

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

ENVIRONMENTAL ASSESSMENT

NEPA NUMBER

DOI-BLM-CO-N040-2014-0001-EA

CASEFILE NUMBER

Federal Oil and Gas Lease COC24603

PROJECT NAME

Proposal to Drill Three Federal Horizontal Wells from the Existing MV 28-4 Pad Located on BLM Land in the Riley Gulch Area Northwest of Parachute, Garfield County, Colorado.

PAD LOCATION

Township 7 South (T7S), Range 96 West (R96W), Section 4, Lot 5, SW $\frac{1}{4}$ NW $\frac{1}{4}$, SW $\frac{1}{4}$ NE $\frac{1}{4}$, Sixth Principal Meridian. The project would be located approximately 4.7 miles northwest of Parachute, Garfield County, Colorado within the Riley Gulch drainage (Figure 1).

APPLICANT

WPX Energy Rocky Mountain LLC (“WPX”). Contact: Greg Davis, 1001 Seventeenth Street, Suite 1200, Denver, Colorado 80202.

PURPOSE AND NEED FOR THE ACTION

The purpose and need of the Proposed Action is to analyze WPX’s proposal to drill three horizontal exploratory wells from the MV 28-4 pad and develop Federal lease COC24603 to the benefit of the public by producing Federal fluid mineral resources (natural gas, liquid condensate, and associated petroleum hydrocarbons) currently trapped within the target geologic formation.

BACKGROUND

The MV 28-4 well pad with six producing Federal oil and gas wells was originally analyzed and approved in the Environmental Assessment (EA) for the South Grand Valley Geographic Area Plan (SGVGAP) #CO-140-2004-0034-EA, signed on April 13, 2004 (BLM 2004). The MV 28-4 well was initially spudded on May 28, 1993, with first sales occurring in July 1993. A subsequent well was drilled and produced in 2002 during a second drilling visit. The 2004 SVGAP EA analyzed a third follow-up drilling visit with four Federal wells drilled and completed in 2006. The interim reclamation of the MV 28-4 pad was accomplished in 2008-2009 with marginal success in the reestablishment of desirable vegetation on portions of the reclaimed pad area.

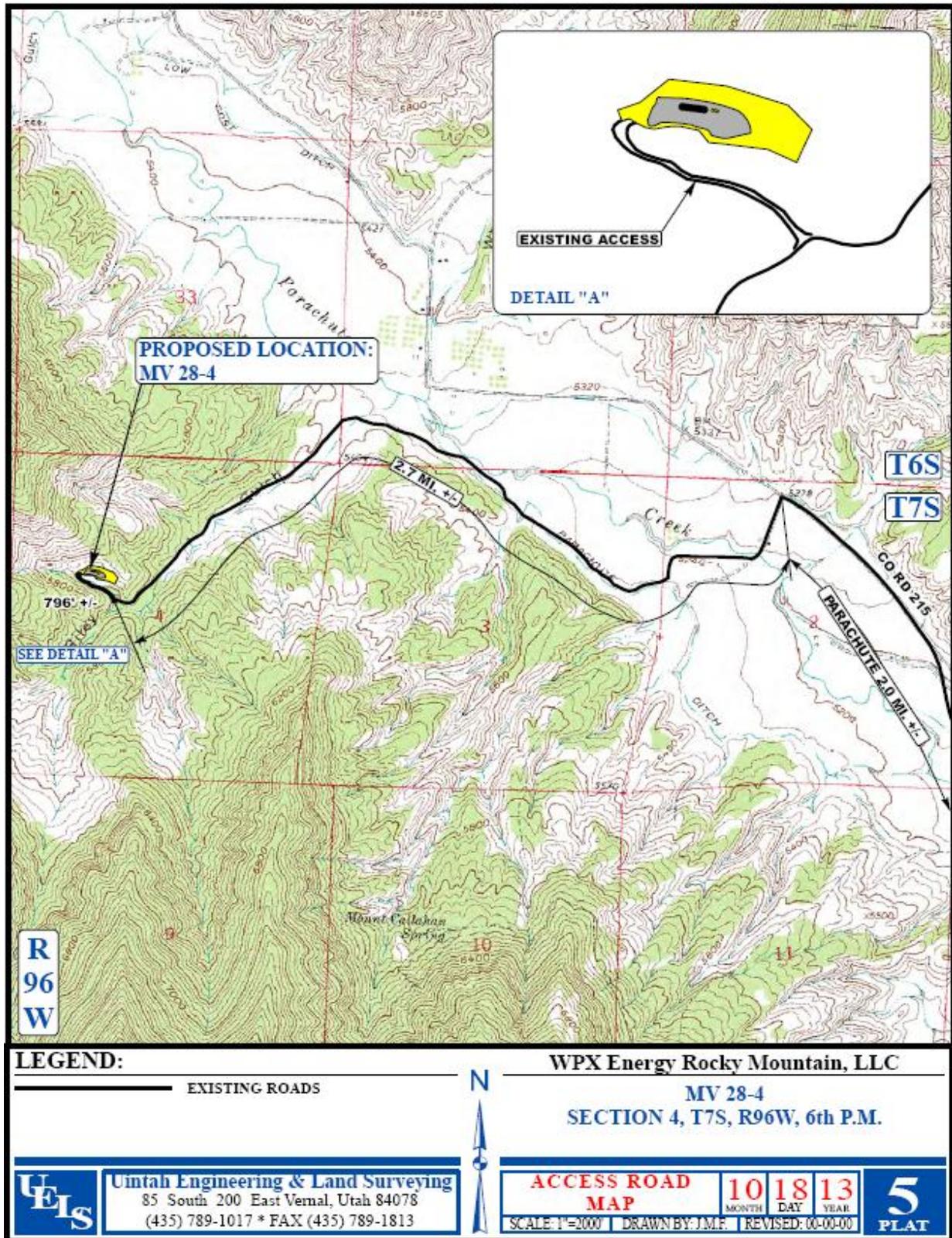


Figure 1. Project Location Map

Since 2012, WPX Energy Rocky Mountain LLC (WPX, formerly Williams Production RMT Company) has drilled two horizontal exploratory wells in the Riley Gulch drainage. WPX has chosen the MV 28-4 location specifically to allow these subsequent exploratory horizontal wells to be located in proximity to the initial exploratory wells to further enhance their knowledge and efficiently develop the Niobrara formation.

ALTERNATIVES

Proposed Action

WPX proposes to drill and develop three new Federal oil and gas wells from the expanded MV 28-4 well pad located on BLM. The Federal wells would be horizontally drilled into underlying Federal lease COC24603. The MV 28-4 pad presently supports six producing Federal wells. The MV 28-4 pad would be expanded to provide space to conduct the horizontal well drilling and completion and stage the associated production equipment on the pad site (Figure 2). The pad expansion would have a maximum cut of 39.1 feet at the northeastern corner and a maximum 9.9 feet of fill along the southern edge.

The MV 28-4 project would involve the following components:

- (1) Expanding the MV 28-4 pad from its 1.75-acre reclaimed area to a 5.72-acre disturbance footprint to provide working space for drilling, completion and well production operations and storage space for excess material from the pad reconstruction (Figures 2 and 2a) and installing a boulder retaining wall along portions of the southern edge of the pad (Figure 2b).
- (2) Hauling approximately 10,000 cubic yards of excess material generated from the MV 28-4 pad expansion to the proposed Riley Gulch Frac Pad (distance of 1 mile) for storage and use on future projects (Figure 3).
- (3) Drilling the three Federal wells horizontally into the underlying Federal lease.
- (4) Hauling and storing drill cuttings from the wellbores on the nearby GM 41-4 pad (Figure 3).
- (5) Conducting well completion operations on the MV 28-4 pad after the drilling is finished and rig is demobilized. Water storage for the completion work would be staged on the nearby GM 32-4 pad. Two existing 10-inch diameter poly surface pipelines (2,164 feet in length) laid between the GM 41-4 and GM 32-4 pads would continue to deliver water to the GM 32-4 pad in support of the MV 28-4 well completion work (Figure 3).
- (6) Laying 1,846 feet of 7-inch diameter steel surface frac line along the Riley Gulch Road west of the GM 32-4 pad and then cross-country across the eastern portion of the MV 28-4 pad would deliver the pressurized water to the frac jobs conducted on the MV 28-4 pad (Figure 3).
- (7) Burying 862 feet of new 8-inch steel gas pipeline in a 20- to 25-foot wide corridor within the MV 28-4 access road and connecting with existing trunk line along the Riley Gulch Access Road (Figure 3).
- (8) Burying 976 feet of new 4-inch diameter Flexsteel production water line from the MV 28-4 pad to the water line connection point at beginning of the MV 28-4 road (water line to be co-located in new gas line trench) (Figure 3).
- (9) Reclaiming (interim) the MV 28-4 pad to a working area footprint of 1.43 acres for the operating period of the producing wells including the implementation interim reclamation practices and excavation work to recontour the pad.

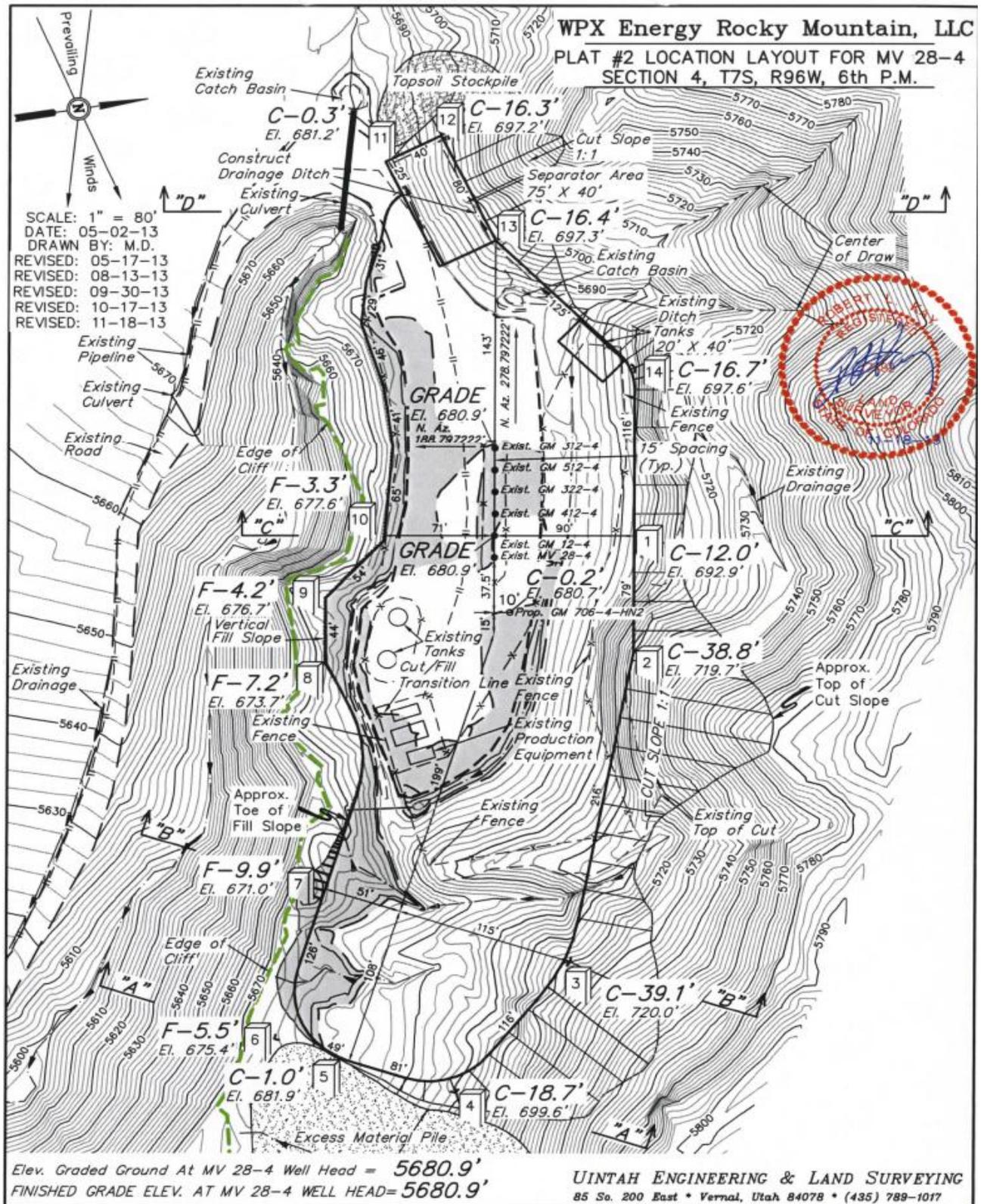


Figure 2. MV 28-4 Expanded Pad Construction

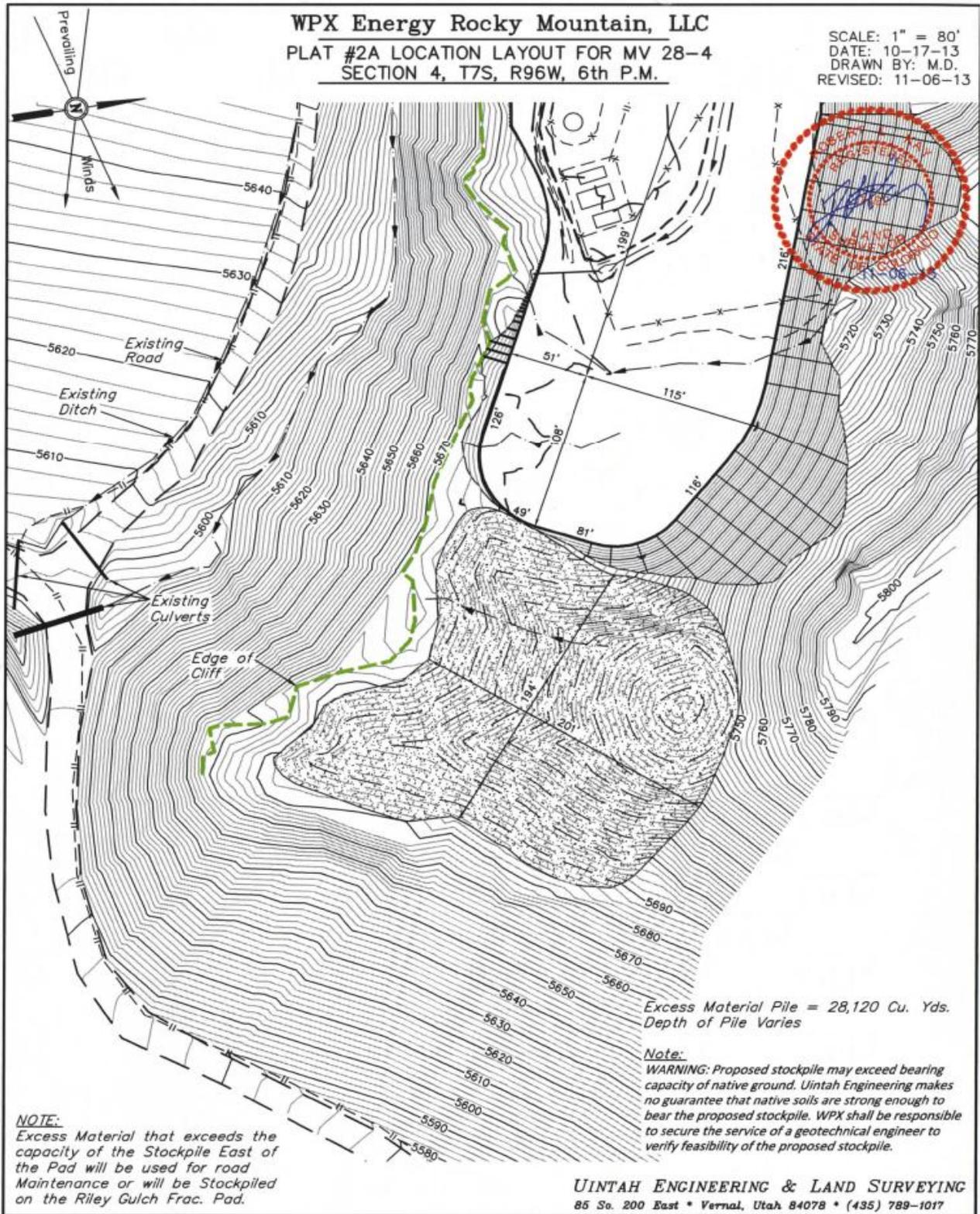


Figure 2a. MV 28-4 Expanded Pad Construction

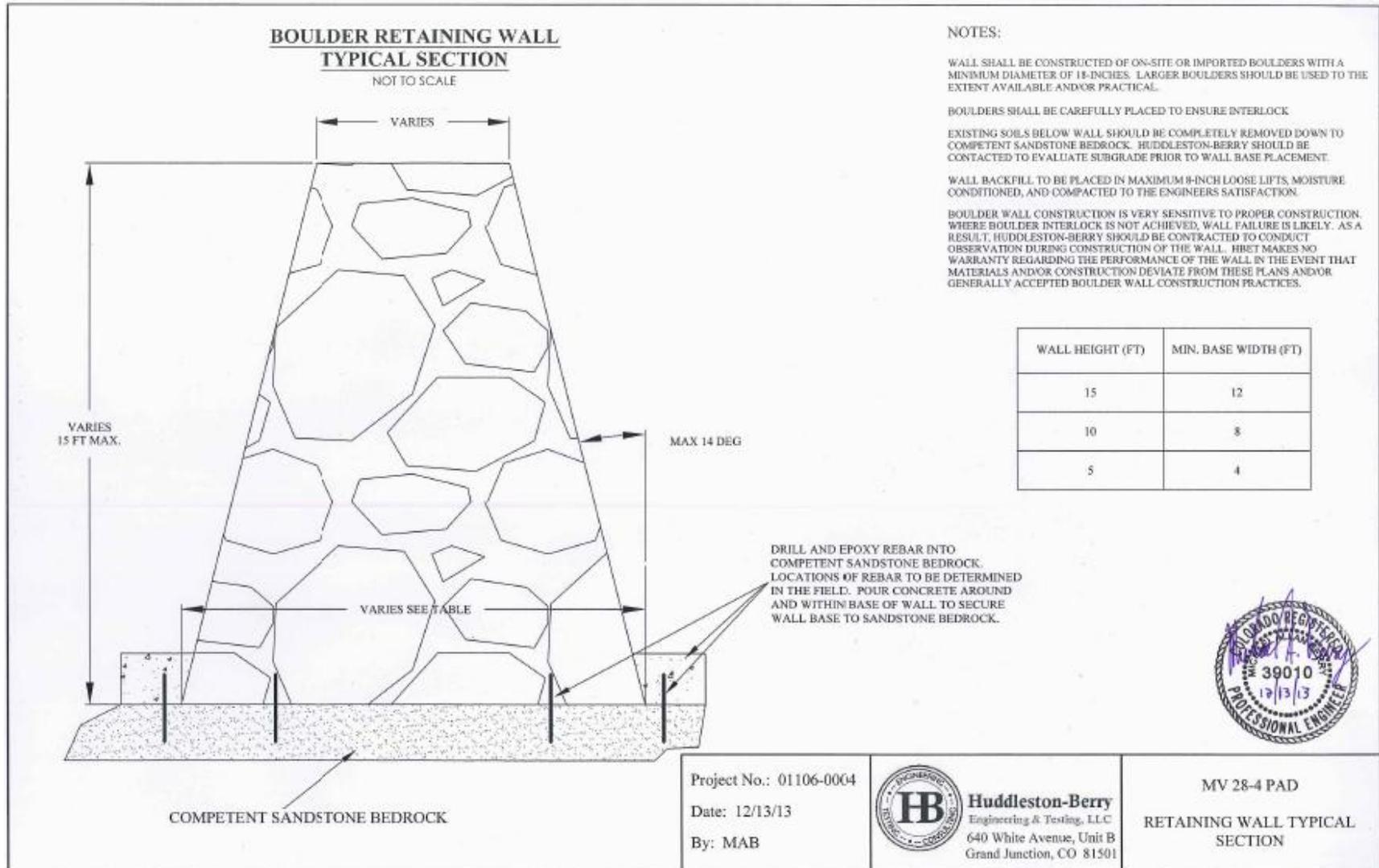
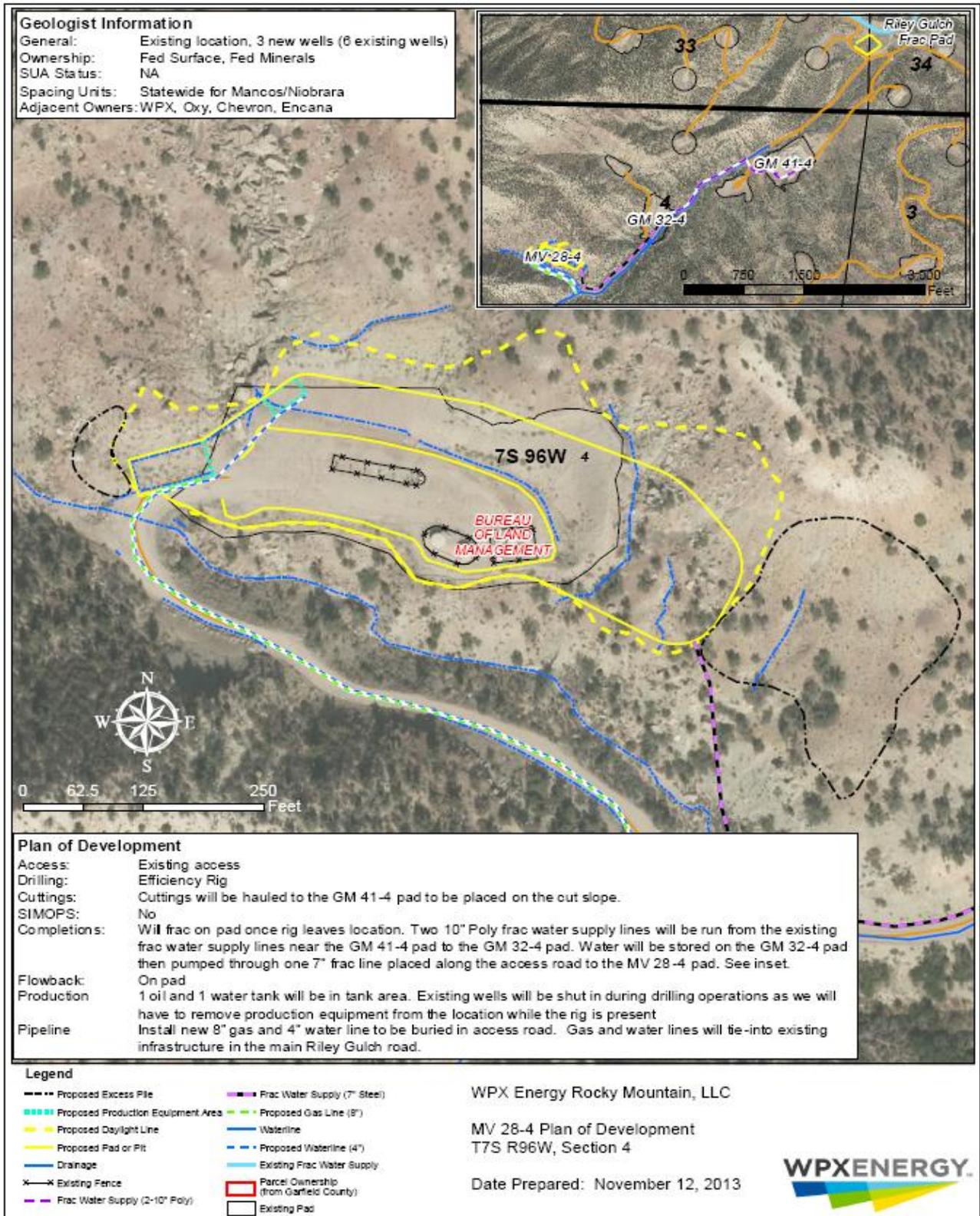


Figure 2b. Boulder Retaining Wall Schematic Drawing



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Figure 3. MV 28-4 Plan of Development

The total surface disturbance associated with this project would be 6.28 acres, comprising 3.97 acres of new surface disturbance and 2.31 acres of existing disturbed or redisturbed areas (Table 1). All of the project disturbance would occur on BLM land. After interim reclamation of the pad and reclamation of temporarily disturbed areas along the roads and pipeline, long-term disturbance on BLM would amount to 2.04 acres.

Table 1. Project Surface Disturbance (initial/long-term acres)			
<i>New Disturbance</i>	<i>Private</i>	<i>BLM</i>	<i>Total</i>
Expanded MV 28-4 Pad	--	3.97/0.12	3.97/0.12
Subtotal	--	3.97/0.12	3.97/0.12
<i>Existing Disturbance</i>	<i>Private</i>	<i>BLM</i>	<i>Total</i>
Existing MV 28-4 Pad	--	0.70/0.69	0.70/0.69
Existing MV 28-4 Road	--	0.09/0.08	0.09/0.08
New Gas & Water Lines in Access Road	--	0.56/0.56	0.56/0.56
Subtotal	--	1.35/1.33	1.35/1.33
<i>Redisturbance</i>	<i>Private</i>	<i>BLM</i>	<i>Total</i>
MV 28-4 Pad	--	0.96/0.59	0.96/0.59
Subtotal	--	0.96/0.59	0.96/0.59
TOTAL DISTURBANCE	0.00	6.28/2.04	6.28/2.04

To provide working space for drilling, completion and production operations and create a storage area for about 28,000 cubic yards of the nearly 35,000 extra cubic yards developed during the pad reconstruction, the MV 28-4 pad would be expanded primarily along its northern and eastern edges to a drilling footprint of 5.72 acres (Figures 2 and 2a). The previously analyzed Riley Gulch frac pad, approved by the Colorado Oil and Gas Conservation Commission (COGCC) and located at the base of Riley Gulch on WPX-owned land (T6S R96W Section 34, Lot 11), would be the auxiliary storage site for the remaining excess material from the pad expansion work (Figure 3). The Riley Gulch frac pad was identified and analyzed in the GM 41-4 project in 2012 (EA #DOI-BLM-CO-N040-2012-0061).

A rock wall structure would be constructed in segments between Corners 6 and 10 along the southern edge of the pad to provide vital pad working space while containing any fillslope material from falling into the drainage below (Figure 2). The wall would have an excavated base or footer made of large boulders and cement with interlocking boulders placed above the base course to create the retaining wall structure. Large sandstone boulders within and adjacent to the project site would be gathered and broken or shaped into pieces with a track-mounted hammer-hoe to develop the stacked boulders for the wall.

The existing access road to the pad would be suitable for traffic related to this drilling visit. The new buried gas and water collection lines to be co-located in the same trench within the existing access road would not result in new surface disturbance since the trenching would be in the roadway. Various surface lines (poly and steel) would be laid along existing Riley Gulch access road to deliver and collect water for the well completion operations. The six producing wells on the pad would be shut-in and the associated separators and tanks would be removed during the drilling visit. Cuttings generated from the well drilling would be hauled and stored on the GM 41-4 pad. Cuttings would be tested to ensure compliance with COGCC Table 910-1 standards prior to reclamation on the GM 41-4 pad.

Topsoil would be stripped during the initial earthwork, windrowed where possible, in available locations around the pad perimeter, and designed to serve as storm water controls. Diversion ditches would be

constructed to direct surface flow around the pad perimeter; pad grading and surfacing with gravel would be accomplished to direct runoff to the diversion ditches and avoid water ponding on the pad surface.

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 minimum 6-inch depth of gravel would be applied to the main Riley Gulch access road west of GM 32-4 pad and along the existing MV 28-4 access spur road after the installation of the new gas and water lines. A road maintenance program would be required during the production phase of the well 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 well drilling and well completions, production of natural gas and associated liquid condensate, proper handling and disposal of produced water, and interim and final reclamation. Water for drilling and well completion operations would be trucked from approved sources via existing State, County, and/or fee lease roads.

The Proposed Action would be implemented consistent with the Federal oil and gas lease, Federal regulations (43 CFR 3100), and the operational measures included in the Applications for Permit to Drill (APDs). The Conditions of Approval (COAs) to be implemented as conservation measures for this project are listed in Appendix A. The operator would be responsible for continuous inspection and maintenance of the access roads, pads, and pipelines.

Resource surveys, including those for cultural resources, nesting raptors, and special status plants and animals, were completed in conjunction with the planning for this project. An updated biological report for the pad location and surroundings was conducted in May 2013 (WWE 2013).

No Action Alternative

The No Action Alternative would constitute denial of the Federal APDs described in the Proposed Action, meaning that the proposed Federal wells would not be drilled or developed, the MV 28-4 pad expansion would not occur, and the installation of the buried gas and water pipelines and surface frac water lines would not be needed. No new surface disturbances on BLM land would be necessary. However, the six producing Federal wells would continue to be maintained and operated. Future levels of activity at the pad would be projected to be the same as they are at present.

PLAN CONFORMANCE REVIEW

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

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

Decision Language: The 1991 Oil and Gas Plan Amendment (BLM 1991) included the following at page 3: “697,720 acres of BLM-administered mineral estate within the Glenwood Springs Resource Area are open to oil and gas leasing and development, subject to lease terms and (as applicable) lease stipulations” (BLM 1991, page 3). This decision was carried forward unchanged in the 1999 ROD and RMP amendment at page 15 (BLM 1999b).

Discussion: The Proposed Action is in conformance with the 1991 and 1999 RMP amendments cited above because the Federal mineral estate proposed for development was designated as open to oil and gas leasing and development, and Federal lease COC24603 was duly issued pursuant thereto. In addition, the 1999 RMP amendment requires multi-year development plans known at that time as Geographic Area Plans (GAPs) for lease development over a large geographic area. The current project is within the area covered by the *South Grand Valley GAP* (CO140-2004-034-EA) and also meets GAP exception criteria in the 1999 RMP Amendments based on its small size and location along existing access roads. Therefore, the Proposed Action is in conformance with the current land use plan.

SUMMARY OF LEASE STIPULATIONS

The Federal wells would be horizontally drilled from the expanded MV 28-4 pad located on BLM land. Table 2 lists the applicable stipulations shown on Federal oil and gas lease COC24603.

Table 2. COC24603 Lease Stipulation		
<i>Lease Number</i>	<i>Description of Lands</i>	<i>Stipulations</i>
COC24603 (1976)	ALL LANDS within lease	An environmental assessment shall be prepared for ensuring proper protection of the surface, the natural resources, the environment, existing improvements, and for ensuring timely reclamation of disturbed lands. Submittal of plan of operations assuring adequate protection of drainages, waterbodies, springs, fish and wildlife habitat, steep slopes or fragile soil. Protection of Cultural Resources.

STANDARDS FOR PUBLIC LAND HEALTH

In January 1997, Colorado BLM approved the Standards for Public Land Health. The five standards cover upland soils, riparian systems, plant and animal communities, threatened and endangered species, and water quality. Standards describe conditions needed to sustain public land health and relate to all uses of the public lands. The environmental analysis must address whether impacts resulting from the Proposed Action or alternatives being analyzed would maintain, improve, or deteriorate land health conditions relative to these resources. These analyses are conducted in relation to baseline conditions described in land health assessments (LHAs) completed by the BLM. The Proposed Action would be implemented in an area included in the Rifle West Watershed LHA (BLM 2005).

AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

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

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

Access and Transportation

Affected Environment

The project area is accessed from the BLM office in Silt, Colorado, by driving west on Interstate 70 (I-70) to the Parachute exit (#75), then northwest on Parachute Creek Road (County Road [CR] 215) approximately 2.0 miles, and then across oil and gas development roads for another 2.7 miles and across Parachute Creek to the lower reaches of Riley Gulch. Although the pad is located on BLM, no public access is available to the project site as the access road originates from CR 215 on private land.

Environmental Consequences

Proposed Action

The existing access road serving the pad is suitable for the planned development. Since new gas and water lines would be buried in the existing road as part of the project construction work, the MV 28-4 access road would be surfaced with a minimum 6 inch depth of gravel after the pipelines are installed. Portions of the Riley Gulch Road would also be subject to spot graveling prior to rig mobilization. The pipeline work within the existing roadway would create 0.56 acres of short-term disturbance as shown in Table 1.

The Proposed Action would result in a substantial increase in truck traffic related to the development of the three additional wells that could be drilled at the location. The largest increase 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 3). 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 adequate dust abatement and road maintenance occur.

Table 3. Traffic Associated with Drilling and Completion Activities		
<i>Vehicle Class</i>	<i>Number of trips per well</i>	<i>Percentage 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

Under the No Action Alternative, the new Federal horizontal well on the existing MV 28-4 pad would not be drilled, and the 6.28 acres of associated surface disturbance on BLM land would not occur. Consequently, installation of new buried pipelines would not be needed, and no new access and transportation impacts

would occur. The access and transportation impacts related to the operation of the six producing wells on the pad would remain and continue for the working life of the wells.

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 (NO₂), sulfur dioxide (SO₂), ozone (O₃), particulate matter less than 10 microns (μ) in diameter (PM₁₀), and particulate matter less than 2.5 μ in diameter (PM_{2.5}).

The project area lies within Garfield County, which has been described as an attainment area under CAAQS and NAAQS. An attainment area is an area where ambient air pollution quantities are below (i.e., better than) NAAQS standards. Regional background values are well below established standards, and all areas within the cumulative study area are designated as attainment for all criteria pollutants. The Garfield County Quarterly Monitoring Report summarizing data collected at monitoring sites in Parachute, Silt, Battlement Mesa, and Rifle in January through June 2012 (the most recent posting) confirms continuing attainment of the CAAQS and NAAQS (Garfield County 2012). Federal air quality regulations are enforced by the Colorado Department of Public Health and Environment (CDPHE).

Federal air quality regulations adopted and enforced by CDPHE through the Clean Air Act (CAA) Prevention of Significant Deterioration (PSD) Program limit incremental emissions increases of air pollutants from certain sources to specific levels defined by the classification of air quality in an area. 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).

Proposed Action

The CDPHE, under CAA delegated authority from the U.S. Environmental Protection Agency (EPA) and in conformance with the Colorado State Implementation Plan (SIP), is the agency with primary responsibility for air quality regulation and enforcement in connection with industrial developments and other air pollution sources in Colorado. Unlike the conceptual “reasonable but conservative” engineering designs used in NEPA analyses, 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 MV 28-4 project as described in the Proposed Action includes constructing, drilling, completing, and operating three new Federal horizontal wells resulting in a short-term surface disturbance of 6.28 acres occurring on BLM. The construction work related to the MV 28-4 pad expansion would create 6.42 acres of surface disturbance and the planned pipeline upgrades located within the MV 28-4 roadway would account for 0.56 acres of short-term disturbance. There are no surface disturbance estimates for the surface water

delivery lines to be laid between the GM 32-4 and MV 28-4 pads since they would be laid on the surface and primarily along the Riley Gulch Road corridor. The long-term surface disturbance for this project would occur on BLM and amount to 2.04 acres for the working area of the MV 28-4 pad and the existing roadway.

Air quality in the project area would decrease during construction of access roads, pads, and pipelines and drilling and completion of the wells.

Pollutants generated during construction activities would include combustion emissions and fugitive dust (PM₁₀ and PM_{2.5}) associated with earthwork and construction equipment. Once construction activities are complete, air quality impacts associated with construction would cease and impacts would transition to emissions associated with transportation of drilling and completion equipment. Fugitive dust and vehicle emissions from mobilization of equipment necessary for the drilling and completions phase and rigging up the drill rig would occur during the transitions between construction, drilling and completions phases. During drilling and completions work air quality impacts would be caused by emissions from generators and engines to run equipment, onsite and offsite vehicle traffic, and escaped and flared gasses during drilling and flowback phases. Following the completion of these phases, emissions would be greatly reduced to emissions associated with long-term natural gas and condensate production.

The CRVFO analyzes air quality impacts of oil and gas development projects using results of a regional air model prepared by Tetra Tech, Inc. and its subcontractor, URS Corporation, in October 2011. The modeling addressed the cumulative impacts of incremental oil and gas development in the CRVFO by assuming a range of future Federal (BLM and USFS) and private wells and associated facilities such as compressors, storage tanks, and roads. The modeled scenarios also incorporated different levels of mitigation. The “no action” scenario assumed 5,106 future Federal (BLM plus USFS) wells with mitigation sufficient to meet CDPHE and EPA regulations and emissions standards. Other scenarios included as many as 6,640 Federal wells and associated facilities in a “maximum development” scenario in combination with more stringent mitigation to meet or exceed State and Federal regulations and standards. For all scenarios analyzed, the estimated impacts to air quality are below the current NAAQS, CAAQS, PSD increments, and visibility and deposition thresholds.

The modeling also estimated cumulative impacts from future Federal plus private wells in the CRVFO, ranging from 12,072 wells in the “no action” scenario to 15,664 wells in the “maximum development” scenario. During the modeling, estimated future emissions from wells in the CRVFO were added to background air quality levels, major stationary sources, and an additional 28,843 future Federal and private wells outside the CRVFO but within the modeling domain. These additional wells were based on estimated numbers for three other BLM field offices in the modeling domain—White River Field Office (Meeker, Colorado), Little Snake Field Office (Craig, Colorado), and Vernal Field Office (Vernal, Utah). Methods and results of the modeling are presented in an Air Resources Technical Support Document (ARTSD) (BLM 2011), available for viewing at the CRVFO in Silt, Colorado, and on its website.

Emissions addressed in the air quality model included greenhouse gases (GHGs), “criteria pollutants” (CO, NO₂, SO₂, ozone, PM₁₀, and PM_{2.5}), and hazardous air pollutants (HAPs) including BTEX (benzene, ethylbenzene, toluene, and xylenes), formaldehyde, and n-hexane. The model 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.

For the maximum level of future oil and gas development modeled, 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 current Proposed Action includes WPX design components and BLM mitigation requirements (Appendix A) among those analyzed in the air quality model. 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 also be reduced by BLM's requirement that WPX 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 BLM-approved dust suppressant throughout the long-term production phase (Appendix A). In addition, 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, generally a more favorable period for atmospheric dispersion due to warmer temperatures and less stable air. Fugitive dust emissions from vehicular traffic during drilling and completion would be further reduced if, as planned under the Proposed Action, these activities are allowed to occur during the winter season, when roads are frozen, snow-covered, or wet.

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, the operator may be required to install a vapor recovery or thermal destruction system to reduce VOC concentrations further.

Ongoing scientific research has identified the potential impacts of "greenhouse gases" (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 (NAS) 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.

An inventory and assessment of GHG emissions from oil and gas projects in the CRVFO was included in the air quality modeling completed in October 2011. In all of the modeled development scenarios, annual GHG emissions from Federal wells in the CRVFO would no more than 0.5% of Colorado emissions from natural gas projects in 2008 and 0.0009% of U.S. emissions from natural gas projects in 2005 (EPA 2010). 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.

Based on the information presented in this section, including results of the air quality model prepared for the BLM in October 2011, the Proposed Action is not expected to have significant adverse impacts on air quality.

No Action Alternative

Under the No Action Alternative, the new Federal horizontal well on the existing MV 28-4 pad would not be drilled, and the 6.28 acres of associated surface disturbance on BLM land would not occur. Consequently, installation of new buried pipelines would not be needed, and no new impacts on air quality would occur. Air quality impacts related to the operation of the six producing wells on the pad would remain and continue for the working life of the wells.

Cultural Resources

Affected Environment

Section 106 of the National Historic Preservation Act (NHPA) requires Federal agencies to take in to 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.

Five Class III (intensive pedestrian survey) cultural resource inventories (CRVFO# 981, 1199, 1198-5, 1107-33 and 1113-16) have been conducted within the proposed project area for the original MV 28-4 pad construction, access roads, and/or pipelines. The cultural inventories and pre-field file searches of the Colorado SHPO database and BLM Colorado River Valley Field Office cultural records identified no historic properties within project Area of Potential Effect (APE). Several eligible or “need data” sites (5GF.143, 5GF.1185, and 5GF.1186) are in the project vicinity, but outside the APE. Eligible or potentially eligible cultural sites are referred to in Section 106 of the National Historic Preservation Act as “historic properties.”

Environmental Consequences

Proposed Action

No cultural resources have been identified within the proposed project APE. Therefore, the BLM has made a determination of “**No Historic Properties Affected.**” This determination was made in accordance with the 2001 revised regulations [36CFR 800.4(d)(1)] for Section 106 of the National Historic Preservation Act (16U.S.C 470f), the BLM/State Historic Preservation Officer (SHPO) Programmatic Agreement 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 the presence of project personnel could result in a range of impacts to known and undiscovered cultural resources in the vicinity of the project location. These impacts could range from accidental damage or vandalism, illegal collection and excavation.

An Education/Discovery COA for cultural resource protection will be attached to the EA. The importance of this COA would 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 the No Action Alternative, the new Federal horizontal well on the existing MV 28-4 pad would not be drilled, and the 6.28 acres of associated surface disturbance on BLM land would not occur. Consequently, installation of new buried pipelines would not be needed. The result would be no new impacts to cultural resources. Potential impacts to cultural resources related to the operation of the six producing wells on the pad would remain and continue for the working life of the wells.

Fossil Resources

Affected Environment

The predominant bedrock formation present at or near the surface within the project is the Shire Member of the Wasatch Formation and the Green River Formation. This formation is overlain by areas of Quaternary pediment gravels and alluvial sands and muds. Occurring in varying thicknesses, these Quaternary sediments are considered Potential Fossil Yield Classification Class 2, defined as having a low probability of fossil occurrence. Class 2 geologic units are not likely to contain vertebrate or scientifically significant invertebrate fossils.

The Wasatch Formation is considered a BLM Condition 4 formation, defined as an area that is known to contain vertebrate fossils or noteworthy occurrences of invertebrate fossils. These types of fossils are known to occur or have been documented, but may vary in occurrence and predictability. The Wasatch Formation is divided into the early Eocene Shire, and the Paleocene age Molina and Atwell Gulch members; while the Eocene aged Green River Formation is divided into the Parachute Creek, Garden Gulch, Douglas Arch, Cow Ridge, and Anvil Points members.

All members of the Wasatch Formation contain vertebrate fossils in varying abundances (Murphy and Daitch 2007). Rocks of the Wasatch Formation are lithologically very similar to one another throughout the Piceance Creek Basin as heterogeneous continental fluvial deposits with interfingering channel sandstone beds and overbank deposits consisting of variegated claystone, mudstone, and siltstone beds (Franczyk et al. 1990). Eocene mammals have been found in the lower part of the Shire member.

Fossils historically identified in the Wasatch are archaic mammals—including marsupials, representatives of two extinct orders of early mammals (pantodonts and creodonts), artiodactyls (deer-like even-toed ungulates), ancestral horses and other perissodactyls (odd-toed ungulates), carnivores, and primates—as well as birds, lizards, turtles, crocodylians, gars and other fishes, freshwater clams, gastropods (snails), and other invertebrates (BLM 1999a).

Environmental Consequences

Proposed Action

Although the Wasatch Formation is mapped as the predominant surface formation of the project area, field inspection revealed it to be exposed in only a few outcrops found on cliff faces and landslide exposures. The thickness of the Quaternary sediments cannot be accurately determined, but construction activities have the potential to adversely affect important fossils that may be present in the underlying Wasatch and Green

Formations. The greatest potential for impacts is associated with excavation of shallow bedrock that may be unearthed during well pad and facilities (especially pipeline) construction. In general, alluvium, colluvium, and other unconsolidated sediments are much less likely than bedrock to contain well-preserved fossils.

An examination of the BLM paleontology database indicates no fossil localities within a 1-mile radius of the proposed well sites. Areas covered with vegetation and soil cover do not usually yield fossil resources, but inspections would be conducted for proposed facilities that are located on or within 200 feet of Wasatch Formation bedrock surface exposures. In the event paleontological resources are encountered, a standard paleontological COA would be attached to the APDs (Appendix A).

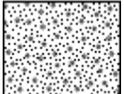
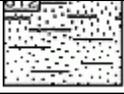
No Action Alternative

Under the No Action Alternative, the new Federal horizontal well on the existing MV 28-4 pad would not be drilled, and the 6.28 acres of associated surface disturbance on BLM land would not occur. Consequently, installation of new buried pipelines would not be needed, and no impacts on fossil resources would occur.

Geology and Minerals

Affected Environment

The project 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). Table 4 lists the geologic formations within the project area.

Table 4. Geologic Formations within the Study Area					
<i>Map Symbol</i>	<i>Lithologic Pattern</i>	<i>Formation Name</i>	<i>Age</i>	<i>Characteristics</i>	<i>Location</i>
Qp		Pediment Gravel deposits.	Pleistocene	Angular to sun-rounded pebble and cobble gravel.	North of Colorado River – mantles slopes and ridges..
Tgg		Parachute Creek Member Green River Formation.	Eocene	Grey, black, and brown marlstone.	Forms Cliffs.
Tgp		Anvil Points Member Green River Formation	Eocene	Coarse-grained, gray and brown sandstone.	Outcrops and cliff faces.
Tws		Shire Member – Wasatch Formation	Eocene/ Paleocene	Variegated purple, lavender, red gray and brown claystone.	Steep slopes and outcrops.
Source: Donnell et al. 1986					

The predominant bedrock exposures within the proposed development area are the Tertiary Wasatch Formation and the Green River Formation. The Wasatch Formation consists of variegated claystone, siltstone, and sandstones 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 development area, the Wasatch Formation is mantled by unconsolidated sedimentary surface deposits of Quaternary age in the form of earthflow deposits. The thickness of these unconsolidated sediments is uncertain, but the depth to the underlying Wasatch Formation may be determined during construction excavation.

The Iles Formation of the Mesaverde Group is the target zone of the proposed drilling program. Comprised of the Williams Fork and Iles Formations, sediments of the Mesaverde Group are marine sandstones 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 and regressive sedimentary sequences of nearshore and offshore sediments that define the Mesaverde Group.

Production is derived from three reservoir intervals, which include the Wasatch, Williams Fork, and Iles Formations. The latter two make up the Upper Cretaceous Mesaverde Group. 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). The upper portions of the Williams Fork include fluvial point bar, floodplain, and swamp deposits. The Lower Williams Fork Formation includes delta front, distributary channel, strandplain, 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. The reservoir rocks are the fine to medium-grained Williams Fork sandstones, 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 and diagenetic.

No commercial deposits of coal, oil shale, uranium, precious metals, limestone, sand and gravel, gypsum, or other leasable, locatable, or salable minerals are believed to occur within or beneath the project area.

Environmental Consequences

Proposed Action

If the proposed wells are proven 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 would be utilized to create fractures within the formation to allow gas production from the wells. In recent years, public concern has been voiced regard potential impacts of hydraulic fracturing from “micro-earthquakes” and from contamination of freshwater aquifers. This issue is addressed in the section on Water Resources – Ground.

No Action Alternative

Under the No Action Alternative, the new Federal horizontal well on the existing MV 28-4 pad would not be drilled, and the 6.28 acres of associated surface disturbance on BLM land would not occur. Consequently, installation of new buried pipelines would not be needed, and no new impacts would occur.

Invasive Non-Native Plants

Affected Environment

Colorado's listed noxious weeds are designated by the Colorado Department of Agriculture, and management of these weeds is regulated under the Colorado Noxious Weed Act, Title 35, Article 5.5. The Colorado noxious weed list is broken down into tiered levels based on existing infestation levels and a tiered approach to weed management. List A weeds are targeted for eradication, List B species are targeted for containment to limit spread, and List C species are targeted for integrated weed management including biocontrols, additional education resources, and research.

The proposed project area lies within the steep, narrow drainage of Riley Gulch, ranging in elevation from 5,400 feet at the GM 41-4 pad, up to 5,700 feet at the MV 28-4 pad. Riley Gulch is an intermittent tributary of Parachute Creek, fed in upper portions by perennial springs but becoming intermittent in its lower reaches. Vegetation in the project areas vicinity is a mix of pinyon-juniper woodlands and sagebrush shrublands, with a sparse band of riparian vegetation immediately adjacent to Riley Gulch. Steep surrounding slopes and ridgelines have rock outcrops and areas with sparse to no vegetation. The soils are high in clay content, derived from the upper Wasatch Formation. This type of habitat is particularly vulnerable to annual grass and forb invasive species in the upland areas, while the wash bottoms provide excellent habitat for invasive shrubs and trees, including tamarisk.

Botanical surveys conducted for this project in April 2013, and in overlapping project areas in May 2013, searched for noxious weeds and other non-native invasive plant species. Overall, the project area is not heavily infested with weeds. Two State List B noxious weeds, houndstongue (*Cynoglossum officinale*) and tamarisk (*Tamarix ramosissima*), and two State List C noxious weeds, common burdock (*Arctium minus*) and common mullein (*Verbascum thapsus*), are sparsely scattered along Riley Gulch. Two other State List C noxious weeds, cheatgrass (*Bromus tectorum*) and redstem filaree (*Erodium cicutarium*), are sparsely scattered within disturbed upland areas. Two other non-native invasive plant species, bur buttercup (*Ceratocephala testiculata*) and common horehound (*Marrubium vulgare*), are also present within the project area, primarily along existing roads, around well pad peripheries, and in other disturbed sites. Other problematic non-native species also present in the project area include yellow sweetclover (*Melilotus officinale*), crested wheatgrass (*Agropyron cristatum*), smooth brome (*Bromus inermis*), and tall wheatgrass (*Thinopyrum ponticum*), which were likely introduced during reclamation seeding on earlier pad developments. These Eurasian species, particularly yellow sweetclover, crested wheatgrass, and smooth brome, have been widely used in dryland pastures and in reclamation of non-BLM lands, but can expand beyond seeded areas, persist indefinitely, resist control efforts, and impede or prevent establishment of native species (Jordan et. al. 2008, Grant-Hoffman et. al. 2012).

Environmental Consequences

Proposed Action

Under the Proposed Action, a total of 6.28 acres would be disturbed, of which 1.35 acres would be within existing disturbance areas in the MV 28-4 pad and access road, 0.96 acres would be redisturbance of

previously disturbed areas around the existing MV 28-4 pad, and 3.97 acres would be new disturbance. Following interim reclamation of the MV 28-4 well pad and reclamation of temporarily disturbed areas along the roads and pipeline, long-term disturbance would remain on 2.04 acres. All of the disturbance would occur on BLM land.

Surface-disturbing activities, such as those proposed for this project, provide a niche for invasion and establishment of non-native plant species particularly when these species are already present in the surrounding area. The mechanisms for this invasion and establishment are multi-fold. Soil disturbance and removal of native vegetation creates niches for invasive species (Parendes and Jones 2000). Linear disturbances, such as roads, provide corridors of connected habitat along which invasive plants can easily spread (Gelbard and Belnap 2003). Construction equipment and heavy vehicles often transport invasive plant seeds alone or in dirt clods on tires or the vehicle undercarriage (Schmidt 1989, Zwaenepoel et. al. 2006).

Noxious weeds and other invasive species are well adapted to colonize and dominate in disturbed ground. These species generally do not require well-developed soils, can out-compete native species for resources, produce prodigious quantities of seeds, and have seeds, which can survive for many years or even decades within the soil. When weeds establish on a site, they can also significantly alter the composition of the soil microbial community of bacteria and fungi, making it increasingly more difficult over time for native species to reestablish on the site (Hierro et. al. 2006, Reinhart and Callaway 2006, Vinton and Goergen 2006, Jordan et. al. 2008, Vogelsang and Bever 2009). Some weed species produce defensive chemicals which can impede germination of native plant seeds, as well as germination of spores for mycorrhizal fungi species upon which most perennial native plants are dependent (Bainard et. al. 2009). Due to the quantity and longevity of weed seeds and the effects of weeds on the soil, once these invasive species have established on a site they can be extremely difficult to eliminate.

Because the project area is relatively free of weeds, the potential risk for spreading weeds within the project area is low. However, cheatgrass and other annual non-native species present in the area could be spread during construction activities. New disturbance would also provide habitat for increased establishment of cheatgrass and other non-native invasive species. The presence of non-native perennial grasses and yellow sweetclover will likely increase the difficulty of establishing native plant species during reclamation. Vehicles and equipment associated with project implementation could also transport new noxious weed species to the site, where they would have disturbed habitats in which to establish.

To mitigate the risk from invasive species, the standard weed control COA would be attached to APDs to require periodic monitoring and weed control practices to ensure that weedy plants are controlled (Appendix A). Establishment of native plant species is also crucial in preventing invasive non-native plant species establishment and spread. Therefore, the standard reclamation COAs (Appendix A) would also be attached to APDs to require seeding with an appropriate native seed mix and monitoring of results.

No Action Alternative

Under the No Action Alternative, the new Federal horizontal well on the existing MV 28-4 pad would not be drilled, and the 6.28 acres of associated surface disturbance on BLM land would not occur. Consequently, installation of new buried pipelines would not be needed. The result would be no new surface impacts that could lead to the development of invasive non-native plants.

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. Five Class III cultural resource inventories (see section on Cultural Resources) were 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, one of the primary Native American tribes 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 regarding cultural resources are identified or disclosed, new terms and conditions may have to be negotiated to accommodate their concerns. Although the Proposed Action would have no direct impacts, increased access and personnel in the vicinity of the proposed project could indirectly impact unknown Native American resources ranging from illegal collection to vandalism.

The National Historic Preservation Act (NHPA) requires that if newly discovered cultural resources are identified during project implementation, work in that area must stop and the agency Authorized Officer notified immediately (36 CFR 800.13). The Native American Graves Protection and Repatriation Act (NAGPRA), requires that if inadvertent discovery of Native American Remains or Objects occurs, activity must cease in the area of discovery, a reasonable effort made to protect the item(s) discovered, and immediate notice made to the agency Authorized Officer, as well as the appropriate Native American group(s) (IV.C.2). Notice may be followed by a 30-day delay (NAGPRA Section 3(d)).

Further actions also require compliance under the provisions of NHPA and the Archaeological Resource Protection Act. WPX Energy Rocky Mountain LLC will notify its staff and contractors of the requirement under the NHPA, that work must cease if cultural resources are found during project operations. A standard Education/Discovery COA for the protection of Native American values would be attached to the APDs (Appendix A). The importance of these COAs 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

Under the No Action Alternative, the new Federal horizontal well on the existing MV 28-4 pad would not be drilled, the 6.28 acres of associated surface disturbance on BLM land would not occur. Consequently, installation of new buried pipelines would not be needed, and no new impacts to cultural resources. Potential impacts to cultural resources related to the operation of the six producing wells on the pad would remain and continue for the working life of the wells.

Noise

Affected Environment

The Proposed Action would occur within a rural setting approximately 4.7 miles northwest of Parachute, Colorado. The project area is rural, and noise levels are presently created by traffic on nearby roads conducting oil and gas development activities.

Noise is generally described as unwanted sound, weighted and 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 (USEPA 1974, Harris 1991). As a basis for comparison, the noise level during normal conversation of two people 5 feet apart is 60 dBA.

Environmental Consequences

Proposed Action

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

<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

Given the remote locations of the proposed project activities, with no reasonably close occupied structure or designated recreational area, the light industrial standard is applicable. The allowable noise level for periodic impulsive or shrill noises is reduced by 5 dBA from the levels shown (COGCC 2008). Short-term (7- to 14-day) increases in nearby noise levels would characterize road and well pad construction while the existing cuttings pit is re-opened. Based on the Inverse Square Law of Noise Propagation (Harris 1991) and an typical noise level for construction sites of 65 dBA at 500 feet (Table 6), project-related noise levels would be approximately 59 dBA at a distance of 1,000 feet, approximating active commercial areas (USEPA 1974).

Traffic noise would also be elevated as a consequence of the Proposed Action. The greatest increase would be along access roads during the drilling and completion phases. Based on the La Plata County data presented in Table 6, approximately 68 dBA of noise (at 500 feet) would be created by each fuel and water truck that travels these roads. Less noise would be created by smaller trucks and passenger vehicles such as

pickup trucks and sport utility vehicles. Although the duration of increased noise from this source would be short, it would occur repeatedly during the drilling and completion phases.

Table 6. Noise Levels at Typical Construction Sites and along Access Roads			
<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	63	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 would decrease during the production phase but would remain background noise levels. During maintenance and well workover operations, noise levels would temporarily increase above those associated with routine well production.

These increased noise levels would be in addition to levels of noise that are already above background levels due to the proximity of I-70 and current oil and gas developments in the area. While exposure to these noise levels is unlikely to be harmful, it may be annoying to residents.

No Action Alternative

Under the No Action Alternative, the new Federal horizontal well on the existing MV 28-4 pad would not be drilled, the 6.28 acres of associated surface disturbance on BLM land would not occur. Consequently, installation of new buried pipelines would not be needed, and no new noise impacts. The noise impacts related to the operation of the six producing wells on the pad would remain and continue for the working life of the wells.

Socioeconomics

Affected Environment

The project area is located entirely within Garfield County, Colorado, with a total county land area of 2,958 square miles (Garfield County 2013a). The county seat is Glenwood Springs; other towns include Carbondale, New Castle, Silt, Rifle, Battlement Mesa, and Parachute. Highway I-70 transects the county east to west with a network of county and private roads servicing the project area.

The population of the county grew by an average of approximately 2.5% per year from 2000 to 2011 but decreased by 2.6% from 2008 to 2011 due to the national economic downturn, resulting in a net increase of 27% from 44,259 to 56,270 residents (CDOLA 2013a). Population growth in Garfield County is expected to nearly double to 109,887 in 2040 (CDOLA 2012). In July 2011, the Garfield County population was 70% urban and 30% rural, with a population density of approximately 19 people per square mile (City Data 2012).

In February 2013, the total estimated civilian labor force was 34,107 with an unemployment rate of 7.8% (CDLE 2013). In the fourth quarter of 2011, the industry groups with the highest percentage of total employment were construction (14.4%), retail trade (13.7%), and Health Care and Social Assistance (13.5%). Table 7 lists the top 10 industries in Garfield County for the fourth quarter of 2011 (CDLE 2013).

Rank	Job Sector	Employees
1	Construction (buildings and engineered projects)	2,901
2	Retail Trade	2,782
3	Health Care and Social Assistance	2,732
4	Education Services	2,484
5	Accommodation and Food Services	2,464
6	Mineral Extraction (including mining and oil and gas)	2,426
7	Public Administration	1,717
8	Professional, Scientific & Technical Services	1,047
9	Administration, Support, Waste Management, and Remediation	874
10	Transportation and Warehousing	782

Personal income in Garfield County has also risen, growing approximately 6% per year from \$1.3 billion in 2000 to \$2.1 billion in 2011. However, personal income dropped by nearly 10% from 2008 to 2011. Annual per capita income has grown in the same period approximately 3% per year, from \$29,081 to \$37,858, but annual per capita income dropped by nearly 11% from 2008 to 2011 (USDOD 2012).

The communities of Parachute, Rifle, Silt, and New Castle are considered to have the most affordable housing, while the communities of Glenwood Springs and Carbondale have the least affordable housing. In March 2012, the cost of living index in Garfield County was 88.6 (less than the U.S. average of 100) (City Data 2012).

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.

Production of natural gas in Garfield County increased dramatically during recent years, from approximately 70 billion cubic feet (BCF) in 2000 to 700 BCF in 2012 (COGCC 2013a). Approximately 1,286 drilling permits were approved in Garfield County between April 2, 2012 and March 29, 2013 (COGCC 2013b). However, U.S. natural gas prices have dropped in recent years from \$10.79 per thousand cubic feet (MCF) in July 2008 to \$1.89/MCF in April 2012 (USDOE 2013). The U.S. price of natural gas has begun to improve, in December 2012 it was \$3.35/MCF, but has not reached the prices of 2008. Natural gas development activity in Garfield County remains low.

Property tax revenue from oil and gas development is a source of public revenue in Garfield County. In 2012, oil and gas assessed valuation in Garfield County was approximately \$2.8 billion, or about 73% of total property tax assessed value distribution (Garfield County 2013b). The county's largest taxpayers are in the oil and gas industry (Garfield County 2013c).

The Federal government makes Payments in Lieu of Taxes (PILT) to local governments to help offset losses in property taxes due to nontaxable Federal lands within their boundaries (USDI NBC 2013). The PILT distributions are based on acres for all Federal land management agencies. Approximately 60% of all Garfield County lands are Federally owned (Garfield County 2013a). The amount may also be adjusted based on population and as apportioned by Congress. By formula, payments are decreased as other Federal funds, such as mineral royalty payments, increase. PILT amounts to Garfield County over the last five years ranged from \$1,732, 974 in 2008 to \$403,176 in 2012 (USDI NBC 2013).

In addition to PILT distributions, 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 (BLM 2007a). Half the royalty receipts received from production are distributed to the state and county governments, which 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 (CDOLA 2013b). Statewide, the population of Hispanic/Latino residents grew 41.2% during the same 10-year period (CDOLA 2013c). African-American, American Indian, Asian, and Pacific Islander residents accounted for a combined 1.6% of the Garfield County population in 2010, compared to a statewide level of 7% (CDOLA 2013b).

Environmental Consequences

Proposed Action

The Proposed Action would have minor positive impacts on the local economy of Garfield County through the creation of additional job opportunities in the oil and gas industry and in supporting trades and services. In addition, Garfield County would receive additional tax and royalty revenues. The Proposed Action could result in negative social impacts including changing the character of the area, reducing scenic quality, increasing dust levels especially during construction, and increasing traffic.

No Action Alternative

Under the No Action Alternative, the new Federal horizontal well on the existing MV 28-4 pad would not be drilled, and the 6.28 acres of associated surface disturbance on BLM land would not occur. Consequently, installation of new buried pipelines would not be needed, and no new no new positive or negative socioeconomic impacts would occur.

Soils (includes an analysis of Public Land Health Standard 1)

Affected Environment

According to the *Soil Survey of Rifle Area, Colorado* (USDA 1985), the entire surface disturbance footprint related to the MV 28-4 project including the pad expansion, nearby excess material stockpile and pipeline installations within the existing access road would occur on the Torriorthents-Rock outcrop complex. This complex consists of exposed bedrock, loose stones, shallow soil over bedrock, and stony basaltic alluvium. These soils and rock outcrops are moderately steep to very steep and have slopes ranging from 15 to 70 percent. Primary uses for these soils are grazing, wildlife habitat, and recreation.

Any excess material storage that would be stockpiled on the Riley Gulch Frac Pad site near the base of Riley Gulch would occur on the Nihill channery loam. This deep, well-drained soil is found on alluvial fans, and sides of valleys at elevations from 5,000 to 6,500 feet and slopes of 6% to 25%. This soil is formed in alluvium derived from Green River shale and sandstone. Surface runoff is moderately rapid, and erosion hazard is severe. Primary uses for this soil is grazing and wildlife habitat.

Environmental Consequences

The MV 28-4 project as described in the Proposed Action includes constructing, drilling, completing, and operating three new Federal horizontal wells resulting in a short-term surface disturbance of 6.28 acres occurring on BLM. The construction work related to the MV 28-4 pad expansion would create 6.42 acres of surface disturbance and the planned pipeline upgrades located within the MV 28-4 roadway would account for 0.56 acres of short-term disturbance. There are no surface disturbance estimates for the surface water delivery lines to be laid between the GM 32-4 and MV 28-4 pads since they would be laid on the surface and primarily along the Riley Gulch Road corridor. The long-term surface disturbance for this project would occur on BLM and amount to 2.04 acres for the working area of the MV 28-4 pad and the existing roadway.

The pad was shaped and positioned in the optimal location to take advantage of the topography and avoid additional disturbances to the drainages and steep slopes. The area generally contains adequate vegetation buffers that would minimize the potential for sediment transport to Riley Gulch, Parachute Creek, and the Colorado River. However, construction activities would cause slight increases in local soil loss, loss of soil productivity, and sediment available for transport to surface waters. 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 drainages.

The proposed pad, existing access road with pipelines, and excess material stockpiles would be located on areas with moderate to severe risk of erosion due to the soil characteristics and topography. Particular care would be taken during construction and reclamation to ensure that proper design and BMPs, including the COAs listed in Appendix A, are utilized to prevent erosion and slope movement.

No Action Alternative

Under the No Action Alternative, the new Federal horizontal well on the existing MV 28-4 pad would not be drilled, and the 6.28 acres of associated surface disturbance on BLM land would not occur. Consequently, installation of new buried pipelines would not be needed, and no new impacts to soil resources would occur. The soil resource impacts related to the operation of the six producing wells on the pad would remain and continue for the working life of the wells.

Analysis on Public Land Health Standard 1 for Upland Soils

The Rifle-West Watershed LHA conducted in 2005 determined that all areas were meeting Standard 1 for upland soils, although some areas were found to be impacted by accelerated erosion. The Proposed Action with associated mitigation is unlikely to prevent Standard 1 from being achieved. Measures attached as COAs (Appendix A) for controlling erosion and revegetating disturbances would minimize long-term impacts to soil volume and productivity. The No Action Alternative would have no bearing on the ability of the area to meet the public land health standard for soils because no new development would occur on BLM land.

Special Status Species (includes an analysis on Public Land Health Standard 4)

Federally Listed, Proposed, or Candidate Plant Species

Affected Environment

According to the latest species list from the U.S. Fish and Wildlife Service (USFWS), four Federally listed plant species may occur within or be impacted by actions occurring in Garfield County. Table 8 lists these species and summarizes information on their habitat associations, potential for occurrence in the project vicinity based on known geographic range and habitats present, and potential for adverse impacts from the Proposed Action.

Table 8. Potential for Occurrence of Threatened or Endangered Plant Species				
<i>Species and Status</i>	<i>Occurrence</i>	<i>Habitat Association</i>	<i>Range or Habitat in Vicinity?</i>	<i>Potentially Affected?</i>
Parachute penstemon (<i>Penstemon debilis</i>) -- Threatened	Sparsely vegetated, south-facing, steep, white shale talus of the Parachute Creek Member of the Green River Formation; 8,000 to 9,000 feet	Other oil shale endemic species, such as Roan Cliffs blazing-star, Cathedral Bluffs meadow-rue, dragon milkvetch, Piceance bladderpod, and oil shale fescue	No	No
DeBeque phacelia (<i>Phacelia submutica</i>) – Threatened	Sparsely vegetated, steep slopes in chocolate-brown, gray, or red clay on Atwell Gulch and Shire Members, Wasatch Formation; 4,700 to 6,200 feet	Desert shrubland with four wing saltbush, shadscale, greasewood, broom snakeweed, bottlebrush squirreltail and Indian ricegrass, grading upward into scattered junipers	Yes	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 4,500 to 6000 feet	Desert shrubland with shadscale, galleta grass, black sagebrush, Indian ricegrass grading upward into big sagebrush and sagebrush/pinyon-juniper	Yes	No
Ute lady’s-tresses orchid (<i>Spiranthes diluvialis</i>) – Threatened	Subirrigated alluvial soils along streams and in open meadows in floodplains; 4,500 to 7,200 feet	Box-elders, cottonwoods, willows, scouring rushes, and riparian grasses, sedges, and forbs	Yes	No

Three Federally listed plant species have the potential to occur within or adjacent to the project area. These are DeBeque phacelia, Colorado hookless cactus, and Ute lady’s-tresses. Rare plant surveys were conducted within the proposed project area around the MV 28-4 pad in May 2013, around the GM 32-4 pad in April 2013, along Riley Gulch in August 2013, and around the GM 41-4 pad in May 2012. Surveys were also conducted in the vicinity of the MV 28-4 pad for the Grand Valley 3D Seismic Survey in June 2013. Suitable habitat for Colorado hookless cactus is present within the project area, but no plants were found during surveys. Marginally suitable habitat for Ute lady’s-tresses was found along portions of Riley Gulch, but no plants were found.

One area of marginally suitable habitat for DeBeque phacelia was found approximately 14 meters from the upper edge of disturbance for the MV 28-4 pad expansion. Another area of marginally suitable habitat was found for DeBeque phacelia within 100 meters of the MV 28-4 pad site, but located on the opposite side of a low ridge from the disturbance area. No plants were found at either site. Surveys in 2012 located several small patches of marginally suitable habitat for DeBeque phacelia between 20 and 100 meters of the GM 41-4 pad. Informal consultation with the USFWS on the GM 41-4 pad resulted in a letter of concurrence with the effects determination of “May Affect, Not Likely to Adversely Affect” for the pad construction. No plants were found in any of these marginally suitable habitat sites, but 2012 was a drought year in which no DeBeque phacelia plants were found in known occurrence sites. DeBeque phacelia emergence was much better in 2013, particularly at higher elevations, but less reliable at lower elevation sites. Because of the conditions for this ephemeral annual species in 2012 and 2013, presence or absence could not be definitively determined within suitable habitat at these sites. However, the marginal habitat near the MV 28-4 pad was located near the elevation above which DeBeque phacelia generally experienced good emergence in 2013.

Environmental Consequences

Proposed Action

DeBeque Phacelia

The Proposed Action would have no direct impacts to DeBeque phacelia at the MV 28-4 pad site. However, one area of marginally suitable habitat is located approximately 14 meters from the upper edge of disturbance for the proposed MV 28-4 pad expansion, and could potentially experience indirect impacts from the project. There are also several patches of marginally suitable habitat located between 20 and 100 meters of the GM 41-4 pad, where cuttings from the MV 28-4 pad would be stored. Because surveys were performed in a year when emergence of DeBeque phacelia was not entirely dependable at known sites at approximately similar elevations to the marginally suitable habitat near the MV 28-4 pad, presence or absence could not be definitively determined. For purposes of this analysis, however, the probability of DeBeque phacelia presence is considered low.

To prevent potential impacts on DeBeque phacelia habitat near the GM 41-4 pad, several protections and mitigations were included in the Biological Assessment, and the effects determination of “May Affect, Not Likely to Adversely Affect” received concurrence from USFWS during the GM 41-4 Section 7 consultation process. These protections and mitigations were attached as COAs for the GM 41-4 pad construction (BLM 2012). They included a 20-meter protection buffer around all DeBeque phacelia habitat, and installation of a temporary fence to delineate this protection buffer and prevent any construction worker entry into these buffers. This fence is to remain in place until interim reclamation has been completed, and therefore would be in place during the addition of cuttings from the MV 28-4 pad.

Potential indirect effects could result from increased dust settling on plant leaves and inhibiting photosynthesis. Introduction and spread of noxious weeds resulting from construction activities could also negatively impact DeBeque phacelia by increasing competition and altering the habitat. To reduce the risk from these indirect effects, dust control measures were required for the GM 41-4 pad, and this requirement would remain in place during the addition of cuttings from the MV 28-4 pad. DeBeque phacelia habitat could also be negatively impacted by noxious weeds associated with ground disturbance activities, or by herbicide used to treat noxious weeds. To reduce the risk of these potential impacts, the GM 41-4 pad permit specifies that 1) a separate Pesticide Use Permit (PUP) specific to the 100 meter buffer around mapped DeBeque phacelia habitat must be obtained from the BLM prior to herbicide treatment, 2) no broadcast spraying of herbicide is allowed, 3) only spot treatments or wicking is allowed, and 4) a botanist approved by the BLM

botanist must be on-site during any pesticide application within this 100 meter buffer. All of these herbicide restrictions shall remain in place during the addition of cuttings from the MV 28-4 pad.

Because the GM 41-4 pad is existing, and because of the DeBeque phacelia protections and mitigations already in place for activities on this pad, no additional impacts are anticipated from the storage of MV 28-4 cuttings at this site.

To prevent potential impacts to mapped marginally suitable habitat near the MV 28-4 pad, the same mitigations and protections applied to the GM 41-4 pad would also be attached as COAs for the MV 28-4 pad expansion. With these mitigations and protections, no impacts are expected to result from expansion of the MV 28-4 pad.

Colorado Hookless Cactus

Although suitable habitat is present, no Colorado hookless plants were found during extensive surveys in 2012 and 2013, in or adjacent to the project area. Therefore, the project would have no impacts on this species.

Parachute Penstemon

Parachute penstemon requires a substrate of Green River shale for its habitat, and no Green River shale is present in the project vicinity. Because no suitable habitat is present, the project would have no impacts on this species.

Ute Lady's-Tresses Orchid

Surveys were conducted along the entire length of Riley Gulch during the appropriate survey season for Ute lady's-tresses in August 2013. Small areas of marginally suitable habitat for Ute lady's-tresses are present intermittently along Riley Gulch near the project area, but no plants were found. Due to marginal habitat quality, small patch size, isolation of separate marginal habitat patches, and negative survey results, it is highly unlikely that Ute lady's-tresses orchids are present near the project area. No new ground disturbance would occur within 100 meters of Riley Gulch. However, mitigation measures to protect the riparian habitat in Riley Gulch would be included in the COAs (Appendix A). With implementation of these measures, impacts on this species are not anticipated.

Determinations of Effect

Because the project area is located outside of core habitat for DeBeque phacelia, no plants were found during June 2013 surveys of marginally suitable habitat for DeBeque phacelia located within 100 meters of new ground-disturbing portions of the project, the cuttings storage would occur on an existing pad with only marginally suitable habitat within 100 meters of the edge of disturbance, and because of the mitigations and protections to be implemented for DeBeque phacelia at the GM 41-4 and MV 28-4 well pads, the effects determination for the Proposed Action on DeBeque phacelia is “**No Effect.**” Because no occurrences of Colorado hookless cactus are known within 100 meters of any proposed ground-disturbing activity, the effects determination for the Colorado hookless cactus is “**No Effect.**” Because no suitable habitat is present for Parachute penstemon within 100 meters of any proposed ground-disturbing activity, the effects determination for Parachute penstemon is “**No Effect.**” Because no known occurrences of Ute lady's-tresses, and only marginally suitable to unsuitable habitat for this species, are present within 100 meters of any proposed ground-disturbing activity, the effects determination for the Ute lady's-tresses is “**No Effect.**”

No Action Alternative

Under the No Action Alternative, the new Federal horizontal well on the existing MV 28-4 pad would not be drilled, and the 6.28 acres of associated surface disturbance on BLM land would not occur. Consequently, installation of new buried pipelines would not be needed. The result would be no new impacts to threatened or endangered species.

BLM Sensitive Plant Species

Affected Environment

BLM sensitive plant species with habitat and/or occurrence records in Garfield County are listed in Table 9, along with summaries of their habitat requirements, potential for occurrence within the project area, and potential to be impacted by the Proposed Action.

Table 9. Potential for Occurrence of BLM Sensitive Plant Species				
<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; 5,100 to 6,400 feet	Pinyon-juniper woodlands and desert shrub.	Yes	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	Yes	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 to 9,000 feet	Pinyon-juniper woodlands, shrublands; often with other oil shale endemic species	No	No
Harrington's penstemon (<i>Penstemon harringtonii</i>)	Flats to hillsides with rocky loam and rocky clay loam soils derived from coarse calcareous parent materials or basalt; 6,200 to 9,200 feet	Sagebrush shrublands, typically with 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 to 8,800 feet	Pinyon-juniper woodlands and shrublands; often with other oil shale endemics, sometimes with rabbitbrush or snowberry	No	No

Species with the potential to occur within the project area are DeBeque milkvetch and Naturita milkvetch. Rare plant surveys were conducted within the proposed project area around the MV 28-4 pad in May 2013, around the GM 32-4 pad in April 2013, along Riley Gulch in August 2013, and around the GM 41-4 pad in May 2012. No occurrences of any BLM sensitive plant species were found within the project area.

Environmental Consequences

Proposed Action

Because no known BLM sensitive plants are known or expected to occur within or adjacent to the project area, the Proposed Action would have no adverse impacts on any BLM sensitive plant species.

No Action Alternative

Under the No Action Alternative, the new Federal horizontal well on the existing MV 28-4 pad would not be drilled, and the 6.28 acres of associated surface disturbance on BLM land would not occur. Consequently, installation of new buried pipelines would not be needed. The result would be no new impacts to BLM sensitive plants.

Federally Listed, Proposed, or Candidate Animal Species

Affected Environment

Federally listed, proposed, or candidate species potentially occurring within or affected by actions in Garfield County include eight species of vertebrate wildlife. Table 10 lists these species and summarizes information on their habitat associations, potential for occurrence in the project vicinity based on known geographic range and habitats present, and potential for adverse impacts from the Proposed Action. Species indicated as potentially affected are described in more detail following the table.

Table 10. Potential for Occurrence of Threatened or Endangered Animal Species				
<i>Species and Status</i>	<i>Distribution in Region</i>	<i>Preferred Habitats</i>	<i>Potentially Present in Vicinity?</i>	<i>Potentially Adversely Affected?</i>
Canada lynx (<i>Lynx canadensis</i>) – Threatened	Dispersed use in in upper montane and subalpine zones of Colorado mountains.	Subalpine spruce-fir forests; also lodgepole pine and aspen to as low as upper montane.	No	No
Yellow-billed cuckoo (<i>Coccyzus americanus</i>) – Proposed	Major rivers and tributaries of western, northwestern, and south-central Colorado.	Large cottonwood stands with tall shrub understory 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 in canyons with closed-canopy coniferous forests.	No	No
Razorback sucker (<i>Xyrauchen texanus</i>) – Endangered	Colorado River and major tributary rivers, including mainstem Colorado River upstream to town of Rifle in CRVFO.	General: Deep, slow runs, pools, and eddies. Spawning: silt to gravel substrates in shallow water and seasonally flooded overbank areas.	No	Yes
Colorado pikeminnow (<i>Ptychocheilus lucius</i>) – Endangered			No	Yes

Humpback chub (<i>Gila cypha</i>) -- Endangered	Mainstem Colorado River and major tributaries – upstream to Black Rocks near Utah state line.	Rocky runs, riffles, and rapids in swift, deep rivers.	No	Yes
Bonytail chub (<i>Gila elegans</i>) – Endangered			No	Yes
*Lineage GB cutthroat trout (<i>Oncorhynchus clarki</i> ssp.) – Threatened	Identified in 60 streams in Colorado River basin including CRVFO area.	Clean, cool headwaters streams and ponds isolated from other strains of cutthroat trout.	No	No
*Lineage GB = Relict populations of cutthroat trout indigenous to the Colorado/Gunnison/Dolores River drainages. Currently protected under the ESA pursuant to prior listing of the greenback cutthroat trout (<i>O. c. stomias</i>) pending completion of genetic and morphometric studies and taxonomic reassessment of native cutthroat trout in Colorado.				

Environmental Consequences

Proposed Action

The Canada lynx, Greater sage-grouse, Mexican spotted owl, and distinct population segment of the yellow-billed cuckoo are not expected to occur in the project vicinity based on documented occurrences and habitat types present. Therefore, the Proposed Action would have “**No Effect**” on these species.

The four species of big-river fishes Federally listed as endangered—the razorback sucker, Colorado pikeminnow, humpback chub, and bonytail chub—are present within the Colorado River drainage basin near or downstream from the project area. Designated Critical Habitat for the razorback sucker and Colorado pikeminnow includes the Colorado River and its 100-year floodplain west (downstream) from the town of Rifle. This portion of the Colorado River lies a few miles northeast of the project area. The nearest known habitat for the humpback chub and bonytail is within the Colorado River approximately 70 miles downstream from the project area. Occasionally, the bonytail is in Colorado west of Grand Junction, but its range does not extend east from that point. Only one population of humpback chub, at Black Rocks west of Grand Junction, is known to exist in Colorado.

The endangered Colorado River fishes could potentially be affected by consumptive use of water 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 0.77 acre-feet of Colorado River water is consumed during activities related to each oil and gas well. This is equivalent to 0.04 to approximately 0.04 cubic feet per second (cfs) of water throughout the typical 10-day drilling period for an oil and gas well in the CRVFO area.

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**” relative to the Colorado pikeminnow, humpback chub, bonytail chub, or razorback sucker as a result of depletions associated with oil and gas projects. To offset the impacts, the BLM has set up a Recovery Agreement, which includes a one-time fee per well. 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 endangered species through restoration of habitat, propagation, and genetics management, instream flow identification and protection, program management, non-native fish management, research and monitoring, and public education.

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. Construction activities would increase the potential for soil erosion and sedimentation. Although a minor temporary increase in sediment transport to the Colorado River may occur, it is unlikely that the increase would be detectable above current background levels. In any case, the Federally listed, proposed, or candidate fish species associated the Colorado River are adapted to naturally high sediment loads and would not be affected.

In contrast to inflow of sediments, the inflow of chemical pollutants could impact the endangered big-river fishes if concentrations are 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 various design requirements imposed by BLM and the State of Colorado. In the event of a spill or accidental release into an ephemeral drainage that could flow to the Colorado River, the operator would be required to implement its Spill Prevention, Control, and Countermeasures (SPCC) plan, including such cleanup and mitigation measures as required by BLM or the State. For these reasons, and because any spills 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.

Based on the above, the BLM has determined that inflow of sediments and chemicals into the Colorado River would have “**No Effect**” on the endangered big river fishes. In the unlikely event of a spill with the potential to affect, or documented occurrence of an effect, the USFWS would initiate discussions with the involved parties to identify appropriate remedies.

No Action Alternative

Under the No Action Alternative, the new Federal horizontal well on the existing MV 28-4 pad would not be drilled, and the 6.28 acres of associated surface disturbance on BLM land would not occur. Consequently, installation of new buried pipelines would not be needed. The result would be no new impacts to sensitive species.

BLM Sensitive Animal Species

Affected Environment

Table 11 lists BLM sensitive vertebrate wildlife species that are known to occur in the region and, if present, could potentially be adversely affected by the Proposed Action. Potential impacts to species indicated as present or possible in the area of potential direct or indirect effects are discussed below.

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. Loss of habitat above which

the bats could search for aerial prey would also be minimal, and disturbance due to construction activities would not occur at night when the bats are feeding.

Table 11. BLM Sensitive Vertebrate Species Present or Potentially Present in the Project Area		
<i>Common Name</i>	<i>Habitat</i>	<i>Potential for Occurrence</i>
Fringed myotis (<i>Myotis thysanodes</i>)	Roosting: Caves, trees, mines, and buildings. Foraging: Pinyon-juniper, montane conifers, and semi-desert shrubs.	Possible
Townsend’s big-eared bat (<i>Corynorhinus townsendii</i>)		
Northern goshawk (<i>Accipiter gentilis</i>)	Montane and subalpine coniferous forests and aspen forests; may move to lower elevation pinyon/juniper woodland in search of prey during winter.	Possible in winter
Bald eagle (<i>Haliaeetus leucocephalus</i>)	Nesting/Roosting: Mature cottonwood forests along rivers. Foraging: Fish and waterfowl along rivers and lakes; may feed on carrion, rabbits, and other foods in winter.	Nests and roosts along Colorado River
Peregrine falcon (<i>Falco peregrinus</i>)	Nesting: Cliffs, usually near a river, large lake, or ocean. Foraging: Waterfowl on rivers and lakes; upland fowl in open grassland or steppe.	Nests on Roan Cliffs
Brewer’s sparrow (<i>Spizella breweri</i>)	Extensive stands of sagebrush, primarily Wyoming sagebrush on level or undulating terrain.	Possible – habitat marginal
Midget faded rattlesnake (<i>Crotalus oreganus concolor</i>)	Cold desert of NW Colorado, SW Wyoming, and NE Utah, primarily in sagebrush with rock outcrops and exposed canyon walls.	Possible – habitat marginal
Great Basin spadefoot (<i>Spea intermontana</i>)	Permanent or seasonal ponds and slow-flowing streams in pinyon-juniper woodlands and semi-desert shrublands.	No suitable habitat
Northern leopard frog (<i>Lithobates pipiens</i>)	Clean, perennial waters in slow-flowing streams, wet meadows, marshes, and shallows of clean ponds and lakes.	Possible
Bluehead sucker (<i>Catostomus latipinnis</i>)	Primarily smaller streams with a rock substrate and mid to fast-moving waters; also shallows of larger rivers.	Present in Parachute Creek
Flannelmouth sucker (<i>Catostomus discobolus</i>)	Runs, riffles, eddies, and backwaters in large rivers.	
Roundtail chub (<i>Gila robusta</i>)	Slow-moving waters adjacent to fast waters in large rivers.	
“Lineage CR” cutthroat trout (<i>Oncorhynchus clarki</i> ssp.)	Headwaters streams and ponds with cool, clear waters isolated from populations of non-native cutthroats and rainbow trout.	
*Lineage CR = Relict populations of cutthroat trout indigenous to the Yampa/Green River drainages but widely transplanted throughout the state. Managed as a BLM sensitive species pursuant to prior designation of the Colorado River cutthroat trout (<i>O. c. pleuriticus</i>) pending completion of genetic and morphometric studies and taxonomic reassessment of native cutthroat trout in Colorado.		

Northern Goshawk. Although this large accipiter (“bird hawk”) nests in upper montane or subalpine conifer or aspen forests, individual often move into lower elevation pinyon-juniper habitats in winter in search of small birds and diurnal small mammals. This winter use is transitory and dispersed, with the goshawks foraging across large areas instead of establishing winter territories. Consequently, human activities that may cause displacement are unlikely to affect the winter survival of individuals and would not affect populations.

Bald Eagle. Although bald eagles nest and roost along the Colorado River just southeast of the project area, the potential for use of the actual project area is moderate. Any such use would most likely be by an individual hunting across large expanses of open upland habitats during winter. The project area would represent a small portion of such potential winter hunting habitat, and the reclaimed grass-forb community would provide better habitat for prey than the current shrubland types.

Peregrine Falcon. Peregrine falcons nest along cliff bands south and north of the project and hunt for waterfowl along the Colorado River or other birds across open terrain. Use of the project area is unlikely, except for infrequent, transitory overflights while traveling between the Colorado River and the cliff bands to the south.

Brewer's Sparrow. Although the habitat is marginal in the project area, the possibility exists of nesting by this species. The 60-day TL to prohibit removal of vegetation during the period May 1 to July 1 (see Appendix A) would avoid or minimize the potential for impacts to nesting Brewer's sparrows. Construction activities outside this period could cause individuals to avoid the disturbance while feeding. However, this impact would be limited in duration at any point along the corridor, and individuals are expected to feed across very large home ranges outside the nesting season, thus minimizing the severity of this potential indirect impact.

Midget Faded Rattlesnake. This small viper is considered a small, pale-colored subspecies of the common and widespread western rattlesnake, although some authorities consider it and another western subspecies, the Great Basin rattlesnake (*C. o. nuntius*) to be genetically distinct species. Although movement patterns of midget faded rattlesnakes are not well known, they are believed to be limited to a few hundred meters from den sites. The limited distribution and small home range make this snake susceptible to impacts from human disturbance (USGS 2007). Threats include direct mortality from vehicles traveling on roads and pads, off-highway vehicle use throughout the landscape, capture by collectors, and livestock grazing. As access increases into previously undeveloped areas, the risk of encounters with humans would increase, resulting in some cases of mortality or collection.

Flannelmouth Sucker and Roundtail Chub. As with the ecologically similar Colorado River endangered fishes described above, the flannelmouth sucker and roundtail chub are adapted to naturally high sediment loads and therefore would not be affected by increased sediment transport to Parachute Creek and the Colorado River. Furthermore, protective COAs for water quality would minimize this potential (Appendix A). However, these species are vulnerable to alterations in flow regimes in the Colorado River (including evaporative losses from dams and depletions from withdrawal of water for irrigation or municipal water supplies) that affect the presence of sandbars and seasonally flooded overbank areas needed for reproduction. The amount of depletion in flows associated with this project is not expected to have a significant adverse impact on the survival or reproductive success of these species.

Colorado River Cutthroat Trout – Lineage CR. This genetically distinct lineage of cutthroat, native to the Yampa/Green River basin, is known to have been transplanted into other drainages, including Parachute Creek upstream of the project area, where its presence has been confirmed by BLM electrofishing surveys. Although not indigenous to the mainstem Colorado River basin, this lineage is treated by BLM Colorado as a sensitive (species). Protective COAs for water quality would minimize the potential for increased sediment transport to creeks (Appendix A). However, this trout recreationally important sportfish is vulnerable to alterations in flow regimes (including evaporative losses from dams and depletions from withdrawal of water for irrigation or municipal water supplies) that affect the presence of sandbars and seasonally flooded overbank areas needed for reproduction. The amount of depletion in flows associated with this project is not expected to have a significant adverse impact on the survival or reproductive success of this species.

No Action Alternative

Under the No Action Alternative, the new Federal horizontal well on the existing MV 28-4 pad would not be drilled, and the 6.28 acres of associated surface disturbance on BLM land would not occur. Consequently, installation of new buried pipelines would not be needed. The result would be no new impacts to sensitive species.

Analysis on Public Land Health Standard 4 for Special Status Species

Based on the Health Assessment Report, Rifle-West Watershed (2005) and species status updates which have occurred since 2005, three Federally listed plant species and three BLM sensitive plant species are known to occur within this watershed area. The Federally listed plant species are Colorado hookless cactus, Parachute penstemon, and DeBeque phacelia, and the BLM sensitive plant species are DeBeque milkvetch, Harrington's penstemon, and Roan Cliffs blazingstar. As of 2005, Standard 4 was being met for these species. However, continued oil and gas development was noted as a risk factor for reduction of potential habitat and habitat quality for special status plant species. There are no known occurrences of any special status plant species within the proposed project area, and potentially suitable habitat is minimal. The Proposed Action would create new ground disturbance, increase the risk of noxious weeds, and potentially impact marginally suitable habitat for special status plant species. This could contribute to the movement away from meeting Standard 4 for special status plants.

According to a recent land health assessment, habitat conditions within this area appear suitable for special status animal species known or likely to occur (BLM 2005). However, large portions of the landscape are being fragmented due to extensive natural gas development. Continued habitat fragmentation is of concern as large blocks of contiguous intact habitat are required by many species. Sustained development and the proliferation of roads, well pads, pipelines, compressor stations, tank farms and other surface facilities will continue to reduce habitat patch size and affect both habitat quality and quantity. The potential to impact some species would increase as development continues. The Proposed Action in conjunction with similar activities throughout this watershed would increase fragmentation and could increase sediment loads. Although the contribution of the Proposed Action is in itself small, it may further trend the area away from meeting Standard 4 for special status wildlife.

The No Action Alternative would not result in a failure of the area to achieve Standard 4 because the proposed developments on BLM land would not occur.

Vegetation (includes an analysis on Public Land Health Standard 3)

Affected Environment

The project area lies within a mosaic of pinyon-juniper woodland, sagebrush shrub, and salt desert shrub habitat types, with patches of unvegetated clay soil barrens at elevations ranging from 5,400 to 5,700 feet. The pinyon-juniper woodlands are dominated by mostly mature Utah juniper (*Juniperus osteosperma*) and pinyon pine (*Pinus edulis*) trees. Understory species are sparse within denser tree stands, but include species such as cushion phlox (*Phlox hoodii*), peppergrass (*Lepidium montanum*), and twistflower (*Streptanthus cordatus*). Sparser tree stands grade into sagebrush shrublands and salt desert shrublands, with overlapping of species.

Sagebrush habitats are dominated by basin big sagebrush (*Artemisia tridentata* ssp. *tridentata*), black sagebrush (*Artemisia nova*), four-winged saltbush (*Atriplex canescens*), rabbitbrush (*Ericameria nauseosus*), and Wyoming sagebrush (*Artemisia tridentata* ssp. *wyomingensis*). Other common species here include

broom snakeweed (*Gutierrezia sarothrae*), arrowleaf balsamroot (*Balsamorhiza sagittata*), claret cup cactus (*Echinocereus triglochidiatus*), Osterhout's penstemon (*Penstemon osterhoutii*), Patterson's milkvetch (*Astragalus pattersonii*), prickly-pear cactus (*Opuntia polyacantha*), pussytoes (*Antennaria* sp.), sharpleaf twinpod (*Physaria acutifolia*), spring parsley (*Cymopterus* sp.), Townsend daisy (*Townsendia incana*), yellow milkvetch (*Astragalus flavus*), yucca (*Yucca harrimaniae*), bluegrass (*Poa* sp.), bottlebrush squirreltail grass (*Elymus elymoides*), Indian ricegrass (*Achnatherum hymenoides*), Letterman's needlegrass (*Stipa lettermanii*), and slender wheatgrass (*Elymus trachycaulus*).

Salt desert shrub habitats are dominated by four-wing saltbush, greasewood (*Sarcobatus vermiculatus*), and shadscale (*Atriplex confertifolia*). Other common species include prickly-pear cactus, wild onion (*Allium* sp.), galleta grass (*Pleuraphis jamesii*), Indian ricegrass, and needle-and-thread grass (*Hesperostipa comata*).

While clay-soil barrens are generally unvegetated, some species can be found on their periphery and in patches with less severe soil conditions. These include perennial species such as evening primrose (*Oenothera caespitosa*) and gumweed (*Grindelia squarrosa*), spring ephemeral species, such as Nuttall's povertyweed (*Monolepis nuttalliana*), and non-native species such as bur buttercup.

Vegetation in disturbed areas around the existing well pad and along roads includes several non-native species such as cheatgrass, crested wheatgrass, smooth brome, tall wheatgrass, bur buttercup, common horehound, salsify, and yellow sweetclover.

Narrow riparian areas along Riley Gulch include narrowleaf cottonwood (*Populus angustifolia*), coyote willow (*Salix exigua*), and knotted rush (*Juncus nodosus*) intergrading with sagebrush, rabbitbrush, and other upland species. These moister areas also contain species typically found at higher elevations, such as Gambel oak (*Quercus gambelii*), Utah serviceberry (*Amelanchier utahensis*), skunkbrush sumac (*Rhus trilobata*), roundleaf snowberry (*Symphoricarpos rotundifolius*), and Woods' rose (*Rosa woodsii*).

Environmental Consequences

Proposed Action

Under the Proposed Action, new disturbance would result in the loss of a total of 3.97 acres of pinyon-juniper and sagebrush shrub vegetation. An additional 0.96 acre of reclamation vegetation would be lost through disturbance of previously reclaimed areas around the MV 28-4 pad. All of this disturbance would occur on BLM land. Following construction and well completion, interim reclamation would occur on all areas not needed for ongoing operations. A total of 0.12 acres of new disturbance would remain as long-term disturbance. Within the redisturbance area, 0.59 acre would remain as long-term disturbance, in addition to 1.33 acres of existing disturbance. Temporary reclamation would consist of seeding with native plant species in accordance with the reclamation COAs presented in Appendix A, and using species mixes appropriate for pinyon-juniper and sagebrush plant communities.

Adjacent native vegetation would not be directly impacted, but could be indirectly impacted by increased dust deposition on leaves. Dust levels could be expected to increase above ambient levels in the short term from pad expansion, well drilling, new road construction, and new pipeline installation. Increased dust levels can negatively impact plants by clogging stomatal openings in the leaves, impeding gas exchange and reducing the ability of plants to take in carbon dioxide. Dust on the leaf surface can also effectively reduce light availability at the leaf surface. Light and carbon dioxide are both critical for plants to conduct photosynthesis, and reductions in either can reduce the quantity of carbohydrates plants can produce through photosynthesis, and thereby reduce plant growth and seed production. Dust on leaf surfaces can also facilitate plant tissue uptake of toxic pollutants (Thompson et al. 1984, Farmer 1993, Sharifi et al. 1997). Dust can also affect

snowmelt patterns and resulting hydrology and soil moisture availability, alter soil pH and nutrient availability, and result in plant community composition changes (Angold 1997, Auerbach et al. 1997, Johnston and Johnston 2004, Field et al. 2010, and Gieselman 2010).

Cumulative impacts from the proposed project development and plant habitat loss, in combination with previous oil and gas development in this area, could also indirectly impact adjacent vegetation through negative effects on pollinators. Pollinators depend on both appropriate floral communities and on appropriate nesting habitat. Many pollinators show fidelity to specific habitat areas, and if these sites become isolated from contiguous habitat by disturbances such as roads, pollinators may be reluctant to cross these barriers to utilize other habitats (Osborne and Williams 2001, Bhattacharya et al. 2002). Roads and well pad construction can negatively impact pollinators by creating barriers, by removing habitat as a result of new construction, and by direct mortality through collisions with vehicles.

Additional indirect impacts to adjacent vegetation could occur from noxious weeds and other non-native plants associated with project area disturbances. The proposed removal of native vegetation would increase the site vulnerability to invasion and establishment of noxious weeds and other non-native invasive plant species, particularly with the existing widespread establishment of noxious weeds and other non-native species. Neighboring vegetation would also become more vulnerable to invasion by noxious weeds and other non-native species. Ground disturbance combined with vehicle traffic and construction equipment provides both ideal habitat and vectors for invasive species, particularly when these species are already present within the soil seed bank (Schmidt 1989, Parendes and Jones 2000, Gelbard and Belnap 2003, Larson 2003, Zaenepoel et al. 2006).

Invasive non-native species can negatively impact native plant communities, both directly through competition for resources, and indirectly through alteration of soil microbial communities (Klironomos 2002, Hierro et al. 2006, Reinhart and Callaway 2006, Vogelsang and Bever 2009). Herbicide treatments of noxious weeds can also result in negative effects or mortality to native plants if they are co-occurring or located nearby (BLM 2007b). Implementation of standard COAs for noxious weeds and temporary reclamation (Appendix A) would reduce the risk of noxious weed and invasive species establishment and spread through the combination of chemically treating noxious weeds while also re-introducing native vegetation through seeding of native plant species.

No Action Alternative

Under the No Action Alternative, the new Federal horizontal well on the existing MV 28-4 pad would not be drilled, and the 6.28 acres of associated surface disturbance on BLM land would not occur. Consequently, installation of new buried pipelines would not be needed. The result would be no new impacts to vegetation.

Analysis on Public Land Health Standard 3 for Plant and Animal Communities (partial, see also Wildlife, Aquatic and Wildlife, Terrestrial)

Based on the Rifle West Land Health Assessment (2005), different portions of this area were meeting the standard, marginally meeting the standard, or not meeting the standard. Problems noted included widespread cheatgrass dominance, particularly at lower elevations and on south-facing slopes, with a corresponding loss of perennial grasses and forbs. Also noted was dominance of sagebrush communities by old shrubs with poor seedling recruitment. Noxious weeds are present at varying levels throughout the assessment area. Appendix A includes provisions to revegetate the disturbances with native species and to control noxious weeds. If successfully revegetated, the Proposed Action should not contribute to the failure of the area to meet Standard 3. The No Action Alternative would have no bearing on the ability of the area to meet the public land health standard for plant and animal communities because no new development would occur on BLM land.

Visual Resources

The Proposed Action would occur entirely on BLM land approximately 4.7 miles northwest of Parachute. The BLM land is classified as visual resource management (VRM) Class II as identified by the 1984 Glenwood Springs Resource Management Plan (Figure 4). The objectives for VRM Class II, as defined by the BLM Manual H-8410-1 – Visual Resource Inventory (BLM 1986), is described below.

- The objective of VRM Class II is to retain the existing character of the landscape. The level of change to the characteristic landscape should be low. Management activities may be seen, but should not attract the attention of the casual observer. Any changes must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape.

The Proposed Action located on BLM land is within Visual Resource Inventory Class II, Scenic Quality B, Sensitivity High, and within the Foreground/Middle Ground Distance Zone.

The project area consists of finger-like ridges extending north from Mount Callahan. The ridges are dissected by steep drainages that terminate at Parachute Creek to the northeast. The Proposed Action would occur within one of these steep drainages, known as Riley Gulch. The area is characteristic predominantly of oil and gas development. Vegetation consists of pinyon-juniper woodlands along the slopes and ridgelines and sagebrush shrublands in the lower open areas with tan and coral/salmon-colored soils.

The visual resource analysis area includes CR 215 (Parachute Creek Road). The typical casual observer in the area would include people who live, work, and travel through the area. Although the Proposed Action would occur predominantly on BLM land, no public access is available to the project location. The access road to the Proposed Action originates from CR 215 on private land. However, this area has high visual sensitivity and is less than 2 miles from CR 215. BLM guidance states that lands with high visual sensitivity are those within 5 miles of a primary travel corridor and of moderate to very high visual exposure, where details of vegetation and landform are readily discernible and changes in visual contrast are easily noticed by the casual observer. The visual impact analysis for this project is based on the view from one key observation point (KOP) representing one linear viewing location representing the viewing angle and direction with the highest frequency of viewers.

KOP 1 (Figure 5) is located along CR 215 and directly across from Riley Gulch. KOP 1 represents the typical view that a casual observer would have while traveling northbound or southbound along CR 215. However, the viewer would have a small viewing window of the Proposed Action because of typical travel speeds and the nature of the topography that surrounds the site. Two ridges form the Riley Gulch drainage, and gently rolling foothills at the base of the ridges enclose the project site to the north and to the south. The ridgelines and rolling foothills provide visual screening into the project location farther south and north.

Environmental Consequences

Proposed Action

The construction of the proposed SG 43-28 pad expansion and pipelines would create visual contrast within the immediate landscape removing existing vegetation, exposing bare ground, and creating a series of distinct lines and colors in the landscape. Such visual changes would be the most evident during construction and completion activities. Once the pad is put into production and the pad is recontoured and vegetation is re-established, the overall visual contrast and texture of the site would be expected to blend with the surroundings. Short-term visual impacts would include the presence of drilling rigs, heavy equipment (dozers, graders, etc.), and vehicular traffic with an increase in dust, light pollution, and well flaring.

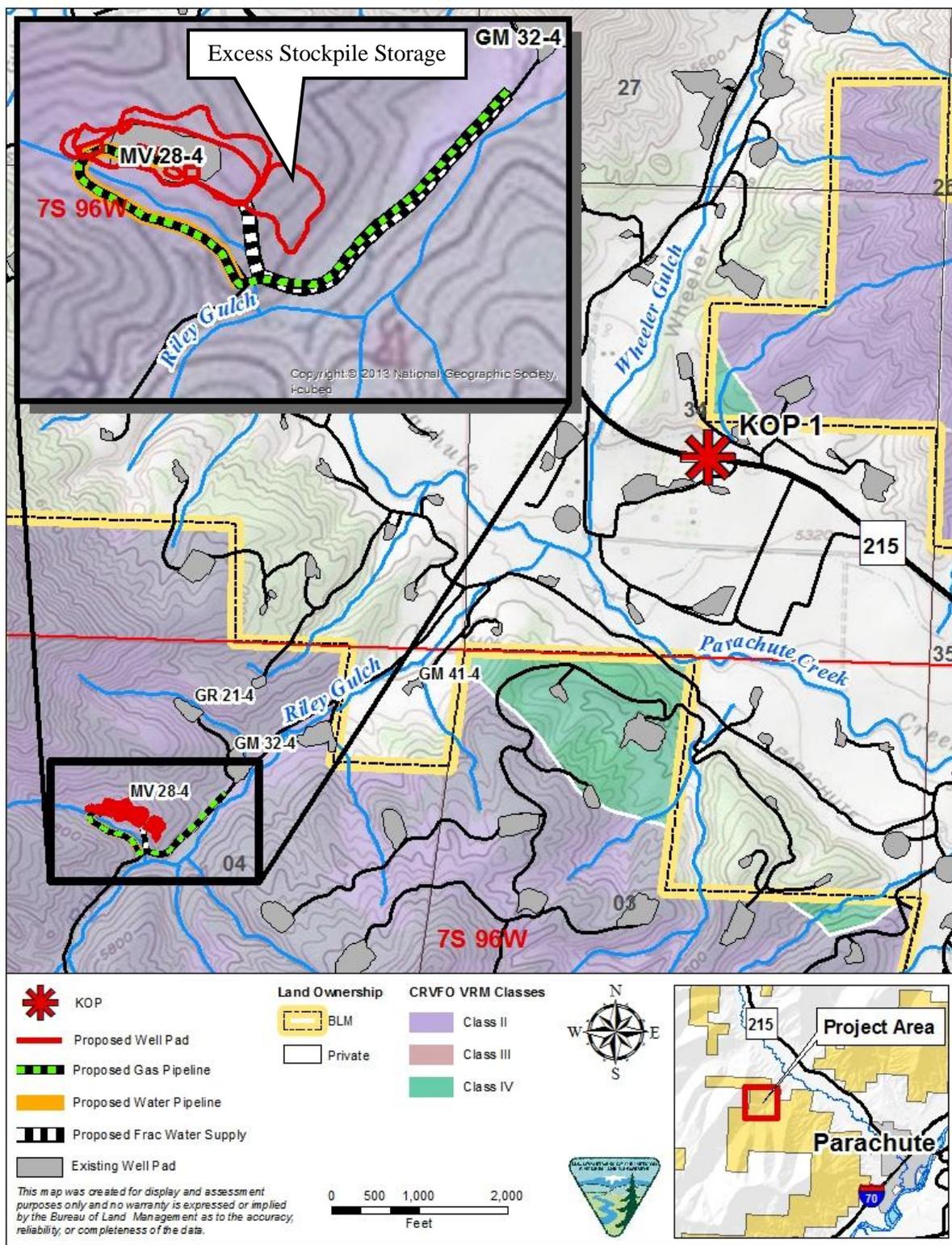


Figure 4. Proposed Action Relationship to VRM Class Designations and Land Ownership

The pad would be expanded from its 1.75-acre reclaimed area to a 5.72-acre disturbance footprint, part of which includes storage space for excess stockpile material (Figures 4 and 6). The excess stockpile material would be the only component of the Proposed Action that would be visible from KOP 1 and CR 215, but the degree and duration of visibility would depend on the scale and depth of the excess stockpile material. A rock wall structure would be constructed in sections along the southern edge of the pad to provide needed pad working area while avoiding any fill slope material falling into the drainage below (Figure 7). Although the pad would not be visible from CR 215 or KOP 1 the constructed rock wall should emulate the natural rock fracture lines as seen in the undisturbed landscape. The rock forms should be irregular in shape. Components of the Proposed Action would be visible, but would not attract the attention of the casual observer because of the window of visibility due to adjacent topography, angle of view, and travel speeds. To meet VRM Class II objectives, mitigation requirements are applied as COAs (See Appendix A).

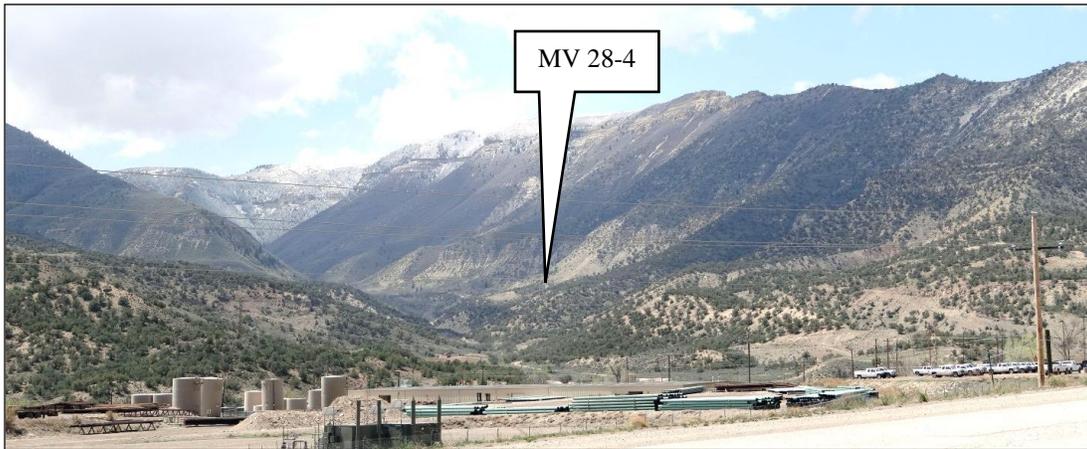


Figure 5. View toward Project Area from KOP 1, with MV 28-4 Pad Obscured by Intervening Ridge



Figure 6. View toward Parachute Creek from Northeastern Edge Proposed Storage Stockpile



Figure 7. Southern Edge of Well Pad Where Rock Wall Structure Would be Constructed

No Action Alternative

Under this alternative, no new Federal wells would be drilled or developed on BLM land, precluding any new visual impacts relating to drilling, completing, servicing or producing Federal wells or gas gathering operations. However, the visual impacts associated with the six producing Federal wells would be projected to be the same as they are present.

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 waterbodies, 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 National Environmental Policy Act documents list and describe any hazardous and/or extremely hazardous materials that would be produced, used, stored, transported, or disposed 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 that are commonly used for oil and gas projects. It also includes a description of the common industry practices for use of these materials and disposal of the waste products. These practices are dictated by various Federal and State laws and regulations, and the BLM standard lease terms and stipulations that would accompany any authorization resulting from this analysis. The most pertinent of the Federal laws dealing with hazardous materials are as follows:

- The Oil Pollution Act (Public Law 101-380, August 18, 1990) prohibits discharge of pollutants into Waters of the U.S., 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, right-of-way holders are not. RCRA strictly regulates the management and disposal of hazardous wastes.

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

Environmental Consequences

Proposed Action

Possible pollutants that could be released during the 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 include those associated with well production and transmission of natural gas through the gathering lines and the 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 larger extent, during drilling and completion operations since the workforce would increase during those activities. Trailers housing workers would be outfitted with self-contained sewage collection system; regular trash collection would occur throughout the drilling and well completion process.

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 new Federal horizontal well on the existing MV 28-4 pad would not be drilled, and the 6.28 acres of associated surface disturbance on BLM land would not occur. Consequently, installation of new buried pipelines would not be needed, and no new impacts from waste, hazardous or solid would occur. The waste impacts related to the operation of the six producing wells on the pad would remain and continue for the working life of the wells.

Water Quality – Surface and Ground (includes an analysis on Public Land Health Standard 5)

Surface Water

Affected Environment

The project lies approximately 4.7 miles northwest of Parachute, Colorado in the lower reaches of Riley Gulch, an ephemeral drainage. Riley Gulch flows northeasterly below the project site for approximately one mile to Parachute Creek and on to the Colorado River, approximately 3 miles to the southeast. According to the *Stream Classifications and Water Quality Standards* (CDPHE, Water Quality Control Commission [WQCC] Regulation No. 37) (CDPHE 2007) the mainstem Parachute Creek, including all tributaries and wetlands, from confluence of the west and east forks to the confluence with the Colorado River are within segment 11h. The following is a brief description of segments 11h.

- Segment 11h – This segment has been classified aquatic life cold 2, recreation P, 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 P refers to waters that have the potential to be used for primary contact recreation. This segment is suitable or intended to become suitable for agricultural purposes that include irrigation and livestock use.

All streams within segment 11h 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, of which Parachute Creek is a tributary, is currently considered impaired due to naturally high levels of selenium. Colorado's Monitoring and Evaluation List identifies waterbodies where there is reason to suspect water quality problems, but uncertainty also exists regarding one or more factors. No stream segments on Riley Gulch or Parachute Creek are on the State of Colorado's Monitoring and Evaluation List (CDPHE 2010).

Sediment is a pollutant of concern for the Colorado River Basin (CDPHE, WQCC Regulation No. 94). The closest downstream sediment measuring station on the Colorado River is USGS station 9093700 near De Beque, Colorado. For the period of 1974 to 1976, the mean sediment yield was 1,818 tons per day, ranging from 8 to 41,300 tons per day. The median value for the same period was 267 tons per day (USGS 2007).

At this time, minimal water quality data are available for Riley Gulch near the MV 28-4 pad site. A water sample collected from Riley Gulch by BLM personnel on April 16, 2004, had a temperature of 21° C (69.8° F), a conductivity of 1,372 microsiemens per centimeter (uS/cm), and a pH of 8.7. Data have been collected on Parachute Creek to which Riley Gulch drains and presented in Table 12.

Table 12. Selected Water Quality Data for Two Sampling Locations near the Project Area		
<i>Parameter</i>	<i>Parachute Creek near Parachute, CO USGS Site #09093000</i>	
	<i>7/29/1981</i>	<i>5/09/1980</i>
Instantaneous discharge (cfs)	4.4	420
Temperature, water (°C)	12.5	
Field pH (standard units)	9.2	8.3
Specific conductance (µS/cm/cm at 25°C)	913	460
Total Dissolved Solids (mg/L)	576	400
Hardness as CaCO ₃ (mg/L)	340	200
Chloride (mg/L)	22	4.6
Selenium (µg/L)	2	1
Dissolved oxygen (mg/L)	7.8	10
NA = data not available Source: USGS 2007		

Environmental Consequences

Proposed Action

The planned pad expansion would occur atop a sandstone ledge directly above an ephemeral drainage that flows southerly through a road culvert in the Riley Gulch Road and enters Riley Gulch. No direct surface disturbance is planned within the ephemeral drainage (Figures 2 and 2a).

Potential impacts to surface water associated with the Proposed Action include increased erosion and sedimentation of streams, changes in channel morphology due to road and pipeline crossings, and contamination by drilling fluids, produced water, or condensate. Surface waters would be most susceptible to sedimentation during construction, drilling, and completion activities. After this period, reclamation activities would substantially reduce surface exposure, decreasing the risk to surface waters over the long-term. In addition, the rerouting of the drainage could cause long-range sediment transport if not installed and maintained properly.

Although surface waters would be most susceptible to sedimentation over the short-term, access roads and the diversion ditches would remain in place over the life of the well (i.e., 20 to 30 years) and would channel

runoff during periods of precipitation. Sedimentation and stream channel impacts associated with roads would be reduced through the implementation of Best Management Practices (BMPs) and other preventative 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 new or upgraded BLM roads in the project area to a compacted thickness of 6 inches (Appendix A).

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 in a cuttings trench. A traditional reserve pit would not be constructed.

Tanks used to store produced water and/or condensate would be placed in secondary containment to prevent offsite release. In the event of an accidental release, produced water and condensate would be confined for cleanup in a containment area and would not migrate to surrounding soils or surface waters. Pipelines associated with the transport of these liquids would be pressure tested to detect leakage prior to use. Cuttings must be decontaminated to COGCC standards prior to pit closure; the table of applicable standards can be found at http://cogcc.state.co.us/RR_docs_new/rules/900Series.pdf

Oil and gas waste management practices have the potential to contaminate soils and surface water. Contamination of soils could cause long-term reduction in site productivity resulting in increased erosion and potential sediment and contaminant delivery to nearby waterways during runoff. Use, storage, and transportation of fluids such as produced water, hydraulic fracturing fluids, and condensate have the possibility of spills that could migrate to surface or groundwater. Elements of the Proposed Action are designed to mitigate risks to surface waters associated with the release and migration 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, decontaminated to COGCC standards and be stacked against the pad cut slope. A reserve pit would not be constructed. Completions may be conducted either onsite or remotely, and fluids may be stored in surface containment or a pit.

In addition to individual containment measures, the entire pad would be bermed to contain an accidental release on the pad. In the event of an accidental release, produced water and condensate would be confined for cleanup in a containment area and would not migrate to surrounding soils or surface waters. Pipelines associated with the transport of these liquids would be pressure tested to detect leakage prior to use. Implementation of the standard COAs for mitigating impacts to surface waters (Appendix A) would minimize risks of adverse impacts associated with construction and ongoing production activities.

Refer to Appendix A for standard Conditions of Approval that would mitigate impacts to surface water. Through the use of COAs and BMPs associated with construction activities, prompt interim reclamation, and the implementation of the preventative measures associated with the treatment of fluids, impacts to surface waters would be minimized and should be minor.

No Action Alternative

Under the No Action Alternative, the new Federal horizontal well on the existing MV 28-4 pad would not be drilled, and the 6.28 acres of associated surface disturbance on BLM land would not occur. Consequently, installation of new buried pipelines would not be needed, and no new impacts to surface water would occur. The surface water impacts related to the operation of the six producing wells on the pad would remain and continue for the working life of the wells.

Waters of the U.S.

Affected Environment

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

Environmental Consequences

Proposed Action

Although no direct or indirect impacts to waters of the U.S. are planned with this project, such impacts would be authorized by the USACE. A COA listed in Appendix A required that the operator obtain a formal jurisdictional determination by USACE prior to any construction that could affect waters of the U.S. and verification that the impacts do not require a permit.

No Action Alternative

Under the No Action Alternative, the new Federal horizontal well on the existing MV 28-4 pad would not be drilled, and the 6.28 acres of associated surface disturbance on BLM land would not occur. Consequently, installation of new buried pipelines would not be needed, and no new impacts to waters of the U.S. would occur. Surface water impacts related to the operation of the six producing wells on the pad would remain and continue for the working life of the wells.

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 (USEPA 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; municipal wells are designed and constructed for maximum potential yield.

The principal bedrock aquifers of the Piceance Basin are the Uinta Formation and the Parachute Creek Member of the Green River Formation, and are defined as the upper and lower Piceance Basin aquifer systems. The Uinta Formation consists of discontinuous layers of sandstone, siltstone, and marlstone and is less permeable than the hydrologically connected upper Parachute Creek Member (Robson and Saulnier 1981). The uppermost Uinta Formation also contains a shallow, perched aquifer that is separate from the upper aquifer unit (Cole et al. 1995). The upper Piceance Basin aquifer is underlain by the Mahogany confining unit, and correlates with the Mahogany Zone, the principal oil shale unit of the Piceance Basin. The Mahogany Zone separates the upper aquifer from the lower. The lower aquifer consists of the fractured marlstone of the lower part of the Parachute Creek Member. The thickness of the upper and lower aquifer units average 700 and 900 feet, respectively (CGS 2003). Both upper and lower aquifer systems are found within the surrounding cliffs of the project area, but no water wells are completed within either the upper or lower bedrock aquifers units as described above. Beneath these two aquifer systems is a confining unit consisting of the Wasatch Formation and the lower two members of the overlying Green River Formation.

Some fresh-water wells are completed in localized water-bearing intervals within this unit. Below 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 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 (USEPA 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 throughout the basin. Only very shallow waters such as those from the surficial Wasatch Formation are used for drinking water (USEPA 2004).

According to the CDWR database, there is one monitoring well located within a 1-mile radius of the proposed well site. The well located approximately 0.75 mile west of the proposed well site, is listed as having a depth of 55 feet, and static water level of 37 feet below ground surface.

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. Hydraulic fracturing 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 otherwise 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. Also see the discussion of hydraulic fracturing on groundwater resources in the section of this EA on Geology and Minerals. Geologic and engineering reviews are conducted to ensure that the cementing and casing programs are adequate to protect all downhole resources. With proper construction practices, drilling practices, and BMPs, no significant adverse impact to groundwater aquifers is anticipated to result from the project (see Downhole COAs in Appendix A).

Potential Impacts of Hydraulic Fracturing During Oil and Gas Well Completions

For decades, oil and gas companies and independent geophysicists have used state of the art equipment to monitor microseismic activity—defined as a “faint” or “very slight” tremor—during hydraulic fracturing to optimize well completions and to gather information about fracture dimensions and propagation (Warpinski 2009). These data give an indication about the magnitude of seismic activity associated with hydraulic fracturing, dimensions of resultant fractures in geologic formations, and probability for induced fractures to extend into nearby aquifers, if present. Research indicates that microseismic activity created by hydraulic

fracturing occurs at Richter magnitude 1 or less (Warpinski and Zimmer 2012). In comparison, a magnitude 3 earthquake is the threshold that can be felt at the ground surface. The Richter magnitude scale is base-10 logarithmic, meaning that a magnitude 1 tremor is 1/100th the amplitude of a magnitude 3 tremor. The National Academy of Sciences reviewed more than 100,000 oil and gas wells and waste water disposal wells around the world and concluded that “incidences of felt induced seismicity appear to be very rare,” with only one such documented occurrence (NAS 2012).

The dimensions of induced fractures have been measured with field monitoring equipment (including microseismic “listeners”) and in laboratory tests and have been compared to three-dimensional (3D) hydraulic fracture models. Researchers have successfully validated these models for fracturing in “tight gas” reservoirs including those in the Piceance Basin. Results of the analyses show that fractures resulting from completions of oil and gas wells can be predicted (Zhai and Sharma 2005, Green et al. 2009, Palisch et al. 2012) and that the length of fractures in relation to depth of the well can be estimated.

Hydraulically induced fracture orientation in relation to the wellbore depends upon the downhole environment (i.e., rock mechanics, minimum and maximum principle stress directions, rock physical properties, etc.) and the wellbore trajectory. In vertical or normal directional wells such as in the Mesaverde formation—the predominant hydrocarbon-producing formation in the CRVFO area—fracture growth is primarily lateral or outward from the wellbore, with minimal secondary fractures extending at some angle away from the lateral fractures. In horizontal wells such as being used to develop deep marine shales, fracture growth from the wellbore is mainly determined by the orientation of the wellbore in relation to the principal stresses of the rock. Fracture growth toward the surface is limited by barriers such as variations in stress and lithology, as is also the case in vertical and normal directional wells. In some horizontal wells, fracture growth is similar to that in vertical or normal directional wells due to wellbore trajectory along the maximum principal stress direction. Analysis of data from thousands of wells indicates fracture extent (length) of less than 350 feet in the vast majority of cases, with outliers of 1,000 to 2,000 feet (Maxwell 2011, Davies et al. 2012). The extreme outlier lengths are associated with fractures in thick deposits of lithologically uniform marine shales.

The potential height of hydraulically induced fractures in horizontal drilling is reduced in layered sediments in which a propagating fracture encounters a change in rock type or a bedding plane within a formation or a contact between formations. When these features are encountered, the fracture either terminates or to a lesser extent reorients along the generally horizontal bedding plane or formation contact instead of continuing upward across it. In the CRVFO area, natural gas production is primarily from vertically stacked, lenticular tight sands of the Mesaverde formation using vertical and directional wells. These tight-sand lenses are a few tens of feet thick or less. More recently, advances in horizontal drilling technology have allowed enhanced development of deeper marine shales such as the Niobrara formation. These tight-shale deposits are a few hundreds to thousands of feet thick in the CRVFO area compared to many hundreds or thousands of feet in some other gas-producing regions. The thickness of hydrocarbon-bearing strata in this area limits the vertical growth of primary and secondary fractures resulting from hydraulic stimulation.

Based on a review of available information on microseismic monitoring and fracture dimensions, Fisher and Warpinski (2011) concluded that fractures from deep horizontal wells are not a threat to propagate across the long distances (thousands of feet) needed to reach fresh-water aquifers much closer to the surface. This conclusion applies to the CRVFO area, and is also applicable to much shallower potable groundwater sources consisting of unconsolidated alluvium (streambed deposits) associated with the Colorado River and major tributaries. In general, alluvial water wells in the CRVFO extend to depths of less than 200 feet, with few in the range of 400 feet. Typical water levels in these wells range from 50 to 100 feet deep. Impacts to water quality of these shallow fresh-water wells is highly improbable as a result of hydraulic fracturing, which occurs at depths of 5,000 to 11,000 feet below ground surface.

In addition to vertical separation of several thousand feet between the upper extent of fractures and fresh-water aquifers are requirements by the BLM and COGCC for proper casing and cementing of wellbores to isolate the aquifers penetrated by a wellbore. BLM requires that surface casing be set from 800 to 1,500 feet deep, based on a geological review of the formations, aquifers, and groundwater. Cement is then pumped into the space between the casing and surrounding rock to prevent fluids from moving up the wellbore and casing annulus and coming in contact with shallow rock layers, including fresh-water aquifers. BLM petroleum engineers review well and cement design and final drilling and cementing logs to ensure that the cement has been properly placed. When penetration of groundwater and freshwater aquifers is anticipated, BLM inspectors may witness the cementing of surface casing and subsequent pressure testing to ensure that the annular space between the casing and borehole wall is properly sealed.

No single list of chemicals currently used in hydraulic fracturing exists for western Colorado, and the exact combinations and ratios used by operators are considered proprietary. However, the general types of compounds and relative amounts used are well known and relatively consistent (Table 13). Since fracture jobs are tailored to the downhole environment and companies are aware of the concerns involving hydraulic fracturing, the chemicals listed in Table 13 may or may not be used, and the information is provided solely as general information. Although a variety of chemicals additives are used in hydraulic fracturing—the examples in Table 13 being drawn from a total of 59 listed on the FracFocus website—the vast bulk of fluid injected into the formation during the process is water mixed with sand, representing 99.51% of the total by volume in the typical mixture shown in Table 13. The sand is as a proppant, or propping agent, to help keep the newly formed fractures from closing.

Table 13. Constituents of Typical Hydraulic Fracturing Operation in Tight Gas Formations

<i>Additive Type*</i>	<i>Typical Example*</i>	<i>Percent by Volume**</i>	<i>Function*</i>	<i>Common Use of Example Compound</i>
Acid	Hydrochloric acid	0.123	Dissolves mineral cement in rocks and initiates cracks	Swimming pool chemical and cleaner
Biocide	Glutaraldehyde	0.001	Eliminates bacteria in the water that produce corrosive or poisonous by-products	Disinfectant; sterilizer for medical and dental equipment
Breaker	Ammonium persulfate	0.010	Allows delayed breakdown of the gel	Used in hair coloring, as a disinfectant, and in manufacture of household plastics
Clay stabilizer	Potassium chloride	0.060	Creates a brine carrier fluid that prohibits fluid interaction with formation clays	Used in low-sodium table salt substitutes, medicines, and IV fluids
Corrosion inhibitor	Formic acid	0.002	Prevents corrosion of the well casing	Used as preservative in livestock feed; used as lime remover in toilet bowl cleaners
Crosslinker	Borate salts	0.007	Maintains fluid viscosity as temperature increases	Used in laundry detergents, hand soaps, and cosmetics
Friction reducer	Polyacrylamide	0.088	“Slicks” the water to minimize friction	Used as a flocculant in water treatment and manufacture of paper
Gelling agent	Guar gum	0.056	Thickens the water to help suspend the sand propping agent	Used as a thickener, binder, or stabilizer in foods
Iron control	Citric acid	0.004	Prevents precipitation of metal oxides	Used as flavoring agent or preservative in foods
Surfactant	Lauryl sulfate	0.085	Increases the viscosity of the fluid	Used in soaps, shampoos, detergents, and as foaming agents

pH adjusting agent	Sodium hydroxide, acetic acid	0.011	Adjusts pH of fluid to maintain the effectiveness of other components	Sodium hydroxide used in soaps, drain cleaners; acetic acid used as chemical reagent, main ingredient of vinegar
Scale inhibitor	Sodium polycarboxylate	0.043	Prevents scale deposits in the pipe	Used in dishwashing liquids and other cleaners
Winterizing agent	Ethanol, isopropyl alcohol, methanol	--	Added as necessary as stabilizer, drier, and anti-freezing agent	Various cosmetic, medicinal, and industrial uses
Total Additives		0.49		
Total Water and Sand		99.51		
*FracFocus Chemical Disclosure Registry, fracfocus.org/chemical-use/what-chemicals-are-used				
**USDOE 2009				

Following completion of fracturing activities, the pressure differential between the formation—a result of several thousand feet of overlying bedrock—and the borehole that connects with the surface causes most of the injected fluids to flow toward the borehole and then upward to the surface along with the hydrocarbon fluids released from the formation. The composition of this mixture, called flowback water, gradually shifts over a period of several days to a few months as injected fluids that have not yet migrated back to the wellbore or reacted with the native rock are carried out of the formation.

In 2011, the COGCC published an analysis of hydraulic fracturing technology use in the state and potential risks to human health and the environment. The introduction to that report included the following paragraph:

“Hydraulic fracturing has occurred in Colorado since 1947. Nearly all active wells in Colorado have been hydraulically fractured. The COGCC serves as first responder to incidents and complaints concerning oil and gas wells, including those related to hydraulic fracturing. To date, the COGCC has not verified any instances of groundwater contaminated by hydraulic fracturing.”

Based on the information summarized above, the CRVFO has concluded that properly implemented hydraulic fracturing of oil and gas wells drilled within its boundaries for the purpose of accessing Federal fluid minerals or for accessing private fluid minerals from BLM surface lands does not represent a significant adverse impact to human health and the environment.

No Action Alternative

Under the No Action Alternative, the new Federal horizontal well on the existing MV 28-4 pad would not be drilled, and the 6.28 acres of associated surface disturbance on BLM land would not occur. Consequently, installation of new buried pipelines would not be needed, and no new impacts to ground water would occur. The potential ground water impacts related to the operation of the six producing wells on the pad would remain and continue for the working life of the wells.

Analysis on Public Land Health Standard 5 for Water Quality

The Rifle-West LHA conducted in 2004-5 included the Riley Gulch drainage. The assessment indicated that road encroachment and improperly functioning culverts were causing increased sedimentation resulting in a failure to meet Standard 5 in the Riley Gulch drainage. The onsite review of this proposed project found that existing culverts were functioning. Furthermore, the road surfacing, road realignments, and pad reclamation

plans along with their associated best management practices outlined in this EA would reduce erosion and sedimentation levels within the ephemeral drainages that are found within the project area.

The Proposed Action would unlikely prevent Standard 5 from being achieved because direct impact to ephemeral drainages and the limited riparian areas are being avoided. Waterbodies, riparian areas and erosive soils are protected by lease stipulations, COAs, and requirements set for permitting by the COGCC and USACE. Therefore, the Proposed Action is not expected to contribute to a failure of the area to meet standards.

The No Action Alternative would have no bearing on the ability of the area to meet the public land health standard for plant and animal communities because no new development would occur on BLM land.

Wildlife (includes an analysis on Public Land Health Standard 3)

AQUATIC ORGANISMS

Affected Environment

Parachute Creek, a perennial stream and tributary of the Colorado River, is located approximately 1 mile northeast from the proposed pad. Fish surveys in the upper reaches of Parachute Creek conducted by CPW and BLM have documented a small population of Colorado River cutthroat trout, a native trout listed as sensitive by the BLM and discussed in the section on Special Status Species. The brown trout (*Salmo trutta*), a non-native sportfish widely stocked throughout the region, also inhabits the creek. This trout of eastern North America has been widely introduced in mountainous areas of Colorado because of its tolerance for slightly warmer waters than the cutthroat trout and its ability to reproduce successfully in streams with small flows.

Aquatic macroinvertebrates living in perennial streams such as Parachute Creek during a portion of their lifecycles include larvae of stoneflies (Plecoptera), mayflies (Ephemeroptera), and some caddisflies (Tricoptera) in fast-flowing reaches with rocky or detrital substrates. Both the aquatic larvae and winged adults of these insects are the primary prey for trout in Parachute Creek. Terrestrial invertebrates that land or fall onto the water surface or are carried into the stream in runoff from adjacent uplands provide a secondary prey base. Slow-flowing portions of Parachute Creek with fine substrates, aquatic macroinvertebrates are likely to support the larvae of certain true flies such as midges (Chironomidae) and mosquitoes (Cuculidae) as well as some species of caddisflies. These species are able to tolerate relatively warm, turbid, and poorly oxygenated waters, and their more abbreviated larval stages allow them to reproduce in intermittent streams and in seasonally inundated overbank areas.

Environmental Consequences

Proposed Action

Implementation of the Proposed Action could result in increases in erosion and sedimentation into Riley Gulch, Parachute Creek, and eventually the Colorado River. Because the Proposed Action includes summer use of the project areas, it is likely that roads and pads would not be muddy for extended periods of time. Roads are generally drier and in better condition during the non-winter months and consequently are less prone to erosion. Vehicular use during muddy road conditions could contribute to increased erosion of sediments into nearby ephemeral washes and eventually the Colorado River. The potential increase of sedimentation into the Colorado River would probably be nominal given background sediment loads currently carried by the river. Sediment-intolerant aquatic wildlife could be negatively affected, as increased erosion

potential would persist and impair water and habitat quality. Measures to minimize erosion and sedimentation of aquatic environments are included among the COAs (Appendix A).

No Action Alternative

Under the No Action Alternative, the new Federal horizontal well on the existing MV 28-4 pad would not be drilled, and the 6.28 acres of associated surface disturbance on BLM land would not occur. Consequently, installation of new buried pipelines would not be needed. The result would be no new impacts to aquatic wildlife.

Analysis on Public Land Health Standard 3 for Plant and Animal Communities (partial, see also Vegetation and Wildlife, Terrestrial)

According to a recent land health assessment, habitat conditions within this area appear suitable for aquatic species known or likely to occur (BLM 2005). Sustained development and the proliferation of roads, well pads, pipelines, compressor stations, tank farms, and other surface facilities would continue to reduce habitat size and affect both habitat quality and quantity. The potential to impact some species would increase as development continues. Although the contribution of the Proposed Action is in itself small, it may further trend the area away from meeting Standard 3 for aquatic wildlife.

The No Action Alternative would not result in a failure of the area to achieve Standard 3 because the proposed developments would not occur.

MIGRATORY BIRDS

Affected Environment

The project area consists of Wyoming sagebrush and rubber rabbitbrush shrublands on the valley floor, rimmed with Utah juniper and scattered pinyon along nearby slopes and ridgelines. Associated species include mountain-mahogany (*Cercocarpus montanus*), serviceberry (*Amelanchier utahensis*), black sagebrush (*Artemisia nova*), and a variety of native grasses and forbs. A weedy non-native annual grass, cheatgrass, is scattered and widespread throughout the project area.

Species on the U.S. Fish and Wildlife Service (2008) list of Birds of Conservation Concern (BCC) for the project region include two species associated with pinyon-juniper woodlands, the pinyon jay (*Gymnorhinus cyanocephalus*) and juniper titmouse (*Baeolophus griseus*). Another BCC species, Cassin's finch (*Haemorhous cassinii*), nests in higher elevation montane and subalpine conifer forests but commonly moves into pinyon-juniper woodlands following nesting and throughout winter. None of these species was observed during the most recent survey (WWE 2013). Other birds associated with this habitat type include the broad-tailed hummingbird (*Selasphorus platycercus*), black-chinned hummingbird (*Archilochus alexandri*), western kingbird (*Tyrannus verticalis*), Say's phoebe (*Sayornis saya*), gray flycatcher (*Empidonax oberholseri*), Townsend's solitaire (*Myadestes townsendii*), American robin (*Turdus migratorius*), mountain bluebird (*Sialia sialis*), plumbeous vireo (*Vireo plumbeus*), blue-gray gnatcatcher (*Poliophtila caerulea*), black-throated gray warbler (*Dendroica nigrescens*), chipping sparrow (*Spizella passerina*), lark sparrow (*Chondestes grammacus*), and lesser goldfinch (*Spinus psaltria*).

Areas of mountain shrubs such as mountain-mahogany and serviceberry, although limited, have the potential to attract additional non-BCC species such as the black-headed grosbeak (*Pheucticus melanocephalus*) and spotted towhee (*Pipilo maculata*).

Sagebrush habitats may support one BCC species associated almost entirely with sagebrush steppe, the Brewer's sparrow (*Spizella breweri*), as well as other migrants such as the western meadowlark (*Sturnella neglecta*) and vesper sparrow (*Pooecetes gramineus*). Based on the extent and quality of the sagebrush, the habitat is marginal for Brewer's sparrow and outside the normal range of the sage sparrow (*Amphispiza bellii*), another obligate on sagebrush occurring in the Wyoming Basin of northwestern Colorado.

See the following subsection for a discussion of raptors, resident passerines, and upland fowl.

Environmental Consequences

Proposed Action

The Proposed Action would result in a loss of nesting, roosting, perching, and foraging habitat for migratory birds on disturbed areas and reduce habitat effectiveness adjacent to areas where disturbance-related effects could be expected. The expansion of the well pad and access road as well as construction of the frac pad would remove approximately 6.28 acres of pinyon-juniper woodlands and sagebrush vegetation that would result in reduced habitat patch size. These changes to the habitat could negatively affect bird species that require large expanses of intact habitat. Habitat fragmentation could result in increased competition, increased exposure to predators, and a higher likelihood of nest parasitism. It is also possible that individual nests could be destroyed if well pads, roads, and production facilities are constructed during the nesting season.

In addition to the physical loss of habitat and habitat fragmentation, it is possible that during construction activities, individual birds could be displaced to adjacent habitats due to noise and human presence. Effects of displacement could include increased risk of predation or failure to reproduce if adjacent habitat is at carrying capacity. Furthermore, impacts to birds at the species or local population level could include a change in abundance and composition as a result of cumulative habitat fragmentation from energy development in the larger area. Impacts to migratory bird species that nest in pinyon-juniper and sagebrush habitats can be minimized by avoiding surface-disturbing activities during the nesting season. take place outside the nesting season.

All migratory bird species are protected by the Migratory Bird Treaty Act (MBTA), which makes it unlawful to pursue, hunt, kill, capture, possess, buy, sell, purchase, or barter any migratory bird, including the feathers or other parts, nests, eggs, or migratory bird products. In addition to the MBTA, Executive Order 13186 sets forth the responsibilities of Federal agencies to further implement the provisions of the MBTA by integrating bird conservation principles and practices into agency activities and by ensuring that Federal actions evaluate the effects of actions and agency plans on migratory birds. Consistent with Executive Order 13186 and BLM Colorado guidelines, CRVFO has established as a COA (Appendix A) a Timing Limitation (TL) prohibiting initiation of vegetation removal or ground-disturbing activities during the period May 1 to July 1, the peak period for incubation and brood rearing among migratory birds in the project vicinity. The BLM may grant an exception to this COA if surveys by a qualified biologist during the nesting season of BCC species potentially present indicate no active nests within 30 meters (100 feet) of the disturbance area.

Also for the protection of migratory birds is a COA specifying that any pits containing fluids must be fitted with one or more devices to avoid or minimize exposure to the fluids by migratory birds (Appendix A). Such exposures could result in acute toxicity or compromised insulation or buoyancy due to dissolution of protective oil on the feathers.

No Action Alternative

Under the No Action Alternative, the new Federal horizontal well on the existing MV 28-4 pad would not be drilled, and the 6.28 acres of associated surface disturbance on BLM land would not occur. Consequently, installation of new buried pipelines would not be needed. The result would be no new impacts to migratory birds.

OTHER TERRESTRIAL SPECIES

Affected Environment

The project area would be located in medium density pinyon-juniper woodlands with openings of sagebrush, saltbush, and greasewood. Understory vegetation consists of mostly native grasses and forbs with some cheatgrass. Given these vegetation types, the area provides cover, forage, breeding, and nesting habitat for a variety of big game and small game species as well as nongame mammals, birds, and reptiles.

MAMMALS

The project area is within overall ranges of mule deer (*Odocoileus hemionus*) and Rocky Mountain elk (*Cervus elaphus nelsonii*). Because of its low elevation the project area is primarily winter range, which means that deer and elk populations increase during winter months when animals migrate to lower elevations from the Battlements to the south. Winter densities of big game animals in a given area are dependent on the type of habitat present and the severity of the winter. Deeper snows and colder temperatures result in increase in the number of big game animals using the area.

The project area contains winter range and severe winter range for mule deer and a smaller amount of winter range for Rocky Mountain elk (*Cervus elaphus nelsoni*) as mapped by the Colorado Parks and Wildlife (CPW 2011). The mule deer is a recreationally important species that are common throughout suitable habitats in the region. Although most of the area is mapped as mule deer winter range, the project area also receives use by deer during the summer. Rocky Mountain elk are also recreationally important, but the project area contains relatively little suitable habitat for this species. Most winter use by elk north of I-70 in the project vicinity is along Parachute Creek and tributary canyons or along Piceance Creek, which the elk access by moving northward from summer range on the Roan Plateau.

Large carnivores potentially present in the project vicinity include the mountain lion (*Felis concolor*), which moves seasonally with its preferred prey, the mule deer, and the black bear (*Ursus americanus*). Black bears are uncommon in the lowlands north of I-70 due to the scarcity of sufficient forest cover and suitable foods (including acorns and berries). Two smaller carnivores, the coyote (*Canis latrans*) and bobcat (*Lynx rufus*), are also present throughout the region in open habitats and broken or wooded terrain, respectively, where they hunt for small mammals, reptiles, and ground-dwelling birds. Other small carnivores potentially present are the raccoon (*Procyon lotor*) and striped skunk (*Mephitis mephitis*) primarily along Parachute Creek and their close relatives the ringtail (*Bassariscus astutus*) and spotted skunk (*Spilogale gracilis*) the drier and more rugged terrain higher in Riley Gulch.

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

BIRDS

Raptors potentially nesting in the area include the red-tailed hawk (*Buteo jamaicensis*), Swainson's hawk (*B. swainsoni*), Cooper's hawk (*Accipiter cooperii*), sharp-shinned hawk (*A. striatus*), American kestrel (*Falco sparverius*), great horned owl (*Bubo virginiana*), and long-eared owl (*Asio otus*), the latter uncommonly. Two small owls potentially nesting in the area include a BCC species, the flammulated owl (*Otus flammeolus*), and a non-BCC species, the northern saw-whet owl (*Aegolius acadicus*). The latter was heard calling during biosurveys. Other raptors nesting in the vicinity and potentially visiting the project area during foraging include two BCC species, the golden eagle (*Aquila chrysaetos*) and prairie falcon (*Falco mexicanus*), both potential transients from suitable nesting sites on cliffs and rocky bluffs throughout the area. The carrion-feeding turkey vulture (*Cathartes aura*) is also likely to search the area for food. Two BCC species that nest in the general project region but are not expected to forage within or near the site are the bald eagle and prairie falcon (see the section on Special Status Species). A raptor survey completed in May 2013 did not identify any nest structures within 0.25 mile of the pad and access road (WWE 2013).

Passerine (perching) birds commonly found in the area include year-round residents such as the common raven (*Corvus corax*), American crow (*C. brachyrhynchus*), black-billed magpie (*Pica hudsonia*), western scrub-jay (*Aphelocoma californica*), mountain chickadee (*Poecile gambeli*), and house finch (*Haemorhous mexicanus*) in addition to the migratory species and raptors described above under Migratory Birds and previously under Special-Status Species.

A non-native gallinaceous species widely introduced as a gamebird, the chukar (*Alectoris chukar*), is present in relatively low numbers on the nearby slopes below the Roan Cliffs.

REPTILES AND AMPHIBIANS

The project area is within elevational range of most reptile species known to occur in Garfield County. Species most likely to occur include the short-horned lizard (*Phrynosoma hernandesi*), plateau lizard (*Sceloporus tristichus*), tree lizard (*Urosaurus ornatus*), and gopher snake (bullsnake) (*Pituophis catenifer*) in pinyon-juniper woodlands, sagebrush shrublands, or grassy clearings. Other reptiles potentially present along riparian areas are the milk snake (*Lampropeltis triangulum*), western terrestrial garter snake (*Thamnophis elegans*), and smooth green snake (*Liochlorophis vernalis*).

The area is also within the known range of the Great Basin spadefoot [toad] (*Spea intermontana*), Woodhouse's toad (*Anaxyrus woodhousii*), and western chorus frog (*Pseudacris triseriata*). Within the CRVFO and vicinity, the spadefoot toad and the true toad occur primarily along ephemeral washes that do not support fish and contain pools of water for a period of at least a few weeks every spring. The chorus frog occurs primarily in cattail and bulrush wetlands and along the vegetated margins of seasonal or perennial ponds and slow-flowing streams.

Environmental Consequence

Proposed Action

Direct impacts to terrestrial wildlife from the Proposed Action may include mortality, disturbance, nest abandonment/nesting attempt failure, or site avoidance/displacement from otherwise suitable habitats. These effects could result from the 6.28 acres of habitat loss or modification, increased noise from vehicles and operation of equipment, increased human presence, and collisions between wildlife and vehicles. Impacts would be more substantial during critical seasons such as winter (deer and elk) or the spring/summer breeding season (raptors, songbirds, amphibians).

Deer and elk are often restricted to smaller areas during the winter months and may expend high amounts of energy to move through snow, locate food, and maintain body temperature. Disturbance during the winter can displace wildlife, depleting much-needed energy reserves and may lead to decreased over winter survival. Additional, indirect habitat loss may occur if increased human activity (e.g., traffic, noise) associated with infrastructure causes intolerant species to be displaced or alter their habitat use patterns. The extent of indirect habitat loss varies by species, the type and duration of the disturbance, and the amount of screening provided by vegetation and topography. In general, disturbance-related impacts are temporary, with patterns of distribution and habitat use returning to predisturbance conditions rather quickly when disturbance stops.

Because no raptor nests were identified during project surveys during the 2013 nesting season, no raptor nesting TL will be applied. However, if a nesting raptor is discovered prior to the initiation of construction, drilling or completion activities, a raptor nesting TL will be applied as a COA (Appendix A) to prohibit initiation of construction, drilling, or completion activities at the MV 28-4 pad from May 1 to July 1.

No Action Alternative

Under the No Action Alternative, the new Federal horizontal well on the existing MV 28-4 pad would not be drilled, and the 6.28 acres of associated surface disturbance on BLM land would not occur. Consequently, installation of new buried pipelines would not be needed. The result would be no new impacts to terrestrial wildlife.

Analysis on Public Land Health Standard 3 for Plant and Animal Communities (partial, see also Vegetation and Wildlife, Aquatic)

According to a recent land health assessment, habitat conditions within this area appear suitable for aquatic species known or likely to occur (BLM 2005). Sustained development and the proliferation of roads, well pads, pipelines, compressor stations, tank farms and other surface facilities would continue to reduce habitat size and affect both habitat quality and quantity. The potential to impact some species would increase as development continues. Although the contribution of the Proposed Action is in itself small, it may further trend the area away from meeting Standard 3 for terrestrial wildlife.

The No Action Alternative would not result in a failure of the area to achieve Standard 3 because the proposed developments would not occur.

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.

Although none of the cumulative impacts was described in the 1999 FSEIS (BLM 1999a) as significant, and while new technologies and regulatory requirements have reduced the impacts of some land uses, it is clear that past, present, and reasonably foreseeable future actions have had and would continue to have adverse

effects on various elements of the human environment. Anticipated impacts for existing and future actions range from negligible to locally major, and primarily negative, for specific resources.

The primary bases for this assessment are twofold: First, although the rate of development, including oil and gas development, has slowed in recent years due to the general economic downturn and depressed natural gas prices, some development continues to occur, adding to the previous residential, commercial, and industrial growth, the previous habitat loss, modification, and fragmentation, and the amount of vehicular traffic and equipment operations associated with long-term production and maintenance. Second, most of the oil and gas development has occurred on private lands where mitigation measures designed to protect and conserve resources may not be in effect to the same extent as on BLM lands. However, COGCC regulations enacted in recent years have closed considerably the former gap between the potential environmental impacts associated with development of private versus Federal fluid mineral resources.

It is clear that the Proposed Action would contribute to the collective adverse impact for some resources. Although the contribution would be minor, the Proposed Action would contribute incrementally to the collective impact to air quality, vegetation, migratory birds, terrestrial wildlife, and other resources.

PERSONS AND AGENCIES CONSULTED

WPX Energy Rocky Mountain LLC: April Mestas, Adam Tankersley, Kris Meil, Wally Hammer, Joe Weaver, Jr., Dan Collette, Brandon Baker

Mike Berry: Huddleston-Berry Engineering and Testing LLC

U.S. Fish and Wildlife Service: Creed Clayton

INTERDISCIPLINARY REVIEW

BLM staff who participated in the preparation of this EA, including review of survey results submitted by the operator’s consultants, evaluation of potential impacts from implementation of the Proposed Action, and identification of appropriate COAs to be attached and enforced by BLM, are listed in Table 15.

Table 15. BLM Interdisciplinary Team Authors and Reviewers		
<i>Name</i>	<i>Title</i>	<i>Areas of Participation</i>
John Brogan	Archaeologist	Cultural Resources, Native American Religious Concerns
Jim Byers	Natural Resource Specialist	EA Project Lead, Access & Transportation, Socioeconomics, Wastes-Hazardous or Solid
Allen Crockett, Ph.D., J.D.	Supervisory Natural Resource Specialist	Technical Review, NEPA Review
Shauna Kocman, Ph.D., P.E.	Petroleum Engineer	Downhole COAs 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 Plants, Vegetation
Sylvia Ringer	Wildlife Biologist	Migratory Birds, Special Status Species Animals, Aquatic and Terrestrial Wildlife
Todd Sieber	Geologist	Geology and Minerals, Groundwater, Paleontology

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APPENDIX A

**MV 28-4 Pad
Surface-Use and Downhole Conditions of Approval**

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**SURFACE-USE CONDITIONS OF APPROVAL
DOI-BLM-CO-N040-2014-0001-EA**

GENERAL SURFACE-USE COAS

The following surface-use COAs shall be implemented, where applicable and feasible, to reduce impacts from project activities. Site-specific surface-use COAs and downhole COAs follow these general COAs.

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. No construction activities shall commence without staking of pad construction limits, pad corners, and road/pipeline centerlines and disturbance corridors.
2. **Pad and 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. **Drill Cuttings Management.** Cuttings generated from the numerous planned well bores shall be worked through a shaker system on the drill rig, mixed with a drying agent, if necessary, and deposited in the planned cuttings trench or piled on location against the cut slope for later burial during the interim reclamation earthwork. The cuttings shall be remediated per COGCC regulations (Table 910-1 standards) prior to earthwork reshaping related to well pad interim reclamation.
4. **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.
5. **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.

6. 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.
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 one year is expected to occur between drilling episodes, BLM may require implementation of all or part of the interim reclamation program.

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

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

The deadlines for seeding described above are subject to extension upon approval of the BLM based on season, timing limitations, or other constraints on a case-by-case basis. If the BLM

approves an extension for seeding, the operator may be required to stabilize the reclaimed surfaces using hydromulch, erosion matting, or other method until seeding is implemented.

- c. Topsoil Stripping, Storage, and Replacement. All topsoil shall be stripped following removal of vegetation during construction of well pads, pipelines, roads, or other surface facilities. In areas of thin soil, a minimum of the upper 6 inches of surficial material shall be stripped. The BLM may specify a stripping depth during the onsite visit or based on subsequent information regarding soil thickness and suitability. The stripped topsoil shall be stored separately from subsoil or other excavated material and replaced prior to final seedbed preparation. The BLM best management practice (BMP) for the Windrowing of Topsoil (COA #18) shall be implemented for well pad construction whenever topography allows.
- d. Seedbed Preparation. For cut-and-fill slopes, initial seedbed preparation shall consist of backfilling and recontouring to achieve the configuration specified in the reclamation plan. For compacted areas, initial seedbed preparation shall include ripping to a minimum depth of 18 inches, with a maximum furrow spacing of 2 feet. Where practicable, ripping shall be conducted in two passes at perpendicular directions. Following final contouring, the backfilled or ripped surfaces shall be covered evenly with topsoil.

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

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 pinyon-juniper woodland habitat type shall be used on all BLM lands affected by the project (see Attachment 1 of the letter provided to operators dated October 23, 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 prohibited or restricted noxious weed seeds and shall contain no more than 0.5% by weight of other weed seeds. Seed may contain up to 2.0% 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 BMPs approved by the BLM. Additional BMPs such as biodegradable wattles, weed-free straw bales, or silt fences shall have be employed as necessary to reduce transport of sediments into the drainages. The BLM may, in areas with high erosion potential, require use of hydromulch or biodegradable blankets/matting to ensure adequate protection from slope erosion and offsite transport of sediments and to improve reclamation success
- 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, including monitoring protocols used, 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 weed monitoring reports and Pesticide Application Records (PARs) shall be submitted to BLM by **December 1**.

9. Big Game Winter Range Timing Limitation. To minimize impacts to wintering big game, no construction, drilling or completion activities shall occur during a Timing Limitation (TL) period from **January 1 through March 1 annually**.
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. Any oil or gas construction, drilling, or completion activities planned within 0.5 mile of a bald or golden eagle nest, or other associated activities greater than 0.5 miles from a nest that may disturb eagles, should be coordinated with the BLM project lead and BLM wildlife biologist and the USFWS representative to the BLM Field Office (970-876-9051).
11. Raptor Nesting. Raptor nest surveys in the project vicinity in May of 2013 did not result in location of raptor nest structures within 0.25 mile of a well pad or 0.125 mile of an access road, pipeline, or other surface facility associated with this project. Therefore, a 60-day raptor nesting TL is not required. However, to help ensure compliance with the Migratory Bird Treaty Act (MBTA), the operator should schedule construction or drilling activities to begin outside the raptor nesting season (February 1 to August 15) if practicable. If initiation of construction, drilling, or completion activities during these dates cannot be avoided, 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 for Migratory Birds).
12. Migratory Birds – Birds of Conservation Concern. Pursuant to BLM Instruction Memorandum 2008-050, all vegetation removal or surface disturbance in previously undisturbed lands providing potential nesting habitat for Birds of Conservation Concern (BCC) is prohibited from **May 1 to July 1**. An exception to this TL may be granted if nesting surveys conducted no more than one 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 aural 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 of placement of fluids into a pit. The requirement for netting does not apply to pits during periods of continuous, intensive human activity at the pad, such as drilling and hydraulic fracturing phases or, as pertains to cuttings trenches, during periods of active manipulation for cuttings management, remediation of contaminated materials, or other purposes.

In addition to netting of pits, 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. 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. Fossil 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.

16. 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).

17. Visual Resources. Production facilities shall be placed to avoid or minimize visibility from travel Corridors 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.

All woody vegetation (live and dead) shall remain standing at the toe (northeast and east edge) of the excess stockpile storage location to provide visual screening. All woody vegetation left standing shall be protected and remain standing and undamaged when the excess stockpile material is pulled back to recontour the well pad.

During the rock wall construction along the southern edge of the well pad, the constructed rock wall shall emulate the natural fractures lines of the rock as seen in the undisturbed landscape and the rock forms shall be irregular in shape.

Above-ground facilities shall be painted **Shadow Gray** to minimize contrast with existing surrounding vegetation or rock outcrops.

During construction, the BLM and WPX representatives shall jointly review construction measures to determine effectiveness in meeting visual resource mitigation measures, and if subtle changes in construction techniques are warranted, they could be directed by the BLM Authorized Officer.

18. 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.
19. Interim Reclamation Related to Drilling Phases. Within 1 year of completion of all exploratory wells proposed on a pad or within one year of completion of all development wells on a pad (whichever the situation may be), the operator would stabilize the disturbed area by recontouring, mulching, providing run-off and erosion control, replacing topsoil as directed, and seeding with BLM-prescribed native seed mixes (or landowner requested seed mix on Fee surface), and conducting weed control, as necessary. In cases where the exploratory drilling and development drilling on a single pad occur more than 1 year apart, slopes shall be recontoured to the extent necessary to accommodate seeding, and seed mixes required by BLM or requested by the private landowner shall be applied to stabilize the soil between visits per direction of the BLM.

SITE-SPECIFIC COAS APPLICABLE TO THE MV 28-4 PROJECT

The following site-specific surface use COAs are in addition to the standard COAs listed above and all relevant stipulations attached to the respective Federal leases.

1. Project Construction Details

Boulder Wall Structure and Construction Oversight: Rock wall structure(s) shall be constructed as outlined in the schematic drawing included in the APD and shown as Figure 2b of the EA. The boulder retaining wall would be installed between Corners 6 and 10 along the southern edge of the pad (as needed) to provide vital pad working space while containing any fillslope material from falling into the adjacent drainage. The wall would have an excavated base or footer made of large boulders, rebar and cement grout with course(s) of interlocking boulders dry-stacked above the base footer to create the retaining wall structure and attain the necessary wall height. Sandstone boulders within and adjacent to the project site would be gathered and broken or shaped into pieces with a track-mounted hammer-hoe to develop the stacked boulders for the wall. Additional boulder material could be hauled to the site from off-site sources on private land, as necessary, to complete the installation of the wall(s).

Inspection(s) of the wall structure would be conducted by the geotechnical firm that created the schematic drawing with an email submitted to BLM documenting the results of the inspection(s) including a statement regarding acceptance of the construction techniques and finished product.

Topsoil Management: Because of limited windrow space surrounding the project, BLM and WPX representatives shall develop a plan during the preconstruction meeting for topsoil storage related to the pad expansion and excess material stockpiles. Prior to any excess material stockpiling at either of the storage locations (directly east of Corners 4 and 5 or at the Riley Gulch Frac Pad site), topsoil shall be stripped to a minimum depth of 6 inches and windrowed around the perimeter of the storage areas to serve as storm water berms. Topsoil can also be used as berms for sediment catches when located in

proximity to the topsoil windrow. Seeding of topsoil windrows or stockpiles shall occur within 30 days of the construction of the windrow structures or stockpiles.

Pad Construction Items: The proposed pad expansion has a considerable volume of excess material (34,930 cubic yards) which would be stockpiled at the following locations (in priority order):

- (a) placed in the excess material storage area designed for 28,120 cubic yards as shown on Plat 2A with special emphasis of piling the material as high as feasible while remaining within the staked setbacks from the edge of the ridge; and
- (b) hauled approximately 1 mile east and stored at the proposed, previously approved Riley Gulch Frac Pad site in T6S R96W Section 34, Lot 11 located on WPX property.

WPX, in collaboration with BLM, shall jointly review the damaged rock gabion structure and the existing culvert located on the road fillslope crossing the canyon near Corner 11 and shall develop a plan to stabilize the gabion structure, ensure continued serviceability of the culvert or require culvert replacement and discuss measures to reclaim the road fillslope. Installation of a new larger diameter culvert shall be a consideration in the review.

Production Equipment Placement: The locations established for the production units between Corners 11 and 13 and the storage tanks near Corner 14 shall be installed on a compacted platform of soil that rises above the pad working surface (minimum of 12 inches). Secondary containment system with a walled liner shall be installed around the equipment locations.

Pad Containment Berm, Spill Prevention Measures: With the pad being in direct proximity to drainages on nearly all sides, there shall be special attention to installing a solid containment berm system around the perimeter of the pad working area. Sediment basins shall be located and designed to readily accept pad drainage with focus of locating these basins near the cut/fill balance line of the pad surface. Using windrowed topsoil as sediment controls and/or basin catchments shall be incorporated into the storm water control plan. Sediment basin outlets with drop-down black piping are discouraged and, if used, such piping shall not feed directly into the nearby drainages. As a minimum, a hand-drawn schematic on Plat #2 shall provide the details for the storm water control plan for this pad. This plan shall be presented to the BLM and approved prior to completion of pad construction earthwork.

Storm Water and Reclamation Considerations: Storm water diversion ditches shall be constructed to direct surface flow around the pad perimeter. Pad grading and surfacing with gravel shall be accomplished to direct runoff to the diversion ditches and avoid water ponding on the pad surface.

A storm water ditch shall be installed between the eastern edge of the pad between Corners 4 and 5 to divert water around the north and east side of the pad into a sediment catchment installed near Corner 6 and the excess material pile. Consideration shall be made during pad work to construct a sediment basin and diversion ditch above elevation 5720 feet between Corners 2 and 3 to catch storm water and direct that flow in a ditch across the lower cutslope around Corners 3 and 4 and into the ditch described above.

After the large boulders have been removed and used as structural materials for the rock wall, the existing draw above the northwest side of the pad that drains between Corners 13 and 14 shall have a sediment basin installed above the pad edge to catch storm water flows and snowmelt and direct the flows through overflow pipes into a culvert that could be directed underneath the pad and outlet on the south edge of the pad. An alternate storm water overflow plan for this sediment catchment is to place the basin at an elevation high enough above the pad so any overflow from sediment basin would be directed into a

diversion ditch behind the separator units between Corners 11 and 13 that would outlet into the main drainage above the road culvert..

During the earthwork for the interim reclamation on the MV 28-4 pad and the final reclamation on the adjacent excess storage pile, the slopes shall be reshaped with a rough finish to control erosion and improve seed bed preparation. The interim reclamation for this project shall involve hydroseeding and hydromulching because of the relatively steep slopes. Soil testing shall be required prior to any reclamation earthwork with objective of using soil amendments for the reclaimed areas based on the soil test results.

Road Surfacing: After the installation of the buried pipeline upgrades, the existing roads west of the GM 32-4 pad to the MV 28-4 pad shall be surfaced with a minimum 6-inch depth of gravel prior to mobilization of the drill rig. Furthermore, any portion of the existing roads between the MV 28-4 pad and the Riley Gulch Frac Pad in need of spot graveling or resurfacing shall be accomplished prior to and/or during the hauling of excess material from the MV 28-4 project to achieve the minimum 6-inch depth of gravel.

2. Pipeline Construction Details

Administrative Notification: The operator shall notify the BLM representative at least 48 hours prior to initiation of pipeline construction. The operator shall schedule a pre-construction meeting with BLM, including key operator and contractor personnel, to ensure that any unresolved issues are fully addressed prior to initiation of surface-disturbing activities. Pipeline integrity testing procedures for these lines shall be outlined to BLM during the 48-hour notification or pre-work meeting. Any installation of pipeline valves (above or below ground) for these new lines shall be identified during the pipeline pre-work meeting.

Buried Pipeline Installation Details: Prior to excavation work for the new steel 8-inch gas pipeline and new Flexsteel 4-inch produced water line, the depth of the operating gas pipeline buried in the existing MV 28-4 roadway shall be determined and the road surface shall be bladed of its gravel surfacing and stored for re-use. Special care shall be taken to avoid damage to existing road culverts or the drain system installed in the slump area along the MV 28-4 road. Any resulting damage shall require repair or replacement of the existing road culverts.

The new 8-inch gas gathering line and 4-inch water collection line shall be installed concurrently in the same trench. The pipelines shall be installed to industry and BLM “Gold Book” standards. All pipeline(s) shall be buried with a minimum depth of 48 inches from the top of the pipe to the surface. Since the lines shall be buried in the MV 28-4 roadway, staking of the centerline and disturbance limits shall not be necessary. The position of the new lines within the roadway shall be determined by “potholing” the alignment of the existing buried gas line. No equipment or sidecasting of trenched materials shall be allowed off the roadway unless authorized by BLM personnel.

Pipeline warning signs shall be installed within 15 days of completion of construction and prior to use of the pipeline for transportation of product. Pipeline warning shall be installed at all road crossings and shall be visible from sign to sign along the ROW. For safety purposes each sign shall be permanently marked with the operator’s name and shall clearly identify the owner (emergency contact) and purpose (product) of the pipeline.

Surface Pipeline Considerations: Prior to installation, the alignment of the 7-inch steel surface frac line between the GM 32-4 and MV 28-4 pads shall be field-reviewed by BLM and WPX representatives

specifically to determine the method of installation, placement along Riley Gulch Road, and traverse underneath the GR 21-4 Road.

3. Special Status Plant Protections. The following measures shall be implemented. Future botany surveys may be conducted at the appropriate time of year and under suitable climate conditions to determine presence or absence of DeBeque phacelia. If these surveys are conducted to the CRVFO standards and determine that these species are not present within delineated suitable and marginally suitable habitats, then the following mitigation requirements shall be lifted.

The Operator shall incorporate the following steps to avoid and minimize impacts to DeBeque phacelia:

- a. No new surface disturbing activities shall occur within 14 meters of the edge of delineated marginally suitable habitat. A temporary fence shall be installed along the edge of disturbance to prevent vehicle and pedestrian traffic across the habitat and its buffer. This fence shall remain in place until interim reclamation seeding has been completed.
- b. Surface disturbing activities located within 100 meters of delineated suitable habitat shall have dust control measures implemented. No adjuvants shall be added to water applied to the ground surface to control dust within this buffer.
- c. Weed control shall be limited to spot spray or wicking treatments only within 100 meters of delineated suitable habitat. A signed Pesticide Use Proposal (PUP) identifying protections for sensitive areas shall be obtained from the BLM prior to any chemical treatments of weeds between within 100 meters of delineated suitable habitat. No broadcast spray of herbicide shall occur within 100 meters of delineated suitable habitat.

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BUREAU OF LAND MANAGEMENT

Colorado River Valley Field Office
2300 River Frontage Road
Silt, CO 81652

DOWNHOLE CONDITIONS OF APPROVAL Applications for Permit to Drill

Operator: WPX Energy Rocky Mountain LLC.
Lease Number: COC24603
Pad(s): MV 28-4
Engineer: Shauna Kocman
Surface Location: Garfield County; Lot 5 Sec. 4 T7S R96W

See list of wells following the COAs.

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; Tim Barrett, PET; Alex Provstgaard, PET; Brandon Jamison, 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 Shauna Kocman or Peter Cowan for verbal approvals (contact information below).
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, Shauna Kocman or Peter Cowan 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 **10M** system and recorded in the IADC/Driller's log. A casing head rated to 10,000 psi or greater shall be utilized.
5. Flexible choke lines shall meet or exceed the API SPEC 16C requirements. Flexible choke lines shall have flanged connections and configured to the manufacturer's specifications. The flexible choke lines shall be anchored in a safe and workmanlike manner. At minimum, all connections shall be effectively anchored in place for safety of the personal on location. 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 (skocman@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 Shauna Kocman or Peter Cowan. 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, Shauna Kocman 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 Shauna Kocman or Peter Cowan immediately.
15. Per 43 CFR 3162.4-1(c), no later than the 5th business day after any well begins production on which royalty is due anywhere on a lease site or allocated to a lease site, or resumes production in a case of a well which has been off production for more than 90 days, the operator shall notify the authorized

officer by letter or sundry notice, Form 3160-5, or orally to be followed by a letter or sundry notice, of the date on which such production has begun or resumed.

Contact Information

Shauna Kocman, PhD, PE
Petroleum/ Environmental Engineer

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Peter Cowan
Petroleum Engineer

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List of Wells			
<i>Proposed Pads</i>	<i>Proposed Wells</i>	<i>Surface Locations</i>	<i>Bottom Hole Locations</i>
MV 28-4 (BLM Surface)	GM 706-4-HN2	T7S R96W, Sect. 4 Lot 5	T7S R96W, Sect. 9 SWNW

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FONSI

DOI-BLM-CO-N040-2014-0001-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. This decision would provide for the orderly, economical, and environmentally sound exploration and development of oil and gas resources on a valid Federal oil and gas lease.

RATIONALE: The bases for this decision are as follows:

1. Approval of the Proposed Action is validating the rights granted with the Federal oil and gas leases to develop the leasehold to provide commercial commodities of oil and gas.
2. The environmental impacts would be avoided, minimized, or offset with the mitigation measures incorporated into the Proposed Action or attached and enforced by BLM as Conditions of Approval (COAs).
3. This Decision does not authorize the initiation of surface-disturbing activities on BLM lands or of drilling activities associated with any Federal oil and gas well. Initiation of activities related to the new Federal oil and gas wells to be added to the existing well pad may commence only upon approval by BLM of the Application for Permit to Drill (APD).

MITIGATION MEASURES: The COAs presented in Appendix A of the attached EA would be attached to the GM 706-4-HN2 APD approved by the BLM for Federal oil and gas wells on the MV 28-4 well pad as part of the Proposed Action. Because no APDs have yet been submitted by WPX for the two additional horizontal gas wells planned for the MV 28-4 pad, this EA has analyzed impacts associated with the additional wells based on information provided with the Notice of Staking (NOS) and does not include Downhole COAs for the additional, horizontal wells. Surface Use and Downhole COAs consistent with CRVFO Appendix A of this EA, revised as necessary based on new information, requirements and/or circumstance, would be attached to APDs for the additional wells in conjunction with BLM's review and approval process

NAME OF PREPARER: Jim Byers, Natural Resource Specialist

SIGNATURE OF AUTHORIZED OFFICIAL:



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

DATE: Dec. 17, 2013

AMENDED DECISION RECORD

DOI-BLM-CO-N040-2014-0001-EA

BACKGROUND: On December 17, 2013, I signed a Finding of No Significant Impact (FONSI) and a Decision Record for NEPA document DOI-BLM-CO-N040-2014-EA, authorizing the BLM Colorado River Valley Field Office (CRVFO) to approve, upon satisfactory fulfillment of all other requirements, the Applications for Permit to Drill (APDs) submitted by WPX Energy LLC for three horizontal wells. WPX subsequently dropped one of the wells. For the other two horizontal wells, both to be drilled into Federal oil and gas lease COC24603 from existing well pad MV 28-4, WPX has submitted a Sundry Notice requesting BLM approval for use of a synthetic-based mud (SBM) in drilling the deep horizontal segment of each well.

WPX requested using an SBM product because the water-based mud normally used in drilling has been less effective for deep horizontal wells due to the high temperature, pressure, and frictional resistance encountered, sometimes making it impossible to complete the bore. SBM has been used for development of deep horizontal wells in other regions.

The EA addressed potential impacts and appropriate mitigations related to air quality, surface water quality, groundwater quality, and other resources from the use of various chemicals for drilling, completing, and producing the proposed oil and gas wells. The EA also addressed potential impacts and appropriate mitigations associated with fluids produced by the proposed activities, including natural gas, liquid condensate, associated volatile organic compounds, and produced water.

Information provided by WPX with the Sundry Notice indicates that: (1) constituents of the SBM product consist primarily of petroleum hydrocarbons and associated volatile organic compounds the same as, or similar to, those associated with other aspects of drilling, completion, or production, as analyzed in the EA; (2) procedures for handling, using, recovering, treating, and disposing of the SBM and of handling cuttings generated during its use would prevent or minimize the risk of accidental releases or discharges to soil and surface water; and (3) emissions to the atmosphere from SBM-derived cuttings temporarily stored in a lined trench would be slight.

DECISION: It is my decision to approve the use of SBM for drilling the deep horizontal segments of the GM 703-4 HN2 and GM 706-4 HN1 horizontal wells from the existing MV 28-4 well pad. This decision would provide for the orderly, economical, and environmentally sound exploration and development of oil and gas resources on a valid Federal oil and gas lease.

RATIONALE: The bases for this decision include the following:

1. Potential impacts to the environment and human health and safety would be avoided, minimized, or offset with the mitigation measures specified as attachments to the Sundry Notice, including COAs identified by the BLM. The COAs are also attached to this Amended Decision Record.
2. Potential impacts to the environment and human health and safety are expected to be similar in type and scale to those associated with use of water-based muds, as analyzed and disclosed in the EA. Therefore, the initial determination of no significant adverse impacts remains.
3. By approving this Amended Decision Record, the BLM is not establishing a precedent for approving use of SBM on vertical or conventional directional wells. Approval of use of SBM on other deep horizontal wells will be based on the results of its use on the two wells identified in the Sundry Notice, including its effectiveness and whether protection of the environment and of human health and safety prove to be as anticipated or warrant additional mitigation.

MITIGATION MEASURES: Information provided by WPX, including procedures for handling, using, and treating/disposing of the SBM and cuttings generated during its use, for protecting the environment and human health and safety, and for monitoring ambient air quality on the well pad during use of the product are attached as COAs to the Sundry Notice and to this Amended Decision Record.

NAME OF PREPARER: Allen B. Crockett, Supervisory Natural Resource Specialist

SIGNATURE OF AUTHORIZED OFFICIAL:



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

DATE: Sept. 12, 2014

BUREAU OF LAND MANAGEMENT

Colorado River Valley Field Office
2300 River Frontage Road
Silt, CO 81652

Sundry Notice Conditions of Approval

Synthetic-Based Mud Drilling Fluid

Operator: WPX Energy Rocky Mountain LLC
Case Number: COC24603
Well(s): GM 703-4 HN1 and 706-4 HN2 (MV 28-4 pad)
Surface Location: Garfield County; Lot 5 Sec. 4 T7S R96W

The use of synthetic-based drilling mud (SBM) to drill the horizontal legs of the two Niobrara wells (GM 703-4-HN1 and GM 706-4-HN2) on the MV 28-4 pad shall be conducted consistent with the protocols outlined in the Sundry Notice and with the attached COAs. Such approval for the use of SBM is expressly limited to the horizontal legs of these two Federal wells.

Air Monitoring

1. Air quality monitoring shall be conducted during the use of SBM in the drilling of the horizontal bores. Ambient air quality testing shall be designed to estimate the VOC emissions from the use of the mud. Air quality testing designed to estimate the exposure of workers to VOC shall be conducted during the use of SBM. The procedure for both types of air quality testing must be submitted to the BLM for review prior to the use of the mud.
2. The results of the air quality testing on the SBM shall be submitted to the BLM within 30 days of the end of the testing period.

Cuttings Management

3. All cuttings developed during the use of SBM shall be segregated from other cuttings and shall be stored in lined and bermed area(s) on the GM 41-4 pad.
4. Cuttings shall be tested separately for levels in the COGCC Table 910-1 and testing results shall be submitted to BLM for review upon request.

Synthetic-Based Mud (SBM) Operations

5. Mud hoses shall be new or like new with hydraulically crimped-on hose ends. King nipples or hose clamps shall not be used.
6. The drilling system shall be equipped with appropriate drip pans, liners, and catchments under reasonably anticipated leak sources as needed to prevent the SBM and cuttings from the contaminating ground surface of the drill pad.
7. Any cuttings dropped or mud spilled shall be immediately cleaned up and placed in the approved containment device.
8. All spills in excess of one barrel outside the containment devices shall be reported to the BLM within 24 hours. A spill kit specific to SBM shall be staged onsite or at the nearby GM 32-4 pad.
9. Prior to skidding or moving the drill rig to another well or well pad, the pumps, pump lines and tanks shall be cleaned to ensure that no SBM is in the system during surface drilling operations of the new well.
10. The BLM shall be notified 24 hours prior to the use of SBM by calling the PET notification phone number (970) 876-9064. For work to commence on a Monday, notice shall be provided to the BLM no later than close of business (COB) on the previous Thursday.

Post-Assessment Review

- ~~11.~~ WPX and representatives shall participate in a post-assessment meeting with the BLM to discuss and review the drilling process for the two MV 28-4 Niobrara wells. The meeting will focus on information sharing, remedies for problems, approaches for future use, etc. If the situation warrants during the drilling process, WPX may request, and the BLM may require, a meeting to jointly discuss methods to remedy unforeseen circumstances or events related to the use of SBM.