

DECISION RECORD AND FINDING OF NO SIGNIFICANT IMPACT
Anadarko E&P Company
Atlantic Rim Natural Gas Project
Jolly Roger Pod Environmental Assessment

EA No. WY-030-04-EA-390

INTRODUCTION

Anadarko Petroleum Corporation (APC) and Warren E&P have proposed to explore and develop coalbed natural gas (CBNG) wells in the Jolly Roger Pod Project Area (JRPA) within the boundaries of the Atlantic Rim Natural Gas Project Area (ARPA) located in Carbon County, Wyoming. The JRPA is located, partly on federal surface estate with federal mineral estate administered by the Bureau of Land Management (BLM), Rawlins Field Office (RFO), and partly on private surface with private mineral estate. The proposed project is part of the exploratory drilling activities proposed for the acquisition of data necessary to prepare the ARPA Environmental Impact Statement (EIS).

The Jolly Roger project consists of constructing, drilling, completing, testing, operating and reclaiming 16 new exploratory coalbed natural gas wells, 8 existing wells, 2 proposed deep injection wells, and 1 existing deep injection well to dispose of produced water located on both private and federal leases. Related access roads, utilities, flowlines, pipeline, and production facilities are also planned for the Proposed Action.

The proposed project is located approximately 18 miles southwest of Rawlins, Wyoming, in Carbon County, Wyoming (Township 18 and 19 North, Range 90 West). Access is along Carbon County Road 605 (Twentymile Road), which intersects Interstate 80 (I-80) near Rawlins. The project is one of nine possible exploration areas that make up the Atlantic Rim Interim Drilling Project. Of the 24 proposed well locations, 10 wells would be located on surface ownership lands administered by the BLM RFO and would develop federal minerals. The remaining 14 wells would develop fee minerals on fee surface. The compressor station and the existing injection well are located on fee lands. The other injection wells would also be located with other natural gas facilities on fee lands. The life of the project is estimated to be from 10 to 20 years.

ALTERNATIVES CONSIDERED

The Environmental Assessment (EA) for the Jolly Roger Pod considered two alternatives. The Proposed Action Alternative assessed and disclosed the projected effects of the proposal as outlined above and detailed in the "Proposed Action" portion of the environmental assessment. The "No Action" alternative assessed the effects of not implementing any portion of the proposal. Under the No Action Alternative, the BLM would consider additional APDs and ROW actions for federal lands on a case-by-case basis, consistent with the scope of existing environmental analysis. Additional gas development may occur on private land under APD approved by the Wyoming Oil and Gas Conservation Commission. This alternative provides a benchmark, enabling the decision-maker to compare the magnitude of the environmental effects of the alternatives.

Alternatives Considered But Not Analyzed in Detail

There is a detailed discussion of alternatives considered but not analyzed in detail in the EA at section 2.3. A discussion of directional drilling has been added to this section, see the Appendix A, ERRATA.

The project was developed around guidance provided in the ARPA Interim Drilling Policy - Development Authorized Concurrent with EIS Preparation for the Atlantic Rim Coalbed Natural Gas Project (Appendix G).

During the alternative analysis, wells and ancillary facilities were analyzed to determine potential impacts to resources. A total of five wells were dropped during the alternative analysis because they resulted in

impacts to wildlife, topography (steep slope), or excessive disturbance to soils and vegetation. These wells were replaced with new pad sites that would result in less impact to these resources.

Several alternative pipeline routes were considered and assessed preliminarily; however only one route was assessed in the EA under any of the alternatives. Within the scope and purpose and need for this project, no other unresolved conflicts involving alternative uses of available resources were identified for assessment.

DECISION

Based upon the analysis of the potential environmental impacts described in the EA, and in consideration of the public, agency, and industry comments received for the environmental assessment, the Authorized Officer has selected the Proposed Action Alternative to be implemented. The decision incorporates the following:

1. Master Drilling Plan, Appendix C
2. Master Surface Use Plan, Appendix D
3. Conditions of Approval, Appendix E
4. Project-Wide Mitigation Measures and Procedures, Appendix F

APPROVED PROJECT COMPONENTS

- development of 16 new exploratory coalbed natural gas wells within the JRPA
- completion of two additional deep water injection wells
- construction of new access roads and facilities associated with coalbed natural gas development, including gas gathering pipelines, water gathering pipelines, and power lines buried parallel and adjacent to access roads
- the transportation pipeline will be approved by a separate Grant of Right-of-Way
- existing facilities on private land - eight previously-drilled exploratory wells and one injection well (no production facilities have been installed)

RATIONALE FOR DECISION

The decision to approve the operator's proposed development was based upon the following factors:

1. Consistency with the Great Divide Resource Management Plan
2. National policy
3. Agency statutory requirements
4. Relevant resource and economic considerations
5. Application of measures to avoid or minimize environmental harm
6. Public comments
7. Consistency with the purpose and need for action

1. Consistency with Resource Management Plans

The proposed action is in conformance with the planning direction developed for this area. The objective for oil and gas management decisions described in the Great Divide Resource Management Plan (1990) is to "provide for leasing, exploration, and development of oil and gas while protecting other resource values."

2. National Policy

Private exploration and development of federal oil and gas leases is an integral part of the Bureau of Land Management's oil and gas leasing program, under the authority of the Mineral Leasing Act of 1920 and the Federal Land Policy and Management Act of 1976. The United States continues to rely heavily upon foreign energy sources. Oil and gas development reduces the United States' dependence upon foreign energy supplies. The decision is consistent with national policy.

3. Agency Statutory Requirements

The decision is consistent with all federal, state, and county authorizing actions required implementing the proposed action. All pertinent statutory requirements applicable to this proposal were considered.

4. Relevant Resource and Economic Considerations

Environmental impacts from the pilot project to resources as identified in the EA are minor and deemed acceptable. Positive economic benefits are expected from this proposal. This project will allow increased knowledge of geologic, natural gas, and environmental conditions.

5. Application of Measures to Avoid or Minimize Environmental Harm

Federal environmental protection laws such as the Clean Air Act, the Clean Water Act, and the Historic Preservation Act apply to all lands and are included as part of the standard oil and gas lease terms. Adoption of mitigations, conditions of approval, and other protections are included as part of the effort of complying with oil and gas lease terms. The mitigation and monitoring measures identified in the project EA and its appendices represent the best means to avoid or minimize environmental impacts.

6. Public Comments

The BLM requested comments on this EA from the public, local landowners; and Federal, State, Local and County Agencies. The BLM issued a news release with a brief summary of the proposed action, location of the project, and information about how the public could comment. Copies of the EA were mailed out in response to requests by public, industries, or agencies via mail, phone, and walk-in visits. In addition, the EA and its appendices and reference documents were posted on the BLM Wyoming internet site for review and downloading. The comment period ran from September 1 to October 1, 2004. A total of eight comments were received by the BLM. The summarized comments and BLM's responses are found in Appendix B of this document. Corrections and supplemental data for the EA are found in Appendix A.

7. Consistency with the Purpose and Need for Action

The need for this proposal is to allow the Applicant to drill and test for commercial natural gas resources in coal bearing formations within their lease holdings. Determination of production potential would allow the Applicant to decide how and if to develop natural gas resources within the area. Developing natural gas is an important element of the nation's energy program, and is used through out the country's economy including for heating, electrical generation, plastics, and fertilizer production. The Secretary of the Interior has entered into a contract (lease) with the Applicant that gives them the "exclusive right to drill for, mine, extract, remove and dispose of all the oil and gas" within the lease.

FINDING OF NO SIGNIFICANT IMPACT

Based on the analysis of potential environmental impacts contained in the Jolly Roger Pod EA, with implementation of the protective measures found in its appendices, and comments received from public review, I have determined that the impacts from this project will not be significant and an environmental impact statement is not required.

APPEAL

Under BLM regulation this decision is subject to appeal. Under BLM regulation, this decision is subject to administrative review in accordance with 43 CFR 3165. Any request for administrative review of this decision must include information required under 43 CFR 3165.3(b) (State Director Review), including all supporting documentation. Such a request must be filed in writing with the State Director, Bureau of Land Management, P.O. Box 1828, Cheyenne, Wyoming 82003, within 20 business days of the date this Decision Record is posted to the Bureau of Land Management's internet site at: <http://www.wy.blm.gov/nepa/nepadocs.htm>.



Field Manager, Rawlins

December 14, 2004

Date

**APPENDIX A
ERRATA
MODIFICATIONS AND CORRECTIONS TO THE
ATLANTIC RIM NATURAL GAS PROJECT, JOLLY ROGER POD
ENVIRONMENTAL ASSESSMENT**

Table of Contents, ACRONYMS AND ABBREVIATIONS, page vi.

The following changes have been made:

Insert after "CERCLA----," "CFD Cubic Feet per Day"

Change "MCF Million Cubic Feet" to "MCF Thousand Cubic Feet"

Change "MCFD Cubic feet of gas per Day" to "MCFD Thousand Cubic Feet of Gas per Day"

Insert after "mi²---," "MMCF Million Cubic Feet"

Chapter 2 – PROPOSED ACTION AND ALTERNATIVES

The following as been added to section 2.3 - Alternatives Considered But not Analyzed in Detail (page 2-23):

Directional Drilling

This alternative is not considered to be economically feasible due to a number of factors. The primary factor is the shallow depth of the formation does not allow sufficient room to directionally place the wellbore in the established reserve recovery pattern without excessively high angles and the attendant costs. The coal zones are thin and scattered over a long interval so that an "S" type directional well (directional and then vertical though the productive zone) is absolutely not feasible due the shallow depth and the attendant extremely high angles required to place the well in the established reserve recovery pattern. An angled directional well (directional through the pay zone) is also not feasible because, again, the shallow depths would not allow sufficient distance to place the angled hole within the reserve recovery pattern. In this case the reserve recovery would be marginal for the upper zones due to interference by the closely spaced high angle wellbores and could also be marginal for the lower zones due to lower drawdown of the widely spaced high angle wellbores. In addition, cementing casing in an angled directional well can be very difficult and this would be extremely detrimental to the required isolation of the coal reservoirs. Horizontal drilling is not feasible because the zones are thin and would not economically support single horizontal completions.

The proponents are aware of the recently emerging technology known as pinnate drilling. The technology developed by CDX Gas, LLC (CDX) is proprietary in nature and, as such, very little detailed technical data is available to the proponents and to the industry as a whole. Given the scarcity of good technical data regarding this technology, the viability and economics of a pinnate drilling alternative could not be and were not evaluated for the Jolly Roger EA.

No pinnate wells have been drilled to recover coalbed natural gas in Wyoming, at this time, thus providing no examples or analogies from which evaluation of this technique in the Jolly Roger Pod could be based. A review of the exhibits provided with is comment indicates this new technology is far from universally applicable in the exploitation of coalbed resources. The *New Technology Magazine* article states, "Very porous coal deposits and coalbeds that are interspaced with limestone or sandstone are generally not conducive to Z-Pinnate technology." CDX representative

David Wight goes on to say, “Sometimes our testing is negative and it tells us not to go forward in those areas.” In the same article, Penn Virginia’s James McKinney indicates the pinnate technology is not always the right one to use. McKinney elaborates by saying, “We are employing the horizontal technology where we have sufficient coal thickness and where we have an absence of subsurface features. For example, our vertical program works very well in thick coals, and it works very well where we have an anticlinal feature.”

The targeted coal intervals within the Jolly Roger Pod are expected to possess geologic and reservoir characteristics which would potentially exclude the application of Z-Pinnate technology. The coals are expected to have high permeability. Pinnate technology is applicable to low permeability coals. Numerous thin seams (< 3’ in thickness) are expected to be encountered. Pinnate technology requires minimum thicknesses generally in the 3’ - 4’ range. Structural complexity and the presence of interbedded porous and permeable water bearing sands further reduce the opportunity to apply pinnate drilling technology within the Jolly Roger Pod.

It is premature to evaluate pinnate drilling technology as a viable alternative to vertical drilling. Minimal “hard” technical data exists due to the proprietary nature of the technique. The technique has yet to be proven in a wide range of geographic and depth-related applications. Geologic and reservoir properties in Jolly Roger suggest the application of pinnate drilling may not be the optimal means of developing the coalbed natural gas resources in this area.

Chapter 3 – AFFECTED ENVIRONMENT

The following paragraph has been added to section 3.8.1.2 Mule Deer:

Although no specific studies have been done to document mule deer migration routes in the project area, Porter (1999) presents data suggesting deer move through or near the project area. We have also recorded spring concentrations of deer that appeared to move from across the main road between the project area and Highway 789, so increased traffic could have an effect on this probable migration area.

The following table has been added to section 3.8.2 Upland Game Birds:

**Wyoming Game and Fish Department’s Lek Status
for the Area Around the Jolly Roger Pod Project**

<u>Lek</u>	<u>Status in 2004</u>	<u>Last Year Known Active</u>	<u>Lek Legal</u>	<u>Lek UTM</u>
Fillmore Cabins	unknown	1995	SWNW 8 T18 R90	13-286200-4602900
Fillmore Creek	active	2004	NESW 26 T19 R91	13-281980-4607450
Fillmore Hilltop	active	1999	NESW 31 T19 R90	13-285200-4606500
Fillmore Ranch	active	2004 (in Sec I)	NWSW 6 T18 R90 & NESE 1 T18 R91	13-284900-4604000 13-284140-4604100
Fillmore Turnoff	unknown	1989	SE 4 T18 R90	13-288800-4603700
Hogback	unknown	prior to 1978	SE 29 T20 R89 & W2 28 T20 R89	13-296800-4616400 13-297600-4616800
Low Ridge	unknown	1991	SWSE 14 T19 R90	13-292000-4610100
Midnight Valley	unknown	2003	SWNE 5 T19 R89	13-296600-4613800
North Fillmore	unknown	1988	30 T19 R90	13-285300-4607500

<u>Lek</u>	<u>Status in 2004</u>	<u>Last Year Known Active</u>	<u>Lek Legal</u>	<u>Lek UTM</u>
Olson Divide	unknown	1989	NWSW 13 T18 R91	13-283000-4601200
Ram Canyon	active	2004	S2 NW4 T19 R89	13-297660-4613700
Red Rim	active	2004	C E2 19 T20 R89	13-295350-4618490
Scottys Peak	active	2004	W2NW 34 T20 R89	13-299020-4615575
Separation Creek	unknown	1981	C NE 27 T19 R90	13-290500-4607800
Separation Hilltop	active	2004 (both)	SENE 2 T19 R90 & SWNW 1 T19 R90	13-292595-4613760 13-292860-4613970
Sixteenmile	active	2004	SESE1 T19 R90	13-293900-4612950
Twentymile Road	active	2004	NESE 23 T19 R90	13-292370-4609140
West Fillmore Ranch	active	2004	SESE 35 T19 R91	13-282560-4605480

On page 3-36, Section 3.12.1.1, Oil & Gas Activities the sentence, "Production of natural gas in Carbon County increased from 76 million cubic feet (MCF) in 1995 to almost 98,100,000 MCF in 2002," is changed to read, "Production of natural gas in Carbon County increased from 76 billion cubic feet (BCF) in 1995 to almost 98.1 BCF in 2002,"

Chapter 4 – ENVIRONMENTAL CONSEQUENCES

The following paragraph has been added to 4.8.1 Proposed Action, Page 4-10, second paragraph.

Man-made construction such as well pads and roads can reduce use of surrounding habitat by wildlife. These sites reduce foraging due to the direct loss of native vegetation from ground disturbance. In addition there is an area surrounding these sites that tends not to be utilized due to the increased human activity. This "zone" can extend up to a half mile from the development area. Consequently, development impacts to wildlife can extend further offsite than the amount of the disturbed area. Some individual animals can "habituate" to the increased infrastructure; but, it is generally assumed that overall, the increases human footprint intensifies the potential for wildlife-human interactions ranging from the harassment of wildlife to poaching and increased legal hunting pressure. Also, increased traffic levels on new and existing access roads could increase the potential for wildlife-vehicle collisions.

On p. 4-17, Section 4.12.1.5, Fiscal Effects, second paragraph, the sentence, "If the productive life of each successful gas well in the project is 15 years and produces on average nearly 100 MCF per year of natural gas." should read, "If the productive life of each successful gas well in the project is 15 years and produces on average nearly 100 MMCF per year of natural gas."

**APPENDIX B
SUMMARY OF EA COMMENTS AND BLM RESPONSES**

The EA was released for a 30-day public review period on December 23, 2003. A total of eight comment letters were received. The letters have been reviewed to determine whether the information they provided would warrant a determination other than a Finding of No Significant Impact (FONSI). Substantive comments are summarized below, with BLM responses to the comments in italics. The RFO would like to thank all who commented for taking the time to review the EA and provide comments.

1. The State of Wyoming Department of Environmental Quality

There are three Water Quality Divisions permits that may apply to the project.

This information is appreciated. BLM Regulation at 43 CFR Part 3164.1 Onshore Oil and gas Order No. 1; Approval of Operation's on Onshore federal and Indian Oil and Gas Leases; section I. Accountability, states in part; "Lessees and operators have the responsibility to see that there exploration, development, production, and construction operations...conforms with applicable federal laws and regulations and with State and local laws and regulations." The Jolly Roger EA, at 1.3.3, page 1-4, states in part, "The proposed project conforms with the State of Wyoming Land Use Plan (Wyoming State Land Use Commission 1979) and the Carbon County Land Use Plan (Pederson Planning Consultants 1979 and 1998), and would comply with all relevant federal, state, and local regulations."

2. The Wyoming State Geological Survey

- a. **There is a serious lack of understanding in this document of the standard unit of natural gas (how production is reported). On page 8 under acronyms and abbreviations, the document defines MCF as million cubic feet. MCF in industry has always been defined as thousand cubic feet (the Roman numeral M=thousand). MMCF is the standard definition for million cubic feet. To redefine MCF to equal million rather than thousand defies convention as well as confuses anyone familiar with the correct convention. Also, MCFD should be defined as thousand cubic feet per day rather than cubic feet per day.**

The suggested corrections have been made to Acronyms and Abbreviations. The changes can be found in the ERRATA.

- b. **The MCF mistake also occurs and is compounded on page 3-36 under Oil & Gas Activities in the sentence, "Production of natural gas in Carbon County increased from 76 million cubic feet (MCF) in 1995 to almost 98,100,000 MCF in 2002." In fact the sentence should read, "Production of natural gas in Carbon County increased from 76 billion cubic feet (BCF) (or 76 million MCF where MCF = one thousand rather than one million cubic feet) in 1995 to almost 98.1 BCF (or 98.1 million MCF, where MCF = one thousand rather than one million cubic feet) in 2002." The way it currently reads with the wrong definition of MCF understates production in 1995 by a factor of 1,000 and overstates production in 2002 by a factor of 1,000. The error also occurs on page 4-17 under Fiscal Effects in the sentence, "If the productive life of each successful gas well in the project is 15 years and produces on average nearly 100 MCF per year of natural gas." The sentence should read, "If the productive life of each successful gas well in the project is 15 years and produces on average nearly 100 MMCF per year of natural gas...." Later on in this paragraph the average**

price is assumed to be \$2.50 per MCF which is correct if MCF = one thousand cubic feet, but would be \$2,500 per MCF under the wrong definition of MCF.

The suggested changes have been made, see the ERRATA.

Also, the Wyoming State Geological Survey has generally mapped (digitally) the subsurface geology in the area. The data can be viewed at <http://www.wrds.uwyo.edu/wrds/view/view.html>. These interpretations may be of value.

This project is possibly near the area of the recent elk kill; so, it will be important to ensure that no unsuitable water or chemicals are released into the environment.

In addition, there may be some seleniferous soils near the proposed pipeline route. Digging up the soils, which will result in oxidation, may make selenium more available for transport. This should not be a significant problem as long as soils are replaced to trench as soon as possible.

Thank you for the information

3. Office of State Lands and Investments

The information and data presented in the document indicate that the proposed action will not preclude the state from developing its oil and gas interest in the area. Therefore, our office has no specific concerns regarding the Jolly Roger Pod.

Thank you for your comment.

4. State of Wyoming, Game and Fish Department

- a. This project is in the Baggs antelope herd unit, the Baggs mule deer herd unit, and the Sierra Madre elk herd unit. The majority of the area is winter-yearlong range for all species. However, small portions of antelope and mule deer crucial winter ranges are in the southern part of the project area.

None of the proposed Jolly Roger facilities will be placed within crucial winter ranges.

- b. Regarding the Affected Environment section, Porter (1999) found that nearly all elk collared in the winter on Powder Rim moved to the Elkhead Mountains in Colorado during the summer. Only a few elk locations in Porter's study were recorded on Wyoming spring and fall ranges near Muddy Mountain and Brown's Hill.

Although we have not done specific studies to document mule deer migration routes in the project area, Porter (1999) presents data suggesting deer move through or near the project area. We have also recorded spring concentrations of deer that appeared to move from across the main road between the project area and Highway 789, so increased traffic could have an effect on this probable migration area.

Thank you for your comment. The following paragraph has been added to section 3.8.1.2, Mule Deer, of the JRPEA:

Although no specific studies have been done to document mule deer migration routes in the project area, Porter (1999) presents data suggesting deer move through or near the project area. We have also recorded spring concentrations of deer that appeared to move

from across the main road between the project area and Highway 789, so increased traffic could have an effect on this probable migration area.

- c. **Also, the analysis suggests that big game will return to the project area after the construction phase. This most likely will depend on the amount of maintenance activity that continues in the project area.**

It is stated in the wildlife section that big game species will not be impacted in the long- term, since they will eventually habituate after the drilling stage is completed. While the well sites themselves are not an issue for big game animals, the activities related to well maintenance activities could continue to disturb big game species.

The concerns mentioned here are adequately covered in Chapter 4, section 4.8, Wildlife and Fisheries.

- d. **In Figure 3-1, the EA identifies 20 sage-grouse leks within the project area. We have no record of any sage-grouse leks in Sections 12 or 19, T.18N., R.91W. If BLM has documented leks in these locations, we would appreciate having this data to keep our records complete.**

BLM has always shared information with the WGFD. If this information has not been passed on it is just a temporary oversight. Thank you for your comment.

- e. **Also in Figure 3-1, the EA determined 5 of the other 18 leks were inactive. Our Department and Wyoming BLM have adopted standardized protocols for determining when a lek is categorized as "inactive." These protocols require considerable documentation of inactivity on a given lek, spanning at least 10 years, before the lek is placed in this category. Department records suggest *none* of these leks have met these criteria. We recommend the icons on this map be corrected to show the current status of these leks as either "active" or "unknown," according to adopted protocols.**

Lastly, Figure 3-1 shows several leks as having an undetermined status, while our records indicate they are active. In order to clarify lek status, we offer the following table containing data for the 18 leks we have records for. In addition, the data in Figure 3-1 and accompanying text discussing leks on page 3-26 should be corrected.

As explained in Section 3.8.2.1, Greater Sage-Grouse, surveys were conducted in accordance with WGFD protocols. The information presented in the JRPEA is information obtained during the 2004 field season. This section adequately explains the difference in the data. The table included in the comments has been added to the ERRATA.

<u>Lek</u>	<u>Status in 2004</u>	<u>Last Year Known Active</u>	<u>Lek Legal</u>	<u>Lek UTM</u>
Fillmore Cabins	unknown	1995	SWNW 8 T18 R90	13-286200-4602900
Fillmore Creek	active	2004	NESW 26 T19 R91	13-281980-4607450
Fillmore Hilltop	active	1999	NESW 31 T19 R90	13-285200-4606500
Fillmore Ranch	active	2004 (in Sec I)	NWSW 6 T18 R90 & NESE 1 T18 R91	13-284900-4604000 13-284140-4604100
Fillmore Turnoff	unknown	1989	SE 4 T18 R90	13-288800-4603700

<u>Lek</u>	<u>Status in 2004</u>	<u>Last Year Known Active</u>	<u>Lek Legal</u>	<u>Lek UTM</u>
Hogback	unknown	prior to 1978	SE 29 T20 R89& W2 28 T20 R89	13-296800-4616400 13-297600-4616800
Low Ridge	unknown	1991	SWSE 14 T19 R90	13-292000-4610100
Midnight Valley	unknown	2003	SWNE 5 T19 R89	13-296600-4613800
North Fillmore	unknown	1988	30 T19 R90	13-285300-4607500
Olson Divide	unknown	1989	NWSW 13 T18 R91	13-283000-4601200
Ram Canyon	active	2004	S2 NW4 T19 R89	13-297660-4613700
Red Rim	active	2004	C E2 19 T20 R89	13-295350-4618490
Scottys Peak	active	2004	W2NW 34 T20 R89	13-299020-4615575
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Sixteenmile	active	2004	SESE1 T19 R90	13-293900-4612950
Twentymile Road	active	2004	NESE 23 T19 R90	13-292370-4609140
West Fillmore Ranch	active	2004	SESE 35 T19 R91	13-282560-4605480

- f. **We continue to have serious concerns that the effect of loud, continuous noise on sage grouse courtship displays will cause significant impacts to lek attendance and, ultimately impact population viability in the long-term. We are unaware of any data that has identified a threshold of tolerance of noise by sage-grouse. Conversely, noise from gas field compressors has been implicated in the abandonment of at least two leks in the Red Desert. Therefore, it appears such a threshold must exist.**

Sage grouse commonly cease strutting activities when winds are high, again suggesting that even ambient noise levels can occasionally inhibit courtship displays. Until quantifiable research has been done, we encourage BLM to establish maximum noise standards for exploration and development activities that do not exceed ambient noise levels as measured during spring strutting periods (i.e., cool, early morning or evening periods from early-March to mid-May). To help prevent project noise from interfering with grouse breeding activities, we recommend compressors and similar continuous noise-producing devices be muffled such that noise levels are no greater than 30 dB at 100 meters from the source (during development and production.)

Section 2.1.10 Project-Wide Mitigation Measures and Procedures, page 2-22, Noise, Number 3, states: "The BLM will require that noise levels be limited to no more than 10 decibels on the A-weighted scale (dBA) above background levels at leks for greater sage-grouse that are located on public lands. The BLM will require that compressor engines located on public lands be enclosed in a building and located at least 600 feet away from sensitive receptors or sensitive resource areas to comply with these limits on noise levels."

- g. The EA should provide a more complete cumulative analysis for wildlife. The current analysis discusses detailed impacts of the adjoining coalbed natural gas pods, but does not include other projects such as fences, roads, and pipelines done in this general area.**

Chapter 4 gives a complete analysis of cumulative impacts.

- h. This project is located at the very upper end of the Separation Creek drainage which does not contain a fishery. However, within this arid region the riparian habitat along this stream does provide valuable habitat for terrestrial animals and possibly amphibians. Impacts to this habitat should be minimized and any necessary reclamation should include native vegetative species.**

Thank you for your comment.

5. Petroleum Association of Wyoming

- a. The applicants have agreed to numerous “Applicant Committed Measures,” which go beyond the required protective measures established in the current land management plan. The Applicant has demonstrated its willingness to work with the BLM in mitigating the potential effects on the environment and as a result, PAW believes that this project has been mitigated to insignificance.**

We agree that the Companies have shown their willingness in working with the BLM to protect the environment. The Project Wide Mitigation Measures and Procedures, found in Chapter 2, along with the Conditions of Approval that are added to the Decision Record, provided sufficient mitigation to protect the environment.

- b. The “Applicant Committed Measures” are voluntary actions agreed to by the individual companies and should not establish the precedent for future projects that are similar in nature.**

The measures identified under Section 2.1.10, Project Wide Mitigation Measures and Procedures, and referred to as Best Management Practices through out the EA, are actions or features which are included as part of the proposed action that would be taken to avoid or reduce project impacts or reflect standards operating procedures. Once the measures as described in Chapter 2 become part of the decision, they are considered enforceable actions that will be implemented, if applicable, to reduce impacts to the environment resulting from the project. Regardless if these measures are proposed by the BLM or the applicant, they will be applied if necessary.

- c. Section 2.1.10.1, Preconstruction Planning, Design, and Compliance Measures, “The Proponents would designate a qualified Representative to serve as compliance coordinator.” The companies have agreed that they will designate a representative as the compliance coordinator with BLM; however, there are multiple companies’ conduction operations within the EA. BLM must recognize that individual contact persons may be required when site-specific operations occur that affect only one company’s operation.**

This comment is appreciated.

- d. Section 2.1.10.2, Vegetation, Wetlands, and Noxious/Invasive Weeds: “An approved Pesticide Use Proposal would be obtained before pesticides are applied on BLM surface ownership lands to control weeds...”**

PWA believes that consultation between the operators, BLM, and County Weed and Pest agencies should be encouraged to identify noxious weed outbreaks. Once identified, the appropriate control measures should be implemented.

This comment is appreciated, the process described is basically the process the BLM uses.

- e. **2.1.10.2 Wildlife and Fisheries: “The Companies would protect greater sage grouse...”**

BLM has significant flexibility in developing protective measures for BLM Sensitive Species and Wyoming Species of Concern such as Sage Grouse. BLM has certain discretionary authority and should consider the effects of restrictions on the oil and gas operator as part of its adoption of reasonable and prudent mitigation measures necessary to minimize potential impacts on non-ESA listed Special Status Wildlife Species.

This comment is appreciated.

- f. **2.1.10.2 Wildlife and Fisheries: “Construction activities in potential mountain plover nesting habitat during the nesting period (April 10 - July 10) would not be allowed unless an exception is granted.”**

Again, BLM has significant flexibility in developing protective measures for BLM Sensitive Species and Wyoming Species of Concern such as the Mountain Plover. BLM has certain discretionary authority and should consider the effects of restrictions on the oil and gas operator as part of its adoption of reasonable and prudent mitigation measures necessary to minimize potential impacts on non-ESA listed Special Status Wildlife Species.

This comment is appreciated.

- g. **2.2.10.2 The Proponents must use existing topography to screen from view roads, pipeline corridors, drill rigs, wellheads, and production facilities.**

BLM should modify this requirement to state: “To the extent possible, the proponents should use existing topography to screen...”

See response to 5.b. above.

- h. **2.1.10.2 Cultural Resources: “Adverse effects to cultural or historical properties that can not be avoided would be mitigated by implementing a cultural resource mitigation plan (including data recovery plan).”**

PAW request clarification from BLM regarding the need for a “cultural resources mitigation plan.” It is PAW’s position that cultural site-specific surreys, block surveys, and consultation with SHPO prior to project approval is the recommended “mitigation plan” for protection of cultural/historic resources. Additional “mitigation plans” are costly, time consuming, and redundant for the agency and industry. With the current requirements in place, no additional plans are necessary. This mitigation measure should be deleted from the EA.

Mitigation plans are only required on those cultural or historical sites that cannot be avoided. As explained on page 2-20, Cultural Resources, number 2, “Avoidance is the preferred method for mitigating adverse effects to a property that is considered eligible for, the NRHP.” A mitigation plan is only required if an eligible site can not be avoided.

- i. **PAW recognizes that the social and economic opportunities generated from the project would continue to benefit the residents of Wyoming and the participating counties by directly creating new jobs and producing additional revenues. Socio-economics are an important component to this cumulative analysis and were appropriately incorporated into the EA.**

This comment is appreciated.

6. U.S. Geological Survey (USGS)

- a. **Page 3-11, Chapter 3, Affected Environment, Section 3.5 Water Resources, Section 3.5.1 Groundwater:**

The hydrologic information provided in the section is very sparse. The USGS suggests that some baseline or background information given in Chapter 4, Section 4.5 (pages 4-5 to 4-6), and in Appendix A (see table on page 5) be moved into the text in Chapter 3, Section 3.51, Groundwater. There are at least eight or nine existing and (or) shut in wells in the project area, as well as about eight permitted water wells within one mile from the project area. Hydrologic information and data gained from these drilled wells, for example, depth to water or water levels, well water yield, production zone depths, hydraulic properties of shallow aquifers and the deeper coal seams and disposal zones, and so forth, can be used to infer existing conditions in the areas of the proposed wells. The above requested information should be presented in quantitative terms; perhaps in ranges of values and qualified as appropriate.

The depth to water/production zone (which are basically the same) is identified in Chapter 2, page 2-6, paragraph 5, and is stated as 1,952 feet to 5,900 feet. Additionally, the amount of water yielded is identified in Chapter 2 as 200 to 500 barrels per day and is located on page 2-7, paragraph 2.

The hydrologic information provided is adequate for the consideration of this exploratory pod; the level of detail included here is adequate to evaluate potential impacts from this action. Additional information is being collected and prepared looking at impacts from the entire Atlantic Rim Project, which includes groundwater modeling and additional isotopic analysis from other pods in the project area.

- b. **Page 4-5, Chapter 4, Environmental Consequences, Section 4.5, Water Resources, Section 4.5.1, Alternative 1 – Proposed Action, second paragraph:**

Although the text states, “There is no current practical use for water” the impacts on these aquifers, including changes in depth to water, changes in discharge amounts, and changes in water quality, should be described in text in quantitative terms if possible and qualified as needed.

Data, such as changes in depth to water, changes in discharge amount, and changes in water quality from drilling activity, will be gathered from the existing wells in operation within the Atlantic Rim. This data is currently being collected and will be included in the Atlantic Rim EIS.

The aquifer in the producing formation should not experience a change in water quality as a result of the proposed action. Because only a portion of water will be removed, the remaining formation water should have similar water quality characteristics after production.

The Interim Drilling Policy for Atlantic Rim recommends three to six groundwater monitoring wells that will continually monitor water levels in the producing formation as well as collecting data in the sandstone aquifers above and below the producing formation. Two of these wells have been drilled (Brown Cow Pod and Blue Sky/Sun Dog Pod) and are collecting data. The third well is to be located in the Jolly Roger Pod and will be used to characterize the northern portion of the project area. This well will periodically collect water quality samples as well as have water level or pressure sensors installed to monitor water levels in the producing formation and the sandstone aquifers above and below the coal formations.

c. Page 4-5, Chapter 4, Environmental Consequences, Section 4.5, Water Resources, Section 4.5.1, Alternative 1 – Proposed Action, fourth paragraph:

The USGS suggests that the justification for the inferred half-mile circle of influence of the proposed production wells be explained. If the information is available from other wells drilled in or near the project, then justification should be provided in the form of anticipated drawdown based on pump rates and duration, aquifer transmissivity and hydraulic connection between the production zone and the wells, or if hard data are not available, then cite literature of similar characteristics in other areas having similar hydrologic and geologic settings.

Three to six groundwater monitoring wells will be installed within the Atlantic Rim study area during the interim drilling project. The effects of interim drilling and development on the coal aquifer, including drawdown, will be monitored by these wells and they will provide data for a groundwater model to look at potential impacts from alternatives in the EIS.

Additionally, because these coal seams are deep and isolated from those formations utilized for drinking water, no impacts are anticipated to drinking water supplies and/or surface waters.

The slight leakage noted in the JREA would be from the aquifers to the coal beds not vice versa; therefore, there is no possibility of contamination of neighboring aquifers (not considering the fact that the leakage is hypothetical and highly improbable).

These targeted coal reservoirs are classified as confined because they are bound by confining layers that consist of impervious layers of shale and siltstone. Hydraulic connection between the coal reservoirs and any aquifer stratigraphically above or below the coal seams is considered nonexistent. The hydrostatic head of the water measured in test wells completed in coal reservoirs in and near the project area are considerably higher than the elevation of the ground level at a specific well location. Confined, or artesian, reservoir conditions of this type signify an effective seal above and below the reservoir.

d. Page 4-5, Chapter 4, Environmental Consequences, Section 4.5, Water Resources, Section 4.5.1, Alternative 1 – Proposed Action, fifth paragraph:

The paragraph states that, because the coal aquifer water to be injected is of “higher quality” presumably, lower total dissolved solids concentration than the native water in the deeper disposal formations, no significant water quality impacts are anticipated. However, if the ionic compositions of the two waters are different, processes of chemical interaction and precipitation are possible and may affect the hydraulics (storage and dispersion of injected wastewater) in the disposal zone, which in term could affect the injection process and rates; this could adversely affect the surface conditions at the drilling sites. This possibility should be described in the DEA.

The injection wells at Jolly Roger are being permitted through the Wyoming Department of Environmental Quality. They set the injection rates through a process called the step rate injection test (and other testing) and this data is supplied to the DEQ. The DEQ sets the injection rates based on this data. Additionally, the DEQ will require that Anadarko supply them with periodic water quality tests for the aquifer utilized for the injection. This monitoring is utilized to show if any changes are occurring to the aquifer based on the injection of the produced water. These samples are compared to the initial aquifer water sample taken for the permitting process.

7. The National Wildlife Federation

a. The Environmental Assessment for the Jolly Roger Pod Interim Drilling Project violates the National Environmental Policy Act because it relies on the BLM's Interim Drilling Policy.

1) The IDP should have been subject to NEPA under BLM's rules.

The Council on Environmental Quality (CEQ) regulations found at 40 CFR 1506.1 discuss the requirements that must be met to allow limited activities during the preparation of an EIS. The IDP was prepared to guide exploratory oil and gas activities and to notify the operators what requirements would be necessary to keep activities at a reasonable level during the preparation of the EIS, while allowing the gathering of data necessary for the completion of the environmental analysis. The IDP is neither a decision nor an action. No action will be authorized until a NEPA document and a Finding of No Significant Impact have been completed. The IDP is a policy to guide activity while collecting data to conduct an environmental analysis.

The IDP describes the "conditions and criteria" that will determine what and where exploration activities may be considered. Those exploration activities constitute the action and are subject to NEPA analysis. The IDP itself states, "Prior to initiating interim drilling, and environmental assessment, including a detailed Water Management Plan, will be prepared and approved for each individual pod."

The policy falls under BLM Manual H-1790, Appendix 3, Categorical Exclusions, Part 1.10, which states, "Policies, directives, regulations and guidelines of an administrative, financial, legal, technical, or procedural nature; or the environmental effects of which are too broad, speculative, or conjectural to lend themselves to meaningful analysis and will be subject later to the NEPA process, either collectively or case-by-case." The IDP meets the policy, guidelines, technical, and procedural categorical exclusion criteria.

IDPs have been generated for several exploratory drilling projects within the Rawlins Field Office and other BLM offices in Wyoming. For this reason alone, the Atlantic Rim IDP does not set precedence.

The Great Divide RMP specifically describes under the section discussing "Management Actions" relating to oil and gas development, "Surface-disturbing activities will be restricted and intensively managed to maintain important resource values in ACECs, the Baggs Elk Crucial Winter Range, and in overlapping crucial winter ranges for the various big game species." The conditions and criteria described in the IDP reflect protective measures described in the RMP that are designed to protect sensitive resources considered by the Interdisciplinary Team as likely to occur in the Atlantic Rim Natural Gas Project Area.

Regulations found at 40 CFR 1506.1 directly state that interim activities, within the limits described, are allowed during preparation of a project EIS. While the IDP document allows the BLM to better manage interim activities to meet CEQ requirements, clearly interim activities could proceed without an IDP.

- 2) **“The IDP was exempt from categorical exclusion and at least an EA should have been prepared for the IDP.”**

The IDP is not precedent-setting, in that it is not a decision which would limit the scope or extent of a proposed action. It is a document which provides guidance to the operators for development of a proposed action which should not result in a significant impact. A proposed action which would not conform to the guidance in the IDP could still be considered by the RFO. However, the RFO likely develop an alternative consistent with the IDP guidance, analyze each alternative in the EA, and make a decision based upon that analysis of effects and NOT based upon compliance with the IDP. For this reason, the IDP is not precedent-setting and is not exempt from categorical exclusion.

- 3) **“The IDP makes numerous decisions which determine the location and extent of the environmental impacts of CBM drilling in the ARPA [Atlantic Rim Project Area].”**

The IDP establishes conditions and criteria to keep all activity at an insignificant and a reasonable level during completion of the EIS. The basis for the criteria described in the IDP document are decisions, management objectives and actions, and mitigation described for oil and gas operations and other surface-disturbing activities in the Great Divide RMP, oil and gas rules and regulations, and standard operating procedures. There are limitations on exploration drilling and location of activities described in the IDP, but no decisions are made, as it is not meant to be a decision document. The limitations are based on allowing exploration without having an adverse environmental impact or limiting the choice of reasonable alternatives while allowing the gathering of data necessary for the completion of the EIS. The operators are allowed to propose activities under the guidelines given, but can choose how many wells to drill, where to place facilities, locations, roads, and propose alternate methods of water disposal, as long as the activities fall within the conditions and criteria of the IDP. The operators can not exceed the number of wells described in the IDP but are not obligated to drill all 200 wells, nor a total of 24 wells in each pod. No proposal will be approved until an EA has been completed and then reviewed by the public. The BLM will review the EA and the public comments and will then make a decision as to whether the project as described will result in no significant environmental impacts.

- 4) **The IDP sets a maximum of 200 CBM wells “for research and exploratory purposes, during the interim period.” How would the impacts have been different if the maximum number of wells were different? Were alternatives to a 200 well maximum even considered?**

Yes, other levels of drilling were considered. The first request by the operators was to consider 400 exploratory wells. After the BLM required the operators to propose an exploratory plan located outside of areas of known sensitive wildlife resources, the number of exploratory wells was revised to 228. Based on sound reservoir management principals, BLM determined that 200 wells was an appropriate level of research and exploration to allow during the preparation of the EIS. This was used to develop the proposed action for the Jolly Roger Pod EA.

- 5) **The IDP allows wells “in the nine pods the operators have proposed,” IDP, Appendix A to JRPEA at A-2, paragraph 1. Did BLM explore other pod areas or fewer pod locations? Would the impacts have been different had there been fewer or different pod locations?**

Again, the level of exploratory activity was based on sound reservoir management principles. The intent of the IDP was to keep exploratory drilling outside of sensitive resources. Placement of the proposed exploratory drilling in different locations may have resulted in greater impacts to sensitive resources.

- 6) **“The IDP sets “a maximum of only 24 CBM wells within any pod....” How would the environmental impacts have been different if a lower maximum number of wells in each pod had been used?”**

The maximum number of wells per pod was derived based on past experience within the Dixon Field and Drunkards Wash Unit (near Price, Utah). The best comparison to the geologic conditions known to exist in this area is the Dixon Field CMNG development of the early 1990s, just south of Atlantic Rim along the Wyoming/Colorado border. The companies believe the Drunkards Wash Unit near Price, Utah, is also a good productive analogy to the situation present within the Atlantic Rim CMNG Project Area. The data from these two fields indicate that somewhere between 11 and 30 wells might be needed in a pod to adequately determine its economic viability. The BLM believes the 24-well target would allow the operators to obtain an indication of economic viability in a reasonable period of time. Each pod must be evaluated with an environmental analysis. If, through this analysis, 24 wells were believed to cause significant impacts to the environment or prejudice decisions to be made a result of the Atlantic Rim Natural Gas Project EIS, a lower number of wells would be considered.

- 7) **“The IDP specifies that ‘required injection and monitoring wells will not count toward the well limit.’ Drilling and using injection and monitoring wells have environmental impacts; how would the overall assessment of impacts vary if injection and monitoring wells were counted toward the maximum number of wells in a pod?”**

Only three monitoring wells will be required, and each pod will likely have two re-injection wells (some outside of the Colorado River Basin may have none). There is generally less than one acre of initial disturbance for each of these wells and a life-of-project disturbance of 0.005 acres for each well. This would result in an initial disturbance from all injection and monitoring wells of 23 acres (23 wells x 1 acre) and LOP of 0.115 acres (23 wells x 0.005). Disturbance from the one to three injection wells proposed for the Jolly Roger Pod Project is described in the EA on page 2-8 and in Table 2-3. Even a slight increase in the number of injection or monitoring wells would only result in a minimal increase in disturbance; however, please note that all monitoring and injection wells will be subject to a NEPA analysis.

- 8) **“The IDP specifies that ‘a ¼-mile buffer is required between surface-disturbing activities and the Overland Trail.’ How would the impacts vary if this buffer were enlarged?”**

The ½-mile corridor is a protection corridor that allows BLM to evaluate effects. It is not a guideline that prohibits surface disturbance within ¼ mile of either side of the trail. Disturbance which is visible and located within ¼ mile of the Trail is considered to be an adverse effect and therefore consultation with the Advisory

Council on Historic Preservation is required according to the Wyoming State Protocol and 36 CFR 800.4 (d). As well, the RFO will conduct and has conducted analyses for any eligible historic trail located within two miles of a proposed action to determine if any adverse effects would occur as defined under 36 CFR 800.4(b). Because each project is unique, impacts vary from case-to-case and would have to be evaluated on that basis.

The Cherokee Trail is located, according to our records, approximately 12 miles south of the Jolly Roger Pod and is, therefore, well outside the Area of Potential Effect for this project. The Overland Trail and the Rawlins-Baggs Stage Road are outside but adjacent to the project area. The two-mile area of effect was analyzed and SHPO has been consulted as required.

- 9) **“The IDP specifies that prior to completion of the ARPA EIS, and with possible exceptions for Double Eagle’s existing and proposed wells, water produced from coalbed methane wells located in the Colorado River Basin will be disposed of by re-injection. What are the environmental benefits and costs of this broad disposal decision?”**

The requirement for re-injection for operations located within the Colorado River Basin is intended to allow CBNG development without violating the requirements of the Clean Water Act. The environmental benefit would be to meet the objectives set forth by the Colorado River Basin Salinity Forum and the Management Objectives for Soil, Water, and Air described on page 39 of the Great Divide RMP. Re-injection will prevent salt loading in watersheds within the Colorado River Basin. Furthermore, the impacts to groundwater were projected to be minimal because the State of Wyoming requires all formations accepting re-injected water contain water of lower quality than the water placed in the formation as described in the EA.

- 10) **“The IDP provides that when a pod contains a prairie dog town, a black-footed ferret survey “will clear the pod for a one-year period.” Operators also have the option to complete the survey for the whole EIS area, “which would clear the area for the life of the project. Would there be greater protection if the clearance period were shorter than a year? If the survey is done for the entire EIS area, why should the clearance be for the ten-to-twenty year life of the project, given that ferrets could move into a prairie dog town after the initial survey, but long before disturbance of their new habitat? Why does the IDP not consider the importance of prairie dog towns to other declining species such as the swift fox, mountain plover, and ferruginous hawk, all of which may be impacted by the proposed CBM development on the Atlantic Rim?”**

The IDP states (IDP, Appendix A, Page A-3, number 11) that drilling will be allowed in each individual pod containing prairie dog towns upon the completion of black-footed ferrets survey using methods approved by the Fish and Wildlife Service. These surveys will clear the pod for one year per service protocol/requirements (Black-Footed Ferret Survey Guidelines for Compliance with the Endangered Species Act. U.S. Fish and Wildlife Service Denver, Colorado, and Albuquerque, New Mexico April 1989).

This requirement meets the USFWS guidance necessary to protect black-footed ferrets on public lands. As part of the project review and analysis, field reviews are conducted to ensure that, wherever possible, the proposed disturbance will avoid prairie dog towns. The current proposed action successfully avoids prairie dog

colonies. This being the case, no adverse effects to prairie dogs or other associated obligate species are anticipated from the proposed action.

- 11) **“The IDP precludes drilling or disturbance ‘in areas where any two or more big game crucial winter ranges overlap.’ What would be the environmental benefits of precluding disturbance where there was only a single species crucial winter range, particularly since under any timing stipulations that may apply, disturbance done in crucial winter range prior to the closure date need not be reclaimed before the next closure period?”**

On page 30 of the Great Divide RMP, Management Actions, the RMP specifically states that surface-disturbing activities will be restricted and intensively managed to maintain important resource values in overlapping crucial winter ranges for various big game species.

The Rawlins Field Office has determined that the timing stipulations adequately protect big game crucial winter range for a single species. If it was determined, through further analysis, that additional mitigation was necessary to protect single-species crucial winter range, the BLM would afford this protection.

There is no crucial winter/year long pronghorn range in the Jolly Roger Pod (page 3-25, JRPEA). Elk, deer, and antelope utilize the JRPA for winter/yearlong range. Cumulative impacts to big game resulting from this project are minimal and no long-term damage to crucial winter range would occur. Effects on big game are expected to be minimal, as the project area represents less than one-tenth of one percent of the winter or year-long range for any species (HWA 2003) Figure 3-1). No long-term loss of habitat is expected once construction is complete and big game species are expected to return to the area.

- 12) **“The IDP provides the BLM must approve a drilling schedule ‘to ensure activities are limited within proven big game migration corridors at critical use times during the year.’ Why did the BLM indicate that it would only limit activities, rather than preclude all activities in the corridors at critical use times?”**

The requirement was placed in the IDP to avoid simultaneous drilling in two adjacent pods if proven big game migration corridors were present.

- 13) **“The IDP requires the installation of fish passage structures ‘for roads which cross drainages with fisheries concerns as identified by BLM.’ Have these drainages already been identified? What criteria were used? Was the public allowed to evaluate these designations? Was any environmental analysis done on which drainages were designated? Given that ‘pipelines, power lines, and fiber optic lines will be buried and, where possible, will follow the road rights-of-way,’ what is to prevent trenching for these lines from destroying fisheries that the passage structures were intended to save?”**

No fish species occur in the Great Divide Basin; therefore, no fisheries would occur in or downstream from the Jolly Roger Pod Project Area. No roads or other facilities within the Jolly Roger Pod Project Area are subject to this requirement.

- 14) **“The IDP’s definition of Sensitive Resource Areas, which requires protection with stipulations or by mitigation, does not include areas important for recreational use, areas of important scenic value, areas of solitude and lack**

of noise, or areas of fragile soils. What would be the environmental benefits of including these other resource values as sensitive areas which must be protected by stipulations or mitigation?”

The project area is managed for multiple uses. There are no areas set aside for special management of sensitive soils within the project area. All of the Atlantic Rim exploratory pods are located in Visual Resource Management Class III. None of the pod areas lie within any area identified in the RMP as a special recreation area or contained in designated recreation sites. The concerns you identify are addressed through project-wide mitigation measures and procedures described in the Jolly Roger Pod EA on pages 2-14 through 2-22.

15) “The Jolly Roger Pod EA relies extensively on the Interim Drilling Policy.”

The IDP is very important in providing guidance to the operators regarding exploration activities. The IDP identifies protective measures to meet 40 CFR 1506.1, but other authorities, rules, regulations, mitigation in the RMP, in addition to the IDP, played a role in determining where and what exploration activities would occur within the Jolly Roger Pod Project .

16) Most of your discussion in this section appears to emphasize that the IDP restricts alternative formulation. According to the H-1790-1, BLM NEPA Handbook, Chapter IV, Preparing Environmental Assessments, page IV-3, alternatives to the proposed action must be considered and assessed whenever there are unresolved conflicts involving alternative uses of available resources. Public controversy or concern about a proposal does not necessarily mean that alternatives must be analyzed. The Handbook raises the question whether there are reasonable alternatives for satisfying the need for the proposed action, and will these alternatives have meaningful differences in environmental effects.

The Jolly Roger Pod Project consists of the drilling of 24 CMNG wells and associated facilities. As stated in response 7.a.3) above, BLM believes the 24-well target is consistent with other CMNG fields with similar geologic conditions, and would allow the operators to obtain an indication of economic viability in a reasonable period of time. Because the impacts from implementing this project were minimal and no unresolved conflicts were apparent, no other reasonable alternatives were considered.

b. “The Jolly Roger Pod EA violates the Federal Land Policy Management Act.”

1) “The Great Divide RMP does not contemplate CBM development or its associated environmental consequences.”

The RMP states that the entire planning area is open to oil and gas leasing and does not make a distinction as to whether oil and gas development is conventional or otherwise. The minerals management program policy and goals described in the RMP are to provide the opportunity for leasing, exploration, and development of oil and gas while protecting other resource values. CMNG-related activity is not unanticipated just because the RMP does not use the specific words “coalbed methane”. “Methane” and “natural gas” are used interchangeably regardless of the source. No specific formation, bed, or seam was identified in the RMP as being suitable or unsuitable for oil and gas development. Natural gas production operations are very similar and CBNG development is no exception. Development and production sequence described in the Oil and Gas Appendix in the Draft

Environmental Impact Statement for the Medicine Bow-Divide Resource Management Plan (later the Great Divide RMP) describes typical development operations, even to the point that water may need to be removed during natural gas production. Therefore, even if coalbed methane has not been specifically mentioned, the activity is clearly consistent with the terms, conditions, and decisions of the approved plan [43 CFR 1610.0-5(b)].

In the Interior Board of Land Appeals' (IBLA) order denying the request for stay by the Wyoming Outdoor Council (IBLA 2003-358), the IBLA stated that "We have scrutinized the Great Divide RMP/EIS and conclude that its analysis of oil and gas impacts adequately analyzed impacts associated with potential CMNG exploration and development in the RFO area, which is located outside the Powder River Basin. Although the BLM did not flag CMNG as a discrete topic in the draft and final EISs, those documents did address the issues typically associated with natural gas production in general and CMNG production in particular (e.g. water volume, quality, discharge/disposal, contamination of surface and groundwater, sodium adsorption ratio (SAR), and the uses to which produced water can be put)."

2) "The JRPEA exceeds the reasonably foreseeable development scenario for the Great Divide Resource Area."

The GDRMP recognizes development of oil and gas resources on two levels: 1) number of wells drilled, and 2) amount of surface disturbance from the development of these resources. The DEIS analysis assumed that 40 acres of disturbance would occur from the development of each gas well brought into production (including ancillary facilities). Efficiencies within the oil and gas industry have resulted in a reduction in the amount of surface disturbance necessary to develop oil and gas operations. The Continental Divide DEIS re-examined the amount of long-term disturbance associated with natural gas development and estimated it to be approximately 9 acres (CD/WII DEIS at 1-8). It is estimated that the surface disturbance associated with developing the Jolly Roger pod would be much less per well, with an estimated short-term disturbance of 1.4 acres/well (16 wells requiring 22.4 acres) and long-term disturbance of 0.3 acres/well.

As elaborated upon in the Desolation Flats DEIS (Page 1-13, released April 2003) there are over 7,000 acres of long-term disturbance acreage available for future projects. Therefore, the reasonably foreseeable development estimate of the future oil and gas wells and associated long-term disturbance within the RFO would not be exceeded by this project.

c. "The Jolly Roger Project is inconsistent with the Great Divide RMP in other respects that violate FLPMA."

- 1) The GDRMP specifies that access to the Atlantic Rim for recreation is of high importance (GDRMP/FEIS at 33). Although the JRPEA claims that the only negative impact on recreation in the JRPA will most likely be the displacement of big game and hunters for one season only (JRPEA at 4-14), it does not specify how it is known that the animals will be displaced and hunting opportunity reduced for only one season of an estimated 15-20 year project. Nor does BLM address the effect that CBM development may have on hunters' and other recreationists' ability to access the Jolly Roger Pod area, including privately-held lands within and adjacent to the project area. In other environmental documents, BLM has acknowledged that gas development may displace hunters from an area for twenty years. Draft Environmental Impact Statement, Desolation Flats Natural Gas Field**

Development Project at 4-91 (2003). How can BLM reconcile the claim that “[o]verall, effects on the recreation resource would be minimal because of the short-term nature of drilling and construction and concentrated locations of those activities,” JRPEA at 4-15, with the fact that drilling will continue for 15-20 years? Why does the EA contain no analysis as to whether alternative recreation and hunting opportunities will be available for recreationists displaced from the Jolly Roger Pod area? Most importantly, why does the EA not analyze whether such impacts are consistent with the GDRMP’s “high priority” on recreational access to Atlantic Rim?

The recreation portion of the EA specifies recreation activities that take place on or near the JRPA. Access to the JRPA is limited by land ownership patterns, as stated in the Jolly Roger EA (page 3-32). At the time of the GDRMP, the private landowner allowed public access to the Fillmore Ranch, the site of the JRPA. Several years after that document was signed, the land owner closed the private lands to the general public. Now the Fillmore Ranch area not only has very limited legal public access, it has been leased for years for commercial outfitting purposes, to the exclusion of hunters unless they pay trespass fees to hunt the area. The general public is displaced by the land ownership pattern, not the Jolly Roger Project.

The recreation resource exists, but the general public can not use it. The public is using nearby areas, such as the Daley Allotment, that have legal public access. The Jolly Roger development would temporarily displace big game species to other nearby areas, possibly where the public would be able to access and harvest them.

The EA acknowledges, in 4.9.1, second paragraph under Recreation, Proposed Action, that some long-term displacement of hunters would occur as a result of the project. This displacement would occur in localized areas during the hunting season where drilling is occurring. Once development is completed, human disturbance associated with the project during hunting season would be reduced to maintenance operations. If the landowner opens the area up to public access again, the network of new roads would provide additional access to areas within and adjacent to the JRPA. If the landowner leaves the area leased to the outfitter, the public is not displaced from the Fillmore Ranch by the project, but rather by the private landowner.

- 2) The GDRMP states that “[s]urface disturbance from oil and gas exploration and development would be restricted in certain areas with[in]...sage grouse leks, and high priority wildlife habitat” (GDRMP/FEIS at 107), yet Figure 3-1 shows crucial sage grouse nesting habitat and mountain plover habitat within the JRPOD. BLM acknowledges that no fewer than ten active sage grouse leks are located within two miles of the JRPA and its sales pipeline, JRPEA at 4-12. Attached as Exhibits A and B to these comments are prior comments, already on record with BLM, by leading sage grouse researcher Dr. Clait Braun, documenting in detail how prevailing scientific research indicates BLM’s quarter-mile surface occupancy restriction (and two-mile seasonal drilling restriction) is not adequate to protect sage grouse habitat. Restricting surface disturbance in the vicinity of sage grouse leks, but to such a limited extent as to fail to provide meaningful benefit for the species, cannot possibly be consistent with the GDRMP’s instruction to restrict surface disturbance for the benefit of sage grouse and, therefore, is in violation of FLPMA.**

Sage grouse nesting habitat and mountain plover habitat are not mentioned in the referenced portion of the GDRMP (GDRMP/FEIS at 107). The referenced section goes on to state "Surface disturbance on these areas would be mitigated through the application of the Wyoming BLM standard mitigation guidelines." The Wyoming BLM standard mitigation guidelines are part of the proposed action (JRPEA at page 2-19 and Appendix A).

- 3) **Several active sage-grouse leks are within two miles of facilities proposed under the Jolly Roger Project, map at JPREA 3-24. According to the BLM's own analysis, "[T]he JPRA is located within the extensive sagebrush/grassland habitat of southcentral Wyoming where greater sage-grouse are common inhabitants," JRPEA at 3-26. Oil and gas development has been shown to reduce the nesting rates of sage grouse and its impacts include direct habitat loss from new construction, increased human activity, and pumping noise causing displacement, increased legal and illegal harvest, direct mortality associated with reserve pits, and lowered water tables resulting in herbaceous vegetation loss. Experts agree that oil and gas facilities should be sited farther than 3.2 km (2 miles) from sage grouse leks to protect nesting that occurs on the lands surrounding the lek. Several of the proposed wells are scheduled to be constructed within two miles of a sage grouse lek, JRPEA at Figure 3-1. Ten sage grouse leks are within two miles of proposed developments; only one well is not located in potential sage grouse nesting habitat, JRPEA at 4-12. The mitigation measures proposed for the project prohibit construction only during the breeding and nesting season, and exceptions to this meager standard will be made available by the BLM, JRPEA at 2-19. While there is a seasonal prohibition on construction activities throughout the project area from March 1 to June 30 to reduce disturbance to sage-grouse, these measures fail to address the disturbance to nesting sage-grouse from routine production-related traffic and activities that will continue throughout the life of the project along roads and well sites within the project area, as well as along the sole access route to the project area, JRPEA at 2-21. Even the weak ¼-mile No Surface Occupancy buffers around sage grouse lek sites employed in other Atlantic Rim exploratory pods are apparently not in force for the Jolly Roger project.**

The Wildlife Appendix of the GDRMP/FEIS, at page 480, addresses the impacts from oil and gas development on greater sage-grouse. The JRPEA, at page 2-19, states, "Surface-disturbing activities would not be allowed within ¼ mile of identifies greater sage-grouse leks. There is no construction proposed within ¼ mile of a greater sage-grouse lek.

- d. **The Jolly Roger Pod environmental assessment violates NEPA by failing to consider other reasonable alternatives, failing to adequately analyze reasonably foreseeable future actions, and failing to adequately disclose impacts of the proposed action**

- 1) **The JRPEA Violates NEPA by failing to consider other reasonable alternatives.**

The CEQ states in its Forty Questions and Answers about NEPA Regulations (1981) that there are two distinct interpretations of the No Action Alternative. The first is that there is no change from the existing situation. This interpretation generally applies to planning decisions. The second interpretation is that the proposed activity (i.e., as described under the Proposed Action) would not take place. This does not mean, however, that activity associated with oil and gas development would never be allowed to occur in this area. Under the Mineral

Leasing Act of 1920, as amended, the BLM cannot deny the lessee the right to develop somewhere within the leasehold. This right is supported by national mineral leasing policies and the regulations by which they are enforced, which recognize the statutory rights of lease holders to develop federal mineral resources to meet continuing national needs and economic demands as long as undue environmental degradation is not incurred.

However, this does not mean the “No Action Alternative” cannot be chosen by the decision-maker. If the components of the project described under the Proposed Action were such that the decision was made that environmental impacts were significant, either an environmental impact statement could be prepared, the project components could be changed, additional mitigation could be proposed that would allow a determination of no significant impacts, or the decision-maker could choose the No Action Alternative and the project would not go forward as described.

2) The JRPEA should have considered alternatives involving directional drilling.

This alternative is not considered to be economically feasible due to a number of factors. The primary factor is the shallow depth of the formation does not allow sufficient room to directionally place the wellbore in the established reserve recovery pattern without excessively high angles and the attendant costs. The coal zones are thin and scattered over a long interval so that an “S” type directional well (directional and then vertical through the productive zone) is absolutely not feasible due the shallow depth and the attendant extremely high angles required to place the well in the established reserve recovery pattern. An angled directional well (directional through the pay zone) is also not feasible because again the shallow depths would not allow sufficient distance to place the angled hole within the reserve recovery pattern. In this case, the reserve recovery would be marginal for the upper zones due to interference by the closely spaced high angle wellbores and could also be marginal for the lower zones due to lower drawdown of the widely spaced high angle wellbores. In addition, cementing casing in an angled directional well can be very difficult and this would be extremely detrimental to the required isolation of the coal reservoirs. Horizontal drilling is not feasible because the zones are thin and would not economically support single horizontal completions.

The proponents are aware of the recently emerging technology known as pinnate drilling. The technology developed by CDX Gas, LLC (CDX), is proprietary in nature and, as such, very little detailed technical data is available to the proponents and to the industry as a whole. Given the scarcity of good technical data regarding this technology, the viability and economics of a pinnate drilling alternative could not be and were not evaluated for the Jolly Roger EA.

*No pinnate wells have been drilled to recover coalbed natural gas in Wyoming, at this time, thus, providing no examples or analogies from which evaluation of this technique in the Jolly Roger Pod could be based. In fact a review of the exhibits provided with is comment indicates this new technology is far from universally applicable in the exploitation of coalbed resources. The **New Technology Magazine** article states “Very porous coal deposits and coalbeds that are interspaced with limestone or sandstone are generally not conducive to Z-Pinnate technology.” CDX representative David Wight goes on to say “Sometimes our testing is negative and it tells us not to go forward in those areas.” In the same article, Penn Virginia’s James McKinney indicates the pinnate technology is not always the right one to use. McKinney elaborates by saying “We are employing*

the horizontal technology where we have sufficient coal thickness and where we have an absence of subsurface features. For example our vertical program works very well in thick coals, and it works very well where we have an anticlinal feature.”

The targeted coal intervals within the Jolly Roger Pod are expected to possess geologic and reservoir characteristics which would potentially exclude the application of Z-Pinnate technology. The coals are expected to have high permeability. Pinnate technology is applicable to low permeability coals. Numerous thin seams (<3' in thickness) are expected to be encountered. Pinnate technology requires minimum thicknesses generally in the 3'-4' range. Structural complexity and the presence of interbedded porous and permeable water bearing sands further reduce the opportunity to apply pinnate drilling technology within the Jolly Roger Pod.

It is premature to evaluate pinnate drilling technology as a viable alternative to vertical drilling. Minimal “hard” technical data exists due to the proprietary nature of the technique. The technique has yet to be proven in a wide range of geographic and depth-related applications. Geologic and reservoir properties in Jolly Roger suggest the application of pinnate drilling may not be the optimal means of developing the coalbed natural gas resources in this area.

3) The JRPEA violates NEPA because its analysis of cumulative impacts fails to thoroughly consider reasonably foreseeable future actions

At this point, the proposal to develop a 3,880 well field is not reasonably foreseeable. In general, two main factors determine whether other actions should be included as part of the cumulative impact analysis—location and timing of actions. The cumulative impact analysis must take into account the past, present, and future actions that overlap in time and location with the proposed action. At this time, there is no data available to confirm that CMNG resources can be developed and produced in the entire ARPA. Implementation of the 200-well interim drilling program was designed to identify where areas of CMNG drilling may be economic and the number of wells at which the program becomes economic. The only reasonably foreseeable activity at this time, other than conventional uses of oil and gas drilling and ranching, is the 200-well proposal.

e. Other specific problems in the JRPEA

1) The JRPEA’s analysis of wildlife impacts (particularly to pronghorn, mule deer, and elk) appears to be based almost entirely on percentages of range disturbed within herd units, JRPEA at 4-9 to 4-11. However, as the United States Fish and Wildlife Service has previously pointed out to the BLM, effects of development extend beyond the percent of ground disturbed, due to indirect effects. Focusing solely on direct effects on disturbed ground is misleading to the reader and understates effects of development on wildlife.

The following paragraph has been added to Chapter 4 of the JRPEA at 4.8.1 Proposed Action, Page 4-10, second paragraph (see ERRATA):

Man-made construction such as well pads and roads can reduce use of surrounding habitat by wildlife. These sites reduce foraging due to the direct loss of native vegetation from ground disturbance. In addition there is an area surrounding these sites that tends not to be utilized due to the increased human activity. This “zone” can extend up to a half mile from the development area.

Consequently, development impacts to wildlife can extend further offsite than the amount of the disturbed area. Some individual animals can “habituate” to the increased infrastructure; but, it is generally assumed that overall, the increases human footprint intensifies the potential for wildlife-human interactions ranging from the harassment of wildlife to poaching and increased legal hunting pressure. Also, increased traffic levels on new and existing access roads could increase the potential for wildlife-vehicle collisions.

- 2) The JRPEA dismisses the effects of wildlife displacement on pronghorn and mule deer “because of the temporary nature of the displacement and the availability of comparable habitats in adjacent areas,” JRPEA at 4-11. This statement is meaningless absent an informed assessment of whether there actually are comparable habitats both available and not currently used in adjacent areas. Moreover, this assumption is fatally flawed because it fails to take into effect the highly foreseeable probability of continuing CBM development throughout the Atlantic Rim area. Even if adjacent, suitable, and unoccupied habitat may be available now, it will not be if and when development of additional CBM wells continues on adjacent areas of the Atlantic Rim.**

The CD/WII DEIS summarized several studies that have occurred over the past 25 years, which examined impacts from oil and gas activity on big game animals. It was concluded that of the three big game species, it appeared that pronghorn antelope exhibited the least amount of displacement due to oil and gas and mining development activities. Studies conducted in Wyoming, New Mexico, and Texas (Gusey 1986; Guenzel 1987; Easterly et al. 1991) found that pronghorn returned to these habitats once the source of disturbance left the areas. Segrestrom (1982) and Deblinger (1988) determined that a large population of pronghorn populations inhabiting surface mine sites in Wyoming were relatively unaffected by mining activities and habituated to the presence of personnel and vehicles.

Mule deer are generally less sensitive to human disturbance than elk and, in some cases, may be less sensitive than pronghorn (Easterly et al. 1991). In the Rattlesnake Hills of Wyoming, mule deer did not avoid oil fields and may have habituated to human activity associated with petroleum extraction. Other studies conducted found that wintering mule deer in Montana were minimally affected by low levels of oil and gas development (Irby et al. 1988), while a study of development on Crooks Mountain in Wyoming did not observe a mule deer within 0.5 miles from a well construction site.

Elk tend to react less to traffic along roads than to concentrated areas of noise and activity such as well sites. The CD/WII DEIS reviewed studies that examined the displacement of elk due to oil and gas development activities and concluded that elk within that project area could be displaced an average of 1.5 miles from the well locations during construction, drilling, completion, and workover operations.

Because activities associated with the construction of this project are anticipated to be short in duration and would be restricted during critical times of the year, and with the implementation of measures described in Chapter 2 of the EA: Master surface Use Plan, impacts to big game as a result of implementing the Jolly Roger Pod project are anticipated to be minimal.

We interpret this to mean that construction activities are more disruptive to wildlife than operational activities; there is a variable response depending on individual species, areas, and animals; and animals return within a short time frame to the area once construction/disturbance is completed.

The Jolly Roger EA analyzes the effects of the proposed action for this pod, not the entire Atlantic Rim EIS project. Because the EIS is currently under preparation, it is not considered a reasonably foreseeable action.

Disturbance of wildlife is expected to be more intense during construction activities, which should be completed prior to the completion of the Atlantic Rim EIS.

At this time the Jolly Roger Pod is planned to be the last exploratory pod in the area of the Atlantic Rim Project.

- 3) Anadarko and Warren will be stimulating coal seams by hydraulic fracturing, JRPEA, Appendix B at 4. This falls within Class II of the UIC program under the Safe Drinking Water Act and must be permitted by EPA, or in this instance, WOGCC. The JRPEA does not include a detailed study of the types of fluids to be used, in which coal seams they will be used, the potential for cross contamination of aquifers, an analysis of all underground fractures and fissures between aquifers, or a full analysis and monitoring program established for ensuring that all known or potential drinking water supplies are protected.**

Hydraulic fracturing is the process in which sand within a viscous fluid is injected into a reservoir in order to improve the reservoir productivity. The viscosity is required to carry the sand and to limit leak off into the formation permeability. Enzymes reduce the viscosity in the formation to that of water and the fluid is easily produced back. The primary fluid used for the hydraulic process is water and, in the case of a single-phase or water saturated system like coal, essentially all of the fracturing water is produced back during the initial dewatering phase. Therefore, there is a very low probability of any impact due to hydraulic fracturing. This conclusion is further verified by the Ground Water Protection Council's survey of 10,000 coalbed natural gas wells and the State of Alabama and the EPA analysis of the well in the LEAF vs. EPA lawsuit that showed no contamination (Testimony of the Independent Petroleum Association of America and the National Stripper Well Association before the Environmental Protection Agency regarding Underground Injection Control, August 25, 2000).

It is highly unlikely that cross aquifer communication and contamination will occur. The contamination question was answered above as the only probability of contamination is due to hydraulic fracturing and this has been shown to be very remote. The thick shales between the coals and the cement that is used to isolate the wellbore from the formations will eliminate communication between these aquifers.

Casing and cement have a long history of ability to isolate formations in the petroleum industry. This history includes isolation of very high-pressure gas from low or hydrostatic pressure gas in the Madden Deep Unit, Wyoming. A history of isolation of very dangerous poisonous H₂S gas from sweet gas in the Worland Field, Wyoming, and isolation of high-pressure water and CO₂ gas injection in the Lost Soldier Field, Wyoming, can be documented. This is a very short list of thousands of zonal isolation cases in Wyoming.

Wellbore control by the use of drilling muds will effectively isolate aquifers during the drilling process and this control will be effective until the casing is cemented in place. Communication outside the wellbore and within the formation is not within the scope of this assessment.

Three to six groundwater monitoring wells will be installed within the Atlantic Rim study area during the interim drilling project. "The effects of interim drilling and development on the coal aquifer, including drawdown, will be monitored by these wells and they will provide data for a groundwater model to look at potential impacts from alternatives in the EIS.

Also; because these seams are deep and isolated from those formations utilized for drinking water, no impacts are anticipated to drinking water supplies and/or surface waters.

- 4) The JRPEA notes that due to confining beds above and below the coal layer, hydraulic connection between the target coals and surrounding aquifers is "limited," JRPEA at 4-5. However, the confining layers are "impervious and semi-pervious," indicating that some cross-contamination may occur, and hydraulic connections are "limited" but not absent. And while leakage between aquifers is asserted by BLM to be "minimal," the fact that "slight leakage" is expected to occur indicates a strong possibility of contamination of neighboring aquifers by migrating methane gas and/or toxic wastewater once head pressure is removed from the target aquifer, see JRPEA at 4-5**

The slight leakage noted here would be from the aquifers to the coal beds not from the coal beds to the aquifers and, therefore, there is no possibility of contamination of neighboring aquifers.

These targeted coal beds are classified as confined because they are bounded by confining layers that consist of impervious layers of shale and siltstone. Hydraulic connection between the coal reservoirs and any aquifer stratigraphically above or below the coal seams is considered nonexistent. The hydrostatic head of the water measured in test wells completed in coal reservoirs in and near the project area are considerably higher than the elevation of the ground level at a specific well location. Confined, or artesian, reservoir conditions of this type signify an effective seal above and below the reservoir.

Fluid flow (gaseous or liquid) through a porous (impervious and semi-pervious) media is directly proportional to the permeability of the media through which it flows (the coal bed). The direction of the flow will occur from a high pressure to a low pressure. In the case of the dewater of coal strata for coalbed natural gas production, the main concept is to lower the confining pressure within the coal strata in order to induce the release of the natural gas absorbed within the coals. As a result of the dewatering process, the hydrostatic pressure within the coal reservoir is reduced from its initial pressure. In the case where the coal seam is overlain and underlain by adjacent aquifers or aquifers separated from the coal seam by impervious and semi-pervious strata, the initial pressures of the aquifers and the coal seam aquifer are likely to be close to identical. When the pressure of the coal seam is lowered as the result of dewatering the coal seam, a pressure sink is created within the coal seam relative to the overlying and underlying aquifers. Thus, any fluid communication between the coal seam and the adjacent aquifers would be in the direction of the adjacent aquifers to the coal seam.

- 5) **The cumulative impacts of the interim CBM drilling activities on water resources are based on current knowledge of the geology and hydrology, JRPEA at 4-5. Effects discussed assume that the strata from which water will be withdrawn to “dehydrate” the coal seams as well as the strata into which produced water will be injected are relatively impervious in relation to other nearby aquifers. However, there is no discussion of alternate disposal of the waters should the strata not be sealed or if they will not take the water. Nor is there any discussion of putting monitoring wells into the targeted aquifer for injection, the adjacent aquifers, or into aquifers adjacent to the coal seam. Furthermore, the JRPEA states that there are eight permitted water wells located within one mile of the JRPA, with three of them being located in the “circle of influence,” or a half mile radius. The JRPEA assumes that the chances of this project lowering the levels of these wells is “highly unlikely,” but does not address how they intend to monitor the levels in the wells, nor what mitigation measures will be taken if such “drawdown” does occur. Cross-aquifer communication and contamination can occur through a variety of mechanisms. Although we believe these concerns ought to be addressed, we generally support the commitment of Anadarko Petroleum to inject all produced waters into subsurface aquifers of equal or lower water quality.**

Three monitoring wells were planned for installation in the Atlantic Rim Project Area to monitor water levels, pressures, and water quality in the producing formation as well as the sandstone zones above and below the coal formations. Two of these monitoring wells are in place and the third will be located in this pod. This will allow the BLM to evaluate impacts on these aquifers due to the pumping of water from the producing formation. In addition to these physical measurements and extensive data collection, a number of water samples have been analyzed for isotopes that give an indication of the climate conditions when the water was deposited. As part of the preparation for the Atlantic Rim EIS, a groundwater modeling project has been initiated that should add additional information to considering this question. As of now, all the analysis confirms the prediction based on geology that these formations are hydrologically isolated from surface waters and shallow aquifers that could be used for domestic or stock watering wells.

Although it is a remote possibility of any impacts to domestic wells in the area, because there is only one nearby, it is prudent to collect water levels and water quality from this well to determine a baseline condition. Current water levels in the well will be measured monthly for four months and a water quality sample will be obtained. At the end of this time an analysis will be performed to determine the feasibility of yearly monitoring based on the variability observed in the samples. In addition, at the end of the sampling period a statistical analysis will be performed to determine conditions in terms of water level or chemical parameters that would warrant a detectable change. This analysis will be submitted to the owner for review. If sampling after the acceptance of this analysis indicates a change that is beyond the calculated detectable change, the operator responsible for the gas development will drill a replacement domestic well for the landowner at no expense to the landowner. The operator will be responsible for selecting the location of the well and replacing infrastructure necessary to use this well as a domestic supply.

- 6) **Temporary reserve pits at each pod would be open for two to eight weeks to allow evaporation of pit fluids. These pits would be fenced to protect livestock but would only have netting installed over the top if they are identified by visual observation or testing as containing oil or toxic**

substances, JRPEA at 2-19. If monitoring is by visual inspection only, then non-oily toxic substances may not be detected and could be a hazard to birds. With the lack of specificity in the plan, the more conservative action would be to string netting over all pits while they are wet. Injury or death to migratory birds could be a violation of the Migratory Bird Treaty Act. Furthermore, the JRPEA mentions nothing about the construction of the pits. Will they be lined? Who will monitor the reserve pits to make sure they are not contaminating the surrounding areas?

See Page 9 of the Master Surface Use Plan, Hazardous Materials

All project-related activities involving hazardous materials will be conducted in a manner that minimizes potential environmental impacts. An on-site file will be maintained containing current Material Safety Data Sheets (MSDS) for all chemicals, compounds, or substances that are used in the course of construction, drilling, completion, production, and reclamation operations. Netting will be placed over any pits that may contain hazardous substances (Comprehensive Environmental Response, Compensation, and Liability Act [CERCLA, Section 101(14)], as determined by visual observation or testing. The mesh diameter shall be no larger than one inch.

Here and at the reference mentioned this netting will be required regardless of how the toxic substances were discovered.

No hazardous substance, as defined by CERCLA, will be used in the construction or drilling operations associated with these wells. No Resource Conservation and Recovery Act (RCRA) hazardous wastes will be generated by well-drilling operations. The term "hazardous materials" as used here means: 1) any substance, pollutant, or containment (regardless of quantity) listed as hazardous under CERCLA of 1980, as amended 42 U.S.C. 9601 et seq., and the regulations issued under CERCLA; 2) any hazardous waste as defined in RCRA of 1976, as amended; and 3) any nuclear or nuclear byproduct as defined by the Atomic Energy Act of 1954, as amended, 42 U.D.C. 2001 et seq. The operator will be required to provide a referenced list of hazardous materials that could be used, produced, transported, disposed of, or stored on the well location including a discussion on the management of the hazardous materials.

Any spills of oil, gas, or any other potentially hazardous substance will be reported immediately to the BLM, landowner, local authorities, and other responsible parties and will be mitigated immediately, as appropriate, through cleanup or removal to an approved disposal site.

Item 10 on page 2-18 states, "The reserve pits would be constructed in cut rather than fill materials. Fill material must be compacted and stabilized, as needed. The subsoil material of the pit to be constructed should be inspected to assess stability and permeability and to evaluate whether reinforcement or lining is required. If lining is required, the reserve pit must be lined with a reinforced synthetic liner at least 12 mils thick and with a bursting strength of 175 by 175 pounds per inch [American Society for Testing and Materials (ASTM) Standard D 75179]. Use of closed or semi-closed drilling systems should be considered in situations where a liner may be required." This requirement should prevent any possible groundwater contamination.

- 7) **There were no mountain plovers located in the project area during surveys in 2001-03, but there is potential mountain plover habitat, JRPEA at 3-24, 3-29. Will there be further monitoring for the presence of mountain plovers throughout the lifetime of the project? There is no assessment of the cumulative impact of roads on mountain plovers should they be present and roads are identified as a risk factor for them as the plovers both nest and forage in the bare ground along road verges. Several tracts of potential plover habitat were identified in the project area, and wells could be built on these potential nesting habitats, see JRPEA at 3-32, Figure 3-1. Well construction should not be permitted within ¼ mile of this potential mountain plover habitat, in order to maintain its viability as nesting habitat and prevent raptors from perching within sight distance of these lands. There is no assessment of the cumulative impacts of roads on mountain plovers (should they be present) and roads were identified as a risk factor for the species, as the plovers both nest and forage in the bare ground along road verges.**

On September 8, 2003, the USFWS withdrew its proposal to list the mountain plover under the ESA. It is still considered a BLM Wyoming State Sensitive Species, and is afforded the same protection stipulations as when it was a candidate to be listed under the ESA. One reason that the USFWS cited as justification to not list the plover was the effectiveness of the mitigation measures applied, as required in the Jolly Roger Pod Proposed Action.

Potential habitat was noted during BLM onsite investigations and COAs will be placed on the APDs if habitat is found. The BLM has established survey routes through potential mountain plover habitat in the Atlantic Rim project area and has surveyed for the birds on the routes during the past three years, but no birds have yet been observed within the breeding season. Should exploration drilling prove economic reserves exist in the Atlantic Rim area, a wildlife monitoring plan will be prepared as part of the mitigation proposed in the EIS outlining the requirements for wildlife monitoring, including mountain plover

- 8) **There is discussion of removing topsoil, storing it, and replacing it at a later date, JRPEA at 2-11, 2-16. There is no indication of how successful this practice is in reality over the long-term. In addition, there is potential for biological soil crusts to occur in the topsoil removed from the JRPA. Their presence has not yet been verified. A more conservative approach to the possibility of these crusts would be to ascertain whether they are or are not present, and if they are, it would need to be determined whether the removal and later replacement of the topsoil would damage these soil crusts. Furthermore, there is a lack of specificity in regards to soil and vegetation reclamation efforts, JRPEA 2-12. The “performance standards” mandate that certain percentages of the land shall be restored to certain levels of reclamation within certain time periods, but do not specify when the remaining reclamation must be completed, JRPEA 2-13. This leaves open the possibility that the “performance standards” time limits will be met and the remaining reclamation not be completed. Also, the short-term reclamation efforts do not specify that the new vegetation must be native, leaving open the possibility of incompatible or invasive species being planted. In addition, encouraging the replacement of native vegetation for both short- and long-term purposes would lessen the impact on native vegetation-dependent species in the area.**

Although it is not included in the JRPEA, please reference the RECLAMATION PLAN FOR THE CONTINENTAL DIVIDE/WAMSUTTER II NATURAL GAS PROJECT. This can be found in Appendix A of the Continental Divide/Wamsutter II Natural Gas Project EIS. This reclamation plan can be used by the Operators as guidance to achieve successful reclamation on federal lands. Alternate reclamation procedures may be implemented on private and state lands. The plan complies with Bureau of Land Management reclamation policy (BLM 1990a) and management directives specified in the Great Divide Resource Area Management Plan. The reclamation plan was developed based on these policies and directives, Executive Order 11987, and impacts and scoping issues identified in this EIS. The procedures presented in this plan are designed to allow flexibility based on specific conditions encountered at each proposed disturbance site. Site-specific reclamation procedures would be developed in each Application for Permit to Drill (APD), Right-of-way (ROW) application, or Sundry Notice and submitted to the BLM for review and approval prior to the authorization of surface-disturbing activities.

Short-term reclamation goals are immediate stabilization of disturbed areas and the protection of adjacent undisturbed areas from unnecessary degradation. The long-term reclamation objective is restore all disturbed lands to conditions equal to or better than pre-disturbance conditions by developing/reestablishing self-sustaining native vegetation communities that meet or exceed pre-disturbance parameters for cover, species composition, production, and diversity (i.e., ecosystem reconstruction). Other goals include the protection of surface and groundwater resources through the restoration of a geologically and hydrologically stable landform that would support future land uses (i.e., wildlife habitat, recreation, livestock grazing, and mineral exploration) and the prevention of the spread of noxious weeds.

BLM-required reclamation objectives are:

- the isolation and/or removal of all undesirable materials (e.g., poor quality subsoils, contaminated soils, potentially hazardous materials) to protect the rehabilitated landscape from contamination;*
- the assurance of subsurface (downhole) integrity to minimize subsidence and/or eliminate groundwater co-mingling and contamination (downhole reclamation and abandonment procedures are specified in Section 2.4.12 of the EIS and would be approved by the BLM through a Sundry Notice prior to implementation);*
- recontouring and the implementation of other soil conservation, surface manipulation, and water management techniques to establish stable slopes, water courses, and drainage features to minimize erosion and sedimentation;*
- the revegetation of reclaimed areas to stabilize soils and establish a self-perpetuating native plant community capable of supporting post-disturbance land uses;*
- the establishment of acceptable long-term visual aesthetics by mitigating visual contrasts; and*
- the monitoring and management of reclamation sites by Operators to evaluate and encourage continued reclamation success (BLM 1990a).*

Site-specific reclamation objectives would be stipulated in Surface Use Plans. The reclamation process has been divided into four major phases: pre-disturbance planning and site preparation, temporary reclamation, permanent reclamation, and reclamation success monitoring. By minimizing the amount of land disturbed through pre-disturbance planning and initially preparing the site for construction activities with the understanding that the area would eventually be reclaimed (e.g., top soil stripping and stockpiling for later use during site rehabilitation, keeping facilities away from cut-and-fill slopes and in as small an area as possible), the acreage requiring disturbance would be reduced and reclamation success would be facilitated. Temporary reclamation would involve the restoration of areas that may be utilized for the planned development but would not necessarily need to be disturbed for the entire life-of-project (LOP) and would include the stabilization of disturbed areas to control runoff and erosion until permanent reclamation procedures are applied. Construction-related disturbance areas along road ROWs are examples of temporary reclamation sites. Permanent reclamation would include the rehabilitation of locations no longer needed for the project. A non-producing well location and associated access road are examples of permanent reclamation sites. Upon project completion, all disturbed areas except roads slated to be retained for other land uses would be permanently reclaimed as designated by the BLM or other landowner. Reclamation success monitoring would involve assessing the status of reclaimed areas to ensure that these areas meet desired site stability and productivity standards.

- 9) **The JRPEA fails to gather baseline data on the distribution and extent of biological soil crusts, despite the fact that these soil organisms perform many important roles to increase soil nutrients and stability, JRPEA at 3-11. Despite the importance of these crusts, “[t]he presence of biological soil crusts on or near the JRPA has not been verified, but they may occur.” *Id.* The failure to gather baseline data on biological soil crusts which stand to be impacted by the Jolly Roger project violates NEPA’s requirement to take a “hard look” at impacts to the human environment.**

Biological soil crusts probably occur on most soil across the RMPPA. We do not inventory them. They are broken by anything disturbing the soil surface--an antelope walking around and laying down, vehicles or people traversing off road, wild horses going to water, building anything with/on the soil, etc. They can not be picked up and replaced. They are natural and can not be re-seeded. Current reclamation measures address revegetation, soil stabilization, and conservation which would help these crusts re-develop over the long term. Measures to minimize off road travel will help protect and maintain the crusts.

- 10) **Fragmentation of sagebrush steppe habitats is known to have deleterious effects on sagebrush obligate species such as sage sparrow, Brewer’s sparrow, and sage thrasher. Oil and gas development has specifically been shown to negatively impact these species in Wyoming. There is no discussion of the cumulative impacts of roads within and presumably connecting the nine pods to such species. Moreover, if the pods are connected then there will be a greater likelihood that after the CBM project ends (estimated 20 years), off-road vehicle enthusiasts, hunters, and other recreational users will use the roads. The potential impact on sagebrush obligate species of public use after the project has not been evaluated.**

Fragmentation of sagebrush steppe habitats may have some impacts on sage brush obligate species, but due to the limited scale of development in exploratory drilling wide spread fragmentation will not occur.

If the Atlantic Rim project goes forward transportation planning will be an integral part of the development of the Atlantic Rim project, and also a means of looking at access into pod areas. Currently all of the interim drilling pods, except the Doty Mountain Pod, can be reached by using existing legal access, so the proliferation of several through roads as a result of these CBNG exploration projects is not anticipated

- 11) **Consider that well-site facilities for productive wells are likely to be in place for 20 years or more, JRPEA at 4-13. These facilities will provide perch sites for raptors and corvids and, coupled with a nearby prairie dog colony and sage grouse lek sites, are likely to increase use of the area by raptors and corvids. The JRPEA fails to account for the potential impacts of creating new raptor perches near the crucial habitat of sensitive prey species.**

Production facilities may serve as perches for raptors which may increase predation on sage-grouse and prairie dogs within the Jolly Roger Pod. Facilities for CBNG are relatively low (~4' in height). The Jolly Roger Pod contains many sandstone rock features in the area that currently serve as potential perches and nest sites in the area. Raptors in this area do not seem to be perch-limited in regards to predation upon small mammals. The BLM predicts that the increase of CBNG facilities would have an insignificant impact with regards to increasing predation on sage-grouse and prairie dog within the Jolly Roger Pod. No well facilities will be placed within a ¼-mile of an active lek and facilities will be placed outside of prairie dog towns. This will minimize impacts to these species. If a raptor perch is discovered during the course of operations, the situation would be reviewed and appropriate mitigation measures applied, as necessary, using the best-available science. Mitigation measures applied will be based upon the specific conditions and circumstances for each location and resource.

- 12) **The project area includes migration or habitat grounds for three big game species: pronghorn, mule deer, and elk, JRPEA at 3-25. In western Wyoming, it has been found that oilfield developments caused game animals to abandon portions of winter range. However, the wildlife stipulations apply only during construction (JRPEA at 2-19) even though harmful effects on wildlife may continue into the production phase.**

There is no crucial winter range for pronghorn, deer, or elk affected by projects with in the Jolly Roger project. There are no deer or elk migration routes through the Jolly Roger project. Appendix A, the Master Surface Use Plan and Conditions of Approval lists the site-specific Conditions of Approval that apply to facilities in the Jolly Roger Pod. These stipulations apply to any activities that are potentially disruptive to reproductive activities of greater sage-grouse and raptors, through out the life of the project.

- 13) **As noted above, the project area has been identified as containing several migration routes for pronghorn moving through the southern part of the project area toward crucial winter/yearlong range, JRPEA at 3-25. Although the antelope herd that uses this area has increased in recent years, it remains below the WGF management objective. In western Wyoming, it has been found that oilfield developments caused game animals to abandon substantial tracts of winter range. Researchers have noted that densities of pronghorn are lowest in areas of severe oil and gas development. The BLM admits that successful results of the Jolly Roger pod would lead to a greatly**

expanded drilling effort throughout the area, JRPEA at 4-1. This shortcoming must be addressed prior to the issuance of a Decision on this project.

Cumulative impacts for the Jolly Roger Pod are disclosed in Section 4.17 “Cumulative Impacts” in the Jolly Roger EA, page 4-20. Cumulative impacts to wildlife are found on pages 4-23 and 4-24 in the Section entitled 4.17.77 “Wildlife and Fisheries.” The Jolly Roger Pod, along with other pods associated with the Atlantic Rim project, are intended to provide exploratory information in support of development of the Atlantic Rim Environmental Impact Statement. The Atlantic Rim Pods have been proposed in order to develop information on the impacts of various actions that are envisioned occurring and to obtain baseline information on geologic and biologic conditions. There is no library where this information may be “checked out,” it must be obtained by exploration in the field. In addition, the productivity of the coal formations targeted in producing natural gas is a critical piece of information. Experience has shown that there are a certain minimum number of wells necessary to successfully obtain such information. The Jolly Roger Pod is proposed for just such reasons. All the elements of a coal bed natural gas operation must be in place (production wells, plumbing, disposal wells, roads, gas lines and compressor stations) in order to adequately develop this information. The Atlantic Rim EIS, concurrently in the process of development with the Atlantic Rim Pods, will provide the broad level of analysis you have requested, including cumulative effects within and around the Atlantic Rim area. An example of the utility of this process is the recent revision of the proposed action from 3,880 wells to 2,000 wells, based on the results obtained from exploratory drilling.

- 14) The JRPEA describes direct impacts to the grazing capacity of the Fillmore Allotment as representing a loss of less than 1% of its capacity for livestock, JRPEA at 4-16. However, the JRPEA must also note the loss of grazing if the full 3,880 wells are drilled under the Atlantic Rim CBM Project, which is not only reasonably foreseeable but also currently under review in preparation for a DEIS to be released in two months. This failure to analyze cumulative impacts violates NEPA.**

At this point, the proposal to develop a 3,880 well field is not reasonably foreseeable. In general, two main factors determine whether other actions should be included as part of the cumulative impact analysis—location and timing of actions. The cumulative impact analysis must take into account the past, present, and future actions that overlap in time and location with the proposed action. At this time, there is no data available to confirm that CBNG resources can be developed and produced in the entire ARPA. Implementation of the 200-well interim drilling program was designed to identify where areas of CBNG drilling may be economic and the number of wells at which the program becomes economic. The only reasonably-foreseeable activity at this time, other than conventional uses of oil and gas drilling and ranching, is the 200-well proposal.

- 15) The JRPEA does not adequately address the cumulative impacts of weed invasion into areas from which plant cover is removed though it does admit that the project area is vulnerable to infestations of invasive/noxious weeds and there is little weed impact at present, JRPEA at 3-21, 3-22. There is a discussion of monitoring for and treating weeds in the construction area (JRPEA at 4-8) but there is no discussion of monitoring the local prairie dog colonies, which often contain large patches of bare to semi-bare ground.**

There is also no indication of who will do monitoring and how often it will occur.

Causing a weed invasion is not part of the proposed action as describe in Chapter 2. As part of the Project-Wide Mitigation Measures and Procedures the “Companies” will implement, if necessary, a weed control and eradication program. As the companies plan to control weeds, there should be no cumulative impacts from weed invasion.

- 16) The plan for revegetation (JRPEA/Appendix A at 12) does not include replacement of lost sagebrush, nor does the JRPEA address the effect of loss of sagebrush on sage dependent species such as sage sparrow or Brewer’s sparrow, both of which are on the BLM Sensitive Species Policy and List. BLM IM WY 2001-040.**

The linear nature of the disturbance from road and pipeline disturbance and the small size of the disturbance from pad construction allow sage brush to come back naturally once the grasses and forbs, that were seeded, have created the needed microclimate. Chapter 4, page 4-7 of the JRPEA analyzes the loss of sage brush and the effect on sage dependent species.

8. U.S. Fish & Wildlife Service

- a. The Service understands that the Bureau will prepare a separate EA for each pod proposed under the Atlantic Rim Coalbed Natural Gas Project to collect information for use in preparing an EIS. The Service believes that, in order to fully analyze cumulative effects pursuant to NEPA and the Act, the effects of full field development of the Atlantic Rim Coal Bed Natural Gas Project should be analyzed under one document rather than through individual EAs that tier to the Interim Drilling Policy.**

The Jolly Roger Pod, along with other pods associated with the Atlantic Rim project, is intended to provide exploratory information in support of development of the Atlantic Rim Environmental Impact Statement. The Atlantic Rim Pods have been proposed in order to develop information on the impacts of various actions that are envisioned occurring and to obtain baseline information on geologic and biologic conditions. There is no library where this information may be “checked out,” it must be obtained by exploration in the field. In addition, the productivity of the coal formations targeted in producing natural gas is a critical piece of information. Experience has shown that there are a certain minimum number of wells necessary to successfully obtain such information. The Jolly Roger Pod is proposed for just such reasons. All the elements of a coal bed natural gas operation must be in place, (production wells, plumbing, disposal wells, roads, gas lines and compressor stations) in order to adequately develop this information. The Atlantic Rim EIS, concurrently in the process of development with the Atlantic Rim Pods, will provide the broad level of analysis you’ve requested, including cumulative effects within and around the Atlantic Rim area. An example of the utility of this process is the recent revision of the proposed action from 3,880 wells to 2,000 wells, based on the results obtained from exploratory drilling.

- b. Page 1-1, Purpose and Need for Action: The EA states that this project would allow the companies to determine, through exploration and extraction, whether further development in the area is feasible. Please clarify whether information regarding the extent and feasibility of coalbed methane reserves within the Jolly Roger Pod can be extrapolated from any one of the adjacent Pods that have been drilled, or are in the process of being drilled, or from the eight existing wells within the project area.**

Data from the two adjacent pods, Doty Mountain and Red Rim, have limited value in establishing the feasibility of coalbed natural gas reserves within the Jolly Roger Pod. Coalbed natural gas feasibility and reserves recovery are dependent upon numerous geologic and engineering factors some of which are: 1) gas content, 2) permeability, 3) coal rank, 4) system hydrodynamics, 5) tectonic and structural setting, and 6) depositional system and coal distribution. Pod locations were purposely chosen recognizing the high degree of variability in the above mentioned factors across the Atlantic Rim area. Limited well and geophysical control suggests a different structural condition may exist at Jolly Roger than that encountered in either Doty Mountain or Red Rim. Furthermore, the lateral continuity of the targeted coal reservoirs is known to vary on a scale of hundreds to thousands of feet. Just as in coal mining, where extensive core holes are drilled in advance of the mining operations to determine seam continuity, rank, and physical properties in a local area, CMNG operations also require the same confidence that the seams will not terminate or change their physical properties. The nearest offsetting drilled pods are over six miles from Jolly Roger making it likely that each pod will produce from a separate and distinct set of coal seams. Consider a swamp, the environment in which coal originates, as a modern day analog for additional perspective on the issue of coal continuity. The variability of channels cutting through the bogs and the random occurrence of ponds illustrates the complexity of coal continuity as a reservoir for CBNG and for mining operations. Available regional data indicate the major coal properties of gas content and permeability also vary significantly, often showing sizeable variation in wells only 80 or 160 acres away. This inconstancy in gas content may also be the result of discontinuity in the coals seams which may act as conduits of varying effectiveness for gas migration from the deep parts of the basin.

The existing eight wells in Jolly Roger provide some useful data for evaluating the area. However, this group of wells fails to cover an adequate range of depths and conditions to fully evaluate the feasibility of coalbed natural gas production in Jolly Roger. Furthermore, experience has shown that a pattern which contains multiple interior wells surrounded by a perimeter of exterior wells is necessary to effectively dewater the coals and produce sufficient gas to establish feasibility in a given area. The existing eight wells are oriented in such a manner that this necessary condition is not met. The proposed pattern of 24 wells in Jolly Roger represents an adequate number of wells to meet this critical requirement.

- c. Directional drilling is not mentioned in the EA. This method of resource extraction may minimize surface disturbance and thus, reduce habitat fragmentation and other factors that may result in negative effects to wildlife and their habitats.**

Directional drilling is not considered to be economically feasible due to a number of factors. The primary factor is the shallow depth of the formation does not allow sufficient room to directionally place the wellbore in the established reserve recovery pattern without excessively high angles and the attendant costs. The coal zones are thin and scattered over a long interval so that an "S" type directional well (directional and then vertical though the productive zone) is absolutely not feasible due the shallow depth and the attendant extremely high angles required to place the well in the established reserve recovery pattern. An angled directional well (directional through the pay zone) is also not feasible because again the shallow depths would not allow sufficient distance to place the angled hole within the reserve recovery pattern. In this case the reserve recovery would be marginal for the upper zones due to interference by the closely spaced high angle wellbores and could also be marginal for the lower zones due to lower drawdown of the widely spaced high angle wellbores. In addition, cementing casing in an angled directional well can be very difficult and this would be extremely detrimental to the required isolation of the coal reservoirs. Horizontal drilling is not feasible because the zones are thin and would not economically support single horizontal completions.

- d. **Page 2-19, Wildlife and Fisheries, Item 4: The Service recommends that a one-mile disturbance-free buffer be established around active nests of bald eagles and ferruginous hawks and a 0.05-mile disturbance-free buffer be established around all other active raptor nests.**

Project wide mitigation measures are detailed in 2.1.10 "Project Wide Mitigation Measures and Procedures." Page 2-19 item 3 describes mitigating measures to be taken with implementation of the project. It is BLM policy, when an "active" raptor nest is located 0.75 to 1.0 mile from a proposed well site (depending on species and line of sight), the Companies must restrict construction during the critical nesting season for the species.

- e. **We believe that a 0.25-mile protective buffer will not adequately protect leking activity and should be considered a mitigation measure. We also believe that a 2-mile buffer may only protect a portion of sage grouse nesting habitat.**

Page 2-19 of the JRPEA states that construction and surface occupancy cannot occur at anytime within 0.25 miles of existing greater sage-grouse leks. In addition construction, drilling, or other activities that could disrupt nesting greater sage-grouse are prohibited from March 1 through June 30 for the protection of nesting areas for this species. The sage-grouse is a BLM sensitive species, listed as such on April 9, 2001. Because of this status, no actions that might jeopardize the future existence or viability of this species may occur.

The Great Divide Resource Management Plan (RMP) in Appendix I lists sage-grouse in several areas of the Wildlife Mitigation Guidelines including 2b and 2c. Item 2c provides for the prohibition of surface activities or use within important habitat areas for the purpose of protecting sage-grouse breeding grounds and or habitat where timing stipulations are not appropriate. The purpose of the Guidelines are: 1) to reserve for the BLM, the right to modify the operations of all surface and other human presence disturbance activities as part of the statutory requirements for environmental protection; and 2) to inform a potential lessee, permittee, or operator of the requirements that must be met when using BLM-administered public lands. The Guidelines in the RMP are not specific as to the distance an action must be moved to mitigate impacts of a proposal on sage-grouse. Literature reviews indicate that spacing requirements from a lek generally run in the 0.25 to 2.0 mile range. The minimum distance for spacing is 0.25 miles.

- f. **In addition, the Service believes that sage-grouse within the project area may be affected by long-term loss of sage brush habitat, fragmentation of habitat, and noise associated with project activities. Unless site-specific information indicates differently, the Service strongly recommends protection measures as described by Connelly et al. (2000), who recommends protective buffers of between 2 and 11 miles from a lek based on the habitat availability and year-round activities of populations of sage grouse.**

Chapter Four adequately assesses the possible impacts to sage-grouse in section 4.8, page 4-9.

Page 4-9 of the EA states, "In addition to the direct loss of habitat due to construction of well pads, roads, and pipelines, disturbances from human activity and traffic would lower wildlife utilization of habitat immediately adjacent to these areas. Species that are sensitive to indirect human disturbance (noise and visual disturbance) would be impacted most. 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 and many animals may become accustomed to equipment and facilities in the gas field and may once again use habitats adjacent to disturbance areas.”

Some wildlife species may be temporarily displaced by construction at well sites, access roads, and pipeline routes, but should return once construction is complete. Extensive suitable habitats for many species exist on adjacent lands and would support individual animals that may be temporarily displaced during Reasonably Foreseeable Future Actions. Cumulative long-term effects on wildlife also are expected to be minimal, as most species would become accustomed to routine operation and maintenance. Only a very small proportion of the amount of available wildlife habitats within the Atlantic Rim EIS study area would be affected. As a result, the capacity of the area to support various wildlife populations should remain essentially unchanged from current conditions. The cumulative impact assessment area varies with species, as indicated in the analyses. Disturbance of wildlife habitat that results from Reasonably Foreseeable Future Actions., 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 cause a slight increase in mortality from increased use of vehicles. However, populations of small mammals and songbirds would quickly rebound to pre-disturbance levels after reclamation is complete because of the relatively high production potential of these species and the relatively small amount of habitat disturbed (0.006 percent of the Atlantic Rim EIS study area). Therefore, no long-term impacts to these populations are expected. Because of the small amount of disturbance associated with the project, their inherent mobility, and the availability of suitable habitats on undisturbed land, the effects on these species should be minimal.

The JRPEA states on page 2-22 under Noise (2.1.10 Project-Wide Mitigation Measures and Procedures): The BLM will require that noise levels be limited to no more than 10 decibels on the A-weighted scale (dBA) above background levels at leks for greater sage-grouse that are located on public lands. The BLM will require that compressor engines located on public lands be enclosed in a building and located at least 600 feet away from sensitive receptors or sensitive resource areas to comply with these limits on noise levels.

Fragmentation of sagebrush steppe habitats may have some impacts on sage brush obligate species, but do to the limited scale of development in exploratory drilling wide spread fragmentation will not occur.

If the Atlantic Rim project goes forward, transportation planning will be an integral part of the development of the Atlantic Rim project and also a means of looking at access into pod areas. Currently all of the interim drilling pods, except the Doty Mountain Pod, can be reached by using existing legal access, so the proliferation of several through roads as a result of these CMNG exploration projects is not anticipated

- g. The service would like to remind the Bureau of the 2001 Memorandum of Understanding that the Forest Service, the Bureau, and the Service signed on with the Western Association of Fish and Wildlife Agencies, including the Wyoming Game and Fish Department, in greater sage-grouse conservation, and these comments should be considered in project planning in sage-grouse habitat.**

These commitments were considered in planning for this and other projects.

- h. Page 3-26, Greater Sage-Grouse, Paragraphs 4 and 5:** The EA states that ten active leks, three inactive leks, and six leks of unknown status are located on and within two miles of the Jolly Roger Pod. In addition, the EA states that nearly half of the Jolly Roger Pod is managed by the Bureau and of that, 88 percent is delineated as sage-grouse nesting habitat. Please refer to our previous comments regarding sage-grouse. The Service strongly encourages the Bureau to consider how the potential permanent loss of these leks and nesting habitat may contribute to the decline of the species and the possible listing under the Act.

Chapter Four adequately assesses the possible impacts to sage-grouse in section 4.8, page 4-9. Also see the response to 8.f. above.

- i. Page 3-27, Raptors, Paragraph 3:** The EA states that a golden eagle and a red-tailed hawk nest are located within 0.25-mile of the proposed pipeline. The service recommends that no disturbance occur within 0.5-mile of either nest from the period of early courtship to fully fledged chicks, as determined by a Bureau biologist.

See response to 8.d. above.

- j. Page 3-39 (birds), page 4-10 (General Wildlife), and Page 4-13 (Wildlife Species):** The EA states that the sage sparrow, sage thrasher, western burrowing owl, loggerhead shrike, greater sage-grouse, ferruginous hawk, and northern goshawk are present or are likely to occur within the project area. The EA further states that the initial phase of surface disturbance will result in the displacement of songbirds and that the proposed action is expected to have minor impacts on these species. The Service reminds the Bureau that all of the above mentioned species, except sage-grouse, are protected under the MBTA for which take is prohibited. Measures to avoid take of migratory birds may include, but are not limited to: 1) prohibiting ground disturbing activities during the nesting season; 2) reclaiming project area with similar vegetative communities that occurred previous to disturbance; 3) incorporating mitigation measures at a rate of 1:2 that replace degraded habitats within the project area with suitable or like habitats adjacent to or nearby the project area; and 4) implementing those strategies outlined within the Memorandum of Understanding directed by the President of the U.S. under the Executive Order 13186, where possible.

These commitments were considered in planning for this and other projects. These comments and recommendations will be taken into consideration. Also see response 8.k. below.

- k. Page 4-11, Greater Sage-grouse:** The EA states that under the proposed action 191 acres of Wyoming big sagebrush will be disturbed during construction (short term disturbance). However, after partial reclamation only 58 acres will be disturbed through the life of the project or production stage. According to the site restoration plan on page 2-12, reclamation activities include reducing erosion, mulching and planting new vegetation. The Service is concerned that, although some type of reclamation is occurring, large tracts of sagebrush dominated habitat will not be available to sage-grouse and other sagebrush obligates for perhaps the entire life of the project based on the slow growth rate of some species of sagebrush. Therefore, long term disturbance within the Jolly Roger Pod may actually be 191 acres or nearly five percent of the pod. On a site-specific basis, five percent may not be a significant portion of sagebrush habitat. However, cumulatively, full field development, which may result in ten times the amount of wells then was indicated in the Interim Drilling Policy, may significantly reduce sagebrush habitats and exacerbate the decline of sagebrush obligates within the area.

Page 4-9 of the EA states, "In addition to the direct loss of habitat due to construction of well pads, roads, and pipelines, disturbances from human activity and traffic would lower wildlife utilization of habitat immediately adjacent to these areas. Species that are sensitive to indirect human disturbance (noise and visual disturbance) would be impacted most. 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 and many animals may become accustomed to equipment and facilities in the gas field and may once again use habitats adjacent to disturbance areas."

Some wildlife species may be temporarily displaced by construction at well sites, access roads, and pipeline routes, but should return once construction is complete. Extensive suitable habitats for many species exist on adjacent lands and would support individual animals that may be temporarily displaced during Reasonably Foreseeable Future Actions. Cumulative long-term effects on wildlife also are expected to be minimal, as most species would become accustomed to routine operation and maintenance. Only a very small proportion of the amount of available wildlife habitats within the Atlantic Rim EIS study area would be affected. As a result, the capacity of the area to support various wildlife populations should remain essentially unchanged from current conditions. The Cumulative Impact assessment area varies with species, as indicated in the analyses. Disturbance of wildlife habitat that results from Reasonably Foreseeable Future Actions., 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 cause a slight increase in mortality from increased use of vehicles. However, populations of small mammals and songbirds would quickly rebound to pre-disturbance levels after reclamation is complete because of the relatively high production potential of these species and the relatively small amount of habitat disturbed (0.006 percent of the Atlantic Rim EIS study area). Therefore, no long-term impacts to these populations are expected. Because of the small amount of disturbance associated with the project, their inherent mobility, and the availability of suitable habitats on undisturbed land, the effects on these species should be minimal.

- I. **Page 4-33, Cumulative Impacts:** The EA states that cumulative impacts are incremental impacts from the Jolly Roger Pod added to past, present, and reasonably foreseeable future actions. The EA further states that the only major development proposed are the pods under the Interim Drilling Policy, which includes 200 wells. Full field development is not discussed in the EA. Therefore, the Service is concerned that full field development of the Atlantic Rim Project may have cumulative effects not considered at the EA level. Our office received a scoping notice for the Atlantic Rim Project EIS on June 18, 2001, which stated that 3,880 coal bed methane wells may be drilled within the Atlantic Rim Project area. More importantly, the scoping notice stated that the Bureau had determined that the full field development could potentially result in significant impacts and that an EIS would be necessary. The Service encourages the Bureau to expedite the analysis of full field development of the Atlantic Rim Coal Bed Natural Gas Project in an EIS in order to adequately address the cumulative impacts of the entire project area.

The section on Cumulative Impacts in the Jolly Roger EA starts on page 4-20 (Page 4-33, Cumulative Impacts, is a reference to the Red Rim Pod Environmental Analysis).

The Jolly Roger Pod, along with other pods associated with the Atlantic Rim project, is intended to provide exploratory information in support of development of the Atlantic Rim Environmental Impact Statement. The Atlantic Rim Pods have been proposed in

order to develop information on the impacts of various actions that are envisioned occurring and to obtain baseline information on geologic and biologic conditions. There is no library where this information may be "checked out," it must be obtained by exploration in the field. In addition, the productivity of the coal formations targeted in producing natural gas is a critical piece of information. Experience has shown that there are a certain minimum number of wells necessary to successfully obtain such information. The Jolly Roger Pod is proposed for just such reasons. All the elements of a coal bed natural gas operation must be in place, (production wells, plumbing, disposal wells, roads, gas lines and compressor stations) in order to adequately develop this information. The Atlantic Rim EIS, concurrently in the process of development with the Atlantic Rim Pods, will provide the broad level of analysis you've requested, including cumulative effects within and around the Atlantic Rim area. An example of the utility of this process is the recent revision of the proposed action from 3,880 wells to 2,000 wells, based on the results obtained from exploratory drilling.

APPENDIX C

**MASTER DRILLING PLAN (MDP)
JOLLY ROGER UNIT ALPHA Pod PLAN OF DEVELOPMENT**

**OPERATORS (The Companies):
Warren E & P, Inc. (Warren)
Anadarko E&P Company (Anadarko)**

Drilling Plan for the subject wells listed below:

CMNG Wells in Section 32 (WYW-148977)

1. AR Federal 1990-SE 32
2. AR Federal 1990-SW 32

CMNG Wells in Section 6 (WYW-148973)

1. AR Federal 1890-NE 6
2. AR Federal 1890-SE 6
3. AR Federal 1890-NW 4
4. AR Federal 1890-SW 4

CMNG Wells in Section 8 (WYW-129066)

1. AR Federal 1890-NE 8
2. AR Federal 1890-SW 8
3. AR Federal 1890-SE 8

CMNG Wells in Section 18 (WYW-129066)

1. AR Federal 1890-NE 18

1. ESTIMATED TOPS OF IMPORTANT GEOLOGIC MARKERS

Formation

Lewis Shale
Isolated Sands in Lewis Shale
Almond
Pine Ridge
Allen Ridge
TD (CMNG Wells)
Cherokee/Deep Creek Sandstones

Depth

Surface
1,460' – 4,870'
1,952' – 5,360'
2,212' – 5,620'
2,492' – 5,900'
2,710' – 6,400'
7,670' – 8,460'

2. ESTIMATED DEPTH OF ANTICIPATED WATER, OIL, GAS OR MINERAL FORMATIONS

Almond	Methane gas
Pine Ridge	Methane gas
Allen Ridge	Methane gas

The Lewis Shale is not anticipated to contain any zones capable of producing water. There are several zones within the Mesaverde Group capable of producing fresh water, including the coal seams. The Companies propose to test the productive formations between 1,952' and 5900'. Several coal seams may be tested for gas production to total depth. All shallow water zones will be protected with casing and cement. Cement will be brought above the base of the Lewis Shale to isolate all formations in the Mesaverde Group.

Planned Objective for CMNG Wells: Mesaverde

3. MINIMUM BLOW OUT PREVENTOR (BOP) REQUIREMENTS

1. The BOPE will conform to Onshore Shore Order #2. The blowout preventer equipment will consist of 2000 psi W.P. Double Ram, Hydraulic Preventer is enclosed. All fill and kill lines will be 2000 psi W.P. The producing CMNG wells in this area have shut-in surface pressures ranging from 180 to 600 psi after the coal has been dewatered. Therefore we are planning on testing the BOPs to 1500 psi. There will be no pressure control (BOPs) for the surface hole section from 0 to 640' MD.
2. The BOP shall be pressure tested when initially installed, whenever any seal subject to pressure testing is broken, after repairs, or every 30 days.
3. The Companies shall notify the Rawlins BLM office 24 hours prior to the BOP test.

4. SUPPLEMENTAL INFORMATION

The primary objective of this project is to drill, stimulate, and produce methane gas from coal seams in recognized gas-producing formations of the Mesaverde Group. The coal seams are overpressured and are very unlikely to be in communication with overlying layers. Produced water will be injected in one injection well completed in the Cherokee/Deep Creek Sandstones.

The coal seams will be perforated and stimulated by hydraulic enhancement or fracturing during testing. Fresh water, gelled water, and/or foam fracturing techniques will be used.

5. CASING PROGRAM

<u>Hole Size</u>	<u>Casing Size</u>	<u>Casing Wt.</u>	<u>Grade</u>	<u>Joint</u>	<u>Depth Set</u>	<u>New/Used</u>	<u>Rng</u>	
12 1/4"	9 5/8"	32.3#	H-40	ST&C	10% of well depth	New	3	
9 7/8"	7"	23#	MC-50	LT&C		New	3	
Surface Casing:		10 3/4"	32.3 ppg.	H-40	STC	Collapse	Burst	Tension
					Ratings:	1370	2270	2254M

- A. Burst = $[0.052 * FG * TVD (shoe)] - [Gas Gradient * TVD]$
 $= [0.052 * 9.3ppg * 640'] - [0.1psi/ft * 640']$
 $= 246 \text{ psi}$
 Safety Factor = Rating/Burst
 $= 2270/246$
 $= 9.23$
- B. Collapse = $0.052 * MW * TVD (shoe)$
 $= 0.052 * 8.8ppg * 640'$
 $= 293 \text{ psi}$

$$\begin{aligned} \text{Safety Factor} &= \text{Rating/Collapse} \\ &= 1370/293 \\ &= 4.68 \end{aligned}$$

C. Tension = Weight * MD * [1 - (MW/65.5ppg)]
= 32.3ppf * 640' * [1 - (8.8ppg/65.5ppg)]
= 17895 lbs.
Safety Factor = Rating/Tension
= 254,000/17895
= 14.2

Surface casing shall have centralizers on the bottom 3 joints of the casing, starting with the shoe joint.

Production Casing:	7"	23 ppf.	MC-50	STC	Collapse	Burst	Tension
				Ratings:	3110	3960	273M

A. Burst = [0.052 * 8.4ppg * 6400'] - [0.2psi/ft * 6400']
= 1515 psi **
Safety Factor = Rating/Burst
= 3960/1515
= 2.61

B. Collapse = 0.052 * 8.4 ppg * 6400' - (.1 psi/ft * 6400')
= 2155psi
Safety Factor = Rating/Collapse
= 3110/2155
= 1.44

C. Tension = 23lbs./ft * 6400' * [1 - (10ppg/65.5ppg)]
= 23lbs./ft * 6400' * .8473
= 124,723 lbs.
Safety Factor = Rating/Tension
= 273,000/124,723
= 2.19

** Our actual shut in tubing pressures in the Atlantic Rim area range from 180 to 600 psi.

6. MUD PROGRAM

Drilling mud will be used as the circulation medium. A fresh water, polymer, gel drilling mud will be used and visual monitoring will be done from spud to total depth. The anticipated mud weight will be between 8.5 – 10 ppg. Sufficient quantities of lost circulation material and barite will be available at the well site at all times for the purpose of assuring well control.

7. CEMENTING PROGRAM

The following is the proposed procedure for cementing the 9 5/8" surface pipe and 7" long string:

Surface Casing:

Lead: Class "C" Type III, 14.4 ppg., yield 1.44ft³/sk @ 101% excess. Compressive strength in 24 hours at 80°F 3100 psi.

The surface casing shall be cemented back to surface. In the event cement does not circulate to surface or fall back of the cement column occurs, remedial cementing shall be done to cement the casing back to surface.

Long String:

Lead: Class "C" Type III, 14.4 ppg., yield 1.44ft³/sk @ 35% excess. Compressive strength in 24 hours at 95°F 3200 psi.

Cementing plan is to bring cement back to surface. In the event cement is not circulated to surface, a temperature log will be run to indicate the cement top and this will be communicated back to the BLM. If the cement top is inside the surface casing no remedial cement work will be performed.

See attached table for details.

8. LOGGING PROGRAM

Cores: Rotary Cores will be taken as needed to evaluate the coal seams.

DSTs: None Planned

Logs: Induction, GR, SP, Density, Neutron and Caliper – From surface to TD
Cement Bond Log – From 10 ¾" casing shoe to TD
Mud Logger – As Needed.

9. PRESSURE DATA AND POTENTIAL HAZARDS

Bottom hole pressures anticipated @ 1180 – 2800 psi.
There is no history of hydrogen sulfide gas in the area and none is anticipated.

10. ANTICIPATED STARTING DATES AND NOTIFICATION OF OPERATIONS

A. Anticipated Starting Dates:

Anticipated Commencement Date - Fall 2004, or upon approval	
Drilling	- Approximately 7 days per well
Completion	- Approximately 2 days per well
Initial Testing	- Approximately 7-14 days per well
Production Testing	- Approximately 6-12 months per well

Note: Drilling operations will commence as soon as practical after approval of all necessary permits including the Applications for Permits to Drill (APDs).

B. Notification of Operations:

Rawlins Field Office, BLM
1300 North Third
Rawlins, Wyoming 82301
(307) 328-4200

Table 1 Jolly Roger Pod CMNG Project Well Information														
		Well Information						Lease Information						
No.	Name	Number	Qtr/Qtr	Sec	Tns	Rng	Lease No.	Elevation	Formation	Depth	Casing	Hole	Depth	Cement (sx)
1	AR Federal	1890-NW-4	SENW	4	18N	90W	WYW148973	7280' GL	Lance Lewis Shale	0' 192	Surface	12 1/4"	330	145
									Almond	1992'	Production	8 3/4"	3280	465
									Pine Ridge	2252'				
									Allen Ridge	2532'				
									Total Depth	3280'				
2	AR Federal	1890-SW-4	NWSW	4	18	90W	WYW148973	7160' GL	Lance Lewis Shale	0' 0'	Surface	12 1/4"	300	135
									Almond	1672'	Production	8 3/4"	2710	385
									Pine Ridge	1932'				
									Allen Ridge	2212'				
									Total Depth	2710'				
3	AR Federal	1890-SE-6	SESE	6	18	90W	WYW148973	7115' GL	Lance Lewis Shale	0' 1727'	Surface	12 1/4"	500	220
									Almond	3877'	Production	8 3/4"	4920	700
									Pine Ridge	4137'				
									Allen Ridge	4417'				
									Total Depth	4920'				
4	AR Federal	1890-NE-6	NENE	6	18N	90W	WYW148973	7140' GL	Lance Lewis Shale	0' 2052'	Surface	12 1/4"	550	242
									Almond	4402'	Production	8 3/4"	5440	775
									Pine Ridge	4662'				
									Allen Ridge	4942'				

**Table 1
Jolly Roger Pod CMNG Project Well Information**

		<i>Well Information</i>				<i>Lease Information</i>						<i>Cementing Program</i>			
No.	Name	Number	Qtr/Qtr	Sec	Tns	Rng	Lease No.	Elevation	Formation	Depth	Casing	Hole	Depth	Cement (sx)	
5	AR Federal	1890-SE-8	SESE	8	18N	90W	WYW129066	7310' GL	Lance Lewis Shale	0' 22'	Surface	12 1 1/4"	380	168	
									Almond	2622'	Production	8 3/4"	3660	520	
									Pine Ridge	2882'					
									Allen Ridge	3162'					
									Total Depth	3660'					
6	AR Federal	1890-NE-8	NENE	8	18N	90W	WYW129066	7180' GL	Lance Lewis Shale	0' 192'	Surface	12 1 1/4"	350	155	
									Almond	2442'	Production	8 3/4"	3480	495	
									Pine Ridge	2702'					
									Allen Ridge	2982'					
									Total Depth	3480'					
7	AR Federal	1890-SW-8	SESW	8	18	90W	WYW129066	7190' GL	Lance Lewis Shale	0' 502'	Surface	12 1 1/4"	450	200	
									Almond	3302'	Production	8 3/4"	4340	615	
									Pine Ridge	3562'					
									Allen Ridge	3842'					
									Total Depth	4340'					
8	AR Federal	1890-NE-18	NWNE	18	18	90W	WYW129066	7360' GL	Lance Lewis Shale	0' 1272'	Surface	12 1 1/4"	530	235	
									Almond	4272'	Production	8 3/4"	5310	752	
									Pine Ridge	4532'					

**Table 1
Jolly Roger Pod CMNG Project Well Information**

		<i>Well Information</i>				<i>Lease Information</i>				<i>Cementing Program</i>				
No.	Name	Number	Qtr/Qtr	Sec	Tns	Rng	Lease No.	Elevation	Formation	Depth	Casing	Hole	Depth	Cement (sx)
									Allen Ridge	4812'				
									Total Depth	5310'				
9	AR Federal	1990-SW-32	NESW	32	19N	90W	WYW148977	7220' GL	Lance Lewis Shale	0' 1732'	Surface	12 1/4"	550	242
									Almond	4482'	Production	8 3/4"	5525	787
									Pine Ridge	4742'				
									Allen Ridge	5022'				
									Total Depth	5525'				
10	AR Federal	1990-SE-32	SESE	32	19N	90W	WYW148977	7470' GL	Lance Lewis Shale	0' 1382'	Surface	12 1/4"	480	211
									Almond	3782'	Production	8 3/4"	4825	687
									Pine Ridge	4042'				
									Allen Ridge	4322'				
									Total Depth	4825'				

APPENDIX D

MASTER SURFACE USE AND WATER MANAGEMENT PLAN (MSUP/WMP)

**JOLLY ROGER ALPHA Pod
OPERATORS:
Warren E & P, Inc.
Anadarko E & P Company**

Surface Use Program and Plan of Development for the subject wells listed below:

Lease WYW-148977

AR Federal 1990-SE 32	1277	FEL	1310	FSL	SE/4	32	19N	90W
AR Federal 1990-SW 32	1582	FSL	1409	FWL	SW/4	32	19N	90W

Lease WYW-148973

AR Federal 1890-NE 6	1208	FNL	1300	FEL	NE/4	6	18N	90W
AR Federal 1890-SE 6	1308	FSL	1092	FEL	SE/4	6	18N	90W
AR Federal 1890-NW 4	1502	FNL	1487	FWL	NW/4	4	18N	90W
AR Federal 1890-SW 4	1437	FSL	1125	FWL	SW/4	4	18N	90W

Lease WYW-129066

AR Federal 1890-NE 8	1262	FNL	1304	FEL	NE/4	8	18N	90W
AR Federal 1890-SW 8	1198	FSL	1433	FWL	SW/4	8	18N	90W
AR Federal 1890-SE 8	1320	FSL	1125	FEL	SE/4	8	18N	90W
AR Federal 1890-NE 18	1246	FNL	1411	FEL	NE/4	18	18N	90W

Plan of Development for the facilities listed below:

Proposed Road ROWs on BLM lands to Fee Gas Wells

Fee Well:	Location and Length of Road on Federal land:
AR Fee 1890-NE 7:	NW NW 8-18N-90W, approximately 100 feet
AR Fee 1890-SE 7:	SW SW 4-18N-90W, approximately 500 feet
	SW SE 8-18N-90W, approximately 1300 feet
	NE NE 18-18N-90W, approximately 1100 feet
AR Fee 1990-SE 31:	NE NE 6-18N-90W, approximately 800 feet
AF Fee 1990-SW 33:	NE SE 32-19N-90W, approximately 1300 feet

Proposed ROW (BLM surface ownership lands): Buried Electrical Utility, Water and Gas Lines in T18N and T19N R90W (all pipeline corridors will parallel roads)

The MSUP contains surface operating procedures for the Companies' Federal Applications for Permits to Drill (APDs), as required under Onshore Order No. 1. The enclosed **Project Map** shows all proposed interim drilling activities associated with the Jolly Roger Alpha Pod. Additional information on each federal well is contained in the **BLM APD Form 3160-3** and **Well Survey Plat**.

This MSUP is intended to serve as the application for the gas and water lines, access roads to well locations, and electric lines in the Pod. Roads and gathering lines will occupy an 80 foot wide common corridor. Roads will require a 50-foot wide disturbance. Gas-gathering and water-gathering lines will require a 20-foot wide disturbance and electric lines a 10-foot wide disturbance. All disturbances located in the same corridor will overlap each other to the maximum extent possible, while maintaining sound

construction and installation practices. Roadways will be used as working space for installation of gathering lines. Please refer to the schematic for the layout of pipelines and roads.

An allocation meter will be used to measure raw produced gas volumes for each well in the Pod. A sales meter will be located downstream of the final compressor and dehydration unit, at the compressor station, and will be used to measure dry salable-quality gas. A request for variance from Onshore Order No. 5, if needed, along with a description of the measurement equipment, will be submitted in a Sundry Notice if the wells are deemed producible.

During well testing associated with this project, natural gas, to the extent it is produced, will be vented or flared on-location in accordance with the applicable BLM Onshore Orders, Notices To Lessees, and WOGCC regulations, and authorized by the WOGCC and the BLM in Sundry Notices. During testing, produced water from the proposed wells will be transported off-location to an approved injection well for disposal.

1. EXISTING ROADS AND TRAVELWAYS

The project area is accessible from Rawlins, Wyoming, by traveling approximately 16 miles south on Carbon County 605 (Twentymile Road), which intersects Interstate 80 (I-80) near Rawlins. In Section 3, T18N R90W, County Road 605 is intersected by the Fillmore Ranch road which runs southwest for approximately .75 mile and then west for approximately 1 mile. This road provides access into the project area.

Maintenance of the roads used to access the well locations will continue until final abandonment and reclamation of the well locations occur. A regular maintenance program will include, but is not limited to, blading, ditching, culvert installation and cleanout, and gravel surfacing where excessive rutting or erosion may occur. The existing roads will be maintained in a safe and usable condition.

Culverts (a minimum of 18-inches in diameter) will be placed in the existing BLM roads as the need arises or as directed by BLM's Authorized Officer. (Refer to individual well area maps).

2. PROPOSED ACCESS ROUTES

1.1.1 Well Access

New access roads have been sited to avoid sensitive resource areas, such as leks, and areas susceptible to increased resource damage from the proposed project, such as areas of steep terrain or poor vegetative cover.

Newly constructed access roads will be crowned, ditched, and graveled. All equipment and vehicles will be confined to identified travel corridors and other areas specified in this MSUP. The access roads will be surfaced with an appropriate grade of aggregate or gravel to a depth of 4 inches before the drilling equipment or rig is moved onto the pad.

Unless otherwise exempted, free and unrestricted public access will be maintained on the access road. Access roads will be maintained in a safe and usable condition. A regular maintenance program will include, but is not limited to, blading, ditching, installing or cleaning culverts, and surfacing.

All existing and proposed access roads will be constructed to minimum standards for a BLM Resource Road, as outlined in BLM Manual 9113. The minimum travelway width of the road will be 14 feet with turnouts. No structure will be allowed to narrow the road top. The inside and outside slope will be 4:1. Turnouts will be spaced at a maximum distance of 1,000 feet and will be intervisible.

Wing ditches will be constructed as deemed necessary to divert water from the road ditches as outlined in BLM Manual 9113 and the 10 erosion index shall be used. Wing ditches will be constructed at a slope of .5 percent to 1 percent.

Topsoil and vegetation will be windrowed to the side of the newly constructed access roads. After the roads are crowned and ditched, the topsoil will be pulled back onto the cut slopes of the road right-of-way so no berm is left at the top of the cut slope.

Drainage crossings on the access routes will be low water crossings or crossings using culverts. Low water crossings would be used in shallow channel crossings. Crossings of the main channel would consist of excavating an area approximately 4 feet deep under the travelway and filling it with rock and gravel to the level of the drainage bottom. Channel banks on either side of these crossings would be cut down to reduce grade where necessary. Culverts would be installed on smaller, steeper channel crossings. Rip-rap may be added at the outlet of each culvert to minimize erosion. Topsoil would be conserved before channel crossing construction occurs. Additional culverts would be placed as the need arises.

Culverts will be covered with a minimum of 12 inches of fill or one-half the diameter of the pipe, whichever is greater. The inlet and outlet will be set flush with existing ground and lined up in the center of the draw. Before the area is backfilled, the bottom of the pipe will be bedded on stable ground that does not contain expansive or clay soils, protruding rocks that would damage the pipe or unevenly sized material that would not form a good seat for the pipe. The site will be backfilled with unfrozen material and rocks no larger than 2 inches in diameter. Care will be exercised to thoroughly compact the backfill under the haunches of the conduit. The backfill will be brought up evenly in 6-inch layers on both sides of the conduit and thoroughly compacted. A permanent marker will be installed at both ends of the culvert to help keep traffic from running over the ends. Culverts will be installed in a manner that minimizes erosion or head-cutting and may include rip rapping or other measures as required. Additional culverts will be placed in the access road as the need arises.

The access roads will be winterized by providing a well-drained travelway to minimize erosion and other damage to the roadway or the surrounding public land. Construction activity or routine maintenance will not be conducted using frozen or saturated soil material or during periods when watershed damage is likely to occur.

No construction or routine maintenance activities will be performed during periods when the soil is too wet to adequately support construction equipment. If such equipment creates ruts in excess of 4 inches deep, the soil will be deemed too wet to adequately support construction equipment, and construction and maintenance will be temporarily suspended.

The written approval of the Authorized Officer will be obtained before snow removal is undertaken outside the new and existing roadways. If approval is given, equipment used for snow removal operations outside the road ditches will be equipped with shoes to keep the blade off the ground surface. Special precautions will be taken where the surface of the ground is uneven to ensure that equipment blades do not destroy the vegetation.

If drilling is productive, all access roads to the well site would remain in place for well servicing (such as maintenance and improvements). Any portions of the ROW for the access road that are no longer needed would be reclaimed. The outside ditch cuts would be seeded and reclaimed.

3. LOCATION OF EXISTING WELLS

Eight permitted water wells are located within 1 mile of the project area (**Permitted Water Wells Within One Mile of the Jolly Roger Alpha Project Area**).

**PERMITTED WATER WELLS WITHIN
ONE MILE OF THE JOLLY ROGER ALPHA PROJECT AREA**

Permit No.	Sec-Tns-Rng	Qtr/Qtr	Applicant	Facility Name	Use	Yield (gpm)	Well Depth	Static Depth
P108373W	10-18N-90W	NE SW	USDI, BLM, PH Livestock Co.	BLM Alamosa #1	Stock	10	4	-4
P108375W	16-18N-90W	SESE	USDI, BLM, PH Livestock Co.	Alamosa #3	Stock	15	4	-4
P131616W	6-18N-90W	SENE	P H Livestock Co.	Fillmore Ranch #1	Domestic Stock	15	100	10
P55867W	5-18N-90W	NENE	P H Livestock Co.	Fillmore #3	Stock	10	300	35
P96832W	15-18N-90W	NWSW	P H Livestock Co.	Alamosa #1	Stock	5	4	-4
P96833W	15-18N-90W	NWNE	P H Livestock Co.	Slide Draw #1	Stock	5	4	-4
P136890W	31-19N-90W	NWSE	P H Livestock Co.	Fillmore #4	Stock	10	220	135
P34582W	1-18N-91W	SE NE	P H Livestock Co.	CBW 3	Monitoring	0	190	70

4. LOCATION OF EXISTING AND/OR PROPOSED FACILITIES, IF WELLS ARE PRODUCTIVE

On Well Pad

Wellhead facilities would be installed if the wells are productive. Natural gas and produced water would be collected and transported from the wellhead via buried pipelines.

The long-term surface disturbance at the location of each productive well would encompass approximately 0.25 acre, including cut and fill slopes. Typically, only the production facilities at the well site would be fenced or otherwise removed from existing uses. A loop road or a small, graveled pad area would provide a safe turnaround area for vehicles.

The wellhead facilities would be contained within an area covering approximately 15 feet by 15 feet. The surface equipment at each well will consist of the wellhead, a pump panel, and an insulated wellhead cover. Additionally, a vertical separator at some well sites would separate gas from the water stream. Each productive well is expected to require installation of an electric submersible pump below ground level, which will be used to produce water necessary to lower pressure within the coal seams.

All production facilities installed on location that have the potential to leak or spill oil, glycol, produced water, or other fluid, which may constitute a hazard to public health or safety, shall be placed within an appropriate containment or diversionary structure. The structure shall be sufficiently impervious to oil, glycol, produced water, or other hazardous fluid. It shall be installed so that any spill or leakage would not drain infiltrate, or otherwise escape to ground water, surface water, or navigable waters before cleanup is completed.

The Companies will paint structures at wells and central facilities with flat colors that blend with the adjacent undisturbed terrain. The paint used will be a color specified by the BLM. This measure does not apply to structures that require safety coloration in accordance with the requirements of the Occupational Safety and Health administration (OSHA).

Electricity would be used to power pumps during well development and to initiate and maintain production. A centrally located electrical generator located at the compressor station will be utilized to provide electricity to the wells. The distribution system will consist of utility lines buried in the road/pipeline corridor. These lines would be installed in trenches approximately 3 feet deep.

Off Well Pad

Pipelines (Gathering Lines and Delivery Pipeline)/Compressor Station/ Water Handling and Disposal Facilities/Injection Wells/Tanks

Pipelines

The corridors for the gathering systems will parallel access roads. ROWs located in the same corridor will overlap each other to the maximum extent possible, while maintaining sound construction and installation practices. Where ROW corridors are located along a road, working space for installation of facilities will be along the road.

The exterior boundaries of the pipeline right-of-way shall be marked with stakes and/or lath at 100 foot intervals. The tops of the stakes or laths shall be painted or flagged in a distinctive color, and remain in place until final construction cleanup is completed.

Clearing along the pipeline route shall be limited to removal of above ground vegetative parts within the area comprising the ditch and backfill.

Trenches will be excavated to install the flowlines and electrical lines. (Refer to the attached schematic for layout of lines) Trenches excavated for well gathering lines and electrical lines (which would require ROWs of 20 feet in width for gas lines and water lines, and 10 feet in width for electrical lines) which would be reclaimed as soon as practical after trenching and backfilling are completed. About 8.5 miles of gathering lines would be located on BLM surface ownership lands.

A gas-gathering pipeline system (low pressure) would be constructed from the wellheads to the compressor station. This system would use high-density polyethylene (HDPE) pipe, starting with 4-inch diameter pipe at the wellhead and graduating up to 20-inch diameter pipe at the inlet to the compressor. Although there is no plan to use additional area for installation of the larger size pipe, should additional pipeline corridor right-of-way width be required on Federal land, application will be made to the BLM.

A produced water-gathering pipeline system (low pressure) would be constructed from the wellheads to the centralized facilities for injection. This network of water lines would use 4-inch through 20-inch diameter pipe made of HDPE. Although there is no plan to use additional area for installation of the larger size pipe, should additional pipeline corridor right-of-way width be required on Federal land, application will be made to the BLM.

All produced water used to test the integrity of the gas delivery pipeline [500 barrels (bbls) or 21,000 gallons] would be injected in injection wells. Pipeline corridors would be reclaimed as soon as practical after construction of the pipeline is complete.

Where it is necessary to remove above ground vegetation, the top 6-inches of top soil material will be stripped, windrowed, and stockpiled to the side and segregated if the pipeline to be installed is 8-inches or greater O.D. Top soil material will not be mixed or covered with subsurface material. After construction cut and fill slopes will be waterbarred or regraded to conform to the adjacent terrain as specified by BLM.

A maximum of 1000 feet unattended or unprotected open trench shall be allowed at any given time. Construction trenches and other openings left overnight shall be covered. Covers shall be secured in place and strong enough to prevent livestock or wildlife from falling through. During the period when a trench is open, warning devices, such as signs, flares, or warning lights shall be posted to warn the public of the hazard.

Drainage crossings shall be constructed to prevent any blocking, diversion, or restriction of the existing channel. Material removed shall be stockpiled for use in reclamation of the crossing.

In order to minimize surface disturbance, the operator will use wheel trenchers (ditchers) or ditch witches, where possible, to construct all pipeline trenches associated with this project. Track hoes or other equipment will be used where topographic or other factors require their use. Trenches shall be compacted during backfilling.

Construction related traffic shall be restricted to approved routes. Cross-country vehicle travel shall not be allowed.

No hydrostatic testing water shall be discharged to the surface.

Water Handling and Disposal Facilities and Injection Wells

Within 90 days of initial production start-up, the operator will submit an analysis of the produced water to the BLM's Authorized Officer. Approval of this Pod includes approval for Onshore Order No. 7 to dispose of produced water. Produced water will be injected into an authorized injection well. Any changes in the produced water disposal method or location must receive written approval from BLM's Authorized Officer before the changes take place.

Water produced at the well sites will be pumped to an injection well on private land for disposal.

5. LOCATION AND TYPE OF WATER SUPPLY FOR DRILLING

Water to drill the first well will be trucked using County Road 605 and Fillmore Ranch Road to the Jolly Roger Alpha project area from the Red Rim pod water facilities located in T.20N., R.89W.

Water produced from project wells will be transported to nearby drilling locations and used to drill subsequent wells.

Any changes in the water source or method of transportation must receive written approval from BLM's Authorized Officer before the changes take place.

6. CONSTRUCTION MATERIALS

Construction materials (mineral material aggregate suitable for surfacing material) will be purchased from a nearby private source or a local supplier having a permitted source of materials in the area. No

construction materials will be removed from federal and/or Indian lands without prior approval from the BLM.

7. METHODS FOR HANDLING WASTE DISPOSAL

Drill cuttings (rock fragments generated during drilling) will be produced during drilling of the borehole. Cuttings will be buried in the reserve pit upon closure of the reserve pit.

No oil or other oil-based drilling additives, chromium/metals-based muds, or saline muds will be used during drilling of these wells. Only fresh water, biodegradable polymer soap, bentonite clay, and non-toxic additives will be used in the mud system. Should unexpected liquid petroleum hydrocarbons (crude oil or condensate) be encountered during drilling or well testing, all liquid petroleum hydrocarbons will be contained in test tanks on the well site.

A portable, self-contained chemical toilet will be provided on location during drilling and completion operations. Upon completion of operations, or as required, the contents of toilet holding tanks will be disposed of at an authorized sewage treatment and disposal facility. Disposal will be in accordance with State of Wyoming, Carbon County, and BLM requirements regarding sewage treatment and disposal. The Companies will comply with all state and local laws and regulations pertaining to disposal of human and solid wastes.

No trash will be placed in the reserve pit. All refuse (trash and other solid waste including cans, paper, cable, etc.) generated during construction, drilling, and well testing activities will be contained in an enclosed receptacle, removed from the drill locations promptly, and hauled to an authorized disposal site.

Immediately after removal of the drilling rig, all debris and other waste materials not contained within trash barrels will be cleaned up and removed from the well location. No potentially adverse materials or substances will be left on the drill locations.

Hazardous Materials Management

All project-related activities involving hazardous materials will be conducted in a manner that minimizes potential environmental impacts. An on-site file will be maintained containing current Material Safety Data Sheets (MSDS) for all chemicals, compounds, or substances that are used in the course of construction, drilling, completion, production, and reclamation operations. Netting will be placed over any pits that may contain hazardous substances (Comprehensive Environmental Response, Compensation, and Liability Act [CERCLA] Section 101(14)), as determined by visual observation or testing. The mesh diameter shall be no larger than 1 inch.

No hazardous substance, as defined by CERCLA, will be used in the construction or drilling operations associated with these wells. No Resource Conservation and Recovery Act (RCRA) hazardous wastes will be generated by well-drilling operations. The term "hazardous materials" as used here means: (1) any substance, pollutant, or containment (regardless of quantity) listed as hazardous under CERCLA of 1980, as amended 42 U.S.C. 9601 et seq., and the regulations issued under CERCLA; (2) any hazardous waste as defined in RCRA of 1976, as amended; and (3) any nuclear or nuclear byproduct as defined by the Atomic Energy Act of 1954, as amended, 42 U.D.C. 2001 et seq. The operator will be required to provide a referenced list of hazardous materials that could be used, produced, transported, disposed of, or stored on the well location including a discussion on the management of the hazardous materials.

Any spills of oil, gas, or any other potentially hazardous substance will be reported immediately to the BLM, landowner, local authorities, and other responsible parties and will be mitigated immediately, as appropriate, through cleanup or removal to an approved disposal site.

8. ANCILLARY FACILITIES

Several self-contained travel-type trailers may be used onsite during drilling operations. No facilities other than those described in this MSUP will be constructed to support the operations associated with the wells.

9. WELL SITE LAYOUT

Information on each federal well is contained in the **BLM APD Form 3160-3, Well Survey Plat, Typical Drill Site and Drill Pad Cross Section** on file with BLM. The cross section shows the orientation of the drill pad with respect to the topographic features (cut and fill), facilities, and access to the pad.

At each drill location, surface disturbance will be kept to a minimum. The areal extent of each drill pad is approximately 200 feet by 300 feet. Each drill pad will be leveled using cut and fill construction techniques. Prior to constructing the drill pad the top 6 to 8 inches of soil (more if available) and associated vegetative material will be removed and stockpiled. A water diversion ditch will be constructed around the up slope side of the well pad to divert storm water away from each pad. No spoil material shall be pushed into drainages.

Each reserve pit will be approximately 10 feet deep (including 2 feet of freeboard), and will be 30 feet wide and 75 feet long (at the surface). Each pit will be excavated within the "cut area" of the drill site to minimize any potential for slope failure. Each pit will be designed to prevent collection of surface runoff and will be closely monitored to ensure no pit overflows occur. The reserve pit will be open for an estimated 2 to 8 weeks to allow for evaporation of pit fluids. During this time the pit will be closed off from wildlife and livestock by two strands of barbed wire above a 32-inch woven wire fence. The reserve pit will be fenced on three sides during drilling, and the working side will be fenced immediately after the drilling rig is moved. Fencing will meet the following specifications.

The woven wire shall be no more than four inches above the ground. The first strand of barbed wire shall be about three inches above the woven wire. Total height of the fence shall be at least 42-inches.

Corner posts shall be cemented and/or braced in such a manner to keep the fence tight at all times. Standard steel, wood, or pipe posts shall be used between the corner braces. The maximum distance between any two posts shall be no greater than sixteen feet. All wire shall be stretched using a stretching device before it is attached to the corner posts.

Netting will be placed over any pits that have been identified as containing oil, as determined by visual observation or testing. The mesh diameter will be no larger than 1 inch. For the protection of livestock and wildlife, all pits and open cellars will be fenced. Fencing shall be in accordance with BLM specifications.

10. PROGRAMS FOR RECLAMATION OF THE SURFACE

BLM surface ownership lands that contain disturbed areas or facilities that are no longer needed would be reclaimed at the earliest opportunity in accordance with applicable regulations and agency guidance.

As soon as practical after the conclusion of drilling and testing operations, unproductive drill holes will be plugged and abandoned and site and road reclamation will commence. A joint inspection of the disturbed area to be reclaimed may be requested. The primary purpose of this inspection shall be to review the existing, or agree upon a revised final reclamation and abandonment plan. The BLM will be notified prior to commencement of reclamation operations. A Notice of Intent to Abandon will be filed for final recommendations regarding surface reclamation.

After abandonment of nonproductive wells, all wellhead equipment that is no longer needed will be removed, and the well sites will be restored.

Any areas, including the drilling locations, reserve pits, or access routes, that are disturbed by earthwork will be recontoured to a natural appearance as near to the original contour as possible as soon as practical after the conclusion of operations. Any flowline trenches that may be constructed will be backfilled completely.

Pits containing drilling muds and fluids shall be allowed to dry. Fluids remaining after two years shall be moved to an approved site. Other options, if approved by the Authorized Officer, may include fly-ash solidification or sprinkler evaporation over the pit containing the fluid.

The reserve pit, upon being allowed to properly dry, shall be backfilled and compacted with a minimum cover of five feet of soil, void of any topsoil, vegetation, large stones, rocks or foreign objects. Soils that are moisture laden and saturated, partially or completely frozen shall not be used for backfill or cover. The pit area shall be mounded to allow for settling and to promote positive surface drainage away from the pit.

Should the well become productive, all disturbed areas not needed for production operations shall be recontoured and re-vegetated as outlined in the MSUP, under an interim or temporary reclamation plan. This shall be performed after placing the well into production but within two years of completion of drilling. If not previously reclaimed, the access road and pipeline right-of-way may be included in this reclamation. Re-contouring involves bringing all construction material from cuts and fills back onto the well pad and site, and reestablishing the natural contours where desirable and practical. Fill and stockpiled soil no longer needed or necessary to the operation shall be spread on the cut slopes and covered with stockpiled topsoil. Final contouring shall blend with and follow as closely as possible the natural terrain and contours of the original site and surrounding areas. The production pad and facilities shall occupy as small an area as possible, but not larger than 0.8 acres unless otherwise approved by the BLM Authorized Officer.

Should the well be put into production or upon final abandonment of the well, fencing of the reseeded well site will be erected as necessary to exclude grazing and to help vegetation success.

After recontouring the site to the original contour that existed prior to pad construction, final grading and replacement of topsoil over the entire surface of the well site and access road will be conducted. The area will be ripped to a depth of 18-24 inches on 18-24-inch centers.

The surface soil material shall be pitted with small depressions to form longitudinal depressions 12-18 inches deep. The entire area will be uniformly covered with the depressions constructed perpendicular to the natural flow of water.

The travelway of the access road to be rehabilitated will be ripped to a depth of 18 inches, recontoured to approximate the original contour of the ground and seeded in accordance with the reclamation portions of the MSUP.

Water control structures will be designed and constructed at drainage crossings to prevent excessive erosion within the drainage.

Waterbars will be constructed on all disturbed areas to: (1) simulate the imaginary contour lines of the slope with a grade of 1-2 percent; (2) drain away from the disturbed areas; and (3) begin and end in undisturbed vegetation or soil.

Recontoured areas will be graded to be outsloped, and waterbreaks will be constructed where needed to avoid concentrating surface waters and producing gullies. The land surface will be left "rough" after recontouring to ensure that the maximum surface area will be available to support the reestablishment of vegetative cover.

All topsoil conserved during earthwork will be redistributed evenly and left "rough" over these recontoured areas. BLM goals for vegetative cover will guide revegetation efforts. Common goals are erosion control, weed control, palatable and nutritious forage for livestock and wildlife, and visual aesthetics.

Seeding will occur in the fall after September, prior to ground frost, or in the spring after frost has left the ground. The seed mixture, including fertilizer and mulching requirements, seeding depth, and seed drilling specifications, have been developed in consultation with the BLM. Seed will be drilled on the contour using a seed drill equipped with a depth regulator to ensure even depths of planting. Seed will be planted between one-quarter to one-half inch deep. The anticipated seed mix to be applied and rates of application are listed below.

SEED MIX FOR RECLAMATION

Species	Rate of Application*
Western Wheatgrass	4 lbs./Acre
Green Needlegrass	4 lbs./Acre
Indian Ricegrass	4 lbs./Acre
Sandberg Bluegrass	0.5 lbs./Acre
Gardner's Saltbush	1 lb./Acre
Winterfat	0.5 lbs./Acre

These rates of application apply to pure live seed (PLS) that is used for drill seeding. For broadcast seeding, the rates of application will be doubled.

11. SURFACE OWNERSHIP

U.S. Bureau of Land Management
 Rawlins Field Office
 1300 North Third
 Rawlins, Wyoming 82301-2407
 (307) 328-4200

P.H. Livestock Co.
 Niels Hansen, President
 P.O. Box 937
 Rawlins, WY 82301
 (307) 324-3203

12. OTHER INFORMATION

The Companies are the lessee or operator for the federal oil and gas leases associated with this MSUP and these APDs.

No slopes in excess of 25 percent would be affected by this proposal. No activities are planned near existing highways, railroads, pipelines, or powerlines. There are no occupied buildings or residences within one-quarter mile of the proposed drill sites.

Any road crossings of dry drainages, riparian, or other wetland areas will use appropriate Best Management Practices (BMP) to minimize impacts to these areas.

Dust abatement using produced water will comply with all applicable WOGCC, WDEQ or BLM requirements. Only water suitable for livestock use would be used for dust abatement. Only disturbed areas will be sprayed. Spraying will be done to reduce runoff and channeled flow.

The presence, distribution, and density of noxious weeds in the project area will be monitored by the Companies. The well access roads and well pads will be inspected regularly to ensure that noxious weeds do not become established in newly disturbed areas. Control methods will be based on available technology, taking into consideration the weed species present. Methods of noxious weed control may include revegetation of disturbed areas to reduce the potential for and success of weed establishment, mowing, hand-pulling, or application of appropriate herbicides. The control methods shall be in accordance with guidelines established by the Environmental Protection Agency (EPA), BLM, and state and local authorities or agencies.

Prior to the use of any herbicides or pesticides on Federal lands, the Companies will obtain written approval from the BLM Authorized Officer. The Companies will also prepare and submit a proposal and plan to the BLM Authorized Officer for an annual weed control program that satisfies the requirements established in the MSUP and any additional Conditions of Approval.

A cultural/historical resource inventory has been conducted on the public lands by a qualified archaeologist permitted in Wyoming by the BLM. The findings have been submitted under separate cover. Any additional areas of potential effect identified subsequent to the completion of these reports will be inventoried as specified by the BLM, and a supplemental report will be prepared.

During the construction phase of the well pad and access road, the operator shall have onsite, a qualified inspector other than the dirt contractor to serve as Compliance Coordinator. This individual will be responsible for assuring that all requirements of the MSUP and appropriate Conditions of Approval are enforced.

Approved facilities no longer included within the lease-unit boundaries due to a change in the lease or unit boundary will be authorized with a right-of-way.

The Companies will be responsible for the prevention and suppression of fires on public lands caused by its employees, contractors, or subcontractors. During conditions of extreme fire danger, surface use operations may be either limited or suspended in specific areas, or additional measures may be required by the Authorized Officer.

Landowner Notification

The Companies have obtained a surface use agreement with the landowner.

13. SITE-SPECIFIC CONDITIONS OF APPROVAL

Wildlife Stipulations

Lease WYW129066 contains a no surface occupancy stipulation in the NW, N2SW of Section 8 to protect sage-grouse breeding habitat and a timing limitation stipulation to protect nesting habitat for raptors and greater sage-grouse, from February 1 through July 31.

Lease WYW148973 contains a timing limitation stipulation to protect big game crucial winter range from November 15 to April 30 and a timing limitation stipulation to protect nesting habitat for raptors and greater sage-grouse, from February 1 through July 31. The lease also contains controlled surface use stipulations: (1) within ¼ mile of a sage/sharp-tailed grouse lek; (2) within Baggs elk crucial winter range special management area; and (3) within the Jep Canyon ACEC.

Lease WYW148977 contains a timing limitation stipulation to protect nesting habitat for raptors and greater sage-grouse, from February 1 through July 31, and a controlled surface use stipulation within the Baggs elk crucial winter range special management area.

14. LESSEE'S REPRESENTATIVE AND CERTIFICATIONS

Representative for Anadarko E & P Company

Name: Cathy Flansburg
Title: Senior Environmental and Regulatory Analyst
Address: 2515 Foothill Boulevard, Suite 300
City/State/Zip: Rock Springs, WY 82901
Phone: (307) 352-3328

Bonding

BLM Nationwide Bond, WY 1280, \$150,000

Certification

I hereby certify that I, or persons under my direct supervision, have inspected the proposed drill sites and access routes; that I am familiar with the conditions which currently exist; that the statements made in this plan are, to the best of my knowledge, true and correct; and that the work associated with the operations proposed herein will be performed by AEPC and its contractors and subcontractors in conformity with this plan and the terms and conditions under which it is approved. This statement is subject to the provisions of 18 U.S.C 1001 for the filing of a false statement.

I also certify that AEPC will comply with the provisions of the law or the regulations governing the Federal or Indian right of reentry to the surface under 43 CFR 3814.

I also certify that AEPC has reached or will reach an agreement with the surface owner(s) and surface lessee(s) regarding the requirements for the protection of surface resources and reclamation of disturbed areas and/or damages in lieu thereof, or if an agreement cannot be reached, will comply with the provisions of the law or the regulations governing Federal or Indian right of reentry to the surface under 43 CFR 3814.

I also certify that:

- A. All potentially affected landowners having properly permitted water wells with the WSEO within each producible well's Circle of Influence (one-half mile radius) will be offered a Water Well Agreement; and
- B. If a Water Well Agreement is not reached with the landowner, AEPC agrees to mitigate the impacts of its producible wells in accordance with State of Wyoming water laws; and
- C. Permits to Appropriate Groundwater have been applied for from the Wyoming State Engineer's Office, concurrently with these Applications for Permits to Drill.

I also certify that AEPC shall use its best efforts to conduct its approved operations in a manner that avoids adverse effects on any properties which are listed, or may be eligible for listing, in the National Register of Historic Places (NRHP). If historic or archaeological materials are uncovered during construction, the operator will immediately stop work that might further disturb such materials, and contact the authorized officer (or his/her representative) at the BLM Rawlins Field Office. Any paleontological resources or fossils discovered as a result of operations associated with these wells will be brought to the

attention of the authorized officer or his/her representative immediately. All activities in the vicinity of such discoveries will be suspended until notified to proceed by the Authorized Officer.

I also certify that AEPC shall use its best efforts to conduct its approved operations in accordance with the Project-wide Mitigation Measures and procedures outlined in Chapter 2 of the Environmental Assessment (EA) for this project.

By: _____ Date: _____

Cathy Flansburg
Senior Environmental and Regulatory Analyst
Anadarko E & P Company

APPENDIX E

CONDITIONS OF APPROVAL
Jolly Roger Pod

Lease Number	Well Name	Well Number	Location
Lease WYW-148977	AR Federal	1990 SE 32	T19N R90W Section 32 SE¼
		1990-SW 32	T19N R90W Section 32 SW¼

Lease WYW-148973	AR Federal	1890-NE 6	T18N R90W Section 6 NE¼
		1890-SE 6	T18N R90W Section 6 SE¼
		1890-NW 4	T18N R90W Section 4 NW¼
		1890-SW 4	T18N R90W Section 4 SW¼

Lease WYW-129066	AR Federal	1890-NE 8	T18N R90W Section 8 NE¼
		1890-SW 8	T18N R90W Section 8 SW¼
		1890-SE 8	T18N R90W Section 8 SE¼
		1890-NE 18	T18N R90W Section 18 NE¼

GOVERNMENT CONTACTS

USDI, BUREAU OF LAND MANAGEMENT

Field Office: Rawlins
 Address: P.O. Box 2407, Rawlins, Wyoming 82301
 Office Hours: 7:45 am to 4:30 pm

Authorized Officer's Designated Representatives:

Assistant Field Manager: Clare Miller Home Phone (307) 324-2372
 (Minerals & Lands) Work Phone (307) 328-4245

Petroleum Engineer: Bob Hartman Home Phone (307) 321-3439
 Work Phone (307) 328-4254

Petroleum Engineer: Jon Dull Work Phone (307) 328-4227
 Cell Phone (307) 321-1687

Pet. Engineer Tech.: Chuck Ross Home Phone (307) 324-9123
 Work Phone (307) 328-4230
 Cell Phone (307) 320-7778

Pet. Engineer Tech.: Bill Ashline Home Phone (307) 324-6355
Work Phone (307) 328-4263
Cell Phone (307) 320-7777

Pet. Engineer Tech.: Bryan Hurst Home Phone (307) 324-5066
Office Phone (307) 328-4277
Cell Phone (307) 320-5414

Resource Specialist: Larry Jackson Work Phone (307) 328-4231

In the event that the Petroleum Engineer named above is not available please contact the following:

Petroleum Engineer: Stuart Cerovski Home Phone (307) 332-2408
Work Phone (307) 332-8426

A COPY OF THE APPLICATION FOR PERMIT TO DRILL AND THESE CONDITIONS OF APPROVAL MUST BE FURNISHED TO YOUR FIELD REPRESENTATIVE AND BE AVAILABLE ON SITE.

GENERAL PERMITTING REQUIREMENTS

1. All lease operations are subject to the terms of the lease and the lease stipulations, the regulations of 43 CFR Part 3100, Onshore Oil and Gas Orders, Notices to Lessees (NTLs), the approved APD and any written instructions or orders of the authorized officer. The following requirements are emphasized.

Abandonment: In the event abandonment of the hole is desired, oral approval may be granted by this office but must be followed within 5 days with a **Notice of Intention to Abandon (Form 3160-5)**. Unless the plugging is to take place immediately upon receipt of oral approval, the BLM Branch of Minerals must be notified at least 24 hours in advance of the plugging of the well in order that a representative can witness the plugging operation. The **Subsequent Report of Abandonment (Form 3160-5)** must be submitted within 30 days after the actual plugging of the wellbore, reporting where the plugs were placed and volumes of cement used, along with copies of the service company invoice and job log.

The operator shall promptly plug and abandon each newly completed, recompleted or producing well which is not capable of producing in paying quantities. No well may be temporarily abandoned for more than 30 days without prior approval of the authorized officer. When justified by the operator, the authorized officer may authorize additional delays, no one of which may exceed an additional 12 months. Upon removal of drilling or producing equipment from the site of a well, which is to be permanently abandoned, the surface of the lands disturbed shall be reclaimed in accordance with a plan first approved or prescribed by the authorized officer.

Completion Report: If the well is completed as a dryhole or as a producer, **Well Completion or Recompletion Report and Log (Form 3160-4)** must be submitted within 30 days after completion of the well or after completion of operations being performed, in accordance with **43 CFR 3160**. Copies of all logs, core descriptions, core analyses, well test data, geologic summaries, sample descriptions, daily drilling reports, daily completion reports, and all other surveys or data obtained and compiled during the drilling, completion, and/or workover operations, will be filed with **Form 3160-4**.

2. Approval of this APD does not warrant that any party holds equitable or legal lease title.

3. This permit is valid for a period of one year from the day of approval or until lease expiration/termination, whichever is shorter. If the permit terminates, any surface disturbance created under the application shall be reclaimed in accordance with the approved plan.
4. The spud date shall be reported to the BLM authorized officer's representative within 24 hours following spudding. A follow-up report on Form 3160-5 confirming the date of spud shall be promptly submitted to this office within 5 working days from date of spud.
5. Verbal notification shall be given to the BLM authorized officer's representative at least 24 hours in advance of pluggings, DST's and/or other formation tests, BOP tests, running and cementing casing (other than conductor casing), and drilling over lease expiration dates.
6. Verbal notification shall be given to the BLM's resource specialist at least 48 hours in advance of access road/well pad construction, seeding, and the initiation of any reclamation work.
7. Operations that deviate from the approved APD shall receive prior written approval from the authorized officer. Emergency approval may be obtained orally but such approval does not waive the written report requirement.
8. All lease exploration, development, production and construction operations shall be conducted in a manner which conforms with all applicable Federal, State, and local laws and regulations.
9. Historic, Cultural, and Paleontological Resources: The operator shall be responsible for informing all persons associated with this project that they shall be subject to prosecution for damaging, altering, excavating or removing any archaeological, historical, or vertebrate fossil objects or site. If archaeological, historical, or vertebrate fossil materials are discovered, the operator shall suspend all operations that further disturb such materials and immediately contact the authorized officer. Operations shall not resume until written authorization to proceed is issued by the authorized officer.

Within five (5) working days, the authorized officer will evaluate the discovery and inform the operator of actions that will be necessary to prevent loss of significant cultural or scientific values.

The operator shall be responsible for the cost of any mitigation required by the authorized officer. The authorized officer will provide technical and procedural guidelines for the conduct of mitigation. Upon verification from the authorized officer that the required mitigation has been completed, the operator shall be allowed to resume operations.

10. Hazardous Waste: Those wastes that qualify as **exempt**, under the Resource Conservation and Recovery Act (RCRA), Oil and Gas Exemption, may be disposed of in the reserve pit. *Generally, oil or gas wastes are exempt if they 1) have been sent downhole and then returned to the surface during oil/gas operations involving exploration, development, or production, or 2) have been generated during the removal of produced water or other contaminants from the oil/gas production stream.* The term hazardous waste, as referred to above, is defined as a listed (40 CFR 261.31-33) or characteristic (40 CFR 261.20-24) hazardous waste under RCRA. These are part of the proposed action along with the MSUP

ADDITIONAL PERMITTING REQUIREMENTS

DRILLING PLAN

BOP:

1. All BOPE shall meet or exceed the requirements of a 2M system as set forth in Onshore Order No. 2.
2. The ram type preventer(s) shall be tested to the approved BOP stack working pressure when a test plug is used. If a test plug is not used, the ram type preventer(s) shall be tested to 70% of the minimum internal yield pressure of the casing.
3. The annular type preventer(s) shall be tested to 50% of the approved BOP stack working pressure.
4. A Sundry Notice (Form 3160-5), along with a copy of the BOP test report, shall be submitted to this office within 5 working days following the test. Test reports shall include time and pressure charts and accumulator tests.
5. If the bleed line is connected into the buffer tank (header), all BOP equipment including the buffer tank and associated valves will be rated at the required BOP pressure.

Casing and Cementing:

1. The surface casing shall be cemented back to surface. In the event cement does not circulate to surface or fall back of the cement column occurs, remedial cementing shall be done to cement the casing back to surface.
2. Pea Gravel or other material shall not be used to fill up around the surface casing in the event cement fall back occurs.
3. A Sundry Notice (Form 3160-5), along with a copy of the service company's materials ticket and job log, shall be submitted to this office within 5 working days following the running and cementing of all casing strings.
4. All casing strings shall be tested, prior to drilling out the casing shoe, to 0.22 psi/ft of casing string length or 1500 psi, whichever is greater, but not to exceed 70% of the internal yield pressure of the casing.
5. Any change in the casing and cement design will be approved by the Authorized Officer prior to running casing and cementing.
6. No freshly hard banded rough carbide pipe/collars will be rotated in the surface casing.
7. The production casing shall be cemented back to surface. In the event cement does not circulate to surface or fall back of the cement column occurs, remedial cementing shall be done to cement back to surface.

Mud Programs:

1. Sufficient quantities of mud materials shall be maintained at the well site, at all times, for the purpose of assuring well control.

Other:

1. A summary of the drilling operation and/or completion operation shall be submitted on Sundry Notice (Form 3160-5), to this office, along with letter size copies of the final daily drilling reports and/or daily completion reports, upon completion of the well.
2. Any permanent plug placed in the well during drilling and/or **completion** operations must have **prior** approval of the Authorized Officer.
3. A copy of all logs, formation test reports, stimulation reports, directional survey (if applicable), etc. shall be promptly submitted to this office.
4. Gas produced from this well may not be vented or flared beyond an initial test period, 30 days or 50 MMcf, whichever first occurs, without approval of the Authorized Officer(as provided in NTL-4A).

MASTER SURFACE USE PLAN OF OPERATIONS

The **Project-Wide Mitigation Measures and Procedures** in section 2.1.10 of Chapter 2 are considered as part of the MSUP.

Existing Roads:

1. Anadarko shall have permission the use (cross) the private land involved in this project.

Access Roads to be Constructed and Reconstructed:

1. The road(s) shall be surveyed and staked with stations set continuously along the centerline at maximum 100-foot intervals (less where needed to be visible) and at all tangent and curve control points, fence or utility crossings, and culverts
2. Prior to moving the drilling equipment onto the well pad the access road shall be thoroughly compacted, completed to an appropriate grade, and surfaced to the degree necessary to support heavy vehicular traffic during all drilling operations. This may include at a minimum the thorough compaction of the road's sub-base to at least 85% of its maximum dry density, prior to surfacing with a minimum of a four (4) inch layer of compacted gravel. The existing road(s) as well as the newly constructed road(s) may require additional compaction and surfacing to ensure the roads will stand up to the heavy equipment used during the drilling of the well.

Location of Existing and/or Proposed Facilities

1. The Standard Environmental Color selected for all above-ground structures, production equipment, tanks, transformers, insulators, not subject to safety requirements is Shale Green (5Y 4/2).

Plans for Reclamation of the Surface:

Seed Mix for Reclamation

The following shall be added to the seed mix:

Thickspike wheatgrass (*Elymus dasystachyum*) @ 2 lbs./Acre
Bluebunch wheatgrass (*Elymus spicatum*) 2 lbs./Acre

Slender wheatgrass (*Elymus dasystachyum*) @ 2 lbs./Acre may also be added.

Indian Ricegrass may be reduced to 2 lbs./Acre

Green Needlegrass and Winterfat may be dropped from the seed mix.

Other Information:

1. Construction, drilling and other activities potentially disruptive to strutting and nesting Greater Sage grouse are prohibited during the period of March 1 to June 30 for the protection of Greater Sage grouse nesting areas. This applies to all wells, pipelines or other facilities associated with the Jolly Roger Pod.
2. The following applies to the 1890-NW9, 1890-NE18, and 1890-SE32 wells: Ground-disturbing activities including construction, drilling, and reclamation are prohibited during the mountain plover reproductive period of April 10 to July 10, unless surveys consistent with the Mountain Plover Survey Guidelines or other USFWS approved method find that no plovers are nesting in the area.
3. The following applies to the 1990-SW-32, and 1990 SE-32 wells: Construction, drilling and other activities potentially disruptive to nesting raptors are prohibited during the period of February 1 to July 31 for the protection of raptor nesting areas.
4. Noise levels shall be limited to no more than 10 decibels on the A-weighted scale (dBA) above background levels at leks for greater sage-grouse. Compressor engines shall be enclosed in a building and located at least 600 feet away from sensitive receptors or sensitive resource areas to comply with these limits on noise levels.

Additional Conditions will be added to individual wells as necessary

APPENDIX F
PROJECT-WIDE MITIGATION MEASURES AND PROCEDURES

For this project, the Proponents have voluntarily agreed to use and comply with measures and procedures to avoid or mitigate impacts to resources or other land uses. These measures and procedures will be referred to as Best Management Practices (BMPs) throughout this document. These mitigation measures and procedures will also be applied on privately owned surface.

Preconstruction Planning, Design, and Compliance Measures

1. The Proponents would designate a qualified representative to serve as compliance coordinator. This person will be responsible for ensuring that all requirements of the APD and Plan of Development (MSUP, MDP, and Conditions of Approval) are followed.
2. New roads would be constructed and existing roads maintained in the JRPA in accordance with standards in BLM Manual 9113 for resource roads and construction details outlined in the MSUP and Conditions of Approval.
3. Roads would be crowned with a 0.3- to 0.5-foot crown, and ditched. The topsoil would be graded over the cut slope so no berm is left at the top of the cut slope.
4. Culverts would be covered with a minimum of 12 inches of fill or one-half the diameter of the pipe, whichever is greater. The inlet and outlet will be set flush with existing ground and lined up in the center of the draw. Before the area is backfilled, the bottom of the pipe will be bedded on stable ground that does not contain expansive or clay soils, protruding rocks that would damage the pipe, or unevenly sized material that would not form a good seat for the pipe. The site would be backfilled with unfrozen material and rocks no larger than 2 inches in diameter. Care would be exercised to thoroughly compact the backfill under the haunches of the conduit. The backfill would be brought up evenly in 6-inch layers on both sides of the conduit.
5. Additional culverts would be installed in the existing access road as needed or as directed by BLM.
6. The access road would be surfaced with an appropriate grade of aggregate or gravel to a depth of 4 inches before the drilling equipment or rig is moved onto the pad.
7. The access roads would be maintained in a safe and usable condition. A regular maintenance program would include, but is not limited to, blading, ditching, installing or cleaning culverts, and surfacing.
8. If snow must be removed outside new and existing roadways, snow removal equipment would be equipped with shoes to raise the blade off the ground surface. If the surface of the ground were uneven, special precautions would be undertaken to prevent the equipment from destroying vegetation.
9. Wing ditches would be constructed, as necessary, to divert water from road ditches.

Resource-Specific Requirements

The Proponents propose to implement the following resource-specific mitigation measures, procedures, and BLM management requirements on public lands.

Geology, Minerals, and Paleontology

Mitigation measures presented in the sections of this EA on soils and water resources would avoid or minimize many of the potential impacts to surface mineral resources. BLM and WOGCC policies on casing and cementing would protect subsurface mineral resources from adverse impacts.

Scientifically significant paleontological resources that may occur in the JRPA have been protected through the following mitigation measures:

1. Project personnel would make contingency plans for the accidental discovery of significant fossils. If construction personnel discover fossils during implementation of the project, the BLM would be notified immediately. If the fossils could be adversely affected, construction would be redirected until a qualified paleontologist had assessed the importance of the uncovered fossils, the extent of the fossiliferous deposits, and had implemented recommendations for further mitigation.
2. No specific data currently exists on deposits of high or undetermined paleontologic potential in JRPA. For that reason, field survey for paleontologic resources would be conducted on a case-by-case basis. These resources would be surveyed in areas where surface exposures of the Browns Park, Green River, or Wasatch Formations occur. Field surveys may result in identification of additional mitigation measures to reduce adverse impacts to fossil resources. This mitigation may include collection of additional data or representative samples of fossil material, monitoring excavation, or avoidance. In some cases, no action beyond measures taken during the field survey may be necessary.

A report would be submitted to the BLM after each field survey is complete. The report will describe in detail the results of the survey, with a list of fossils collected, if any, and may recommend additional mitigation measures. If significant fossils are collected, the report must document the curation of specimens into the collection of an acceptable museum repository and must contain appropriate geologic records for the specimens.

Air Quality

1. All activities conducted or authorized by BLM must comply with local, state, tribal, and federal air quality regulations and standards. The proponents would adhere to all applicable ambient air quality standards, permit requirements (including preconstruction, testing, and operating permits), standards for motorized equipment, and other regulations, as required by the State of Wyoming, WDEQ, Air Quality Division (AQD).
2. The proponents would not allow garbage or refuse to be burned at well locations or other facilities. Before any wells are vented or flared, WDEQ-AQD would be notified as required by Wyoming Air Quality Standards and Regulations, Chapter 1, Section 5 Reporting Guidelines for Well Flaring and Venting. Test periods longer than 15 days would require authorization by WOGCC, in accordance with Chapter 3, Section 40 Authorization for Flaring and Venting of Gas.
3. On federal land, the proponents would immediately abate fugitive dust (by application of water, chemical dust suppressants, or other measures) when air quality is impaired, soil is lost, or safety concerns are identified by the BLM or the WDEQ-AQD. These concerns include, but are not limited to, actions that exceed applicable air quality standards. BLM would approve the control measure, location, and application rates. If watering is the approved control measure, the operator must obtain the water from state-approved sources.

Soils

1. The Proponents have reduced the area of disturbance to the absolute minimum necessary for construction and production operations while providing for the safety of the operation.
2. The Proponents have located pipelines immediately adjacent to roads to avoid creating separate areas of disturbance and to reduce the total area of disturbance.
3. The Proponents will avoid using frozen or saturated soils as construction material.
4. The Proponents will minimize construction in areas of steep slopes.

5. Cut slopes would be designed in a manner that would retain topsoil, and facilitate use of surface treatment such as mulch and subsequent revegetation.
6. The Proponents will selectively strip and salvage topsoil or the best suitable medium for plant growth from all disturbed areas. Topsoil would be removed and conserved to a minimum depth of 6 inches and a maximum of 12 inches from all drill locations, unless otherwise agreed by the BLM and the operator.
7. Where possible, disturbance to vegetated cuts and fills would be minimized on existing improved roads.
8. The Proponents would install runoff and erosion control measures such as water bars, berms, and interceptor ditches.
9. The Proponents would install culverts for ephemeral and intermittent drainage crossings. In addition, drainage crossing structures would be designed to carry the 25-year discharge event, or as otherwise directed by the BLM.
10. Layout of the access roads may require minor variations in routing to avoid steep slopes adjacent to ephemeral or intermittent drainage channels. The Proponents would maintain a 100-foot wide buffer of natural vegetation (not including wetland vegetation) between construction and ephemeral and intermittent channels.
11. The Proponents would include adequate drainage control devices and measures in the design of roads (for example, berms and drainage ditches, diversion ditches, cross drains, culverts, out-sloping, and energy dissipaters). These devices and measures would be located at sufficient intervals and intensities to adequately control and direct surface runoff above, below, and within the road to avoid erosive, concentrated flows. In conjunction with surface runoff or drainage control measures, the Proponents would use erosion control devices and measures such as temporary barriers, ditch blocks, erosion stops, matts, mulches, and vegetative covers. In addition, the Proponents would implement a revegetation program as soon as possible to reestablish the soil protection afforded by vegetation.

When construction that is not specifically required for production operations is complete, the Proponents would restore topography to near pre-existing contours at the well sites, along access roads and pipelines, and other facilities sites. The Proponents also would replace up to 6 inches of topsoil or suitable plant growth material over all disturbed surfaces.

Water Resources

1. The Proponents would limit construction of all drainage crossings to no-flow or low-flow periods.
2. The area of disturbance would be minimized within perennial, ephemeral, and intermittent drainage channels.
3. The BLM would prohibit construction of well sites and other non-linear features within 500 feet of surface water and riparian areas. BLM would grant possible exceptions for linear features based on an environmental analysis and site-specific mitigation plans.
4. The Proponents would design channel crossings to minimize changes in channel geometry and subsequent alterations in flow hydraulics.
5. Layouts of the access roads may require minor variations in routing to avoid steep slopes adjacent to ephemeral or intermittent drainage channels. Where possible, a 100-foot wide buffer of natural vegetation (not including wetland vegetation) would be maintained between construction and ephemeral and intermittent channels.
6. Interceptor ditches, sediment traps, water bars, silt fences, and other revegetation and soil stabilization measures would be designed and constructed, as needed.

7. The Proponents would construct channel crossings by pipelines such that the pipe is buried a minimum of 4 feet below the channel bottom.
8. Disturbed channel beds would be regraded to the original geometric configuration and would contain the same or similar bed material.
9. Wells must be cased during drilling, and all wells cased and cemented in accordance with Onshore Order No. 2 to protect all high-quality aquifers. High-quality aquifers exhibit known water quality of 10,000 milligrams per liter total dissolved solids (TDS) or less. Well casing and cementing must be of adequate integrity to contain all fluids under high pressure during drilling and well completion. Furthermore, wells would adhere to the appropriate BLM cementing policy.
10. The reserve pits would be constructed in cut rather than fill materials. Fill material must be compacted and stabilized, as needed. The subsoil material of the pit to be constructed should be inspected to assess stability and permeability and to evaluate whether reinforcement or lining is required. If lining is required, the reserve pit must be lined with a reinforced synthetic liner at least 12 mils thick and with a bursting strength of 175 by 175 pounds per inch (American Society for Testing and Materials [ASTM] Standard D 75179). Use of closed or semi-closed drilling systems should be considered in situations where a liner may be required.
11. Two feet of freeboard must be maintained on all reserve pits to ensure they are not in danger of overflowing. Drilling operations must be shut down if leakage is found outside the pit until the problem is corrected.
12. Hydrostatic test water used in conjunction with pipeline testing, and all water used during construction must be extracted from sources that contain sufficient quantities and with appropriation permits approved by the State of Wyoming.
13. The Proponents would develop and implement a pollution prevention plan (PPP) for storm water runoff at drill sites as required per WDEQ permit requirements.
14. The Proponents would exercise stringent precautions against pipeline breaks and other potential accidental discharges of oil or hazardous chemicals into adjacent streams. If liquid petroleum products are stored on site in sufficient quantities (per the criteria contained in Title 40 Code of Federal Regulations [CFR] Part 112), a Spill Prevention Control and Countermeasures (SPCC) plan would be developed in accordance with 40 CFR Part 112, dated December 1973 and updated in July 2002.
15. The Proponents would coordinate all crossings or encroachments of Waters of the U.S. with the U.S. Army Corps of Engineers (COE).
16. BLM must approve in writing any changes in the method or location for disposal of produced water.

Vegetation, Wetlands, and Noxious/Invasive Weeds

1. An approved Pesticide Use Proposal would be obtained before pesticides are applied on BLM surface ownership lands to control weeds.
2. Disturbed areas would be seeded and stabilized in accordance with BLM-approved reclamation guidelines.

Range Resources and Other Land Uses

1. The Proponents would coordinate with the affected livestock operators to ensure that livestock control structures remain functional (as directed by the livestock operator) during drilling and production operations, and to coordinate timing of activities.
2. Traffic control and speed limits would be used to limit potential conflicts between operators and livestock.

Wildlife and Fisheries

1. During reclamation, the Companies would establish a variety of forage species that would return the land to a condition that approximates its state before disturbance. In the short term, grasses and forbs would be established and in the long term, shrub species would establish themselves naturally when seeding conditions.
2. The Companies would prohibit unnecessary off-site activities of operational personnel near the drill sites. The Companies also would inform all project employees of applicable wildlife laws and penalties associated with unlawful take and harassment.
3. Construction would not be allowed during critical nesting season (February 1-July 31) near active raptor nests. Seasonal timing restrictions within a "buffer zone" around nests to avoid disturbance to nesting raptors would reduce impact from construction activities. Exception requests may be granted if nests are found to be inactive or modified if there is visual screening of the nest that is determined by the BLM to be sufficient to minimize impacts.
4. Surface disturbing activities would not be allowed within ¼ mile of identified greater sage-grouse leks.
5. The Companies would protect greater sage-grouse nesting habitat during the breeding, egg-laying, incubation and early brood-rearing period (March 1 through June 30) by restricting construction within a 2-mile radius of active leks for greater sage-grouse. Exceptions may be granted if the activity would not interfere with greater sage-grouse nesting activity.
6. Construction activities in potential mountain plover nesting habitat during the nesting period (April 10 -July 10) would not be allowed unless an exception is granted. An exception may be granted if a survey for mountain plovers is conducted, within areas of potential habitat, prior to any surface disturbance in those areas, according to current mountain plover survey protocol and no plovers are found (USDI-FWS 2002).
7. All pits and open cellars must be fenced for the protection of wildlife and livestock. Fencing must be in accordance with BLM specifications. Netting must be placed over all production pits to eliminate any hazard to migratory birds or other wildlife. Netting is also required over reserve pits that have been identified as containing oil or hazardous substances (Comprehensive Environmental Response, Compensation, and Liability Act [CERCLA] Section 101 (14)), as determined by visual observation or testing. The mesh diameter will be no larger than 1 inch.
8. No mitigation for fisheries is needed beyond the measures indicated under Water Resources. No fish species are located within the JRPA.
9. Clearance surveys would be performed for threatened, endangered, proposed, candidate, and sensitive species of concern.

Recreation

1. The Proponents must minimize conflicts between project vehicles/equipment and recreation traffic by posting warning signs, implementing operator safety training, and requiring project vehicles to adhere to low speed limits.

Visual Resources

1. The Proponents must use existing topography to screen from view roads, pipeline corridors, drill rigs, wellheads, and production facilities.
2. The Proponents must paint structures, wells, and facilities with flat colors (such as Carlsbad Canyon or Slate Green) that blend with the adjacent undisturbed terrain. This measure does not apply to structures that require safety coloration in accordance with the requirements of the Occupational Safety and Health Administration (OSHA).

Cultural Resources

1. Avoidance is the preferred method for mitigating adverse effects to a property that is considered eligible for, or is already on, the National Register of Historic Places (NRHP).
2. Adverse effects to cultural or historical properties that cannot be avoided would be mitigated by implementing a cultural resources mitigation plan (including data recovery plan).
3. If cultural resources are discovered at any time during construction, all construction would halt and BLM would be immediately notified. Work would not resume until BLM issues a Notice to Proceed.

Socioeconomics

1. The Proponents would implement hiring policies that encourage use of local or regional workers who would not have to relocate to the area.
2. Project activities must be coordinated with ranching operations to minimize conflicts that involve movement of livestock or other ranch operations. Coordination would include scheduling project activities to minimize potential disturbance of large-scale livestock movements. The Proponents would establish effective and frequent communication with affected ranchers to monitor and correct problems and coordinate scheduling.
3. The Proponents and their subcontractors would obtain Carbon County sales and use tax licenses for purchases made in conjunction with the project so that project-related sales and use tax revenues would be distributed to Carbon County.

Transportation

1. Existing roads would be used as collectors and local roads whenever possible. Standards for road design would be consistent with BLM Road Standards Manual Section 9113.
2. Roads that are not required for routine operation and maintenance of producing wells and ancillary facilities would be permanently blocked, reclaimed, and revegetated.
3. Areas with important resource values, steep slopes, and fragile soils would be avoided where possible in planning for new roads.
4. Permits are required from Carbon County for any access to or across a county road or for any pipeline that crosses a county road. These permits would be acquired before additional roads are built. All roads on public lands that are not required for operation and maintenance of field production would be permanently blocked, re-contoured, and seeded. Roads on private lands would be treated in a like manner, depending on the desires of the landowner.
5. The Proponents would be responsible for preventive and corrective maintenance of roads in the JRPA throughout the duration of the project. Maintenance may include blading, cleaning ditches and drainage facilities, abating dust, controlling noxious weeds, or other requirements as directed by the BLM or the Carbon County Road and Bridge Department.
6. Except in emergencies, access would be limited to drier conditions to prevent severe rutting of the road surface. Culverts would be installed where needed to allow drainage in all draws and areas of natural drainage. Low water crossings would be used where applicable. On-site reviews would be conducted with BLM personnel for approval of proposed access before any construction begins.

Health and Safety

1. Sanitation facilities installed on the drill sites, and any resident camps would be approved by the WDEQ.
2. To minimize undue exposure to hazardous situations, the Proponents would comply with all applicable rules and regulations (such as Onshore Orders and OSHA requirements) that would prevent the public from entering hazardous areas and would post warning signs to alert the public of truck traffic.
3. The Proponents would haul all garbage from the drill site to a state-approved sanitary landfill for disposal. In addition, the Proponents would collect and store any garbage or refuse on location until it can be transported in containers approved by the BLM.

Hazardous Materials

1. SPCC Plans would be written and implemented as necessary, in accordance with 40 CFR Part 112, to prevent discharge into navigable waters of the United States.
2. If quantities that exceed 10,000 pounds or the threshold planning quantity (TPQ) as designated by the RFO are to be produced or stored in association with the project, chemical and hazardous materials would be inventoried and reported in accordance with the toxic release inventory (TRI) requirements set forth in Title III of the Superfund Amendments and Reauthorization Act (SARA) and codified at 40 CFR Part 335. The required Section 311 and 312 forms would be submitted at the specified times to the state and county emergency management coordinators and the local fire departments.
3. Any hazardous wastes, as defined by the Resource Conservation and Recovery Act (RCRA), would be transported and disposed of in accordance with all applicable federal, state, and local regulations.
4. All storage tanks and compressor facilities that are designed to contain oil, glycol, produced water, or other fluid that may constitute a hazard to public health or safety, must be surrounded by a secondary means of containment for the entire contents of the largest single tank in use, plus 1 foot of freeboard. The Proponents would use 2-foot berms around affected storage tanks and facilities. The containment or diversionary structure must be impervious to any oil, glycol, produced water, or other hazardous fluid for 72 hours. In addition, it would be constructed so that any discharge from a primary containment system would not drain, infiltrate, or otherwise escape to groundwater, surface water, or navigable waters before cleanup is completed.

Noise

1. The Proponents would muffle and maintain all motorized equipment according to manufacturer's specifications.
2. In any area of operations (such as a drill site or compressor station) where noise levels may exceed safe limits specified by OSHA, the Proponents would provide and require that employees use proper personal protective equipment.
3. The BLM will require that noise levels be limited to no more than 10 decibels on the A-weighted scale (dBA) above background levels at leks for greater sage-grouse that are located on public lands. The BLM will require that compressor engines located on public lands be enclosed in a building and located at least 600 feet away from sensitive receptors or sensitive resource areas to comply with these limits on noise levels.

**APPENDIX G
INTERIM DRILLING POLICY
DEVELOPMENT AUTHORIZED CONCURRENT WITH EIS PREPARATION
FOR THE ATLANTIC RIM COALBED NATURAL GAS PROJECT**

During the preparation of the Atlantic Rim Coalbed Natural gas Environmental Impact Statement (EIS), the Bureau of Land Management's (BLM) authority to allow drilling on the federal mineral estate is limited. The Council on Environmental Quality (CEQ) Regulations and 40 CFR 1506.1, *limitations on actions during NEPA process* to comply with the National Environmental Policy Act (NEPA) provide the following regarding limitation on concurrent authorizations:

Section 1506.1

(a) Until an agency issues a record of decision as provided in para. 1505.2 (except as provided in paragraph (c) of this section), no action concerning the proposal shall be taken which would:

- (1) Have an adverse environmental impact; or*
- (2) Limit the choice of reasonable alternatives.*

(b) If any agency is considering an application from a non-federal entity, and is aware that the applicant is about to take an action within the agency's jurisdiction that would meet either of the criteria in paragraph (a) of this section, then the agency shall promptly notify the applicant that the agency will take appropriate action to insure that the objectives and procedures of NEPA are achieved.

(c) While work on a required program environmental impact statement is in progress and the action is not covered by an existing program statement, agencies shall not undertake in the interim any major Federal action covered by the program which may significantly affect the quality of the human environment unless such action:

- (1) Is justified independently of the program;*
- (2) Is itself accompanied by an adequate environmental impact statement; and*
- (3) Will not prejudice the ultimate decision on the program. Interim action prejudices the ultimate decision on the program when it tends to determine subsequent development or limit alternatives.*

(d) This section does not preclude development by applicants of plans or designs or performance of other work necessary to support an application for Federal, State or local permits or assistance....

The above regulations and the following criteria and conditions will be used by the BLM to determine new exploratory activities allowed on Federal surface and/or minerals during preparation of the EIS. They also establish conditions under which these activities will be approved. The intent of these criteria and conditions are to keep all activity within the scope of existing analysis and at a reasonable level, to allow limited drilling activity for acquisition of additional data necessary for completion of the EIS, and to prevent unnecessary hardship to leaseholders. These criteria may be modified by the BLM authorized officer (AO) if any of the allowed activities are viewed as having a potentially significant effect on the environment or prejudice the ultimate decision on the drilling program for the EIS as outlined in the CEQ regulations quoted above.

ACTIVITIES ALLOWED ON FEDERAL LANDS AND MINERALS DURING EIS PREPARATION

1. A maximum of 200 coalbed natural gas wells will be allowed within the project area, for research and exploratory purposes, during the interim period in which the EIS is prepared. Wells will only be allowed in the nine pods the operators have proposed and a maximum of only 24 coalbed natural gas wells will be allowed within any pod, regardless of multiple zones to be evaluated (see map).
2. Activities within individual pods will be authorized by BLM. For any pod location which overlaps the boundary of a sensitive resource area for sage-grouse, mountain plover, raptors, big game migration corridors, and sensitive plants, appropriate stipulations and mitigation will be applied to protect any sensitive resources present (see Term Definitions below). Some sensitive resources such as high density paleontological or cultural resources sites, are not mapped and will also be handled on a pod basis.
3. Existing coalbed natural gas wells (two wells re-completed as coalbed natural gas producers in the Cow Creek Unit by Double Eagle and one new well completed by Petroleum Development Corporation, to the east of this unit) will count toward the above well limits. As Federal 1691 #10-8 has been plugged and abandoned, it will not count toward the above well limit. In addition, the six coalbed natural gas wells originally permitted by North Finn LLC and drilled in Section 5, T. 17 N., R. 90 W., and the well located in Section 36 of T. 15 N., R. 91 W., will not count toward the allowed well number, as long as they are not included as part of any proposed pod. In addition, required injection wells and monitoring wells will not count toward the well limit.
4. Any modifications proposed to the approved pods (i.e. changing pod locations, drilling wells outside of the current pod locations, or increasing the total number of wells allowed during interim drilling), will only be approved if geologic, hydrologic, or reservoir characteristics support a change. These changes will be allowed after review by, and concurrence of, the Reservoir Management Group and authorization by the BLM, Rawlins Field Office. Additional federal drainage protection wells may be required.
5. During preparation of the EIS, coalbed natural gas wells and associated roads and pipelines on any private surface/private mineral where the operator has, or has obtained legal access (i.e., county roads, approved BLM ROW grant or private access road) prior to approval of the interim drilling plan, may be developed as deemed appropriate by the operator/lessee. However, these wells will count toward the total number of wells allowed to be drilled under this interim drilling policy.

THE FOLLOWING CRITERIA AND CONDITIONS APPLY TO INTERIM DRILLING OPERATIONS

1. A detailed Plan of Development/Surface Use Plan (POD/SUP) and Master Drilling Plan for each individual pod, using guidance provided by the BLM Rawlins Field Office, will be submitted and approved prior to surface disturbing activities.
2. The operator(s) agree to supply the geologic, coal, and water data information discussed in Appendix A of this document.
3. Prior to initiating interim drilling, an environmental assessment (EA), including a detailed Water Management Plan will be prepared and approved for each individual pod. Because of the current BLM workload, and in order to expedite the completion of the EAs, it is recommended that these documents be prepared by a third-party contractor.

4. All pod EAs will be submitted to the BLM in pdf format and each document will be placed on the BLM Wyoming web page. A 30-day public review of each document will occur from the date the document is placed on the site. BLM will be responsible for writing the Decision Record for each EA.
5. A ¼-mile buffer is required between surface disturbing activities and the Overland Trail.
6. Block surveys for cultural resources will be required for each pod.
7. No interim drilling will be allowed in the Sand Hills Area of Critical Environmental Concern as described in the Great Divide Resource Management Plan Record of Decision (RMP-1990).
8. The Great Divide RMP states the BLM will include intensive land-use practices to mitigate salt and sediment loading caused by surface disturbing activities within the Muddy Creek watershed. The Muddy Creek Coordinated Resource Management (CRM) group was established as an advisory group to address this issue. Because this area overlaps with the Muddy Creek CRM effort, and since road use contributes the most in increasing the amount of sediment in the Muddy Creek drainage, the POD/SUP will be reviewed by the Muddy Creek CRM Road Committee and recommendations of the group will be considered by BLM. Changes to the POD/SUP will be made prior to initiating work on the pod EA.
9. Surface discharge as a method of disposal for produced coalbed natural gas waters will be considered for each individual pod during interim drilling activities within the Great Divide Basin. This is subject to the approval of the Water Management Plan and upon obtaining all required federal, state and local permits.
10. Water produced from interim coalbed natural gas wells drilled in the Colorado River Basin will be disposed of by re-injection. The only exception to this would be waters currently proposed for surface containment by Double Eagle, should they receive a state permit. Appropriate NEPA documentation will need to be completed prior to BLM approval of this proposal. No additional wells within the Colorado River Basin will be permitted to discharge produced water to the surface prior to completion of the EIS.
11. No drilling activities will be allowed in prairie dog towns during interim operations. However, drilling will be allowed in each individual pod containing prairie dog towns upon the completion of a black-footed ferrets survey using methods approved by the United States Fish and Wildlife Service. These surveys will clear the pod for a one year period. The operators also have the option of completing surveys in the whole EIS area which would clear the area for the life of the project.
12. No drilling or disturbance will be allowed in those areas determined to be critical winter habitat for sage-grouse.
13. No drilling or disturbance will be allowed in areas of overlapping big game crucial winter ranges.
14. The operators will be required to submit a drilling schedule as part of the Master Drilling Plan. This schedule will be reviewed, and approved by BLM, to ensure that activities are limited within proven big game migration corridors at critical use times during the year.
15. Pipelines, power lines, waterlines, fiber optic lines will be buried and, where possible, will follow the road rights-of-way.
16. Fish passage structures will be installed for roads which cross drainages with fisheries concerns as identified by BLM.

TERM DEFINITIONS

SENSITIVE RESOURCE AREAS are defined as those areas containing stabilized sand dunes, sensitive plant areas, raptor nesting concentration areas, prairie dog towns, two-mile buffer around sage-grouse leks, mountain plover aggregation areas or potential habitat, big game migration corridors and crucial big game winter ranges, and areas with high density cultural or paleontological resource sites. Field inspections by the BLM will be conducted to verify presence of these resource values and potential impacts prior to considering authorization of any proposed development activity on Federal surface and/or minerals.

WILL BE AUTHORIZED means BLM will authorize the action if, following the environmental review of the APD or ROW application, sensitive resource areas are protected with appropriate stipulations or mitigation and the criteria established under CEQ regulation 40 CFR 1506.1 have been met. An environmental assessment (EA) will be completed for each individual pod prior to authorizing the proposal. Consultation and Coordination with the Wyoming Game and Fish Department and the U.S. Fish and Wildlife Service will occur when applicable for proposed activity within sensitive resource areas. The pod EA will identify the most environmentally acceptable access route, well site, and pipeline location. Mitigation measures developed from nearby project EISs and EAs for protection of resource values may be considered in the assessment. Any action proposed must be in conformance with the Great Divide Resource Management Plan (RMP) and mineral lease terms and conditions.

A coalbed natural gas pod may consist of two or more production wells, injection wells, access roads, product pipelines, water pipelines, power lines and other ancillary facilities designed specifically to assess the development potential of the play.

**ATTACHMENT 1
DATA SUBMISSION REQUIREMENTS**

GEOLOGIC AND COAL INFORMATION REQUIRED TO BE SUBMITTED BY OPERATORS DURING INTERIM DRILLING ACTIVITIES

The geologic and coal information needs identified below are those that the Reservoir Management Group, in consultation with the United States Geologic Survey, has determined are needed based on their experience with coalbed natural gas development in the Powder River Basin. The information will be used to define the potential gas resource and provide valuable data for the NEPA assessment including the determination of future development potential.

1. Operators will provide copies of all geologic information obtained to the Rawlins Field Office and the Reservoir Management Group as required under 43 CFR 3162.4.
2. The suite of logs required to evaluate coal beds in the project area are high resolution gamma ray, resistivity, density, and neutron logs. The full suite will be required during this phase but may be reviewed for changes during any later drilling phase.
3. Detailed geologic and coal information will be required and obtained for a minimum of one well within each of the nine pods. Information required includes; coal cores, fluid level, and production analysis. From this data information can be obtained on coal rank, adsorption and desorption gas content, core density, specific gravity, orientation of cleats and joints, initial saturations, coal permeability, and desorption pressure.
4. Initial reservoir pressure for each pod drilled.
5. Agree to standard stratigraphic nomenclature for all operators to use in preparing reports to the BLM and Wyoming Oil and Gas Conservation Commission.
6. Obtain an initial reservoir pressure for each coal bed in three of the pods.
7. Obtain reservoir pressure at the end of one year and two years, for each coal bed in three of the pods.

WATER ASSESSMENT/MONITORING DATA NEEDS

Recognizing that surface and ground water resources can be affected by large coalbed natural gas drilling projects, the following data submission requirements will be necessary to complete the assessment of impacts and develop baseline water conditions. Also water monitoring data has been found to be vital when reviewing drainage situations.

1. The operator(s) will obtain aquifer hydraulic baseline data for all pods in the initial exploration phase. This will include hydraulic conductivity and storativity derived from a multiple well pumping test conducted at each pod. This information could be used to provide data for the NEPA document and to assess monitoring needs for full field development.
2. Identify all domestic/industrial wells in the area and make a baseline and annual measurement of each.
3. Prepare a well mitigation agreement for existing wells and offer it to all groundwater appropriators in the vicinity.

4. Monitoring wells need to be installed both in an updip and downdip direction, completed in coal and overburden, from the pods selected. Details of this requirement will be done in coordination with the Rawlins Field Office hydrologist.
5. Measure initial static water levels in all production wells.
6. Collect water quality analyses for each pod.
7. Each well must have a continuous flow meter installed to measure water production rates for the duration of the project. All water production data will be furnished to the Bureau.
8. Baseline surface water quality should be collected in each stream or receiving water that will collect or transport discharge water. The analysis will include all BLM category I, II and III constituents.
9. The operator will provide to BLM a geologic map of the area/watershed where the produced water is to be re-injected. This should include surficial and bedrock geology, with a clear definition of recharge zones of the receiving formation/unit. The pre-injection water levels and water quality should be monitored and that data provided to BLM. The receiving aquifer should be pump tested and aquifer hydraulics reported to BLM. The reported parameters will include hydraulic conductivity, water levels and storativity for each receiving aquifer.