

U.S. DEPARTMENT OF THE INTERIOR  
 BUREAU OF LAND MANAGEMENT  
 RAWLINS FIELD OFFICE  
 ENVIRONMENTAL ASSESSMENT TITLE PAGE

RAWLINS FIELD OFFICE

EA No. WY-030-06-EA- 192

**File Name** Access to Anadarko's Doty Mountain Fee Well 2006 Program

**Location:** T. 17 N., R. 91 W., 6th P.M., ~~Sweetwater~~ Carbon County, Wyoming

- Section 11: All (private)
- Section 14: NE $\frac{1}{4}$ NE $\frac{1}{4}$ , NW $\frac{1}{4}$ SW $\frac{1}{4}$
- Section 15: All (private)
- Section 21: All (private)
- Section 22: NW $\frac{1}{4}$ NE $\frac{1}{4}$ , SW $\frac{1}{4}$ SW $\frac{1}{4}$
- Section 27: N $\frac{1}{2}$  (private)
- Section 28: NE $\frac{1}{4}$ NE $\frac{1}{4}$

*Carbon*

**BLM Office:** Rawlins Field Office

**Lease Number:** WYW-133658,  
 WYW-137692

WYW-136728

**Applicant:** Anadarko Exploration & Production Company LP (Anadarko)

<u>Authors</u> <u>Reviewers</u>	<u>Title</u>	<u>Assignment</u> <u>(i.e. Author or Review)</u>	<u>Initials</u> <u>&amp; Date</u>
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*Includes  
Cumulative*

*See  
Correction  
Janich*

Activity Code 1310

WY-03-1791-5 (05/89)

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<u>Rowena M. Trapp</u>	<u>Archeologist</u>	<u>Review</u>	
<u>Krystal Clair</u>	<u>Outdoor Recreation Planner</u>	<u>Review</u>	
<u>David Simons</u>	<u>Environmental Coordinator</u>	<u>Review</u>	
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WYW-136728

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*W/4 same*

## INTRODUCTION

### Description and Location

Anadarko E&P Company (AEPC), (referred to as "Anadarko" or "Company") has notified the Bureau of Land Management (BLM), Rawlins Field Office (RFO) that Anadarko proposes to explore for and potentially develop coal bed natural gas (CBNG) resources on private land and the underlying fee minerals, in an area just north, west and south of the Doty Mountain Pod. This new proposal lies within the Atlantic Rim Environmental Impact Statement (EIS) study area in south-central Wyoming (Figure 1-1). The Project Area is located within the administrative boundary of the RFO in T17N R91W within Carbon County, Wyoming.

### Need for Proposed Action

Domestic natural gas production is an integral part of U.S. energy development and conservation plans, due to its availability and the presence of existing market delivery infrastructure. Domestic production reduces immediate dependence upon foreign sources of energy, and maintains an adequate and stable supply of fuel to maintain economic well-being, industrial production, and national security. The environmental advantages of burning natural gas are emphasized in the Clean Air Act amendments of 1990.

The Proposed Action would provide access to private lands, thus enabling the Company to exercise existing rights to private minerals within the Project Area to drill for, extract, remove, and market gas products. National mineral leasing policies recognize the statutory right of leaseholders to access private mineral resources to meet continuing national needs and economic demands. Also included is the right of the leaseholders within the Project Area to build and maintain necessary improvements for drilling, producing, and marketing natural gas, in accordance with the appropriate authority.

### Conformance with Land Use Plan

This proposed action is in conformance with the Great Divide Resource Management Plan (RMP) that was approved on November 8, 1990. The RMP has been reviewed to determine if the proposed action conforms to the land use plan terms and conditions as required by 43 CFR 1610.5. Development of oil and gas reserves is in conformance with the RMP. On page 30, the RMP states "The entire planning area [Great Divide Resource Area] is open to oil and gas leasing."

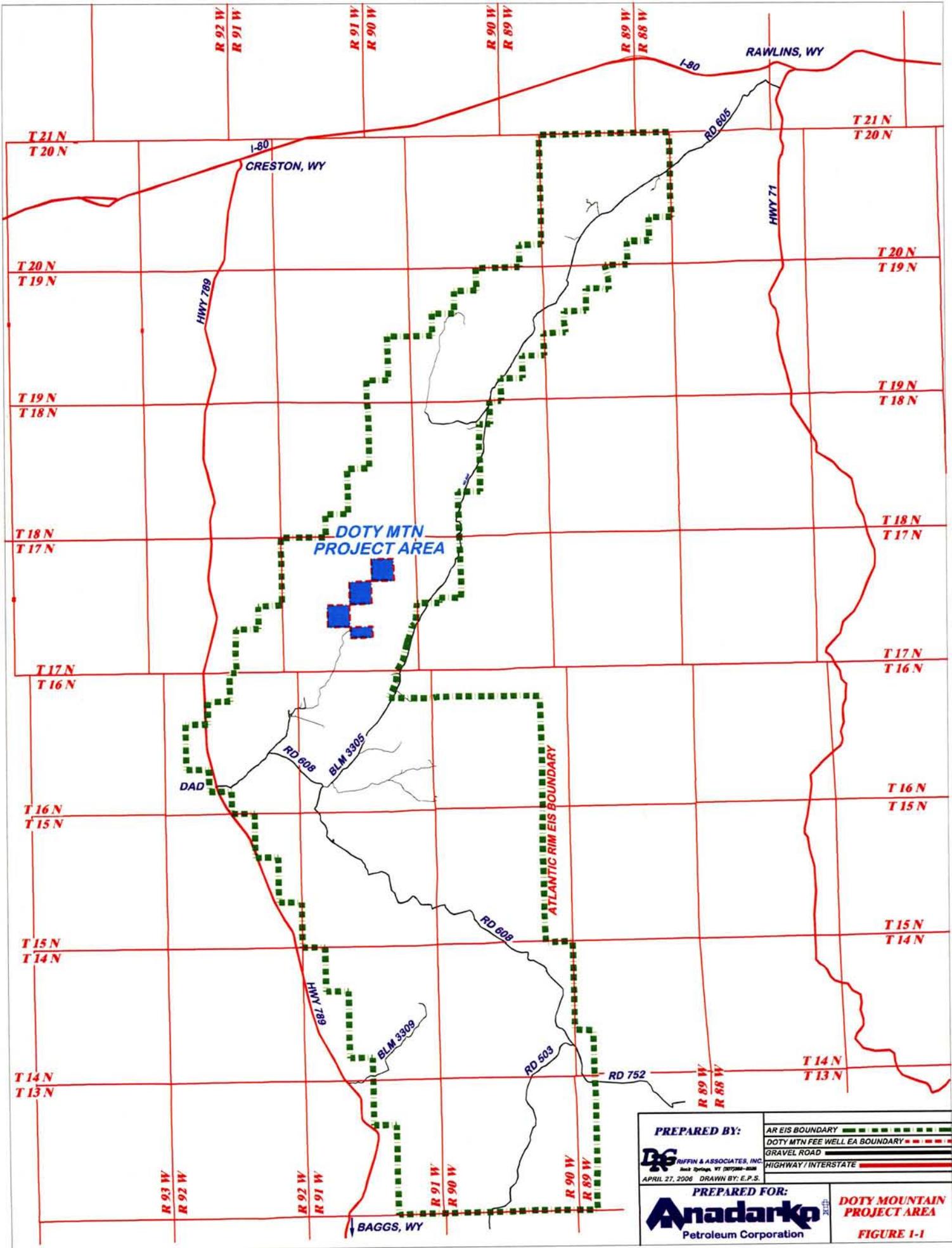
The Great Divide Resource Management Plan (RMP) Record of Decision (ROD) (BLM 1990a) directs the management of BLM-administered lands. The objective for management of oil and gas resources, as stated in the RMP, is to provide for leasing, exploration, and development of oil and gas while protecting other resource values.

### Relationship to Statutes, Regulations, or other Plans

Wyoming Instruction Memorandum WY-98-036, Rights-of-Ways on Federal Surface and State or Private Minerals, provides Wyoming's policy for approving access to private lands. The IM states BLM has full control over the use of public lands and has some reasonable say as to time, place, and manner of use of the surface. BLM Wyoming's practice is to provide reasonable access to any parcel of non-Federal lands completely surrounded by public lands.

This EA is tiered to and references the "Environmental Assessment for the Atlantic Rim Interim Drilling Project, Doty Mountain Pod" (EA Number: WY-030-04-EA-027).

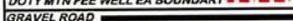
The "Environmental Assessment for the Atlantic Rim Interim Drilling Project, Doty Mountain Pod" was written to assess the drilling in the Doty Mountain Pod. The



**PREPARED BY:**  
 RUFFIN & ASSOCIATES, INC.  
 2622 S. 20th St., Cheyenne, WY 82001-2622  
 APRIL 27, 2006 DRAWN BY: E.P.S.

**PREPARED FOR:**  
 **Anadarko**  
 Petroleum Corporation

**DOTY MOUNTAIN PROJECT AREA**  
**FIGURE I-1**

AR EIS BOUNDARY	
DOTY MTN FEE WELL EA BOUNDARY	
GRAVEL ROAD	
HIGHWAY / INTERSTATE	

Decision Record for this action was approved on February 6, 2004. The Doty Mountain Pod is located within the administrative boundary of the RFO in T17N R91W within Carbon County, Wyoming, and is one of nine areas or well pods that make up the Atlantic Rim Interim Drilling Project. The Doty Mountain Pod proposal is a part of interim drilling activity that BLM has allowed while an EIS is being prepared for the Atlantic Rim Natural Gas Project. The Doty Mountain Pod consisted of constructing, drilling, completing, testing, operating, and reclaiming 24 exploratory wells and two deep injection wells to dispose of produced water, located on both private and federal leases. The Doty Mountain Pod Project also included related access roads, utilities, flowlines, a market access line, production facilities, and a compressor station. The life of the Doty Mountain Pod is estimated to be 10 to 20 years. Of the 24 well locations, 16 wells are located on lands administered by the RFO and develops federal minerals. The remaining wells (eight) develop fee minerals on fee surface. The one deep injection well is located on lands administered by RFO. The compressor station and one deep injection well are located on fee lands.

**Nether the proposed action, Access to Anadarko's Doty Mountain Fee Well 2006 Program (WY-030-06-EA-192), nor Anadarko's Doty Mountain Fee Well 2006 Program are part of the original Doty Mountain Pod and were not analyzed in the Environmental Assessment for the Atlantic Rim Interim Drilling Project, Doty Mountain Pod.**

The *Draft Environmental Impact Statement for the Atlantic Rim National Gas Field* was released in December of 2005. This DEIS was prepared to analyze the potential impacts of drilling and production operations of natural gas wells and associated access roads, pipelines, and production facilities in the Atlantic Rim Project Area. The proposed action and Anadarko's Doty Mountain Fee Well 2006 Program is within the *Atlantic Rim National Gas Field Area*.

The development of this project will not affect the achievement of the Wyoming Standards for Healthy Rangelands (August 1997).

This EA, Access to Anadarko's Doty Mountain Fee Well 2006 Program (WY-030-06-EA-192) is prepared in accordance with NEPA, and is in compliance with all applicable regulations and laws passed subsequently, including Council of Environmental Quality (CEQ) regulations (40 Code of Federal Regulations [C.F.R.] 1500-1508), U.S. Department of Interior (USDI) requirements (*Department Manual 516, Environmental Quality [USDI 1980]*), guidelines listed in the BLM *NEPA Handbook, H-1790-1* (BLM 1989a), and *Guidelines for Assessing and Documenting Cumulative Impacts* (BLM 1994). This EA assesses the environmental impacts of the Proposed Action, Alternatives, and No Action Alternative, and serves to guide the decision-making process.

#### **Proposed Action and Alternatives**

Anadarko is proposing to develop their minerals on private land north and west of the existing Doty Mountain Pod. This would expand from the Doty Mountain Pod as analyzed in the "*Environmental Assessment for the Atlantic Rim Interim Drilling Project, Doty Mountain Pod.*" Anadarko wants to cross public land in sections 14, 16, 22, and 28, T.17N, R91W, in the Doty Mountain Pod, to access and develop their minerals in private sections 11, 15, 21, and 27, T.17N, R91W. The proposed action is to approve nine Sundry Notices (Sundries) submitted by Anadarko. Four of these sundries are for roads to access the private land, and five sundries are for installation of water and gas pipelines and electric conduit (gathering system) to support the production of wells drilled on the private land.

The sundries that Anadarko presented address only the access roads and gathering systems on the public land (see Figure 2-2). NEPA requires that the environmental analyses include reasonably foreseeable future development. Because of this Anadarko has furnished a Description of their proposal for development of the private sections (Appendix "A").

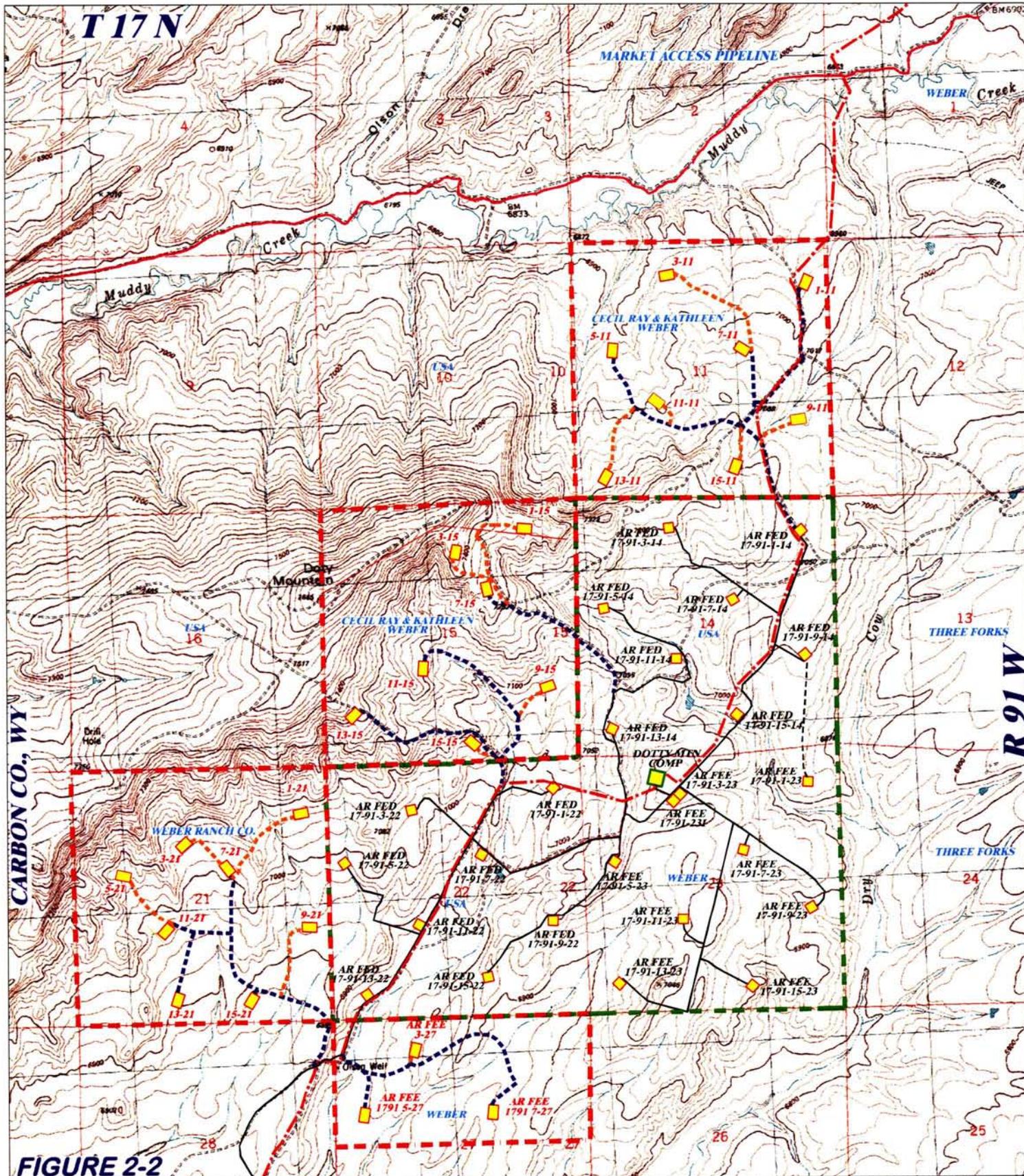


FIGURE 2-2

**DOTY MOUNTAIN R-O-W EXHIBIT**



**DRG RIFFIN & ASSOCIATES, INC.**



1414 ELK ST., SUITE 202  
ROCK SPRINGS, WY 82901  
(307) 362-5028

NOT TO SCALE  
JOB No. 9635  
DATE: 4/28/06

60' R-O-W EXISTING ROAD   
80' R-O-W OVERLAND TRAIL   
DOTY MTN EA BOUNDARY   
DOTY MTN FEE WELL EA BOUNDARY

**Proposed Action:** Approve all Nine Sundries Notices submitted my Anadarko.

The proposed action is to approve Nine Sundries Notices submitted my Anadarko. Anadarko is requesting authorization to construct approximately 4,092 feet of road and about 5,339 feet of gathering systems (water and gas pipelines and electric conduit) on public land to access their proposed coal bed natural gas project on fee land. The proposed project location is shown in Figure 1-1. Although the proposed action (the nine sundries) is located with in the boundaries of the Doty Mountain Pod it was not part Doty Mountain Pod proposal.

Environmental assessment number WY-030-04-EA-027 was written evaluating the activity proposed for the Doty Mountain pod. The Decision Record and Finding of No Significant Impact for that EA was on February 6, 2004. The Project-wide Mitigation Measures and Procedures, and Conditions of Approval Doty Mountain Pod (Appendix C and D of the Decision Record) will be applied and are considered part of this EA.

Roads will be constructed to BLM specifications for a "Resource Road," as specified in BLM Manual Section 9113. Adequate drainage structures will be constructed or installed. The travelway will be at least 14 feet wide and will have an average disturbed width of 50 feet.

The proposed gathering system would parallel either side of the proposed access roads. Clearing along the gathering systems would be limited to removal of above ground vegetative parts of the plants along the route. This clearing would require 10 feet of disturbance on one side of the road for the electrical conduit. The water and gas line will require 20 feet of disturbance on the other side of the road. These lines will be installed with a trencher and a backhoe.

The total length of the new roads and gathering system (water and gas pipelines and electric lines) on public land would be 4,092 feet. Total length of new road and gathering system on public land would be 5,339 feet. Total disturbed width needed for the road and gathering system would be 80 feet. There would not be any new disturbance for the gathering system serving section 27 (sections 22 and 28) because the pipe and conduit would be placed in previously disturbed corridors.

**Table 1**

This table shows the location, length and disturbance of roads and gathering system on the public land.

Section	New Disturbance	Previously Disturbed	Length	Width	Acres
NE¼NE¼ 14	1,062		1,062	80	2.0
NW¼SW¼ 14	1,418		1,418	80	2.6
NW¼NE¼ 22	602		602	80	1.1
SW¼SW¼ 22		707	707	30	.5
NE¼NE¼ 28	1,010		1,010	80	1.9
NE¼NE¼ 28		540	540	30	.4
Total	4,092	1,247	5,339		8.5

On the private land in sections 11, 15, 21, and 27 Anadarko proposes to construct, drill, complete, and operate 26 coal bed natural gas wells and three injection wells. The injection wells would each be co-located with one of the production wells. Twenty-six well pads would be needed for the project. The Proposal also includes related access roads and a gathering system consisting of gas and produced water lines and electric conduct. Anadarko has supplied BLM with a description of their planned field development in private sections. This description can be found in Appendix "A." A map showing the location of the roads, wells, and gathering system is also included. Anadarko's plans are very similar to the proposed action found in Chapter 2 of the "Environmental Assessment for the Atlantic Rim Interim Drilling Project, Doty Mountain Pod."

Table 2 summarizes the disturbance for the roads, wells and gathering system on the private land.

TABLE 2

ESTIMATES OF DISTURBED AREAS ANADARKO'S DOTY MOUNTAIN FEE WELL 2006 PROGRAM

Facility	Evaluation Phase				Operations
	Length (feet)	Width (feet)	Area, ea. (acres)	Temporary Acres	Life of Project Acres
New Roads and Gathering Lines on Federal Land <sup>a</sup>	4,092	80	N/A	7.5	1.5
New Roads and Gathering Lines on Fee Land <sup>b</sup>	20,053	60	N/A	28	5.6
New Roads and Gathering Lines on Fee Land <sup>c</sup>	32,404	80	N/A	60	12
New Drill Pads (26)	N/A	N/A	2.0	52	6.5
New Injection Wells (3)	N/A	N/A	NA	NA	NA
Total Disturbance				147.5	25.6

<sup>a</sup>Includes 4,092' of existing two-track trail

<sup>b</sup>Includes 10,290' of existing two-track trail

<sup>c</sup>Includes 9,947' of existing two-track trail

**No Action Alternative**

**Background**

The Council on Environmental Quality (CEQ) has established limitations on activities allowed by Federal agencies when preparing an EIS. These CEQ regulations are found at 40 CFR 1506.1, and state that during the preparation of an EIS, no action concerning the proposal can be taken by the Federal agency which would result in an adverse environmental impact or limit the choice of reasonable alternatives in the EIS.

The no action alternative would result in denial of the project as proposed.

**Affected Environment**

Please refer to Chapter 3 of "The Atlantic Rim Natural Gas Project, Doty Mountain Pod EA." Anadarko's proposal is contiguous to the Doty Mountain Pod. Chapter 3 gives an accurate description of the environment in the area around this proposal. Exceptions and additions are given below:

**Water Resources** (also refer to section 3.5 of the "The Atlantic Rim Natural Gas Project, Doty Mountain Pod EA")

**Groundwater**

The proposed wells analyzed in the "Environmental Assessment for the Atlantic Rim Interim Drilling Project, Doty Mountain Pod" were drilled in 2004. Monitoring wells measuring producing formation pressure as well as the first potential aquifers above and below the producing formation are located to the North of the

Doty Mountain pod in the Jolly Roger Pod near Filmore Creek and South in the Sun Dog Pod.

Water production from the Doty Mountain Pod is currently about 7,500 bwpd, which is on average 320 bwpd per well. There are currently two injection wells that are used to dispose of these waters at the Doty Mountain Pod.

**Groundwater Wells near the Project Area**

Five permitted water wells have been completed in or near or within the inferred area of influence (township 17N and 91W). Information from these wells is presented in Table 3. This information was obtained from the Wyoming State Engineers Office WSEO. The maximum depth of all permitted wells is 606 feet. Injection wells are proposed for the Cherokee and Deep Creek Sandstones, which occur 4,400 to 5,300 feet below the surface. The water wells within the 1 mile buffer are much shallower than the proposed gas wells and proposed injection zones.

**TABLE 3            SEO PERMITTED WATER WELLS TOWNSHIP 17N AND 91W**

Permit No.	Sec	Qtr/Qtr	Applicant	Facility Name	Use	Yield (gpm)	Well Depth	Static Depth
P130533 W	29	SWNE	WEBER RANCH	PAPPY FRY WELL	Stoc k	25	606	31
P17356W	28	NENE	USDI BLM	OLSON WELL (INDEX #4139)	Stoc k	5	100	Unknown
P17356W	28	NENE	USDI BLM	OLSON WELL (INDEX #4139)	Stoc k	5	100	Unknown
P34089W	15	SEnw	WEBER RANCH INC.	DOTY MOUNTAIN	Stoc k	Unknown	320	Unknown
P34089W	15	SEnw	WEBER RANCH INC.	DOTY MOUNTAIN	Stoc k	Unknown	320	Unknown

**Isotopic Analysis**

In 2004 water samples were collected by Anadarko for well AR Fee 1791-3-23 completed in the targeted formation and located in T17N 91W Sec. 23. At the same time, samples were taken from the injection well AR Fee 1791-2-31 in the Haystack Mountains, Deep Creek and Cherokee Creek Sandstones.

**TABLE 4            ISOTOPIC ANALYSIS RESULTS FROM WELLS IN T17N AND 91W**

Sample ID	Formation	Section	Oxygen (O-18/O-16) per mil <sup>1</sup> vs. SMOW <sup>2</sup>	Hydrogen (D/H)	Tritium (H-3)
AR Fee 1791-2-31	Haystack Mtns.	31	-19.70	-148.4	<0.50
AR Fee 1791-2-31	Deep Creek	31	-19.60	-145.8	<0.50

TABLE 4 ISOTOPIC ANALYSIS RESULTS FROM WELLS IN T17N AND 91W

Sample ID	Formation	Section	Oxygen (O-18/O-16) per mil <sup>1</sup> vs. SMOW <sup>2</sup>	Hydrogen (D/H)	Tritium (H-3)
AR Fee 1791-2-31	Cherokee Creek	31	-19.49	-146.7	<0.50
AR Fee 1791-3-23	Mesa Verde Coals	23	-18.85.	-141.7	<0.50

<sup>1</sup> per mil stands for per thousand

<sup>2</sup> SNOW is an international standard used for isotopic analysis of hydrogen and oxygen

<sup>3</sup> TU stands for Tritium Unit

**Wildlife and Fisheries** (also refer to section 3.8 of the "The Atlantic Rim Natural Gas Project, Doty Mountain Pod EA")

**Wildlife**

The Project Area includes sagebrush steppe wildlife habitat. Shrub cover on these sites averages between 5 and 10 percent.

**Big Game**

The types of big game seasonal ranges designated by WGFD are crucial winter, winter and winter/yearlong. Crucial winter range can describe any particular seasonal range or habitat component often the determining factor in a population's ability to maintain itself at a certain level over the long term (Wyoming Chapter of the Wildlife Society 1990). Crucial winter range (in this instance for big game species), is commonly referred to as a "limiting factor" for big game populations, in that their populations can be limited by the amount, quality, and lack of disturbance factors on these critical areas.

**Pronghorn Antelope** The Project Area is designated as pronghorn winter/yearlong range (2,080 acres).

**Mule Deer** The Project Area is located within the Baggs Herd Unit. The Baggs Herd Unit is large (3,440 square miles) and contains habitats ranging from subalpine to montane coniferous forests to desert scrub. The Project Area is designated as winter/yearlong mule deer range with 267 acres of crucial mule deer winter range all occurring within section 15 of Township 17 North, Range 91 West. Currently, a mule deer collaring study is on going to determine migration corridors in the area. The first years results of this study shows that a portion of section 15 may be part of a migration corridor for deer wintering in the Dad area along the Muddy creek to Muddy Creek Canyon which move to summer ranges on Atlantic Rim or Miller Hill.

**Elk** The Project Area is located within the Sierra Madre Herd Unit (2,425 square miles). Most elk in the herd unit use spring/summer/fall ranges in the Sierra Madre Mountains, although groups use habitats on Atlantic Rim and around McCarty Canyon. During winter, the elk migrate to winter range habitats at lower elevations on the western side of the Sierra Madre Mountains and into the Atlantic Rim and Sand Hills areas just east of the project area.

## Upland Game Birds

### **Greater Sage Grouse**

The project area incorporates three known greater sage grouse leks the Doty Mountain Lek, Dry Cow 2 Lek and Dry Cow 3 Lek. The Doty Mountain lek was discovered in 1978 with 15 strutting male birds. The last time birds were observed on this lek was in 1982. Currently, the lek status is determined to be unknown and is provided protection until the Wyoming Game and Fish determine this lek to be unoccupied. The Dry Cow 2 Lek was discovered in 1978. The last time birds were observed on this lek was 1988. Currently, the lek status is determined to be unknown and is provided protection until the Wyoming Game and Fish determine this lek to be unoccupied. The Dry Cow 3 Lek was discovered in 1978. This lek had been active up through 2004/05 when a pipeline was built through the lek. In 2006, no birds were observed on the lek. This lek will continue to be protected until such time the Wyoming Game and Fish determine this lek to be unoccupied. Some of the sagebrush habitat on private land within the project area has been treated. This vegetation treatment may have an impact on greater sage-grouse nesting habitat within the project area; however the area still provides good nesting habitat. The project area may contain additional leks which have yet to be discovered.

### **Raptors**

Species of raptors that may occur in the Project Area include golden eagle, bald eagle, northern harrier, sharp-shinned hawk, Cooper's hawk, northern goshawk, red-tailed hawk, Swainson's hawk, rough-legged hawk, ferruginous hawk, American kestrel, merlin, prairie falcon, peregrine falcon, short-eared owl, long-eared owl, great-horned owl, and burrowing owl. Helicopter surveys of raptor nests located in and around the Project Area were conducted during late May 2001 (HWA 2003). The helicopter survey protocol consisted of flying low-level transects at ½-mile intervals within a 1-mile buffer zone of each area. Areas of potential raptor nest habitat (such as cliffs and rock outcrops) were surveyed more intensively. Locations of nests were recorded with a GPS unit. No raptor nests (active or inactive) were located within the project boundary. However, several nests were located within 1 mile of the Project Area.

## Special Status Species - Wildlife and Fish

### **Wildlife Species**

Surveys for species that are federally listed as threatened, endangered, candidate, or species of concern were conducted in 2000 and 2001 as part of larger-scale surveys being performed in support of the Atlantic Rim Natural Gas Project EIS Hayden-Wing Associates 2003, (HWA 2003). The area of interest for threatened, endangered, candidate and species of concern includes the Project Area and a 1-mile buffer for raptor nests. Locations for threatened and endangered species were obtained from the Wyoming Observation System (WOS).

## Threatened and Endangered Species-Wildlife and Fish

### **Wildlife Species**

#### **Black-footed Ferret and Associated White-tailed Prairie Dog Colonies**

Aerial surveys of prairie dog colonies were conducted over the Project Area between March 26 and April 3, 2001 (HWA 2003). Linear transects (¼-mile spacing) were flown using a fixed-wing aircraft with GPS capabilities at an average

altitude of 200 feet. Prairie dog colonies were observed from the air, and the approximate center of each town was recorded as a single GPS point. Prairie dog towns located from the air were mapped on the ground using a handheld GPS and an all-terrain vehicle (ATV) between June 6 and June 27, 2001 for the Atlantic Rim EIS. The project area contains no prairie dog towns therefore, it is unlikely that black-footed ferrets would occur in the Project Area.

**Bald Eagle** Primary wintering areas for the bald eagle are typically associated with concentrations of food sources along major rivers that remain unfrozen where fish and waterfowl are available, and near ungulate winter ranges that provide carrion (HWA 2003). Wintering bald eagles are also known to roost in forests with large, open conifers and snags that are protected from winds by ridges, often near concentrations of domestic sheep and big game (HWA 2003).

Incidental sightings of bald eagles have been recorded near the Project Area (HWA 2003). Most observations were documented between November and March, indicating that the area is used by bald eagles during the winter. No communal winter roosts are known to exist in or near the Project Area. Inspection of BLM and WGFD raptor nest records and results of aerial and ground raptor nest surveys revealed that no bald eagle nests occur within a 2-mile buffer of the Project Area. The closest known nest is located approximately 30 miles southwest of the Cow Creek POD, another exploratory project of the Atlantic Rim Interim Drilling Project (HWA 2003).

Bald eagles typically build stick nests in the tops of large coniferous or deciduous trees along streams, rivers, or lakes. These types of habitats are not present in the Project Area; therefore, bald eagles are not expected to nest there. Bald eagles may use the Project Area during the winter, when big game species are more concentrated on winter ranges. However, the Project Area does not support concentrated use by bald eagles, and bald eagle use is likely incidental.

#### **Fish Species**

Four federally endangered fish species may occur as residents of the Little Snake River system downstream of the Project Area. These species are the Colorado pikeminnow, bonytail, humpback chub, and razorback sucker (FWS 2003). The last sighting of any of these fish in the Little Snake River was of a single Colorado pikeminnow in 1990. The lack of perennial waters adjacent to the Project Area and for several miles downstream precludes potential for the occurrence of the four species of endangered fish within the Project Area (HWA 2003). Although highly unlikely, any of these fish species may occur in Muddy Creek outside of the Project Area or farther downstream in the Little Snake River or Yampa River on a seasonal basis for spawning and/or rearing. Currently, it is not known whether suitable spawning, age-0, or juvenile habitats for any of these species may still be present in the waters downstream from the Project Area. To date, critical habitat for these fish species has not been designated anywhere in Wyoming (HWA 2003).

#### **Species of Concern-Wildlife and Fish**

##### **Wildlife Species**

Species of concern include candidates for federal listing under the ESA, BLM special status species (BLM 2001), Wyoming Game and Fish Department (WGFD) special concern species, and species that are designated rare by The Nature Conservancy and the Wyoming Natural Diversity Data Base (WYNDD) Species that have not been listed as endangered or threatened by the Fish and Wildlife Service (FWS), but have been identified for possible listing in the future, are classified as candidate species.

Six mammal species of concern, 15 bird species of concern, three amphibian species of concern, and three fish species of concern may occur in or near the Project Area.

#### **Mammals**

Six BLM Wyoming state sensitive mammal species are found in the RFO area (BLM 2002). These species include Wyoming pocket gopher, white-tailed prairie dog, swift fox, fringed myotis, long-eared myotis, and Townsend's big-eared bat. Only one of these species, the white-tailed prairie dog, may occur in the Project Area. The Wyoming pocket gopher and swift fox are likely to occur in the Project Area. The remaining species (fringed myotis, long-eared myotis, and Townsend's big-eared bat) have a slight potential to occur in the Project Area (HWA 2003).

#### **Birds**

Sixteen BLM Wyoming state sensitive bird species are found in the RFO area (BLM 2002). These species include mountain plover, Baird's sparrow, sage sparrow, Brewer's sparrow, long-billed curlew, sage thrasher, western burrowing owl, yellow-billed cuckoo, loggerhead shrike, Columbian sharp-tailed grouse, greater sage grouse, white-faced ibis, trumpeter swan, peregrine falcon, ferruginous hawk, and northern goshawk. The western subspecies of yellow-billed cuckoo is considered a FWS candidate for listing as endangered. Five of these species are known to be present in the Project Area, and include: sage sparrow, sage thrasher, loggerhead shrike, greater sage grouse, and ferruginous hawk. Two of these species, western burrowing owl and Columbian sharp-tailed grouse may occur in the Project Area. Columbian sharp-tailed grouse have been documented in the Sand Hills area just east of the Project Area (Blomquist 2003), and western burrowing owls are known to utilize prairie dog colonies for nesting and rearing sites. Five species, including Baird's sparrow, long-billed curlew, yellow-billed cuckoo, white-faced ibis, and trumpeter swan, are unlikely to occur. Brewer's sparrow, peregrine falcon, and northern goshawk have a slight potential to occur in the Project Area (HWA 2003).

#### **Amphibians**

Three BLM Wyoming state sensitive amphibian species are found in the RFO area (BLM 2002). These species include boreal toad, Great Basin spadefoot toad, and northern leopard frog. The Great Basin spadefoot toad is present, boreal toad, and northern leopard are likely to occur in the Project Area (Michael bower 2004).

**Fish Species** (refer to section 3.8 of the *"The Atlantic Rim Natural Gas Project, Doty Mountain Pod EA"*)

**Recreation** (also refer to section 3.9 of the *"The Atlantic Rim Natural Gas Project, Doty Mountain Pod EA"*)

The Doty Mountain Project Area (DMPA) contains no developed recreation sites. Off-highway vehicle (OHV) use on BLM lands is limited to existing roads and two-tracks. Dispersed recreation in the DMPA area occurs on both private and BLM lands, due to the checkerboard land pattern and a landowner that allows public trespass with permission. Recreational use consists largely of hunting by residents and visitors from outside the region. Camping and OHV use occur most often in conjunction with hunting. There is some seasonal pleasure driving and snow machine use, which often incorporate wildlife viewing as a significant reason for visiting the area.

The health and abundance of wildlife populations directly affect the quality of

hunting in the DMPA. When wildlife populations fluctuate, so do wildlife-based recreational opportunities. See the wildlife section for the effect of development on hunting due to a potential loss of carrying capacity or the displacement of game.

Impacts to visual resources by development in the DMPA, identified in Section 4.10, should also be considered for effects on recreation. Visual resources influence the character of outdoor opportunities by affecting the recreation setting, as do other effects of gas development such as noise, dust and traffic on recreational access routes.

**Visual Resources** (also refer to section 3.10 of the "The Atlantic Rim Natural Gas Project, Doty Mountain Pod EA")

Much of the DMPA's is visible from State Highway 789, Carbon County or BLM roads. Users of the unpaved road network include private property owners, ranchers, hunters, sightseers, wildlife observers and other recreationists.

Visual Resources Management (VRM) of BLM lands falls under the BLM's VRM program. The intent of the VRM program is to preserve scenic values on BLM lands in concert with resource development where resource development is appropriate. BLM lands in the DMPA area are classified as VRM Class III. The VRM Management Class Objectives (BLM Manual 8431 - Visual Resource Contrast Rating) are as follows:

Class III - The objective of this class is to partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate. Management activities may attract attention but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape.

**Cultural and Historic Resources** Rowena M. Trapp, BLM Archeologist, has written this revised Cultural History for the general area. (also refer to section 3.11 of the "The Atlantic Rim Natural Gas Project, Doty Mountain Pod EA")

#### **Cultural Chronology of Area**

Archaeological investigations in the Great Divide Basin and the Washakie Basin indicate the area has been inhabited by people for at least 12,000 years from Paleoindian occupation to the present.

#### **Paleoindian Period**

The oldest period for which there is archaeological evidence is the Paleoindian, beginning ca. 12,000 years B.P. and ending around 8500 B.P. This is the transition period from the periglacial conditions of the Wisconsin ice advance during the terminal Pleistocene to the warmer and drier climatic conditions of the Holocene. A savanna-like environment with higher precipitation than occurs today was prevalent in southwest Wyoming. Paleoindian sites are rare in southwest Wyoming. However, isolated surface finds of Paleoindian projectile points are not uncommon and suggest that site preservation may be a major factor affecting the number of known sites.

#### **Archaic Period**

Settlement and subsistence practices, in southwest Wyoming, remained largely unchanged from the end of the Paleoindian period through the Archaic and continued until at least the introduction of the horse, or even until Historic Contact. Reduced precipitation and warmer temperatures occurred ca. 8500 B.P. The environmental change at the end of the Paleoindian period led to a pattern of broad spectrum resource exploitation which is reflected in the subsistence and settlement practices of the Archaic period. The resource exploitation became more diverse. Faunal assemblages from Archaic components document increased use of small animals (Thompson and Pastor, 1995). One of the only Early Archaic

housepit sites discovered to date within the interior basin is located west of the study area. Most other Archaic housepit sites are located along the margins of the basins or in the uplifted areas.

#### **Late Prehistoric Period**

The Late Prehistoric period 2000/650 B.P. is subdivided into the Uinta and the Firehole phases. Large-scale seed processing and an increase in the number of features including roasting pits is noted in the Late Prehistoric period as is the presence of pottery and the introduction of bow and arrow technology. A characteristic of the Uinta phase is clusters of semi-subterranean structures dating to ca. 1500 B.P. At least two different types of structures have been identified. The Firehole phase is distinguished from the preceding Uinta phase by a dramatic decline in radiocarbon dates possibly related to a decline in population density.

#### **Proto-Historic Period**

The Proto-Historic period begins sometime after 300 years B.P. with the first European trade goods to reach the area, and ends with the development of the Rocky Mountain fur trade 150 years ago. The Wyoming Basin was the heart of Shoshone territory during this period, with occasional forays into the area by other groups such as the Crow and Ute (Smith 1974). The most profound influence on native cultures during this time was the introduction of the horse enabling Native Americans to expand their range. Metal projectile points have been recovered from both surface and subsurface contexts in southwest Wyoming.

#### **Historic Period**

Historic use of the area is limited by the formidable topographic relief. Steep canyons, inadequate water supply, badlands, and escarpments make the area inhospitable for settlement with only limited ranching activities present. Seven historic ranches have been recorded in the study area and grazing/sheepherding activities (n=21) have also been documented. Fur trapping and trading was not an important occurrence in the study area due to lack of perennial streams. The Overland Trail crosses the general area trending east to west. The Rawlins to Baggs Road transects the area, trending northeast to southwest.

#### **Summary of Extant Cultural Resources**

##### **Historic Sites**

Seventy-one historic sites have been documented in the surrounding area. Site types include historic trails, stage roads, stage stations, ranches, cairns, and debris. Two of the historic sites are linear trails/roads that cross the area. The Overland Trail and the Rawlins to Baggs Road transect the area. The Overland Trail and the Rawlins to Baggs Road are recommended eligible for inclusion on the NRHP.

According to Gardner et al. (1993) only one trail guide, published in 1859, for the Overland Trail is known to exist. Written by O. Allen, it states: "This road is only practicable for light vehicles from Bridger's Pass to Fort Bridger, inasmuch as heavy teams cannot cross the frail bridges erected over Muddy Creek. Summit of Bridger's Pass - Good grass may be found along the water courses and valleys through the section of the country. Bridger's Pass is a deep cut in the mountains, about one mile wide and 18 long, terminating in a narrow gorge or Canyon along Muddy Creek, some twelve or thirteen miles long. This Pass is always practicable, even in winter, when other passes are entirely closed....Muddy Creek - this stream furnishes abundance of speckled trout; cherries, and currents abundant in the fruit season; from this point the road continues down the valley of Muddy Creek, and crosses the creek six times to avoid rocky points at short distances along the creek. 4 miles. Historic inscriptions have been found along the Overland Trail. Two of these sites are located three miles west of Doty Mountain and one is located three miles south of Baldy Butte. All three sites are located on the west-face of the ridge overlooking Muddy Creek.

Stage stations were important to westward migration. The Washakie Stage Station (listed on the NRHP) and Sulphur Springs Stage Station, were stops along the Overland Trail. Gardner et al. (1993) states: "Construction of stage stations at Sulphur Springs, Washakie, and Duck Lake more than likely took place in 1862." This time frame coincides with Ben Holladay beginning his Overland Stage venture to connect Denver, Colorado, with Salt Lake City, Utah. The Rawlins to Baggs Stage Road (48CR3648) was a route used to freight goods, mail, and passengers from Rawlins to Baggs, Wyoming, and further south into northern Colorado. According to Rosenberg (1994) the route was first used in 1881 and was known as the Rawlins to White River, the Rawlins, and the Snake River Road. The route was later labeled the Baggs to Rawlins Road (1916).

Historic trails rarely follow a single route across the landscape. Instead, numerous parallel or alternate routes may be evident as a result of travelers adjusting to specific conditions along the trails. Trail trace varies dramatically in its condition. The segments may be in original condition or may have been subject to disturbance by previous construction projects, other human influences (recreation or off highway travel, etc.) or natural factors including erosion. Historic trail setting is characterized as those elements of integrity of location, feeling and association that contribute to the eligibility of the trails or associated sites. Ranching/stock herding sites in the area are generally sheepherder camps exhibiting hole-in-top cans and purple glass. Refuse left behind from tending herds is usually located on terrain with a good view to watch over the herds as well as water. Historic cairns, often associated with sheep herding, are located on ridges or high points, sometimes overlooking seasonal drainages. Historic debris/trash sites are found distributed throughout the area. These scatters usually include trash associated with emigration and ranching/herding activities.

**Summary**

The subsistence and settlement patterns reflect a hunter-gatherer lifeway. Research into the subsistence and settlement patterns used during the Archaic period indicates summer occupations in the mountains, winter occupations in the foothills, and spring and fall movements utilizing all available zones (Creasman and Thompson 1997). Subsistence patterns in the Archaic period and the Late Prehistoric period are similar in that they are based on seasonal movement throughout the basins and foothills in response to the availability of floral and faunal resources (Creasman and Thompson 1988). Cultural resources are found along the major ephemeral drainages and along the lower benches of escarpments that dominate the terrain. Sensitive areas include drainages such as Muddy Creek. The numerous springs in the project area would be likely to contain cultural resources. Certain topographic settings have higher archaeological sensitivity such as eolian deposits (sand shadows and sand sheets), alluvial deposits along major drainages, and colluvial deposits along lower slopes of ridges. Previous investigations along the Savery Creek drainages, east of the project area, support a higher site potential along streams. Historic use of the project area was limited by terrain and lack of perennial water sources. Historic trails and stage stations are located near the project area. Ranches, irrigation, grazing and limited ranching activities are identified by the historic debris scatters and historic record.

Western Archaeological Services, Atlantic Rim EIS, 2005

**Environmental Consequences** (also refer to Chapter 4 of the "The Atlantic Rim Natural Gas Project, Doty Mountain Pod EA")

Table 5 Critical Element	Affected		Critical Element	Affected	
	Yes	No		Yes	No
Air Quality	X		T & E Species		X
ACEC's		X	Wastes, Hazardous/Solid		X
Cultural Resources	X		Water Quality	X	

Prime/Unique Farmlands		X	Wetlands/Riparian Zones		X
Floodplains		X	Wild & Scenic Rivers		X
Native American Rel. Concerns		X	Wilderness		X
Environmental Justice		X	Invasive, Nonnative Species	X	

**Water Resources** (also refer to section 4.5 of the *"The Atlantic Rim Natural Gas Project, Doty Mountain Pod EA"*)

**Proposed Action**

No surface discharge of produced waters is planned for this project. The use of water for livestock watering in contained systems is anticipated, however these systems would have shutoff valves to prevent discharge of water directly onto the surface. The Company would ensure that produced water is not spilled and that it would not come in contact with surface waters in the Project Area. Because water produced by the project would be injected, no surface waters of the state would be affected by the management of produced water by water disposal. All water injection wells would be permitted with the state agency that regulates the facilities, including but not limited to the Wyoming Oil and Gas Conservation Commission (WOGCC) or Wyoming Department of Environmental Quality (WDEQ).

Water pumping from these wells is intended to lower the hydraulic head in the coal seam aquifer. The reduction of hydraulic head in an aquifer also is referred to as drawdown. Water production is expected to be approximately 350 barrels of water per day (bwpd). With 26 producing wells this is expected to be an additional approximately 9,100 bwpd of water produced for the Doty Mountain Pod. This makes approximately 16,700 bwpd. Typical water injection wells can handle at least 5,000 bwpd, therefore with a total of five injection wells they would have a capacity of 25,000 bwpd. This plan should allow for excess injection capacity for the Doty Mountain Pod.

**Targeted Producing Formation:**

The targeted coal seams are classified as confined to semi-confined aquifers because they are bounded by confining layers that consist of impervious to semi-pervious layers of shale and siltstone (aquicludes). Hydraulic connection between the coal seams and any aquifer stratigraphically above or below the coal seams is expected to be limited. The hydrostatic head of the water measured in test wells completed in coal seams in the Project Area can be considerably higher than the aquifer or even the elevation of the ground level at a specific well location. Confined, or artesian, aquifer conditions of this type indicate an effective seal above and below the aquifer. However, lowering the hydraulic head in the coal seam aquifers by removing water may induce a leakage through the semi-pervious shale layers into the pumped aquifer. If this were to occur, the volume of water needed to be removed to induce gas migration to the well bores would increase. Since the original pod wells have been pumping for a few years this situation is not likely to occur. Therefore the assumptions above are reasonable, current water production rates from the Doty Mountain Pod are approximately 320 bwpd per well.

**Injection Zone and Water Disposal:**

The proposed injection targets are the Cherokee and Deep Creek Sandstones that occur about 4,400 to 5,300 feet below the surface. The injection wells are stratigraphically below existing water wells. It is anticipated that the produced water that would be injected would be of equal or higher quality in regards to class of use as defined by WDEQ Ground Water Division regulations. The only likely effect on the injection horizons would consist of an increase in the hydraulic head emanating from the injection well, which would dissipate with

distance away from the wellbore. In terms of water quantity and quality, the effect of the Proposed Action on the injection horizon is expected to be minimal.

The proposed deep injection wells would be drilled, cased, and cemented from total depth (50 feet below the base of the Cherokee or Deep Creek Sandstone) to the surface. These sandstones are isolated above and below by competent shale. Maximum pressure requirements to prevent initiation and propagation of fractures through overlying strata to any zones of fresh water would be determined and would be regulated by the State of Wyoming and the BLM. The results of the open-hole log and injectivity test would be provided to the regulatory agencies. The injectivity tests will be used to determine the fracture pressure limits that will be imposed to insure the overlying shale is not breached. In addition, before produced water is injected, water from the Cherokee or Deep Creek Sandstones (or both) would be analyzed and the results provided to the regulatory agencies. Produced water would come from coals in the Mesaverde Group.

Before the injection wells are completed, water produced from the wells may be transported to nearby drilling locations and used for drilling and completion activities in the operation of additional wells. Formation water may be temporarily contained in the reserve pit during drilling and well completion activities. During the testing period, produced water from the Mesaverde aquifer will be contained in closed tanks on location or trucked to an authorized disposal well, pending the completion of flowlines for produced water. Fracing fluids also will be contained in closed tanks on location. All closed tanks on location will be encompassed by protective berms. Once all wells have been drilled, water produced at the well sites would be gathered and transported to the injection wells for disposal.

Produced water would be collected in a buried polyethylene flowline (pipeline) for transport to a water disposal facility. The water disposal facilities would be approved by the WOGCC or the WDEQ and the private surface owner, as required. To keep surface disturbance to a minimum, ditches would combine as many pipelines as possible (water, electricity, and gas). BMPs would be used to control erosion and divert overland flows away from the facility. Centrifugal pumps, reciprocating pumps, filter systems, and tanks at the disposal facility would be used to remove solids from the water stream and to pump the water at pressures sufficient to allow downhole disposal.

The fracture gradient of the shale aquitards that overlie and underlie the injection horizons will not be exceeded based on injectivity tests and applicable permit limits. Thus, injected water would be contained in the injection horizon and would not likely migrate vertically. For this reason, the injected water is not expected to degrade water quality injection aquifer or other aquifers.

If it is not possible to safely inject the volume of produced water planned into the proposed injection wells, some or all of the wells would be shut in temporarily while alternative plans are developed and approved. These alternative plans would include additional injection wells.

#### **Other Groundwater Resources:**

The groundwater would be removed from a formation that is stratigraphically lower than and hydraulically isolated from shallow groundwater sources that are developed by water wells. The proposed injection zone is also stratigraphically lower than the shallow groundwater sources. Shallow groundwater sources (stratigraphically above the Mesaverde coal zones) are not likely to be affected by the project.

Information about the groundwater system in the Project Area could be obtained in three ways: first, by monitoring the quality of produced water; second, by monitoring the volume of water produced over time during testing and production;

and third, by measuring pressures and/or water quality samples from monitoring wells.

**Surface Water Resources:**

Potential effects on surface water resources would include increased surface water runoff and off-site sedimentation caused by soil disturbance, impairment to surface water quality, and changes in stream channel morphology caused by construction of roads and pipeline crossings. Effects on surface water resources would depend on:

- The proximity of the disturbance to a drainage channel,
- The aspect and gradient of the slope,
- The degree and area of soil disturbance,
- Characteristics of the soil, duration of construction, and
- Timely implementation and success or failure of mitigation measures.

Impacts from construction would likely be greatest in the short term and would decrease in time as a result of stabilization, reclamation, and revegetation. Construction disturbance would not be uniformly distributed across the Project Area, but instead would be concentrated near drill locations and access roads.

Surface disturbance associated with drilling and installing pipelines and utilities would increase the potential for erosion and the sediment and salt load in the Muddy Creek drainage. These disturbances include removing vegetation and stockpiling topsoil, constructing roads, and digging shallow excavations for drill pads or facilities. The Company would implement the mitigation measures described in Affected Environment section of this EA, to control wind and water erosion at disturbed sites and provide for re-establishment of vegetation on disturbed areas. These measures, collectively, would represent BMPs for erosion control. Impacts to water resources are not likely to be significant with the proper application of the applicant committed measures and BMPs described in Appendix "A".

Water for use in drilling the wells would be obtained from existing wells completed in the coal seams of the Mesaverde Group. Approximately 700 barrels of water (almost 30,000 gallons) would be needed to drill each well. The actual volume of water used in drilling operations would depend on the depth of the well and any losses that might occur during drilling. In all, the proposed project would require nearly 100,000 gallons (or 0.3 acre-feet) of water per well for drilling, preparation of cement, well stimulation, and dust control.

**Potential Water Depletions to Colorado River Basin Surface Waters:**

The geologic structure of the Washakie Basin as described in Chapter 3 of the Environmental Assessment for the Atlantic Rim Interim Drilling Project, Doty Mountain Pod (Doty Mountain EA) is a series of sedimentary beds that are generally dipping to the west south-west. Groundwater generally flows west-southwest from the higher elevations along the Sierra Madre Uplift toward the low-lying center of the Washakie Basin and the major streams (Collentine et al. 1981). The Mesaverde Group is approximately 6,500 feet below the surface under Muddy Creek near Highway 789 and about 2,000 feet below the surface in the Doty Mountain Pod Area. Therefore water from the Mesaverde Group is most likely confined due to the Lewis Shale (approximately 1,000 to 3,000 ft. thick) formation above this group, the steep dip of the formations to the west south-west and the general movement of groundwater in this same direction. There is a potential for the Mesaverde to be connected to surface waters through fractures, however none are currently known or have been identified. There is no significant faulting down gradient from these wells, hence no likely natural opportunities for this water to contribute to surface waters through artesian springs.

In addition to geologic argument, isotopic analysis has been performed on groundwater collected from numerous wells constructed within the interim drilling Pods. Groundwater samples from 1 CBNG well in the Doty Mountain Pod was analyzed for tritium, a radioactive isotope of hydrogen, and deuterium and 180 stable isotopes of hydrogen and oxygen. Tritium is a naturally occurring isotope that occurs at much higher concentrations in waters precipitated after nuclear testing in 1952. The absence of tritium in groundwater is indicative of water that was isolated from the atmosphere prior to the early 1950s. The information from this isotope, therefore, indicates if water was recharged in the last 50 years. If so, it would be assumed that flow through the formation (transmissivity) would be greater than what could be predicted from the geology and hence may mean there is a connection to surface waters. The tritium content of the eight samples indicates pre-1950s recharge.

Further, the isotopic ratios of 180 and deuterium indicate that the groundwater was isolated from the atmosphere when the mean temperature was approximately 10 degrees cooler than the present. Since temperatures this low are associated with the Pleistocene Epoch, which ended approximately 10,000 years ago, this information suggests that groundwater flow through the Mesaverde Group coals is sluggish and apparently not closely connected to nearby surface water supplies. Although this test is not entirely conclusive it does confirm the geologic arguments.

Additional data from pressure sensors in monitoring wells is being collected and analyzed, additional isotopic samples are planned for surface waters, a groundwater model was also built to test some of the assumptions made and surface water monitoring is planned. These different avenues should further test the assumption of this analysis that waters in the Mesaverde group are not connected to surface waters.

#### **No Action**

Under the No Action alternative, the coordinated plan of development described under the Proposed Action would not be approved. No additional effects on water resources would be expected to occur if the proposed wells are not drilled. Demand for natural gas locally and nationally, however, likely would result in new proposals for exploration and development of the Project Area. Future mineral development in the Project Area would occur by development of individual wells with no coordinated planning for the cumulative impacts.

**Wildlife and Fisheries** (also refer to section 4.8 of the *"The Atlantic Rim Natural Gas Project, Doty Mountain Pod EA"*)

#### **Wildlife**

##### **Proposed Action**

The analysis of potential direct, indirect, short-term, and long-term impacts to terrestrial wildlife species was based on documented species' use of the area, associated habitat values, relative degree of historical and ongoing mineral (e.g., CBNG) exploration and development activities in and near this proposed project and its ancillary facilities (i.e., Proposed Action). Direct habitat losses would result from well pad, access road and utility line construction, and indirectly from increased human presence. Short-term impacts arise from habitat removal and disturbance, as well as from activities associated with construction, drilling and production. These impacts would cease upon project closure and completion of successful reclamation. Long-term impacts would consist primarily of permanent changes to habitats and the wildlife populations dependent on those communities. Historically, the area has experienced a low to moderate level of CBNG exploration; however, the area habitats, terrain, and landscape features support a diverse number of terrestrial wildlife species. The Proposed Action's project components were examined relative to the temporal and spatial patterns of

both resident and migratory wildlife species and the current wildlife population trends apparent in the project area.

The project would cause a loss of natural habitats in areas where well sites, facilities, and access roads would be constructed. An estimated 147.5 acres would be affected in the short term by surface-disturbing activities during drilling and testing.

Should the exploratory wells be productive, the surface areas required for roads or production facilities would not be reclaimed until production ends, which could be within 10 to 20 years. An estimated 25.6 acres (including 1.5 acres of federal land) could be affected by production facilities over the long term.

The Proposed Action proposes a fairly contained drilling scenario of 26 vertical CBNG wells and 3 injection wells; however, the placement and density of these wells entirely within these three private sections would fundamentally result in 80-acre well spacing for the project. The presence of the existing road combined with the previous, current, and proposed gas exploration and development activities would reduce the overall habitat values and associated carrying capacities of these native habitats on a local scale and increase overall habitat fragmentation for area wildlife species. The potential direct loss of wildlife species from project construction would be expected to be low to moderate, depending on the species (as discussed below), and habitat fragmentation and animal displacement would be moderate to severe, as discussed in more detail for each species or animal group.

Direct and indirect impacts to terrestrial wildlife species from an increase in human presence are generally proportional to the size and duration of the project, construction work force, overall land use, recreational demands (e.g., hunting ORV use), and other regional activities. Increased noise levels during project construction and operation often results in some animal displacement in both the short and long term. Typically, animals either avoid noise sources or become accustomed to the increased noise levels. Abrupt and intermittent noises would be more likely to disturb individuals than the more continuous noises (e.g., traffic, equipment operation). The severity of the potential impacts from both an increase in human presence and increased noise levels would depend on factors such as the species' sensitivity, seasonal use patterns, the type and timing of project actions, noise sources and duration, and physical parameters (e.g., buffering capacity of area topography, cover, forage, other environmental factors).

The Proposed Action would result in 147.5 acres of new disturbance (direct habitat loss). The habitat type impacted by new surface disturbance associated with this project is sagebrush. Of the 147.5 acres of disturbance estimated for the Proposed Action, 121.9 acres would be reclaimed in the short term, and 25.6 acres would be reclaimed in the long term, following project closure.

The disturbance of wildlife habitat would reduce habitat availability for a variety of small birds and mammals. The temporary disturbances that occur during the construction period would tend to favor early succession wildlife species such as ground squirrels and horned larks and would have more impact on mid-to-late-succession species such as sage sparrows, sage thrashers, and voles. The long-term disturbance acres would have a minor effect on wildlife species not dependant upon shrubs. In addition to the direct disturbance acreage, dust would directly and indirectly impact 15 to 30% more acreage. These impacts would include habitat avoidance by birds, mammals, and insects. Indirectly, this may increase inter- and intra-species competition for nesting and foraging areas; in areas already fully occupied, density dependant species would be further displaced, possibly outside of the project area. This may force animals to utilize lower quality habitats, which may lead to a reduction in reproduction rates or an increase in predation. Dust not only directly impacts the plants, but also reduces plant palatability for livestock and wildlife.

During the production phase, pipelines and the unused portion of well sites would be reclaimed. After production operations end (the life of the project is estimated at 10 to 20 years), the well field and ancillary facilities would be reclaimed and abandoned. Well pads would be removed; the areas would be revegetated with seed mixes approved by the BLM, and some are specifically designed to enhance wildlife use. The duration of impacts to vegetation would depend, in part, on the success of mitigation and reclamation efforts and the time needed for natural succession to return revegetated areas to pre-disturbance conditions. Grasses and forbs are expected to become established within the first several years after reclamation; however, much more time would be required to re-establish shrub communities. Consequently, disturbance of shrub communities would result in a longer-term loss of the specific habitat.

In addition to the direct loss of habitat caused by construction of well pads and associated roads and pipelines, disturbances from human activity and traffic would lower use of habitat immediately adjacent to these areas. Species that are sensitive to indirect human disturbance (both noise and visual) would be most affected. Habitat effectiveness of these areas would be lowest during the construction phase, when human activities are more extensive and localized. Disturbance would be reduced during the production phase of operations, however, and many animals may become accustomed to equipment and facilities in the gas field and return to habitat adjacent to disturbance areas.

#### **Big Game**

In general, effects on big game would include direct loss of habitat and forage and increased disturbance and noise from drilling, construction, operation, and maintenance operations. Disturbance of big game during the parturition period and on winter range can increase stress and may influence species distribution (Hayden-Wing 1980; Morgantini and Hudson 1980). There may also be a potential for an increase in poaching and harassment of big game, particularly during winter. According to management directives in the RMP (BLM 1990), crucial big game winter ranges would be closed to construction and development from November 15 through April 30 on public lands. This seasonal closure of crucial winter ranges would reduce disturbance to wintering big game on public lands but not on private lands. However, all construction and development is planned to be completed prior to the big game wintering stipulation. The BLM stipulation of prohibiting construction and other activities potentially disruptive to wintering wildlife on public land during the period of November 15 to April 30 for the protection of big game winter habitat would minimize the potential for direct and indirect disturbance of wintering mule deer and pronghorn during construction phases. It does not address the potential loss of wintering habitat due to the presence and operation of wells in winter range for the life of the project after construction is complete.

A portion of the Project Area has been designated as winter/yearlong range for pronghorn antelope. Pronghorn likely migrate through the project area toward crucial winter/yearlong range located northwest of the Doty Mountain POD boundary (HWA 2003). Assessing the potential impacts to pronghorn (also commonly referred to as antelope) from implementing the Proposed Action is somewhat complex, discerning between direct and indirect impacts. Some perception of pronghorn use in and near oil and gas development projects is that some individuals may habituate to project construction and operational activities in both the short and long term. Over time, some individuals may habituate to certain disturbances, depending on the spatial relationship (i.e., distance) between these areas of disturbance to available forage, water, and thermal cover. However, this is true for only certain individuals within a population. Other individuals may exhibit a lower tolerance to certain human-related activity thresholds. Therefore, animals within a population may respond differently to construction and operational actions. Rawlins Field Office biologists have noted anecdotally that in impacted areas, antelope herd sizes are significantly smaller

than in relatively pristine areas. Those animals that potentially acclimate seem to do so only in smaller herd sizes; in undisturbed areas, the herds are much larger and show flight responses at much greater distances than in disturbed zones.

The Project Area is designated as winter/yearlong mule deer range with 267 acres of crucial mule deer winter range all occurring within section 15 of Township 17 North, Range 91 West. Currently, a mule deer collaring study is on going to determine migration corridors in the area. The first years results of this study shows that a portion of section 15 may be part of a migration corridor for deer wintering in the Dad area along the Muddy creek to Muddy Creek Canyon which move to summer ranges on Atlantic Rim or Miller Hill.

The proposed well density (i.e., approximate 80-acre spacing) is considered to be dense for big game ranges. The influence of each project component effectively extends outside the surface disturbance footprint, which is generally determined by the individual animal's avoidance and stress responses to an activity or facility. These factors not only reduce the associated habitat value of the adjacent areas, they also extend the displacement zone of individuals. Consequently, development impacts to wildlife can extend further offsite than the actual amount of disturbed area. The WGFD Oil & Gas Mitigation Guidelines (2004e) note: "As densities of wells, roads, and facilities increase, the effectiveness of adjacent habitats can decrease until most animals no longer use the habitat. Although vegetation and other natural features may remain unaltered within areas near oil and gas features, wildlife makes proportionately less use of these areas than their availability. Animals attempting to forage inside the affected zones are also subjected to increased physiological stress. The avoidance/stress effect impairs function by reducing the capability of wildlife to use the habitat effectively. In addition, physical or psychological (i.e., disturbance-related) barriers lead to fragmentation of habitats and further reduce the availability of effective habitat. These impacts can be especially problematic when they occur within limiting habitat components such as crucial winter ranges and reproductive habitats."

Although a native range's carrying capacity for wildlife may vary, based on precipitation levels and vegetative trends, the proposed well density and extent of ancillary facilities in the immediate project area would reduce the relative carrying capacity of the crucial winter range in the drilling area. The habitat fragmentation and animal displacement would result in the under use of habitats in close proximity (within .5 miles) to the disturbance areas (i.e., a reduction in habitat value); increased animal densities on remaining habitats; and increased stress from intraspecific and interspecific competition. The degree of mule deer displacement and reduction in habitat values would vary, depending on the habitat types, vegetative cover (forage and thermal), topography, aspect, existing population dynamics, traffic levels, and future road use. Displacement would result in local reductions in wildlife populations if adjacent, undisturbed habitats are at carrying capacity. In this situation animals are either forced into less than optimal habitats or they compete with other animals that already occupy unaffected habitats. Possible consequences of such displacement are lower survival, lower reproductive success, lower recruitment, and ultimately lower carrying capacity and reduced populations (Oil and Gas Mitigation Working Group 2004).

The WGFD (2004e) developed recommended minimum recommendations for oil and gas development in crucial and other important wildlife habitats on BLM lands. These management guidelines were structured to provide a management tool to be implemented on a programmatic basis on BLM lands in Wyoming. In this review, the WGFD classifies "important wildlife habitats," based on certain defining factors. "Vital habitats" are defined as "directly limit[ing] a community, population, or subpopulation, and restoration and replacement may not be possible." Big game crucial winter ranges are classified as "vital habitats," and the WGFD recommends "no loss of habitat function" for these areas (WGFD 2004e).

The project area is located within the Sierra Madre Elk Herd Unit (2,425 square miles). Habitat in the area is designated as elk winter range. Activities associated with the construction phase of the project would likely displace mule deer and elk. During winter, the elk migrate to winter range habitats at lower elevations on the western side of the Sierra Madre Mountains and into the Atlantic Rim and Sand Hills areas just east of the project area. Some animals may migrate as far west as the Powder Rim, located 40 miles west of Baggs (HWA 2002). Habitats in the project area are designated as elk winter range.

The amount of vegetation disturbed is not as important as the noise and activity levels that would still occur and result in displacement of elk. In addition to the direct removal of habitat due to the development of pads and associated transportation facilities, disturbances from drilling activities and traffic would affect utilization of the habitat adjacent to these areas (Powell 2003). Elk are more sensitive to human activities than pronghorn or mule deer, and they may be displaced from construction areas by 0.75 - 2 miles (Brekke 1988, Gusey 1986, Hiatt and Baker 1981). Displacement would be reduced in areas with topographic barriers (Edge and Marcum 1991). Elk would likely habituate to the physical presence of gas wells (Ward et al. 1973, Ward 1976, Hiatt and Baker 1981, Perry and Overly 1976). However, elk rarely adjust to continued human presence required during the production phase of the project (Thomas and Toweill 1982). With the increase in roads and potential recreational access to the area, displacement of elk is extremely likely during all phases of development. To reduce human presence, remote monitoring of project facilities would be utilized to the greatest extent possible during the production phase.

Although some individual animals can habituate to the increased infrastructure, it is generally assumed that, overall the increased human footprint on a previously lightly developed area is detrimental to big game species. As well, acclimation to activity may increase predation on some species.

#### ***Upland Game Birds***

The project area incorporates habitat for three known greater sage grouse leks the Doty Mountain Lek, Dry Cow 2 Lek and Dry Cow 3 Lek. The Doty Mountain lek was discovered in 1978 with 15 strutting male birds. The last time grouse were observed on this lek was in 1982. Currently, the lek status is determined to be unknown and is provided protection until the Wyoming Game and Fish determine this lek to be unoccupied. The Dry Cow 2 Lek was discovered in 1978. The last time birds were observed on this lek was 1988. Currently, the lek status is determined to be unknown and is provided protection until the Wyoming Game and Fish determine this lek to be unoccupied. The Dry Cow 3 Lek was discovered in 1978. This lek had been active up through 2004/05 when a pipeline was built through the lek. In 2006, no birds were observed on the lek. This lek will continue to be protected until such time the Wyoming Game and Fish determine this lek to be unoccupied. Some of the sagebrush habitat on private land within the project area has been treated. This vegetation treatment may have an impact on greater sage-grouse nesting habitat within the project area; however the area overall still provides good nesting habitat. The project area may contain additional leks which have yet to be identified.

Greater sage grouse are of special concern because populations throughout the west have been declining. Under the Proposed Action, 136.9 acres of the Wyoming big sagebrush vegetation cover type located within the Project Area would be disturbed during construction over the short term and 25.6 acres would be disturbed in the long term. This amount of habitat disturbance is minimal considering the amount available in the Project Area, however, greater sage grouse can be affected by other activities associated with development, including increased human activity, increased traffic disturbance, and noise from pumping or compressor engines. Increased noise that occurs in sensitive resource areas could affect the ability of greater sage grouse to mate. Greater sage grouse exhibit site fidelity to leks, winter areas, summer areas, and nesting areas (HWA

2003). Therefore, steps should be taken to ensure that impacts to these areas, especially leks and nesting areas, are minimized.

The RMP contains mitigating measures that would protect nesting greater sage grouse from February 1 to July 31 on public lands, including strutting grounds and nesting habitat. Exceptions may be granted, however, if the activity would occur in unsuitable nesting habitat. Controlled surface use (CSU) stipulations are applied within ¼-mile around active leks on public lands. The portion of the Project Area included within the 2-mile buffer of an active greater sage grouse lek is a sensitive resource area for the protection of nesting habitat.

*The project proponent has moved two well locations and an access road in section 21 to avoid the ¼ mile buffer around a lek on private land. However, the project proponent has not committed to the timing stipulation on private lands that are applied to public lands for nesting greater sage-grouse. Therefore, this project may impact nesting greater sage-grouse if well pads are built during the March 1 to July 15 time period.*

### **Raptors**

The principal potential effects of the project on avian species could be nest abandonment and reproductive failure caused by project-related disturbance and increased noise. Other potential effects involve increased public access and subsequent human disturbance that could result from new construction or production and from small, temporary reductions in prey populations for raptors. Construction activities may dissuade raptors from nesting at these sites in the future. Above ground electrical transmission lines are not included in the project; therefore, there would be no potential effects.

As discussed for big game species, some raptors exhibit varying tolerances to human-related disturbances (e.g., increased presence, noise). Species, such as the ferruginous hawk and golden eagle are more susceptible to disturbances and may more readily abandon nest sites in the proximity to project actions. Ferruginous hawks are particularly sensitive to disturbance during the breeding period. An increase in human-related activities (e.g., presence, noise, pedestrian, or vehicle traffic) could directly impact nesting raptors, if they occur in close proximity to the nest site. Loss of eggs or young would be in violation of the Migratory Bird Treaty Act, and if the nest were occupied by a golden eagle, potential loss of eggs or individual birds in addition to disturbance to adult birds would be in violation of the Bald and Golden Eagle Protection Act.

Mitigating measures for public lands contained in the RMP for oil and gas projects state that no activity or surface disturbance would be allowed near raptor nesting habitat from February 1 through July 31. The size of the restrictive radius and the timing on the restriction may be modified depending on the species of raptor and whether the nest is within the line of sight of construction.

However, the project proponent has not committed to the timing stipulation on private lands that are applied to public lands for nesting raptors. Therefore, this project may impact nesting raptors if well pads are built during the February 1 to July 31 time period. Currently, data collected by HWA in 2001 for the Atlantic Rim EIS identifies 5 potential nest locations that may be affected by the project. At this time it is unknown if any of these nests are active in 2006.

## Threatened and Endangered Species - Wildlife and Fish

### **Wildlife Species**

The following wildlife species are threatened, endangered, or proposed for listing under the ESA: black-footed ferret; bald eagle; and Canada lynx. These species may occur in or near the Project Area according to the FWS; therefore, potential impacts to these species that could occur under the Proposed Action are considered.

**Black-footed Ferret** In Wyoming, white-tailed prairie dog colonies provide essential habitat for black-footed ferrets. Ferrets depend almost exclusively on prairie dogs to obtain food, and they rely on prairie dog burrows for shelter, parturition, and raising young (HWA 2002). Prairie dog towns must be larger than 200 acres and the burrow density must be greater than or equal to eight burrows per acre to be considered suitable habitat for black-footed ferrets (HWA 2002). No prairie dog towns were observed during a field site visit to the project area.

**Bald Eagle** Although incidental sightings have occurred near the Project Area, no bald eagle nests were found within a 2-mile buffer of the Project Area during surveys in 2001 (HWA 2003). Bald eagles feed on road-killed carrion in the Project Area, and workers should be educated about the danger of striking a bald eagle with a vehicle.

**Canada Lynx** The Canada lynx is not expected to occur within the Project Area because of the lack of potentially suitable habitats. Thus, implementation of the project is not expected to affect Canada lynx.

### **Fish Species**

Four federally endangered fish species may occur as downstream residents of the Colorado River system: Colorado pikeminnow (*Ptychocheilus lucius*), bonytail (*Gila elegans*), humpback chub (*Gila cypha*), and razorback sucker (*Xyrauchen texanus*) (USDI-FWS 2003).

The occurrence of these endangered fish species has not been confirmed in the Muddy Creek drainage or downstream in the Little Snake River, and is highly unlikely. If any of these species is identified within the downstream portion of Muddy Creek or immediately downstream in the Little Snake River, the BLM would consult with the FWS and develop a protection plan for the fish. Given these precautionary measures, no adverse impacts to any of these species would be expected to result from the project.

Although they currently only exist downstream of the project area, water draining from the project area contributes to the downstream habitat of these species. Under the Recovery and Implementation Program for Endangered Fish Species in the Upper Colorado River Basin (RIP), "any water depletions from tributary waters within the Colorado River drainage are considered as jeopardizing the continued existence of these fish." Tributary water is defined as water that contributes to instream flow habitat. Depletion is defined as water which would contribute to the river flow if not intercepted and removed from the system. However, depletions within the study area are not expected.

If the recovery program is unable to implement the RIP in a timely manner or make sufficient progress in recovery of these endangered species, re-initiation of Section 7 consultation may be required so that new reasonable and prudent alternatives can be developed. The FWS has determined that progress made under the RIP has been sufficient to merit a waiver of the mitigation fee for depletions of 100 acre-feet per year or less (Memorandum dated March 9, 1995 to Assistant Regional Director, Ecological Services, Region).

Under the proposed action, the primary source of potential risks to these fish species is increases in suspended sediments and sedimentation from land disturbance from project activities. No produced water from the project area would be discharged to the Little Snake River drainage; therefore, produced water discharges do not pose a risk to these species. Accidental releases of produced waters or other materials could occur. However, these materials would become highly diluted before they would reach any downstream waters where these species occur; consequently, the potential risks from such occurrences are negligible.

**Colorado Pikeminnow** Suitable habitat for the Colorado pikeminnow does not exist on the project area. Suitable habitat does exist downstream of the project area in the Yampa and Green Rivers; however, the Proposed Action is not expected to affect this habitat provided that mitigation measures for water resources and soils outlined in this document are implemented.

**Bonytail** Suitable habitat for adult bonytail is absent from the project area. Suitable habitat does exist downstream of the project area in the Yampa and Green Rivers; however, the Proposed Action is not expected to affect this habitat provided that mitigation measures for water resources and soils outlined in this document are implemented.

**Humpback Chub** Suitable habitat for adult humpback chub is absent from the project area. Suitable habitat does exist downstream of the project area in the Yampa and Green Rivers; however, the Proposed Action is not expected to affect this habitat provided that mitigation measures for water resources and soils outlined in this document are implemented.

**Razorback Sucker** Suitable habitat for this species is not available on the project area. Suitable habitat does exist downstream of the project area in the Yampa and Green Rivers; however, the Proposed Action is not expected to affect this habitat provided that mitigation measures for water resources and soils outlined in this document are implemented.

#### **Species of Concern-Wildlife and Fish**

##### **Wildlife**

Effects on BLM wildlife species of concern could occur as a result of loss of habitat or displacement caused by increased noise. Based on the relatively small size of the Project Area, the inherent mobility of the species of concern, and the abundance of potentially suitable habitats nearby, no noticeable effects are expected under the project.

**Mountain Plover** Although no mountain plovers were found during surveys in 2001, the potential exists for effects on mountain plovers if nesting habitat were identified and removed or an active nest were disturbed. Implementation of the project is not expected to affect mountain plovers due to the lack of potential habitat.

##### **Sensitive Fish**

Goals of the BLM Wyoming sensitive species policy and list (BLM 2002) are to: (1) "maintain vulnerable species and habitat components in functional BLM ecosystems, (2) ensure sensitive species are considered in land management decisions, (3) prevent a need for species listing under the Endangered Species Act, and (4) prioritize needed conservation work with an emphasis on habitat." In addition, a Range-Wide Conservation Agreement, signed by multiple states including the Wyoming Game and Fish Department for roundtail chub, bluehead sucker, and flannelmouth sucker has similar goals to minimize actions that would compromise the persistence or recovery of these fish populations throughout their range.

During the construction phase, prior to interim reclamation, erosion of soils exposed during earth-moving activities accelerates fine-sediment loading in stream channels. Though the biological effects of sedimentation include a variety of ecological interactions (Waters 1995), sedimentation can act to shift habitat structure such as channel depth, pool-to-riffle ratio, percent fines in substrates, and cover availability (Angermeyer et al. 2004). This sediment can extend miles downstream of the construction site and persist in stream channels for years (Angermeyer et al. 2004). Channel incision occurs when the base elevation of the stream channel adjusts to account for an alteration of geomorphic parameters such as sediment supply, flow volume, or channel roughness (e.g., riparian vegetation). Channel incision has been shown to simplify channel geometry and result in the loss of pool habitats (Shields et al. 1994).

Research conducted during the summer and fall of 2003 and 2004 within the upper Muddy Creek watershed, including the project area, found the two most consistent habitat associations among sub-adult and adult roundtail chubs, bluehead suckers, and flannelmouth suckers to be positive associations with both rock substrates and deep pools (Bower 2005). Under the Proposed Action, potential impacts to these two habitat features are (1) sedimentation from new construction and project-related land disturbance resulting in decreased availability of rock substrates, and (2) alteration of local hydrologic conditions by construction associated with natural gas development that could lead to sedimentation and channel adjustments resulting in a loss of deep pool habitats. Implementation of reasonable precautions to limit off-site movement of sediment should prevent violations of Wyoming Surface Water Quality Standards that would include "quantities which could result in significant degradation of habitat for aquatic life or adversely affect public water supplies, agricultural or industrial water use, plant life or wildlife" (WDEQ 2001). Given these precautionary measures, implementation of the project is not likely to adversely affect these sensitive fish species.

No surface water withdrawals from Colorado River system drainages are included in the project, and no surface discharge of produced water is planned. In addition, use of water drawn from productive wells would avoid depleting surface flows in Muddy Creek and Little Snake rivers, reducing subsequent adverse impacts to roundtail chub, bluehead sucker, and flannelmouth sucker caused by removal of surface water or near-surface water used for drilling. Therefore, significant impacts to these fish species are not likely to occur as a result of the proposed project.

A special management area (SMA) or area of critical environmental concern (ACEC) for the upper Muddy Creek watershed/Grizzly is currently under review in the form of a draft environmental impact statement EIS for the Rawlins resource management plan (RMP; 2004). The purpose of this SMA is to protect general riparian function and Colorado River fish fauna unique to the Muddy Creek watershed. Sections of the proposed project area occur within the upper Muddy Creek watershed/Grizzly potential ACEC/SMA. One alternative addresses the application of NSO stipulations on all existing leases within ¼ mile of all ephemeral or perennial stream channels. Development within this potential ACEC/SMA prior to completion of the RMP may jeopardize selection of alternatives before completion of the EIS.

#### **No Action**

Under the No Action alternative, the coordinated plan of development described under the Proposed Action would not be approved. No additional effects on wildlife or fisheries or threatened, endangered, or sensitive species would be expected to occur if the proposed wells are not drilled. Demand for natural gas locally and nationally, however, likely would result in new proposals for exploration and development of the Project Area. Future mineral development in the Project Area would occur under the guidelines of the RMP, by development of individual wells with no coordinated planning for the cumulative impacts.

**Recreation** (refer to section 4.9 of the "The Atlantic Rim Natural Gas Project, Doty Mountain Pod EA")

**Proposed action:**

If the proposed access is allowed to the private sections (11, 15, 21, and 27), the associated increase in improved access roads to drill sites would not benefit most forms of recreation because of the corresponding negative impacts to wildlife populations and habitat. If the number of game animals goes down, so does the desirability of the hunt area because the hunter success rate is a primary consideration in choosing a hunt area. Wildlife viewers would have diminished experiences for the same reason - less probability of wildlife viewing opportunities.

**No action:**

Additional improved industrial access to private lands in the DMPA would not occur. Recreation activities would continue in the DMPA using access on unimproved two-track roads.

**Visual Resources** (refer to section 4.10 of the "The Atlantic Rim Natural Gas Project, Doty Mountain Pod EA")

**Proposed action:**

The additional improved roads on BLM lands accessing fee well locations created as a result of authorization of the proposed action would increase visual impacts in the DMPA area. Much of the DMPA area is visible from State Highway 789, Carbon County or BLM roads. Users of the unpaved road network include private property owners, ranchers, hunters, sightseers, wildlife observers and other recreationists. The existing two-tracks have a minimal visual impact compared to the impacts of these same roads when upgraded for industrial use. Upgrading roads increases their contrast with the surrounding environment and adds linear features, attracting the viewer's attention and making them visible from a greater distance.

Visual impacts on BLM lands as a result of this project would be minimal because a minimum of new construction on BLM is proposed. BLM has no jurisdiction over visual impacts on private lands.

**No action:**

Additional improved industrial access to private lands and the associated visual impacts on BLM lands in the DMPA would not occur.

**Cultural Resources** (refer to section 4.11 of the "The Atlantic Rim Natural Gas Project, Doty Mountain Pod EA")

**Impact Significance Criteria for Cultural sites**

Significance is measured by four categories defined by the Code of Federal Regulations (36CFR 60.4): "the quality of significance in American history, architecture, archaeology, and culture present in districts, sites, buildings, structures and objects of state and local importance that possess integrity of location, design setting, materials, workmanship, feeling, and association; and that:

- A. are associated with events that have made a significant contribution to the broad patterns of our history; or
- B. are associated with the lives of persons significant in our past; or
- C. embody the distinctive characteristics of a type, period, or method of

construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or

D. yielded, or may be likely to yield information important in prehistory or history." For archaeological sites, both prehistoric and historic, significance is primarily judged either by the site's ability or potential to yield information important in prehistory or history (Criterion D) or the site's association with events that have made a significant contribution to the broad patterns of our history (Criterion A). Each site's importance, however, is determined individually, so the existence of sites eligible under criteria B or C must not be discounted.

Four Class III cultural resource inventories for four of the previously identified proposed well locations have been conducted on public and private sections. Four access road corridors were examined on private and public surface and one ten-acre block inventory was done on private surface.

Direct impacts would result primarily from construction-related activities. Activities that could affect cultural resources would include grading well pads and associated facilities and construction of roads and pipelines.

Indirect impacts would not immediately result in physical alteration of the property. Instead, indirect impacts to prehistoric sites would result primarily from unauthorized surface collection of artifacts, which could physically alter the sites. At historic properties, these impacts could include bottle or tool collecting or erosion from surface disturbance. BLM has designated a quarter mile buffer surrounding the historic trails as highly sensitive.

#### **Proposed Action**

No historic properties were identified during the inventories however; two historic trails are located in the vicinity. While no well locations or other facilities are proposed within ¼ mile of either of the historic trails, project visibility and affects to their historic settings is likely. Alteration of the environment that abuts eligible historic properties may be considered an adverse direct impact.

**Mitigation Measures under the Proposed Action would be applied on a site specific basics.**

Cumulative effects could be expected to the historic trail setting as a result of this project.

**No Action Alternative** Under the No Action alternative, the coordinated plan of development described under the Proposed Action would not be approved. No additional effects on cultural resources would be expected to occur if the proposed wells are not drilled.

**Cumulative Impacts** (refer to section 4.16 of the "The Atlantic Rim Natural Gas Project, Doty Mountain Pod EA")

#### **Proposed Action**

Approving the Proposed Action would allow Anadarko to start and complete their Doty Mountain Fee Well 2006 Program.

Cumulative impacts would result from the incremental impacts of the project when added to non-project impacts that result from past, present, and reasonably foreseeable future actions (RFFA). RFFA is any development likely to occur within the project area or cumulative impact assessment (CIA) area, within the next 5 years. CIA areas vary between resources and are generally based on relevant landscapes, resources, projects, or jurisdictional boundaries.

The only major resource development currently proposed near the Project Area, other than Anadarko's Doty Mountain Fee Well 2006 Program, is the exploration planned under the Interim Drilling Policy for the Atlantic Rim area. Thus, the effects of this project would not overlap cumulatively with the effects of current or reasonably foreseeable projects or activities other than the interim drilling program, grazing activities, and existing or planned prescribed burns within the Atlantic Rim EIS study area.

Table 1 in the Existing Environment section shows the proposed disturbance expected from the proposed Action. Table 6, below, shows the estimates of disturbed area Anadarko's Doty Mountain Fee Well 2006 Program

**TABLE 6**

**ESTIMATES OF DISTURBED AREA ANADARKO'S DOTY MOUNTAIN FEE WELL 2006 PROGRAM**

Facility	Evaluation Phase				Operations
	Length (feet)	Width (feet)	Area, ea. (acres)	Temporary Acres	Life of Project Acres
Existing Roads and Gathering Lines in original Doty Mtn. Pod <sup>a</sup>	77,000	80	N/A	141	71 <sup>c</sup>
New Roads and Gathering Lines in new proposal 60 foot wide	20,053	60	N/A	28	18 <sup>c</sup>
New Roads and Gathering Lines in new proposal 80 foot wide	32,404	80	N/A	60	30 <sup>c</sup>
Existing Drill Pads in original Doty Mtn. Pod (28)	N/A	N/A	2	56	7
New Drill Pads in new proposal (26)	N/A	N/A	2	52	7
Existing Injection Wells (2)			2	4	4
New Injection Wells (3) <sup>b</sup>	N/A	N/A	0	0.0	1 <sup>d</sup>
Existing Compressor Site			2	2	2
<b>Total Disturbance</b>	<b>129,457</b>			<b>3343.6</b>	<b>140</b>

<sup>a</sup> An 80 foot width was used here because of changes made subsequent to the Doty Mtn. decision document.

<sup>b</sup> The new injection well will be co-located on a proposed well pad.

<sup>c</sup> A reclaimed width of 40 feet was used here.

<sup>d</sup> Each injection well would increase the size of the producing well pad.

The Cumulative Impacts section of the "The Atlantic Rim Natural Gas Project, Doty Mountain Pod EA" (section 4.16.1) gives a good account of cumulative impacts. The Cumulative Impacts presented there would not appreciably change except for the disturbance noted in Table 6 above. Additions and changes to, water resources, wildlife, and fisheries are given below.

**Cumulative Impacts Water Resources** (refer to section 4.16.1.4 of the *"The Atlantic Rim Natural Gas Project, Doty Mountain Pod EA"*)

The CIA area for water resources includes the 188,000-acre portion of the Muddy Creek Watershed that overlaps the Atlantic Rim EIS Project area. There are 154 oil or gas wells listed with current permits, waiting on approval and were not abandoned or shut-in by February 2006 in the CIA area (Based on coverage from Oil and Gas Commission and clipped for the CIA area). Of these wells 79 are producing gas wells, 7 are producing oil wells, 36 have active permits, 9 are injection wells, 12 flowing wells, 8 spudded, 2 listed as monitoring wells, and one waiting approval. If an average disturbance is assumed of 12 acres of short-term disturbance, based on averages from the Desolation Flats area and half of that for long-term disturbance, the CIA contains an estimated 2,000 acres of short-term disturbance and 1,000 acres of long-term disturbance. This is about 0.5 to 1 % of the CIA.

Impacts to water resources from these activities are not typically proportional to the percentage of surface disturbance. This is because roads and pads can change surface runoff dynamics by increasing surface rilling or channelization in localized areas. Drainage crossings and culverts can also restrict flows or cause changes in groundwater surface water interactions that can cause impact in excess of their acres of disturbance. Disturbance in local closed basins may never migrate to surface waters and do to the small and periodic movement of sediment in surface drainage systems soil loss may not transfer to increases in salt and/or sediment loading.

The cumulative effects of other activities in the Muddy Creek CIA, such as prescribed burns that are planned, projected grazing of livestock, recreation use, and conventional oil and gas development, will continue to impact water resources. However, additional water sources in the uplands through the establishment of self-contained troughs served by produced water from this project will reduce some of the concentrated livestock use of riparian areas along Muddy Creek by livestock. Burns, prescribed and otherwise, would increase the potential for erosion and sedimentation for the first 2 years after they occur, because of their effects on erosion of areas without vegetative cover.

Impacts to groundwater are anticipated within the Muddy Creek CIA area. The coal seams in the mesaverde group will have reduced pressure due to gas production in the area. These impacts will likely be isolated to the mesaverde group and impacts to shallower aquifers and surface waters are not anticipated to be significant. Cumulative impacts to the groundwater resources within the Mesaverde Group would be limited to a decline in hydrostatic head within the coal aquifers targeted.

In general, the springs in the area are classic "contact" springs, which result from permeable rocks that overlie rocks of much lower permeability. Along the Atlantic Rim the permeable Browns Park Formation overlies the less permeable Almond Formation. Further evidence that there is no communication between the Almond Formation and the overlying permeable layers is the fact that the Almond Formation is currently overpressured or has a hydrostatic head that is substantially higher than current elevation of the overlying layers. A line of springs can result where this contact is exposed by erosion. No impact to these springs is foreseen from pumping the coal seams in the Almond Formation during the ongoing Atlantic Rim exploration program, since the source of the springs is infiltrating precipitation, and not from the underlying coal seams.

Water wells completed in water-bearing strata above or below the Almond Formation coal seams are not likely to be affected because of the thick shale layers that act as aquicludes.

Surface disturbance would increase the potential for erosion and sedimentation. This disturbance would be associated with related activities, such as removing

vegetation and stockpiling topsoil, road construction, or shallow excavations for drill pads or facilities and existing burned areas within the CIA.

Cumulative impacts to surface water resources would be peak shortly after construction begins and would decrease over time in response to reclamation efforts. These impacts would then stabilize during the production and operation period, when routine maintenance of wells and ancillary facilities takes place. There would be a 25-50 year loss of shrub vegetation where surface disturbance occurs. Re-colonizing from sagebrush dominated areas adjacent to the sites would eventually replace much of this lost vegetation. Section 11 has had a spike treatment (slow release herbicide) that has changed the section from sage brush dominated to grass dominated; therefore impacts from the project will be different in this area and there will be no conversion of sagebrush vegetation. Foreseeable developments of federal sections adjacent to the proposed project are anticipated to be at a similar density and are analyzed in the EIS for Atlantic Rim.

**Cumulative Impacts Wildlife and Fisheries** (refer to section 4.16.1.7 of the "The Atlantic Rim Natural Gas Project, Doty Mountain Pod EA")

#### **Wildlife**

The cumulative indirect effects from the proposed action or alternatives to all wildlife species in general, would come from roads and traffic noise. As roads are developed within and adjacent to the project area, habitat is fragmented and roads serve as barriers to some animal movement. The displacement of species away from roadsides is cumulative in and of itself. Insects, birds, and amphibians all avoid dust and noise from roads which compounds impacts to adjacent habitats throughout the CIA area. Sagebrush obligate species would be affected by the cumulative removal of habitat (reduction or fragmentation of patch size and/or vertical habitat structure) throughout the area, mostly as a result of development in this project and adjacent pod areas.

The CIA area varies with species, as indicated in the analyses. Disturbance of wildlife habitat that results from RFFAs, including the interim drilling program, would reduce the availability and effectiveness of habitat for a variety of common mammals, birds, and their predators. Initial phases of surface disturbance would result in some direct mortality to small mammals, would displace songbirds, and would cause a slight increase in mortality from increased use of vehicles.

Anticipated cumulative effects to big game species is one of the more important terrestrial wildlife resource issues associated with the increased oil and gas development in Wyoming, including the cumulative effects issues examined for this project. Crucial winter range is most important to pronghorn and mule deer during severe storm events, years of high snow pack, or during extended and extreme winter conditions. These environmental conditions force the mule deer into areas that historically contained suitable forage and thermal cover necessary to support animals during periods of stress. However, sagebrush communities across Wyoming are exhibiting late successional stages of relatively even age classes dominated by older plants (>50 years) (WGFD 2004e). Displacement of individual pronghorn and mule deer into adjacent areas of winter range that may or may not be characterized by plants of reduced vigor, productivity, and nutritional quality may contribute to the decline of these populations' distribution and number.

Animals may experience severe physiological stress during the winter period, particularly gestating does, which require higher levels of energy for survival and successful reproduction. Specific to mule deer, Hobbs (1989) determined that human-induced disturbances to mule deer (i.e., two disturbances per day, each

disturbance causing the animals to move a minimum of 1,500 feet) during a severe winter period could double doe mortality. Mule deer in South Dakota require an average of 3.5 to 4 pounds of dry-weight forage per 100 pounds of body weight during the winter season (Richardson and Petersen 1974). Therefore, disturbances during the winter could prevent access to sufficient amounts of forage to sustain individual deer. A deer's ability to survive the winter and a doe's ability to produce viable offspring ultimately depend on the fat reserves, which are continuously used during the winter. Increased stress that causes these fat reserves to be used faster reduces survival for deer and reduces the interuterine survival of fawns. Therefore, increased human activity or harassment combined with a severe winter event could lower deer survival (Richardson 1992; Yarmoloy et al. 1988) and lower doe fecundity. Elk winter range occurs in the Project Area. Crucial winter range for the pronghorn occurs only in the Blue Sky area. The proportion of crucial winter range for the pronghorn within the Baggs Herd Unit that would be affected over the short term would be 0.03 percent and would be 0.008 percent in the long term. Prescribed fires are not expected to affect big game, as the burns would not alter the dominant forage.

Greater sage grouse occupy the area where interim drilling is proposed year-round and make seasonal use of the habitats. No exact figures are available on the amount of greater sage grouse habitat available within the Atlantic Rim EIS study area, but the RMP identifies the area as included in the Baggs Habitat Management Plan. In this larger area, 160,500 acres of greater sage grouse habitat was identified. Prescribed fires are not expected to affect greater sage grouse, as the height and density of the sagebrush typically treated by burns are outside of the range that greater sage grouse use for nesting and brooding habitat.

Data collected at seven sites in Wyoming documented 45% of nests occur within the two miles of a lek and that 64% of nests occur with three miles of a lek. In addition, nest success probability suggests increased nesting success rates beyond five miles of a lek (Holloran, 2005).

The following habitat components area would be affected by RFFAs under the interim drilling program:

- a portion of the ¼-mile NSO radius of a lek
- about 11,005 acres (56.2 percent of the total surface area that would be affected by the 200-well interim drilling program) that overlaps the 2-mile radius of the historical leks in the area
- about 365 acres (3.3 percent) of potential nesting habitat for greater sage grouse would be affected cumulatively by short-term disturbances associated with production
- 112 acres (1.0 percent) would be affected in the long term

Considering the amount of potential nesting habitat available, the 112-acre loss would be minimal. Greater sage grouse within Sierra Madre Upland Game Management Unit (Area 25) would be only minimally affected by the cumulative 361-acre disturbance associated with RFFAs, including interim drilling. This minimal amount affected assumes that provisions and stipulations in the RMP, interim drilling guidelines, seasonal closures, reclamation, and mitigation measures specified by the RFO are followed.

No active raptor nests were located in the interim drilling pods during aerial surveys in 2001, the protection measures identified in Chapter 2 and the Interim Drilling Policy are expected to protect the raptor populations on public lands within the interim drilling area during RFFAs. Therefore, some cumulative impacts to raptors within the Muddy Creek Watershed are likely to occur.

Acreages and burrow densities that are adequate to support black-footed ferrets (200 or more acres with eight or more burrows per acre) are currently estimated to occur in only two of the pods included in the interim drilling program. Surveys for black-footed ferret have been conducted on both of these pods, and no

ferrets or ferret sign were found. No impacts to this species are expected as the result of RFFAs, including the proposed 200-well interim drilling program. The lack of impacts is predicted because of the lack of evidence that black-footed ferrets occur and because surveys for the black-footed ferret will be conducted when required (per interim drilling guidelines). However, the Dad non block cleared black-footed ferret complex does occur within and around the Sundog pod. Actions need to be taken not to jeopardize any potential for future black-footed ferret reintroductions.

### **Fisheries**

Based on the cumulative impacts of new roads and other facilities on the habitat features found to be important to bluehead suckers within the upper Muddy Creek watershed as well as the effects of habitat fragmentation on the ability of bluehead suckers, *Flannelmouth Suckers*, and *Roundtail Chubs* to access required habitats, there is potential significant impacts to the habitat of this species within the ARPA, and may preclude improvement of their status as prescribed in the *Range-wide Conservation Agreement for Bluehead Suckers, Flannelmouth Suckers, and Roundtail Chubs*.

Permitted disturbances associated with well pod development and other actions within the Muddy Creek watershed have the potential to increase sedimentation in the watershed to a significant level (Bob Lange, BLM, personal communication). Consequently, a significant increase in sediment deposition within the Muddy Creek watershed could significantly impact BLM sensitive fish species. Thus, there is a potential for cumulative impacts to fish species found within the affected watershed. Impacts to these fish are not likely to be significant with the proper application of the applicant committed measures and BMPs described in Appendix "A".

**Recreation** (refer to section 4.16.1.8 of the "The Atlantic Rim Natural Gas Project, Doty Mountain Pod EA")

**Visual Resources** (refer to section 4.16.1.9 of the "The Atlantic Rim Natural Gas Project, Doty Mountain Pod EA")

**Cultural Resources** ((refer to section 4.16.1.10 of the "The Atlantic Rim Natural Gas Project, Doty Mountain Pod EA")

### **No Action**

As stated in the No action section of **Proposed Action and Alternatives:**

The Council on Environmental Quality (CEQ) has established limitations on activities allowed by Federal agencies when preparing an EIS. These CEQ regulations are found at 40 CFR 1506.1, and state that during the preparation of an EIS, no action concerning the proposal can be taken by the Federal agency which would result in an adverse environmental impact or limit the choice of reasonable alternatives in the EIS.

Under the No Action alternative granting legal access to the private land for development of fee minerals (Anadarko's Doty Mountain Fee Well 2006 Program) would be deferred until an EIS for the proposed action could be written or the Record of Decision for the on going *Environmental Impact Statement for the Atlantic Rim National Gas Field* is issued. No new CBNG drilling or production would take place. After a Record of Decision is issued the access to the private land and fee minerals could be again considered and analyzed.

**Mitigation Measures**

Mitigation of potential effects is part of the proposed action, and specific mitigation details can be found in Appendix C and D of the *Decision Record and Finding Of No Significant Impact for the Atlantic Rim Interim Drilling Project Doty Mountain Pod, Wy-030-04-EA-027*.

**Persons/Agencies Consulted:**

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