

**DECISION RECORD**  
**Western Operating Company, Doane Federal 23-27**  
**Environmental Assessment (EA), WY-070-EA15-1**  
**Bureau of Land Management, Buffalo Field Office, Wyoming**

**DECISION.** BLM approves Western Operating Company (WOC) Doane Federal 23-27 oil and gas well application for permit to drill (APD) described in Alternative B of the environmental assessment (EA) WY-070-EA. This approval includes the well's support facilities.

**Compliance.** This decision complies with or supports:

- Federal Land Policy and Management Act of 1976 (FLPMA) (43 USC 1701); DOI Order 3310.
- Mineral Leasing Act of 1920 (MLA) (30 U.S.C. 181); including the Onshore Oil and Gas Orders.
- National Environmental Policy Act of 1969 (NEPA) (42 USC 4321).
- National Historic Preservation Act of 1966 (NHPA) (16 USC 470).
- Powder River Basin Oil and Gas Project Final Environmental Impact Statement (FEIS), 2003.
- Buffalo Resource Management Plan (RMP) 1985 and Amendments 2001, 2003, 2011.

BLM summarizes the details of the approval of Alternative B below. The EA includes the project description, including specific changes made at the onsite, and site-specific mitigation measures.

**Well Site.** BLM approves 1 APD:

#	Well Name & #	TwN	Rng	Sec	Qtr	Lease #	Status
1	Doane Federal 23-27	51N	69W	27	NESW	WYW182245	APD

**Limitations.** There are no denials or deferrals. Also see the conditions of approval (COAs).

**THE FINDING OF NO SIGNIFICANT IMPACT (FONSI).** Analysis of Alternative B of the EA, WY-070-EA15-1, and the FONSI (incorporated here by reference) found WOC's proposal for the Doane Federal 23-27 will have no significant impacts on the human environment, beyond those described in the PRB FEIS. There is no requirement for an EIS.

**COMMENT OR NEW INFORMATION SUMMARY.** BLM publically posted the APDs for 30 days, received no comments, and then internally scoped them.

**DECISION RATIONALE.** BLM bases the decision authorizing the selected project on:

1. BLM and WOC included mitigation measures to reduce environmental impacts while meeting the BLM's need. For a complete description of all site-specific COAs, see the COAs.
2. WOC will conduct operations to minimize adverse effects to surface and subsurface resources, prevent unnecessary surface disturbance, and conform with currently available technology and practice.
3. The selected alternative will help meet the nation's energy needs, and help stimulate local economies by maintaining workforce stability.
4. The operator committed to:
  - Comply with the approved APD, applicable laws, regulations, orders, and notices to lessees.
  - Obtain necessary permits from agencies.
  - Offer water well agreements to the owners of record for permitted wells.
  - Incorporate several measures to alleviate resource impacts into their submitted surface use plan and drilling plan.

5. The operator certified it has a surface access agreement.
6. The project is clearly lacking in wilderness characteristics since it is amidst mineral development.
7. This APD is pursuant to the Mineral Leasing Act for developing oil or gas and does not satisfy the categorical exclusion directive of the Energy Policy Act of 2005, Section 390.

**ADMINISTRATIVE REVIEW AND APPEAL.** This decision is subject to administrative review according to 43 CFR 3165. Request for administrative review of this decision must include information required under 43 CFR 3165.3(b) (State Director Review), including all supporting documentation. Such a request must be filed in writing with the State Director, Bureau of Land Management, P.O. Box 1828, Cheyenne, Wyoming 82003, no later than 20 business days after this Decision Record is received or considered to have been received. Parties adversely affected by the State Director's decision may appeal that decision to the Interior Board of Land Appeals, as provided in 43 CFR 3165.4.

Field Manager: \_\_\_\_\_ /s/ Duane W. Spencer \_\_\_\_\_

Date: \_\_\_\_\_ 10/21/14 \_\_\_\_\_

**FINDING OF NO SIGNIFICANT IMPACT**  
**Western Operating Company, Doane Federal 23-27**  
**Environmental Assessment (EA), WY-070-EA15-1**  
**Bureau of Land Management, Buffalo Field Office, Wyoming**

**FINDING OF NO SIGNIFICANT IMPACT (FONSI).** Based on the information in the EA, WY-070-EA15-1, which BLM incorporates here by reference; I find that: (1) the implementation of Alternative B will not have significant environmental impacts beyond those addressed in the Powder River Basin (PRB) Oil and Gas Project Final Environmental Impact Statement (FEIS), 2003; (2) Alternative B conforms to the Buffalo Field Office (BFO) Resource Management Plan (RMP) 1985, and amendments 2001, 2003, 2011; and (3) Alternative B does not constitute a major federal action having a significant effect on the human environment. Thus an EIS is not required. I base this finding on consideration of the Council on Environmental Quality's (CEQ) criteria for significance (40 CFR 1508.27), with regard to the context and to the intensity of the impacts described in the EA, and Interior Department Order 3310.

**CONTEXT.** Mineral development is a common PRB land use, sourcing over 42% of the nation's coal. The PRB FEIS foreseeable development analyzed the development of 54,200 wells. The additional development analyzed in Alternative B is insignificant in the national, regional, and local context.

**INTENSITY.** The implementation of Alternative B will result in beneficial effects in the forms of energy and revenue production however; there will also be adverse effects to the environment. Design features and mitigation measures included in Alternative B will reduce adverse environmental effects. The preferred alternative does not pose a significant risk to public health and safety. The geographic area of the project does not contain unique characteristics as identified in the 1985 RMP, the 2003 PRB FEIS, or other legislative or regulatory processes. BLM used relevant scientific literature and professional expertise in preparing the EA. The scientific community is reasonably consistent with their conclusions on environmental effects relative to oil and gas development. Research findings on the nature of the environmental effects have minor controversy, are not highly uncertain, or do not involve unique or proven risks. The PRB FEIS predicted and analyzed oil development of the nature proposed with this project and similar projects. The selected alternative does not establish a precedent for future actions with significant effects. The proposal may relate to the PRB Greater Sage-Grouse and its habitat decline having cumulative significant impacts; yet this project is within the parameters of the impacts in the PRB FEIS. There are no cultural or historical resources present that will be adversely affected by the selected alternative. The project area is clearly lacking in wilderness characteristics since it is amidst mineral development. No species listed under the Endangered Species Act or their designated critical habitat will be adversely affected. The selected alternative will not have any anticipated effects that would threaten a violation of federal, state, or local law or requirements imposed for the protection of the environment.

**ADMINISTRATIVE REVIEW AND APPEAL.** This finding is subject to administrative review according to 43 CFR 3165. Request for administrative review of this finding must include information required under 43 CFR 3165.3(b) (State Director Review), including all supporting documentation. Such a request must be filed in writing with the State Director, Bureau of Land Management, P.O. Box 1828, Cheyenne, Wyoming 82003, no later than 20 business days after this FONSI is received or considered to have been received. Parties adversely affected by the State Director's finding may appeal that finding to the Interior Board of Land Appeals, as provided in 43 CFR 3165.4.

Field Manager: \_\_\_\_\_/s/ Duane W. Spencer\_\_\_\_\_

Date: \_\_\_\_\_10/21/14\_\_\_\_\_

**ENVIRONMENTAL ASSESSMENT (EA), WY-070-EA15-1**  
**Western Operating Company, Doane Federal 23-27**  
**Bureau of Land Management, Buffalo Field Office, Wyoming**

**1. INTRODUCTION**

BLM provides an EA for Western Operating Company (WOC) Doane Federal 23-27 oil and gas well application for permit to drill (APD). BLM’s jurisdiction for this proposal is fee (non-federal) surface – overlying federal minerals “split-estate”. This site-specific analysis tiers into and incorporates by reference the information and analysis in the Powder River Basin Oil and Gas Project Final Environmental Impact Statement and Plan Amendment (PRB FEIS), WY-070-02-065, 2003, and the PRB FEIS Record of Decision (ROD) per 40 CFR 1508.28 and 1502.21. One may review these documents at the BLM Buffalo Field Office (BFO) and on our website:  
[http://www.blm.gov/wy/st/en/field\\_offices/Buffalo.html](http://www.blm.gov/wy/st/en/field_offices/Buffalo.html).

**1.1. Background**

The Doane Federal 23-27 application to drill (APD) was received on February 3, 2014. The pre-approval APD onsite was conducted on May 15, 2014 by the following personal:

<b>NAME</b>	<b>TITLE</b>	<b>AGENCY</b>
Andy Perez	NRS	BLM
Mike Skinner	Agent/Drilling	Western Operating
Mike Miller	Superintendent	Fuller Construction
Jake Sinner	Landowner	

The project post APD deficiency letter was sent out on June 2, 2014. The operator re-submitted the project revisions to BLM on August 5, 2014. Several drilling and Legal Instrument Examiner (LIE) deficiencies were still outstanding. On September 25, 2014 BLM issued a second Post Onsite deficiency letter to address outstanding deficiencies such as surface use plan, LIE, certifications, and design deficiencies. On October 14, 2014 the operator still had outstanding LIE, Drilling, and Surface Use Plan deficiencies. On October 17, 2014 the operator answered all of the project deficiencies.

**1.2. Need for the Proposed Project**

BLM’s need for this project is to determine whether, how, and under what conditions to support the Buffalo Resource Management Plan’s (RMP) goals, objectives, and management actions with allowing the exercise of the operator’s conditional lease rights to develop fluid minerals on federal leases. BLM incorporates by reference here, the APD information (40 CFR 1502.21). Conditional fluid mineral development supports the RMP and the Mineral Leasing Act of 1920, the Federal Land Policy Management Act (FLPMA), and other laws and regulations.

**1.3. Decision to be Made**

The BLM will decide whether or not to approve the proposed development, and if so, under what terms and conditions agreeing with the Bureau’s multiple use mandate, environmental protection, and the Buffalo RMP.

**1.4. Scoping and Issues**

BLM posted the proposed APD for 30 days and will timely publish the EA, any finding, and decision on the BFO website. This project is similar in scope to other fluid mineral development the BFO analyzed. External scoping is unlikely to identify new issues, as verified with recent fluid mineral EAs that BLM

externally scoped. External scoping of the horizontal drilling in Crazy Cat East EA, WY-070-EA13-028, 2013, in the PRB area received 3 comments, revealing no new issues.

The BFO interdisciplinary team (ID team) conducted internal scoping by reviewing the proposal, its location, and a resource (issue) list (see administrative record, AR), to identify potentially affected resources, land uses, resource issues, regulations, and site-specific circumstances not addressed in the tiered analysis or other analyses incorporated by reference. The APD and associated plans as well as the AR are available for review at the BFO. This EA will not discuss resources and land uses that are not present, unlikely to receive material affects, or that the PRB FEIS or other analyses adequately addressed. This EA addresses the project’s site-specific impacts that were unknown and unavailable for review at the time of the PRB FEIS analysis to help the decision maker come to a reasoned decision. The project area is clearly lacking wilderness characteristics as it lacks public surface and is amidst mineral development.

**2. PROPOSED PROJECT AND ALTERNATIVES**

**2.1. Alternative A – No Action**

The no action alternative would deny this APD requiring the operator to resubmit an APD that complies with statutes and the reasonable measures in the PRB Record of Decision (ROD) in order to lawfully exercise conditional lease rights. The PRB FEIS considered a no action alternative, pp. 2-54 to 2-62

**2.2. Alternative B Proposed Action (Proposal)**

**Table 2.1. Well Name/#/Lease/Location:**

#	Well Name & #	TwN	Rng	Sec	Qtr	Lease #	Status
1	Doane Federal 23-27	51N	69W	27	NESW	WYW182245	APD

**Drilling, Construction and Production Design Features Include:**

- This is a wildcat well.
- There will be a reserve pit on location.
- This is a vertical well that has no horizontal lateral planned at this time.
- To access the Doane 23-27 take the Adon Road North for 3.4 miles. Go East and North on the Heptner road for 4.5 miles. Turn right (east) on private road for 2.4 miles, then continue on proposed and existing two track road for 1.2 miles to the location.

**Table 1: Planned Access Roads**

±1,080'	(0.2 miles)	Sec. 27 T51N R69W New road construction	Fee
±2,450'	(0.5 miles)	Sec. 27 T51N R69W Two-track to be upgraded	Fee
±2,390'	(0.4 miles)	Sec. 28 T51N R69W New road construction	Fee
<b>±5,920'</b>	<b>(1.1miles)</b>	<b>Total New and Upgrade Road Construction</b>	

- Running surface width to be approximately 16', total disturbed width to be no more than 40' or as agreed upon with the private surface owner. The road will be crowned and ditched, as agreed to by the private surface owner. Plans for improvement and/or maintenance of existing roads are to maintain in as good or better conditions than at present. A regular maintenance plan will include, but not be limited to blading, ditching, surfacing, and replacing damaged culverts.
- The access road will be 5,920' long with a total ROW width of 60'. Totals disturbance of the access road will be 8.15 acres See Table 1. above for further detail and footages.
- No overhead power is anticipated at this time. If the well is completed as a producer, WOC will

address overhead power at that time. Please refer to Map B of the administrative record (AR) for further detail of where the potential power will be routed. If overhead power is installed it will consist of approximately a 40ft corridor 1.7 miles (8,976ft) in length.

- The source/drilling of water will be fresh water from a reservoir in Cottonwood Creek, one mile west of the location in the SWNW/4 of Section 28. The creek should contain sufficient supplies of water for the drilling of this well. The water will be trucked along the existing two-track and newly proposed roads to the location. The anticipated volume of water to drill the well is between 8,000-10,000 bbls. A water quality analysis will be done on the water source to ensure the source meets the cement manufacturer's specifications. A copy of this report will be provided to the BLM. *Western Operating will only use a water source that will meet the cement manufacturer's specifications.*
- A production facility will be located on the wellsite. The facility will consist of a wellhead, separator, 2 oil production tanks (400 bbl capacity) and one water production tank. The oil will initially be trucked from the location pending review of the economics of running a pipeline. Measurement of the oil will be accomplished via daily tank gauges in strapped tanks. In the event the well produces water, the water will be hauled to a nearby approved, permitted, disposal facility. No gas production is anticipated because the Minnelusa formation does not have measurable associated gas production with the oil. Berms will be constructed around the tanks and separator and the capacity of the berm will be 110% of the largest vessel independent of the back cut.

For a detailed description of design features and construction practices associated with the proposed project, refer to the surface use plan (SUP) and drilling plan included with the APD. Also see the APD for maps showing the proposed well location and associated facilities described above.

Additionally, the operator, in their APD, committed to:

- Comply with the approved APD, applicable laws, regulations, orders, and notices to lessees.
- Obtain necessary permits from agencies.
- Offer water well agreements to the owners of record for permitted wells.
- Incorporate measures to alleviate resource impacts in their submitted surface use and drilling plans.
- Certify it has a surface access agreement with the landowners.

**Table 2.2. Drilling Disturbance Summary for Doane Federal 23-27 well/pad:**

Facility	Number or Miles	Factor	Disturbance
Engineered Pad/ Spoils and Topsoil piles	Varies (see design)	43,560 sq ft	4.08 acres
New Proposed Roads			8.15 acres
Proposed Overhead Power	1.7miles X 40ft	43,560 sq ft	8.24 acres
<b>Total Surface Disturbance</b>			<b>20.47 acres</b>

**Table 2.3. Interim Disturbance Summary for Doane Federal 23-27 well/pad/access:**

Facility	Number or Miles	Factor	Disturbance
Engineered Pad Interim Design	Varies (see design)	Varies (see design)	2.90 acres
New Proposed Roads	5,290ft	16ft running surface + borrow ditches(8ft each) total of 32ft	3.89 acres
Proposed Overhead Power	1.7miles X 40ft	43,560 sq ft	8.24 acres
<b>Total Surface Disturbance</b>			<b>15.03 acres</b>

### **2.3. Conformance to the Land Use Plan and Other Environmental Assessments**

This proposal does not diverge from the goals and objectives in the Buffalo Resource Management Plan (RMP), 1985, and generally conforms to the terms and conditions of that land use plan, its amendments, supporting FEISs, 1985, 2003 (2011), and laws including the Clean Air Act, 42 USC 7401-7671q (2006), the Clean Water Act, 33 USC 1251 et seq. (1972), etc.

## **3. AFFECTED ENVIRONMENT**

This section briefly describes the physical and regulatory environment that may be affected by the alternatives in Section 2, or where changes in circumstances or regulations occurred since adoption of analyses to which the EA tiers or incorporates by reference. The PRB FEIS considered a no action alternative (pp. 2-54 to 2-62) in evaluating a development of up to 54,200 fluid mineral wells. Nearly all of the PRB's coalbed natural gas (CBNG) wells and over 60% of the deep oil and gas wells are hydraulically fractured; BLM and Goolsby 2012. The BLM uses the aggregated effects analysis approach incorporating by reference the circumstances and developments approved via the subsequent NEPA analyses for adjacent and intermingled developments coincident to proposal area to retain currency in the no action alternative. 615 F. 3d 1122 (9th Cir. 2010). The total number of conventional wells in the Buffalo planning area is 1313, which includes 783 horizontal wells (federal, fee, and state) (as of April 2013). This represents 41% of the projected 3,200 in the 2003 PRB ROD. This agrees with the PRB FEIS which analyzed the reasonably foreseeable development of 51,000 CBNG and 3,200 natural gas and oil wells.

### **3.1. Air Quality**

Refer to the PRB FEIS pp. 3-291 to 3-299, for a 2003-era description of the air quality conditions. BLM incorporates by reference, Update of Task 3A Report for the Powder River Basin Coal Review Cumulative Air Quality Effects for 2020, BLM (AECOM), 2009, (Cumulative Air Quality Effects, 2009) as it captures the cumulative air quality effects of present and projected PRB fluid and solid mineral development. PRB coal review documents are available at [http://www.blm.gov/wy/st/en/programs/energy/Coal\\_Resources/PRB\\_Coal/prbdocs.html](http://www.blm.gov/wy/st/en/programs/energy/Coal_Resources/PRB_Coal/prbdocs.html).

The Environmental Protection Agency (EPA) established ozone standards in 2011. Existing air quality in the PRB is "unclassified/attainment" with all ambient air quality standards. It is also in an area that is in prevention of significant deterioration zone. PRB air quality is a rising concern due to ozone in the oil and gas producing Upper Green River Basin that became one of the nation's 40 "nonattainment" zones for ozone in 2012; in addition to PRB-area air quality alerts issued in 2011-2014 for particulate matter (PM), attributed to coal dust. Four sites monitor the air quality in the PRB: Cloud Peak in the Bighorn Mountains, Thunder Basin northeast of Gillette, Campbell County south of Gillette, and Gillette. In addition, the Wyoming Air Resource Monitoring System (WARMS) measures meteorological parameters from 9 sites throughout the State, and particulate concentrations from 5 of those sites, monitors speciated aerosol (3 locations), and evapotranspiration rates (1 location). The sites monitoring air quality for the Powder River Basin are located at Sheridan, South Coal Reservoir, Buffalo, Fortification Creek, and Newcastle. The northeast Wyoming visibility study is ongoing by the Wyoming Department of Environmental Quality (WDEQ). Sites adjacent to the Wyoming PRB-area are at Birney on the Tongue River 24 miles north of the Wyoming-Montana border, Broadus on the Powder River in Montana, and Devils Tower. Adgate, et al. (2014) advanced a hypothesis that air and water quality effects from HF may negatively impact human health but concluded that there were "major uncertainties" and a "paucity of baseline data" after drilling 153,260 wells since 2004. They called for more research funding. Existing air pollutant emission sources in the region include:

- Exhaust emissions (primarily CO and nitrogen oxides (NOx)) from existing natural gas fired compressor engines used in production of natural gas and CBNG; and, gasoline and diesel vehicle tailpipe emissions of combustion pollutants;

- Particulate matter (PM), dust, generated by vehicle travel on unpaved roads, windblown dust from neighboring areas, road sanding during the winter months, coal mines, and trains;
- Transport of air pollutants from emission sources located outside the region;
- NOx, PM, and other emissions from diesel trains and,
- SO2 and NOx from power plants.

### 3.2. Soils, Ecological Sites, and Vegetation

Project area soils developed in alluvium and residuum derived mainly from the Wasatch Formation. Lithology consists of light to dark yellow and tan siltstone and sandstones with minor coal seams resulting in a wide variety of surface and subsurface textures. The project area soil depths vary from 3 - 6” on the ridge top to shallow on the steeper slopes. Reclamation potential of soils also varies in the project area. The main soil limitations include: depth to bedrock, low organic matter content, and high erosion potential especially in areas of steep slopes.

The Campbell County Survey Area, Wyoming Soil Survey Geographic (SSURGO) Database WY605, provide detailed soils identification and data. NRCS performed the soil survey according to National Cooperative Soil Survey standards. The BLM uses county soil survey information to predict soil behavior, limitations, or suitability for a given activity or action. The agency’s long term goal for soil resource management is to maintain, improve, or restore soil health and productivity, and to prevent or minimize soil erosion and compaction. Soil management objectives are to ensure that adequate soil protection is consistent with the resource capabilities. Soils and landforms of this area may present distinct challenges for development, and/or eventual site reclamation. Dominant/Important Soils/Ecological sites in the affected area are loamy soils. The major ecological site for the project is shallow clayey.

**Table 3.1. Soils and Ecological Sites**

Well Name & No. Pad	Map Unit Name	Ecological Site
Doane Federal 23-27	254:Badland-Lismas complex, 15-75% slopes	15-17 NP Shallow Clayey

### 3.3. Ecological Sites and Vegetation

The elevations range from 4,200-4,500 feet in the project area. Livestock grazing is the predominant land use in the area as well as oil and gas development. The project area is comprised primarily of a Shallow Clayey ecological site and the major plant community identified in the project area is Mixed Sagebrush/Grass Plant Community. This site occurs on ridges on uplands, hills on uplands. The parent material consists of residuum weathered from acid shale. Depth to bedrock is 10-20 inches. The natural drainage class is well drained. Shrink swell factor potential is very high. The main soil limitations include: low organic matter (2%) content and soil droughtiness. The low annual precipitation should be considered when planning a seeding.

#### Mixed Sagebrush/Grass Plant Community

This mixed sagebrush/grass community is under moderate, season-long livestock grazing. Wyoming big sagebrush is a significant component of this plant community. Cool-season grasses make up the majority of the understory with the balance made up of short warm-season grasses, annual cool-season grasses, and miscellaneous forbs. Dominant grasses may include needleandthread, western wheatgrass, and green needlegrass. Grasses of secondary importance include blue grama, prairie junegrass, and Sandberg bluegrass. Forbs commonly found in this plant community include plains wallflower, hairy goldaster, slimflower scurfpea, and scarlet globemallow. Sagebrush canopy ranges from 20% to 30%. Fringed sagewort is commonly found. Plains pricklypear also occurs.

When compared to the Historic Climax Plant Community, sagebrush and blue grama have increased. Production of cool-season grasses, particularly green needlegrass, has been reduced. The sagebrush canopy protects the cool-season mid-grasses, but this protection makes them unavailable for grazing. Cheatgrass (downy brome) has invaded the site. The overstory of sagebrush and understory of grass and forbs provide a diverse plant community that will support domestic livestock and wildlife such as mule deer and antelope. This plant community is resistant to change. A significant reduction of big sagebrush can only be accomplished through fire or brush management. The herbaceous species present are well adapted to grazing; however, species composition can be altered through long-term overgrazing. If the herbaceous component is intact, it tends to be resilient if the disturbance is not long-term.

During the onsite blue bunch wheatgrass, needle and thread, phlox, and Wyoming big sagebrush were identified.

### **3.4. Water Resources**

WDEQ regulates Wyoming's water quality with EPA oversight. The Wyoming State Engineer's Office (WSEO) has authority for regulating water rights issues and permitting impoundments for the containment of the State's surface waters.

#### **3.4.1. Groundwater**

A search of the WSEO Ground Water Rights Database showed 2 registered stock and domestic water wells within 1 mile of the proposed well with depths from 390 to 400 feet. Refer to the PRB FEIS for additional information on groundwater, pp. 3-1 to 3-36. In the PRB, the Fox Hills formation is the deepest fresh water aquifer which merits specific attention. In this area, the depth to the Fox Hills is 1,979 feet.

#### **3.4.2. Surface Water**

The project area is in the Hamm drainage which is a tributary to the Little Powder River. Most of the area drainages are ephemeral (flowing only in response to a precipitation event or snow melt) to intermittent (flowing only at certain times of the year when it receives water from alluvial groundwater, springs, or other surface source – PRB FEIS, Glossary). The channels are primarily well vegetated grassy swales, without defined bed and bank. See generally the PRB FEIS for a surface water quality discussion, pp. 3-48 to 3-49.

### **3.5. Wetlands/Riparian**

The Doane Federal 23-27, is located on an upland site and access by existing roads also located in uplands. No wetland or riparian habitats are impacted by this project.

### **3.6. Invasive or Noxious Species**

Cheatgrass (*Bromus tectorum*) and to a lesser extent, Japanese brome (*B. japonicus*) exist in the affected environment. These species are found in high densities and numerous locations throughout NE Wyoming. Balch, 2013, linked the proliferation of cheatgrass in semi-arid environments to the increased frequency and severity of wildfire.

### **3.7. Fish and Wildlife**

The PRB FEIS identified wildlife species occurring in the PRB, pp. 3-113 to 3-206. Grouse Mountain Environmental Consultants performed wildlife surveys for federally listed species, migratory birds and BLM Sensitive Species. The wildlife report is on file at the Buffalo BLM office. Site specific information is described below for species suspected to be impacted beyond the analysis of the PRB FEIS 2003. Rationale for species not discussed in detail below can be referenced in the administrative record (Table W.1., Summary of Sensitive Species Habitat and Project Effects and Table W.2., Summary of Threatened and Endangered Species Habitat and Project Effects).

Land uses and other disturbances occurring within the proposed project include livestock grazing, ranching, dryland agriculture, overhead power lines, conventional oil and gas, and improved and unimproved roads. Habitats within the proposal are comprised of sagebrush grassland, pine breaks, and mixed-grass prairie.

### **3.7.1. Special Status Species (SSS): Threatened, Endangered, Candidate, Sensitive Species**

#### **3.7.1.1. Candidate Species – Greater Sage-Grouse (GSG)**

The affected environment for this proposal is similar to a recently approved BLM project (Sahara POD). Therefore, the Sahara POD EA, WY-070-EA13-72 analysis is incorporated here by reference: Affected Environment (Section 3.7.4.1, p.18-19). Nesting and brooding GSG habitat exists within the proposal area. Grouse Mountain completed sage-grouse surveys on May 1 and May 7 2014. In addition to looking for lekking birds, they searched suitable habitat within 0.25 miles of the pad for indications of grouse use. No birds or sign were reported. No known leks occur within 2 mile of the proposed well pad.

#### **3.7.1.2. Raptors**

The proposal area includes suitable nesting and foraging habitats for tree nesting raptors. Grouse Mountain found 2 inactive nests within 0.5 miles of the proposed well pad. Both nests are out of line of sight and have an adequate biological buffer for well operations. (a biologic buffer is a combination of distance and visual screening that provides nesting raptors with security such that they will not be flushed by routine activities).

#### **3.7.1.3. Migratory Birds**

The PRB FEIS discussed the affected environment for migratory birds, pp. 3-150 to 3-153. A wide variety of migratory birds may occur in the proposal area at some point during the year. Migratory birds are birds that migrate for breeding and foraging at some point in the year. The BLM-Fish and Wildlife Service (FWS) Memorandum of Understanding (MOU) (2010) promotes the conservation of migratory birds, complying with Executive Order 13186 (Federal Register V. 66, No. 11). BLM must include migratory birds in every NEPA analysis of actions that have potential to affect migratory bird species of concern to fulfill obligations under the Migratory Bird Treaty Act (MBTA). The MBTA (and Bald and Golden Eagle Protection Act (BGEPA)) are strict liability statutes so require no intent to harm migratory birds through prosecuting a taking. Recent prosecutions or settlements in Wyoming, and the west, cost companies millions of dollars in fines and restitution (which was usually retrofitting power lines to discourage perching to minimize electrocution or shielding ponds holding toxic substances). BLM encourages voluntary design features and conservation measures supporting migratory bird conservation, in addition to appropriate restrictions.

Nationally, grassland and shrubland birds declined more consistently than any other ecological association of birds over the last 30 years (WGFD 2009). The FWS's Birds of Conservation Concern (BCC 2008) report identifies species of all migratory nongame birds that, without additional conservation actions, are likely to become candidates for listing under the Endangered Species Act. Species in this list that have the potential to occur in the project area are: Brewer's sparrow, sage thrasher, loggerhead shrike, short-eared owl, and grasshopper sparrow. Of these, Brewer's sparrow, sage thrasher, sage sparrow, Baird's sparrow, and loggerhead shrike are BLM WY Sensitive Species (PRB FEIS WY-070-02-065, pp 3-189).

Habitats occurring near the proposed well location include sage-brush steppe grasslands, mixed grass prairie, and mature deciduous trees. Habitat quality is suitable for migratory birds at the well pad; however, suitability for BLM sensitive species is low, and the probability of nesting in the proposed well pad area is low.

### 3.8. Cultural Resources

In accordance with section 106 of the National Historic Preservation Act, BLM must consider impacts to historic properties (sites that are eligible for or listed on the National Register of Historic Places (NRHP)). For an overview of cultural resources that are generally found within BFO the reader is referred to the *Draft Cultural Class I Regional Overview, Buffalo Field Office* (BLM, 2010). A Class III (intensive) cultural resource inventory (BFO project no. 700140086) was performed in order to locate specific historic properties which may be impacted by the proposed project. The following resources are located in or near the proposed project area.

#### Cultural Resources Located In or Near the Project Area

Site Number	Site Type	NRHP Eligibility
48CA4330	Prehistoric	NE
48CA7196	Historic	NE

## 4. ENVIRONMENTAL EFFECTS

**No Action Alternative.** BLM analyzed the no action alternative as Alternative 3 in the PRB FEIS and it subsequently received augmentation of the effects analysis in this EA through the analysis of mineral projects, their approval, and construction; and through the analysis and approval of other projects. This updated the no action alternative and cumulative effects. Under the no action alternative, on-going well field operations would continue as would the development of fee wells. The production and the drilling and completion of these new wells would result in noise and human presence that could affect resources in the project area; these effects could include the disruption of wildlife, the dispersal of noxious and invasive weed species, and dust effects from traffic on unpaved roads. Present fluid mineral development in the PRB is under half of that envisioned and analyzed in the PRB FEIS. There is only a remote potential for significant effects above those identified in the PRB FEIS to resource issues as a result of implementing the no action alternative.

### Alternative B, Proposed Action (Proposal)

#### 4.1. Air Quality

In the project area, air quality impacts would occur during construction (due to surface disturbance by earth-moving equipment, vehicle traffic fugitive dust, well testing, as well as drilling rig and vehicle engine exhaust) and production (including well production equipment, booster and pipeline compression engine exhaust). The amount of air pollutant emissions during construction would be controlled by watering disturbed soils, and by air pollutant emission limitations imposed by applicable air quality regulatory agencies. BLM incorporates by reference the analysis found in the August 2012 Lease Sale EA, WY-070-EA12-44, pp. 45-51 (air quality, greenhouse gas emissions, and visibility). Air quality impacts modeled in the PRB FEIS and Cumulative Air Quality Effects, 2009 concluded that PRB projected fluid and solid development would not violate state, tribal, or federal air quality standards and this project is well within the projected development parameters.

#### 4.2. Soils, Ecological Sites, and Vegetation

##### 4.2.1. Soils and Vegetation

##### 4.2.1.1. Direct and Indirect Effects

The PRB FEIS analyzed direct and indirect impacts to soils associated with fluid mineral development. For these effects refer to p. 4-134-149 of the PRB EIS.

### **Construction Activities**

The greatest impacts to the soil resources associated with this project would occur with the construction of the well pad and road upgrades. Construction of these requires grading and leveling, with the greatest level of effort required on more steeply sloping areas. These impacts would begin immediately as the soils would be subjected to grading and construction activities and impacts would continue for the term of operations. The duration and intensity of these impacts would vary according to the type of construction activity to be completed and the inherent characteristics of the soils to be impacted.

The proposed APD requires 20.47 acres total disturbance to safely drill the proposed well. During the construction and drilling phase of the project, the operator plans to maintain cut and fill slopes at 1½:1(67%), 2:1(50%) slopes. These constructed slopes will be bare ground void of vegetation thus identified as highly erosive due to water erosion, and the total 20.47 acres site is classified as highly erosive for wind erosion. The predicted construction cut depth exceeds the identified soil depth, thus impacting soil horizons described as “little affected by pedogenic processes”, or unaltered parent material. The physical and chemical properties of this material may be variable and limiting in its potential to support plant growth, variable in erosion potential and suitability for construction material. The 4.08 acre engineered pad area would be defined as an Low Recalamation Potential (LRP) area per Wyoming Reclamation Policy, and p. 4-143 and 4-149 of the PRB-EIS.

The well pad will be reduced to 2.90 acres of disturbance at interim reclamation for the production phase. See Exhibit IX for an illustration of the well pad reduction as per Onshore Oil and Gas Order Number 1 Surface Use Plan of Operations. Cut slopes and fill slopes will be maintained at 2:1 and 3:1 respectively as per standard conditions of approval. Road running surface is 16 feet with the remaining right-of-way (ROW) to be re-contoured and seeded. The operator committed measures and attached mitigation measures listed below this section reduce the potential impacts to the soil resource to levels described in the PRB-FEIS.

Changes in soil productivity would depend on the success of the stabilization and interim reclamation efforts. The replaced soil could support stable and productive vegetation adequate in quantity and kind to support the post disturbance land uses- wildlife habitat and rangeland. After reclamation (interim and final), the soils would be unlike the predisturbance soils in structure, horizon, bulk density, and chemical composition. The new soils would be more uniform in type, thickness and texture than the predisturbance soils. The soil-forming processes would be disturbed, resulting in the alteration of soil characteristics and, consequently, the taxonomic classification of the soils. Productivity capabilities, biologic activity, and nutrient content also would be affected.

#### **4.2.1.2. Cumulative Effects**

The PRB FEIS defined the duration of disturbance, pp. 4-1 and 4-15. The impacts to the soil resource described in the direct and indirect effects section could be minimized by reducing initial surface disturbance, successful site stabilization and maximum interim reclamation, as committed to by the operator in their POD Surface Use Plan and as required by the BLM in COAs. (Total initial and long term disturbance) PRB-FEIS 4-134. Most of the disturbance associated with the construction of well pads would be short term. See Sheet 5 of 5 in the MSUP for production phase pad design (interim reclamation phase), and section 4.4.2.

#### **4.2.1.3. Mitigation Measures**

The operator will reduce impacts to vegetation and soils from surface disturbance by following its plans (MSUP, and (design features, engineered designs), Storm Water Pollution Prevention Plan (SWPPP) requirements, reclamation plan and the BLM Wyoming Reclamation Policy). These practices, as well as other approved mitigation measures will result in less surface disturbance and environmental impacts. In addition the following site specific COAs will be added as mitigation.

1. The entire access road must be fully upgraded (including all water control structures such as wing ditches, culverts, relief ditches, turnouts, surfacing, etc.) and functional to BLM standards prior mobilizing the drilling equipment to the well location.
2. Re-contouring and interim reclamation will be initiated as soon as is practicable but not more than 6 months from the date of the well completion incorporating stored soil material into that portion of the well pad not needed for well production; exception(s) may be granted with sufficient justification.
3. Soil compaction will be remediated on all compacted surfaces and prior to the redistribution of topsoil on disturbed surfaces to the depth of compaction by methods that prevent mixing of the soil horizons. BLM's recommended methods are subsoiling, paraplowing, or ripping with a winged shank. Scarification is acceptable on areas identified as very shallow or shallow soils.
4. The production facility for this location is not approved with this APD. The operator must submit a new production design that maximizes interim reclamation, i.e. the production tanks placed near the road entrance.

#### **4.2.1.4. Residual Effects**

The PRB FEIS identified residual effects (p. 4-408). Residual effects across the project area would include a long-term loss of soil productivity associated with well pads and roads. Alteration of soils would result in the formation of new soil with different properties. Post disturbance productivity should be similar to predisturbance. In spite of the above residual effects, the BLM considers that Alternative B is within the parameters for surface disturbance and surface disturbance reclamation in PRB FEIS ROD.

### **4.2.2. Vegetation and Ecological Sites**

#### **4.2.2.1. Direct and Indirect Effects**

The PRB FEIS discusses direct and indirect effects to ecological sites and vegetation (p. 4-153 to 4-164). The proposed action would impact the existing plant communities, species richness, diversity, and structure that occur on the site and the transition between the communities. Other impacts anticipated to occur include those in the direct and indirect effects listed above under soils section. Direct effects to ecological sites would occur from ground disturbance caused by construction practices. Short term effects would occur where vegetated areas are disturbed but later reclaimed as soon as practical from initial disturbance. Long-term effects would occur where well pads, roads, and other semi-permanent facilities, resulting in loss of vegetation and prevent reclamation for the life of the project. Other impacts include a reduction in the utility of interim reclaimed areas because of reduced species and landscape diversity on reclaimed sites, increased soil erosion, and habitat loss for wildlife and livestock.

#### **4.2.2.2. Cumulative Effects**

The PRB FEIS discusses the cumulative effects to ecological sites (pp. 4-153 to 4-172). Cumulative effects to ecological sites include the further alteration of disturbance regimes from the increased disturbance, increase in noxious weeds, and alterations in vegetation community's diversity and cover.

#### **4.2.2.3. Mitigation Measures**

Implementation of operator's MSUP (specifically Plans for Reclamation of the Surface), agreed to COAs, and mitigation measures described in the operator's Integrated Weed and Pest Management Plan will reduce surface disturbance impacts to ecological sites and vegetation. See the administrative record.

#### **4.2.2.4. Residual Effects**

Residual effects were also identified in the PRB FEIS, p. 4-408. Including loss of vegetative cover during construction, interim reclamation and long-term on well location and access road. The potential spread and establishment of weeds, and alteration of species biodiversity until successful final reclamation. Successful interim reclamation should create a stable functioning ecosystem that prepares the site for eventual final reclamation, which would reduce the residual effects of the proposed action.

### **4.3. Water/Groundwater Resources**

WOC's drilling program provides additional protection for the Fox Hill formation. The casing design and cement program includes centralizers on every joint of casing to facilitate adequate cement covering. The volume of cement pumped is calculated to provide cement across the Fox Hill from 100 feet above to 100 feet below the aquifer. Adherence to the drilling COAs, the setting of casing at appropriate depths, following safe remedial procedures in the event of casing failure, and using proper cementing procedures should protect fresh water aquifers above the drilling target zone. The operator will set surface casing at 500 feet to provide additional protection for shallow groundwater aquifers and coal zones. Compliance with the drilling and completion plans and Onshore Oil and Gas Orders Nos. 2 and 7 minimize an adverse impact on ground water. The volume of water produced by this federal mineral development is unknowable at the time of permitting.

#### **4.3.1. Cumulative Effects**

WOC will have to produce the well for a time to be able to estimate the volume and quantity of water production. To comply with Onshore Order Oil and Gas Order No. 7, Disposal of Produced Water, WOC will submit a Sundry to the BLM within 90 days of first production which includes a representative water analysis and the final proposal for water management. The quality of water produced in association with conventional oil and gas historically was such that surface discharge would not be possible without treatment. Initial water production is quite low in most cases. There are 3 common alternatives for water management: re-injection, deep disposal, or disposal into pits. All alternatives would be protective of groundwater resources when performed in compliance with state and federal regulations.

#### **4.3.2. Mitigation Measures**

Adherence to the drilling COAs, the setting of casing at appropriate depths, following safe remedial procedures in the event of casing failure, and utilizing proper cementing procedures would protect fresh water aquifers above the target coal zone. Adherence to WDEQ permits and regulations will also mitigate impacts from produced water. This will ensure that groundwater will not be adversely impacted by well drilling and completion operations.

#### **4.3.3. Residual**

No residual effects are anticipated.

### **4.4. Invasive Species**

#### **4.4.1. Direct and Indirect Effects**

The operator committed to the control of noxious weeds and species of concern using the following measures identified in their Integrated Pest Management Plan (IPMP): 1) Control Methods; 2) Preventive practices; and 3) Education. Cheatgrass (*Bromus tectorum*) and to a lesser extent, Japanese brome (*B. japonicus*) exist in the affected environment. The use of existing facilities along with the surface disturbance associated with construction of proposed access roads, pipelines, and related facilities would present opportunities for weed invasion and spread. The activities related to the performance of the proposed project would create a favorable environment for the establishment and spread of noxious weeds/invasive plants such as salt cedar, Canada thistle, and perennial pepperweed. However, applicant committed measures will reduce potential impacts from noxious weeds and invasive plants.

#### **4.4.2. Cumulative Effects**

Cumulative effects resulting from noxious and invasive weed species are discussed in the PRB FEIS, p. 4-171

#### **4.4.3. Mitigation**

Successful reclamation through application of the operator's reclamation plans will discourage establishment of invasive species during operations. In addition, measures incorporated into the

programmatic COAs listed in the COA document will further mitigate the potential spread and establishment of weed species. The operator will be responsible for prevention and control of noxious weeds and weeds of concern on all areas of surface disturbance associated with this project (well locations, roads, water management facilities, etc.). Use of pesticides shall comply with the applicable federal and state laws.

#### **4.4.4. Residual Effects**

Control efforts by the Operator would be limited to the surface disturbance associated the construction and operation of the project. Cheatgrass and other weed species that are present within non-physically disturbed areas of the project area are anticipated to continue to spread unless control efforts are expanded. Cheatgrass and to a lesser extent, Japanese brome (*Bromus japonicus*) are found in high densities and numerous locations throughout northeast Wyoming. Efforts are being made by BLM, USDA, WGFD and other partners at some small infestation areas are being treated but for the most part,

### **4.5. Fish and Wildlife**

#### **4.5.1. Greater Sage-grouse**

Effects (Direct and indirect, Cumulative, Mitigation, and Residual) to GSG from surface disturbing and disruptive activities associated with development of oil wells were analyzed in the Sahara POD EA, WY-070-EA13-72, 2013, Section 4.6.4.1, pp. 34-37, incorporated here by reference. Activities associated with development of this project are anticipated to be similar in nature, with the following additional site-specific information.

The proposal area contains marginal nesting habitat. Noise and human disturbance associated with roads, construction, drilling, and completion may be disruptive to GSG. Implementation of the project has a low probability of adversely impact nesting through direct loss of suitable habitats and avoidance of the area by GSG due to fragmentation and anthropogenic activity.

##### **4.5.1.1. Cumulative Effects**

Cumulative effects to GSG from surface disturbing and disruptive activities associated with development of oil wells were analyzed in the Sahara POD EA, WY-070-EA13-72, 2013, Section 4.6.4.1.2, pp. 36-37, incorporated here by reference.

##### **4.5.1.2. Mitigation Measures**

None. There are no known leks within 2 miles.

##### **4.5.1.3. Residual Effects**

Noise and human disturbance resulting from completion, maintenance, and production activities may impact GSG nesting in the area for the life of the project. The impact of the proposed development cumulatively contributes to the potential for local GSG extirpation. Alternative B is consistent with current BLM and Wyoming GSG conservation strategies and the anticipated effects are within the parameters of the PRB FEIS/ROD. Current research does not identify specific components of energy development that measurably decrease impacts to GSG or their habitats. Even in areas where a variety of mitigation measures were applied, negative population impacts were still measurable when well density exceeded 1 well per square mile. Management of energy development based on current core area configurations and associated lease stipulations, conditions of approval, and best management practices (BMPs), may not be sufficient to protect the population viability of PRB GSG.

#### **4.5.2. Raptors**

##### **4.5.2.1. Direct and Indirect Effects**

The two raptor nests within 0.5 miles of the well pad were inactive in 2014, the only survey year for the area. The probability of nesting occurring at these nest locations is unknown based on limited surveys.

The topographic relief will provide a sufficient buffer for operations. Construction and drilling may be disruptive if these nests are active.

#### **4.5.2.2. Cumulative Effects**

The cumulative effects associated with Alternative B are within the analysis parameters and impacts described in the PRB FEIS, Volume 2, Chapter 4, p. 4-221. Existing and reasonably foreseeable development in the PBR may affect the raptor population due to increased human activity and fragmentation of habitat.

#### **4.5.2.3. Mitigation Measures**

The following conditions will alleviate impacts to raptors:

1. No surface disturbing activity shall occur within 0.5 mile of identified raptor nests from February 1 through July 31, annually, prior to a raptor nest occupancy survey. This COA will apply to the proposed well and road construction in Section 27.
  - a. Surveys to document nest occupancy shall be conducted by a biologist, following the most current BLM protocol, between April 15 and June 30. All survey results shall be submitted in writing to a Buffalo BLM biologist and approved prior to surface disturbing activities. A 0.5 mile timing restriction will be applied if a nest is identified as active.
  - b. Surveys for new raptor nests shall be conducted during the construction phase of the project and 5 years following completion of the project within the POD. Surveys shall occur throughout the entire POD and 0.5 mile outside of the POD boundary between April 15 and June 30, and prior to or during the first nest occupancy check. A seasonal timing restriction (February 1 through July 31) will be added to surface disturbing activities within 0.5 miles of any newly discovered nests.
2. If an undocumented raptor nest is located during project construction or operation, the Buffalo Field Office (307-684-1100) shall be notified within 24 hours.

#### **4.5.2.4. Residual Impacts**

None.

### **4.5.3. Migratory Birds**

#### **4.5.3.1. Direct and Indirect Effects**

The PRB FEIS discussed direct and indirect effects to migratory birds on pp. 4-231 to 4-235. BLM analyzed the effects to migratory birds from surface disturbing and disruptive activities associated with development of horizontal oil wells in the Sahara POD EA, WY-070-EA13-72, 2013, Section 4.6.2.2, pp. 31-33, incorporated here by reference. Effects and mitigation associated with this project are similar in nature, with the following additional site-specific information. BLM identified marginally suitable nesting habitat for BLM sensitive sagebrush obligates on the well pad.

Heater treaters, and similar facilities with vertical open-topped stacks or pipes, can attract birds. Facilities without exclusionary devices pose a mortality risk. Once birds crawl into the stack, escape is difficult and the bird may become trapped (U.S. v. Apollo Energies Inc., 611 F.3d 679 (10th Cir. 2010); see also Colorado Oil and Gas Commission, Migratory Bird Policy, accessed February 13, 2012).

#### **4.5.3.2. Cumulative Effects**

The cumulative effects within the analysis parameters and impacts described in the PRB FEIS, p. 4-235.

#### **4.5.3.3. Mitigation Measures**

The operator will equip all open-top pits, tanks, and pipes containing hydrocarbons with nets, screens, or other avian exclusion devices to prevent injury or death to migratory birds.

#### **4.5.3.1. Residual Impacts**

None identified.

### **4.6. Cultural Resources**

#### **4.6.1. Direct and Indirect Effects**

BLM policy states that a decision maker's first choice should be avoidance of historic properties (BLM Manual 8140.06(C)). If historic properties cannot be avoided, mitigation measures must be applied to resolve the adverse effect. No historic properties will be impacted by the proposed project. Following the State Protocol Between the Wyoming Bureau of Land Management State Director and The Wyoming State Historic Preservation Officer, Section V(E)(iv), the Bureau of Land Management electronically notified the Wyoming State Historic Preservation Officer (SHPO) on 9/26/14 that no historic properties exist within the area of potential effect (APE). If any cultural values (sites, features or artifacts) are observed during operation, they will be left intact and the Buffalo Field Manager notified. If human remains are noted, the procedures described in Appendix L of the PRB FEIS must be followed. Further discovery procedures are explained in Standard COA (General)(A)(1) and in Appendix K of the Wyoming Protocol.

#### **4.6.2. Cumulative Effects**

Construction and development of oil and gas resources impacts cultural resources through ground disturbance, unauthorized collection, and visual intrusion of the setting of historic properties. This results in fewer archaeological resources available for study of past human life-ways, changes in human behavior through time, and interpreting the past to the public. Additionally, these impacts may compromise the aspects of integrity that make a historic property eligible for the National Register of Historic Places. Recording and archiving basic information about archaeological sites and the potential for subsurface cultural materials in the proposed project area serve to partially mitigate potential cumulative effects to cultural resources.

Fee actions constructed in support of federal actions can result in impacts to historic properties. Construction of large oil and gas developments on split estate often include associated infrastructure that is not permitted through BLM. Project applicants may connect wells draining fee minerals, or previously constructed pipelines on fee surface with a federal plan of development. BLM has no authority over such development which can impact historic properties. BLM has the authority to modify or deny approval of federal undertakings on private surface, but that authority is limited to the extent of the federal approval. Historic properties on private surface belong to the surface owner and they are not obligated to preserve or protect them. The BLM may go to great lengths to protect a site on private surface from a federal undertaking, but the same site can be legally impacted by the landowner at any time. The cumulative effect of numerous federal approvals can result in impacts to historic properties. Archeological inventories reveal the location of sites and although the BLM goes to great lengths to protect site location data, information can potentially get into the wrong hands. BLM authorizations that result in new access can inadvertently lead to impacts to sites from increased visitation by the public.

#### **4.6.3. Mitigation Measures**

If operators observe any cultural values [sites, artifacts, human remains (Appendix L PRB FEIS and ROD)] during operation of this lease/permit/right-of-way, they will be left intact and the Buffalo Field Manager notified. Standard COA (General)(A)(1) further explains discovery procedures.

#### **4.6.4. Residual Effects**

During the construction phase, there will be numerous crews working across the project area using heavy construction equipment without the presence of archaeological monitors. Due to the extent of work and the surface disturbance caused by large vehicles, it is possible that unidentified cultural resources can be

damaged by construction activities. The increased human presence associated with the construction phase can also lead to unauthorized collection of artifacts or vandalism of historic properties.

## 5. CONSULTATION/COORDINATION:

### BLM Consulted or Coordinated with the Following on this Analysis; OSP (Onsite Presence):

Contact	Organization	OSP?
Doug Swanson	Permit Agent	yes
Jake Sinner	Surface Owner	yes

### List of Preparers (BFO unless otherwise noted)

Position/Organization	Name	Position/Organization	Name
NRS/Team Lead	Andy Perez	Archaeologist	Seth Lambert
Supr NRS	Casey Freise	Wildlife Biologist	Bill Ostheimer
Petroleum Engineer	Will Robbie	Geologist	Kerry Aggen
LIE	Karen Klaahsen	Assistant Field Manager	Chris Durham
Supr NRS ( Resources)	Bill Ostheimer	NEPA Coordinator	Tom Bills

## 6. References and Authorities

- Adgate, J.L., Goldstein, B.D., and McKenzie, L.M., Potential Public Health Hazards, Exposures and Health Effects from Unconventional Natural Gas Development, Environ, Sci. and Tech., Am. Chem. Soc., 2014.
- AHPIS, Animal and Plant Health Inspection Service. 2002. General information available online at <http://www.aphis.usda.gov/lpa/issues/wnv/wnv.html>.
- American Water Works Association. 2013. Water and Hydraulic Fracturing, a White Paper. [www.awwa.org/fracturing](http://www.awwa.org/fracturing). Denver, CO. 17pp.
- Balch, J.K, B.A. Bradley C.M D'Antonio, and J. Gomez-Dans. 2013. Introduced Annual Grass Increases Annual Fire Activity Across the Arid West (1980-2009). Global Change Biology. 19-1, pp. 173-183. <http://onlinelibrary.wiley.com/doi/10.1111/gcb.12046/abstract>.
- BLM 2010 Draft Cultural Class I Regional Overview. Prepared by the U.S. Department of the Interior, Bureau of Land Management, Buffalo Field Office. On file at the Bureau of Land Management, Buffalo Field Office
- Bradley, B. A., J. F. Mustard. 2006. Characterizing the Landscape Dynamics of an Invasive Plant and Risk of Invasion Using Remote Sensing. Ecological Applications, 16(3), pp. 1132-1147.
- Chapman, S.S., Bryce, S.A., Omernik, J.M., Despain, D.G., ZumBerge, J., and Conrad, M. 2004. Ecoregions of Wyoming (color poster with map, descriptive text, summary tables, and photographs). Reston, Virginia, U.S. Geological Survey (map scale 1:1,400,000).
- Curtis, Jan and K. Grimes. 2004. Wyoming Climate Atlas. Wyoming Water Research Program, University of Wyoming; the U.S. Geological Survey; and the Wyoming Water Development Commission. 328 pp. <http://www.wrds.uwyo.edu/sco/climateatlas/toc.html>.
- Duniway, M.C. J. E. Herrick, D. A. Pyke, and D. P. Toledo. 2010. Assessing Transportation Infrastructure Impacts on Rangelands: Test of a Standard Rangeland Assessment Protocol. Rangeland Ecol Manage 63:524-536.
- Ebert, Jamies I., and Timothy A. Kohler. 1988. The Theoretical Basis of Archaeological Predictive Modeling and a Consideration of Appropriate Data-Collection Methods, in *Quantifying the Present and Predicting the Past: Theory, Method, and Application of Archaeological Predictive Modeling* edited by W. James Judge and Lynne Sebastian, pp. 97-171. U.S. Department of the Interior, BLM Service Center, Denver, CO.

- Eckerle, William. 2005. Experimental: Archaeological Burial Model for Powder River and Tongue River Hydrological Basins, Wyoming. In *Adaptive Management and Planning Models for Cultural Resource in Oil and Gas Fields in New Mexico and Wyoming*, by Eric Ingbar, Lynne Sebastian, Jeffrey Altschul, Mary Hopkins, William Eckerle, Peggy Robinson, Judson Finley, Stephen A. Hall, William E. Hayden, Chris M. Rohe, Tim Seaman, Sasha Taddie, and Scott Thompson, pp. 39-102. Prepared for the Department of Energy, National Energy Technology Laboratory by Gnomon, Inc. Electronic Document, <http://www.gnomon.com/DOEPumpIII/FinalCombinedReport.pdf>, accessed August and September 2010.
- Gelbard J. L., and J. Belnap. 2003. Roads as conduits for exotic plant invasions in a semiarid landscape. *Conservation Biology*. 17:420–432.
- Goolsby, J. 2012. Evolution & Revolution of Drilling Technologies & the Impact on Wyoming. Goolsby, Finley, and Associates, LLC. Presentation.
- Ken Kreckel. 2007. Direction Drilling: The Key to Smart Growth of Oil and Gas Development in the Rocky Mountain Region. The Wilderness Society, <http://wilderness.org/files/Directional-Drilling.pdf>.
- North Dakota Industrial Commission Oil and Gas Research Program. 2011. Investigation of Methodologies to Control Dust on County Roads in Western North Dakota. Grant Applicants: Dunn and McKenzie County.
- Pendery, Bruce M. 2010. BLM's Retained Rights: How Requiring Environmental Protection Fulfills Oil and Gas Lease Obligations, 40 *Environmental Law*, 599-685.
- US National Academy of Sciences, 2012. *Induced Seismicity Potential in Energy Technologies*. Washington, D.C.
- US Department of Agriculture, 2006, *Land Resource Regions and Major Land Resource Areas of the United States, the Caribbean, and the Pacific Basin*, Handbook 296, Washington, DC.
- US Environmental Protection Agency, 2012, Oil and Natural Gas Sector: New Source Performance Standards and National Emission Standards for Hazardous Air Pollutants Reviews, 77 FR 49490.
- US Department of the Interior 2009, Bureau of Land Management, Instruction Memorandum 2009-078. Processing Oil and Gas Applications for Permit to Drill for Directional Drilling into Federal Mineral Estate from Multiple-Well Pads on Non-Federal Surface and Mineral Estate Locations.
- US Department of the Interior 2009, Bureau of Land Management, High Plains District, Update of Task 3A Report for the Powder River Basin Coal Review Cumulative Air Quality Effects for 2020, (AECOM).
- US Department of the Interior 2011, Bureau of Land Management. State Director Review, SDR WY-2011-010.
- US Department of the Interior, Geological Survey. 2007. Organic Compounds in Produced Waters from Coalbed Natural Gas Wells in the Powder River Basin, Wyoming. *Applied Geochemistry* 22, 2240–2256.
- US Department of the Interior, Geological Survey. 2010. Assessment of Potential Effects of Water Produced from Coalbed Methane Natural Gas Development on Macroinvertebrate and Algal Communities in the Powder River and Tongue River, Wyoming and Montana.
- US Department of the Interior, Geological Survey. 2012. Hydraulic Fracturing – The State of the Science. Induced Seismicity. Leith, B. [http://www.usgs.gov/solutions/ppt/2012june08\\_leith.pptx](http://www.usgs.gov/solutions/ppt/2012june08_leith.pptx). Congressional Briefing hosted by the Honorable Gerry Connelly (D-VA). June 8, 2012. View at: <http://www.youtube.com/watch?v=XnRH9i8hpbo&feature=youtu.be> See, Earthquakes Induced by Fluid Injection. <http://www.usgs.gov/faq/index.php?sid=54684&lang=en&action=show&cat=125>
- US Department of the Interior, Geological Survey. 2012. Kresse, T.M., Warner, N.R., Hays, P.D., Down, A., Vengosh, A., and Jackson, R.B., 2012, Shallow groundwater quality and geochemistry in the Fayetteville Shale gas-production area, north-central Arkansas, 2011: Investigations Report 2012–5273, 31 p.
- US Environmental Protection Agency. 2004. Evaluation of Impacts to Underground Sources of Drinking Water by Hydraulic Fracturing of Coalbed Methane Reservoirs Study, EPA 816-R-04-003, <http://water.epa.gov/type/groundwater/uic/upload/completestudy.zip>.
- University of Wyoming, Norton, J., Strom, C., Reclamation Considerations for Oil and Gas Lease Contracts on Private Lands, Bulletin B-1242, Apr. 2013.
- Warner, N.R., Jackson, R.B., Darraha, T.H., Osborn, S.G., Down, A., Zhaob, K., Whitea, A. and Vengosha, A., 2012, Geochemical evidence for possible natural migration of Marcellus Formation brine to shallow aquifers in Pennsylvania, Proceedings Natl Acad Sciences
- Wyoming Department of Environmental Quality, June 14, 2004. Compliance Monitoring for Ground Water Protection Beneath Unlined Coalbed Methane Produced Water Impoundments
- Wyoming Oil and Gas Conservation Commission. 2013. Well Files, <http://wogcc.state.wy.us/>.