USDA

United States
Department of
Agriculture

Forest
Service

August 2008

Environmental Assessment

Federal Coal Lease COC-61357 Modification, Tract 4

Paonia Ranger District
Grand Mesa, Uncompahgre and Gunnison National Forests
Gunnison County, Colorado
Section 32, T.12S. R.90W., Section 5, T.13S., R. 90W., 6th PM

Federal Coal Lease COC-61357 Modification, Tract 4
Environmental Assessment
Gunnison County, Colorado

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SUMMARY

The Grand Mesa, Uncompahgre and Gunnison National Forests together with the Uncompahgre Field Office of the Bureau of Land Management propose to authorize a 148 acre lease modification to federal coal lease COC-61357. The proposed lease modification is located Section 32, T.12S. R.90W., Section 5, T.13S., R. 90W., 6th PM, in Gunnison County, Colorado (approximately 9 miles north/northeast of Paonia, Colorado). The purpose of the lease modification is to accommodate a change in mine design, and to ensure that compliant and super-complaint coal reserves are recovered.

Four responses were received in response to public scoping. Concerns were expressed primarily related to subsidence, surface disturbance in an Inventoried Roadless Area, and air quality/climate change. No significant impacts will occur to any resource area under the Proposed Action. In many cases, the Proposed Action is indistinguishable from the No Action Alternative with the exception of subsidence. Additional slight impacts may be realized from potential reasonably foreseeable future actions which are subject to further review.

Based upon the effects of the alternatives, the Forest Service responsible official will decide:

- Whether or not to consent to the BLM modifying existing federal coal Lease COC-61357 by adding 142 acres according to the Federal Coal Leasing Amendments Act of 1976; and
- Prescribe conditions (stipulations) needed for the protection of non-coal resources.

The BLM responsible official, in addition to accepting USFS consent (if provided), will decide whether to:

- Adopt the No-Action Alternative (no leasing);
- Adopt the proposed action (lease the coal as applied for by the applicants);
- Adopt an alternative with features of both of the alternatives

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CHAPTER 1. PURPOSE OF AND NEED FOR ACTION

1.1 Document Structure

The Forest Service has prepared this Environmental Assessment in compliance with the National Environmental Policy Act (NEPA) and other relevant Federal and State laws and regulations. This Environmental Assessment discloses the direct, indirect, and cumulative environmental consequences that would result from the proposed action and alternatives. The document is organized into four chapters:

Chapter 1. Purpose and Need for Action: The chapter includes information on the history of the project proposal, the purpose of and need for the project, and the agency's proposal for achieving that purpose and need. This section also details how the Forest Service informed the public of the proposal and how the public responded.

- *Chapter 2. Alternatives, including the Proposed Action:* This chapter provides a more detailed description of the agency's proposed action as well as alternative methods for achieving the stated purpose. These alternatives were developed based on significant issues raised by the public and other agencies. This discussion also includes mitigation measures. Finally, this section provides a summary table of the environmental consequences associated with each alternative.
- *Chapter 3. Affected Environment and Environmental Consequences*: This chapter describes the environmental effects of implementing the proposed action and other alternatives. This analysis is organized by [insert topic (i.e., resource area, significant issues, environmental component)].
- *Chapter 4. Consultation and Coordination:* This chapter provides a list of preparers and agencies consulted during the development of the environmental impact statement.
- *Appendices:* The appendices provide more detailed information to support the analyses presented in the environmental impact statement.
- *Index:* The index provides page numbers by document topic.

Additional documentation, including more detailed analyses of project-area resources, may be found in the project planning record located at the Grand Mesa, Uncompahgre, and Gunnison National Forests Supervisor's Office, Delta, Colorado.

1.2 Background

An application was filed by Oxbow Mining, LLC (Oxbow) to modify an existing federal coal lease by adding 148 acres. The lease modification application contains National Forest System (NFS) surface lands managed by the Grand Mesa, Uncompahgre, and Gunnison National Forests (GMUG; approximately 142 acres), and lands managed by the Uncompahgre Field Office of the Bureau of Land Management (BLM; approximately 6 acres). The coal estate is administered by the BLM. The lease modification application will be processed according to procedures set forth in 43 CFR 3432.

The proposed lease modification is located Section 32, T.12S. R.90W.,

Section 5, T.13S., R. 90W., 6th PM, in Gunnison County, Colorado (approximately 9 miles north/northeast of Paonia, Colorado), and is shown on the attached map.

The coal in this lease modification would be accessed and recovered by underground longwall mining methods. Oxbow applied for this lease modification to allow for a more safe and logical mine design.

1.3 Purpose and Need for Action

The GMUG and BLM have identified the need to consider issuing a coal lease modification for federal coal lands immediately adjacent to exiting federal coal lease COC-61357. The purpose of the lease modification is to accommodate a change in mine design, and to ensure that compliant and super-complaint coal reserves are recovered.

The BLM, charged with administration of the mineral estate on these Federal lands, is required, by law, to consider leasing Federally-owned minerals for economic recovery. With respect to lands managed by the USDA-Forest Service (FS), the agency, considers consenting to the BLM leasing reserves underlying lands under its jurisdiction, and prescribes conditions (as stipulations) for the protection of non-mineral resources. For lands in which the BLM is the surface management agency, the BLM considers leasing reserves and prescribes stipulations for the protection of non-minerals resources. This action considers modifying one existing federal coal lease. Under 43 CFR 3432 (as amended by the Energy Policy Act of 2005), the holder of a federal coal lease may apply to modify a lease by up to 960 acres. The federal agencies are responding to an application to modify an existing lease.

The proposed action conforms to the overall guidance given in the GMUG Land and Resource Management Plan, as amended (Forest Plan, 1991) which encourages environmentally sound energy and mineral development, and the BLM Uncompahgre Basin Resource Management Plan (RMP, 1989).

The USDI- Office of Surface Mining Reclamation and Enforcement, Western Region will participate as a cooperating agency.

The proposed action conforms to the overall guidance given in the GMUG Land and Resource Management Plan, as amended (Forest Plan, 1991), and the BLM-Uncompahgre Basin Resource Management Plan (RMP, 1989). This EA also incorporates by reference previous analysis conducted in the project area:

- 2000, USDA FS, EIS for the Elk Creek Coal Exploration License, the Elk Creek Coal Lease Tract and the Elk Creek Coal Lease Tract and Record of Decision; Mar 30, 2000.
- 2002, USDA FS, Decision Memo, COC-61357 Lease Modification; July 30, 2002.
- 2004, USDA FS, Decision Memo, Exploration Plan on COC-61357, Aug 20, 2004.
- 2006, BLM, Environmental Assessment, NE Elk Creek Coal Exploration License (COC-67643). May 18, 2006.
- 2006, USDA FS, Decision Memo, Panels 7-11 Methane Drainage Wells, May 26, 2006.

- 2007, USDA FS, Decision Memo, Panels 8-10, Supplemental Methane Drainage Wells, July 9, 2007

The applications for lease modifications was specifically identified as a foreseeable action in the final EIS completed in March 2000 for the Elk Creek Coal Exploration License, the Elk Creek Coal Lease Tract and the Elk Creek Coal Lease Tract.

1.4 Proposed Action

The proposed action is to modify Oxbow's existing federal coal lease COC-61357 by adding 148 additional acres to compensate for changes to a more safe mine design, and to ensure that federal coal reserves are not bypassed.

1.5 Authorizing Actions

Mining and Minerals Policy Act of 1970 and Mineral Leasing Act of 1920

The Forest Service and BLM manage their minerals programs under guidance given in the Mining and Minerals Policy Act of 1970 which states in part that it is the "continuing policy of the federal government in the national interest to foster and encourage private enterprise in… (t)he development of economically sound and stable domestic mining minerals and mineral reclamation industries,…(and) the orderly and economic development of domestic mineral resources…" Further, federal mineral leasing follows the Mineral Leasing Act of 1920 as amended by the Federal Coal Leasing Amendments Act of 1976 (MLA), and specific procedures set forth in 43 CFR 3400.

This lease modification application will be processed according to procedures set forth in 43 CFR 3432. Lease modifications are considered non-competitive leasing actions, as they are applied for by lease holders to add acreage to an existing lease. In this case, Oxbow has applied for this modification, and no other coal company could obtain the rights to the coal in this lease modification if it was approved. The subsequent permitting action to allow mining, and change the approved mine permit boundary to include the modification area, would be evaluated by the Colorado Division Reclamation Mining Safety (DRMS) under procedures set forth in 30 CFR 700 et. seq., and the Regulations of the Colorado Mined Land Reclamation Board for Coal Mining. This change may also require approval from the USDI through the Office of Surface Mining Reclamation and Enforcement (OSM).

Surface Mining Control and Reclamation Act of 1977

The Surface Mining Control and Reclamation Act of 1977, as amended (SMCRA) gives the OSM primary responsibility to administer programs that regulate surface coal mining operations and the surface effects of underground coal mining operations in the United States. Pursuant to Section 503 of SMCRA, the CDRMS developed, and the Secretary of the Interior approved, Colorado's permanent regulatory program authorizing CDRMS to regulate surface coal mining operations and the surface effects of underground coal mining on private and State lands within the State of Colorado. In September 1982, under Section 523(c) of SMCRA, CDRMS entered into a cooperative agreement with the Secretary of the Interior authorizing CDRMS to regulate surface coal mining operations and the surface effects of

underground coal mining on Federal lands within the State.

Based on the cooperative agreement, Federal coal lease holders in Colorado must submit a permit application package (PAP) to OSM and CDRMS for proposed mining and reclamation operations on Federal lands in the State. CDRMS reviews the package to ensure that the permit application complies with the permitting requirements and that the coal mining operation will meet the approved permanent program's performance standards. If it does comply, CDRMS issues the applicant a permit to conduct coal mining operations. OSM, BLM, the Forest Service, and other Federal agencies review the PAP to ensure that it contains the necessary information for compliance with the coal lease, the MLA, NEPA and other applicable Federal laws and their attendant regulations. OSM recommends approval, approval with conditions, or disapproval of the MLA mining plan to the Assistant Secretary of the Interior, Land and Minerals Management. Before the mining plan can be approved, OSM obtains input from the surface-managing agency.

CDRMS enforces the performance standards and permit requirements during the mine's operation and has primary authority in environmental emergencies. OSM retains oversight responsibility for this enforcement. The surface management agency (in the case the Forest Service and/or the BLM) have authority in emergency situations in which CDRMS or OSM inspectors cannot act before environmental harm or damage occurs.

1.6 Decision Framework

Forest Service

The GMUG Forest Supervisor is the NEPA Responsible Official for the Forest Service. The BLM Colorado State Director is the Responsible Official for the BLM.

Given the purpose and need, the Forest Service Responsible Official will review the proposed action, the other alternatives, and the environmental consequences in order to decide the following:

- Whether or not to consent to the BLM modifying existing federal coal Lease COC-61357 by 141 acres; and
- Prescribe conditions (stipulations) needed for the protection of non-coal resources under FS jurisdiction.

The Forest Service Responsible Official will determine if the activity is consistent with the GMUG Forest Plan.

BLM

The BLM Colorado State Director is the deciding official for the BLM, and will decide whether or not to modify the existing coal lease under the MLA, as amended, and the federal regulations under 43 CFR 3400. The Uncompahgre Field Office Manager is responsible for providing the State Director with briefings and recommendations**.** Specifically, the BLM will decide whether to:

- Adopt the No-Action Alternative (no leasing);
- Adopt the proposed action (lease the coal as applied for by the applicants);
- Adopt an alternative with features of both of the alternatives; or
- Adopt the action alternative with additional mitigation measures.

OSM

OSM is a cooperating agency. OSM will prepare any MLA mining plan decisions related to this lease.

1.7 Conformance with Land Use Plans

Forest Plan Consistency

The amended Land and Resource Management Plan (LRMP) dated September 1991, for the GMUG National Forests made provisions for coal leasing subject to the application of the coal unsuitability criteria established in 43 CFR 3461. (See *Appendix A Unsuitability Analysis Report)* The LRMP also provided for applicable stipulations to be utilized for protection of specific surface resources as addressed in Section III, General Direction, pages 63-69 of the LRMP.

The Forest Plan guides all natural resource management activities and establishes management standards and guidelines for the GMUG. Management directions described in the Forest Plan are a result of public issues, management concerns, and management opportunities. Multiple use management area prescriptions as designated in the Forest Plan (pages 111-187) for the lands bounded by the proposed lease tract is summarized below:

- 4D –Emphasis on Aspen Management. Aspen is managed to produce wood fiber, visual quality and plan and animal diversity while maintaining and improving aspen sites on summer rage. Aspen dependent non-game, elk, and deer indicator species are emphasized. Investments in other compatible resources occur.
- 9A–Riparian / Aquatic Ecosystems. Emphasis is on the management of all the components of aquatic/riparian ecosystems to provide healthy, self-perpetuating plant communities, acceptable water quality standards, habitats for viable populations of fish and wildlife, and stable stream channels and still water body shorelines. Mineral activities may occur but must minimize disturbance to riparian areas and initiate timely and effective rehabilitation of disturbed areas and restore them to a state of productivity comparable to that before disturbance.

BLM Resource Management Plan Consistency

The proposed action is in compliance with the existing BLM land use plan. The Uncompahgre Basin Resource Management Plan (RMP) was completed, and approved in July of 1989. This RMP determined that the areas subject to the lease applications and exploration license applications were to be managed for both existing and potential coal development. The area is acceptable for coal development and coal production, and such coal activities could occur without conflicting with other land uses as described in the RMP. Upon receipt of the lease applications, BLM completed tract delineation. The assessment of coal unsuitability criteria has been completed for the proposed lease modification. The criteria has also been reviewed for implications with the other alternatives in this analysis. The unsuitability criteria published in 43 CFR 3461 were used. This coal unsuitability analysis report is included in this EA document as *Appendix A*

Unsuitability Analysis Report. In addition, data adequacy standards were reviewed and determined to be adequate. The land use plan was amended to address the standards for land health (i.e., Standards and Guidelines). The land analyzed in the EA project area is within the North Fork landscape unit. Briefly, Colorado BLM's Standards are:

- Ensure health of upland soils;
- Protect and improve riparian systems;
- Maintain healthy, productive plant and animal communities;
- Maintain or increase populations of threatened and endangered species in suitable habitat; and
- Ensure water quality meets minimum Colorado standards.

1.8 Public Involvement

The Notice of Opportunity to Comment was published in the Grand Junction Daily Sentinel on April 26, 2004. The notice asked for public comment on the proposal for 30 days following publication. In addition, as part of the public involvement process, the agency met with Colorado Division of Wildlife, other federal and state agencies and sent scoping letters to approximately 85 groups, individuals and agencies. Three comments letters were received.

Using the comments from the public, other agencies, and the interdisciplinary team, the issues brought up are addressed in the following sections: Key Issues, Non-key Issues, or Alternatives Considered but Eliminated from Detailed Study.

1.9 Issues

The Forest Service and BLM have separated the issues into two groups: key and non-key issues. Key issues were defined as those directly or indirectly caused by implementing the proposed action. Non-key issues were identified as those: 1) outside the scope of the proposed action; 2) already decided by law, regulation, Forest Plan, or other higher level decision; 3) irrelevant to the decision to be made; or 4) conjectural and not supported by scientific or factual evidence. The Council on Environmental Quality (CEQ) NEPA regulations explain this delineation in Sec. 1501.7, "…identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review (Sec. 1506.3)…". A list of non-key issues and reasons regarding their categorization as non-significant can be found below.

Issues Carried Forward in the Analysis

Issues relating to the proposed lease modification were identified and based on the comments received during the public scoping process. These issues, along with issues raised by the Interdisciplinary Team (IDT), were carried forward in the EA analysis. The issues carried forward are listed below.

- Cumulative effects including:
  - Surface disturbance that will likely occur as a result of mining (in addition to subsidence).
  - Reasonably foreseeable impacts to the surface and other resources.
  - Impacts from Oxbow and Bowie mining activities including effects to Elk Creek.
  - Effects on climate change including analysis of release of methane from mine mouth or through the mine ventilation system, release of methane through any gob

vent boreholes and release of $C0_2$ caused by the burning of coal that is mined.

- Impacts to Canada lynx (FP III-64).
- A reasonably complete discussion of mitigation measures should be addressed.
- Impacts to the area's visual quality objectives (FP III-121).
- Impacts to the 4D management area, with respect to Management Indicator Species (FP III-121-122).
- Effects of subsidence on:
  - Water resources including local water quality and quantity in Elk Creek.
  - Wildlife habitat, including effects to riparian habitat.
  - Cultural resources.
  - Other land uses, including range improvements, cattle trails and other multiple uses of the land.
- Effects of adding coal reserves on coal resource recovery.
- Effects of the proposed action on air quality.
- Effects on the Springhouse Park Inventoried Roadless Area.
- A stipulation to prevent surface disturbance throughout the lease modification area. *The Proposed Action includes a blanket no surface occupancy stipulation for future surface facilities (e.g. roads and drill pads; see Section 2.2). This was included due to Oxbow's statement that no surface facilities were needed for mine development of the lease modification area. Since the cumulative impacts of the analysis are measured from the Reasonably Foreseeable Mine Plan, the USFS is carrying forward this stipulation to ensure the integrity of the analysis.*

Non-Key Issues (Not Carried Forward In the Analysis)

- A stipulation to prevent surface disturbance on steep slopes has already be considered. *This stipulation will be carried forward from the parent lease.*
- A stipulation to prevent surface disturbance in riparian areas has already been considered. *This stipulation will be carried forward from the parent lease.*
- Effects of adding coal reserves on coal transportation. *The coal from the lease modification areas would be transported using existing coal transportation facilities. The amount of coal reserve available in the lease modifications would not increase the number of trains. Further, no increase in annual production is proposed with the addition of the lease modifications.*

1.10 Other Related Efforts

Oxbow has been operating the Elk Creek Mine since 1999 and produces approximately 6 million tons of coal per year. Oxbow currently holds 2 federal coal leases, covering about 6,250 acres of combined BLM, Forest Service and private land.

The reasonably foreseeable development scenario for this lease modification includes extending 6 longwall panels to allow for a more safe and logical mine design. The only surface disturbance associated with this lease modification would be that incident to subsidence (see Chapter 3 for a discussion of those effects). No other surface disturbing activities are proposed. However, a table and discussion showing other past,

present and reasonably foreseeable future actions with regard to other forest activities and resources is given in Chapter 3.

CHAPTER 2. ALTERNATIVES, INCLUDING THE PROPOSED ACTION

2.1 Introduction

This chapter describes and compares the alternatives considered for the Federal Coal Lease COC-61357 Modification 4. It includes a description and map of the action alternative considered. This section also presents the alternatives in comparative form, sharply defining the differences between each alternative and providing a clear basis for choice among options by the decision makers. Information used to compare the alternatives is based upon the environmental, social and economic effects of implementing each alternative.

2.2 Alternatives Considered in Detail

The Forest Service developed two alternatives, including the No Action and Proposed Action alternatives, in response to issues raised by the public.

Alternative 1-No Action

Analysis of the No Action alternative is required by CEQ 40 CFR Part 1502.14(d). Under the no action alternative, the lease modifications would not be approved, and no mining would occur in these specific areas. Impacts from mining would not occur on these lands, and the effects from on-going land uses would continue. The land would continue to be managed according to Forest Plan standards, goals and guidelines.

Alternative 2-The Proposed Action

The proposed action is to modify Oxbow's existing federal coal lease COC-61357 by adding 148 additional acres to allow for a more safe and logical mine design, and to ensure that federal coal reserves are not bypassed.

The proposed lease modification contains National Forest System (NFS) surface lands managed by the Grand Mesa, Uncompahgre, and Gunnison National Forests (GMUG; approximately 142 acres), and lands managed by the Uncompahgre Field Office of the Bureau of Land Management (BLM; approximately 6 acres). The legal description of the Elk Creek tract modification area (ECM4) is as follows:

Township 12 South, Range 90 West of the 6th P.M. A parcel of land located partially within the NE1/4 and partially within Lots 1, 2, 7, 8, 9, 10, 15 and 16 of Section 32, and Township 13 South, Range 90 West of the 6th P.M.
A parcel of land located partially within Lots 5, 16 and 19 of Section 5, being more particularly described as follows:

Beginning at a point from whence the Section Corner common to Sections 28, 29, 32 and 33 bears N.02°27'33"E. 2829.7 feet, more or less; thence S.14°36'09"W. 7032.93 feet to the existing lease line for Coal Lease No. COC-61357; thence along said existing lease line N.00°00'36"W. 7268.02 feet; thence leaving said existing lease line S.75°23'51"E. 1833.57 feet to the Point

of Beginning. Said parcel contains 148.0 acres, more or less.

The coal estate is administered by the BLM.

The proposed action deals primarily with underground mining. It is assumed that longwall mining practices would be used. Only minor surface disturbing activities would occur on Forest Service lands as a result of subsidence. See Figure 1. COC-61357 Lease Modification, Tract 4.

Stipulations for Action Alternative

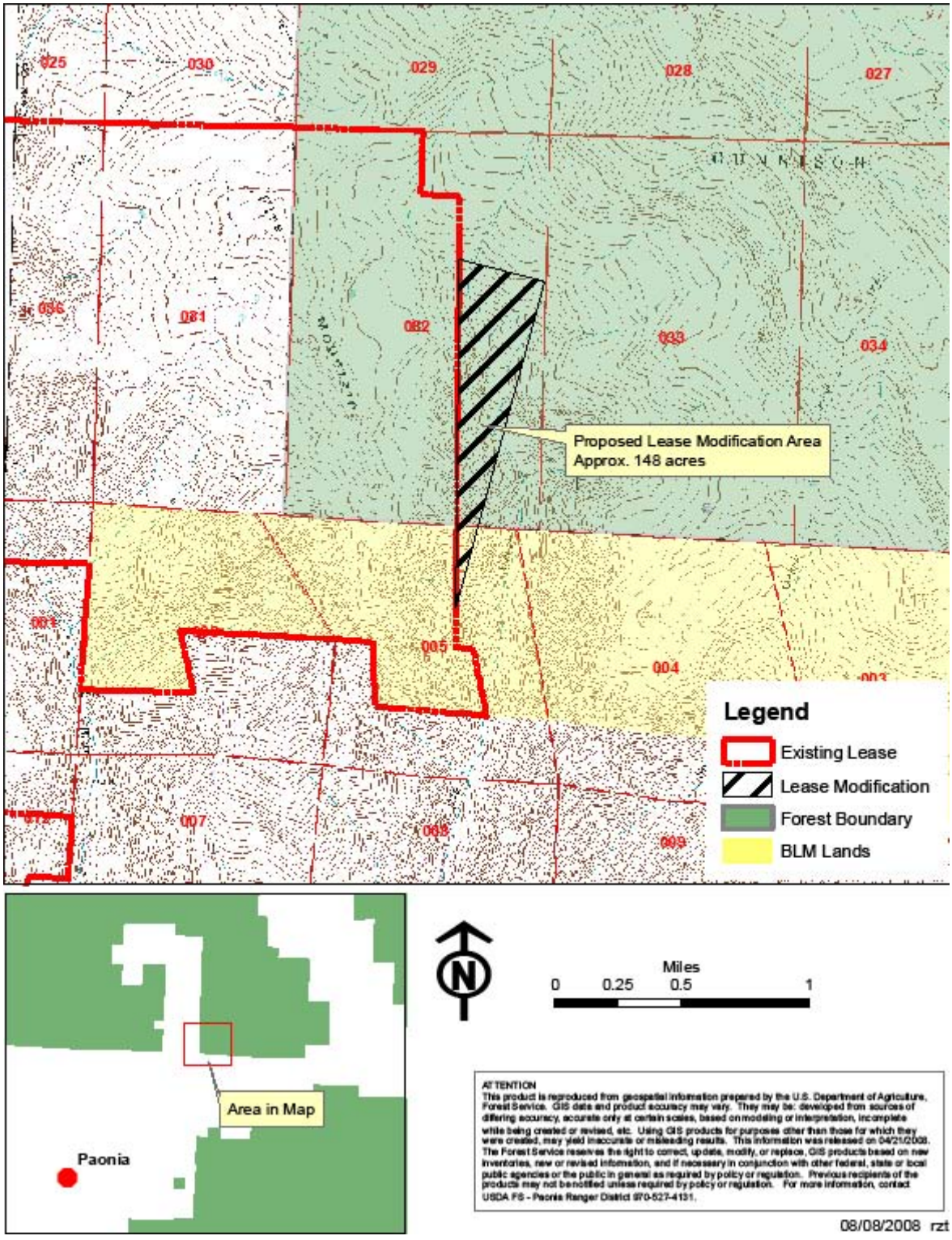
The Forest Service and BLM also developed the following stipulation measures to be used as part the action alternative.

Stipulations Carried Forward from Parent Lease (COC-61357)

Cultural and Paleontoloqical Resources. Prior to any surface disturbing activities, including subsidence, the lessee shall conduct a cultural resources survey and paleontological assessment of all previously unsurveyed areas that will be directly impacted by operations under this lease. The survey shall be an intensive field inventory of cultural, historical, and archaeological values, including, but not limited to, any and all objects of antiquity, historic or prehistoric ruins and artifacts, or other specimens of scientific interest. If the paleontological assessment demonstrates a need for a site specific inventory, this survey will also be performed.
(1) Surveys shall be conducted by a qualified professional cultural or paleontological resources specialist approved in advance by the Uncompahgre Field Office Manager or the Paonia District Ranger. A report on the survey and recommendations for protecting any identified cultural or paleontological resources shall be submitted to the Uncompahgre Field Office Manager or the Paonia District Ranger. After review and approval of the report, surface disturbing operations may be further conditioned with the imposition of additional stipulations for protection of the identified cultural or paleontological resources.
(2) The cost of the cultural or paleontological resources survey, the report, and any measures to protect cultural or paleontological resources identified thereby shall be borne by the lessee. All identified items shall remain the property of the appropriate surface owner, but the United States reserves its right and obligation under applicable law to take action necessary to protect, preserve, or acquire such items.
(3) If any items or features of historical, cultural or archaeological value are discovered during lease operations, the lessee shall immediately notify the Uncompahgre Field Office Manager or the Paonia District Ranger and shall not disturb such items or features until the Uncompahgre Field Office Manager issues instructions. If the lessee is ordered to take measures to protect any items or features of historical, cultural or archaeological value discovered during lease operations, the cost of the measures shall be borne by the lessor and such items and features shall remain under the jurisdiction of the United States.

The cost of conducting the inventory, preparing the reports and carrying out mitigating measures shall be borne by the lessee. Of particular concern in this lease area are un-inventoried cultural resource sites associated with rock overhangs and escarpments.

Figure 1. COC-61357 Lease Modification, Tract 4



Threatened and Endangered Species
If there is reason to believe that new individuals or populations of Threatened or Endangered, or Sensitive (TES) species of plants or animals, or migratory bird species of high Federal interest occur in the area, the lessee shall be required to conduct an intensive field inventory of the area to be disturbed and/or impacted inventory shall be conducted by a qualified specialist and a report of findings will be prepared. A plan will be prepared making recommendations for the protection of these species or action necessary to mitigate the disturbance. The cost of conducting the inventory, preparing reports and carrying out mitigating measures shall be borne by the lessee.

Birds
(A) To protect and preserve breeding and nesting habitat for the Loggerhead shrike, and other Neo-tropical birds, disturbances in sagebrush, Gambel oak stands, and riparian areas will be avoided to the extent practicable.
(B) No surface disturbance or facilities will be located in occupied Southwest willow flycatcher habitat. Prior to any planned disturbance within riparian habitats on the lease, the lessee must: (i) Survey the area of the proposed disturbance for suitable Southwest willow flycatcher habitat, and survey all suitable habitat for the presence of the species. All habitat and species surveys must be in accordance with the accepted U.S. Fish and wildlife Service (USFWS) protocol; (ii) Provide the results of all surveys to the USFWS, the Uncompahgre Field Office of BLM and the Paonia Ranger District of the USFS; (iii) If suitable habitat or individuals are located in the area, consultation with the USFWS will be required to determine suitable conservation measures to prevent a "taken under section 9 of the Endangered Species Act. Conservation measures may include avoidance of the occupied habitat, establishment of a buffer zone and seasonal restriction around occupied habitat, or others developed for the specific site. In accordance with current protocol, surveys for the presence of the species are valid for only one year.

Wildlife
(1) Raptors. (A) With respect to bald or golden eagle nests which may be established on the lease during the life of the project, the following shall apply: (i) No new permanent surface facilities or disturbances shall be located within a 1-mile-radius buffer zone around each bald or golden eagle nest site. (ii) No above ground activities will be allowed within a 1 mile radius buffer zone around each active eagle nest site from November 15 to July 30 for bald eagles, and around each active golden eagle nest site from February 1 to July 15. (iii) Any proposed surface facilities, disturbances or activities (noted above) in, or adjacent to, these buffer zones will require approval from the BLM or USFS on a site-specific basis, after consultation with the USFWS.
(B) With respect to bald eagle winter roost sites or concentration areas which may become established on the lease during the life of the project, the following special stipulation shall apply: (i) No above ground activities will be allowed within a *1/4* mile radius of winter roosts between November 15 and March 15; development may be permitted at other periods. If periodic visits are required within the buffer zone after development, activity should be restricted to the hours of 10 am and 2 pm from November 15 through March 15.
(C) With respect to other raptors (except American Kestrel) which may occur or

become established on the lease during the life of the project, the following special stipulation shall apply: (i) Conduct surveys for nesting raptors on the lease tract prior to development of any surface facilities. No surface activities will be allow within 1 mile radius of active nest sites between the dates of February 1 and August 15, unless authorized by BLM or USFS on a site specific basis.

Big Game Winter Range

(A) With respect to mule deer and elk crucial winter rage that may be established by Colorado Division of Wildlife (CDOW) on BLM managed lands on the lease during the life of the project, the following shall apply: (i) Coal related facilities and surface disturbances except subsidence will be authorized in the review area only if no practical alternatives exist. The BLM will co-ordinate with the CDOW to determine the type and extent of allowable variances. Coal exploration, facility construction, and major scheduled maintenance will not be authorized within these crucial winter ranges from December 1 through April 30. All unavoidable surface disturbances within these crucial winter ranges during these times will require approval of the authorized officer.

Water

(1) Water Replacement Plan. (A) Lessee shall replace, in a manner consistent with state law, the water supply of any owner of a vested water right which is proximately injured as a result of the mining activities.

(B) Lessee, will conduct an inventory of all existing water sources (including gain/loss analyses on Elk, Bear and Hubbard Creeks) adjacent to, originating on or flowing over the lease tract (including state adjudicated water rights, stock ponds, springs, etc.) which may be impacted by subsequent mining activities. At a minimum, this inventory will include: the water right holder, location, source, amount of decree, beneficial use, current and historical flow, (including seasonal/annual variation), and the appropriation and adjudication dates, In addition to the water inventory, the lessee shall be required to establish a water resource monitoring program to locate, measure and quantify the progressive and final effects of underground mining activities on the water resources potentially affected by mining. Monitoring of water resources would continue until a determination is made by the CDMG that there would be no injury to water resources.

(C) Lessee shall formulate a water replacement plan to replace the possible loss of water resulting from mining activity of the lease. The water replacement plan will include all existing water sources, including those presently adjudicated and historically put to beneficial use in the Elk Creek, Bear Creek, and Hubbard Creek drainages. The water replacement plan for each respective drainage shall be developed after consultation with affected water right users and federal and state authorities, and shall be approved by state authorities before mining in the particular drainage. At a minimum, the water replacement plan will require, upon injury, replacement of wat2r of suitable quality and water right seniority to provide for all existing uses (including sources supporting livestock and ecosystem, and other land uses as authorized by 36 CFR 251) and be delivered to existing points of diversion in a timely manner. As part of each water replacement plan, the lessee shall demonstrate its legal and physical ability to implement said plan. A source of

replacement water may include, but is not limited to, the transfer of water rights, an augmentation plan, a long term water use lease, or compensatory storage.

(D) Fueling and lubricating vehicles are prohibited within 100 feet of streams and wetlands. No fuel storage is allowed within 500 feet of any water bodies.

Subsidence

(2) A pillar stability analysis shall be used to design chain and barrier pillars for long term structural integrity where needed to protect surface resources.

Additional Stipulations for Forest Service Lands.

(1) Mining that would cause subsidence will not be permitted under perennial portions of Hubbard Creek. Further, mining that would cause subsidence will not be permitted within a zone under these drainages created by projecting a 25 degree angle of draw from vertical) from the surface expression of the creeks down to the top of the coal seam to be mined. (See Figure 2 of the FS and BLM Records of Decision.)

(4) No surface occupancy or use is allowed on the lands defined as a wetland, floodplain or riparian area.

(7) Existing Forest Service owned or permitted surface improvements will need to be protected, restored or replaced to provide for continuance of current land uses.

(9) Lessee shall provide for the suppression and control of fugitive dust on roads used by the lessee.

(10) Lessee shall be required to perform a study to secure adequate baseline data to quantify existing surface resources on and adjacent to the lease area. Existing data may be used if such data are adequate for the intended purposes. The study shall be adequate to locate, quantify and demonstrate the interrelationship of the geology, topography, surface hydrology, soils, vegetation and wildlife. Baseline data will be established so that future programs of observation can be incorporated at regular intervals for comparison. .

(11) Lessee shall be required to establish a monitoring system to locate, measure, and quantify the progressive and final effects of underground mining activities on the topographic surface, subsurface and surface hydrology, soils and vegetation. The monitoring system shall utilize techniques which will provide a continuing record of change over time and an analytical method for location and measurement of a number of points over the lease area.

(12) The licenscee/permittee/lessee must comply with all the rules and regulations of the Secretary of Agriculture set forth at Title 36, Chapter II, of the Code of Federal Regulations governing the use and management of the National Forest System (NFS) when not inconsistent with the rights and regulations must be complied with for (a) all use and occupancy of the NFS prior to approval of a permit/operation plan by the Secretary of the Interior, (b)uses of all existing improvements, such as Forest Development Roads, within and outside the area licensed, permitted or leased by the Secretary of the Interior, and (c) use and occupancy of the NFS not authorized by a permit/operating plan approved by the Secretary of the Interior.

New Stipulations Specific to Lease Modification

Colorado River Fish
In the future, if water used for mine related activities exceeds a depletion amount previously consulted upon by the GMUG, the permitting agency must enter into consultation with the U.S. Fish and Wildlife Service to determine appropriate conservation measures to offset effects to listed fish and critical habitat in the upper Colorado River Basin.

Surface Occupancy
No surface occupancy is allowed for exploration, methane drainage, or ventilation and/or escape shafts in the modification area.

Stipulations that will be updated

The following stipulations exist on the parent lease (COC-61357). However, due to outdated or incorrect information, they need to be updated. The changes described will be reflected on the parent lease and/or lease modification, if approved.

Original - *Riparian Zones*
A 1/8 mile buffer zone (660 ft.) Will be protected on either side of the riparian zones (or a buffer zone may be established in accordance with the surface management agency guidelines). No surface disturbances, except surface subsidence, will be permitted within these buffer zones unless no practical alternatives exist. All unavoidable surface disturbances will require approval of the BLM and/or USFS authorized officer. The BLM or USFS will coordinate with the USFWS and CDOW to determine the type and extent of allowable variances. A site specific analysis will determine if this stipulation will apply.

Change – *Riparian Zones*- **only applicable to Lease Modification**
A 1/8 mile buffer zone (660 ft.) Will be protected on either side of the riparian zones (or a buffer zone may be established in accordance with the surface management agency guidelines). No surface disturbances, except surface subsidence, will be permitted within these buffer zones.

The above change reflects that no surface occupancy is allowed in the lease modification area.

Original - *Subsidence*
(1) Except at specifically approved locations, mining that would cause subsidence will not be permitted within a zone under Elk Creek, Bear Creek, and Hubbard Creek. (See Figure 2 of the FS and BLM Records of Decision). The zone is determined by projecting a 25 degree angle of draw (from vertical) from the surface expression of the creeks down to the top of the coal seam to be mined.

Change – Subsidence – **only applicable to parent lease (COC-61357)**.
(1) Except at specifically approved locations, mining that would cause subsidence will not be permitted within a zone under Hubbard Creek. (See Figure 2 of the FS and BLM Records of Decision). The zone is determined by projecting a 25 degree angle of draw (from vertical) from the surface expression of the creeks down to the top of the coal seam to be mined.

The above change reflects the original decision and analysis. Bear Creek and Elk Creek were never analyzed as

having a no subsidence stipulation. They were incorrectly included in the original lease documentation.

Original - *Roadless*
(8) Lands contained within this lease are subject to the Forest Service Interim Rule, "Administration of the Forest Service Development Transportation System: Temporary Suspension of Road Construction and Reconstruction in Unroaded Areas", Federal Register Vol. 64. No. 29. Friday, February 12, 1999, pages 7290 through 7305. These lands will also be subject to the final road management policy which will be set in 18 months. No road construction will be allowed within the unroaded area until the Forest Service adopts it's revised road management policy or 18 months from the effective date of this final interim rule, whichever is sooner.

Change – *Roadless* –**will apply to USFS portion on both the parent and lease modification**
All or part of the land included in COC-61357 and subsequent modifications, are in the Springhouse Park Inventoried Roadless Area (IRA) and may be subject to restrictions on road-building pursuant to rules and regulations of the Secretary of Agriculture applicable at the time any road may be proposed on the lease. Locations of any proposed surface use will be verified for relationship to IRA boundaries using site-specific maps if/when surface operations are proposed.

This change reflects the recent changes in the 2001 Roadless Rule and subsequent court proceedings.

Stipulations which are not applicable to lease modification area

The following stipulations will not apply to the lease modification because no surface disturbing activities will be allowed due to overriding stipulations in the proposed action:

Surface Disturbing Activities
Any surface disturbance related to installation of degasification boreholes, ventilation shafts, drill holes or any other surface-disturbing activity must be approved by the surface management agency. The lessee/operator will be responsible for soil preservation/protection and final reclamation. For reclamation that would require reseeding, a certified weed free source of seed would be used. The lessee will be responsible for controlling spread of, and eradicating noxious weeds.

(2)Specific approval will be required for locating drill sites, degasification boreholes or ventilation shafts or any other surface disturbances (if they are needed) in areas of moderate geologic hazards and on slopes ranging from 40 to 60 percent.

(3) Drill sites, degasification boreholes, ventilation shafts or any other surface disturbances will not be located on slopes in excess of 60 percent or in areas of high geologic hazard

(5) With regard to protecting elk on the winter range and minimizing surface damage, no surface use (exploration, drilling and development activity) will be allowed from October 1 through May 15, or whenever conditions in the spring allow operations without causing surface damage. Operations between October 1 and the Friday preceding regular big game hunting season may be allowed during dry weather upon written authorization of the Forest *Service* District Ranger.

(6) If new road access is required for construction of degasification boreholes or ventilation shafts, new accesses will be obliterated. Until obliteration, all new access will be closed to the public. Long term access will be by foot and horse.

2.3 Alternatives Considered but Eliminated from Detailed Study

Federal agencies are required by NEPA to rigorously explore and objectively evaluate all reasonable alternatives and to briefly discuss the reasons for eliminating any alternatives that were not developed in detail (40 CFR 1502.14). Public comments received in response to the Proposed Action provided suggestions for alternative methods for achieving the purpose and need. Some of these alternatives may have been outside the scope of considering consenting to the issuance of a coal lease modification for federal coal lands immediately adjacent to exiting federal coal lease COC-61357 for the purpose of accommodate a change in mine design, duplicative of the alternatives considered in detail, or determined to be components that would cause unnecessary environmental harm. Therefore, a number of alternatives were considered, but dismissed from detailed consideration for reasons summarized below.

Reduce the potential greenhouse gas emissions of the project including flaring and methane capture.
Alternatives that address flaring and methane capture are duplicative of the Proposed Action as these are possible mitigation measures that may be implemented if the coal is mined in this particular area. In addition no methane drainage is proposed or foreseeable in the lease modification area.

Vent all methane through mine mouth
An alternative that addresses venting all methane through mine mouth is duplicative of the Proposed Action as this is addressed in the Air Quality analysis section.

Prevent future disturbance for road construction, drill pads and the like.
Effects from an alternative that considers prevention of future disturbance is already covered by consideration of the No Action Alternative and the Proposed Action. CEQ NEPA regulations describe this situation as having been covered by prior environmental review (Sec. 1506.3).

2.4 Comparison of Alternatives

This section provides a summary of the effects of implementing each alternative. Information in the table is focused on activities and effects where different levels of effects or outputs can be distinguished quantitatively or qualitatively among alternatives.

Table 2.4. Comparison of Alternatives

Topic	Alternative 1-No Action	Alternative 2-Proposed Action
Air Quality	None	Negligible
Water Quality and Quantity	None	Negligible
Geology & Soils	None	Low
Subsidence, Potential Effect to Elk Creek	None	Negligible
Subsidence, Potential or Aggravate Landslides	None	Low
Threatened and Endangered Species	None	None
Management Indicator Species	None	None
Cultural Resources	None	None
Roadless Character	None	None – no surface disturbing activities other than subsidence
Coal Recovery	No additional coal resources mined	Additional mineable reserves added to mine base.

CHAPTER 3. AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

3.0 Introduction

This Chapter summarizes the physical, biological, social, and economic environments of the project area and the environmental consequences of implementing each alternative on that environment. It also presents the scientific and analytical basis for the comparison of alternatives presented in the alternatives chapter.

Short-term and Long-term Effects

Unless otherwise specified, short-term is the life of the project. Long-term effects are defined as those that would occur after coal is mined.

Direct and Indirect Effects

Direct effects are caused by the action and occur at the same time and place as the action. Indirect effects are caused by the action and occur later in time or farther removed in distance, but are still reasonably foreseeable. Direct and indirect effects analysis for each alternative and each resource are based on description of the alternatives provided in Chapter 2, including conditions of approval and assumes all would be implemented as described.

Cumulative Effects

Cumulative impacts are impacts on the environment that result from incremental impact of the action when added to other past, present, and reasonably foreseeable future actions.

3.1 Past, Present and Reasonably Foreseeable Actions

General Background

Coal mining has been one of the dominant land uses in the North Fork of the Gunnison River area. Underground mining has occurred in this area for the past 100 years. Coal mining has occurred on both private and public lands in the general area. There are currently three operating coal mines in the North Fork Valley. These are the Bowie No. 2 Mine, the West Elk Mine, and the Elk Creek Mine. Coal exploration is occurring in the area in conjunction with actual coal mining operations. Such exploration activities have been undertaken to identify and delineate recoverable coal deposits. These activities generally involve drilling holes to delineate the coal reserves and evaluate coal quality. Exploration activities have occurred on National Forest System lands and BLM administered lands under plans of operation and subsequent amendments approved by the BLM and the Forest Service. There has also been coal exploration and development on private lands. All exploration activities, whether on federal or private lands, must be permitted with the Colorado DRMS.

Elk Creek Mine

The mine has been operating for 7 years and holds over 6,000 acres of Federal coal leases. Subsidence on the GMUG, BLM, and private lands has occurred in and immediately adjacent to the project area. Minor surface tension cracks are visible in places on the surface. Topography has lowered between three

and twelve feet across the existing subsided areas. Mine life is currently projected to last 5 years (or until 2013) based on existing leased reserves.

Coal Exploration Drilling & Methane Drainage Drilling

Exploration for the Elk Creek Mine has taken place for several years on BLM and FS lands. Some access roads are still visible, however road closures and/or obliteration are inhibiting traffic Reclamation success has returned lands to prescribed uses. Current disturbance associated with Oxbow's MDW operations west of the project area includes fifteen pads (6 on BLM, 7 on FS, and 2 on private lands; totaling approx. 5 acres of disturbance), and approx. 7 miles of road. Oxbow has reclaimed fourteen MDW pads (approximately 5 acres) and ~2.6 miles of road.

With respect to Oxbow exploration, since the opening of the Elk Creek Mine, 49 drill pad site have been disturbed and 42 sites have been reclaimed. The 7 remaining open sites are all related to the fact that drilling activities have not yet been completed. There are no sites where all drilling activities have been completed and reclamation has not yet been performed. In addition, there are 9.7 miles of new road construction and 8.7 miles of completed road reclamation for these exploration sites.

Oxbow maintains approximately 15 surface water monitoring stations (ponds, springs, streams, ditches, etc) in the vicinity of the project area (Annual Hydrology report 2007). Routine monitoring occurs generally three times per year (quarterly without winter monitoring). Oxbow also monitors a network of approximately 13 ground water monitoring wells/drill holes/formation throughout their permit and lease areas.

Subsidence monitoring has occurred since 1999 in support of previous Oxbow lease applications.

Range Use/ Improvements

NFS and BLM lands have been grazed for many years and are currently managed on an intensive time-controlled system. No changes in the grazing system are planned. Existing range features and improvements include stock trails, stock tanks, and fences.

Recreation

The project area has no developed recreation sites. Dispersed recreation includes hunting. Primary use occurs during hunting seasons. No recreation developments are planned.

Special Use Authorization

No specific special use activities occur in the permit area.

Road and Trail System

There are no roads or trails identified within the project area.

Reasonably Foreseeable Future Development on Lease Modification

The environmental analysis will incorporate a reasonably foreseeable development plan (RFDP) in order to address cumulative impacts. An RFDP includes surface impacts such as subsidence and potential surface facilities (roads/drill pads) associated with mine development (if applicable). The RFDP was developed by the proponent with cooperation from the USFS. The future actions described herein are based upon existing information and are logical approximations of what is expected to occur in this area to provide for safe

operation of the underground mine. Values in this analysis are estimates.

Currently, reasonably foreseeable development for this lease modification area includes only subsidence, surface facilities are not expected, nor will be allowed (see proposed action).

3.2 Air Quality Affected Environment

Air quality in the study area is affected by activities currently conducted within the area. The study area for direct, indirect, and cumulative effects is defined here as the County of Gunnison (approximately a 40-mile radius around the City of Gunnison-general area of nearest Class II sensitive viewshed). Activities occurring within the study area that affect air quality include fixed facilities such as coal mining and subsequent coal mining operations (e.g., loading), concrete mix plants, gravel pits, lime storage facilities, natural-gas fired electrical generating plants, natural gas dehydration facilities, landfills, and crematoriums, etc. Portable source examples include facilities such as gravel crushers, associated processing equipment, and asphalt plants. Smoke from grass and forest fires from late spring through early fall can affect air quality depending on the year Potential impacts to air quality from installation of the methane drainage wells and the ventilation/escapeway shaft were evaluated using the type and source of priority pollutants (e.g., equipment engines emissions and dust from construction activities) and air regulations (including emission standards, as applicable) pertinent to the project. It is estimated for this analysis that 3 to 4 MDWs would be in operation at any given time and life of an MDW varies depending on placement in the panel. Baseline information for air resources in the study area was derived from other coal NEPA projects in the area. Baseline information includes data such as area impacted by construction activities (e.g., drill pad areas, length of roads, etc.) equipment type, and duration of construction and the project. Approximately 7.4% of US emissions of methane come from coal mining and approximately 75% (or 5.6% of US methane emissions) of that comes from underground coal mining activities. Comparative information, such as ambient air quality, atmospheric conditions, and existing air emission sources, were derived from databases maintained by the United States Environmental Protection Agency (U.S. EPA 2006a) and Colorado Department of Public Health and Environment, Air Pollution Control Commission (CAPCC 2006a). Regulatory standards for air quality (e.g., criteria pollutants) were obtained from U.S. EPA (U.S.EPA 2006b) and Colorado Department of Public Health and the Environment Air Pollution Control Commission (CAPCC 2006b).

Area Air Quality

The federal government and CAPCC have established ambient air quality standards for criteria air pollutants. The criteria pollutants are carbon monoxide (CO), lead (Pb), sulfur dioxide (SO_2), particulate matter smaller than10 microns (PM_{10}), ozone (O_3), and nitrogen dioxide (NO_2). In 1997, the U.S. EPA revised the federal primary and secondary particulate matter standards by establishing annual and 24-hour standards for particulate 2.5 micrometers in diameter or smaller ($PM_{2.5}$). Ambient air quality standards must not been exceeded in areas where the general public has access. Table 3.2

lists federal and state air quality standards. National primary standards are levels of air quality necessary, with an adequate margin of safety, to protect public health. National secondary standards are levels of air quality necessary to protect public welfare from known or anticipated adverse effects of a regulated air pollutant. The attainment status for pollutants in the project area is determined by monitoring levels of criteria pollutants (CO, Pb, SO_2, PM_{10}, O_3, and NO_2) for which National Ambient Air Quality Standards (NAAQS) and Colorado quality in the study area is designated as attainment for all criteria pollutants. The attainment designation means that no violations of Colorado or national air quality standards have been documented in the area.

No data is available regarding current ambient methane concentrations in air, because methane is not yet a regulated constituent.

Recent reporting of methane emissions to BLM is considered confidential information and cannot be released by the Forest Service. However, the values used to estimate methane emissions included in the analysis were based on values associated with averages from the past 9 months. This data is somewhat non-representative of over-all operations because methane at this mine is the direct result of the depth of over-burden. Where over-burden is the deepest, the methane emissions are the highest and where over-burden is the shallowest, the methane emissions are nearly non-existant.

PSD Classification

The area surrounding the study area is designated a Class II area, as defined by the Federal Prevention of Significant Deterioration (PSD) provision of the Clean Air Act. The PSD Class II designation allows for moderate growth or degradation of air quality within certain limits above baseline air quality. Industrial emission sources proposing construction or modifications must demonstrate that the proposed emissions will not cause significant deterioration of air quality in all areas. The standards for significant deterioration are more stringent for Class I areas than for Class II. Federal/State Mandatory Class I Areas located in the project area include West Elk Wilderness at approximately 10 miles south-southeast and Black Canyon of the Gunnison National Park approximately 25 miles southwest of Somerset, Colorado Due to the nature of the project (i.e., mobile equipment), no specific permit requirements apply to gaseous emissions. However, construction will be required to comply with fugitive dust provisions under Regulation 1 (5CCR 1001-3) which requires that precautions be taken to control fugitive emissions (e.g., airborne particulate matter) to levels below percent opacity. The Oxbow Mine currently operates under air emission discharge permits obtained from the State of Colorado. Activities under the proposed action are not anticipated to require a modification of existing or application for new permits (USDA FS 2006a).

Table 3.2. State of Colorado and National Ambient Air Quality Standards

Pollutant	Averaging Time	Air Quality Standard Concentration [a]	
		Colorado	National
Ozone	1 hour	235 μg/m^3 (0.12 ppm)	235 μg/m^3 (0.12 ppm)
	8 hours	--	157 μg/m^3 (0.08 ppm)
Carbon Monoxide	1 hour	40,000 μg/m^3 (35 ppm)	40,000 μg/m^3 (35 ppm)
	8 hour	10,000 μg/m^3 (9 ppm)	10,000 μg/m^3 (9 ppm)
Nitrogen Oxides	Annual Arithmetic Mean	100 μg/m^3 (0.05 ppm)	100 μg/m^3 (0.053 ppm)
Sulfur Dioxide	Annual Arithmetic Mean	10 μg/m^3 (0.004 ppm)[c]	79 μg/m^3 (0.03 ppm)
	24 hours	50 μg/m^3 (0.02 ppm)[c]	367 μg/m^3 (0.14 ppm)
	3 hours	--	1,310 μg/m^3 (0.5 ppm)[b]
Particulate Matter as PM_{10}	Annual Arithmetic Mean	50 μg/m^3	50 μg/m^3
	24 hours	150 μg/m^3	150 μg/m^3
Particulate Matter as $PM_{2.5}$	Annual Arithmetic Mean	--	15 μg/m^3
	24 hours	--	65 μg/m^3
Lead (Pb)	Quarterly Arithmetic Mean	--	1.5 μg/m^3

Note: μg/m3 = micrograms per cubic meter; ppm = parts per million; PM10 = Particulate Matter smaller than 10 microns; PM2.5 =Particulate Matter smaller than 2.5 microns.
Sources: Colorado Code of Regulations (CCR) 5 CCR 1001-14 and Code of Federal Regulations, 40 CFR Part 50, National Primaryand Secondary Ambient Air Quality Standards
(a) Primary Standard unless otherwise noted
(b) Secondary Standard
(c) Category II increment per 5-CCR-1001-14

3.3 Air Quality Environmental Consequences

3.3.1 No Action

Under the No Action Alternative, gaseous and fugitive (e.g., particulate matter) emissions in the area would remain at current levels because methane drainage is occurring in the project area due to previously approved projects.

An estimated range of 0 to 64,447 tonnes of methane (based on 2007-2008 values submitted to BLM by Oxbow) depending on depth of over-burden would be released to the atmosphere each year as the result of MDW venting and continued mining at Oxbow Mine. Value range includes methane vented from MDWs and mine fans.

Coal fired power plants will continue to release CO2, NOx and S02 which are believed to cause global warming or are criteria pollutants at the current rates.

3.3.2 Proposed Action

Particulate Emissions

Potential sources of particulate such as smoke, soot, dust, and vehicle and industrial emissions (PM_{10}, $PM_{2.5}$ pollutants) would come from equipment used during construction and operations and maintenance of access roads and methane drainage wells. These emissions would include fugitive dust from vehicles traveling on dirt roads and engine emissions. As no surface activities are proposed, no estimates on

hours of operation of vehicles or pounds of dust per year are able to be calculated; however they are anticipated to be minimal, if not immeasurable, due to not having any reasonably foreseeable development in the lease modification area. Dust abatement could further reduce particulates. Fugitive dust emissions would further decrease once any construction activities were complete.

Proposed Alternative Gaseous Emissions

Potential sources of gaseous emissions (NO_2, SO_2, and CO) would come from equipment used during construction. Emissions would be from engines and would decrease in quantity when is complete. No reasonably foreseeable construction will be occurring in the lease modification area.

Information on other potential gaseous emission including: ethane, propane, pentane, hexane, alkenes, aldehydes, and benzene/benzene derivatives is not available for the Elk Creek Mine. However, when the information becomes available, effects would be analyzed under an air permit modification if the levels generated make a modification necessary.

Operations and maintenance of potential methane drainage wells, and roads would contribute gaseous emission of NO_2, SO_2, and CO although at about half the pounds per year as construction activities. No methane drainage wells or roads are reasonably foreseeable in the project area.

It is impossible to quantify emissions related to coal that is burned at coal fired power plants with regard to the coal in the lease modification as it will be mixed with other less compliant coals all over the United States to meet air quality standards. Coal fired power plants will continue to release CO_2, NO_x and $S0_2$ at the current rates.

Greenhouse Gases

Gaseous emissions in the form of methane from methane drainage wells and other ventilation activities would occur during the project from all systems including: vertical wells/gob vent boreholes (MDWs) and main mine fans. Methane is over 20 times more effective in trapping heat in the atmosphere than CO_2 over a 100-year period. Methane emissions, from an air permit perspective, are not regulated by the State of Colorado. Preliminary modeling results using EPA's SCREEN3 air model indicate that methane concentrations from existing methane drainage wells may result in an increase of breathing zone methane concentrations in air which would still be below the Mine Safety and Health Administration (MSHA) level of one percent. No new methane drainage wells will be needed for mining this lease modification area.

An estimated range of 0 to 64,447 tonnes of methane (based on 2007-2008 values submitted to BLM by Oxbow) depending on depth of over-burden would be released to the atmosphere each year as the result of MDW venting and continued mining at Oxbow Mine. Methane value includes methane vented from MDWs and mine fans. Assuming that mining is extended for approximately three months due to the mineable coal quantity in the lease modification and that over-burden is approximately 2000 feet (highest level of methane release) in the lease modification, it is possible that up to 14,758 additional tonnes of methane

may be released from anywhere in the mine.

Class I Airshed

The Class I airshed (West Elk Wilderness) is 10 miles from the project area and there would be no effects on the Class I airshed from proposed activities.

The proposed Action would contribute immeasurable greenhouse gases, along with those produced from the other North Fork coal mines, and emission from every other man-made and natural source of greenhouse gas. However, because there is minimal increase in coal production (approximately 14 trainloads) proposed due to the relocation of reserves that are currently under permit and hence no increased transportation needs (no new infrastructure or frequency of trains), there would be no measurable impacts on air quality over current conditions.

3.3.3 Cumulative Effects

Using data updated in August, 2008 up to 3.8 million tonnes CO_2 equivalent/year has been released from previous coal mining activities from the three mines in the North Fork Valley in the last 5 years. Continuation of mining at Oxbow Mine will release an average of 0 to 1.61 million tonnes of CO_2 equivalent/year depending upon the depth of coal mined.

Short-term impacts from the proposed action would contribute cumulative effect in the form of short-term particulate and gaseous emissions resulting from construction activities. Ongoing, existing activities discussed in the Affected Environment will continue to affect air quality, and emissions and particulate contributed by the proposed action would likely not be noticeable or measurable within the study area and would not exceed any established air quality standards. All alternatives would contribute additional greenhouse gases, along with those produced from the other North Fork coal mines, and emissions from every other man-made and natural source of greenhouse gas.

3.3.4 Possible Mitigation for All Alternatives

Direct mitigation of the release of methane through either flaring or capturing methane and putting to beneficial use would be very effective in reducing greenhouse gas emissions.

Flaring of methane gas was brought forward as a way to mitigate venting of methane, a potent green house gas, to the atmosphere. It is acknowledged that flaring may be used to reduce green house gas emissions in an approved system. Flaring is driven by economic concerns such as carbon credits available if capture and use is not readily available because of the distance to a pipeline. Systems that use methane flaring (including abandoned mines, gas production wells and landfills) around the world still capture the gas and flare from a controlled system. When methane is burned or flared the resulting compounds are water and CO2. It is estimated that the CO2 equivalent of methane may be reduced by as much as 87% through flaring assuming a concentration of 90% methane (based on a report by Shell Coal in Australia (http://www.greenhouse.gov.au/challenge/members/shell.html)). If flaring is approved for project area, flaring may result in final CO2 equivalent emissions of approximately 209,453 tonnes depending on the efficiency of the flaring system approved. There are additional factors which may come into

play, while flaring pure, or nearly pure, concentrations of methane results in a large greenhouse gas emission reduction, other inert constituents in the gas flared can become criteria pollutants. For this project, inert constituents are estimated to be between 6 and 77% (based on methane concentrations in other areas of the North Fork) which when flared with the methane result in nitrogen oxides and carbon monoxide which are criteria pollutants. It is unknown due to the fluctuating nature of the gas constituents what effects this might have on Colorado and National Ambient Air Quality Standards and Permitting and would also require site-specific emissions monitoring if flaring is ever approved to determine air permit requirements. Flaring in an active mine in the US has not yet been approved by MSHA.

Capture of methane gas was also brought forward as a way to mitigate venting of methane. This method would likely require additional infrastructure and further studies to evaluate the economic feasibility from this mine. The relatively low levels of methane released by this mine may make this cost prohibitive.

The likelihood of flaring or methane capture occurring is very low for this lease modification as the coal lessee and the gas lessee are different companies and there are no surface facilities that are reasonably foreseeable in this area.

Offset mitigation of the release of methane is possible and may or may not be reasonable due to the quantities of methane released. Off-set mitigation has not been considered at this mine.

Further, since methane is not regulated, nor have any standards been promulgated by EPA, the federal agencies (BLM, FS, OSM, MSHA, MMS and EPA) and state agencies with delegated authority (DRMS and CDPHE) operating within their jurisdiction in the federal coal program cannot currently require or request flaring or capture as a mitigation measure. This situation is currently under review by many State and Federal Agencies.

3.3.5 Consistency with Forest Plan and Other Laws

Proposed Action would be consistent with air quality and fugitive dust provisions required by the Colorado and National Ambient Air Quality Standards and PSD increments as well as alternative gaseous emissions regulated by the Mine Safety and Health Administration. The proposed action is also consistent with Forest Service Manual 2580-Air Resource Management and the 1991 GMUG Forest Plan.

3.4 Topographic and Physiographic Affected Environment

The analysis area encompasses the lands within and immediately surrounding the lease modification area. Topography of the general area ranges from steep to relatively flat.

The elevations in the lease modification area range from about 7,200 feet in the lease modification area. Elk Creek (ephemeral) drains the area, which drains into the North Fork of the Gunnison. The topography of the area has been greatly influenced by a wide range of mass movement landforms and historic geologic processes (e.g., faulting). The Elk Creek drainage contains localized landslides and rock falls (both natural and mining induced).

Landsliding in this region is usually preceded, accompanied, and followed by perceptible creep along the surface of the slide or within the slide mass. Landslides, rock falls, and other areas of general geologic/topographic instability are shown on Figure 2 Geologic Hazards Map.

3.5 Topographic and Physiographic Environmental Consequences

3.5.1 No Action

If the No-Action Alternative is selected, coal would not be mined in the lease tracts. The coal resource and the topography of the modification area would remain unchanged. Natural processes would continue.

3.5.2 Proposed Action

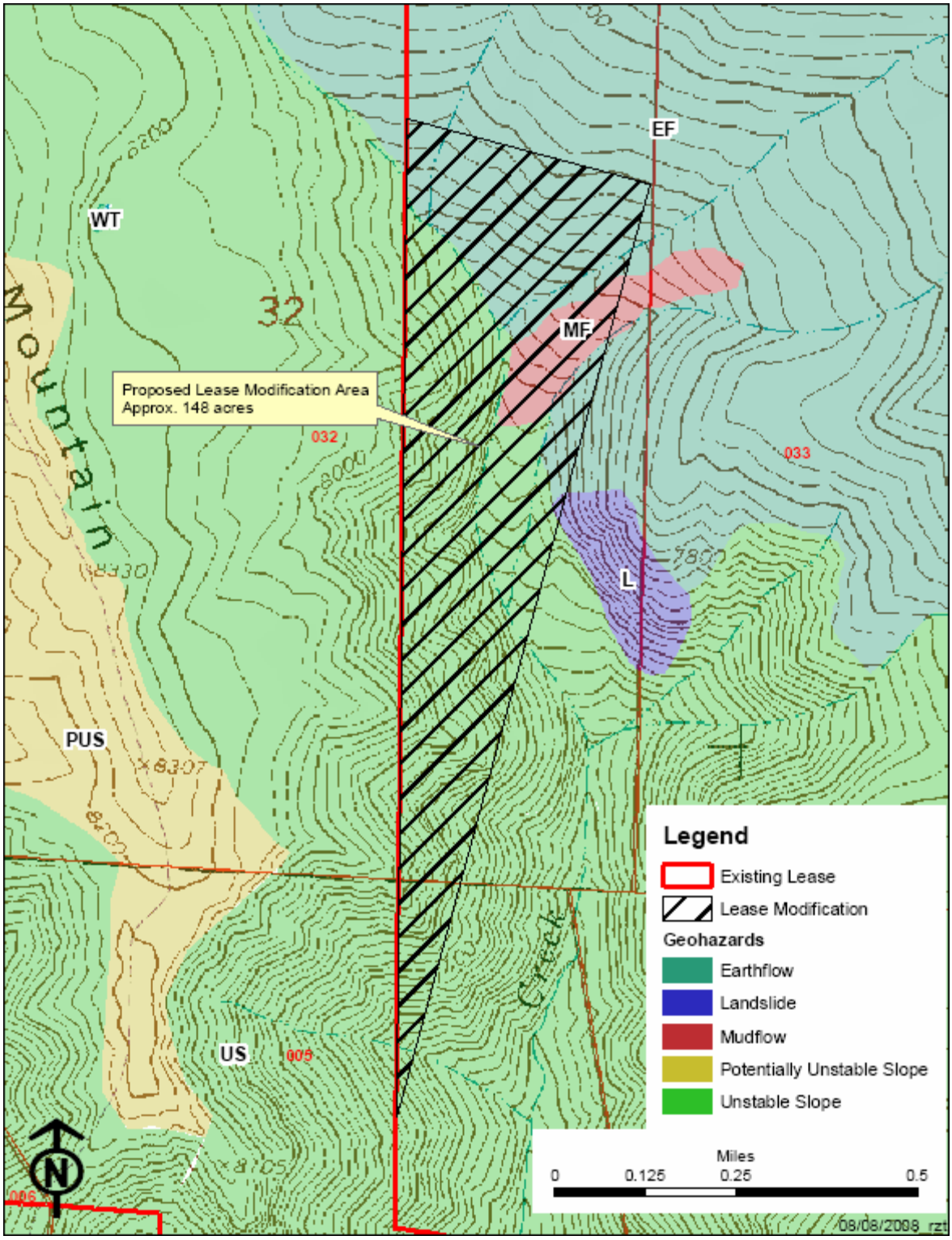
The actual leasing of the lease modification would impose no topographic change on the tracts. If the tract is leased, subsequent underground longwall mining would cause subsidence Subsidence does occur in areas above and adjacent to longwall mining. The amount of subsidence triggered by longwall mining depends on many factors including mine plans, coal thickness, geologic strata, and overburden depth. As a general rule, the greater the overburden thickness, the less the surface subsidence there will be.

Subsidence would be most noticeable on ridges and steeper slopes, particularly cliffs, where cracks might appear on the order of a few inches to possibly 2-feet wide, and up to 50 feet deep. Fewer cracks would appear in the valleys than on ridges because the alluvial material found in the valleys is more yielding than the brittle bedrock found on the ridges, thereby "healing" the crack. Previous mining (subsidence) in the general vicinity has created landslides and rockfalls on the edges of ridges and cliffs. Some of these geologic instabilities are small scale features, affecting less than 100 cubic yards, but others can be large scale, affecting thousands of cubic yards of material. Other natural factors may cause an acceleration of impacts, which may mimic mine-induced instability. For example, during an extremely wet spring, the moisture from snowmelt and spring rains could cause natural landslides and rock falls to move and shift. Therefore, it is sometimes difficult to assess whether a mass movement is occurring due to subsidence or other naturally occurring processes.

As mentioned earlier, the thickness of coal mined influences the total amount of subsidence. For example, assuming a coal extraction thickness of 12 feet, surface subsidence would be expected to be 7 to 8 feet for those areas with 500 feet of overburden. At overburden depths of 2,000 to 2,500 feet, surface subsidence would be projected between 1 and 3 feet. The subsidence over the gate roads (entries on either side of a longwall panel) is typically 1 to 2 feet less than the panel itself. Figure 3 Anticipated Subsidence, shows the expected location and magnitude of subsidence in the lease modification area[1]. Within the project area (both in and adjacent to the lease modification area), the maximum amount of subsidence anticipated is 6 feet.

[1] This assumes the lease modification area will by mined in a manner consistent with Oxbow's Technical Revision 59, currently under review by the CDRMS.

Figure 2. Geologic Hazards Map.



Topographic changes caused by subsidence with longwall mining are often unnoticeable to the untrained eye. Subsidence at any given point on the surface begins when the longwall face is beneath that point and is generally 90 percent complete when the longwall face has passed at 1.2 to 1.4 times the overburden depth beyond the point of mining. For example, at 500 foot depth of over-burden, the subsidence beneath longwall mining would be 90 percent complete within about a month when the longwall face is 600 to 700 feet beyond that point on the surface.

Other than lowering the land surface, the long-term effects of subsidence on surface topography would be minimal, and even unnoticeable to most casual observers. Some residual cracks may remain in the more brittle bedrock material on ridges or cliffs. Overall, the topography above subsided longwall mining workings would be similar to the pre-mining topography, albeit lower in elevation. Subsidence from underground mining could initiate, aggravate, and perhaps even accelerate, the existing landslides and rock falls in the area.

Elk Creek is an ephemeral drainage within the project area. It will be subsided according to the RFD. This subsidence may increase sedimentation into the creek. However, due to a high natural sediment load it would be difficult to differentiate between natural and mine-induced sedimentation.

3.5.3 Cumulative Impacts

As discussed in Section Geologic Hazards, the North Fork Valley region east of the town of Paonia has numerous existing natural landslide and other unstable areas. These natural features when combined with subsidence from existing and future coal mining would continue to contribute to future changes in the topography of the area. In addition, if landslides and rockfalls are initiated or accelerated due to subsidence, increased sedimentation and erosion is likely to occur in those areas.

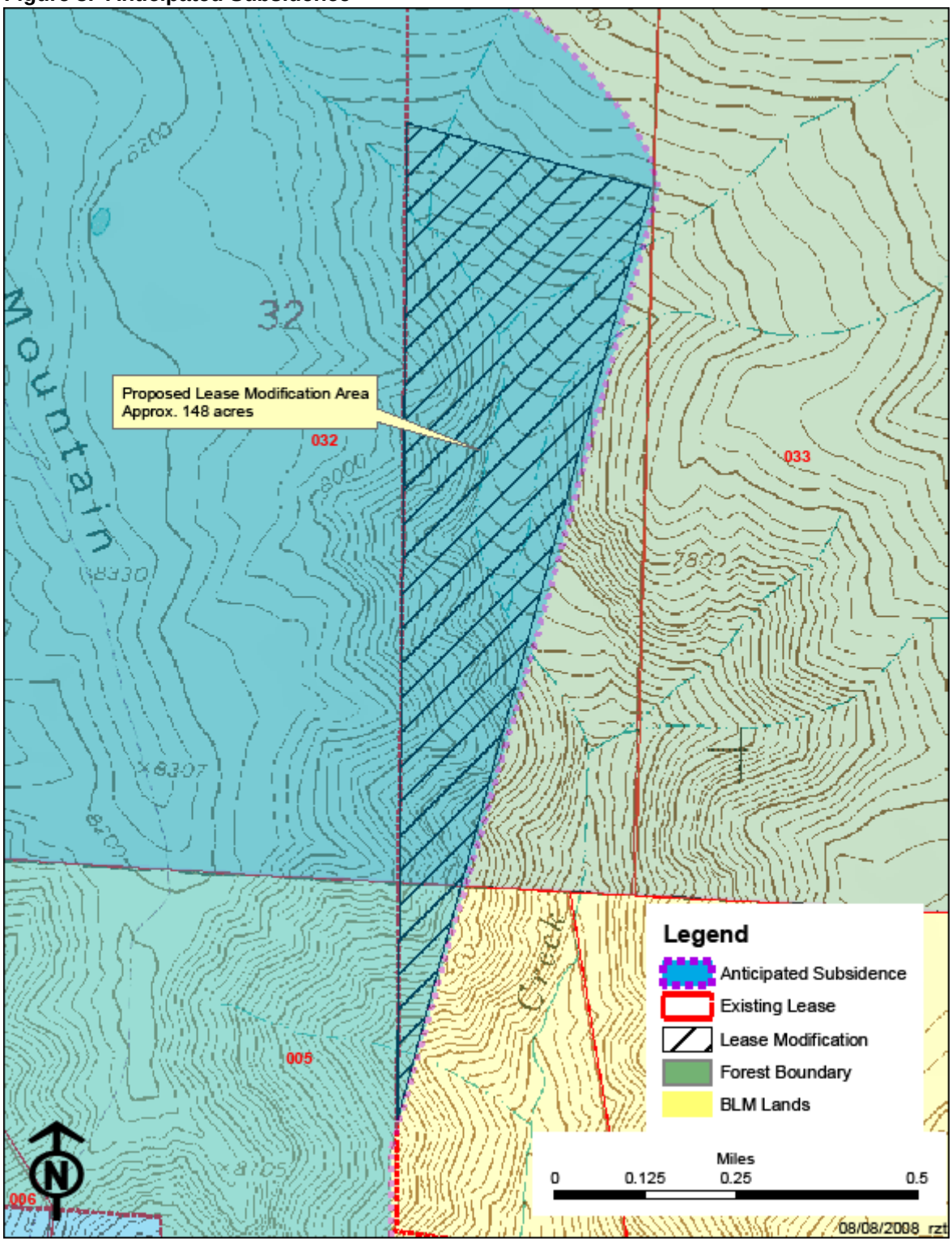
3.5.4 Conditions of Approval

Currently, subsidence monitoring is a requirement of the mine permit issued by the Colorado DRMS. If surface cracks occur that affect other uses (roads, trails, etc.), the surface management agencies have authority to require timely on-site mitigation. Therefore, no additional conditions of approval are recommended beyond those in the parent lease.

3.5.5 Consistency with Forest Plan and Other Laws

The Proposed Action is consistent with Forest Plan standards for geology which establishes limits on ground-disturbing activity on unstable slopes and highly erodible sites, and regulations adopted pursuant to the Surface Mining Control and Reclamation Act of 1977 and the State of Colorado's OSM-approved permanent program for coal mining per the Colorado Surface Coal Mining Reclamation Act as administered by the CDRMS with oversight from the OSM, which govern all direct effects of coal mining, including those that may impact geology. Other impacts to the geologic resource that may occur as a result of mining, including landslides and erosion, must be mitigated to stabilize the surface and return the land to an approved post-mining land use.

Figure 3. Anticipated Subsidence



3.6 Geology Affected Environment

The characteristics of a coal deposit dictate the most economical and practical mining application. See Appendix C. Geologic data and the interpretations form the basis for mine evaluation and mine production by providing coal reserve estimates and geologic structure data (such as dip, faults, fracture patterns, etc.). For underground mining operations, geologic information is also used to assess subsidence.

General Geology

The Elk Creek coal lease modification lies in the Paonia-Somerset coal field which contains medium to high coal development potential deposits. The main coal beds within this area are found in the Upper Cretaceous Mesa Verde Formation.

The coal bearing sedimentary strata of the Mesa Verde Formation are relatively flat lying with a regional dip of approximately five degrees to the north/northeast. Local dips can vary. The principal mineable coal seams on the Elk Creek Coal Lease are the "D" seam and the "B" seam. Other seams within the tract, A, C, and E, are either considered too thin (less than 6 feet) or are too discontinuous to mine.

The Tertiary Wasatch Formation, Upper Cretaceous Mesa Verde Formation, and Quaternary deposits outcrop within the Elk Creek lease and modification area. The Cretaceous Mancos Shale does not outcrop on the lease tract but lies below the Mesa Verde Formation. The following is a brief overview of the geologic units in the area:

- *Quaternary Deposits:* The Quaternary deposits are an unsorted mixture of soil and rock formed by various mass-wasting processes such as landslides, earth flows, soil creep, and debris avalanches. These deposits also include slope colluvium and Quaternary unconsolidated deposits derived from the Wasatch Formation.
- *Wasatch Formation (Tertiary):* The Wasatch formation overlies the Mesa Verde Formation. It consists of red and buff shales and red sandstones in the upper part of the formation, and red to gray conglomerates in the lower portion. The Ohio Creek conglomerate, which is the basil conglomerate unit, is a regional marker and commonly referenced geologic mapping datum.
- *Mesa Verde Formation* (Cretaceous): The Mesa Verde Formation is the primary coal bearing formation in this region and conformably overlies the Mancos Shale Formation. It consists of approximately 2,300 feet of interbedded coal seams, sandstones, shales, and siltstones. The Mesa Verde Formation consists of the Barren Member, Paonia Member, Bowie Member, and Rollins Sandstone Member. The Barren Member is approximately 1,600 feet in thickness and contains no coal seams. The Paonia Member ranges from approximately 300 to 500 feet and is composed of shales and interbedded sandstone. The Paonia Member contains the D and E coal seams. The Bowie Member ranges from

270 to 350 feet thick and consists primarily of grey shales, interbedded lenticular sandstones, and coal seams. The Bowie Member contains the A, B, and C coal seams. The Rollins Sandstone ranges from 120 to 200 feet in thickness. It is a massive, cross-bedded medium to coarse grained, buff to white sandstone unit. The Rollins Sandstone lies conformably on the underlying Mancos Shale and is relatively continuous throughout the area, thus serving as a common marker bed.

- *Mancos Shale (Cretaceous):* The Mancos Shale is a regionally extensive bed of marine shales ranging up to 4,000 feet in thickness. In the lease tracts, it underlies the exposed geologic sequence. West of the town of Somerset, the North Fork of the Gunnison River has cut through the upper portion of the Mancos Shale, exposing the grey marine shales which are prominent with this formation.

Geologic faults in the area have been observed to have steep dips (ranging from about 75 degrees to vertical) and throws varying from 0-10 feet.

Geologic Hazards

Land within and surrounding the modification area has numerous existing natural landslide areas and other unstable slopes. Landslides, rock falls, and other areas of general geologic/topographic instability are shown on Figure 2 Geologic Hazards Map.

Geologic hazards have been mapped in accordance C.R.S. 1973, 24-65.1-101, et. seq. Geologic hazards, which are a normal dynamic process, can be intensified or lessened by human activity. Most of the geologic hazards observed in area are historic in nature. However, during periods of high precipitation in the mid 1980s, there was increased movement of existing landslides and development of new landslides on unstable slopes.

Previous mining in the general vicinity has initiated landslides and rockfalls on the edges of ridges and cliffs. Some of these geologic instabilities are small scale features, affecting less than 100 cubic yards, but others can be large scale, affecting 1000s of cubic yards of material.

Other Geologic Resources

The lands in the area have been rated as having high potential for oil and gas (Colorado Oil & Gas Potential Map, BLM, 1991). The project area is near the edge of the productive basin and exploration interest has been increasing. The area under the existing Elk Creek Lease, as well as, the modification area, has been lease for gas resources, although no development has occurred. Wells have been drilled to the Dakota Sandstone a few miles to the southwest and to the northwest of the lease tract areas.

Methane is found in the coal seams and surrounding sandstones and is released through the mining process. Interest in coal bed methane capture is high in the immediate area. See Air Quality Section for further discussion.

Other coal seams in the project area are not considered economically recoverable.

3.7 Geology Environmental Consequences

If leasing and mining proceeds on the Elk Creek Coal Lease modification area, coal would be removed and the overlying overburden material would be altered through subsidence. The coal would be extracted, and the existing geologic structure and lithologic continuity in the area above the mined coal would be altered by subsidence.

Any oil and gas resources in the coal seams would be lost. Recoverability of any oil and gas resources present in geologic formations above and below the coal seams could be reduced.

3.7.1 No-Action

If the No-Action Alternative is selected, coal would not be mined in the lease tracts. The coal resource and the structural and lithologic integrity of the Elk Creek Coal Lease modification area would remain in-place. The potential to recover the coal resource at some time in the future would remain. Geologic instabilities, such as landslides and rockfalls would continue in historic magnitudes.

3.7.2 Proposed Action

Under the Proposed Action, coal would be mined by longwall techniques. After coal recovery, the overburden would be altered due to subsidence. Subsidence would occur due to the extraction of coal. However, due to the thickness of the overburden in the lease tract, it is anticipated that subsidence would not be easily seen by casual observers.

As it has been demonstrated in areas in and adjacent to the lease modification area, there is a potential that mining subsidence could aggravate existing landslides and other geologic hazards (eg. rock falls). As subsidence causes tension zones near the edges of ridges and/or cliffs, this force can induce shearing and movement within the rock formations, thereby initiating mass movement.

Other natural factors may cause an acceleration of impacts, which may mimic mine-induced instability. For example, in an extremely wet spring, the moisture from snowmelt and spring rains could cause natural landslides and rock falls to move and shift. That said, it is sometimes difficult to assess whether a mass movement is occurring due to subsidence, or other naturally occurring processes.

Residual subsidence from historic room-and-pillar mining has and will continue to create mining induced seismic events in the area. For example, seismic events from the now abandoned Somerset Mine have been measured on the Richter Scale at the U.S. Geological Survey (USGS) Earthquake Center in Golden, Colorado.

Mining induced seismic events as a result of longwall mining may occur. Based on existing information, these events are not expected to cause damage to surface resources or overlying structures. Two adjacent mines, the Bowie #2 and West Elk Mine, are currently participating with the National Institute of Occupational Safety and Health (NIOSH), and Mountain Coal Company, by being part of the North Fork Valley Seismic Network. Each mine monitoring continuously and reports are generated quarterly.

Mining of the coal seam(s) could result methane loss within the coal bed. Recoverability of any oil and gas resource present in geologic formations above and/or below the coal seams could

be reduced due to the evacuation of gas through mine ventilation, see the Air Quality section for details. However, due to the fracturing of the rock from mining, the potential exists for the recoverable gas resource to be increased, due to changes in porosity and permeability.

There are a number of landslides and other unstable slopes in the region. Subsidence beneath such steep slopes could contribute or aggravate landslide movements, but this determination is difficult to quantify given the natural (pre-mining) geologic instability of the local area.

3.7.3 Cumulative Impacts

Historically, a considerable amount of the area surrounding the lease modification area has been mined. Both natural and mine induced mass movements are likely to continue in the vicinity of the lease modification area. In addition, if landslides and rockfall are initiated or accelerated due to mine operations, increased sedimentation and erosion is likely to occur in those areas. Due to the naturally occurring mass movements, and natural sedimentation loads and erosion rates, it would be difficult to quantify natural vs. mine induced changes. Gas production, in a conventional sense, will probably be delayed until coal mining is completed in this area.

3.7.4 Conditions of Approval

Currently, subsidence monitoring is a requirement of the mine permit issued by the Colorado DRMS. If surface cracks or mass movements occur that affect other uses (roads, trails, etc.), the surface management agencies have authority to require timely on-site mitigation. The Colorado DMG requires detailed information, monitoring, and repair of subsidence impacts as set forth in Section 2.05.6(6), Subsidence Survey, Subsidence Monitoring, and Subsidence Control Plan, of the Regulations of the Colorado Mined Land Reclamation Board for Coal Mining. These regulations have been in force for Colorado since 1980. Therefore, no additional conditions of approval are recommended beyond those in the parent lease for this resource area.

3.7.5 Consistency with Forest Plan and Other Laws

The Proposed Action is consistent with Forest Plan standards for geology which establishes limits on ground-disturbing activity on unstable slopes and highly erodible sites, and regulations adopted pursuant to the Surface Mining Control and Reclamation Act of 1977 and the State of Colorado's OSM-approved permanent program for coal mining per the Colorado Surface Coal Mining Reclamation Act as administered by the CDRMS with oversight from the OSM, which govern all direct effects of coal mining, including those that may impact geology. Other impacts to the geologic resource that may occur as a result of mining, including landslides and erosion, must be mitigated to stabilize the surface and return the land to an approved post-mining land use.

3.8 Soils Affected Environment

Authorities specifically governing Forest Service soil management include the Multiple-Use Sustained Yield Act of 1960 and the Forest and Rangelands Renewable Resources Planning Act of 1974, as amended by the National Forest Management Act of 1976 (NFMA). The GMUG Forest Plan authorizes and governs management of mineral resources and surface uses over them.

With respect to soils management, the GMUG Forest Plan establishes limits on ground-disturbing activity on unstable slopes and highly erodible sites. The Forest Plan further directs using site preparation methods to keep fertile topsoil intact, revegetating areas disturbed during road construction, and design mitigations and restoration to ensure that 80 percent original ground cover occurs within 5 years after disturbance.

Regulations adopted pursuant to the Surface Mining Control and Reclamation Act of 1977 and the State of Colorado's OSM-approved permanent program for coal mining per the Colorado Surface Coal Mining Reclamation Act as administered by the CDMG with oversight from the OSM, govern all direct effects of coal mining, including those that may impact soils. These acts and attendant regulations require that topsoil be removed, stockpiled, and replaced on reclaimed surfaces associated with construction or mining disturbance. Other impacts to the soil resource that may occur as a result of mining, including landslides and erosion, must be mitigated to stabilize the surface and return the land to an approved post-mining land use.

Soils information and technical data were taken from the following soil survey completed for the project area:

- An Order III soil survey, entitled Soil Survey of Grand Mesa-West Elk Area (Cryer and Hughes, 1997) was used to characterize and describe the soils overlying that portion of the project area administered by the Forest Service.

These surveys each contain soil maps depicting the aerial extent of the soils delineated as well as map unit descriptions, typical pedon descriptions, and interpretation tables which were used to develop the text below. These two soil surveys were not correlated, and the map unit boundaries merging along federal and private land boundaries do not necessarily meet.

No site-specific soil baseline studies were conducted for the modification area as a part of this project.

Soils in the project area have developed from a combination of residual, colluvial, and alluvial materials derived from local bedrock. The soil survey identified and described six map units within the tract. The map unit name, percentage coverage within the modification area, dominant soil series and attendant percent map unit composition, relative depth, hazard classifications (water erosion, shrink swell, and mass movement), and considerations as described in the soil survey are shown in Table 3.8.

Soils in the project area are generally deep, fine textured and well suited for vegetative production with steep slopes being the primary limitation on use. Erosion and mass movement are potential hazards associated with most soils in the area, due to fine textures. Soils on steeper slopes have slower infiltration rates, resulting in more surface flow and erosion. Mass movement on steep slopes is also a potential hazard, with Wetopa and Wesdy soil types having the highest potential hazard rating within the tract (see Table 3.8). Fine textures and high activity clays result in a moderate to high shrinks well hazard ratings for most soil types.

Table 3.8. Summary of Soil Resources in the Modification Area

Map Unit Name	Percent of Area	Dominant Soil Series	Depth	Hazard			Considerations For Use
				Water Erosion	Shrink Swell	Mass-Movement	
Hayrack - Muggins - Nutras complex, 40 to 65 percent slopes	45	Hayrack soil and similar soils	VD	H	M	M - H	steep slopes, shrink-swell potential, slow permeability, high soil erosion hazard, high mass movement potential in the steeper areas, (Nutras - subsurface rock fragments)
		Muggins soil and similar soils	VD	H	M	M - H	
		Nutras complex and similar soils	VD	H	M	M - H	
Herm - Fughes - Kolob Family Complex; 25-40% slopes	15	Herm soil and similar soils	VD	L - H	H	L - M	Steep slopes in some areas; high shrink-swell potential; slow permeability; high soil erosion hazard in steeper areas; moderate mass movement potential in steeper areas; clayey subsurface soil textures.
		Fughes soil and similar soils	D	M - H	H	L - M	
		Kolob Family and similar soils	VD	L - H	M	L - M	Steep slopes in some areas; moderate shrink swell potential; slow permeability; high soil erosion hazard in the steeper areas; subsurface rock fragments; clayey surface soil textures; clayey subsurface soil textures; moderate mass movement potential in the steeper areas.
Wetopa - Wesdy Complex; 5-65% slopes	3	Wetopa soil and similar soils	VD	L - H	H	H	Slow permeability; high erosion hazard and mass movement potential on steep slopes; shrink-swell potential. Subsurface Rock Fragments.
		Wesdy soil and similar soils	VD	L - H	M	H	Slow permeability; high erosion hazard and mass movement potential on steep slopes; shrink-swell potential. Subsurface Rock Fragments.

3.9 Soils Environmental Consequences

3.9.1 No Action

The tract would not be leased and no mining would occur; therefore, soil conditions would exist in their current state without effect. Ongoing natural processes and other existing land uses would continue.

3.9.2 Proposed Action

Assuming the Reasonably Foreseeable Mining Plan (Beginning of Chapter 3), impacts to the soil resource due to subsidence would include cracks and other surface manifestations in areas of shallow overburden, where surface rocks are brittle, or where soils are shallow over bedrock. Soil cracking is most likely to occur at the ends of individual longwall panels and over the gate roads where the land surface is left in a tensional state after mining. Subsidence cracks that might develop in soil or colluvium tend to self-heal due to sloughing and natural filling by soil material. This type of disturbance to soils at the surface are likely to heal a few years after mining is complete. Subsidence has potential to affect surface water channels and basins and could result in increased rates of erosion. Soil erosion within drainage basins and resultant sediment loading may be increased until ground movements associated with subsidence stabilize relative to natural conditions. The RFMP does not include any post lease surface use (eg. access roads, methane drainage, and related activities); as surface occupany will not be authorized due to lease stipulations.

All activities would be conducted in accordance with regulations administered by the CDMG. Activities resulting in disturbance on steep or unstable slopes of soil types with high erosion or mass movement hazard may result in increased erosion or trigger land slides. These hazards and related effects of disturbance are more likely to be present where existing geologic hazards and steep slopes are present. Disturbances on these slopes may also prove more difficult to revegetate and stabilize during reclamation. The GMUG Forest Plan calls for limiting ground-disturbing activities on unstable slopes and highly erosive areas. Further, the Forest Plan recognizes special leasing stipulations may be required to prohibit occupancy on steep or highly erosive slopes; these types of stipulations are proposed to be carried forward from the parent lease.

3.9.3 Cumulative Impacts

The acreage of soils proposed to be affected by surface disturbances on the nearby coal lease tracts and exploration license areas totals approximately 90 acres. At the Sanborn Creek/Elk Creek Mine, approximately 110 acres have been disturbed.

Soils in the nearby area have and will continue to be affected by construction of exploration drill pads and temporary road construction from exploration activities (Chapter 3 Past, Present and Reasonably Foreseeable Actions). The areas would be reclaimed at the completion of use. No additional surface disturbance, other than subsidence, is expected within the modification area.

Mining and subsidence would occur within the modification area, lowering the land surface. Surface-tension cracks may form at isolated locations within these areas. Additional surface facilities

and temporary roads may be proposed and approved on lands to the west and south on BLM and private lands (primarily exploration and methane drainage). These additional surface disturbing activities would affect the soil resource by displacing soils at specific locations. The topsoil and subsoil is stockpiled and reserved for reclamation. Contemporaneous reclamation techniques would be used, thus replacing the soils on the site as soon as the location is no longer needed. These activities would temporarily affect an estimated 20 acres.

Few adverse impacts to soils have been observed during subsidence monitoring at nearby mines. Reclamation of surface use sites, including methane drainage drill sites, exploration drill sites and associated temporary roads, has been generally successful in three to five years following reclamation. Reclamation typically includes regrading the surface to approximate original contour and revegetating with a specified seed mix. The area of surface disturbance in the region will temporarily increase during construction, returning to conditions similar to pre-disturbance following reclamation.

The area within and adjacent to the lease modification area contains numerous existing natural landslides and other unstable areas. These natural features when combined with surface disturbing activities and subsidence from existing and future coal mining would continue to contribute to localized increased sedimentation. In addition, if landslides and rockfalls are initiated or accelerated due to subsidence, increased sedimentation and erosion is likely to occur in those areas.

3.9.4 Conditions of Approval

No additional conditions of approval are recommended for soils other than those addressed in the parent lease. Proper soil management and reclamation measures are required by the surface management agencies on disturbed sites. Colorado DRMS would also require proper soil management procedures as part of their exploration and mine permits.

3.9.5 Consistency with Forest Plan and Other Laws

The Proposed Action is consistent with Forest Plan standards for geology which establishes limits on ground-disturbing activity on unstable slopes and highly erodible sites, and regulations adopted pursuant to the Surface Mining Control and Reclamation Act of 1977 and the State of Colorado's OSM-approved permanent program for coal mining per the Colorado Surface Coal Mining Reclamation Act as administered by the CDRMS with oversight from the OSM, which govern all direct effects of coal mining, including those that may impact geology. These acts and attendant regulations require that topsoil be removed, stockpiled, and replaced on reclaimed surfaces associated with construction or mining disturbance. Other impacts to the geologic resource that may occur as a result of mining, including landslides and erosion, must be mitigated to stabilize the surface and return the land to an approved post-mining land use.

3.10 Surface Water Resources Affected Environment

The study area required to address the impacts to surface water hydrology from leasing the COC-61357 Lease

Modification is defined by the watershed boundaries of the local drainages (Figure 4. Surface Hydrology Map). The following sections include discussion of the regional hydrologic setting, flow characteristics within the surface drainage system, analysis of surface water quality, water rights, and environmental consequences mining on surface water resources. The following information sources were used for this evaluation:

- Surface water quality and quantity data for regional hydrology from the USGS;
- Surface water quality and quantity data for the Elk Creek Lease modification from Oxbow;
- Surface water rights information for the drainages in the vicinity of the study area from the Colorado State Engineers Office, Division of Water Resources; and
- Review of Bowie and Oxbow data, including annual hydrology reports, permit applications, and other reports related to surface water hydrology.

To respond to issues raised during scoping, effects of subsidence on Elk Creek were included in the analysis.

The Elk Creek Coal Lease modification is located within the North Fork of the Gunnison River basin.

Regional Surface Water Hydrology

Elk Creek, within the lease modification area, drains to the North Fork of the Gunnison River. The North Fork of the Gunnison River joins the Gunnison River downstream of Hotchkiss. There are two USGS monitoring locations along this reach: North Fork of the Gunnison River near Somerset, Colorado (Station No. 09132500), and North Fork of the Gunnison River below Leroux Creek, near Hotchkiss, Colorado (Station No. 09135950). Stream flow has been monitored at the station near Somerset since October 1933. The drainage area at the Somerset station is 526 square miles. The average annual mean flow is between 94 and 829 cfs with peak flow of 9,220 cfs.

Surface water quality in the North Fork of the Gunnison River in the vicinity of Paonia is good with low concentrations of TDS, nitrate, nitrite, and metals. The water is of calcium bicarbonate type.

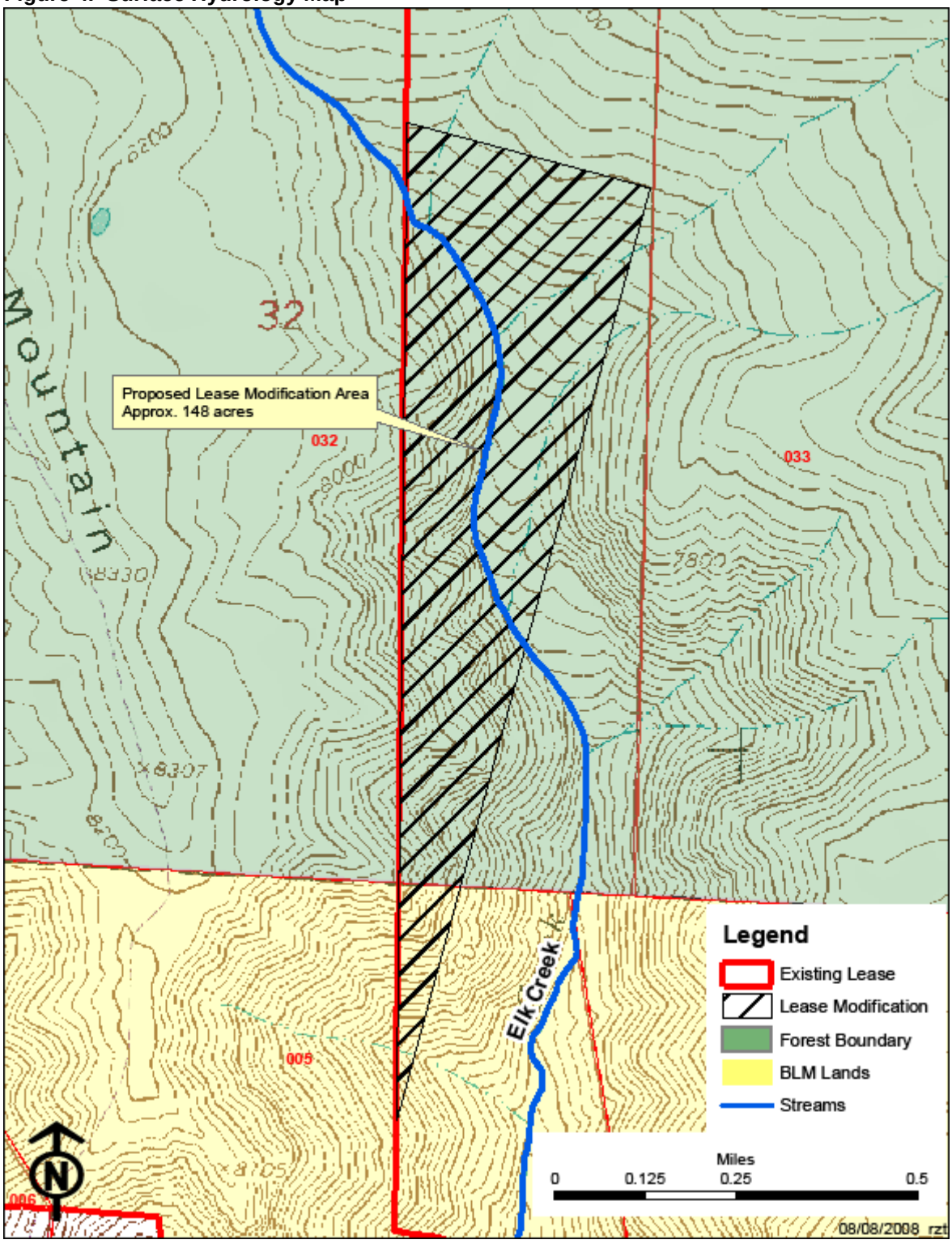
Project Area Surface Water Hydrology

Figure 4. Surface Hydrology Map shows the watershed areas that encompass the coal lease modification. Elk Creek drains the lease modification area.

Elk Creek is an ephemeral drainage that has an estimated drainage basin area of 5.5 square miles. The main channel length is ~5.2 miles long. Approximately 4% of the Elk Creek drainage basin lies within the lease modification area.

Baseline water quality and flow data for the Elk Creek Mine has been collected for several years. Oxbow has initiated additional baseline monitoring in the general area of the lease modification.

Figure 4. Surface Hydrology Map



There are two surface water monitoring locations on Elk Creek. Instantaneous flow data and water quality data are monitored at each location.

Surface Water Quality

Oxbow collects water monitoring samples at approximately 28 water sampling stations (both springs and streams) within the vicinity of the mine on a quarterly basis (except for winter months when inaccessible). Oxbow also collects data around its mine. Further information can be obtained from project and district files or from the mines in their Annual Hydrology Reports.

From previous management activities (see Section 3.1 Past, Present and Reasonably Foreseeable Actions) effects to surface water quality and quantity have been minimal.

Seasonal Trends in Surface Water Quality

General seasonal trends in surface water quality were not obvious in reviewing the water quality data. In general spring run-off from snow-melt significantly increases the sediment load and transport within the surface water system. Flows also increase dramatically during this period from March – June. For example, upper Elk Creek runs an average 0.0 cfs (no measurable flow) in August, whereas April flows are closer to 23 cfs.

Oxblow monitors two spring locations. Springs in the area typically show the same seasonality as the stream system, or have year long very low flow rates

Water Rights

The study area is located within the Colorado Division of Water Resources Division 4, District 40. Water rights for this district were obtained from this agency. Water rights in an area bounded by a 1 mile buffer around the modification area. Water rights originating from the North Fork of the Gunnison River between Somerset and the Bowie No. 2 Mine surface facilities are also included, even though they may be located more than 1 mile from the lease area boundaries.

There are no diversions or water structures on Elk Creek proper.

Seven ditches originating in the North Fork of the Gunnison River were also included because of the potential that the water source could be impacted upstream by mining. They are the Fire Mountain Canal, the Carol Ditch, the North Fork Farmers Ditch, the Jenkins Ditches No. 1 and 2, the Stewart Ditch, the Stephens Ditch, and an additional headgate for the Stewart Ditch.

Influence of Past Mining on Surface Water

Various National Pollution Discharge and Elimination System (NPDES) permits granted to Oxbow regulate impacts of current and historical mining on local streams.

Monitoring on the North Fork of the Gunnison River shows little impact to the water quality from current or historical mining. Subsidence impacts from past mining have been observed in several areas where overburden is less than 500 feet thick. Although subsidence was observed in the form of cracks in the weathered bedrock and colluvium from 15 to 100 feet above the stream channel, there were no cracks observed in saturated alluvium underlying the stream. There was also no evidence of loss of flow observed.

3.11 Surface Water Resources Environmental Consequences

Potential environmental consequences of leasing (and eventual mining of) the lease modification area includes the following impacts:

- Dewatering of coal seams affecting groundwater supplied surface water; and,
- Water discharge from the mines to surface streams could impact the quality of water in the receiving streams; and,
- Continued use of surface facilities could increase sedimentation.

In addition, subsidence caused by longwall mining can potentially disrupt stream/spring flow directly above the underground mine and within the angle of draw. Other mine subsidence impacts could include changes in drainage channel morphology resulting in changes in general surface gradients, which could lead to head cutting, pooling, soil erosion, and sedimentation.

3.11.1 No Action

Under the No Action alternative, there would be no mining-induced effects on water resources in the modification area. Current ongoing activities in the watershed as well as natural variation in spring and stream flow would continue to occur.

3.11.2 Proposed Action

Subsidence from mining may alter surface water hydrology by altering groundwater flow regimes, surface water drainages, seeps, and ponds. Subsidence under surface water drainages could result in changes in channel morphology and gradient, thereby affecting water quality by inducing minor cutting, pooling, soil erosion, and sedimentation. Surface-tension cracks have the potential to develop within the surrounding surface drainages, resulting in an initial period of erosion and sedimentation after initial periods of runoff after subsidence occurs. However, the potential for surface fractures to develop in drainages where unconsolidated materials occur will be partially mitigated by the ductile nature of the unconsolidated alluvium/colluvium.

Subsidence resulting from longwall mining can be expected anywhere above or within the angle of draw of fully extracted longwall panels. Measurable subsidence effects for the modification area are expected to attenuate within 750 feet from the edge of the longwall panels (assuming a 25 degree angle of draw).

Based on subsidence studies and observations from the West Elk Mine area made available in the Dry Fork LBA Subsidence Evaluation (Agapito 2005), measured subsidence values in the North Fork Valley are typically less than predicted subsidence magnitudes. Adverse impacts on surface water drainages, ponds, springs, or seeps were not found in the three mines reviewed.

There are no known springs inventoried in the modification area. Static water levels in bedrock aquifers in the mine are many hundreds of feet below ground surface and show no connection to surface water sources. Based on the estimated overburden in the modification area, it does not appear that the surface water supported by groundwater sources will be affected by fracture zone-induced

subsidence. In addition, there is low risk of ephemeral alluvial/colluvial springs being intercepted by subsidence-induced tension fractures. The lowering of the land surface may cause springs to migrate a few feet, but no discernable loss of water is anticipated.

Water usage from the National Forest for mining would be relatively minor and quantities would fall below the Forest's Biological Opinion for water depletions

Water discharge from the mine to surface streams could impact the quality of water in the receiving streams. Mine effluent would be regulated, and any discharge to receiving streams would have to meet permitted effluent requirements. Concentrations of TDS, iron, manganese, and sulfate could be constituents likely to increase.

Subsequent mining in exploration areas south and east of the modification could lead to indirect effects on water quality (e.g. sedimentation).

3.11.3 Cumulative Effects

Leasing the coal in the modification area would slightly extend the life of the Elk Creek Mine, thereby increasing the potential for indirect impacts to surface water quality due to longwall mining related subsidence under ephemeral drainages and to springs/seeps within the area. However, current mining activity at the Elk Creek Mine has had no discernable localized effects stream morphology, erosion rate, or suspended sediment load. Ephemeral surface water resources in smaller tributary drainages are limited to spring runoff and very large thunderstorm events; therefore, subsidence-induced impacts in these drainages would be minimal.

Due to the overriding influence of continued drought in the North Fork basin and the fact that creek flow is unlikely to be affected by subsidence or mine operations; it is unlikely that Forest Service water resource allocations for the watershed will be impacted.

Potential adjacent land surface use (exploration drilling, methane drainage, ventilation shaft construction) has the potential to affect surface water through surface disturbance related to drill pad and road construction. Depending on location of these activities, construction could have impacts on sedimentation in stream channels, however these effects are mitigatable through use of best management practices, including sediment control. Any proposed post-lease activities would be analyzed under a separate NEPA analysis if/when activities are proposed.

Agriculture is an important and significant activity in the North Fork of the Gunnison Valley. Cumulative effects to surface water quality would be minimal in the North Fork of the Gunnison River Valley. Under state law, the mine operator/lessee would be required to replace any water right injured as a result of mining activities.

Minimal logging is anticipated in this area in the future. Based on experience in the area, impacts to surface water would not be expected from small timber sales. Recreation is fairly limited in the area due to the lack of developed recreational facilities. Hunting is the primary recreational activity in this area, and impacts to streams from four-wheeling activity can result in increased sedimentation and damage to drainage channels.

3.11.4 Conditions of Approval

Other than the water depletion which will be addressed in the Threatened and Endangered Species Section, no new conditions of approval other than those listed in the parent lease are recommended.

3.11.5 Consistency with Forest Plan and Other Laws

This quantity of water for reasonably foreseeable future development is within the GMUG's blanket consultation with USFWS for depletion associated with the Upper Colorado River System. The previous restriction with respect to water resources was found to be applicable to the Proposed Action after applying the unsuitability criteria stipulated in the amended LRMP dated September 1991 for the GMUG National Forests. Proposed Action is consistent with the Clean Water Act and Forest Plan standards for water resources. The stipulations for water resources in Proposed Action are also consistent with the FS Region 2 Water Conservation Practices Handbook and Ground Water Management FSM 2880.

3.12 Ground Water Resources Affected Environment

The study area for groundwater hydrology includes the region within a 1 mile radius of the proposed coal lease modification area. Particular attention was given to the area of potential subsidence induced impacts (see *Figure* 14, *Subsidence Potential Map).*

The analysis of groundwater hydrology includes wells, springs and seeps, and spring-fed stock ponds. Springs are defined as flowing at a rate of greater than or equal to one gallon per minute (gpm). Seeps flow rates are less than one gpm or are immeasurable. Information for this evaluation was derived from the following sources:

- Groundwater quality and quantity data for area wells and springs from Oxbow;
- Oxbow, USGS, and Hotchkiss Ranches, as well as previous site visits;
- Water rights information from the Colorado State Engineers Office, Division of Water Resources;
- Review of coal mine data, annual hydrology reports, permit applications, and reports related to groundwater hydrology;
- Previous NEPA documents; and,
- Review of reports, data, and maps compiled by state and federal agencies.

Regional Hydrogeology

The primary groundwater-bearing zones in the North Fork of the Gunnison River Basin occur in Quaternary alluvial, colluvial, glacial, and aeolian deposits and Cretaceous bedrock. Alluvial (river) deposits along the North Fork of the Gunnison River are saturated and considered to be an aquifer. Alluvial water-bearing units are thickest in the axis of the drainage bottoms and are typically 100 feet or less in thickness. The water quality of the alluvial groundwater is calcium bicarbonate type and is of good quality. The total dissolved solids (TDS) concentrations sometimes exceed federal drinking water standards. Well yields from this zone range from 1 to 150 gpm and average

about 20 gpm (Ackerman and Brooks, 1985).

Colluvial water-bearing units located on valley slopes are generally isolated and are limited in extent. These units are normally saturated seasonally and have a low storage capacity and yield. Most springs and seeps in the region issue from colluvial deposits underlain by less permeable bedrock. Seasonal spring discharge from colluvial deposits ranges from 0.2 to 20 gpm and averages 5 gpm. Colluvial deposits do not represent an aquifer in the region, and no reported wells are developed in this zone. However, numerous seasonal springs and seeps issuing from these zones have been developed for livestock watering (stock ponds) and support wildlife.

The primary bedrock water-bearing zones in the North Fork of the Gunnison River basin are in the sandstone and conglomerate units and fractured zones of the Lower Cretaceous Burro Canyon Formation and Late Cretaceous Dakota Sandstone. Minor groundwater occurrence is reported in the Late Cretaceous Mancos Shale, Mesa Verde and Tertiary Wasatch Formations. Saturated bedrock units are generally confined in nature, except near outcrops. Well yields from the Burro Canyon Formation/Dakota Sandstone are generally greater than 10 gpm (Ackerman and Brooks, 1985). Groundwater from the Mancos Shale, while unsuitable for drinking or agricultural use, has yields that range from 0.5 to 15 gpm (Ackerman and Brooks, 1985). Wells completed in the Mesa Verde Formation typically yield less than 10 gpm (Ackerman and Brooks, 1985). Limited data from wells completed in the Wasatch Formation indicate yields as high as 25 gpm (Ackerman and Brooks, 1985). No data is available for other Tertiary age deposits in the region. Spring flow from the Mancos, Mesa Verde, and Wasatch formations ranges from 1 to 25 gpm, with an average of 10 gpm (Ackerman and Brooks, 1985).

Water-bearing zones are recharged through seepage from area streams, direct infiltration of precipitation, and snowmelt. Alluvial water-bearing zones are hydraulically connected to adjacent bedrock and intermixing of the two units with groundwater is likely (Ackerman and Brooks, 1985). The shallow alluvial and colluvial groundwater flow follows local topography.

The regional bedrock groundwater flow direction is northeast following the regional geologic dip of about 5 degrees. Locally, bedrock groundwater flow paths follow topography and are affected by numerous drainages bisecting the region.

Mine Site Hydrogeology

Groundwater occurs within the proposed coal lease modification in the Quaternary alluvial and colluvial deposits, and Mesa Verde Formation. Saturated alluvium along the North Fork of the Gunnison River and primary tributary drainages has been developed for industrial, domestic, and livestock use. Area wells yield ranges from 5 to 120 gpm and average 17 gpm.

Saturated alluvium is unconfined and is recharged primarily by seepage from rivers and streams and, to a minor extent, by discharge from water-bearing bedrock and direct precipitation. Groundwater flow gradient in the alluvium follows the local drainage topography.

Water-bearing colluvial deposits are found along the slopes of area drainages and on the gentle terrain of the ridge tops, as noted by the occurrence of

numerous seasonal springs and seeps. These saturated deposits are perched, limited in lateral extent, and are not considered significant water resources. However, several local stock ponds are constructed to collect the seasonal spring flow. There are no known springs within the project area, however, in a general sense, local springs and seeps issue from these zones during periods of high precipitation and snowmelt. Seasonal spring and seep flows range from less than 1 gpm to about 5 gpm and are reported to be dry from summer to spring except after major precipitation events. Direct precipitation and snowmelt recharge these deposits. Groundwater is unconfined, and the flow direction follows the local topography.

Based on mining and drilling data and spring and seep surveys, groundwater in the Mesa Verde Formation is limited to isolated sandstone beds in the barren and coal bearing members, the Rollins Sandstone member, various coal beds, and along fault and fracture zones. Low primary permeability and limited storage capacity of the Mesa Verde Formation hydrogeologic units limit potential groundwater resource development (Brooks, 1983). However, significant quantities of groundwater are reported where the Mesa Verde Formation is fractured. The D coal seam is apparently saturated on the west side of Hubbard Creek as indicated by numerous springs and seeps. Spring flows range from less than 1 gpm to about 25 gpm with flow decreasing during dry seasons. Direct precipitation and snowmelt infiltration recharge these deposits. Seepage from local streams provides little recharge due the steep stream gradients and gaining character in the upper drainages where these units outcrop. Groundwater is unconfined near outcrop and semi-confined to confined in deeper subsurface strata. Groundwater flow direction follows the local topography near drainages and flows to the northeast (regional geologic dip of about 5 degrees) in other areas.

A summary of the spring and seep data is presented in Oxbow's Annual Hydrology Report located in the project file.

Current and historic mining in the area have encountered groundwater in the coal seams and adjacent strata. The Elk Creek Mine is currently developed in the D seam and reports inflows of less than 17 gpm (Oxbow, 2008).

The Sanborn Creek Mine (Oxbow) was developed in the B and C seams with average inflows of 100 gpm and peak flows of 250 gpm near fractured zones. This mine is situated below the outcrop/sub-crop of the North Fork of the Gunnison River.

The Oliver Mine was developed in the D seam mostly above the outcrop/sub-crop with Elk Creek. Historic information indicates mostly dry conditions with inflows ranging from 0 to 6 gpm (Oxbow, 1999).

Increased groundwater flow potential is expected near fault and fractured zones in all of the water-bearing strata of the area. However, little information is currently available to confirm this, except where mining operations have crossed fault zones. The local mines have been typically relatively dry, even in fractured terrain.

Groundwater Quality

Bowie and Oxbow have collected groundwater quality data for the past several years. Both have long term data from monitoring wells and springs within and adjacent to their permit boundaries.

A summary of water quality data is presented in Oxbow's Annual Hydrology Report located in the project file. Review of Oxbow water quality data from monitoring wells and springs does not reveal any general seasonal trends in groundwater quality at the study area. Spring, alluvial well and bedrock monitoring well data for the Elk Creek Mine has been collected since 2003. Seasonal groundwater quality trends will likely become more defined when more consistent water quality data becomes available. Typically, seasonal trends include increased concentrations of TDS and dissolved constituents and high groundwater levels in the spring.

Past and current mining activities have affected groundwater quantity and quality. Current mining activities at the Elk Creek Mine does not utilize any groundwater for operations. As a result, there have not been any impacts to groundwater due to water consumption. Since 2000, there has been between 0 gpm and 17 gpm inflow into the mine from non-point sources in the D seam, although, no dewatering activities have occurred.

Past and current activities other than mining have also affected groundwater quality. Livestock grazing causes minor impacts to springs and seeps due to erosion, sedimentation, and water quality (i.e. fecal colifom). Unauthorized off-road vehicle use also causes erosion and sedimentation that effect spring areas. Individual domestic water wells and community water wells have had limited impact on groundwater quantity. Rural septic systems may impact local groundwater quality.

Groundwater Use

Water rights and well records from the Colorado Division of Water Resources were reviewed for the area of the proposed coal lease modification area, and areas extending about 1 mile outside of these boundaries. There are no adjudicated water rights associated with springs near the lease modification area.

There are eight well applications on file with the State within the 1-mile buffer, however all are associated with the Elk Creek Mine

3.13 Ground Water Resources Environmental Consequences

Longwall mining causes bedrock fracturing and land subsidence above longwall panels. By potentially providing pathways for groundwater to move downward toward the mined horizon, fracturing and subsidence may divert water from saturated horizons and surface water bodies above and adjacent to caved areas. Impacts to groundwater systems may potentially result in the decrease in natural discharge rates from springs and seeps or change water levels and yields in area wells. Potential effects include the following.

Mining would dewater the coal seam and water-saturated horizons immediately above and below the coal seam.

Water quality could be degraded when groundwater flows through active or abandoned mine workings.

Trans-basin diversion of groundwater resulting from dewatering of the coal seam is a potential impact.

Water rights could be affected if area spring flows and associated pond levels and well water levels are diminished.

Increased sedimentation of area springs from construction and use of surface facilities (exploration drill pads and associated access roads) could occur.

Accidental fuel or solvent spills could impact shallow groundwater locally. The criteria for significant impacts refer to adverse impacts to the quality or quantity of groundwater utilized for important uses such as domestic water supply, livestock watering, springs that recharge wetland/riparian areas or support wildlife habitat, and natural resource values.

Subsidence induced impacts to groundwater resources were calculated from the reasonably foreseeable development scenarios and generalized overburden strata characteristics for the lease modification area. It was also assumed that coal would be extracted using longwall mining techniques so that subsidence occurred within the limits of the lease modification boundary.

The strata are not uniformly saturated, so there is little concern for inter-aquifer communication for installing gob vent boreholes as they would be of small diameter and would cause little disturbance to the geologic strata.

3.13.1 No Action

Under the No Action alternative, there would be no increased mining-induced effects on water resources in the lease modification area. Current activities in the area, along with natural variation in spring and seep flow would occur based on climatic variations.

3.13.2 Proposed Action

Shallow groundwater in the modification area is limited due to geomorphologic controls from the relatively steep gradients and stream profiles of drainages, resulting in thin alluvial/colluvial deposits confined to the drainage bottoms. Seasonal groundwater may surfaces as seasonal springs and seeps in the area is are associated with these shallow alluvial/colluvial deposits and do not appear to be hydrologically connected with deeper bedrock aquifers.

Groundwater may also be present to a limited extent within coal seams. Bedrock and associated coal seams dip to the northeast, with the uppermost strata outcropping along the North Fork Valley. The occurrence of groundwater springs in the North Fork outcrops of the Mesa Verde formation is rare. BLM and Oxbow report that the coal seams in the mine area are typically dry, with average moisture content of 5 percent. Groundwater discharges from faults intercepted by longwall panels in the mine have experienced initially high volume discharge periods followed diminishing to negligible flow within a short time period.

No effects to surface water resources have been documented from interception of water-bearing faults underground. Not all faults encountered during mining have contained water. Mine under-drain and mine inflow sites are currently monitored for flow and water quality by the Elk Creek Mine hydrologic program. The total inflow for the Elk Creek Mine varies, but ranges from 0 to approx. ~17 ga gallons per minute depending upon the working area. Any groundwater encountered would be handled by the existing system in the Oxbow's underground operation. Discharge water would be required to meet the NPDES and Colorado Discharge Permit System (CDPS) surface water quality standards. It is difficult to assess mining-related effects of groundwater interception and withdrawal on regional water supply due to ongoing drought conditions in the region. Yearly decreases in annual stream flow in the North Fork of the Gunnison River during the period

between 2001 and 2007 document ongoing drought conditions.

Longwall mining development of lease modification would induce subsidence of the overlying ground surface. The extent, severity, and potential impact to groundwater due to subsidence is dependent on the thickness, composition, and geotechnical properties of the overburden, thickness of the mined coal, and mining plans. Subsidence-induced impacts to groundwater are primarily related to the break angle. The break angle defines the zone of maximum strain above a mining panel. Subsidence induced impacts to groundwater in the modification area are rated low to very low because thickness above the coal seam to be mined is greater than 1,000 feet.

Longwall mining development in the D seam of the lease modification would induce subsidence of the overlying ground surface and temporarily dewater the strata adjacent to the D coal seam. Mined areas would likely refill with water to approximate pre-mining levels after mining operations cease which could impact groundwater quality through exposure to collapsed and abandoned mine workings. No subsurface water rights are located in the areas of potential impacts.

Subsidence could potentially disrupt or alter springs, seeps, ponds, and change local groundwater levels directly above the underground mine and within the angle of draw.

The potential for indirect groundwater impacts in the study area is expected to be minimal. Private domestic wells would be drilled and septic systems would be installed. Appropriate state and county regulations would have to be followed, minimizing impacts to groundwater quantity and quality.

Methane release from coal mines would not be expected to impact domestic water wells because the wells are below the coal seams to be mined.

3.13.3 Cumulative Effects

Activities contributing to cumulative effects can be separated into several categories: mining, agriculture, other water uses (municipal/residential). Current mining activity in the North Fork of the Gunnison River Valley includes the Bowie No.1 Coal Loadout, the Bowie No. 2 Mine, the Elk Creek Mine, and the West Elk Coal Mine. Cumulative effects to ground water from mining activities include minimal impacts to water quantity and quality in the area and water use via adjudicated water rights. Multiple seam mining would have a cumulative effect in regard to subsidence. The subsidence impacts evaluation calculates that maximum vertical displacement would be equal to the sum of the potential displacements from mining individual seams. The potential subsidence impacts to groundwater resources would essentially be minimized due the great overburden thickness relative to the total mined thickness.

Agriculture is an important and significant activity in the North Fork of the Gunnison Valley and groundwater is sometimes used for irrigation purposes and affects groundwater quantity and quality.

Cumulative effects to ground water quality would be minimal in the North Fork of the Gunnison River Valley. Under state law, the mine operator/lessee would be required to replace any water right injured as a result of mining activities.

3.13.4 Conditions of Approval

No new conditions of approval other than those listed in the parent lease are recommended.

3.13.5 Consistency with Forest Plan and Other Laws

Proposed Action is consistent with the Clean Water Act and Forest Plan standards for water resources. The stipulations for water resources in Proposed Action are also consistent with the FS Region 2 Water Conservation Practices Handbook and Ground Water Management FSM 2880.

3.14 Vegetation Affected Environment

Data from the Colorado Vegetation Classification Project, generated from Landsat TM imagery, was used in this analysis to describe existing vegetation within the project area.

The analysis area is the geographic footprint of the lease modification. To adequately assess cumulative effects of past, present and reasonably foreseeable future projects, including all new ground disturbance is the immediate area buffered by one mile. Existing vegetation at the analysis scale (project footprint with a 1 mile buffer), is shown in Table 3.14.

Habitats in the project vicinity are dominated by Gambel oak (Quercus gambelii) and associated vegetation, followed by aspen. As none of these habitats are within an LAU and are not suitable for lynx, quantitative discussion of overall habitat changes will be done in the Biological Evaluation for this project.

The project area is approximately 6800 to 8500 feet of elevation.

3.15 Vegetation Environmental Consequences

3.15.1 No Action

No direct human-caused change in existing condition of current vegetation is anticipated if no action is undertaken for this project. Other projects in the surrounding areas, however, will likely occur and may have impacts to vegetation within the project area. Condition trends will continue as they currently exist, modified as per other actions occurring on the landscape. Continued aspen decline is expected to occur and may have substantial impacts to the quantity and health of aspen stands and surrounding areas in the short-term (less than ten years). In addition to the aspen decline, succession of conifers within aspen stands would be expected to continue. This succession and would take place over many decades.

3.15.2 Proposed Action

There are no Threatened, Endangered or Candidate, Sensitive, or Management Indicator plant species in the project area and, therefore, no effects to special status species will occur with the Proposed Action.

Except where subsidence occurs and destroys or uproots individual plants, there would be no impact to vegetation communities to implement the proposed action.

Other projects in the surrounding areas, however, will likely occur and may have impacts to vegetation within the project area. Condition trends will continue as they currently exist, modified as per other actions occurring on the landscape. Continued aspen decline is expected to

occur and may have substantial impacts to the quantity and health of aspen stands and surrounding areas in the short-term (less than ten years). In addition to the aspen decline, succession of conifers within aspen stands would be expected to continue. This succession and would take place over many decades.

3.15.3 Cumulative Effects

Actions which have occurred in adjacent areas previously are primarily related to coal operations (exploration and methane drainage). The FACTS database shows no vegetation projects or timber sales in the lease modification area.

Other federal actions which have occurred in the past and are expected to occur in the future include permitted livestock (currently sheep) grazing and permitted outfitter/guided hunting. Road and trail maintenance is expected to continue within the area at a minimal level. Non-federal actions occurring in the area within the last ten years include recreational hunting, dispersed camping, and nonspecific dispersed recreation. No known water developments, except for stock ponds occurs on federal lands in the area.

Vegetation has been affected by previous activities by mining and associated activities in areas surrounding the tract, primarily as a result of road construction and installation of drill sites for MDWs and exploration. The bulk of this affected vegetation has been oak brush, with lesser amounts of removal in aspen and spruce communities. Because the bulk of the vegetation type in the proposed modification is aspen and Gambel oak, it is foreseeable that the bulk of the disturbance will occur in these upland vegetation types in the future (outside the modification area). In addition to vegetation removal, other effects include: a possible hardening of the site and/or compaction of soils where roads and vents are to be located, which could affect the future succession of vegetation; damage to tree trunks (especially thin-barked aspen) in the immediate surrounding resulting in weak and stressed trees; damage to tree roots as a result of blading or grade work; increased fuel load and the attraction of borers as result of the accumulation of large, woody debris; opening the forest and increasing the likelihood of windthrow; and introduction of noxious weeds.

3.15.4 Conditions of Approval

No new conditions of approval other than those listed in the parent lease are recommended.

3.15.5 Consistency with Forest Plan and other Regulations

Proposed Action is consistent with the Forest Plan, NFMA, FSM 2670 at 2670.22 - Sensitive Species, Executive Order 11990 - Protection of Wetlands, and Executive Order 131120 - Invasive Species.

Table 3.14 Project Area Existing Vegetation Data

Vegetation (Cover Type)	Action Area (project footprint with 1 mile buffer) acreage
Sagebrush Community	**5**
Sagebrush/Grass Mix	**41**
Sagebrush/Mesic Mtn Shrub Mix	**71**
Pinon-Juniper	**31**
Gambel Oak	**50**
Mesic Mountain Shrub Mix	**2167**
PJ-Mtn Shrub Mix	**15**
Sparse PJ/Shrub/Rock Mix	**27**
Aspen	**1196**
Aspen/Mesic Mountain Shrub Mix	**98**
Englemann Spruce/Fir Mix	**5**
Douglas Fir	**200**
Spruce/Fir/Aspen Mix	**35**
Douglas Fir/Aspen Mix	**47**
Rock	**35**
Sub-Alpine Shrub Community	**1**
Subalpine Grass/Forb Mix	**76**
Riparian	**2**
Cottonwood	**1**
Shrub Riparian	**13**
Willow	**1**

3.16 Threatened and Endangered Wildlife & Aquatic Species

A county-by-county species list was emailed to the district by the US Fish and Wildlife Service on 19 February 2008 (USDI 2008). There is only one federally listed terrestrial species that has the potential to be found in the project area, the Canada lynx.

Other species considered are shown in Table 3.16. As these species do not occur in the project area and no habitat for them will be impacted by the project; therefore, these species were not further analyzed. These species would all have no effect determinations. There are four fish species which do not occur in the area, but for which water depletions associated with projects constitute an adverse effect. These four species are discussed herein.

No consultation has been conducted with the USFWS on this project at this time as either no effect determinations exist or effect determinations are covered by programmatic Biological Opinions.

3.16.1a Canada Lynx Affected Environment

The Canada Lynx was listed as threatened in March 2000. In August 2004, the Second Edition of the Canada Lynx Conservation Assessment and Strategy (LCAS) was released, to provide a consistent and effective approach to conserve Canada lynx on federal lands. The Canada Lynx Conservation Agreement (USDA 2005) identifies the Science Report (Ruggiero et al. 2000) and the LCAS (Ruediger et al. 2000) as including the best available science on habitat and conservation measures. Both of these documents, along with local information are to be used for project analyses.

Following release of the LCAS, the Forest mapped lynx analysis units (LAUs) and habitat within them, based on Regional direction. Habitat was mapped based on existing vegetation information, including vegetation type, canopy closure and size of trees. Areas outside of LAUs are not considered to be lynx habitat, even though they may contain habitat components or stands similar to those within LAUs.

The LCAS includes direction about limiting the amount of currently unsuitable habitat within a LAU (less than 30%), as well as maintaining at least 10% of the suitable habitat as denning habitat.

The proposed project area does not lie within a Lynx Analysis Unit and is therefore not considered suitable lynx habitat. In addition there are no proposed surface disturbing activities associated with this project.

3.16.1b Canada Lynx Environmental Consequences

As stated, there are no surface disturbing activities associated with this project and the project area does not lie within suitable lynx habitat. The only anticipated alteration of the land will be due to subsidence as a result of underground mining activities. These activities are not expected to have adverse impacts on lynx.

3.16.1c Canada Lynx Cumulative Effects

As there are no measurable direct or indirect effects to lynx or suitable lynx habitat as a result of this project, it does not contribute to cumulative effects on lynx.

Table 3.16. Federally Threatened and Endangered or Candidate Species considered for project.

Species	Scientific Name	Impacted by project?	Habitat Description and Requirements
Canada Lynx	*Lynx canadensis*	No	Spruce/fir, mixed conifer, lodgepole pine forest (primary), or mixed deciduous/conifer (secondary)
Gunnison's prairie dog (Candidate)	*Cynomys gunnisoni*	No	Open areas, grass, sage, scrublands. Not known or expected to occur on the district.
Yellow-billed cuckoo (Candidate)	*Coccyzus americanus*	No	Low elevation river corridors, cottonwoods. Project actions will not impact suitable habitat.
Uncompahgre fritillary butterfly	*Boloria acrocnema*	No	The butterfly exists above treeline in patches of its larval host plant, snow willow. The butterfly is most often found on north and east facing slopes, which provide a moist, cool, microclimate. Not known or expected to occur in this area.
Bonytail chub	*Gila elegans*	Yes	Colorado and Gunnison Rivers
Razorback sucker	*Xyrauchen texanus*	Yes	Colorado and Gunnison Rivers
Humpback chub	*Gila cypha*	Yes	Colorado and Gunnison Rivers
Colorado pikeminnow	*Ptychocheilus lucius*	Yes	Colorado and Gunnison Rivers

3.16.1d Canada Lynx Determination

Implementation of the project **will have no effect on** the lynx due to the lack of surface disturbing activities.

3.16.2a Endangered Fish (Big River) Affected Environment

There are four federally listed fish species associated with this project (Table 3.16). These four fish species occur in warm water habitats downstream of the project area in the

Gunnison and Colorado River drainages. None of the fish are known or expected to occur in the project area. Although water depletions are known to impact these fish species, there are no water depletions anticipated with this project.

3.16.2b Endangered Fish Environmental Consequences

Water depletions affecting habitat quality and quantity are known to have adverse impacts on the four federally listed fish species. However no water depletions are anticipated with this project.

3.16.2c Endangered Fish Cumulative Effects

Cumulative effects for the Endangered Species Act include future federal and non-federal actions which may impact this species. Past, present, and future reasonably foreseeable actions are described in Section 3.1. Grazing in this area may contribute to vegetation changes on lands in the area. However, those lands are already modified through long term human use, and continued grazing is not likely to alter the suitability of lynx habitat in this area from current conditions. Water developments already exist on the landscape, and future actions will continue use and maintenance of existing facilities. Mining in adjacent lands has resulted in some surface disturbance, subsidence, and water depletion.

For these fish species, the cumulative impact area must include all of the drainage downstream of the location of the fish, which therefore encompasses a large portion of western Colorado. By definition, water depletions represent an adverse impact to these fish species and their designated critical habitat. However there are no water depletions expected as a result of this lease modification which would adversely impact downstream habitat quantity and quality, therefore this project is not expected to contribute to cumulative effects for these fish species.

3.16.2d Endangered Fish Determination

Implementation of this project is not likely to adversely affect the bonytail chub, Colorado pikeminnow, the humpback chub, or the razorback sucker. No water depletions are anticipated that would affect habitat quality or quantity downstream.

3.16.5 Consistency with Forest Plan and Other Regulations

The NFMA and the ESA require the Forest Service to manage wildlife habitat to maintain viable populations of native and desirable nonnative wildlife species and conservation of listed threatened or endangered species populations (36 CFR 219.19). Additional guidance is found in FSM direction which states: *Identify and prescribe measures to prevent adverse modifications or destruction of critical habitat and other habitats essential for the conservation of endangered, threatened, and proposed species* (FSM 2670.31[6]). The ESA requires the Forest Service to manage for recovery of threatened, endangered, and proposed (TEP) species and the ecosystems upon which they depend. A Biological Assessment has been completed and assesses the impacts of the proposed action on threatened and endangered species.

Consultation with the FWS is not required due to the no effects determinations and existing biological opinions.

3.16.4 Conditions of Surface Use

No new conditions of approval other than those listed in the parent lease and proposed action are recommended.

3.17 Sensitive and Management Indicator Species Wildlife & Aquatic Species

3.17.1 Sensitive and Management Indicator Wildlife & Aquatic Species General Affected Environment

Existing Condition

R2Veg GIS data as of 07 March 2008 was used in this analysis to describe existing vegetation and habitats within the project area. The analysis area for the Biological Assessment is the lease modification area, buffered by one mile. Other scales of analysis may be used for other species, as noted in the Biological Evaluation for these projects. Existing vegetation at the analysis scale (project footprint with a 1 mile buffer), is shown in Table 2. This value was determined to include sufficient habitat to encompass all impacts to species which may occur in the vicinity of the project.

Habitats in the project vicinity are dominated by Gambel oak (*Quercus gambelii*) and associated vegetation, followed by pockets of aspen and spruce-fir forest.

Assumptions

For this analysis, all project design standards, lease stipulations, and mitigation measures described in the proposed action above were considered. While few if any of these are wildlife-specific, they may result in changes to timing or other alterations to project activities which may impact wildlife species.

HABCAP modeling was used for this analysis. It was developed as a comparative tool to model differences in habitat capabilities between alternatives by calculating changes in habitat types and structural stages. A Habitat Capability Index (HCI) for each species is determined from the relative amounts of particular habitat types within the analysis area, based on the species' uses of that habitat for various functions and at various times of the year. Other factors, such as road density, are included for some species such as elk. It estimates capability at a single point in time, and does not simulate change over time. Long-term changes in habitat are addressed in the discussion within this document. In addition, HABCAP models were run for the analysis area and species with a habitat capability index (HCI) of less than 0.05 (Pine marten, Lewis' woodpecker, and northern 3-toed woodpecker) were not carried forward for analysis.

3.17.2 Sensitive and Management Indicator Species Wildlife & Aquatic Species Environmental Consequences

3.17.2b No Action

No direct human-caused change in existing condition, of current vegetation and habitat is anticipated

3.17.2c Proposed Action

The Proposed Action would not entail a change in management of resources within the project area; therefore, there would be no direct or indirect impacts to MIS. Subsidence has the potential to slight affect plant and water resources within the project area, however under this alternative, wildlife habitat would remain essentially the same.

3.17.2d Cumulative Effects

Within the project area and adjacent lands, current activities include underground coal mining, cattle grazing, and recreational hunting. Recent coal-related activities include the ongoing construction of gob vent boreholes on this and other leases, monitoring well construction, ventilation shaft construction, exploration, and road building to access drill sites at other locations in the general area. Range and recreational use will also continue in this area.

As there are no anticipated direct or indirect effects as a result of this project, there are no cumulative effects.

3.17.2e Conditions of Surface Use

No new conditions of approval other than those listed in the parent lease and proposed action are recommended.

3.17.2f Consistency with Forest Plan and Other Regulations

The FSM directs the Regional Forester to identify sensitive species for each National Forest where species viability may be a concern. National Forests are then required to monitor sensitive species populations and prevent declines that could require listing under ESA (FSM 2670.32 (4)). The direction requires the Forest Service to manage the habitat of the species listed in the Regional Sensitive Species List to prevent further declines in populations, which could lead to Federal listing under the ESA.

The alternatives discussed in this EA would not result in a decline or reduction of viability of the populations of sensitive species identified to occur on the GMUG National Forests. A Biological Evaluation has been completed to assess the impacts of the alternatives on sensitive species. The Biological Evaluation is located in the project file.

Proposed Action is consistent with the Forest Plan, NFMA, ESA, RPA, Executive Order 13186, the Bald and Golden Eagle Protection Act, Forest Service Manual (FSM) and Handbook (FSH) direction. All alternatives are consistent with the recent Management Indicator Species Amendment, Forest Plan Amendment 2005-01. This amendment was approved in May 2005. The amendment revises language in Forest Direction and Standards and guidelines for Management Areas, and the Monitoring Plan.

3.18 Sensitive Species

3.18.1 Sensitive Species Affected Environment

There are several sensitive species that are or are potentially present in the project area. Information on distribution, dispersal capability, abundance, population trends, habitat trends, habitat vulnerability, and risks based on life history and demographics has been reviewed for USFS R2 Sensitive Species, and is available on Region 2's website (www.fs.fed.us/r2/projects/scp).

This information has been incorporated where relevant. The list of species reviewed for this project was taken from the Region 2 Sensitive Species Matrix (USDA 2008). This excluded R2 Sensitive Species which were not known or expected to occur on the GMUG. Numerous species which may occur on the GMUG NF, but are not known or expected to occur in the project area, due to absence of habitats or range limitations, were not carried forward for

analysis. None of the plant species on the Sensitive Species list are known or expected to occur in this area and were not analyzed in detail for this project. Species are presented here in the order they are listed in the matrix.

3.18.2 Sensitive Species Environmental Consequences

No Action (common to all species)

The direct and indirect impacts of the "no action" alternative would not change current habitat or population conditions of any Forest Service sensitive species in the short term. Long-term changes would continue to be dependent on existing conditions, current succession of vegetative types, and other actions within and adjacent to the project area.

Proposed Action (common to all species)

While several of the species are likely to occur in this area and use habitats which may be found in the area, due to the lack of surface activity associated with this proposal, there are no anticipated effects to any Sensitive species (see Table 3.18).

3.18.3 Conditions of Surface Use

No new conditions of approval other than those listed in the parent lease and proposed action are recommended.

3.19 Management Indicator Species (MIS)

3.19.1 MIS Affected Environment

General

A complete list of all of the GMUG Management Indicator (MIS) species is presented in Table 3.19. The project site is in a very steep sandstone canyon with ephemeral drainage. Habitats in the area are highly mixed due to topography and underlying geology, with Gambel oak, aspen, mountain shrub, and Douglas fir-dominated conifer within the lease modification area. Rock outcrops are common in the area. The site is on the ridge above the North Fork of the Gunnison, a perennial fish-bearing stream.

3.19.2 MIS Environmental Consequences

No Action Alternative (common to all species)

The direct and indirect impacts of the "no action" alternative would not change current habitat or population conditions of any Forest Service management indicator species in the short term. Long-term changes would continue to be dependent on existing conditions, current succession of vegetative types, and other actions within and adjacent to the project area.

Proposed Action (common to all species)

While several of the species are likely to occur in this area and use habitats which may be found in the area, due to the lack of surface activity associated with this proposal, there are no anticipated effects to any MIS species (see Table 3.19).

3.19.3 Conditions of Surface Use

No new conditions of approval other than those listed in the parent lease and proposed action are recommended.

3.20 Other Species Considerations

The golden eagle (*Aquila chrysoetos*) is known to occur in the area. There is one known nest location near Terror

Reservoir (Monarch and Ward 2005) and other locations may exist within the project analysis area. This species is protected under the Bald and Golden Eagle Protection Act as well as other Federal and state laws, including the Migratory Bird Treaty Act. The Colorado Division of Wildlife has recently published Recommended Buffer Zones and Seasonal Restrictions for Colorado Raptors (CDOW 2008). In that document, specific protection measures for golden eagles are listed, and those measures are incorporated into the Conditions for Surface Use as described in the parent lease and above.

3.20.1 Conditions for Surface Use

No pre-disturbance monitoring for golden eagle nests will be required as conditions for surface use as no surface activities are proposed for this project.

3.21 Migratory Bird Treaty Act

No alteration of bird habitat will occur as a result of this project. Therefore no impacts to migratory birds are expected.

Table 3.16. Threatened, Endangered or Candidate Species Considered for Evaluation
from Colorado County List provided by US Fish and Wildlife Service

Species	Scientific Name	Impacted by project?	Habitat Description and Requirements
Canada Lynx	*Lynx canadensis*	No	Spruce/fir, mixed conifer, lodgepole pine forest (primary), or mixed deciduous/conifer (secondary). Project area is not within lynx habitat.
Gunnison's prairie dog (Candidate)	*Cynomys gunnisoni*	No	Open areas, grass, sage, scrublands. Not known or expected to occur on the district.
Yellow-billed cuckoo (Candidate)	*Coccyzus americanus*	No	Low elevation river corridors, cottonwoods
Uncompahgre fritillary butterfly	*Boloria acrocnema*	No	The butterfly exists above treeline in patches of its larval host plant, snow willow. The butterfly is most often found on north and east facing slopes, which provide a moist, cool, microclimate. Not known or expected to occur in this area.
Bonytail chub	*Gila elegans*	No*	Colorado and Gunnison Rivers
Razorback sucker	*Xyrauchen texanus*	No*	Colorado and Gunnison Rivers
Humpback chub	*Gila cypha*	No*	Colorado and Gunnison Rivers
Colorado pikeminnow	*Ptychocheilus lucius*	No*	Colorado and Gunnison Rivers

* Water depletions to tributaries of the Colorado and Gunnison Rivers could affect these species.

Table 3.18. Documentation of the Presence or Absence of Forest Service Sensitive Species. From Region 2 Sensitive Species List and Region 2 TES Matrix by Unit

Species	Present and Affected by Project	Habitat Description and Requirements
Desert Bighorn Sheep	No	Arid canyonlands and range. Locally, Black Canyon of the Gunnison.
Rocky Mountain Bighorn Sheep	No	Alpine and subalpine meadow habitats in summer, winter range at lower elevations in grass/forb/shrub habitats. Locally, Sheep Mountain on Gunnison District and near Marble, WRNF. Occasional animals moving through district.
Pygmy shrew	No	Moist boreal habitats above 9600 feet. May also be present in various other habitats.
Fringed myotis	No	Most common in coniferous woodlands and greasewood, oakbrush, and saltbrush shrublands at elevations from 5,000 to 7,500 feet. Caves, mines, and stone buildings serve as roost sites, both for day and night roosting, as well as for hibernation .
Spotted bat	No	Likely 6,000-8,000 feet in Colorado. Cliffs, ponderosa pine, pinyon-juniper, desert scrub; rough, arid, desert terrain. Wet meadows used for foraging
Townsend big-eared bat	No	Up to approximately 9,500 feet. Variety of scrub and forest habitats. Cool places like mines, caves, buildings. Rock fissures used for roosting and hibernation. Forages in open woodlands, along forest edges, and over water.
White-tailed prairie dog	No	Inhabits open shrublands, semidesert grasslands, and mountain valleys at elevations up to 10,000 ft. Not known to occur on NFS lands on the district but common in lower elevations of North Fork valley.
Gunnison's prairie dog	No	Inhabits grasslands and semi-desert or montane shrublands at elevations of ~5,900-12,000 ft. Delta County outside of range.
Kit fox	No	Found exclusively in arid and semi-arid desert and shrub-steppe habitat. Dens in burrows; apparently, vast majority of dens are located in existing holes expanded by the foxes--most often prairie dog burrows, badger digs, and natural water-drainage tubes; however, can dig own burrows.
River otter	No	Requires permanent water, of relatively high quality. Specializes on fish; requires suitable den and resting sites.
American marten	No	Subalpine, spruce-fir and lodgepole pine forests, alpine tundra and occasionally Montane forests. Generally associated with

		older growth or mixed age stands of spruce fir and lodgepole pine
Wolverine	No	Sagebrush to alpine. Uses a large variety of habitat types, although usually remote and inaccessible to humans. Riparian areas may be important especially in winter. Possibly extirpated in Colorado.
Northern goshawk	No	Up to 11,200 feet. Spruce/fir, Douglas fir, mixed conifer, aspen, ponderosa pine, lodgepole pine. Uses a variety of forest structural stages although mature forests are required for nesting.
Ferruginous hawk	No	Below 6,000 feet, rarely to 9,500 feet. Large open grasslands and shrub lands.
American peregrine falcon	No	Usually below 10,000 feet, very rare to 11,500 feet. Nest on cliffs, forage over adjacent coniferous and riparian forests, and other habitats. Migrants occur mostly around reservoirs, rivers, and marshes, but also grasslands, agricultural areas, and other habitats.
Bald Eagle	No	Major river systems, reservoirs, upland areas supporting carrion and other foraging opportunities.
Northern harrier	No	Breeding habitat includes open wetlands, marshy meadows, wet pastures, and marshes; also (more predominantly in the western U.S.) dry upland prairies, mesic grasslands, drained marshes, croplands, cold desert shrub-steppe, and riparian woodlands.
Columbian sharp-tailed grouse	No	Open grasslands and shrublands. Not known or expected to occur on the Paonia District.
Gunnison sage grouse	No	Primary habitat is large, contiguous, and gently rolling areas of sagebrush; also in summer native or cultivated meadows, grasslands, aspen, and willow thickets adjacent to or interspersed with sagebrush. Not present on the Paonia District, nearest population west of CO 92 near Crawford.
Greater sage grouse	No	Large, contiguous areas of sagebrush. Not known or expected to occur on the Paonia District.
White-tailed ptarmigan	No	Alpine habitats, montane forests.
Yellow-billed Cuckoo	No	Accidental above 6,000 feet. Lowland riparian forests and urban areas with tall trees. Mature closed-canopy forests.
Burrowing owl	No	Below 9,000 feet. Grasslands and rarely semi-desert shrublands, in or near prairie dog towns.
Boreal owl	No	Above 9,200 feet. Spruce/fir, mixed conifer/aspen, Douglas fir.
Flammulated owl	No	6,000-10,000 feet. Old growth and mature ponderosa pine, Douglas fir, lodgepole pine, spruce/fir mixed with aspen, pinyon-juniper, hardwood forests.
Black swift	No	(< 14,000 feet. Forages over all types of terrain. Nests in

		crevices, ledges, caves on high rocky cliffs, preferably near or behind waterfalls or over pools. Migratory. No nesting habitat in project area.
Lewis' woodpecker	No	Below 8,000 feet, very rare accidental to 10,000 feet. Lowland and foothill riparian forests and agricultural areas, urban areas with tall deciduous trees (cottonwood). Open ponderosa pine and oak, especially in logged or burned areas. Rare in pinyon-juniper. Prefers a good understory of grasses and shrubs to support insect populations. Favored nest trees are ponderosa pine and cottonwood.
American three-toed woodpecker	No	8,000-11,500 feet. Spruce/fir, Douglas fir, lodgepole pine, ponderosa pine, and burned forests of older age classes.
Olive-sided flycatcher	No	< 11,500 feet. Open mature spruce/fir and Douglas Fir, especially with abundant dead trees bordering meadows, bogs, and other open foraging areas. Other coniferous, aspen, and riparian forests used less often. Forages in woodlands near edges, clearings, bogs, streams, and burned areas. Uses tall exposed perches in tops or high exposed limbs of trees. Migratory.
Purple martin	No	< 10,000 feet. Old growth aspen, mixed aspen/ponderosa pine or Douglas fir, deciduous riparian woodlands, burns with snags especially when near water and open foraging areas (parks, forest openings, open grassy river valleys, lake shores, marsh edges, agricultural areas, open woodlands, towns). Nests built in cavities in trees and cliffs, loose rock, and crevices in old buildings. Migratory.
Loggerhead shrike	No	Rare above 6,000-9,000 feet. Open riparian areas, agricultural areas, grasslands, shrublands, sometimes open pinyon-juniper.
Brewer's sparrow	No	Breeds primarily in sagebrush shrublands and in alpine meadows. Nests in small shrubs or low trees, usually less than one foot above ground. Migratory.
Sage sparrow	No	Suitable breeding habitat of interior subspecies: generally extensive, unfragmented tracts of open to semi-open dry chaparral, desert scrub, sage shrublands <6,500 ft associates most often with big sagebrush; also uses saltbush, bitterbrush, shadscale, rabbitbrush, greasewood, chamisa. Migratory.
Boreal toad	No	7,000-11,860 feet. Marshes, springs, wet meadows, margins of streams, beaver ponds, lakes, glacial ponds, irrigation ditches.
Northern leopard frog	No	Up to 11,000 feet. Variety of usually permanent water sources (especially rooted aquatic vegetation) including banks and shallow areas of marshes, ponds, lakes, reservoirs, streams,

		springs, and irrigation ditches. Wet meadows and grassland are also used. Breeding pools commonly contain algae mats, vegetation, and clear water.
Colorado River cutthroat trout	No	Cool to cold mountain streams, lakes, ponds
Roundtail chub	No	Stream habitats below 2300 m (7500') in the Colorado River basin
Bluehead sucker	No	Stream and lake habitats
Flannelmouth sucker	No	Stream and lake habitats
Mountain sucker	No	Stream and lake habitats
Great Basin silverspot	No	Associated with Viola spp. Wet meadows, seeps, sloughs from 5200 to 9000 feet.
Sphagnum angustifolium	No	Peat bogs, fens.
Lesser panicled sedge *Carex diandra*	No	Wetlands, typically montane and subalpine fens.
Lesser yellow lady's slipper *Cypripedium parviflorum*	No	Variety of forested habitats above 5800 feet, on calcareous soils.
Whitebristle cottongrass *Eriophorum altaicum* var. *neogaeum*	No	Uncommon resident in bogs about 3000 meters (10,000 feet) in Rocky Mountains.
Slender cottongrass *Eriophorum gracile*	No	Near-neutral-pH fens, margins of small lakes and ponds, with abundant water supply, 8100-12000 feet.
Simple bog sedge *Kobresia simpliciuscula*	No	Mesic to wet tundra, fens.
Park milkvetch *Astragalus leptaleus*	No	Sedge-grass meadows, swales, hummocks, along willows.
Wetherill's milkvetch *Astragalus wetherillii*	No	Open sites primarily in pinyon-juniper woodlands.
Smooth northern rock-cress *Braya glabella*	No	Alpine habitats in calcareous soils.
Rocky Mountain thistle *Cirsium perplexans*	No	Clay soils derived from the shales of the Mancos or Wasatch formations with pinon-juniper woodlands, sage, saltbrush, and mixed shrublands, usually disturbed.
Roundleaf sundew *Drosera rotundifolia*	No	In Region 2, fens.
Stonecrop gilia *Gilia sedifolia*	No	Dry, rocky talus of tuffaceous sandstone, above treeline in known Colorado population.
Colorado tansyaster *Machaeranthera*	No	Montane to alpine in a variety of habitats.

coloradoensis		
Kotzebue's grass of parnassus *Parnassia kotzebuei*	No	Moist subalpine areas, boggy soils, along creeks. Mossy ledges and seeps. Habitat not present in project area.
DeBeque's phacelia *Phacelia scopulina* var. *submutica*	No	Occurs on barren brown clay patches found on Atwell Gulch and Shire Members of the Wasatch Formation. Elevation ranges form 5,040 – 6,200 ft. Candidate T&E species.
Ice cold buttercup *Ranunculus karelinii*	No	Dry, rocky alpine habitats above 10,000 feet within its Region 2 range. Habitat not present along proposed route.
Arizona willow *Salix arizonica*	No	Subalpine wet meadows and streams. Single known CO occurrence is above 10,000 feet.
Autumn willow *Salix serissima*	No	Associated with permanently saturated soils with peat present.
Cathedral Bluff meadow-rue *Thalictrum heliophilum*	No	Sparsely vegetated, dry shale talus slopes of the Green River Formation at elevations of 6300-8800 ft. (Spackman et al 1997)

Table 3.19. Management Indicator Species Considerations

Species	Present and Affected by Project	Habitat Description and requirements
Elk	No	Various habitats including oak, sage, aspen, and conifer forests. Winter range includes lower elevation oak and sage, summer range primarily higher elevation forest.
Abert's squirrel	No	Obligate to ponderosa pine. Mature pine and pine-oak habitats, primarily on the Uncompahgre Plateau.
Brewer's sparrow	No	Breeds primarily in sagebrush shrublands and in alpine meadows. Nests in small shrubs or low trees, usually less than one foot above ground.
Northern goshawk	No	Up to 11,200 feet. Spruce/fir, Douglas fir, mixed conifer, aspen, ponderosa pine, lodgepole pine. Uses a variety of forest structural stages although mature forests are required for nesting.
Merriam's wild turkey	No	Associated with Gambel oak, pinyon-juniper, ponderosa pine, and neadow edges.
Pine marten (American marten)	No	Subalpine, spruce-fir and lodgepole pine forests, alpine tundra and occasionally Montane forests. Generally associated with older growth or mixed age stands of spruce fir and lodgepole pine
Red-naped sapsucker	No	Mature aspen, including aspen with a riparian willow component. Migratory.
Common trout (includes Colorado River cutthroat, rainbow, brook and brown trout)	No	Stream and lake habitats with cool to cold clear water.

3.22 Range Resources and Other Land Uses Affected Environment

Introduction
Dominant land uses within the region are mining, mineral exploration, agriculture, logging, residential development, and recreation. Specifics about land use within and adjacent to the coal lease modification are set forth in Section 3.1 Past, Present and Reasonably Foreseeable Cumulative Actions Considered in this Analysis. This section describes the various land uses within and surrounding the coal lease tracts.

Private and Public Lands
The lease modification is all on federal lands.

Timber Operations
The no major timber harvest activities in the region have occurred in the lease modification or surrounding analysis area. Future large timber sales are not being planned in this area. The Forest Service does not expect that small timber sales would occur in the future.

Oil and Gas
Although the area of the lease modification does contain lease for oil/gas activity, none have occurred or are currently proposed for the area.

Agricultural Activities
Agricultural activities have historically been, and continue to be, a prominent part of the local Paonia economy. Fruit production (orchards) is generally confined to the valley floors and low mesas/terraces adjacent to the North Fork of the Gunnison River. In recent years, vineyards (and several wineries) have been developed and are being operated in the Paonia area.

Sheep and cattle grazing also occur on pasture land in the Paonia area, with summer livestock grazing occurring in the higher elevations within and adjacent to lands in the proposed in the lease modification.

Some pasture lands have been used for hay production.

Residential Activities
There is no residential housing development planned for the coal lease modification or surrounding area.

Recreation
There are no developed recreation facilities operated by the proposed coal lease modification area. Hunting is the primary recreation activity within and adjacent to these areas. Other dispersed recreational activities occur in the area, but on a limited basis four-wheeling, hiking, picnicking, horse back riding, are all common recreational activities.

3.23 Range Resources and Other Land Uses Environmental Consequences

3.23.1 No Action

Existing range and other land uses would continue in the lease modification areas. There would be no risk for surface tension cracks to form in ponds or on stock or recreation trails in the lease modification area.

3.23.2 Proposed Action
Subsidence-induced ground movements have the potential to damage the stock

ponds, fences or stocks trails if surface tension cracks form where these features are present. In the dry uplands in the area, stock ponds create important water sources for stock and wildlife. Loss of any water source would have negative impacts on the animal distribution and range health. If a crack were to form in an earthen stock pond, the pond may cease to hold water or cease functioning effectively. The probability for cracks to form under stock ponds in the area is negligible. Therefore, the risk to damaging stock ponds is low.

Subsidence of the land surface is not likely to damage fences. During subsidence, the land surface lowers gently, and without noticeable changes to the surface topography, therefore it is unlikely that fences would be damaged. Dispersed surface tension cracks may form across stock trails in the area. Cracks could pose a safety hazard to cattle if they formed and were present when sheep were on the allotment. The likelihood that cracks would form is considered low.

Subsidence-induced ground movements would not affect recreation opportunities in the lease modification areas, or affect the ability to hunt. Surface tension cracks may form on existing trails, but would be expected to close unaided.

In the long term, following mining, the area would be used much as it was before mining. Any surface subsidence caused by underground mining would be minimal and would not affect the post-mining land uses.

3.23.3 Cumulative Effects

Mining, and recreation would probably remain the dominant land uses in the immediate area of the coal lease modification.

Lands over the parent lease and lease modification also contain rangelands and improvements. Cumulative effects would include the potential for multiple disruptions of stock watering sources if ponds are damaged by subsidence. When surface activities occur, the vehicle traffic can have a negative impact on livestock management.

New roads associated with coal exploration/development in adjacent areas can also effect grazing management. New roads can help improve livestock distribution, especially in areas of oak brush. However, if new roads are left open to wheeled traffic, the positive effect is often negated by the increase in traffic. This impact can be mitigated by ensuring that all new roads constructed associated with coal exploration are reclaimed and left passable by foot and horse traffic only. With mitigation and reclamation, the implementation of any of the alternatives would not substantially affect the long-term land use or land use planning on National Forest System lands, BLM-administered lands, or adjacent private areas.

Subsidence would not noticeably alter the appearance of the modification area. Surface disturbances on the coal lease tract due to subsidence would be minimal.

There have not been any timber sales directly in the lease modification area, and none are planned. Since subsidence will not affect personal fuelwood gathering, there are no cumulative effects to consider with regard to timber use of the area.

Cumulative effects to recreation use would include the potential for surface tension cracks to form on trails. It is anticipated that surface tension cracks, if they form, would be dispersed and not concentrated. The cumulative effect would be minimal.

Post-mining land use would be similar for all alternatives. It would include livestock grazing, wildlife habitat, and dispersed recreation.

3.23.4 Conditions of Approval

No additional conditions of approval are recommended other than those already identified in the parent lease.

3.23.5 Consistency with Forest Plan and Other Regulations

Proposed action is consistent with all aspects of Forest Plan regarding Range and other resources and Forest Service Manual 2200-Range Management.

3.24 Cultural and Heritage Resources Affected Environment

Human use of the region has occurred for at least the last 8,000 years. Evidence of early occupation has been found on the nearby Grand Mesa where projectile points of the Early Archaic-Late Paleo period have been found.

Perhaps as early as 1400 A.D. the Ute Indians entered the area from the Great Basin region. By 1750 A.D., the Utes acquired horses and expanded their territory eastward over the Rockies and onto the Great Plains. Here they were heavily influenced by the Plains Indians and acquired the use of tipis and the art of beadwork. By the late 1800s pressure from miners, ranchers and farmers reduced the Ute territory to ever-dwindling reservations on the west slope of Colorado. After the Meeker Incident of 1879, all Northern Utes were removed to the Uintah-Ouray Reservation in Utah and the Southern Utes were confined to the Southern Ute and Ute Mountain Ute Reservations in southern Colorado.

Subsequent to the Ute removal, ranchers, then miners, moved into the area and small towns were established in the valleys surrounding the mountains. The mountain areas were used for grazing and seasonal cow camps were constructed. Coal mining and natural gas exploration occur today in the North Fork Valley in proximity to the project area.

Several heritage resource inventories have occurred within the proposed project area. All areas within this proposal were examined by an adequate heritage resource inventory and no significant heritage resources were located.

These inventories occurred in areas where there could have been a likelihood of discovering heritage resources, i.e., along the ridge tops and in the drainage bottoms. No rockshelters, overhangs, or historic structures were encountered.

3.25 Cultural and Heritage Resources Environmental Consequences

3.25.1 No Action

No heritage or cultural resource sites would be affected.

3.25.2 Proposed Action

No known heritage or cultural resources will be affected by the proposed action.

3.25.3 Cumulative Effects

There will be no direct/indirect effects on known heritage resources, thus no cumulative effects will occur.

3.25.4 Conditions of Approval

No additional conditions of approval are deemed necessary for heritage resources other than those occurring in the parent lease.

3.25.5 Consistency with Forest Plan and Other Laws

Proposed Action is consistent with the Forest Plan and all other laws governing archaeological resources.

3.26 Transportation Affected Environment

Regulatory Framework Roads and Trails

Roads and trails are managed through the GMUG Forest Plan, the Gunnison National Forest Interim Travel Restrictions, and Forest Service Handbook (FSH) 7700. Roads and trails are managed to provide public and administrative access, and recreational opportunities while protecting the quality of other resources, such as air quality.

Analysis Area and Methods

The project and cumulative effects area of influence is State Highway 133 between Paonia and Somerset, CO; north to NFST 806. No roads or trails are currently located in the lease modification area.

The major transportation route in the Paonia and Somerset region is State Highway 133. This highway serves local vehicular and truck traffic for the communities in Delta and Gunnison Counties. The highway provides access to the coal handling facilities and existing spur rail line in the Somerset area, and to surface operations mines in the North Fork Valley.

State Highway 133 is an asphalt, all-weather, two-lane highway which has been periodically upgraded over the past 20 years. In 1996, the average daily traffic on Highway 133 east of Paonia was 3,150 vehicle trips per day. Traffic counts in the Somerset area average 2,000 per day and decrease to only 1,050 per day between the Somerset area and the town of Marble. Based on a one percent per year population growth rate, it is estimated that the 2008 average daily traffic on Highway 133 east of Paonia was approximately 3,550 vehicle trips per day. Traffic counts in the Somerset area average 2,280.

The GMUG manages NFST 806 as a motorized trail, suitable for ATV traffic. Traffic use on 806 is relatively low, with the majority of use occurring during hunting season. A small amount of traffic uses these roads for recreational purposes, including hunting.

Grazing permittees also use the trail for access to range allotments. No Forest Service maintained trails exist in the modification area.

3.27 Transportation Environmental Consequences

3.27.1 No Action

Under the No Action Alternative, mining of the reserves at the Elk Creek Mine would continue at existing rates until the coal reserves are depleted. No additional impacts on the transportation system would be expected. On going effects

related to methane drainage drilling and exploration on BLM and private lands would continue to occur until project completion. Other uses of the existing roads would continue to occur.

3.27.2 Proposed Action

No additional demand for transportation of employees to the mine surface operations facilities, or coal handling and transport facilities would be required under this alternative. Mining operations and processing would be extended throughout the period required to mine available coal. The existing use of State Highway 133 as access to the mine operations and facilities would continue at close to the existing rate for an additional 4 months as a result of developing the lease modification (see Appendix C). It is noted that existing rail transportation constraints currently limit the annual production from the North Fork Valley.

No additional impacts on transportation would be expected.

The existing use of State Highway 133 as access to the mine operations and facilities would continue at near the existing rate for an additional 2.5 years

3.27.3 Cumulative Effects

Depending on Roadless rule restrictions, it may be possible for NFST 806 to be used for additional coal exploration drilling, methane drainage well installation, ventilation facilities, etc.

On a cumulative basis, if the lease modification were not approved, coal mining in the North Fork of the Gunnison River Valley would continue as permitted by existing leases and reserves. Other leases may be let elsewhere in the immediate vicinity of the lease modification or in the general area. Eventually, coal mining would cease as the coal reserves of existing leases deplete. Traffic and use of State Highway 133, local private, USFS and BLM roads and trails would continue for the next 10-15 years as needed for development/monitoring of existing leases.

The cumulative transportation effects of past, present and reasonably foreseeable actions in the North Fork of the Gunnison River Valley relative to coal mining operations would be negligible.

No additional surface use for road or trail construction will be allowed in the modification area.

3.27.4 Consistency with Forest Plan and Other Laws

The GMUG Amended Land and Resource Management Plan (Forest Plan), dated September 1991, and the BLM Uncompahgre Basin Resource Management Plan (RMP), dated July 1989, made provisions for coal leasing subject to the application of the coal unsuitability criteria established in 43 CFR 3461.

3.28 Coal Resource Recovery Affected Environment

Stratigraphy

The modification is located in the Paonia coal field on the North Fork of the Gunnison river. The formations in the area of the lease modification dip N-NE about 3.5 degrees. The sediments underlying the tract are of Cretaceous

and Tertiary age and are described in descending order.

The Ruby (Wasatch) formation overlies the Mesa Verde formation and consists of red and buff shales, red sandstones, and red to grey conglomerates. It can be 1600 ft. thick. The Mesa Verde formation contains four members. The top member is called the Barren member, can be 1500 ft. thick, and is composed predominately of buff lenticular sandstones. The Paonia member lies below the Barren member, contains two coal horizons, and ranges from 300 to 500 ft. thick. The top portion of this member is a lenticular cliff forming sandstone which can occur at slightly different stratigraphic horizons. The Bowie member is the lower coal bearing member and ranges from 270 to 350 ft. thick. It is composed predominately of grey shale and contains several coal beds in three coal horizons. The top of the member is marked by a massive buff sandstone 90 ft. thick. The Rollins sandstone member lies below the Bowie, is a massive cliff-forming buff-white sandstone 120 to 200 ft. thick, and serves as the most persistent marker horizon in the area. The Rollins clearly defines the lower limit of coal occurrences in the area. Below the Rollins Sandstone member of the Mesa Verde is the Mancos Shale formation which is approximately 4000 ft. thick. The upper portion of the formation which is exposed in the area is composed of grey marine shales and minor buff sandstones.

Coal Beds

BLM reviewed existing coal resources in all the seams in the tract but found none were mineable except those applied for in the D-Seam although B-Seam reserves might be modified into the tract if future economics allow. The A seam is thin, the B & C seams lay well beyond the 2000' overburden. The E and F seams were inconsistent in thickness and quality thereby being rendered unmineable.

D-seam This coal seam averages 13.4 ft. thick and is classified high volatile Bituminous. Its average location is about 350 feet above the Rollins sandstone. The seam varies in thickness from 6' to 16' but within the modification it ranges from 11' to 18'. In most areas a thin interburden layer splits the seam into two members called D-1 (lower) and D-2 (upper). Areas of greater thickness are generally locations where the two coal members have little or no interburden and actually appear as a uniform seam. The modification covers an area where the D-1 and D-2 are merged as a single thick seam. The recoverable reserves for this seam are calculated to be 581,000 tons on the modification plus 795,000 tons gained on the original lease.

Overburden on the tract ranges from 1200 ft. (at the southern end) to just over 2500 ft. (on the north end), and *averages* about 2200'. Although this high overburden has greater ground stresses associated with it, the BLM criteria of coal recovery calculations considers a full development of north mains the entire projected length of the modification.

COAL QUALITY - The B-Seam coal is high volatile C bituminous with an “as received” analysis for the moisture, ash, sulfur, and BTU content based on drill hole samples expected to be approximately: Ash 10.19%, Sulfur 0.43%, BTU 13,092.

Projected coal quality for the modification is expected to be similar to

current quality being extracted from the Elk Creek Mine. The seam has exhibited some roof failure dilution where development occurs, therefore the coal mined from the modification would be of lesser quality but will be blended with higher quality longwall coal before being sold.

Mining Factors

METHOD CONSTRAINTS - The amount of overburden (mentioned above) necessitates underground mining, and for Oxbow that method is restricted to the longwall method of mining due to their commitment to employ it in all their mining ventures. Oxbow would use continuous miner equipment on the modification to develop north-northeast mains and gate roads necked off to the west for longwall blocks on the original lease tract.

Production Factors

Current
Short Term Schedule - Production to meet the market demand is supplied by two active development sections operating on two 8 hr. shifts per day, 7 day per week schedule that total 1400 to 1450 operating shifts per year. The single longwall production unit will work a single 8 hr. shift per day 7 day per week schedule and should total 320 to 350 shifts per year.

Production Data -- The current Elk Creek mine operation extracts coal entirely within the D-Seam to the west and southwest of the modification. OML successfully mines coal using continuous miners to develop seven-entry mains and three-entry gate roads. Development is ahead of longwall mining; therefore, the modification would be developed ahead of final mining on the original lease tract and the very last longwall mining would take place on a small portion at the northern most end of the modification. With longwall operations in place, the mine would be capable of producing up to 6 million tons per year

Mining Equipment -- The following is a list of major equipment currently slated for use by Oxbow and is typical for underground longwall operations:

- Continuous Miners 3
- Roof Bolters 4
- Shuttle Cars 9
- Utility Scoops 3
- Utility Haulers 3
- Utility Man trips 6
- Shield Puller 1 60"
- Belt Drives 8
- Shield Hauler 2
- Shearer (JOY) 1
- Face Shields & Pans 206 (built by M.T.A.)
- Main Mine Fan 2

Life of Mine - The BLM calculated recoverable reserves based on the current OML mine plan layout are those existing in the fee and federal holdings being accessed by the Elk Creek Mine. They are approximately 39 million tons and would provide 6 - 8 years of life at the projected longwall production rates. It should be noted that just over 20 million tons are under greater than 2000 ft. of overburden and may prove to be difficult to recover. Current north mains development in the Elk Creek Mine is idle awaiting a start-up as early as October 2008 which would almost immediately cross onto the modification tract at its southern end. The development would then proceed across the modification to the northern boundary near the end of the life-of-mine. The current manpower level averages about 305.

3.29 Coal Resource Recovery Environmental Consequences

3.29.1 No Action

There would be no coal recovered from the lease modification area under the No Action Alternative. Mining would continue in existing approved portions of the mine until reserves are depleted.

3.29.2 Proposed Action

Short Term Schedule - Oxbow management has no plans to increase production beyond that level anticipated from the longwall operation. Mining currently conducted in the Elk Creek Mine would extract about 1.6 million tons of fee coal intermittently during 2008 and 2009 then produce exclusively from federal coal (including the modification) to the end of the life-of-mine.

Production Data - The operation has portal and shafts into the D seam on fee coal property near the current surface facilities now being used by Oxbow. Production would remain within the D seam for the life-of-mine. Panel geometry for the modification would incorporate mains developing approximately north-northeast and longwall panels developed west-northwest off those mains. Production could vary but is expected to be about 6 million tons per year and go no lower than 4 million tons per year or no higher than 7 million tons per year.

Mining Equipment - The current projection is that longwall mining equipment would continue to be employed. (SEE LIST ABOVE)

Life of Mine - The modification would add about 3 months to the life of the mine. Some of that time is due to the added longwall production block area gained on the original federal lease tract where the north mains were originally projected. The actual operating time spent on the modification could last 3 to 4 years since coal production rates might be less and development activity of the north mains would not need to be completed until near the end of the life-of-mine.

Manpower - Current level is projected to remain about the same with a short period of lower requirements near the end of the life-of-mine.

Surface Facilities

The current surface coal handling facilities of the Oxbow Elk Creek mine are capable of handling longwall mining production. They are located at Somerset on state highway 133, and would serve the needs of the operation even with additional coal leased as proposed in the modification as applied for by OML.

Transportation

The current surface transportation infrastructure at the Elk Creek mine would serve the mining needs of the operation even with the addition of the modification. The current belt structure used to deliver coal from the Elk Creek mine working faces to the surface coal handling facility would be used in the altered extent of the mine. The existing train load-out tipple would be employed for that same purpose during the life-of-mine on the modification.

Estimated Recovery

The D-Seam recovery within the ECM4 should approximate calculated recovery using the OML north mains projection with 1830 tons per acre-ft., 11’ of

excavation, and considering the following:

1. 59 acres of CM mains and gate road development at 27% recovery.
2. 12.9 acres of LW block mined at 100% recovery. 39.4 acres of LW block gained on original lease at 100% recovery.

BLM calculates a recoverable reserve for the modification to be 581,000 tons plus 795,000 tons gained on original lease. Total additional tons recovery realized is calculated to be 1,376,000 tons.

Potential Markets

Coal markets supplied by production from the modification area are expected to be somewhat the same as those historically supplied by Oxbow with production from the Elk Creek mine. The operation primarily supplies coal for American electrical power generation used by the public. The approximate breakdown of market destinations for the coal is shown below:

- Electric Utilities 80 - 85%
- Cement & Lime Manufacturing 12 - 16%
- Other Manufacturing 3 - 5%

Maximum Economic Recovery Determination

The modification has been determined by availability of mineable coal (constrained by the limiting acreage of a modification area and the orientation of the north mains projections). It is located in such a way as to allow the Oxbow planned Elk Creek mine projections the most efficient access to federal coal using north mains turned slightly east at the point of the existing extent of the north mains. It enhances the value of the Oxbow existing federal coal holdings. Although a neighboring coal company (Bowie Resources, Ltd.) has a federal coal lease in coal reserves to the west of the Oxbow holdings, they do not have any interest in the modification; therefore, the modification application will not generate competitive bidding. It is entirely unlikely that a third party would deem the coal resource in the modification either substantial or valuable enough for them to initiate new surface and underground facilities.

It has been determined by BLM that Maximum Economic Recovery (MER) of the modification can be achieved by underground mining using the longwall method mining as described above.

3.30 Social and Economic Resources Affected Environment

The Environmental Justice Executive Order 12898, released by the White House in February 1994, places attention on any adverse human health and environmental effects of agency actions that may disproportionately impact minority and low-income populations.

Low-income populations are households that live below the subsistence or poverty level as defined by local, states, or national government. The Order simultaneously directs Federal agencies to avoid making decisions that discriminate against these communities.

Environmental justice means that to the greatest extent practicable and permitted by law, 1) populations are provided the opportunity to comment before decisions are rendered on, and 2) are allowed to share in the benefits of, are not excluded from and are not affected in a disproportionately high and adverse manner by government programs and

activities affecting human health or the environment.

The area of influence for the social and economic elements of this EA includes both Delta and Gunnison counties in west central Colorado.

The cumulative impact area would include both Gunnison and Delta counties. Baseline data for the counties in the area of influence includes population and demographic data as well as current business and economic statistics information for the Information in this section was obtained from the US Bureau of the Census based on the 2000 census data and 2004 estimates. Additional information was obtained from the Sonoran Institute (2004).

Population

Table 3.30a (population) presents basic population and demographic information for the Delta County and the state of Colorado. Delta County comprises 1,142 square miles with 24.4 people per square mile and a total population of 27,834 people in 2000. Delta County's population grew by almost 33 percent between 1990 and 2000. According to the Sonoran Institute (2004), Delta County's population grew slower than the state but faster than the nation between 1970 and 2000, with an annual average growth rate of 2.7 percent. The median age in Delta County is 42.3 years with 24.0 percent of the population being under the age of 18 and almost 20 percent being 65 years or older. Over 80 percent of the people age 25 and older in Delta County have graduated from high school, and just over 17 percent have graduated from college (US Census Bureau 2006).

Social and Economic Resources population grew slower than the state but faster than the nation between 1970 and 2000, with an annual average growth rate of 2.7 percent. The median age in Delta County is 42.3 years with 24.0 percent of the population being under the age of 18 and almost 20 percent being 65

Table 3.30a. Population by Category, 1990 and 2000, Delta County and the State of Colorado

	1990	2000	Percent Annual Change 1990-2000
Population			
Delta County	20,980	27,834	3.3
Colorado	3,294,394	4,301,261	3.1
Male			
Delta County	10,353	13,972	3.5
Colorado	1,631,295	2,165,983	3.3
Female			
Delta County	10,627	13,862	3.0
Colorado	1,663,099	2,135,278	2.8
Under 20 years			
Delta County	5,571	7,291	3.1
Colorado	958,341	1,224,668	2.8
65 years and over			
Delta County	4,691	5,473	1.7
Colorado	329,443	416,073	2.6
Median Age			
Delta County	NA	42.3	
Colorado	NA	34.3	

Source: Sonoran Institute 2004.

years or older. Over 80 percent of the people age 25 and older in Delta County have graduated from high school, and just over 17 percent have graduated from college (US Census Bureau 2006).

The town of Delta is the largest town in Delta County with a 2004 population of 8,087, an increase of 26 percent since 2000. Other communities in the county include Cedaredge (2004 population of 2,190), Crawford (2004 population of 397), Hotchkiss (2004 population of 1,024), Orchard City (2004 population of 3,094), and Paonia (2004 population of 1,639) (Region 10 2005).

The 2000 US Census reports that there were 12,374 housing units in Delta County that housed 11,058 households,

indicating a vacancy rate of less than 11 percent. Only 3.7 percent of the vacant houses are classified as seasonal, recreational, or for occasional use.

Approximately eight percent of rental units were classified as vacant. There were 2.43 persons per household. Delta County had a home ownership rate of 77.5 percent in 2000, well above the state average of 67 percent. The median value of an owner occupied housing unit was $115,500, well below the state average of $166,600 (US Census Bureau 2006).

Table 3-29b (population) presents basic population and demographic information for the Gunnison County compared to the state of Colorado.

Gunnison County comprises 3,260 square miles with 4 people per square mile and a total population of 13,956 people in 2000. Gunnison County's population grew by almost 36 percent between 1990 and 2000, slightly more than 3.1 percent rate of increase of the state population.

The median age in Delta County is 30.4 years with 24.0 percent of the population being under the age of 20 and 7 percent being 65 years or older. Over 94 percent of the people age 25 and older in Gunnison County have graduated from high school, and just over 76 percent have graduated from college (US Census Bureau 2006).

Gunnison is the largest town in Gunnison County and the county seat. Gunnison's population in 2000 was 5,490. Crested Butte is the other larger community in Gunnison County with a 2000 population of 1,529. Somerset, where the West Elk Mine is located, is an unincorporated town with a population in 2000 estimated at 190 and 201 estimated in 2005. All three communities are increasing slightly in population.

Table 3.30b Population by Category, 1990 and 2000, Gunnison County and the State of Colorado

	1990	2000	Percent Annual Change 1990-2000
Population			
Gunnison County	10,273	13,956	3.6
Colorado	3,294,394	4,301,261	3.1
Male			
Gunnison County	5,442	7,563	4.0
Colorado	1,631,295	2,165,983	3.3
Female			
Gunnison County	4,831	6393	3.2
Colorado	1,663,099	2,135,278	2.8
Under 20 years			
Gunnison County	2,998	3,308	1.0
Colorado	958,341	1,224,668	2.8
65 years and over			
Gunnison County	657	965	4.7
Colorado	329,443	416,073	2.6
Median Age			
Gunnison County	28.3	30.4	.7
Colorado	NA	34.3	NA

Source: Sonoran Institute 2004, US Census 2000.

The 2000 US Census reports that there were 9,135 housing units in Gunnison County with 5,649 occupied and 3,486 vacant. Nearly all the vacant units are seasonal, recreational, or for occasional use (3,125). Approximately 5.5 percent of rental units were classified as vacant. There was an average of 2.30 people per household. Gunnison County had a home ownership rate of 58.3 percent in 2000, below the state average of 67 percent. The median value of an owner occupied housing unit was $189,400,

higher than the state average of $166,600 (US Census Bureau 2006).

Economic Resources

The area of influence for economic resources is comprised of Delta and Gunnison Counties.

Delta County is the county of residence for most of the mining personnel and supports most of the indirect employment that provides supplies and services to mine workers and their families. Gunnison County is included in the area of influence because the Elk Creek Mine is in Gunnison County, and the county receives royalty and tax revenues from the mine.

Gunnison County receives about $1.1 million annually in tax revenues from the Elk Creek Mine. Mining companies are the largest property tax revenue sources for Gunnison County. Gunnison County has identified the areas surrounding the coal mines as the *North Fork Valley Coal Resource Special Area.*

Together, these counties supported 24,519 full and part-time jobs in 2000, an increase of 16,007 jobs since 1970. In 2004, in Gunnison County, 655 of its 7,511 wage and salary jobs are in the mining sector, and increase of 55 jobs since 2000. Mining employment in Delta County was not reported because the data was suppressed for confidentiality (Region 10 2005).

The unemployment rate in Gunnison County in 2004 was 4.2 percent, below the statewide average of 5.5 percent. The Delta County unemployment rate of 5.2 percent, is also lower than the statewide average (Region 10 2005).

As of spring, 2008, the Elk Creek Mine employed approximately 325 full and part time workers with an annual payroll of approximately $32 million.

Average mining wages in Gunnison County in 2004 ($64,220) were more than twice the average wage for all employment sectors ($26,832) (Region 10 2005). The North Fork mines spent up to $100 million in 2006 locally for materials, supplies, and services, and royalty and tax payments for Elk Creek Mine totaled approximately $35 million. Total direct economic benefits associated with the North Fork Mines exceed $60 million annually.

Environmental Justice

Executive Order 12898 (Feb. 11, 1994), *Federal Actions to Address Environmental Justice in Minority and Low-Income Populations* was executed to avoid a disproportionate placement of adverse environmental, economic, social, or health effects from Federal actions and policies on minority and low-income populations. Analysis requires the identification of minority and low income populations that may be affected by any of the alternatives.

The area of influence for environmental justice is Delta County, Colorado, where the majority of Elk Creek Mine workers and their families live. Demographic information on ethnicity, race, and economic status is provided in this section as the baseline against which potential effects can be identified and analyzed.

Identification of Minority and Low Income Populations

For purposes of this section, minority and low income populations are defined as follows: Minority populations are persons of Hispanic or Latino origin of any race, Blacks or African Americans, American Indians or Alaska Natives, Asians, and Native Hawaiian and other Pacific Islanders.

Low-income populations are persons living below the poverty level. In 2000, the poverty weighted average threshold for a family of four was $17,603 and $8,794 for an unrelated individual. Estimates of these two populations were then developed to determine if environmental justice populations exist in Delta County (Table 3.30c).

Table 3.30c Minority or Low-income Populations Delta County and State of Colorado, 2004

Location	Total Population	Percent Minority	Percent below poverty (2003)
Delta	29,947	15.0	13.2
State of Colorado	4,665,177	27.5	10.0

Source: US Census Bureau 2006.

Minority populations were lower in Delta County than in the state of Colorado; the low income population in Delta County was higher than for the state of Colorado.

The Council on Environmental Quality (CEQ) identifies minority and low income groups as EJ populations when either (1) the population of the affected area exceeds 50 percent or (2) the population percentage in the affected area is meaningfully greater (generally taken as being at least 10 percent more) than the population percentage in the general population of the region or state. Neither the minority population percentage nor the low-income population percentage that would be affected by the project meets the CEQ guidelines. As a result, it is assumed that no environmental justice populations exist within the area of influence, and no impact analysis is required.

Protection of Children

Executive Order 13045, *Protection of Children from Environmental Health Risks and Safety Risks* (April 21, 1997), recognizes a growing body of scientific knowledge that demonstrates that children may suffer disproportionately from environmental health risks and safety risks. These risks arise because (1) children's bodily systems are not fully developed, (2) children eat, drink, and breathe more in proportion to their body weight, (3) their size and weight may diminish protection from standard safety features, and (4) their behavior patterns may make them more susceptible to accidents. Based on these factors, the President directed each Federal agency to make it a high priority to identify and assess environmental health risks and safety risks that may disproportionately affect children. The President also directed each Federal agency to ensure that its policies, programs, activities, and standards address disproportionate risks to children that result from environmental health risks or safety risks.

Children are seldom present at the coal mining facilities. On such occasions, the coal mining companies have taken and will continue to take precautions for the safety of children by using a number of means, including fencing, limitations on access to certain areas, and provision of adult supervision. No additional impact analysis is required.

3.31 Social and Economic Resources Environmental Consequences

3.31.1 No Action

Under the No Action Alternative, the primary impact would be that the estimated 1,376,000 tons of additional recoverable coal would not be mined.

Mining of the reserves at the Elk Creek Mine would continue at existing rates

until the available coal reserves are depleted. Job and associated salaries, local expenditures, royalty and tax payments would not be realized after the reserves are depleted. This alternative would limit the opportunity to realize economic benefits. The Federal government would not receive the rents and royalties associated with mining the coal in the Federal Coal Lease COC-61357 proposed lease modification area.

3.31.2 Proposed Action

Existing employment opportunities at the Elk Creek Min would continue. No additional demand for housing or municipal services would be anticipated.

Mining operations would be extended throughout the period required to mine the additional 1,376,000 tons of recoverable coal reserves in the D Seam, plus the approximate 4 years of permitted reserves at the present average monthly extraction rate (~410,000 tons per month). The D Seam coal in the modification would be mined from about 2008 to 2012. The extension of mining operations would also extend the annual payroll, local expenditures, and taxes and royalty payments.

The direct economic benefits associated with continued mining at the Elk Creek Mine would equal approximately $1.1 million per month, which equates to approximately $52 million for the 4 year remaining life of the mine.

Royalty payments are 8 percent of the value of the coal removed from an underground mine (43 CFR 3473). Of royalties from the Federal coal, 50 percent returns to the Federal treasury in the general fund and 50 percent is returned to the state where the coal was mined, with a portion of that percentage being returned to the county where the coal was mined. In Colorado, those funds are managed by the State Department of Local Affairs in the Energy Impact Fund. These monies are distributed on a grant-like basis to counties affected by energy resource development for community benefit projects.

3.31.3 Cumulative Effects

The cumulative social and economic effects of past, present and reasonably foreseeable actions in the North Fork of the Gunnison River Valley relative to coal mining operations would be to continue the mining employment sector pretty much the same as it is.

Coal mining at other coal mines in the North Fork of the Gunnison River Valley would continue. Delta and Gunnison counties are currently adding approximately 530 full-time or part-time positions annually which accounts for nearly one percent of the employment in the area of influence (255 out of 24,519 full time or part time jobs). Mining accounts for ~700 jobs, a loss or reduction in employment of 325 (~35 percent) at the Elk Creek would adversely affect the mining jobs available and the overall salary of jobs in the county.

Cumulatively, the continued operation of the Elk Creek Mine until ~2012 will contribute to the overall important, beneficial impact on Gunnison and Delta Counties from mining. The proposed action and other ongoing and reasonably foreseeable coal mining operations would continue to directly provide approximately 10 percent of the employment, pay the largest amount of property taxes and maintain a relatively high general salary for the area.

3.31.4 Consistency with Forest Plan and Other Laws

Proposed Action is consistent with Executive Orders 12898 (Feb. 11, 1994) and Executive Order 13045 (April 21, 1997) addressing Environmental Justice and the Protection of Children from Environmental Health Risks and Safety Risks respectively, the 1991 GMUG Forest Plan and 1989 BLM Uncompahgre Basin Resource Management Plan (RMP).

3.32 Visual Quality Affected Environment

Visual resource management is guided by the GMUG Forest Plan (USDA FS 1983 as amended 1991). Visual resource management promotes protection, and if possible enhancement, of the visual quality of an area.

The project area includes the viewshed (Elk Creek watershed) potentially affected by the mine development. The GMUG determined Visual Quality Objectives (VQOs) when the land resource management plan was developed in 1983. Since then, the FS has changed to the Scenery Management System (SMS) described in Agricultural Handbook 701 (USDA FS 1995). The GMUG uses a SMS and VQOs respectively to evaluate visual resources. VQO criteria include landscape character, scenic attractiveness, scenic integrity, concern levels, and distance zones. Landscape character expresses the visual image of a geographic area and consists of the combination of physical, biological, and cultural attributes that make each landscape identifiable or unique. The term delineates landscape attributes that distinguish an area. The landscape character of the project area is generally natural appearing with a lack of FS roads and trails. Minor improvements such as livestock management facilities such as fences, stock ponds are present. Tree cover patterns help shield the access/road and adjacent mining activities, creating a visual combination of rock, water, and trees, which make up the aesthetic qualities of the area. There are no existing access roads or system trails in the project area. Scenic Attractiveness is a class rating of the relative scenic value of a landscape. The project area is all in the typical class. Residents and tourists visit the area for scenic and recreation values.

The Forest Plan has assigned the VQO of modification to the majority of the area, however, portions are partial retention.

These VQOs can be translated into the SMS as low scenic integrity for modification and moderate scenic integrity for partial retention.

Low scenic integrity appears moderately altered, while moderate scenic integrity appears slightly altered. The project area is not directly visible from a public highway, including the Grand Mesa Scenic and Historic Byway, or from the West Elk Loop Scenic Byway, both Concern Level 1 (high scenic integrity) travelways. The major transportation route in the Paonia and Somerset region is State Highway 133. This highway serves local vehicle and truck traffic for the communities in Delta County, including providing access to the coal handling facilities and existing spur rail line in the Somerset area and to operations at the Elk Creek Mine in the North Fork Valley.

3.33 Visual Quality Environmental Consequences

3.33.1 No Action

Under the No Action Alternative, the proposed the coal lease modification would not be approved. However, existing methane drainage and exploration activities would continue in adjacent areas under separate permits, so minimal impacts to the visual environment would still be expected if the No Action Alternative is selected.

3.33.2 Proposed Action

Under the Proposed Action, no surface disturbance, other than subsidence will occur in the project area. This impact would be consistent with the modification and partial retention VQOs in the GMUG land and resource management plan.

Construction and reclamation activities in adjacent areas would affect form, line and color patterns.

3.33.3 Cumulative Effects

Long-term reasonably foreseeable ground disturbing activities associated with adjacent land uses and historical use would be minimally visible. Though these disturbances would be reclaimed a long term visual quality impact could be anticipated throughout the project area due to the alteration of line and form and color with the addition of differing vegetation.

The impact within the project area would be minimal based upon the limited effect on VQO criterions, and limited access to the area. It would be anticipated that long and short term VQOs would be met in this area.

3.33.4 Conditions of Approval

No conditions of approval regarding visuals are recommended.

3.33.5 Consistency with Forest Plan and Other Laws

The visual quality of the viewshed would not be impacted over the long-term. In the long and short term, VQOs would be met. Proposed Action is consistent with VQOs defined in the Forest Plan and the SMS.

3.34 Noise Affected Environment

From the surface, the actual mining of the coal seam does not create any noise disturbances. However, the noise generated from construction and drilling equipment in adjacent areas would be noticeable even when the equipment causes noise increases as low as 2 dBA.

Noise has historically been recognized as a health hazard with the potential for causing hearing damage. Efforts by industry and regulatory actions have lessened the likelihood for hearing damage occurrence. For example, the U.S. Mine Safety and Health Administration (MSHA) imposes noise standards on coal mining operations for worker hearing protection.

A secondary impact associated with noise is the nuisance effects of noise that include interference with speech, psychologically unsettling environment at home and work, and more specific problems such as sleep disruption. The extent of these effects varies, sometime significantly, between individuals and as a factor of the noise source. The noise characteristics which affect the listener's response include overall loudness, sound pressure level, duration of exposure,

time distribution of occurrence, and sound frequency. Other factors include the listener's total exposure, age, and individual susceptibility.

Background noise level measurements at representative locations around nearby sites were taken on April 21, 1999 and April 23, 1999 were taken during a period when there were no mine related trucks or trains. Rural background measurements were taken during the daytime and nighttime at two locations on Garvin Mesa and at one location next to State Highway 133. Some of the monitoring points in Paonia and Hotchkiss were later used to measure noise levels caused by passing trains.

In general, the background noise measurements were as expected. The quietest measurements taken at night on Garvin Mesa were 36 dBA, with the predominant noise levels being natural bird sounds. Routine daytime noise levels in the Paonia and Hotchkiss residential areas were 48 to 56 dBA with predominant sounds produced by routine local traffic. At the rural site near State Highway 133, measurements showed 41 to 49 dBA during brief periods of no discernible traffic, and spot noise levels of 64 dBA while a coal truck passed. Noise levels during passing trains at sites in Paonia and Hotchkiss registered noise levels ranging from 5l dBA, for a westbound train, at a point 550 feet from the tracks, to 100 dBA for an eastbound train in Paonia approximately 30 feet from the tracks. Train whistle noises measured 11 0 dBA at a point 30 feet from the tracks in Paonia and 106 dBA in Hotchkiss at a point 40 feet from the tracks.

Because decibels are measured on a logarithmic scale, a doubling of the sound pressure corresponds to a noise increase of 3 dBA. For example, a single bulldozer typically produces a sound level of about 80 dBA at a distance of 50 feet from the bulldozer. Two identical bulldozers working side by side would give a noise reading of 83 dBA, and this noise would be perceived as barely louder than one bulldozer.

There are many factors that determine whether an increase in the noise level above the existing background is "audible." The most important factor is the nature of the new noise source as compared to the nature of the background noise. In the case of noise generated from industrial sites such as mining, or the noise generated from coal truck and/or train traffic, this noise would be different from rural background sounds, so relatively small increases in such noise levels caused by mechanical equipment would be noticeable.

The focus of the noise analysis is centered on the mining and transportation activities for coal operations in the North Fork of the Gunnison River Valley.

3.35 Noise Environmental Consequences

3.35.1 All Alternatives

Typically, the noise emissions as a result of adjacent surface facilities for the underground mines are not expected to be a general nuisance to nearby towns and residents, or on the modification itself.

The major noise nuisances associated with these mines would result from truck and railroad transportation of coal; these

impacts are expected to occur on continued basis with future coal production from presently permitted coal production rates for valley mines.

Noise Impacts From Surface Facilities
Noise from routine mining activities at the surface facilities of Bowie and Oxbow would not create any unacceptable noise levels at the nearest homes. Measurements of noise levels near surface facilities of these mines showed that ambient noise levels are low. Noise levels taken at the valley floor beneath the Bowie No. 2 Mine surface facilities ranged from 39 to 46 dBA and were scarcely discernible above background noise. Noise readings taken by Oxbow at homes nearest their surface operation at Somerset ranged from 55 to 61 dBA, but those noise readings were dominated by public traffic.

Ventilation fans would generate a "white noise" sound that would be barely discernible at a distance of 3 to 4 miles.

Under certain meteorological conditions with quiet background, it is possible that noise from the surface facilities of the mine could be audible at Garvin Mesa, approximately 2 miles west of the surface facilities. Under certain conditions, the noise could be perceptible as a nuisance. Generally, however, environmental impacts of that relatively quiet noise would be minor. Most of the noise from the surface facilities at the mines would be blocked by topographic features near the facilities.

Noise Impacts from Train Loading Operations
Noise readings conducted on October 29, 1999 by Air Sciences, Inc. (under contract to Oxbow) at the Oxbow train loading facility at Somerset indicated that the train loading operation complied with Colorado noise statutes.

Noise Impacts from Train Whistles
Whistles blown an estimated 100 feet from the public crossing would be expected to exceed noise levels of 100 dBA. Train whistles sounded at night would exceed the Colorado statutes that limit noise level to 75 dBA at the edge of the railroad right-of-way. The whistle is clearly audible above the quiet background, as intended by federal regulation.

Noise Impacts from Coal Trains
Train noise varies considerably depending on the speed of the train, the distance from the track, and the presence of buildings between the tracks and the receiver. Generally, noise from a fast-moving train would be much higher than noise from a slow-moving train. With regard to passing train noise, the following generalizations are made:

- Homes near the railroad tracks without intervening buildings between them and the tracks would be subject to a severe impact.
- Homes more than about one block from the railroad tracks that are partially shielded by adjacent buildings would be subjected to noise levels above non-train background levels, but the noise levels would not be considered severe.
- Homes more than about two blocks from the railroad tracks that are shielded by intervening buildings would perceive noise levels during the daytime that would be only slightly higher than the background levels.

Although the noise from passing trains would be audible during quiet nighttime periods, the noise of passing trains would not be expected to disrupt sleep or normal speech of individuals living more than two blocks from the railroad tracks under most conditions.

3.35.2 Cumulative Impacts

Noise from the surface facilities of the Elk Creek Mine would not be expected to add cumulatively to noise nuisance impacts.

3.35.3 Conditions of Approval

No conditions of approval regarding noise are recommended.

3.35.4 Consistency with Forest Plan and Other Laws

The GMUG Amended Land and Resource Management Plan (Forest Plan), dated September 1991, and the BLM Uncompahgre Basin Resource Management Plan (RMP), dated July 1989, made provisions for coal leasing subject to the application of the coal unsuitability criteria established in 43 CFR 3461.

3.37 Inventoried Roadless Areas Affected Environment

All Forest Service lands within the lease modification are within the Spring House Park Inventoried Roadless Area (IRA). The Proposed Action includes underground mining of coal without any surface facilities (no roads, methane drainage wells, etc.). Current management of IRAs is guided by the September 2006 re-instatement of the 2001 Roadless Area Conservation Rule (RACR)[2]. Currently in the Springhouse Park IRA there are approximately 11 miles of road and approximately 9 miles of motorized trail which connect to routes on BLM and private. See Figure 5, Springhouse Park Inventoried Roadless Area.

The Springhouse Park IRA was identified in the Roadless Area Review and Evaluation II (RARE II), completed in 1979, which inventoried and evaluated for possible wilderness designation 53 roadless areas on the GMUG NFs. These areas contained 1,523,780 acres. It is this 1979 inventory that is officially on file in the USFS Washington Office, and is the information to be used when following the RACR. In 1980, 374,900 acres of RARE II inventory lands on the GMUG were classified as wilderness by the Colorado Wilderness Act of 1980 (Public Law 96-560). Springhouse Park IRA was not recommended for wilderness designation or identified as a "further planning area". The Colorado Wilderness Act of 1980 released the remaining GMUG NFS lands inventoried as roadless for non-wilderness management. The Colorado Wilderness Act of 1993 (Public Law 103-77) did not consider or designate any portion of the Springhouse Park IRA as wilderness. Further, the GMUG Forest Plan management direction allows for road construction in these areas. In 2005, the Springhouse Park IRA was evaluated within the Roadless Inventory & Evaluation of Potential Wilderness Areas (USDA FS 2005b) for the GMUG's Forest Plan Revision. This analysis evaluated 65 roadless "units" within the GMUG. Based on court rulings in 2006, the management of the original RARE II Springhouse Park IRA

[2] However, this re-instatement was permanently enjoined by Judge Clarence A. Brimmer again on August 12, 2008. At this time, the Forest Service has not established regulatory direction in dealing with this court ruling.

designation is currently directed by the 2001 RACR.

The project area also falls within the area defined by Colorado Roadless Petition (November 13, 2006) as North Fork Coal Mining Area. The Petition was amended by Governor Bill Ritter, Jr. in a letter to Department of Agriculture Undersecretary, Mark Rey, on April 11, 2007 with the following language: "The 2006 Petition identified portions of seven specific IRAs in the Grand Mesa, Uncompahgre, and Gunnison National Forests and removed these areas from the Roadless Inventory during the period of coal exploration and development. My preference in the 2007 Petition is to leave these areas in the Roadless Inventory but to make clear in the Colorado Rule that such areas may be managed in a way that permit roads and other activities associated with coal exploration and development. Any other non-coal related activities resulting in the use or development of new roads would not be allowed. Restrictions identical to those referenced in the 2006 Petition (see (A)(b) and (B) regarding restrictions on motorized access) would be retained." The *Rulemaking for Colorado Roadless Areas Draft Environmental Impact Statement* (Rulemaking EIS) is in its comment period as this EA is being prepared. In the Rulemaking EIS proposal, the Colorado Roadless Areas description of the original Rare II Springhouse Park IRA would be reduced from approximately 17,600 acres to approximately 16,220.

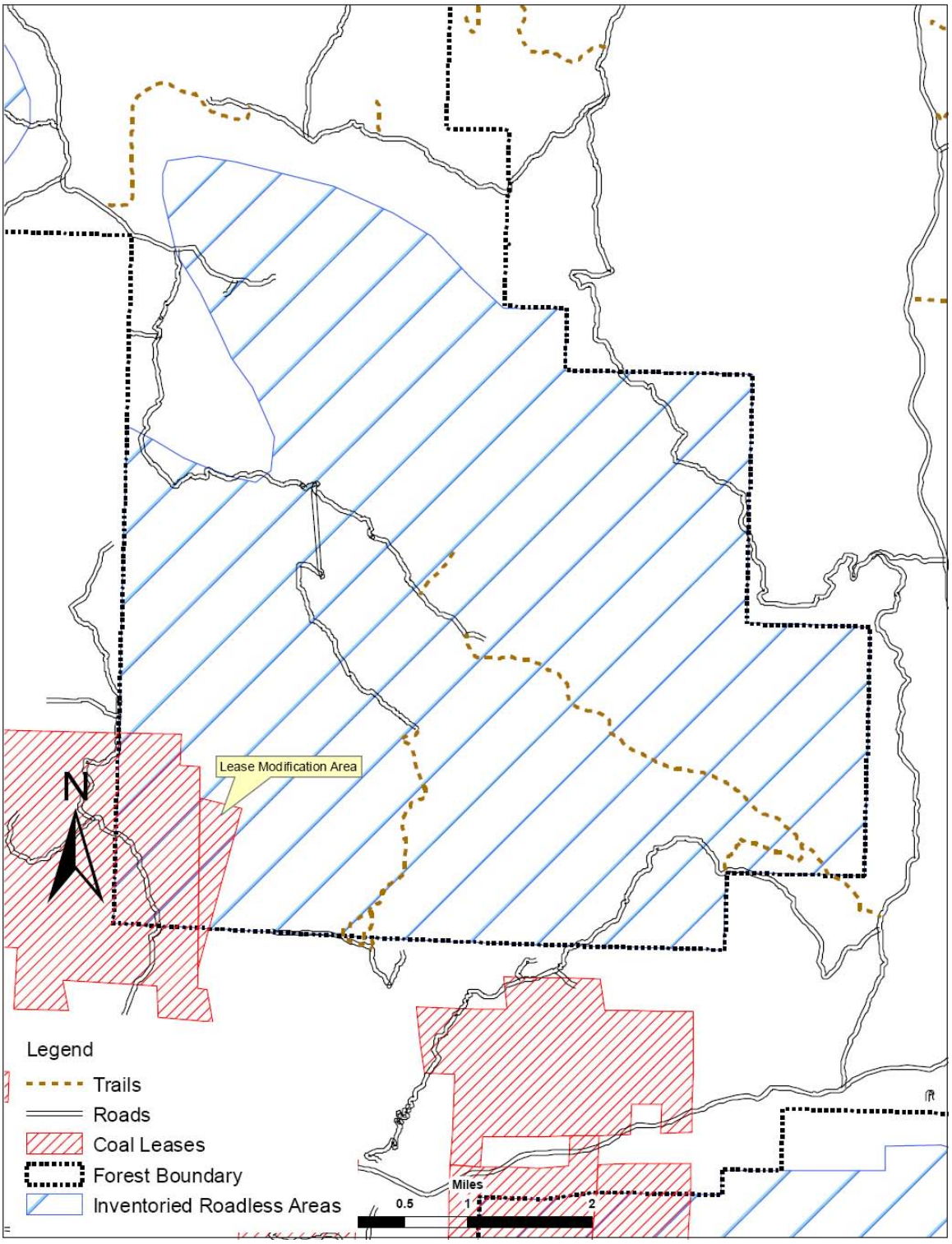
In the interim of the Rulemaking EIS, this project analysis will follow RACR which defines roadless areas to contain nine characteristics and values (36 CFR 294.11, January 12, 2001):

- **High quality or undisturbed soil, water, air** - Soils in the area have been undisturbed. Soils in the area are generally unstable and erodible. The project area encompasses portions of the Elk Creek which is an ephemeral drainage ultimately draining to the North Fork of the Gunnison River (Chapter 3, *Water Resources*). The creek is a neither a fishery nor used as a public drinking water supply. Air quality in the project area meets the state standards; however it is not a classified airshed.
- **Sources of public drinking water** – Elk Creek is not used for public drinking water sources.
- **Diversity of plant and animal communities** -This project would not affect vegetation, fish (except water depletions obtained elsewhere used in mining), or wildlife or affect the biological diversity of the area (Chapter 3, *Wildlife Section*).
- **Habitat for special status (threatened, endangered, proposed, candidate or sensitive) species and for those species dependent on large, undisturbed areas of land** - This project would not affect special status species, or affect the biological diversity of the area (Chapter 3, *Wildlife Section, Threatened and Endangered Species*).

- **Primitive, semi-primitive non-motorized, and semi-primitive motorized classes of dispersed recreation** – Other than occasional hunting in the lease modification area, there are no

recreational activities/facilities such trails or dispersed use sites.

Figure 5. Springhouse Park Inventoried Roadless Area



- **Reference landscapes** -. The area is not used for organized study or research, or as a reference landscape.
- **Natural appearing landscapes with high scenic quality** - The portion of the IRA in the lease modification area has a natural appearance.
- **Traditional Cultural Properties and Sacred Sites** - According to the cultural resources surveys of the area, the likelihood of traditional cultural properties and sacred sites in the project area is low.
- **Other locally identified unique characteristics** No other locally unique characteristics have been identified.

3.38 Inventoried Roadless Area Environmental Consequences

3.38.1 No Action

Current activities related to existing roads and trails would continue in the Springhouse Park IRA.

3.38.2 Proposed Action

Current activities related to existing roads and trails would continue in the Springhouse Park IRA. Effects to Roadless characteristics and values from the lease modification are described below;

- **High quality or undisturbed soil, water, air** - Soils in the area are generally unstable and erodible and may see a immeasurable increase in instability and erosion due to subsidence from underground coal mining due to the lease modification. Elk Creek, which is usually dry, is not anticipated to see any decline/change in water quality. Air quality in the lease modification area will continue to meet state standards.
- **Sources of public drinking water** – As Elk Creek is often dry and not used for public drinking, there will be no effects public drinking water sources from the lease modification.
- **Diversity of plant and animal communities** -As there is no reasonably foreseeable future surface development, the lease modification would not affect vegetation, fish (except water depletions obtained elsewhere used in mining), or wildlife or affect the biological diversity of the area (Chapter 3, *Wildlife Section*).
- **Habitat for special status (threatened, endangered, proposed, candidate or sensitive) species and for those species dependent on large, undisturbed areas of land** - As there is no reasonably foreseeable future surface development, the lease modification would not affect special status species, or affect the biological diversity of the area (Chapter 3, *Wildlife Section, Threatened and Endangered Species*).
- **Primitive, semi-primitive non-motorized, and semi-primitive motorized classes of dispersed recreation** – As there is no reasonably foreseeable future surface development or recreational activities/facilities; there would be no effect to dispersed recreation.

- **Reference landscapes** - There will be no change over current conditions as the lease modification area is not used for organized study or research, or as a reference landscape.
- **Natural appearing landscapes with high scenic quality** - The portion of the IRA in the lease modification will retain a natural appearance despite slight surface cracking, due to subsidence, which is generally unnoticeable to the untrained eye.
- **Traditional Cultural Properties and Sacred Sites** – No traditional cultural properties or sacred sites have been identified in the lease modification area; therefore, there would be no effect.
- **Other locally identified unique characteristics** No locally unique characteristics have been identified; therefore, there would be no effects from the lease modification.

In order to be in compliance with the RACR and current direction, the stipulation regarding the Roadless, will be updated on the parent lease and lease modification area in order to be consistent with currently direction. See Conditions of Approval below.

3.38.3 Cumulative Effects

Cumulative effects to the Springhouse Park IRA would be similar to the Proposed Action in that current activities related to existing roads and trails would continue and there would be subsidence in the lease modification area that would be unnoticeable. Through other NEPA processes, the size of this IRA may be changed and have fewer restrictions on road-building with regard to coal mining and further affect Roadless character.

3.38.4 Conditions of Approval

No surface occupancy is allowed for exploration, methane drainage, or ventilation and/or escape shafts in the modification area.

All or part of the land included in COC-61357 and subsequent modifications, are in the Springhouse Park Inventoried Roadless Area (IRA) and may be subject to restrictions on road-building pursuant to rules and regulations of the Secretary of Agriculture applicable at the time any road may be proposed on the lease. Locations of any proposed surface use will be verified for relationship to IRA boundaries using site-specific maps if/when surface operations are proposed.

This change reflects the recent changes in the 2001 Roadless Rule and subsequent court proceedings.

3.38.5 Consistency with Forest Plan and Other Laws

The Proposed Action is consistent with Forest Plan standards for the characteristics and values described above and also with the RACR of 2001.

3.39 Short-term Uses and Long-term Productivity

NEPA requires consideration of "the relationship between short-term uses of man's environment and the maintenance and enhancement of long-term productivity" (40 CFR 1502.16). As declared by the Congress, this includes using all practicable means and measures, including financial and technical assistance, in a manner calculated to foster and promote the

general welfare, to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans (NEPA Section 101).

See discussions of environmental consequences in this chapter.

3.40 Unavoidable Adverse Effects

For the Proposed Action, subsidence is unavoidable if coal is mined. See Topography and Geology Sections for details.

3.41 Irreversible and Irretrievable Commitments of Resources

Irreversible commitments of resources are those that cannot be regained. In this case the removal of mined coal is an irreversible commitment of resources. Irretrievable commitments are those that are lost for a period of time. In this case the temporary loss of vegetative productivity/cover where subsidence occurs is irretrievable commitment of resources.

Soil loss due to erosion and reduced productivity in areas of subsidence are likely to be irreversible and irretrievable. Landslides or other mass movement, are difficult to fully reclaim and may result in permanent landscape features.

Mitigation measures required by the Colorado CDMG mining permit will reduce, but not eliminate these adverse impacts.

• Heritage Resources
Any disturbance of cultural sites could result in an irreversible commitment. However, research values could be recovered prior to any physical loss. Cultural resources are not known to occur in lease modification area.

CHAPTER 4. CONSULTATION AND COORDINATION

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Southern Utes

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Distribution of the Environmental Assessment

This Environmental Assessment will be distributed to individuals who specifically requested a copy of the document and/or commented during scoping. It will also be made available electronically at:

http://www.fs.fed.us/r2/gmug/policy/

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APPENDIX A - UNSUITABILITY ANALYSIS

Federal Coal Lease Modification COC-61357, Modification 4

DESCRIPTION OF THE FEDERAL LANDS INVOLVED

This unsuitability analysis and report has been prepared to comply with regulations at 43 CFR 3461 for Federal Coal Lease Modification COC-61357 Mod 4, 147 acres of federal coal lands described as:

T.12S. R.90W., 6th PM
All or portion of Section 32: Lots 1, 2, 7, 8, 9, 10, 15, 16

T.13S., R. 90W., 6th PM
All or portion of Section 5: Lots 5, 16, 19

This lease modification application was brought forward by Oxbow Mining, LLC (Oxbow) to compensate for changes in mine design, and to ensure that compliant and super-complaint coal reserves are recovered. . The modification lies immediately east, and is contiguous with federal coal lease COC-61357. The coal in this lease modification would be accessed and recovered by underground longwall mining methods from Oxbows existing Elk Creek Mine. The lease modification application contains National Forest System (NFS) surface lands managed by the Grand Mesa, Uncompahgre, and Gunnison National Forests (GMUG; approximately 141 acres), and lands managed by the Uncompahgre Field Office of the Bureau of Land Management (BLM; approximately 6 acres). The coal estate is administered by the BLM.

As a first step in this analysis, the preliminary mining plan submitted by the applicant was examined in order to identify areas in which the proposed underground mining operation would produce surface effects, including where the zone of influence from subsidence may extend beyond the lease modification boundaries. Areas identified as likely to be affected by subsidence were delineated as having surface effects. For this lease modification the zone of influence is primarily lands within the modification area, however, a small area to the north of the boundary will also be subsided (see attached Map A).

This analysis and report was prepared consistent with the unsuitability criteria published in 43 CFR 3461. The unsuitability criteria were applied individually to the area being considered, and areas identified as having surface effects as applicable. Each criterion was applied individually, then after all criteria had been applied, the exemptions of each criterion found to be applicable were then examined; thirdly a determination was made if the exceptions to each criterion were applicable. Exceptions to certain criteria allow areas to be considered further even though they have been determined to be unsuitable. These exceptions to the criteria are noted where applied.

ANALYSIS OF THE UNSUITABILITY CRITERIA

The analysis examined the applicability of exemptions and exceptions to the criteria as detailed in regulation. Exemptions to the criteria are not described, as no exemptions were determined to apply. Exceptions to the criteria are described only if they apply.

Criterion 1

All Federal lands included in the following land systems or categories shall be considered unsuitable: National Park System, National Wildlife Refuge System, National System of Trails, National Wilderness Preservation System, National Wild and Scenic Rivers System, National Recreation Areas, lands acquired with money derived from the Land and Water Conservation Fund, National Forests, and federal lands in incorporated cities, towns, and villages.

1. Exceptions. (i) A lease may be issued within the boundaries of any National Forest if the Secretary finds no significant recreational, timber, economic or other values which may be incompatible with the lease; and (A) surface operations and impacts are incident to an underground coal mine, or (B) where the Secretary of Agriculture determines, with respect to lands which do not have significant forest cover within those National Forests west of the Meridian, that surface mining may be in compliance with the Multiple-Use Sustained-Yield Act of 1960, the Federal Coal Leasing Amendments Act of 1976 and the Surface Mining Control and Reclamation Act of 1977.

Analysis

The lands described in this lease modification were proclaimed National Forest on June 5, 1905 and are within the Gunnison National Forest. Management direction for coal resources are listed in the Amended Land and Resource Management Plan (LRMP), Grand Mesa, Uncompahgre and Gunnison National Forests - General Direction on pages III-62 through III-70.

The LRMP allows for multiple use management on the lands in the lease modification, which are principally managed for wildlife habitat, however management includes livestock grazing, motorized recreation and vegetation treatment. The LRMP does not identify that any significant recreational, timber, economic or other values which may be incompatible with the lease are present. No significant forest cover is present.

In addition, Oxbow has indicated that there are no foreseeable surface operations within the modification area. Therefore, for reasons stated above, the exception can apply to this criterion.

Criterion 2

Federal lands that are within rights-of-way or easements or within surface leases for residential, commercial, industrial, or other public purposes, on federally-owned surface shall be considered unsuitable.

1. Exceptions. A lease may be issued, and mining operations approved, in such areas if the surface management agency determines that (i) all or certain types of coal development (e.g., underground mining) will not interfere with the purpose of the right-of-way or easement, or (ii) the right-of-way or easement was granted for mining

purposes, or (iii) the right-of-way or easement was issued for a purpose for which it is not being used, or (iv) the parties involved in the right-of-way or easement agree, in writing, to leasing, or (v) it is impractical to exclude such areas due to the location of coal and method of mining and such areas or uses can be protected through appropriate stipulations.

Analysis

There is a General Land Office Order, 10/31/1973, which classifies the lands within the application area for coal. The lands are also within the Paonia-Somerset Known Recoverable Resource Area, COC-20093. There are no rights-of-way, easements or surface leases for residential, commercial, industrial, or other public purposes within the review area.

Criterion 3

Federal lands affected by section 522(e)(4) and (5) of the Surface Mining Control and Reclamation Act of 1977 shall be considered unsuitable. This includes lands within 100 feet of the outside line of the right-of-way of a public road, or within 100 feet of a cemetery, or within 300 feet of any public building, school, church, community or institutional building or public park, or within 300 feet of an occupied dwelling.

1. Exceptions. A lease may be issued for lands (i) used as mine access roads or haulage roads that join the right-of-way for a public road, (ii) for which the Office of Surface Mining Reclamation and Enforcement has issued a permit to have public roads relocated,(iii) if, after public notice and opportunity for public hearing in the locality, a written finding is made by the Authorized Officer that the interests of the public and the landowners affected by mining within 100 feet of a public road will be protected, or (iv) for which owners of occupied dwellings have given written permission to mine within 300 feet of their buildings.

Analysis

No public roads, cemeteries, occupied dwellings, public buildings, schools, churches, community, or institutional buildings exist within this area.

Criterion 4

Federal lands designated as wilderness study areas shall be considered unsuitable while under review by the Administration and Congress for possible wilderness designation. For any federal land which is to be leased or mined prior to completion of the wilderness inventory by the surface management agency, the environmental assessment or impact statement on the lease sale or mine plan shall consider whether the land possesses the characteristics of a wilderness study area. If the finding is affirmative, the land shall be considered unsuitable, unless issuance of noncompetitive coal leases and mining on leases is authorized under the Wilderness Act and the Federal Land Policy and Management Act of 1976.

Analysis

No lands within the review area are designated Wilderness Study Areas. The current LRMP manages these lands for multiple uses (see Criterion 1). Wilderness

characteristics for these lands were evaluated by the GMUG in 2005. These lands did not meet the criteria for roadless character, or wilderness characteristics.

Criterion 5

Scenic federal lands designated by visual resource management analysis as Class I (an area of outstanding scenic quality or high visual sensitivity) but not currently on the National Register of Natural Landmarks shall be considered unsuitable. A lease may be issued if the surface management agency determines that surface coal mining operations will not significantly diminish or adversely affect the scenic quality of the designated area.

Analysis

No lands within the review area are designated as visual resource management Class I areas.

Criterion 6

Federal lands under permit by the surface management agency, and being used for scientific studies involving food or fiber production, natural resources, or technology demonstrations and experiments shall be considered unsuitable for the duration of the study, demonstration, or experiment except where mining could be conducted in such a way as to enhance or not jeopardize the purposes of the study, as determined by the surface management agency, or where the principal scientific use or agency give written concurrence to all or certain methods of mining.

Analysis

No lands within the review area are under permit for scientific study.

Criterion 7

All publicly-owned places on federal lands which are included in the National Register of Historic Places shall be considered unsuitable. This shall include any areas that the surface management agency determines, after consultation with the Advisory Council on Historic Preservation and the State Historic Preservation Officer, are necessary to protect the inherent values of the property that made it eligible for listing in the National Register.

Analysis

No publicly-owned places on federal or fee lands within the review area are included in the National Register of Historic Places.

Criterion 8

Federal lands designated as natural areas or as National Natural Landmarks shall be considered unsuitable.

Analysis

No lands within the review area are designated as natural areas or as National Natural Landmarks.

Criterion 9

Federally designated critical habitat for listed threatened or endangered plant and animal species, and habitat proposed to be designated as critical for listed threatened or endangered plant and animal species or species proposed for listing, and habitat for Federal threatened or endangered species which is determined by the Fish and Wildlife Service (Service) and the surface management agency to be of essential value and where the presence of threatened or endangered species has been scientifically documented, shall be considered unsuitable.

1. Exceptions. A lease may be issued and mining operations approved if, after consultation with the Fish and Wildlife Service, the Service determines that the proposed activity is not likely to jeopardize the continued existence of the listed species and/or its critical habitat.

Analysis

No lands within the review area are designated as critical habitat, proposed to be designated as critical habitat, or determined to be essential habitat for any Federally listed threatened or endangered plant or animal species, or species proposed for listing (Federal Register, various dates).

A county-by-county species list was provided by the US Fish and Wildlife Service in February 2008. Habitat does not exist in the immediate project area for any of the listed or proposed species.

Federally Threatened and Endangered or Candidate Species considered in the Lease Modification Area.

Species	Scientific Name	Impacted by project?	Habitat Description and Requirements
Canada Lynx	***Lynx canadensis***	**No**	**Spruce/fir, mixed conifer, lodgepole pine forest (primary), or mixed deciduous/conifer (secondary)**
Black-footed ferret	***Mustela nigripes***	**No**	**Coincident with prairie dogs, its primary prey. Not known or expected to occur on the GMUG.**
Yellow-billed cuckoo* (Candidate)	***Coccyzus americanus***	**No**	**Low elevation river corridors, cottonwoods**
Clay-loving wild buckwheat	***Erigonium pelinophilum***	**No**	**Specific microhabitats along toe slopes in adobe soils of Mancos shale in sage and shadscale near 5270' elevation.**

			Not known or expected to ccur in the project area.
Uinta Basin Hookless Cactus	***Sclerocactus glaucus***	**No**	**Grows on fine-textured soils derived from Mancos shale in shadscale, greasewood and juniper community types at elevations generally near 5,000 ft. No known or expected to occur on the district.**
Bonytail chub	***Gila elegans***	**No***	**Colorado and Gunnison Rivers**
Razorback sucker	***Xyrauchen texanus***	**No***	**Colorado and Gunnison Rivers**
Humpback chub	***Gila cypha***	**No***	**Colorado and Gunnison Rivers**
Colorado pikeminnow	***Ptychocheilus lucius***	**No***	**Colorado and Gunnison Rivers**
Greenback cutthroat trout	***Oncorhynchus clarki stomias***	**No***	**Upper Hubbard Creek**

*water depletions to tributaries of the Colorado and Gunnison Rivers could affect these species.

The Canada Lynx was listed as threatened in March 2000. In August 2004, the Second Edition of the Canada Lynx Conservation Assessment and Strategy (LCAS) was released, to provide a consistent and effective approach to conserve Canada lynx on federal lands. The Canada Lynx Conservation Agreement (USDA 2005) identifies the Science Report (Ruggerio et al. 2000) and the LCAS (Ruediger et al. 2000) as including the best available science on habitat and conservation measures. Both of these documents, along with local information are used for project analyses.

Following release of the LCAS, the Forest mapped lynx analysis units (LAUs) and habitat within them, based on Regional direction. Habitat was mapped based on existing vegetation information, including vegetation type, canopy closure and size of trees. Areas outside of LAUs are not considered to be lynx habitat, even though they may contain habitat components or stands similar to those within LAUs. Approximately 2.8 acres of the new lease modification area is within the Crater Lake LAU. Effects to that landscape are anticipated to be limited to subsidence from underground mining activities. Implementation of the project **will have no effect on** the lynx. Any potential effects are insignificant and discountable due to the distance of the project from suitable denning habitat, the lack of suitable habitat alteration, and the low probability of loss of lynx from traffic or shooting as a result of this project.

Water depletion associated with this project would be consistent with the programmatic document developed for small water depletions (< 100 acre-feet per year) associated with numerous mineral development projects located on the GMUG NF (USFWS May 25, 2005, amended April 27, 2007 - #ES/GJ-6_CO-99-F-033-CP062). At the post-leasing (permitting) stage, prior to the approval of the mine plan, if it is determined that development of the lease would result in a change in water use resulting in a surface

water depletion in the upper Colorado River Basin that exceeds the quantity covered in the existing programmatic opinion, the permitting agency must enter into consultation with the U.S. Fish and Wildlife Service to determine the appropriate conservation measures to offset the effect to these listed fishes.

Specific Protections Endangered Colorado River Fish:

1. In the future, if water used for mine related activities exceeds a depletion amount previously consulted upon by the GMUG, the permitting agency must enter into consultation with the U.S. Fish and Wildlife Service to determine appropriate conservation measures to offset effects to listed fish and critical habitat in the upper Colorado River Basin.

Therefore for reasons stated above, the exception can apply to this criterion.

Criterion 10

Federal lands containing habitat determined to be critical or essential for plant or animal species listed by a state pursuant to state law as endangered or threatened shall be considered unsuitable.

1. Exceptions. A lease may be issued and mining operations approved if, after consultation with the state, the surface management agency determines that the species will not be adversely affected by all or certain stipulated methods of coal mining.

Analysis

There is no suitable habitat within the lease modification area for any State threatened or endangered species.

Therefore, for reasons stated above, the exception can apply to this criterion.

Criterion 11

A bald or golden eagle nest site on federal lands that is determined to be active, and an appropriate buffer zone of land around the nest site shall be considered unsuitable. Consideration of availability of habitat for prey species and of terrain shall be included in the determination of buffer zones. Buffer zones shall be determined in consultation with the Fish and Wildlife Service.

1. Exceptions. A lease may be issued if (1) it can be conditioned in such a way, either in manner or period of operation, that eagles will not be disturbed during the breeding season, or (2) the surface management agency, with the concurrence of the Fish and Wildlife Service, determines that the golden eagle nest(s) will be moved, or (3) buffer zones may be decreased if the surface management agency determines that the active eagle nests will not be adversely affected.

Analysis

There are no known golden eagle or bald eagle nests, roost sites, within the lease modification area.

Underground coal mining and nesting bald or golden eagles are compatible on the same tract of land unless surface facilities or surface disturbances cause nest-site abandonment. Present guidelines used by the CDOW are:

Golden Eagle:

No surface occupancy beyond historic levels within ¼ mile radius of active golden eagle nests. (CDOW 2008)
Seasonal restriction to human encroachment within ½ mile radius of active nests from December 15 through July 15. (CDOW 2008)

No surface facilities are expected within the lease modification area. Other than subsidence, no surface disturbances are expected. .

Stipulations on the existing lease, which will apply to the modification area, are consistent and/or more restrictive than the current DOW language.

Therefore, for reasons stated above, the exception can apply to this criterion.

Criterion 12

Bald and golden eagle roost and concentration areas on federal lands used during migration and wintering shall be considered unsuitable.

Analysis

No bald or golden eagle roost sites or concentrations areas are known to exist on federal lands within the review area.

Criterion 13

Federal lands containing a falcon (excluding kestrel) cliff nesting site with an active nest and buffer zone of federal land around the nest site shall be considered unsuitable. Consideration of availability of habitat for prey species and of terrain shall be included in the determination of buffer zones. Buffer zones shall be determined in consultation with the Fish and Wildlife Service.

1. Exception. A lease may be issued where the surface management agency, after consultation with the Fish and Wildlife Service, determines that all or certain stipulated methods of coal mining will not adversely affect the falcon habitat during the periods when such habitat is used by the falcons.

Analysis

There are no known peregrine or prairie falcon nest sites in the lease modification area. However, suitable nesting cliffs exist in the area, and surveys for peregrines will need to occur in this area. Lease stipulations on the parent lease require raptor surveys:

- Conduct surveys for nesting raptors on the lease tract prior to development of any surface facilities. No surface activities will be allowed within ½ mile rates of active nest sites between the dates of February 1 and August 15, unless authorized by the BLM or USFS on a site specific basis.

These stipulations will apply to the lease modification area.

Therefore, for reasons stated above, the exception can apply to this criterion.

Criterion 14

Federal lands which are high priority habitat for migratory bird species of high federal interest on a regional or national basis, as determined jointly by the surface management agency and the Fish and Wildlife Service, shall be considered unsuitable.

1. Exception. A lease may be issued where the surface management agency, after consultation with the Fish and Wildlife Service, determines that all or certain stipulated methods of coal mining will not adversely affect the migratory bird habitat during the periods when such habitat is used by the species.

Analysis

Of the 278 breeding bird species in Colorado, 65 priority species in 15 major habitats and three physiographic areas are addressed in the Colorado Bird Conservation Plan. The project area is within the Southern Rocky Mountains Physiographic Province (62), and several priority habitats are present within or immediately adjacent to the lease modification area. These habitats and associated high priority species include:

Aspen: broad-tailed hummingbird, red-naped sapsucker, purple martin, violet-green swallow;
Cliff/Rock: peregrine falcon, black swift;
High elevation riparian: Cordilleran flycatcher, American dipper, McGillivray's warbler, Wilson's warbler;
Low elevation riparian: Lewis' woodpecker, lazuli bunting;
Mixed conifer: blue (currently dusky) grouse, Williamson's sapsucker;
Mountain shrubland: Virginia's warbler, green-tailed towhee;
Spruce-fir: boreal owl, olive-sided flycatcher, Hammond's flycatcher.

Many of these species are known or suspected to be present in the project area. In addition, the flammulated owl is listed as a ponderosa pine species in the plan. However, it is known to use aspen in this area. Implementation of the proposed action "may impact individuals or habitat, but will not likely contribute to a trend towards federal listing".

Stipulations on the parent lease, which will apply to the lease modification, require avoidance of certain habitats of breeding and neotropical birds:

- If there is reason to believe that new individuals or populations of Threatened or Endangered, or Sensitive Species or plants or animals, or migratory bird species of high federal interest occur in the area, the lessee shall be required to conduct an intensive field inventory of the area to be disturbed and/or impacted….

Therefore, for reasons stated above, the exception can apply to this criterion.

Criterion 15

Federal lands which the surface management agency and the state jointly agree are habitat for resident species of fish, wildlife and plants of high interest to the state and which are essential for maintaining these priority wildlife and plant species shall be considered unsuitable. Examples of such lands which serve a critical function for the species involved include: (i) active dancing and strutting grounds for sage grouse, sharp-tailed grouse, and prairie chicken, (ii) winter ranges crucial for deer, antelope, and elk, (iii) migration corridor for elk, and (iv) extremes of range for plant species.

1. Exception. A lease may be issued if, after consultation with the state, the surface management agency determines that all or certain stipulated methods of coal mining will not have a significant long-term impact on the species being protected.

Analysis

There are no known habitats for sage grouse, sharp-tailed grouse, or prairie chickens in this area. The area contains winter range for deer and elk, but due to its elevation is not critical winter range. Elk do migrate through this area from higher elevations to winter range in the valley, but it is not delineated as a corridor by CDOW. This area may be at the extreme range for plant species but there are no known populations of threatened, endangered, or Forest Service Sensitive plants in this area. Therefore, for reasons stated above, the exception can apply to this criterion.

Criterion 16

Federal lands in riverine, coastal, and special floodplains (100-year recurrence interval) on which the surface management agency determines that mining could not be undertaken without substantial threat of loss of life or property shall be considered unsuitable for all or certain stipulated methods of coal mining.

Analysis

The application lands are not within a riverine, coastal or special floodplain.

Criterion 17

Federal lands which have been committed by the surface management agency to use as municipal watersheds shall be considered unsuitable.

Analysis

None of the lands in the proposed lease tract are within a municipal watershed.

Criterion 18

Federal lands with National Resource Waters, as identified by states in their water quality management plans, and a buffer zone of federal lands ¼-mile from the outer edge of the far banks of the water, shall be unsuitable.

Analysis

None of the lands in the proposed lease tract are identified as a National Resource Water.

Criterion 19

Federal lands identified by the surface management agency, in consultation with the state in which they are located, as alluvial valley floors according to the definition in Subpart 3400.0-5(a) of this title, the standards of 30 CFR Part 822, the final alluvial floor guidelines of the Office of Surface Mining Reclamation and Enforcement when published, and approved state programs under the Surface Mining Control and Reclamation Act of 1977, where mining would interrupt, discontinue, or preclude farming, shall be considered unsuitable. Additionally, when mining federal land outside an alluvial valley floor would materially damage the quantity or quality of water in surface or underground water systems that would supply alluvial valley floors, the land shall be considered unsuitable.

Analysis

The application lands are not within an alluvial valley floor, but such lands drain into the North Fork Gunnison River, along which, both surface irrigated and potentially irrigable sites exist. Within the lease modification boundary, no water facilities (reservoirs, ditches, diversions) exist.

Changes in ground slope and creation of tension cracks can alter surface hydrology and soil erosion processes. Increased surface erosion, debris flows and disruption of drainage pattern and flow in streams have been documented (Sidle, et al. 2000). Effects to stream channels include (1) increase in lengths of cascades and to a lesser extent glides; (2) increases in pool length, numbers and volumes; (3) increase in median particle diameter of bed sediment in pools; and (4) some constriction in channel geometry. The magnitude of these effects varies depending upon the amount and location of subsidence.

Increased sediment delivery will affect water quality in Elk Creek (e.g. increased sediment load). This section of Elk Creek already receives large amounts of sediment from the erosive soils in the vicinity during normal precipitation and runoff so effects of increased sedimentation may not be quantifiable beyond baseline levels.

Subsidence is predicted to occur within Elk Creek. Increased surface erosion, changes to stream morphology and possible disruption of streamflows could occur as a result. Disruption of stream flow is also a possibility. Again, since this portion of Elk Creek is ephemeral and it already receives large amount of sediment from natural processes, quantification of additional effects from sedimentation beyond baseline is difficult. The

magnitude and duration of predicted effects depends upon the amount and location of subsidence features.

Although material damage to the quality and quantity water arising on or flowing over the proposed lease modification is possible, because of the reason listed above, this is not anticipated, and would be hard to separate from natural process that are currently affecting water quality/quantity.

Therefore, for reasons stated above, the exception can apply to this criterion.

Criterion 20

Federal lands in a state to which is applicable a criterion (i) proposed by the state or Indian tribe located in the planning area, and (ii) adopted by rulemaking by the Secretary, shall be considered unsuitable.

Analysis

This criterion is not presently in effect in the State of Colorado.

REFERENCES

Colorado Division of Wildlife GIS data http://ndis.nrel.colostate.edu/ftp/index.html

Partners in Flight 2000. Landbird Conservation Plan Colorado. Estes Park, CO. Available http://www.blm.gov/wildlife/plan/pl-co-10.pdf

Pfister, Allan R. (USFWS Grand Junction Office) 2007. Programmatic Biological Opinion for Water Depletions on the GMUG National Forest. May 25, 2005, amended April 27, 2007 - #ES/GJ-6_CO-99-F-033-CP062.

Ruediger, Bill, et.al. 2000. Canada Lynx Conservation Assessment and Strategy. USDA Forest Service, USDI Fish and Wildlife Service, USDI Bureau of Land Management, and USDI National Park Service. Forest Service Publication #R1-00-53, Missoula, Montana.

USDA Forest Service 2008a. Biological Evaluation and Management Indicator Species Assessment for Oxbow Coal Lease Modification. Gunnison County, CO. 26 June.

USDA Forest Service 2008b. Biological Assessment for Oxbow Coal Lease Modification. Gunnison County , CO. 26 June.

U.S. Department of The Interior, 1983, Uinta-Southwestern Utah Coal Region Environmental Impact Statement, U. S. Department of the Interior, Bureau of Land Management, Utah State Office, Salt Lake City, Utah.

_____. 2000. Final Environmental Impact Statement, Iron Point Exploration License, Iron Point Coal Lease Tract, Elk Creek Coal Lease Tract, Delta and Gunnison Counties, Colorado, February 2000. USDA Forest Service, Paonia, Colorado, and USDI, BLM Montrose, Colorado.

U.S. Fish and Wildlife Service, 2008. Western Colorado Suboffice, Grand Junction, CO. Updated Species List.

Other references in the Biological Assessment and Biological Evaluation for the project.

CONSULTATION AND COORDINATION

The following agencies and organizations were contacted to gain information pertinent to the application of the 20 coal suitability criteria:

Federal Agencies

U.S. Department of Interior
Fish and Wildlife Service
Western Colorado Suboffice
529 25 1/2 Road
Grand Junction, CO 81505-6199

Colorado State Agencies

Division of Wildlife, Southwest Region Office, Gunnison, CO.

APPENDIX B- GER/MER

Combined Geologic and Engineering Report (GER) and Maximum Economic Recovery Report (MER) for Coal Lease Modification Application dated January 24, 2008 applied for by Oxbow Mining, LLC Federal Coal Lease COC61357 T. 12 S. R. 90 W., 6th P.M. T. 13 S. R. 90 W., 6th P.M. by Desty Dyer BLM Mining Engineer

March 27, 2008 Combined GER/MER reports for Oxbow Mining, LLC - 2008 Lease Modification Application No. 4 for federal lease COC61357 2

LOCATION

The legal description of the Elk Creek tract modification area (ECM4) is as follows:

Township 12 South, Range 90 West of the 6th P.M.

A parcel of land located partially within the NE1/4 and partially within Lots 1, 2, 7, 8, 9, 10, 15 and 16 of Section 32, and

Township 13 South, Range 90 West of the 6th P.M.

A parcel of land located partially within Lots 5, 16 and 19 of Section 5, being more particularly described as follows:

Beginning at a point from whence the Section Corner common to Sections 28, 29, 32 and 33 bears N.02°27’33”E. 2829.7 feet, more or less; thence S.14°36’09”W. 7032.93 feet to the existing lease line for Coal Lease No. COC-61357; thence along said existing lease line N.00°00’36”W. 7268.02 feet; thence leaving said existing lease line S.75°23’51”E. 1833.57 feet to the Point of Beginning. Said parcel contains 148.0 acres, more or less.

Note: Hereafter the tract area will be referred to as the ECM4.

Approximately 6 acres of surface are managed by BLM and the remaining surface acres are managed by the USFS.

The ECM4 is located on the north side of state highway 133, over the upper reaches of the Elk Creek drainage. It forms a right triangle across Elk Creek and is adjacent to the east side of the existing Lease Tract (COC61357) in Gunnison County, Colorado. The ECM4 lies to the north of the OML fee coal property. OML has applied for the D seam reserves within this ECM4 tract, and the tract will allow a slight revision of their mine plan to develop north mains on a small angle east of north and thereby increase recovery of known federal coal reserves by facilitating longer longwall blocks on the original tract.

STRATIGRAPHY

GENERAL - The ECM4 is located in the Paonia coal field on the North Fork of the Gunnison river. The formations in the area of the ECM4 dip N-NE about 3.5 degrees.

The sediments underlying the tract are of Cretaceous and Tertiary age and Combined GER/MER reports for Oxbow Mining, LLC - 2008 Lease Modification Application No. 4 for federal lease COC61357 3

are described in descending order.

The Ruby (Wasatch) formation overlies the Mesa Verde formation and consists of red and buff shales, red sandstones, and red to grey conglomerates. It can be 1600 ft. thick. The Mesa Verde formation contains four members. The top member is called the Barren member, can be 1500 ft. thick, and is composed predominately of buff lenticular sandstones. The Paonia member lies below the Barren member, contains two coal horizons, and ranges from 300 to 500 ft. thick. The top portion of this member is a lenticular cliff forming sandstone which can occur at slightly different stratigraphic horizons. The Bowie member is the lower coal bearing member and ranges from 270 to 350 ft. thick. It is composed predominately of grey shale and contains several coal beds in three coal horizons. The top of the member is marked by a massive buff sandstone 90 ft. thick. The Rollins sandstone member lies below the Bowie, is a massive cliff-forming buff-white sandstone 120 to 200 ft. thick, and serves as the most persistent marker horizon in the area. The Rollins clearly defines the lower limit of coal occurrences in the area. Below the Rollins Sandstone member of the Mesa Verde is the Mancos Shale formation which is approximately 4000 ft. thick. The upper portion of the formation which is exposed in the area is composed of grey marine shales and minor buff sandstones.

COAL BEDS - BLM reviewed existing coal resources in all the seams in the tract but found none were mineable except those applied for in the D-Seam although B-Seam reserves might be modified into the tract if future economics allow. The A seam is thin, the B & C seams lay well beyond the 2000' overburden. The E and F seams were inconsistent in thickness and quality thereby being rendered unmineable.

D-seam This coal seam averages 13.4 ft. thick and is classified high volatile Bituminous. Its average location is about 350 feet above the Rollins sandstone. The seam varies in thickness from 6' to 16' but within the ECM4 it ranges from 11' to 18'. In most areas a thin interburden layer splits the seam into two members called D-1 (lower) and D-2 (upper). Areas of greater thickness are generally locations where the two coal members have little or no interburden and actually appear as a uniform seam. The ECM4 covers an area where the D-1 and D-2 are merged as a single thick seam. The recoverable reserves for this seam are calculated to be 581,000 tons on the ECM4 plus 795,000 tons gained on the original lease. Combined GER/MER reports for Oxbow Mining, LLC - 2008 Lease Modification Application No. 4 for federal lease COC61357 4

Overburden on the tract ranges from 1200 ft. (at the southern end) to just over 2500 ft. (on the north end), and averages about 2200'. Although this high overburden has greater ground stresses associated with it, the BLM criteria of coal recovery calculations considers a full development of north mains the entire projected length of the ECM4 (SEE ESTIMATED RECOVERY STARTING ON PAGE 6).

COAL QUALITY - Analysis of the D-Seam 2007 market sales is shown in the following table as Short Proximate Analysis:

As Received Dry Basis

% Moisture 8.03 XXXXX

% Ash 9.38 10.19

% Sulfur 0.40 0.43

BTU/lb 12,041 13,092

Note: (Analysis from the 2007 market sales average representing 4.8 million tons. This data was not available during the original Elk Creek tract delineation.)

Projected coal quality for the ECM4 is expected to be similar to current quality being extracted from the Elk Creek Mine. The seam has exhibited some roof failure dilution where development occurs, therefore the coal mined from the ECM4 would be of lesser quality but will be blended with higher quality longwall coal before being sold.

MINING FACTORS

METHOD CONSTRAINTS - The amount of overburden (mentioned above) necessitates underground mining, and for OML that method is restricted to the longwall method of mining due to their commitment to employ it in all their mining ventures. OML would use continuous miner equipment on the ECM4 to develop north-northeast mains and gate roads necked off to the west for longwall blocks on the original lease tract.

PRODUCTION FACTORS

CURRENT- Short Term Schedule - Production to meet the market demand is supplied by two active development sections operating on two 8 hr. shifts per day, 7 day per week schedule that total 1400 to 1450 operating shifts per year. The single longwall production unit will work a single 8 hr. shift per day 7 day per week schedule and should total 320 to 350 shifts per year.

Production Data - The current Elk Creek mine operation extracts Combined GER/MER reports for Oxbow Mining, LLC - 2008 Lease Modification Application No. 4 for federal lease COC61357 5

coal entirely within the D-Seam to the west and southwest of the ECM4. OML successfully mines coal using continuous miners to develop seven-entry mains and three-entry gate roads. Development is ahead of longwall mining; therefore, the ECM4 would be developed ahead of final mining on the original lease tract and the very last longwall mining would take place on a small portion at the northern most end of the ECM4. With longwall operations in place, the mine would be capable of producing up to 6 million tons per year

Mining Equipment - The following is a list of major equipment currently slated for use by OML and is typical for underground longwall operations:

Continuous Miners 3 Roof Bolters 4

Shuttle Cars 9 Utility Scoops 3

Utility Haulers 3 Utility Mantrips 6

Shield Puller 1 60" Belt Drives 8

Shield Hauler 2 Shearer (JOY) 1

Face Shields & Pans 206 (built by M.T.A.)

Main Mine Fan 2

Life of Mine - The BLM calculated recoverable reserves based on the current OML mine plan layout are those existing in the fee and federal holdings being accessed by the Elk Creek Mine. They are approximately 39 million tons and would provide 6 - 8 years of life at the projected longwall production rates. It should be noted that just over 20 million tons are under greater than 2000 ft. of overburden and may prove to be difficult to recover. Current north mains development in the Elk Creek Mine is idle awaiting a start-up as early as October 2008 which would almost immediately cross onto the ECM4 tract at its southern end. The development would then proceed across the ECM4 to the northern boundary near the end of the life-of-mine.

Manpower - The current manpower level averages about 305.

PROJECTED with ECM4- Short Term Schedule - OML management has no plans to increase production beyond that level anticipated from the longwall operation. Mining currently conducted in the Elk Creek Mine would extract about 1.6 million tons of fee coal intermittently during 2008 and 2009 then produce exclusively from federal coal (including the ECM4) to the end of the life-of-mine.

Production Data - The operation has portal and shafts into the D seam on fee coal property near the current surface facilities now being used by OML. Production would remain within the D seam for the life-of-mine. Panel geometry for Combined GER/MER reports for Oxbow Mining, LLC - 2008 Lease Modification Application No. 4 for federal lease COC61357 6

the ECM4 would incorporate mains developing approximately north-northeast and longwall panels developed west-northwest off those mains. Production could vary but is expected to be about 6 million tons per year and go no lower than 4 million tons per year or no higher than 7 million tons per year.

Mining Equipment - The current projection is that longwall mining equipment would continue to be employed. (SEE LIST ABOVE)

Life of Mine - The ECM4 would add about 3 months to the life of the mine. Some of that time is due to the added longwall production block area gained on the original federal lease tract where the north mains were originally projected. The actual operating time spent on the ECM4 could last 3 to 4 years since coal production rates might be less and development activity of the north mains would not need to be completed until near the end of the life-of-mine.

Manpower - Current level is projected to remain about the same with a short period of lower requirements near the end of the life-of-mine.

SURFACE FACILITIES

The current surface coal handling facilities of the OML Elk Creek mine are capable of handling longwall mining production. They are located at Somerset on state highway

133, and would serve the needs of the operation even with additional coal leased as proposed in the ECM4 as applied for by OML.

TRANSPORTATION

The current surface transportation infrastructure at the Elk Creek mine would serve the mining needs of the operation even with the addition of the ECM4. The current belt structure used to deliver coal from the Elk Creek mine working faces to the surface coal handling facility would be used in the altered extent of the mine. The existing train load-out tipple would be employed for that same purpose during the life-of-mine on the ECM4.

ESTIMATED RECOVERY

The D-Seam recovery within the ECM4 should approximate calculated recovery using the OML north mains projection with 1830 tons per acre-ft., 11' of excavation, and considering the following:

1. 59 acres of CM mains and gateroad development at 27% recovery.

2. 12.9 acres of LW block mined at 100% recovery. Combined GER/MER reports for Oxbow Mining, LLC - 2008 Lease Modification Application No. 4 for federal lease COC61357 7

3. 39.4 acres of LW block gained on original lease at 100% recovery.

BLM calculates a recoverable reserve for the ECM4 to be 581,000 tons plus 795,000 tons gained on original lease. Total additional tons recovery realized is calculated to be 1,376,000 tons.

POTENTIAL MARKETS

Coal markets supplied by production from the ECM4 are expected to be somewhat the same as those historically supplied by OML with production from the Elk Creek mine. The operation primarily supplies coal for American electrical power generation used by the public. The approximate breakdown of market destinations for the coal is shown below:

1. Electric Utilities 80 - 85%

2. Cement & Lime Manufacturing 12 - 16%

3. Other Manufacturing 3 - 5%

MAXIMUM ECONOMIC RECOVERY DETERMINATION

The ECM4 OML applied for has been determined by availability of mineable coal (constrained by the limiting acreage of a modification area and the orientation of the north mains projections). It is located in such a way as to allow the OML planned Elk Creek mine projections the most efficient access to federal coal using north mains turned slightly east at the point of the existing extent of the north mains. It enhances the value of the OML existing federal coal holdings. Although a neighboring coal company (Bowie Resources, Ltd.) has a federal coal lease in coal reserves to the west of the OML holdings, they do not have any interest in the ECM4; therefore, the ECM4 application will not generate competitive bidding. It is entirely unlikely that a third party would deem

the coal resource in the ECM4 either substantial or valuable enough for them to initiate new surface and underground facilities.

It has been determined by BLM that Maximum Economic Recovery (MER) of the ECM4 can be achieved by underground mining using the longwall method of mining as described above.