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- Disclose how timber removal will be handled.
  - Disclose reclamation bonding.
  - Disclose reclamation standards and requirements.
  - Potential for reclamation success, particularly woody species.

### **Wildlife**

- Effects on USFS management indicator species.
- Stress, displacement, migration, and critical winter range effects to big game.
- Disturbance to elk herd calving areas, including area approximately 2 miles away from Leon Lake #4 and #5.
- Effects on migratory and nesting bird species.
- Noise and human disturbance effects on wildlife.
- Potential habitat fragmentation due to drilling and road building.
- Potential toxic effects on wildlife from exposure to industrial pond water and reserve pits.
- Beneficial impact of increased grasses and shrubs in reclaimed areas.
- Effects on wildlife linkage areas.
- Effects of Proposed Action on species diversity.
- Disclose effects of winter use on wildlife.
- Effects on “enhanced wildlife area” in Gunnison National Forest (Hubbard Park).
- Effects to important wildlife habitat landscape features (e.g., corridors between regionally important wildlife usage areas).

### **Fisheries**

- Potential effects of spills, sediment loading, sedimentation, and contaminants on fisheries.
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- Effects of selenium on aquatic life.
  - Effects to Colorado River cutthroat trout.

### **Threatened, Endangered, and Sensitive Species**

- Effects to TES species.
- Effects to potential reintroduction of lynx and potential habitat destruction for lynx and snowshoe hare.
- Effects of potential effects to water resources on Colorado River endangered fish species.
- Disclose effects of potential winter use on TES species.
- Effects to *Aconitum bakeri* forma *ochroleucum* form of (monkshood).

### **Land Use/Recreation**

- Effects of construction traffic on use by recreationists (horseback riders, hunters, fishermen, 4-wheelers, mountain bikers, and campers) and local residents.
- Visual and noise effects on outdoor recreation enjoyment.
- Potential loss of recreational opportunities (hiking, cross country skiing, biking, hunting, and snowmobiling).
- Displacement of dispersed recreation sites.
- Effects on current access to recreation.
- Potential availability of new roads for recreation access.
- Compatibility with offsite local land uses (railroad, mining, logging, agricultural crops, and grazing).
- Consistency with existing designated land uses.
- Effects on the naturalness of Grand Mesa.
- Effects on recreational trail use on the Coal Gulch/Pilot Knob ATV trail.

### **Noise**

- Noise effects from drill pads' activities.

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- Noise effects from increased truck traffic, including effects on local communities.
  - Adequacy of baseline noise data for well sites and truck traffic routes.

### **Visual Resources**

- Effects of exploration on visual resources and scenery.
- Effects of road development on visual resources.
- Effects on Grand Mesa National Scenic and Historic Byway and West Elk Scenic Loop.
- Effects of light pollution from lighting at drill sites.

### **Cultural Resources**

- Effects of proposed activity on known cultural or historic resources.

### **Transportation**

- Effects of new road development in area, and upgrading existing roads.
- Damage and wear to roads from increased truck traffic.
- Effects of truck traffic on public safety, including school zones.
- Ensure adequate standards for new roads.
- Public use of new roads for recreation and other uses.
- Road construction, traffic effects on road use by recreationists (horseback riders, hunters, 4-wheelers, mountain bikers, and campers), local residents, and cattle grazing.
- Effects of increased truck traffic on other uses of USFS roads, including 125 and 127 (i.e., hunters, hikers, campers horseback riders, ranchers, fishermen, mountain bikers, 4-wheelers, and snowmobilers).
- Traffic effects on Grand Mesa National Scenic Byway (SH 65) and West Elk Scenic Loop.
- Traffic effects on road access to water ditches.
- Financial responsibility for road development and maintenance.

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- Drilling traffic conflict with road closures (seasonal and non-seasonal).
  - Consider mitigation, including:
    - Restricting nighttime traffic;
    - Restricting winter traffic (October through April);
    - Road paving; and
    - Constructing equine/cattle trails parallel to roads.
  - Compliance with agency and county dust control requirements.
  - Potential erosion from new roads.
  - Offsite impacts of transporting produced water to disposal site.
  - Effects of new roads and existing road use on GMUG travel plan.
  - Improvements to FR 127 will make it unusable to other interests.
  - Effects of winter road use.
  - Need to prepare a Road Analysis Procedure for the project, and follow guidance of USFS Interim Directive 1920.
  - Impacts to IRAs.

### Socioeconomics

- Identify amount and agency use (local or otherwise) of oil and gas lease fees.
- Effects to local economy including:
  - Loss of retiree revenues;
  - Decreased agriculture productivity;
  - Maintenance of tax base and associated services;
  - Higher local infrastructure maintenance and emergency services costs;
  - Loss of tourism revenues; and
  - Loss of recreation revenues.
- Economic effects on ranching and farming.
- Effect on quality of life and life style.

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- Population loss and associated economic effect to local business.
  - Effects on property values and real estate.
  - Economic benefit from future natural gas and CBM development.
  - Effect associated with timber and firewood removal.
  - Potential loss of hunting revenue from big game herd displacement.

### **Hazardous Materials**

- Transport of hazardous materials, considering need for weather or time of transport restrictions.
- Potential effects from release or spill.
- Disclose all chemical compounds to be used for proposed activities.

### **Health and Safety, Potential for Fire Danger**

- Potential health effects of chemicals used during drilling.
- Ensure fire prevention plan to minimize effects of fires.
- Need for coordinated fire plan to include firebreaks, access roads, and logging.
- Potential fire danger associated with flaring of gas.
- Public safety concerns due to truck traffic on roads.
- Potential water quality effects due to spill of saline water during transport to disposal site.
- Risk of explosion caused by methane leak.
- Identify proposed disposal methods for hydrofracturing chemicals and saline water.
- Disclose potential for, and contingency plans to address potential spills, wellhead blowout, and fires.
- Ensure applicant coordination with local emergency services.

### **Cumulative Effects**

- Consider cumulative effects of drilling and other activities on environmental resources.
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- Consider cumulative effects on wildlife big game species and hunting.
  - Consider cumulative offsite effects on Delta County roads, water resources, agriculture, and traffic.
  - Include Leon Lake #2 in impact analysis.

## **2.4 Issues Not Carried Forward in the Analysis**

The following issues were determined to be out of the scope of this project, or not affected by the Proposed Action. Rationale for the exclusion of these issues from the NEPA document is provided below.

- The USFS and BLM need non-industry expertise to reviewing the drilling information.

*The agencies have qualified geologists and petroleum engineers on staff that will review this drilling information.*

- Will USFS/BLM put a restriction on the number of exploratory wells that can be drilled?

*The usual process is for the proponent to analyze the exploration data and make a determination whether or not additional exploration is needed, or whether sufficient data have been gathered to warrant a production proposal. Any future proposals for exploration drilling or production will undergo a NEPA analysis.*

- Will the USFS regulate the siting of the wells?

*The proposed well locations were sited based on stipulations contained in the oil and gas lease. Through the NOS and APD process, the agencies were involved in field siting the individual well locations.*

- Can the agencies manage spacing of no more than one well per 160 acres, or restrict production well density?

*Well spacing on an acreage basis is considered at the production stage. This proposal is for exploration. There are insufficient gas resource data at this time to assess whether production is viable. The BLM regulates spacing of federal oil and gas reserves, generally at 160 acres.*

- What justification is required from the companies for proposed spacing?

*Well spacing on an acreage basis is considered at the production stage. This project proposal is for exploration. A company would need to supply geologic and gas reservoir data to support a spacing plan.*

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- Consider surface disturbance associated with long-term CBM development. Until a Supplemental EIS to the 1993 Oil and Gas Leasing EIS is done, the GMUG cannot approve CBM related leasing or development proposals.

*This proposal is for exploration activities. There are insufficient gas resource data to meaningfully state that CBM is present in the area in producible quantities. Therefore, considering long-term CBM development at this time would be speculative.*

- Consider full field development, and GEC's long-term plans. What could potentially occur on the 90,000 acres of GEC's leases.

*This Proposed Action is for exploration activities on existing leases. There are insufficient gas resource data to support considering full field development. The agencies will work with GEC on longer term plans once the exploration data are available.*

- GEC has proposed 600 wells.

*The agencies do not have applications for 600 wells. The number 600 is purely speculative and is not based on any gas resource data, and therefore is unreliable. This NEPA document addresses the applications the agencies have received from GEC.*

- How will gas wells fit into the Healthy Forests Initiative?

*This project does not fall within the scope or auspices of the Healthy Forests Initiative, which focuses on treating fuels and vegetation. This project would not impede management toward achieving goals of this Initiative.*

- The leasing and drilling approval process is unsound.

*The process followed for leasing and this exploration project proposal is following existing federal and state laws and enacting regulations.*

- Need for equal treatment of private landowners and project proponents for access.

*As holders of federal oil and gas leases, the project proponent is guaranteed a right for reasonable access to explore and develop a lease. Private landowners applying for easements to access private lands across federal lands are given the same consideration for reasonable access.*

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- USFS has made the decision not to reopen the Hubbard Canyon Road. How is upgrading Hubbard Canyon Road considered environmentally damaging, but drilling is not?

*No activities are proposed in Hubbard Canyon (in relation to the Hubbard Creek proposed well site, which is on a ridge above and to the east of Hubbard Canyon); therefore, this issue is out of the scope of this analysis.*

- Road locations are not included on the map included with scoping letter.

*The proposed road access was included on the map in the scoping letter, and a text box was included to help explain the proposed routes and new spur roads proposed.*

- Grand Mesa should be protected as a recreation area.

*The Grand Mesa is managed for multiple uses. Agricultural and municipal water storage, timber harvest, fish/wildlife habitat, livestock grazing, and a variety of recreation opportunities are among the uses on the Grand Mesa.*

- Evaporation ponds will be built to eliminate water.

*No evaporation ponds are proposed. Water used or produced during drilling operations would be contained in a reserve pit on the drill site and then removed to a certified disposal facility.*

- The legality of GEC's leases is in question.

*The agencies are not aware that GEC's leases are illegal. The leases were issued in accordance with federal laws and guidelines and regulations.*

- Provide the Local Government Designee (LGD) access to the drill sites.

*The agencies worked with the Delta County LGD during the NOS process. Allowing access for the LGD during the drilling process is not within the federal agency jurisdiction to grant. This is a request that needs to be brought before the COGCC.*

- Regulate the quantity of fracing fluids used.

*There are no regulations pertaining to regulating the amount of fracing fluids used.*

- The leasing was done without an EIS.

*Lease COC-13563-A was leased in 1971, and predates the laws that required NEPA analysis for leasing. Leases COC-65529, 65534, 65535 and 65537 are on lands that were made available and authorized for*

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*leasing in the GMUG National Forests Oil and Gas Leasing EIS (1993). Lease COC-65117 is on BLM public lands that were authorized for leasing the BLM Uncompahgre Basin RMP (1989a).*

- Effects of noise from compressors.

*No compressors are proposed.*

- Consider Delta County regulations, as Delta County is developing high industrial level regulations, including natural gas development; federal government should cooperate with county and postpone decision pending these regulations.

*The agencies are aware of the proposed Delta County regulations. Delta County is participating in the federal NEPA process. This issue is out of the scope of the analysis.*

- Consider Gunnison County moratorium on oil and gas drilling.

*The agencies are aware of the proposed Gunnison County moratorium. Gunnison County is participating in the federal NEPA process. This issue is out of the scope of the analysis.*

- Suggested use of Colorado School of Mines geologic analysis contracted by Delta County.

*The agencies are aware that this analysis is being prepared. It will be used as reference material when it is available.*

- Adverse visual effects of pipelines should be addressed.

*No pipelines are proposed.*

- The environmental analysis should include gas development proposed by BDS International (three recompletion wells and six new wells in Buzzard Divide Area).

*The gas wells proposed in the Buzzard Divide Area are about 12 miles north of this project area, and beyond the cumulative impact analysis area. These wells are proposed in a proven, producing gas field.*

- Sustainable resources or other fuels should be considered as an alternative to natural gas or CBM.

*This would not meet the purpose and need of the Proposed Action, and is beyond the scope of this analysis.*

- Effects to “areas considered for wilderness designation.”

*No areas proposed or considered for wilderness designation are involved in the Proposed Action.*

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- CBM and natural gas development proposed for the entire Grand Mesa should be included in the cumulative impact analysis.

*This proposal is for exploration activities. There are insufficient gas resource data to support considering full field development.*

- Evaluate potential effects of gravel pit development.

*No gravel pits are proposed as part of the Proposed Action.*

- Identify landowner rights.

*This issue is out of scope of the analysis for activities on federal lands. The COGCC has information regarding private landowner rights with respect to oil and gas activities.*

- NEPA documents for oil and gas leases should include site-specific analyses of potential future leases; the leasing process is flawed in that future site-specific NEPA documents cannot preclude exploration or development that has been approved in a prior programmatic EIS.

*The NEPA process for oil and gas leasing, exploration, and development follow a staged process (43 CFR 3100 and 36 CFR 228). At the leasing stage, insufficient information is available to analyze site-specific impacts.*

- Need for agency review of applicant's track record.

*The purpose of the NEPA analysis is to analyze the effects of the proposed project; the applicant's performance on other projects is outside of the scope of this analysis.*

- Delta County should hire an independent geologist to review drilling results.

*The agencies have qualified geologists and petroleum engineers on staff that will review this drilling information. Delta County may hire their own specialists as needed.*

- Inconsistencies in agency policies regarding road uses (i.e., oil and gas exploration versus water development).

*The NEPA analysis considers all relevant policies and regulations.*

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- Relevant existing documents, including the Oil and Gas Leasing EIS (1993), BLM's Uncompahgre Basin RMP (1989a), and the GMUG Amended LRMP (1991) do not address CBM exploration or development; these documents should be updated prior to the environmental analysis of site-specific CBM exploration or development.

*The referenced documents pertain to leasing for oil and gas on federal lands. Subsequent NEPA analyses are prepared for site-specific proposals regarding exploration and development proposals, according to the staged NEPA process used in oil and gas leasing, exploration, and development.*

- Concern with piece-mealing environmental studies for various proposed exploration wells (e.g., Leon Lake #2, etc.).

*The recompletion for the Leon Lake #2 well is not part of the Proposed Action. A separate environmental analysis was completed by the USFS, with the findings discussed in a Decision Memo. Other projects are considered in the cumulative effects analyses. The agencies consider projects when proposed.*

- Leon Lake #2 drilling should not have been approved under a Categorical Exclusion; an EIS should be prepared for the Leon Lake #2 drilling.

*The Leon Lake #2 recompletion activities were reviewed and approved in a Decision Memo. Preparation of an EIS for that activity was not warranted.*

- The Leon Lake #2 stipulations should be applied to GEC's exploratory drilling proposal.

*The Leon Lake #2 falls on the same oil and gas lease as the Leon Lake #4 and #5, therefore the same stipulations will apply. Conditions of Approval for each specific site will be developed from this NEPA analysis.*

- Air quality modeling should be conducted for this analysis.

*Requirements for dispersion modeling are established in guidelines for obtaining a permit for construction from the Colorado Department of Public Health and Environment (CDPHE), Air Pollution Control Division. These guidelines establish the need for a permit and include a threshold of emission rates for which modeling is required. For the installation and temporary operation of the drill sites, none of the predicted emission rates exceeds the established modeling thresholds.*

- The 2000 USFS Management Indicator Species (MIS) Assessment is inadequate. The Forest Plan requires actual collection of MIS data.

*There is no requirement that "site-specific" monitoring of population trends be conducted. Monitoring of population trend must be designed and conducted at a scale that is appropriate to the distribution and life history characteristics of the individual species. MIS population data monitoring was considered in the Forest-wide MIS assessment where such data are available. This information along with the adequacy of*

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*the USFS MIS assessment that was affirmed in recent appeal decisions by the Regional Office, Appeal Deciding Officer for Sheep Flats and other GMUG Timber Sale projects.*

- Effects on possible reintroduction of Uinta Basin hookless cactus, boreal toad, boreal owl, and moose.

*The project area does not contain suitable habitat for the hookless cactus. There are no plans for reintroduction of the boreal owl on the GMUG. Reintroduction of the boreal toad has been proposed for the Grand Mesa top about 15 miles west of the project area. No firm plans for reintroduction have been made. Moose reintroduction on the Grand Mesa has been put on hold.*

- Effects on recreational trail use, including east end of Crag Crest Trail.

*No project activities are proposed near the Crag Crest Trail. The trail is 6 miles from the proposed Leon Lake #4 and #5 well sites.*

- Effects to pristine and wilderness nature of Grand Mesa.

*The Grand Mesa is managed for multiple uses agricultural and municipal water storage, timber harvest, fish/wildlife habitat, and a variety of recreational opportunities. There are no designated wilderness areas on the Grand Mesa.*

- Improvements required for project-related use of FR 121.

*There is no project-related use proposed for FR 121.*

- Traffic transporting chemicals needs to be placarded.

*This is a state law with which all commercial vehicles must comply.*

- Potential for underground coal seam fire.

*This is considered extremely unlikely in association with the Proposed Action. Underground coal seam fires usually are associated with coal burning naturally at the outcrop of the seam to the atmosphere, and in some cases with an underground mine. The outcrop ranges from 1 to 4 miles away from the proposed wells.*

- Removing large quantities of water from shallow aquifers could cause sinkholes. Effects to utilities (gas, water, and electric) from groundwater-drawdown-related geologic effects such as subsidence.

*The Proposed Action does not include large quantities of water removal from shallow aquifers; therefore, no sinkhole formation is anticipated, or risk to utilities from groundwater withdrawal subsidence.*

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- The agencies need to place a moratorium on APDs pending completion of a Supplemental EIS on CBM development.

*This is out of the scope of the Proposed Action. The agencies are considering exploration drilling on existing federal oil and gas leases.*

- The GMUG will far exceed the number of wells “analyzed” in the 1993 EIS. The EIS assumed 47 wells.

*The 1993 EIS was for oil and gas leasing. The analysis assumed a reasonably foreseeable development scenario for drilling permits over a 15-year period starting in 1993. For the Grand Mesa and Gunnison portions of the GMUG, it forecasted 24 wells (GMUG Oil and Gas EIS, Appendix E). Since 1993, about 5 drilling permits have been received and approved for these areas. The six permits being considered in this analysis for GMUG are within the forecast.*

- A Biological Evaluation (BE) has not been done for leasing. The USFS is required to undertake an evaluation on whether leases “may affect” a TES species.

*A BE was done at the time the GMUG Oil and Gas Leasing EIS was prepared.*

- Risk of water injection-induced seismic activity.

*Deep water injection is not proposed.*

- Impacts on the Colby Domestic Water Company and the City of Orchard City water sources.

*These water systems, their diversion points, and facilities are more than 5 miles from any of the proposed wells.*

- Consider the cumulative effects of development on the Grand Mesa Slopes.

*This extends outside of the cumulative effects analysis area.*

## **2.5 Alternatives**

The USFS and BLM considered 5 alternatives during the analysis process. Two of these, the No Action Alternative, and the Proposed Action were carried forward for detailed analysis in the EA.

The Proposed Action alternative includes the project as proposed in the APDs that was developed through the NOS and field review process described in Section 2.1.1. The decisions to be made under the Proposed Action alternative offer the decision makers an opportunity to approve, or approve with conditions the SUPOs as described in the APDs for any or all of the eight proposed sites. Under the Proposed Action alternative, the decision makers have the opportunity to select additional mitigations identified in the environmental analysis for protection of the surface resources.

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The three remaining alternatives, Consideration of Other Well Locations, Alternative Drilling Methods, and Seismic Exploration were considered, but not carried forward for detailed analysis. A discussion for these three is provided, and rationale for eliminating them from detailed study is in Section 2.6. No other “action” alternative was carried forward for detailed analysis because they either were already part of the Proposed Action, had been modified through the NOS process, or did not meet the purpose and need for the project.

### **2.5.1     No Action Alternative**

Consideration of the No Action Alternative is required by Council on Environmental Quality (CEQ) regulations (40 CFR 1502.14). Under the No Action Alternative, the USFS and BLM Uncompahgre Field Office would not approve SUPOs as submitted. Selection of the No Action Alternative would not authorize occupancy and surface use of some/all of the federal oil and gas leases at this time. All activities and natural processes currently permitted or occurring would continue. No additional mitigation or monitoring would be required as part of this alternative other than meeting Forest Plan and RMP directions, standards, and guidelines. If the No Action Alternative should be selected for all or certain individual locations, then the proponent could reapply for drilling on a particular lease in the future.

The U.S. Department of Interior’s (USDI) authority to implement “No Action” is limited, because the public lands have already been leased. USDI has the authority to deny an APD under certain conditions. An oil and gas lease grants the lessee the “right and privilege to drill for, extract, remove, and dispose of all oil and gas deposits” in the leased lands, subject to the terms and conditions incorporated in the lease (BLM Form 3110-2). Because the Secretary of the USDI has the authority and responsibility to protect the environment within federal oil and gas leases, restrictions are imposed on the lease terms. For the GEC lease area, various stipulations concerning surface disturbance, surface occupancy, and limited surface use are required. None of the stipulations would empower the Secretary to deny all drilling activity because of environmental concerns.

### **2.5.2     Consent/Approval of All or Parts of Project as Proposed (Proposed Action)**

This action alternative considers the eight-well exploration program as proposed in the APDs, including design features derived from the APDs and lease stipulations (see Section 2.1.2.12). Based on the NOS process discussed in Section 2.1.1, the revised site/road locations are part of the Proposed Action. This alternative also considers the need for lease stipulation exceptions, granting ROWs for access roads and the Thompson Creek drill site location as described in Section 1.4. This alternative assumes that the proposed activities would be done in accordance with standards identified in the GMUG National Forests Plan and Oil and Gas Leasing EIS and the BLM Uncompahgre Basin RMP.

## **2.6     Alternatives Considered but Eliminated from Detailed Analysis**

### **2.6.1     Consideration of Other Well Locations**

The project was proposed as part of the NOS option of the APD process described in Section 2.1.1. Through the filing of NOSs for proposed drill locations, the agencies had early involvement to evaluate the

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proposed activities, and identify resource concerns before APDs were filed. During the field reviews, initially proposed locations for the Leon Lake #4 and #5, Bull Park, Hubbard Creek, Oakbrush, and Thompson Creek sites were identified to have resource concerns. The agency review teams moved the locations to minimize impacts and comply with lease stipulations. NOSs for six drill locations were originally filed in the vicinity of the Leon Lake #4 and #5 locations, however after the NOS field reviews, only two (the Leon Lake #4 and #5) locations had APDs filed and carried forward for analysis. Maps of the originally proposed locations and correspondence documenting the need for moving them is given in Appendix E. The originally proposed locations were not evaluated in detail, because the revised locations were screened by the NOS process as being in compliance with lease stipulations and reduced resource concerns.

### **2.6.2 Other Alternatives**

Two other alternatives were considered but eliminated from detailed analysis, as explained below.

1. Alternative drilling methods such as use of chemical mud bases, air drilling, and biodegradable chemicals were recommended during scoping. Air drilling and use of chemical mud bases and biodegradable chemicals are part of the Proposed Action.
2. Seismic exploration was not considered in detail because the particular geologic environment of the area does not lend itself to meaningful results from seismic methods. Seismic exploration would not yield the desired data on quantity and quality of gas present.

### **2.7 Summary Comparison of Alternatives Related to Issues**

**Table 2-8** summarizes and compares the projected environmental impacts of the Proposed Action and the No Action Alternative in relation to issues. Detailed descriptions of the impacts are presented in Chapter 3.0. The summarized impacts incorporate the design features of the Proposed Action identified in Section 2.1.2.12. Additional mitigation recommended to further reduce impacts are described for specific environmental resources in Chapter 3.0. An ER system is used in **Table 2-8** as a means to evaluate the effectiveness of the Design Features of the Proposed Action as well as the effectiveness of the potential additional mitigation measures, following implementation. An explanation of the ER system is provided below:

- ER 1 indicates that the measure would minimize the potential impact to a minor degree. For example, the commitment or requirement to implement monitoring would provide for identification of potential impacts, but by itself would not minimize the impact. As a result, it would receive a low ER.
- ER 2 indicates that the measure would minimize the potential impact to an extent. For example, measures implemented to minimize the transport of noxious weed seeds into project disturbance areas (e.g., cleaning of equipment and use of certified weed-free straw bales) would minimize the introduction of weed species into these areas. However, they would not control the spread of noxious weeds in project disturbance areas, should they become established. As a result, the measures would receive a moderate ER.

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- ER 3 indicates that a measure would minimize the potential impact to the extent possible, although it would not eliminate it completely. For example, implementation of approved reclamation procedures would not prevent vegetation removal during project development; however, it subsequently would provide for re-establishment of vegetation in project disturbance areas. As a result, it would receive a high ER.
  - ER 4 indicates that the measure would be very effective as it would eliminate the identified impact completely. For example, prohibiting use during the winter months in areas of designated big game winter range would completely eliminate impacts to these animals during the critical winter period.

## **2.8 Past, Present, and Reasonably Foreseeable Future Actions**

As defined in 40 CFR 1508.7 (regulations implementing NEPA), other past, present, and reasonably foreseeable future actions must be identified for the cumulative impact analysis. The analysis is dependent on identification of past, present, and future actions in the vicinity that could cause impacts affecting the same resources and overlap in a geographical and temporal manner with the anticipated impacts from the Proposed Action. The geographical areas considered for these potentially interrelated actions vary among resources (see study areas discussed for each resource in Chapter 3.0), since a remote activity may contribute to cumulative impacts for one resource, while not contributing to cumulative impacts for other resources. Past, present, and reasonable foreseeable future actions likely to contribute to cumulative impacts for those resources affected by the Proposed Action are listed in **Table 2-9**. A more detailed description of cumulative actions is provided in Appendix F. These actions are grouped under land uses such as natural gas development, coal mining, range use/improvements, timber harvesting, recreation, wildlife projects, roadless areas, transportation, and agriculture. Cumulative impacts are discussed for each environmental resource in Chapter 3.0.

**Table 2-8**  
**Impact Summary and Alternatives Comparison**  
(Design Features of Proposed Action are noted in *italics*.  
ER for design features and additional mitigation:  
1 = low, 2 = moderate, 3 = high, 4 = very effective<sup>1</sup>)

Resource/Impact Issue	Proposed Action	Potential Additional Mitigation	No Action Alternative
<b>Air Quality</b>			
Criteria pollutant emissions and impacts: particulate matter less than 10-micron aerodynamic diameter ( $PM_{10}$ ), $NO_x$ , sulfur dioxide ( $SO_2$ ), carbon monoxide ( $CO$ ), volatile organic compounds (VOCs), ozone	Minor source for all criteria pollutants. Impacts would be below air quality standards.	None.	No project-related emissions of criteria pollutants.
Fugitive dust	Temporary increased particulates due to surface disturbance. <i>Dust control would be required on unpaved roads (ER = 3).</i> Dust control would reduce particulates below state standards.	AQ-1: The blowie line discharge dust would be controlled during drilling by use of water injection or other acceptable methods. The line would be a minimum of 100 feet from the blowout preventer and directed into the blowie pit (ER = 2).	No project-related traffic use on existing unpaved access roads would generate dust.
Greenhouse gases	Small quantities of methane and carbon dioxide ( $CO_2$ ) may be released.	None.	No well-site emissions would occur.
Potential hazardous air pollutants (HAPs)	Well site emissions may contain HAPs in the VOCs and flare emissions. Quantities are expected to be quite low and below required reportable values.	None.	No well-site emissions would occur.

**Table 2-8 (Continued)**

Resource/Impact Issue	Proposed Action	Potential Additional Mitigation	No Action Alternative
<b>Soils</b> Soil mixing, compaction, and increased erosion	Soil mixing, compaction, and potential erosion due to soil disturbance at well pads and along access roads. <i>Impacts would be minimized by implementation of erosion control measures, restricting equipment to approved locations, and reclamation (ER = 3).</i>	S-1: Design soil stockpiles to minimize erosion (ER = 2).  S-2: Activities may be restricted during periods when the soil and/or subgrade is saturated (ER = 3).  S-4: Revegetate disturbed soils by the end of the first growing season (ER = 3).  S-5: Use site preparation methods designed to keep fertile, friable topsoil essentially intact (ER = 2).  S-6: Use of heavy equipment would be limited to times when soil is least susceptible to compaction/rutting (ER = 3).  Characterize pre-construction road conditions and repair road damage on existing access roads, as listed in T-2 and T-3, Transportation.	Soils would not be disturbed by construction, drilling, completion, testing, or vehicle use.
Potential soil contamination	Potential effects of a chemical or fuel spill or chemical use on soil contamination. <i>The SPCC Plan would be implemented to minimize effects on soils affected by chemical use or spills (ER = 3).</i>	S-3: If a spill occurred, contaminated soil would be properly disposed of prior to backfilling/reclaiming (ER = 3).	Soils would not be potentially affected by chemicals or fuel.

**Table 2-8 (Continued)**

Resource/Impact Issue	Proposed Action	Potential Additional Mitigation	No Action Alternative
Effects of construction on slope stability	Clearing and grading could alter slope stability. Since proposed disturbance areas exhibit relatively low slopes (6 to 15 percent for well sites and less than 8 percent for roads), effects on slope stability would be minor. <i>Lease stipulations involving well siting on slopes less than 40 percent minimizes effects on slope stability (ER = 3).</i>	None.	Soils would not be disturbed by construction.
<b>Geology and Mineral Resources</b>			
Landslides and mass-wasting	Landslides have the potential to disrupt roads, pipelines, and other infrastructure. Wells on pads that are built on unstable materials also would be subject to damage or loss due to large mass-wasting events. However, NSO or CSU in designated areas would avoid landslide areas (ER = 4).	None.	No effect beyond existing conditions.
Seismicity	Ground motion or movement on active faults resulting in damage to facilities and roads is not expected.	None.	No effect beyond existing conditions.
Induced seismicity	Injection of fluids during hydraulic stimulation causing movement on faults or breakouts to surface is not expected.	None.	No effect beyond existing conditions.
Mineral recovery conflicts	Potential change in availability of coal resources from natural gas well drilling and production in areas designated for future coal recovery. <i>Consultation and coordination with coal mine operators would be required to avoid resource conflicts as part of a lease stipulation proposed well sites (ER = 2). Coal would be the primary resource if conflict arises.</i>	None.	No effect beyond existing conditions.

**Table 2-8 (Continued)**

<b>Resource/Impact Issue</b>	<b>Proposed Action</b>	<b>Potential Additional Mitigation</b>	<b>No Action Alternative</b>
Removal of natural gas	Permanent consumption of resource.	None.	No impact beyond existing conditions.
Methane seepage through fault planes	Potential methane gas seepage to the surface via faults.	None.	No impact beyond existing conditions.
<b>Groundwater</b>			
Effects of drilling and hydrofracturing on groundwater quality and quantity	No impact to groundwater resources is expected because of the low permeability of the formations and the distance below the ground surface. Most springs and seeps and domestic water wells are over 1 mile from the proposed wells and/or at least 2,000 vertical feet away from the zones to be hydrofractured. Thus, no impacts are expected because hydrofractures usually extend about 500 feet from the well bore.	WR-5: Groundwater intercepted during drilling would be analyzed for major and minor constituents. If groundwater flow greater than 3 gallons per minute (gpm) is encountered during drilling, the stratigraphic horizon would be isolated with packers and tested for permeability (ER = 1).  WR-6: Groundwater monitoring wells would be installed after completion of well sites with groundwater inflow of 3 gpm or greater. Sampling would be conducted annually (ER = 1).  WR-11: Water production would need to be monitored and recorded (ER = 1).  WR-12: If a well produces more than 1,500 bpd after 60 days with TDS less than 2,000 milligrams per liter (mg/l), it would be shut-in to determine any connection to shallow groundwater or surface water (ER = 3).	No effect beyond existing conditions.

**Table 2-8 (Continued)**

Resource/Impact Issue	Proposed Action	Potential Additional Mitigation	No Action Alternative
Effects on domestic water wells and municipal watershed areas	The test horizons are much deeper than surface springs, seeps, or domestic water wells. Domestic wells and municipal water supply use unconsolidated alluvium and surface water as their main water supply. <i>Design feature of Proposed Action would include water quality monitoring for wells and springs within a 1-mile radius of well roads (ER = 1).</i>	None.	No effect beyond existing conditions.
Effects on aquifers	The Mesaverde is not a regional aquifer and is not transmissive to water over large distances. Water in the Mesaverde is localized by faults, fracture sets, and zones of sand with high permeability. Water in the Mesaverde does not communicate over long distances, so impacts to local water in the Mesaverde that may occur due to hydrofracturing and injection of chemicals would not affect other water resources in the formation.	None.	No effect beyond existing conditions.
<b>Surface Water</b>			
Sedimentation in surface water drainages	Potential for short-term, localized sedimentation in Surface Creek and a tributary to West Fork Terror Creek (Leon Lake #4, Bull Park sites). Traffic use on unpaved portions of existing access roads could contribute sediment to adjacent perennial streams. <i>Design feature of Proposed Action (SWPPP, Grading and Surface Hydrology Plan, reclamation, and water quality monitoring) would minimize sediment input to these drainages (ER = 3).</i>	WR-4: Sedimentation devices would be used along roads and drill pads to control erosion (ER = 3).	No sedimentation from well pad and road construction. Potential localized sediment could occur due to current use of existing access roads.

**Table 2-8 (Continued)**

<b>Resource/Impact Issue</b>	<b>Proposed Action</b>	<b>Potential Additional Mitigation</b>	<b>No Action Alternative</b>
Effects of drilling, completion, and testing on surface water quality	<p>Drilling, completion, and testing activities would not contaminate streams, since there is no hydrological connection between groundwater and surface flows. By implementing the SPCC Plan, potential releases would be minimized and controlled (ER = 3).</p>	<p>WR-1: No refueling or lubricating would occur within 100 feet of waterbodies. No chemicals or materials would be stored within 100 feet of waterbodies (ER = 3).</p> <p>WR-2: Test the pit water (if present) for hazardous constituents prior to covering (ER = 3).</p> <p>WR-7: All reserve pits would be made impervious to leaks and resistant to weather conditions and drilling substances (ER = 3).</p> <p>WR-8: Reserve pit use would be allowed between June 15 and October 15. A closed drilling system would be required during the restricted period. The reserve and flare pits must be reclaimed within 1 month of completing operations. The pit liner must be taken to a certified disposal site (ER = 3).</p> <p>WR-9: Reserve and flare pits would be designed to exclude surface runoff. A minimum 2 foot freeboard between the maximum fluid level and top of berm would be required (ER = 3).</p> <p>WR-10: If fluids are produced, the flare pit would be lined (ER = 3).</p>	No effect beyond existing conditions.

**Table 2-8 (Continued)**

Resource/Impact Issue	Proposed Action	Potential Additional Mitigation	No Action Alternative
Effects of drilling, completion, and testing on surface flows	Water used for drilling, completion, and dust control would be provided by an existing water right, thus, no surface flow reductions would occur. Produced water from well testing and completion would not affect surface flows, since there is no connection between groundwater and surface flows. <i>Produced water would be taken to a disposal site and not discharged to streams (ER = 3).</i>	WR-3: Surface water flows and water quality would be monitored on streams located within a 1-mile radius of the proposed well sites (ER = 1).  Measure WR-12 in groundwater would apply to surface water.	No effect beyond existing conditions.
Effects of potential fuel leaks or spills on water quality	Potential spills or leaks could affect water quality. <i>The SPCC Plan would minimize potential releases (ER = 3).</i>	None.	No effect beyond existing conditions.
Vegetation	Approximately 10 acres of aspen forest, 10 acres of oakbrush, 9 acres of meadow, and 1 acre of mountain shrub habitat would be removed or cleared due to construction. <i>Reclamation would return vegetation through reseeding or natural re-establishment of woody species (ER = 3).</i>	V-1: Reclamation would be completed within 60 days after well completion, or as soon thereafter within the appropriate spring or fall planting season, unless an extension is granted in writing by the USFS or BLM, as applicable (ER = 3).  V-2: Vegetation cover would be minimized by lopping and scattering slash to a depth of no more than 18 inches (ER = 2).  V-3: A surface reclamation bond would be prepared (ER = 3).  V-4: Waterbars may be used on abandoned roads as part of reclamation (ER = 2).	No effect beyond existing conditions.

**Table 2-8 (Continued)**

Resource/Impact Issue	Proposed Action	Potential Additional Mitigation	No Action Alternative
		<p>V-5: All pits and other holes would be backfilled immediately after the drill rig is released (ER = 2).</p> <p>V-6: During interim reclamation, the unused portion of the pad would be recontoured, seeded, and removed vegetation scattered over the recontoured area (ER = 3).</p> <p>V-7: As part of reclamation, reserve pits may need to be pumped of fluids. The disturbed area would be reshaped and scarified prior to replacement of topsoil to a uniform depth (ER = 2).</p> <p>V-8: Immediately after seeding at an abandoned site, stockpiled trees and slash would be lopped and scattered over the disturbed area. The new spur road would be blocked to prevent vehicle access (ER = 2).</p> <p>V-9: Cut-and-fill slopes would be reduced and graded to conform with the adjacent terrain. The disturbed area would be prepared for seed application (ER = 2).</p> <p>V-10: USFS-approved seed mixes would be used for reclamation (ER = 3).</p>	

**Table 2-8 (Continued)**

Resource/Impact Issue	Proposed Action	Potential Additional Mitigation	No Action Alternative
Fire risk to vegetation	Potential fire risks to vegetation during dry periods. <i>A Fire Prevention Plan would be followed to minimize fire risks (ER = 3).</i>	None.	Potential fire risks would be present during existing use of the area.
Effects of chemical use on vegetation	Potential effects of spills or leaks on vegetation. <i>SPCC Plan would minimize spill or leaks at well sites or along the transport route (ER = 3).</i>	None.	No effect beyond existing conditions.
Introduction or spread of noxious weeds	Noxious weeds could be introduced or spread due to soil disturbance and vehicle traffic. <i>Prevention measures involving cleaning equipment, and use of certified weed-free straw bales would reduce impacts (ER = 2). A Noxious Weed Control Plan would be prepared to treat disturbed areas with weeds after construction (ER = 3).</i>	None.	No effect beyond existing conditions.
Effects on rangeland	Temporary reductions in forage production (2.4 to 13.8 acres) in five allotments. Temporary reductions in animal grazing units, but no stocking adjustments would be required due to the small proportion compared to available grazing land. Potential interference with cattle driving along Coal Gulch Road and cattle holding in the Mill Creek Facility due to traffic access to the Leon Lake #4 and #5 sites.	V-12: Coordinate with the USFS to schedule use of the Mill Creek Facility and permittee driving operations (ER = 3).  V-13: Coordinate with the BLM to avoid conflicts with grazing permittee's use of Coal Gulch Road (ER = 3).	No effect beyond existing conditions.

**Table 2-8 (Continued)**

Resource/Impact Issue	Proposed Action	Potential Additional Mitigation	No Action Alternative
Effects on wetlands	No loss of wetlands since pads and roads are located outside of wetland areas. Potential indirect effects of sediment or chemical use on adjacent wetland areas. By following erosion control/measures, SPCC Plan, and water quality monitoring, potential impacts would be minimized or eliminated (ER = 3).	None.	No effect beyond existing conditions.
<b>Fish and Wildlife</b>			
Sedimentation effects on aquatic species and their habitat	Same as discussed for surface water, sedimentation.	Measure WR-4 in surface water would help minimize effects.	No sedimentation from well pad and road construction. Potential localized sediment could occur due to current use of existing access roads.
Water quality effects on aquatic species	Drilling, completion, and testing activities would not contaminate streams, since there is no hydrological connection between groundwater and surface flows. Transport and storage of chemicals could result in a spill or leak in drainages containing fish species. By implementing the SPCC Plan potential releases would be minimized and controlled (ER = 3).	Restriction on fueling near waterbodies, as listed in WR-1 for water resources.	No impacts to aquatic species from construction and drilling, completion, and testing activities.
Loss of aquatic habitat due to surface water reductions	No loss of habitat since there would be no flow changes (see surface water, water quality impacts).	None.	No impacts to aquatic species from drilling, completion, and testing activities.
Big game winter range impacts	No effect. <i>Restriction on occupancy in winter range during winter period would be implemented (ER = 4).</i>	None.	No effect beyond existing conditions.
Big game summer range impacts	Reduction in elk habitat effectiveness at the Leon Lake #4 and #5 sites due to motorized traffic.	FW-5: Drilling and completion activities at the Leon Lake #4 and #5 sites would not be scheduled at the same time (ER = 2).	No effect beyond existing conditions.

**Table 2-8 (Continued)**

Resource/Impact Issue	Proposed Action	Potential Additional Mitigation	No Action Alternative
Elk calving disturbance	Possible single season disturbance with reduction in reproductive potential.	FW-4: Activities would not be permitted at the Leon Lake #4 and #5 and Powerline sites from May 15 to June 15 due to protect elk calving (ER = 4).	No effect beyond existing conditions.
Effects on USFS management indicator species	Minor short-term losses of habitat due to direct disturbance and displacement. <i>Reclamation would result in minor improvements in forage conditions for big game (ER = 3). Possible adverse impacts to nesting for northern goshawks. Completion of a northern goshawk and other raptor species nest survey would ensure lack of presence. If present, activities would be modified to preclude impacts (ER = 3).</i>	FW-1: Survey for presence of aspen snags potentially used by nesting owls, woodpeckers, or other songbirds. If present, activities may be modified to avoid loss of snags (ER = 2).	No short-term losses of habitat due to direct disturbance or displacement. No impacts to nesting goshawks or other raptor species. No improvement in big game forage conditions.
Migratory and nesting bird species	Potential for minor habitat losses to impact individual nesting pairs or migratory individuals but not populations.	FW-2: NSO would be allowed within a 0.25-mile radius of a golden eagle nest site (ER = 3).  FW-3: NSO would be permitted within a 0.5-mile radius of an active golden eagle nest site from February 1 to July 15 (ER = 3).	No potential impacts to nesting and migratory birds.
Noise and human activity impacts	Minor short-term losses of habitat due to displacement. <i>Restriction on activity in big game winter range during winter period would minimize potential adverse effects on big game (ER = 4 during the winter).</i>	FW-4: Activities would not be permitted at the Leon Lake #4 and #5 and Powerline sites from May 15 to June 15 due to protect elk calving (ER = 4).	No effect beyond existing conditions.
		FW-5: Drilling and completion at the Leon Lake #4 and #5 sites would not be scheduled at the same time to minimize traffic effects on elk summer range (ER = 2).	

**Table 2-8 (Continued)**

<b>Resource/Impact Issue</b>	<b>Proposed Action</b>	<b>Potential Additional Mitigation</b>	<b>No Action Alternative</b>
Habitat fragmentation and effects on wildlife linkages and corridors	Minor short-term loss of habitat would not increase habitat fragmentation or adversely affect wildlife corridors and linkages.	None.	No effect beyond existing conditions.
Effects on Hubbard Park wildlife habitat improvement area	No effect. There would be no development in the area, and there would be no increase in open road densities.	None.	No effect beyond existing conditions.
<b>Threatened, Endangered, and Sensitive Species</b>			
Impacts to Canada lynx and other threatened and endangered animal and plant species	No effect since identified lynx habitat in Lynx Analysis Unit (LAU) would not be affected. No habitat of other threatened or endangered animal or plant species would be affected.	None.	No effect beyond existing conditions.
Effects on USFS and BLM sensitive animal species	No effect on suitable habitat for USFS sensitive animal species except possibly for northern goshawk and purple martin. Completion of goshawk, purple martin, and other USFS and BLM sensitive breeding bird nest surveys would minimize lack of presence. If present, activities would be modified to preclude impacts (ER = 3).	TE-2: Water flow would be maintained in stream channels crossed by new access roads to minimize effects on boreal toad habitat (ER = 3).	No potential effect on nesting northern goshawks or breeding birds.
Effects on USFS and BLM sensitive plant species	Potential effects on 12 sensitive plants due to construction disturbance.	TE-1: Completion of pre-construction survey to determine the presence of sensitive plant species. If plants are present, USFS/BLM would decide if further mitigation would be required (ER = 2).	No effect beyond existing conditions.
<b>Land Use and Recreation</b>			
Impacts to grazing management	Exploration activities would affect grazing management. See range land impacts under Vegetation.	See V-4 as discussed for rangeland under Vegetation.	Land use in the project area would remain the same. No impacts to grazing management.

**Table 2-8 (Continued)**

<b>Resource/Impact Issue</b>	<b>Proposed Action</b>	<b>Potential Additional Mitigation</b>	<b>No Action Alternative</b>
Hunting opportunities reduced in the project area	Potential reductions in hunting opportunities or success could occur during construction and testing. Noise and traffic could disperse or displace big game from the area. This impact would be temporary, and no long-term impacts would occur.	R-1: Drilling activities would be restricted during the hunting seasons at Leon Lake #4 and #5, Bull Park, Powerline, Thompson Creek, and Hawksnest sites (ER = 4).	No reduction in hunting opportunities.
Reduced opportunities for dispersed recreation	Activities could reduce opportunities for dispersed recreation in the project area. However, public access would be maintained within and around the project area. Displacement of dispersed recreation would be minimal because of the abundance of available national forest and public lands.	None.	No reduction in recreational opportunities.
Reduced ATV use along trails and conflicts with ATV users	Potential reduction in ATV use could occur along the Green Mountain Trail and other trails in the Leon Lake area during construction activities. The impact would be short-term and temporary. If deemed necessary, the trail would be rerouted.	R-2: The Coal Gulch/Pilot Knob ATV trail would be rerouted around the Thompson Creek well pad (ER = 3).  R-3: Gates would be installed at the access roads and trails to Leon Lake #4 at FR 127 and the interconnection with the Cedaredge Aqueduct ATV trail (ER = 3).	No reduction in ATV use along the Green Mountain Trail  R-3: Gates would be installed at the access roads and trails to Leon Lake #4 at FR 127 and the interconnection with the Cedaredge Aqueduct ATV trail (ER = 3).
<b>Noise and Visual Resources</b>			
Increased noise levels from drill pad activities	Temporary noise levels from drilling, completion, and testing would be below federal standard for the closest residences. Increased noise could affect wildlife species within 200 feet of the well pads (see wildlife impacts). Engines would be equipped with mufflers to reduce noise (ER = 3).	See FV-5 and FW-6 as discussed for wildlife.	No effect beyond existing conditions.

**Table 2-8 (Continued)**

Resource/Impact Issue	Proposed Action	Potential Additional Mitigation	No Action Alternative
Traffic-related noise	Temporary increased noise levels (40 to 65 decibels on the A-weighted scale [dBA]) along access roads. Noise levels would be below the federal standard for the closest residences (communities of Paonia, Hotchkiss, Cedaredge, and Somerset). Increased noise could affect wildlife.	See FW-3 as discussed for wildlife.	Existing noise would continue.
Effects of drilling and completion and new road construction on visual resources	Temporary effects on views from the pad areas and new roads would occur during exploration activities. <i>By implementing the SWPPP, Grading and Hydrology Plan, and reclamation, visual resources would meet the scenic integrity objective and Visual Resource Management (VRM) objective of these areas (ER = 3).</i>	By implementing timber-cutting practices (see V-2 for Vegetation), visual effects would be reduced. VR-1: Vegetation cleared for the well pad sites would be scalloped to reduce visual impacts (ER = 3).	No change in visual resources would occur.
Visual effects on views from the Grand Mesa National Scenic Byway and West Elk Scenic Byway	No effect on views of the closest wells (Leon Lake #4 and #5) from the Grand Mesa National Scenic Byway or West Elk Scenic Byway from the Thompson Creek and Hawksnest well sites.	None.	No change in visual resources would occur.
Light pollution from the well pads during drilling and completion	Temporary effects (several days) of flare pit flames and night lighting on visual resources. <i>Testing would use a venting structure with no flame (ER = 4 during testing).</i>	None.	No short-term flare pit flames would be needed.
<b>Cultural Resources</b>			
Direct impacts to cultural resources	No direct impacts to cultural resources.	None.	No direct impacts to cultural resources.

**Table 2-8 (Continued)**

Resource/Impact Issue	Proposed Action	Potential Additional Mitigation	No Action Alternative
Potential impacts to previously undiscovered significant sites	Project-related construction could adversely affect undiscovered significant sites. Field surveys may not locate all significant sites. Buried sites, in particular burials, may be missed during field inventories. <i>Leave stipulations require reporting and protection of cultural resources (ER = 3).</i>	CR-1: Operators would caution project personnel regarding restriction on removal, injury, defacement, or alteration of cultural resources (ER = 2).  CR-2: In addition to the project design features regarding unanticipated cultural materials, operators would stop work in the vicinity of the discovery, and the jurisdictional agency would determine whether avoidance or mitigation would be required prior to authorizing permission to proceed (ER = 3).	No impacts to previously undiscovered significant sites.
Potential indirect impacts to cultural resources	Increased number of project-related personnel could indirectly impact cultural resources in the form of illegal collecting and vandalism.	CR-1: Operators would caution project personnel regarding restriction on removal, injury, defacement, or alteration of cultural resources (ER = 2).	No indirect impacts to cultural resources.
<b>Transportation</b>			
Increased traffic on access roads	Project-related truck traffic would increase average daily traffic on SH 92 by less than 1 percent and truck traffic by about 5 percent during drilling and completion. Traffic volumes on other access roads would temporarily increase volumes during a 28- to 61-day period. <i>Heavy truck traffic would be scheduled during the week (ER = 2).</i>	T-4: Project-related heavy traffic travel, including water hauling, would be prohibited from SH 65 over the Grand Mesa (ER = 4 for SH 65).	Existing traffic trends and patterns would continue to occur.

**Table 2-8 (Continued)**

Resource/Impact Issue	Proposed Action	Potential Additional Mitigation	No Action Alternative
Effects of project-related traffic on accident rates on public safety	Temporary traffic increases would increase risks of traffic accidents with other vehicles, wildlife, and cattle. When considering the short-term duration and low volume increase, the risk would be low. <i>Drivers must abide by speed limits to minimize risk (ER = 2).</i>	None.	Existing traffic trends and patterns would continue to occur.
Effects of increased traffic on other users in the area (recreationists, local property owners, cattle, wildlife) and resources such as water	Other users could notice temporary increased traffic, but it would not restrict use of the public roads. <i>Gates would be placed on the new spur road segments to ensure site security (ER = 1).</i>	<p>Potential conflict with the use of the Mill Creek Facility would be addressed as listed for rangeland mitigation V-4.</p> <p>T-1: Pre-construction coordination with property owners, tenants, water/utility companies, and other users of local roads would ensure continued access during construction activities (ER = 3).</p> <p>T-4: Prohibit project-related heavy-truck traffic, including water-hauling from SH 65 over the Grand Mesa (ER = 4 on SH 65).</p> <p>T-8: Streams would be crossed at right angles and on as gentle a slope as possible to minimize effects on surface water (ER = 2).</p> <p>T-9: Cattle guards would be installed to minimize effects on livestock (ER = 3).</p> <p>T-11: The operator would abide by seasonal road closures (ER = 2).</p> <p>T-12: All new roads would be signed and equipped with gates (ER = 2).</p>	<p>Current traffic levels would continue under present conditions.</p>

Table 2-8 (Continued)

Resource/Impact Issue	Proposed Action	Potential Additional Mitigation	No Action Alternative
Traffic effects on road condition	<p>Increased heavy truck use on existing access roads, particularly USFS, BLM, and local roads, could adversely affect road surface.</p> <p><i>Impacts to road conditions would be minimized by restricting traffic to approved locations, no mud blading, and implementing erosion measures identified for soil resources (ER = 3).</i></p>	<p>T-2: Completion of a pre-construction road condition assessment for affected county, USFS, and BLM roads (ER = 1).</p> <p>T-3: A multi-party agreement between affected county and project applicant outlining the identification of and responsibilities for repairs for unexpected road damage from the Proposed Action (ER = 2).</p> <p>T-5: Traffic counters may be required on one or more of the well access roads to monitor traffic levels. If required, counters would be provided and installed by project applicant (ER = 1).</p> <p>T-6: Any damage to FR 701 must be repaired as soon as possible to avoid adverse impacts on the timber harvesting and hauling operations in the Gunnison National Forest (ER = 3).</p> <p>T-10: Activities may be curtailed during periods when soil and road subgrade is saturated (ER = 3).</p> <p>T-13: Water would be used as dust control on new spur roads (ER = 3).</p>	<p>Existing traffic trends and patterns would continue to occur.</p>
Potential conflicts with road closures or seasonal use restrictions	Project-related activities may occur during times when seasonal road closures are in effect.	Project traffic would comply with road closures or seasonal restrictions (ER = 4).	Current seasonal use and road closures would continue.

**Table 2-8 (Continued)**

<b>Resource/Impact Issue</b>	<b>Proposed Action</b>	<b>Potential Additional Mitigation</b>	<b>No Action Alternative</b>
Impacts on IRA	No effect on roadless areas by locating well pad and new road spurs outside IRA boundaries.	T-7: The USFS boundary would be surveyed at the Thompson Creek well site to ensure no encroachment into IRA (ER = 4).	Road development restrictions within IRA would continue.
<b>Socioeconomics</b>			
Effects on local economic conditions (e.g., local businesses, tourism, recreation and hunting, and agriculture)	Temporary, minor increases in project-related employment and spending in Delta County. Limited potential for adverse effects on other sources of economic stimulus. Little net effect, either beneficial or adverse.	None.	Local economic conditions would be influenced by numerous local and non-local factors, some of which may trigger adjustments by businesses, consumers, and government.
Effects on population	No long-term impact on Delta County's population. Impacts of temporary, non-resident workers would be analogous to tourists, hunters, and other transient populations.	None.	Local population growth would be determined by numerous local and non-local factors.
Effects on local government fiscal conditions	Local counties would experience additional costs associated with road condition inventories, local permitting and regulation, and increased road maintenance costs.	Cost sharing and/or reimbursement for extraordinary road wear or damages, as listed in T-2 and T-3, Transportation.	Demands for governmental services, the levels of services provided, and local government fiscal conditions would reflect established trends and conditions.
<b>Environmental Justice</b>			
Low income or minority population disproportionately affected	No effects on low income or minority populations.	None.	Current income and population composition would continue.
<b>Hazardous Materials</b>			
Generation of hazardous wastes	Hazardous wastes are not expected to be generated.	HZ-1: Disposal records of all waste streams must be current and well maintained (ER = 2). HZ-4: Final written certification would be required to verify that residual materials left in reserve pits do not contain hazardous materials (ER = 2).	No effect beyond existing conditions.

**Table 2-8 (Continued)**

<b>Resource/Impact Issue</b>	<b>Proposed Action</b>	<b>Potential Additional Mitigation</b>	<b>No Action Alternative</b>
Spill of fuels/lubricants and hazardous materials/substances during transportation, storage, and use	<p>Spills and releases have the potential to impact water and soil. <i>Transportation, storage, and use would be conducted in accordance with applicable rules and regulations. Spills of fuels/lubricants would be handled and reported according to the SPCC Plan. Releases of other hazardous materials/substances would be reported and handled according to regulations governing the release of such materials/substances (ER = 3).</i></p>	<p>HZ-2: Control and containment mitigation would be provided by the SPCC Plan, Emergency Response Plan, and Safety Plan (ER = 3).</p> <p>HZ-3: All releases (unless reportable quantity is less than 10 gallons) would be immediately reported to the BLM and USFS Compliance officers and proof of cleanup would be documented (ER = 2).</p> <p>Restrictions on fueling near waterbodies as listed in mitigation WR-1 for water resources.</p>	No effect beyond existing conditions.
<b>Health and Safety</b>	Health effects of drilling, completion, and testing chemicals	<p>Surface water and domestic well water in the project area are hydraulically isolated from the proposed fracture zones in the Mesaverde Formation. As a result, there would be no impact to domestic or agricultural water sources and no resulting health effects. <i>The SPCC Plan would be implemented to minimize potential health effects in the event of a materials spill or leak (ER = 3).</i></p>	No effect beyond existing conditions.

**Table 2-8 (Continued)**

Resource/Impact Issue	Proposed Action	Potential Additional Mitigation	No Action Alternative
Potential fire danger associated with gas flaring or other project activities	<p>Low fire potential associated with flaring and project-related activities. <i>Flare pits would be bermed and flare stacks covered to minimize fire potential. Fire potential associated with other project activities would be minimized through compliance with agency fire restrictions, maintaining a vegetation-free zone at the well pads, and implementation of the Fire Prevention Plan. Project activities must adhere to fire restrictions (ER = 3).</i></p>	<p>HS-4: Water would be provided onsite for fire suppression (ER = 3).</p> <p>HS-5: A pilot light must be lit at all times during drilling to avoid explosive accumulation of gas (ER = 3).</p> <p>HS-6: Operator would conform to any fire restrictions in place on USFS and BLM lands during operations (ER = 2).</p>	No effect beyond existing conditions.
Potential truck traffic effects on accident rates	<p>Temporary minor increase in traffic levels. The associated temporary increase in vehicle accident risks is anticipated to be low.</p> <p><i>Transportation-related effects would be minimized through implementation of a well sequencing plan, use of approved transportation routes, and scheduling of heavy traffic periods during the week to avoid weekends and holidays (ER = 3).</i></p>	<p>None.</p>	No effect beyond existing conditions.
Risk of methane explosions	<p>Low potential for a methane explosion, including a blowout. To minimize the potential for a methane explosion, flare pits and flare stacks would be used to burn in a controlled environment any gas (including methane) that may be circulating to the surface.</p> <p><i>Appropriate blowout prevention equipment and implementation of pressure control procedures would minimize the potential for and effects of a blowout (ER = 3).</i></p>	<p>HS-2: A contingency plan outlining procedures necessary to regain control of a blowout would be developed (ER = 2).</p> <p>HS-5: A pilot light would be lit at all times during drilling to avoid explosive accumulation of gas (ER = 3).</p>	No effect beyond existing conditions.

**Table 2-8 (Continued)**

<b>Resource/Impact Issue</b>	<b>Proposed Action</b>	<b>Potential Additional Mitigation</b>	<b>No Action Alternative</b>
Coordination with local emergency services	The SPCC Plan and Fire Prevention Plan, which include procedures to be followed and reporting and emergency services contacts, would be implemented, if needed.	HS-1: Mapped locations of well sites, and copies of the SPCC Plan, Fire Suppression Plan, Emergency Response Plan, Safety Plan, and MSDS sheets would be provided to emergency services personnel in advance of drilling. Phones or radios, as appropriate, would be available onsite to ensure accessibility to emergency services (ER = 2).  HS-3: Local emergency telephone numbers and global positioning system (GPS) coordinates would be posted at well pad sites (ER = 2).	No effect beyond existing conditions.

<sup>1</sup>Refer to Section 2.7 for further explanation relative to the ER system.

**Table 2-9**  
**Summary of Past, Present, and Foreseeable Actions Within a 2-mile Radius of the Proposed Well Sites**

Activity Type	Description	Specifics	Proposed Well Sites							
			Leon Lake #4	Leon Lake #5	Powderline	Bull Park	Hubbard Creek	Oakbrush	Hawksnest	Thompson Creek
Livestock Grazing	Mill Creek, Electric Mountain, East Terror, Hotchkiss, Coal Gulch Allotments	Cattle and sheep livestock grazing under USFS and BLM permits. Also see Table 3.5-2.								
Roads	FR 125 (Surface Creek Road)	Popular access to national forest from Cedaredge. Corrals at USFS Boundary (Section 14, T12S, R94W) used frequently as parking area and take off point for horseback riders. Portions of road off national forest would be used to access Spaulding Peak #1 well on private land.	Ongoing	1-2	1-2					
	FR 127	Part coincides with Green Mountain trail, used by ATVs, horseback riders, and hikers. Also access to water developments.	Ongoing	1	1					
	Route 127.1A (spur access to Leon Lake #4)	Route used by water users and special use permittees. Slated for decommissioning to approved ATV use.	Ongoing	1	2					

Table 2-9 (Continued)

		Proposed Well Sites		
Activity Type	Description	Specifics	Time Periods	
Bear Creek Road	Road partially on BLM land and part on private land. BLM issued ROW to Oxbow mining (BLM 2002) and pending ROW to GEC for access to Lone Pine #1 well on private land. Road also used by outfitter guides and for access to private ranch.	Ongoing		
Stevens Gulch Road (FR 701)	Vehicle use and maintenance FR 701(Stevens Gulch Road) and timber hauling from Hubbard timber sale. Route used by Bowie Resources Limited to access portions of Alder Creek Coal Exploration License, heavy use during hunting season, parts of road are part of Sunlight to Powderhorn snowmobile trail, closed in winter north of USFS Boundary in Section 36, T12S, R92W. Portions of road off the national forest would be used to access Stevens Gulch #1 well on private land.	Ongoing	1	1
Leon Lake #4				
Leon Lake #5				
Powellline				
Bull Park			2	1
Hubbard Creek				
Oakbrush				
Hawksnest				
Thompson Creek				

Table 2-9 (Continued)

Activity Type	Description	Specifics	Proposed Well Sites		
			Time Periods		
	Coal Gulch	Public use of designated four-wheel-drive (4WD) roads. Road used and upgraded by Oxbow Mining to access coal exploration hole and degassification holes and continued use for reclamation and monitoring. ATV trail upgrades had occurred prior to road use by ATV users group. Occasional use by mountain bikers.	Ongoing		
	SH 133	Colorado Department of Transportation (CDOT) road construction/upgrades.	Future (2004)		
Timber Management	Terror Creek Green Oak Area	200 acres.	Future	1	
	East Terror timber sale and personal use firewood	20 acres.	Future	1	
	Hazard tree removal	5 miles along Steven's Gulch Road (24 acres).	Future	1	1
	Stevens Gulch	5 acres.	Past	1	2
	Personal Use Area			1	1
	Rifle-Curecanti powerline clearing	18 miles by 125 feet of forest vegetation removed (273 acres).	1962-ongoing	1	1
	Past clearcut units	368 acre Alder Creek; 860 acre Terror Creek; 46 acre Surface Creek watersheds.	1982-2002	2	2

Table 2-9 (Continued)

Activity Type	Description	Specifics	Proposed Well Sites								
			Time Periods	Leon Lake #4	Leon Lake #5	Powerline	Bull Park	Hubbard Creek	Oakbrush	Hawksnest	Thompson Creek
Mining	Hawksnest Mine	Operated 1900-1970.	Reclaimed 1991	1997 to Present			2	1		1	1
	Bowie Mine #2	Active subsidence. Currently permitted to upgrade 1.8 miles of road, construct 5.4 miles of road, and disturb 3 acres of drill pads for gas ventilation. Also permitted for 18 coal exploration holes.									
	Blue Ribbon Mine	In reclamation process.	Partially closed in 1986				2				
	Iron Point and Alder Creek coal exploration licenses	Large license over several sections. Approved to drill 18 exploratory wells and road access to them (approximately 18 acres). Locations listed in Appendix F, Table F-1.	2000-2004		1	2	1	1			
	Sanborn Coal Mine	Recent decline in reserves. Mine being sealed/reclaimed.	Closed in 2003						1	1	
	Elk Creek Mine	Mining in federal coal leases.	Starting longwall mining 2003						2	2	
	Oxbow Mining coal exploration	2 acres disturbance for a proposed coal exploration hole and road access.	Pending 2003						2	1	
Oil and Gas	Leon Lake Gas Unit- Leon Lake #1	Leon Lake #1 drilled in 1981; plug and abandonment planned for 2003.	1981- 2003	1	2						
	Leon Lake Gas Unit- Leon Lake #2	Leon lake #2 drilled in 1981; recompletion planned 2003 (USFS 2003C).	1981-ongoing	1	1						

Table 2-9 (Continued)

Activity Type	Description	Specifics	Proposed Well Sites							
			Leon Lake #4	Leon Lake #5	Powderline	Bull Park	Hubbard Creek	Oakbrush	Hawksnest	Thompson Creek
Future gas development	Potential for 50 percent of exploration wells to become producing wells. Pipelines and new roads would be needed.									
GEC exploration – Spaulding Peak #1	Private land site; 0.5 mile of new road; 1.1 acre pad.	Approved by COGCC and Delta County	2	1						
GEC exploration – Lone Pine #1	Private land site; 0.4 mile of new road; 1.1 acre pad.	Approved by COGCC and Delta County			1	1				
GEC exploration – Stevens Gulch #1	Private land site; 0.2 mile of new road; 1.1 acre pad.	Approved by COGCC and Delta County		2						
Powerline ROW	Rifle-Curecanti Powerline (administered by WAPA) and maintenance road.	1962-ongoing		1	1					
Pipeline ROWs	Pitkin Mesa Pipeline co-located along Steven's Gulch Road.	1949-ongoing			1					
Telephone line ROW	TDS Telecom line	1959-ongoing	1	1						
Cedaredge aqueduct	Provides water for Town of Cedaredge supply.	1959-ongoing	1	1						
Outfitter guides	Two outfitter guide operations in area of Oakbrush and Hubbard Creek wells. One outfitter guide near Leon Lake #4 and #5.	Past 7 years, intermittent prior years Past 10 to 20 years			1	1				
Water Storage, Transport, and Use <sup>1</sup>	Irrigation ditches, reservoirs, stock ponds, stream segments with water rights, spring developments	Existing water rights and structures. Ongoing	1	1	1	1	2	2	2	

Table 2-9 (Continued)

Activity Type	Description	Specifics	Proposed Well Sites						
			Leon Lake #4	Leon Lake #5	Powerline	Bull Park	Hubbard Creek	Oakbrush	Hawksnest
Recreation	Snowmobile access to Sunlight-Powderhorn Trail System	Stevens Gulch Road part of trail.				1	1		
	Dispersed camping	There are many dispersed (i.e., undeveloped) campsites.	Ongoing		1	1-2	1-2	1	
ATV use		Pilot Knob/Coal Gulch ATV Trail, FR 127 (portion of Green Mountain Trail).	Ongoing						1
Hiking		Foot trail by Leon Lake #5.	Ongoing		1	1			
Popular hunting areas		Leon Lake #4 and #5, Bull Park, and Powerline areas.	Ongoing-fall and spring	1	1	1			
Vegetation Management and Wildfires	Prescribed burning	800 acres in Terror Creek drainage.	Past 10-20 years			2			
	Oakbrush control	169 acres burned in 1979; 515 acres oakbrush burned 1994; 559 acres oakbrush burned 1989.	Past 25 years			1-2			
	Ponderosa pine thinning	120 acres in Dove Gulch.	2004 planned				2	2	
	Wildfires	4,515 acres (including 217 acres near Hawksnest and 339 acres near Thompson Creek).	Past 30 years				2	2	

<sup>1</sup>For specific information about water rights and locations see Appendix G, Tables G-2 and G-3.

Note:

1=Occurs within a 1-mile radius of proposed well site.

2=Occurs within a 2-mile radius of proposed well site.