

In order U.S. Department of the Interior  
Bureau of Land Management  
Colorado River Valley Field Office  
2300 River Frontage Road  
Silt, Colorado 81652

## **ENVIRONMENTAL ASSESSMENT**

### **NUMBER**

DOI-BLM-CO-N040-2012-0080-EA

### **CASEFILE NUMBER**

Bottomholes for all Federal wells are located within Federal Lease COC15976.

### **PROJECT NAME**

Proposal to Drill up to 16 Federal Wells and 11 Fee wells from the Proposed CBC 1 and CBC 2 Well Pads on Private Land South of Silt, Garfield County, Colorado.

### **PAD LOCATIONS**

Township 6 South (T6S), Range 92 West (R92W), Section 22, SESW and NESE, Sixth Principal Meridian

### **APPLICANT**

Bill Barrett Corporation

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### **PROPOSED ACTION**

Bill Barrett Corporation (BBC) proposes to drill and develop up to 16 Federal oil and gas wells (Table 1) from two proposed pads located approximately 4 miles south of Silt, Garfield County, Colorado (Figure 1). The CBC 1 pad is located primarily on private or "Fee" land (private surface underlain by private minerals), with the northern portion of the pad located on "Split Estate" land (private surface underlain by Federal minerals). The CBC 2 pad is located on Fee surface, underlain by Federal minerals. The Federal wells would be drilled into Federal lease COC15976, and 11 additional Fee wells would be drilled into private mineral estate.

Cuttings generated during drilling would be directed to a lined and bermed cuttings containment area along the cut slope of the pad prior to site reclamation. Cuttings would then be washed, dewatered and amended to spread or bury on-site. The cuttings trench would be constructed to be free from leaks and would not be located on natural drainages. Approximately 2,500 feet of pipeline would be run from the CBC 1 pad to the CBC 2 pad along a corridor on BBC property. Production equipment would be situated on the cut slope side of the pads adjacent to existing access roads (Figures 2 and 3).

<b>Table 1. Surface and Bottomhole Locations of Proposed Federal Wells</b>			
<i>Proposed Pads</i>	<i>Proposed Wells</i>	<i>Surface Locations</i>	<i>Bottomhole Locations</i>
CBC 1	23A-22-692	T6S R92W, Section 22 SESW, 1,175 feet FSL, 2,499 feet FWL	T6S R92W, Section 22 NESW 1,356 feet FSL, 1,980 feet FWL
	23B-22-692	T6S R92W, Section 22 SESW, 1,184 feet FSL, 2,510 feet FWL	T6S R92W, Section 22 NESW 1,723 feet FSL, 1,980 feet FWL
	23C-22-692	T6S R92W, Section 22 SESW, 1,195 feet FSL, 2,501 feet FWL	T6S R92W, Section 22 NESW 2,091 feet FSL, 1,980 feet FWL
	23D-22-692	T6S R92W, Section 22 SESW, 1,194 feet FSL, 2,511 feet FWL	T6S R92W, Section 22 NESW 2,459 feet FSL, 1,980 feet FWL
CBC 2	32A-22-692	T6S R92W, Section 22 NESE, 1,791 feet FSL, 1,224 feet FEL	T6S R92W, Section 22 SWNE 2,489 feet FNL, 1,980 feet FEL
	32B-22-692	T6S R92W, Section 22 NESE, 1,807 feet FSL, 1,224 feet FEL	T6S R92W, Section 22 SWNE 2,158 feet FNL, 1,980 feet FEL
	32C-22-692	T6S R92W, Section 22 NESE, 1,823 feet FSL, 1,224 feet FEL	T6S R92W, Section 22 SWNE 1,828 feet FNL, 1,980 feet FEL
	32D-22-692	T6S R92W, Section 22 NESE, 1,823 feet FSL, 1,214 feet FEL	T6S R92W, Section 22 SWNE 1,498 feet FNL, 1,980 feet FEL
	33A-22-692	T6S R92W, Section 22 NESE, 1,727 feet FSL, 1,224 feet FEL	T6S R92W, Section 22 NWSE 1,468 feet FSL, 1,980 feet FEL
	33B-22-692	T6S R92W, Section 22 NESE, 1,743 feet FSL, 1,224 feet FEL	T6S R92W, Section 22 NWSE 1,799 feet FSL, 1,980 feet FEL
	33C-22-692	T6S R92W, Section 22 NESE, 1,759 feet FSL, 1,224 feet FEL	T6S R92W, Section 22 NWSE 2,129 feet FSL, 1,980 feet FEL
	33D-22-692	T6S R92W, Section 22 NESE, 1,775 feet FSL, 1,224 feet FEL	T6S R92W, Section 22 NWSE 2,460 feet FSL, 1,980 feet FEL
	43A-22-692	T6S R92W, Section 22 NESE, 1,759 feet FSL, 1,214 feet FEL	T6S R92W, Section 22 NESE 1,440 feet FSL, 660 feet FEL
	43B-22-692	T6S R92W, Section 22 NESE, 1,775 feet FSL, 1,214 feet FEL	T6S R92W, Section 22 NESE 1,774 feet FSL, 660 feet FEL
	43C-22-692	T6S R92W, Section 26 NESE, 1,791 feet FSL, 1,214 feet FEL	T6S R92W, Section 22 NESE 2,107 feet FSL, 660 feet FEL
	43D-22-692	T6S R92W, Section 22 NESE, 1,807 feet FSL, 1,214 feet FEL	T6S R92W, Section 22 NESE 2,441 feet FSL, 660 feet FEL

For completions, hydraulic fracturing (“fracing”) would occur on the pad from a constructed completions pit. The frac water would be supplied from BBC’s own water system or purchased from private landowners. Drilling fluids would be recycled. The site would be kept free of trash and debris.

Initial pad size would be 5.0 acres (CBC 1) and 5.2 acres (CBC 2), reduced to 1.2 acres (CBC 1) and 1.7 acres (CBC 2) during interim reclamation and for long-term production of wells (Figures 4 and 5).

Topsoil conservation practices during construction would include salvaging as much suitable growth medium as practical and segregating the topsoil and suitable subsoil media around the pad perimeter, where topography allows, in a windrow. Windrowing is intended to enhance viability of the soil during storage by facilitating the infiltration of moisture and maintaining an aerobic condition. The windrow would also serve for stormwater detention. Cuttings generated from the well bores would be worked through a shaker system, mixed with sawdust, and placed in a cuttings trench against the cut slope for later burial during interim reclamation earthwork.

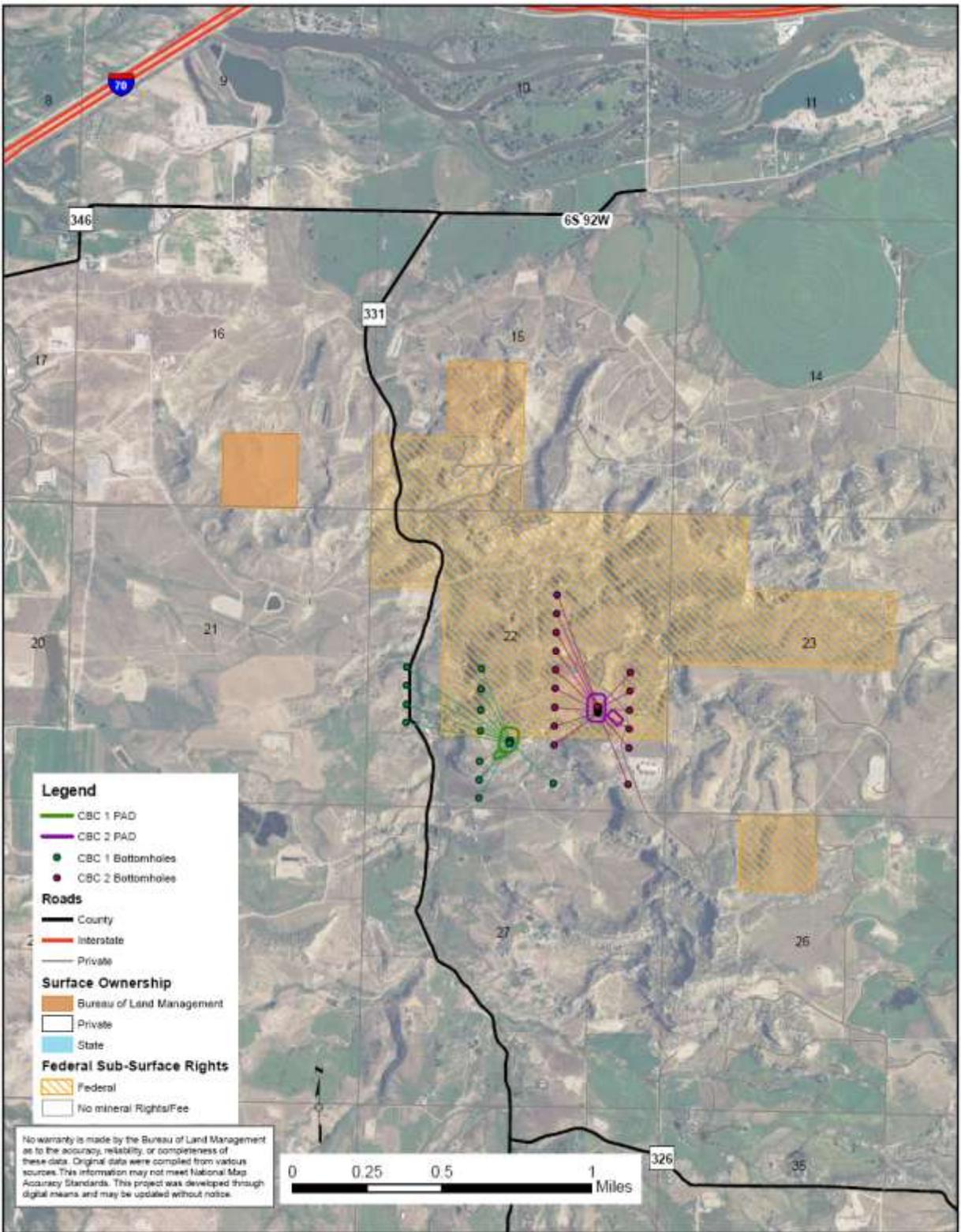


Figure 1. Location Map showing Proposed Pad Access to CBC 1 and CBC 2 Pads.

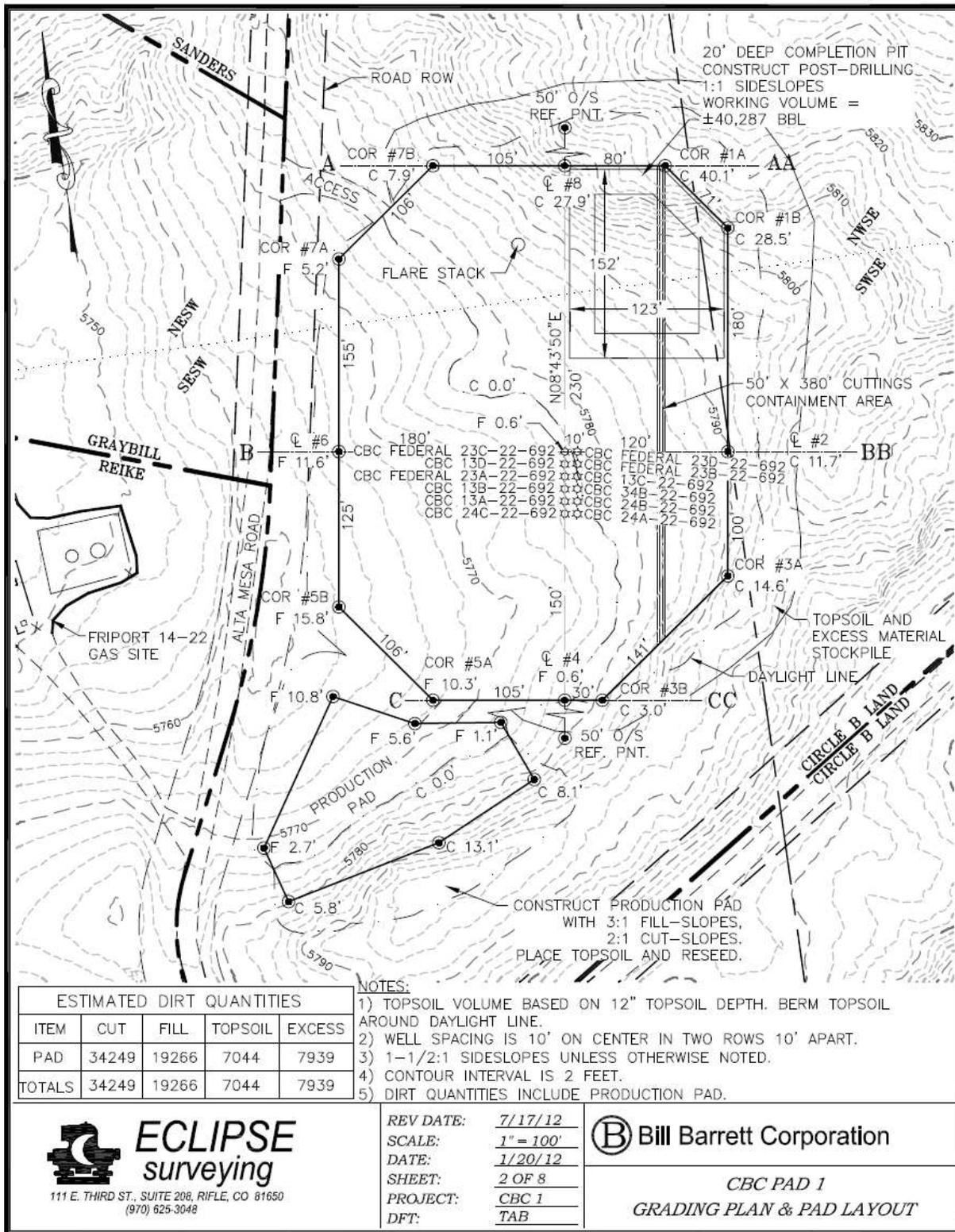


Figure 2. CBC 1 Pad Construction Layout



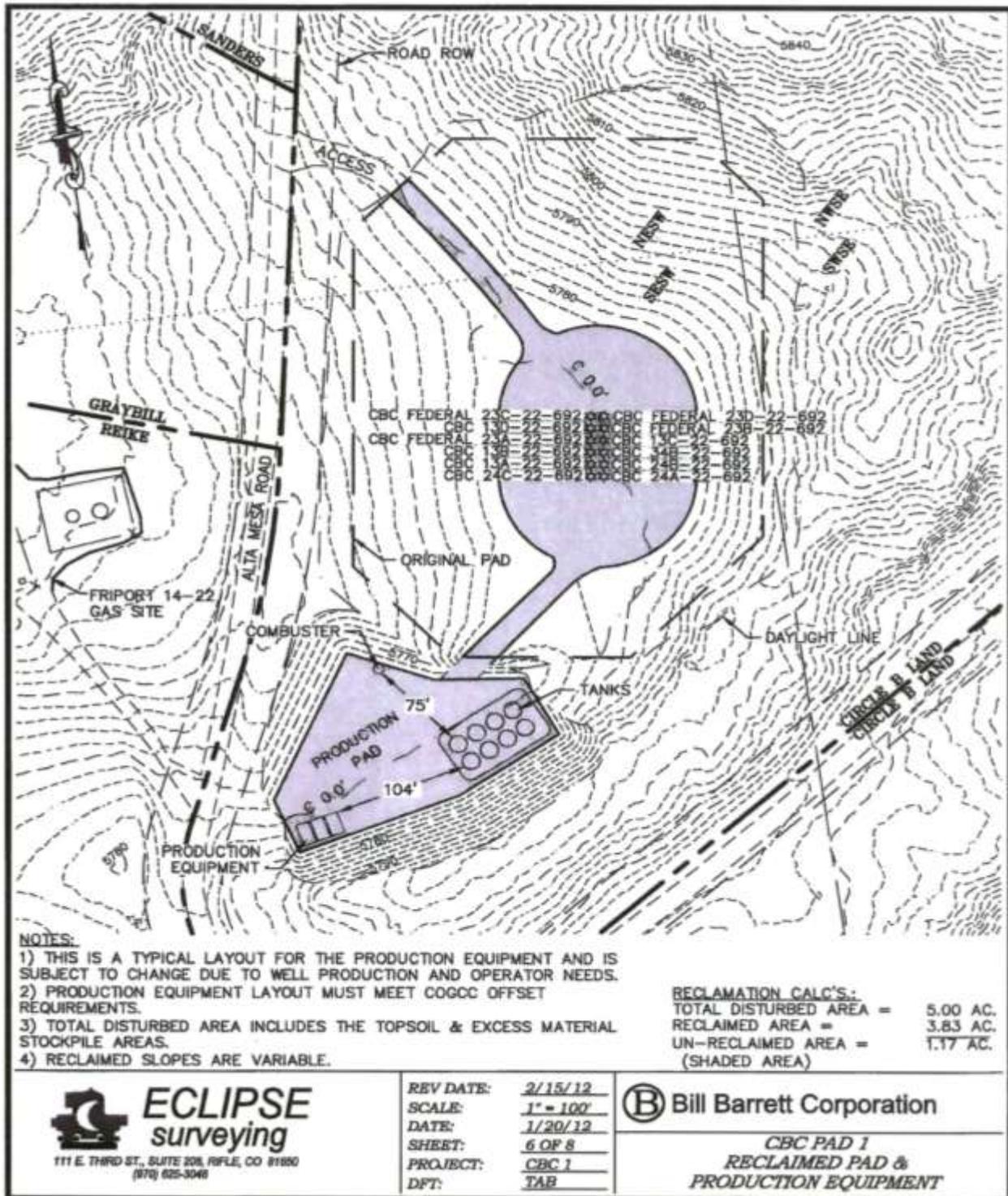


Figure 4. CBC 1 Interim Reclamation Plat.

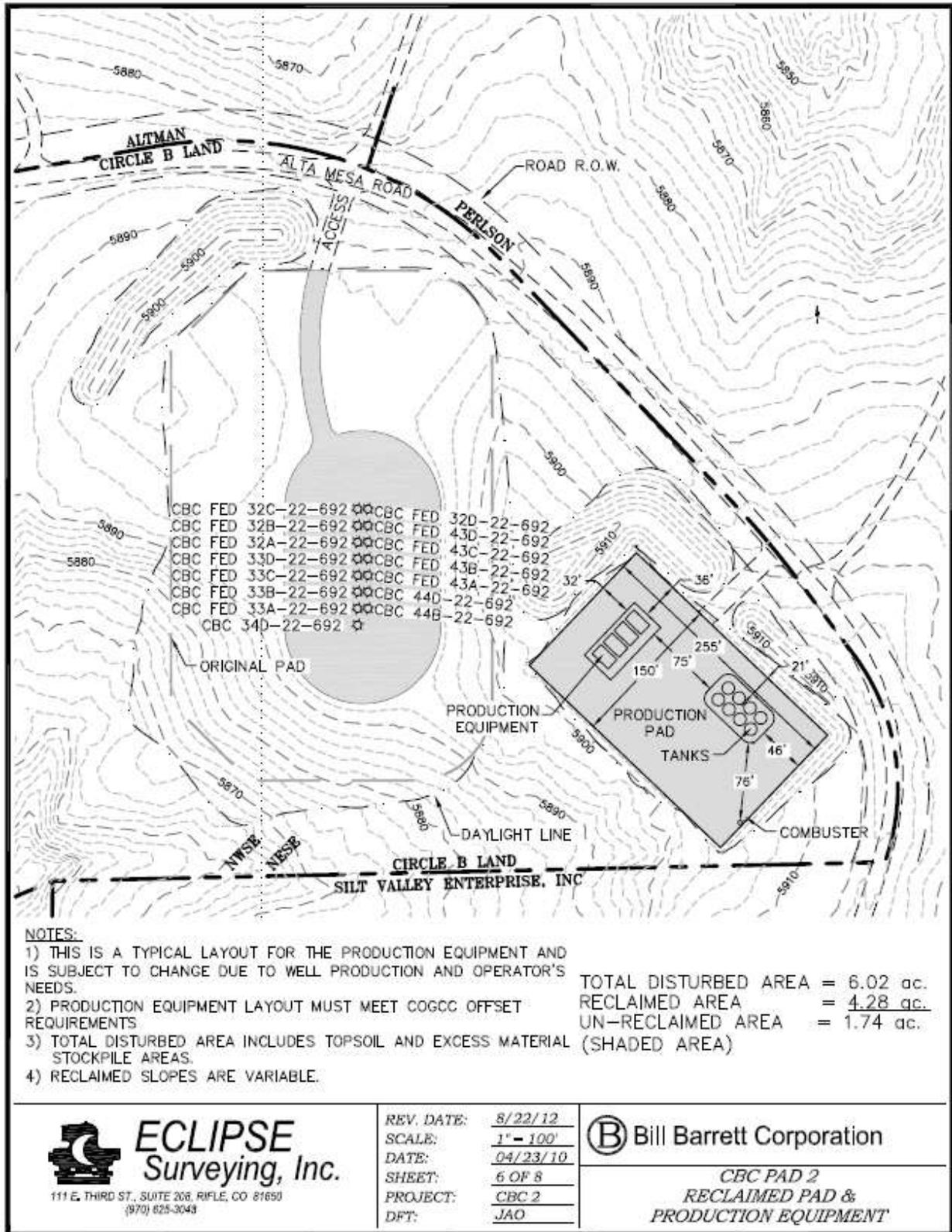


Figure 5. CBC 2 Interim Reclamation Plat.

The road, pipeline, and pad construction work would follow the 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 would be required during the production phase of the wells which includes, but is not limited to, blading, ditching, culvert installation and cleanout, weed control, and gravel surfacing where excessive rutting or erosion may occur. Roads would be maintained in a safe and usable condition.

The Proposed Action would include drilling and completion, production of natural gas and associated liquid condensate, proper handling and disposal of produced water, and interim 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 access roads, pads and pipelines.

### **NO ACTION ALTERNATIVE**

The Proposed Action involves the drilling of 16 Federal wells from Fee surface into the subsurface minerals encumbered with Federal oil and gas lease COC15976. Although the Bureau of Land Management (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 Federal APD(s) described in the Proposed Action. In so doing, the proposed Federal wells would not be approved. However, BBC would drill, complete, and produce the proposed Fee wells from the proposed locations. Therefore, impacts under the No Action Alternative would be only slightly less than the Proposed Action.

### **PURPOSE AND NEED FOR THE ACTION**

The purpose of the action is to develop oil and gas resources on Federal lease COC15976 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**

No specific lease stipulations are associated with Federal lease COC15976. However, site-specific COAs developed during the APD/Environmental Assessment (EA) review and onsite field consultation would apply to all pads and would be attached to the Federal APDs (Appendix A).

### **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 Record of Decision 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.”

Discussion: 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 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 is therefore in conformance with the exception to the requirement to require operators to submit MDPs, previously known as GAPs.

### **AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES**

During its internal scoping process for this 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	Socioeconomics
Air Quality	Soils
Cultural Resources	Special Status Species
Geology and Minerals	Vegetation
Invasive Non-Native Plants	Visual Resources
Migratory Birds	Wastes, Hazardous and Solid
Native American Religious Concerns	Water Quality, Surface and Ground
Noise	Wildlife, Aquatic and Terrestrial

#### **Access and Transportation**

##### Affected Environment

The project area would be located approximately 4 miles south of Silt, Garfield County, Colorado. The primary light vehicle access is as follows: From Interstate 70 (I-70) Exit 97, proceed south to River Frontage Road, then east on River Frontage Road for 0.4 mile to the intersection with County Road (CR) 311 (Divide Creek Road), then south on CR 311 for 0.6 mile to the intersection with CR 331 (Dry Hollow Road), then west on CR 331 for approximately 4 miles to the intersection with Sierra Vista Road, then east on Sierra Vista Road for 0.4 mile to an intersection with Alta Mesa Road on the left. Proceed on Alta Mesa Road 0.5 mile to the access road to the CBC 1 pad on the right. To reach the CBC 2 pad, proceed on Alta Mesa Road for 0.4 mile to the access road on the right.

The preferred heavy haul access route is as follows: From I-70 Exit 94, proceed south along Mamm Creek Road (CR 315) 5 miles to the intersection with Jenkins Cutoff Road (CR 336) on the left, then east along CR 336 for 2.5 miles to the intersection with CR 331, then north on CR 331 for 4 miles to the intersection with Sierra Vista Road, then east on Sierra Vista Road for 0.4 mile to an intersection with Alta Mesa Road on the left. Proceed on Alta Mesa Road 0.5 mile to the access road to the CBC 1 pad on the right. To reach the CBC 2 pad, proceed on Alta Mesa Road for 0.4 mile to the access road on the right.

Construction, maintenance, and reclamation would conform to guidelines established in the BLM Gold Book (USDI and USDA 2007). A road maintenance program would be required during the drilling, completion, and production phases which includes, but is not limited to blading, ditching, culvert installation and cleanout, weed control, and gravel surfacing where excessive rutting or erosion may occur. The access road would be maintained in a safe and usable condition. Surface and subsoil materials within the proposed construction areas would be used. Gravel or pit lining material (if required) would be obtained from Federal or Fee lands in conformance with applicable regulations.

### Environmental Consequences

#### *Proposed Action*

The Proposed Action would result in a substantial increase in truck traffic related to the eventual development of 27 wells. The largest increase in truck use would be during rig-up, drilling, and completion activities. Data indicate that approximately 1,160 truck trips over a 30-day period would be required to support the drilling and completion of each well (Table 2). Once the wells are producing, traffic would decrease to occasional visits for monitoring or maintenance activities. Each well may have to be recompleted once per year, requiring three to five truck trips per day for approximately 7 days. Degradation of field development roads may occur due to heavy equipment travel and fugitive dust and noise would be created. Mitigation measures (Appendix A) would be required as COAs to ensure that adequate dust abatement and road maintenance occur.

<i>Vehicle Class</i>	<i>Trips per Well</i>	<i>Percent of Total</i>
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.

#### *No Action Alternative*

For the No Action Alternative, the 16 proposed Federal wells would not be approved. However, BBC would drill, complete, and produce the 11 proposed Fee wells from this proposed Fee surface location. Therefore, impacts of the No Action Alternative on access and transportation would be less than under the Proposed Action but not eliminated.

### 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<sub>2</sub>), sulfur dioxide (SO<sub>2</sub>), ozone (O<sub>3</sub>), particulate matter less than 10 microns ( $\mu$ ) in diameter (PM<sub>10</sub>), and particulate matter less than 2.5  $\mu$  in diameter (PM<sub>2.5</sub>).

The project area lies within Garfield County, which was 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. 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 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.

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, as is Dinosaur National Monument, located approximately 180 miles to the northwest. PSD Class I areas located within 100 miles of the project area are 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 Park (approximately 65 miles south), and Eagles Nest Wilderness (approximately 60 miles east).

### Environmental Consequences

#### *Proposed Action*

The CDPHE, under delegated authority from the U.S. Environmental Protection Agency (EPA) and in conformance with Colorado's State Implementation Plan, is the agency with primary responsibility for air quality regulation and enforcement in conjunction with industrial developments and other air pollution sources in Colorado. Unlike the conceptual "reasonable but conservative" engineering designs used in NEPA analyses, any CDPHE air quality preconstruction permitting is based on site-specific, detailed engineering values, which are assessed in CDPHE's review of the permit application.

The CBC 1 and CBC 2 pads include constructing, drilling, completing, and operating up to 16 Federal wells. Although the impacts to air quality from these wells are disclosed in this EA, the drilling and operation is permitted with the approval of an APD for each well. Individual wells would require approximately 7 to 10 days to drill and approximately 5 to 15 days to complete. Air quality would decrease during construction of access roads, pads, and pipelines and drilling and completing the wells.

Pollutants generated during construction activities would include combustion emissions and fugitive dust associated (PM<sub>10</sub> and PM<sub>2.5</sub>) with construction equipment and vehicles. Construction activities for the well pad, access road, and pipelines would occur between the hours of 7:00 a.m. and 6:00 p.m. each day. Once construction activities are complete, air quality impacts associated with these activities would also cease. Fugitive dust from mobilization and rigging up the drill rig would also occur however impacts associated

would be minor and short lived. Emissions associated with drilling and completing the wells would also be greatly reduced to emissions associated with long-term natural gas and condensate production.

A regional air model addressing air quality impacts of current and future oil and gas activities within the CRVFO has recently been completed for the BLM by Tetra Tech, Inc. and its subcontractor URS Corporation. The model addressed the cumulative impacts of incremental oil and gas development in the modeling domain by assuming a total of 4,198 new BLM wells and the associated facilities and infrastructure including compressor stations and gas plants in the CRVFO. In addition, the cumulative impacts of all oil and gas development in conjunction with other major emissions sources were evaluated by assuming 15,664 future wells, and incorporating background air quality data and other major sources within the modeling domain. The methods and results of that modeling are presented in an Air Resources Technical Support Document (BLM 2011).

The air quality model addressed impacts associated with emissions of greenhouse gases (GHGs), “criteria pollutants” (CO, NO<sub>2</sub>, SO<sub>2</sub>, ozone, PM<sub>10</sub>, and PM<sub>2.5</sub>), hazardous air pollutants including BTEX (benzene, ethylbenzene, toluene, and xylenes), formaldehyde, and n-hexane. The modeling also addressed potential impacts on visibility due to particulates and “photochemical smog” (caused by chemical reactions in the atmosphere) and on lake chemistry of selected pristine lakes due to modeled deposition rates of sulfur and resultant impacts on acid neutralizing capacity of the lake waters. The visibility analysis predicted a slight impact (1 day per year with a reduction in visibility of 1 deciview or greater) in the Flat Tops Wilderness and no days with 1 deciview or greater reduction in visibility at all other modeled Class I and II receptors. For the remaining pollutants analyzed, modeled levels of future oil and gas development within the CRVFO would have no or negligible long-term adverse impacts on air quality. Since the Proposed Action is within the scope of the future development modeled, no significant adverse impacts on air quality are anticipated.

The air quality model incorporated assumptions about various development and mitigation scenarios, many of which have been integrated into the Proposed Action by BBC or would be imposed by the BLM as COAs (Appendix A). These include use of directional drilling to reduce the number of well pads, piping instead of trucking of fluids to a centralized collection facility, flaring instead of venting of natural gas during well completions, self-contained flare units to minimize emissions to the atmosphere, and use of closed-loop drilling. Closed-loop drilling minimizes emissions by recycling drilling muds and separating fluids and drill cuttings, thus eliminating open pits containing petroleum fluids. In addition to minimizing emissions associated with drilling and completion activities, these mitigation measures would also significantly reduce fugitive dust and vehicle tailpipe emissions by greatly reducing the volume of truck traffic required to support the operations.

Generation of fugitive dust as a result of construction activities and travel on unpaved access roads would be further reduced by BLM’s requirement that the operator apply gravel to a compacted depth of 6 inches on the access road, apply water to the access road during the development phase, and apply a dust suppressant surfactant approved by the BLM throughout the long-term production phase (Appendix A).

Emissions of volatile organic compounds (VOCs) such as the BTEX constituents of condensate vary depending on the characteristics of the condensate, the volume produced, and tank operations. Operators are required to control emissions of VOCs from condensate tanks under CDPHE Regulation 7. If deemed necessary by the State, BBC may be required to install a vapor recovery or thermal destruction system to further reduce VOC concentrations.

Ongoing scientific research has identified the potential impacts of GHGs and their effects 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 the Earth 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 supports these predictions, but has acknowledged that there are uncertainties 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” (NAS 2007). Other theories about the effect of GHGs on global climate change exist.

The recent air modeling for the CRVFO inventoried and assessed GHG emissions associated with various scenarios of future oil and gas development. In all scenarios modeled, the GHG emissions would not increase the total U.S. natural gas sector emissions by more than 0.5%. 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. While any oil and gas development project 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*

For the No Action Alternative, the 16 proposed Federal wells would not be approved. However, BBC would drill, complete, and produce the 11 proposed Fee wells from the proposed Fee surface locations. Therefore, impacts of the No Action Alternative on air quality would be less than under the Proposed Action but not eliminated.

### **Cultural Resources**

#### **Affected Environment**

Section 106 of the National Historic Preservation Act (NHPA) requires Federal agencies to take into account the effects their actions will have on cultural resources. As a general policy, an agency must consider effects to cultural resources for any undertaking that involves Federal monies, Federal permitting/authorization, or Federal lands.

A Class III cultural resource inventory (CRVFO# 1112-9) was conducted for this project and covered the proposed CBC 1 and CBC 2 well pads. The cultural inventory and pre-field file search of the Colorado State Historic Preservation Officer (SHPO) database and BLM CRVFO cultural records identified no cultural resources eligible for the National Register of Historic Places within the project area. Eligible or potentially eligible cultural sites are referred to in Section 106 of the NHPA as “historic properties”.

#### **Environmental Consequences**

##### *Proposed Action*

No historic properties are located in the vicinity of the project area or will be affected by the construction of the proposed CBC 1 and CBC 2 well pads. 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 NHPA (16U.S.C 470f), the BLM/SHPO Programmatic Agreement and Colorado Protocol]. 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.

Although unlikely, indirect, long-term cumulative damage from increased access and presence of project personnel could result in a range of impacts to 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 Federal APDs. 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 operations.

#### *No Action Alternative*

Under this alternative, the 16 proposed Federal wells would not be drilled, completed, and produced, but BBC would likely drill and complete 11 proposed Fee wells from these locations. Therefore, the No Action Alternative would most likely reduce the potential for accidental damage, vandalism, illegal collection and excavation on the public lands involved.

### **Geology and Minerals**

#### Affected Environment

The development area is located near the eastern margin of the Colorado Plateau physiographic province (Fenneman 1946), a region characterized by dissected plateaus of strong relief. A broad, asymmetric, southeast-northwest trending structural basin, the Piceance Basin contains stratified sediments ranging in age from Cambrian through middle Tertiary up to 20,000 feet thick. The Basin lies between the White River uplift to the northeast, the Gunnison uplift to the south, and the Uncompahgre swell to the west (George 1927, Weiner and Haun 1960).

Bedrock exposed within the proposed development project consists of the Tertiary Wasatch Formation. The Wasatch Formation consists of variegated siltstone, claystone, and sandstone and ranges from 1,000 to 2,500 feet thick. The Wasatch Formation is underlain unconformably by the Mesaverde Group. The Mesaverde Group is composed of mudstones and sandstones with interlayered coal beds and ranges in thickness from about 3,000 to over 7,000 feet. The Mesaverde Group has also been referred to as the Mesaverde Formation, which includes informal subdivisions based on gas productivity characteristics.

In the proposed project area, the Wasatch Formation is mantled by unconsolidated sedimentary surface deposits of Quaternary age in the form of alluvium (stream deposits), colluvium (slope deposits), and loess (fine-textured wind deposits). The thickness of these unconsolidated sediments is uncertain, but the depth to the underlying Wasatch Formation may be determined during construction excavation. Table 3 lists the geologic formations present within the proposed project area.

The Mesaverde Group is the target zone of the proposed drilling program. Composed of the Williams Fork and Iles Formations, the Mesaverde Group consists of marine sandstones and transitional to non-marine beds of coal, shale, and sandstone. These sediments were deposited marginal to the great Cretaceous seaway. The oscillating shoreline of this sea, due to the rise and fall of sea level, left behind a

complex of transgressive (encroaching toward land) and regressive (receding away from land) sedimentary sequences of nearshore and offshore sediments that define the Mesaverde Group.

<b>Table 3. Geologic Formations within the Study Area</b>				
<i>Map Symbol</i>	<i>Formation Name</i>	<i>Age</i>	<i>Characteristics</i>	<i>Location</i>
Qlo	Loess deposits	Pleistocene	Wind-deposited, non-stratified, clayey sandy silt.	Mantles flat to gently sloping surface deposits.
Qsw	Sheet wash deposits	Holocene	Pebbly, silty sand	Gentle to moderate slopes.
Qc	Colluvium	Pleistocene	Very poorly sorted to Extremely poorly sorted clay, sand and variable amounts of pebble to boulder sized clasts.	Slope deposits.
Tw	Wasatch Formation	Eocene, Paleocene	Red, gray, and brown sandstone and siltstone and red, green and gray shale	Base of mesas and predominant surface exposures both north and south of the Colorado River

Source: Shroba et al. 1994

The proposed drilling program would target the sandstone sequences of the Upper Williams Fork Formation, which provide most of the natural gas production volumes (Lorenz 1989). Upper portions of the Williams Fork include fluvial point bar, floodplain, and swamp deposits. The Lower Williams Fork includes delta front, distributary channel, lacustrine, and swamp environments (Hemborg 2000), while the sandstones and coalbeds of the Iles Formation were deposited in a wave-dominated coastal setting (Johnson 1989, Lorenz 1989). The source rocks are interbedded and thermally mature gas-prone shales, mudstones, siltstones, and coals. Reservoir rocks are fine- to medium-grained Williams Fork sandstone, varying in thickness from less than 10 feet to more than 50 feet (Spencer and Wilson 1988), creating an interbedded relationship between source and reservoir. The trapping mechanism of the gas is both stratigraphic, related to vertical and lateral changes in the types of sediments being deposited, and diagenetic (post-depositional), related to changes in chemical and physical changes in the rocks during prolonged burial at great depth.

Environmental Consequences

*Proposed Action*

If the proposed wells prove feasible, initial production rates would be expected to be highest during the first few years of production, then decline during the remainder of the economic lives of the wells. Substantial reserves have been known to be trapped within the tight sands of these reservoirs since the late 1950s, but only within the last decade, and particularly within the last few years, has the integrated application of new technologies turned the tight gas sands of the Mesaverde Group 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.

Natural gas production from the proposed wells would contribute to the draining of hydrocarbon-bearing reservoirs within the Mesaverde Group in this area, an action that would be consistent with BLM objectives for mineral production. Hydraulic fracturing or “fracing” would be used to create fractures within the formation to allow gas production from the wells. Tight gas sands refer to low permeability

sandstone reservoirs that produce primarily dry natural gas. Typically, these reservoirs cannot be produced at economic flow rates or volumes unless the well is stimulated by hydraulic fracture treatment (Holditch 2006). 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 and Davis 2006).

Casing programs have been designed to specifically prevent hydrocarbon migration from gas-producing strata penetrated by the wellbore during drilling, initial production, and after completion of the well. Identification of potential fresh-water bearing zones, aquifers, gas-producing zones, and over- and under-pressured zones are incorporated into drilling scenarios for the proposed wells. Estimates of what depth these zones would be encountered are used to determine drilling fluids, fluid densities, surface casing depths, and production planning. If one of these identified zones is encountered during drilling, cement volumes would be adjusted to isolate that zone. This is designed to prevent accidental contamination or leakage of hydrocarbons or fracturing fluids into other productive zones within the wellbore.

#### *No Action Alternative*

For the No Action Alternative, the 16 proposed Federal wells would not be approved. However, BBC would drill, complete, and produce 11 Fee wells from the proposed Fee surface locations. Therefore, impacts of the No Action Alternative on geology and minerals would be less than under the Proposed Action but not eliminated.

### **Invasive Non-Native Plants**

#### Affected Environment

Native vegetation in the project area is dominated by open pinyon-juniper interspersed with sagebrush shrublands and meadows. Associated species include a variety of native perennial cool-season bunchgrasses, native perennial forbs, and native mid-height shrubs. More detailed description of plant communities of the project are provided in the Vegetation section of this document.

The project area is heavily infested with noxious weeds, particularly Russian knapweed (*Acroptilon repens*), a State-listed noxious weed (B List), which infests a total of approximately 35.4 acres within 200 meters of the two proposed pad center stakes. Jointed goatgrass (*Aegilops cylindrica*), also on the B List of State-listed noxious weeds, occurs continuously along access roads in the project area, covering approximately 3.8 acres. Scotch thistle (*Onopordum acanthium*), also a B List noxious weed, occurs in isolated infestations near the CBC 1 pad site. Three C List noxious weeds—the annual grass cheatgrass (*Anisantha tectorum*), the annual forb redstem filaree (*Erodium cicutarium*), and the perennial forb field bindweed (*Convolvulus arvensis*)—are scattered throughout the project area (WWE 2012).

#### 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 of the current heavy infestations of noxious weeds, the potential for weed infestation following construction activities and during reclamation is high in the area, particularly in areas with sparse vegetation. Mitigation measures to minimize and control weeds would be attached as COAs to APDs for the Federal wells and would include treatment of noxious weeds prior to surface-disturbing activities (see Appendix A).

### *No Action Alternative*

Under this alternative, the 16 proposed Federal wells would not be drilled, completed, and produced, but BBC would likely drill and complete 11 proposed Fee wells from these locations. Therefore, the potential for new or expanded weed infestations would be similar and potentially greater because BLM requirements for weed control would not apply to the project.

## **Migratory Birds**

### Affected Environment

The Migratory Bird Treaty Act (MBTA) provides protections for 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. Within the context of the MBTA, “migratory” birds include non-migratory “resident” species as well as true migrants, essentially encompassing virtually all native bird species. For most migrant and resident species, nesting habitat is of special importance because it is critical for supporting reproduction in terms of both nesting sites and food. In addition, 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.

A variety of migratory bird species occupy, or have the potential to occupy, the project area. Species Federally listed as threatened or endangered under the Endangered Species Act and species classified by the BLM as sensitive species are addressed in the section on Special Status Species. The current section addresses migratory birds that may inhabit the proposed project area. Emphasizing the need to conserve declining species, the U.S. Fish and Wildlife Service (USFWS) has published a list of Birds of Conservation Concern (BCC) that warrant conservation attention to stabilize or increase populations or to secure threatened habitats. This section also addresses species within the project area that listed as BCC species (USFWS 2008). This analysis focuses on BCC species, non-BCC species that are Neotropical (long-distance) migrants, and raptors—three groups highly vulnerable to habitat loss or modification on their breeding grounds.

Species on the BCC list potentially present in the project area, based on habitat preferences and known geographic ranges, include the golden eagle (*Aquila chrysaetos*), pinyon jay (*Gymnorhinus cyanocephalus*), juniper titmouse (*Baeolophus griseus*), Brewer’s sparrow (*Spizella breweri*), and Cassin’s finch (*Carpodacus cassinii*). Golden eagles nest on cliffs and rocky ledges, and an occupied golden eagle nest was documented the edge of a 0.25-mile buffer from the CBC 2 pad (Figure 6). Because of the proximity of the nest to the project area, frequent flights across the area are likely, and some use of grassland or sagebrush shrubland habitats for foraging is expected to occur.

The pinyon jay and juniper titmouse are limited to pinyon-juniper habitats, while Brewer’s sparrow (also listed as a BLM sensitive species) is limited to stands of sagebrush. Habitat appears marginally suitable for Brewer’s sparrow based on the limited extent of contiguous habitat and the heavy grazing use of private lands. Cassin’s finch normally nests in montane or subalpine coniferous forests but may move to lower elevation pinyon-juniper following nesting and remain there through the winter.

Non-BCC species likely to occur in the pinyon-juniper and sagebrush within the project area or venturing into the area from more extensive habitats nearby include Neotropical migrants such as the black-chinned hummingbird (*Archilochus alexandri*), western kingbird (*Tyrannus verticalis*), Say’s phoebe (*Sayornis saya*), mountain bluebird (*Sialis currucoides*), western bluebird (*S. mexicana*), vesper sparrow (*Pooecetes*

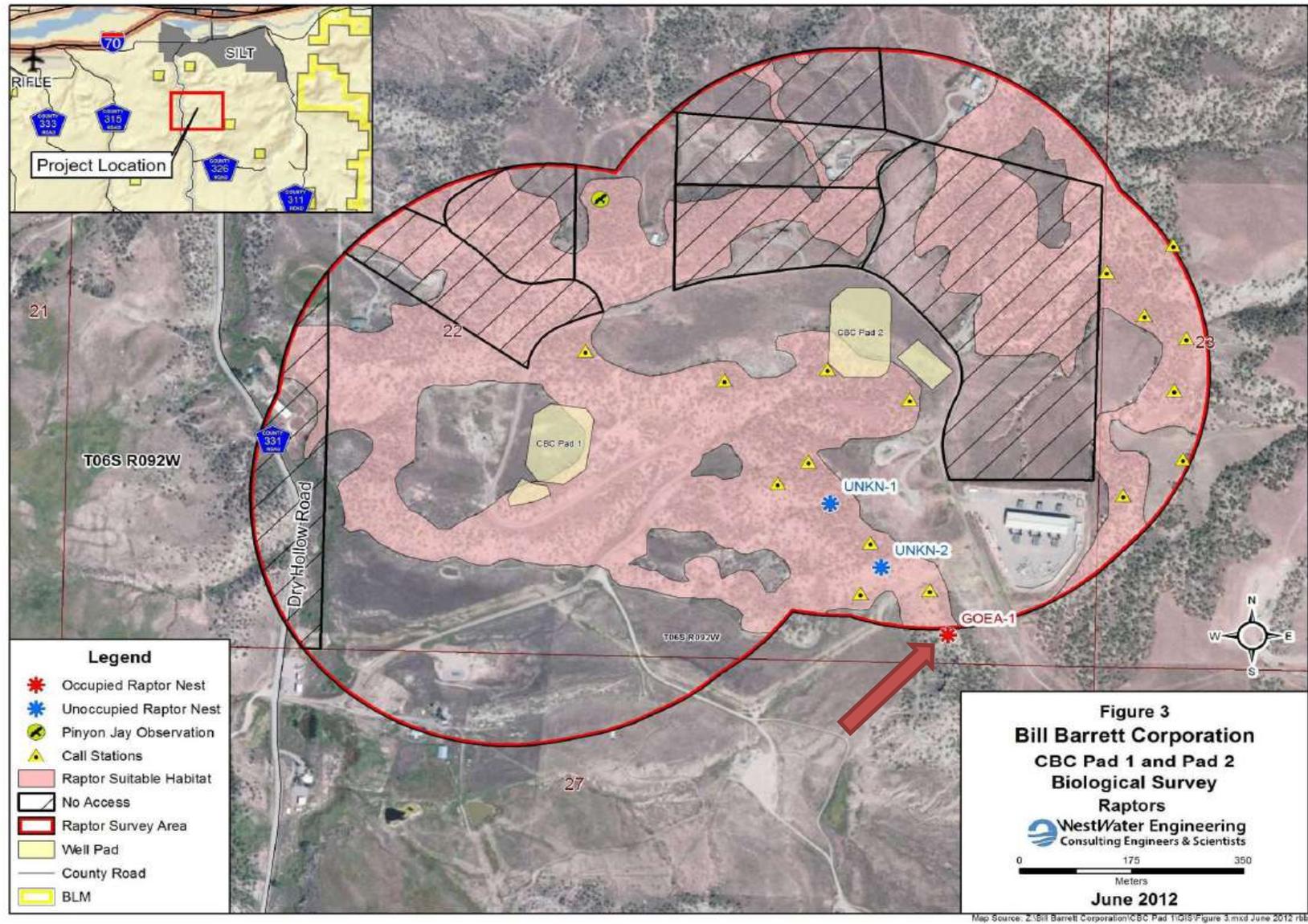


Figure 6. Results of Raptor Nesting Survey, WWE 2012 (red arrow indicates active golden eagle nest)

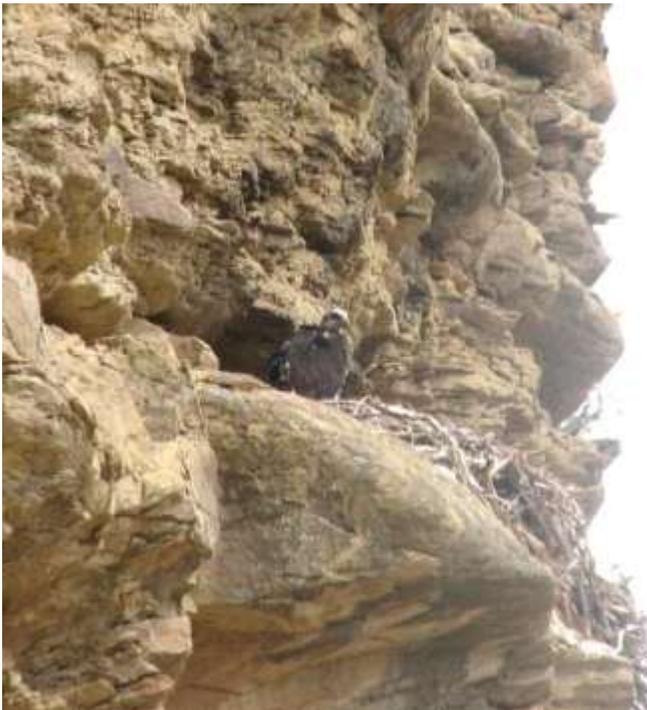
*gramineus*), lark sparrow (*Chondestes grammacus*), chipping sparrow (*Spizella passerina*), and lesser goldfinch (*Spinus psaltria*). Resident or short-distance migratory species are likely to include the American robin (*Turdus migratorius*) and Townsend's solitaire (*Myadestes townsendi*) in pinyon-juniper and the western meadowlark (*Sturnella neglecta*) in sagebrush.

Small raptors potentially present in nearby pinyon-juniper woodlands include the flammulated owl (*Otus flammeolus*) and, less likely, the northern pygmy-owl (*Glaucidium gnoma*). The flammulated owl is listed by BLM as a sensitive species and addressed in the section on Special Status Species. Several species of larger raptors are widespread through the region and potentially present in the project vicinity, both as nesters and as transients in search of prey. Species most likely to nest within or near the project area include the American kestrel (*Falco sparverius*), sharp-shinned hawk (*Accipiter striata*), Cooper's hawk (*A. cooperii*), red-tailed hawk (*Buteo jamaicensis*), Swainson's hawk (*B. swainsoni*), and great horned owl (*Bubo virginiana*). Nesting habitat consists primarily of larger trees in nearby pinyon-juniper.

Raptor nesting surveys have documented three nest sites in or near the 0.25 mile-survey boundary surrounding the well pads. These included an occupied golden eagle nest with two young was recorded at the edge of the raptor survey buffer, south-southeast of CBC 2. Two unoccupied stick nests of unknown species affiliation were observed in the woodlands south of CBC 2.

### Environmental Consequences

#### *Proposed Action*



Oil and gas operators, whether on Federal or private lands, are subject to the MBTA, administered by the USFWS, which precludes the "take" of any raptor or most other native 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 by physical destruction of the nest.

Because of the presence of an active golden eagle nest 0.25 mile from the CBC 2 pad (Figure 6 and photo at left), the operator is also subject to the Bald and Golden Eagle Protection Act (b). The proximity of the nest to a proposed well pad creates the potential that construction, drilling, or completion activities at that pad, or anywhere within the vicinity of the nest, could interfere

with nesting-related activities. This could range from affecting courtship and pair formation to nest construction and maintenance, egg laying and incubation, and brooding or feeding of the young. Abandonment of the nest by one or both adults could result in loss of the eggs or nestlings too late in the breeding season for successful re-nesting. These adverse impacts would represent a violation of the MBTA and BGEPA.

Realistically, the presence of the nest in proximity to an operator compressor facility on private land (Figure 6) indicates a high degree of habituation of this pair to human activity. However, this situation could change in future years due to less tolerance by one or both adults, or of a replacement adult if one of the existing adults dies during the non-nesting season.

Colorado raptor nesting guidelines published by CPW (2008) suggest a 0.25-mile buffer of no surface occupancy around a nest site and a seasonal Timing Limitation within a 0.5-mile buffer. The USFWS typically uses these CPW guidelines as a basis for evaluating whether adverse impacts to an active nest are likely to be the result of a source of disturbance—i.e., sources of disturbance occurring within the seasonal TL buffer are presumed to have been caused by the disturbance.

Because Federal lease COC15976 does not carry a lease stipulation related to nesting raptors, the CRVFO instead applies a 60-day TL under BLM's regulatory authority and as specified in the CRVFO land use plan (BLM 1999b). The dates of the TL are discretionary and based on the species involved, specifics of site conditions and the relationship of the nest location to existing and proposed new facilities, and other restrictions on development. Existing information in the literature on nesting dates by the golden eagle in Colorado indicate that March through July typically include some nesting activities (e.g., Kingery et al. 1998). In general, disturbance is more likely to result in partial or total nesting failure or loss in the period from pair formation through brooding of the young.

Based on the above, this project would have a COA attached to prohibit construction, drilling, or completion activities during the period March 1 to May 1 (COA #10, Appendix A). As described in Appendix A, the CRVFO may grant an exception to COA #10 for any year in which the nest is not active. A big game winter range TL, also applied as a COA (COA #9, Appendix A) to protect use by wintering big game during the period January 1 to March 1 would also provide protections for eagle nesting.

Regarding other migratory birds, the Proposed Action would result in 10.2 acres of new disturbance as a result of pad, road, and pipeline construction. Removal of pinyon-juniper and sagebrush would reduce nesting sites for birds. Construction, drilling, or completion activities during the nesting season could cause nest abandonment and failure, reducing the productivity of affected species. Construction activity during the nesting season could also result in the destruction of eggs or mortality of nestlings. Although these impacts would affect individual birds, it is not expected to adversely affect populations or species as a whole. Consequently, a separate TL would be applied (COA #11) for the same 60-day period as the raptor nesting TL (May 1 to July 1) to prohibit removal of vegetation throughout the project area to reduce adverse impacts to migratory birds, including BCC species nesting in the area. Appendix A provides details of this COA and potential bases for the granting of an exception.

#### *No Action Alternative*

Under this alternative, the 16 proposed Federal wells would not be drilled, completed, and produced, but BBC would likely drill and complete 11 proposed Fee wells from these locations. Therefore, impacts of the No Action Alternative on migratory birds, including the golden eagle nest located 0.25 mile from the CBC 2 pad, would be similar to those under the Proposed Action, although drilling and completing fewer wells would shorten the period of disturbance. Under the No Action Alternative, BBC would remain subject to the provisions of the MBTA and the BGEPA regarding the golden eagle nest and other raptor nests in the project vicinity.

## **Native American Religious Concerns**

### Affected Environment

The Proposed Action is located within an area identified by the Ute Tribes as part of their ancestral homeland. A Class III cultural resource inventory (see section on Cultural Resources) was conducted in the Proposed Action's vicinity 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 were 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 with Native American Tribes was not undertaken for the current project. 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 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. Bill Barrett Corporation would 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 Federal APDs (Appendix A). The importance of these COAs would 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 would also be made aware of requirements under the NAGPRA.

#### *No Action Alternative*

The Proposed Action involves the drilling of 16 Federal wells from Fee surface into the subsurface minerals encumbered with Federal oil and gas lease COC15976. Although the 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 would most likely reduce the potential for accidental damage, vandalism, illegal collection and excavation on public lands.

## Noise

### Affected Environment

Noise is generally described as unwanted sound. Weighted noise intensity (or loudness) is measured as sound pressure in 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 area is in a rural setting approximately 4 miles south of I-70. Noise levels in the project area are presently created by ranching/farming operations, traffic serving the existing nearby well pads, and ongoing drilling and completion activities.

### Environmental Consequences

#### *Proposed Action*

Noise is generally defined as unwanted and/or unpleasant sounds. The Proposed Action would result in increased levels of noise during the construction, drilling, and completion phases of the project and would be most noticeable along roads used to haul equipment and at the pad location. Drilling activities are subject to noise abatement procedures defined in the COGCC Rules and Regulations (Aesthetic & Noise Control Regulations). Operations involving pipeline or gas facility installation or maintenance, compressors, use of a drilling rig, completion rig, workover rig, or stimulation are subject to 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 maximum permissible levels (Table 4) at a distance of 350 feet. Periodically, noise levels may increase to 10 decibels (dBA) above the permissible levels in Table 4 for no more than 15 minutes in a 1-hour period. Operations involving pipeline or gas facility installation or maintenance, use of a drilling rig, completion rig, or workover rig, or fracture stimulation are subject to the maximum permissible levels for industrial zones.

Because several occupied structures are present within 1,000 feet of the proposed project, the agricultural/rural standard is applicable. The allowable noise level for periodic impulsive or shrill noises is reduced by 5 dBA from the levels shown. In addition, BBC would need to implement mitigation measures to subdue noise that would impact residences within 500 feet of the proposed project. The CBC 2 pad would have sound dampening structures such as stacks of hay bales placed along the northern and western sides of the proposed CBC 2 Pad to reduce noise impacts to the residence northwest of the pad.

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

Short-term (7- to 14-day) increases in nearby noise levels would characterize road and well pad construction. Based on the Inverse Square Law of Noise Propagation (Harris 1991) and a typical noise level for construction sites of 65 dBA at 500 feet (Table 5), project-related noise levels would be approximately 59 dBA at a distance of 1,000 feet, approximating active commercial areas (EPA 1974). These increased noise levels would be in addition to levels of noise that are already above background levels due to current oil and gas development in the area.

<b>Table 5. Noise Levels at Typical Construction Sites and along Access Roads</b>			
<i>Equipment</i>	<i>Noise Level (dBA)</i>		
	<i>50 feet</i>	<i>500 feet</i>	<i>1,000 feet</i>
Air Compressor, Concrete Pump	82	62	56
Backhoe	85	65	59
Bulldozer	89	69	63
Crane	88	68	62
Front End Loader	83	83	57
Heavy Truck	88	68	62
Motor Grader	85	65	59
Road Scraper	87	67	61
Tractor, Vibrator/Roller	80	60	54
Sources: BLM (1999a), La Plata County (2002)			

Noise impacts from drilling and completion activities would last approximately 45 to 60 days for each well. Noise would occur continuously, 24 hours per day, during the drilling and completion period. Based on a measured noise level of 68 dBA at 500 feet, actions associated with drilling and completion would generate approximately 62 dBA at 1,000 feet. This noise level approximates that associated with light industrial activities (EPA 1974). These increased noise levels would be in addition to levels of noise that are already above background levels due to current oil and gas developments in the area.

Traffic noise would also be elevated as a consequence of the Proposed Action, primarily along access roads during the drilling and completion phases. Based on the data in Table 5, approximately 68 dBA of noise (at 500 feet) would be created by each fuel and water truck. Less noise would be created by smaller trucks and passenger 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 at background noise levels. During maintenance and well workover operations, noise levels would temporarily increase above those associated with routine well production. The increased noise levels would be in addition to noise levels that are already above background levels due to current oil and gas developments in the area. Traffic noise levels would affect residences located along County roads that provide primary access into the area.

*No Action Alternative*

For the No Action Alternative, the 16 proposed Federal wells would not be approved. However, BBC would construct the pad and drill, complete, and produce the 11 proposed Fee wells from the proposed locations. Therefore, impacts of the No Action Alternative on noise would be only slightly less overall than the Proposed Action.

## **Socioeconomics**

### **Affected Environment**

The population of Garfield County grew by 28.8% from 2000 to 2010, representing an increase from 43,791 to 56,389 residents (DOLA 2010). Population growth in Garfield County is expected to more than double over a 20-year period from approximately 50,000 in 2005 to approximately 106,500 in 2025 (DOLA 2010).

In 2009, industry groups in Garfield County with the highest percentage of total employment were construction 15%, tourism 12%, retail trade 13%, and education and health 20% (Colorado Department of Labor and Employment 2010). An estimated 13% of the population was retired in 2000 and did not earn wages (Garfield County 2000). Employment in agriculture, forestry, hunting, and mining accounted for 8% of total employment (Colorado Department of Labor and Employment 2010).

Personal income in Garfield County has also risen, from \$504 million in 1990 to \$2.2 billion in 2008 (USDOC 2008). Annual per capita income has grown in the same period; from about \$19,354 to \$40,166 (USDOC 2008), and the average earnings per job in 2005 was approximately \$37,500 (Garfield County 2007). The communities of Parachute, Silt, and Rifle are the most affordable for housing, while the communities of Battlement Mesa, New Castle, and Glenwood Springs are the least affordable, with the cost to rent or own similar housing higher by 50% or more.

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 U.S. Forest Service (USFS) public lands where most hunting occurs (BLM 2006). Expenditures by hunters in the Roan Plateau Planning Area alone are estimated to be as much as \$1 million annually, with perhaps an additional \$1 million annually of indirect and local expenditures.

The growth of the oil and gas industry in the past 10 years has been increasingly important to local economies. Production of natural gas in Garfield County increased dramatically during recent years, from approximately 70 bcf in 2000 to 576 bcf in 2009 (COGCC 2010). In addition, Garfield County is experiencing the fastest increase in oil and gas development in Colorado, with over 2,000 drilling permits currently approved between July 2009 and September 2010 (COGCC 2010). While the number of workers employed in the mining and extraction industry in Garfield County has been shown to be only 1.7%, this number is considered misleading because some oil and gas employment has been incorporated as part of the construction sector 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 for nontaxable Federal lands within the county. Payments are based on Federal acreage in the county for all land management agencies, including BLM, USFS, USFWS, and National Park Service. The amount may also be adjusted based on population and as appropriated by Congress. By formula, payments are decreased as other funds, such as mineral royalty payments, increase. PILT amounts received by Garfield County in recent years have been as follows: \$0.8 million in 2005; \$1.1 million in 2006, 2007, and 2008; and \$1.9 million in 2009 (USDI 2010).

Property tax revenue from oil and gas development has become the largest source of public revenue in Garfield County (BLM 2006), with an assessed valuation in Garfield County of approximately \$3.8 billion, or 74% of the total. Total tax revenues from property taxes and special district levies were \$130 million. Tax dollar distributions in 2009 were Schools – 30.4%, County – 32.3%, Special Districts – 14.3%, Fire Districts – 12.3%, Colleges – 8.9%, and Towns – 1.7% (Garfield County 2009).

In addition to PILT payments, BLM shares revenue generated by commercial activities on public lands with state and county governments. 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 to Garfield County in 2002 attributable to oil and gas production was \$14.1 million. In 2001, the amount was \$5.5 million. These funds are then allocated to fund county services, schools, and local communities.

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 Hispanic/Latino community is the only minority population of note in the project vicinity. In 2010, approximately 28% of the residents of Garfield County identified themselves as Hispanic/Latino, compared to 17% in 2000. Statewide, the percentage of Hispanic/Latino residents grew from 17% to 21% during the same 10-year period. African-American, American Indian, Asian, and Pacific Islander residents accounted for a combined 2.6% of the Garfield County population in 2010, compared to a statewide level of 8% (CDLE 2010).

### Environmental Consequences

#### *Proposed Action*

The Proposed Action would have 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. The Proposed Action could result in minor negative social impacts, including reduced scenic quality, increased dust levels, and increased traffic. However, these impacts would be minor and limited to the relatively short duration of drilling and completion activities.

#### *No Action Alternative*

Under this alternative, the socioeconomic impacts related to drilling, completing, servicing, and producing the 16 Federal wells would not occur, but BBC would still drill and complete the 11 Fee wells from the current proposed pads on Fee surface. Therefore, impacts to socioeconomics—both negative and positive—would be reduced compared to the Proposed Action but not eliminated.

### Soils

#### Affected Environment

The project area is covered by the *Soil Survey of Rifle Area, Colorado* (USDA 1985) and would include surface-disturbing activities on one soil complex. The pipeline, the access road, and the pad are located on Torriorthents-Camborthids-Rock outcrop complex. This soil complex consists of exposed sandstone and shale bedrock, loose stones and shallow to deep soils over sandstone and shale bedrock. These soils

and outcrops are steep to very steep, ranging from 15 to 70%. The erosion hazard is moderate to severe. This soil is generally used for wildlife habitat limited grazing. Building is limited by stoniness and steep slopes.

Environmental Consequences

The Proposed Action would result in 10.2 acres of short-term vegetation loss and soil compaction and displacement on Circle B land. After interim reclamation, long-term surface disturbance would be reduced to 2.9 acres. In general, the area to be affected by the Proposed Action contains adequate vegetation buffers and moderate slopes to reduce the potential for sediment transport to Dry Hollow Creek and Colorado River. In areas susceptible to erosion or possible slope instability issues, proper erosion control and construction techniques, and geotechnical analysis would be required.

In addition, construction activities would cause mixing of soil horizons, slight to moderate increases in local soil loss, loss of soil productivity, and increases in the amount of sediment available for transport to surface waters. Noxious weed infestation resulting from disturbance would impact soil productivity. Potential for such soil loss and transport would increase as a function of slope, feature (pad, road, or pipeline route) to be constructed, and proximity to streams.

The potential would also exist for accidental spills or leaks of petroleum products and hazardous materials during construction, drilling activities, and long-term operations for the life of the wells. These events would cause soil contamination and may decrease the soil fertility and revegetation potential.

No Action Alternative

For the No Action Alternative, the 16 proposed Federal wells would not be approved. However, BBC would drill, complete, and produce the 11 proposed Fee wells from this proposed Fee surface location. Therefore, impacts on soils would be similar or slightly less than under the Proposed Action.

Special Status Species

*Federally Listed, Proposed, or Candidate Plant Species*

Affected Environment

Four species of Federally listed threatened, endangered, threatened, or candidate plants are known to occur in Garfield County. Descriptions of these species and their status, distribution, and habitat associations are summarized in Table 6.

<b>Table 6. CRVFO Listed, Proposed, or Candidate Threatened or Endangered Plant Species</b>			
<i>Species and Status</i>	<i>Habitat</i>	<i>Project Vicinity</i>	
		<i>Suitable Habitat?</i>	<i>Species Found?</i>
Parachute penstemon ( <i>Penstemon debilis</i> ) -- Threatened	Sparsely vegetated, steep, south-facing, white shale talus of the Parachute Creek Member, Green River Formation; with other oil shale endemic species such as Roan Cliffs evening-star, Cathedral Bluffs meadow rue, dragon milkvetch, Piceance bladderpod, and oil shale fescue; 8,000 to 9,000 feet.	No	No

<b>Table 6. CRVFO Listed, Proposed, or Candidate Threatened or Endangered Plant Species</b>			
<i>Species and Status</i>	<i>Habitat</i>	<i>Project Vicinity</i>	
		<i>Suitable Habitat?</i>	<i>Species Found?</i>
DeBeque phacelia ( <i>Phacelia submutica</i> ) – Threatened	Steep, sparsely vegetated slopes in chocolate-brown, gray, or red clay on Atwell Gulch and Shire Members, Wasatch Formation. Soils often have large cracks because of the high shrink-swell potential of the clays; desert shrubland with fourwing saltbush, shadscale, greasewood, broom snakeweed, bottlebrush squirreltail and Indian ricegrass, grading upward into scattered junipers; 4,700 to 6,200 feet.	No	No
Colorado hookless cactus ( <i>Sclerocactus glaucus</i> ) – Threatened	Rocky hills, mesa slopes, and alluvial benches in salt desert shrub communities; often with well-formed microbiotic crusts; can occur in dense cheatgrass; with shadscale, galleta grass, black sagebrush, Indian ricegrass grading upward into big sagebrush and sagebrush/pinyon-juniper; 4,500 to 6,000 feet.	No	No
Ute lady’s-tresses orchid ( <i>Spiranthes diluvialis</i> ) Threatened	Subirrigated alluvial soils along streams and in open meadows in floodplains; sometimes with box-elders, cottonwoods, willows, scouring rushes, and riparian grasses, sedges, and forbs; 4,500 to 7,200 feet.	No	No

Environmental Consequences

*Proposed Action*

Habitat types in the area are unsuitable for any of the Federally listed, proposed, or candidate plants listed for Garfield County. Therefore, the Proposed Action would have “**No Effect**” on these species.

*No Action Alternative*

Habitat types in the area are unsuitable for any of the Federally listed, proposed, or candidate plants listed for Garfield County. Therefore, the No Action Alternative would have “**No Effect**” on these species.

***Federally Listed, Proposed, or Candidate Animal Species***

Affected Environment

Eight species of Federally listed, proposed, or candidate threatened or endangered vertebrate species are known to occur or potentially be affected by projects in Garfield County, or may be affected by projects in Garfield County. These species, their status, and their distributions and habitat associations in the region are summarized in Table 7. Of the species listed in the table, note that only two of big-river fishes Federally listed as endangered—the razorback sucker and Colorado pikeminnow—are potentially present in the project area or potentially affected by the Proposed Action. Two other Federally listed species (humpback chub and bonytail chub) are not known to occur in the project vicinity but could be affected by the project.

<b>Table 7. Potential for Occurrence of Threatened or Endangered Animal Species</b>				
<i>Species and Status</i>	<i>Distribution</i>	<i>Habitat Association</i>	<i>Range or Habitat in Vicinity</i>	<i>Potentially Affected</i>
Canada lynx ( <i>Lynx canadensis</i> ) – Threatened	Expanses of subalpine and upper montane coniferous forests	Spruce-fir forests; also lodgepole pine and aspen	No	No
Yellow-billed cuckoo ( <i>Coccyzus americanus</i> ) – Candidate	North Fork of Gunnison, Colorado, Dolores, Yampa, and Rio Grande rivers	Large cottonwood stands along rivers	No	No
Mexican spotted owl ( <i>Strix occidentalis lucida</i> ) – Threatened	No historic occurrence in area; present in southwestern Colorado and southern Front Range	Rocky cliffs within closed-canopy coniferous forests	No	No
Razorback sucker ( <i>Xyrauchen texanus</i> ) – Endangered	Occur in mainstem of the Colorado River and major tributary rivers – upstream to Rifle, Colorado, in CRVFO	Deep, slow runs, pools, and eddies; spawn over silt to gravel substrates in shallow water and in seasonally flooded overbank areas	Yes	Yes
Colorado pikeminnow ( <i>Ptychocheilus lucius</i> ) – Endangered			Yes	Yes
Humpback chub ( <i>Gila cypha</i> ) -- Endangered	Occur in mainstem of the Colorado River and major tributaries – upstream to Black Rocks near Utah line	Rocky runs, riffles, and rapids	No	Yes
Bonytail chub ( <i>Gila elegans</i> ) – Endangered		Shallow reaches of swift, deep rivers	No	Yes
Greenback cutthroat trout ( <i>Oncorhynchus clarkii stomias</i> ) – Endangered	Native in South Platte drainage, recently documented in the CRVFO	Clear, cold mountain streams and headwaters lakes	No	No

Environmental Consequences

*Proposed Action*

For all of the species in Table 6 except the four endangered big-river fishes, the project would have no potential for adverse impacts. Therefore, the Proposed Action would have “**No Effect**” on these species.

The endangered Colorado River fishes could potentially be affected by the consumptive use of water taken from the Colorado River basin to support activities associated with the Proposed Action. Depletions in flows in the Colorado River and major tributaries are a major source of impacts to these fishes due to changes in the flow regime that reduce the availability and suitability of spawning sites and habitats needed for survival and growth of the larvae. Principal sources of depletion in the Colorado River basin include withdrawals for agricultural or industrial uses, withdrawals for municipal water supplies, and evaporative losses from reservoirs. On average, approximately 0.7 acre-feet of Colorado River water is consumed during activities related to each oil and gas well.

In 2008, the BLM prepared a Programmatic Biological Assessment (PBA) 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, humpback chub, bonytail chub, and 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. The estimated depletions from the Proposed Action would be added to the CRVFO tracking log and submitted to the USFWS per the PBA/PBO at the end of the year to account for depletions associated with BLM’s fluid mineral program. The calculated mitigation fees are used by the USFWS for mitigation projects and contribute to the recovery of these species.

Other potential impacts to these species include inflow of sediments from areas of surface disturbance and inflow of chemical pollutants related to oil and gas activities on the well pads, associated with ancillary surface facilities, or resulting from an accident involving a haul truck in proximity to a stream. Stormwater controls required for the protection of surface water quality would also provide protection of aquatic organisms (see COAs in Appendix A). Even if sediment inflow were to occur, including incidental aerial deposition of fugitive dust from roadways and construction areas, these fishes are adapted to the naturally high sediment loads that characterize the Colorado River and its tributaries.

In contrast to inflow of sediments, the inflow of chemical pollutants could impact the endangered big-river fishes if concentrations were sufficient to cause acute effects. The potential for adverse impacts would be limited to the Colorado pikeminnow and razorback sucker, the two species known to occur within the CRVFO area. Spills or other releases of chemical pollutants as a result of oil and gas activities are infrequent in the CRVFO area due to the requirements of BLM and the State of Colorado.

In the event of a spill or accidental release, the operator is required to implement its Spill Prevention, Control, and Countermeasures (SPCC) plan, including such cleanup and mitigation measures as required by BLM or the State. In addition, implemented stormwater controls (see COAs in Appendix A) would reduce the risk of transport of these substances as well as sediments to surface waters, including the Colorado River. For these reasons, and because any spills making their way into the Colorado River would be rapidly diluted to levels below that are not deleterious, or even detectable, the potential for adverse impacts from chemical releases is not considered significant.

#### *No Action Alternative*

Under this alternative, the 16 proposed Federal wells would not be drilled, completed, and produced, however, BBC would likely drill and complete 11 Fee wells from these proposed locations. Therefore, impacts of the No Action Alternative on Federally listed, proposed, or candidate animal species would be less than under the Proposed Action but not eliminated.

#### ***BLM Sensitive Plant Species***

##### Affected Environment

BLM sensitive plant species with habitat and/or occurrence records in Garfield County are listed in Table 8. Project-specific surveys to identify suitable habitat and presence/absence of sensitive plants were conducted in 2011 and 2012. Of these, potential habitat is present in the project vicinity for only one species, Harrington’s penstemon. Botanical surveys conducted in May and June 2012 did not locate any Harrington’s penstemon plants with in or adjacent to the project area, and the site is lower in elevation than sites where this species typically occurs.

<b>Table 8. Potential for Occurrence of BLM Sensitive Plant Species</b>				
<i>Species and Status</i>	<i>Occurrence</i>	<i>Habitat Association</i>	<i>Range or Habitat in Vicinity</i>	<i>Potentially Affected</i>
Debeque milkvetch ( <i>Astragalus debequaeus</i> )	Varicolored, fine-textured, seleniferous or saline soils of Wasatch Formation-Atwell Gulch Member; 5,100 to 6,400 feet	Pinyon-juniper woodlands and desert shrub.	No	No
Naturita milkvetch ( <i>Astragalus naturitensis</i> )	Sandstone mesas, ledges, crevices and slopes in pinyon/juniper woodlands; 5,000 to 7,000 feet	Pinyon-juniper woodlands	No	No
Piceance bladderpod ( <i>Lesquerella parviflora</i> )	Shale outcrops of the Green River Formation, on ledges and slopes of canyons in open areas; 6,200 to 8,600 feet	Pinyon-juniper woodlands, shrublands; often with other oil shale endemic species	No	No
Roan cliffs blazing-star ( <i>Mentzelia rhizomata</i> )	Steep, eroding talus slopes of shale, Green River Formation; 5,800-9,000 feet	Pinyon-juniper woodlands, shrublands; often with other oil shale endemic species	No	No
Harrington's beardtongue ( <i>Penstemon harringtonii</i> )	Sagebrush shrublands, including invaded by pinyon/juniper, rocky loams and rocky clay loams derived from coarse calcareous parent materials (basalt); 6,200-9,200 feet	Sagebrush, with some scattered pinyon-juniper	No	No
Cathedral Bluffs meadow-rue ( <i>Thalictrum heliophilum</i> )	Endemic on sparsely vegetated, steep shale talus slopes of the Green River Formation; 6,300-8,800 feet	Pinyon-juniper woodlands, shrublands; often with other oil shale endemic species; sometimes with rabbitbrush, snowberry	No	No

Environmental Consequences

*Proposed Action*

Because no potential habitat for any BLM sensitive plant species is present within or adjacent to the project area, the Proposed Action would not impact any BLM Sensitive plant species.

*No Action Alternative*

Under this alternative, the 16 proposed Federal wells would not be drilled, completed, and produced. However, no BLM sensitive plant species are known to occur within or near the project area. Therefore, the No Action Alternative would have no adverse impacts on any BLM sensitive plant species.

***BLM Sensitive Animal Species***

Affected Environment

BLM sensitive animal species with geographic ranges that include the project vicinity are listed in Table 9. The potential for adverse impacts on species listed as in Table 9 as unlikely or possible in the project area is described following the table.

<b>Table 9. Sensitive Animal Species Potentially Present in the Project Vicinity</b>		
<i>Common Name</i>	<i>Habitat</i>	<i>Potential for Occurrence</i>
Fringed myotis ( <i>Myotis thysanodes</i> ) and Townsend's big-eared bat ( <i>Corynorhinus townsendii</i> )	Breed and roost in caves, trees, mines, and buildings; hunt over pinyon-juniper, montane conifers, and semi-desert shrubs.	Possible – habitat marginal
Northern goshawk ( <i>Accipiter gentilis</i> )	Predominantly uses spruce/fir forests but also use Douglas-fir, various pines, and aspens.	Possible – habitat marginal; winter only
Bald eagle ( <i>Haliaeetus leucocephalus</i> )	Nests and roosts in mature cottonwood forests along rivers, large streams, and lakes. Feeds on fish and waterfowl, and some carrion.	Unlikely; nests and roosts along Colorado River
Peregrine falcon ( <i>Falcon peregrinus</i> )	Nests on cliffs, usually near a river, large lake, or ocean. Hunts for waterfowl or for upland fowl on expansive grasslands and steppe.	No suitable habitat
Brewer's sparrow ( <i>Spizella breweri</i> )	Nests in large stands of sagebrush, primarily Wyoming sagebrush on level or undulating terrain at middle elevations.	Unlikely – habitat marginal and limited
Midget faded rattlesnake ( <i>Crotalus viridis concolor</i> )	Limited to cold desert dominated by sagebrush with rock outcrops or exposed canyon walls; typically farther west than the project area.	No suitable habitat
Great Basin spadefoot ( <i>Spea intermontana</i> )	Habitat includes pinyon-juniper woodlands and semi-desert shrublands, typically farther west than the project area.	No suitable habitat
Northern leopard frog ( <i>Lithobates pipiens</i> )	Limited to perennial ponds, lakes margins, and slow-flowing streams with good water quality and aquatic vegetation; also found in persistently wet meadows.	No suitable habitat
Flannelmouth sucker ( <i>Catostomus latipinnis</i> ) and roundtail chub ( <i>Gila robusta</i> )	Generally restricted to rivers and major tributaries.	No suitable habitat in potentially affected waters
Bluehead sucker ( <i>Catostomus discobolus</i> )	Found in smaller streams with a rocky substrate and moderate to fast flows.	No suitable habitat in potentially affected waters
Colorado River cutthroat trout ( <i>Oncorhynchus clarki pleuriticus</i> )	Restricted to small headwaters streams and lakes with cold, clear waters isolated from populations of rainbow and non-native cutthroat trouts	Not Present

Environmental Consequences

*Proposed Action*

Fringed Myotis and Townsend's Big-eared Bat – 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 – Goshawks feed primarily on small birds but also on diurnal small mammals (rabbits, chipmunks, etc.) and are 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.

Bald Eagle – 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 the 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 is generally restricted to extensive, uniform stands of sagebrush, primarily sagebrush steppe at middle elevations. If the species were to occur, oil and gas activities within 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.

#### *No Action Alternative*

Under this alternative, the 16 proposed Federal wells would not be drilled, completed, and produced. However, BBC would likely drill and complete the 11 Fee wells from the proposed locations. Therefore, impacts of the No Action Alternative on BLM sensitive animal species would be less than under the Proposed Action but not eliminated.

## **Vegetation**

### **Affected Environment**

Native vegetation in the project area is dominated by open pinyon pine-Utah juniper (*Pinus edulis-Juniperus osteosperma*) woodlands interspersed with Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) shrublands and meadows. Common native perennial grasses include bottlebrush squirreltail (*Elymus elymoides*), slender wheatgrass (*Elymus trachycaulus*), Indian ricegrass (*Achnatherum hymenoides*), Junegrass (*Koeleria macrantha*), needle-and-thread (*Hesperostipa comata*), and galleta (*Pleuraphis jamesii*), all bunchgrass species. Native perennial forbs include tansy-aster (*Machaeranthera* sp.), cushion phlox (*Phlox hoodii*), scarlet globemallow (*Sphaeralcea coccinea*), Osterhout's penstemon (*Penstemon osterhoutii*), and prickly pear cactus (*Opuntia* sp.). Woody plants in addition to big sagebrush include mountain-mahogany (*Cercocarpus montanus*), greasewood (*Sarcobatus vermiculatus*), fourwing saltbush (*Atriplex canescens*), skunkbrush (three-leaf sumac) (*Rhus trilobata*), and broom snakeweed (*Gutierrezia sarothrae*), the last species a subshrub (woody at the base).

Non-native species present include crested wheatgrass (*Agropyron cristatum*), a widely planted non-native perennial bunchgrass. Both well pad sites are heavily infested with Russian knapweed, an invasive non-native forb (see the section on Invasive Non-Native Species). On steeper slopes, the understory is

sparse due to shallow soils, rocky surfaces, and dry conditions. Previously disturbed areas are dominated by snakeweed, rubber rabbitbrush (*Ericameria nauseosa*), and non-native invasives such as cheatgrass.

### Environmental Consequences

#### *Proposed Action*

Under the Proposed Action, 10.2 acres of new disturbance would occur. With implementation of interim reclamation (see reclamation COAs in Appendix A), desirable native vegetation on the unused portions of the pads could be established within 2 to 3 years, reducing the total unvegetated area to 2.9 acres. However, periodic workovers and the potential for additional well bores in the future would likely result in repeated vegetation disturbances and reclamation efforts in the future.

#### *No Action Alternative*

Under this alternative, the 16 proposed Federal wells would not be drilled, completed, and produced. However, BBC would likely drill and complete 11 Fee wells from the proposed locations. Therefore, impacts of the No Action Alternative on vegetation would be less but not eliminated.

### Visual Resources

#### Affected Environment

The Proposed Action is located on private land approximately 4 air miles south of Silt, Colorado (Figure 7). The proposed CBC 1 pad is located primarily on Fee surface underlain by private minerals with the northern portion of the pad located on “Split Estate” (private surface underlain by Federal minerals). The proposed CBC 2 pad is located on Fee surface underlain by Federal minerals. Visual resource management (VRM) objectives do not apply to non-BLM lands, and visual values for those lands are protected by landowner discretion. However, the BLM maintains regulatory authority regarding protection of sensitive resources when Federal wells would be located on a Fee pad.

The project area consists of gently rolling hills dissected by small drainages, intermixed with flatter open areas nestled in between Dry Hollow Creek to the west and Divide Creek to the east. The proposed CBC 1 Pad would be located within a bowl-like structure created by small ridgelines that surround the location to the north, northeast, and south (Figures 8 and 9). The ridgelines surrounding the proposed CBC 1 pad location would screen views into the project area from the north, northeast, and south.

The proposed CBC 2 pad would be located on top of one of the rolling hills in the area directly northeast of the proposed CBC 1 pad location (Figures 10 and 11). The proposed CBC 2 pad location sits on a flatter surface and is more visible to surrounding rural residences. The project area is characteristic of agricultural and ranching land with scattered rural residences. The area is also surrounded by heavy oil and gas development including a compressor station immediately to the southeast of the proposed CBC 2 pad (Figure 11).

### Environmental Consequences

#### *Proposed Action*

Short-term visual impacts due to pad, access road construction, pipeline installation, drilling and completion activities would occur within the project area. Construction of the Proposed Action would

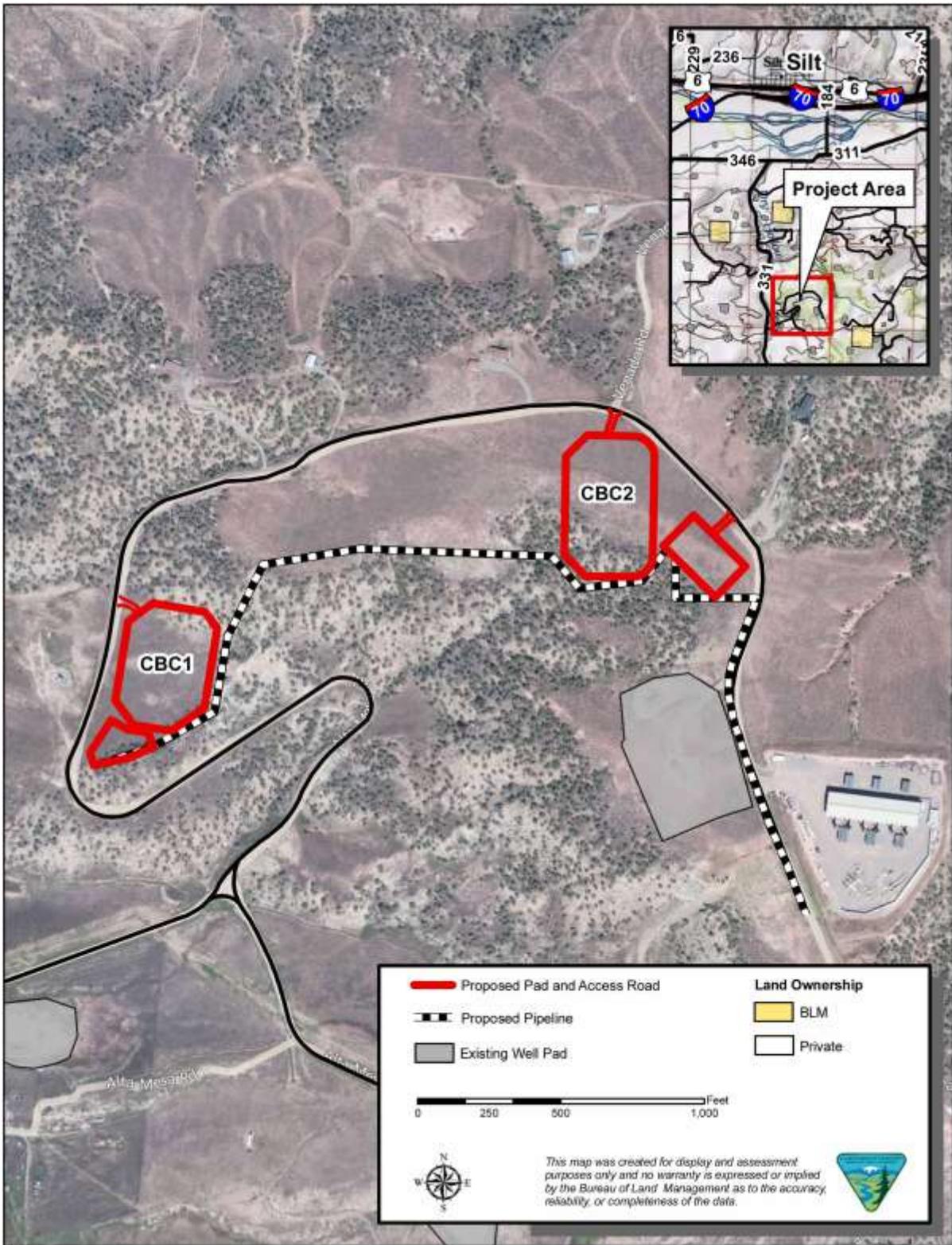


Figure 7. Proposed Action



**Figure 8. Proposed CBC1 Pad Location, Looking South from Northern Ridgeline.**



**Figure 9. Proposed CBC1 Pad Location, Looking North from Southern Ridgeline.**



**Figure 10. View to North from Proposed CBC 2 Pad Location.**



**Figure 11. View to South/Southeast from Proposed CBC 2 Pad Location.**

create contrast within the landscape by removing the existing vegetation, exposing bare ground, and creating distinct lines and forms within the landscape. The new pads, surface facilities, access roads, and pipelines would increase the presence of drilling rigs, heavy equipment (e.g., dozers, graders, trackhoes), and vehicular traffic with an associated increase in dust and light pollution.

Long-term impacts of the Proposed Action would include an increase in the departure from the native characteristics of the visual character within the landscape where pad, facilities, access road, and pipeline are constructed. The visibility of new surface disturbances and production equipment would increase the existing visual contrasts associated with human modification already present in the area.

#### *Proposed CBC 1 Pad*

The proposed CBC 1 pad would be located entirely on private land in a bowl-like feature created by the adjacent topography. The pad would be 300 feet x 380 feet, with a maximum cut of 40 feet at the northeastern corner and a maximum fill of 15.8 feet at the southwestern corner. A smaller pad would be located directly to the south to accommodate the production equipment. This pad would have a maximum cut of 13.1 feet along the southwestern edge and maximum fill of 10.8 feet at the northwestern corner. Total disturbance for the well pad and production pad would be 5 acres. After drilling and well completion work, the well pad and production pad would be reshaped and seeded reducing the pads to approximately 1.17 acres.

The northeastern corner of the pad would be the most visible from views from the south because of the large cut slope required to accommodate the drill rig, ancillary equipment, and cuttings containment area. However, this area is rocky and may inhibit the ability to cut into the slope as much as proposed. If rock is encountered, it may provide a retaining structure that would minimize the cut slope, thus reducing the visual impacts associated with the Proposed Action. During the onsite for the proposed pad, shifting the pad or decreasing the size of the pad was discussed. Shifting the pad to the east or south would require cutting into the ridges that surround the pad location more than what is currently proposed. These ridges provide visual screening into the project location. Reducing the size of the pad would not accommodate the drill rig, ancillary equipment, and cuttings containment area. Production equipment would be screened from view by the ridge immediately to the south and by the pinyons and junipers on the ridge.

Standard Best Management Practices (BMPs) related to reclamation, facility paint colors, and screening the road and pipeline alignments from view would mitigate the visual impacts of the CBC 1 pad.

### *Proposed CBC 2 Pad*

The proposed CBC 2 pad would be located entirely on private land on top of a hill. The hill is relatively flat and is surrounded by rural residences that would have views into the project location (Figure 11). The pad would be 300 feet x 380 feet, with a maximum cut of 12 feet at along the eastern edge and a maximum fill of 24.6 feet at the southwestern corner. A smaller pad would be located directly to the southeast to accommodate the production equipment. The production pad would be 255 feet x 150 feet and would have a maximum cut of 6.1 feet at the eastern corner and maximum fill of 2.5 feet at the northern corner. Total disturbance for the well pad and production pad would be 5.2 acres. After drilling and well completion, the well pad and production pad would be reshaped and seeded, reducing the disturbance to 1.74 acres.

The pad would be visible from nearby residences, particularly the homeowner located directly northwest of the pad location. BBC proposes to include hay bales along the northwestern corner as a sound and visual barrier. Hay bales would not be adequate for the lifetime of the pad to visually screen the pad from adjacent residences. During the onsite for the proposed pad, lowering the pad and creating berms along the northwestern, northern, and northeastern edges was discussed to reduce the visual impacts to the adjacent homeowners. In response to a request by BLM during subsequent meetings, BBC modified the pad design to improve screening from these residences. These improvements include constructing a small berm on the edge of the pad working surface closest to the residences and a higher berm between the well pad and production facilities working area to help screen that equipment.

Construction of the pad would eliminate some of the dense pinyon-juniper woodland along the southern edge, but trees would remain to provide partial screening. The production pad would be located farther away from the adjacent residences, reducing the visual impact of the proposed facilities. The standard BMPs related to reclamation, facility paint colors, and screening the road and pipeline alignments from view would help mitigate the visual impacts of the project.

### *No Action Alternative*

Under this alternative, the 16 proposed Federal wells would not be drilled, completed, and produced, but BBC would likely drill and complete 11 Fee wells from these proposed locations. Therefore, impacts to visual resources would be reduced slightly overall, but not eliminated.

## **Wastes, Hazardous or Solid**

### Affected Environment

The affected environment for hazardous materials includes air, water, soil, and biological resources that may potentially be affected by an accidental release of hazardous materials during transportation to and from the project area, storage, and use in construction and operations. Sensitive areas for hazardous materials releases include areas adjacent to water bodies, above aquifers, and areas where humans or wildlife would be directly impacted.

BLM Instruction Memoranda numbers WO-93-344 and CO-97-023 require that all NEPA 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 (June 1998), Appendix L, Hazardous Substance Management Plan, contains a comprehensive list of materials commonly used for oil and gas projects and a description of common industry practices for use of these

materials and disposal of waste products. These practices are dictated by various Federal and State laws and regulations, and BLM standard lease terms and stipulations that would accompany any authorization resulting from this analysis. The most pertinent of Federal laws dealing with hazardous materials are:

- The Oil Pollution Act (Public Law 101-380, August 18, 1990) 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 of 1980) 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.
- The Resource Conservation and Recovery Act (RCRA) (Public Law 94-580, October 21, 1976) regulates the use of hazardous substances and disposal of hazardous wastes. Note: While oil and gas lessees are exempt from RCRA, ROW 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 construction phase of this project would include diesel fuel, hydraulic fluid, and lubricants. These materials would be used during construction of the pads, roads, and pipelines, and for refueling and maintaining equipment and vehicles. Potentially harmful substances used in the construction and operation phases 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.

Waste generated by construction activities would not be exempt from hazardous waste regulations under the oil and gas exploration and production exemption of RCRA. Exempt wastes would include those associated with well production, transmission of natural gas through gathering lines, and natural gas itself.

With the exception of produced hydrocarbons, ethylene glycol (antifreeze), lubricants, and amine compounds, chemicals subject to reporting under Title III of the Superfund Amendments and Reauthorization Act in quantities of 10,000 pounds or more would not be used, produced, stored, transported, or disposed of during construction or operation of the facilities. None of the chemicals that would be used in construction meet the criteria for an acutely hazardous material/substance, or meet the quantities criteria per BLM Instruction Memorandum No. 93-344. In addition, no extremely hazardous substance, as defined in 40 CFR 355, in amounts above threshold planning quantities would be produced, used, stored, transported, or disposed of during construction or operation of the facilities.

Solid waste (human waste, garbage, etc.) would be generated during construction activities and, to a limited extent, during project operations. These would be removed to a landfill or water treatment facility as needed, and all would be removed prior to interim reclamation.

Surface water or groundwater could be affected under the Proposed Action. Pollutants that might 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 occur that could result in a release of any of these materials. A release could result in 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, emergency or otherwise, the responsible party would be liable for cleanup and any 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.

These laws, regulations, standard lease stipulations, and contingency plans and emergency response resources are expected to adequately mitigate any potential hazardous or solid waste issues associated with the Proposed Action.

#### *No Action Alternative*

Under the No Action Alternative, the proposed Federal wells would not be drilled, completed, or produced. However, BBC would drill, complete, and produce the 11 proposed Fee wells from the proposed Fee surface locations. This would result in impacts similar to the Proposed Action.

### **Water Quality, Surface and Ground**

#### *Surface Water*

##### Affected Environment

The Proposed Action would occur within Dry Hollow Creek 6<sup>th</sup> code hydrologic unit, which drains to the Colorado River. The project area drains 0.4 mile to the mainstem of Dry Hollow Creek, which empties into the Colorado River approximately 2.3 miles north of the project. The *Stream Classifications and Water Quality Standards* (CDPHE, Water Quality Control Commission [WQCC] Regulation No. 37) (CDPHE 2007) indicates the mainstem of Dry Hollow Creek, including all tributaries and wetlands, from the source to the confluence with the Colorado River as being within segment 4d. The following is a brief description of segment 4d.

- Segment 4d – This segment has been classified 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, however, suitable or intended to become suitable for potable water supplies and agricultural purposes that include irrigation and livestock use.

All streams within segment 4d are not on the State of Colorado's 303(d) List of Impaired Waters and Monitoring and Evaluation List (CDPHE, WQCC Regulation No. 93) (CDPHE 2010). The Colorado River which Dry Hollow Creek flows to is currently considered impaired due to naturally high levels of selenium. 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 stream segments within the project area are on the State of Colorado’s Monitoring and Evaluation List (CDPHE 2010). Data were also collected from the Colorado River below the project area near Rulison in 1977 and 1978 (Table 10).

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).

<b>Table 10. Selected Water Quality Data for Two Sampling Locations near the Project Area</b>		
<i>Parameter</i>	<i>Colorado River below Rulison CO, USGS Site #09092570</i>	
	<i>1/18/1978</i>	<i>4/8/1977</i>
Instantaneous discharge (cfs)	1,500	1,560
Temperature, water (°C)	2.5	11
Field pH (standard units)	7.9	8.1
Specific conductance (µS/cm/cm at 25°C)	1,320	1,200
Total Dissolved Solids (mg/L)	756	733
Hardness as CaCO <sub>3</sub> (mg/L)	280	250
Chloride (mg/L)	230	230
Selenium (µg/L)	2	1
Dissolved oxygen (mg/L)	11.2	10
Note: NA = data not available Source: USGS 2007		

## Environmental Consequences

### *Proposed Action*

The Proposed Action would result in 10.2 acres of surface disturbance, of which approximately 2.9 acres would remain unreclaimed during the life of the wells. Potential impacts to surface water associated with the Proposed Action occur from surface-disturbing activities, traffic, waste management, and the use, storage and transportation of fluids (i.e., chemicals, condensate, and produced water). Surface-disturbing activities associated with well and facility pads, roads, and pipelines cause loss of vegetation cover, soil compaction and displacement, increased volume and velocity of runoff, and increased sedimentation and salinity in surface waters. Initially, impacts can be minimized by stormwater management, stockpiling topsoil, controlling erosion, and rehabilitation of disturbed surfaces. 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 limiting cut slope steepness, step-cutting, 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 increase the possibility of spills that could migrate to surface or groundwater. Other elements of the Proposed Action are designed to mitigate risks to surface waters associated with the release of drilling fluids, produced water, and condensate. A closed-loop drilling system would be implemented which recycles drilling fluids; cuttings would be dried through the use of a shaker system and be stacked against the cut slope on the pad. A completions pit would be constructed. The pit and pipelines associated with the transport of these liquids would be tested to detect leakage prior to use. Cuttings management areas must be decontaminated to COGCC standards prior to pit closure. Implementation of standard COAs for mitigating impacts to surface waters (Appendix A) would minimize risks of adverse impacts associated with construction and ongoing production activities.

#### *No Action Alternative*

For the No Action Alternative, the 16 proposed Federal wells would not be approved. However, BBC would drill, complete, and produce the 11 proposed Fee wells from the proposed Fee surface locations. Therefore, impacts of the No Action Alternative on surface waters would be similar or slightly less than under the Proposed Action.

#### ***Waters of the U.S.***

Waters of the U.S. located in the project vicinity include the ephemeral tributaries and the eastern branch of 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. A permit is required for both permanent and temporary discharges into Waters of the U.S.; larger discharges require an individual permit, while smaller discharges may be granted a nationwide permit.

#### Environmental Consequences

##### *Proposed Action*

No new crossings of Waters of the U.S. are included in the Proposed Action, nor is pad construction proposed, road alignments, or pipeline installation 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 2 miles to the north. However, standard and site-specific COAs listed in Appendix A would be implemented to protect Dry Hollow Creek, the Colorado River, and any other Waters of the U.S. potentially impacted by long-distance stormflow transport.

##### *No Action Alternative*

For the No Action Alternative, the 16 proposed Federal wells would not be approved. However, BBC would drill, complete, and produce the 11 proposed Fee wells from the proposed Fee surface locations. Therefore, impacts of the No Action Alternative on Waters of the U.S. would be slightly less than under the Proposed Action but likely the same.

## ***Groundwater***

### Affected Environment

The Lower Piceance Basin contains both alluvial and bedrock aquifers (Colorado Geological Survey 2003). Unconsolidated alluvial aquifers are the most productive aquifers in the region (EPA 2004) and are defined as narrow, thin deposits of sand and gravel formed primarily along stream courses, in this case, along the Colorado River and its tributaries. Alluvial well depths are generally less than 200 feet and water levels typically range between 100 to 150 feet. Well yield is dependent upon the intended use of the well, well construction design, sediment type and saturated thickness. Domestic use wells are limited to 15 gallons per minute (gpm) administratively, while municipal wells are designed and constructed for maximum potential yield. Below these alluvial aquifers resides the Wasatch formation. Although considered a confining unit, some fresh water wells are completed in the discontinuous water-bearing sands of the Wasatch Formation, but these water bearing intervals are considered to be localized.

Underlying the Wasatch Formation is the Cretaceous-aged Mesaverde aquifer. The depth to the top of this aquifer beneath the project area is more than 5,000 feet below ground surface (bgs), far too deep for economic development. The Mesaverde aquifer is of regional importance but does not provide recharge into the fresh water system within the shallower groundwater system of the project area.

Water quality of the upper Piceance Basin aquifer unit is relatively good, ranging in Total Dissolved Solid (TDS) levels from 500 to 1,000 milligrams per liter (mg/L). In the lower unit, TDS concentrations increase from 1,000 to 10,000 mg/L along basin flow paths. Waters with TDS values in excess of 1,000 mg/L are generally unsuitable for potable supply. Water suitable for drinking has a Federal secondary standard set at 500 mg/L or less (EPA 2006).

The quality of the water in the Mesaverde aquifer is highly variable, with concentrations of dissolved solids ranging from less than 1,000 mg/L in many of the basin-margin areas to more than 10,000 mg/L in the central part of the Piceance Basin (EPA 2004). In general, areas of the aquifer that are recharged by infiltration from precipitation or surface water sources contain relatively fresh water. However, water quality in the Piceance Basin is generally poor overall due to the presence of nahcolite deposits and salt beds found throughout the basin. Only a few aquifers such as those in the Wasatch Formation are used as sources of drinking water (Graham 2001, cited in EPA 2004).

A total of 28 permitted domestic water wells are located within a 1-mile radius of the proposed pads. The statuses of 18 permits are unknown. The remaining 10 wells range in depth from 115 to 450 feet, have static water levels at depths between 33 and 120 feet bgs and discharge rates between 6 and 15 gpm. The majority of these wells are located to the northwest and downgradient of the proposed pads. Furthermore, numerous fresh-water wells are located farther southwest, along the Divide Creek drainage, and farther north closer to and within the alluvium terraces of the Colorado River. It is recommended that all wells within a 0.25-mile radius should have base line water sampling prior to drilling.

### Environmental Consequences

#### *Proposed Action*

Potential impacts to groundwater resources from the proposed development would include contamination of the groundwater with produced water, drilling mud, and petroleum constituents. Fracing would be incorporated to create additional pathways to facilitate gas production. Agents called “proppants” used to prop open the fractures are mixed with both fresh water and produced water. Typical proppants include

sand, aluminum, glass, or plastic beads, with less than 1% of other compounds such as corrosion-, friction-, and scale-inhibitors (EnerMax Inc. 2007). Fracing techniques are used to create secondary porosity fractures, held open by proppants, allowing the trapped gas to migrate up the borehole for production. Hydraulic fracturing would be conducted at 5,000 feet or more bgs. 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 the cementing and casing programs are adequate to protect all downhole resources. This analysis shows that water wells are common in the project area, some within 0.25 mile of the proposed wellbores. Therefore, additional protection measures regarding casing depths would be instituted for all Federal wells and any Fee wells drilled from Federal land (see Appendix A). With the use of proper construction practices, drilling practices, and BMPs, no significant adverse impact to groundwater aquifers are anticipated.

#### *No Action Alternative*

For the No Action Alternative, the 16 proposed Federal wells would not be approved. However, BBC would drill, complete, and produce the proposed Fee wells from the proposed Fee surface locations. Therefore, impacts of the No Action Alternative on groundwater resources would be less than under the Proposed Action but not eliminated.

### **Wildlife, Aquatic and Terrestrial**

#### Affected Environment

##### *Aquatic Organisms*

Aquatic habitat is limited in the project area. No fish occur in Dry Hollow Creek, to which the project area drains, due to limited water flows. For the same reason, and a substrate primarily of silt and other fine sediments, Dry Hollow Creek is not known to support breeding by amphibians or the types of aquatic macroinvertebrates associated with perennial streams. Macroinvertebrates are expected to consist of the larvae of species tolerant of warm temperatures, low levels of dissolved oxygen, flashy flows, and a heavily silted streambed. Areas supporting riparian vegetation such as willows or cattails may also support invertebrates associated with surface waters in the adult stage, such as water striders and dragonflies.

##### *Mammals*

The site is located within winter range, severe winter range, and winter concentration area for mule deer (*Odocoileus hemionus*) and winter range, severe winter range, and winter concentration area for American elk (*Cervus elaphus*) as mapped by CPW (2010).

- 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 (CPW 2011).
- Severe winter range is that part of the overall range where 90% 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 (CPW 2010).
- Winter concentration areas are that part of the winter range where densities are at least 200% greater than the surrounding winter range density during the same period used to define winter

range in the average five winters out of ten (CPW 2010). Field surveys indicate that the project area is occupied winter range for elk and that mule deer occupy the proposed project area on a year-round basis.

Large carnivores present in the project area include the mountain lion (*Puma concolor*) and black bear (*Ursus americanus*). Mountain lions move seasonally to generally follow migrations of their preferred prey, mule deer. Two medium-sized carnivores, the coyote (*Canis latrans*) and bobcat (*Lynx rufus*), are also present in 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 red fox (*Vulpes vulpes*), ringtail (*Bassariscus astutus*) and spotted skunk (*Spilogale gracilis*).

Small mammals present within the project area include rodents such as the rock squirrel (*Spermophilus variegatus*), least chipmunk (*Neotamias minimus*), packrat (bushy-tailed woodrat)(*Neotoma cinerea*), and desert cottontail (*Sylvilagus audubonii*). Rodents and rabbits are the primary prey base for a variety of avian and mammalian predators.

### *Birds*

The wild turkey (*Meleagris gallopavo*) is native to North America and is the largest upland gamebird. Wild turkeys are omnivorous, foraging on the ground or climbing shrubs and small trees to feed. Turkeys prefer eating hard mast such as acorns, nuts, and various trees, including pinyon pine as well as various seeds, berries such as juniper and bearberry, roots and insects. Wild turkeys often feed in cow pastures and are also known to eat a wide variety of grasses. See the sections on Migratory Birds and Special Status Species for discussions of other birds in the area.

### *Reptiles and Amphibians*

Species most likely to occur include the western fence lizard (*Sceloporus undulatus*), plateau striped whiptail (*Cnemidophorus velox*), gopher snake (bullsnake) (*Pituophis catenifer*), and yellow-bellied racer (*Coluber constrictor*), all of which may be found in sagebrush shrublands, pinyon-juniper woodlands, and degraded pastures such as those in the project vicinity.

## Environmental Consequences

### *Proposed Action*

Total surface disturbance for the proposed construction would be 10.2 acres, reduced to approximately 2.9 acres following interim reclamation. In areas where shrubs and trees would be disturbed, impacts to wildlife from loss of thermal and/or hiding cover would be long-term, lasting the 20 to 30 or more years following final reclamation at the end of the productive life of the wells. Surface-disturbing activities within these habitats during the winter and during migratory seasons have the potential to displace mule deer and elk from these important habitats.

Construction activities, soil disturbance, and traffic could potentially spur the introduction and spread of weed species within the project area. Weed invasion and establishment has become an increasingly important concern associated with surface disturbing activities in the West. Weeds often outcompete native plant species, rendering an area less productive as a source of forage for wildlife. However, implementation of the suggested mitigation measures in the section on Invasive Non-Native Species would minimize the potential for invasion and establishment of the project area by undesirable plants.

Indirect impacts on wildlife, especially big game and raptors, would be 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 disturbances, or move to different areas screened by vegetation 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.

#### *No Action Alternative*

Under this alternative, the 16 proposed Federal wells would not be drilled, completed, and produced, but BBC would likely drill and complete 11 Fee wells from these proposed locations. Therefore, impacts of the No Action Alternative on terrestrial wildlife would be less the Proposed Action but not eliminated.

### **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 loss, habitat fragmentation, and decreased habitat effectiveness; (2) increased potential for runoff, erosion, and sedimentation; (3) expansion of noxious weeds and other invasive species; (4) increased fugitive dust from construction of oil and gas pads, roads, and pipelines and associated truck travel; (5) increased noise, especially along access and haul roads; (6) increased potential for spills and other releases of chemical pollutants; and (7) decreased scenic quality.

None of the cumulative impacts was described in the 1999 FSEIS (BLM 1999a) as significant, and the more recent air quality modeling published in 2011 also indicated no significant cumulative impacts on that resource. In addition, new technologies and regulatory requirements have reduced the impacts of some land uses. Nonetheless, the past, present, and reasonably foreseeable future actions of the type analyzed in this EA, and of other industrial uses, have had and would continue to have adverse effects on various elements of the human environment. Anticipated impacts for past, present, and future actions range from negligible to locally major, and primarily negative, for specific resources.

The primary bases for this assessment are twofold: First, the rate of development, particularly oil and gas development has generally been increasing in the area, resulting in an accelerated accumulation of individually nominal effects. Second, residential and commercial expansion, as well as most of the oil and gas development, has occurred on private lands where mitigation measures designed to protect and conserve resources may not be applied to the same extent as on BLM lands. Recent COGCC regulations have closed considerably the gap between the potential environmental impacts associated with development of private versus Federal fluid mineral resources.

The Proposed Action would contribute to the collective adverse impact for some resources. For example, direct and indirect habitat loss, traffic, noise, and air quality impacts of the Proposed Action are in addition to those associated with three other pads were recently analyzed and approved within 1 mile of the Proposed Action. These other pads, the Dixon SENW, Dixon SWNW, and Federal NENW, were analyzed in EA DOI-BLM-CO-N040-2011-0117, approved November 9, 2011. The impacts associated with the two pads analyzed in the current EA, although minor, would contribute incrementally to the collective impacts of the three nearby pads and other development within the larger CRVFO area.

**PERSONS AND AGENCIES CONSULTED**

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 Eclipse Surveying: Jim Kalmon

**INTERDISCIPLINARY REVIEW**

BLM staff who participated in the preparation of this EA are listed in Table 11.

<b>Table 11. BLM Interdisciplinary Team Authors and Reviewers</b>		
<i>Name</i>	<i>Title</i>	<i>Areas of Participation</i>
John Brogan	Archaeologist	Cultural Resources, Native American Religious Concerns
Vanessa Bull	Natural Resource Specialist	EA Project Lead, Access & Transportation, Socioeconomics, Wastes-Hazardous or Solid.
Allen Crockett, Ph.D.	Supervisory Natural Resource Specialist	NEPA Review
Bob Hartman	Petroleum Engineer	Downhole COAs
Shauna Kocman, Ph.D.	Hydrologist	Air Quality, Noise, Soils, Surface Water, Waters of the U.S.
Julie McGrew	Natural Resource Specialist	Visual Resources
Judy Perkins, Ph.D.	Botanist	Invasive Non-native Species, Special-status Species (Plants), Vegetation
Sylvia Ringer	Wildlife Biologist	Migratory Birds, Special-status Species (Animals), Wildlife, Aquatic and Terrestrial
Todd Sieber	Geologist	Geology and Minerals, Groundwater.

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## **APPENDIX A**

### **Surface-Use and Downhole Conditions of Approval**

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## **SURFACE-USE CONDITIONS OF APPROVAL**

### **STANDARD COAS APPLICABLE TO ALL ACTIVITIES FOR EA #DOI-BLM-CO-N040-2012-0080**

The following standard surface-use COAs are in addition to all stipulations attached to the respective Federal leases and to any site-specific COAs for individual well pads. In cases of discrepancies, the following COAs supersede earlier versions.

1. Administrative Notification. The operator shall notify the BLM representative at least 48 hours prior to initiation of construction. If requested by the BLM representative, the operator shall schedule a pre-construction meeting, including key operator and contractor personnel, to ensure that any unresolved issues are fully addressed prior to initiation of surface-disturbing activities or placement of production facilities.
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 Colorado West Regulatory Branch at 970-243-1199 ext. 17.

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 Colorado West Regulatory Branch at 970-243-1199 ext. 17. Copies of any printed or emailed approved USACE permits or verification letters shall be forwarded to the BLM.

6. Wetlands and Riparian Zones. The operator shall restore temporarily disturbed wetlands or riparian areas. The operator shall consult with the BLM Colorado River Valley Field Office to determine appropriate mitigation, including verification of native plant species to be used in restoration.
7. 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 plans, 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 1 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 number 19) 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.

If directed by the BLM, the operator shall implement measures following seedbed preparation (when broadcast-seeding or hydroseeding is to be used) to create small depressions to enhance capture of moisture and establishment of seeded species. Depressions shall be no deeper than 1 to 2 inches and shall not result in piles or mounds of displaced soil. Excavated depressions shall not be used unless approved by the BLM for the purpose of erosion control on slopes. Where excavated depressions are approved by the BLM, the excavated soil shall be placed only on the downslope side of the depression.

If directed by the BLM, the operator shall conduct soil testing prior to reseeding to identify if and what type of soil amendments may be required to enhance revegetation success. At a minimum, the soil tests shall include texture, pH, organic matter, sodium adsorption ratio (SAR), cation exchange capacity (CEC), alkalinity/salinity, and basic nutrients (nitrogen, phosphorus, potassium [NPK]). Depending on the outcome of the soil testing, the BLM may require the operator to submit a plan for soil amendment. Any requests to use soil amendments not directed by the BLM shall be submitted to the CRVFO for approval.

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

- 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 April 6, 2012). 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% by weight of other weed seeds. Seed may contain up to 2 % 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 reseeding 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% 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.

8. 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 Pesticide Application Record (PAR) forms and weed monitoring reports shall be submitted to BLM by **December 1**.

9. Big Game Winter Range Timing Limitation. Federal lease COC15976 does not have a timing limitation associated with it. However, to minimize impacts to wintering big game, a 60-day big game winter range Timing Limitation (TL) is applied to this project to prohibit construction, drilling, or completion activities during the period **January 1 to March 1** of each year. The BLM also recommends that operations conducted outside the TL period but during the months of December through April be limited to the hours of 9 a.m. and 3 p.m. to the extent practicable.
10. 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. To minimize this potential, a 60-day TL is applied to the project to prohibit construction, drilling, or completion activities during the period **March 1 to May 1**. If such activities are planned outside this TL period and within 0.5 mile of a bald or golden eagle nest, or greater than that distance but with the potential to result in disturbance of nesting eagles, shall be coordinated with the BLM wildlife biologist and the USFWS representative to the BLM Field Office (970-876-9051). The CRVFO may grant an exception to this TL for any golden eagle breeding season in which the nest is not active, but consistent with the general raptor nesting TL (COA #11).
11. Raptor Nesting (General). Raptor surveys documented three nest structures within 0.25 mile of a well pad in addition to the golden eagle nest addressed in COA #10 above. As a result of the presence of these nest structures, a 60-day TL is applied to the project to prohibit initiation of construction, drilling, or completion activities during the period **May 1 to July 1**. The operator is responsible for complying with the MBTA, which prohibits the “take” of birds or of active nests (those containing eggs or young), including nest failure caused by human activity (see COA #12 for Migratory Birds, below). An exception may be granted in any breeding season in which no raptor nest is active within 0.25 mile of any project activity with the potential to interfere with nesting or result in nest failure.
12. Birds of Conservation Concern. Pursuant to BLM Instruction Memorandum 2008-050, initiation of vegetation removal and other surface-disturbing activities is prohibited from **May 1 to July 1** to reduce impacts to Birds of Conservation Concern (BCC). An exception to this TL will be granted if nesting surveys conducted no more than 1 week prior to surface-disturbing activities indicate that no BCC species are nesting within 30 meters (100 feet) of the area to be disturbed. Nesting shall be deemed to be occurring if a territorial (singing) male is present within the distance specified above. 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 1 and continue into the 60-day period at the same location.
13. Migratory Birds (General). 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, which includes injury and direct mortality resulting from human actions not intended to have such result. To minimize the

potential for the take of a migratory bird, the operator shall take reasonable steps to prevent use by birds of fluid-containing pits associated with oil or gas operations, including but not limited to reserve pits, produced-water pits, hydraulic fracturing flowback pits, evaporation pits, and cuttings trenches. Liquids in these pits—whether placed or accumulating from precipitation—may pose a risk to birds as a result of ingestion, absorption through the skin, or interference with buoyancy and temperature regulation.

Based on low effectiveness of brightly colored flagging or spheres suspended over a pit, the operator shall install netting with a mesh size of 1 to 1.5 inches, and suspended at least 4 feet above the fluid surface, on all pits into which fluids are placed, except for storage of fresh water in a pit that contains no other material. The netting shall be installed within 24 hours following fluids release. In addition, oil slicks and oil sheens shall be promptly skimmed off the fluid surface. The requirement for prompt skimming of oil slicks and oil sheens also applies to cuttings trenches in which precipitation has accumulated. To minimize the potential for violation of the MBTA, the BLM recommends installation of netting at cuttings trenches left open for more than 24 hours following cessation of drilling and completion activities during a continuous development cycle on a pad. The recommendation for prompt netting does not apply to cuttings trenches during periods of active manipulation for cuttings management, remediation of contaminated materials, or other purposes.

All mortality or injury to birds shall be reported immediately to the BLM project lead and to the USFWS representative to the BLM Field Office at 970-243-2778 x28 and visit <http://www.fws.gov/mountain-prairie/contaminants/oilpits.htm>.

14. 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.
15. Ips Beetle. To avoid mortality of pinyon pines due to infestations of the *Ips* beetle, any pinyon trees damaged during road, pad, or pipeline construction shall be chipped after being severed from the stump or grubbed from the ground, buried in the toe of fill slopes (if feasible), or cut and removed from the site within 24 hours to a location approved by the Colorado State Forest Service.
16. 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.

17. 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).

18. Visual Resources. Existing vegetation shall be preserved when clearing and grading for pads, roads, and pipelines. The BLM may direct that cleared trees and rocks be salvaged and redistributed over reshaped cut-and-fill slopes or along linear features.

Production facilities shall be placed to avoid or minimize visibility from travel corridors, residential areas, and other sensitive observation points—unless directed otherwise by the BLM due to other resource concerns—and shall be placed to maximize reshaping of cut-and-fill slopes and interim reclamation of the pad. Above-ground facilities shall be painted **Shadow Gray** to minimize contrast with adjacent vegetation or rock outcrops.

19. 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.
20. Reserve Pit. A minimum of 2 feet of freeboard shall be maintained in the reserve pit. Freeboard is measured from the highest level of drilling fluids and cuttings in the reserve pit to the lowest surface elevation of ground at the reserve pit perimeter.
21. Requirement for self-contained flare unit. The operator shall use a flare system while drilling which contains fluids and has self-ignition to flare hydrocarbons generated during drilling.
22. Noise Abatement. If on-pad compressors or water disposal wells are proposed in the future, the CRVFO may require submittal of a noise abatement plan and implementation of such measures as necessary to minimize potential adverse impacts of the noise on wildlife.
23. Interim Reclamation Related to Multiple Drilling Phases. Within 1 year of completion of the initial development wells in the first cellarhole configuration or within 1 year of completion of all development wells on a pad (whichever situation arises), the operator shall stabilize the disturbed area by recontouring, mulching, installing runoff and erosion controls, replacing topsoil as directed, and seeding with a BLM-prescribed native seed mix (or landowner-requested seed mix on privately owned or State-owned surface), and conducting weed control as necessary. In cases where the development drilling is conducted in phases on a single pad with periods of inactivity 1 year or longer in duration, slopes shall be recontoured to the extent necessary to accommodate seeding, and seed mixes required by BLM shall be applied to stabilize the soil between visits per direction of the BLM.

#### **Site-Specific COAs Applicable to the CBC 1 Pad**

1. The operator shall treat all State List B noxious weeds within the area of ground disturbance prior to project implementation.

#### **Site-Specific COAs Applicable to the CBC 2 Pad**

1. The operator shall treat all State List B noxious weeds within the area of ground disturbance prior to project implementation.
2. The operator shall construct the pad to provide the best possible mitigation of visual and noise impacts to adjacent residents.
3. The operator shall comply with the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act.

**DOWNHOLE CONDITIONS OF APPROVAL  
Applications for Permit to Drill**

**Company/Operator: Bill Barrett Corporation**

**CBC 1 Pad**

**Well Pad Surface Location:** Garfield County, SESW, Section 22, T6S, R92W

1. Twenty-four hours *prior* to (a) spudding, (b) conducting BOPE tests, (c) cementing/running casing strings, and (d) within 24 hours *after* spudding, the CRVFO shall be notified. One of the following CRVFO 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; Greg Rios, PET; Alex Provstgaard, PET; and Tim Barrett, 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. Contact Peter Cowan at 970-876-9049 or Bob Hartman at 970-244 3041 (office) or 970-210-2374 (cell) for verbal approvals.
3. If a well control issue or failed test (e.g. kick, blowout, water flow, casing failure, or a bradenhead pressure increase) arises during drilling or completions operations, Bob Hartman at 970-244 3041 (office) or 970-210-2374 (cell) shall be notified within 24 hours from the time of the event. IADC/Driller's Logs and Pason Logs (mud logs) shall be forwarded to CRVFO – Petroleum Engineer, 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 No. 2 for a 3M system and recorded in the IADC/Driller's log. A casing head rated to 3,000 psi or greater shall be utilized.
5. Flexible choke lines shall meet or exceed the API SPEC 16C requirements. Flexible choke lines shall be effectively anchored, have flanged connections, and configured to the manufacturer's specifications. Manufacturer specifications shall be kept with the drilling rig at all times and immediately supplied to the authorized officer/inspector upon request. Specifications at a minimum shall include acceptable bend radius, heat range, anchoring, and the working pressure. All flexible choke lines shall be free of gouges, deformations, and as straight/short as possible.
6. 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.
7. 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.
8. 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 wellhead 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.

9. After the surface/intermediate casing is cemented, a Pressure Integrity Test/Mud Equivalency Test/FIT shall be performed on the first well drilled in accordance with OOGO No. 2; Sec. III, B.1.i. to ensure that the surface/intermediate 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 highest anticipated mud weight equivalent necessary to control the formation pressure to the next casing shoe depth or TD. Submit the results from the test via email (bhartman@blm.gov) on the first well drilled on the pad or any horizontal well and record results in the IADC log. Report failed test to Bob Hartman at 970-244 3041 (office) or 970-210-2374 (cell). A failed pressure integrity test is more than 10% pressure bleed off in 15 minutes.
10. As a minimum, cement shall be brought to surface. After WOC for the production casing, a CBL shall be run to verify the TOC and an electronic copy in .las and .pdf format shall be submitted to CRVFO – Petroleum Engineer, 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 Formation /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.
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 – Todd Sieber, 2300 River Frontage Road, Silt, CO 81652. Contact Todd Sieber at 970-876-9000 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 CFR 3160-9 (a).
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, Bob Hartman 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. During hydraulic frac operations, monitor the bradenhead/casing head pressures throughout the frac job. Frac operations shall be terminated upon any sharp rise in annular pressure (+/- 40 psi or greater) in order to determine well/wellbore integrity. Notify BLM Bob Hartman at 970-244 3041 (office) or 970-210-2374 (cell) immediately.
15. Per 43 CFR 3162.4-1(c), not later than the 5<sup>th</sup> 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.

## **CBC 2 Pad**

**Well Pad Surface Location:** Garfield County; NESE, Section 22, T6S, R92W

1. Twenty-four hours *prior* to (a) spudding, (b) conducting BOPE tests, (c) cementing/running casing strings, and (d) within 24 hours *after* spudding, the CRVFO shall be notified. One of the following CRVFO 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; Greg Rios, PET; Alex Provstgaard, PET; and Tim Barrett, 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. Contact, Bob Hartman at 970-244 3041 (office) or 970-210-2374 (cell) or Peter Cowan at 970-867-9049 (office) or 970-309-8548 (mobile) for verbal approvals.
3. If a well control issue or failed test (e.g. kick, blowout, water flow, casing failure, or a bradenhead pressure increase) arises during drilling or completions operations, Bob Hartman at 970-244 3041 (office) or 970-210-2374 (cell) or Peter Cowan at 970-867-9049 (office) or 970-309-8548 (mobile) shall be notified within 24 hours from the time of the event. IADC/Driller's Logs and Pason Logs (mud logs) shall be forwarded to CRVFO – Petroleum Engineer, 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 No. 2 for a **3M** system and recorded in the IADC/Driller's log. A casing head rated to 3,000 psi or greater shall be utilized.
5. Flexible choke lines shall meet or exceed the API SPEC 16C requirements. Flexible choke lines shall be effectively anchored, have flanged connections, and configured to the manufacturer's specifications. Manufacturer specifications shall be kept with the drilling rig at all times and immediately supplied to the authorized officer/inspector upon request. Specifications at a minimum shall include acceptable bend radius, heat range, anchoring, and the working pressure. All flexible choke lines shall be free of gouges, deformations, and as straight/short as possible.
6. 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.
7. 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.
8. 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 wellhead 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.

9. After the surface/intermediate casing is cemented, a Pressure Integrity Test/Mud Equivalency Test/FIT shall be performed on the first well drilled in accordance with OOGO No. 2; Sec. III, B.1.i. to ensure that the surface/intermediate 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 highest anticipated mud weight equivalent necessary to control the formation pressure to the next casing shoe depth or TD. Submit the results from the test via email (picowan@blm.gov) on the first well drilled on the pad or any horizontal well and record results in the IADC log. Report failed test to Bob Hartman at 970-244 3041 (office) or 970-210-2374 (cell) or Peter Cowan at 970-867-9049 (office) or 970-309-8548 (mobile). A failed pressure integrity test is more than 10% pressure bleed off in 15 minutes.
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 shall be submitted to CRVFO – Petroleum Engineer, 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 Formation /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.
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 – Todd Sieber, 2300 River Frontage Road, Silt, CO 81652. Contact Todd Sieber at 970-876-9000 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 CFR 3160-9 (a).
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, Bob Hartman or Peter Cowan 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. During hydraulic frac operations, monitor the bradenhead/casing head pressures throughout the frac job. Frac operations shall be terminated upon any sharp rise in annular pressure (+/- 40 psi or greater) in order to determine well/wellbore integrity. Notify BLM Bob Hartman at 970-244 3041 (office) or 970-210-2374 (cell) or Peter Cowan at 970-876-9049 (office) or 970-309-8548 (mobile) immediately.
15. Per 43 CFR 3162.4-1(c), no later than the 5<sup>th</sup> 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.

<b>Proposed Pads</b>	<b>Proposed Wells</b>	<b>Surface Locations</b>	<b>Bottomhole Locations</b>
CBC 1	23A-22-692	T6S R92W, Section 22 SESW, 1,175 feet FSL, 2,499 feet FWL	T6S R92W, Section 22 NESW 1,356 feet FSL, 1,980 feet FWL
	23B-22-692	T6S R92W, Section 22 SESW, 1,184 feet FSL, 2,510 feet FWL	T6S R92W, Section 22 NESW 1,723 feet FSL, 1,980 feet FWL
	23C-22-692	T6S R92W, Section 22 SESW, 1,195 feet FSL, 2,501 feet FWL	T6S R92W, Section 22 NESW 2,091 feet FSL, 1,980 feet FWL
	23D-22-692	T6S R92W, Section 22 SESW, 1,194 feet FSL, 2,511 feet FWL	T6S R92W, Section 22 NESW 2,459 feet FSL, 1,980 feet FWL
CBC 2	32A-22-692	T6S R92W, Section 22 NESE, 1,791 feet FSL, 1,224 feet FEL	T6S R92W, Section 22 SWNE 2,489 feet FNL, 1,980 feet FEL
	32B-22-692	T6S R92W, Section 22 NESE, 1,807 feet FSL, 1,224 feet FEL	T6S R92W, Section 22 SWNE 2,158 feet FNL, 1,980 feet FEL
	32C-22-692	T6S R92W, Section 22 NESE, 1,823 feet FSL, 1,224 feet FEL	T6S R92W, Section 22 SWNE 1,828 feet FNL, 1,980 feet FEL
	32D-22-692	T6S R92W, Section 22 NESE, 1,823 feet FSL, 1,214 feet FEL	T6S R92W, Section 22 SWNE 1,498 feet FNL, 1,980 feet FEL
	33A-22-692	T6S R92W, Section 22 NESE, 1,727 feet FSL, 1,224 feet FEL	T6S R92W, Section 22 NWSE 1,468 feet FSL, 1,980 feet FEL
	33B-22-692	T6S R92W, Section 22 NESE, 1,743 feet FSL, 1,224 feet FEL	T6S R92W, Section 22 NWSE 1,799 feet FSL, 1,980 feet FEL
	33C-22-692	T6S R92W, Section 22 NESE, 1,759 feet FSL, 1,224 feet FEL	T6S R92W, Section 22 NWSE 2,129 feet FSL, 1,980 feet FEL
	33D-22-692	T6S R92W, Section 22 NESE, 1,775 feet FSL, 1,224 feet FEL	T6S R92W, Section 22 NWSE 2,460 feet FSL, 1,980 feet FEL
	43A-22-692	T6S R92W, Section 22 NESE, 1,759 feet FSL, 1,214 feet FEL	T6S R92W, Section 22 NESE 1,440 feet FSL, 660 feet FEL
	43B-22-692	T6S R92W, Section 22 NESE, 1,775 feet FSL, 1,214 feet FEL	T6S R92W, Section 22 NESE 1,774 feet FSL, 660 feet FEL
	43C-22-692	T6S R92W, Section 26 NESE, 1,791 feet FSL, 1,214 feet FEL	T6S R92W, Section 22 NESE 2,107 feet FSL, 660 feet FEL
	43D-22-692	T6S R92W, Section 22 NESE, 1,807 feet FSL, 1,214 feet FEL	T6S R92W, Section 22 NESE 2,441 feet FSL, 660 feet FEL

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# FONSI

## DOI-BLM-CO-N040-2012-0080-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 (FONSI) 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.

RATIONALE: The bases for this decision are as follows:

1. This decision will provide for the orderly, economical, and environmentally sound exploration and development of oil and gas resources on Federal oil and gas leases.
2. Approval of the Proposed Action validates the rights granted with the Federal oil and gas leases to develop the leasehold to provide commercial commodities of oil and gas.
3. Environmental impacts will be avoided or minimized through protective lease stipulations and by the best management practices and mitigation measures included in the Proposed Action or otherwise applied and enforced by BLM as Conditions of Approval (COAs).
4. This decision does not authorize the initiation of surface-disturbing activities on BLM lands or the development of new Federal oil and gas wells on new or existing well pads. Surface-disturbing activities on BLM lands and development of Federal wells will not commence until approval by BLM of Applications for Permits to Drill (APDs) or issuance by BLM of right-of-way grants pursuant to this EA.

MITIGATION MEASURES: Mitigation measures presented in Appendix A of the EA will be incorporated as COAs for both surface and drilling operations and attached to APDs for the Federal wells drilled on the proposed well pads. These measures include specific protections relative to an active golden eagle nest located in proximity to the project area.

NAME OF PREPARER: Vanessa Bull, Natural Resource Specialist

SIGNATURE OF AUTHORIZED OFFICIAL:



Allen B. Crockett, Ph.D., J.D.  
Supervisory Natural Resource Specialist

DATE: Aug. 24, 2012