

# Previously Issued Oil and Gas Leases in the White River National Forest Final Environmental Impact Statement

## Volume I – Cover through Chapter 3.0



August 2016

BLM/CO/PL-16/013

Colorado River Valley Field Office, Colorado



### ***BLM Mission Statement***

*To sustain the health, diversity, and productivity of America's public lands for the use and enjoyment of present and future generations.*

*The BLM's multiple-use mission, set forth in the Federal Land Policy and Management Act of 1976, mandates that we manage public land resources for a variety of uses, such as energy development, livestock grazing, recreation, and timber harvesting, while protecting a wide array of natural, cultural, and historical resources.*



# United States Department of the Interior

BUREAU OF LAND MANAGEMENT

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In Reply Refer To:  
3100 (CO-922)

JUL 19 2016

Dear Reader:

Enclosed for your review is the Final Environmental Impact Statement (EIS) for Previously Issued Oil and Gas Leases in the White River National Forest. The Final EIS evaluates the environmental impacts that would result from cancelling, reaffirming, or modifying (with additional or different terms) 65 previously issued federal fluid minerals leases underlying White River National Forest (WRNF) lands in western Colorado. These leases were issued between 1995 and 2012, and are located in Mesa, Garfield, Pitkin and Rio Blanco counties, between the towns of De Beque and Carbondale south of Interstate 70, except for one lease northeast of Meeker.

In 2007, the Interior Board of Land Appeals (IBLA) ruled that before including U.S. Forest Service parcels in an oil and gas lease sale, the Bureau of Land Management (BLM) must either formally adopt National Environmental Policy Act (NEPA) analysis completed by the U. S. Forest Service or conduct a NEPA analysis of its own. In response to that decision, the BLM determined that the most current U.S. Forest Service NEPA analysis (prepared in 1993) conducted for the 65 previously issued leases was no longer adequate due to changes in laws, regulations, policies and conditions since the earlier EIS was finalized in 1993. Therefore, the BLM prepared this EIS to evaluate and disclose the potential impacts of a range of management decisions for these leased parcels and the associated reasonably foreseeable oil and gas development in compliance with NEPA and associated regulations.

The BLM developed the alternatives analyzed in the Final EIS in response to issues and concerns raised through public comments, coordination with Cooperating Agencies, and interaction with BLM management and resource specialists. The alternatives are briefly described below.

- Alternative 1 (the No Action Alternative): The BLM would reaffirm the 65 leases as they were issued.
- Alternative 2: The BLM would modify eight of the leases to address inconsistencies by adding stipulations identified in the 1993 EIS and Record of Decision (ROD) that were not attached to the leases as issued.
- Alternative 3: The BLM would modify each of the 65 leases to match the stipulations for future leasing identified in the Proposed Action from the 2014 WRNF Oil and Gas Leasing Final EIS.
- Alternative 4 (the Proposed Action): The BLM would both modify and cancel leases. In areas identified as open to future leasing by the U.S. Forest Service's 2015 Final ROD for Oil and Gas Leasing on Lands Administered by the White River National Forest, lease stipulations would be modified as in Alternative 3. All or part of 25 leases would be cancelled in areas identified in the Final ROD as closed to future leasing.

- h Alternative 5: The BLM would cancel all of the previously issued 65 leases, plug and abandon all producing wells, remove infrastructure, and reclaim well pads and other ancillary facilities.
- h The Preferred Alternative: Based on the analysis presented in this EIS and the comments received on the Draft EIS, the BLM's Preferred Alternative for purposes of this analysis is a combination of portions of Alternatives 2 and 4. Alternative 2 would apply to leases that are producing or committed to an exploratory unit agreement or communitization agreement held by production, and Alternative 4, with minor modifications, would apply to non-producing and non-committed ("undeveloped") leases.

This approach is consistent with the BLM's stated purpose and need for the EIS including: (1) revisiting or reaffirming the previously issued leases, (2) assessing the conformance of those leases with applicable U.S. Forest Service decisions, including recent availability decisions, (3) fulfilling the federal government's policy of fostering the orderly and responsible development of domestic resources, (4) meeting domestic energy needs, and (5) supporting the U.S. Forest Service's management of oil and gas resources under the lands it manages.

The BLM released a Draft EIS to the public on November 20, 2015, with the publication of a Notice of Availability (NOA) in the *Federal Register*. The NOA initiated a public comment period that ended on January 8, 2016. The BLM held public meetings to receive comments on the Draft EIS on December 14, 15, and 16, 2015, in Glenwood Springs, De Beque, and Carbondale, respectively. Agencies, businesses, organizations, and interested parties submitted a total of 60,515 letters on the Draft EIS via mail and email. Each submission varied in content, and ranged from one to many comments that contained technical information, suggestions for improving the content of the Draft EIS, as well as personal opinions. The majority of the submissions were form letters. Substantive comments received and responses to these comments are contained in Appendix E of the Final EIS. Some comments resulted in modifications to the EIS. Changes between draft and final EISs are marked using lines in the left margin; additions are in **bold text**.

The Final EIS is available online at: [http://www.blm.gov/co/st/en/fo/crvfo/existing\\_leases\\_on.html](http://www.blm.gov/co/st/en/fo/crvfo/existing_leases_on.html). Copies of the Final EIS are available from the BLM Colorado River Valley Field Office, 2300 River Frontage Road, Silt, CO, 81652. Project materials may be viewed at the Colorado River Valley Field Office at the address indicated above during regular business hours (8:00 a.m. to 4:30 p.m.), Monday through Friday, except holidays. The publication of the NOA for the Final EIS in the *Federal Register* initiates a 30-day availability period. Following the availability period, the BLM will issue a ROD based on the Final EIS.

For further information please contact Greg Larson, BLM Project Manager at (970) 876-9000.

Sincerely,



Ruth Welch  
State Director

**Final Environmental Impact Statement for  
Previously Issued Oil and Gas Leases on the  
White River National Forest**

August 2016

Lead Agency: U.S. Department of the Interior, Bureau of Land Management, Colorado River Valley Field Office

Cooperating Agencies: U.S. Environmental Protection Agency Region 8, Colorado Division of Natural Resources, Colorado Parks and Wildlife, U.S. Forest Service (White River National Forest), Garfield County, Mesa County, Pitkin County, Rio Blanco County, City of Glenwood Springs, City of Rifle, Town of Carbondale, Town of New Castle, Town of Parachute, Town of Silt

Project Location: Mesa, Garfield, Pitkin, and Rio Blanco counties, Colorado

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Date Final EIS Notice of Availability Published in Federal Register: August 5, 2016

BLM Authorized Officer Responsible for Preparing the Final EIS: Karl Mendonca, Field Manager

**ABSTRACT**

This Final Environmental Impact Statement (EIS) has been prepared to document and disclose the environmental impacts of reaffirming, modifying, or cancelling 65 previously issued federal fluid minerals leases underlying White River National Forest (WRNF) lands. These leases were issued between 1995 and 2012, and are located in Mesa, Garfield, Pitkin, and Rio Blanco counties. The Forest Service decision that made the 65 parcels considered in this EIS available for oil and gas leasing was documented through the 1993 WRNF Oil and Gas Leasing Record of Decision and reaffirmed in the 2002 White River National Forest Plan. In 2007, in a challenge brought against the issuance of three leases, the Interior Board of Land Appeals (IBLA) held that before including Forest Service parcels in an oil and gas lease sale the BLM must either formally adopt NEPA analysis completed by the Forest Service or conduct a NEPA analysis of its own (see Board of Commissioners of Pitkin County, 173 IBLA 173 [2007]). The 2007 IBLA decision addressed three leases in the WRNF that were later cancelled; however, the 65 existing leases addressed in this EIS share the same NEPA deficiency. With respect to the 65 leases at issue, the IBLA ruled that although the BLM was a cooperating agency on the 1993 WRNF Oil and Gas Leasing EIS, the BLM did not formally adopt the Forest Service NEPA analysis, and therefore did not comply with its NEPA obligations with respect to the issuance of those leases. Following the IBLA's decision, the BLM determined that the WRNF NEPA analysis conducted for the 65 previously issued leases is no longer adequate due to changes in laws, regulations, policies, and conditions since the earlier EIS was finalized in 1993.

The Final EIS discusses the purpose and need for the Proposed Action; alternatives to the Proposed Action; and potential direct, indirect, and cumulative impacts of each alternative. The potential impacts of each alternative are analyzed by using adjusted Reasonable Foreseeable Development Scenario estimates. Six alternatives are analyzed in detail in the FEIS:

1. Alternative 1: Reaffirms all 65 leases (No Action).
2. Alternative 2: Reaffirms 57 leases and addresses lease inconsistencies on 8 leases.
3. Alternative 3: Modifies leases to match stipulations identified in the Proposed Action for the Final EIS for Future Oil and Gas Leasing on the WRNF (2014).
4. Alternative 4: Modifies or cancels leases to match the stipulations and availability decisions of the Final ROD for Future Oil and Gas Leasing on the WRNF (2015f) (Proposed Action).
5. Alternative 5: Cancels all leases; plug and abandon all existing wells.
6. Preferred Alternative: **A combination of Alternatives 2 and 4; it would cancel 25 undeveloped leases in full to match the availability decisions of in the Final ROD for Future Oil and Gas Leasing on the WRNF (2015f) (Alternative 4) and would modify the remaining undeveloped leases as outlined in Alternative 4. Leases that are producing or committed to an exploratory unit agreement or communitization agreement would be treated as outlined in Alternative 2.**

These alternatives were developed by the BLM in response to issues and concerns from public comments submitted during the public scoping period, coordination with Cooperating Agencies, interaction between BLM management and resource specialists, and public and agency comments on the Draft EIS. The BLM also considered alternatives raised during scoping, alternatives development and the Draft EIS public comment period that are not carried forward for detailed analysis.

The 30-day review period for this Final EIS was initiated with publication of the Notice of Availability (NOA) in the Federal Register on August 5, 2016.

## Executive Summary

### ES.1 Introduction

In compliance with the National Environmental Policy Act of 1969, as amended (NEPA), the Bureau of Land Management (BLM) Colorado River Valley Field Office in Silt, Colorado, has prepared this Environmental Impact Statement (EIS) to analyze the potential impacts of cancelling, reaffirming, or modifying (with additional or different terms) 65 federal fluid minerals leases within the White River National Forest (WRNF). These leases were issued between 1995 and 2012, and are located in Mesa, Garfield, Pitkin, and Rio Blanco counties, between the towns of De Beque and Carbondale south of Interstate 70, except for one lease northeast of Meeker (see **Figure ES-1**).

In 2007, the Interior Board of Land Appeals (IBLA) held that before including Forest Service parcels in an oil and gas lease sale the BLM must either formally adopt NEPA analysis completed by the Forest Service or conduct a NEPA analysis of its own (see Board of Commissioners of Pitkin County, 173 IBLA 173 [2007]). The IBLA ruled that although the BLM was a cooperating agency on the Forest Service's 1993 WRNF Oil and Gas Leasing EIS, the BLM did not formally adopt the Forest Service NEPA analysis or prepare its own analysis, and therefore did not comply with its NEPA obligations with respect to the issuance of those leases at issue in that proceeding. **While the 2007 IBLA decision addressed three leases in the WRNF that were later cancelled, the 65 existing leases addressed in this EIS share the same NEPA deficiency identified by the IBLA with respect to those leases.**

Following the IBLA's decision, the BLM determined that the Forest Service NEPA analysis conducted for the previously issued leases is no longer adequate due to changes in laws, regulations, policies, and conditions since the Forest Service's EIS was issued in 1993. Therefore, this EIS evaluates and discloses the potential impacts of leasing those parcels. It does not address future fluid mineral leasing availability, which has recently been addressed in a separate NEPA analysis prepared by the Forest Service, the WRNF Oil and Gas Leasing Final EIS (December 2014). The BLM has incorporated as much of the Forest Service's new NEPA analysis related to future oil and gas leasing on the WRNF as possible into this analysis (**43 CFR 46.120 and 46.135**). The BLM was a cooperating agency on the 2014 WRNF EIS. **The WRNF Oil and Gas Leasing Final Record of Decision (ROD) was released in December 2015.**

### ES.2 Reasonably Foreseeable Development Scenario

For purposes of this analysis, the BLM needed to prepare a Reasonably Foreseeable Development Scenario (RFDS) of potential oil and gas leasing activity within the analysis area. An RFDS is a long-term projection of the likely potential future oil and gas development and production within a defined area and a defined period of time (20 years). An RFDS for the WRNF was prepared by the Forest Service in connection with the Forest Service's recent analysis of future leasing. That analysis was published in September 2010, and was included as Appendix F in the WRNF Oil and Gas Leasing Draft EIS (U.S. Forest Service [USFS] 2012).

As stated in the RFDS (USFS 2010a), its purpose is to provide an estimated projection of unconstrained, future oil and gas exploration and development based on a set of assumptions in order "to evaluate potential effects that might reasonably occur as a result of leasing." The RFDS is based on geology; resource occurrence potential; past and current leasing, exploration, and development activity; and engineering technology, with consideration of economics and physical limitations on access to resources. An RFDS is not a decision, and it does not establish or imply a limit on future development.

The RFDS (USFS 2010a) was used as a starting point for estimating the number of wells likely to be developed within the 65 previously issued leases. The basic assumptions used to develop the estimated unconstrained oil and gas development within the 65 leases are summarized below.

- At least one well can be reasonably foreseen for each of the 65 leases.
- Future development will follow past development trends.
- Almost 4 percent of all wells will be horizontally drilled.
- A total of 444 wells is projected within the 65 leases without taking into account constraints such as No Surface Occupancy (NSO) stipulations.
- The 444 wells would not be evenly distributed across the 65 leases. Rather, the leases have been grouped spatially into zones based on the location of past development, production infrastructure, and access for exploration and production.

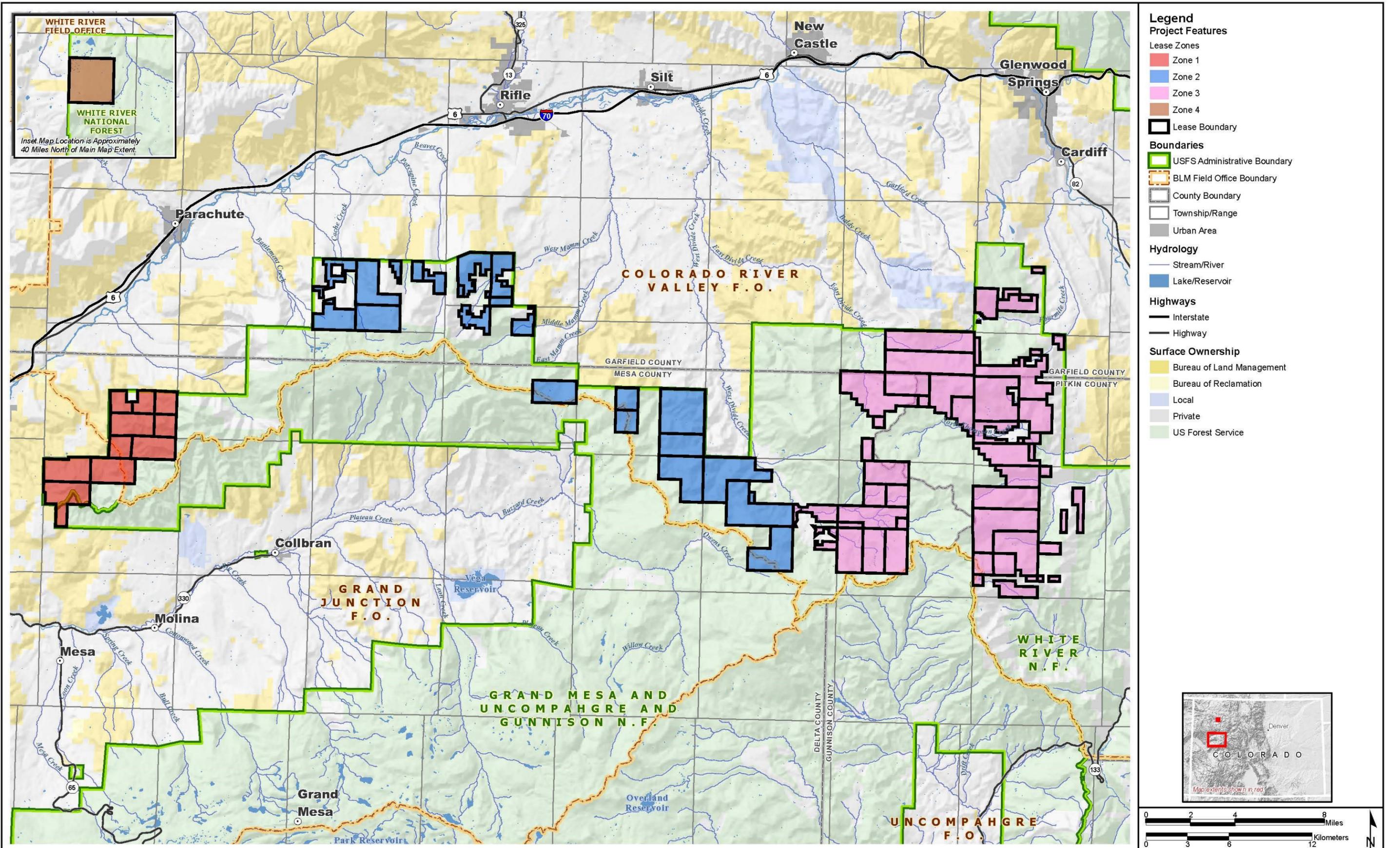
### ES.3 Standard Lease Terms and Lease Stipulations

Standard Lease Terms (**SLTs**) establish that the lessee has the right to use as much of the leased lands as is necessary to explore, drill, and extract all the leased resource. **SLTs** allow for reasonable measures that may be required to minimize adverse impacts to other resource values, land uses, or land users to the extent consistent with the lease rights granted. Lease stipulations are conditions placed on a lease that become part of the lease issued by BLM. The purpose of lease stipulations is to minimize potential adverse impacts of exploration and development operations in compliance with applicable management direction. Additional information related to lease stipulations and the specific stipulations considered by the Forest Service to meet the standards and guidelines of the WRNF Forest Plan (USFS 2002b) can be found in Section 1.4.6 of the WRNF Oil and Gas Leasing Final EIS (USFS 2014a). The types of lease stipulations applied and analyzed in this EIS include the following.

- **No Surface Occupancy (NSO)**—Prohibits all surface activities and intended for use only when other stipulations are determined to be inadequate to protect surface resources, especially where the resource protection cannot be accomplished by relocating proposed operations less than 200 meters (approximately 660 feet).
- **Controlled Surface Use (CSU)**—Controls lease activities where resource protection cannot be accomplished adequately with mitigation measures provided by **SLTs**, regulations, and other guidance. It is less restrictive than NSO and applied where use and occupancy is allowed but special operational constraints are needed for specific types of activities without prohibiting all surface activities.
- **Timing Limitations (TL)**—Prohibits surface use during a specified period to protect identified resources and resource values on a seasonal basis.

Exceptions, modifications, or waivers may be issued on a case-by-case basis to exempt the lessee from NSO, CSU, or TL stipulations temporarily or permanently (for the life of the lease) if the conditions under which the stipulation was established do not exist. Modifications and waivers are defined at 43 CFR 3101.1-4.

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Date: 9/17/2015

Figure ES-1 General Location of Leases to be Evaluated

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## **ES.4 Purpose and Need; Decisions to Be Made**

### **ES.4.1 Purpose of the Action**

BLM's purpose for this federal leasing action is to:

- Revisit or reaffirm previous BLM decisions to issue 65 leases underlying Forest Service lands. These leases were issued from 1995 to 2012 following the Forest Service's availability decision considered in the 1993 EIS;
- Assess conformance with the decisions making these lands available for oil and gas leasing in the 1993 EIS, as reaffirmed in the 2002 White River National Forest Plan and consider consistency with the Forest Service's recent availability decisions for lands within the White River National Forest;
- Support the Forest Service in managing oil and gas resources, as required by law and memoranda of understanding between the agencies; and
- Fulfill the federal government's policy to "foster and encourage private enterprise in the development of economically sound and stable industries, and in the orderly and economic development of domestic resources to help assure satisfaction of industrial, security, and environmental needs" (Mining and Minerals Policy Act of 1970) while continuing to sustain the land's productivity for other uses and capability to support biodiversity goals (**Forest Service Minerals Program Policy**).

### **ES.4.2 Need for the Action**

The BLM's need for this federal leasing action is to:

- Meet domestic energy needs under the requirements of the Mineral Leasing Act of 1920, as amended, the Mining and Minerals Policy Act of 1970, and the Federal Onshore Oil and Gas Leasing Reform Act of 1987 ("Reform Act"). The BLM's responsibility under these laws is to regulate the development of oil and gas in the public domain, and to ensure that deposits of oil and gas owned by the United States shall be subject to disposition **in accordance with** the land use planning process.
- Address the NEPA deficiency identified by the 2007 IBLA ruling on the appeal by the Board of Commissioners of Pitkin County **and other groups** that BLM must formally adopt NEPA analysis completed by the Forest Service or conduct a NEPA analysis of its own for issuance of oil and gas leases underlying WRNF lands;
- Support **Forest Service** mineral policy that puts responsibility on field units, with the known presence or potential presence of a mineral or energy resource, to foster and encourage the exploration, development, and production of the mineral or energy resource consistent with Forest Service management direction; and
- Meet BLM's collaborative responsibility under the Reform Act to issue and manage oil and gas leases where the **Forest Service** has issued a land availability decision.

## **ES.5 Decisions to be Made**

### **ES.5.1 Decisions to Be Informed Through This Analysis**

This EIS considers 65 previously issued leases issued in the WRNF that were issued between 1995 and 2012. The decision to be made by the BLM, based on the analysis in this EIS, is whether some or all of the 65 leases should be:

1. Reaffirmed with their current existing stipulations;
2. Modified with additional or different lease terms or additional mitigation measures; or
3. Cancelled.

**Note that several leases, as shown in Table 1-1, expired before or during the preparation of the EIS. These leases have been retained in the EIS and its analysis for continuity, and because the circumstances surrounding the expiration of several of those expired leases are either subject to administrative appeal or are under appeal to the IBLA. For purposes of the ultimate decisions on any of the actions analyzed in this EIS, there will be no decision made by the BLM on any leases that are expired at the time of any final decision.**

### **ES.5.2 Decisions Beyond the Scope of This Analysis**

The decision of whether National Forest System (**NFS**) lands are available or unavailable for oil and gas leasing remains with the Forest Service, although the BLM retains the ultimate discretion whether to issue a lease (43 CFR 3101.7-2). In light of this, the BLM will only consider the currently leased parcels issued without BLM NEPA analysis (65 parcels) and not future leasing availability within the WRNF, which **has been** addressed by the Forest Service separately. This EIS will not directly affect decisions on any pending or proposed Application for Permit to Drill because the Forest Service has the authority to address the NEPA on the proposed Surface Use Plans of Operations that accompany each Application for Permit to Drill.

This is strictly a leasing decision and will not authorize any development on these previously issued leases. Any discussion of development in this EIS is only to facilitate an analysis of the effects of leasing through analysis assumptions based on historic oil and gas development in this region and the 2010 RFDS.

## **ES.6 Scoping, Public Involvement, and Relevant Issues Identified**

### **ES.6.1 Public Scoping Issues**

In early 2014, the BLM held a public scoping period for the project. Substantive scoping comments fell into the following four broad categories: Process, Purpose and Need, Alternatives Development, and Impacts Analysis (including resource-specific concerns and cumulative impacts). The primary public scoping issues are summarized in **Table ES-1** with the locations in this EIS where they are addressed.

### **ES.6.2 Internal Scoping**

Following review of the public scoping comments, the BLM Colorado River Valley Field Office interdisciplinary team met to discuss the external scoping comments and to formulate alternatives to be analyzed in the EIS. This meeting was held to identify issues of concern to the BLM and to discuss how to address the public and agency issues in the EIS. The meeting also helped to more fully develop the conceptual alternatives that were presented in the Notice of Intent.

**Table ES-1 Summary of Primary Scoping Comments**

Resource	Primary Scoping Comments	Where Issues Are Analyzed in EIS
Process	What NEPA deficiencies exist and by what process should the BLM address them? By what authority may the BLM cancel or modify leases?	Sections 1.2 — 1.5
	How can cooperators, affected stakeholders, and other interested parties participate during the NEPA process?	Section 1.7, Chapter 5.0
Purpose and Need	Should the Purpose and Need for agency action extend beyond addressing a NEPA deficiency?	Sections 1.2, 1.3
	What are BLM's and <b>Forest Service's</b> respective roles and decisions to be made?	Section 1.4
Analysis Approach (General)	What RFDS and other development assumptions should be used for EIS analysis? What level of analysis is appropriate for a lease sale EIS?	Section 4.1
	How should the BLM address changed circumstances and new information in a remedial NEPA process?	Chapter 1.0; Chapter 2.0; Section 4.1
Cumulative Impacts	What reasonably foreseeable future actions are appropriate for inclusion in the cumulative impact analyses?	Section 4.1
Air Quality	How would reasonably foreseeable development activities such as drilling, production, vehicle use, and other sources affect air quality?	Section 4.2
	How will the Proposed Action and alternatives address emissions of greenhouse gasses and potential contributions to climate change?	Section 4.2
Geology and Minerals, including Paleontology	What is the potential for seismic activity or other geological instability as a result of reasonably foreseeable development?	Section 4.3
	How would the potential for gas and liquid migration or seismic activity be affected by Mancos shale drilling, hydraulic fracturing, injection of produced water, or other reasonably foreseeable activities?	Sections 4.3, 4.5
	What is the potential for impacts to important paleontological resources from reasonably foreseeable development?	Section 4.3
Soils	How does area soil type affect the potential for erosion, runoff, and subsequent sediment loading? How will impacts from reasonably foreseeable development to sensitive soils be minimized or mitigated?	Section 4.4
Water Resources	How would the projected water use affect long-term availability of water sources?	Section 4.5
	How would the characteristics of the oil/gas formations, aquifer formations, and their interconnectedness affect water quality during activities such as drilling, hydraulic fracturing, or other reasonably foreseeable activities?	Sections 4.3, 4.5
	What are appropriate setbacks for protection of public and private wells, lakes and streams, impaired waters, floodplains, or other water resources?	Chapter 2.0; Section 4.5
	How can the impacts from spills to water quality and other resources be minimized?	Chapter 2.0; Sections 4.5, 4.16
Vegetation and Special Status Species	How would reasonably foreseeable habitat disturbance affect vegetation resources, plant diversity, and ecologically intact/undisturbed locations and special status plant species?	Chapter 2.0; Section 4.6

**Table ES-1 Summary of Primary Scoping Comments**

Resource	Primary Scoping Comments	Where Issues Are Analyzed in EIS
Wildlife and Special Status Species	How would reasonably foreseeable habitat disturbance, vehicle use, and other elements of oil and gas development such as noise affect terrestrial and aquatic wildlife, big game, special status species, and their habitat?	Sections 4.6, 4.7, 4.8
Cultural Resources	How can the BLM protect and conserve cultural resources such as Traditional Cultural Properties, from reasonably foreseeable development?	Chapter 2.0; Section 4.9
	How can the setting of historic tourism be maintained in consideration of reasonably foreseeable development?	Sections 4.9, 4.13
Hazardous Materials	What types and amounts of hazardous materials will be used for oil and gas development? What methods will be used for hazardous materials transport, storage, and usage and disposal? What contingencies exist to handle unexpected contaminations?	Section 4.16
Health and Human Safety	How will the BLM protect public health and safety in and around the analysis area? What are the cumulative and combined impacts of multiple exposures to chemicals and toxic substances such as hydraulic fracturing flues, ozone, and volatile organic compounds on humans?	Chapter 2.0; Section 4.16
Land Use	How would the Proposed Action and alternatives comply with federal, county and local policies concerning development?	Section 4.11
Livestock Grazing	How will the BLM minimize impacts to livestock in and around the analysis area from exposure to hydraulic fracturing fluids, fugitive dust, and as well as impacts from noise or traffic?	Section 4.14
Recreation	How would reasonably foreseeable activities affect access to recreation and the quality of the recreational experience? How would this affect the recreation industry?	Sections 4.13, 4.17
Socioeconomics	How would lease reaffirmation, lease modification, and lease cancellation affect local and regional social and economic conditions?	Section 4.17
	Would reasonably foreseeable development be compatible with the varying social and economic conditions across the analysis area?	Section 4.17
Special Designations	How would the Proposed Action and alternatives comply with the 2001 and 2012 Roadless Rules? How would the alternatives affect the wilderness qualities of Inventoried Roadless Areas and the values of Research Natural Areas?	Chapter 2.0; Section 4.12
Transportation	How will development affect local and regional road system, access and traffic? How will adverse impacts to traffic be minimized?	Chapter 2.0; Section 4.10
<b>Scenic Resources</b>	How would the reasonably foreseeable development affect the general landscape and rural character of the area under each of the alternatives?	Chapter 2.0; Section 4.15

### **ES.6.3 Public Meetings and Comments on the Draft EIS**

The publication of the Notice of Availability (NOA) for the Draft EIS in the Federal Register on November 20, 2015, initiated the public comment period that ended on January 8, 2016. All submissions received during the comment period were analyzed for content. In accordance with NEPA guidelines, the BLM has formally responded to all comments identified as substantive. Appendix E contains additional information regarding public outreach, submissions by type, a description of the content analysis process and comment disposition, a summary of out of scope and non-substantive comments, and all substantive comments with BLM responses.

### **ES.7 Alternatives**

In addition to the No Action Alternative, there are **five** action alternatives analyzed in detail. The alternatives analyzed were developed by the BLM in response to issues and concerns from public comments submitted during the public scoping period, coordination with Cooperating Agencies, and interaction with BLM management and resource specialists. The BLM also considered alternatives raised during the scoping and alternatives development processes that are not carried forward for detailed analysis.

The alternatives analyzed in detail are briefly described below.

#### **ES.7.1 Alternative 1 (No Action)**

Alternative 1 reaffirms the lease stipulations on the 65 leases as they were issued. Under Alternative 1, the BLM would continue to administer the leases with their current stipulations. Those leases that are currently under suspension would be reaffirmed and allowed to be developed at the discretion of the lessee, subject to applicable legal requirements.

#### **ES.7.2 Alternative 2**

Alternative 2 modifies 8 existing leases to address inconsistencies with the 1993 EIS and ROD by adding stipulations identified in the 1993 EIS and ROD that were not attached to the leases as issued. Under this alternative, the BLM would offer the lessee the option of either accepting the new lease stipulations or having the lease cancelled.

#### **ES.7.3 Alternative 3**

Alternative 3 modifies the existing 65 leases to match the stipulations for future leasing identified in the Proposed Action from the WRNF Oil and Gas Leasing Final EIS (USFS 2014a). Although the Forest Service's 2014 Proposed Action (USFS 2014a) does not apply to these 65 leases, Alternative 3 is designed to consider the modification of the 65 leases to match its stipulations for future leasing. Under this alternative, the BLM would offer the lessee the option of either accepting the new lease terms or having the lease cancelled. For **non-producing or non-committed ("undeveloped")** leases, cancellation (if elected by the lessee) would be done through a BLM administrative process and would require that the BLM refund any bonus bids and lease payments. For leases with producing wells, the new stipulations would only apply to new development. Existing wells would remain in production. Should the lessee not accept the new lease stipulations for future development on a producing lease, it may be necessary for the BLM to request judicial action to cancel the lease.

#### **ES.7.4 Alternative 4 (Proposed Action)**

Alternative 4 modifies existing lease stipulations in areas identified as open to future leasing by the Forest Service and cancels all or part of 25 existing leases in areas identified as closed to future leasing. Although the Forest Service's **final** decision on future leasing (USFS 2015f) does not apply to these 65 previously issued leases, this alternative is designed to reflect the Forest Service's future

management objectives for the areas covered by those 65 leases. The primary difference between Alternatives 3 and 4 is that under Alternative 4, some leases or parts of leases would be cancelled to match those areas determined to be closed to leasing in the draft decision. In the areas identified as open to future leasing in the WRNF **Final** ROD (USFS 2015f), the stipulations would be modified to be the same as those in Alternative 3. Under this alternative, the BLM would offer the lessee the option of either accepting the new lease stipulations or having the lease cancelled. For undeveloped leases, cancellation would be done through a BLM administrative process and would require that the BLM refund any bonus bids and lease payments.

#### **ES.7.5 Alternative 5**

Under Alternative 5, all of the previously issued 65 leases would be cancelled. All producing wells would be plugged and abandoned, infrastructure would be removed, roads, well pads, and other ancillary facilities would be reclaimed, and all disturbed areas would be revegetated.

#### **ES.7.6 Preferred Alternative**

**Based on public input received and additional internal assessments, the BLM developed its Preferred Alternatives by combining aspects of Alternatives 2 and 4 above. The Preferred Alternative would cancel in their entirety 25 non-producing or non-committed (“undeveloped”) leases that overlap the area identified as closed to future leasing by the Final ROD (USFS 2015f); would apply Alternative 4 stipulations to the 13 undeveloped leases that are within parts of the WRNF open to future leasing; and would apply Alternative 2 stipulations to 23 leases that are producing or committed to an exploratory unit agreement or communitization agreement and 4 expired leases currently under appeal that had previously been part of the Willow Creek Unit (the Alternative 2 stipulations would apply to these leases only if the unit contraction under appeal is overturned and those leases are reinstated as they have currently expired). With respect to lease that receive new stipulations, the BLM would offer the lessee the option of either accepting the new lease stipulations or having the lease cancelled. For undeveloped leases, cancellation would be done through a BLM administrative process and would require that the BLM refund any bonus bids and lease payments.**

**The Preferred Alternative addresses public comments and concerns while acknowledging recent decisions by the Forest Service with respect to availability for oil and gas development. The Alternative also recognizes the adverse economic impacts and technical challenges for the BLM and local governments associated with any decision to cancel producing or committed leases.**

#### **ES.8 Comparison of Reasonably Foreseeable Future Development under the Action Alternatives**

The numbers of wells predicted to be developed under each alternative was determined by starting with the unconstrained development from the RFDS (USFS 2010); prorating the well numbers projected for each zone based on past development numbers, production potential, and anticipated drilling technology; and considering the constraints on development, such as NSO stipulations and the maximum distance from the surface location to the target formation. **Table ES-2** displays the estimated number of new wells and pads that are used as the basis for the analysis of effects in Chapter 4.0. Because the predicted number of wells and pads was developed by scaling the RFDS projections, there are fractional numbers for wells and pads. These estimates were used for the development of projected surface disturbance, projected water use, transportation needs, staffing requirements, and production forecasts that are used in the impact analysis.

**Table ES-2 Number of Projected Wells by Alternative**

<b>Zone (acres in zone) and Development Type</b>	<b>Alternative 1</b>	<b>Alternative 2</b>	<b>Alternative 3</b>	<b>Alternative 4</b>	<b>Alternative 5<sup>1</sup></b>	<b>Preferred Alternative</b>
<b>Zone 1 (10,114 acres)</b>						
Vertical/ Directional Wells	19.7	19.7	19.7	19.7	0	<b>19.7</b>
Horizontal wells	16	16	16	16		<b>16</b>
Pads	5.1	5.1	5.1	5.1	0	<b>5.1</b>
<b>Zone 2 (24,938 acres)</b>						
Vertical/ Directional Wells	318.1	318.1	318.1	318.1	-73	<b>318.1</b>
Horizontal wells	1	1	1	1		<b>1</b>
Pads	45.6	45.6	45.6	45.6	-13	<b>45.6</b>
<b>Zone 3 (42,766 acres)</b>						
Vertical/ Directional Wells	50.7	50.7	47.6	17.9	-2	<b>10.6</b>
Horizontal wells	1	1	1	0.4		<b>0.2</b>
Pads	7.4	7.4	6.9	2.6	-3	<b>1.5</b>
<b>Zone 4 (2,562 acres)</b>						
Vertical/ Directional Wells	10	10	10	10	0	<b>10</b>
Horizontal wells	0	0	0	0		<b>0</b>
Pads	1.4	1.4	1.4	1.4	0	<b>1.4</b>
<b>Totals (80,380 acres)</b>						
Vertical/ Directional Wells	398.4	398.4	395.4	365.7	-75	<b>358.4</b>
Horizontal wells	18	18	18	17.4		<b>17.2</b>
Pads	59.5	59.5	59.1	54.7	-16	<b>53.7</b>

<sup>1</sup> Under Alternative 5 all leases would be cancelled; therefore, the number of new wells in all zones would be zero.

**Negative numbers in this column account for the number of wells and pads to be reclaimed under Alternative 5, which is the only alternative that requires reclamation of existing wells and pads consequent to their cancellation**

**ES.8.1 Comparison of Alternatives**

**Table ES-3** displays, by alternative, projected surface disturbance (for well pads, roads, and pipelines), as well as projected water use, transportation needs, staffing requirements, and production forecasts for reasonably foreseeable development. The totals shown in the table account for the combination of vertical/directional wells and the number of horizontal wells projected under each alternative. These results are used in the analysis contained in Chapter 4.0.

**Table ES-3 Development Assumptions by Alternatives**

	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5 <sup>1</sup>	Preferred Alternative
<b>Zone 1</b>						
Initial Surface Disturbance (acres)	77	77	77	77	0	77
Long-term Surface Disturbance (acres)	33	33	33	33	0	33
Fresh Water Use <sup>2</sup> (acre-feet)	339	339	339	339	0	339
Recycled Water Use (acre-feet)	1,091	1,091	1,091	1,091	0	1,091
Gas Production (Bcf)	126	126	126	126	0	126
Produced Water (gallons)	<b>81,761,565</b>	<b>81,761,565</b>	<b>81,761,565</b>	<b>81,761,565</b>	<b>0</b>	<b>81,761,565</b>
<b>Zone 2</b>						
Initial Surface Disturbance (acres)	684	684	684	684	76	684
Long-term Surface Disturbance (acres)	296	296	296	296	0	296
Fresh Water Use <sup>2</sup> (acre-feet)	675	675	675	675	0	675
Recycled Water Use (acre-feet)	1,702	1,702	1,702	1,702	0	1,702
Gas Production (Bcf)	388	388	388	388	0	388
Produced Water (gallons)	<b>510,837,600</b>	<b>510,837,600</b>	<b>510,837,600</b>	<b>510,837,600</b>	<b>0</b>	<b>510,837,600</b>
<b>Zone 3</b>						
Initial Surface Disturbance (acres)	111	111	104	39	10	23
Long-term Surface Disturbance (acres)	48	48	45	17	0	10
Fresh Water Use <sup>2</sup> (acre-feet)	123	123	117	44	0	26
Recycled Water Use (acre-feet)	323	323	307	115	0	70
Gas Production (Bcf)	67	67	64	24	0	14
Produced Water (gallons)	<b>84,067,200</b>	<b>84,067,200</b>	<b>79,119,600</b>	<b>29,713,855</b>	<b>0</b>	<b>17,681,236</b>

**Table ES-3 Development Assumptions by Alternatives**

	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5 <sup>1</sup>	Preferred Alternative
<b>Zone 4</b>						
Initial Surface Disturbance (acres)	21	21	21	21	0	21
Long-term Surface Disturbance (acres)	9	9	9	9	0	9
Fresh Water Use <sup>2</sup> (acre-feet)	21	21	21	21	0	21
Recycled Water Use (acre-feet)	52	52	52	52	0	52
Gas Production (Bcf)	12	12	12	12	0	12
Produced Water (gallons)	15,960,000	15,960,000	15,960,000	15,960,000	0	15,960,000
<b>Totals</b>						
Initial Surface Disturbance (acres)	893	893	886	821	86	805
Long-term Surface Disturbance (acres)	386	386	383	355	0	349
Fresh Water Use <sup>2</sup> (acre-feet)	1,158	1,158	1,152	1,079	0	1,061
Recycled Water Use (acre-feet)	3,168	3,168	3,152	2,960	0	2,914
Gas Production (Bcf)	593	593	590	550	0	540
Produced Water (gallons)	692,626,365	692,626,365	687,678,765	638,273,020	0	626,240,401

<sup>1</sup> Under Alternative 5, all leases would be cancelled; therefore, the number of new wells in all zones would be zero. The Alternative 5 column displays the surface disturbance due to reclamation of existing wells, pads, and roads.

<sup>2</sup> Includes 20% of completion water (for hydraulic fracturing) that is not recycled.

Notes: Bcf = Billion Cubic Feet

Assumptions used to calculate this information are derived from **Tables 2-7, 2-8, and 2-9**.

## ES.9 Summary of Direct and Indirect Impacts

Leasing, by itself, would not affect most resources with the possible exception of socioeconomics but, given that the probable result of leasing is fluid mineral development, the analysis considers the potential impacts of reasonably foreseeable future development. The basis for the analysis of future oil and gas development is the WRNF RFDS (WRNF 2010), which has been scaled to the amount of development feasible under each alternative (see **Table ES-2**). The impact analyses assume that the environmental protection measures required by Forest Service and BLM policies and guidelines would be successfully implemented. It also assumes that operators and lessees would comply with applicable state and federal regulations and conditions of required permits. In general, the highest potential impacts to surface resources would occur in areas with the most wells and the greatest acreage of associated surface in

the lowest acreage of restrictive (i.e., NSO, CSU, and TL) stipulations. Under Alternatives 1 and 2, more projected well development would occur and there are fewer restrictive lease stipulations. Alternative 3 has similar levels of development but more restrictive lease stipulations. Alternative 4 has the same lease stipulations as Alternative 3, but somewhat less development due to lease cancellations. Alternative 5, which would cancel all existing leases, would result in minimal acreage of surface disturbance to remove infrastructure and reclaim disturbed areas and the least amount of overall impacts to resources. **The Preferred Alternative, which incorporates Alternative 2 and 4 stipulations and expands Alternative 4 lease cancellations, would have less projected development than Alternative 4.** Detailed descriptions of impacts are presented in each resource section in Chapter 4.0 and summarized in Chapter 2.0, **Table 2-11**. The summarized impacts assume the implementation of laws, regulations, and environmental protection measures required by permits and policy. The following sections summarize the key conclusions regarding impacts.

### ES.9.1 Air Quality

In general, the highest air quality impacts would be associated with those alternatives that have more potential for oil and gas development activity. The concentrations of directly emitted pollutants such as carbon monoxide, **sulfur** dioxide, and greenhouse gases are expected to increase as a result of increased oil and gas development. Emission estimates for each alternative were not developed for this analysis but it is expected that the potential development **would fall within the range** of emissions considered in the Colorado Air Resources Modeling Management Study (CARMMS) used in this analysis. CARMMS developed high, medium and low emissions scenarios that account for different levels of oil and gas development as well as emission controls. In general the CARMMS modeling determined that no scenario contributes significantly to adverse effects on air quality and air quality related values (visibility and atmospheric pollutant deposition). Because the level of development under all the alternatives falls within the CARMMS scenarios that were modeled, it is reasonably expected that the impacts from all alternatives would not significantly impact air quality. Disclosure of emissions inventories at the project level and monitoring would be required during development and production. The range of annual contribution to global greenhouse gas emissions is estimated to be between 908,770 metric tons of carbon dioxide equivalent and 1,160,586 metric tons of carbon dioxide equivalent— depending on the potential level of development. This annual estimate was developed for the maximum oil and gas production year in 2021.

### ES.9.2 Geology and Minerals

Alternatives 1 and 2 would provide less coverage of lands subject to geologic hazards under NSO stipulations and the resource-specific CSU stipulation as compared to Alternatives 3 and 4. Alternative 5 provides the most protections through cancellation of all leases. **Under the Preferred Alternative, CSU and NSO stipulations for steep slopes and geological hazards would provide limited coverage to unstable areas, but lease cancellation would preclude development in 77 percent of Zone 3.**

Under Alternatives 1 and 2, an estimated total of 593 Bcf of gas would be produced. Alternatives 3, 4, **and the Preferred Alternative** would reduce production to 590, 550, and **540** Bcf of gas, respectively. Alternative 5 would result in a resource loss of an estimated 45 Bcf of gas. **Alternatives 1 and 2 would have minor or no changes in the current management that would restrict development. The stipulations and restrictions proposed under Alternatives 3 and 4 would have a range of effects from increasing the costs of development and production to the potential loss of planning investment. The potential for this to occur would be reduced under the Preferred Alternative, which would retain existing stipulations on producing or committed leases. Alternative 5 would have the greatest impact, by cancelling all 65 leases.**

The reliance on the Potential Fossil Yield Classification system management objectives and stipulations of other resources in Alternatives 1 and 2 would not provide as great a degree of protection as the CSU stipulation for Alternatives 3 and 4. **The Preferred Alternative would apply the CSU stipulation to**

**23 percent of Zone 2 and would cancel 77 percent of the area in Zone 3; protection in the remainder of the zones would rely on the Potential Fossil Yield Classification system and regulatory protections.** There would be no stipulations for the protection of fossil resources for Alternative 5 beyond the Potential Fossil Yield Classification system.

### ES.9.3 Soils

**While the acreage of surface disturbance associated with projected oil and gas development would be similar under Alternatives 1 through 4, Alternative 4 would have a lower risk of adverse impacts to soils based on lease stipulations, modifications, and cancellations. The Preferred Alternative would result in the least surface disturbance (other than under Alternative 5) due to cancellation of leases and associated reduced number of wells to be developed in Zone 3; however, the Preferred Alternative would provide less NSO stipulation coverage in Zone 2 of water erodible soils and for all soils generally than Alternative 4. Alternative 5 would have the least amount of potential risks to erodible soils because all leases would be cancelled, most of the surface disturbance would occur on previously disturbed soils, and reclamation and revegetation would be implemented for the entire analysis area.**

### ES.9.4 Water Resources

Compared to the No Action Alternative, Alternatives 2 through 5 progressively provide increased protection to surface water resources inside the lease boundaries through stipulations that limit surface disturbance and minimize sedimentation. **The Preferred Alternative would provide coverage in the range between Alternatives 2 and 5, depending on the specific parameter compared.** However, the increased coverage to the lease areas may have the opposite impact to the areas outside the leases by causing the disturbance to occur off-lease. Therefore, Alternatives 2 through 4 **and the Preferred Alternative** may increase the risk of impacts to water resources in the areas immediately adjoining the leases. **Alternative 4 and the Preferred Alternative would pose lower risk for off-lease development in Zone 3 because of the cancellation of certain leases. The Preferred Alternative would reduce risk as compared to Alternative 4 by fully cancelling 25 leases in Zone 3.** Alternative 5 would provide the most coverage to water resources, including those outside the lease areas.

There are no groundwater coverage stipulations **under** Alternatives 1 and 2. It may be possible that stipulations for other resources may offer some coverage for groundwater, but stipulations for other resources may not be adequate **to protect groundwater because they do not contain the technological and engineering controls necessary to lower the risk of contamination.** Protection of groundwater resources would rely on operators' compliance with federal and state requirements. Alternatives 3 and 4 have a groundwater stipulation that covers limited areas of potential concern. Alternative 4 provides more potential coverage for groundwater when taking into account the leases that would be cancelled. **The Preferred Alternative would apply the groundwater CSU stipulation to limited areas of Zones 2 and 4. As with Alternatives 3 and 4, the Preferred Alternative would preclude surface disturbance in almost all of Zones 1 and 4 through NSO stipulations intended to cover other resources; however the coverage afforded to Zones 2 and 4 from NSO stipulations and lease cancellations would be about 9 to 18 percent less than under Alternatives 3 and 4.** Alternative 5 would minimize potential impacts to groundwater resources to the greatest extent when compared to the other alternatives.

### ES.9.5 Vegetation Resources

Under Alternative 1 (the No Action Alternative) and Alternative 2 level of NSO coverage afforded to vegetation resources by NSO stipulations would be minimal as development could occur in any vegetation type, including riparian habitat and other suitable habitat for special status species. Under Alternative 3, more riparian and most special status species suitable habitat would be precluded from surface disturbance and covered by CSU stipulations requiring surveys or special development

techniques to minimize disturbance. While both Alternatives 3 and 4 preclude surface disturbance within special status species habitat to a similar degree, Alternative 4 would offer an advantage over Alternative 3 because in Zone 3, much of the surface disturbance in special status species habits would be precluded through lease cancellation, which cannot be exempted. **The Preferred Alternative would offer some resource-related stipulation coverage, some coverage by all NSO stipulations, and some coverage provided by lease cancellation. Relative to Alternatives 3 and 4, the Preferred Alternative would remove potential for surface disturbance (and vegetation removal) in a large portion of Zone 3 due to lease cancellations, but would also decrease some of the stipulation coverage that preclude surface disturbance in Zones 2 and in portions of Zone 3 where leases are not cancelled. Overall, the Preferred Alternative would reduce proposed new surface disturbance relative to Alternatives 1 through 4.** Alternative 5 would minimize the potential for the impacts to vegetation resources to the greatest extent, since all surface disturbance would be associated with reclamation. The potential for the introduction of noxious weeds would be similar under Alternative 1, 2, 3, and 4 but lower under Alternative 5. Under all alternatives, the BLM would retain the ability to relocate operations to some degree and require Best Management Practices or other measures to minimize the potential for noxious weeds to become established or proliferate.

### ES.9.6 Terrestrial Wildlife Resources

Under Alternative 1, wildlife-specific NSO stipulations would be applied to bighorn sheep ranges and elk and mule deer game winter ranges. With consideration of all NSO stipulations, Zone 1 would be fully covered by NSO, thus potentially protecting all terrestrial wildlife resources, including all bighorn sheep habitat. Within the remaining zones, NSOs would cover a small amount of elk winter range, but no designated mule deer winter ranges, and less than half of bighorn sheep both overall and summer ranges. The Big Game Winter Range TL stipulation that would apply to mule deer and elk winter range within the analysis area would not always cover winter range as it is currently mapped. All known locations of federally listed species would be precluded from surface disturbance. Alternative 2 stipulations would result in a slight increase in coverage to increase elk winter range, elk production areas, and lynx denning habitat as compared to Alternative 1. Under Alternatives 3 and 4, Zone 1 also would be fully precluded from surface disturbance. NSOs for big game and lease cancellations would cover a greater percentage of big game sensitive habitats (between 60 and 100 percent), and big game timing stipulations would cover between 71 and 100 percent of big game winter ranges. Moose sensitive habitat would have between 80 and 100 percent coverage. **Under the Preferred Alternative, impacts to mule deer would be similar to Alternative 2, with slight additions to coverage in Zone 3 through lease cancellations. Elk production areas would not be covered by any resource-specific NSO; however, the combination of unrelated NSOs and lease cancellation would cover most habitat areas. Impacts to elk severe winter range and winter concentration areas would be the same as Alternative 2, except in Zone 3 where lease cancellation would cover 100 percent of elk severe winter range. Elk winter range winter range would have coverage ranging from 54 to 91 percent, by zone. Moose habitat would have between 60 percent and 81 percent combined NSO coverage.** All known locations of federally listed species as well as their designated habitat would be covered under NSO stipulations. Alternative 5 would result in the least impact to **wildlife** as disturbance activities would impact a much smaller acreage and would be related to reclamation.

### ES.9.7 Aquatic Resources

In summary, the highest level of potential impacts to aquatic habitat and species would occur under Alternatives 1 and 2, as indicated by the percentage of perennial streams not subject to resource stipulations. Potential impacts would include habitat loss or alteration and negative changes in water quality. In contrast, there would be **limited** impacts to game fish and special status aquatic species under Alternatives 3 and 4 **and the Preferred Alternative**, since streams that contain these species are subject to aquatic-focused stipulations **or are within leases that would be cancelled under the Preferred Alternative**. There could be impacts to a limited number of perennial streams that do not contain game fish or special status species under Alternatives 3, 4, **and the Preferred Alternative**.

Potential water use from drilling and completion would negatively affect aquatic species if there are new depletions. The estimated volume of potential water use is similar for Alternatives 1 through 4 **and the Preferred Alternative**. Under Alternative 5, there would be no potential alteration of aquatic habitat after reclamation and there would be no water use or depletions related to well drilling or completion within the lease zones.

#### **ES.9.8 Cultural Resources**

The potential risks to cultural resources derive from the extent of surface disturbance and the relative protection through the limitation of surface disturbance under each alternative. For those alternatives where oil and gas development is projected (Alternatives 1 through 4), Alternative 4 would have the greatest extent of protection from surface disturbance and the fewest sites at risk from construction and development activities, while Alternative 1 would have the least protection and greatest risk. Alternative 5 would have the lowest potential adverse effects on cultural resources due to the low area of projected surface disturbance and the reclamation of existing disturbed areas. **Potential risks to eligible sites under the Preferred Alternative would fall between the range of impacts under Alternative 1 and Alternative 5.** However, it is unlikely that sites that are eligible for the national Register of Historic Places would be adversely affected under any alternative because federal regulations require site-specific surveys before surface-disturbing activities begin and avoidance or mitigation of eligible sites.

#### **ES.9.9 Transportation**

Within the analysis area the maximum estimated new road construction would take place within Zone 2 under Alternatives 1 and 2. Additionally, the highest average daily vehicle round-trips and total trips would take place within Zone 2 under Alternatives 1 and 2. **Impacts may include temporary conflicts with normal traffic, travel delays, decreased travel speeds, and increased vehicle collision rates with other vehicles or with wildlife and livestock, fugitive dust and noise. Increased traffic would be most noticeable along roads in areas without high levels of existing development.** Impacts to local areas and roads of concern near the Thompson Divide area, Glenwood Springs, and Carbondale also would be greatest under Alternatives 1 and 2, although impacts would be spread along a 20-year development period. **The Preferred Alternative and Alternatives 3 and 4 would produce fewer impacts to transportation resources as a result of the potential development of fewer wells pads and associated wells.** Alternative 5 would produce fewer impacts than Alternative 1 and the least of any alternative as existing wells are plugged and abandoned and lease pads and access roads reclaimed.

#### **ES.9.10 Land Use**

As compared to Alternative 1, Alternatives 3 and 4 **and the Preferred Alternative** contain the most stipulations, which would limit where and when federal lands and realty authorizations may be modified or issued and how land uses would change. **Lease cancellations under Alternative 4 and the Preferred Alternative would reduce the land use changes and potential for conflicts with county land use plans and zoning in Zone 3. The Preferred Alternative would increase the potential for conflicts with Mesa and Garfield county land use plans and zoning within Zones 1 and 2 relative to Alternative 4, as Alternative 2 stipulation would be applied to producing or committed leases. Under Alternative 5, land uses within the leases would not be modified by mineral development, and the existing wells, associated roads, and pipelines would revert to previous land uses after reclamation is completed.**

#### **ES.9.11 Special Designations**

Within the analysis area, the maximum net long-term disturbance in acres across all alternatives would be less than 0.8 percent of the analysis area. Under all alternatives, surface disturbance would be precluded in the Lower Battlement Research Natural Area and all Colorado Roadless Areas (CRAs) in Zone 1 through one or more NSO stipulation. Under Alternative 1, NSO stipulations would cover

**49 percent of Zone 2 CRAs and about 5 percent of Zone 3 CRAs. Under Alternatives 3 and 4, NSO coverage and lease cancellations (Alternative 4 only) coverage would be increased to about 100 percent in both zones, with additional constraints provided by CSU stipulations. The Preferred Alternative would cover 88 percent of Zone 2 CRAs and 77 percent of Zone 3 CRA through NSO stipulations and lease cancellation; the additional constraints provided by CSU stipulations would be reduced relative to Alternatives 3 and 4.** Alternative 5 would produce fewer impacts than Alternative 1 and the least of any alternative as existing wells are plugged and abandoned 31 and lease pads and access roads reclaimed within CRAs.

#### ES.9.12 Recreation

Under each alternative, impacts from noise, lights, dust, smell, and activities associated with lease development could cause recreationists to relocate to a more natural setting. The greatest potential for impacts lies within Semi-Primitive Motorized (**SPM**) and Semi-Primitive Non-Motorized (**SPNM**) Recreation Opportunity Spectrum (ROS) Classes, recreation-oriented management areas, or other areas where the characteristics of remoteness and naturalness would be vulnerable. Under Alternative 1 and 2, the RFDS for Zones 2, 3, and 4 could be developed in any ROS class and in backcountry year-round motorized and dispersed recreation management areas (in Zone 1, all surface disturbances would be fully precluded). Under Alternative 3, surface disturbance would be fully precluded in Zone 1, NSO stipulations would generally cover between 80 and 95 percent in **SPM and SPNM** ROS classes in Zones 2, 3, and 4, and a greater portion of management areas with a recreational emphasis would be precluded from surface disturbance. Alternative 4 would be the same as Alternative 3, except in Zone 3, where a combination of lease cancellations and NSO stipulations would decrease the acreage in which development would take place. **The Preferred Alternative would fully preclude surface disturbance in Zone 1 and provide between 69 and 100 percent NSO coverage in SPM and SPNM ROS classes in Zones 2, 3, and 4.** Alternative 5 would result in the least impact to recreation as all disturbance activities would be related to reclamation.

#### ES.9.13 Livestock Grazing

Oil and gas development under Alternatives 1 and 2 would have the greatest potential for impacts to livestock grazing operations within the analysis area due to the least amount of coverage from associated stipulations (25 and 30 percent and the lease areas, respectively). This does not necessarily equate to less surface disturbance under Alternative 2 compared to Alternative 1; however, it would influence where development would take place, some disturbance may occur off-lease or the same amount of disturbance may be concentrated into a smaller area. Under Alternatives 3 and 4, **almost 100 percent of the allotments areas overlapped by leases would receive coverage from stipulations. Under the Preferred Alternative, NSO coverage in Zones 1 and 4 would remain the same, but NSO coverage in some Zone 2 allotments would be reduced. In Zone 3, proposed lease cancellations would eliminate impacts in 6 allotments in Zone 3; the remaining allotment in Zone 3 would receive less than one percent coverage by a NSO stipulation.** Under Alternative 5 stipulations would not affect the associated allotments because no future development would occur and existing wells, pads and roads would be plugged, abandoned, and reclaimed with the intention of returning 86 acres to pre-disturbance condition.

#### ES.9.14 Scenic Resources

Alternative 1, the No Action Alternative, offers the least coverage of high scenic value resources and there is potential for the RFDS to occur in areas with High, Moderate, and Low Scenic Integrity Objectives (SIOs). Development in Moderate SIOs may be inconsistent with the Forest Plan, and on some leases in Zone 2, it may not be possible to locate all new development within areas of lower scenic importance and sensitivity. Alternative 2 would have similar impacts except there would be slightly more NSO and resource-specific CSU coverage in areas of high scenic value. Under Alternative 3, the potential for RFDS development in High and Moderate SIOs would be largely eliminated through NSO

stipulations. A resource-specific CSU would be applied in most areas where development is still possible in Moderate SIO. Alternative 4 would have the same potential impacts as Alternative 3 except in Zone 3, where over 60 percent of the lease area would be cancelled. **With consideration of all NSO stipulations, impacts under the Preferred Alternative would be generally the same as Alternative 4 except that in Zone 2, there would be less coverage provided by NSO stipulations, and in Zone 3, the additional lease cancellations and lower projected development would more effectively prevent surface-disturbing activities in areas of high scenic importance.** Alternative 5 offers the greatest opportunity to maintain or improve high scenic value resources over the long term through cancellation of all leases.

#### **ES.9.15 Hazardous Materials and Human Health and Safety**

Activities conducted under any of the alternatives carry risks of spills and releases of hazardous materials and solid waste. In the absence of stipulations, activities would be carried out in accordance with applicable regulatory programs. **Based on projected development, the No Action Alternative would statistically present the greatest risk for spills, followed by Alternatives 2, 3, 4, the Preferred Alternative, and Alternative 5.** The risks **would be** much less under Alternative 5 compared with the other **five** alternatives since the chemicals and materials used in gas production would not be present. Compared to the No Action Alternative, Alternatives 2, **3, 4, the Preferred Alternative, and Alternative 5 would generally** progressively minimize the potential for impacts to human health and safety through lower levels of development, stipulations that would limit development near public water supply source areas, and reduced vehicle and equipment use. Alternative 4 **and the Preferred Alternative would minimize the risk to human health and safety relative to Alternatives 1, 2, and 3 due to lease cancellation versus NSO stipulations (which may serve to push development off-lease rather than eliminating it entirely).** **The Preferred Alternative would cover a lower percentage of Colorado Source Water Assessment and Protection (CSWAP) and Source Water Protection Plan (SWPP) areas than Alternative 4, but would also have a lower projected development level than Alternative 4.** In comparison to the No Action Alternative and Alternative 2, Alternatives 3, 4, **the Preferred Alternative and 5 progressively** would reduce oil and gas development revenues that would benefit emergency services. Alternative 5 would minimize the risk to human health and safety to the greatest degree by cancelling all leases but would eliminate all lease-related revenue that might fund emergency services.

#### **ES.9.16 Socioeconomics**

Under Alternatives 1 and 2, total future natural gas production is projected to be approximately 312 billion cubic feet (Bcf) over the 20-year period (2017 to 2036) and the future revenue value of the total new natural gas production would be almost \$1.6 billion. Total direct jobs from construction and operation are expected to be 93 full time equivalents (FTEs) in 2017 and increase to 182 FTEs by 2036 **Over the 20-year period the projected job growth would result in an estimated total increase in employment of 2,751 FTEs.**

**Alternative 1 and 2 are projected to generate approximately \$99 million in county government revenues from future lease development that would add an additional 332 government FTEs over the twenty year period. Furthermore, in addition to these direct employment effects, the spending from construction, operations and the public revenue payments are projected to add another 2,101 FTEs in future employment gains over the 20-year period.**

**Under Alternative 3, its future natural gas production is expected to be less than 1 percent lower under Alternatives 3 and consequently its direct employment, public revenue, indirect and induced economic impacts would be approximately the same as those estimated for Alternatives 1 and 2.**

Compared to Alternative 1, future oil and gas activity and production is projected to be 7 percent lower under Alternative 4 and reduced by a total of 9 percent under the Preferred Alternative (289 and 284 Bcf, respectively). Consequently, Alternative 4 and the Preferred Alternative would generate slightly fewer FTEs. Under Alternative 4, total direct jobs from construction and operation are expected to be 86 FTEs in 2017 and increase to 168 FTEs by 2036. Over the 20-year period the projected job growth would result in an estimated total increase in oil and gas employment of 2,542 FTEs. There would be comparable future employment impacts under the Preferred Alternative which is projected to add a total of 2,496 natural gas production and operation FTEs over the 20-year period.

Both Alternative 4 and the Preferred Alternative would also result in slightly lower total county government revenue receipts of approximately \$94 million and \$92 million, respectively, relative to the \$99 million estimated to be generated under Alternatives 1 and 2. This spending is expected to result in additional new direct government employment of approximately 318 FTEs and 314 FTEs, respectively. Over the 20-year period, Alternative 4 and the Preferred Alternative are also expected to result in additional 1,947 and 1,912 FTEs, respectively, of indirect and induced employment.

Under Alternatives 4, 5, and the Preferred Alternative, leaseholders of cancelled leases would be refunded all rental fees and bonus bids. While a percentage of these funds were subsequently distributed to the counties, it is assumed for analysis (in accordance with similar circumstances for lease cancellation under the Roan Plateau settlement agreement), that the State of Colorado would reimburse the federal government for the revenues disbursed by the federal government to the state in connection with the cancelled leases (approximately 49 percent of the total bonus bids and rentals). The precise schedule for that reimbursement by the state is unknown; the BLM is assuming that the reimbursement would occur through offsets for future disbursements to the state from other mineral leases. BLM does not have information about the formula that the state may use to allocate future federal disbursements among local governments. Consequently, it is expected that any economic impact to the region's economy from the lessee refunds would be minor or negligible.

Under Alternative 5, the **plugging** of 75 existing wells is expected to result in a loss of approximately 45 Bcf of natural gas production worth approximately \$188 million, a total employment loss (**including government workers, indirect and induced**) of approximately 333 FTEs and a total future county revenue loss of approximately \$13 million. In addition, Alternative 5 would result in the non-development of leases as foreseen in Alternative 1, and therefore would have the total loss of approximately 357 Bcf of natural gas production worth approximately \$2.0 billion, an employment loss of approximately 5,517 FTEs and a total future county revenue loss of approximately \$128 million.

#### **ES.9.17 Environmental Justice**

No disproportionate and adverse effects to environmental justice communities are expected from any of the action alternatives as no environmental justice communities were identified within the study area.

## List of Acronyms

°F	degrees Fahrenheit
µeq/l	micro-equivalent per liter
µg/m <sup>3</sup>	micrograms per cubic meter
AASHTO	American Association of State Highway and Transportation
ACHP	Advisory Council on Historic Preservation
AEO	Annual Energy Outlook
ALC	Aquatic Life Cold
amsl	above mean sea level
ANC	acid neutralizing capacity
APCD	Air Pollution Control Division
APD	Application for Permit to Drill
APE	Area of Potential Effect
AQRV	air quality related value
AUM	animal unit month
BA	Biological Assessment
BBC	BBC Research and Consulting
Bcf	billion cubic feet
BE	Biological Evaluation
BGEPA	Bald and Golden Eagle Protection Act
BLM	Bureau of Land Management
BLS	Bureau of Labor Statistics
BMP	Best Management Practice
C&H	Cattle and Horse Allotment
CAA	Clean Air Act
CARMMS	Colorado Air Resources Management Modeling Study
CARMS	Colorado Air Resources Management Modeling Study
CARPP	Comprehensive Air Resource Protection Protocol
CBNG	coalbed natural gas
CCR	Colorado Code of Regulations
CDOT	Colorado Department of Transportation
CDOW	Colorado Division of Wildlife
CDPHE	Colorado Department of Public Health and Environment
CDWR	Colorado Division of Water Resources
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CGS	Colorado Geological Survey

CH <sub>4</sub>	methane
CIAA	Cumulative Impacts Analysis Area
CNHP	Colorado Natural Heritage Program
CO	carbon monoxide
CO <sub>2</sub>	carbon dioxide
CO <sub>2</sub> (e)	carbon dioxide equivalent
COA	Condition of Approval
COGCC	Colorado Oil and Gas Conservation Commission
CPW	Colorado Parks and Wildlife
CR	County Road
CRA	Colorado Roadless Area
CRCT	Colorado River Cutthroat Trout
CRR	Colorado Roadless Rule
CRVFO	Colorado River Valley Field Office
CSU	Controlled Surface Use
CSWAP	Colorado Source Water Assessment and Protection
CTL	Closed to Leasing
CWA	Clean Water Act
DAU	Data Analysis Unit
dBA	decibels on the A-weighted scale
DOLA	Colorado Department of Local Affairs
DVF	Future Design Value
E&P	exploration and production
EIS	Environmental Impact Statement
EO	Executive Order
EPCRA	Emergency Planning and Community Right-to-Know Act
EPS-HDT	Economic Profile System-Human Dimension Toolkit
ESA	Endangered Species Act
FLAG	Federal Land Managers' Air Quality Related Values Work Group
FLM	Federal Land Manager
FLPMA	Federal Land Policy and Management Act of 1976
FML	Federal Mineral Lease
FO	Field Office
Forest Service	U.S. Forest Service
FR	Federal Register
FSM	Forest Service Manual
FSVeg	Forest Service Field Sampled Region 2 Vegetation Data
FTE	full time equivalent
GBCT	greenback lineage cutthroat trout
GHG	greenhouse gas

GHMA	General Habitat Management Areas
GIS	Geographic Information System
GJFO	Grand Junction Field Office
GMU	Game Management Unit
GMUGNF	Grand Mesa, Uncompahgre, and Gunnison National Forest
gpm	gallons per minute
H <sub>2</sub> S	hydrogen sulfide
HAP	Hazardous Air Pollutant
HM	Head month
HUC	Hydrologic Unit Code
I-70	Interstate 70
IBLA	Interior Board of Land Appeals
IM	Instruction Memorandum
IMPROVE	Interagency Monitoring of Protected Visual Environments
IPCC	Intergovernmental Panel on Climate Change
IRA	inventoried roadless area
LAC	Level of Acceptable Change
LRMP	Land and Resource Management Plan
MATS	Modeled Attainment Test Software
MBTA	Migratory Bird Treaty Act
Mcf	billion thousand cubic feet
MDP	Master Development Plan
mg/L	milligrams per liter
MIS	Management Indicator Species
MLA	Mineral Leasing Act of 1920
MLRA	Major Land Resource Area
MMPA	Mining and Minerals Policy Act of 1970
MMTCO <sub>2</sub> e	million metric tons of carbon dioxide equivalents
MP	milepost
MWX	Multiwell Experiment
N <sub>2</sub> O	nitrous oxide
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NESHAP	National Emission Standards for Hazardous Air Pollutants
NFMA	National Forest Management Act
NFS	National Forest System
NHPA	National Historic Preservation Act of 1966, as amended
NO <sub>2</sub>	nitrogen dioxide
NOI	Notice of Intent
NORM	naturally occurring radioactive materials

NO <sub>x</sub>	oxides of nitrogen
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NSO	No Surface Occupancy
NSPS	New Source Performance Standards
O <sub>3</sub>	ozone
OSHA	Occupational Safety and Health Administration
P.L.	Public Law
PBA	Programmatic Biological Assessment
PBO	Programmatic Biological Opinion
PFYC	Potential Fossil Yield Classification
PHMA	Priority Habitat Management Area
PHMSA	Pipeline & Hazardous Materials Safety Administration
PILT	Payments in Lieu of Taxes
PM	particulate matter
PM <sub>10</sub>	particulate matter with an aerodynamic diameter of 10 microns or less
PM <sub>2.5</sub>	particulate matter with an aerodynamic diameter of 10 microns or less
ppb	parts per billion
ppm	parts per million
PSD	prevention of significant deterioration
PUD	Planned Unit Development
RCRA	Resource Conservation and Recovery Act
REL	Reference Exposure Level
RfC	Reference Concentrations for Chronic Inhalation
RFD	Reasonably Foreseeable Development
RFDS	Reasonably Foreseeable Development Scenario
RFFA	reasonably foreseeable future actions
RMP	Resource Management Plan
RNA	Research Natural Areas
ROD	Record of Decision
ROS	Recreation Opportunity Spectrum
ROW	right-of-way
RPPA	Roan Plateau Planning Area
SARA	Superfund Amendments and Reauthorization Act
SCORP	Statewide Comprehensive Outdoor Recreation Plan
SHPO	State Historic Preservation Office(r)
SIA	Special Interest Area
SIO	Scenic Integrity Objective
SLT	Standard Lease Term

SO <sub>2</sub>	sulfur dioxide
SPCC Plan	Spill Prevention, Control, and Countermeasure Plan
SPM	Semi-primitive Motorized
SPNM	Semi-primitive Non-motorized
SR	State Route
SUPO	Surface Use Plan of Operation
SWAP	Source Water Assessment and Protection
<b>SWMP</b>	<b>Stormwater Management Plan</b>
SWPP	Source Water Protection Plan
TCP	Traditional Cultural Property
TDS	total dissolved solid
TENORM	Technologically Enhanced naturally occurring radioactive materials
TEPC	Threatened, Endangered, Proposed, and Candidate
TIPU	Transportation, Information, Power, and Utilities
TL	Timing Limitation
TPQ	threshold planning quantities
tpy	tons per year
U.S.	United States
USACE	U.S. Army Corps of Engineers
USC	United States Code
USDA	U.S. Department of Agriculture
USDOT	U.S. Department of Transportation
USEIA	U.S. Energy Information Administration
USEPA	U.S. Environmental Protection Agency
USFS	United States Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VOC	volatile organic compound
WA	Wilderness Area
WEM	Waivers, Exceptions, or Modification
WIZ	Water Influence Zones
WRFO	White River Field Office
WRNF	White River National Forest
WUS	Waters of the U.S.

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