U.S. Department of the Interior
Bureau of Land Management
2300 River Frontage Road
Silt, Colorado 81652

ENVIRONMENTAL ASSESSMENT

NUMBER: DOI-BLM-CO-N040-2010-0061-EA

CASEFILE NUMBER: Federal Lease COC56027

PROJECT NAME: Proposal to dill three Federal wells from the existing Burckle A well pad, located on private land overlying private minerals, approximately 1 mile south of the town of Silt, Garfield County, Colorado.

LOCATION: Township 6 South (T6S), Range 92 West (R92W), Section 16, NW¼SE¼, Sixth Principal Meridian (Figure 1).

LEGAL DESCRIPTIONS: Surface and bottomhole locations of the proposed Federal wells addressed in this Environmental Assessment (EA) are listed in Table 1.

Table 1. Surface and Bottomhole Location of Proposed Well

Proposed Well	*Surface Location (Section 16, T6S, R92W)*	*Bottomhole Location (Section 16, T6S, R92W)*
A 14	2,055 feet FSL 2,202 feet FEL	701 feet FSL 2,003 feet FEL
A 13	2,051 feet FSL 2,183 feet FEL	827 feet FSL 1,724 feet FWL
A 2	2,047 feet FSL 2,163 feet FEL	327 feet FSL 1,994 feet FEL

APPLICANT: Antero Resources Piceance Corporation, 1625 Seventeenth Street, Denver, Colorado 80202. Contact: Hannah Knopping, Permit Analyst

PROPOSED ACTION

Antero Resources Piceance Corporation (Antero) proposes to drill three Federal wells directionally into Federal Lease COC56027 from the existing Burckle A well pad. The pad is located on private land owned by Antero. Five Fee wells currently exist on the location, with plans to drill six more Fee wells in addition to the three proposed Federal wells. The Burckle A pad is situated along a small access road west of County Road 331CR 331) and s behind a small hill.

All gas and water pipelines are in place in a pipeline corridor adjacent to the north side of the access road to the Burckle A pad. Two 12-inch water pipelines and one 8-inch natural gas pipeline are currently located within the pipeline corridor. Water for drilling operations would be purchased through an existing agreement with Grand River Marketing and piped to the site. Water for drilling is not expected to exceed 5,000 barrels per well. Water for cementing operations would be fresh water sourced from the local municipal water supply. Antero proposes to use a closed-loop drilling system, which would eliminate the need for a reserve pit. In addition, cuttings would be hauled to the Eagle County or Garfield County landfill, thereby eliminating the need for a cuttings pit.

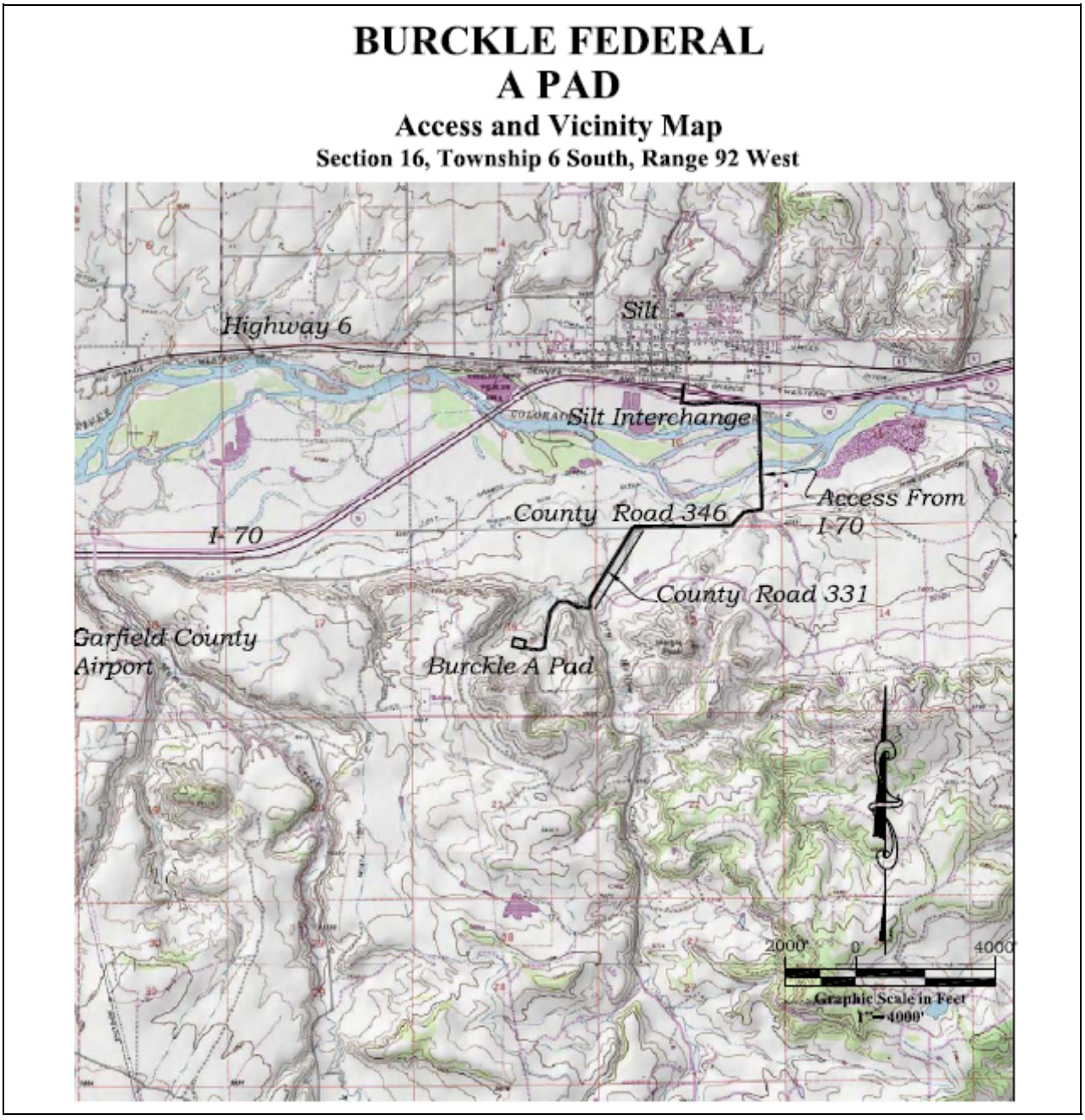

Figure 1. Project Location of Burckle A Pad

Produced water resulting from completions operations would be placed into holding tanks on location and then transferred into water trucks and disposed at a state-approved disposal facility. Condensate and produced water tanks would be located on the pad, located near the entrance of the pad in the east corner. Separators would be located across from the wells, along the southern edge of the pad near the entrance (Figure 2). The northern and western edges of the pad would be pulled back at the time of interim reclamation. Figure 3 shows the proposed layout of the pad after interim reclamation.

The expected short-term disturbance of the pad would be approximately 2.5 acres, all of which is existing surface disturbance. Following interim reclamation, the area of long-term disturbance would be 1.0 acres. The road would undergo final reclamation when the wells are plugged and abandoned. Construction work would follow guidelines established in the BLM Gold Book, *Surface Operating Standards for Oil and Gas Exploration and Development* (USDI and USDA 2007). A road maintenance program during the production phase of the wells would include blading, ditching, culvert installation and cleanout, weed control, and application of additional gravel where excessive rutting or erosion occurs. Roads would be maintained in a safe and usable condition.

The Proposed Action would include drilling and completion operations, production of natural gas and associated liquid condensate, proper handling and disposal of produced water, and intermediate and final reclamation. The Proposed Action would be implemented consistent with Federal oil and gas lease, Federal regulations (43 CFR 3100), and the operational measures included in the Applications for Permit to Drill (APDs). Appendix A lists the specific Surface Use Conditions of Approval (COAs) that would be implemented as mitigation measures for this project. The operator would be responsible for continuous inspection and maintenance of the pad, access road, and pipeline.

NO ACTION ALTERNATIVE

The Proposed Action involves Federal subsurface minerals encumbered with Federal oil and gas leases that grant the lessee a right to explore and develop the leases. Although BLM cannot deny the right to drill and develop the leasehold, individual APDs can be denied to prevent unnecessary and undue degradation. The No Action alternative constitutes denial of the APD associated with the Proposed Action. Under the No Action alternative, the Federal well proposed and described in the Proposed Action would not be drilled; however, future private Fee wells could be drilled under approval from the Colorado Oil and Gas Conservation Commission (COGCC).

PURPOSE AND NEED FOR THE ACTION

The purpose of the action is to develop oil and gas resources on Federal lease COC56027 consistent with existing Federal lease rights. The action is needed to increase the development of oil and gas resources for commercial marketing to the public.

SUMMARY OF LEASE STIPULATIONS

Federal Lease COC56027 carries stipulations for the protection of big game, raptors, and scenic values. However, the proposed Federal oil and gas wells would be drilled into this lease from the Burckle A pad, located on private surface with underlying private minerals. The CRVFO does not apply lease stipulations to wells drilled diagonally from off-lease areas. Nonetheless, The CRVFO may apply COAs to the project in conjunction with approval of the Environmental Assessment (EA) for the project and of Applications for Permits to Drill (APDs) the individual Federal wells. These COAs, attached to the EA and to APDs under BLM's regulatory authority, are intended to protect public health and safety and avoid undue environmental harm, particularly with respect to Federal resources. These include cultural resources, special status species, migratory birds, air quality, water quality, and waters of the U.S.

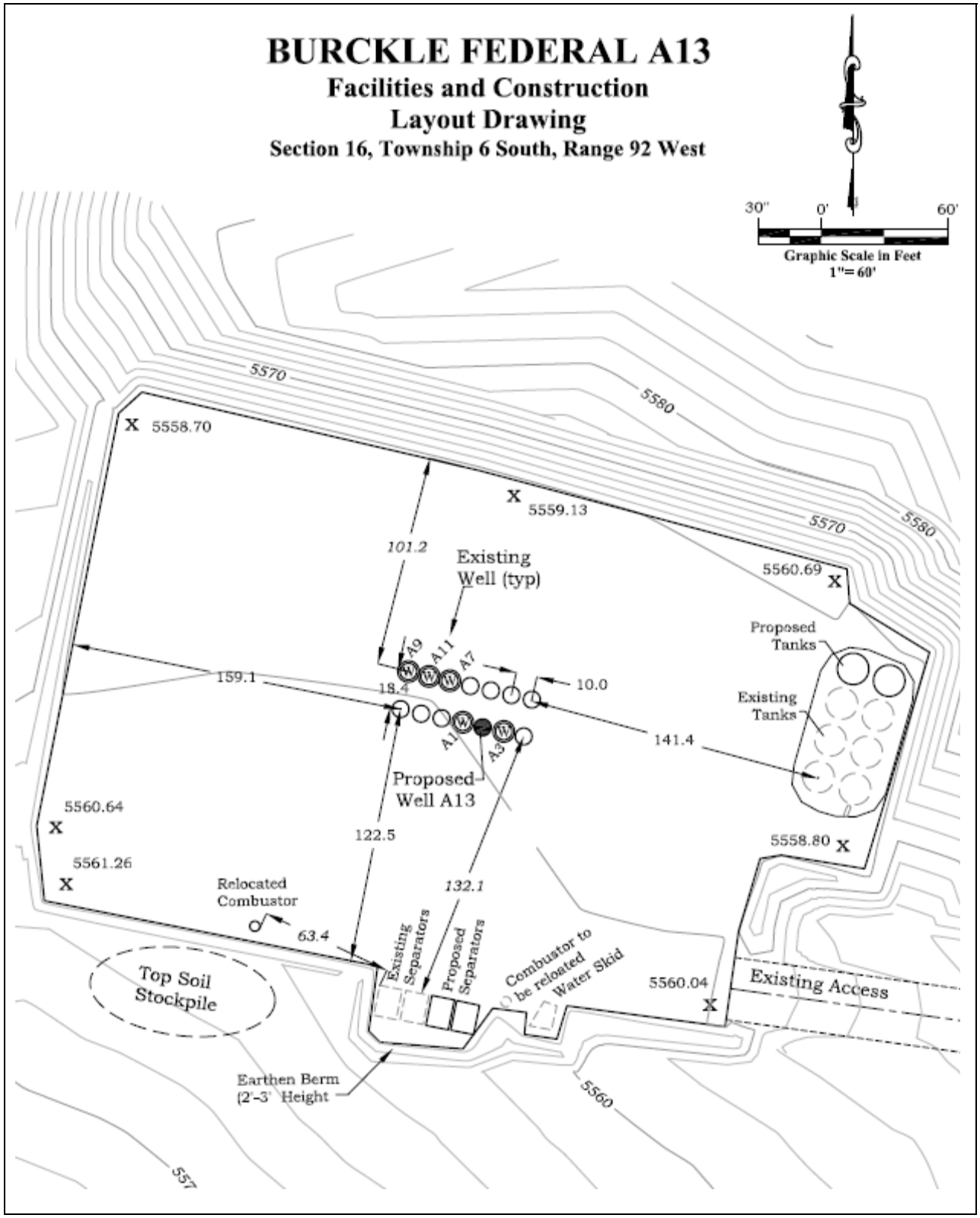

Figure 2. Facilities and Pad Layout.

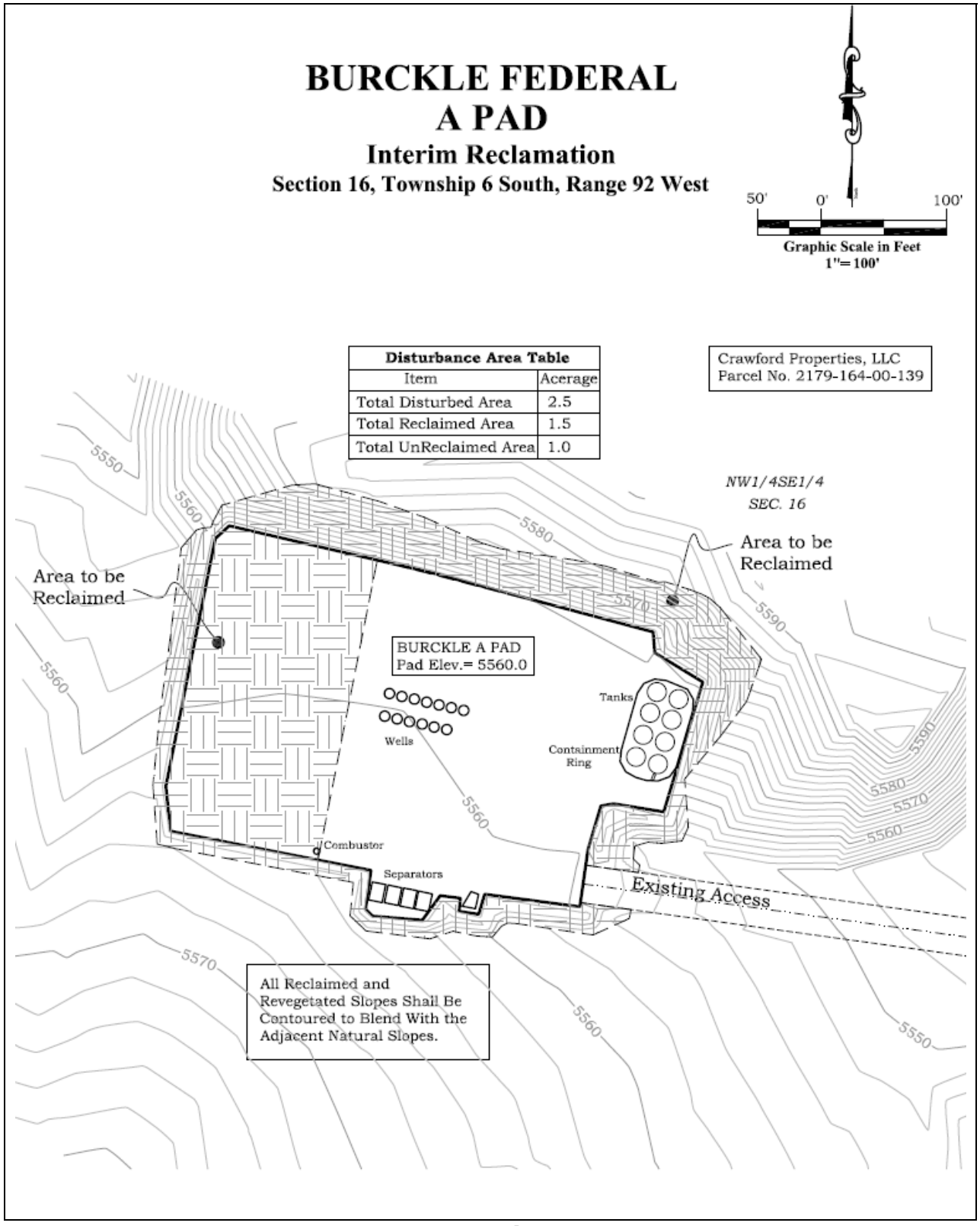

Figure 3. Interim Reclamation Layout.

PLAN CONFORMANCE REVIEW

The Proposed Action and No Action alternative are subject to and have been reviewed for conformance with the following plan (43 CFR 1610.5, BLM 1617.3):

Name of Plan: The current land use plan is the *Glenwood Springs Resource Management Plan* (RMP), approved in 1984 and revised in 1988 (BLM 1984). Relevant amendments include the *Oil and Gas Plan Amendment to the Glenwood Springs Resource Management Plan* (BLM 1991) and the *Oil &Gas Leasing & Development Record of Decision and Resource Management Plan Amendment (*BLM 1999a).

Decision Language: The 1991 Oil and Gas Plan Amendment (BLM 1991) included the following at page 3: "697,720 acres of BLM-administered mineral estate within the Glenwood Springs Resource Area are open to oil and gas leasing and development, subject to lease terms and (as applicable) lease stipulations" (BLM 1991, page 3). This decision was carried forward unchanged in the 1999 ROD and RMP amendment at page 15 (BLM 1999b): "In areas being actively developed, the operator must submit a Geographic Area Proposal (GAP) [currently referred to as a Master Development Plan, MDP] that describes a minimum of 2 to 3 years of activity for operator controlled leases within a reasonable geographic area." The Proposed Action is in conformance with the 1991 and 1999 RMP amendments cited above because the Federal mineral estate proposed for development is open to oil and gas leasing and development. The 1999 RMP amendment requires multi-year development plans known at that time as Geographic Area Plans (GAPs) for lease development over a large geographic area. However, the 1999 RMP amendment also provides exceptions to that requirement for individual or small groups of exploratory wells drilled in relatively undrilled areas outside known high production areas. The Proposed Action, as such, is in conformance with the exception to the requirement to require operators to submit Master Development Plans (MDPs), previously known as Geographic Area Plans (GAPs).

STANDARDS FOR PUBLIC LAND HEALTH

In January 1997, Colorado BLM approved the Standards for Public Land Health. The five standards cover upland soils, riparian systems, plant and animal communities, threatened and endangered species, and water quality. Standards describe conditions needed to sustain public land health and relate to all uses of the public lands.

Environmental analysis of proposed projects on BLM land must address whether the Proposed Action or alternatives being analyzed would result in impacts that would maintain, improve, or deteriorate land health conditions identified in the applicable Land Health Assessment (LHA). However, because no component of the Proposed Action would involve BLM surface lands, an LHA does not apply, and conformance with land health standards is not evaluated in this EA.

AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

During its internal scoping process for this Environmental Assessment (EA), pursuant to the National Environmental Policy Act (NEPA), BLM resource specialists identified the following elements of the natural and human environment as present in the project vicinity and potentially affected by the project:

Access and Transportation
Air Quality
Cultural Resources
Geology and Minerals
Invasive Non-Native Plants
Migratory Birds
Native American Religious Concerns
Noise, Special Status Species
Vegetation, Visual Resources
Wastes (Hazardous and Solid)
Water Quality (Surface and Ground)
Wildlife (Aquatic and Terrestrial)

Access and Transportation

Affected Environment

The project area is accessed by exiting I-70 at Silt, then proceeding south to River Frontage Road, then turning left and proceeding east on River Frontage Road for approximately 0.4 mile to CR 311, then turning right and proceeding approximately 0.5 mile to CR 346, then turning right and proceeding west along CR 346 approximately 0.75 mile to CR 331, then turning left on CR 331 and proceeding south for approximately 0.5 mile to the Burckle Access Road, then turning right and proceeding west approximately 0.5 mile to the pad location.

Environmental Consequences

Proposed Action

The Proposed Action would result in a substantial temporary increase in truck traffic and a less substantial long-term increase compared to existing traffic associated with the two existing Fee wells. The greatest increase would be during rig-up, drilling, and completion activities. An estimated 1,160 truck trips over a 30-day period would be required to support the drilling and completion of a proposed Federal well (Table 2). Once the well is in production, traffic would decrease to occasional visits for monitoring or maintenance activities. The well is assumed to require recompletion once per year. Each recompletion would require three to five truck trips per day for approximately 7 days. Fluids generated during the life of the well would be stored in tanks onsite, increasing the number of water and oil truck traffic related to haulage of fluids.

Table 2. Traffic Associated with Drilling and Completion Activities

Vehicle Class	***Number of Trips per Well***	***Percentage of Total***
16-wheel tractor trailers	88	7.6%
10-wheel trucks	216	18.6%
6-wheel trucks	452	39.0%
Pickup trucks	404	34.8%
Total	**1,160**	**100.0%**

Source: BLM 2006. Note: Trips by different vehicle types are not necessarily distributed evenly during the drilling process. Drilling and completion period is approximately 30 days per well.

Degradation of field development roads may occur due to heavy equipment travel, and fugitive dust and noise would be created. Mitigation measures would be required as conditions of approval to ensure adequate dust abatement and road maintenance occur.

No Action Alternative

This alternative would not affect access or transportation other than those associated with the long-term production and maintenance of the five existing Fee wells on the pad, and with any new Fee wells drilled under the authority of the COGCC.

Air Quality

Affected Environment

Colorado Ambient Air Quality Standards (CAAQS) and National Ambient Air Quality Standards (NAAQS) are health-based criteria for the maximum acceptable concentrations of air pollutants in areas of public use. Although specific air quality monitoring has not been conducted within the project area, regional air quality monitoring has been conducted in Rifle and elsewhere in Garfield County. Air pollutants measured in the region for which ambient air quality standards exist include carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), particulate matter less than 10 microns (μ) in diameter (PM_{10}) and less than 2.5 μ in diameter ($PM_{2.5}$), and sulfur dioxide (SO_2).

The project area lies within Garfield County, which has been described as an attainment area under CAAQS and NAAQS. An attainment area is an area where ambient air pollution quantities are below (i.e., better than) NAAQS standards. As shown in Table 3, regional background values are well below established standards, and all areas within the cumulative study area are designated as attainment for all criteria pollutants. Federal air quality regulations are enforced by the Colorado Department of Public Health and Environment (CDPHE). The Prevention of Significant Deterioration (PSD) Program within CDPHE is designed to limit incremental increases for specific air pollutant concentrations above a legally defined baseline level, as defined by an area's air quality classification. Incremental increases in PSD Class I areas are strictly limited.

Air pollutants measured in the region for which ambient air quality standards exist include carbon monoxide (CO), nitrogen dioxide (NO2), ozone (O3), particulate matter less than 10 microns (μ) in diameter (PM_{10}) and less than 2.5 μ in diameter ($PM_{2.5}$), and sulfur dioxide (SO2). Federal air quality regulations adopted and enforced by CDPHE limit incremental emissions increases to specific levels defined by the classification of air quality in an area. The PSD Program is designed to limit the incremental increase of specific air pollutant concentrations above a legally defined baseline level. Incremental increases in PSD Class I areas are strictly limited, while increases allowed in Class II areas are less strict.

The project area and surrounding areas are classified as PSD Class II. The PSD Class I areas located within 100 miles of the project area are the Flat Tops Wilderness (approximately 25 miles north), Maroon Bells-Snowmass Wilderness (approximately 35 miles south), West Elk Wilderness (approximately 60 miles southeast), Black Canyon of the Gunnison National Monument (approximately 65 miles south), and Eagles Nest Wilderness (approximately 60 miles east). Dinosaur National Monument (approximately 80 miles northwest) is listed as a Federal Class II area but is regulated as a Class I area for SO_2 by CDPHE. Regional background pollutant concentrations and applicable standards or limits are listed in Table 3**.**

Environmental Consequences

Proposed Action

The CDPHE, under its Environmental Protection Agency (EPA)-approved State Implementation Plan (SIP), is the primary air quality regulatory agency responsible for determining potential impacts once detailed industrial development plans have been made; those development plans are subject to applicable air quality laws, regulations, standards, control measures, and management practices. Prior to operations, CDPHE has the ultimate responsibility for reviewing and permitting any project's air quality impacts. Unlike the conceptual "reasonable but conservative" engineering designs used in NEPA analyses, any CDPHE air quality preconstruction permitting required would be based on site-specific, detailed engineering values, which would be assessed in CDPHE's review of the permit application.

Table 3. Air Pollutant Background Concentrations, Colorado and National Ambient Air Quality Standards, and Prevention of Significant Deterioration (PSD Increments)

Pollutant/Averaging Time		*Measured Background Concentration*	*Colorado and/or National AAQS*	*Incremental Increase Above Legal Baseline PSD Class I/ II*	
Carbon Monoxide (CO) [1]	1-hour 8-hour	1,160 µg/m^3 1,160 µg/m^3	40,000 µg/m^3 (35 ppm) 10,000 µg/m^3 (9 ppm)	n/a n/a	n/a n/a
Nitrogen Dioxide (NO_2) [2]	Annual	10 µg/m^3	100 µg/m^3 (0.053 ppm)	2.5 µg/m^3	25 µg/m^3
Ozone[3]	8-hour	149 µg/m^3 (highest)	147 µg/m^3 (0.075 ppm)	n/a	n/a
Particulate Matter (PM_{10}) [1]	24-hour	114 µg/m^3 (highest)	150 µg/m^3	8 µg/m^3	30 µg/m^3
Particulate Matter ($PM_{2.5}$) [4]	24-hour Annual	40 µg/m^3 (highest) 11.2 µg/m^3	35 µg/m^3 15 µg/m^3	n/a n/a	n/a n/a
Sulfur Dioxide (SO_2) [5]	3-hour 24-hour Annual	24 µg/m^3 13 µg/m^3 5 µg/m^3	1,300 µg/m^3 (0.5 ppm) 365 µg/m^3 (0.14 ppm) 80 µg/m^3 (0.03 ppm)	25 µg/m^3 5 µg/m^3 2 µg/m^3	512 µg/m^3 91 µg/m^3 20 µg/m^3

[1] Background data collected in Rifle, 2008; highest levels recorded in April (Air Resource Specialists 2009).
[2] Background data collected by EnCana at site north of Parachute, 2007 (CDPHE 2008).
[3] Background data collected in Rifle, 2008; highest levels recorded in July (Air Resource Specialists 2009).
[4] Background data collected in Rifle, September - December 2008; highest levels recorded in December (Air Resource Specialists 2009).
[5] Background data collected at Unocal site, 1983-1984 (CDPHE 2008).

Emissions of volatile organic compounds (VOCs) are dependent on the characteristics of the condensate, tank operations, and production. Air impacts associated with the condensate tanks are anticipated to be minor, but VOC emissions would be controlled under CDPHE Regulation 7. This includes capture and thermal disruption of VOCs from condensate tanks.

The Roan Plateau RMPA and EIS describes potential effects from oil and gas development (BLM 2006a:4-26 to 4-37). Analysis was completed with regard to greenhouse gas emissions, a near-field and far-field analysis for "criteria pollutants" (particulate matter [PM_{10} and $PM_{2.5}$], carbon monoxide, sulfur dioxide, and nitrogen oxides) and hazardous air pollutants (benzene, ethylbenzene, formaldehyde, hydrogen sulfide, toluene, and xylenes. Sulfur and nitrogen deposition, acid neutralizing capacity, and a visibility screening analysis were also completed in the Roan Plateau RMPA and EIS. Because the visibility screening analysis showed potential impacts at one or more Class I areas, a refined visibility analysis was also completed. The refined visibility analysis indicated a "just noticeable" impact on visibility for one day each at two Class I areas (Black Canyon of the Gunnison National Park and the Mt. Zirkel Wilderness). For the other pollutants analyzed, the implementation of oil and gas development under the Roan Plateau RMPA and EIS were calculated as having no or negligible long-term adverse impacts on air quality. Although modeling of cumulative air impacts for the Roan Plateau RMPA and EIS did not specifically address the proposed Burckle A Federal wells, these wells are within the area of the model and within the total number of wells for which modeling was conducted.

Activities described in the Proposed Action would result in localized short-term increases in pollutant emissions from vehicles and drilling equipment and fugitive dust emissions from the use of the well pad and access road. Concentrations would be below applicable ambient air quality standards as analyzed in the Roan Plateau RMPA and EIS. However, drilling and production activities may produce temporarily high levels of fugitive dust in dry conditions without dust abatement. To mitigate fugitive dust generated by these activities, the operator would be required to implement dust abatement strategies as needed by

watering the access road and/or by applying a surfactant approved by the BLM (Appendix A). Additionally, the operator would be required to apply gravel to the access road to a compacted depth of 6 inches, further reducing fugitive dust emissions (Appendix A). Air quality would decrease during mobilization and rigging up the drill rig, however impacts associated with this activity would be minor and short lived.

Since the current land use plan was approved BLM (1999), ongoing scientific research has identified the potential impacts of "greenhouse gases" (GHGs) on global atmospheric conditions. These GHGs include carbon dioxide, methane, nitrous oxide, water vapor, and several trace gases. Through complex interactions on a global scale, these GHG emissions are believed by many experts to cause a net warming effect of the atmosphere, primarily by decreasing the amount of heat energy radiated by back into space.

In 2001, the Intergovernmental Panel on Climate Change (IPCC) predicted that by the year 2100, global average surface temperatures would increase 1.4 to 5.8°C (2.5 to 10.4°F) above 1990 levels. The National Academy of Sciences (2007) supports these predictions but has acknowledged that uncertainties exist regarding how climate change may affect different regions. In 2007, the IPCC also concluded that "warming of the climate system is unequivocal" and "most of the observed increase in globally average temperatures since the mid-20th century is very likely due to the observed increase in anthropogenic (man-made) greenhouse gas concentrations" (National Academy of Sciences 2007). Other theories about the effect of GHGs on global climate change exist.

The assessment of GHG emissions and climate change remains in its formative phase. Therefore, it is not yet possible to know with certainty the net impact to climate from GHGs produced globally over the last century or from those produced today. The lack of scientific tools designed to predict climate change on regional or local scales limits the ability to quantify potential future impacts of climate change on the specific area of the Proposed Action. In addition, while any oil and gas leasing or development projects may contribute GHGs to the atmosphere, these contributions would not have a significant effect on a phenomenon occurring at the global scale believed by some to be due to more than a century of human activities.

No Action Alternative

The No Action alternative constitutes denial of the three Federal APDs described in the Proposed Action. Therefore, emissions from vehicle and equipment engines or fugitive dust from drilling activities that would accompany the Proposed Action would not occur, except in relation to the drilling, completion, and production of Fee wells under COGCC authority.

Cultural Resources

Affected Environment

A Class I cultural resource inventory (files and records search) was conducted for the vicinity around the proposed Burckle A project. A thorough search of cultural records at the Colorado River Valley Field Office (CRVFO) and of the Colorado Office of Archaeology and Historic Preservation's COMPASS database was conducted on March 6, 2011. Although the remains of a historic habitation site (5GF246) are located in the project vicinity, the site has been determined as not eligible for inclusion on the National Register of Historic Properties (NRHP). Therefore, no "historic properties" were identified as being within the area of the Proposed Action. "Historic properties" are cultural resources that are eligible or potentially eligible for inclusion on the NRHP.

Environmental Consequences

Proposed Action

The implementation of the Proposed Action would have no direct impacts to known "historic properties" as no new ground disturbance is proposed. Guidance from the Colorado BLM State Office with regards to Section 106 Inventory Requirements recommends the following when Federal wells are directionally drilling from private surface/private mineral (Fee) lands:

(a) When previously constructed well pad(s), access road(s), and other related improvements are used without additional expansion, no additional cultural inventory is required to assess the potential adverse effects to historic properties.

(b) When previously constructed well pad(s), access road(s), and other related improvements are expanded and used, cultural inventory is required to assess the potential adverse effects to historic properties.

(c) When new pad(s), access road(s), and other related improvements are constructed, cultural inventory work is required to assess the potential adverse effects to historic properties.

Additionally, a draft BLM Instructional Memorandum on the subject of "Guidelines and Procedures for Considering the Effects of BLM Actions and Authorizations on Cultural Resources located on Non-Federal land" indicates that:

(b) Directional drilling from non-Federal surface/private minerals into Federal surface/Federal minerals.

(1) A Class III inventory is required in the Area of Potential Effect on Federal and non-Federal land for all new surface disturbances

(2) When previously constructed pad(s) and access road(s) are used on non-Federal land, a Class I inventory of these lands is sufficient to assess the potential adverse effects to historic properties.

Therefore, the BLM made a determination of "**No Historic Properties Affected**." This determination was made in accordance with the 2001 revised regulations [36CFR 800.4(d)(1)] for Section 106 of the National Historic Preservation Act (16U.S.C 470f), the BLM/State Historic Preservation Officer (SHPO) Programmatic Agreement (1997) and Colorado Protocol (1998)]. As the BLM has determined that the Proposed Action would have no direct impacts to known "historic properties," no formal consultation was initiated with the SHPO.

Indirect, long-term cumulative impacts from increased access and the presence of project personnel could result in a range of impacts to known and undiscovered cultural resources in the vicinity of the project location. These impacts could range from accidental damage or vandalism to illegal collection and excavation.

A standard Education/Discovery COA for cultural resource protection would be attached to the APD(s). The importance of this COA should be stressed to the operator and its contractors, including informing them of their responsibilities to protect and report any cultural resources encountered during construction, drilling, completion, and maintenance operations.

No Action Alternative

The No Action alternative constitutes denial of the APD associated with the Proposed Action. Under the No Action alternative, the Federal wells proposed and described in the Proposed Action would not be drilled. However, six Fee wells would be drilled under the authority of the COGCC, resulting in the same potential for impacts to cultural resources as described for the Proposed Action.

Geology and Minerals

Affected Environment

The Burckle A pad is located along the southern edge of the Piceance Basin on the northern side of Battlement Mesa. Battlement Mesa is a large, prominent highland that stretches for approximately 20 miles east-west and sits along the Garfield-Mesa county line between the Colorado River to the north and Plateau Creek to the south. It is visible similar in geology to the nearby Grand Mesa to the southwest, consisting largely of basalt-capped sedimentary rocks of the Green River and Uinta Formations. The lower part of the Green River Formation is visible along the flanks of Battlement Mesa but mostly cloaked by landslide deposits in the vicinity of the site. Table 4 lists the formations that crop out along or near the project site.

The Cretaceous-age Mesaverde Group is the target zone of the proposed drilling program. Comprising the Iles and Williams Fork Formations, the Mesaverde Group is composed of marine sandstones transitional to non-marine beds of coal, shale, and sandstone that were deposited marginal to the great Cretaceous seaway (Warner 1964) that occupied much of the Western Interior region during that time. The oscillating shoreline of this sea, due to the rise and fall of sea level, left behind a complex of transgressive and regressive sedimentary sequences of onshore, nearshore, and offshore sediments.

The orogenic (mountain-building) processes that also took place during the late Cretaceous produced uplift and subsidence structures in central and eastern Utah, western Colorado, and most of Wyoming (USGS 2009). As the highland areas were exposed to erosion and the basin deepened, a greater amount of sediment was available for deposition along the ancient shoreline. The subsequent facies (textural) changes that occurred as a result of these two processes are believed to be the trapping mechanism that defines the extensive gas accumulation of the Williams Fork Formation. The source rocks are interbedded and thermally mature gas-prone shales, mudstones, siltstones, and coals. The reservoir rocks are fine- to medium-grained sandstones, varying in thickness from less than 10 feet to more than 50 feet (Spencer 1988), creating an interbedded relationship between source and reservoir. The trapping mechanism of the tight gas is both stratigraphic and diagenetic (post-depositional).

Production is derived from three reservoir intervals, which include the Wasatch Formation, the Williams Fork Formation, and Iles Formation. The latter two make up the Upper Cretaceous Mesaverde Group. Mesaverde Group reservoirs are tight throughout most of the Piceance Basin, and generally become tighter with depth of burial (Spencer 1983). Substantial reserves have been known since the late 1950s to be trapped within the tight sands of these reservoirs. However, only within the last decade, and particularly within the last few years, has the integrated application of new technologies turned the tight gas sands into a profitable play (Kuuskraa 1997). Natural fracture detection, advanced log analysis, more rigorous well completions and recompletions, and denser spacing have increased the amount of recoverable gas within these reservoirs.

Table 4. Surficial Geologic Formations in the Study Area				
Map Symbol	***Formation Name***	***Age***	***Characteristics***	***Location***
Qc	Undivided Colluvium	Holocene	Pebble, cobble, and boulder gravel.	North flanks of Grand Hogback
Qac	Colluvium / Alluvium	Holocene	Pebble, cobble, and boulder gravel.	Flood plains, alluvial fans, and low terraces.
Qsw	Sheet wash deposits	Holocene / Pleistocene.	Pebbly, silty sand.	Gentle slopes and minor drainages.
Qtt	Old Terrance Alluvium	Pleistocene	Sandy, cobbly pebble gravel.	Stream valleys and terraces.
Qty	Young Terrace Alluvium	Pleistocene	Sandy, cobbly pebble gravel.	Stream valleys and terraces.
Qlo	Loess	Pleistocene	Non-stratified, slightly clayey, sandy silt wind deposits	Mantels gentle slopes and floodplains.
Tw	Wasatch Formation	Paleocene, Eocene	Red, gray, and brown sandstone and siltstone and red, green, and gray shale	Prominent exposures north of the Colorado River and east of site
Source: Shroba et al. (1994)				

Environmental Consequences

Proposed Action

Implementation of the proposed development program would result in natural gas and associated water being produced from the tight gas sands of the Mesaverde Group. The amount of natural gas that may be potentially produced can only be estimated based on production rates from nearby wells and adjacent fields. Reserves have been estimated to approach 2 billion cubic feet (bcf) of natural gas per well (Vargas 2006). If the wells become productive, initial production rates would be expected to be highest during the first few years of production, then steadily decline during the remainder of the economic lives of the wells. Most of the wells currently in production are estimated to have a life span of 30 to 35 years. See the section on Surface Water for requirements regarding disposal of produced water.

Specific casing depths would vary depending on well location and drilling conditions. Surface casing used to protect and isolate usable water and potential production zones would be set at depths substantially below known aquifers within the area. If a water-bearing, gas-producing, lost-circulation, or pressurized zone is encountered below the surface casing, cement volumes would be adjusted to protect and further isolate those zones. This configuration is designed to prevent accidental contamination or leakage of hydrocarbons or drilling fluids from reaching usable water- or gas-producing zones within the wellbore.

No Action Alternative

Under the No Action alternative, drilling and completion of the Federal wells would not take place. However, six Fee wells would be drilled under the authority of the COGCC, resulting in the same potential for impacts to geology and mineral resources as described for the Proposed Action.

Invasive Non-Native Species

Affected Environment

The existing pad is located in a an area of Wyoming big sagebrush (*Artemisia tridentata* subsp. *wyomingensis*) with a few Utah juniper (*Juniperus osteosperma*) trees. The area is fairly weedy, with cheatgrass (*Anisantha tectorum*), redstem filaree (*Erodium cicutarium*), Russian-thistle (*Salsola australis*), and yellow alyssum (*Alyssum alyssoides*) being the dominant non-natives.

Environmental Consequences

Proposed Action

Surface-disturbing activities provide a niche for the invasion and establishment of invasive non-native species, particularly when these species are already present in the surrounding area. Because invasive, non-native species are found within the project area, the potential for invasion following construction activities is high. Mitigation measures designed to minimize the spread of these species would be attached as COAs to well APDs.

No Action Alternative

Under the No Action alternative, the Federal wells would not be drilled; however, continued operations and maintenance activities of the existing pad, including six Fee wells drilled under the authority of the COGCC, would present a continuing potential source of weed introductions. Weed control requirements associated with ongoing operations are the same as under the Proposed Action (see Appendix A).

Migratory Birds

Affected Environment

The Migratory Bird Treaty Act (MBTA) includes native passerines (flycatchers and songbirds) as well as birds of prey, migratory waterbirds (waterfowl, wading birds, and shorebirds), and other species such as doves, hummingbirds, swifts, and woodpeckers. For most migrant and native resident species, nesting habitat is of special importance because it is critical for supporting reproduction in terms of both nesting sites and food. Because birds are generally territorial during the nesting season, their ability to access and utilize sufficient food is limited by the quality of the territory occupied. During non-breeding seasons, birds are generally non-territorial and able to feed across a larger area and wider range of habitats.

BLM's management for migratory birds focuses on species listed by the U.S. Fish and Wildlife Service (USFWS) as Birds of Conservation Concern (BCC), non-BCC Neotropical migrants, and birds of prey. The current BCC list (USFWS 2008a) for Region 16 (Southern Rockies/Colorado Plateau) includes 13 species known to occur in the CRVFO area and potentially present in or near the project vicinity: the peregrine falcon (*Falco peregrinus*), prairie falcon (*F. mexicanus*), bald eagle (*Haliaeetus leucocephalus*), golden eagle (*Aquila chrysaetos*), flammulated owl (*Otus flammeolus*), yellow-billed cuckoo (*Coccyzus americanus*), Lewis's woodpecker (*Melanerpes lewis*), willow flycatcher (*Empidonax traillii*), gray vireo (*Vireo vicinior*), pinyon jay (*Gymnorhinus cyanocephalus*), juniper titmouse (*Baeolophus griseus*), Brewer's sparrow (*Spizella breweri*), and Cassin's finch (*Carpodacus cassinii*).

Of the BCC species present in the CRVFO, only the Brewer's sparrow is commonly associated with the type of sagebrush habitat that dominates the project area. Although no birds of prey (raptors) were observed to nest in the project area, habitat at or near the project area provides perching, foraging, and

potential nesting sites for Swainson's hawk as well as the Cooper's hawk, sharp-shinned hawk, red-tailed hawk, and the western screech-owl and northern pygmy-owl. Another species that would not be expected to nest onsite but could visit the area in search of prey is the golden eagle.

Environmental Consequences

Proposed Action

Under the Proposed Action, no new surface would be disturbed. The existing surface disturbance of approximately 2.0 acres of private land would be reduced to 1 acre following successful interim reclamation. Drilling of the wells would displace birds away from preferred habitats for a short time due to noise and human presence. Displaced individuals are less likely to nest due to other suitable habitat already being occupied and may be subject to reduced survival if the areas into which they are displaced are less suitable. Research indicates that noise associated with development and production activities can also lead to lower avian diversity and density in both adjacent and distant areas (Forman 2000, Forman and Deblinger 2000). Noise can decrease usable habitat for birds by reducing the distance at which courtship or territorial vocalizations by males are heard by potential mates, interfering with territory establishment and defense, mate selection, and reproductive potential. These impacts may result in a short-term decrease in the local populations of some species, due to both direct habitat loss resulting from vegetation removal and indirect habitat loss resulting from disturbance. However, none of the BCC species or other migratory bird species present in the area would be expected to suffer significant declines in population size or reductions in the overall viability of the species.

No raptor survey has been completed for the area. If construction, drilling, and completion are initiated after February 1, BLM would apply a 60-day timing limitation (TL) during the period May 1 to June 30 (Appendix A), which includes the peak of the nesting season for the raptor species most likely to occur. BLM would grant an exception to this TL if a survey conducted during the nesting season documented no active nests.

Irrespective of raptor surveys, Antero remains subject to the MBTA, administered by the USFWS, which precludes the "take" of any raptor or most other native species. The MBTA prohibits the "take" of a protected species. Under the Act, the term "take" means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. The USFWS interprets "harm" and "kill" to include loss of eggs or nestlings due to abandonment or reduced attentiveness by one or both adults as a result of disturbance by human activity, as well as physical destruction of an occupied nest.

No Action Alternative

The No Action alternative constitutes denial of the APD associated with the Proposed Action. Under the No Action alternative, the new Federal wells would not be drilled. However, development of six Fee wells under the authority of the COGCC would have the same impacts as described above.

Native American Religious Concerns

Affected Environment

The Burckle A well pad is located within an area identified by the Ute Tribes as part of their ancestral homeland. A Class I cultural resource inventory (see section on Cultural Resources) was conducted to determine if any areas were known to be culturally sensitive to Native Americans. No sensitive areas were identified or are currently known in the proposed project area.

Environmental Consequences

Proposed Action

At present, no Native American concerns are known within the project area and none was identified during the inventories. The Ute Tribe of the Uintah and Ouray Bands, the primary Native American tribe in this area of the CRVFO, have indicated that they do not wish to be consulted for small projects or projects where no Native American areas of concern have been identified either through survey or past consultations. Therefore, formal consultation was not undertaken. If new data are disclosed, new terms and conditions may have to be negotiated to accommodate their concerns.

Although the Proposed Action would have no direct impacts, increased access and personnel in the vicinity of the proposed project could indirectly impact unknown Native American resources ranging from illegal collection to vandalism.

The National Historic Preservation Act (NHPA) requires that if newly discovered cultural resources are identified during project implementation, work in that area must stop and the agency Authorized Officer notified immediately (36 CFR 800.13). The Native American Graves Protection and Repatriation Act (NAGPRA), requires that if inadvertent discovery of Native American Remains or Objects occurs, activity must cease in the area of discovery, a reasonable effort made to protect the item(s) discovered, and immediate notice made to the agency Authorized Officer, as well as the appropriate Native American group(s) (IV.C.2). Notice may be followed by a 30-day delay (NAGPRA Section 3(d)). Further actions also require compliance under the provisions of NHPA and the Archaeological Resource Protection Act. Laramie will notify its staff and contractors of the requirement under the NHPA, that work must cease if cultural resources are found during project operations. A standard Education/Discovery COA for the protection of Native American values would be attached to the APDs (Appendix A). The importance of these COAs should be stressed to the operator and its contractors, including informing them of their responsibilities to protect and report any cultural resources encountered. The proponent and contractors should also be aware of requirements under the NAGPRA.

No Action Alternative

The No Action alternative constitutes denial of the APD associated with the Proposed Action. Under the No Action alternative, the Federal wells proposed and described in the Proposed Action would not be drilled. Any future Fee wells drilled under the authority of the COGCC would have the same types of impacts as described above.

Noise

Affected Environment

Noise is generally described as unwanted sound, weighted and noise intensity (or loudness) is measured as sound pressure in units of decibels (dBAs). The decibel scale is logarithmic, not linear, because the range of sound that can be detected by the human ear is so great that it is convenient to compress the scale to encompass all the sounds that need to be measured. Each 20-unit increase in the decibel scale increases the sound loudness by a factor of 10.

Sound levels have been calculated for areas that exhibit typical land uses and population densities. In rural recreational areas, ambient sound levels are expected to be approximately 30 to 40 dBA (EPA 1974, Harris 1991). As a basis for comparison, the noise level during normal conversation of two people 5 feet apart is 60 dBA. The project would be located in a rural, unpopulated area with few potential noise

sources. Noise levels from human activity in the project vicinity are mostly mechanical, consisting mainly of existing oil and gas wells, new exploration activities, and ranching/farming operations. These noises are widely dispersed throughout the area, with localized impacts from vehicular traffic.

Environmental Consequences

Proposed Action

The project would result in increased levels of noise during the drilling and completion phases. The noise would be most noticeable along the roads used to haul equipment and at the pad location. Drilling activities are subject to noise abatement procedures as defined in the COGCC Rules and Regulations (Aesthetic & Noise Control Regulations). Operations involving pipeline or gas facility installation or maintenance, the use of a drilling rig, completion rig, workover rig, or stimulation are subject to the maximum permissible noise levels for industrial zones. The 2006 revised COGCC noise control rules call for noise levels from oil and gas operations at any well site and/or gas facility to comply with the maximum permissible levels (Table 5) at a distance of 350 feet. The allowable noise level for periodic impulsive or shrill noises is reduced by 5 dBA from the levels shown (COGCC 2006).

Table 5. Noise Standards for Light industrial, Residential/Agriculture/Rural

Zone	***7:00 A.M. to 7:00 P.M***	***7:00 P.M. to 7:00 A.M***
Light Industrial	70 dBA	65 dBA
Residential/Agricultural/Rural	55 dBA	50 dBA

An existing residence is located approximately 1,000 feet west of the Burckle A pad. Given the proximity of this house, uphill of the site, noise reduction devices may be required if the noise levels greater than 55 dBA are found to be adversely impacting the resident.

Traffic noise would also be elevated as a consequence of the Proposed Action. The greatest increase would be along access roads during the drilling and completion phases. Less noise would be created by smaller trucks and passenger vehicles such as pickup trucks and sport utility vehicles. Although the duration of increased noise from this source would be short, it would occur repeatedly during the drilling and completion phases.

Noise impacts would decrease during the production phase but would remain background noise levels. During maintenance and well workover operations, noise levels would temporarily increase above those associated with routine well production.

No Action Alternative

This alternative would not have an impact on existing noise levels, because the development activities would not occur. However, the six Fee wells developed under the authority of the COGCC would have the same potential for noise impacts as described above for the Proposed Action.

Socio-Economics

Affected Environment

The project area is located within Garfield County, Colorado. The population of Garfield County grew by approximately 3% per year from 2000 to 2005, with an increase from 44,263 to 50,663 residents (DOLA

2009). Population growth in Garfield County is expected to more than double over the next 20 years from over 50,000 in 2005 to 105,087 in 2025 (DOLA 2009).

In 2000, the last year for which Garfield County has reported data, industries with the highest percentage of total employment were construction (20.4%), tourism (10.7%), retail trade (13.7%), and education and health (15.4%). An estimated 13.3% of the 2000 population was retired and did not earn wages. Employment in agriculture, forestry, hunting, and mining combined for 2.4% of total employment.

Total personal income in Garfield County has also risen by 120%, from $513 million in 1990 to $1.1 billion in 2000. Annual per capita income grew by 50% during the same period, from about $17,000 to $26,000 (BLM 2006), and the average earnings per job in 2005 was approximately $37,500 for male and $27,250 for female full-time year-round workers. The communities of Parachute, Silt, and Rifle are considered the most affordable for housing, while Battlement Mesa, New Castle, and Glenwood Springs are the least affordable, with the cost to rent or own similar housing up to 50% higher (BLM 2006).

Activities on public land in the vicinity of the project area are primarily ranching/farming, hunting, OHV travel, and the development of oil and gas resources. Hunters contribute to the economy because many require lodging, restaurants, sporting goods, guides and outfitting services, food, fuel, and other associated supplies. Big-game hunting, in particular, is viewed as critical to Garfield County, and especially the local community economies that depend on BLM and Forest Service public lands where most hunting occurs (BLM 2006). Expenditures by hunters in the Roan Plateau Planning Area have been estimated to be as much as $1 million annually, with perhaps an additional $1 million annually of indirect and local expenditures (CDOW 1995, cited in BLM 2006).

The growth of the oil and gas industry has been increasingly important to local economies (BLM 2006). Production of natural gas in Garfield County has increased dramatically in the current decade, from 70 trillion cubic feet (TCF) in 2000 to 575 TCF in 2009 (COGCC 2010). Garfield County is experiencing the fastest oil and gas development in Colorado, with 3,000 drilling permits currently approved (COGCC 2009). While the number of workers employed in the mining and extraction industry in Garfield County is reported as only 1.7% of total employment, this number is considered misleading because some oil and gas employment data are incorporated into construction statistics instead (BLM 2006). For example, in 2005, an estimated 4,000 persons were directly employed by gas development companies and their subcontractors in Garfield County (Garfield County 2009).

The Federal government makes “Payments in Lieu of Taxes” (PILT) to County governments to help offset property tax revenue lost of nontaxable Federal lands within County boundaries (BLM 2006). Payments are based on Federal acreage in the County for all land management agencies, including BLM, USFS, USFWS, and the National Park Service (NPS). The amount may also be adjusted based on population and as appropriated by Congress. By formula, payments are decreased as other Federal funds such as mineral royalty payments increase. PILT received by Garfield County was $1,170,205 in 2004; $808,348 in 2005; $1,065,158 in 2006; and $1,078,087 in 2007.

In addition to PILT payments, BLM shares revenue generated by commercial activities on public lands with State and County governments (BLM 2006). Federal mineral royalties are levied on oil and gas production from Federal mineral leases. Oil and gas lessees pay royalties equal to 12.5% of the wellhead value of oil and gas produced from public land. Half the royalty receipts are distributed to Colorado, and the amount distributed by the State to Garfield County in 2002 was $14.1 million, compared to $5.5 million in 2001 (BLM 2006). These funds are then allocated to fund County services, schools, and local communities.

Property tax revenue from oil and gas development has also become the largest source of public revenue in Garfield County (BLM 2006). In 2007, oil and gas assessed valuation in Garfield County amounted to approximately $1.9 billion, or about 65% of total assessed value. Total tax revenues from property taxes and special district levies were $130 million. Tax dollar distributions in 2007 were Schools 37%, County 30%, Special Districts 13%, Fire Districts 10%, Colleges 8%, and Towns 2%.

The NEPA process requires a review of the environmental justice issues as established by Executive Order 12898 (February 11, 1994). The order established that each Federal agency identify any "disproportionately high and adverse human health or environment effects of its programs, policies, and activities on minority and low-income populations." The Latino community is the only minority population of note in the vicinity of the project area. In 2000, 16.7% of the residents of Garfield County identified themselves as Hispanic or Latino, and this is consistent across the State (17.1%). African Americans, American Indians, and Pacific Islanders account for less than 1% of the Garfield County population, which is below the State levels.

Environmental Consequences

Proposed Action

The Proposed Action would minor positive impacts on the local economies of Garfield County through the creation or retention of job opportunities in the oil and gas industry and in supporting trades and services. In addition, local governments in Garfield County would experience an increase in tax and royalty revenues. Some minor economic loss to private landowners or guides may result from the potential displacement of big game and resulting reduction in big game hunting within the project area.

The Proposed Action could result in minor negative social impacts, including (1) decrease in the recreational character of the area, (2) reduced scenic quality, (3) increased dust levels, and (4) increased traffic. However, most of these impacts would be minor and limited to the relatively short duration of drilling and completion activities.

No Action Alternative

The No Action alternative would result in no additional impacts to socio-economics of the general area associated with the new Federal wells. However, impacts not associated with Federal royalties would occur as a consequence of any new Fee wells drilled on the pad under the authority of the COGCC.

Special Status Species

Federally Listed, Proposed, or Candidate Plant Species

Affected Environment:

According to the latest species list from the USFWS, the following Federally listed, proposed, or candidate plant species may occur within or be impacted by actions occurring in Garfield County: Parachute beardtongue (*Penstemon debilis*), DeBeque phacelia (*Phacelia submutica*), Colorado hookless cactus (*Sclerocactus glaucus*), and Ute ladies'-tresses orchid (*Spiranthes diluvialis*).

Environmental Consequences

Proposed Action

Results of a plant survey conducted in March 2011 indicated no habitat for Federally listed, proposed, or candidate plant species in the project area. Therefore, the project would have "**No Effect**" on these species.

No Action Alternative

Because of the lack of potential habitat for any Federally listed, proposed, or candidate plant species in the project area, no impacts to these species would result from implementation of the No Action alternative.

Federally Listed, Proposed, or Candidate Animal Species

Affected Environment

According to the latest species list from the USFWS, the following Federally listed, proposed, or candidate animal species may occur within or be impacted by actions occurring in Garfield County: Canada Lynx (*Lynx canadensis*), Mexican Spotted Owl (*Strix occidentalis),* Western Yellow-billed Cuckoo (*Coccyzus americanus occidentalis),* Razorback Sucker (*Xyrauchen texanus*), Colorado Pikeminnow (*Ptychocheilus lucius*), Humpback Chub (*Gila cypha*), Bonytail (*G. elegans), and* Greenback Cutthroat Trout (*Oncorhynchus clarki stomias).*

Aquatic Vertebrates. Of the four species of Federally listed big-river fishes within the Colorado River basin, two species—the razorback sucker and Colorado pikeminnow—have Designated Critical Habitat within the Colorado River and 100-year floodplain west (downstream) from the State Highway 13 bridge at the town of Rifle. This portion of the Colorado River lies about 6 miles west/northwest of the project area. The nearest known habitat for the humpback chub and bonytail is within the Colorado River approximately 90 miles downstream from the project area. Only one population of humpback chub, at Black Rocks west of Grand Junction, is known to occur in Colorado.

The greenback cutthroat trout is a subspecies of cutthroat trout native to the eastern slope of Colorado (Platte River drainage). Its documented presence in some streams of Garfield County suggests that either (1) fish were intentionally removed from east-slope waters and stocked in west-slope waters, or (2) the genetics of this species and the Colorado River cutthroat trout (the subspecies native the western slope) are not clearly defined. Because the greenback cutthroat trout is not known or expected to occur within or near the project area, it is not addressed further in this document.

Terrestrial Vertebrates. None of the Federally listed, proposed, or candidate terrestrial wildlife species that occur or are potentially present in Garfield County is considered likely to occur in the project area or vicinity due to lack of habitat or negative results of prior surveys in potentially suitable habitat. Hence, these species are not considered further in this document. The bald eagle and peregrine falcon were removed from the listed of threatened or endangered species in August 2007 and August 1999, respectively, and are now classified by BLM as sensitive species (see below). Although no longer protected by the Endangered Species Act, both species remain protected by the Migratory Bird Treaty Act; the bald eagle is also protected by the Bald and Golden Eagle Protection Act.

Environmental Consequences

Proposed Action

No Federally or proposed terrestrial vertebrate animal species present or potentially present in Garfield County are expected to occur in the project vicinity based on habitat types present and documented occurrences. Therefore, the Proposed Action would have "**No Effect**" on these species.

For the four Federally listed big-river fishes, BLM prepared a Programmatic Biological Assessment (PBA) in 2008 addressing water-depleting activities associated with BLM's fluid minerals program in the Colorado River Basin in Colorado. In response to this PBA, the USFWS issued a Programmatic Biological Opinion (PBO) (ES/GJ-6-CO-08-F-0006) on December 19, 2008. The PBO concurred with BLM's effects determination of "**May Affect, Likely to Adversely Affect**" the Colorado pikeminnow, bonytail, humpback chub, or razorback sucker as a result of depletions associated with oil and gas projects. To offset the impacts, the BLM has set up a Recovery Agreement, which includes a one-time Fee per well to use for site-specific mitigation projects. These funds are used to contribute to the recovery of endangered fish through the restoration of habitat, propagation, and genetics management, instream flow identification and protection, program management, non-native fish management, research and monitoring, and public education.

No Action Alternative

The No Action alternative constitutes denial of the APD associated with the Proposed Action. Under the No Action alternative, the Federal wells proposed and described in the Proposed Action would not be drilled. However, the Fee wells developed under the authority of the COGCC would have the same potential for impacts as described above for the Proposed Action.

BLM Sensitive Plant Species

Affected Environment

BLM sensitive plant species with habitat and/or occurrence records in Garfield County include DeBeque milkvetch (*Astragalus debequaeus),* Naturita milkvetch (*Astragalus naturitensis),* Piceance bladderpod (*Lesquerella parviflora*), Roan Cliffs blazing star (*Mentzelia rhizomata*), Harrington's penstemon (*Penstemon harringtonii*), and Cathedral Bluffs meadow-rue (*Thalictrum heliophilum*).

Environmental Consequences

Proposed Action

Results of a March 2011 plant inventory indicate no BLM sensitive plant species or their habitats in the vicinity of the Burckle A pad.

No Action Alternative

Since no BLM sensitive plant species occur in the project area, no impacts to these species are anticipated.

BLM Sensitive Animal Species

Affected Environment

BLM sensitive animal species with habitat and/or occurrence records in the portion of the CRVFO that includes the project area and vicinity are listed in Table 6.

Environmental Consequences

Proposed Action

BLM sensitive animal species with habitat and/or occurrence records in the portion of the CRVFO that includes the project area and vicinity are listed in Table 6.

Table 6. BLM Sensitive Wildlife Species Present or Potentially Present in the Project Area

Common Name	***Habitat***	***Potential for Occurrence***
Fringed myotis	Breeds and roosts in caves, trees, mines, and buildings; hunts over pinyon-juniper, montane conifer, and semi-desert shrubland habitats.	Unlikely
Townsend's big-eared bat	Breeds and roosts in caves, trees, mines, and buildings; hunts over pinyon-juniper, montane conifer, and semi-desert shrubland habitats.	Unlikely
Northern goshawk	Predominantly uses spruce/fir forests but will also use Douglas-fir, various pines, and aspens.	Unlikely
Bald eagle	Nests and roosts in mature cottonwood forests along rivers, large streams, and lakes.	Present along Colorado River
Brewer's sparrow	Sagebrush shrublands, mountain parks; may be found in alpine willow stands.	Possible
Great Basin spadefoot	Habitat includes pinyon-juniper woodlands, sagebrush, and semi-desert shrublands	No suitable habitat in vicinity
Northern leopard frog	Wet meadows and the shallows of marshes, ponds, glacial kettles, beaver ponds, lakes, reservoirs, streams, and irrigation ditches.	No suitable habitat in vicinity
Colorado River cutthroat trout	Headwaters streams and lakes isolated from populations of non-native trouts, including other subspecies of cutthroat trout.	No suitable habitat in vicinity
Midget faded rattlesnake	High, cold desert dominated by sagebrush and with an abundance of rock outcrops and exposed canyon walls.	No suitable habitat in vicinity
Flannelmouth sucker	Variety of streams from headwaters to major rivers; prefers rocky substrates and relatively fast-flowing stream regimes.	Present in Colorado River
Bluehead sucker	Generally restricted to rivers and major tributaries.	Present in Colorado River
Roundtail chub	Generally restricted to rivers and major tributaries.	Present in Colorado River

Fringed Myotis (*Myotis thysanodes* and Townsend's Big-eared Bat (*Corynorhinus townsendii*) – No caves or other suitable roosting sites occur in the project area. Loss of large trees, potentially also used for roosting, would be negligible. No new loss of habitat above which the bats could search for aerial prey would occur, and the area they might avoid during nighttime drilling and completion activities would represent a small portion of their total feeding range, if present.

Northern Goshawk (*Accipiter gentilis*) – This species is mostly limited to spruce/fir or aspen forests, such as atop the Roan Plateau, Battlement Mesa, and other areas that reach subalpine elevations. However,

goshawks may migrate to lower elevation pinyon/juniper or Douglas-fir habitats during winter and therefore could make occasional, transitory use of the project area for winter foraging. Goshawks feed primarily on small birds but also on diurnal small mammals (rabbits, chipmunks, etc.).

Bald Eagle (*Haliaeetus leucocephalus*) – Formerly listed as endangered, downlisted to threatened, and more recently removed from the list of threatened or endangered species, the bald eagle remains protected by the MBTA and the Bald and Golden Eagle Protection Act (BGEPA). Although the project area lies relatively near occupied habitat along the Colorado River, habitats present within the project area and vicinity are unlikely to attract use by this species, minimizing the potential for adverse impacts.

Brewer's Sparrow (*Spizella breweri*) – This project vicinity contains limited and marginal habitat for the Brewer's sparrow, which generally is restricted to extensive, uniform stands of sagebrush, primarily sagebrush steppe. If the species were to occur, oil and gas activities occurring with the home range of a nesting pair could cause individuals to shift their feeding patterns and to locate their nests to avoid the disturbance (noise, dust, human activity). However, this impact would be limited to the nesting season and would not be an issue for long-term production and maintenance operations.

Great Basin Spadefoot (*Spea intermontana*) – This species generally inhabits seasonal pools and ponds in pinyon-juniper woodland, sagebrush, and semi-desert shrubland habitats, mostly below 6,000 feet in elevation. The project vicinity is of marginal suitability for this species, and spadefoots have not been discovered in the area. Because the project would not involve new habitat disturbance, impacts to this species would not be expected, even if it were present in area streams or ponds.

Northern Leopard Frog (*Rana pipiens*) – Unlike the spadefoot, the northern leopard frog is limited to perennial waters, including ponds and slow-flowing perennial streams or persistent portions of intermittent streams. This species requires streams with good water quality and abundant aquatic or shoreline vegetation. Suitable habitat occurs along some streams in the general vicinity of the project area. However, the project would not involve new habitat disturbance, an no impacts are expected.

Midget Faded Rattlesnake (*Crotalus viridis concolor*) – The midget faded rattlesnake is a small, pale-colored subspecies of the common and widespread western rattlesnake. The midget faded rattlesnake is endemic to a small area of southwestern Wyoming, northeastern Utah, and northwestern Colorado, including western Garfield County. Suitable habitats include sandy and rocky areas in pinyon-juniper and semi-desert shrub. The relatively densely vegetated and generally north-facing aspects of the plan area are less suitable than the more barren south-facing areas north of I-70. In the unlikely event that this species were to occur in the project area, the lack of new habitat disturbance would greatly reduce the potential for adverse impacts.

Colorado River Cutthroat Trout (*Oncorhynchus clarki pleuriticus*) – Remaining populations of this subspecies of cutthroat trout occur mostly in headwater streams and lakes of the Colorado River drainage. There are no perennial streams within the vicinity of the project area, therefore the Colorado River cutthroat trout would not be affected by the Proposed Action.

Flannelmouth Sucker (*Catostomus latipinnis*) and Roundtail Chub (*Gila robusta*) – As with the ecologically similar Colorado River endangered fishes described above, the flannelmouth sucker and roundtail chub are adapted to naturally high sediment loads and therefore would not be affected by increased sediment transport to the Colorado River, in the unlikely event that this were to occur as a result of the project. Although not typically affected adversely by high sediment loads, inflow of chemical pollutants from the project area could result in direct impacts. The stormwater controls enforced by the CDPHE and protective COAs for water quality would minimize this potential (Appendix A). These species are also, like the endangered Colorado River big-river fishes, vulnerable to alterations in flow

regimes (including evaporative loses from dams and depletions from withdrawal of water for irrigation or municipal water supplies) that affect the presence of sandbars and seasonally flooded overbank areas needed for reproduction. The small amount of water consumption associated with the Proposed Action would not cause discernible impacts to the Colorado River flow regime.

Bluehead Sucker (*Catostomus discobolus*) – This species is found throughout the middle and upper Colorado River Basin, in a variety of areas from headwater streams to large rivers (Woodling 1985). The bluehead sucker prefers areas with a rock substrate and mid to fast flowing waters. Because no perennial streams are present in the vicinity, the bluehead sucker would not be affected by the Proposed Action.

No Action Alternative

The No Action alternative constitutes denial of the APDs associated with the Proposed Action. Under the No Action alternative, the Federal wells proposed and described in the Proposed Action would not be drilled. However, the Fee wells developed under the authority of the COGCC would have the same potential for impacts as described above for the Proposed Action.

Vegetation

Affected Environment

The project area lies within a Wyoming big sagebrush shrubland interspersed with a few middle-aged juniper. Dominant forbs and grasses are mostly non-native species such as cheatgrass, redstem filaree, and Russian thistle.

Environmental Consequences

Proposed Action

Under the Proposed Action, no new construction or development activities would take place. The expected short-term disturbance of the pad would be approximately 2.5 acres, all of which is existing surface disturbance. Following interim reclamation, the area of long-term disturbance would be 1.0 acres. With implementation of standard conditions of approval (Appendix A), desirable forbs and grasses on the unused portions of the pad, road, and pipeline could be established within 2 to 3 years. However, because of periodic workovers and the potential for additional well bores in the future, it is likely that vegetation would remain in an early seral stage for the life of the wells.

No Action Alternative

Under the No Action alternative, because the pad is existing and no new disturbance is anticipated, no impacts to vegetation would occur. This is also true for any future Fee wells drilled under the authority of the COGCC, assuming that the pad size remains the same.

Visual Resources

Affected Environment

The Proposed Action would occur on private land south of I-70 and the Colorado River. Vegetation is predominantly gray-green sagebrush flats with scattered dark green juniper trees. Pockets of tan exposed soil are common throughout the proposed project location. There are existing structures nearby including private residences, ranch houses and associated outbuildings. The structures consist of geometric lines,

blocky forms, smooth texture, and a variety of colors (white, gray, brown, and green). The visual exposure from I-70 would be limited due to the pad's location behind a small hill and out of sight from the casual observer. In addition, the speed in which the casual observer would be traveling along I-70 or CR 331 would also limit the view. The Proposed Action would be most visible to private landowners living adjacent to the site.

Since the Burckle A pad is located on private land, Federal lease terms regarding visual concerns are not applicable. Visual resource management objectives do not apply to non-BLM lands; visual values for those lands are only protected by landowner discretion.

Environmental Consequences:

Proposed Action

Since no additional disturbance outside the current pad layout would occur, visual resources would not be impacted long term. Short-term visual impacts include light pollution, dust, and increased traffic from drilling and completion activities.

No Action Alternative

The No Action alternative constitutes denial of the APD associated with the Proposed Action. Under the No Action alternative, the Federal wells proposed and described in the Proposed Action would not be drilled. However, the six Fee wells would likely be developed under the authority of the COGCC, and so would have the same potential for impacts as described above for the Proposed Action.

Wastes, Hazardous or Solid

Affected Environment

BLM Instruction Memoranda numbers WO-93-344 and CO-97-023 require that all National Environmental Policy Act documents list and describe any hazardous and/or extremely hazardous materials that would be produced, used, stored, transported, or disposed of as a result of a proposed project.

The Glenwood Springs Resource Area, Oil & Gas Leasing & Development Draft Supplemental Environmental Impact Statement (BLM 1998), Appendix L, Hazardous Substance Management Plan, contains a comprehensive list of materials that are commonly used for oil and gas projects. It also includes a description of the common industry practices for use of these materials and disposal of the waste products. These practices are dictated by various Federal and State laws and regulations, and the BLM standard lease terms and stipulations that would accompany any authorization resulting from this analysis. The most pertinent of the Federal laws dealing with hazardous materials contamination are as follows:

- The Oil Pollution Act (Public Law 101-380) prohibits discharge of pollutants into waters of the US, which by definition would include any tributary, including any dry wash that eventually connects with the Colorado River.

- The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (Public Law 96-510) provides for liability, compensation, cleanup, and emergency response for hazardous substances released into the environment. It also provides national, regional, and local contingency plans. Applicable emergency operations plans in place include the National

Contingency Plan (40 CFR 300, required by section 105 of CERCLA), the Region VIII Regional Contingency Plan, the Colorado River Sub-Area Contingency Plan (these three are Environmental Protection Agency produced plans), the Mesa County Emergency Operations Plan (developed by the Mesa County Office of Emergency Management), and the BLM Grand Junction Field Office Hazardous Materials Contingency Plan.

- Hazardous spill cleanup activities that fall outside the criteria set forth in CERCLA still require the submission of a Preconstruction Notice to the U.S. Army Corps of Engineers and may be subject to Nationwide Permit Number 38.

- The Resource Conservation and Recovery Act (RCRA) (Public Law 94-580) regulates the use of hazardous substances and disposal of hazardous wastes. Note: While oil and gas lessees are exempt from RCRA, right-of-way holders are not. RCRA strictly regulates the management and disposal of hazardous wastes.

Emergency response to hazardous materials or petroleum products on BLM lands are handled through the BLM Grand Junction Field Office contingency plan. BLM would have access to regional resources if justified by the nature of an incident.

Environmental Consequences

Proposed Action

Possible pollutants that could be released during the mobilization of the rig include diesel fuel, hydraulic fluid, and lubricants. These materials would be used during rigging up of the drilling rig, refueling and maintaining vehicles and equipment, not for the road, pad, and pipeline because it is existing. Potentially harmful substances used in the operation would be kept onsite in limited quantities and trucked to and from the site as required. No hazardous substance, as defined by 40 CFR 355 would be used, produced, stored, transported, or disposed of in amounts above threshold quantities.

Surface water or groundwater could be impacted under the Proposed Action. Pollutants that could be released during the operational phase of the project could include condensate, produced water (if the wells in the area produce water), and glycol (carried to the site and used as antifreeze). While uncommon, an accident could result in the release of any of these materials and contamination of surface water or soil. Improper casing and cementing procedures could result in the contamination of groundwater resources. In the case of any release, the responsible party would be liable for cleanup and damages. Depending on the scope of the accident, any of the above referenced contingency plans would be activated to provide emergency response. At a minimum, the BLM Grand Junction Field Office contingency plan would apply.

No Action Alternative

The No Action alternative would consist of denial of the APDs for the Federal wells. However, the six Fee wells would still be drilled and completed under the authority of the COGCC, and would have the same potential for impacts as described above for the Proposed Action.

Water Quality, Surface and Ground

Surface Water

Affected Environment

The existing locations lie within one USGS 6th-code hydrologic unit watershed. The project area where proposed activities for Burckle A pad would occur is within the Colorado River above Rifle Creek unit, which empties directly into the Colorado River approximately 1 mile to the northeast of the project. According to the *Stream Classifications and Water Quality Standards* (CDPHE, Water Quality Control Commission [WQCC] Regulation No. 37) (CDPHE 2007), unnamed ephemeral drainages that drain most of the project vicinity are within the Lower Colorado River segment 4d , which includes the mainstem and tributaries to the Dry Hollow Creek from its source to the confluence with the Colorado River. Following is a brief description of segment 4d.

- Segment 4d – This segment has been classified as aquatic life cold 2, recreation N, water supply, and agriculture. Aquatic life cold 2 indicates that this water course is not capable of sustaining a wide variety of cold or warm water biota due to habitat, flows, or uncorrectable water quality conditions. Recreation class N refers to waters that are not suitable or intended to become suitable for primary contact recreation. This segment is suitable or intended to become suitable for potable water supplies and agricultural purposes that include irrigation and livestock use.

No streams within segment 4d are on the State of Colorado's *303(d) List of Impaired Waters and Monitoring and Evaluation List* (CDPHE, WQCC Regulation No. 93) (CDPHE 2010) *Colorado's Monitoring and Evaluation List* identifies water bodies where there is reason to suspect water quality problems, but uncertainty also exists regarding one or more factors. No segments in the project area are on the State of Colorado's *Monitoring and Evaluation List* (CDPHE 2010. The USGS has collected limited surface water flow and quality data at sites along Dry Hollow and Divide Creek near the project area (USGS 2007b). Data were also collected from the Colorado River below the project area near Rulison in 1977 and 1978 (Table 7).

Table 7. Selected Water Quality Data for Two Sampling Locations near the 36L Pad

Parameter	***Dry Hollow Creek near Silt, CO, USGS Site # 393203107392 10/15/03***	***Divide Creek near Silt, CO, USGS Site # 393140107365 09/01/79***
Instantaneous discharge (cfs)	0.15	2.0
Temperature, water (°C)	10	14
Field pH (standard units)	7.9	8.1
Specific conductance (µS/cm/cm at 25°C)	2700	950
Total Dissolved Solids (mg/L)	NA	594
Hardness as CaCO3 (mg/L)	NA	230
Chloride (mg/L)	NA	22
Dissolved oxygen (mg/L)	NA	7.6

Note: NA is data not available
Source: USGS (2007).

No sediment measuring stations are present on the Colorado River or its tributaries near the pad location. The closest downstream station on the Colorado River is near DeBeque, Colorado. A summary of USGS data collected at this station indicates that the mean sediment load was 1,817 tons per day during the

period of 1974 to 1976. The maximum and minimum for this location during the same period was 41,300 and 8 tons/day respectively (USGS 2007).

Environmental Consequences

Proposed Action

The Proposed Action would result in no additional surface disturbance to the existing 2.5-acre pad, of which approximately 1 acre would not be reclaimed during the life of the wells. Potential impacts to surface water associated with the Proposed Action occur from traffic, waste management, and the use, storage and transportation of fluids (i.e., chemicals, condensate, and produced water). Long-term soil protection could be achieved by continued road and pad maintenance to reduce erosion, remediation of contaminated soils and minimizing the size of the long-term pad footprint through interim reclamation measures. As proposed, these measures would include crowning road surfaces, installing culverts and drainage systems, and applying gravel to all upgraded BLM roads in the project area to a compacted thickness of 6 inches (Appendix A).

Oil and gas waste management practices have the potential to contaminate soils and surface water. Contamination of soils could cause long-term reduction in site productivity resulting in increased erosion and potential sediment and contaminant delivery to nearby waterways during runoff. Use, storage, and transportation of fluids such as produced water, hydraulic fracturing fluids, and condensate have the possibility of spills that could migrate to surface or groundwater. Additionally, tanks used to store produced water and condensate would be placed in secondary containment to prevent offsite release. In the event of an accidental release, produced water and condensate would be confined for cleanup in a containment area and would not migrate to surrounding soils or surface waters. Pipelines associated with the transport of these liquids would be pressure tested to detect leakage prior to use.

Implementation of the standard COAs for mitigating impacts to surface waters (Appendix A) would minimize risks of adverse impacts associated with ongoing production activities. Because the Proposed Action would occur within the City of Rifle municipal watershed, Antero would be required to obtain necessary permits and authorization from the City prior to conducting any work within the watershed.

No Action Alternative

The No Action alternative would constitute denial of the Federal wells as proposed. Fee wells drilled under the authority of the COGCC would result in the same potential for impacts to surface waters as described above for the Proposed Action.

Waters of the U.S.

Affected Environment

Waters of the U.S. located in the project vicinity include the Dry Hollow Creek. Section 404 of the Clean Water Act requires a Department of the Army permit from the U.S. Army Corps of Engineers (USACE) prior to discharging dredged or fill material into waters of the U.S. as defined by 33 CFR Part 328.

Environmental Consequences

Proposed Action

No new crossings of waters of the U.S. are included in the Proposed Action, nor is pad expansion proposed that could discharge fill into Waters of the U.S.

Improperly designed crossings of small ephemeral drainages, in particular any undersized or poorly aligned culverts, could result in soil degradation, including erosion at culvert outlets. This could potentially supply sediment to the Colorado River approximately 1 mile to the north. However, standard and site-specific surface-use COAs listed in Appendix A would be implemented to protect NAMES Creeks, the Colorado River, and any other waters of the U.S. potentially impacted by long-distance stormflow transport.

No Action Alternative

The No Action alternative would constitute denial of the Federal wells as proposed. However, Fee wells drilled under the authority of the COGCC would result in the same potential for impacts to waters of the U.S. as described above for the Proposed Action.

Groundwater

Affected Environment

Groundwater within the proposed development area occurs in both alluvial and sedimentary aquifers. Alluvial fresh-water wells are the most productive, and consist of boulders, cobbles, gravel, sand, silt, and clay. Alluvial well depths are usually less than 200 feet, and water levels typically range between 100 to 150 feet. Most fresh-water wells are drilled in support of rural residences and the numerous agricultural operations found throughout the Piceance Basin.

Two bedrock aquifer units are identified within the Piceance Basin. The Upper and Lower Piceance Basin aquifers are separated by two confining units. The upper unit is found within the Uinta Formation and the upper part of the Parachute Creek Member of the Green River Formation (Robson and Saulnier 1981). The lower Piceance Basin aquifer unit is found within the lower part of the Parachute Creek Member, separated from the upper unit by the Mahogany oil shale interval. South of the Colorado River, these upper Tertiary-age aquifers have largely been eroded off, leaving isolated remnants of these formations lacking connectivity. Beneath the Upper and Lower Piceance Basin aquifer systems is a confining unit consisting of the lower two members of the Green River Formation, and the Wasatch Formation, both of which are present in surface exposure within the project vicinity. Although considered a confining unit, some fresh-water wells are completed in the discontinuous water bearing sands of the Wasatch Formation. These water-bearing intervals are considered to be localized due to the lenticular nature of the strata.

Below the Wasatch Formation is the Cretaceous-age Mesaverde aquifer. This aquifer consists of sandstone with interbedded shales and coal of the Williams Fork Formation and the marine sands and shales of the Iles Formation. The depth to the top of this aquifer beneath the project area is more than 6,000 feet below ground surface (bgs), far too deep to be considered for production. The water quality of the Mesaverde aquifer is considered poor as well, due to the minerals nahcolite ($NaHCO_3$, sodium bicarbonate), dawsonite ($NaAl(OH)_2CO_3$), and halite (NaCl), with total dissolved solids (TDS) ranging in excess of 10,000 mg/L at that depth in that portion of the basin (EPA 2004).

According to the Colorado Division of Water Resources (DWR), there are 11 permitted fresh water wells located within a 0.5-mile radius of the proposed well site. The nearest fresh water well is located approximately 900 feet west-southwest. It is listed as 240 feet deep, with a water level of 110 feet, and yielding 0.5 gpm. Of the water wells identified, only five of the wells have water level and depth data. All are listed as domestic wells, but there is one monitoring well listed in Section 16. The well was drilled to 240 feet, showing a water level of 110 feet and only yielding 0.5 gpm. Of the remaining wells that had data, all water levels were listed as being between 40 and 100 feet. The surface casing will be set at 1000 feet MD and all potentially useable water zones and potential production zones will be protected. The standard COA should be included, which requires cementing across any usable water zones encountered below the surface casing. Barite and a selection of 'sized' lost circulation materials will be kept on location during drilling operations in the event they may be needed to mitigate any lost circulation that may occur. No additional COAs will be required.

Environmental Consequences

Proposed Action

Potential impacts to groundwater resources from the development plan would include contamination of the groundwater with produced water, drilling mud, and petroleum constituents. Hydraulic fracturing would be incorporated to complete the wells, which would include both fresh and produced water mixed with proppants, or propping agents. Typical proppants include sand, aluminum, glass, or plastic beads, mixed with water and minor amounts, less than 1%, of other compounds such as corrosion, friction, and scale inhibitors (EnerMax 2007).

Propping agents are used to keep open the fractures created near the borehole during the hydrofracturing process, allowing the gas trapped within the formation to move freely into and up the borehole, where it is captured. Hydrofracturing would be conducted at greater than 6,000 feet bgs (below ground surface) and is unlikely to cause impacts to groundwater found near the surface. Drilling scenarios are developed to prevent fluids and produced hydrocarbons from migrating upward into fresh-water zones. Geologic and engineering reviews are conducted to ensure that the cementing and casing programs are adequate to protect all downhole resources. The interbedded and impermeable nature of the Williams Fork Formation also creates a series of confining units inhibiting fluids at depth from migrating into near surface zones, as well as preventing shallow groundwater sources from migrating into deeper water zones.

No Action Alternative

Under the No Action alternative, the development of the Federal wells proposed for the existing Burckle A pad would not be approved. However, any future Fee wells drilled under the authority of the COGCC would have the same potential for impacts to groundwater as described above for the Proposed Action.

Wildlife, Aquatic

Affected Environment

The well pad is located approximately 1 mile south of the Colorado River. The Colorado River contains a variety of fishes, including introduced non-native trout, native and non-native prey (nongame) fishes, and aquatic macroinvertebrates.

Environmental Consequences

Proposed Action

Because no construction would occur outside the previously disturbed area of the pad, the Proposed Action would not directly affect the Colorado River, or the species that inhabit these waters. The greatest risks would be associated with spillage of produced water, condensate, or other chemicals as a result of a truck accident. More likely but of less consequence would be aerial deposition of fugitive dust resulting from increased traffic along the local access roads.

No Action Alternative

The No Action alternative constitutes denial of the APDs associated with the Proposed Action. However, Fee wells drilled under the authority of the COGCC would have the same impacts to aquatic wildlife and described above for the Proposed Action.

Wildlife, Terrestrial

Affected Environment

Terrestrial wildlife habitats in the project vicinity are dominated by Wyoming big sagebrush with scattered juniper trees. These habitats are capable of supporting resident or transient populations of a variety of terrestrial vertebrates typically found in similar habitats at similar elevations in the region.

Large Mammals

The site is located within winter range and severe winter range for both mule deer (*Odocoileus hemionus*) and Rocky Mountain elk (*Cervus elaphus nelsoni*) as mapped by CDOW (2008a). Winter range is that part of the overall range of a species where 90% of the individuals are located during the average five winters out of ten from the first heavy snowfall to spring green-up, or during a site-specific period of winter as defined for each data analysis unit (DAU) (CDOW 2008). Severe winter range is that part of the range of a species where 90 percent of the individuals are located when the annual snowpack is at its maximum and/or temperatures are at a minimum in the two worst winters out of ten (CDOW 2006). Field surveys indicate that the project area is occupied winter range for elk and that mule deer occupy on a year-round basis.

Two medium-sized carnivores, the coyote (*Canis latrans*) and bobcat (*Lynx rufus*), are also present throughout the region in open habitats and broken or wooded terrain, respectively, where they hunt for small mammals, reptiles, and ground-dwelling birds. Smaller carnivores in habitats similar to those near the project site include the raccoon (*Procyon lotor*) and striped skunk (*Mephitis mephitis*).

Small mammals present within the planning area include rodents such as the rock squirrel (*Spermophilus variegatus*), golden-mantled ground squirrels*(Spermophilus lateralis)*, least chipmunk (*Tamias minimus*), and packrat (bushy-tailed woodrat)(*Neotoma cinerea*), as well as the desert cottontail (*Sylvilagus audubonii*). Rodents and, to a lesser extent rabbits, are the primary prey base for a variety of avian and mammalian predators.

Resident Raptors and Other Birds

As mentioned in the section on Migratory Birds, only the Brewer's sparrow is commonly associated with the type of sagebrush habitat that dominates the project area. Although no birds of prey (raptors) were

observed to nest in the project area, habitat at or near the project area provides perching, foraging, and potential nesting sites for Swainson's hawk as well as the Cooper's hawk, sharp-shinned hawk, red-tailed hawk, and the western screech-owl and northern pygmy-owl. Another species that would not be expected to nest onsite but could visit the area in search of prey is the golden eagle.

Other residents or short-distance migrants in the project vicinity include the northern flicker (*Colaptes auratus*), common raven (*Corvus corax*), black-billed magpie (*Pica hudsonia*), American robin (*Turdus migratorius*), Townsend's solitaire (*Myadestes townsendi*), blue-gray gnatcatcher (*Polioptila caerulea*), and house finch (*Carpodacus mexicanus*).

Reptiles and Amphibians

Species most likely to occur in the project area include the western fence lizard (*Sceloporus undulatus*) and gopher snake (bullsnake) (*Pituophis catenifer*) in xeric shrublands or grassy clearings. More mesic sites may support the western terrestrial garter snake (*Thamnophis elegans*).

The surrounding area is also potentially suitable for Woodhouse's toad (*Bufo woodhousii*) and the western chorus frog (*Pseudacris triseriata*). Within the CRVFO and vicinity, the spadefoot toad and Woodhouse's toad occur primarily along ephemeral washes that do not support fish and contain pools of water for a period of at least a few weeks every spring. The chorus frog occurs primarily in cattail and bulrush wetlands and along the vegetated margins of seasonal or perennial ponds and slow-flowing streams. Some existing stock ponds and slow-flowing portions of the drainages are potentially suitable for the northern leopard frog, though none have been documented.

Environmental Consequences

Proposed Action

Because no new construction would be associated with the Proposed Action, the greatest impact on wildlife, especially big game and raptors, would be the disturbance caused by increased human activity, equipment operation, vehicle traffic, harassment by any dogs brought to the site by contractors, and noise related to drilling and completion activities. Most species of wildlife are relatively secretive and distance themselves from these types of disturbance or move to different areas screened by vegetation screening or topographic features. This avoidance, referred to as displacement, results in underuse of habitat near the disturbance. Avoidance of forage and cover resources adjacent to disturbance reduces habitat utility and the capacity of the affected acreage to support wildlife populations (BLM 1999a).

No Action Alternative

The No Action alternative constitutes denial of the APDs associated with the Proposed Action. Under the No Action alternative, the Federal wells proposed and described in the Proposed Action would not be drilled, and therefore no impacts to terrestrial wildlife would occur beyond those associated with the existing pad. However, the Fee wells developed under the authority of the COGCC would have the same potential for impacts as described above for the Proposed Action.

SUMMARY OF CUMULATIVE IMPACTS

Historically, habitat loss or modification in the CRVFO areas was characteristic of agricultural, ranching lands, rural residential, with localized industrial impacts associated with the railroad and I-70 corridors and the small communities. More recently, the growth of residential and commercial uses, utility corridors, oil and gas developments, and other rural industrial uses (e.g., gravel mining along the

Colorado River) has accelerated the accumulation of impacts in the area. Cumulative impacts have included (1) direct habitat losses; (2) habitat fragmentation and losses in habitat effectiveness; (3) elevated potential for runoff, erosion, and sedimentation; (4) expansion of noxious weeds and other invasive species; and (5) increased noise and traffic and reductions in the scenic quality of the area (BLM 1999: 4-1 to 4-68).

Although none of the cumulative impacts described in the 1999 FSEIS (BLM 1999) was characterized as significant, and while new technologies and regulatory requirements have reduced the impacts of some land uses, it is nonetheless clear that past, present, and reasonably foreseeable future actions has had and would continue to have adverse affects on various elements of the human environment. The anticipated impact levels for existing and future actions range from negligible to locally major, and primarily negative, for specific resources. The primary reasons for this assessment are twofold: (1) the rate of development, particularly oil and gas development, has until recently been increasing in the area, resulting in an accelerated accumulation of individually nominal effects; and (2) residential and commercial expansion, as well as most of the oil and gas development, has occurred private holdings lands where mitigation measures designed to protect and conserve resources are not in effect.

It is clear that the Proposed Action would contribute to the collective adverse impact for some resources. However, this contribution would be very minor, since it would consist of only one new well with no additional construction for the well pad, access road, or pipeline. Therefore, incremental impacts to the resources and uses described in this EA would be insignificant and generally indiscernible.

PERSONS AND AGENCIES CONSULTED

Antero Resources – Lars Inman, Geologist

INTERDISCIPLINARY TEAM REVIEW

Members of the CRVFO Interagency Energy Team who participated in the impact analysis of the Proposed Action, development of appropriate mitigation measures, and preparation of this EA are listed in Table 8, along with their areas of responsibility.

Table 8. BLM Interdisciplinary Team Authors and Reviewers

Name	***Title***	***Areas of Participation***
Vanessa Bull	Natural Resource Specialist	EA Project Lead, Access and Transportation, Noise, Socio-Economics
Allen Crockett	Supervisory Natural Resource Specialist	NEPA Review
Beth Brenneman	Ecologist	Invasive Non-native Species, Special-status Species (Plants)
Shauna Kocman	Hydrologist	Air Quality, Surface Water, Water Quality, Soils
Sylvia Ringer	Wildlife Biologist	Migratory Birds, Special-status Species (Animals), Wildlife, Aquatic and Terrestrial
John Brogan	Archaeologist	Cultural Resources, Native American Religious Concerns
Todd Sieber	Petroleum Engineering Technician	Geology and Minerals, Groundwater
William Howell	Petroleum Engineer	Downhole COAs

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APPENDIX A

Surface-Use and Downhole Conditions of Approval

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SURFACE USE CONDITIONS OF APPROVAL
DOI-BLM-CO-N040-2011-0061 EA

1. Administrative Notification. The operator shall notify the BLM representative at least 48 hours prior to initiation of construction and earthwork related to interim pad reclamation.

2. Road Construction and Maintenance. Roads shall be crowned, ditched, surfaced, drained with culverts and/or water dips, and constructed to BLM Gold Book standards. Initial gravel application shall be a minimum of 6 inches. The operator shall provide timely year-round road maintenance and cleanup on the access roads. A regular schedule for maintenance shall include, but not be limited to, blading, ditch and culvert cleaning, road surface replacement, and dust abatement. When rutting within the traveled way becomes greater than 6 inches, blading and/or gravelling shall be conducted as approved by the BLM.

3. Dust Abatement. The operator shall implement dust abatement measures as needed to prevent fugitive dust from vehicular traffic, equipment operations, or wind events. The BLM may direct the operator to change the level and type of treatment (watering or application of various dust agents, surfactants, and road surfacing material) if dust abatement measures are observed to be insufficient to prevent fugitive dust.

4. Drainage Crossings and Culverts. Construction activities at perennial, intermittent, and ephemeral drainage crossings (e.g. burying pipelines, installing culverts) shall be timed to avoid high flow conditions. Construction that disturbs any flowing stream shall utilize either a piped stream diversion or a cofferdam and pump to divert flow around the disturbed area.

   Culverts at drainage crossings shall be designed and installed to pass a 25-year or greater storm event. On perennial and intermittent streams, culverts shall be designed to allow for passage of aquatic biota. The minimum culvert diameter in any installation for a drainage crossing or road drainage shall be 24 inches. Crossings of drainages deemed to be jurisdictional waters of the U.S. pursuant to Section 404 of the Clean Water Act may require additional culvert design capacity. Due to the flashy nature of area drainages and anticipated culvert maintenance, the U.S. Army Corps of Engineers (USACE) recommends designing drainage crossings for the 100-year event. Contact the USACE Western Colorado Regulatory Branch at 970-243-1199.

   Pipelines installed beneath stream crossings shall be buried at a minimum depth of 4 feet below the channel substrate to avoid exposure by channel scour and degradation. Following burial, the channel grade and substrate composition shall be returned to pre-construction conditions.

5. Jurisdictional Waters of the U.S. The operator shall obtain appropriate permits from the U.S. Army Corps of Engineers (USACE) prior to discharging fill material into waters of the U.S. in accordance with Section 404 of the Clean Water Act. Waters of the U.S. are defined in 33 CFR Section 328.3 and may include wetlands as well as perennial, intermittent, and ephemeral streams. Permanent impacts to waters of the U.S. may require mitigation. Contact the USACE Western Colorado Regulatory Branch at 970-243-1199. Copies of any printed or emailed approved USACE permits or verification letters shall be forwarded to the BLM.

6. Reclamation. The goals, objectives, timelines, measures, and monitoring methods for final reclamation of oil and gas disturbances are described in Appendix I (Surface Reclamation) of the 1998 Draft Supplemental EIS (DSEIS). Specific measures to follow during interim and temporary (pre-interim) reclamation are described below.

a. Reclamation Plans. In areas that have low reclamation potential or are especially challenging to restore, reclamation plans will be required prior to APD approval. The plan shall contain the following components: detailed reclamation plats, which include contours and indicate irregular rather than smooth contours as appropriate for visual and ecological benefit; timeline for drilling completion, interim reclamation earthwork, and seeding; soil test results and/or a soil profile description; amendments to be used; soil treatment techniques such as roughening, pocking, and terracing; erosion control techniques such as hydromulch, blankets/matting, and wattles; and visual mitigations if in a sensitive VRM area.

b. Deadline for Interim Reclamation Earthwork and Seeding. Interim reclamation to reduce a well pad to the maximum size needed for production, including earthwork and seeding of the interim reclaimed areas, shall be completed within 6 months following completion of the last well planned to be drilled on that pad as part of a continuous operation. If a period of greater than one year is expected to occur between drilling episodes, BLM may require implementation of all or part of the interim reclamation program.

Reclamation, including seeding, of temporarily disturbed areas along roads and pipelines, and of topsoil piles and berms, shall be completed within 30 days following completion of construction. Any such area on which construction is completed prior to December 1 shall be seeded during the remainder of the early winter season instead of during the following spring, unless BLM approves otherwise based on weather. If road or pipeline construction occurs discontinuously (e.g., new segments installed as new pads are built) or continuously but with a total duration greater than 30 days, reclamation, including seeding, shall be phased such that no portion of the temporarily disturbed area remains in an unreclaimed condition for longer than 30 days. BLM may authorize deviation from this requirement based on the season and the amount of work remaining on the entirety of the road or pipeline when the 30-day period has expired.

If requested by the project lead NRS for a specific pad or group of pads, the operator shall contact the NRS by telephone or email approximately 72 hours before reclamation and reseeding begin. This will allow the NRS to schedule a pre-reclamation field visit if needed to ensure that all parties are in agreement and provide time for adjustments to the plan before work is initiated.

The deadlines for seeding described above are subject to extension upon approval of the BLM based on season, timing limitations, or other constraints on a case-by-case basis. If the BLM approves an extension for seeding, the operator may be required to stabilize the reclaimed surfaces using hydromulch, erosion matting, or other method until seeding is implemented.

c. Topsoil Stripping, Storage, and Replacement. *All* topsoil shall be stripped following removal of vegetation during construction of well pads, pipelines, roads, or other surface facilities. In areas of thin soil, a minimum of the upper 6 inches of surficial material shall be stripped. The BLM may specify a stripping depth during the onsite visit or based on subsequent information regarding soil thickness and suitability. The stripped topsoil shall be stored separately from subsoil or other excavated material and replaced prior to final seedbed preparation. The BLM best management practice (BMP) for the Windrowing of Topsoil (COA #18) shall be implemented for well pad construction whenever topography allows.

d. Seedbed Preparation. For cut-and-fill slopes, initial seedbed preparation shall consist of backfilling and recontouring to achieve the configuration specified in the reclamation plan. For compacted areas, initial seedbed preparation shall include ripping to a minimum depth of 18 inches, with a maximum furrow spacing of 2 feet. Where practicable, ripping shall be conducted

in two passes at perpendicular directions. Following final contouring, the backfilled or ripped surfaces shall be covered evenly with topsoil.

Final seedbed preparation shall consist of scarifying (raking or harrowing) the spread topsoil prior to seeding. If more than one season has elapsed between final seedbed preparation and seeding, and if the area is to be broadcast-seeded or hydroseeded, this step shall be repeated no more than 1 day prior to seeding to break up any crust that has formed.

Seedbed preparation is not required for topsoil storage piles or other areas of temporary seeding.

Requests for use of soil amendments, including basic product information, shall be submitted to the BLM for approval.

e. Seed Mixes. A seed mix consistent with BLM standards in terms of species and seeding rate for the specific habitat type shall be used on all BLM lands affected by the project (see Attachments 1 and 2 of the letter provided to operators dated May 1, 2008). Note that temporary seeding no longer allows the use of sterile hybrid non-native species.

   For private surfaces, the menu-based seed mixes are recommended, but the surface landowner has ultimate authority over the seed mix to be used in reclamation. The seed shall contain no noxious, prohibited, or restricted weed seeds and shall contain no more than 0.5 percent by weight of other weed seeds. Seed may contain up to 2.0 percent of "other crop" seed by weight, including the seed of other agronomic crops and native plants; however, a lower percentage of other crop seed is recommended. Seed tags or other official documentation shall be submitted to BLM at least 14 days before the date of proposed seeding for acceptance. Seed that does not meet the above criteria shall not be applied to public lands.

f. Seeding Procedures. Seeding shall be conducted no more than 24 hours following completion of final seedbed preparation.

   Where practicable, seed shall be installed by drill-seeding to a depth of 0.25 to 0.5 inch. Where drill-seeding is impracticable, seed may be installed by broadcast-seeding at twice the drill-seeding rate, followed by raking or harrowing to provide 0.25 to 0.5 inch of soil cover or by hydroseeding and hydromulching. Hydroseeding and hydromulching shall be conducted in two separate applications to ensure adequate contact of seeds with the soil.

   If interim revegetation is unsuccessful, the operator shall implement subsequent reseedings until interim reclamation standards are met.

g. Mulch. Mulch shall be applied within 24 hours following completion of seeding. Mulch may consist of either hydromulch or of certified weed-free straw or certified weed-free native grass hay crimped into the soil.

   NOTE: Mulch is not required in areas where erosion potential mandates use of a biodegradable erosion-control blanket (straw matting).

h. Erosion Control. Cut-and-fill slopes shall be protected against erosion with the use of water bars, lateral furrows, or other measures approved by the BLM. Cut-and-fill slopes along drainages or in areas with high erosion potential shall also be protected from erosion using hydromulch designed specifically for erosion control or biodegradable blankets/matting, bales, or wattles of weed-free straw or weed-free native grass hay. A well-anchored fabric silt fence shall also be

placed at the toe of cut-and-fill slopes along drainages or to protect other sensitive areas from deposition of soils eroded off the slopes. Additional BMPs shall be employed as necessary to reduce soil erosion and offsite transport of sediments.

i. Site Protection. The pad shall be fenced to BLM standards to exclude livestock grazing for the first two growing seasons or until seeded species are firmly established, whichever comes later. The seeded species will be considered firmly established when at least 50 percent of the new plants are producing seed. The BLM will approve the type of fencing.

j. Monitoring. The operator shall conduct annual monitoring surveys of all sites categorized as "operator reclamation in progress" and shall submit an annual monitoring report of these sites to the BLM by **December 31** of each year. The monitoring program shall use the four Reclamation Categories defined in Appendix I of the 1998 DSEIS to assess progress toward reclamation objectives. The annual report shall document whether attainment of reclamation objectives appears likely. If one or more objectives appear unlikely to be achieved, the report shall identify appropriate corrective actions. Upon review and approval of the report by the BLM, the operator shall be responsible for implementing the corrective actions or other measures specified by the BLM.

7. Weed Control. The operator shall regularly monitor and promptly control noxious weeds or other undesirable plant species as set forth in the Glenwood Springs Field Office *Noxious and Invasive Weed Management Plan for Oil and Gas Operators*, dated March 2007. A Pesticide Use Proposal (PUP) must be approved by the BLM prior to the use of herbicides. Annual weed monitoring reports shall be submitted to BLM by **December 1**.

8. Bald and Golden Eagles. It shall be the responsibility of the operator to comply with the Bald and Golden Eagle Protection Act (Eagle Act) with respect to "take" of either eagle species. Under the Eagle Act, "take" includes to pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest and disturb. "Disturb" means to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, (1) injury to an eagle; (2) a decrease in its productivity by substantially interfering with normal breeding, feeding, or sheltering behavior; or (3) nest abandonment by substantially interfering with normal breeding, feeding, or sheltering behavior. Avoidance of eagle nest sites, particularly during the nesting season, is the primary and preferred method to avoid a take. Any oil or gas construction, drilling, or completion activities planned within 0.5 mile of a bald or golden eagle nest, or other associated activities greater than 0.5 mile from a nest that may disturb eagles, should be coordinated with the BLM project lead and BLM wildlife biologist and the USFWS representative in the BLM Field Office (970-876-9051).

9. Raptor Nesting. To protect nesting raptors, a survey shall be conducted prior to construction, drilling, or completion activities that are to begin during the raptor nesting season (February 1 to August 15). The survey shall include all potential nesting habitat within 0.25 mile of a well pad or 0.125 mile of an access road, pipeline, or other surface facility. Results of the survey shall be submitted to the BLM. If a raptor nest is located within the buffer widths specified above, a 60-day Timing Limitation (TL) shall be applied to postpone initiation of construction, drilling, and completion activities.

10. Migratory Birds. It shall be the responsibility of the operator to comply with the Migratory Bird Treaty Act (MBTA) with respect to "take" of migratory bird species. Under the MBTA, "take" means to pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. The operator shall prevent use by migratory birds of any pit containing fluids associated with oil or gas operations, including but not limited to reserve pits, produced water pits, frac-water pits, cuttings trenches (if covered by water/fluid), and evaporation pits. Fluids in these pits may pose

a risk to migratory birds (e.g., waterfowl, shorebirds, wading birds, songbirds, and raptors) as a result of ingestion, absorption through the skin, or interference with buoyancy and temperature regulation. Regardless of the method used, it shall be in place within 24 hours following the placement of fluids into a pit. Because of high toxicity to birds, oil slicks and oil sheens should immediately be skimmed off the surface of any pit that is not netted. The most effective way to eliminate risk to migratory birds is prompt drainage, closure, and reclamation of pits, which is strongly encouraged. All mortality or injury to species protected by the MBTA shall be reported immediately to the BLM project lead and to the USFWS representative in the BLM Field Office at 970-876-9051 and visit http://www.fws.gov/mountain-prairie/contaminants/oilpits.htm.

11. Birds of Conservation Concern. Pursuant to BLM Instruction Memorandum 2008-050, all surface-disturbing activities are prohibited from **May 15 to July 15** to reduce impacts to Birds of Conservation Concern (BCC). An exception to this COA will be granted if nesting surveys conducted no more than one week prior to surface-disturbing activities indicate that no BCC species are nesting or otherwise present within 10 meters of the area to be disturbed. Nesting surveys shall include an audial survey for diagnostic vocalizations in conjunction with a visual survey for adults and nests. Surveys shall be conducted by a qualified breeding bird surveyor between sunrise and 10:00 AM under favorable conditions for detecting and identifying a BCC species. This provision does not apply to ongoing construction, drilling, or completion activities that are initiated prior to May 15 and continue into the 60-day period at the same location.

12. Range Management. Range improvements (fences, gates, reservoirs, pipelines, etc) shall be avoided during development of natural gas resources to the maximum extent possible. If range improvements are damaged during exploration and development, the operator will be responsible for repairing or replacing the damaged range improvements. If a new or improved access road bisects an existing livestock fence, steel frame gate(s) or a cattleguard with associated bypass gate shall be installed across the roadway to control grazing livestock.

13. Paleontological Resources. All persons associated with operations under this authorization shall be informed that any objects or sites of paleontological or scientific value, such as vertebrate or scientifically important invertebrate fossils, shall not be damaged, destroyed, removed, moved, or disturbed. If in connection with operations under this authorization any of the above resources are encountered the operator shall immediately suspend all activities in the immediate vicinity of the discovery that might further disturb such materials and notify the BLM of the findings. The discovery must be protected until notified to proceed by the BLM.

    Where feasible, the operator shall suspend ground-disturbing activities at the discovery site and immediately notify the BLM of any finds. The BLM will, as soon as feasible, have a BLM-permitted paleontologist check out the find and record and collect it if warranted. If ground-disturbing activities cannot be immediately suspended, the operator shall work around or set the discovery aside in a safe place to be accessed by the BLM-permitted paleontologist.

14. Cultural Education/Discovery. All persons in the area who are associated with this project shall be informed that if anyone is found disturbing historic, archaeological, or scientific resources, including collecting artifacts, the person or persons will be subject to prosecution.

    Pursuant to 43 CFR 10.4(g), the BLM shall be notified by telephone, with written confirmation, immediately upon the discovery of human remains, funerary items, sacred objects, or objects of cultural patrimony. Further, pursuant to 43 CFR 10.4 (c) and (d), activities shall stop in the vicinity of the discovery, and the discovery shall be protected for 30 days or until notified by the BLM to proceed.

If in connection with operations under this contract, the operator, its contractors, their subcontractors, or the employees of any of them discovers, encounters, or becomes aware of any objects or sites of cultural value or scientific interest such as historic ruins or prehistoric ruins, graves or grave markers, fossils, or artifacts, the operator shall immediately suspend all operations in the vicinity of the cultural resource and shall notify the BLM of the findings (16 USC 470h-3, 36 CFR 800.112). Operations may resume at the discovery site upon receipt of written instructions and authorization by the BLM. Approval to proceed will be based upon evaluation of the resource. Evaluation shall be by a qualified professional selected by the BLM from a Federal agency insofar as practicable. When not practicable, the operator shall bear the cost of the services of a non-Federal professional.

Within five working days, the BLM will inform the operator as to:

- whether the materials appear eligible for the National Register of Historic Places
- what mitigation measures the holder will likely have to undertake before the site can be used (assuming that *in-situ* preservation is not necessary)
- the timeframe for the BLM to complete an expedited review under 36 CFR 800.11, or any agreements in lieu thereof, to confirm through the SHPO State Historic Preservation Officer that the findings of the BLM are correct and that mitigation is appropriate

The operator may relocate activities to avoid the expense of mitigation and delays associated with this process, as long as the new area has been appropriately cleared of resources and the exposed materials are recorded and stabilized. Otherwise, the operator shall be responsible for mitigation costs. The BLM will provide technical and procedural guidelines for relocation and/or to conduct mitigation. Upon verification from the BLM that the required mitigation has been completed, the operator will be allowed to resume construction.

Antiquities, historic ruins, prehistoric ruins, and other cultural or paleontological objects of scientific interest that are outside the authorization boundaries but potentially affected, either directly or indirectly, by the Proposed Action shall also be included in this evaluation or mitigation. Impacts that occur to such resources as a result of the authorized activities shall be mitigated at the operator's cost, including the cost of consultation with Native American groups.

Any person who, without a permit, injures, destroys, excavates, appropriates or removes any historic or prehistoric ruin, artifact, object of antiquity, Native American remains, Native American cultural item, or archaeological resources on public lands is subject to arrest and penalty of law (16 USC 433, 16 USC 470, 18 USC 641, 18 USC 1170, and 18 USC 1361).

15. Visual Resources. Above-ground facilities shall be painted Shadow Gray to minimize contrast with existing surrounding vegetation.

16. Windrowing of Topsoil. Topsoil shall be windrowed around the pad perimeter to create a berm that limits and redirects stormwater runoff and extends the viability of the topsoil per BLM Topsoil Best Management Practices (BLM 2009 PowerPoint presentation available upon request from Glenwood Springs Field Office). Topsoil shall also be windrowed, segregated, and stored along pipelines and roads for later spreading across the disturbed corridor during final reclamation. Topsoil berms shall be promptly seeded to maintain soil microbial activity, reduce erosion, and minimize weed establishment.

17. Soils. Cuts and fills shall be minimized when working on erosive soils and slopes in excess of 30 percent. Cut-and-fill slopes shall be stabilized through revegetation practices with an approved seed mix shortly following construction activities to minimize the potential for slope failures and excessive erosion. Fill slopes adjacent to drainages shall be protected with well-anchored silt fences, straw wattles, or other acceptable BMPs designed to minimize the potential for sediment transport. On slopes greater than 50 percent, BLM personnel may request a professional geotechnical analysis prior to construction.

DOWNHOLE CONDITIONS OF APPROVAL
Applications for Permit to Drill

Company/Operator: Antero Resources Piceance Corp.

Surface Location: NWSW, Section 15, Township 6 South, Range 92 West, 6th P.M.

Well Name	Well No./Pad	Bottomhole Location	Lease/Unit
Burckle Federal	A2 / Burckle A	SWSE, Sec 16, T6S, R92W	COC56027
Burckle Federal	A13 / Burckle A	SWSE, Sec 16, T6S, R92W	COC56027
Burckle Federal	A14 / Burckle A	SWSE, Sec 16, T6S, R92W	COC56027

1. Twenty-four hours *prior* to (a) spudding, (b) conducting BOPE tests, (c) cementing/running casing strings, and (d) within twenty-four hours *after* spudding, the CRVFO shall be notified. One of the following CRVFOs inspectors shall be notified by phone. The contact number for all notifications is: 970-876-9064. The BLM CRVFO inspectors are Julie King, Lead PET; David Giboo, PET; and Alan White, PET.

2. A CRVFO petroleum engineer shall be contacted for a verbal approval prior to commencing remedial work, plugging operations on newly drilled boreholes, changes within the drilling plan, sidetracks, changes or variances to the BOPE, deviating from conditions of approval, and conducting other operations not specified within the APD. Please contact Will Howell at 970-876-9049 (office) or 970-319-5837(c) for verbal approvals.

3. If a well control issue (e.g. kick, blowout, water flow, casing failure, or bradenhead pressure increase) arises during drilling or completions operations, Will Howell 970-876-9049(o), 970-319-5837(c) shall be notified within 24 hours from the time of the event. IADC/Driller's Logs and Pason Logs (mud logs) will be forwarded to CRVFO, Will Howell, 2300 River Frontage Road, Silt, CO 81652 within 24 hours of a well control event.

4. The BOPE shall be tested and conform to Onshore Order #2 for a **5M** system and recorded in the IADC/Driller's log. A casing head rated to 5,000 psi or greater shall be utilized.

5. An electrical/mechanical mud monitoring equipment shall be function tested prior to drilling out the surface casing shoe. As a minimum, this equipment shall include a trip tank, pit volume totalizer, stroke counter, and flow sensor.

6. Prior to drilling out the surface casing shoe, gas-detecting equipment shall be installed in the mud return system. The mud system shall be monitored for hydrocarbon gas/pore pressure changes, rate of penetration, and fluid loss.

7. A gas buster shall be functional and all flare lines effectively anchored in place, prior to drilling out the surface casing shoe. The discharge of the flare lines shall be a minimum of 100 feet from the well head and targeted at bends. The panic line shall be a separate line (not open inside the buffer tank) and effectively anchored. All lines shall be downwind of the prevailing wind direction and directed into a flare pit, which cannot be the reserve pit. The flare system shall use an automatic ignition. Where noncombustible gas is likely or expected to be vented, the system shall be provided supplemental fuel for ignition and maintain a continuous flare.

8. 1000 feet of Surface Casing will be required on these wells to protect potential water source/aquifers and control loss circulation zones.

9. After the surface casing is cemented, a Pressure Integrity Test/Mud Equivalency Test/FIT will be performed on the first well drilled in accordance with OOGO No. 2, Sec. III, B.1.i., in order to make sure the surface casing is set in a competent formation. This is not a Leak-off Test, but a formation competency test, insuring the formation at the shoe is tested to the minimum mud weight equivalent anticipated to control the formation pressure to the next casing shoe depth or TD. Submit the results from the test via email (whowell@blm.gov) on the first well drilled on the pad and record results in the IADC log.

10. As a minimum, cement shall be brought to 200 feet above the Mesaverde. After WOC for the production casing, a CBL shall be run to verify the TOC and an electronic copy in .las and .pdf format will be submitted to CRVFO, Will Howell, 2300 River Frontage Road, Silt, CO 81652 within 48 hours. If the TOC is lower than required or the cement sheath of poor quality, a CRVFO petroleum engineer shall be notified for remedial operations within 48 hours from running the CBL and prior to commencing fracturing operations,.

    A greater volume of cement may be required to meet the 200-foot cement coverage requirement for the Williams Fork Fm./Mesaverde Group. Evaluate the top of cement on the first cement job on the pad (Temperature Log). If cement is below 200-foot cement coverage requirement, adjust cement volume to compensate for low TOC/cement coverage.

    Surface casing will have centralizers on the bottom three joints of the casing (a minimum of 1 centralizer per joint, starting with the shoe joint) per OOGO No: 2, Sec. III, B.1.f. Production casing centralizer program should maintain a 67% stand-off through the tangent (build/drop) sections of the well.

11. On the first well drilled on this pad, a triple combo open hole log shall be run from the base of the surface borehole to surface, and from TD to bottom of surface casing shoe. This log shall be in submitted within 48 hours in .las and .pdf format to: CRVFO, Will Howell/Todd Sieber, 2300 River Frontage Road, Silt, CO 81652. Please contact Todd Sieber at 970-876-9044, 970-319-7887 (cell) or asieber@blm.gov for clarification.

12. Submit the (a) mud/drilling log (e.g. Pason disc), (b) driller's event log/operations summary report, (c) production test volumes, (d) directional survey, and (e) Pressure Integrity Test results within 30 days of completed operations (i.e. landing tubing) per 43 CRF 3160-9. Please contact Will Howell for clarification.

13. Prior to commencing fracturing operations, the production casing shall be tested to the maximum anticipated surface treating/fracture pressure and held for 15 minutes without a 2% leak-off. If leak-off is found, Will Howell shall be notified within 24 hours of the failed test, but prior to proceeding with fracturing operations. The test shall be charted and set to a time increment as to take up no less than a quarter of the chart per test. The chart shall be submitted with the well completion report.

14. Submit a monthly report of operations or production per CFR 3162.4-3 including any production from these wells in MCFPD, BOPD, BWPD with FTP/SITP until the completion report (Form 3160-4) is filed.

15. Per CFR 3162.4-1(c), not later than the 5th business day after any well begins production on which royalty is due anywhere on a lease site or allocated to a lease site, or resumes production in a case of a

well which has been off production for more than 90 days, the operator shall notify the authorized officer by letter or sundry notice, Form 3160-5, or orally to be followed by a letter or sundry notice, of the date on which such production has begun or resumed.

FONSI

DOI-BLM-CO-040-2011-0061 EA

The Environmental Assessment (EA) analyzing the environmental effects of the Proposed Action has been reviewed. The project design and approved mitigation measures result in a Finding of No Significant Impact on the human environment. Therefore, an Environmental Impact Statement (EIS) is not necessary to further analyze the environmental effects of the Proposed Action.

DECISION RECORD

DECISION: It is my decision to approve the Proposed Action as described and analyzed in this EA. This decision will provide for the orderly, economical, and environmentally sound exploration and development of oil and gas resources on a valid Federal oil and gas lease.

RATIONALE: The bases for this decision are as follows:

1. Approval of the Proposed Action is validating the rights granted with the Federal oil and gas leases to develop the leasehold to provide commercial commodities of oil and gas.

2. The environmental impacts would be avoided, minimized, or offset with the mitigation measures incorporated into the Proposed Action or attached and enforced by BLM as Conditions of Approval (COAs).

3. This Decision does not authorize the initiation of surface-disturbing activities on BLM lands or of drilling activities associated with any Federal oil and gas well. Initiation of activities related to the new Federal oil and gas well to be added to the existing well pad may commence only upon approval by BLM of the Application for Permit to Drill (APD) submitted by Antero Resources Piceance Corp.

MITIGATION MEASURES: Mitigation measures presented in Appendix A will be incorporated as COAs attached to the APD for the Antero Burckle A Federal wells and for other activities related to Federal resources potentially affected by operations on the existing Burckle A well pad.

NAME OF PREPARER: Vanessa Bull, Natural Resource Specialist

SIGNATURE OF AUTHORIZED OFFICIAL:

Allen B. Crockett, Ph.D., J.D.
Acting Associate Field Manager

DATE: April 8, 2011