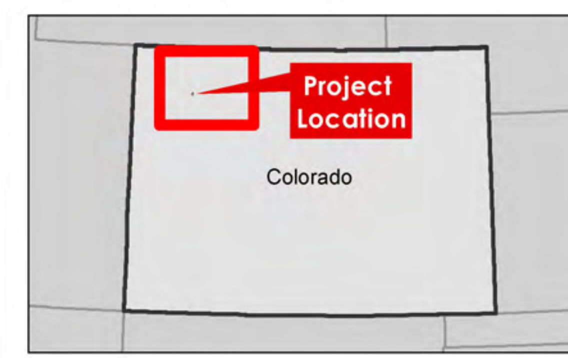
County Boundary

0 8 16 miles

1:506,880 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 13N
2. Basemap: Content may not reflect National Geographic's current map policy. Sources: National Geographic, Esri, DeLorme, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp.



Project Location

Rio Blanco & Moffat Counties
Colorado

Project

Office of Surface Mining Reclamation & Enforcement
Colowyo Coal Mine: Collom Permit Expansion Area
Project Mining Plan Environmental Assessment

Figure No.

5-2

Title

Air and Climate Resources CIAA

5.4.2.4 Cumulative Emissions (Direct and Indirect)

Cumulative emissions for Alternatives A and B were determined using three regional emission scenarios based on maximum coal production. First, the maximum emission potential based on a coal production level of 5.1 million tons between the Craig and Hayden Generating Stations was implemented to conservatively estimate annual criteria pollutants. Second, a regional average of emission potential between the Craig Generating Station and the Hayden Generating Station was calculated to represent a typical regional emission rate. Lastly, because the vast majority of coal from the mine is sent to the Craig Generating Station, a Craig Only emissions scenario was evaluated. Refer to **Table 4.3-23** for explicit emissions details. Alternative A shows a high percentage of gaseous pollutants, particularly NO_x and SO_2, when compared to other emission sources within the surrounding four counties. However, this is to be expected as the two generating stations contribute the vast majority of emissions within the CIAA and the maximum combustion rate is higher than what would occur in reality. Alternative B shows a moderate contribution of CO when compared to the surrounding counties. For all other pollutants, both alternatives demonstrate a negligible to moderate contribution when compared to county, state, and national totals.

<u>Alternative A Cumulative Criteria Pollutant Emissions</u>

The maximum annual mining rate of 5.1 mtpy generates both direct and indirect emissions (**Section 4.3**). Direct emissions associated with the maximum production rate remains static regardless of the regional combustion emission rates (maximum, average, or Craig Only). Cumulative criteria pollutant totals are provided in **Table 5.4-3** for each combustion rate. Average is defined as the mean value of total emissions from the Craig and Hayden Generating Stations. It should be noted that 5.1 mtpy equates to unrealistic combustion rates and the corresponding emissions are conservative.

Table 5.4-3 Cumulative Emissions from Criteria Pollutants (tpy)

Activity	PM_{10}	$PM_{2.5}$	NO_x	CO	VOC	SO_2
Direct Emissions	7,167	765	4,548	24,605	89	2.7
Indirect Rail	0.6	0.6	6.2	7.8	0.3	0.13
Indirect Combustion Maximum	431	196	18,867	1,545	143	6,782
Indirect Combustion Average	324	174	17,008	1,333	111	5,434
Craig Combustion Only	216	152	15,149	1,545	78	4,086
Total Maximum	**7,598**	**961**	**23,421**	**26,157**	**232**	**6,785**
Total Average	**7,491**	**939**	**21,562**	**25,945**	**200**	**5,437**
Total Craig Only	**7,383**	**917**	**19,703**	**26,157**	**167**	**4,089**

Note that Total Maximum is the higher value between the Craig and Hayden Generating Stations. Total Average is the average value between the two sites.

Table 5.4-4 illustrates the percentage of criteria pollutant emissions associated with Alternative A relative to the regional totals for the four counties within the CIAA as well as the entire state of Colorado. It should be noted that the proposed maximum firing rate of 5.1 mtpy at the Craig Generating Station is unrealistic in practice; hence the percentage comparison is greater than 100 percent shown below. A large amount of blasting and fugitive emissions (vehicle travel) contribute the vast majority of direct emissions.

Table 5.4-4 Criteria Pollutants as Percentage of 2011 Regional Criteria Pollutant Emissions

Percentage Comparison	PM_{10}	$PM_{2.5}$	NO_x	CO	VOC	SO_2
Proposed Maximum % of 4 Counties	34.0%	16.5%	53.3%	45.7%	0.18%	101%
Proposed Average % of 4 Counties	33.5%	16.2%	49.0%	45.3%	0.16%	80.6%
Proposed Craig Only % of 4 Counties	33.0%	15.8%	44.8%	45.7%	0.13%	60.6%
Proposed Maximum % of Colorado	2.3%	0.94%	7.7%	1.8%	0.04%	12.2%
Proposed Average % of Colorado	2.3%	0.92%	7.1%	1.8%	0.04%	9.8%
Proposed Craig Only % of Colorado	2.2%	0.90%	6.5%	1.8%	0.03%	7.3%

Alternative A Cumulative GHG Emissions

Climate change by nature is a cumulative process; the discussion of direct and indirect emissions relative to the current global GHG emissions rates and the projected impacts provided in Chapter 4 is for all practical purposes the same one that would be provided here, and therefore does not bear repeating. However, it is worth noting that sea level rise and ocean acidification (while not a regional concern) are a major cumulative concern that the Alternative A would contribute toward, albeit insignificantly.

The values detailed in **Table 5.4-5** represent the total GHG emissions impacts from the combustion of all coal under Alternative A along with all direct mine-related activities. The worst case annual emissions assume that all mined coal (at the 5.1 mtpy maximum mining rate) is combusted in one year. Note that the calculation methodology for railroad engine emissions uses only a representative CO_2e factor; thus the individual component emissions are already calculated within the factor. Also, only methane is emitted from the physical extraction of coal and its subsequent handling.

Table 5.4-5 Cumulative Emissions from Greenhouse Gases (metric tonnes/yr)

Activity	CO_2	CH_4	N_2O	CO_2e
Direct Combustion	445,885	16.6	6.4	448,203
Indirect Rail Combustion	--	--	--	2,792
Methane Release	--	2,827	--	70,675
Indirect Combustion	11,859,899	1,399	203	11,955,485
Total	**12,305,784**	**4,243**	**209**	**12,477,155**

Table 5.4-6 compares the potential GHG emissions from 5.1 mtpy to state-wide totals and national totals from the 2011 NEI database and the 2014 Colorado Greenhouse Gas Inventory Update.

Table 5.4-6 GHG Emissions as Percentage of State and National Emissions (mmt/yr)

Comparison	CO_2e
Total GHG for State of Colorado[1]	130
Nationwide GHG Total[2]	2,245
% of State Total	9.6%
% of United States Total	0.56%

[1]CDPHE Colorado Greenhouse Gas Inventory -2014 Update (https://www.colorado.gov/pacific/sites/default/files/AP-COGHGInventory2014Update.pdf)
[2] Derived from all 60 sectors of the 2011 NEI database and all 50 states plus the District of Columbia. Puerto Rico, Virgin Islands, and Tribal land was excluded.

Alternative A Cumulative Hazardous Pollutant and Mercury Emissions

Cumulative hazardous pollutants are a summation of those pollutants emitted by the combustion process of coal and the combustion of diesel fuel from equipment at the mine site or transferring coal to the Craig Generating Station. Similar to GHG and criteria pollutants, indirect HAP emissions were determined for a maximum, average, and Craig Only regional scenario as shown in **Table 5.4-7**.

Table 5.4-7 Cumulative Emissions of Hazardous Air Pollutants (tpy)

Activity	HAPs
Direct Emissions	13.4
Indirect Rail	0.02
Indirect Combustion Max	65.47
Indirect Combustion Avg.	54.67
Craig Combustion Only	65.47
Total Maximum	**78.9**
Total Average	**68.1**
Total Craig Only	**78.9**

The state of Colorado had a total of 195,455 tons of HAPs in 2011 as indicated by the NEI data. Nationwide, 9.05 mt were emitted. **Table 5.4-8** compares the Alternative A HAP potential to the state and national totals as a percentage.

Table 5.4-8 HAP Emissions as Percentage of State and National Emissions

Percentage Comparison	HAPs
Proposed Maximum % of Colorado	0.040%
Proposed Average % of Colorado	0.035%
Proposed Craig Only % of Colorado	0.040%
Proposed Maximum % of U.S.	0.00087%
Proposed Average % of U.S.	0.00075%
Proposed Craig Only % of U.S.	0.00087%

Estimated mercury emission rates from the Craig Generating Station are calculated based on 5.1 mt of coal per year combusted. The MATS Rule was published in 2011 and sources had 3 or 4 years to comply with the new standards. The Craig Generating Station had complied with the new standard at all three units in April 2015. Prior to compliance with the MATS rule indirect mercury emissions were estimated at 155 lbs/yr, but after implementation of controls it drops to 62 lbs/yr. Other sources of mercury are negligible (less than 0.01 lbs/yr) when compared to the Craig Generating Station. The 2011 NEI information for electric generating coal facilities in Colorado indicates that 745.8 lbs. (0.37 tons) of mercury were emitted from coal facilities. The Craig Generating Station's contribution assuming 5.1 mtpy is approximately 8.4 percent of the total to the state. Nationally, the total is 25.6 tons. The Craig Generating Station is approximately 0.12 percent of the national total.

Alternative B Criteria Pollutant Cumulative Emissions

Alternative B comprises emissions for the mine, Craig Generating Station, and the Hayden Generating Station mining only the Collom Lite Pit. Mining the Little Collom X Pit is excluded. **Tables 5.4-9** outlines the cumulative criteria pollutant emissions for the Collom Lite Pit using a maximum average and Craig Only regional emission rate for coal combustion. The maximum represents the higher rate between the Craig Generating Station and the Hayden Generating Station. Emissions from the surrounding four counties within the CIAA and the state in its entirety are compared against the Project-related values.

Table 5.4-9 Cumulative Emissions of Criteria Pollutants (tpy)

Activity	PM_{10}	$PM_{2.5}$	NO_x	CO	VOC	SO_2
Direct Emissions	2,779	279	3,388	18,079	64.1	2.0
Indirect Rail	0.3	0.3	6.1	7.7	0.3	0.13
Indirect Combustion Max	431	196	18,867	1,545	143	6,782
Indirect Combustion Avg.	324	174	17,008	1,333	111	5,434
Indirect Craig Combustion	216	152	15,149	1,545	78	4,086
Total Maximum	**3,211**	**476**	**22,261**	**19,631**	**208**	**6,784**
Total Average	**3,103**	**453**	**20,402**	**19,419**	**175**	**5,436**
Total Craig Only	**2,995**	**431**	**18,543**	**19,631**	**142**	**4,088**

CO, NO_x, and SO_2 emissions are higher than all other criteria pollutants. This is expected because the indirect combustion emissions dominate the cumulative impacts, while blasting contributes a large percentage of the CO emissions. The percentage contribution of Alternative B compared to the counties surrounding the study area produce a maximum of 50.6 percent of the NO_x emissions; 34.3 percent of CO emissions, and 101 percent of SO_2 emissions. It should be noted that the 5.1 mtpy combustion rate is unrealistic from either Generating Station; thus the greater than 100% scenario. Compared to the state, those percentages reduce to 7.32 percent, 1.39 percent, and 12.2 percent, respectively (**Table 5.4-10**).

Table 5.4-10 Criteria Pollutants as Percentage of 2011 Regional Criteria Pollutant Emissions

Percentage Comparison	PM_{10}	$PM_{2.5}$	NO_x	CO	VOC	SO_2
Proposed Maximum % of 4 Counties	14.4%	8.2%	50.6%	34.3%	0.16%	101%
Proposed Average % of 4 Counties	13.9%	7.8%	46.4%	33.9%	0.14%	80.6%
Proposed Craig Only % of 4 Counties	13.4%	7.4%	42.2%	34.3%	0.11%	60.6%
Proposed Maximum % of Colorado	0.98%	0.47%	7.32%	1.39%	0.04%	12.2%
Proposed Average % of Colorado	0.94%	0.45%	6.71%	1.37%	0.03%	9.76%
Proposed Craig Only % of Colorado	0.91%	0.42%	6.09%	1.39%	0.03%	7.34%

Alternative B Cumulative GHG Emissions

GHG emission calculations (**Table 5.4-11**) are based on maximum annual mining rates and all coal being sent to the Craig Generating Station.

Table 5.4-11 Cumulative Emissions of Greenhouse Gases (metric tonnes CO_2e/yr)

Activity	CO_2	CH_4	N_2O	CO_2e
Direct Combustion	265,423	10.0	4.9	267,123
Indirect Rail Combustion	--	--	--	2,792
Methane Release	--	2,827	--	70,675
Indirect Combustion	11,859,899	1,399	203	11,955,485
Total	**12,125,322**	**4,236**	**208**	**12,296,075**

Alternative B would contribute a small percentage of overall GHGs to the region and state. Maximums are no greater than 9.5 percent when compared to the state totals and less than 1 percent of the total GHGs emitted nationwide (**Table 5.4-12**).

Table 5.4-12 GHG Emissions as Percentage of State and National Emissions

Activity	5.1 mtpy
Total GHG for State of Colorado[1]	130
Nationwide GHG Total[2]	2,245
% of State Total	9.5%
% of U.S. Total	0.55%

[1]CDPHE Colorado Greenhouse Gas Inventory -2014 Update (https://www.colorado.gov/pacific/sites/default/files/AP-COGHGInventory2014Update.pdf)

[2] Derived from all 60 sectors of the 2011 NEI database and all 50 states plus the District of Columbia. Puerto Rico, Virgin Islands, and Tribal land was excluded.

Alternative B Hazardous Pollutants and Mercury Cumulative Emissions

Cumulative hazardous pollutants are a summation of those pollutants emitted by the combustion process of coal and the combustion of diesel fuel from equipment at the mine site or transferring coal to Craig Generating Station. Similar to GHG and criteria pollutants, indirect HAP emissions were determined for a maximum, average and Craig Only regional scenario (**Table 5.4-13**).

Table 5.4-13 Cumulative Emissions of Hazardous Air Pollutants (tpy)

Activity	HAPs
Direct Emissions	8.0
Indirect Rail	0.02
Indirect Combustion Max	65.47
Indirect Combustion Avg.	54.67
Craig Combustion Only	65.47
Total Maximum	**73.5**
Total Average	**62.7**
Total Craig Only	**73.5**

Compared to the state (195,455 tpy), Alternative B includes only a maximum of 0.038 percent of the state HAPs and 0.00081 percent of the U.S.'s total (**Table 5.4-14**). Therefore, Alternative B would emit an essentially negligible amount of HAPs when compared to the state and the rest of the country.

Table 5.4-14 HAP Emissions as Percentage of State and National Emissions

Percentage Comparison	HAPs
Proposed Maximum % of Colorado	0.038%
Proposed Average % of Colorado	0.032%
Proposed Craig Only % of Colorado	0.038%
Proposed Maximum % of U.S.	0.00081%
Proposed Average % of U.S.	0.00069%
Proposed Craig Only % of U.S.	0.00081%

Actual mercury emission rates from the Craig Generating Station, as provided by the EPA TRI, show that the maximum mercury emitted between 2007 and 2014 for the entire Craig Generating Station was 130 lbs or 0.065 tpy (prior to the installation of controls). The plant became compliant with the MATS rule in April 2015. As a result, the amount has dropped to the annual average of 44 lbs or 0.022 tons/year since 2010. The 2013 TRI data showed that 1,070 lbs (0.535 tons) of mercury were emitted within the state of Colorado. The Craig Generating Station contributes 4.02 percent of the total mercury emitted by facilities within Colorado. Similarly, the 2011 NEI information for electric generating coal facilities in Colorado indicates that 745.8 lbs (0.37 tons) of mercury were emitted from coal facilities. The Craig Generating Station's average contribution since 2010 is approximately 5.9 percent of the total to the state. Nationally, the total is 25.6 tons. The Craig Generating Station is approximately 0.09 percent of the national total.

Ozone Precursor Emissions

Discussion throughout **Chapter 4** describes both NO_x and VOC emissions and their comparison to the development of ozone. In addition, regional CDPHE monitors have demonstrated that Moffat County is in compliance with the ozone NAAQS (**Section 4.3.2.5**). As a result, blasting and coal combustion associated with the Colowyo Coal Mine and either the Hayden or Craig Generating Stations does not pose a regional compliance issue.

5.4.2.5 Colorado Air Resource Management Modeling Study

The BLM funded the Colorado Air Resources Management Modeling Study (CARMMS) to better predict air quality impacts from future federal and non-federal energy development throughout the state. The study tracks impacts in each BLM field office to better understand the significance that oil and gas has had on impacted resources and populations.[1]

CARMMS simulates future impacts of oil and gas development out to the year 2021. Projections for development are based on either the most recent field office Reasonably Foreseeable Development (RFD) document (high), or by projecting the current 5 year average development paces forward to 2021 (low). The medium scenario included the same well count projections as the high, but assumed restricted emissions, where the high assumed current development practices and on the books emissions controls and regulations (2012).[2]

The CARMMS project leverages the work completed by the West Jump Air Quality Modeling Study (WestJumpAQMS), and the base model platform (and associated model performance metrics) and meteorology are based on those products (2008).

The model CAMx is a one atmosphere photo-chemical grid model and represents state of the science methodology for modeling atmospheric chemistry and physics. The model accounts for every emissions source in the domain (global), including all of the coal fired power plants in the regional 4 km (6.4 miles) domain. Although these sources were not tracked using source apportionment technology, their impacts are included in the results, and in general the CARMMS data shows that air quality improves in the future.

Criteria Pollutant Results from CARMMS

CARMMS evaluated regional air quality impacts for PM, NO_2, and O_3. **Table 5.4-15** illustrates the average regional impacts compared to the applicable NAAQS. The findings suggest that the regional air quality surrounding the Colowyo Coal Mine and the Craig Generating Station is compliant for those pollutants and averaging periods evaluated. All pollutants assume the 1st high average concentration with the exception of ozone, which is the average 4th high value. Note that all concentrations are the maximum values for each averaging period through the study timeframe of 2021.

[1] Bureau of Land Management - http://www.blm.gov/co/st/en/BLM_Information/nepa/air_quality/carmms.html
[2] Environ - CARMMS 2021 Modeling Results for the High and Medium Oil and Gas Development Scenarios http://www.blm.gov/style/medialib/blm/co/information/nepa/air_quality.Par.97516.File.dat/CAR%20MMS_Final_Report_w-appendices_012015.pdf

Table 5.4-15 Regional NAAQS Comparison from CARMMS Data

Pollutant	Averaging Period	CARMMS Average (μg/m³)	NAAQS (μg/m³)	Percent of Standard
$PM_{2.5}$	24-hr	22.19	35	63.4%
	Annual	8.84	12	73.67%
PM_{10}	24-hr	34.51	150	23.01%
NO_2	1-hr	56.41	188	30.01%
O_3[1]	8-hr	63.73	70	91.04%

1. O_3 concentrations are in units of ppb

In western sections of Moffat County and Rio Blanco County near Rangely, the projected O_3 levels are above the 70 ppb NAAQS level based on the CARMMS modeling for the "high" development scenario. However, the CARMMS areas of modeled O_3 concentrations above 70 ppb are outside the Colowyo Mine air quality study area boundary. Also, the projected elevated O_3 levels in western sections of Moffat County and Rio Blanco County are likely due to the emissions associated with existing and future oil and gas development in the Uinta Basin of eastern Utah and are not tied to the Colowyo Mine direct and indirect emissions.

5.4.2.6 Regional Haze, Visibility, and AQRV Improvements

In accordance with the Guidance for Setting Reasonable Progress Goals under the Regional Haze Program,[3] states are required to establish "reasonable" Progress Goals for each Class I area. The purpose is to improve visibility on the haziest of days and present no degradation on the clearest days. The Progress Goals are incremental in nature, such that, over time the visibility will reach natural background conditions.

Part of showing progression is to determine the glidepath. A comparison of baseline conditions in terms of deciviews (dv; *a unit of visibility impairment*) to natural conditions is conducted. Next, the annual average visibility improvement needed to reach natural conditions by 2064 - 60 years is determined. Finally, the annual average visibility is multiplied by the number of years in the first planning period. The result is the glidepath or uniform rate of progress needed to meet the goal natural conditions visibility by 2064.

Mount Zirkel Wilderness is the nearest Class I Area to the Craig and Hayden Generating Stations. A 2007 study established the glidepath starting in 2004. Based on Interagency Monitoring of Protected Visual Environments (IMPROVE) from 2001 to 2004 the 20 percent worst visibility days baseline was determined to be 10.52 dv. Natural conditions of the worst 20 percent are 6.44 dv creating an improvement need of 4.08 dv by 2064. An annual improvement of 0.068 dv is needed to meet the 2064 goal. The first planning period was set from 2004-2018. Therefore, the visibility goal by 2018 is 9.57 dv or a visibility increase of 0.95 dv.[4]

Flat Tops Wilderness falls within the CIAA. Using the same methodology as for Mount Zirkel, a baseline and natural conditions visibility was established using 2000 to 2004 IMPROVE data.

[3] U.S. EPA http://www.epa.gov/ttn/caaa/t1/memoranda/reasonable_progress_guid071307.pdf
[4] Colorado SIP Mount Zirkel Technical Support Document https://www.colorado.gov/pacific/sites/default/files/AP_PO_Mount-Zirkel-Wilderness_0.pdf

Natural conditions are 6.54 dv, while baseline visibility is 9.61 dv. Over the span of 14 years during the first planning period, the visibility is projected to improve by 0.72 dv or 0.051dv per year.[5]

The Craig Generating Station has two units that are Best Available Retrofit Technology (BART) eligible (Units 1 and 2). These two units (along with Unit 3) are included in the current Regional Haze SIP. As a result, both are required to meet specific NO_x standards. To help meet applicable standards, Selective Catalytic Reduction (SCR) units are being or will be installed to control NO_x emissions. They have also installed wet lime scrubbers for SO_2 control, which have been operational since the end of 2004. According to modeling prepared as part of the BART analysis, NO_x controls will improve visibility by 1.01 dv for Unit 1 and 0.98 dv for Unit 2. Unit 3 is considered to be eligible for "Reasonable Progress."[6] The Colorado SIP includes a determination for Unit 3 stating that it is reasonable to include a Selective Non-Catalytic Reduction (SNCR) for NOx, which will improve visibility by 0.32 dv.

Similarly, the Hayden Generating Station has two units identified as BART eligible in the SIP. Both are using lime spray dryers to control SO_2. Unit 1 improves visibility by 0.10 dv and Unit 2 by 0.21 dv. Hayden also currently controls NO_X using SCR. Visibility improvements are estimated at 1.12 dv and 0.85 dv for Units 1 and 2, respectively.

The controls being implemented by the two power stations are helping to greatly improve the visibility in the region surrounding both the Mount Zirkel Wilderness and the Flat Tops Wilderness. In addition, the U.S. Forest Service has stated their concerns regarding visibility (in a letter to CDPHE in 1993) within the wilderness, which has subsequently been resolved. Colorado is also in agreement that control measures taken by the two facilities are sufficient in resolving the U.S. Forest Service concerns.

5.4.2.7 Regional Nitrate and Sulfate Deposition

Secondary aerosols form in the atmosphere from precursors gases (e.g., SO_2, NO_x, and VOCs). The secondary aerosols of interest are nitrate (NO_3-) and sulfate (SO_4^2-). Both negatively charged anions have an affinity toward ammonium creating ammonium nitrate and ammonium sulfate. All of the above secondary aerosols including ammonium compounds contribute to the formation of $PM_{2.5}$.

The U.S. Forest Service has had a monitoring site for fine aerosols within the Mount Zirkel Wilderness since July 1994. Data from that monitor is available at the IMPROVE network website operated by Colorado State University. The data are captured for 24 hours every three days. Data was evaluated between 2007 through August 2014. Estimated annual average concentrations for total $PM_{2.5}$, NO_3^-, and SO_4^{2-} were determined.

All years suggested that there were considerably more SO_4^{2-} ions in the atmosphere than nitrate. This is likely because ammonium will combine with NO_3 until it is exhausted before forming ammonium sulfate. Thus, the measure of excess nitrate remaining is highly dependent on the amount of ammonium in the atmosphere.

[5] https://www.colorado.gov/pacific/sites/default/files/AP_PO_Flat-Tops-Wilderness_0.pdf

[6] CDPHE Regional Haze SIP Craig Station https://www.colorado.gov/pacific/sites/default/files/AP_PO_Craig-Power-Plant_0.pdf

During 2007 to 2014, the average $PM_{2.5}$ concentration was 2.25 µg/m^3, with SO_4^{2-} contributing approximately 18 percent and NO_3^- only 3.6 percent. Note that the vast majority of fine particulates in the area are comprised of organic mass and soil. Based on average aerosol data since 1994, those two components (organic mass and soil) comprise approximately 40 percent and 20 percent of total $PM_{2.5}$, respectively.

With no change in the firing rate proposed for either the Craig or Hayden Generating Stations as part of any of the alternatives, these levels of NO_3^- and SO_4^{2-} deposition are not likely to change as a result of those actions. Note that SCRs only control NO_x emissions, which are a ratio of NO to NO_2. Thus there is no impact on NO_3^- regarding the presence of SCRs. It should be noted that SCRs do have some ammonia emissions (ammonia slip). The rate of ammonia from SCRs is typically 2-10 ppm and not considered to result in plume formation or human health hazards.[7]

5.4.2.8 Alternative C (No Action) Cumulative Effects

Alternative C (No Action) would equate to no development of the Collom Lite or Little Collom X areas. Only the South Taylor Pit would include active mining. All direct mining emissions would decrease as the total amount of coal extracted would not reach 5.1 mtpy. The total amount would be closer to 4.0 mtpy. Indirect railroad emissions may increase somewhat as the rail distance from another mine to the Craig Generating Station could become greater as the South Taylor Pit coal amount decreases.

The maximum combustion rate at the Craig Generating Station over the past several years has been approximately 4.8 mtpy. In order to maintain that rate, the Craig Generating Station would continue to obtain 2.3 mtpy from the Colowyo Coal Mine, but the amount would steadily decline and be zero following 2019. Alternative C (No Action) would have a lower overall cumulative emissions effect than Alternative A or B, which were discussed in detail above. Both Alternatives A and B were shown to have no significant impact when compared to the nearby counties, state, and the United States as a whole. Similarly, Alternative C (No Action) would create an insignificant comparative impact.

5.4.3 Geology

The CIAA for geological resources is the Project Area. The cumulative impacts from either Alternative A or Alternative B would be the removal of coal. Since 1977, Colowyo has mined between 0.3 and 6.4 million tons of coal per year for a total of 150.9 million tons of coal produced. Approximately 81.6 million tons of coal would be mined under Alternative A, or 54 percent of all the previously mined coal at the Colowyo Coal Mine. Other geologic features in the area would remain in place and would not be impacted as they typically occur at greater depths than where mining would occur. Other actions that may cumulatively impact geological resources are limited to future mining and oil and gas development. However, while future mining would possibly occur in the CIAA, such mining would not occur until the subject Project is complete. Oil and gas drilling would not be allowed until mine reclamation is completed. Cumulative impacts from these activities would be minor to moderate as geologic resources are removed. Mining and reclamation under Alternative C (No Action) would conclude when

[7] SCR Air Pollution Control fact Sheet: http://www3.epa.gov/ttncatc1/dir1/fscr.pdf

the available coal reserves are depleted at the existing mine (approximately 2029). Consequently, cumulative impacts under the No Action are considered less than minor to moderate.

5.4.4 Water Resources

The CIAA for water resources includes the Morgan Gulch and Wilson Creek watersheds. Generally, much of the area is undeveloped, but may be a source for non-point sediment sources due to geology and land use. Other land use activities in the Morgan Gulch and Wilson Creek watersheds (receiving streams for Project Area drainages) could include existing coal mining operations, oil and gas exploration, and agriculture (primarily grazing).

No other active mines occur within the CIAA for water resources. All coal mining operations in Colorado are regulated by CDRMS to reduce or eliminate potential impacts to water resources in accordance with SMCRA. All coal mining operations must also comply with the CWA and the permits for all coal mines include numerous design features to protect water resources. Therefore the cumulative effects of other coal mining would be negligible.

Coal is transported from the Colowyo Coal Mine to the Craig Generating Station on an approximately 27 mile long rail line with the unit trains operated by Union Pacific. Approximately 18 miles of the railroad line from the mine towards Craig is owned and maintained by Colowyo. Union Pacific owns and maintains the remainder of the line to the Craig Station. At the current average production rate of 2.3 mtpy, coal is shipped on approximately 250 unit trains per year. At the proposed maximum production rate of 5.1 mtpy, approximately 554 unit trains per year would be needed to transport the coal to markets.

With rail transport there is the possibility of an accidental derailment of coal cars and spill of coal. The number of historic accidents on the line from the Colowyo Coal Mine to the Craig Station provides a perspective on the general probability of such an accident occurring in the future. According to the accident records of the Federal Railroad Administration (FRA), between 1977 and 2015 (38 years) only one accident involving derailment of a loaded coal car occurred between the Colowyo Coal Mine and the Craig Station in 2003 (FRA 2015). Two derailment accidents occurred on the Craig Station property in August and November of 2006. At the current average production rate of 2.3 mtpy, the 1977-2015 timeframe would represent about 9,500 unit train trips, and at an average of 110 coal cars per unit train, about 1,045,000 individual coal car trips with only one spill accident. Therefore, based on this information, the general possibility of a spill due to accidental derailment would be extremely small.

Even if a spill did occur along the rail route, coal is not classified by EPA as a hazardous material. Coal is naturally occurring in the region and coal beds are exposed at the surface in many areas as well as crossed by river and stream beds directly. The very small amount of additional coal potentially left after cleanup or that would enter stream waters would be a negligible amount compared with the large amount of naturally occurring coal material exposed in the region. The area affected by a spill would be contained within a very localized area adjacent to the rail line. The main impact would be disturbance of the ground beneath the coal cars and the spilled coal. Cleanup of the site would occur expeditiously to prevent interruption in transport of coal from the mine to markets. Given the lack of historic coal car derailment accidents over the past 38 years and the factors described above, the potential cumulative effects would be negligible.

Oil and gas exploration within the Project Area could not go forward until mining operations and reclamation were complete. However, oil and gas exploration could occur in other areas of the CIAA so coal mining and oil and gas development could occur concurrently within the CIAA. Oil and gas development would have potential to contribute to sedimentation and spills with potential cumulative impacts to water quality, but would be minimized by their permitting requirements. Therefore, there would be negligible cumulative effects on water resources within the CIAA from these activities.

With respect to agriculture, grazing is expected to be an important land use within the CIAA for the foreseeable future. Grazing within the Project Area would not be conducted under either Alternative A or B prior to final reclamation in order to prevent land use conflicts and to enhance the success of revegetation. Even after reclamation is complete, grazing in the Project Area would be restricted to approximately 60 percent of the authorized use to enhance the continued success of revegetation. Therefore, for an extended period of time, there would be no effects from grazing on water resources in the Project Area. However, grazing in other portions of the CIAA would have the potential to increase erosion and sedimentation with potential cumulative impacts to water quality, but would be managed by the BLM. In the long term, the cumulative effects would be minor.

In summary, given: 1) the minor impacts to water resources that have occurred as a result of mining in past years; 2) the sequential nature of other potentially impacting land uses in the Project Area that would be deferred until after reclamation is complete; 3) the extended timeframe when there would be no impacts from those other activities in the Project Area; and 4) the predicted negligible to minor level of impacts predicted to occur for water resources under either Alternative A or Alternative B, only minor cumulative impacts to water resources are predicted. Mining and reclamation under Alternative C (No Action) would conclude when the available coal reserves are depleted at the existing mine (approximately 2029). Consequently, cumulative impacts under the No Action are considered less than minor.

5.4.5 Vegetation

The CIAA for vegetation is the Project Area. Additional mining under Alternative A and Alternative B would have the potential to cumulatively impact vegetation in the area. Grazing is anticipated to continue outside of the Project Area as currently practiced, and vegetation communities are not likely to be adversely impacted. Wildlife usage (including GRSG) and vegetation communities are not likely to be adversely impacted outside of the Project Area over the long term. Reclamation activities would actually likely add seral and community diversity and increased production of forage for livestock, fish and wildlife. Along with the past, present, and future actions, mining in the CIAA is likely to result in minor cumulative impacts due to the disturbance and reclamation (some contemporaneous) of the area at the end of the life of the mine and re-establishment of local vegetative communities. Mining and reclamation under Alternative C (No Action) would conclude when the available coal reserves are depleted at the existing mine (approximately 2029). Consequently, cumulative impacts under the No Action are considered less than negligible.

5.4.6 Wetlands

The CIAA for wetlands is the Project Area. The cumulative impacts of additional mining to wetlands would arise from the removal of the wetlands within the Project Area and potential sedimentation of downstream wetlands. Given the measures in place and approved in PR 03 to reduce the potential for downstream impacts, these impacts would be minimal. Grazing, if not properly managed, can cause impacts to the structure and water quality of those wetlands. Oil and gas development is generally required through federal lease stipulations or permit approval conditions to remain a set distance from wetlands, and few impacts occur. Additionally, increased road construction and use has the potential for an increase of sedimentation from the roads that are not paved. However, sedimentation control design features would be incorporated into road construction to preclude impacts.

The CIAA for WOTUS (excluding wetlands) is the Morgan Gulch and Wilson Creek watersheds. Alternative A and Alternative B would result in the loss of some of the mapped WOTUS in these watersheds. This would cumulatively add to the impacts to WOTUS. Other activities that have the potential to impact WOTUS (excluding wetlands) include oil and gas development and agricultural development through the potential loss of WOTUS or an increase of sedimentation into the channels. Recreation, livestock grazing, and other "non-ground disturbing" activities are likely to add to cumulative impacts through a potential increase of sedimentation, particularly if these activities occur near WOTUS (excluding wetlands).

All activities are limited through federal regulations under Section 404 of the CWA and regulations set by the USACE. The restrictions imposed by these regulations reduce the potential for developments to remove or impact wetlands and WOTUS in the area or require wetland impacts to be mitigated. Overall, Alternative A or Alternative B would have minor cumulative impacts to wetlands and WOTUS, since any impacted wetlands and WOTUS would be subject to mitigation. If any additional wetlands are located or delineated within the Project Area, they may be subject to additional mitigation. Mining and reclamation under Alternative C (No Action) would conclude when the available coal reserves are depleted at the existing mine (approximately 2029). Consequently, cumulative impacts under the No Action are considered less than negligible.

5.4.7 Fish and Wildlife

The CIAA for fish and wildlife resources is the SMCRA permit boundary, which provides a large buffer zone around the disturbance areas.

When combined with past, present, and future activities in the region, mining in the Project Area would cumulatively contribute to impacts to fish and wildlife species. This cumulative impact would be relatively minor given the large amount of similar undisturbed habitat that occurs in the region and because the area would be reclaimed to pre-disturbance conditions at the end of the Project.

Other activities in the region have the potential to cumulatively impact wildlife. Livestock grazing can create competition for grazing resources between cattle and big game species. The Morgan Creek Ranch owned primarily by Colowyo is located in the vicinity of the Project Area. The Morgan Creek Ranch participates in the Ranching for Wildlife program for this area that was created in 1993 through a voluntary cooperative agreement between the landowner (Colowyo) and the CPW. This program provides Colorado residents with the opportunity to hunt on private ranch land normally closed to the public (CPW 2015c). Participating ranches provide public hunting recreation access to their land free of charge to those who draw licenses. The ranch includes approximately 30,265 acres, with 25,156 acres owned by Colowyo. Livestock grazing on the ranch is limited to mid-May through mid-October du e to climatic conditions and a relatively short growing season. Rotational grazing has been implemented using well-maintained boundary and cross fences, along with water developments. Long term planning for grazing management and wildlife habitat improvement continues with considerations of weather conditions and resource management. Wildlife habitat management objectives are met using a wide range of improvements including grazing management, prescribed burning, water development, and riparian restoration. Managing livestock grazing on the Morgan Creek Ranch for the mutual benefit of wildlife will reduce potential cumulative impacts on wildlife in the area resulting from grazing. Future oil and gas development would have the potential to displace wildlife species from an area for the life of those projects. Any future potential oil and gas development within the permit boundary would occur after mining and reclamation are complete. Outside the permit boundary, oil and gas development may occur on other federal or private lands concurrent with mining. However, oil and gas development on both federal and state leases is strictly regulated and subject to extensive wildlife protection mitigation measures and thus would be analyzed independently should such development occur. Dispersed recreation may disturb individual animals and result in minor and temporary displacement. Cumulative impacts from these activities are likely to be negligible.

For fisheries, Alternative A and Alternative B would have the potential to add to the cumulative impacts in the CIAA. The additional surface disturbance created by either Alternative A or B would increase the potential for sedimentation to occur and therefore may potentially impact fisheries downstream of the Project Area. However, with the implementation of the design features in **Appendix B**, the potential for sedimentation would be small. Therefore, the cumulative impacts to fisheries would also be negligible. Mining and reclamation under Alternative C (No Action) would conclude when the available coal reserves are depleted at the existing mine (approximately 2029). Consequently, cumulative impacts under the No Action are considered less than negligible.

5.4.8 Special Status Species

The CIAA for special status species is the Project Area plus a 1 mile (1.6 km) buffer around the disturbance area. The CIAA for the Colorado River fish species and western yellow-billed cuckoo extends to the Yampa River in a 2 mile (3.2 km) buffer surrounding the Craig Generating Station. Continued development of mining operations in the Project Area would contribute incrementally to other surface uses that occupy and adversely modify habitat for the special status species that occur.

GRSG is a Colorado species of special concern and BLM sensitive species. For GRSG, Colowyo is required to implement their proposed design features for GRSG as approved by CDRMS under PR 03 for Alternative A as contained in **Appendix B**. In addition, Colowyo's approved Reclamation Plan (**Appendix A**) focuses on restoration of the sagebrush steppe vegetative community for the specific benefit of GRSG. This plan would result in a post mining increase in GRSG habitat when compared with the pre-mining condition. The above design features are also in addition to other design features for GRSG that Colowyo is required to implement under their previous permit revisions and the original SMCRA permit for the Colowyo Coal Mine. Further, under Alternative B, Colowyo would be committed to a proposed GRSG mitigation package previously described in **Chapter 2**.

Since the 4,543 acres of PHMA that would be donated by Colowyo under Alternative B would be more than the acreage of PHMA that would potentially be impacted under this alternative, there would be a net increase in the acreage of PHMA protected under Alternative B when compared to the pre-mining condition. Donation of those lands to CPW would also ensure that the PHMA would be preserved, protected, and managed for the benefit of GRSG in perpetuity. With the inclusion of Colowyo's grazing and mineral interests in the donation package, CPW would control management of future grazing in the interest of GRSG habitat and there would be a greater assurance that there would be no future oil and gas or mining development of those lands. Both Alternative A and Alternative B follow the guidelines set forth in the recent GSRG RMP Amendment that looks at the cumulative effects from ground disturbing activities to the GSRG. This amendment sets a cap on disturbance allowed in priority habitat and both alternatives would remain below that cap.

The Colorado River fish are also of particular concern. Other activities that occur in the region would have the potential to result in water depletions including future mining at the Colowyo Coal Mine. However, any future depletion(s) would be subject to RIPRAP and would be offset through funding of the RIPRAP program.

Given the combination of BMPs and design features that would be implemented as requirements under Alternative A or B and other reasonably foreseeable actions in the CIAA, these actions would not be expected to appreciably change the current aquatic conditions in the Yampa River. Consultation with the USFWS under Section 7 of the ESA has also included several conservation measures designed to mitigate cumulative impacts to the Colorado River fish species and western yellow-billed cuckoo.

Neither action alternative would be expected to directly contribute to cumulative impacts to the Colorado River fish species or western yellow-billed cuckoo. However, indirect impacts from the combustion of Colowyo Coal Mine coal at the Craig Generating Station would continue to release mercury. Some portion of this mercury is reasonably likely to end up in the Yampa River, which would cumulatively impact the Colorado River fish and western yellow-billed cuckoo. It is also reasonably foreseeable that combustion at the Craig Generating Station would continue to occur if coal was not supplied by the Colowyo Coal Mine. Therefore, while mining in the Project Area would result in cumulative impacts to the Colorado River fish and western yellow-billed cuckoo from water depletions, mercury deposition would occur even if mining was eliminated in the Project Area (i.e., Alternative C (No Action)) as coal would be supplied from elsewhere. Overall, cumulative impacts would be minor.

Alternative A or Alternative B, in conjunction with other past, present, and reasonably foreseeable future actions, would contribute negligible to minor long-term cumulative impacts from the loss of habitat in the CIAA for Great Basin spadefoot, mountain plover, Columbian sharp-tailed grouse, burrowing owl, Brewer's sparrow, and white-tailed prairie dog until reclamation restores habitat. Further, Alternatives A or B, in conjunction with other past, present, and reasonably foreseeable future actions, would contribute negligible to minor short-term to long-term cumulative impacts from the loss of foraging habitat in the CIAA for ferruginous hawk, bald eagle, American peregrine falcon, and Townsend's big-eared bat. All impacts on special status species would be negligible after successful reclamation.

Given the combination of design features and reclamation measures that would be implemented, the contribution of the mining in the Project Area would have negligible cumulative impacts. Additionally, in the context of other land uses and processes that are currently occurring or may occur in the future, the cumulative impacts would be lessened by the amount of habitat that would remain available.

5.4.9 Cultural and Historic Resources

The CIAA for cultural resources is the SMCRA permit boundary, which provides a large buffer zone around the disturbance areas.

Most cultural resources tend to degrade over time due to natural processes but many survive for thousands of years. Modern human activity can exacerbate the damage that naturally occurs to cultural resources. Cumulative impacts to cultural resources can be broad and include past, present, and future activity within and adjacent to the Project Area as well as the surrounding area viewshed. The CIAA has been historically used for livestock ranching, mining, and recreational activities such as hunting. Any extant historic properties (i.e., NRHP-eligible cultural resources) within the CIAA are more likely to have sustained impacts as a result of prior ranching/grazing activities or other historic land-use activities than from mining.

Continued use and/or development of the area would have the potential to detract from the integrity of cultural resources directly through physical disturbance or indirectly through the degradation of the historical environmental setting. Increased utilization of the area also increases the potential for illegal collection or vandalism of cultural resource sites. Conversely, the development of the area would result in additional cultural resource studies. The information and data gained from these potential studies would be valuable to the overall knowledge of the area and have the potential to aid in the mitigation of unknown adverse effects.

The potential impacts of Alternatives A and B are avoided through implementing cultural resources protection measures described in **Section 2.3.16** and **Appendix D**. Similar measures would be implemented for other types of federal undertakings and would also limit cumulative impacts to cultural resources. Since no impacts to NRHP-eligible or "needs data" cultural resources have occurred or are predicted under Alternatives A or B, there would be no cumulative impacts. Mining and reclamation under Alternative C (No Action) would conclude when the available coal reserves are depleted at the existing mine (approximately 2029). Consequently, cumulative impacts under the No Action are considered less than negligible.

5.4.10 Indian Concerns

The CIAA for Indian concerns is the Project Area, which provides a large buffer zone around the disturbance areas. None of the tribes contacted indicated that there are areas of concern. Since no impacts to Indian concerns have occurred or are predicted under Alternatives A or B, there would be no contribution to cumulative impacts to Indian concerns in the region. Mining and reclamation under Alternative C (No Action) would conclude when the available coal reserves are depleted at the existing mine (approximately 2029). There would be no cumulative impacts under the No Action.

5.4.11 Socioeconomics

The CIAA for socioeconomics includes Moffat, Rio Blanco, and Routt counties. The individuals and businesses that would be affected by the Project would be primarily in these counties, with the cumulative effects greater for the individuals and businesses in Moffat and Rio Blanco counties where the Colowyo Coal Mine is located. The social and economic structures and relationships that are in place in the CIAA in support of previous and current mining and other activity in the area are described in **Section 3.12**, in addition to the local, mine-related employment and activity. The incremental socioeconomic impacts of Alternatives A and B would include a constant level of employment and economic contribution from tax, royalty, and service revenues for the next 19 and 15 years, respectively. Cumulatively, the mining in these counties including that which occurs at the Trapper, Foidel Creek, and Deserado mines in conjunction with current mining at the Colowyo Coal Mine, contribute to the economy and need for services in the CIAA. There is a cumulative need for housing, schools, retail, food services, and municipal services such as police, fire, etc. because of the presence of (and active mining at) all of these mines within the CIAA. Consequently, the eventual closure of these mines will have a minor to moderate cumulative impact to these factors in the CIAA, which would be more substantial depending on the timing of the cessation of mining at each facility.

Under Alternative C (No Action), mining of coal at the existing mines would continue until the available coal reserves are depleted (approximately 2019) and reclamation completed (approximately 2029). The socioeconomic impacts discussed in **Section 4.12** would not happen under Alternative A or B. Currently, the counties in the CIAA are experiencing economic impacts related to the reduction in the agricultural and ranching economies, and the potential reduction in oil and gas development due to the presence of GRSG habitat (Jaffe 2015). The management of public lands under the direction of the Northwest Colorado Greater Sage Grouse LUP/FEIS (BLM 2015a) may cause reductions in employment in the CIAA due to land use restrictions. Impacts in local areas could be dramatic and significant, especially in areas where mineral exploration and development, including the development of minerals other than oil and gas (e.g., coal and several salable and locatable minerals), is a sizeable contributor to employment, output, earnings, and tax revenues (BLM 2015a). Therefore, the economic impacts under Alternative C (No Action) would have greater incremental cumulative economic impacts, and add to the economic uncertainty, within the CIAA than either action alternative when compared to the decline in other industries in the CIAA.

5.4.12 Environmental Justice

As there are no anticipated impacts to environmental justice populations, there would be no cumulative impacts under either Alternative A or Alternative B.

5.4.13 Visual Resources

The CIAA for visual resources is the SMCRA permit boundary. Combined with other ongoing surface disturbing activities, including the current mining operation at the South Taylor Pit, and in the region, (i.e., oil and gas development) implementation of Alternative A or Alternative B would cumulatively contribute to a visually impacted landscape. Mining operations at the South Taylor Pit will reduce and ultimately terminate shortly after completion of the transition of mining to the Collom area and reclamation will continue returning that area to its pre-mining landscape. This would reduce the cumulative impacts of mining over a period of several years. Also, given the topographically screened location of the mine and ancillary facilities, and the fact that these features may not be visible outside of the mine permit area, the cumulative impacts would be negligible.

The CIAA for visual resources is the Project Area and a 20 mile (32 km) buffer to account for the viewshed from the highest point in the disturbance area. While the location of the mine and ancillary facilities are topographically screened, visual disturbances associated with the temporary overburden and topsoil stockpiles are intermittently visible for travelers on the highways north of the Project Area. Combined with other ongoing surface disturbing activities within the Project Area, including the ongoing South Taylor/Lower Wilson expansion to the Colowyo Coal Mine and sand and gravel operations (approximately 5 [8.0 km] to 8 miles [12.8 km]) north and northwest of the Project Area), mining in the Project Area cumulatively contributes to a visually impacted landscape. Under both Alternative A and B, mining would continue; mining disturbance would increase in areas intermittently visible north of the Project Area until mining is complete, and would contribute to cumulative effects to visual resources. Under either action alternative, reclamation would include recontouring and revegetating disturbance areas, and the gradual use of and associated decrease in size of the temporary stockpiles. Alternative B would have potentially greater cumulative impacts as it would disturb a larger footprint than Alternative A. Residual effects of mining would be apparent for a number of years until the reclaimed area naturalizes with mature vegetation. Cumulative impacts to visual resources would be minimized due to reclamation efforts. Cumulative impacts under either Alternative A or Alternative B would be negligible to minor. Mining and reclamation under Alternative C (No Action) would conclude sooner than both Alternative A and Alternative B. Consequently, cumulative impacts under the No Action are considered negligible.

5.4.14 Recreation

The CIAA for recreation is Moffat and Rio Blanco Counties. Under either Alternative A or Alternative B, recreation, including hunting by the general public, would not be allowed to occur within the Project Area. Only mine employees or their families are currently allowed to access Colowyo-owned lands (excluding the active mining areas) during hunting season. There would not be any loss of recreational potential, on Colowyo privately owned land, because public access has never been allowed. The public parcels of land within the Project Area are closed to public access for safety reasons. The continuation of programs such as Ranching for Wildlife that provides Colorado residents with the option to hunt on private ranch land normally closed to the public, would offer additional hunting opportunities. Recreational trends in Moffat and Rio Blanco counties would continue. Cumulative impacts to recreation under Alternative A or Alternative B would be negligible. Mining and reclamation under Alternative C (No Action) would conclude when the available coal reserves are depleted at the existing mine (approximately 2029). Consequently, cumulative impacts under the No Action are considered less than negligible.

5.4.15 Paleontology

The CIAA for paleontological resources is the Project Area. Mining under Alternative A or Alternative B could cumulatively add to the potential impacts on paleontological resources in the Project Area. Other activities that may impact paleontological resources include future oil and gas development and additional mining. Activities such as recreational hunting that may occur within the Project Area are limited due to the fact that the Project Area is closed to the public. Future ground disturbing activities associated with mining within the CIAA would be subject to paleontological protection measures. Given the small area disturbed (49 percent of the Project Area, 7 percent of the permit area), relative to the overall large land area of the region, as well as the limited number of surface disturbing activities other than mining that may occur on the privately held Colowyo land, cumulative impacts under Alternative A or Alternative B would be negligible. Mining and reclamation under Alternative C (No Action) would conclude when the available coal reserves are depleted at the existing mine (approximately 2029). Consequently, cumulative impacts under the No Action are considered less than negligible.

5.4.16 Access and Transportation

The CIAA for access and transportation includes Moffat and Rio Blanco counties. Mining under either Alternative A or Alternative B would maintain mine-related infrastructure for traffic. Although the Jubb Creek access road would be an improved new 5.9 mile (9.5 km) long road into the Project Area, only mine traffic would be allowed on the road and the public would be prohibited from utilizing the road. The tax revenue generated from mining would contribute to the maintenance of public roads in the counties. The number of mine employees and associated traffic volume is not anticipated to vary from current levels. This relatively constant mine traffic would be included in the overall traffic volume for the counties, which varies somewhat seasonally due to tourism and hunting. The cumulative impacts of wear and tear on the roadways from mine traffic would be negligible in the overall context of the other sources of traffic. However, if the mine production rate rose to the maximum permitted level for several years, the number of mine employees would likely increase along with traffic volume both inside the mine permit boundary and outside the boundary on county and state roads. Regardless of such an increase in production, the cumulative impacts from the relatively small incremental increase in mine traffic under either alternative would remain negligible. Mining and reclamation under Alternative C (No Action) would conclude when the available coal reserves are depleted at the existing mine (approximately 2029). Consequently, cumulative impacts under the No Action are considered less than negligible.

5.4.17 Solid and Hazardous Waste

The CIAA for solid and hazardous waste is the Project Area. Mining under Alternative A or Alternative B would produce small amounts of hazardous and solid wastes. These wastes would continue to be managed and controlled under current regulations, as well as through Colowyo-initiated solid and hazardous waste handling procedures approved under PR 03 and BMPs. Ongoing oil and gas development has the potential to cumulative add to the amount of solid and hazardous wastes produced in the region. Cumulative impacts would be kept within state and federal standards and would be minor. Under Alternative C (No Action) mining would conclude when the available coal reserves are depleted at the existing mine (approximately 2019) and reclamation completed (approximately 2029). Consequently, cumulative impacts under the No Action are considered negligible to minor.

5.4.18 Noise

The CIAA for noise is the Project Area and the railroad. The principle noise sources related to additional mining operations include blasting, vehicles, the railroad, and noise from other facilities such as for mine vehicle maintenance. While noise would increase within the Project Area and along the railroad if there is increased production, most of the noise would attenuate before reaching the mine permit boundary. During the transition from the current mining operation at the South Taylor Pit to the Collom area, there would be a temporary increase in overall noise as construction and mine operations in the South Taylor Pit area overlap with those initiated in the Collom area. Once the transition is complete, mine operation related noises would shift from the South Taylor Pit area to the Collom area. Noise levels in the South Taylor Pit area would be substantially reduced over time as reclamation progresses and noise levels at the Collom area would be similar to those which have been ongoing at the South Taylor Pit area (including the East and West pits) for about 21 years. In conjunction with other past, present, and reasonably foreseeable future land uses, the mining under Alternative A or Alternative B would result in negligible cumulative impacts to the region. Mining and reclamation under Alternative C (No Action) would conclude when the available coal reserves are depleted at the existing mine (approximately 2029). Consequently, cumulative impacts under the No Action are considered less than negligible.

5.4.19 Livestock

The CIAA for livestock grazing is the five grazing allotments within the permit boundary. Closure of the expanded mine boundary to grazing under both Alternative A and Alternative B would cumulatively add to impacts on livestock grazing in the affected grazing allotments by reducing available forage. However, grazing is one of the post mine land uses targeted by Colowyo's CDRMS approved Reclamation Plan and, upon completion of mining, the mine area would be restored for future livestock grazing. Other activities in the allotments, such as oil and gas development, would also contribute to the cumulative impacts on grazing activities although the dispersed and time limited nature of oil and gas operations would result in negligible impacts over the long term as well. The reduction of the available forage in the allotments would likely be minor. The reduction of the available forage in the allotments would be negligible to minor because grazing would again be available after reclamation and successful revegetation. Under Alternative or Alternative B cumulative impacts to livestock grazing would be negligible to minor. Mining and reclamation under Alternative C (No Action) would conclude when the available coal reserves are depleted at the existing mine (approximately 2029). Consequently, cumulative impacts under the No Action are considered less than negligible.

5.4.20 Soils

The CIAA for soils is the Project Area. Mining under Alternative A and Alternative B would add to the cumulative impacts to soil resources from other surface disturbing activities such as oil and gas development. However, because oil and gas development within the CIAA would not be allowed until mining and reclamation are complete, those impacts would be negligible.

Mining would likely increase erosion in impacted areas; however, the implementation of the Reclamation Plan under approved PR03 (**Appendix A**), as well as other mitigation required under PR03 and BMPs would reduce the likelihood of increased sedimentation outside of the Project Area. Additionally, no other surface disturbing activities would be allowed within the Project Area until post-mining reclamation of the area is complete. Therefore, the cumulative impacts on soil resources in the CIAA would be minor. Mining and reclamation under Alternative C (No Action) would conclude when the available coal reserves are depleted at the existing mine (approximately 2029). Consequently, cumulative impacts under the No Action are considered less than negligible.

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CHAPTER 6 COORDINATION AND CONSULTATION

6.1 AGENCIES/PERSONS CONSULTED

The following people or agencies were consulted prior to and during the preparation of this EA:

- U.S. Fish and Wildlife Service (USFWS)
- Colorado Department of Public Health and Environment (CDPHE)
- Office of Archaeology and Historic Preservation, History Colorado
- Colorado Department of Natural Resources (DNR), including the Executive Director's Office, Colorado Division of Reclamation Mining and Safety (CDRMS), Colorado Division of Parks and Wildlife (CPW), and Colorado State Land Board (SLB)
- Eastern Shoshone Chairman and Tribal Council
- Ute Mountain Ute Chairman and Tribal Council
- Ute Indian Chairman and Tribal Council
- Southern Ute Chairman and Tribal Council
- Moffat County
- Rio Blanco County
- Affected Landowners

6.1.1 Public Comment Process

Public comments were solicited via public outreach legal notices published in the Rio Blanco Herald Times and the Craig Daily Press on September 26 and 27, 2013 and again on October 24 and 31, 2013, respectively. The legal notice was also posted in public locations in Craig and Meeker. In addition, a public outreach notice letter was mailed to 45 identified interested parties including Native American Tribes, state agencies, city and county governments, adjacent landowners, and other interested parties. OSMRE created a project website, http://www.wrcc.osmre.gov/initiatives/colowyo.shtm, which provided the notice and other project and comment opportunities available on the website. The legal notice and letter invited the public to comment on issues of concern for the proposed Project and informed the public of a public outreach meeting held on November 7, 2013, in Craig. Public comments were received through November 14, 2013, and included the following issues:

- General support of the Project;
- Additional traffic on County roads;

- Increased dust creation;
- Impacts to domestic water wells;
- Increased noise;
- The need for an EIS;
- Impacts to rare imperiled fish, wildlife, and plants;
- Impacts to air quality; and climate change;
- Alternative mining levels; and
- Offsite mitigation for impacts.

A discussion of the issues raised during scoping is discussed in **Section 1.6**.

6.1.2 US Fish and Wildlife Section 7 Process

Formal consultation with the USFWS was initiated on September 4, 2012 to determine the potential effects of the proposed Project on threatened and endangered species. The resulting BO from the USFWS was issued on October 30, 2012. On October 27, 2015, OSMRE reinitiated the Section 7 consultation process with USFWS by submitting a supplemental BA. The supplemental BA requested USFWS to reinitiate the consultation process due to the indirect effects of mercury and selenium deposition from combustion of coal on listed species.

6.1.3 Tribal Consultation

Letters describing the proposed Project were sent to the Eastern Shoshone Chairman and Tribal Council, Ute Mountain Ute Chairman and Tribal Council, Ute Indian Tribe Chairman and Tribal Council, and the Southern Ute Chairman and Tribal Council on September 26, 2013, and January 15, 2015. No concerns were raised regarding any specific religious site, sacred site, or traditional cultural property.

6.2 PREPARERS AND PARTICIPANTS

Table 6.2-1 shows a list of the preparers of this EA and those who participated in the preparation of this EA from OSMRE.

Table 6.2-1 Office of Surface Mining Reclamation and Enforcement

Name	Title
Robert Postle	Manager, Program Support Division
Marcelo Calle	Manager, Field Operations Branch
Nicole Caveny	Environmental Protection Specialist
Bobbi Hernandez	Civil Engineer
Jeremy Iliff	Cultural Resources
Alex Birchfield	Ecologist
Jacob Mullinix	Soils Scientist

Table 6.2-2 shows a list of the preparers of this EA and those who participated in the preparation of this EA from BLM.

Table 6.2.2 Bureau of Land Management

Name	Title
Wendy Reynolds	Field Manager (Retired)
Timothy Wilson	Assistant Field Manager
Desa Ausmus	Wildlife Management Biologist
Jennifer Maiolo	Mining Engineer
Kathryn McKinstry	Planning and Environmental Coordinator
Brian Naze	Archeologist
Chad Meister	Air Resource Specialist

Table 6.2-3 lists the participants in the preparation of this EA from the Cooperating Agencies.

Table 6.2-3 Participants from Cooperating Agencies

Name	Title
Amy Laughlin, DNR, Office of the Executive Director	Policy Advisor
Dan Hernandez, CDRMS	Senior Environmental Protection Specialist
Jim Stark, CDRMS	Senior Environmental Protection Specialist
Rob Zuber, CDRMS	Environmental Protection Specialist
Phillip Courtney, SLB	Solid Minerals Leasing Manager
Mike Warren, CPW	Energy Liaison, Northwest Region
Mark Sprague, Rio Blanco County	County Commissioner

Table 6.2-4 shows a list of the preparers of this EA and those who participated in the preparation of this EA from the third party consultants Stantec Consulting Services Inc. and Trinity Consultants.

Table 6.2-4 Consultants

Name	Title	Resource/Role
Greg Brown, Stantec Consulting	Principal	Review and project oversight
Doug Koza, Stantec Consulting	Environmental Scientist	Project Manager
Neil Lynn, Stantec Consulting	Environmental Scientist	Wildlife, Special Status Species
Karla Knoop, Stantec Consulting	Environmental Scientist	Water Resources, Geology, Topography, Soils, Alluvial Valley Floors
Schelle Davis, Stantec Consulting	Environmental Scientist	Visual Resources
Stephanie Lauer, Stantec Consulting	Environmental Scientist	Socioeconomics, Environmental Justice, Livestock Grazing, Solid and Hazardous Wastes, Noise
Jenni Prince-Mahoney, Stantec Consulting	Environmental Scientist	Cultural Resources, Indian Concerns, Paleontology, Recreation, Transportation/Access
Daniel Heiser, Stantec Consulting	Manager, Engineering	Air Quality and Modeling
Eric Clark, Stantec Consulting	Project Engineer	Air Quality and Modeling
Nick Faust, Stantec Consulting	GIS Analyst	Geographic Information Systems, Mapping
David E. B. Strohm II, Trinity Consultants	Managing Consultant	Air Quality and Modeling

CHAPTER 7 REFERENCES

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