

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-N040-2013-0007-EA

### CASEFILE NUMBER

Federal Oil and Gas Leases: COC41916

### PROJECT NAME

Proposal to Drill 36 Federal Wells from the Existing RU 23-5 Pad Located on BLM Land in the Flatiron Mesa Area South of Rifle, Garfield County, Colorado.

### PAD LOCATION

Township 6 South (T6S), Range 93 West (R93W), Section 32, SE $\frac{1}{4}$ SW $\frac{1}{4}$ , SW $\frac{1}{4}$ SE $\frac{1}{4}$ ; T7S R93W, Section 5, Lots 1 and 2, E $\frac{1}{2}$ SW $\frac{1}{4}$ , SW $\frac{1}{4}$ SW $\frac{1}{4}$ , NW $\frac{1}{4}$ SE $\frac{1}{4}$ , Section 6, S $\frac{1}{2}$ SE $\frac{1}{4}$ , Section 7, Lot 5, Section 8, NW $\frac{1}{4}$ NW $\frac{1}{4}$ , Sixth Principal Meridian. The project would be located approximately 4.5 air-miles south of Rifle, Garfield County, Colorado on Flatiron Mesa east of Beaver Creek (Figure 1).

### APPLICANT

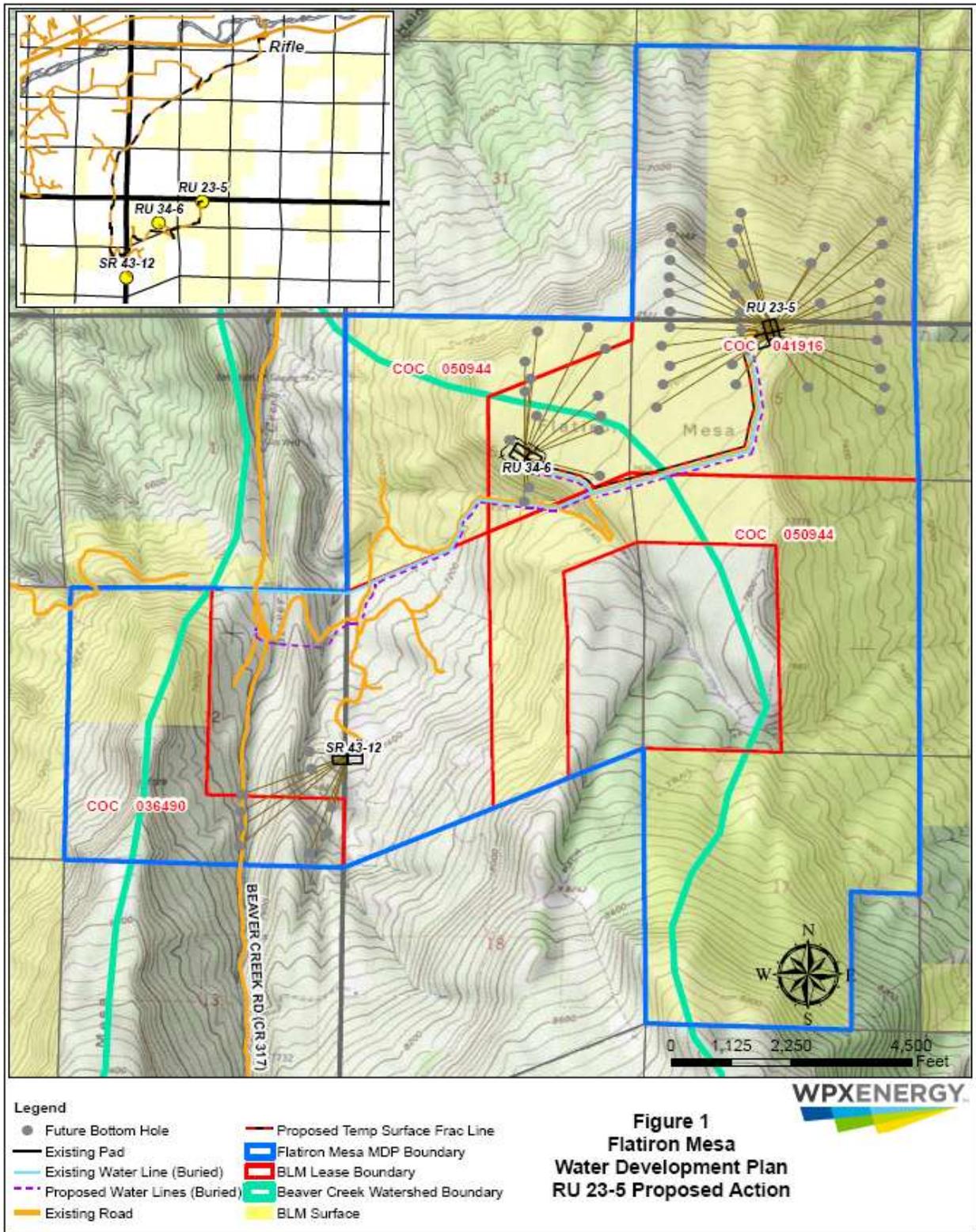
WPX Energy Rocky Mountain, LLC (“WPX”). Contact: Greg Davis, 1001 Seventeenth Street, Suite 1200, Denver, Colorado 80202.

### PURPOSE AND NEED FOR THE ACTION

The purpose and need of the Proposed Action is to respond to WPX’s revised proposal to develop Federal lease COC41916 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

On December 14, 2009, the Bureau of Land Management (BLM), Colorado River Valley Field Office (CRVFO), approved the Flatiron Mesa Master Development Plan (EA #DOI-BLM-CO-N040-0002). Included as part of the FMMDP was development of up to 44 Federal oil gas wells from the proposed RU 23-5 well pad, to be drilled during four drilling visits. Since that time, the operator (WPX) has constructed the pad and drilled four wells, which are now in production. This Environmental Analysis (EA), prepared pursuant to the National Environmental Policy Act (NEPA), serves three purposes in relation to development activities at the RU 23-5 pad:



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Figure 1. Project Location Map.

- Re-analyzes direct, indirect, and cumulative air quality impacts of 36 wells previously analyzed but not yet drilled, using a new (updated and expanded) air quality model published by the BLM in October 2011.
- Analyzes the impacts of 2.6 acres of additional surface disturbance at the RU 23-5 pad.
- Analyzes the impacts of a proposed change by WPX in drilling and completion operations at the RU 23-5 pad that would include drilling the 36 new wells during one continuous drilling and completion operation including the 2013-14 winter season instead of during three separate visits over three consecutive years (2013, 2014, and 2015) outside the winter season.

The modified drilling and completion operations at the RU 23-5 and two other facilities analyzed in the FMMDP (the RU 34-6 pad and RU 11-7) pad are described in detail in the Proposed Action, below.

## **ALTERNATIVES**

### **Proposed Action**

The Proposed Action analyzed in this EA includes certain aspects of the proposed drilling, completion, and production of 36 Federal oil and gas wells to be drilled from the RU 23-5 well pad on BLM-administered surface land. In the FMMDP, the BLM analyzed the impacts of construction and operation of the RU 23-5 pad and ancillary surface facilities, and drilling of up to 44 wells from the RU 23-5 pad during four separate visits from 2010 through 2013, using the proposed RU 11-7 pad on private surface to support hydraulic fracturing (fracing) operations. The proponent, WPX, proposes to amend the project in the following ways, as analyzed in this EA:

1. The project would result in a total of 40 wells (including 4 existing wells), instead of 44. Following initial construction and mobilization in May 2013, the 36 remaining wells would be drilled and completed in one continuous operation from July 2013 through September 2014 instead of during multiple visits in 2013, 2014, and 2015.
2. In connection with drilling the 36 previously analyzed wells, WPX would institute a modified water management system. This would include construction of a new water management facility adjacent to the existing RU 23-5 pad, resulting in 2.6 acres of additional surface disturbance not previously analyzed. The modified water management system also would include using the nearby RU 34-6 pad to support completions at the RU 23-5 pad, different use of the nearby RU 11-7 pad in support of development of the 36 wells than originally analyzed, and use of a pipeline system to move water to and from the pads, instead of water haul trucks.
3. Drilling the 36 remaining wells in one continuous operation would involve drilling through the 2013-2014 big game winter range season, subject to BLM's grant of an exception to the associated Timing Limitation (TL) stipulation at the RU 23-5 pad and a TL condition of approval (COA) at the RU 34-6 pad.

The proposed 2.6 acres of new surface disturbance at the RU 23-5 pad would provide additional room for storage of cuttings and topsoil as well as the construction of a new water management facility to be located between the existing drilling pad and the existing production facilities pad located approximately 400 feet to the west (Figures 2 and 3). This would increase the disturbance footprint from the current 8.14 acres to 10.74 acres. After the 36 new wells are put into production, WPX would reduce the 2.6 acres of new disturbance on the RU 23-5 pad to 1.76 acres, which would remain throughout the life of the wells. This would result in a long-term footprint of 9.9 acres during the life of the wells (Table 1).

<b>Table 1. Surface Disturbance Associated with Modified Project Design, RU 23-5 Pad, Flatiron Mesa Master Development Plan</b>		
<i>Initial Disturbance</i>	<i>Long-term Disturbance</i>	<i>Surface Ownership</i>
<b>New Disturbance Not Previously Analyzed</b>		
2.60 acres	1.76 acres	BLM
<b>Existing Disturbance Previously Analyzed</b>		
8.14 acres	8.14 acres	BLM
<b>Total Surface Disturbance</b>		
10.74 acres	9.90 acres	BLM

The proposed new water storage facility at the RU 23-5 pad, designed by Quick Pit of Grand Junction, would be constructed with 10-foot-high steel-frame walls supporting a liner with a leak detection system, a cover with a venting system, and a designed secondary containment system with a capacity of 110% of the largest water vessel within the facility (the “Quick Pit”). The water storage capacity of the Quick Pit planned for the expanded area of the RU 23-5 pad would be approximately 35,000 barrels. Containment of 110% of this volume would be provided by a berm. The Quick Pit would be built to standards established by the Colorado Oil and Gas Conservation Commission (COGCC). WPX would deliver water to the Quick Pit storage site at the RU 23-5 pad using its Flatiron Mesa buried waterline currently under construction. In the interim, haul trucks would deliver water to the pad for use in drilling and completion operations.

The Proposed Action would also include changes in remote fracing operations. As described and analyzed in the FMMDP, WPX originally planned to support fracing at the RU 23-5 pad from the RU 11-7 pad, previously analyzed in the FMMDP and to be constructed on private surface. WPX now proposes to provide remote fracing support for the RU 23-5 pad from the existing RU 34-6 pad (Figure 4) using water moved to that pad via waterlines from the RU 11-7 pad (Figure 5). In turn, when new wells on the RU 34-6 pad, analyzed as part of the FMMDP, are developed (currently anticipated for 2015), WPX would use the RU 23-5 pad to support remote fracing at the RU 34-6 pad. The RU 11-7 pad would provide water storage for both pads during fracing operations. Because of the dual use of the RU 23-5 and RU 34-6 pads for drilling and remote fracing, they are expected to be open through 2015, and the RU11-7 frac pad would remain open through 2016 to support other development in the FMMDP area.

The new plan for water management and remote fracing described above would rely on pipelines instead of haul trucks to deliver water throughout the FMMDP area, dramatically reducing truck traffic on Garfield County Road (CR) 320 and CR317. Use of trucks was analyzed in the FMMDP. The proposed water management system would include upgrades to buried waterlines from the Beaver Creek Tank Farm (near the RU 31-12V pad) to the RU 11-7 frac pad pit and the various well pads planned for FMMDP area. These waterlines were authorized by the BLM under a Categorical Exclusion (CX) (DOI-BLM-CO-N040-2013-0006), signed in November 2011. The project met the criteria for CX because it would entail no new surface disturbance outside existing disturbance corridors for roads and pipelines analyzed in the FMMDP.

Table 2 lists pertinent stipulations attached to Federal lease COC41916, underlying the RU 23-5 pad and the RU 34-6 pad and the target formation for all wells planned for the RU 23-5 pad and most wells planned for the RU 34-6 pad. Note that the proposed additional surface disturbance from expanding the RU 23-5 pad and constructing an adjacent water management facility would occur outside the No Surface Occupancy (NSO) area for Town of Rifle municipal watershed along Beaver Creek (Figure 1, Table 2).

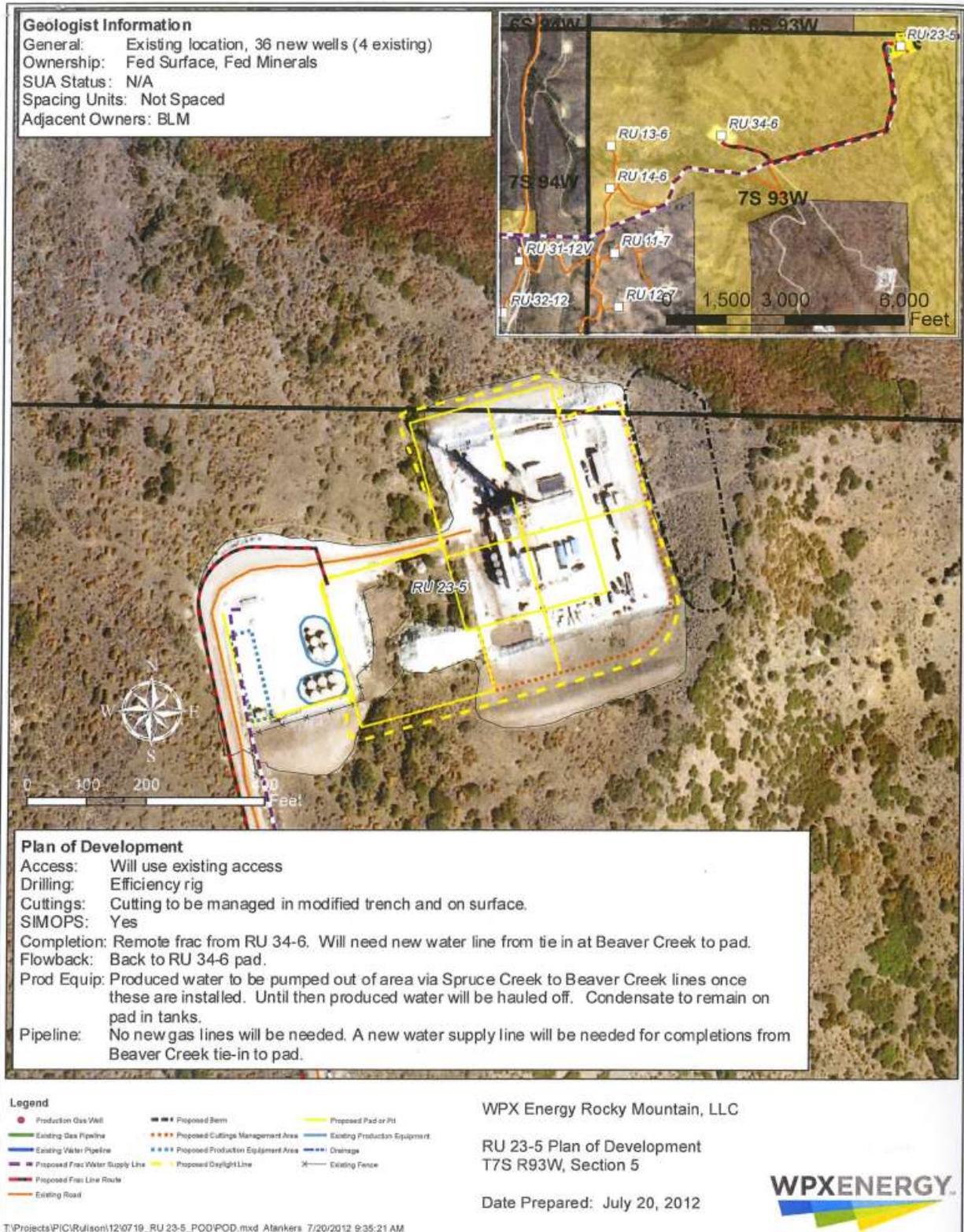


Figure 2. RU 23-5 Project Plan of Development



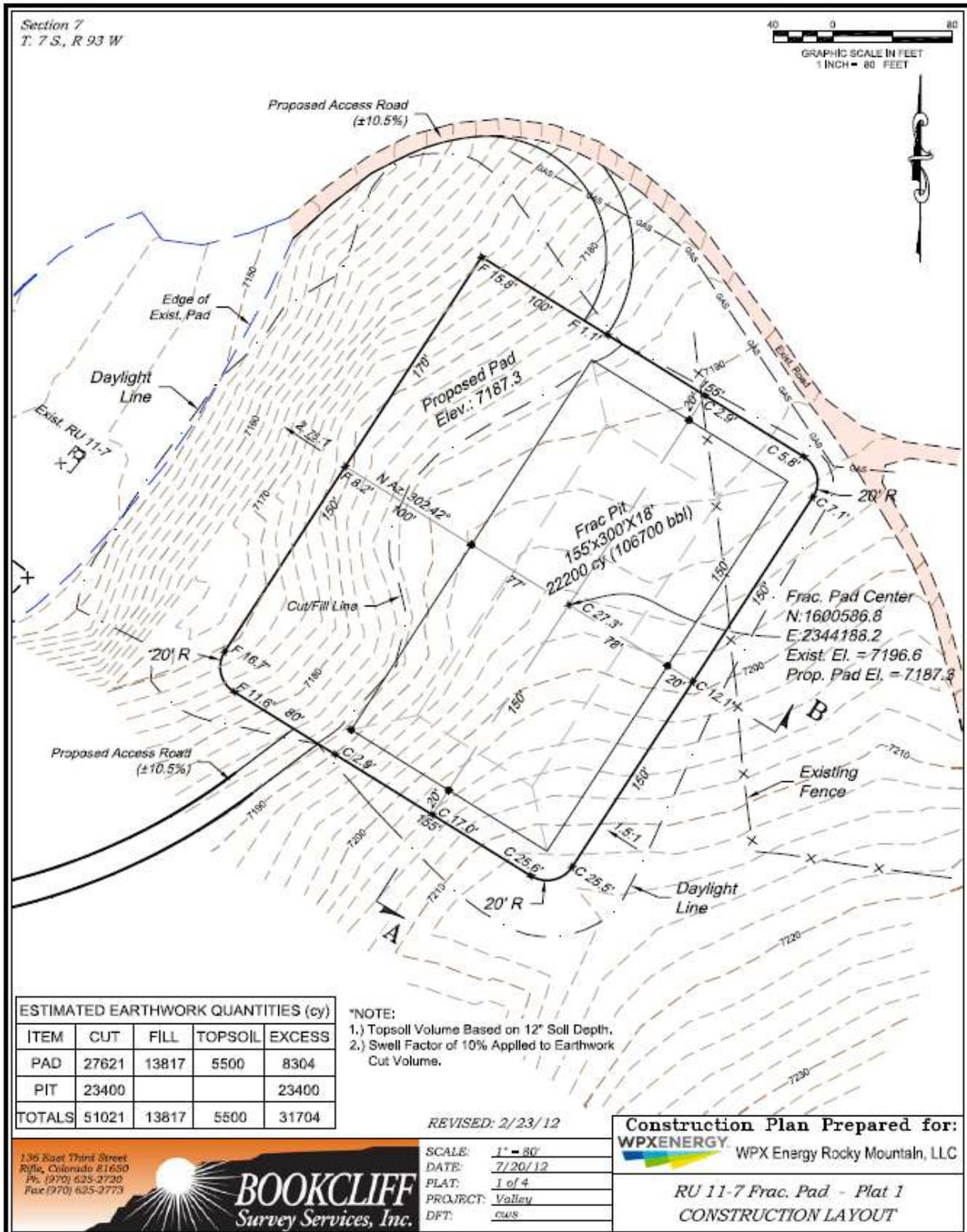


Figure 4. RU 11-7 Remote Frac Water Storage Facility

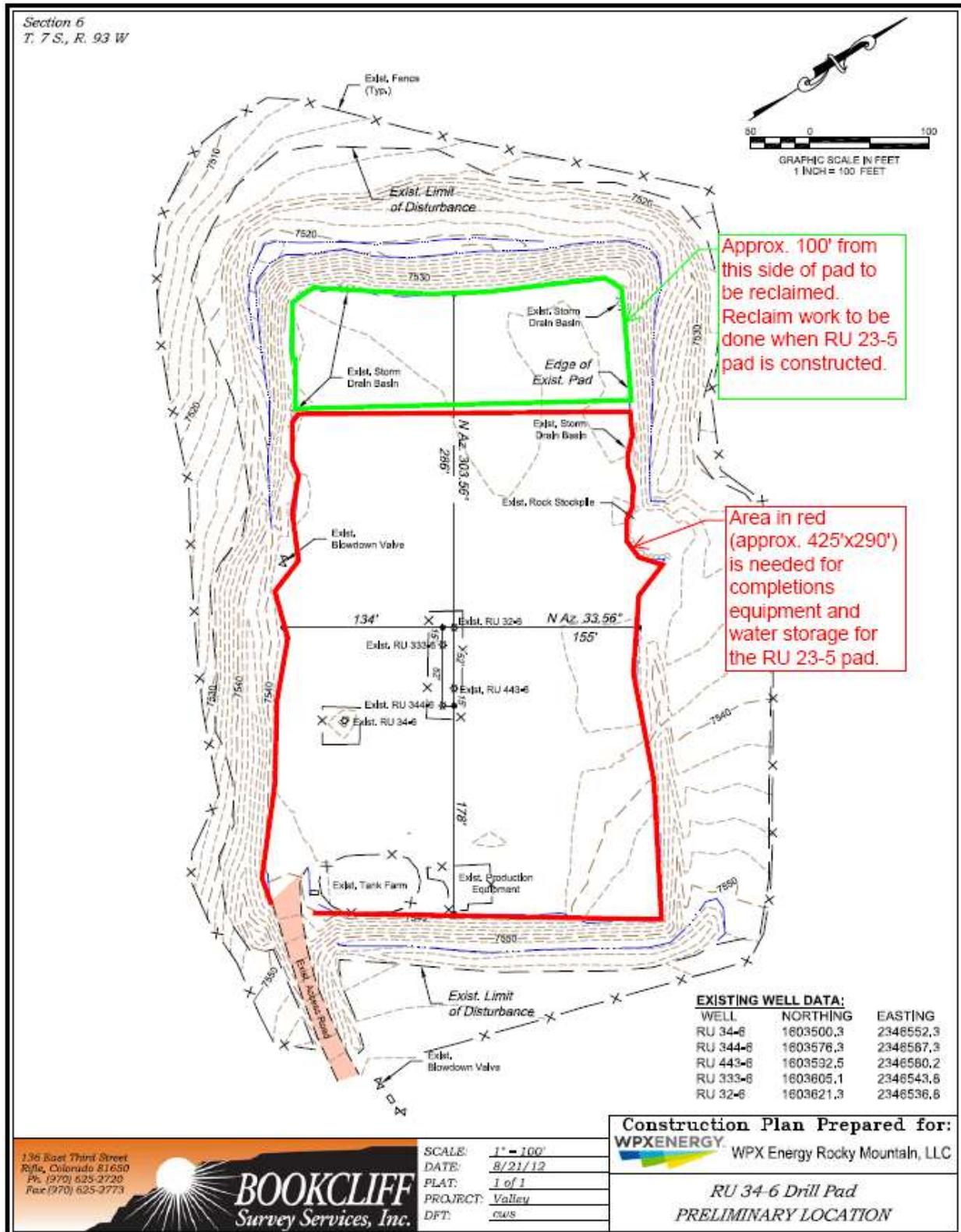


Figure 4. RU 34-6 Pad Layout Showing Remote Frac Area to Support RU 23-5 Well Completions.

<b>Table 2. Lease Stipulations Applicable to Federal Oil and Gas Leases COC41916</b>		
<i>Lease Number</i>	<i>Description of Lands</i>	<i>Stipulations</i>
<b>COC41916 (1986)</b>	T6S R93W Section 32: ALL T7S R93W Section 5: Lots 1, 2, S½	<b>Timing Limitation:</b> "In order to protect important seasonal wildlife habitat, exploration, drilling and other development will [not] be allowed only during the period from [January 16 to April 29]. This limitation does not apply to maintenance and operation of producing wells. Exceptions... in any particular year may be specifically approved by the [Authorized Officer]."
<b><u>RU 23-5 Pad,</u> <u>RU 34-6 Pad</u></b>	T7S R93W Section 6: SE¼	<b>No Surface Occupancy:</b> Note – Although the lease has an attached NSO, it provides no rationale for the stipulation. However, review of the 1984 RMP/EIS identifies the Town of Rifle’s municipal watershed as a “Critical Municipal Watershed” and species that “critical water quality... would be maintained” (BLM 1984:3, map 3-3). No specific exception criteria are specified on the lease or in the 1984 RMP/EIS.

Appendix A lists all surface-use and downhole COAs to be attached to approved APDs for each of the 36 new wells previously analyzed for the RU 23-5 pad.

**No Action Alternative**

The No Action Alternative would consist of denying approval of the 36 wells previously analyzed but not yet approved and denying approval of the associated 2.6 acres of additional disturbance at the RU 23-5 pad and other project components associated with the 36 wells.

**Alternatives Not Analyzed**

WPX’s preliminary concept for the FMMDP included multiple pads to access Federal lease COC41916. However, as is common practice in the CRVFO for oil and gas MDPs and other project planning processes, discussions between WPX and BLM personnel resulted in a number of changes, including consolidating multiple pads onto a single pad (the RU 23-5 pad) and using advanced directional drilling technology to reach up to 44 downhole targets from that pad. Because the multi-pad concept was dropped by WPX before the Proposed Action was finalized and published for public review and comment, it was not analyzed as a formal alternative in the FMMDP (EA #DOI-BLM-CO-N040-2010-0002), nor is it analyzed here.

**PLAN CONFORMANCE REVIEW**

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

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

Decision Language: The 1991 Oil and Gas Plan Amendment (BLM 1991) included the following at page 3: “697,720 acres of BLM-administered mineral estate within the Glenwood Springs Resource Area are open to oil and gas leasing and development, subject to lease terms and (as applicable) lease stipulations”

(BLM 1991, page 3). This decision was carried forward unchanged in the 1999 ROD and RMP amendment at page 15 (BLM 1999b): “In areas being actively developed, the operator must submit a Geographic Area Proposal (GAP) [currently known as a Master Development Plan, MDP] that describes a minimum of 2 to 3 years of activity for operator controlled leases within a reasonable geographic area.”

Discussion: The Proposed Action is in conformance with the 1991 and 1999 RMP amendments cited above because (1) the Federal mineral estate proposed for development is open to oil and gas leasing and development and (2) development of the RU 23-5 well pad was originally disclosed and analyzed in the FMMDP (DOI-BLM-CO-N040-2010-0002-EA) signed on December 14, 2009.

### **NEPA COMPLIANCE**

The BLM would normally consider approving the project changes described in this EA using an Energy Policy Act of 2005 Section 390 CX, based on the minimal additional surface disturbance (less than 5 acres) and prior NEPA analysis (EA #DOI-BLM-CO-N040-2010-0002). However, the BLM concluded that preparation of a new EA was appropriate to re-analyze air quality impacts using a more recent air quality model, analyze impacts of the proposed 2.6 acres of additional surface disturbance, analyze impacts of winter drilling and completion operations in conjunction with drilling the 36 wells in one continuous operation, and disclose changes in water management and remote fracing for the 36 wells. This EA also presents an analysis not included in the FMMDP of potential impacts of fracing operations on hydrogeology and water quality.

### **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 the current Proposed Action, CRVFO resource specialists evaluated the Proposed Action in relation to current resource conditions and information. This evaluation indicated that nine resources and resource uses could be impacted differently, or to a different extent, than disclosed and analyzed in the FMMDP (EA #DOI-BLM-CO-NO40-2010-0002). Resources and resource uses identified as requiring additional analysis are as follows:

Air Quality, Water–Ground, and Wildlife–Terrestrial (Migratory Birds, Big Game Ungulates)

For the remaining resources and resource uses, evaluation of the Proposed Action by the BLM indicated that the analysis in the FMMDP remained appropriate and sufficient notwithstanding the small area of additional disturbance (2.6 acres initially, 1.76 acres long-term) associated with pad expansion and a new water management facility. These resources include Access and Transportation, Cultural Resources, Fossil Resources (listed as “Paleontology” in the FMMDP), Geologic Resources, Invasive Non-Native Plants, Native American Religious Concerns, Range Management, Socioeconomics, Soils, Visual Resources, Wastes–Hazardous or Solid, Water–Surface, and Wildlife– Aquatic. For these resources and resource uses, the impact analyses in analogous sections of the FMMDP are incorporated by reference.

The FMMDP (EA #DOI-BLM-CO-NO40-2010-0002) is available for review at the CRVFO office and its website.

### **Access and Transportation**

BLM analyzed impacts to access and transportation from the project described in the FMMDP and found them to not be significant. Because of the small additional surface disturbance (2.6 acres), the current Proposed Action would have the same level of adverse impacts on access and transportation as analyzed previously. Because of the small amount of additional surface disturbance adjacent to existing disturbed areas, that analysis remains adequate regarding the Proposed Action and No Action Alternative and is incorporated here by reference.

### **Air Quality**

#### **Affected Environment**

This section re-analyzes potential impacts to air quality from the 36 additional wells to be drilled on the RU 23-5 pad. This analysis supersedes the analysis incorporated into the FMMDP.

Colorado Ambient Air Quality Standards (CAAQS) and National Ambient Air Quality Standards (NAAQS) are health-based criteria for the maximum acceptable concentrations of air pollutants in areas of public use. Although specific air quality monitoring has not been conducted within the project area, regional air quality monitoring has been conducted in Rifle and elsewhere in Garfield County. Air pollutants measured in the region for which ambient air quality standards exist include carbon monoxide (CO), nitrogen dioxide (NO<sub>2</sub>), sulfur dioxide (SO<sub>2</sub>), ozone (O<sub>3</sub>), particulate matter less than 10 microns (μ) in diameter (PM<sub>10</sub>), and particulate matter less than 2.5 μ in diameter (PM<sub>2.5</sub>).

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 Colorado's 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 revised development plan for the RU 23-5 pad under the Proposed Action includes constructing, drilling, completing, and operating up to 36 new Federal wells during a continuous operation instead of three separate drilling visits across 3 years. In addition, the pad would be expanded by 2.6 acres. This would increase total disturbance at the RU 23-5 pad to 10.74 acres, reduced to 9.9 acres upon interim reclamation (Table 1). Total surface disturbance including associated project components previously analyzed in the FMMDP (i.e., the RU 23-5, RU 34-6, and RU 11-7 pads and associated roads and pipelines) would be 18.46 acres, of which 15.66 acres would be on BLM land. Individual wells would require approximately 7 to 10 days to drill and 5 to 15 days to complete. 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 (PM<sub>10</sub> and PM<sub>2.5</sub>) 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 a total of 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 a total of 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 plus 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, NO<sub>2</sub>, SO<sub>2</sub>, ozone, PM<sub>10</sub>, and PM<sub>2.5</sub>), 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 1deciview 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, which is 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 further reduce VOC concentrations.

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 36 Federal wells on the existing RU 23-5 pad would not be drilled, the 2.6 acres of additional surface disturbance would not occur, and use of the RU 34-6 pad to support fracing and water management would not be needed. The result would be no new impacts on air quality.

#### **Cultural Resources**

The BLM analyzed and disclosed impacts to cultural resources in the FMMDP and determined that they would not be significant. Because of the small amount of additional surface disturbance adjacent to existing disturbed areas, that analysis remains adequate regarding the Proposed Action and No Action Alternative and is incorporated here by reference.

#### **Fossil Resources**

The BLM analyzed and disclosed impacts to fossil (paleontological) resources in the FMMDP and determined that they would not be significant. Because of the small amount of additional surface disturbance adjacent to existing disturbed areas, that analysis remains adequate regarding the Proposed Action and No Action Alternative and is incorporated here by reference.

#### **Geologic Resources**

The BLM analyzed and disclosed impacts to geologic resources in the FMMDP and determined that they would not be significant. Because of the small amount of additional surface and slightly smaller number of well bores than previously analyzed, the FMMPD remains adequate relative to geologic resources for both the Proposed Action and No Action Alternative and is incorporated here by reference.

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

Impacts from invasive non-native plants in the FMMDP and determined that they would not be significant. Because of the small amount of additional surface disturbance adjacent to existing disturbed areas, that analysis remains adequate regarding the Proposed Action and No Action Alternative and is incorporated here by reference.

### **Migratory Birds**

The BLM analyzed and disclosed impacts to migratory birds in the FMMDP and determined that they would not be significant. However, the current Proposed Action would differ from the project plan analyzed in the FMMDP in a way that would affect migratory birds differently, as described below.

#### *Proposed Action*

The current Proposed Action includes developing the 36 wells in one continuous year-round operation from May 2013 through September 2014, including two nesting seasons instead of three nesting seasons (2013, 2014, and 2015). This would reduce impacts to migratory birds, which are most vulnerable to disturbance in the nesting season, when they are tied to specific territories and may avoid disturbance by abandoning the nest. In addition, fewer songbirds would be affected by winter operations, because Neotropical migrants are not present, and year-round residents or winter visitors are not tied to specific territories and able to feed across larger areas. Birds of Conservation Concern (BCC)(USFWS 2008) potentially present in the project area include three residents or winter visitors—the pinyon jay (*Gymnorhinus cyanocephalus*), juniper titmouse (*Baeolophus ridgwayi*), and Cassin's finch (*Haemorhous cassinii*)—that would benefit by reducing impacts from three nesting seasons to two as under current Proposed Action.

Based on the information above, the Proposed Action is not expected to have significant adverse impacts on migratory birds, and substantially less impacts than analyzed in the FMMDP.

#### *No Action Alternative*

Under the No Action Alternative, the 36 Federal wells on the existing RU 23-5 pad would not be drilled, the 2.6 acres of additional surface disturbance would not occur, and use of the RU 34-6 pad to support fracing and water management would not be needed. The result would be no new impacts on migratory birds.

### **Native American Religious Concerns**

The BLM analyzed and disclosed impacts to Native American religious concerns in the FMMDP and determined that they would not be significant. Because of the small amount of additional surface disturbance adjacent to existing disturbed areas, that analysis remains adequate regarding the Proposed Action and No Action Alternative and is incorporated here by reference.

### **Noise**

The BLM analyzed and disclosed noise impacts in the FMMDP and determined that they would not be significant. Because of the small amount of additional surface and slightly smaller number of wells than previously analyzed, the FMMPD remains adequate relative to noise impacts for both the Proposed Action and No Action Alternative and is incorporated here by reference.

### **Range Management**

The BLM analyzed and disclosed impacts to livestock grazing in the FMMDP and determined that they would not be significant. Because of the small amount of additional surface disturbance adjacent to existing disturbed areas, that analysis remains adequate regarding the Proposed Action and No Action Alternative and is incorporated here by reference.

### **Socioeconomics**

The BLM analyzed and disclosed impacts to socioeconomic values in the FMMDP and determined that they would not be significant. Because of the small amount of additional surface disturbance adjacent to existing disturbed areas, that analysis remains adequate regarding the Proposed Action and No Action Alternative and is incorporated here by reference.

### **Soils**

The BLM analyzed and disclosed impacts to soil resources in the FMMDP and determined that they would not be significant. Because of the small amount of additional surface disturbance adjacent to existing disturbed areas, that analysis remains adequate regarding the Proposed Action and No Action Alternative and is incorporated here by reference.

### **Special Status Species**

The BLM analyzed and disclosed impacts to special status species and potential habitats in the FMMDP and determined that they would not be significant. Because of the small amount of additional surface disturbance adjacent to existing disturbed areas, that analysis remains adequate regarding the Proposed Action and No Action Alternative and is incorporated here by reference.

### **Vegetation**

The BLM analyzed and disclosed impacts to vegetation in the FMMDP and determined that they would not be significant. Because of the small amount of additional surface disturbance adjacent to existing disturbed areas, that analysis remains adequate regarding the Proposed Action and No Action Alternative and is incorporated here by reference.

### **Visual Resources**

The BLM analyzed and disclosed impacts to visual resources in the FMMDP and determined that they would not be significant. Because of the small amount of additional surface disturbance adjacent to existing disturbed areas, that analysis remains adequate regarding the Proposed Action and No Action Alternative and is incorporated here by reference.

### **Wastes, Hazardous or Solid**

Impacts related to use and potential release of hazardous or solid wastes in the FMMDP and determined that they would not be significant. Because of the small amount of additional surface disturbance adjacent to existing disturbed areas, that analysis remains adequate regarding the Proposed Action and No Action Alternative and is incorporated here by reference.

## **Water Quality – Ground**

The BLM analyzed and disclosed impacts to quality and quantity of surface waters (including waters of the U.S.) and groundwater in the FMMDP and determined that they would not be significant. However, the CRVFO has begun incorporating information on potential impacts of fracturing operations on groundwater resources as a result of microseismic events and fracture stimulation and propagation. This new information is presented below. For other aspects of surface water and groundwater quality, the analysis presented in the FMMDP remains adequate regarding the Proposed Action and No Action Alternative, based on minor additional surface disturbance, and is incorporated here by reference.

### *Proposed Action*

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. 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 noted above 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, BLM and COGCC requirements for proper casing and cementing of wellbores are intended to isolate the aquifers penetrated by a wellbore. BLM requires that surface casing be set 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 and, when appropriate, witness the cementing and pressure testing to ensure that the space between the casing and borehole wall is properly sealed.

No single list of chemicals currently used in hydraulic fracturing exists for western Colorado. However, the general types of compounds and relative amounts used are well known and relatively consistent (see Table 3 on the following page).

Since hydraulic fracturing operations are tailored to the downhole environment, the chemicals listed in Table 3 may or may not be used for a specific well, and the information in the table is provided solely as general information. Although a variety of chemical additives are used in hydraulic fracturing—the examples in Table 3 being drawn from a total of 59 listed on the FracFocus Chemical Disclosure Registry 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 3 on the following page. The sand is used as a propping agent to help keep the newly formed fractures from closing.

Following hydraulic fracturing, 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.

**Table 3. 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 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
<b>Total Additives</b>		<b>0.49</b>		
<b>Total Water and Sand</b>		<b>99.51</b>		
*FracFocus Chemical Disclosure Registry, <a href="http://fracfocus.org/chemical-use/what-chemicals-are-used">fracfocus.org/chemical-use/what-chemicals-are-used</a>				
**USDOE 2009				

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.”

Because of the limited horizontal and vertical extent of fractures, the vertical separation between freshwater aquifers and the zone of fracture stimulation, casing and cementing requirements of the BLM and COGCC to prevent flowback of hydraulic fracturing fluids and formation fluids from contacting the aquifers, and largely inert fluid contents, the CRVFO has concluded use of hydraulic fractures as part of the Proposed Action would not adversely impact groundwater quality.

#### *No Action Alternative*

Under the No Action Alternative, the 36 Federal wells on the existing RU 23-5 pad would not be drilled, the 2.6 acres of additional surface disturbance would not occur, and use of the RU 34-6 pad to support fracturing and water management would not be needed. The result would be no new impacts on hydrogeology and groundwater quality.

#### **Wildlife – Aquatic**

The BLM analyzed and disclosed impacts to aquatic wildlife and their habitats in the FMMDP and determined that they would not be significant. Because of the small amount of additional surface disturbance adjacent to existing disturbed areas, that analysis remains adequate regarding the Proposed Action and No Action Alternative and is incorporated here by reference.

#### **Wildlife – Terrestrial**

The BLM analyzed and disclosed impacts to terrestrial wildlife, including big game ungulates (hoofed grazers, deer and elk) in the FMMDP and determined that they would not be significant. Because the Proposed Action involves only the small additional surface disturbance adjacent to existing disturbed areas, the analysis in the FMMDP remains generally accurate and is incorporated here by reference. However, the timing of the current Proposed Action differs from the project plan analyzed in the FMMDP. The associated differences in impacts to terrestrial wildlife are described below.

#### *Proposed Action*

The current Proposed Action includes developing the 36 wells in one continuous operation including the 2013-2014 winter TL period specified in Federal lease COC41916 instead of three consecutive years (2013, 2014, and 2015) outside the winter TL period. In general, wildlife—and especially big game ungulates such as mule deer (*Odocoileus hemionus*) and North American elk (*Cervus canadensis*)—are especially sensitive to disturbance during the winter as a result of following:

- Winter range is generally less extensive than habitats used in other seasons and often the limiting factor in population sizes of big game.
- Winter range commonly consists of grasses, low-growing shrubs such as sagebrush, or open woodlands. These habitats provide less hiding cover for big game than forested areas often used in summer, resulting in greater disturbance of wildlife from human activity.
- Winter range, being mostly at lower elevations, is disproportionately located on private lands along valley floors, where highways, gravel mining, concentrated ranching/farming operations, and residential/commercial developments have caused previous habitat modification or fragmentation and represent additional sources of disturbance.

- Winter range provides better access to forage when areas at higher elevations or less favorable aspects have deeper and more persistent snow cover.
- Winter range is generally warmer due to lower elevation and sunnier aspects, resulting in less stress from cold and less fatigue from moving through deeper snow, particularly important for pregnant females.

The Proposed Action offers the following offsetting benefits:

1. During planning of the project, WPX agreed to reach the bottomhole targets initially planned for two pads on the eastern slopes of Flatiron Mesa from one larger pad (the RU 23-5) on flatter terrain of Flatiron Mesa. In addition to the better location of the final pad design compared to the initial location on the eastern slopes of Flatiron Mesa, consolidating two pads into one pad would reduce wildlife impacts associated with habitat loss, fragmentation, and modification as well as reducing disturbance to wildlife by having a single point location of construction, drilling, and completion activities.
2. Performing construction, drilling, and completion activities in one continuous operation from May 2013 through September 2014 instead of constructing and initiating drilling in 2013 and continuing drilling and completion in 2014 and 2015 would reduce impacts to non-winter use by wildlife as well as impacts to other resources. Although disturbance during the winter is often more impactful than disturbance in other seasons, disturbance during any season can affect big game and other wildlife movement patterns and habitat use.
3. A single drilling operation would include only a single drill-rig mobilization in July 2013 and a single demobilization in August 2014. Mobilization/demobilization of drilling operations includes intensive traffic by heavy trucks over a period of up to 2 weeks. Consequently, drilling during 3 years would require mobilization in spring (May) and demobilization in late fall (November) during each of 3 years. The project area is not located within optimal winter range due to its elevation but consists of transitional habitat used in mild winters or while migrating between winter range at lower elevations and summer range at higher elevations. The Proposed Action would eliminate mobilization/demobilization during the spring and fall seasons.
4. Implementation of pipelines to replace haul trucks for water movement would reduce disturbance to big game and other wildlife from noise and vehicular traffic.
5. Because of these benefits to wildlife, the BLM concluded that the 50% reduction in the number of well pads warranted a 50% reduction in the amount of mitigation normally required for granting an exception to the big game winter range TL. However, WPX has already performed 400 acres of habitat treatments in mapped winter range in the project vicinity, of which approximately 300 acres remains available project mitigation. This is more than the full amount normally required for granting a TL exception of this duration and scale and more than twice the amount required after giving credit for WPX's relocation and consolidation of two well pads into a single pad.<sup>1</sup>

The habitat treatments performed by WPX consist of thinning dense stands of tall oakbrush with a hydro-ax. The method, location, and timing of the treatments were specified by the CRVFO in collaboration with Colorado Parks and Wildlife (CPW). The purpose of the treatment was to open the impenetrable stands to improve wildlife movement and increase the penetration of light and moisture into the understory, stimulating growth of the herbaceous understory and improving forage quality and quantity.

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<sup>1</sup> Based on CRVFO's standard formula of 25 acres of mitigation per pad-month of TL exception (3.5 months for the RU 23-5 pad + 2 months for the RU 34-6 pad = 5.5 pad-months x 25 acres = 137.5 acres).

Based on the considerations above, the current Proposed Action, while potentially displacing some big game during the 2013-2014 winter season, would also provide a variety of benefits to minimize or offset these negative impacts to the affected herd both during and following the project. Consequently, while adverse impacts to individual animals could result, the overall deer and elk populations in the project vicinity would not be significantly affected. In addition, impacts to migratory and resident songbirds, raptors, and other species nesting in the general project vicinity would be reduced by the shorter project duration. Overall, project impacts of the current Proposed Action to terrestrial wildlife would be substantially less than analyzed and disclosed in the earlier EA for the FMMDP.

#### *No Action Alternative*

Under this alternative, the 36 Federal wells on the existing RU 23-5 pad would not be drilled, the 2.6 acres of additional surface disturbance would not occur, and use of the RU 34-6 pad to support fracing and water management would not be needed. The result would be no new impacts on terrestrial wildlife.

### **SUMMARY OF CUMULATIVE IMPACTS**

BLM analyzed cumulative impacts to affected resources from the project described in the FMMPD, including development of the RU 23-5 pad, and found them to not be significant. The Proposed Action includes drilling slightly fewer wells than previously analyzed, implementation of a new water management system including use of pipelines instead of trucks for most water delivery, and a shorter overall project duration. Because of the small amount of additional surface disturbance adjacent to existing disturbed areas, and the similar number of proposed wells, the analysis of cumulative impacts to most of the affected resources and resource uses presented in the FMMDP remains accurate for the Proposed Action and No Action Alternative, and is incorporated here by reference. For resources re-analyzed in this EA—air quality, geology/hydrogeology/groundwater quality, migratory birds, and terrestrial wildlife—cumulative impacts from the Proposed Action are not expected to be significant, for the reasons discussed below.

Air Quality – Results of the 2011 air quality model show no significant adverse cumulative impacts on air quality from projected levels of Federal and non-Federal oil and gas development in the CRVFO. The proposed action is within the scope of that analysis, and includes various restrictions on atmospheric emissions that were within the modeled scenarios.

Geology/Hydrogeology/Groundwater Quality – The analysis of use of hydraulic fracturing technology to stimulate release of natural gas and other hydrocarbons from the target formation indicates that microseismic events and stimulation/propagation of horizontal and vertical fractures are highly unlikely to have significant impacts on geologic/hydrogeologic resources, freshwater aquifers, and groundwater. This conclusion is based on the great depth of hydrocarbon-bearing zones in relation to shallow freshwater zones, and COGCC and BLM requirements for proper casing and cementing of the borehole to prevent fracing fluids and produced fluids (e.g., methane, saltwater) from contacting freshwater aquifers while flowing to the surface. Moreover, the lack of connectivity of fractures between wells on different oil and gas projects would limit the cumulative impacts of fractures potentially created by the Proposed Action.

Migratory Birds –The FMMDP concluded that the application of COAs restricting vegetation removal in habitat for BCC species would minimize the potential for direct impacts from project activities to individual birds or their active nests, thereby avoiding significant cumulative impacts. The current Proposed Action would reduce project impacts further due to a smaller number of wells, one continuous drilling operation across two instead of three nesting seasons, and less truck traffic for water haulage

year-round, including during the migratory bird nesting season. Consequently, while the FMMDP concluded that cumulative impacts to migratory birds would not be significant, the current Proposed Action would further reduce those cumulative impacts.

Terrestrial Wildlife (Big Game Ungulates) – Drilling the 36 previously approved wells in one continuous operation including the 2013-2014 winter TL period would result in different impacts to big game than analyzed in the FMMDP, which did not address winter drilling. However, the BLM has concluded that a single drilling visit including one winter TL period in lieu of three consecutive years of drilling outside the winter TL period would result in negligible adverse impacts to big game. Over the long term, the habitat treatments in big game winter range previously conducted in the project vicinity by WPX in cooperation with BLM and CPW represents a net benefit to deer and elk in combination with the shorter project duration and greater use of pipelines instead of trucks to move water. Consequently, the Proposed Action would not contribute significantly to cumulative adverse impacts on wintering big game at the project, field office, or regional levels.

**PERSONS AND AGENCIES CONSULTED**

WPX Energy Rocky Mountain LLC: April Mestas, Adam Tankersley, Kris Meil, Joe Weaver, Jr.

**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 4.

<b>Table 4. BLM Interdisciplinary Team Authors and Reviewers</b>		
<i>Name</i>	<i>Title</i>	<i>Areas of Participation</i>
D. J. Beaupeurt	Realty Specialist	Lands and Realty
John Brogan	Archaeologist	Cultural Resources, Native American Religious Concerns
Jim Byers	Natural Resource Specialist	Project Lead, Access and Transportation, Range Management, Recreation, Socioeconomics, Wastes
Allen Crockett, Ph.D., J.D.	Supervisory Natural Resource Specialist	Technical Review, NEPA Review
Shauna Kocman, Ph.D., P.E.	Petroleum Engineer	Air Quality, Noise, Soils, Surface Water, Downhole COAs
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 Animals, Aquatic and Terrestrial Wildlife
Todd Sieber	Geologist	Geology and Minerals, Groundwater, Fossil Resources

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**APPENDIX A**

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

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**SURFACE-USE CONDITIONS OF APPROVAL  
DOI-BLM-CO-N040-2013-0007-EA**

**GENERAL SURFACE-USE COAS**

The following general surface use COAs are in addition to all stipulations attached to the respective Federal leases and to any site-specific COAs for individual well pads. Wording and numbering of these COAs may differ from those included in the Flatiron Mesa Master Development Plan (EA #CO140-2010-0002-EA). In cases of discrepancies, the following COAs supersede earlier versions. 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 #17) shall be implemented for well pad construction whenever topography allows.
- d. Seedbed Preparation. For cut-and-fill slopes, initial seedbed preparation shall consist of backfilling and recontouring to achieve the configuration specified in the reclamation plan. For compacted areas, initial seedbed preparation shall include ripping to a minimum depth of 18 inches, with a maximum furrow spacing of 2 feet. Where practicable, ripping shall be conducted in two passes at perpendicular directions. Following final contouring, the backfilled or ripped surfaces shall be covered evenly with topsoil.

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

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

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

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

- e. Seed Mixes. A seed mix consistent with BLM standards in terms of species and seeding rate for the specific habitat type shall be used on all BLM lands affected by the project (see 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 measures approved by the BLM. Cut-and-fill slopes along drainages or in areas with high erosion potential shall also be protected from erosion using hydromulch designed specifically for erosion control or biodegradable blankets/matting, bales, or wattles of weed-free straw or weed-free native grass hay. A well-anchored fabric silt fence shall also be placed at the toe of cut-and-fill slopes along drainages or to protect other sensitive areas from deposition of soils eroded off the slopes. Additional BMPs shall be employed as necessary to reduce soil erosion and offsite transport of sediments.
- i. Site Protection. The pad shall be fenced to BLM standards to exclude livestock grazing for the first two growing seasons or until seeded species are firmly established, whichever comes later. The seeded species will be considered firmly established when at least 50% of the new plants are producing seed. The BLM will approve the type of fencing.
- j. Monitoring. The operator shall conduct annual monitoring surveys of all sites categorized as “operator reclamation in progress” and shall submit an annual monitoring report of these sites to the BLM by **December 31** of each year. The monitoring program shall use the four Reclamation Categories defined in Appendix I of the 1998 DSEIS to assess progress toward reclamation objectives. The annual report shall document whether attainment of reclamation objectives appears likely. If one or more objectives appear unlikely to be achieved, the report shall identify appropriate corrective actions. Upon review and approval of the report by the BLM, the operator shall be responsible for implementing the corrective actions or other measures specified by the BLM.

8. Weed Control. The operator shall regularly monitor and promptly control noxious weeds or other undesirable plant species as set forth in the Glenwood Springs Field Office *Noxious and Invasive Weed Management Plan for Oil and Gas Operators*, dated March 2007. A Pesticide Use Proposal (PUP) must be approved by the BLM prior to the use of herbicides. Annual weed monitoring reports and Pesticide Application Records (PARs) shall be submitted to BLM by **December 1**.
9. Big Game Winter Range Timing Limitation. See site-specific COA #1 following these general surface use COAs.
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 resulted in the location of one or more raptor nest structures within 0.25 mile of a well pad or 0.125 mile of an access road, pipeline, or other surface facility. To protect nesting raptors, a 60-day Timing Limitation (TL) shall be applied to construction, drilling, or completion activities within the buffer widths specified above, if the activities would be initiated during the nesting period of **May 1 to July 1**. An exception to this TL may be granted for any year in which a subsequent survey determines one of the following: (a) the nest is in a severely dilapidated condition or has been destroyed due to natural causes, (b) the nest is not occupied during the normal nesting period for that species, (c) the nest was occupied but subsequently failed due to natural causes, or (d) the nest was occupied, but the nestlings have fledged and dispersed from the nest. If project-related activities are initiated within the specified buffer distance of any active nest, even if outside the 60-day TL period, the operator remains responsible for compliance with the MBTA with respect to a “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. Existing vegetation shall be preserved when clearing and grading for pads, roads, and pipelines. The BLM may direct that cleared trees and rocks be salvaged and redistributed over reshaped cut-and-fill slopes or along linear features.

Production facilities shall be placed to avoid or minimize visibility from travel corridors, residential areas, and other sensitive observation points—unless directed otherwise by the BLM due to other resource concerns—and shall be placed to maximize reshaping of cut-and-fill slopes and interim reclamation of the pad.

Above-ground facilities shall be painted **Shadow Gray** to minimize contrast with 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 RU 23-5 PROJECT**

1. Exception to Big Game Winter Timing Limitation. Based on the analysis presented in this EA, the BLM has concluded that granting of an exception to the big game winter range Timing Limitation (TL) stipulation for Federal lease COC41916 to allow well development during one continuous drilling operation instead of multiple drilling operations in three consecutive years, and in conjunction with other project design elements and mitigation measures, would not result in significant adverse impacts to big game (deer and elk). However, formal granting of a TL exception will be made by the BLM only on a year-by-year basis in collaboration with CPW upon submittal by WPX of a request using a Sundry Notice.
2. Harrington's Penstemon. The Operator shall incorporate the following steps to avoid and minimize impacts to Harrington's penstemon:
  - a) Weed Control. A Pesticide Use Permit (PUP) specific to Harrington's penstemon sites shall be submitted to the BLM. Herbicide treatment of noxious weeds shall not occur within Harrington's penstemon habitat until approval of the PUP by the CLM.

Noxious weed treatments within Harrington's penstemon habitat shall be limited to spot spraying or wicking. No broadcast spraying will be allowed in order to promote the reestablishment of Harrington's penstemon and other forbs and shrubs with which it co-occurs.
  - b) Sensitive Plant Mitigation. Within the interim reclamation areas, the seed mix shown in **Table A-1** shall be used instead of CRVFO's standard menu-based seed mix.

A minimum of five grass, three forb, and two shrub species shall be included in the seed mix initially installed by drill-seeding or hydroseeding, with the exception of Wyoming big sagebrush

which shall be surface sown (**Table A-1**). Seeding shall be at the rate of 60 pure live seeds (PLS) per square foot if drill-seeded and 120 PLS per square foot if broadcast-seeded or hydroseeded where drill-seeding is impracticable. If hydroseeding is used, application of seeds shall be performed as a separate step from application of hydromulch.

<b>Table A-1. Seed Mix for Initial Seeding of Harrington's Penstemon Sites.<sup>1</sup></b>				
<i>Common Name</i>	<i>Scientific Name</i>	<i>Variety</i>	<i>Season</i>	<i>Form</i>
<b>Choose Five Grasses (50% of Total PLS)</b>				
Indian Ricegrass	<i>Achnatherum [Oryzopsis] hymenoides</i>	Paloma, Rimrock	Cool	Bunchgrass
Columbia Needlegrass	<i>Achnatherum nelsonii, Stipa columbiana</i>	VNS	Cool	Bunchgrass
Bottlebrush Squirreltail	<i>Elymus elymoides, Sitanion hystrix</i>	VNS	Cool	Bunchgrass
Needle and Thread Grass	<i>Hesperostipa [Stipa] comata</i>	VNS	Cool	Bunchgrass
Junegrass	<i>Koeleria macrantha</i>	VNS	Cool	Bunchgrass
Muttongrass	<i>Poa fendleriana</i>	VNS	Cool	Weakly Rhizomatous
Bluebunch Wheatgrass	<i>Pseudoroegneria spicata, Agropyron spicatum</i>	Secar, P-7, Anatone, Goldar	Cool	Bunchgrass
<b>Choose Three Forbs (30% of Total PLS)</b>				
Arrowleaf Balsamroot	<i>Balsamorhiza sagittata</i>	Fernleaf Biscuitroot	<i>Lomatium dissectum</i>	
Rocky Mountain Beeplant	<i>Cleome serrulata</i>	Silverleaf Lupine	<i>Lupinus argenteus</i>	
Sulphur Flower Buckwheat	<i>Eriogonum umbellatum</i>	Scarlet Globemallow	<i>Sphaeralcea coccinea</i>	
<b>Use Two Shrubs (20% of Total PLS)</b>				
Fourwing Saltbush	<i>Atriplex canescens</i>	*Wyoming Big Sagebrush	<i>Artemisia tridentata</i> ssp. <i>wyomingensis</i>	
* Seeds of Wyoming sagebrush ( <i>Artemisia tridentata</i> ssp. <i>wyomingensis</i> ) shall be collected from plants in the vicinity of the reclamation areas and seeded within 6 months of collection. Sagebrush seeding shall occur prior to winter snowfall, or on top of snow. Sagebrush may be sown either by broadcast seeding, or, if not on snowpack, by placing the seed in the fluffy seed box of a seed drill, with the drop tube left open to allow seed to fall out on the ground surface.				

### 3. Road and Pad Construction Details.

Cuttings Management Considerations on the RU 23-5 Pad. By October 15 of each drilling season, stockpiled cuttings shall be tested per COGCC regulation (Table 910-1). After meeting the COGCC standards, the cuttings shall be consolidated in the cuttings trench in a manner that allows the cuttings to be capped by native soil material and prepared for seeding so that portion of the cuttings pile can be reclaimed..

Changes to RU 23-5 Construction Plat. The area to remain undisturbed near the north side of the road entrance of the pad as shown on Plat 2 shall be disregarded. The area to be disturbed for installation of flowlines between the wellheads and the production pad shall be condensed as much as possible. Large boulders encountered during the flowline installation can be set aside for placement along the access road or used as barriers as directed by the Authorized Officer.

4. Use of Above-ground Frac Water Storage (“Quick Pit”) Facility. The installation, use, operation and maintenance of the proposed “Quick Pit” above-ground water storage facility to be installed on BLM (RU23-5 pad or RU 34-6 pad) shall adhere to the manufacturer’s specifications, instructions and warranties. Such specifications, instructions and warranties provided by the manufacturer of the Quick Pit storage facility shall be provided to the BLM via Sundry Notice prior to beginning any installation of the water storage facility.
  
5. Construction and Use of RU 11-7 Frac Pit. The installation, use, operation, and maintenance of the RU 11-7 frac pit water storage facility on private land, as it relates to supporting activities related to Federal well drilling or well completion work, shall adhere to COGCC permitting requirements and regulations.

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

Operator: WPX Energy Rocky Mountain LLC  
Lease Number: COC41916  
Surface Location: Garfield County; Lot 2, Sec. 5 T7S R93W  
Pad: RU 23-5  
Engineer: Peter Cowan

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; and Alex Provstgaard, 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 **3M** system and recorded in the IADC/Driller's log. A casing head rated to 3,000 psi or greater shall be utilized.
5. Flexible choke lines shall meet or exceed the API SPEC 16C requirements. Flexible choke lines shall be effectively anchored, have flanged connections, and configured to the manufacturer's specifications. Manufacturer specifications shall be kept with the drilling rig at all times and immediately supplied to the authorized officer/inspector upon request. Specifications at a minimum shall include acceptable bend radius, heat range, anchoring, and the working pressure. All flexible choke lines shall be free of gouges, deformations, and as straight/short as possible.
6. An electrical/mechanical mud monitoring equipment shall be function tested prior to drilling out the surface casing shoe. As a minimum, this equipment shall include a 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 5<sup>th</sup> business day after any well begins production on which royalty is due anywhere on a lease site or allocated to a lease site, or resumes production in a case of a well which has been off production for more than 90 days, the operator shall notify the authorized officer by letter or sundry notice, Form 3160-5, or orally to be followed by a letter or sundry notice, of the date on which such production has begun or resumed.

**Contact Information:**

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<b>List of Wells</b>			
<i>Proposed Pad</i>	<i>Proposed Wells</i>	<i>Surface Location</i>	<i>Bottomhole Location</i>
RU 23-5 Pad Federal Surface	Federal NER 14-32	T7S R93W, Sect. 5 Lot 2	T6S R93W, Sect. 32 SWSW
	Federal NER 24-32	T7S R93W, Sect. 5 Lot 2	T6S R93W, Sect. 32 NESW
	Federal NER 34-32	T7S R93W, Sect. 5 Lot 2	T6S R93W, Sect. 32 SWSE
	Federal NER 44-32	T7S R93W, Sect. 5 Lot 2	T6S R93W, Sect. 32 SESE
	Federal NER 314-32	T7S R93W, Sect. 5 Lot 2	T6S R93W, Sect. 32 SWSW
	Federal NER 324-32	T7S R93W, Sect. 5 Lot 2	T6S R93W, Sect. 32 SESW
	Federal NER 343-32	T7S R93W, Sect. 5 Lot 2	T6S R93W, Sect. 32 NESW
	Federal NER 344-32	T7S R93W, Sect. 5 Lot 2	T6S R93W, Sect. 32 SESE
	Federal NER 413-32	T7S R93W, Sect. 5 Lot 2	T6S R93W, Sect. 32 NWSW
	Federal NER 414-32	T7S R93W, Sect. 5 Lot 2	T6S R93W, Sect. 32 SWSW
	Federal NER 423-32	T7S R93W, Sect. 5 Lot 2	T6S R93W, Sect. 32 NESW
	Federal NER 424-32	T7S R93W, Sect. 5 Lot 2	T6S R93W, Sect. 32 SESW
	Federal NER 434-32	T7S R93W, Sect. 5 Lot 2	T6S R93W, Sect. 32 SWSE
	Federal NER 443-32	T7S R93W, Sect. 5 Lot 2	T6S R93W, Sect. 32 NESE
	Federal NER 444-32	T7S R93W, Sect. 5 Lot 2	T6S R93W, Sect. 32 SESE
	Federal NER 513-32	T7S R93W, Sect. 5 Lot 2	T6S R93W, Sect. 32 NWSW
	Federal NER 514-32	T7S R93W, Sect. 5 Lot 2	T6S R93W, Sect. 32 SWSW
	Federal NER 523-32	T7S R93W, Sect. 5 Lot 2	T6S R93W, Sect. 32 NESW
	Federal NER 524-32	T7S R93W, Sect. 5 Lot 2	T6S R93W, Sect. 32 SESW
	Federal NER 533-32	T7S R93W, Sect. 5 Lot 2	T6S R93W, Sect. 32 NWSE
	Federal NER 534-32	T7S R93W, Sect. 5 Lot 2	T6S R93W, Sect. 32 SESW
	Federal RU 11-5	T7S R93W, Sect. 5 Lot 2	T7S R93W, Sect. 5 Lot 2
	Federal RU 12-5	T7S R93W, Sect. 5 Lot 2	T7S R93W, Sect. 5 NWSW
	Federal RU 13-5	T7S R93W, Sect. 5 Lot 2	T7S R93W, Sect. 5 NWSW
	Federal RU 21-5	T7S R93W, Sect. 5 Lot 2	T7S R93W, Sect. 5 Lot 2
	Federal RU 22-5	T7S R93W, Sect. 5 Lot 2	T7S R93W, Sect. 5 NESW
	Federal RU 41-5	T7S R93W, Sect. 5 Lot 2	T7S R93W, Sect. 5 Lot 1
	Federal RU 42-5	T7S R93W, Sect. 5 Lot 2	T7S R93W, Sect. 5 NESE
	Federal RU 43-5	T7S R93W, Sect. 5 Lot 2	T7S R93W, Sect. 5 NESE
	Federal RU 311-5	T7S R93W, Sect. 5 Lot 2	T7S R93W, Sect. 5 NWSW
	Federal RU 313-5	T7S R93W, Sect. 5 Lot 2	T7S R93W, Sect. 5 SWSW
	Federal RU 321-5	T7S R93W, Sect. 5 Lot 2	T7S R93W, Sect. 5 NESW
	Federal RU 322-5	T7S R93W, Sect. 5 Lot 2	T7S R93W, Sect. 5 NESW
	Federal RU 331-5	T7S R93W, Sect. 5 Lot 2	T7S R93W, Sect. 5 NWSE
Federal RU 332-5	T7S R93W, Sect. 5 Lot 2	T7S R93W, Sect. 5 NWSE	
Federal RU 341-5	T7S R93W, Sect. 5 Lot 2	T7S R93W, Sect. 5 NESE	

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# FONSI

## DOI-BLM-CO-N040-2013-0007-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 environmental elements analyzed in this EA or incorporated by reference from the Flatiron Mesa Master Development Plan EA# DOI-BLM-CO N040-2010-0002-EA, approved on December 14, 2009. Therefore, an Environmental Impact Statement (EIS) is not necessary to analyze further the environmental effects of the Proposed Action.

### DECISION RECORD

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

RATIONALE: The bases for this decision are as follows:

1. Approval of the Proposed Action is validating the rights granted with the Federal oil and gas leases to develop the leasehold to provide commercial commodities of oil and gas.
2. Decisions regarding granting of exceptions to the big game winter range Timing Limitation (TL) stipulation as analyzed in this EA would be made on a year-by-year basis in collaboration with Colorado Parks and Wildlife following submittal by the operator of a request via Sundry Notice.
3. This Decision does not authorize any surface-disturbing activity or initiation of well development activities associated with any Federal oil and gas well or BLM surface lands. Such activities shall commence only upon approval by the BLM of individual Applications for Permit to Drill (APDs) or issuance by the BLM of any required Right-of-Way grants.

MITIGATION MEASURES: The COAs presented in Appendix A of the attached EA would be attached to any and all APDs approved by the BLM for Federal oil and gas wells on the RU 23-5 well pad as part of the Proposed Action.

NAME OF PREPARER: Jim Byers, Natural Resource Specialist

SIGNATURE OF AUTHORIZED OFFICIAL:



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

DATE: March 26, 2013