

**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-N040-2013-0014-EA

CASEFILE NUMBER

Federal Oil and Gas Leases: COC07506

PROJECT NAME

Proposal to Drill Six Federal Wells from the New RWF 11-35 Pad Located on Private Land in Porcupine Creek Drainage Southwest of Rifle, Garfield County, Colorado.

PAD LOCATION

Township 6 South (T6S), Range 94 West (R94W), Section 35, NW $\frac{1}{4}$ NW $\frac{1}{4}$, Sixth Principal Meridian.

APPLICANT

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

BACKGROUND

The RWF 11-35 well pad with six new Federal oil and gas wells was originally analyzed and approved in Environmental Assessment (EA) #DOI-BLM-CO-NO40-2011-0080, signed on July 17, 2011 (BLM 2011a). The 2011 EA also included analysis of eight new Federal oil and gas wells on the proposed RWF 15-35 well pad. In conjunction with final planning for the project, the operator, WPX Energy Rocky Mountain LLC (WPX, formerly Williams Production RMT Company), has proposed to increase the disturbance footprint of the RWF 11-35 pad from 2.8 acres as analyzed in the 2011 EA to 3.1 acres to better accommodate cuttings handling.

The BLM has concluded that preparation of a new EA to support final approval of the Proposed Action was appropriate for the following reasons:

- (1) The Decision Record (DR) for EA #DOI-BLM-CO-N040-2011-0080-EA deferred final approval of the RWF 11-35 pad and associated six Federal wells pending two additional pieces of information: (a) identification by the operator of exact surface locations for the six wells and (b) preparation by the BLM of downhole Conditions of Approval (COAs) for the six wells, which could not be completed without precise surface locations.

- (2) The previous (2011) EA relied on results of an air quality model prepared for a Resource Management Plan Amendment (RMP) and Environmental Impacts Assessment (EIS) completed in 2006. Currently, the Colorado River Valley Field Office (CRVFO) is evaluating new oil and gas proposals using results of an updated and expanded air quality model published in October 2011 in connection with a new RMP.
- (3) The CRVFO is currently including in EAs for new oil and gas projects an analysis of potential groundwater impacts associate with the use of hydraulic fracturing (“fracing”) to stimulate production of natural gas from tight-gas formations.

Based on the three items above, the BLM has prepared this EA to re-analyze air quality and groundwater impacts using the newer information now available and to include a larger pad footprint in the DR for the project.

ALTERNATIVES

Proposed Action

WPX Energy Rocky Mountain LLC (“WPX”) proposes to drill and develop six Federal oil and gas wells from the proposed RWF 11-35 well pad located on split-estate land (private surface overlying Federal minerals) in the Porcupine Creek watershed about 5.5 miles southwest of Rifle, Colorado (Figure 1). The wells would be drilled into underlying Federal lease COC07506. The current Proposed Action is the same as previously analyzed and disclosed in EA #DOI-BLM-CO-N040-2011-0080 except as follows:

- The pad is now proposed to have an initial disturbance footprint of 3.1 acres, representing an increase of 0.3 acre above the 2.8 acres analyzed and disclosed in the 2011 EA. The additional initial footprint would better accommodate handling of cuttings. Associated disturbance of 0.4 acre for 525 feet of new access road and 275 feet of collocated water, gas, and condensate pipelines would be as analyzed in the 2011 EA (Table 1). Despite the slightly larger initial pad footprint, long-term surface disturbance for the pad, access road, and collocated pipelines would be 1.5 acres, the same as originally proposed.
- The pad layout (Figure 3) shows the exact surface locations of the six Federal oil and gas wells. The locations were identified in the 2011 EA as “To Be Determined.”
- With submittal of exact surface locations, the CRVFO has prepared downhole COAs for the six Federal wells. The downhole and surface-use COAs (Appendix A) would be attached to any Approved Applications for Permit to Drill (APDs) for wells authorized pursuant to this EA.

All other aspects of the Proposed Action would be as analyzed in EA #DOI-BLM-CO-N040-2011-0080. Key aspects are summarized below:

The RWF 11-35 pad would be constructed in proximity to the existing Vaquero 1-35-6S-94W pad. However, the new pad is needed to separate the Vaquero well operations from the planned WPX wells and associated surface facilities. Most of the frac equipment staged on the nearby Juhan 14-26H frac pad, with the remainder placed on the RWF 11-35 pad.

A closed-loop drill system would be used on the pad, eliminating the need for a fluids-containing reserve pit. Recovered drilling fluid would be stored on location in steel tanks for reuse. Drill cuttings would be collected from the rig’s shaker system and placed within a bermed “management” area during drilling

operations. Cuttings would be mixed with drying agents and stored at the cut slope. After drilling and completion, cuttings would be used in interim reclamation of the pad.

Temporary steel surface frac lines would be welded together between the RWF 11-35 pad and the Juhan frac pad to deliver and receive waters in support of the well completions. Temporary surface frac lines would be laid across private lands parallel to existing roads and along pipeline right-of-ways (Figure 2).

WPX has no specific timing established for this project; the RWF 11-35 pad but desires to have all necessary authorizations in place to facilitate development on short notice when a schedule is established.

Table 1. Surface Disturbance Associated with RWF 11-35 Pad, including 525 Feet for Access Road and 275 Feet for Three Collocated Pipelines		
<i>Initial Disturbance</i>	<i>Long-term Disturbance</i>	<i>Surface Ownership</i>
New Disturbance Not Previously Analyzed		
0.3 acre	N/A	Private
New Disturbance Previously Analyzed		
3.2 acres	1.5 acres	Private
Total New Surface Disturbance		
3.5 acres	1.5 acres	Private

Pad, road and pipeline construction work would follow guidelines established in the BLM Gold Book, *Surface Operating Standards for Oil and Gas Exploration and Development* (USDI and USDA 2007). A road maintenance program would be required during the production phase of the wells which includes, but is not limited to blading, ditching, culvert installation and cleanout, weed control, and gravel surfacing where excessive rutting or erosion may occur. Roads would be maintained in a safe and usable condition.

The Proposed Action would be implemented consistent with the Federal oil and gas lease, Federal regulations (43 CFR 3100), and the operational measures included in the Applications for Permit to Drill (APDs). Appendix A lists the specific Surface Use Conditions of Approval (COAs) to be implemented as mitigation measures for this project. The operator would be responsible for continuous inspection and maintenance of the access roads, pads and pipelines. Resource surveys, including those for cultural resources, nesting raptors, and special status plants and animals, were completed in conjunction with the planning for this project. An updated biological report for the pad location and surroundings was conducted in February 2012 (WWE 2012).

No Action Alternative

The No Action Alternative would constitute denial of the Federal APD(s) described in the Proposed Action, meaning that none of the proposed six Federal wells would be drilled or developed, the RWF 11-35 pad construction would not occur, the use of the Juhan 14-26H pad as frac support would be unnecessary, and the installation of the surface frac lines would not occur.

SUMMARY OF LEASE STIPULATIONS

The 6 proposed Federal wells would be directionally drilled from the proposed RWF 11-35 pad located on private surface with underlying Federal minerals. The lease (COC07056), issued in 1953, does not contain any specific lease stipulations. Protective mitigation measures derived in this environmental assessment are identified as surface-use (COAs) (Appendix A).

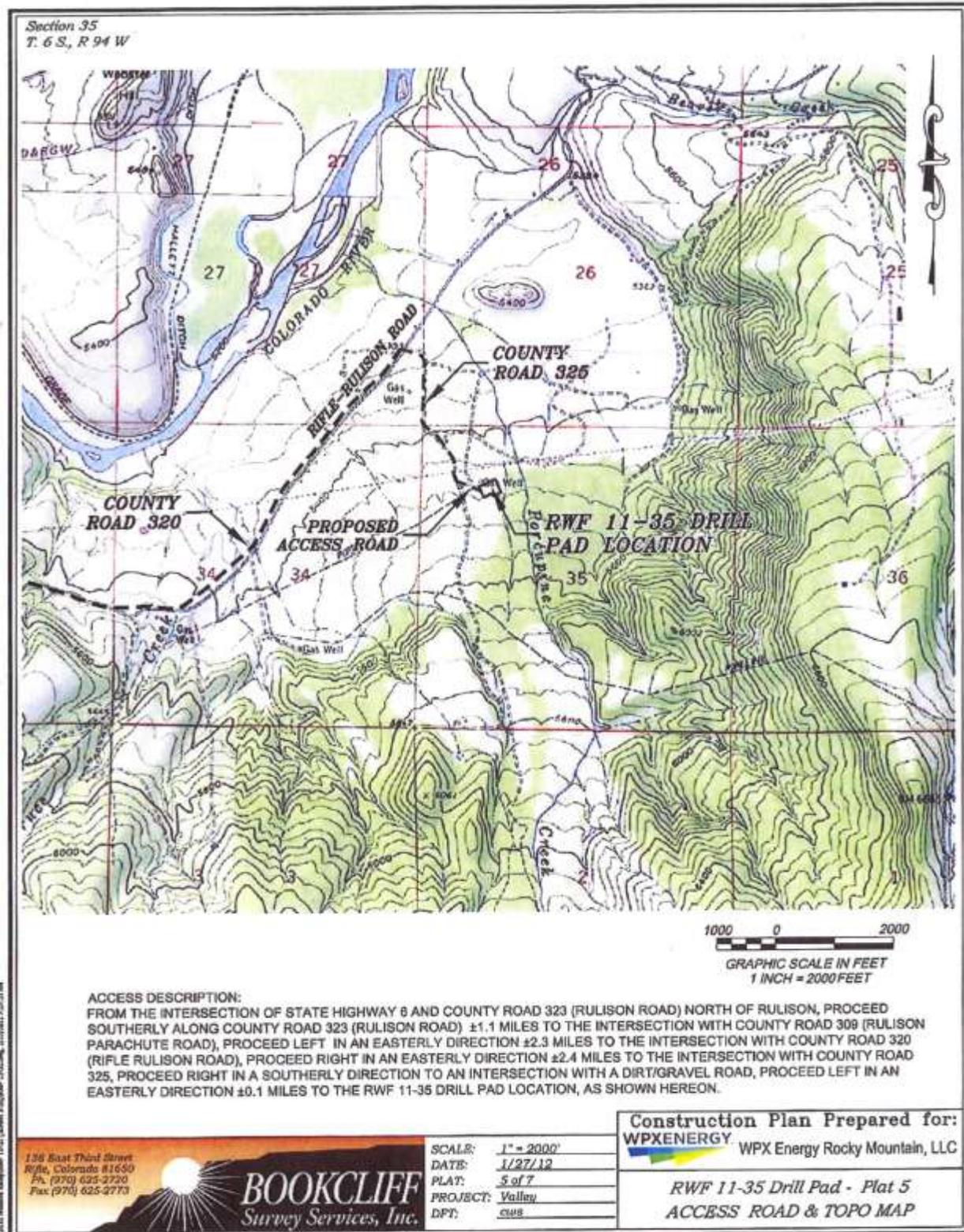


Figure 1. Project Location Map.

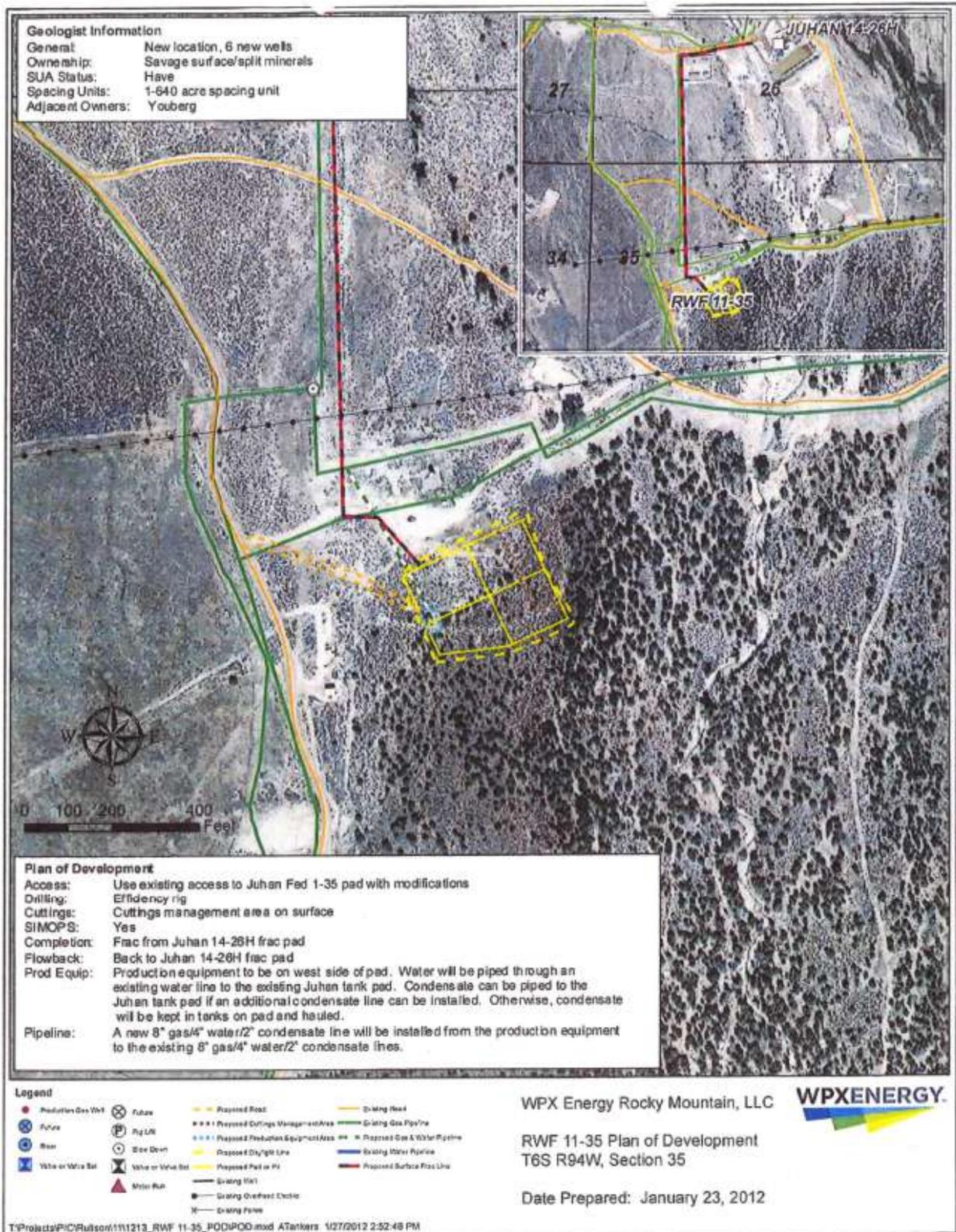


Figure 2. RWF 11-35 Project Plan of Development

NEPA COMPLIANCE

The BLM concluded that preparation of a new EA was an appropriate mechanism for re-analyzing air quality impacts using results of a more recent air quality model, analyzing potential impacts of fracturing operations on groundwater, and analyzing impacts of the proposed 0.3 acre of additional surface disturbance beyond the amount analyzed and disclosed in EA #DOI-BLM-CO-N040-2011-0080, signed July 17, 2011. The Decision Record for that EA deferred final approval of the RU 11-35 pad and six Federal wells pending submittal by the operator of exact surface locations and preparation by BLM of downhole COAs. Both of these additional pieces of information are included and in the current EA.

PLAN CONFORMANCE REVIEW

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

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

Decision Language: The 1991 Oil and Gas Plan Amendment (BLM 1991) included the following at page 3: “697,720 acres of BLM-administered mineral estate within the Glenwood Springs Resource Area are open to oil and gas leasing and development, subject to lease terms and (as applicable) lease stipulations” (BLM 1991, page 3). This decision was carried forward unchanged in the 1999 ROD and RMP amendment at page 15 (BLM 1999b): “In areas being actively developed, the operator must submit a Geographic Area Proposal (GAP) [currently referred to as a Master Development Plan, MDP] that describes a minimum of 2 to 3 years of activity for operator controlled leases within a reasonable geographic area.”

Discussion: The Proposed Action is in conformance with the 1991 and 1999 RMP amendments cited above because the Federal mineral estate proposed for development is open to oil and gas leasing and development. The 1999 RMP amendment requires multi-year development plans known at that time as Geographic Area Plans (GAPs) for lease development over a large geographic area. However, the 1999 RMP amendment also provides exceptions to that requirement for individual or small groups of exploratory wells drilled in relatively undrilled areas outside known high production areas. The Proposed Action is therefore in conformance with the exception to the requirement to require operators to submit GAPs/MDPs.

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. However, because the Proposed Action would occur on private land, an analysis of the project in relation to Land Health is not required.

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 8 resources and resource uses could be impacted differently, or to a different extent, than analyzed and disclosed in the EA #DOI-BLM-CO-N040-2011-0080. The resources and resource uses identified as requiring additional analysis are as follows:

Air Quality
Water Quality - Ground

For the remaining resources and resource uses, evaluation of the Proposed Action by the BLM indicated that the analysis in the initial 2011 EA remained appropriate and sufficient notwithstanding the small area of additional disturbance (0.3 acre short-term). These resources include Access and Transportation, Cultural Resources, Fossil Resources, Geologic Resources, Invasive Non-Native Plants, Migratory Birds, Native American Religious Concerns, Noise, Socioeconomics, Soils, Special Status Species, Visual Resources, Wastes - Hazardous or Solid, Water Quality - Surface, and Wildlife - Aquatic and Terrestrial. For these resources and resource uses, the impact analyses in analogous sections of EA #DOI-BLM-CO-N040-2011-0080 are incorporated by reference.

Access and Transportation

Impacts to access and transportation were adequately analyzed in EA #DOI-BLM-CO-N040-2011-0080 and found to not be significant. Because of the small additional surface disturbance (0.3 acre), the current Proposed Action would have the same level of adverse impacts on access and transportation as analyzed previously. The analysis presented in the previous EA 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 RWF 11-35 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 (NO₂), sulfur dioxide (SO₂), ozone (O₃), particulate matter less than 10 microns (μ) in diameter (PM₁₀), and particulate matter less than 2.5 μ in diameter (PM_{2.5}).

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

Federal air quality regulations adopted and enforced by CDPHE through the Clean Air Act (CAA) Prevention of Significant Deterioration (PSD) Program limit incremental emissions increases of air pollutants from certain sources to specific levels defined by the classification of air quality in an area. Incremental increases in PSD Class I areas are strictly limited, while increases allowed in Class II areas are less strict.

The project area and surrounding areas are classified as PSD Class II, as is Dinosaur National Monument, located approximately 180 miles to the northwest. PSD Class I areas located within 100 miles of the project area are Flat Tops Wilderness (approximately 25 miles north), Maroon Bells – Snowmass Wilderness (approximately 35 miles south), West Elk Wilderness (approximately 60 miles southeast), Black Canyon of the Gunnison National Park (approximately 65 miles south), and Eagles Nest Wilderness (approximately 60 miles east).

Proposed Action

The CDPHE, under CAA delegated authority from the U.S. Environmental Protection Agency (EPA) and in conformance with 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 current Proposed Action would create a total project surface disturbance of 3.5 acres with a reduction to 1.5 acres with interim reclamation to account for the working surfaces of the pad and road. Although the impacts to air quality from these wells are disclosed in this EA, the drilling and operation is permitted with the approval of an APD for each well. Individual wells would require approximately 7 to 10 days to drill and approximately 5 to 15 days to complete. Air quality would decrease during construction of access roads, pads, and pipelines and drilling and completing the wells.

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

The CRVFO analyzes air quality impacts of oil and gas development projects using results of a regional air model prepared by Tetra Tech, Inc. and its subcontractor, URS Corporation, in October 2011. The modeling addressed the cumulative impacts of incremental oil and gas development in the CRVFO by assuming a range of future Federal (BLM and USFS) and private wells and associated facilities such as compressors, storage tanks, and roads. The modeled scenarios also incorporated different levels of mitigation. The "no action" scenario assumed 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. In all scenarios analyzed, impacts to air quality are estimated to be below applicable 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 2011b), available for viewing at the CRVFO in Silt, Colorado, and on its website.

Emissions addressed in the air quality model included greenhouse gases (GHGs), “criteria pollutants” (CO, NO₂, SO₂, ozone, PM₁₀, and PM_{2.5}), and hazardous air pollutants (HAPs) including BTEX (benzene, ethylbenzene, toluene, and xylenes), formaldehyde, and n-hexane. The model also addressed potential impacts on visibility due to particulates and “photochemical smog” (caused by chemical reactions in the atmosphere) and on lake chemistry of selected pristine lakes due to modeled deposition rates of sulfur and resultant impacts on acid neutralizing capacity of the lake waters. For the maximum level of future oil and gas development modeled, the visibility analysis predicted a slight impact (1 day per year with a reduction in visibility of 1 deciview or greater) in the Flat Tops Wilderness and no days with 1 deciview or greater reduction in visibility at all other modeled Class I and II receptors. For the remaining pollutants analyzed, modeled levels of future oil and gas development within the CRVFO would have no or negligible long-term adverse impacts on air quality. Since the Proposed Action is within the scope of the future development modeled, no significant adverse impacts on air quality are anticipated.

The current Proposed Action includes WPX design components and BLM mitigation requirements (Appendix A) among those analyzed in the air quality model. These include use of directional drilling to reduce the number of well pads, piping instead of trucking of fluids to a centralized collection facility, flaring instead of venting of natural gas during well completions, self-contained flare units to minimize emissions to the atmosphere, and use of closed-loop drilling. Closed-loop drilling minimizes emissions by recycling drilling muds and separating fluids and drill cuttings, thus eliminating open pits containing petroleum fluids. In addition to minimizing emissions associated with drilling and completion activities, these mitigation measures would also significantly reduce fugitive dust and vehicle tailpipe emissions by greatly reducing the volume of truck traffic required to support the operations.

Generation of fugitive dust as a result of construction activities and travel on unpaved access roads would also be reduced by BLM’s requirement that WPX apply gravel to a compacted depth of 6 inches on the access road, apply water to the access road during the development phase, and apply a BLM-approved dust suppressant throughout the long-term production phase (Appendix A). In addition, construction activities for the well pad, access road, and pipelines would occur between the hours of 7:00 a.m. and 6:00 p.m. each day, a generally 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 this alternative, none of the proposed 6 Federal wells would be drilled or developed, the RWF 11-35 pad construction would not occur, the use of the Juhan 14-26H pad as frac support would be unnecessary, and the installation of the surface frac lines would not be needed. Consequently, the No Action Alternative would preclude any new air quality impacts related to drilling, completing, servicing, or producing new Federal wells or gas gathering operations from occurring.

Cultural Resources

Impacts to cultural resources were adequately analyzed in the EA #DOI-BLM-CO-NO40-2011-0080 and found to not be significant. Because of the small amount of additional surface disturbance (0.3 acre) within the area covered by previous surveys, the analysis in that EA remains adequate regarding the Proposed Action and No Action Alternative and is incorporated here by reference.

Fossil Resources

Impacts to fossil (paleontological) resources were adequately analyzed in the EA #DOI-BLM-CO-NO40-2011-0080 and found to not be significant. Because of the small amount of additional surface disturbance (0.3 acre) within the area covered by previous surveys, the analysis in that EA remains adequate regarding the Proposed Action and No Action Alternative and is incorporated here by reference.

Geologic Resources

Impacts to geologic resources were adequately analyzed in the #DOI-BLM-CO-NO40-2011-0080 and found to not be significant. Because of the small amount of additional surface disturbance (0.3 acre) within the area covered by previous surveys, the analysis in that EA remains adequate regarding the Proposed Action and No Action Alternative and is incorporated here by reference.

Invasive Non-Native Plants

Impacts from invasive non-native plants as a result of the Proposed Action were adequately analyzed in the #DOI-BLM-CO-NO40-2011-0080 and found to not be significant. Because of the small amount of additional surface disturbance (0.3 acre) and new surveys conducted in 2012 (WWE 2012), the analysis in the previous EA remains adequate regarding the Proposed Action and No Action Alternative and is incorporated here by reference.

Migratory Birds

Impacts to migratory birds were adequately analyzed in the #DOI-BLM-CO-NO40-2011-0080 and found to not be significant. Because of the small amount of additional surface disturbance (0.3 acre) within the area covered by previous survey and new surveys conducted in 2012 (WWE 2012), the analysis in the previous EA remains adequate regarding the Proposed Action and No Action Alternative and is incorporated here by reference.

Native American Religious Concerns

Impacts to Native American religious concerns were analyzed in EA #DOI-BLM-CO-NO40-2011-0080 and found to not be significant. Because of the small amount of additional surface disturbance (0.3 acre) within the area covered by previous surveys, the analysis presented in the previous EA remains adequate regarding the Proposed Action and No Action Alternative and is incorporated here by reference.

Noise

Impacts from noise were analyzed in EA #DOI-BLM-CO-NO40-2011-0080 and found to not be significant. Because the current Proposed Action represents the same type, intensity, and duration of noise-generating activities, the analysis presented in the previous EA remains adequate regarding the Proposed Action and No Action Alternative and is incorporated here by reference.

Socioeconomics

Impacts to socioeconomic values were adequately analyzed in EA #DOI-BLM-CO-NO40-2011-0080 and found to not be significant. Because the current Proposed Action represents the same type, intensity, and duration of potential impacts to socioeconomic values, the analysis presented in the previous EA remains adequate regarding the Proposed Action and No Action Alternative and is incorporated here by reference.

Soils

Impacts to soil resources were analyzed in EA #DOI-BLM-CO-NO40-2011-0080 and found to not be significant. Because of the small amount of additional surface disturbance (0.3 acre) within the area covered by previous surveys, the analysis presented in the previous EA remains adequate regarding the Proposed Action and No Action Alternative and is incorporated here by reference.

Special Status Species

Impacts to special status species were analyzed in EA #DOI-BLM-CO-NO40-2011-0080 and found to not be significant. Because of the small amount of additional surface disturbance (0.3 acre) within the area covered by previous surveys, new surveys conducted in 2012 (WWE), and the absence of suitable habitat for any special status plant or animal species in the project vicinity, the analysis presented in the previous EA remains adequate regarding the Proposed Action and No Action Alternative and is incorporated here by reference.

Vegetation

Impacts to vegetation were analyzed in EA #DOI-BLM-CO-NO40-2011-0080 and found to not be significant. Because of the small amount of additional surface disturbance (0.3 acre) within the area covered by previous surveys, the analysis presented in the previous EA remains adequate regarding the Proposed Action and No Action Alternative and is incorporated here by reference.

Visual Resources

Impacts to visual resources were analyzed in EA #DOI-BLM-CO-NO40-2011-0080 and found to not be significant. Because of the small amount of additional surface disturbance (0.3 acre) within the area covered by previous surveys, the analysis presented in the previous EA 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 were analyzed in EA #DOI-BLM-CO-NO40-2011-0080 and found to not be significant. Because the current Proposed Action represents the same types and levels of potential generation of hazardous or solid wastes, the analysis presented in the previous EA 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 freshwater aquifers and groundwater quality in EA #DOI-BLM-CO-NO40-2011-0080 and found the impacts to not be significant. However, the CRVFO has begun incorporating information on potential impacts of fracing 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 previous EA 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 (Table 2). Since hydraulic fracturing operations are tailored to the downhole environment, the chemicals listed in Table 2 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 2 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 2. The sand is used as a proppant, or 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.

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.

Table 2. 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
Total Additives		0.49		
Total Water and Sand		99.51		

*FracFocus Chemical Disclosure Registry, fracfocus.org/chemical-use/what-chemicals-are-used
**USDOE 2009

No Action Alternative

Under the No Action Alternative, the six Federal wells on the RWF 11-35 would not be drilled, and use of hydraulic fracturing would not be needed. Consequently, the result would be no new impacts on hydrogeology and groundwater quality.

Water Quality, Surface

Impacts to quality and quantity of surface waters (including waters of the U.S.) and groundwater were analyzed in EA #DOI-BLM-CO-NO40-2011-0080 and found to not be significant. Because of the small amount of additional surface disturbance (0.3 acre) within the area covered by previous surveys and the same level and location of surface disturbance as previously analyzed, the earlier EA remains adequate regarding the Proposed Action and No Action Alternative and is incorporated here by reference.

Wildlife, Aquatic and Terrestrial

Impacts to aquatic and terrestrial wildlife resources were analyzed in EA #DOI-BLM-CO-NO40-2011-0080 and found to not be significant. Because of the small amount of additional surface disturbance (0.3 acre) within the area covered by previous surveys and the same type, intensity, and duration of activities potentially disruptive to wildlife use, the analysis presented in the previous EA remains adequate regarding the Proposed Action and No Action Alternative and is incorporated here by reference.

SUMMARY OF CUMULATIVE IMPACTS

BLM analyzed cumulative impacts to affected resources from the Proposed Action in EA #DOI-BLM-CO-N040-2011-EA and found them to not be significant. The Proposed Action includes drilling the same number of wells as previously analyzed but requiring 0.3 acre of additional surface disturbance on the pad. Because of the small amount of additional surface disturbance adjacent to the previously analyzed disturbance footprint, 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 further analyzed in this EA—air quality and groundwater quality—cumulative impacts from the Proposed Action continue to be considered by the BLM as not significant, for the reasons discussed below.

Air Quality – Results of the 2011 air quality model show no 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.

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 fracturing 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.

PERSONS AND AGENCIES CONSULTED

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

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 impacts likely to occur from implementation of the Proposed Action, and identification of appropriate COAs to be attached and enforced by BLM, are listed in Table 3.

Table 3. BLM Interdisciplinary Team Authors and Reviewers		
<i>Name</i>	<i>Title</i>	<i>Areas of Participation</i>
John Brogan	Archaeologist	Cultural Resources, Native American Religious Concerns
Jim Byers	Natural Resource Specialist	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-N040-2013-0014-EA**

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.

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 #16) 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. To minimize impacts to wintering big game, no construction, drilling or completion activities shall occur during a Timing Limitation (TL) period from **January 1 to March 1 annually.**
10. Bald and Golden Eagles. It shall be the responsibility of the operator to comply with the Bald and Golden Eagle Protection Act (Eagle Act) with respect to “take” of either eagle species. Under the Eagle Act, “take” includes to pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest and disturb. “Disturb” means to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, (1) injury to an eagle; (2) a decrease in its productivity by substantially interfering with normal breeding, feeding, or sheltering behavior; or (3) nest abandonment by substantially interfering with normal breeding, feeding, or sheltering behavior. Avoidance of eagle nest sites, particularly during the nesting season, is the primary and preferred method to avoid a take. Any oil or gas construction, drilling, or completion activities planned within 0.5 mile of a bald or golden eagle nest, or other associated activities greater than 0.5 miles from a nest that may disturb eagles, should be coordinated with the BLM project lead and BLM wildlife biologist and the USFWS representative to the BLM Field Office (970-876-9051).
11. Raptor Nesting. Raptor nest surveys in the project vicinity 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 **March 1 to May 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 June 30.** 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 audial survey for diagnostic vocalizations in conjunction with a visual survey for adults and nests. Surveys shall be conducted by a qualified breeding bird surveyor between sunrise and 10:00 AM under favorable conditions for detecting and identifying a BCC species. This provision does not apply to ongoing construction, drilling, or completion activities that are initiated prior to May 1 and continue into the 60-day period at the same location.
13. Migratory Birds – General. It shall be the responsibility of the operator to comply with the Migratory Bird Treaty Act (MBTA) with respect to “take” of migratory bird species, which includes injury and direct mortality resulting from human actions not intended to have such result. To minimize the potential for the take of a migratory bird, the operator shall take reasonable steps to prevent use by birds of fluid-containing pits associated with oil or gas operations, including but not limited to reserve pits, produced-water pits, hydraulic fracturing flowback pits, evaporation pits, and cuttings trenches.

Liquids in these pits—whether placed or accumulating from precipitation—may pose a risk to birds as a result of ingestion, absorption through the skin, or interference with buoyancy and temperature regulation.

Based on low effectiveness of brightly colored flagging or spheres suspended over a pit, the operator shall install netting with a mesh size of 1 to 1.5 inches, and suspended at least 4 feet above the fluid surface, on all pits into which fluids are placed, except for storage of fresh water in a pit that contains no other material. The netting shall be installed within 24 hours 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.

14. 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.

15. 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).

16. 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.

17. 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.

18. 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 RWF 11-35 WELL PAD

1. Pad Construction Details.

The operator shall adhere to the following:

If the pad is located in an active livestock grazing area, fence the pad perimeter prior to construction to avoid conflicts with grazing animals during drilling and completion activities.

Locate the VOC thermal destructor (burner) proposed for the southwestern pad corner in a manner that allows the 9-foot cutslope to be reshaped and reclaimed during interim reclamation earthwork while maintaining the 75-foot setback distance from the production units.

If feasible given the drill rig layout plans, shift the Cuttings Management Area shown on the eastern side of the RWF 11-35 pad toward the south and away from the northeastern corner of the fillslope.

If feasible, locate large boulders and rocks generated during pad construction along the northern edge of the RWF 11-35 pad to minimize encroachment onto the Vaquero pad directly to the north.

BUREAU OF LAND MANAGEMENT
Colorado River Valley Field Office
2300 River Frontage Road
Silt, CO 81652

DOWNHOLE CONDITIONS OF APPROVAL
Applications for Permit to Drill

Operator: WPX Energy Rocky Mountain LLC
Lease number: COC60234
Pad(s): RWF 11-35
Surface Location: Garfield County; NWNW, Sec. 35 T6S R94W
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 (picowan@blm.gov) on the first well drilled on the pad or any horizontal well and record results in the IADC log. Report failed test to Shauna Kocman or Peter Cowan. A failed pressure integrity test is more than 10% pressure bleed off in 15 minutes.
10. As a minimum, cement shall be brought to 200 feet above the Mesaverde. After WOC for the production casing, a CBL shall be run to verify the TOC and an electronic copy in .las and .pdf format shall be submitted to CRVFO – Petroleum Engineer, 2300 River Frontage Road, Silt, CO 81652 within 48 hours. If the TOC is lower than required or the cement sheath of poor quality, a CRVFO petroleum engineer shall be notified for remedial operations within 48 hours from running the CBL and prior to commencing fracturing operations,

A greater volume of cement may be required to meet the 200-foot cement coverage requirement for the Williams Fork Formation /Mesaverde Group. Evaluate the top of cement on the first cement job on the pad (Temperature Log). If cement is below 200-foot cement coverage requirement, adjust cement volume to compensate for low TOC/cement coverage.
11. On the first well drilled on this pad, a triple combo open-hole log shall be run from the base of the surface borehole to surface and from TD to bottom of surface casing shoe. This log shall be in submitted within 48 hours in .las and .pdf format to: CRVFO – Todd Sieber, 2300 River Frontage Road, Silt, CO 81652. Contact Todd Sieber at 970-876-9000 or asieber@blm.gov for clarification.
12. Submit the (a) mud/drilling log (e.g. Pason disc), (b) driller's event log/operations summary report, (c) production test volumes, (d) directional survey, and (e) Pressure Integrity Test results within 30 days of completed operations (i.e. landing tubing) per 43 CFR 3160-9 (a).
13. Prior to commencing fracturing operations, the production casing shall be tested to the maximum anticipated surface treating/fracture pressure and held for 15 minutes without a 2% leak-off. If leak-off is found, Shauna Kocman or Peter Cowan shall be notified within 24 hours of the failed test, but prior to proceeding with fracturing operations. The test shall be charted and set to a time increment as to take up no less than a quarter of the chart per test. The chart shall be submitted with the well completion report.
14. During hydraulic frac operations, monitor the bradenhead/casing head pressures throughout the frac job. Frac operations shall be terminated upon any sharp rise in annular pressure (+/- 40 psi or greater) in order to determine well/wellbore integrity. Notify Shauna Kocman or Peter Cowan immediately.
15. Per 43 CFR 3162.4-1(c), no later than the 5th business day after any well begins production on which royalty is due anywhere on a lease site or allocated to a lease site, or resumes production in a case of a well which has been off production for more than 90 days, the operator shall notify the authorized

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

Contact Information:

Shauna Kocman, PhD, PE
Petroleum/ Environmental Engineer
Office: (970) 876-9061
Cell: (970) 456-5602
skocman@blm.gov

Peter Cowan
Petroleum Engineer
Office: (970) 876-9049
Cell: (970) 309-8548
picowan@blm.gov

List of Wells			
Proposed Pads	Proposed Wells	Surface Locations	Bottom Hole Locations
RWF 11-35 Pad (Fee Surface)	RWF 11-35	T6S R94W, Sect. 35 NWNW	T6S R94W, Sect. 35 NWNW
	RWF 21-35	T6S R94W, Sect. 35 NWNW	T6S R94W, Sect. 35 NENW
	RWF 311-35	T6S R94W, Sect. 35 NWNW	T6S R94W, Sect. 35 NWNW
	RWF 321-35	T6S R94W, Sect. 35 NWNW	T6S R94W, Sect. 35 NENW
	RWF 411-35	T6S R94W, Sect. 35 NWNW	T6S R94W, Sect. 35 NWNW
	RWF 421-35	T6S R94W, Sect. 35 NWNW	T6S R94W, Sect. 35 NENW

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FONSI

DOI-BLM-CO-N040-2013-0014-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 original RWF 11-35 EA # DOI-BLM-CO-N040-2011-0080, approved on July 27, 2011. 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. This Decision does not authorize the initiation of surface-disturbing activities on BLM lands or of drilling activities associated with any Federal oil and gas well. Initiation of activities related to the six Federal oil and gas wells to be drilled from the proposed RWF 11-35 well pad may commence only upon approval by the BLM of an Application for Permit to Drill (APD) for each well.

MITIGATION MEASURES: The Conditions of Approval (COAs) presented in Appendix A of the attached EA would be applied to any and all APDs approved by the BLM for Federal oil and gas wells on the RWF 11-35 well pad.

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 5, 2013