

**ENVIRONMENTAL ASSESSMENT
For
LOWER BUSH CREEK
COAL BED METHANE EXPLORATORY PILOT PROJECT**

WY-040-EA03-211

Prepared by

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CHAPTER 1

PURPOSE AND NEED

1.0 INTRODUCTION

Kennedy Oil (Kennedy) of Gillette, Wyoming, has notified the Bureau of Land Management (BLM), Rock Springs Field Office (RSFO), that the company proposes an exploratory pilot project (Proposed Action) to explore for, test, and potentially develop coal bed methane (CBM) wells. The two 10-well groupings (pods) comprising the Proposed Action are within the Red Desert Watershed Management Area of the Great Divide Basin located in south central Wyoming (Figure 1.1). The BLM refers to this project as the Lower Bush Creek Exploratory Coal Bed Methane Project (Project). The Project is within the administrative boundary of the RSFO in Townships 24 and 25 North, Range 98 West, 6th Principal Meridian, Sweetwater County, Wyoming. The proposed well sites are located on public lands administered by the BLM. The proposed wells would develop federal fluid minerals. The analysis area, here defined as the sections directly affected by the Proposed Action, encompasses approximately 3,500 acres.

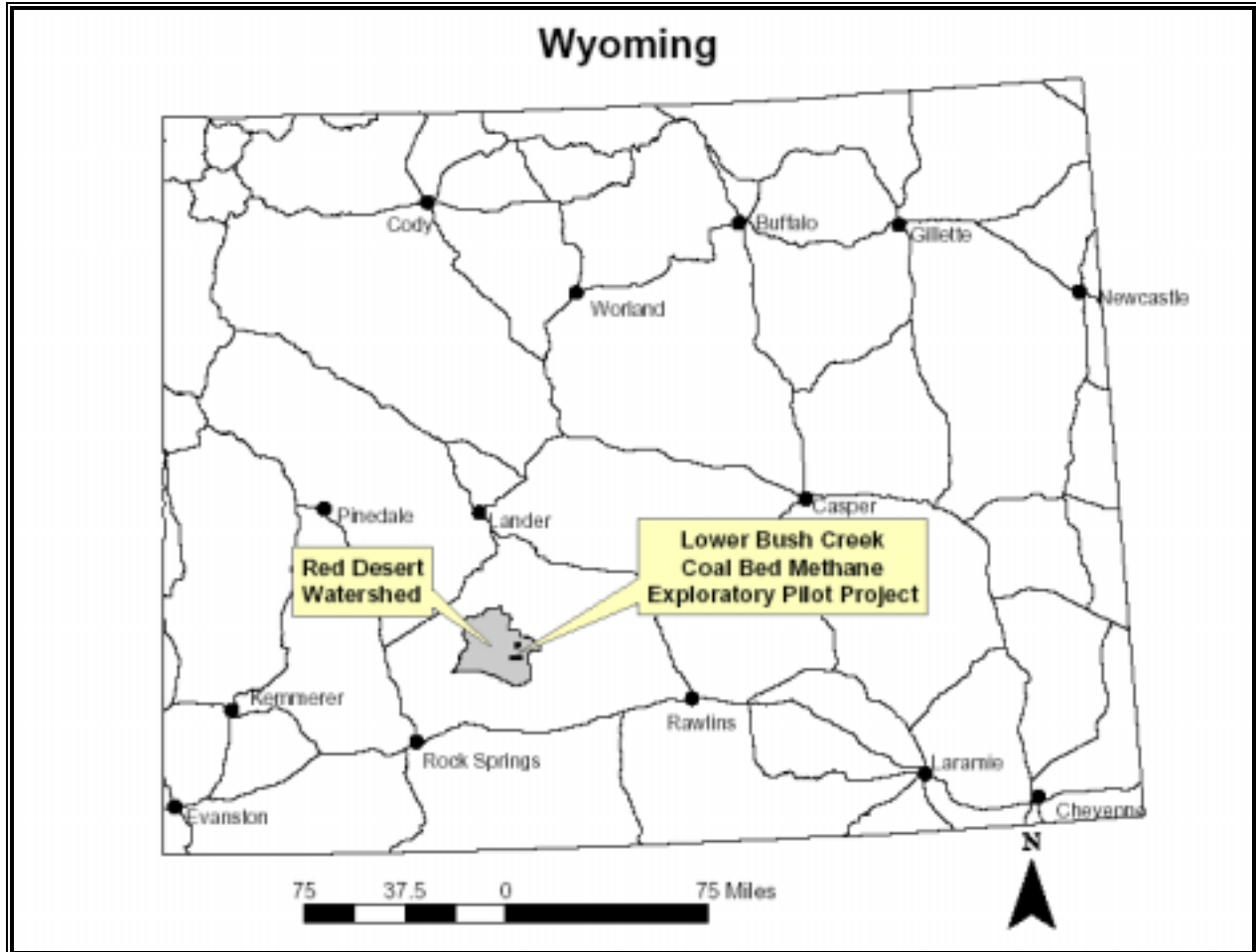
The Proposed Action involves drilling and testing commercial CBM production potential of the Big Red Coal seam in the Fort Union Formation with two pods of 10 exploratory CBM wells on 160-acre spacing. This well number and spacing is believed to be the minimum necessary to sufficiently de-water the coal, allow the gas to desorb through reduced pressure in the coal seam, and determine whether natural gas production is economically viable in the coal at this location. All produced water will be reinjected into a sandstone formation containing water of lesser or equal quality as compared with the injected water. This Proposed Action would require the construction of access roads, completion of two injection wells and related production facilities for each of the pods, known as the North Sweetwater Pilot and the Central Sweetwater Pilot.

Access to the area is by Interstate Highway 80 and Sweetwater County Road 4-21 (Bar X Road). Driving directions are as follows: Travel approximately 42 miles east from Rock Springs, Wyoming or approximately 60 miles west from Rawlins, Wyoming, on I-80 to Exit 152 access to Sweetwater County Road 4-21 (Bar X Road), then travel north on the Bar X Road for approximately 33 miles to the project area. Figure 1.1 provides a general location map and a more specific map of the pods and related access roads/pipeline facilities can be found in Chapter 2 (Figure 2.1).

1.1 PURPOSE AND NEED FOR THE PROPOSAL

Exploration and development of federal oil and gas leases by private industry is an integral part of the BLM's oil and gas leasing program under the authority of the Mineral Leasing Act of 1920 as amended. The Mining and Minerals Policy Act of 1970, the Federal Land Policy and Management

Figure 1.1, General Location Map



Act of 1976, the National Materials and Minerals Policy, Research, and Development Act of 1980, and the Federal Onshore Oil and Gas Leasing Reform Act of 1987.

Exploration and production of natural gas, including methane gas from coal-bearing formations, is in accordance with the President's National Energy Policy, Executive Order 13212. The policy calls for federal agencies "to develop a national energy policy designed to help the private sector, and, as necessary and appropriate, State and local governments, promote dependable, affordable, and environmentally sound production and distribution of energy for the future." Natural gas is an integral part of the U.S. energy future due to its availability, the presence of an existing market delivery infrastructure, and the environmental advantages of clean-burning natural gas.

The purpose and need for this project is to drill to and test for methane gas within a coal bearing formation. The Proposed Action would allow for exploration to determine the commercial production potential of federal oil and gas leases issued by the BLM. The proposed CBM development would exercise the leaseholders' existing rights to drill for, extract, remove, and market gas products if exploration proves successful. National mineral leasing policies and the regulations

by which they are enforced recognize the statutory right of lease holders to develop federal mineral resources to meet continuing needs and economic demands so long as undue and unnecessary environmental degradation is not incurred. Also included is the right of the lease holder within the project area to build and maintain necessary improvements, subject to renewal or extension of the leases in accordance with the appropriate authority. The proposal would allow Kennedy to determine through exploration of CBM if larger scale development is feasible.

1.1.1 PURPOSE OF THE ENVIRONMENTAL ANALYSIS PROCESS

The purpose of this environmental assessment (EA) is to provide the decision-makers with information needed to make a decision that is fully informed and based on factors relevant to the proposal. It also documents the analysis conducted on the proposal and alternatives in order to identify environmental impacts and mitigation measures necessary to address those impacts.

Factors considered during the environmental analysis process for this proposal include:

- Determine whether the proposal and alternatives are in conformance with BLM policies, regulations, and approved resource management plan direction.
- Determine whether the proposal and alternatives are in conformance with the policies and regulations of other agencies likely associated with this project.
- Determine whether location of environmentally suitable well pad locations access roads, pipelines, and production facilities best meet other resource activities and minimize resource impacts, yet honor the lease rights within the project area.
- Determine whether impacts on the human environment resulting from the Proposed Action and the alternatives are significant and develop mitigation measures necessary to avoid or minimize impacts.

Although the BLM has the authority to deny individual APDs and ROW applications, the lessees' right to drill and develop cannot be denied entirely. Pursuant to the *Federal Land Policy and Management Act of 1976* (FLPMA), the BLM also has the authority and responsibility to protect the environment within federal oil and gas leases; therefore, restrictions may be imposed on lease terms. However, mitigation measures that would render a proposed operation uneconomic or unfeasible are not consistent with the lessee's rights and cannot be required unless they are included as a lease stipulation or are necessary to prevent unnecessary and undue degradation of public lands or resources (43 CFR 3101.1-2). This EA will provide a resource-specific analysis of the impacts associated with the Proposed Action and alternatives to determine whether any significant impacts would likely occur that would require the preparation of an EIS.

1.2 CONFORMANCE AND AUTHORIZATION ACTIONS

Land use plan decisions within this area are contained in the Green River Resource Management Plan (GRRMP). The Record of Decision for the GRRMP was signed in 1997. The environmental analysis that supports the decisions made in the GRRMP is documented in Green River Resource Area Resource Management Plan Draft and Final Environmental Impact Statement (1992, 1996).

Values applicable to the proposal and to the GRRMP are described in Chapter 3, the Affected Environment. The other land use plan decisions applicable to the area are described in the GRRMP.

The objective for management of the minerals program in the RSFO area is to maintain or enhance opportunities for mineral exploration and development, while protecting other values. Management of oil and gas resources provides for leasing, exploration and development of oil and gas, including that which originates in coal-bearing seams, while protecting other resource values. All public lands in the analysis area have been considered and found suitable for oil and gas leasing and development, subject to certain stipulations and appropriate mitigation measures (GRRMP 1997). In accordance with 43 CFR1610.5, the Proposed Action has been reviewed and has been found to be in conformance with the GRRMP.

The project area is located in the Red Desert Watershed Management Area. The objective for managing the Red Desert Watershed Area is to manage for all resource values with emphasis on protection of visual resources, watershed values, and wildlife resources and to provide large areas of unobstructed views for enjoyment of scenic qualities. This is accomplished through facility design and placement and using topography to shield activities, using neutral colors so facilities blend with the landscape, identification of backcountry byways, and providing viewing points for the public (GRRMP 1997).

Management actions for the Red Desert Watershed Management Area allow for surface disturbing activities, mineral exploration and development subject to the guidelines found under the GRRMP, Minerals section. Management objectives and actions for mineral development are to allow for mineral exploration and development. Leases contain stipulations to protect certain resource values.

One lease, WYW153613, has a controlled surface use stipulation, which requires an "acceptable plan" in order to mitigate anticipated impacts to watershed, visual, wildlife, and soils. The criteria for an acceptable plan can be found in Appendix A.

A tiered approach to environmental review is used by the BLM in actions involving the leasing, exploration, and development of mineral resources. Initial environmental review occurs during BLM land use planning, during which the appropriateness of leasing and stipulations for development are identified with public input. Accordingly, the federal minerals within the RSFO area that have been leased to Kennedy carry a contractual commitment to allow for the mineral development in accordance with the terms and conditions of the respective leases. During exploration, site-specific Environmental Assessments (EAs) are prepared to ensure that unnecessary and undue impacts to surface and subsurface resource values do not occur. This EA serves as site-specific analysis for the two pods; however, further analysis may be required if there is a change in circumstances. This EA tiers to and incorporates the GRRMP and Draft (1992) and Final EIS (1996) and Record of Decision (1997).

In addition to addressing project-specific impacts, this EA will serve to update the assumptions for analysis for the Final Environmental Impact Statement (1996) for the Green River Resource Management Plan. The analysis contained in this EA provides an evaluation of impacts associated with an increased level of cumulative development in the Red Desert Watershed Area (RDWA). Specifically, the analysis in this EA provides a disclosure of the impacts of 20 exploratory wells and

related facilities within the RDWA. At the time the Final EIS for the Green River RMP (1996) was being prepared, it was assumed that 10 new producing wells would be drilled in the RDWA. The analysis in this EA updates this assumption to 20 new producing wells. The impacts of the proposed level of development do not result in a change to the existing RMP decisions or the addition of a new decision to the GRRMP. The Proposed Action is within the intent, scope, and meaning of the GRRMP.

The Proposed Action is in conformance with the *State of Wyoming Land Use Plan* (Wyoming State Land Use Commission 1979) and the Sweetwater County Land Use Plan (Sweetwater County Board of Commissioners [SCBC] 1996) and complies with all other relevant federal, state, and local laws. Table 1.1 provides an overview of laws applicable to oil and gas development and an overview of the key regulatory requirements that would govern oil and gas project implementation. Additional approvals, permits, and authorizing actions may be necessary.

**Table 1.1
Major Federal, State, and Local Permits, Approvals, and Authorizing Actions Applicable to Oil and Gas Development in Sweetwater County, Wyoming**

Agency	Permit, Approval, or Action	Authority
U.S. Fish and Wildlife Service (USFWS)	Coordination, consultation and impact review federally listed threatened and endangered (T&E) species	Fish and Wildlife Coordination Act (16 U.S.C. 661-666c); Section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1536); bald eagle Protection Act (16 U.S.C. 668-668dd)
	Migratory bird impact coordination	Migratory Bird Treaty Act (16 U.S.C. 704)
U.S. Environmental Protection Agency (EPA)	Spill Prevention Control and Countermeasures (SPCC) Plans	Oil Pollution Prevention, as amended (40 C.F.R. 112)
	Regulate hazardous waste treatment, storage, and/or disposal	Resource Conservation and Recover Act of 1976, as amended (42 U.S.C. 6901 et req.)
U.S. Department of Energy (DOE)	Regulate interstate pipeline product transportation	Various sections of the U.S.C.
	Rights-of-way (ROW) grants and temporary use permits for pipelines and central tank battery on BLM-managed land	Mineral Leasing Act of 1920, as amended (30 U.S.C. 185); Onshore Oil and Gas Unit Agreements: Unproven Areas, as amended (43 C.F.R. 3180)
	ROW grants for access roads on BLM-managed land	Federal Land Policy and Management Act (43 U.S.C. 1761-1771); Right-of-Way, Principles and Procedures, as amended (43 C.F.R. 2800)
	Authorization for flaring and venting of natural gas on BLM-managed land	Mineral Leasing Act of 1920, as amended (30 U.S.C. 181 et seq.); Requirements for Operating Rights Owners and Operators, as amended (43 C.F.R. 3162)
	Plugging and abandonment of a well on BLM-managed land	Mineral Leasing Act of 1920, as amended (30 U.S.C. 181 et seq.); Requirements for Operating Rights Owners and Operators, as amended (43 C.F.R. 3162)
	Antiquities and cultural resource permits on BLM-managed land	Antiquities Act of 1906, as amended (16 U.S.C. 431-433); Archaeological Resources Protection Act of 1979, as amended (16 U.S.C. 470aa-47011); Preservation of American Antiquities, as amended (43 C.F.R. 3)
	Approval to dispose of produced water on BLM-managed land	Mineral Leasing Act of 1920, as amended (30 U.S.C. 181 et seq.); Special

Agency	Permit, Approval, or Action	Authority
		Provisions, as amended (43 C.F.R. 3164); Onshore Oil and Gas Order No. 7 as amended (58 Federal Register 47,354)
Sweetwater	Mineral extraction permits	County Code
County	Construction/use permits	County Code and Zoning Resolution
	Conditional use permits	County Code and Zoning Resolution
	Road use agreements/oversize trip permits	County Code
	County road crossing/access permits	County Code / Engineering Department
	H ₂ S contingency plan	County Health Department
	Small wastewater permits	County Health Department
	Hazardous material recordation and storage	County Code
	Zone changes	Zoning Resolution
	Filing fees	County Code
	Noxious weed control	County Code
U.S. Department of Transportation (DOT)	Control pipeline maintenance and operation	Transportation of Natural and Other Gas by Pipeline; Annual Reports, Incident Reports, and Safety Related Condition Reports, as amended (49 C.F.R. 191); and Transportation of Natural and Other Gas by Pipeline: Minimum Safety Standards, as amended (49 C.F.R. 192)
Wyoming Department of Environmental Quality, Water Quality Division (WDEQ/WQD)	Permits to construct settling ponds and waste water systems, including ground water injection and disposal wells	Wyoming Environmental Quality Act, Article 3, Water Quality, as amended (Wyoming Statute [W.S.] 35-11-301 through 35-11-311)
	Regulate disposal of drilling fluids from abandoned reserve pits	Wyoming Environmental Quality Act, Article 3, Water Quality, as amended (W.W. 35-11-301 through 35-11-311)
	NPDES permits for discharging waste water and storm water runoff	WDEQ-WQD Rules and Regulations, Chapter 18; Wyoming Environmental Quality Act, Article 3, Water Quality, as amended (W.S. 35-11-301 through 35-11-311); Section 405 of the Federal Water Pollution Control Act (Clean Water Act) (codified at 33 U.S.C. 1345); EPA-administered (40 C.F.R. 122); State Program Requirements (40 C.F.R. 123); EPA Water Program Procedures for Decision-making, as amended (40 C.F.R. 124)
	Administrative approval for discharge of hydrostatic test water	Wyoming Environmental Quality Act, Article 3, Water Quality, as amended (W.S. 35-11-301 through 35-11-311)
Wyoming Department of Environmental Quality, Air Quality Division (WDEQ/ADQ)	Permits to construct and permits to operate	Clean Air Act, as amended (42 U.S.C. 7401 et seq.); Wyoming Environmental Quality Act, Article 2, Air Quality, as amended (W.S. 35-11-201 through 35-11-212)
Wyoming Department of Environmental Quality, Land Quality Division (WDEQ/LQD)	Mine permits, impoundments, and drill hole plugging on state lands	Wyoming Environmental Quality Act, Article 4, Land Quality, as amended (W.S. 35-11-401 through 35-11-437)
Wyoming Department of Environmental Quality, Solid Waste Division (WDEQ/SWD)	Construction fill permits and industrial waste facility permits for solid waste and disposal during construction and operations	Wyoming Environmental Quality Act, Article 5, Solid Waste Management, as amended (W.S. 35-11-501 through 35-11-520)
Wyoming Department of Transportation (WDOT)	Permits for oversize, overlength, and overweight loads	Chapters 17 and 20 of the Wyoming Highway Department Rules and Regulations

Agency	Permit, Approval, or Action	Authority
	Access permits to state highways	Chapter 13 of the Wyoming Highway Department Rules and Regulations
Wyoming Oil and Gas Conservation Commission (WOGCC)/Wyoming Board of Land Commissioners/Land and Farm Loan Office	Approval of oil and gas leases, ROWs for long-term or permanent off-lease/off-unit roads and pipelines, temporary use permits, and development on state lands	Public Utilities, W.S. 37-1-101 et seq.
	Permit to drill, deepen or plug back (APD process)	WOGCC Regulation, Chapter 3, Operational and Drilling Rules, Section 2 Location of Wells
	Permit to use earthen pit (reserve pit)	WOGCC Regulations, Chapter 4, Environmental Rules, Including Underground Injection Control Program Rules for Enhanced Recovery and Disposal Projects, Section 1, Pollution and Surface Damage (Forms 14A and 14B)
	Authorization for flaring or venting of gas	WOGCC Regulations, Chapter 3, Operational and Drilling Rules, Section 45 Authorization for Flaring or Venting of Gas
	Permit for Class II underground injection wells	Underground Injection Control Program: Criteria and Standards, as amended (40 C.F.R. 146); State Underground Injection Control Programs, State-administered program- Class II Wells, as amended (40 C.F.R. 147.2551)
	Well plugging and abandonment	WOGCC Regulations, Chapter 3, Section 14, Reporting (Form 4) Section 15, Plugging of Wells, Stratigraphic Toxic, Core, or Other Exploratory Holes (Form 4)
	Change in depletion plans	Wyoming Oil and Gas Act, as amended (W.S. 30-5-110)
Wyoming State Engineer's Office (WSEO)	Permits to appropriate ground water (use, storage, wells, dewatering)	W.S. 41-3-938, as amended (Form U.W. 5)
Wyoming State Historic Preservation Office (SHPO)	Cultural resource protection, programmatic agreements, consultation	Section 106 of National Historic Preservation Act of 1966, as amended (16 U.S.C. 470 et req.) and advisory Council Regulations on Protection of Historic and Cultural Properties, as amended (36 C.F.R. 800)

1.3 LAND AND RESOURCE MANAGEMENT ISSUES AND CONCERNS

In accordance with NEPA and CEQ regulations 40 CFR 1501.7, an early and open process for determining the scope of issues to be addressed is required and for identifying the significant issues related to a proposal. In compliance with this procedural requirement, the BLM, RSFO released a scoping notice on February 28, 2002 for a 30-day review period. Sixteen comment letters were received. The scoping process led to the identification of the following land and resource management issues and concerns potentially associated with the Proposed Action:

- Impacts to the Red Desert Watershed Management Area and the Great Divide Basin
- Impacts to Class III visual resources
- Impacts to cultural resources, Native American Religious Concerns, Indian Trail
- Impacts on Great Divide Basin Wild Horse Herd

- Impacts of noise
- Impacts on resources from road layout and transportation planning
- Impacts to Brannan homestead
- Impacts on wetlands/playa lakes
- Conformance with LUP/Leases
- Impacts of produced water injection on subsurface hydrology, and geology including subsidence
- Impacts to aquifer being produced including water quality and recharge of aquifers
- Impacts of surface discharge on soils, domestic water supply and surface water quality of streams and reservoirs
- Impacts to wildlife and water table if reservoirs are required to store produced water
- Reclamation of soils and vegetation if surface reservoirs are required to store produced water
- Potential for migration of methane
- Potential for underground (coal seam) fire
- Risk to ground water from hydraulic fracturing
- Impacts to soils due to construction of roads, well pads, and buried pipelines
- Control of invasive, non-native species (weeds).
- Protection of special status wildlife and plant species including endangered, threatened, candidate, proposed, and BLM sensitive species including bald eagle, Whooping Crane, Mountain plover, black-footed ferrets, and Ute-ladies' tresses
- Potential for depletion of Colorado and/or Platte River water
- Potential effects on small and big game species, and migratory birds
- Impacts to air quality
- Impacts to recreation, open spaces, visual resource values
- Impacts to social/economic values
- Application and acquisition of appropriate permits
- Reclamation
- Cumulative impacts
- Use of alternative technologies, particularly directional drilling
- Potential for impacts to biological soil crusts

Certain issues were determined to not be “significant issues related to the Proposed Action” (40 CFR 1501.7) because they are not potentially affected or impacted by the proposal. These issues brought forth during public scoping and reasons for eliminating that issue from consideration in the analysis are stated below.

Potential Impacts to the Brannan Homestead

This property is located more than four miles north, northwest of the project area, well outside the analysis area of the Proposed Action.

Underground Coal Fires

Spontaneous combustion of the seam following dewatering is not possible. The coal-bearing seam is “confined”, meaning it does not outcrop (is not exposed at the surface), so sufficient oxygen is not available for spontaneous combustion.

Subsidence

Although it is possible for subsidence to occur, experience in the RSFO has shown subsidence is only likely to occur when material (i.e., coal, trona) is extracted. Extraction of coal is not proposed for this action and only partial dewatering of the coal seam is necessary for the gas to desorb. The coal seam is located well over 3,000 feet deep and the integrity of the formations above (i.e., sandstone) would preclude any subsidence from occurring at the surface. The pilot project affects only a small portion of the Big Red Coal further reducing any potential for subsidence to occur.

Migration of Methane

Migration of natural gas to the surface was identified during public scoping as a possible health hazard. The target zone of the proposal is the Big Red Coal, 3,600 to 6,700 feet below the surface. The targeted natural gas reservoir is confined, and fractures or other structures that would allow the gas to move from the formation are not present. The layered overburden includes sandstone, siltstones and over 600 feet of shale. Migration of gas to the surface is extremely unlikely. Large quantities of gas would need to migrate through more than 3,000 feet of layered rock to reach the surface, an extremely unlikely occurrence. Migration is further prohibited by well completion processes, designed and implemented to prevent the loss of the resource being produced. The area between the boreholes and casing will be cemented from surface to total depth, preventing the gas from migrating other than through the production pipe.

The efficiency of completion methods is demonstrated by existing wells in similar settings that do not allow migration of the gas. Many gas wells produce from intervals less than 4,500 feet deep in Wyoming, and in the Rocky Mountains. PI/Dwights oil and gas well production database lists over 500 shallow (less than 4,500 feet) gas wells in Wyoming and about 9,600 shallow gas wells for the entire Rocky Mountains (excluding coal bed gas wells). Many of the wells produce from gas reservoirs that are much shallower than the Big Red Coal in the project area.

Invalid CBM Leases

The Final Environmental Impact Statement (1996) for GRRMP recognized CBM development potential of up to 300 wells (pg 674, Appendix 12-1).

Potential Damage to Reservoirs, Streams and Wetlands through Surface Discharge of Produced Waters

Surface discharge of produced water is not being proposed nor considered as an alternative. The proponent is not requesting surface discharge in the proposal action. The quality of produced water found at such depths is expected to be too poor to allow any surface discharge. If injection of produced water can not be accomplished, the Proposed Action would be deemed a failure and would not proceed further.

Potential for Depletion of Colorado and/or Platte River Waters

The subsurface and surface water resources in the Great Divide Basin are hydrographically closed. The proposal has no potential to impact these resources.

Impacts to Domestic Water Supplies

The nearest domicile with a domestic water supply is more than 8 miles away. Aquifers accessed for domestic water supplies are far shallower (by hundreds of feet) than the target production zone for this proposal. Data from Powder River Basin water monitor wells have shown that when a sandstone aquifer is separated from a dewatered coal by more than 100 feet of siltstone and shale there is very little if any impact on the adjacent aquifer (Joe Meyer, BLM Hydrologist, personal communication with Fred Crockett, Petroleum Geologist, Wyoming State Office – Reservoir Management Group). More than 600 feet of shale with interbedded sandstone, siltstone, and thin coal beds overlie the Big Red Coal within the project area. Based on the available information in the Wyoming State Engineer’s water well database, there are no water wells productive from the Big Red Coal zone within six miles of the project area and the deepest water well within six miles of the project area is 610 feet. There are no known springs in the project area indicated on U.S. Geological Survey topographic maps. Any springs that may exist issue from exposed beds and are more likely to produce from sandstone layers. Any exposed beds issuing ground water are separated by over 3,000 feet of rock strata from the Big Red Coal bed.

Potential for impacts to domestic water supplies from injection of the produced water is also minimal to non-existent. The target zone for the two injection wells is Fort Union formation sands. The Fort Union sands occur from 3,000 to 5,100 feet below the surface and are part of that confined basin previously described. These two wells will also be completed with best technology practices. The Fort Union formation is isolated above and below by competent shale barriers, as shown on well logs from the area. These shales will prevent the initiation and propagation of fractures through overlying strata to any fresh water zones. Regardless of this, the potential for injected water to reach the nearest domestic well, approximately 8 miles south of and up-dip from the project area is non-existent. In summary, it is extremely unlikely that depletion of water from the Big Red Coal would affect any water wells or springs.

Risk to Ground Water from Hydraulic Fracturing

Aquifers accessed for water supplies are nearer the surface than the target zone and are separated by hundreds of feet of sedimentary layers from the target zone. Hydraulic fracturing will be performed in accordance with best technological methods designed to protect against risks to other aquifers. The EPA recently released a draft report addressing potential for impacts to underground sources of drinking water by hydraulic fracturing of coal bed methane reservoirs (EPA 816-D-02-006). Based on information from data collected during the Phase I investigation, the EPA has preliminarily found that “the potential threats to public health posed by hydraulic fracturing of CBM wells appear to be small and do not appear to justify additional study.” For more details on protective practices, refer to Chapter 2, this document, under Well Completion and Testing.

Potential for Impacts to Biological Soil Crusts

Biological soil crusts are common, but not ubiquitous, in semiarid and arid environments. Unlike the Colorado Plateau area, where crusts are a prominent feature, crusts in southwest Wyoming seem to be limited to protected or inaccessible areas that probably have not been disturbed by historical or

contemporary, heavy, sustained livestock grazing. Observations have found crusts under shrubs and in other protected venues in this region. No crusts were observed in the project area during field reviews; however, this does not preclude their presence.

The fact that these crusts may exist in the project area does not limit development or other surface disturbing activities. Since biologic crusts are integral to the topsoil, and in fact are part of the topsoil, they receive the same protection as topsoil, which is considered to be a valuable resource. The RSFO mandates a minimum of 6 inches of topsoil salvage prior to surface disturbing actions such as construction of well pads, roads, and pipelines. The salvaged topsoil is recontoured and seeded with native species, usually within 2 to 3 months of original disturbance, in order to maintain soil microbe viability and increase reclamation success.

It is unlikely that construction activities related to the Proposed Action will be located on contiguous areas of biological soil crusts. Should such an area be identified, efforts would be made to avoid these contiguous crusts, as would any area identified as having sensitive or fragile soils.

CHAPTER 2

PROPOSED ACTION AND ALTERNATIVES

2.0 INTRODUCTION

Two alternatives are evaluated in detail in this EA. The Proposed Action is discussed in Section 2.1. The Proposed Action involves 20 production test wells and 2 injection wells (on 20 locations), over three federal mineral leases. The No Action Alternative is discussed in Section 2.2. Other alternatives were considered but eliminated from detailed analysis in accordance with 40 CFR 1502.14. These alternatives and rationale for eliminating them from detailed analysis are discussed in Section 2.3.

2.1 THE PROPOSED ACTION

The Proposed Action is within the administrative boundary of the BLM's Rock Springs Field Office and is located in the north-central part of Sweetwater County, Wyoming. Access to the area is by Interstate Highway 80 and Sweetwater County Road 4-21 (Bar X Road). Figure 2.1, the Proposed Action Map, and Table 2.1 provide information on wells and leases involved.

The lease holder proposes drilling exploratory wells to the Big Red Coal in the Fort Union formation and testing the commercial potential for CBM production of that zone. Two exploratory areas, or pods, are proposed within the Proposed Action area with each pod consisting of 10 exploratory wells on 160-acre spacing and one injection well. These pods are known as the North Sweetwater Pilot (northern pod on Figure 2.1) and the Central Sweetwater Pilot (southern pod on Figure 2.1). The proposed well number and spacing is believed to be the minimum necessary to sufficiently de-water the coal, allow the gas to desorb through reduced pressure in the coal seam, and allow the determination of the zone's commercial production potential in this geographic region. The exploratory Proposed Action is expected to provide additional data about the natural gas resources in this area. Life-of-project is unknown since this project is designed to test the commercial potential for CBM production but could last anywhere from 60 days to 20 years or more should testing prove successful. As more is learned about the resources, Wyoming Oil and Gas Conservation Commission (WOGCC)-specified spacing orders for the area could change if further development is proposed. All applicable permits would be acquired.

All produced water would be disposed of through injection wells drilled into a Fort Union sandstone containing water of lesser or equal quality, as defined by the Wyoming Department of Environmental Quality (DEQ), compared with the injected (produced) water. A number of sandstone lenses are found in this formation and it is expected that more than one would be tested for suitability for this use. Each injection well would be located with a proposed well on a well site location. For more

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detail on the technical aspects of the Proposed Action, please refer to Appendix D.

The Proposed Action would also require the construction of access roads, pipelines (most would be buried adjacent to the roads) and related production facilities (well pads, pump jacks, pits, etc.) for each of the pods. The project area, here defined as the sections directly affected by the Proposed Action and enclosed by lease boundaries, encompasses approximately 3,500 acres.

**TABLE 2.1
LOWER BUSH CREEK PROJECT WELL INFORMATION**

Proposed Action Area	Lease No.	Well Name	Location		
North Sweetwater Pilot	WYW154200	North Sweetwater Fed 21-25	NENW Sec. 25, T25N R98W		
		North Sweetwater Fed 23-25	NESW Sec. 25, T25N R98W		
		North Sweetwater Fed 43-25	NESE Sec. 25, T25N R98W		
		North Sweetwater Fed 41-26	NENE Sec. 26, T25N R98W		
		North Sweetwater Fed 23-26	NESW Sec. 26, T25N R98W		
		North Sweetwater Fed 43-26	NESE Sec. 26, T25N R98W		
		North Sweetwater Fed 21-35	NENW Sec. 35, T25N R98W		
		North Sweetwater Fed 41-35	NENE Sec. 35, T25N R98W		
		North Sweetwater Fed 23-35	NESW Sec. 35, T25N R98W		
		Injection well	North Sweetwater Fed 41-35i	NENE Sec. 35, T25N R98W	
			Kennedy North SW Fed 43-35	NESE Sec. 35, T25N R98W	
		Central Sweetwater Pilot	WYW153613	Central Sweetwater Fed 21-22	NENW Sec. 22, T24N R98W
				Central Sweetwater Fed 23-22	NESW Sec. 22, T24N R98W
Central Sweetwater Fed 41-22	NENE Sec. 22, T24N R98W				
Central Sweetwater Fed 43-22	NESE Sec. 22, T24N R98W				
Central Sweetwater Fed 21-23	NENW Sec. 23, T24N R98W				
Central Sweetwater Fed 23-23	NESW Sec. 23, T24N R98W				
WYW152180	Central Sweetwater Fed 21-21			NENW Sec. 21, T24N R98W	
	Central Sweetwater Fed 23-21			NESW Sec. 21, T24N R98W	
	Central Sweetwater Fed 41-21			NENE Sec. 21, T24N R98W	
	Central Sweetwater Fed 43-21			NESE Sec. 21, T24N R98W	
	Injection well	Central Sweetwater Fed 41-21i	NENE Sec. 21, T24N R98W		

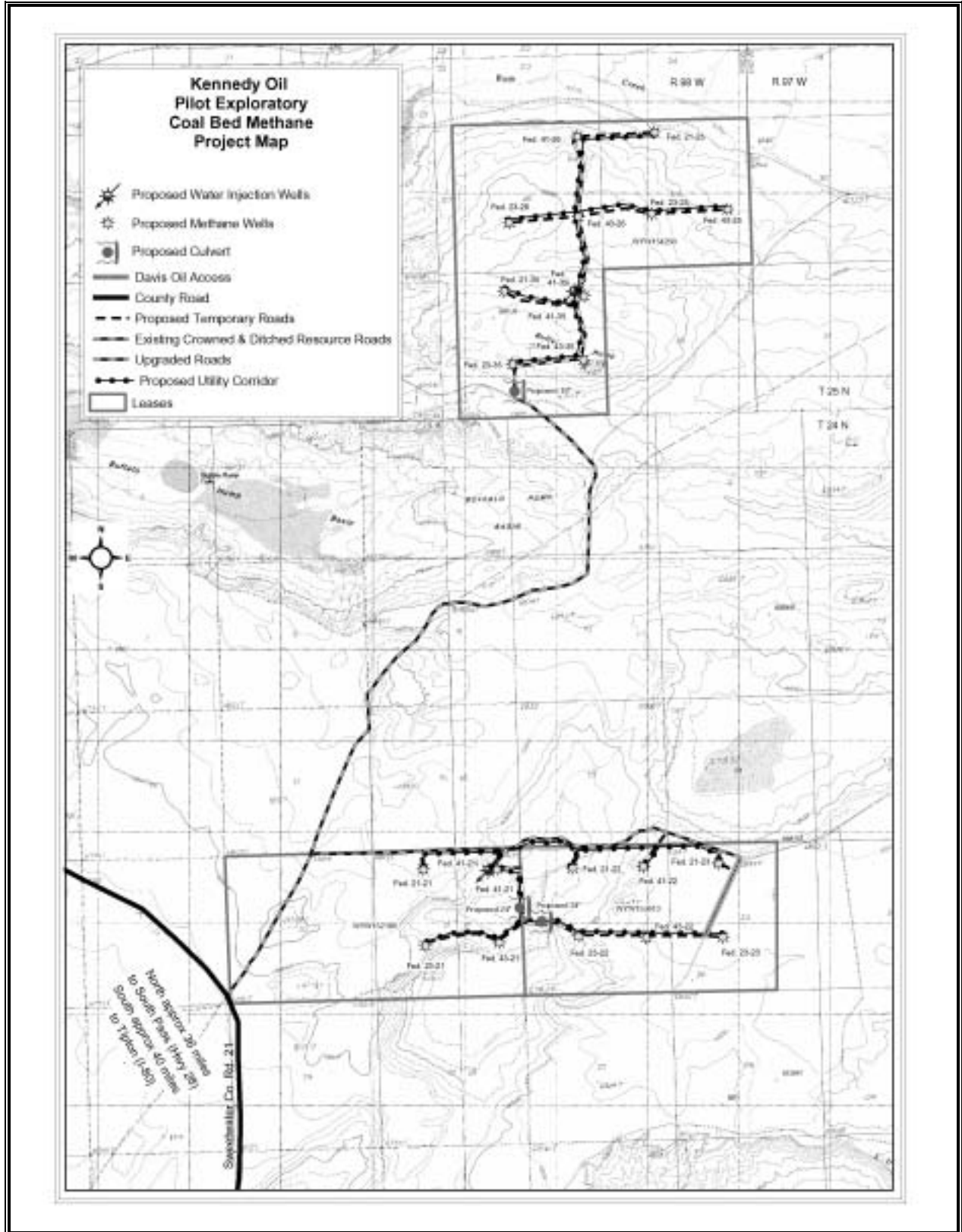
2.1.1 PRE-CONSTRUCTION ACTIVITIES

Kennedy would follow the procedures outlined below to gain approval for the proposed activities. Development activities also would be approved prior to construction through applicable permit procedures including the filing with the State of Wyoming for appropriate permits for each proposed well. Aquifer exemptions have been obtained for the injection wells from WOGCC. Any other applicable permits would be obtained as necessary prior to construction.

Prior to the start of construction activities, Kennedy would submit and obtain approval of federal Application to Permit to Drill (APD), and any necessary right-of-way applications. A Master Surface Use Plan (MSUP), Master Drilling Plan (MDP), and an Addendum to the Master Surface Use Plan-Comprehensive Transportation Plan (see Appendix D) and the project map (Figure 2.1)

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Figure 2.1 PROPOSED ACTION MAP



have been submitted to the RSFO. These documents include site-specific plans describing the proposed development (i.e., drilling plans with casing/cementing program; surface use plans with road and drill pad construction details; and site-specific reclamation plans, etc.). Approval of all planned operations would be obtained in accordance with authority prescribed in Onshore Oil and Gas Order No. 1 (Approval of Operations on Onshore Federal and Indian Oil and Gas Leases).

The proposed facilities have been staked by Kennedy and inspected by an interdisciplinary team and/or an official from the BLM to ensure consistency with the approved RMP and oil and gas lease stipulations.

Table 2.2 provides information on initial and life-of-project disturbance.

**TABLE 2.2
LOWER BUSH CREEK PROJECT SURFACE DISTURBANCE SUMMARY**

Facility	Length (feet)	Width (feet)	Initial Disturbance (Acres)	Production Disturbance Should Exploratory Drilling Prove Successful (Acres)
Proposed Special Purpose Roads (includes parallel water gathering line)	40267	30 (initial) 12 (LOP)	27.73	11.09
Proposed Utility Corridor (paralleling existing crowned and ditched resource road)	7623	30 (initial) 0 (LOP)	5.25	0
Proposed Utility Corridor (not paralleling roads)	3228	30 (initial) 0 (LOP)	2.22	0
Use of an existing old oil field road	22,436	(initial/ LOP)	0.0	0.0
Proposed Upgraded Roads	2425	30 (initial) 24 (LOP)	1.67	1.34
Each Producing Well Pad (18 pads total)	295 (init.) 175 (prod.)	205 (initial) 175 (LOP)	1.39 (well) 25.02 (total)	0.7 (well) 12.6 (total)
Each Pad for Producing and Injection Well Locations (2 locations total)	455 (init.) 200 (prod.)	205 (initial) 200 (LOP)	2.14 (well) 4.28 (total)	0.92 (well) 1.84 (total)
Total Disturbance			84.66	28.72

2.1.2 CONSTRUCTION AND DRILLING

Following is a general discussion of proposed construction techniques to be used by Kennedy implementing the Proposed Action. These construction techniques would be generally applicable to drill sites, pipelines, and access roads within the project area, but may vary in detail between the individual well sites. Roads and pipelines on BLM-administered public lands constructed in association with the Proposed Action would require BLM right-of-way authorizations and/or Sundry Notices which could include additional mitigation to further minimize environmental impacts.

2.1.2.1 WELL PAD CONSTRUCTION

Well pads would be prepared by clearing an area approximately 295 feet by 205 feet (1.39 acre) for individual wells. Well locations would be cleared of vegetation and topsoil (up to 12 inches), which would be stockpiled for future use in reclamation. The well location would be leveled using standard cut-and-fill construction techniques. The typical well pad would disturb no more than 1.39 acres during drilling operations. Once drilling operations are complete and if production ensues, well pads would be partially reclaimed (for operation purposes) resulting in life-of-project disturbance of 0.7 acres per well. For the purpose of analysis, maximum disturbance is assumed to be 1.4 acres; however, it is Kennedy's practice to keep surface disturbance to a minimum. See Appendix D (pg 108), for a typical well site layout. Should testing prove unsuccessful, the entire well pad and access road would be reclaimed and seeded with native species.

Well pads for locations of an exploratory well and injection well would be an exception to this estimate. The locations of two exploratory wells, the Kennedy Central Sweetwater Fed 41-21 and the Kennedy North SW Fed 41-35, would also be the sites of the two injection wells, the Kennedy Central Sweetwater Fed 41-21i and the Kennedy North SW Fed 41-35i, respectively. Preparation for these locations would include clearing an area 455 feet by 205 feet. Surface disturbance at these locations could be less but no more than 2.14 acres. Should production ensue, unneeded areas of the well pad would be reclaimed resulting in a life-of-project disturbance of 0.92 acres per each production and injection well pad.

Components of the well pad include an earthen reserve pit lined with 12-mil reinforced poly (liner to have a permeability less than 10^{-7} cm/sec. or according to stipulations) to contain drilling fluids, cuttings, and water produced during drilling and completion operations. Venting of any gas produced would be over an unlined emergency pit. These emergency pits are unlined as they serve as backdrop to any flaring necessary for safety during the operations. All pits would be constructed in accordance with BLM requirements. The reserve pits would be approximately 110 feet long by 75 feet wide and 10 feet deep. One side of the pits would be ramped with a 2:1 slope.

The reserve pit would be fenced on three non-working sides during drilling, and the fourth side at the time the rig is removed. Kennedy estimates the reserve pits could be open for up to six months to allow for evaporation of pit fluids. During this time, the pit would be fenced on all sides to prohibit wildlife or livestock from falling into the pit.

Pits would be tested regularly to ensure that water quality meets protection guidelines for wildlife. Any pits with sodium testing at or above 17,000 ppm would be netted with a mesh size sufficient to prevent a sparrow-sized bird from falling through or becoming entangled in the net.

2.1.2.2 ROAD CONSTRUCTION AND TRANSPORTATION

Kennedy proposes to use existing crowned and ditched roads to and within the project area and to construct or create new roads. Establishment or construction of new roads in the North Pilot Area

would total approximately 4.6 miles and in the Central Pilot Area would total approximately 3 miles. Approximately half of a mile of the existing Davis Oil access road would be used for access in the Central Pilot Area. If drilling is productive, all access roads to the well site would remain in place for well-servicing activities (i.e., maintenance, improvements, etc.) for the life of the well. Reclamation would be completed on segments of the well pads and access roads that are no longer needed following construction activities. The project map (Figure 2.1) indicates road locations and each road type. See Table 2.2 for details on disturbance. Details of the proposed road construction and transportation plan can be found in Appendix D, Master Surface Use Plan and Comprehensive Transportation Plan.

Proposed roads would be established as follows:

- Use of existing Collector Roads (multi-purpose, upgraded roads)
- Construction of Resource Roads to access well roads
- Development of Special Purpose roads to access one or more wells

Special Purpose roads, as defined in Appendix D, would be used to move equipment and personnel onto well sites. Development of such roads would be brush hogged (using a mowing machine to cut brush near the ground without disturbing the soil). Spot upgrading could be implemented in areas by application of gravel 12-foot wide by 4 inches deep. In other areas, “plating” could be utilized and would require combining drilling mud or clay soils with native sand and/or gravel to build up a driving surface (plate base) 2 to 8 inches thick.

Three culverts are proposed for construction on these roads, with two in Section 21 of T24N R98W and one in Section 35 of T25N R98W. Rarely, a spot upgrade of gravel and/or shallow grading would help protect the road from rutting or turn-outs in areas prone to boggy conditions when wet.

An estimate of workforce and traffic for the Proposed Action is found in Table 2.4. Traffic would include:

- Drilling rig/s and associated equipment
- Water trucks for drilling
- Traffic associated with occasional workover activities
- Light truck traffic would include the use of pickup trucks to visit each well daily

Kennedy would prohibit travel during periods when severe rutting (creation of ruts in excess of 4” deep) or resource damage might occur. Snow removal equipment would be equipped with shoes to keep the blade six (6) inches above the natural ground surface. Locations of snow stockpiles, if needed, would be designated in advance by the Authorized Officer.

The locations of the proposed roads have been placed to maximize transportation efficiency. Roads would be closed and reclaimed by Kennedy when they are no longer required for operations, unless otherwise directed by the BLM.

2.1.2.3 DRILLING OPERATION

Drilling of the exploratory wells and injection wells would utilize either a conventional or truck-mounted drilling rig. Additional equipment and materials needed for drilling operations would be trucked to the well site. Water used for drilling would come from an approved water well located in Section 28, T23N, R96W and/or Section 31, T24N, R97W. Approximately 600 barrels of water would be needed for drilling each well. The actual water volume used in drilling operations would be dependent upon the depth of the well and any losses that might occur during drilling. Based on existing hydrogeologic information, groundwater in the coal seams at the completion depths of the proposed CBM wells is hydraulically isolated from shallow groundwater and surface water resources. See Section 1.3 subsection titled “Impacts to Domestic Water Supplies” for further discussion. Refer to Appendix D for specific details on the drilling procedures.

Drilling mud would consist of fresh water, native clays, and bentonite gel. As hole conditions dictate, small amounts of polymer additives and/or potassium chloride salts may be added for hole cleaning and clay stabilization.

Depending on the depth of the coal seam, each producing well would be drilled to a depth of 3,800 feet to 5,000 feet or deeper, and would be exposed to the coal seam through open-hole completion¹. The well control system would be designed to meet the conditions likely to be encountered in the hole and would be in conformance with BLM and State of Wyoming requirements.

The drilling and completion operation for a CBM well normally requires approximately five to seven people at a time, including personnel for logging and cementing activities. Each well would be drilled within a period of four to ten days. A well completion program may be initiated to stimulate production of gas and to determine gas and water production characteristics in preparation for production of gas from a drilled, cased, and cemented well. A mobile completion rig similar to the drill rig may be transported to the well site and used to complete each well. Completion operations are expected to average two to five days per well. Methane gas would be vented over the emergency pit or, rarely, flared and water temporarily discharged into the reserve pit for a short period of time during testing. If determined to be productive, wells would be shut-in until pipelines and other production facilities are constructed and any applicable permits obtained.

Depth of the water injection wells is expected to be approximately 6,000 feet. Drilling and completion of each injection well is expected to take approximately 7 to 14 days and installation of surface equipment, holding tanks and pumping equipment, an additional 14 days.

No use of materials or chemicals considered hazardous under Superfund Amendment and Reauthorization Act of 1986 as amended or the Resource Conservation and Recovery Act or extremely hazardous wastes as defined in 40 CFR 355 are proposed. Materials utilized for this project are identified in Table 2.3. Further details of the drilling operations and materials used for

¹ Open-hole completion is the method used for dewatering and/or production of CBM that entails setting casing to the top of the coal seam but not through the coal seam.

drilling can be found in Appendix D, Drilling Plan.

TABLE 2.3 LOWER BUSH CREEK PROJECT HAZARDOUS MATERIALS

Materials utilized for each well during drilling operations					
Item	Use	Average Quantity Used per Well	Hazardous Chemicals	Chemical Categories	Extremely Hazardous Wastes
None					
Materials Used for Each Well During Completion Operations					
Item	Use	Average Quantity Used per Well	Hazardous Chemicals	Chemical Categories	Extremely Hazardous Wastes
None					
Expected Materials Used Annually for Production Operations Should Production Ensure					
Item	Use	Average Quantity Used per Well	Hazardous Chemicals	Chemical Categories	Extremely Hazardous Wastes
Fuel	Operate pump jack engine	N/A	Propane	Extremely Flammable	No

2.1.3 WELL COMPLETION AND PRODUCTION TESTING

Well completion methods isolate aquifers with surface and production casing to prevent condensates, gas and/or water movement from reservoir to reservoir and isolate the production zones. All well casing and cementing operations on these wells would be conducted in compliance with applicable rules and guidance and with BLM Onshore Oil and Gas Order No. 2.

Pumping units (pump jacks) would be used to draw water during the initial de-watering. Each pumping unit would run on propane until methane gas begins to flow, then would run on the methane gas. Pump units would be removed once the coal seam has been de-watered enough to allow testing of gas. Should methane gas production ensue, a covered wellhead and measurement devices would remain on the well pad.

Production testing has two phases. The first phase objective is water production, an indicator of well potential. After completion activities, each well would be allowed to flow water for up to 15 days to the reserve pit (pit designed to hold 30 days flow) to evaluate well performance. At no time would water be allowed to overflow the reserve pit. If this first phase of well performance indicates potential gas production, the well would be capped until injection wells and water gathering systems are completed. Each gas well could produce approximately 500 to 1,000 barrels of water daily, resulting in a total daily volume of 5,000 to 10,000 barrels being injected through each injection well.

The second phase objective is initiation of gas production. This phase requires continuation of de-watering and may last from a few months up to a year. During testing any produced gas would be vented over the emergency pit in accordance with BLM and WOGCC rules and regulations. This phase would also entail evaluation of the formation for fracture stimulation.

Venting or flaring at oil and gas facilities is regulated by two agencies, the Wyoming Department of Environmental Quality (WDEQ) and the Wyoming Oil and Gas Conservation Commission (WOGCC). Each agency regulates these activities with a slightly different objective. The WDEQ is concerned about the emission of regulated pollutants and the WOGCC is concerned about royalties of the vented gas. Both parties are concerned about safety of the public with regard to the venting of H₂S gas.

In general, venting CBM gas from a wellhead does not release any regulated pollutants. CBM gas is approximately 97% methane (CH₄), 2.5% ethane (C₂H₆), with remaining fractions of carbon dioxide (CO₂), and free nitrogen (N₂). Therefore, in general, no notification is required for the WDEQ for venting CBM gas from a wellhead. Flaring operation (combustion of the gas) does release regulated pollutants, however flaring is rarely performed. The WDEQ policy is to require verbal notification within 24 hours of the beginning of the episode. Notification is only required if the flare event emits more than 5 tons per year (TPY) of a regulated pollutant in a single event or 50 TPY annually. Using emissions factors published by the EPA in AP-42 Chapter 13, more than 82,000 standard cubic feet of gas (900 btu/scf) would have to be consumed in a single event or more than 820,000 standard cubic feet of gas would have to be consumed over an entire year for the notification thresholds to be met.

The WOGCC requires a retroactive notice of venting or flaring operations that persist for a period exceeding 15 days. This notice requests an authorization to continue flaring or venting.

No compression facilities are proposed at this time.

2.1.4 PRODUCED WATER DISPOSAL SYSTEM AND GAS PRODUCTION

Pumping units would be used for initial de-watering. Each pumping unit would run on propane and then on natural gas should the wells flow natural gas. Pumping units would be removed once the coal seam has been de-watered enough to allow testing of gas.

After completion each exploratory well could flow water for up to approximately 15 days to evaluate well performance. Produced water discharged to the reserve pit would not be allowed to exceed the capability of the pit to contain the water. Following the water flow-testing period, wells would be capped pending completion of the injection wells and associated water-gathering system. The target formation for produced water disposal is into a Fort Union sandstone containing water of lesser or equal quality. A number of sandstone lenses are found in this formation and it is expected that more than one would be tested for suitability for this use. There would be no surface discharge of water other than to the reserve pits, in accordance with BLM and WOGCC rules and regulations. In particular, the water injection wells would meet the requirements of the Underground Injection Control Program: Criteria and Standards, as amended; State Underground Injection Control Programs, State-administered program- Class II Wells, as amended, as regulated by WOGCC.

If the initial water production indicates commercial viability, injection wells would be drilled. Each

exploratory well would produce approximately 500 to 1,000 barrels of water daily, resulting in a total daily volume of 5,000 to 10,000 barrels being injected through each injection well.

Gathering systems for the produced water would link the wells to the injection wells by buried water lines in the utility corridors parallel to the access corridors. The total length of utility corridors to be constructed is approximately 14 miles. Refer to the project map (Figure 2.1) for utility corridor and injection well locations. Each pod would be serviced by one injection well. The utility corridors would parallel the access roads where possible. Refer to Appendix D for further details on rights-of-way for corridors.

During testing any gas flow would be vented over the emergency pit in accordance with BLM and WOGCC rules and regulations. Testing would also entail evaluation of the formation for fracture stimulation. The gas is primarily composed of methane, at an estimated 97% of total composition. The remaining constituents are dominated by ethane.

2.1.5 OPERATIONS AND MAINTENANCE

All operations would be conducted in accordance with industry standards for safe and efficient operation. All project roads and wells would be inspected periodically by Kennedy and the BLM and maintained by Kennedy to minimize any resource damage or loss and ensure safe operating conditions.

2.1.6 ANCILLARY FACILITIES

No ancillary facilities are planned.

2.1.7 WORKFORCE AND TRAFFIC

The expected traffic levels associated with the Proposed Action are addressed in Table 2.4 which provides a conceptual representation of types and maximum frequencies of typical traffic that could be expected during ‘round-the-clock’ drilling. The ‘Trip Type’ column lists the various service and supply vehicles associated with this type of activity and tends to demonstrate a maximum activity level. The ‘Round-Trip Frequency’ column includes the number of trips, both external (i.e., to/from each project area) and internal (within each project area).

**TABLE 2.4
LOWER BUSH CREEK PROJECT TRAFFIC ESTIMATES**

Proposed Action Traffic – General Estimates

Trip Type	Round-Trip Frequency
Drilling (1 rig, 2 crews/rig)	External (to/from Project Area)
Rig supervisor	1/day
Rig crews	2 vehicles/day/per drilling well
Engineers	2/week
Mechanics	1/week/per drilling well
Supply delivery	2/week/per drilling well

Proposed Action Traffic – General Estimates

Trip Type	Round-Trip Frequency
Drilling (1 rig, 2 crews/rig)	External (to/from Project Area)
Water truck	1/week
Mud trucks	1/week/per drilling well
Rig move	10 trucks/well
Drill bit/tool delivery	2/week
Completion	
Small truck mounted rig/crew	1/day/per completing well
Cement crew	3 trucks/2 trips/per completing well
Consultant	1/day
Well loggers	1 trip/well
Gathering systems construction	8/day
Power systems placement	2/day
Other field development	3/day
Testing and operations	2/day

2.1.8 RECLAMATION AND ABANDONMENT

The seed mixes for reclamation were recommended by the RSFO. Table 2.5 details the mixes to be used for the soil types found on the project area. Seeding rates are assumed for drill seeding. Seeding rates would be doubled if seed is broadcast. Standard success criteria would be based on attainment of total vegetation cover. Standard success criteria would be based on attainment of 50% of predisturbance cover in three years and 80% of predisturbance cover in five years. These identified seed mixes could be modified or added to by the BLM, as needed or required to meet the RSFO objectives for reclamation.

In the event drilling is non-productive at any given site, all disturbed areas associated with that site, including the well site and access road, would be reclaimed to the approximate landform existing prior to construction. Following construction, all areas not occupied by Proposed Action features would be reclaimed in the next growing season, or as directed by the agency. Remaining disturbed areas would be reclaimed following abandonment of project components. Stockpiled topsoil would be replaced as part of the seedbed preparation. Reclamation and site stabilization techniques would be applied as specified in the MSUP (see Appendix D). Clean-up would be ongoing throughout the project life.

**TABLE 2.5
LOWER BUSH CREEK PROJECT PROPOSED SEED MIX**

Species	Variety	Drill Seeding Rate (lbs. Per acre pure live seed)
General Seed Mixture		
Thickspike wheatgrass	Critana	3.0
Western wheatgrass	Rosanna	3.0
Indian ricegrass		3.0
Sandberg bluegrass		3.0
Blue flax		0.25
Winterfat		1.0
TOTAL		13.25
Sandy Sites Seed Mixture		

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Species	Variety	Drill Seeding Rate (lbs. Per acre pure live seed)
Thickspike wheatgrass	Critana	4.0
Sandberg bluegrass		4.0
Indian ricegrass		4.0
Rocky Mountain penstemon		1.0
Shadscale		2.0
TOTAL		15.0
Saline/Sodic Soils Seed Mixture		
Western wheatgrass	Rosanna	3.0
Sandberg bluegrass		3.0
Indian ricegrass		3.0
Bottlebrush squirreltail		3.0
Rocky Mountain beeplant		1.0
Gardner saltbush		2.0
TOTAL		15.0

Any mulch applied to areas with high soil erosion potential or where use is otherwise indicated would be free from mold and noxious weed seeds. Site preparation may include ripping or chiseling to break up compacted soils, increase water penetration, promote root growth, and control erosion.

Implementation of the Proposed Action would result in surface disturbance. Estimates of the extent of that disturbance are found in Table 2.2. Turn-arounds and passing could result in full use of a 50-foot right-of-way on the right-of-way for the roadway and buried water gathering line paralleling the road. A full right of way could be 70 feet; however use of the full right of way would be rare and limited to the construction phase. Reclamation would likely be necessary on only 30 to 50 feet of that right of way. For the analysis, a 50-foot wide area of disturbance was assumed.

2.1.9 OTHER APPLICANT COMMITTED PRACTICES

2.1.9.1 AIR QUALITY

1. Kennedy would adhere to all applicable local, state, and federal air quality regulations and standards. Kennedy would adhere to all applicable ambient air quality standards, permit requirements (including preconstruction, testing, and operating permits), motorized equipment and other regulations, as required by the State of Wyoming, Department of Environmental Quality, Air Quality Division (WDEQ-AQD).
2. Kennedy would not allow burning garbage or refuse at well locations or other facilities. Any flaring would be conducted under the permitting provisions of Section 13 of the Wyoming Air Quality Standards and Regulations.

2.1.9.2 SOILS

1. Implement established BLM road standards practice to minimize offsite impacts and provide for the safety of operations.

2. Locate pipelines immediately adjacent to roads to avoid creating separate areas of disturbance and to reduce the total area of disturbance.
3. Frozen soils will not used as construction material.
4. Minimize construction activities in areas of steep slopes.
5. Design cut slopes in a manner that will allow retention of topsoil, use of surface treatment such as mulch, and subsequent revegetation.
6. Six inches of topsoil will be salvaged from all disturbed areas.
7. Where possible, minimize disturbance to vegetated cuts and fills on existing improved roads.
8. Install runoff and erosion control measures such as water bars, berms, and interceptor ditches if needed.
9. Install culverts for ephemeral and intermittent drainage crossings.
10. Upon completion of construction activities not specifically required for production operations, restore topography to near pre-existing contours at the well sites, along access roads and pipelines, and other facilities sites; replace up to six inches of topsoil or suitable plant growth material over all disturbed surfaces; apply fertilizer as required; seed; and mulch.

2.1.9.3 WATER RESOURCES

Other mitigation measures listed in the Soils, and Vegetation and Wetlands sections of this EA would also apply to Water Resources.

1. Limit construction of all drainage crossings to no-flow periods or low-flow periods.
2. Minimize the area of disturbance within drainage channel environments.
3. Prohibit construction of well sites and other non-linear features within 500 feet of surface water and/or riparian areas. Possible exceptions to this will be granted by the BLM for linear features based on an environmental analysis and site-specific mitigation plans.
4. Construct channel crossings by pipelines such that the pipe is buried a minimum of four feet below the channel bottom.
5. Case wells during drilling and case and cement all wells in accordance with Onshore Order No. 2 to protect all high quality water aquifers. High quality water aquifers are aquifers with known water quality of 10,000 TDS or less. Include well casing and welding of sufficient integrity to contain all fluids under high pressure during drilling and well completion. Wells will adhere to the appropriate BLM cementing policy.

6. Construct the reserve pits in cut rather than fill materials. Compact and stabilize fill material, as needed. Inspect the subsoil material of the pit to be constructed in order to assess soil stability and permeability and determine whether reinforcement is required. The reserve pit will be lined with reinforced synthetic liner at least 12 mils in thickness with a bursting strength of 175 x 175 pounds per inch (ASTMD 75179) or according to stipulation.
7. Maintain one foot of freeboard on all reserve pits to minimize the risk of overflowing. Shut down drilling operations until the problem is corrected if leakage is found outside the pit.
8. Extract hydrostatic test water used in conjunction with pipeline testing and all water used during construction activities from sources having sufficient quantities and appropriation permits approved by the State of Wyoming.
9. No crossings or encroachments of waters of the U.S., as defined by the U.S. Army Corps of Engineers (COE), are planned in association with this project. The Great Divide Basin is hydrographically closed and has been determined by the COE not to contain any waters of the U.S. that will fall under their jurisdiction. The COE has reviewed the scoping notice for the Proposed Action. Based on the information provided and the Court ruling, it has been determined that any wetlands or other waters in the project area are isolated and are no longer considered to be 'waters of the U.S.' under Section 404 of the Clean Water Act (COE March 22, 2002 response to T Deakins, re scoping notice for Kennedy Oil Pilot Exploratory Coal Bed Methane Project).

Any changes in the produced water disposal method or location must have written approval from the BLM before the changes take place.

2.1.9.4 NOISE

1. Muffle and maintain all motorized equipment according to manufacturers' specifications.
2. In any area of operations (drill site, etc.) where noise levels may exceed federal OSHA safe limits, Kennedy will provide and require the use of proper personnel protective equipment by employees. No compression facilities are proposed for this project.

2.1.9.5 TRANSPORTATION

1. Existing roads will be used whenever possible. Standards for road design will be consistent with BLM guidance.
2. Roads not required for routine operation and maintenance of producing wells and ancillary facilities will be reclaimed and revegetated.
3. Areas with important resource values, steep slopes, and fragile soils will be avoided.

4. Kennedy will be responsible for preventive and corrective maintenance of roads in the project area throughout the duration of the Proposed Action. This may include shallow grading, cleaning ditches and drainage facilities, dust abatement, noxious weed control, or other requirements as directed by the BLM or the Sweetwater County Road and Bridge Department.
5. Except in emergency situations, access will be limited to drier conditions to prevent severe rutting (creation of ruts in excess of 4" deep) of the road surface. Culverts will be installed where needed to allow drainage in all draws and natural drainage areas. Onsite reviews will be conducted with BLM personnel for approval of proposed access prior to any construction.

2.1.9.6 HEALTH AND SAFETY

Measures listed under Air Quality and Water Quality also apply to Health and Safety.

1. Sanitation facilities installed on the drill sites and any resident campsite locations will be approved by the WDEQ and authorized officer.
2. To minimize undue exposure to hazardous situations, the operator will comply with all existing applicable rules and regulations (i.e., Onshore Orders, OSHA requirements, etc.) that will preclude the public from entering hazardous areas and place warning signs alerting the public of truck traffic, if required by the BLM.
3. Haul all garbage and rubbish from the drill site to a state-approved sanitary landfill for disposal. Collect and store any garbage or refuse materials on location prior to transport in containers approved by the BLM.
4. Spill Prevention Control and Countermeasure Plans will be written and implemented as necessary, in accordance with 40 CFR 112.

Spills of oil, gas, or any other potentially hazardous substance will be reported immediately to the BLM, and will be mitigated immediately, as appropriate, through cleanup or removal to an approved disposal site.

2.1.9.7 VEGETATION/WETLANDS/NOXIOUS WEEDS

Other mitigation measures under Soils and Water Resources of this EA will also apply to vegetation and wetlands.

1. File noxious weed monitoring forms with the BLM and implement, if necessary, a weed control and eradication program.
2. Evaluate all project facility sites for occurrence and distribution of waters of the U.S., special aquatic sites, and jurisdictional wetlands. All project facilities will be located out of these sensitive areas. If complete avoidance is not possible, minimize impacts through modification

and minor relocations.

3. On BLM-administered public lands, an approved Pesticide Use Proposal will be obtained before the application of herbicides or other pesticides for the control of noxious weeds.
4. Disturbed areas will be seeded and stabilized in accordance with BLM-approved reclamation guidelines.

2.1.9.8 WILDLIFE AND FISHERIES

No fisheries mitigation is needed beyond that indicated under Water Resources and Special Status Species.

1. During reclamation, establish a variety of forage species that will return the land to a condition approximate or equal to that which existed prior to disturbance.
2. Prohibit unnecessary off-site activities of operational personnel in the vicinity of the drill sites. Inform all project employees of applicable wildlife laws and penalties associated with unlawful take and harassment. Minimize surface disturbance.
3. No construction is planned in big game crucial winter range at any time. No crucial winter range is identified in the project area.
4. Conduct a raptor survey within 1 mile of the project activity areas prior to construction if activities will be conducted between February 1 and July 31. No permanent above ground structures will be constructed within 825 feet of an active raptor nest (NSO).
5. Surface-disturbing activities will be seasonally restricted from February 1 through July 31 within a 0.5-mile radius of all active raptor nests, except for Ferruginous Hawk nests, which will have a 1.0-mile seasonal buffer. Active nests are described as any active within the past 3 years. Such restriction will not apply to routine maintenance activities. When an “active” raptor nest is within ½ to 1 mile (depending on species and line of sight) of a proposed well site, restrict construction during the critical nesting season for that species. For listed and BLM sensitive species the distance should be increased to within one mile of a proposed well site. See Chapters 3 and 4 for details. No above ground structures or roads are allowed to be constructed within 825 feet of any raptor nest (Wyoming BLM State Guidelines).
6. Protection for breeding Greater Sage-Grouse will include No Surface Occupancy within 0.25 mile of a lek. Construction of low profile facilities or performance of temporary disruptive activities will be avoided where possible, but exceptions may be requested from the authorizing officer, in accordance with the GRRMP ROD.

Protection for Greater Sage-Grouse nesting habitat within appropriate distances from leks will include avoidance of such habitat and/or restriction of seasonal activities within those areas. Such restrictions may apply to suitable nesting habitat up to two miles from the lek from

February 1 through July 31. The time frames will be assessed on a case-by-case basis by the RSFO, in accordance with the GRRMP ROD. Exceptions may be granted if the activity will occur in unsuitable nesting habitat.

7. Mountain plover will be protected by restricting or avoiding construction activities in mountain plover nesting and brood-rearing habitat during breeding periods (April 10 through July 10). Seed mixes for plants 6 inches high or less will be used in mountain plover habitat, or as otherwise directed by an authorized officer. Sightings of Mountain Plover will be reported to the BLM. Observances of mountain plover nest, eggs, or chick will be immediately reported to the BLM and USFWS. Few structures amenable to raptor perching are proposed. Noise reduction measures will be implemented in this project. See Chapters 2, 3, and 4 for details. Exceptions may be requested from the authorizing officer, in accordance with the GRRMP ROD.
8. If sodium levels reach 17,000 ppm or more, reserve pits will be netted to protect migratory birds.
9. If threatened, endangered, candidate, or proposed species are discovered at any time during construction, all construction activities will halt and the BLM will be immediately notified. Work will not resume until a Notice to Proceed is issued by the BLM.

2.1.9.9 CULTURAL AND HISTORIC RESOURCES

Kennedy has completed Class III cultural inventories of all previously uninventoried parcels of land that will have surface disturbance associated with the Proposed Action.

1. If cultural resources are discovered at any time during construction, all construction activities will halt and the BLM will be immediately notified. Work will not resume until a Notice to Proceed is issued by the BLM.

2.1.9.10 SOCIOECONOMICS

1. Implement hiring policies that will encourage the use of local or regional workers who will not have to relocate to the area.
2. Coordinate project activities with ranching operations to minimize conflicts involving livestock movement or other ranch operations. Establish effective and frequent communication with affected ranchers to monitor and correct problems and coordinate scheduling.

2.2 NO ACTION ALTERNATIVE

Regulations found in 40 CFR 1502.14(d) require that the alternatives analysis include the alternative of no action. Under this alternative (and for the purpose of this analysis) the No Action Alternative means the Proposed Action would be denied. If any future activity were proposed on these leases, it would be subject to RMP conformance review including best management practices and standard operating procedures, and NEPA requirements in effect at the time.

Mineral activity would be allowed to continue by the BLM in the general area although the oil and gas lessee or their operator, contractor or sub-contractors would not be permitted to commence any activity upon the lease other than surveying and staking well and road locations, and inventorying for certain resource values (i.e., cultural, listed species, etc.). All proposals are subject to appropriate level of environmental analysis per the procedural provisions under NEPA.

An oil and gas lease grants the lessee the "right and privilege to drill for, mine, extract, remove and dispose of all oil and gas deposits" in the leased lands, subject to the terms and conditions incorporated in the lease (Form 3110-2). Because the Secretary of the Interior has the authority and responsibility to protect the environment within federal oil and gas leases, restrictions are imposed on the lease terms. Leases within the project area contain various stipulations concerning surface disturbance, surface occupancy and limited surface use. In addition, the lease stipulations provide that the USDI may impose "such reasonable conditions, not inconsistent with the purposes for which [the] lease is issued, as the [BLM] may require to protect the surface of the leased lands and the environment." None of the stipulations contained in the existing leases, however, empower the Secretary of the Interior to deny all drilling activity because of environmental concerns.

2.3 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED STUDY

In accordance with 40 CFR 1502.14(a), the BLM is required to explore and evaluate all reasonable alternatives. The following alternatives were considered by the BLM but found to be unreasonable for reasons provided. Thus, these alternatives were eliminated from detailed study.

No Upgrade or Construction of Roads. This alternative was based on the Proposed Action with no allowance for upgrading of existing roads or construction of roads. Such an alternative would reduce surface disturbance caused by road upgrading or construction. However, the GRRMP requires roads to be constructed according to BLM standards to protect the health and safety of those working on or visiting public lands in the area. The GRRMP states:

“Roads would be constructed as described in BLM Manual 9113. Where necessary, running surfaces of the roads would be graveled if the base does not already contain sufficient aggregate....” (BLM 1997, Appendix 5-1, p. 159)

An alternative of not allowing road upgrade or construction would not be in conformance with the existing land use plan and would not meet BLM standards for road construction or public health and safety.

Alternative of Ninety-three wells in 2 pods: In September 2001 when Kennedy first approached BLM, their tentative proposal consisted of 93 wells, located in two pods, to test the viability of CBM production. The two pods included 35 wells including 3 injection wells in T24NR98W and 58 wells including 4 injection wells in T25N, R 97/98W. However, bids to write the document were considerably higher than the company wanted to pay; thus, Kennedy chose to scale their proposal down to the minimum necessary to test CBM production. Hence, the Proposed Action was developed. Because Kennedy found the

cost to complete the necessary study to be uneconomic and modified their proposal, this alternative was drop from detailed study.

Directional or Horizontal Drilling Method Alternative: Directional drilling refers to a technique of drilling on an angle from the vertical that allows the completion of multiple wells from one drill pad. The success of this method is dependent on well depth, gas pressure and down-hole pump needs. Directional drilling is generally used to gain access to a part of an oil and/or gas reservoir that is not directly below the surface well location. It is also generally used in areas where surface locations are expensive or prohibitive. Multiple wells can be drilled directionally from one surface location. Directional drilling is used extensively offshore. In remote areas such as the Middle East, Alaska's North Slope, or offshore, mobilization and site preparation costs are much higher than in the pilot project area. In these remote areas directional drilling is often justified from an economic standpoint.

One comment letter referred to the study done by the U.S. Bureau of Mines (Baker, et al. 1984) to test the feasibility of directional drilling for coal bed methane gas. This study involved drilling three lateral drains in anthracite coal in the Emerald Mine area in Pennsylvania. Anthracite coal is much denser and probably has substantially higher gas content than the sub bituminous coal in the pilot project area. The well drilled in the Bureau of Mines study also had significant mechanical problems. The report by Baker, et al. (1984, p. 2) states "However, little gas has been produced from the Emerald Mine directional hole because of caving of the horizontal holes drilled in shale near the bottom of the casing." Baker, et al. (1984) assumed a gas production rate and price to do an economic evaluation. A 25 percent rate of return, after taxes, was calculated. The economic analysis is detailed but does not include severance and ad valorem taxes, or landowner royalty. In Wyoming, taxes and royalty payments on federal leases total about 25 percent of gross revenue. Also, gas compression costs were estimated for compression to only 30 pounds per square inch gage pressure (psig). In the pilot area, produced gas could need to be compressed to about 500 to 900 psig. This would cost about \$0.15/MCFG or about 7.5 percent of the gross sales price (assuming \$2.00/MCFG). Overall, the evaluation by Baker, et al. (1984) bears little relevance to the geologic and economic conditions found in southwest Wyoming. The study by Baker, et al. (1984) does not indicate that directional nor horizontal drilling would be economically feasible in the project area.

Horizontal drilling is a method of completing a well with a long horizontal wellbore segment in the target formation. This method has been used extensively to increase hydrocarbon recovery from low permeability fractured reservoirs. Although the density of horizontal wells may be less than the density of vertical wells, usually only one horizontal well is drilled from each surface location. Horizontal drilling has been used extensively to develop low permeability fractured oil and gas reservoirs in Texas, North Dakota, and southeast Wyoming. In all three of these areas vertical wells were drilled initially.

The purpose of a pilot project, such as the one proposed by Kennedy, is to gather data and determine the economic feasibility of more extensive development. At this stage, it would be very difficult to evaluate the feasibility of directional drilling, or horizontal completion techniques in the Kennedy project area as little data or information is available. Requiring directional drilling or horizontal completions would complicate the Kennedy pilot project in that the purpose of the pilot project is to

collect reliable information on reservoir heterogeneity, coal thickness, coal gas content, gas chemistry, recovery efficiency, coal permeability, water quality and quantity, plus drilling, completion, and processing costs. This data must be collected before an assessment of the feasibility of drilling directional wells from a central location or using horizontal completions can be properly evaluated. Neither directional nor horizontal drilling methods have been successful in low-pressure coal bed methane wells, as is the character of the Big Red Coal. Due to these factors, a directional or horizontal drilling program was found to be unreasonable.

2.5 SUMMARY OF ENVIRONMENTAL IMPACTS

A summary of impacts and mitigations for the Proposed Action and No Action analyzed in this EA is provided in Table 2.7. A detailed analysis of project impacts and mitigation measure is presented in Chapter 4.

**TABLE 2.6
LOWER BUSH CREEK PROJECT
SUMMARY OF ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES**

RESOURCE	PROPOSED ACTION	NO ACTION	MITIGATION
Air Quality	Temporary short-term construction-related increases in dust and exhaust emissions.	No change from current situation. Impacts to air quality could occur due to other, proposed and on-going activities.	Implement dust suppression during construction; properly maintain construction equipment; promptly reclaim
Topography and Physiography	No or minimal changes in topography due to cuts and fills.	No change from current situation.	Avoid steep slopes; properly reclaim
Geology and Geologic Hazards	No Impacts expected to geology or geologic hazards	No change from current situation.	Minimize disturbance or avoid sensitive areas; promptly reclaim
Paleontology	No Impacts anticipated.	Impacts could occur from other proposed and on-going activities.	Notify BLM of any discoveries
Mineral Resources	Depletion of natural gas resources.	Impact to the lease holder if Proposed Action denied.	Promote efficient recovery of natural gas resources
Soils	Disturbance of up to 85 acres of previously undisturbed soils. Increase erosion and other surface damage should Special Purpose roads fail	No change from current situation. Impacts to soils could occur due to other proposed and on-going activities.	Minimize disturbance; implement soil erosion practices until sites are permanently reclaimed; promptly stabilize and reclaim; appropriate road and well location design and maintenance. Monitor construction and use of Special Purpose roads.
Water resources	No direct impacts to springs, seeps, or usable ground water. Increased	No change from current situation. Impacts to water resources could occur due to	Avoid channel crossings; construction in channels during periods of no or low flow; prompt

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RESOURCE	PROPOSED ACTION	NO ACTION	MITIGATION
	runoff from insufficiently designed roads could reach local waterways.	other proposed and on-going activities.	stabilization and reclamation; appropriate road and well location design and maintenance. Monitor construction and use of Special Purpose roads.
Noise	Temporary construction-related increases in noise	No change from current situation. Impacts from noise could occur due to other proposed and on-going activities.	Properly muffle all construction equipment.
Vegetation and Wetlands	Disturbance of up to 85 acres previously undisturbed vegetation. Potential for additional disturbance to vegetation should insufficiently designed roads fail. Potential for invasive species to become established.	No change from current situation. Impacts to vegetation and wetlands could occur due to other, proposed and on-going activities.	Minimize disturbance; implement noxious weed controls; allow no disturbance to wetlands; prompt revegetation with native, adapted species; appropriate road and well location design and maintenance. Monitor construction and use of Special Purpose roads.
Wildlife and Fisheries	Direct effects from collision-related mortality; direct/indirect effects from 85 acres of habitat alteration; temporary displacement particularly during construction.	No change from current situation. Impacts to wildlife and fisheries could occur due to other, proposed and on-going activities.	Comply with all seasonal stipulations and applicant committed measures for wildlife protection unless otherwise authorized by the BLM; minimize disturbance; promptly reclaim
Wild Horses	Temporary disruption of up to 85 acres of habitat use	No change from current situation. Impacts to wild horses could occur due to other, proposed and on-going activities.	Prompt reclamation
Threatened, Endangered, Proposed and Candidate, Species, and Sensitive and Animal and Plant Species	No adverse effects to TEP&C species; possible direct effects (e.g., collision-and/or construction-related morality) on certain state-sensitive species or inadvertent destruction of sensitive plants	No change from current situation. Impacts to TEP&C species could occur due to other, proposed and on-going activities.	Complete surveys and consultation with U.S. Fish and Wildlife Service prior to construction; avoid sensitive species habitats where practical
Cultural Resources	Added knowledge and information about cultural resources of the area; buried sites or artifacts could be disturbed or	Loss of knowledge and information about cultural resources of the area. Impacts to cultural resources could occur due to other	Complete surveys of all areas to be disturbed; avoid or mitigate NRHP-eligible sites where practical; mitigate possible impacts on a case-by-case basis through the NHPA

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RESOURCE	PROPOSED ACTION	NO ACTION	MITIGATION
	destroyed	proposed and on-going activities.	Section 106 consultation process. Monitor construction.
Socioeconomic /Environmental Justice	Temporary beneficial economic impacts to local and state economics during construction and drilling; if production occurs, long term benefits from collection of royalty and taxes; no impacts to environmental justice	Loss of positive economic benefits. Impacts to economic situation could occur due to other proposed and on-going activities.	Hire workers locally as available
Landownership and Use	No change in landownership; temporary loss of grazing forage and wildlife habitat; decreased recreation in immediate area.	No Change. Use of lands could be impacted due to other proposed and on-going activities.	Prompt stabilizing after construction and reclamation of disturbed areas
Health and Safety	Proposed roads could result in injury, damaged resources, or equipment if roads are used during wet periods.	No change.	Roads should be designed by or under the direction of a licensed engineer.
Aesthetic and Visual Resources	Temporary visual impacts during construction; no long-term impacts requiring re-categorization of existing Visual Resource management classification	No change from current situation. Impacts to VRM could occur due to other, proposed and on-going activities.	Minimize disturbance; prompt stabilization and reclamation of disturbed areas; painting aboveground features to blend with the surrounding landscape

CHAPTER 3

AFFECTED ENVIRONMENT

3.0 INTRODUCTION

This chapter describes the existing conditions of the affected environment for the proposed Lower Bush Creek CBM exploratory pilot project area (project area, analysis area). See Figure 2.1, Chapter 2 for details of the proposed project components and the area involved. The project area is located outside special status plant species areas, big game crucial winter range and parturition areas, select cultural resource sites and historic trails, and areas of critical environmental concern (ACEC). However, the project area is within the Great Divide Basin Wild Horse Herd Management Area and the Red Desert Watershed Management Area. Figure 2.1 shows the leases involved in the project and project component locations.

Elements of the human environment, including critical elements required by law or executive order, their status, and their potential to be affected by the Proposed Action or alternatives are listed in Table 3.1. Those items listed as ‘none present’ would not be affected or impacted by the Proposed Action or the No Action Alternatives and are not addressed further in the document. The impact analysis area for each resource is found in the right-hand column.

TABLE 3.1
CRITICAL AND OTHER ELEMENTS OF THE HUMAN ENVIRONMENT

Element	Project Area Status	Addressed in Text
Geology/Minerals/Paleontology	Potentially affected	Yes
Climate and Air Quality	Potentially affected	Yes
Soils	Potentially affected	Yes
Water Resources (including surface and groundwater quality)	Potentially affected	Yes
Vegetation/Wetlands/Noxious Weeds (including riparian zones, invasive species, threatened and endangered species, and special status species)	Potentially affected	Yes
Range Resources and Other Land Uses	Potentially affected	Yes

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Element	Project Area Status	Addressed in Text
Wildlife/Fisheries (including threatened and endangered species, and other special status species)	Potentially affected	Yes
Recreation	Potentially affected	Yes
Visual Resources	Potentially affected	Yes
Cultural Resources	Potentially affected	Yes
Socioeconomics	Potentially affected	Yes
Transportation	Potentially affected	Yes
Health and Safety	Potentially affected	Yes
Noise	Potentially affected	Yes
Areas of Critical Environmental Concern	None present	No
Prime or Unique Farmlands	None present	No
Floodplains	None present	No
Native American Religious Concerns	Potentially affected	Yes
Hazardous or Solid Wastes	Potentially affected	Yes
Wild and Scenic Rivers	None present	No
Wilderness	None present	No

3.1 GEOLOGY/MINERALS/PALEONTOLOGY

3.1.1 PHYSIOGRAPHY, TOPOGRAPHY, AND LANDFORMS

The analysis area is located in the Red Desert Watershed Area of the Great Divide Basin, which is also known as the Red Desert Basin. The Great Divide Basin, so named for its position on the Continental Divide, is one of several interior basins in south-central Wyoming sometimes referred to collectively as the Wyoming Basins. The Great Divide Basin is hydrographically closed and asymmetric. It is surrounded by uplifts including the Axial Arch on the south, the Rock Springs Uplift on the west, the Sweetwater Arch on the north, and the Rawlins and Sierra Madre Uplifts on the east. Elevations range from 9,225 feet on Whiskey Peak to 6,500 feet on the Basin's floor. The elevations of the proposed project area are between approximately 6,760 and 6,960 feet. Major water resources in this portion of the basin include the Chain Lakes area and numerous playas that serve as drainage basins for intermittent streams. Bush Creek is the major drainage near the project

area and is fed by numerous ephemeral drainages. Water in the Basin is also available as a point resource in the form of seeps and springs; however, no springs or seeps are known or identified on topographic maps within the project area.

3.1.2 GEOLOGY

The project area lies within the northern part of the Great Divide Basin. The Basin is a product of the Laramide Orogeny and is defined by Dickison, et al. (1988) as a ponded basin because the Paleocene fluvial drainages of such areas were blocked at times to form large freshwater lakes or playas, in the case of the Red Desert Sub-basin, Lake Gosiute. During the two million years of deposition for Lake Gosiute, great numbers of fossil fish, reptiles, birds, and plants representing a subtropical environment were preserved in the lake sediments. The lake had classically been considered a freshwater lake; however, recent studies have indicated that periods of increased salinity occurred in the lake's depositional history. By the early Tertiary the uplifted areas surrounding the basin were in place and from the lower Paleocene to the Upper Eocene Fort Union, Wasatch, Green River and Washakie formations were laid down. The depositional environments for these formations are quite varied and include alluvial fans as well as fluvial and lacustrine environments.

Bedrock under the Central Pilot Area is the Wasatch formation, main body (Case, et al. 1998). See Figure 3.1 for bedrock geology of the project area. Surface geology of the area is expressed as residuum and eolian deposits at the locations for Fed. 21-21 and the Fed. 23-21. The Fed. 41-21, 43-21, and 21-22 are located on playa and eolian features. See Figure 3.2 for surface geology. The playa is not an active wetland at this time. The Fed. 23-22 is located on bedrock slope wash. The Fed. 41-22 and 21-23 are located on the boundary between the slope wash and terrace and eolian deposits. The Fed. 43-22 and 23-23 are both on terrace and eolian deposits (Case, et al. 1998). Bedrock under the North Pilot Area is the Tipton Shale of the Green River Formation. Surface geology at most of the well locations is expressed as bedrock, slope wash, and eolian deposits. The exception is the Fed. 21-25, where surface geology is alluvium of stream and river deposits (Case, et al. 1998).

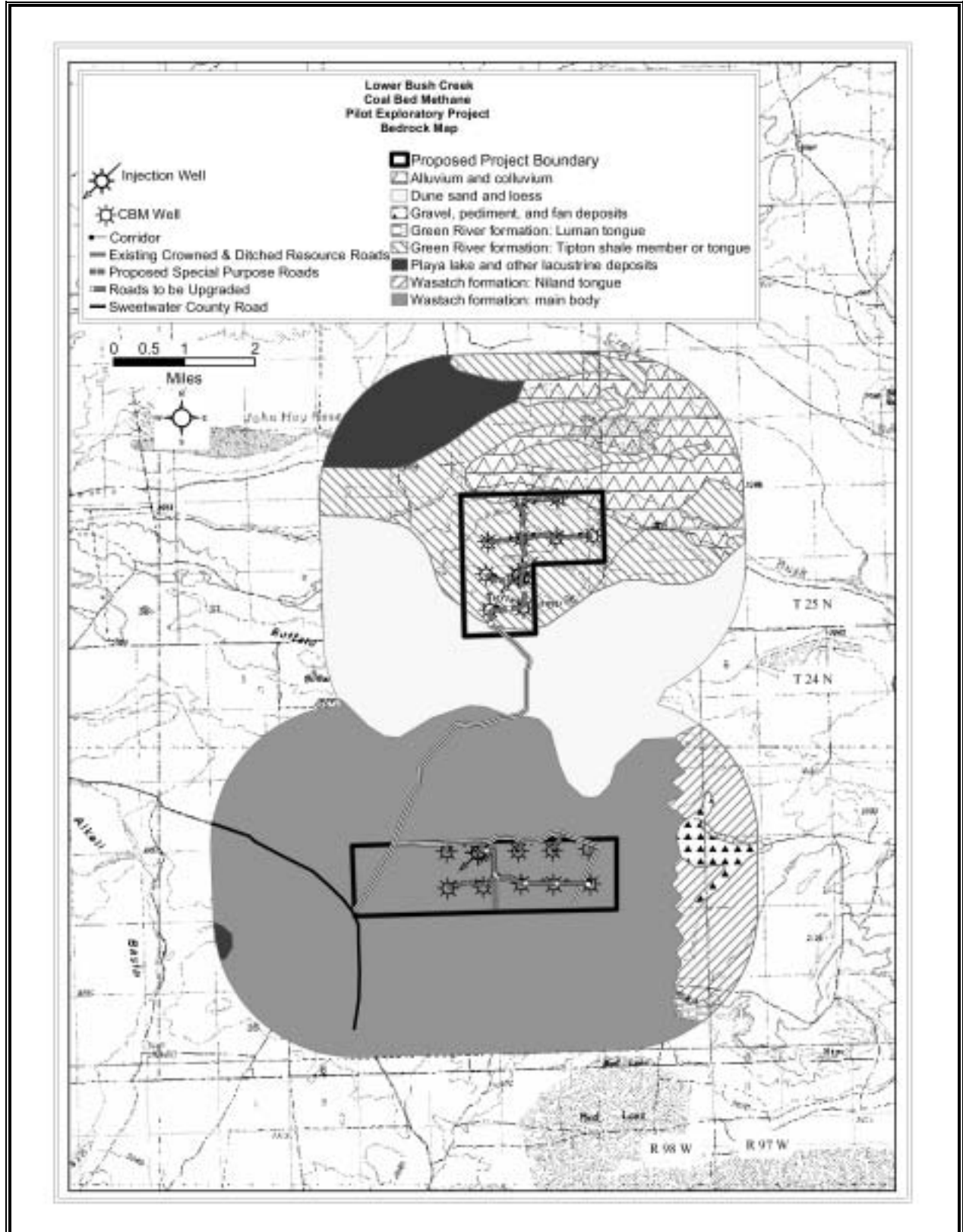
Sediments in the project area are generally residual or colluvial and are a tan sandy silt or silty sand with little organic content. The majority of the project area has rounded to angular siliceous pebbles and small cobbles in moderate to dense quantities on the surface. Occasional dune areas exist within the project area. These are coppice dunes, sand captured by vegetation. An extensive dune field is located south of the project area.

3.1.3 MINERAL AND ENERGY RESOURCES

The primary mineral commodities occurring in Sweetwater County are coal, natural gas, oil, and trona. On-going mineral development in the general area has been oil and gas exploration and

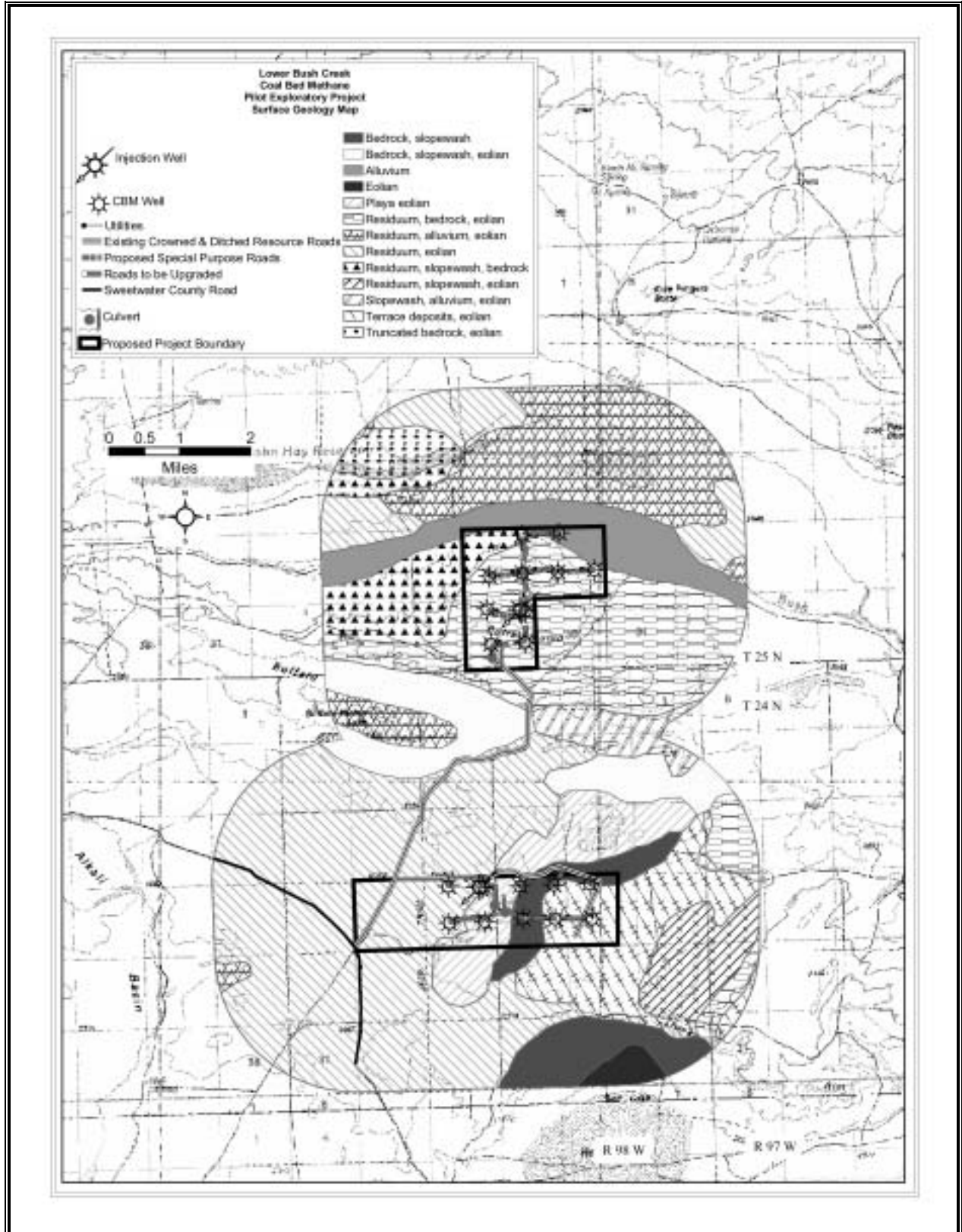
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Figure 3.1 Bedrock Found Within Project Area and Vicinity



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Figure 3.2 Surface Geology Found Within Project Area and Vicinity



production. As of August 11, 2003, BLM records showed a total of 23 wells drilled or shut-in in that portion of the Red Desert Watershed Area located outside of the Jack Morrow Hills planning effort area (see Figure 3.3). Since the original analysis was written, 7 APDs have been submitted and are under review. Two APDs have been approved but have yet to be drilled: the Vermillion Basin 27-6 located in Section 27 of T. 24 N., R. 98 W., and the Jade Road 17-11 located in Section 17, T. 25 N., R. 98 W. Other activity is occurring or pending in the Rawlins Field Office including an 11 well CBM exploratory proposal located in T23N, R97W.

3.1.4 GEOLOGIC HAZARDS

Potential geologic hazards include landslides and known or suspected active faults. Landslide potential is greatest in areas where steep slopes occur, particularly where the geologic dip of rock formations are steep and parallel to slope, or where erosional undercutting may occur. Landslides occur outside of the project area in steeper regions of the surrounding uplifts.

Sweetwater County has been subject to 31 earthquakes between 1888 and 1995, ranging in magnitude from 2.2 to 5.3 (Case 1999). A recent earthquake occurred on February 3, 1995 in the area. This earthquake's epicenter was near Little America, Wyoming. The quake had a magnitude of 5.3 and was felt throughout the state and as far away as Salt Lake City. The quake was associated with the collapse of a portion of a trona mine.

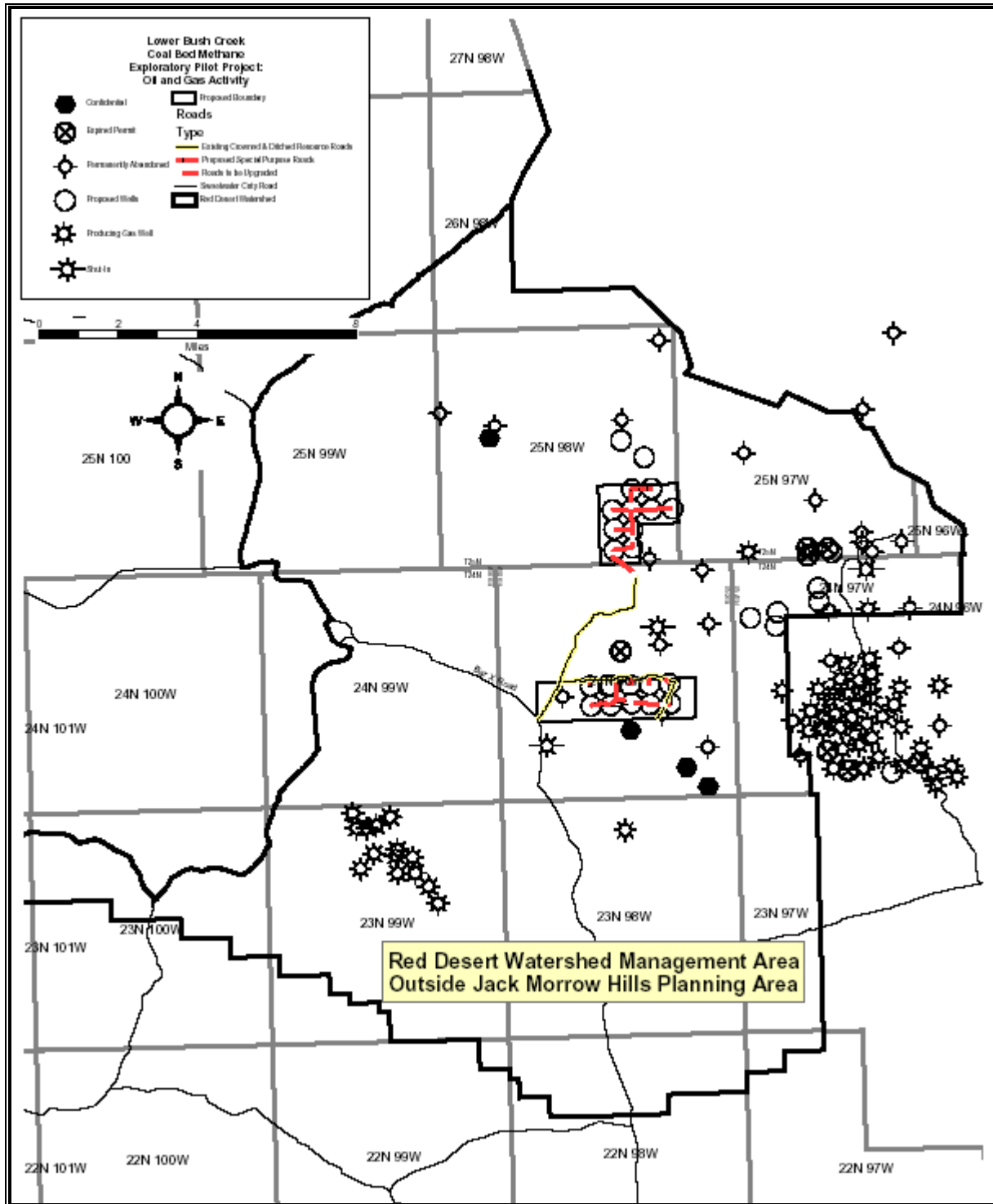
Fault zones in the geographic region area have been recurrently active in the past 20 million years. However, their activity is poorly defined or nonexistent in recent (Quaternary) times (Case, et al. 1995). Known or suspected active faults are located on the northern and southern boundaries of the County (Case and Green 2000). Sand dunes are also considered potential geologic hazards. No active dunes are found in the analysis area.

In summary, slope gradients in the project area are mild to moderate, but generally best described as mild. Potential for regional geologic hazards in the project area is low. The most likely hazard existing in the project area is potential for unstable soils to move.

3.1.5 PALEONTOLOGY

Paleontologic resources include the remains or traces of any prehistoric organism that have been preserved by natural processes in the earth's crust (BLM Information Bulletin WY-93-371). Energy minerals such as coal, oil shale, lignite, bitumen, asphalt, and tar sands, as well as some industrial minerals such as phosphate, limestone, diatomaceous earth, and coquina, while of biologic origin, are not considered fossils in themselves. However, fossils of scientific interest may occur within or in association with such materials. Fossils of scientific interest include those of particular interest to professional paleontologists and educators. Vertebrate fossils are always considered to be of

Figure 3.3 Oil and Gas Activity and Well Status in the Red Desert Watershed Management Area Outside Jack Morrow Hills Planning Area and Vicinity



scientific interest. The State Director and field managers, in consultation with BLM staff paleontologists or other expertise, may place other kinds of fossils in this category.

The BLM has established conditions for ranking areas based on potential to contain fossils of scientific interest. The Wasatch and Green River formations have a high potential for fossils of scientific interest. Two sites are known in or near the analysis area and are categorized as Condition 1 for paleontological resources; however, one site is located away from both pods and proposed and existing access roads. Another formation known as the Tipton Shale of the Green River Formation is a known source for fossils; however, no fossils of scientific interest are known to occur from this formation in the project area.

3.2 CLIMATE

The climate of southwestern Wyoming is classified as arid to semi-arid mid-continental (dry and cold) climate regime. The area is characterized by cold, dry winters, dry summers, and a short growing season. Mean annual precipitation is approximately 9 inches and is heaviest during the late winter and spring months. Approximately 20 percent of the precipitation falls as snow. Mean January temperature for the Red Desert Basin is 21 degrees while the average July temperature for this area is 66 degrees. Prevailing winds are from the west and southwest. These winds are relatively constant and have an average speed of between 12 and 14 miles per hour.

3.3 AIR QUALITY

Although specific air quality monitoring is not conducted in the immediate project area, the State of Wyoming has used monitoring in the Jack Morrow Hills planning area (approximately 10 miles west) to determine that air quality conditions in the region is in compliance with Wyoming Ambient Air Quality Standards (WAAQS) and National Ambient Air Quality Standards (NAAQS). The Supplemental Draft Impact Statement for the Jack Morrow Hill Coordinated Activity Plan /Draft Green River Resource Management Plan Amendment (2003) provides a specific discussion on monitoring data. This data is incorporated by reference and can be found in section 3.8.2 (pg 3-55) in the aforementioned document. Air quality in this area is considered excellent, as characterized by limited emission sources (few industrial facilities and residential emissions found in small communities and isolated ranches) and good atmospheric dispersion conditions, resulting in relatively low air pollutant concentrations.

The Green River Basin Visibility Study (GRBVS, a cooperative effort funded by Federal, state, and industry) was completed in September 2000. This study was designed to characterize visibility in the Green River Basin area of southwest Wyoming to determine concentrations of pollutants that cause visibility impairment. The final report for the study is not yet available (Potter 2003). The GRBVS monitoring system was comprised of three automatic cameras, a nephelometer, transmissometer, and aerosol monitor.

The Air Quality Division presented results and conclusions based on the first two years of GRBVS visibility monitoring data (August 1, 1996 – July 31, 1998) to the Air Quality Advisory Board and public at large on January 6, 2000 in Green River, Wyoming. Improvements are indicated in the data

of those initial years.

In February of 1998, gaseous monitoring equipment was installed at the GRBVS base monitoring site to monitor for nitrogen oxides (NO_x, NO, NO₂) and ozone. The gaseous monitoring equipment was installed to verify where the area is with respect to the ambient air quality standards and was funded solely by the Wyoming Department of Environmental Quality Air Quality Division. Gaseous monitoring continued through December 31, 2001. To yield further information on the range of visual air quality in the Basin, the Division funded continued visibility monitoring at the GRBVS base monitoring site through September 30, 2000. A number of monitoring stations for particulate matter are found in Sweetwater County, two of which are found in the Great Divide Basin. Neither has exceeded the air quality standard for PM-10. Air quality in the area is generally excellent with measured background concentrations of all criteria pollutants well below established standards.

3.4 SOILS

Soils in the project area generally have poorly developed structure and therefore have relatively weak internal cohesion. The primary soil association in the project area is the Teagulf-Huguston-Haterton. The soils of this association are deep to very shallow, well-drained soils, which occur on rolling to moderately steep upland plains, which are dissected by ravines, short escarpments and draws. Teagulf soils are Haplocalcids present on undulating upland plains. They are moderately deep, fine sandy loams that have a high calcium carbonate layer in the subsoil and are underlain by sandstone or shale. Huguston soils are Torriorthents present on rolling upland plains but are also present on short escarpments, rocky ravines and breaks. These are shallow, fine sandy loams that are underlain by soft sandstone. Haterton soils are Torriorthents also found in escarpments, rocky ravines and breaks. These are shallow loam soils and are underlain by shale rather than sandstone (see Figure 3.5).

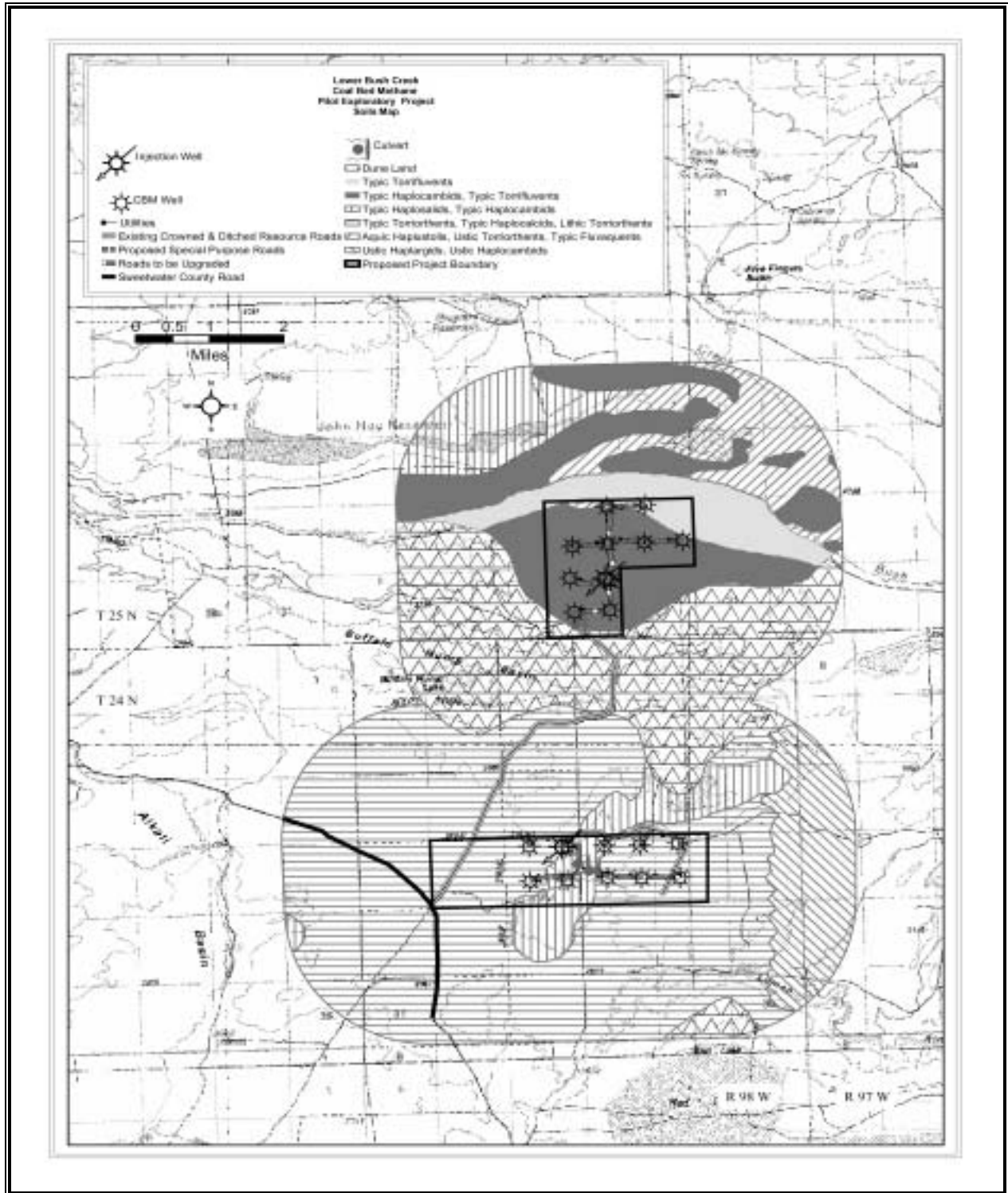
The southern part of the project area in T24N R98W is dominated by sandy loam and sandy clay loam soils with hard sandstone bedrock generally at depths of 20 to 40 inches below the surface. These soils have high concentrations of carbonates, usually within 12 to 18 inches of the surface. Because of their sandy surface texture they are susceptible to wind erosion. These soils are found on the gently rolling residual uplands dominated by sagebrush.

The uplands are bisected by and intermittent drainage in the western part of Section 22. Soils on the alluvial fans and terraces associated with this drainage are generally silt loam and clay loam greater than 60 inches to bedrock although some shale bedrock may be found closer to the surface along the fringes. These soils are strongly calcareous and highly saline. Because of the high clay content these soils have a high shrink swell capacity. Vegetation is dominated by salt tolerant species including Gardener saltbush, greasewood, Indian ricegrass, and *Poa* species.

The hill slopes between the drainage and the uplands are dominated by sandy loam and loam soils with bedrock generally around 20 inches or less. The northern

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Figure 3.5 Soils in Project Area and Vicinity



part of the project area in T25N R98W is dominated by clay loam and loam soils with shale or sandstone bedrock generally at depths of 20 to 40 inches below the surface. The upper slopes in proximity to Buffalo Hump have bedrock closer to the surface. These soils are calcareous and moderately saline. Vegetation is dominated by Gardner saltbush and sagebrush.

The alluvial fans on the northern edge of the project area are influenced by Bush Creek drainage. This floodplain is dominated by silt loam and silty clay loam soils greater than 60 inches to bedrock. These soils are strongly alkaline and have a high shrink swell capacity. These soils are highly susceptible to water erosion as is evidenced by gulying in side drainages, cow paths, and an old two-track trail. Vegetation is dominated by greasewood (Sandy Grazing Final Environmental Impact Statement, BLM-1978).

In addition to these soils, a number of stabilized or dormant dune complexes of various types and sizes are present in the surrounding area. These dunes have been stabilized relatively recently by low grasses and shrubs. Most of the sand within the dunes is fine-grained and moderately well sorted and is probably derived from Bridger, Mesaverde, or Foxhills formation sandstones.

3.5 WATER RESOURCES

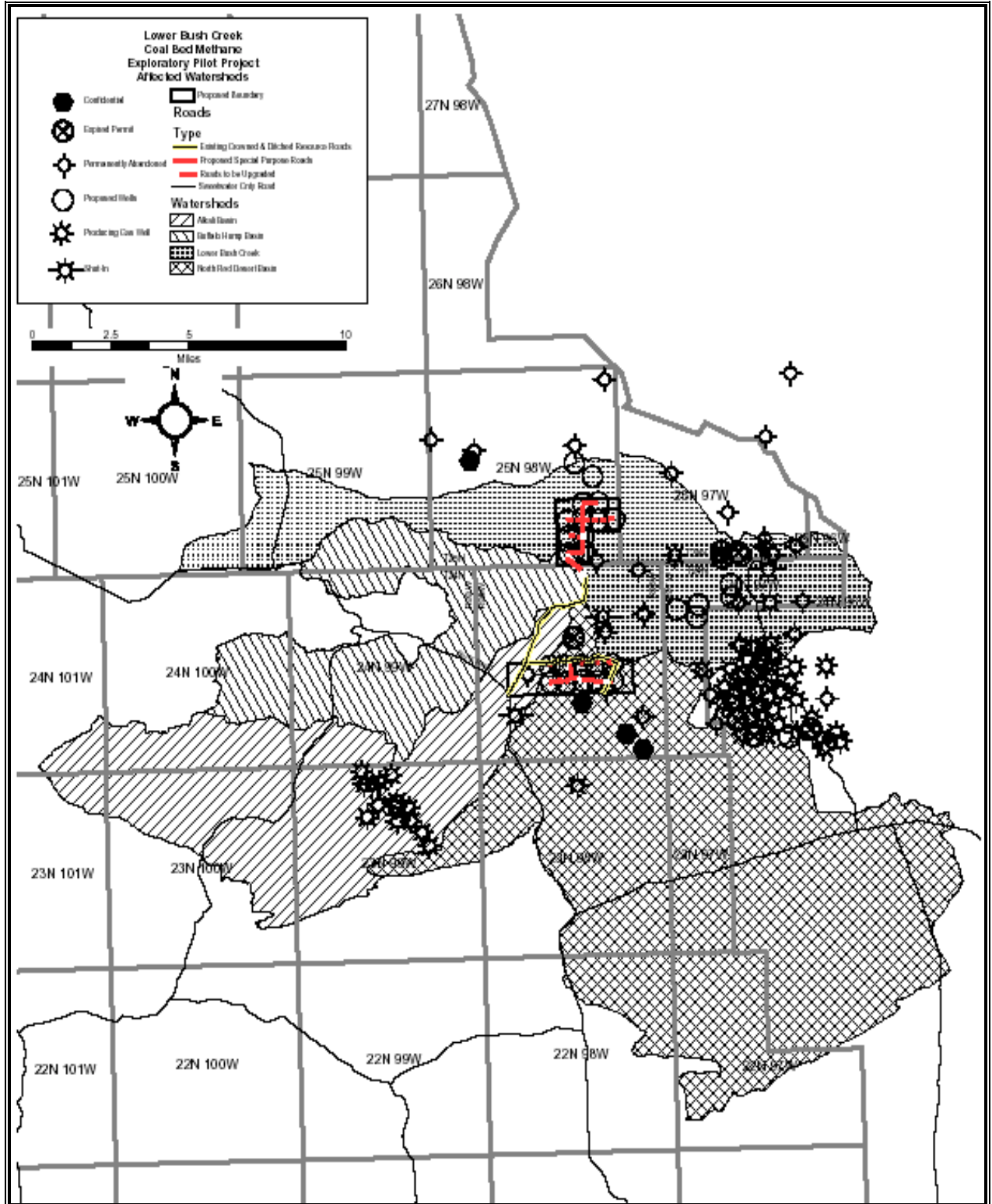
3.5.1 SURFACE WATER

The proposed project is located within the Red Desert watershed. Major water resources in this portion of the basin include the Chain Lakes area and numerous playas that serve as drainage basins for ephemeral drainages. The project area overlaps 4 sixth-order watersheds including Lower Bush Creek, North Red Desert Basin, Alkali Basin, and Buffalo Hump Basin (Figure 3.6). Bush Creek is the major drainage near the project area and is fed by numerous ephemeral drainages. Bush Creek drains into Bush Lake where any water simply evaporates (closed watershed). Water is also available as a point resource in the form of seeps and springs; however, these are rare. No springs or seeps are within the project area or vicinity. Water bodies are dry for much of the year and flow or contain water only during runoff periods. The area has experienced drought over the last several years.

Data regarding quality and quantity of surface water is limited to rare grab samples from water bodies miles outside the project area. However, given the alkaline nature of the surface and subsurface geology and general character of water in the Red Desert Basin, surface waters could be expected to be more alkaline. The volumes of typical flows are unknown, as gaging stations are not sited in this closed basin. According to WDEQ's water quality information on the Red Desert Basin, flow is seasonal primarily in response to snowpack and flows are contained within the basin with no connection to external drainages. The streams tend to have very high TDS (total dissolved solids) and sediment loads. The WDEQ classifies Wyoming streams according to quality and degree of protection. The water bodies within this watershed are categorized as Class 4 waters. Class Four waters have the following characteristic (WDEQ 2000): Those surface waters which are determined to not have the hydrologic or natural water quality potential to support fish and include all intermittent and ephemeral streams.

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Figure 3.6 Affected Watersheds



3.5.2 WATERS OF THE U.S.

Channels that carry surface flows and show signs of active water movement are generally considered “waters of the U.S.” Similarly, all open bodies of water (except ponds and lakes created on upland sites and used exclusively for agricultural and industrial activities or aesthetic amenities) are considered “waters of the U.S.” (EPA, 33 CFR 328.3(a)). The EPA and the Army Corps of Engineers (COE) regulate such areas. COE regulates the placement of dredged and fill material into wetlands and other “waters of the U.S.” as authorized primarily by Section 404 of the Clean Water Act (33 U.S.C. 1344). The term “waters of the U.S.” has been broadly defined by statute, regulation, and judicial interpretation to include all waters that were, are, or could be used in interstate commerce, such as rivers, streams (including ephemeral streams), reservoirs, and lakes, as well as wetlands adjacent to those areas.

The COE has reviewed the scoping notice for the proposed project. Based on the information provided by the COE, it has been determined that any wetlands or other waters in the project area are isolated and are no longer considered to be “waters of the U.S.” under Section 404 of the Clean Water Act (COE March 22, 2002 response to T Deakins/RSFO, re scoping notice for Kennedy Oil Pilot Exploratory Coal Bed Methane Project). “Waters of the U.S.” will not be discussed further in this analysis.

3.5.3 GROUND WATER

The project area is located in the Wyoming Basin groundwater region described by Heath (1984). Groundwater resources include deep and shallow, confined and unconfined aquifers. Site-specific groundwater data for the project area are limited. Existing information comes primarily from the WOGCC oil and gas well records, Wyoming State Engineers Office (WSEO) water-well records, and the U.S. Geological Service (USGS). Groundwater in the Great Divide Basin is generally found confined in sands in formations including the Fort Union and Wasatch. The Kennedy State 1-36 well (Big Red Coal), located in Section 36, T23N, R97W, water quality analysis showed a total dissolved solids of 21,771 ppm. Water quality in the Big Red Coal in the project area is expected to be equally poor. Permitted water wells are primarily related to oil and gas development and a few are permitted for livestock watering and other agricultural uses. Table 3.2 details the permitted wells in and near the project area. Potential groundwater sources are found in Quaternary, Tertiary, and Cretaceous formations. Although wells depths are provided in records, no correlation is made to the formation source for the water.

**TABLE 3.2
GROUND WATER WELLS IN AND AROUND PROJECT AREA**

Permit No.	Priority	Twp	Rng	Sec	Qtr	Qtr	Applicant	Facility Name	Well Depth ^{1/}
P56037W	11-Mar-81	24	98	1	NWNW		USDI BLM	EAST BUFFALO HUMP WELL #4679	550

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Permit No.	Priority	Twp	Rng	Sec	Qtr	Qtr	Applicant	Facility Name	Well Depth ^{1/}
P46103W	07-Dec-78	24	98	6		SWSW	USDI BLM	BAR X ROAD WELL #4510	
P50705W	07-Nov-79	24	98	12		NESW	DAVIS OIL CO.,USDI, BLM	BROWN BUFFALO FEDERAL #1	480
P44489W	20-Jul-78	24	98	14		NWNW	DAVIS OIL CO., USDI, BLM	DAVIS RIGBY ROAD UNIT #1 WATER	
P85368W	12-Jun-91	24	98	16		SWNW	WYO BOARD OF LAND COMMISSIONERS, JIM NEBEKER TRUCKING CO.	NEBEKER #2	
P85367W	12-Jun-91	24	98	16		SESW	WYO BOARD OF LAND COMMISSIONERS, JIM NEBEKER TRUCKING CO.	NEBEKER #1	
P56969W	23-Apr-81	24	98	19		SESW	DAVIS OIL CO., USDI, BLM	LIGHTHOUSE UNIT #1	
P57743W	07-Jul-81	24	98	19		SWSE	DAVIS OIL COMPANY, USDI, BLM	LIGHTHOUSE #1-A	
P51038W	04-Feb-80	24	98	20		SWNE	DAVIS OIL CO., USDI, BLM	BASIN WELL UNIT #1	470
P48529W	12-Jun-79	25	98	1		SWNE	DAVIS OIL CO., USDI, BLM	FIVE FINGERS UNIT #2	200
P42422W	14-Mar-78	25	98	14		SWNE	DAVIS OIL CO., USDI, BLM	DAVIS #1 FIVE FINGERS UNIT WATER	520
P44365W	13-Jul-78	25	98	17		SENW	WOODS PETROLEUM CORPORATION, USDI, BLM	LOST VALLEY UNIT #1	550

^{1/} Information on the depths of some wells were not available.

3.6 VEGETATION, SPECIAL STATUS PLANT SPECIES, WETLANDS, NOXIOUS WEEDS

3.6.1 VEGETATION COVER TYPES

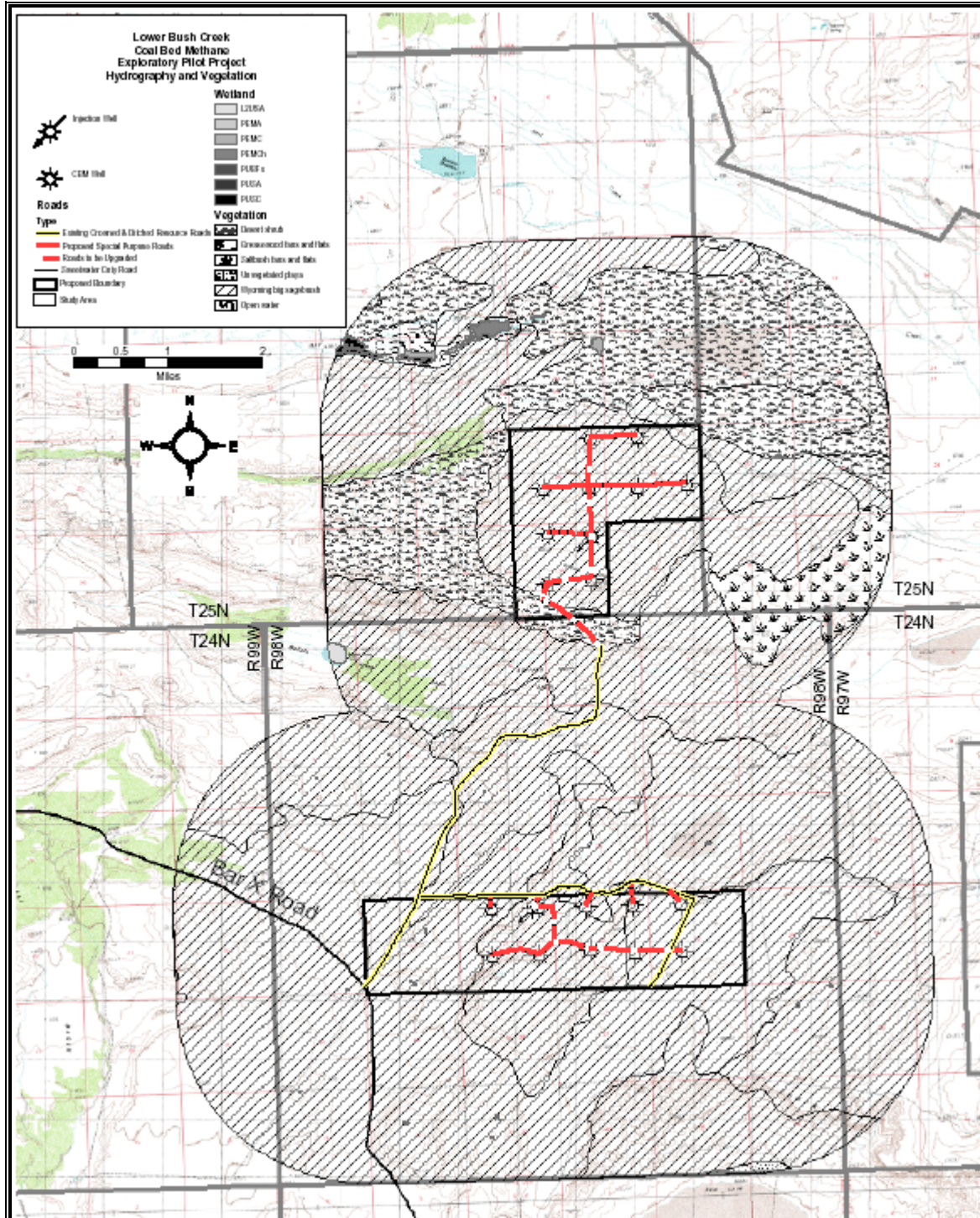
The Great Divide Basin is within the Upper Sonoran zone. Shrubs growing in these areas include saltbush, greasewood, sagebrush, and rabbitbrush. Other common plant species include: gray horsebrush, spiny hopsage, and Indian rice grass. Observed plants in the project area included several species of sagebrush, Mormon tea, rabbitbrush, greasewood, pricklypear cactus, low grasses, upland sedges, and weedy forbs. See Figure 3.7 for land cover of the project area, as available from the USGS National Gap Analysis Program. The GRRMP identifies the vegetation as a mosaic of high and low-density sagebrush communities.

3.6.2 THREATENED AND ENDANGERED PLANT SPECIES

U.S. Fish and Wildlife Service identified two plant species as having potential habitat in the general area. These two species include Ute Ladies'-tresses (*Spiranthes diluvialis*) listed as threatened, and blowout penstemon (*Penstemon haydenii*) listed as endangered. Ute Ladies'-tresses has been found along Platte River drainages below Alcova, Cheyenne, and Niobrara drainages. Blowout penstemon

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Figure 3.7 Riparian, Wetland, and Vegetation Types Found in Project Area and Vicinity



has been found along the Killpecker Sand Dunes near Rawlins. No potential habitat in or within a mile of the project area has been identified during field reviews. Since no potential habitat occurs in or adjacent to the project area, BLM has made a no-effect determination. These species will not be given further consideration in this document.

3.6.3 CANDIDATE AND BLM SENSITIVE PLANT SPECIES

The BLM State Director has designated several plant species found in Sweetwater County as sensitive. Sensitive species with potential for habitat in the project area include large-fruited bladderpod (*Lesquerella macrocarpa*), Nelson's milkvetch (*Astragalus nelsonianus*), and persistent sepal yellowcress (*Rorippa calycina*). A summary of the sensitivity status and rank of the species of concern is found in Appendix B.

The large-fruited bladderpod (*Lesquerella macrocarpa*) is endemic to the western rim of the Red Desert Basin in Fremont and Sweetwater Counties. This species is designated by the BLM as sensitive and was a candidate for federal listing. Other populations have been identified in Lincoln and Sublette counties in high rim and butte topography. Total population size is estimated at approximately 52,000 plants in 1994 covering an area of 2,079 acres (Fertig 1995). Large-fruited bladderpod occurs in gypsum-clay hills and benches, clay flats, and barren hills at elevations between 7,200 and 7,700 feet. This plant is usually absent from rocky soils and areas dominated by sagebrush or high cover of grasses. Nine populations are known in the state of Wyoming. This species does not have potential habitat in the project area. The nearest known population is about 20 miles northwest of the project area.

Nelson's milkvetch (*Astragalus nelsonianus*, syn. *Astragalus pectinatus* var. *platyphyllus*) is also endemic to areas that are alkaline, often seleniferous, clay flats, shale bluffs and gullies, and on pebbly slopes in sparsely vegetated sagebrush and cushion plant communities at elevations of 5,200 to 7,600 feet. Population data are lacking for nearly all occurrences of this species; however, one population observed in 1995 was found to consist of relatively few and widely scattered individuals over approximately 20 acres. The nearest known population is approximately 12 miles outside the project area. The plant is not expected to occur on the project area.

Persistent sepal yellowcress (*Rorippa calycina*), another endemic, is a member of the mustard family (*Brassicaceae*). This species has been documented in south-central Montana, western North Dakota, central Wyoming, and on the arctic coast of Canada's Northwest Territories. The species is found along moist sandy to muddy banks of streams, stock ponds, and reservoirs near the high-water line at 3,660 to 6,800 feet. Populations tend to be found in semi-disturbed openings in small inlets or bays. The nearest known population is over 15 miles to the east. No potential habitat for this plant exists in the project area.

Because these sensitive species or their habitat are not known to occur within the project area or the 2-mile buffer area, these species will not be addressed further in this analysis.

3.6.4 Wetlands

The U.S. Fish and Wildlife Service National Wetland Inventory (NWI) Maps identify two wetland areas within the lease boundaries of the project area. These wetlands are located in the Central Sweetwater pod in Section 20, T. 24 N., R. 98 W., and consist of Palustrine Unconsolidated Bottom Semipermanently Flooded Excavated ponds (PUBFx) and Palustrine Unconsolidated Shore Temporarily Flooded (PUSA) wetlands (see Figure 3.7). The designation and its description are contained in the following list.

Designation	Description
L2USA	- Lacustrine, Littoral, Unconsolidated shore, Temporarily flooded
PEMA	- Pallustrine, Emergent, Temporarily flooded
PEMC	- Pallustrine, Emergent, Seasonally flooded
PEMCh	- Pallustrine, Emergent, Seasonally flooded, Impounded
PUBFx	- Pallustrine, Unconsolidated bottom, Semipermanently flooded, Excavated
PUSA	- Pallustrine, Unconsolidated shore, Temporarily flooded
PUSC	- Pallustrine, Unconsolidated shore, Seasonally Flooded

Given the wetland locations and surface drainage patterns, proposed road and well pad locations should not affect these wetlands. Because these wetlands are not affected and no direct, indirect or cumulative impacts are expected, these wetlands are not discussed further in this analysis.

Site observations reveal that most wetlands are restricted to the margins of John Hay Reservoir, outside the project area. Figure 3.7 shows the NWI for the region surrounding the project area.

3.6.5 NOXIOUS WEEDS/INVASIVE SPECIES

Although the project area is vulnerable to infestations of invasive/noxious weeds as is any area within the RSFO area, infestations of invasive/noxious weeds are relatively minimal within the project area at present. However, any newly disturbed surface would be susceptible to introduction of invasive or noxious weeds. Infestations known north and south of the project area include populations of Black henbane (*Hyoscyamus niger*), Kochia (*Kochia scoparia*), and Halogeton (*Halogeton glomeratus*).

3.7 RANGE RESOURCES AND OTHER LAND USES

The project area is within the Red Desert Allotment (#13012). Grazing management on this allotment has been evaluated by the RSFO as satisfactory, and the overall trend of use and sustainability is static. In 1999 a standards assessment was performed and the public lands within the allotment were found to be in compliance with Wyoming standards for rangeland health. The allotment size is 243,676 acres and has 9,758 active AUMs utilized by sheep and cattle.

Other land uses include the proposed Hay Reservoir 3-D geophysical project (permit under review) and existing rights-of-way (e.g., roads, pipelines) associated with on-going mineral-related activity in

and adjacent to the project area (see Figure 3.3).

3.8 WILDLIFE/SPECIAL STATUS ANIMAL SPECIES

The project area includes sagebrush/saltbush steppe and greasewood wildlife habitats. The Red Desert Basin is within the Upper Sonoran zone. Shrubs growing in these areas include saltbush, greasewood, sagebrush, and rabbitbrush. Other common plant species include gray horsebrush, winterfat, and Indian ricegrass. Observed plants in the project area include Wyoming big sage, spiny hopsage, Gardner saltbush, rabbitbrush, greasewood, pricklypear cactus, grasses, and forbs.

Many species of birds, mammals, amphibians, and reptiles may be found within the Red Desert. The most common large game animals found in the study area today are pronghorn antelope, mule deer, and elk. Other mammals include coyote, fox, skunk, badger, White-tailed prairie dog, Whitetail jackrabbit, and a number of small rodents. The area also contains Greater Sage-grouse. Raptors found in the area include Ferruginous Hawk, Golden Eagle, Prairie Falcon, and Burrowing Owl.

Reptiles found in the study area include Northern sagebrush lizard, Short-horned lizard, and Great Basin gopher snakes. Tiger salamanders and the Leopard frog may be found in the geographic area, but do not occur in the project area. The proposed development is not expected to impact the common species found in the project area; therefore, they are not considered in this analysis. Those species considered in this document include threatened, endangered or proposed for listing status, big game species, raptors, and BLM sensitive species.

Information regarding the occurrence of species included in this analysis was obtained from several sources. Greater Sage-grouse lek locations, seasonal big game range designations, raptor nest locations, and locations for threatened and endangered species were obtained from the Wyoming Game and Fish Department's (WGFD) Wildlife Observation System and BLM GIS database.

3.8.1 BIG GAME

Three big game species, pronghorn antelope (*Antilocapra americana*), mule deer (*Odocoileus hemionus*), and elk (*Cervus elaphus*), occur in the project area during all or parts of the year. Several categories of range use define habitat utilization. Winter ranges are used by substantial numbers of animals only during the winter months (December through April). Winter/year-long ranges are occupied throughout the year, but during winter these ranges are used by additional animals that migrate from other seasonal ranges. Crucial big game range (e.g., crucial winter/year-long range) describes any seasonal range or habitat component that has been documented as a determining factor in a population's ability to maintain itself at a specified level over the long-term. Crucial winter ranges are typically used eight out of 10 winters. No crucial winter range overlaps with the project area.

Pronghorn Antelope

The project area is within the Red Desert Pronghorn Antelope Herd Unit. The Red Desert Herd Unit including WGFD Hunt Areas 60, 61, and 64. The unit area is described as leaving Rawlins,

Wyoming, along I-80 in a westerly direction to Point-of-Rocks, north to Continental Peak, north and east to Baroil, Wyoming, then south along Highway 287 to Rawlins. The herd unit contains 2,165,682 acres of which 272,516 acres are crucial winter range and 1,849,588 acres are winter/yearlong range. For the purpose of this analysis, the portion of the herd unit analyzed is limited to that which overlaps the general cumulative impact assessment area of the Continental Divide/Wamsutter II project encompassing 1,849,024 acres (Figure 3.8). The pods lie within a migration area. No crucial winter range for antelope occurs in the project area or vicinity.

Hunter success rates in the area for 1998 through 2000 averaged 95%. The 2000 hunting season resulted in a harvest of 1,144 animals in the unit. The population objective for the Herd Unit is 12,000 animals. Recent population data are not available; however, the 1992 population was estimated at 12,800. Intervening years have been characterized as drier than average and certainly the past three have brought drought conditions to the area.

Preferred pronghorn habitat may be characterized by sagebrush/rabbit-brush plant communities with an open view. An important factor affecting antelope population is weather. Severe winters with deep, crusted snow, and sub-zero temperatures may result in high mortality. Drought conditions often result in high fawn mortality.

Mule Deer

The project area is within the Steamboat Herd Unit. The herd unit occupies the area between the Green River and the east side of the Great Divide Basin, south of Highway 28, and north of I-80. The herd unit takes in more than 1,273,734 acres of which 144,272 acres are crucial winter range and another 492,822 acres make up winter/yearlong range. For the purpose of this analysis, the portion of the herd unit analyzed is limited to that which overlaps the general cumulative impact assessment area of the CD/WII project encompassing 642,668 acres (Figure 3.9). Habitats range from coniferous forests to desert scrub. The project area lies in seasonal use ranges for mule deer. Refer to the RSFO GIS database and WGFD for details on the seasonal range types and boundaries. Hunter success rates in the area for 1998 through 2000 ranged from 23 to 34 percent and averaged 30%. Overall harvest numbers were variable over those years, ranging from 191 in 1998 to 321 in 1999 to 295 in 2000. The population objective for the herd unit is 4,000. The model estimate for the 1992 population was 3,219.

Elk

The project area is located within the Steamboat Herd Unit (Hunt Area 100, 101, and 109). This herd unit occupies the area north of Rock Springs, Wyoming, east of the Green River, south of Highway 28 and the Sweetwater River, and west of Wamsutter, Wyoming. The herd unit contains well over 2 million acres of which 215,000 acres are crucial winter range. No crucial winter range occurs in the project area. For the purpose of this analysis, the area of the herd unit analyzed is limited to that

Figure 3.8 Antelope Herd Units, CD/WII Cumulative Impact Assessment Area in Relation to the Project Area

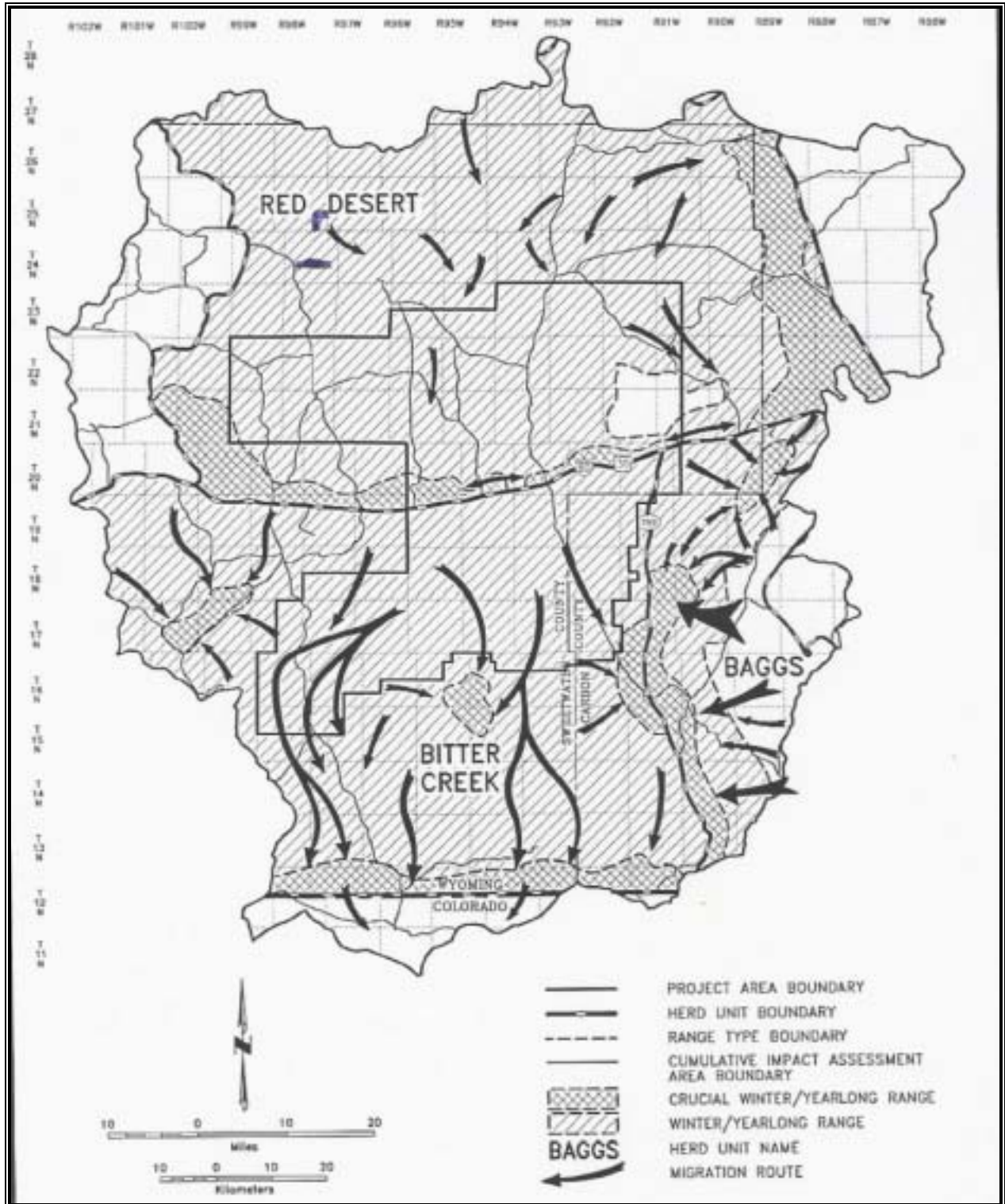
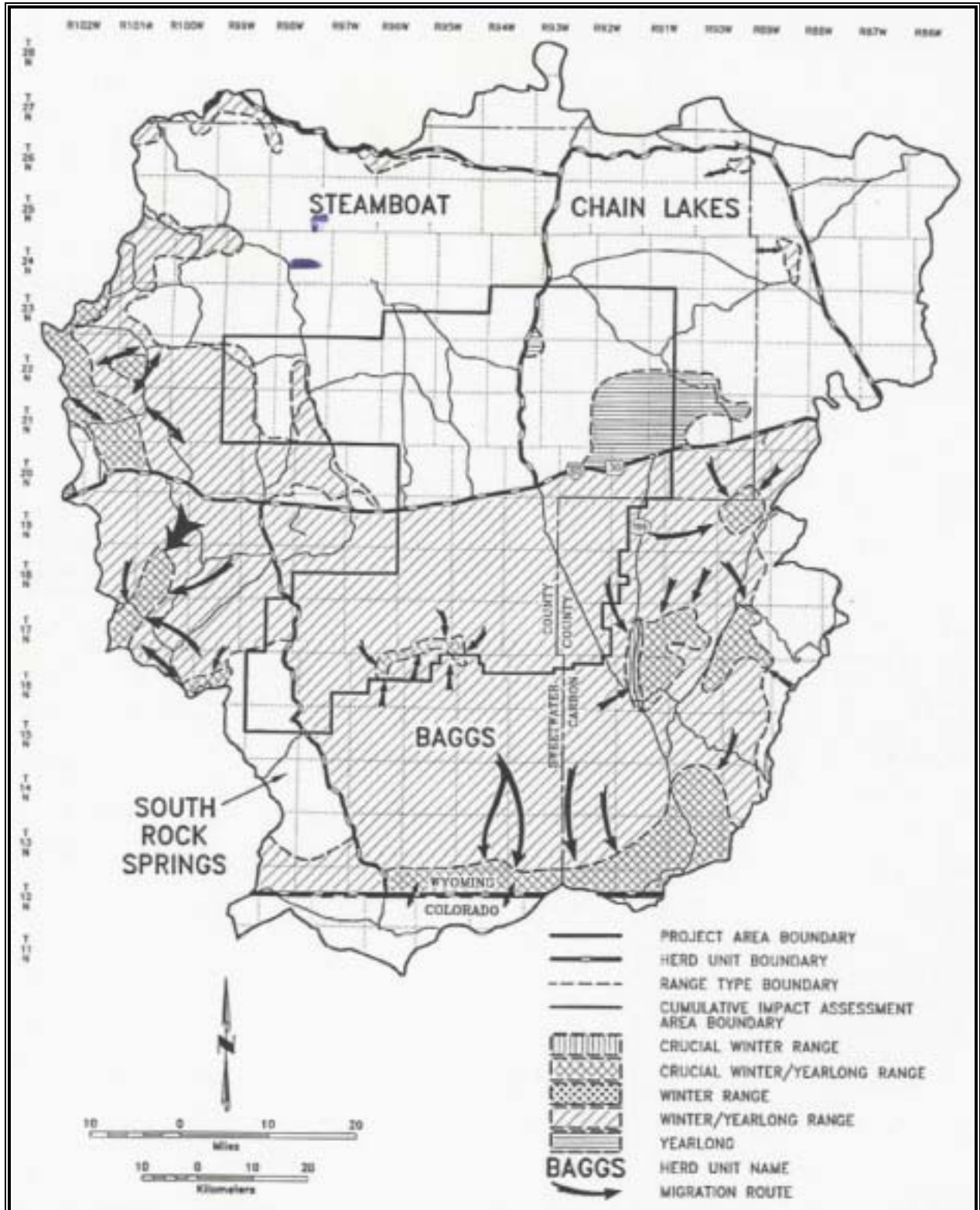


Figure 3.9 Mule Deer Herd Units, CD/WII Cumulative Impact Assessment Area in Relation to the Project Area



which overlaps the general cumulative impact assessment area for the CD/WII project encompassing 715,200 acres (Figure 3.10). The BLM and WGFD, through the University of Wyoming, have been gathering elk movement information for this herd over the past several years. This information should better define seasonal use areas and habitat preferences of this elk population.

The Steamboat elk herd was reestablished through a series of transplants from the Jackson Hole and Yellowstone area beginning in 1944. The population objective was originally established at 500 animals; however, due to an increase in herd unit size and greater population, the herd unit objective was recently increased to 1,200. The Wyoming Game and Fish population data for the year 2000 showed the population to be approximately 1,800 animals. Within the last five or six years, herds of elk are routinely observed in the Buffalo Hump area during all seasons.

3.8.2 UPLAND GAME BIRDS

Greater Sage-Grouse

The greater sage-grouse (*Centrocercus urophasianus*) is an important upland game bird in Wyoming. The project area is within suitable grouse habitat for breeding, nesting, brood-rearing, and winter occupation. According to WGFD and RSFO records, no leks are located within the project area; however, five leks are known within two miles of the project area. See Figure 3.11 for locations of these strutting grounds.

Populations of the species are suspected to have declined in the late 1990's on the Buffalo Hump West lek, in Section 34, T25W R98N; the Buffalo Hump Lake lek in Section 8, T24N, R98W; the Buffalo Hump South lek, in Section 9, T24N, R98W; the Basin Well lek; and the Luman Rim lek, based on field observations by WGFD and BLM biologists. Monitoring by BLM on two of the leks during 2001 and 2002 have shown that one strutting ground appears to be abandoned and the other had only two males on it each year. Dry conditions have been noted as contributing elsewhere to declines in sage-grouse populations. No current population data or estimates are known for sage grouse in the Red Desert Upland Game Management Area (Figure 3.12). WGFD observations in the Bastard Butte (T25N R97W) and Alkali Well (T23N R99W) areas demonstrate a potential trend for populations in the project area. The graph below shows apparent population trends on these two strutting grounds.

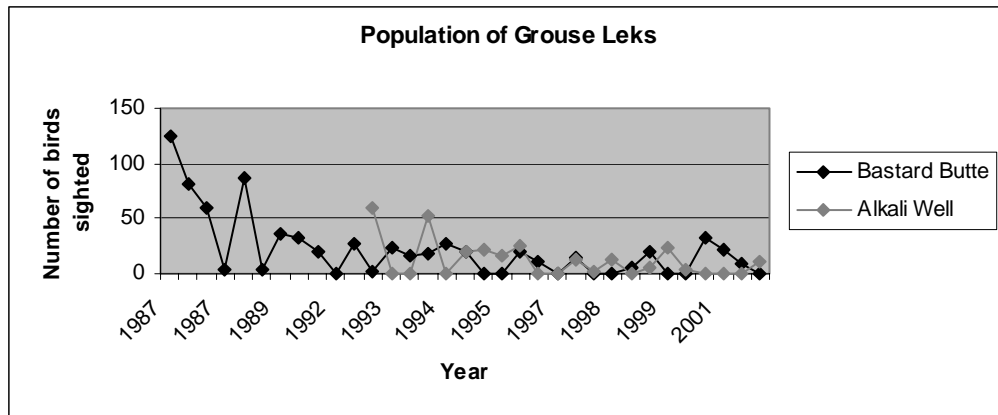
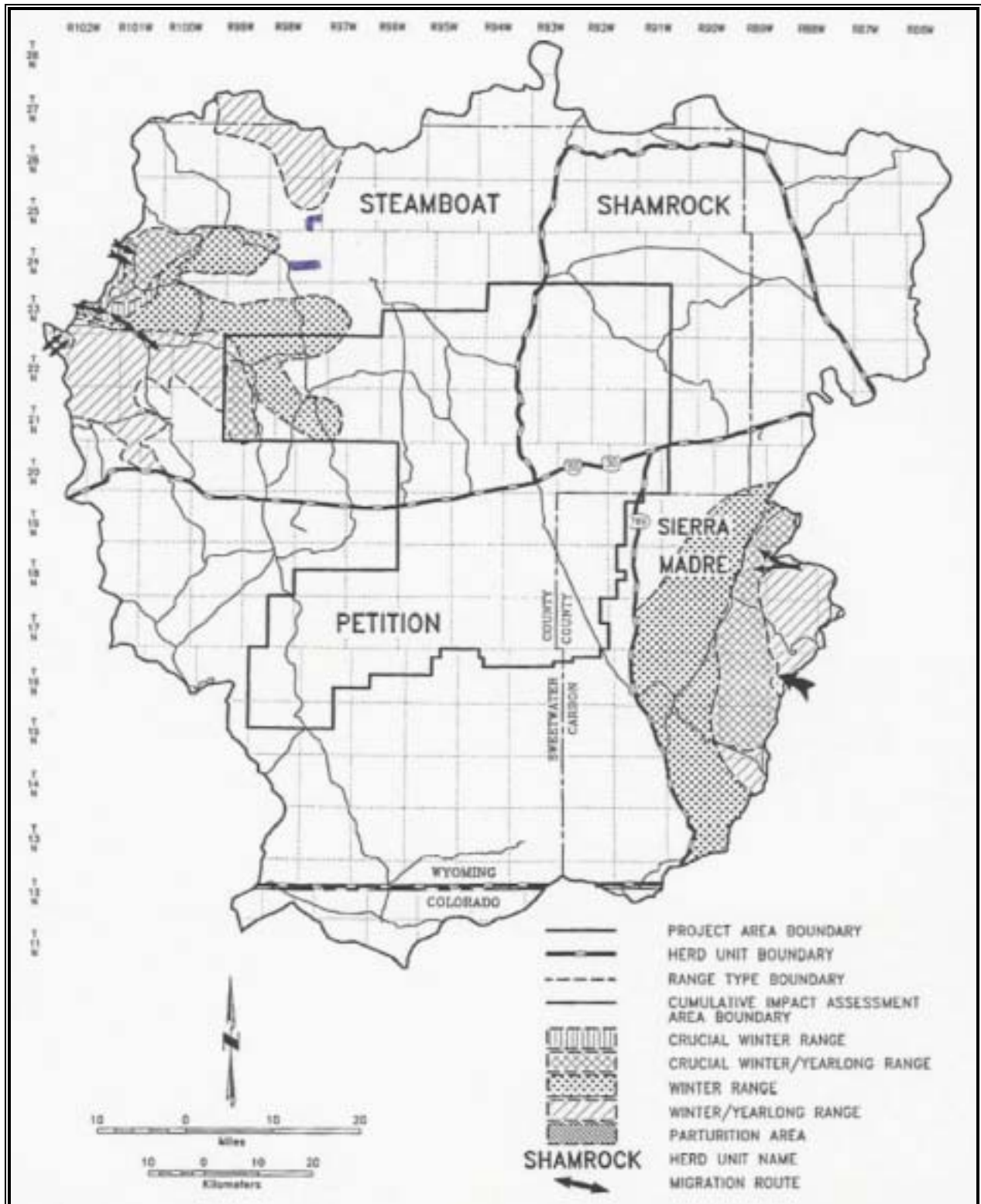


Figure 3.10 Elk Herd Units, CD/WII Cumulative Impact Assessment Area in Relation to the Project Area



Environmental Assessment, Lower Bush Creek Pilot Exploratory Coal Bed Methane Project

Figure 3.11 Sage Grouse, Raptor Nests in the Vicinity of the Project Area

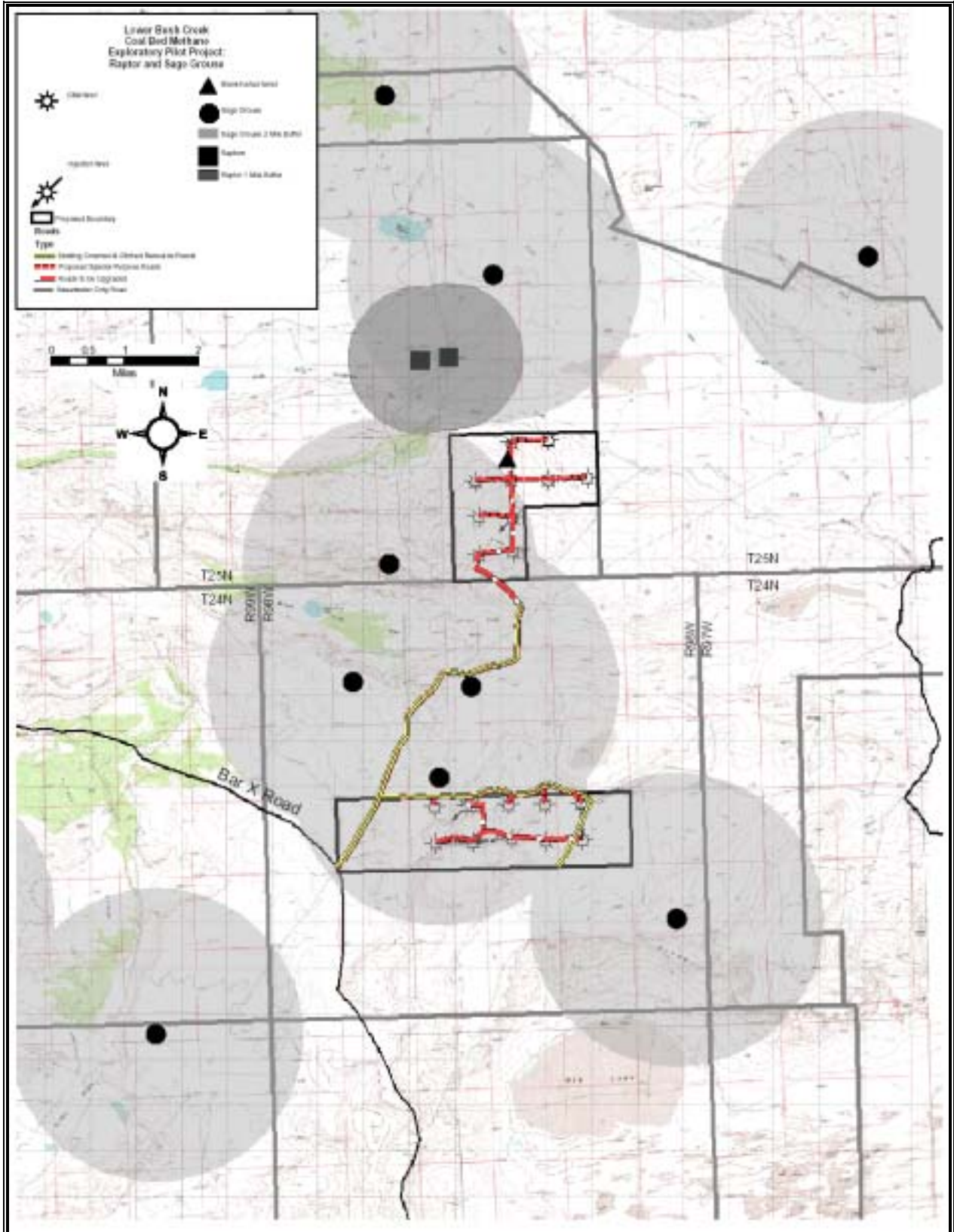
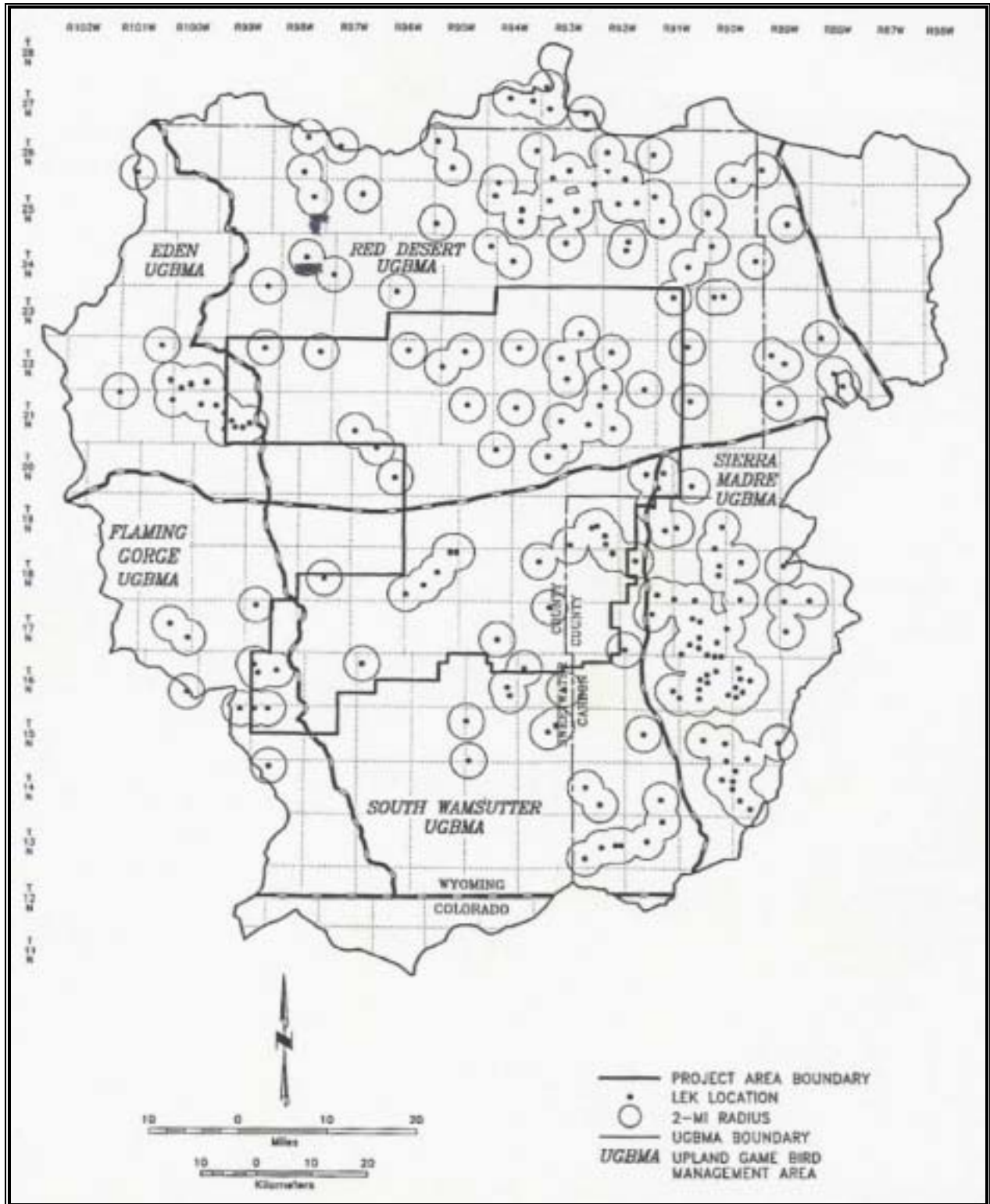


Figure 3.12 Upland Game Management Areas in CD/WII Cumulative Impact Assessment Area in Relation to the Project



3.8.3 RAPTORS

Several birds-of-prey species occur within or adjacent to the project area. They include the ferruginous hawk (*Buteo regalis*), northern harrier (*Circus cyaneus*), burrowing owl (*Athene cunicularia*), golden eagle (*Aquil cyrysaetos*), and prairie falcon (*Falco mexicanus*). Two ferruginous hawk nests have been documented north of the North Sweetwater Pilot pod, approximately one mile from the northern pod boundary at the John Hay Reservoir (see Figure 3.11). A burrowing owl is also known to nest in a prairie dog colony 3.5 miles northwest of the project.

Observations by BLM biologists in and around the project area during the spring and early summer of 2002 revealed an active ferruginous hawk nest at the John Hay Reservoir but no other nesting raptors were observed.

3.8.4 Threatened and Endangered Species

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

White-tailed prairie dog (*Cynomys leucurus*) colonies provide habitat for black-footed ferrets (*Mustela nigripes*). One prairie dog colony occupies approximately 20 acres on the north boundary of the Central Sweetwater Pilot pod. Scattered burrows are also found outside this colony. This colony size is not sufficient to support ferrets but the prairie dog complex is large enough and sufficiently populated by prairie dogs to provide suitable habitat for black-footed ferrets.

The North Sweetwater pod falls within or adjacent to a large prairie dog colony and is part of a very large complex. Searches for black-footed ferrets have not been conducted within this complex. The Final EIS for the GRRMP (BLM 1996), Appendix 14-1, Table 2, indicates a confirmed sighting of a black-footed ferret in May 1983 in T. 23 N., R. 98 W. Other probable or positive sightings in the general area occurred in August 1972 in T. 14 N., R. 98 W., and 1969 in T. 18 N., R. 93 W. The Final EIS prepared for the GRRMP indicates that two sightings of ferrets have been recorded in or near the project area, one near Brannan Reservoir and the other near Buffalo Hump. Researchers have concluded, through archaeological and historical evidence, that this species has never been abundant throughout its range.

Mountain Plover

Mountain plover (*Charadrius montanus*) are small birds similar to killdeer that inhabit short-grass prairie and shrub-steppe landscapes. They are also found on cultivated farms, prairie dog towns, and habitats of sparse sagebrush. These birds are ground nesters that prefer nesting habitat characterized by sparse vegetation and/or bare ground with sandy soil. Nest sites in shrub-steppe environments are often located in the area of prairie dog towns. These birds are rarely found near water. Positive indicators for mountain plovers include near-level terrain, prairie dogs, bare ground, cactus, cattle, widely spaced plants, and horned larks. Mountain plovers are seldom found in tall grass or any dense vegetation. Mountain plovers do not appear to be wary of vehicles; therefore, survey work for this species is best done on ATV's or pickup trucks.

No mountain plovers were observed in suitable habitat during general resource surveys in 2002;

however, prairie dog towns and other suitable habitat exist in the project area. The species is expected to use the area for nesting and brood rearing. No surveys have been conducted in the project area in accordance with the USFWS guidelines. However, the entire project area is being considered as suitable mountain plover habitat and mapping to determine prairie dog habitat in the spring of 2003, confirmed that mountain plover are occupying the area. Other mountain plover sightings have been documented approximately three and a half miles east of the project area and recent sightings (Spring 2003) of mountain plover occurred north of the project area.

Whooping Crane

The U.S. Fish and Wildlife Service identified the whooping crane (*Grus americana*) as experimental during public scoping. However, since then, the bird has been declared extirpated from western Wyoming (U.S. Fish and Wildlife Service, pers comm. L.Keith 5/03). Therefore, this species will not be given further consideration in this document.

Bald Eagle

No sightings of the bald eagle (*Haliaeetus leucocephalus*) have been documented in or adjacent to the project area. Bald eagles prefer habitat near water and cliffs or large trees for nesting. No such habitat exists in or near the project area.

Water Depletions to the Platte and Colorado River Systems

The U.S. Fish and Wildlife Service identified certain fish species as potentially affected by water depletions in the Colorado River System including the endangered bonytail (*Gila elegans*), Colorado pikeminnow (*Ptychocheilus lucius*), humpback chub (*Gila cypha*) and the razorback sucker (*Xyrauchen texanus*). Water depletions occurring in the Platte River system may affect whooping crane, endangered interior least tern (*Steerna antillarum*), threatened piping plover (*Charadrius melodus*), and endangered pallid sturgeon (*Scaphirhynchus albus*), bald eagle, endangered Eskimo curlew (*Numenius borealis*), and the threatened western prairie fringed orchid (*Platanthera praeclara*). The Great Divide Basin is hydrographically closed both as subsurface and surface resources. This project has no potential to affect or impact either river system or special status aquatic species living in them and will not be given further consideration in this document.

3.8.5 BLM SENSITIVE SPECIES

Twelve special-concern species of wildlife occur or potentially occur in the project area. They are the pygmy rabbit, white-tailed prairie dog, swift fox, ferruginous hawk, Greater sage-grouse, burrowing owl, sage thrasher, loggerhead shrike, Brewer's sparrow, sage sparrow, and Great Basin spadefoot toad. Because of changes in censusing techniques, it has been determined that the dwarf shrew (*Sorex nanus*) is not as rare as once believed and has been dropped from the Wyoming BLM Sensitive list and will not be further addressed in this document.

The analysis area contains or has potential habitat for the following species:

Pygmy Rabbit (*Brachylagus idahoensis*) digs its own burrows and is typically distributed in dense

stands of big sagebrush growing in deep loose soils. Such habitat is very limited in the project area. Sightings of the rabbit have occurred just south of Steamboat Mountain located well over 20 miles from the project area. This species is expected to be found in habitats adjacent to but not within the project area.

White-Tailed Prairie Dog is a species which typically lives in towns or colonies established in short grass and sage steppe habitat. This species is present across much of the project area. Refer to the discussion on black-footed ferrets for a discussion of this species.

Swift Fox (*Vulpes velox*) is a housecat size fox usually found in short grass prairie. It prefers to build its dens near ridge tops situated with broad views. Their prey includes ground squirrels, mice, birds, eggs, and a variety of small prey. Swift fox has the potential to occupy the project area.

Ferruginous Hawks (*Buteo regalis*) are raptors found in sagebrush, juniper, and cliff habitats. This species is a common desert dweller which nests on anything from a windmill, juniper tree, barren hilltop, or artificial nest structure. They presently nest on the John Hay Reservoir catwalk north of the project area, on a windmill south of the project area, and on a cliff site southeast of the project area. A one-mile radius from the nest is protected from human activity during the nesting and fledgling rearing season (GRRMP identifies the period between February 1 and July 31). This buffer is established because the nest is usually placed where the bird has a wide vista. In southwestern Wyoming, hatchlings are usually off the nest by the first of July.

Greater Sage-Grouse are a common shrub steppe inhabitant and a popular game species. See Section 3.8.2 for a detailed discussion of this species.

Burrowing Owls (*Athene cunicularia*). Nesting pairs of this species in eastern Wyoming utilized approximately 8.5 acres per pair and are most often associated with prairie dog colonies where they live in abandoned burrows. They are also found nesting in ground squirrel or badger holes and along roadways. Burrowing owls have been sighted within the project area and in suitable habitats outside the area. This species is known to nest in a prairie dog colony south of John Hay Reservoir, a prairie dog colony west of Brannan Reservoir, and in a ground squirrel hole near Chalk Buttes.

Sage Thrashers (*Oreoscoptes montanus*) are common migratory sagebrush obligate passerines. About the size of a robin, this mottled brown bird prefers sagebrush and greasewood communities for nesting and breeding. They commonly feed on seeds and berries, especially buffaloberry, currant, and chokecherry.

Loggerhead Shrike (*Lanius ludovicianus*) are found on the project area from early spring until they migrate south to Mexico and Central America in the fall. This black and white bird is slightly smaller than a robin and is often classified with raptors. Their prey includes songbirds, grasshoppers, crickets, beetles and even small mice. This species often impales their prey on cactus thorns, barbed wire, or greasewood thorns.

Brewer's Sparrow (*Spizella breweri*) and the **Sage Sparrow** (*Amphispiza belli*) are both sagebrush-obligate species and likely occur in the project area. Both nest on or near the ground and feed on seeds and small insects. The Brewer's sparrow is commonly seen in the project area, while the Sage

sparrow is found more often near the John Hay Reservoir.

Great Basin Spadefoot Toad (*Spea intermontana*) is a small toad-like frog that has a spade-like growth on its hind feet to dig a burrow in sand or mud. This family of amphibians is distinguished from true toads by their cat-like eyes and teeth in the upper mouth. Like other amphibians, they must live near a water body, even if the water is seasonal, for successful reproduction. They are commonly found in wetlands associated with flowing wells, along Brannon Reservoir and at the east end of Red Lake. The Great Basin spadefoot toad may occur in playa basins or ephemeral wetlands in the project area following heavy rain.

A summary of the sensitivity status and rank of special status species is found in Appendix B and as an attachment to any permitted component.

3.8.6 MIGRATORY BIRDS

A large number of neotropical and migratory bird species occupy this sagebrush steppe plant community. Birds which typically frequent this area during summer include raven, sage sparrow, horned lark, western bluebird, loggerhead shrike, sage thrasher, McCowen's longspur, and vesper sparrow. Many of the migratory bird species which nest here are common through mid-July, then as this high desert becomes dry and warm, they move north and west to springs, seeps, and more permanent waters, where there is protection from the heat and wind. The slopes of Bush Rim and Joe Hay Rim, located over 12 miles west of the project area, become summer meccas for birds which nest within the Great Divide Basin.

Casual winter species include snow bunting, horned lark, and grey-crowned rosy finch. They may be seen here as winter flocks picking gravel from 2-track trails and roadsides and feeding on plant seed heads which show above the wind-swept snow.

3.9 WILD HORSES

The project area is located within the Great Divide Basin Wild Horse Herd Management Area and encompasses 778,915 acres. The herd management area has an appropriate management level of 415-600 horses with approximately 812 horses currently in the management area. Wild horses are tolerant of human activity. The herd co-exists with current traffic and activity. Wild horses were observed in the vicinity of the project area during 2002 late spring and early summer surveys and observation visits.

3.10 RECREATION

Recreational activities occurring in or near the project area include hunting, off-highway vehicle use, and some camping (generally associated with hunting). No developed recreational sites, facilities, or special recreational management areas exist within or near the project area. The geographic area attracts hunters for big and small game seasons. The area also attracts small numbers of visitors engaged in rock collecting, camping, hiking, wild horse/wildlife observation, outdoor photography,

and picnicking. Although data on recreational use are limited, it is expected that overall use levels are generally low. Trips to the area require long drives from major population centers, and visitation is limited because of the lack of publicized natural attractions and road conditions that limit vehicle access into many back country areas. The GRRMP identifies and manages the area as an extensive recreation management area (not designated as a “special recreation management area”).

3.11 VISUAL RESOURCES

The GRRMP describes and designates scenic quality classifications for the Field Office area, including the project area. The Red Desert is classified as a vast rolling, dry plain with occasional steeper hills and rock outcrops. The project area is typical of the less rugged sections of the Great Divide Basin. The characteristic landscape within the project area and adjacent lands is moderately undulating. Numerous small drainages dissect the landscape. Larger views encompassing several viewsheds are available from high points, taking in vistas of mountain ranges to the north and northwest. The sky/land interface is an important aspect of all distant views. Reddish brown and buff colors of the badland formations add contrast and dominate in areas of steeper topography. Evidence of cultural modification in the project area includes improved and unimproved roads, and oil and gas production facilities.

The project area occurs within a Class III area for visual resource management. Under this classification, changes in the basic elements (form, line, color, or texture) caused by a management activity may be evident in the characteristic landscape. The objective of this class is to provide for management activities that may require modification of the existing character of the landscape. However, changes should remain subordinate to the visual strength of the existing character.

3.12 CULTURAL RESOURCES

Archaeological investigations in the Red Desert Basin indicate the area has been inhabited by prehistoric people for at least 10,000 years from Paleo-Indian occupation to the present. The area was inhabited by small bands of hunters and gatherers for thousands of years. Evidence of these previous inhabitants typically include scattered campsites, occasional burials, occasional house pits, and other sites.

Historic use of the Red Desert Basin typically involves pastoralism and mineral extraction. Inadequate water supply, badlands, and escarpments make the area inhospitable for settlement with only limited ranching activities present. There are numerous features within the present landscape related to both these uses.

Three areas of Native American traditional cultural properties are presently known. Although the Tribal entities did not respond to BLM’s request for public input during scoping, BLM would consult with affected Tribes to elicit concerns and resolve mitigation issues.

Prior to fieldwork, the Wyoming Cultural Records Office will be contacted to request a file search. Cultural resources investigations for the proposed project area included block survey for 20 wells and linear survey of access road/utility corridors for those wells. A total of 468 acres were surveyed

for cultural resources in the initial inventories. There were 10 sites and 10 isolated artifacts located and recorded as a result of this survey. The sites include eight prehistoric sites, one historic site, and one site containing a historic component, prehistoric component, and paleontological materials. The 10 isolated artifacts include two solder dot cans and eight prehistoric artifacts. Additional inventories are anticipated and will change the number of resources identified.

The prehistoric sites consisted of artifact scatters and artifact scatters with features. The recorded sites and isolated finds did not include any diagnostic prehistoric tools. The prehistoric sites probably represent lithic reduction, resource procurement, and habitation areas. The findings of the inventory will serve as a basis for completion of consultations under Section 106 of the National Historic Preservation Act.

Further investigation at some of the sites, in particular 48SW14300, may provide chronological information that would indicate if this site was occupied during the same range of time. It is possible that some of the six sites with prehistoric materials represent task groups, perhaps related to the inhabitants of the Buffalo Hump site that were gathering resources and returning to base camp at Buffalo Hump. Site 48SW14300 is a large prehistoric site with an extensive artifact scatter and features. This may represent another habitation site, similar to Buffalo Hump. Pit structures excavated at Buffalo Hump had a similar morphology to Feature 1 at 48SW14300. Information from this site could provide information to compare and contrast to Buffalo Hump in terms of chronology, technology, and resource use and procurement.

The Buffalo Hump site, 48SW5057, is the largest known archaeological site yet recorded within the Red Desert Basin. The Archaeological Services of Western Wyoming College excavated the site during 1985 and 1986 as part of a data recovery plan designed to mitigate adverse effects from construction of Exxon's Bairoil/Dakota CO2 Pipeline, Section One, from Green River to Jeffrey City, Wyoming (Harrell 1989). A total of 318 square meters (sq. m) was excavated and revealed a multicomponent prehistoric habitation that produced evidence of four occupations spanning the last 2000 years, representing the Late Archaic and Late Prehistoric periods. Evidence from the features and associated cultural remains, indicated that the people who had occupied the camp had a primary focus on collection and processing of plant seeds for food (Harrell 1989). Four housepits, or pit structures, were observed and excavated illuminating the type of shelter or constructions used by the prehistoric inhabitants.

3.13 SOCIOECONOMICS

The geographic area of analysis for potential socioeconomic effects is Sweetwater County and the western portion of Carbon County, Wyoming, and the communities of Rock Springs and Rawlins. Socioeconomic conditions characterized for the assessment include employment and earnings. Sweetwater County has a natural resource-based economy. The oil and gas sector plays an important role. This project would not generate any new employment, but would provide short-term opportunities for existing contractors.

Support for oil and gas development in Sweetwater County is mixed. Nearby residents who are economically tied to the mineral industry generally support development. Opposition comes from

those whose economic interests and lifestyles may be affected, such as grazing allotment permittees and those who value the land for recreation and wildlife habitat purposes and/or believe that certain areas should be left in an undeveloped state.

Executive Order (EO) 12898, "Federal Action to Address Environmental Justice in Minority Populations and Low-Income Populations" was published in the Federal Register (59 FR 7629 on February 11, 1994). EO 12898 requires federal agencies to identify and address disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority populations and low-income populations (defined as those living below the poverty level). The EO makes clear that its provisions apply fully to American Indian populations and Indian tribes, specifically to affects on tribal lands, treaty rights, trust responsibilities, and the health and environment of Indian communities.

Communities within Sweetwater County, entities with interests in the area, and individuals with ties to the area all may have concerns about the presence of CBM development within the project area. Communities potentially impacted by the presence or absence of the proposed development have been identified above in this section. Environmental Justice concerns are usually directly associated with impacts on the natural and physical environment, but these impacts are likely to be interrelated to social and economic impacts as well.

3.14 TRANSPORTATION

The regional transportation system serving the project area is well established and includes Interstate Highway 80, County Road 21 (Bar X Road), and BLM management roads. Improved and unimproved BLM roads also serve local traffic on federal land.

3.15 HEALTH AND SAFETY

Existing health and safety concerns in and adjacent to the project area include occupational hazards associated with CBM exploration and operations; risk associated with vehicular travel on improved and unimproved roads; and low probability events such as landslides, flash floods, and range fires.

3.15.1 OCCUPATIONAL HAZARDS

Two types of workers would be employed by the project: oil and gas workers, who in 1998, had an annual accident rate of 4.0 per 100 workers, and special trade contractors, who had a non-fatal accident rate of 8.9 per 100 workers (U.S. Department of Labor, Bureau of Labor Statistics 1998). These rates compare with an overall private industry average for all occupations of 6.2 per 100 workers.

There has been recent concern among CBM drillers that worker safety standards and training used for conventional oil and gas activities may not be appropriate for the CBM industry (Rock Springs Rocket Miner 2001). During 2000, five workers died and six others were seriously injured in CBM-related accidents in Campbell County, Wyoming. The Wyoming Occupational Safety and Health

Administration, Worker's Safety Division (OSHA) is working with CBM company officials to consider changes in worker safety standards and revised training requirements.

3.15.2 OTHER RISKS AND HAZARDS

Potential for firearm-related accidents would occur primarily during hunting season. No data were available to estimate or discuss likelihood of risk for CBM workers to be injured by hunters. Risk of fire in the project area could occur but is expected to have a low potential. The sagebrush/grass steppe of the project area is subject to a low incidence of lightning strikes, in comparison to the higher incidence of lightning caused fires in the southern area of the RSFO.

3.16 HAZARDOUS MATERIALS

There are no known hazardous waste sites within the analysis area. No hazardous waste or materials are known to be present except those being used for on-going oil and gas activity. Such materials used in association with oil and gas drilling are exempt under Resource Conservation and Recovery Act (RCRA) as long as they are properly handled, stored, and used as intended in accordance with federal and state law.

3.17 NOISE

The project area is located in a sparsely-populated rural setting having modest sound disturbances. The principal sound source within the project area is the wind. Jet aircraft overflights at high altitudes, localized vehicular traffic on county, BLM and two-track roads in the project area and nearby drilling activities also cause sound disturbances within the analysis area. The EPA has established an average 24-hour noise level of 55 dBA as the maximum noise level that does not adversely affect public health and welfare. No regulations concerning quantitative noise levels have been established by the State of Wyoming.

CHAPTER 4

ENVIRONMENTAL CONSEQUENCES

4.0 INTRODUCTION

This chapter provides an analysis of the potential environmental consequences that could result from implementation of the proposed Lower Bush Creek Pilot Exploratory Coal Bed Methane Project for development of federal minerals associated with 20 exploratory and two injection well locations, access roads and associated facilities. Two alternatives including the Proposed Action and the No Action (denial of Proposed Action) are analyzed.

Impact significance criteria are presented for each affected resource. The criteria are based on current regulatory standards, scientific and environmental documentation, or professional judgement.

Measures proposed by the applicant that would avoid or reduce impacts have been identified in Chapter 2, Section 2.1.9. The following impact assessment takes these measures into consideration. Any additional opportunities to mitigate impacts beyond the practices committed to in Chapter 2, are presented in this chapter under the mitigation summary for each resource. Such measures are designed to further reduce or avoid unnecessary or undue impacts.

The analysis of the potential environmental consequences addresses the direct, indirect, and cumulative effects as a result of the Alternatives. This analysis tiers to and incorporates by reference the cumulative impact analysis for the Continental Divide/Wamsutter II Natural Gas Project Environmental Impact Statement (CD/WII) (see individual resource discussions in Chapter 4; document available at the Rock Springs Field Office). The cumulative analysis for the CD/WII included a reasonably foreseeable development of 850 exploratory wells and associated facilities within the general cumulative impact analysis area (the area outside of the minerals cumulative impact analysis area; see Figure 4.1). The proposed project lies within the general cumulative impact assessment area.

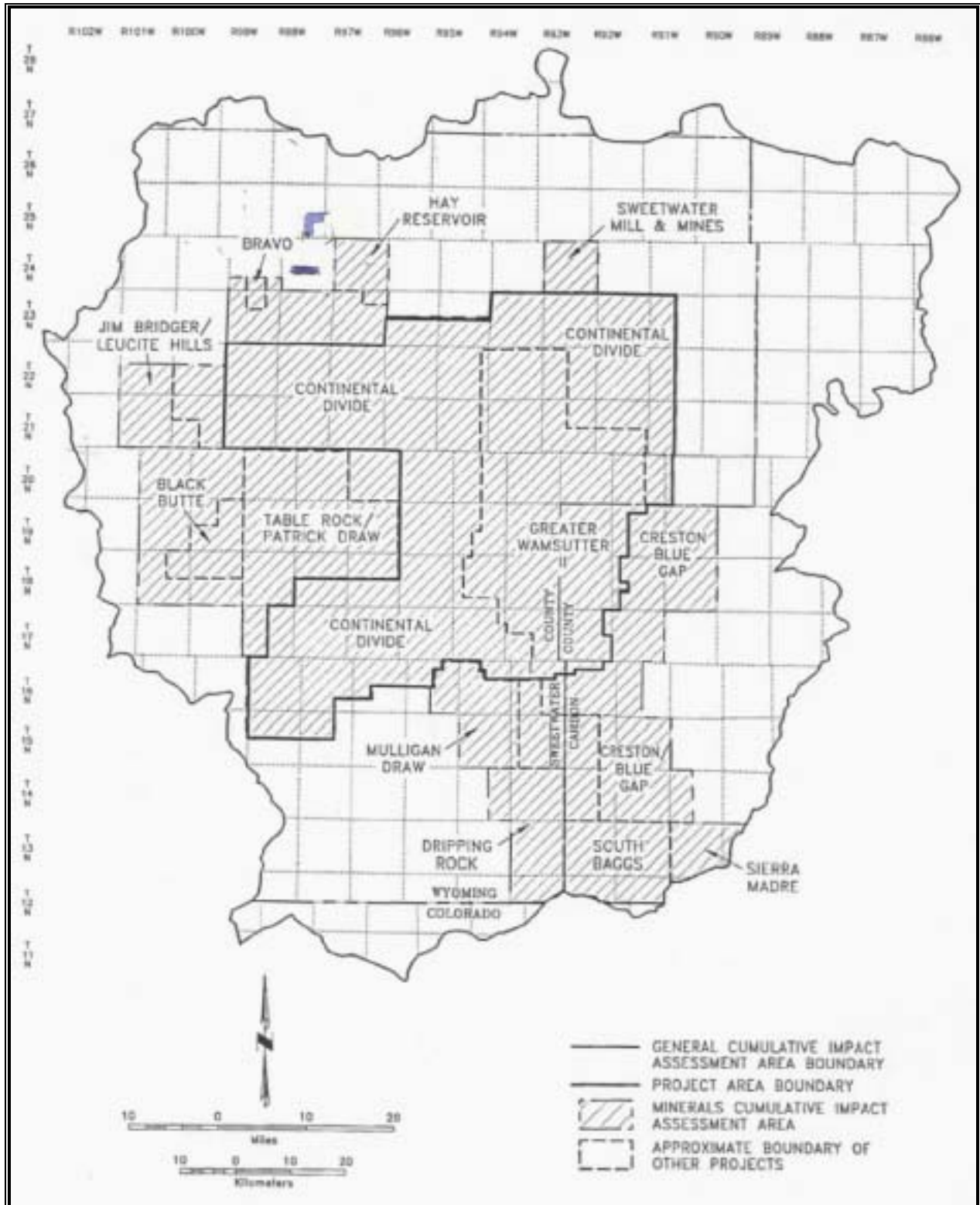
The air quality analysis found in this document tiers to and incorporates by reference the Pinedale Anticline Oil and Gas Exploration and Development Project Environmental Impact Statement (1999a [Chapter 5; document can be found via the internet at <http://www.wy.blm.gov/nepa/pfodocs/anticline/index.htm>]).

4.1 GEOLOGY/MINERALS/PALEONTOLOGY

No standards have been identified for determining the significance threshold for geology or minerals. Damage, destruction, or improper collection of scientifically important paleontological resources

Environmental Assessment, Lower Bush Creek Pilot Exploratory Coal Bed Methane Project

Figure 4.1 CD/WII General and Mineral Cumulative Impact Assessment Areas in Relation to the Project Area



could be considered significant if not properly mitigated or indirectly lost or destroyed due to private collection or vandalism.

4.1.1 Proposed Action

No direct, indirect, or cumulative impacts are expected on geology from the Proposed Action. As discussed in Chapter 3, no major landslides or fault zones have been mapped within the analysis area. The potential for damage from disruption of project facilities from seismic activity is minimal to non-existent over the life of the project.

Drilling of the wells may result in the determination of commercial production potential of CBM resources. This determination would likely lead to further exploration and development. Production of CBM would result in the depletion of an in-place resource and should testing prove economically viable quantities of natural gas are present, it would be expected that further exploration and development would be proposed. Any such proposal would be analyzed at that time. If no commercially viable CBM resources are discovered, then additional exploratory wells may or may not be drilled, depending on the information obtained during drilling of the proposed wells. No other mineral resources would be impacted by implementation of the Proposed Action.

No effect to one of the known fossil sites is anticipated as the site is not directly or indirectly affected by the Proposed Action. Effects to the other known site are unknown as the site has not been fully investigated. Construction excavation associated with the development of access roads, well pads, or reserve pits located on well pads could result in uncovering scientifically important fossils which would be an adverse impact if mitigation were not applied.

4.1.2 MITIGATION

Implementation of the committed practices found in Chapter 2, Sections 2.1.9.2, (soils) and 2.1.9.3 (water resources) would avoid impacts on the surface geologic resources. Implementation of these measures and adherence to federal and state rules and regulations regarding drilling, testing, and completion procedures would avoid or reduce effects on the subsurface geologic environment.

With the mitigation outlined below all known and any unknown paleontological resources uncovered during construction would be protected and any potential impacts minimized.

- The proponent should immediately contact the BLM Field Manager (authorized officer) if any paleontological resources or fossils are discovered as a result of operations. All activities would be suspended in the vicinity of such discovery until notified to proceed by the authorized officer. The authorized officer would evaluate, or would have evaluated, such discoveries not later than 5 working days after being notified, and would determine what action would be taken with respect to such discoveries. The decision as to the appropriate measures to mitigate adverse affects to significant paleontological resources would be made by the authorized officer after consulting with BLM's regional Paleontologist. The proponent may be responsible for the cost of any investigation necessary for the evaluation and for any mitigative measures.

- Should paleontological materials be found during project implementation, all activities within a 100 ft radius should cease and BLM's authorized office notified immediately.
- During processing of each APDs or ROWs, BLM should determine whether a paleontological survey is required.
- The proponent should initiate a worker education of important fossil remains and restrictions on collection of paleontological resources without a permit. The proponent should be responsible for informing all persons associated with the project that they could be subject to prosecution for damaging, altering, excavating, or removing any vertebrate fossil objects on site. Should vertebrate fossil materials be discovered, the operator is to suspend all operations that further disturb such materials and contact the Authorized Officer immediately. Operations would not resume until written authorization to proceed is issued by the Authorized Officer.
- The proponent should be responsible for the cost of any mitigation required by the Authorized Officer. The Authorized Officer would 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 should be allowed to resume operations.

4.1.3 NO ACTION

Under the No Action Alternative, the lease holder would be denied approval to explore and test for economically viable CBM gas on their federal oil and gas leases. Information on CBM reservoirs in this area would remain unknown and the collective knowledge base would not increase at this time. Selection of the No Action alternative would not preclude another exploration and/or development drilling program from being proposed in the same area or elsewhere.

4.2 AIR QUALITY

Standards for healthy public rangelands requires management actions or use authorizations to comply with all federal and state air quality laws, rules, regulations, and standards. Impacts which exceed this standard could be considered significant.

4.2.1 PROPOSED ACTION

Air quality modeling was done for the Pinedale Anticline Oil and Gas Exploration and Development Project and the corresponding EIS Technical Report (1999b) included emissions from the project. This modeling also included a cumulative analysis of emissions from projected development of 7,211 wells in the surrounding areas of the model domain of southwestern Wyoming, north-eastern Utah, and northwestern Colorado. Impacts of both near-field and far-field impacts were considered. The Proposed Action falls within the 7,211 wells analyzed. The results of the air quality modeling

analysis are incorporated by reference. The result of the study found that the predicted emissions from cumulative sources were in compliance with the NAAQS and WAAQS for all pollutants.

Construction emissions would include PM₁₀, SO₂, NO_x, CO, and VOCs from ground-clearing, heavy equipment use, drilling and completion activities, as well as the construction of access roads. Construction emissions are temporary and would occur in isolation, without interacting with adjacent wells.

The small number of exploratory wells and facilities included in the Proposed Action would generate a near-undetectable amount of air pollutants. The engines proposed to be used on the pumping units are among the most efficient on the market. The limited number of vehicles over the short time period of the exploration project would add a minor amount of emissions to the atmosphere and would be considered temporary. These temporary effects on air quality could occur in the immediate vicinity of project activities due to loose road dust and exhausts from vehicles and equipment. These effects would be local and would be widely dispersed by prevailing winds. The effects on air quality would be minimized through the application of dust abatement practices, including adherence to speed limits, and best available technology for engines.

4.2.2 MITIGATION

See Chapter 2, Section 2.1.9.1, for committed practices to protect air quality.

The WDEQ-AQD requested the addition of the mitigation found below to assure appropriate state permits are acquired for any temporary or permanent equipment used in association with this project. With application of this measure, state requirements for permitting for emissions would be met.

- The proponent would seek appropriate permits and follow state protocol for approval of all on-site temporary or permanent equipment used in association with this project from the Wyoming Department of Environmental Quality, Air Quality Division.

4.2.3 NO ACTION

Under the No Action Alternative, no change in the current situation would be expected.

4.3 SOILS

Standards for healthy public rangelands require soils to be stable and allow for water infiltration to provide for optimal plant growth and minimal surface runoff. Impacts which exceed this standard could be considered significant.

4.3.1 PROPOSED ACTION

Soil productivity would be impacted at locations where well sites, facilities, and access roads are constructed. An estimated maximum of 85 acres would be affected by surface-disturbing activities.

Stockpiled topsoil and other disturbed areas, particularly on sandy soils, could be subject to wind erosion and runoff during storm events until stabilized by a vegetative cover. Practices that Kennedy has committed to, as detailed in Chapter 2, and existing regulatory requirements would help conserve soil resources through best management practices for erosion control and revegetation in disturbed areas.

Kennedy's experience in the Powder River Basin has convinced them that special purpose roads work well for CBM exploration and results in less initial disturbance and resource damage. BLM's experience in southwestern Wyoming is that potential direct and indirect impacts to soils due to year-round use of special purpose roads could result in soil damage as a result of traffic on unconstructed roads (without a crown/ditch design element) in the form of rutting and possibly gully development which leads to water and wind erosion. Use of drilling mud (bentonite is used as a lubricant during drilling activity) as a binder with native soils could prove problematic. Bentonite expands when wet and use of this material to build up the driving surface (plating) would result in slippery driving conditions. Cohesiveness of soils in the analysis area is rated as low, making them susceptible to erosion when disturbed. These soils therefore lack strength to carry heavy traffic. Ruts in the travel-way cause drivers to avoid those areas and create new disturbance. Ruts also act as conduits for runoff water, concentrating the flow and increasing the erosiveness of the runoff.

Vehicle travel on unprotected dry surfaces loosens and pulverizes what little soil structure and cohesion that exists in the soils found in southwest Wyoming. The result is a powder-like duff that is highly susceptible to wind erosion and compaction when wetted. As is found on wet, muddy areas, drivers frequently avoid these soft spots by driving around them and creating new, uncontrolled disturbance. Wind eroded roads often become below grade (lower than the surrounding surfaces) as a result of scour and displacement. These surfaces then become flumes for runoff water.

If use of special purpose roads were allowed without a mechanism for monitoring and mitigating any resource damage, use could result in adverse impacts.

4.3.2 MITIGATION

See Chapter 2, Section 2.1.9.2, for committed practices.

With application of the measures found below, impacts from testing of special purpose roads would be within acceptable limits and any resource damage repaired before it becomes severe.

- BLM could allow the proponent to test use of special purpose roads to confirm likely impacts. All special purpose roads would be surveyed. BLM would monitor construction and use of these roads. If during monitoring, damage to soils or other resource values becomes evident, the proponent would be required to stop activity, engineer the roadway, and construct the road to BLM road standards in accordance with RMP mandates. If resource damage occurred and rectifying the damage necessitated disturbing an area greater than that analyzed or approved, the project or component of the project would be halted while further environmental study occurs.

- The proposed special purpose road, located between the existing upgraded road and the Federal 23-22 (Central Sweetwater pod) would be upgraded to a resource road as this area will serve as a loop road for the pod but would result in an additional 17 acres of disturbance.
- All resource roads would be designed by or under the direction of a licensed engineer in accordance with RMP mandates.
- If development of ruts results in unnecessary or undue damage to soils or other resources, the proponent would be required to re-construct the special purpose road to a higher road standard.
- Drilling mud should not be used for road plating, surfacing, or development.

4.3.4 NO ACTION

No effects on soils would be expected beyond the current situation.

4.4 WATER RESOURCES

Standards for healthy public rangelands require actions to comply with Wyoming State water quality standards. Impacts which exceed this standard could be considered significant.

4.4.1 PROPOSED ACTION

With the use of proper well pad construction techniques and drilling practices, and with the implementation of Best Management Practices (BMPs) and applicant committed practices, these standards would be met and no adverse effect on groundwater aquifers and quality would be anticipated under the Proposed Action. Groundwater would be removed from the coal seam aquifers within the Big Red Coal of the Fort Union Formation in order to test CBM production. CBM testing activities likely would lower the hydraulic pressure head in the affected coal seam aquifer. The reduction of hydraulic pressure head in an aquifer also is referred to as drawdown. Relative to the available drawdown within the aquifer, and the extent of the Proposed Action, effect on the coal aquifer is expected to be minimal because this project is designed to test CBM production and reinjection potential. Because testing results would remain unknown until after the project is completed (assuming initial testing proves promising), the effects of groundwater extraction and reinjection should be subject to monitoring of groundwater conditions and findings analyzed prior to any expansion of activities in the area. No ground water wells permitted by the WSEO are known to occur within a mile of the project area. There would be no impacts to existing wells.

CBM exploratory wells would produce water that would be disposed of in two injection wells. The proposed injection targets for each injection well are the sands of the Fort Union Formation, located approximately 4,500 to 6,000 feet below the surface, respectively. Background water quality analyses of the injection horizon currently are not available, but it is anticipated that the CBM

produced water that would be of equal or higher quality compared to the water quality in the injection zone, with regard to class of use as defined by WDEQ-GWD regulations. Injection of the CBM produced water is not expected to result in any deterioration in groundwater quality within the injection horizon due to the depth and expected water quality (must be equal to or worse quality than the produced water. These sands are isolated above and below by competent shale barriers that would prevent the initiation and propagation of fractures through overlying strata to any fresh water zones. The only effect on the injection horizons would consist of an increase in hydraulic head, which would decrease with distance away from the wellbore. In terms of water quantity and quality, the Proposed Action's effect on the injection horizon would be minimal.

The fracture gradient of the beds that overlie and underlie the injection horizons would not be expected to be exceeded, so all injected water would be contained in the injection horizon and would not migrate vertically. For this reason, the injected water is not expected to degrade water quality of any adjacent aquifers.

Water for use in drilling the initial CBM well in the project area would be obtained from a local permitted source and water for drilling the remaining wells would be obtained from the first well drilled. The project would require approximately 600 barrels of water per well for drilling, completion, and well stimulation. This water requirement is relatively small and would not adversely affect existing surface or groundwater sources or rights.

Construction activities would occur over a relatively short period of time. Construction impacts would likely be greatest shortly after the start of the project and would decrease in time due to stabilization, reclamation, and revegetation efforts. The Proposed Action would result in 85 acres of initial disturbance and 29 acres of life-of-project disturbance. Construction disturbance would not be uniformly distributed across the project area, but rather, construction activities would be concentrated within and around the wells. Kennedy would implement BMPs and committed practices to ensure spills of produced water do not occur; therefore, no impact from spills is anticipated.

Potential direct and indirect impacts due to year-round use of "special purpose" roads could result in damage as a result of traffic on unconstructed roads (without a crown/ditch design element) in the form of ruts and possibly overland channelization (gulying) which accelerates water erosion. The use of drilling mud as a road construction material is also problematic. Many drilling muds contain bentonite which expands when wet. Use of this material to build up a driving surface (plating) in low-lying areas where water collects would result in slippery and unsafe driving conditions. Soils found in the area lack the strength to carry heavy traffic; therefore, any rut development not only leads to drive-arounds but acts as conduit for runoff water, concentrating the flow and increasing the erosiveness of the runoff.

Vehicle travel on unprotected dry surfaces loosens and pulverizes existing soil structure and cohesion. The result is a powder-like duff that is highly susceptible to wind erosion and compaction when wetted. Traffic frequently avoids wet, muddy areas by driving around them and creating new uncontrolled disturbance. Wind eroded roads often become below grade (lower than the surrounding surfaces) as a result of scour and displacement. These surfaces then become flumes for runoff water.

If use of special purpose roads were allowed without a mechanism for monitoring and mitigating any resource damage, adverse impacts from use of such roads could occur.

4.4.2 MITIGATION

See Chapter 2, Sections 2.1.9.2, 2.1.9.3, 2.1.9.6, and 2.1.9.7 for committed practices. Additional mitigation for ground water resources has been identified.

- Monitoring of groundwater conditions and findings would be analyzed prior to any expansion of activities in the area.
- Results of water quality testing from reserve pits and injection wells would be submitted to BLM RSFO.

With application of the measures found below, impacts from testing of special purpose roads would be within acceptable limits and any resource damage repaired before it becomes severe.

- Any special purpose roads allowed would be surveyed. BLM would monitor construction and use of these roads. If during monitoring, damage to resource values becomes evident, the proponent would be required to stop activity, engineer the roadway, and construct the road to BLM road standards. If resource damage occurred and rectifying the damage necessitated disturbing an area greater than that analyzed or approved, the project or component of the project would be halted while further environmental study occurs.
- The proposed special purpose road located between the existing upgraded road and the Federal 23-22 (Central Sweetwater pod) would be upgraded to a collector road as this area will serve as a loop road for the pod but would result in an additional 17 acres of disturbance.
- All resource roads would be designed by or under the direction of a licensed engineer in accordance with RMP mandates.
- If development of ruts results in unnecessary or undue damage to soils or other resources, the proponent would be required to re-construct the Special Purpose road to a higher road standard.
- Drilling mud would not be used for road plating, surfacing, or development.

4.4.3 NO ACTION

No additional effects on water resources would be expected to occur beyond the current situation.

4.5 VEGETATION, SPECIAL STATUS PLANT SPECIES, WETLANDS, NOXIOUS WEEDS

Standards for healthy public rangelands require upland vegetation to consist of plant communities appropriate to the site which are resilient, diverse, and able to recover from natural and human disturbance. Impacts which exceed this standard could be considered significant.

4.5.1 PROPOSED ACTION

Implementation of the project would result in the loss of natural vegetation in terms of cover and species composition in areas where well sites, facilities, and access roads would be constructed. An estimated 85 acres would be affected by initial surface-disturbing activities during drilling and testing. To avoid permanent loss of species diversity and vegetative cover, topsoil would be stockpiled, and reclaimed areas would be seeded with site-specific mixes during appropriate planting periods, according to the committed practices detailed in Chapter 2. Life-of-project disturbance would be approximately 29 acres.

Indirect effects would include increased potential for weed invasion, exposure of soils to accelerated erosion, loss of habitats, and changes in visual aesthetics. Use of committed practices described in Chapter 2 during construction, operation, and reclamation activities would minimize effects on vegetation resources. Weed monitoring would occur during drilling, production, and reclamation activities. Weeds found would be eradicated following county control and BLM-approved procedures. To further reduce potential impacts from invasive species, equipment should be washed prior entering the project area. Properly reclaimed areas free of weed species would not cause loss of habitat or change visual aesthetics.

The Wyoming big sagebrush, greasewood, and saltbush cover types that would be disturbed under the project are commonly found across southwest Wyoming. The short-term or long-term loss in acreage described above would not impact the overall abundance and quality of these habitats.

In general, the duration of effects on vegetation in the project area would depend on the time required for natural succession to return disturbed areas to pre-disturbance conditions of diversity (species diversity and structural diversity). Reestablishment of pre-disturbance conditions would be influenced by climatic (growing season, temperature, and precipitation patterns) and edaphic (physical, chemical, and biological soil conditions) factors. This would include the amount and quality of topsoil salvaged, stockpiled, and spread over disturbed areas. If reseeding can not be completed in accordance with Kennedy's proposal of reseeding in the fall, seeding should take place in the early spring. Application of this measure would help assure proper revegetation.

BLM has made a no-effect determination for federally listed threatened or endangered plant species as their habitat is not known to occur in the project area. Wetlands are not expected to be impacted.

4.5.2 MITIGATION

See committed practices in Chapter 2, Sections 2.1.9.2, 2.1.9.3, and 2.1.9.5.

- All equipment would be washed prior to entering the project area in order to prevent or minimize the spread of invasive species.
- If seeding in the fall cannot be done in accordance with Appendix D, seeding would be done in the early spring prior to April 15.

4.5.3 NO ACTION

Under the No Action Alternative, the development of the Proposed Action would not occur. No additional effects on vegetation resources or wetlands would be expected to occur beyond the current situation.

4.6 RANGE RESOURCES AND OTHER LAND USES

Standards for healthy public rangelands require upland vegetation to consist of plant communities appropriate to the site which are resilient, diverse, and able to recover from natural and human disturbance. Impacts which exceed this standard could be considered significant.

4.6.1 PROPOSED ACTION

Anticipated effects on range resources associated with the project are limited to a minimal loss of forage, an increased potential for vehicle/livestock collisions, and an increased potential for the spread of noxious and invasive weeds (discussed above under Vegetation/Wetlands/Noxious Weeds). The project would not be likely to result in noticeable effects on range resources. The area of disturbance (85 acres) represents approximately 5 to 7 AUMs.

Livestock grazing activities would continue during the implementation of the project. Forage in the project area would be reduced slightly during drilling and field development and restored as soon as practical thereafter, except for areas used for road corridors and well facilities, which would remain disturbed throughout the productive life of the project. The increased traffic associated with project activity could correspondingly increase the potential for vehicle/livestock accidents during that period; however, roadways are limited and the grazing area expansive, resulting in decreased likelihood of collisions.

No impacts to other land uses are anticipated as geophysical operations can easily accommodate on-going land use activity. As long as Kennedy Oil restricts operations to their right-of-way, no impact to existing pipelines is expected although holders of existing rights-of-way should be notified when activity is planned within or adjacent to the existing facilities. Kennedy would use certain roads having rights-of-way held by other operators. Kennedy should contribute to any required road maintenance.

4.6.2 MITIGATION

- The proponent could be required to notify holders of existing rights-of-way or other permits (i.e., grazing) of planned construction, operations, or maintenance activities.
- For the purpose of determining joint maintenance responsibilities, the proponent would make road use plans known to all other authorized users of the road. Any road rights-of-way would include a standard stipulation for joint road maintenance agreement.

4.6.3 NO ACTION

Under the No Action, the development of the Proposed Action would not occur. No additional effects on range resources would be expected to occur beyond the current situation.

4.7 WILDLIFE/SPECIAL STATUS SPECIES

Standards for healthy public rangelands require that such lands are capable of sustaining viable populations and a diversity of native animal species appropriate to that habitat. Those habitats that support threatened, endangered species, species of special concern, or sensitive species would be maintained or enhanced. Impacts which exceed this standard could be considered significant.

4.7.1 PROPOSED ACTION

The effects on wildlife of the proposed project would include displacement of wildlife, loss or temporary disturbance of wildlife habitats, an increase in the potential for collisions between wildlife and motor vehicles, and an increase in the potential for illegal kill, harassment, and disturbance of wildlife due to increased human presence and improved vehicle access. The magnitude of impacts to wildlife resources would depend on a number of factors including the type and duration of disturbance, the species of wildlife present, time of year, and successful implementation of avoidance and mitigation practices. An estimated 85 acres under the Proposed Action would be affected by surface-disturbing project activities. Reclamation following project activities is expected to return most habitats to pre-disturbance conditions over the long term. During construction, the project is expected to be avoided by some resident species.

Disturbances from human activity and traffic would reduce wildlife use of habitats immediately adjacent to these areas by species sensitive to indirect human disturbance (noise and visual disturbance). Wildlife use of these areas would be lowest during the construction phase when human activities are more extensive and localized. Disturbance would decline during the production phase of operations and some animals may become acclimated to equipment, facilities, and infrequent human presence, and may reoccupy habitats near disturbed areas.

The direct disturbance of wildlife habitat in the project area likely would reduce habitat availability and effectiveness for a variety of small mammals, birds, reptiles, amphibians, and their predators.

The initial phases of surface disturbance and increased traffic would potentially result in some direct mortality to small mammals, reptiles, and amphibians. Noise and traffic would displace wildlife from construction areas. An increase in mortality from increased vehicle use of roads in the project area would also be expected.

Due to the relatively high reproduction potential of some of these species and the relatively small amount of habitat disturbed, small mammal and songbird populations should quickly rebound to pre-disturbance levels following reclamation of utility corridors, unused portions of roads, well pads, and wells that prove to be unproductive. No long-term effects on populations of common small mammals and songbirds are expected.

4.7.1.1 BIG GAME

Effects on big game species would include direct loss of habitat and forage, and increased disturbance from activities associated with the project. Disturbance of big game species during the parturition period and on winter range can increase stress and may influence species distribution and productivity (Hayden-Wing 1980, Morgantini and Hudson 1980). No crucial big game winter range or parturition areas have been identified in the project area.

There may also be a potential for an increase in poaching and harassment of big game, particularly during winter. Big game would be expected to demonstrate some avoidance of the area for the life of the project due to an increase in human presence.

Effects on big game are expected to be minimal, as the project area represents less than one percent of pronghorn antelope (migration would not be impeded since no fencing is proposed other than around the reserve pits which is designed to keep animals out), mule deer, or elk winter or year-long range. Any snow removal could impede big game movement if berms were too high or if there were no breaks in the berms. Application of the mitigative measure found below should prevent this potential impact. No long-term habitat loss is expected once reclamation is complete, as big game species are expected to return to the area.

4.7.1.1.1 MITIGATION

See committed practices found in Section 2.1.9.8, Chapter 2 and Appendix B.

- Any snow removal would be done in a manner that would not preclude movement by big game (i.e., no tall berms or regularly spaced breaks in the berms).

4.7.1.2 UPLAND GAME BIRDS

Effects to greater sage-grouse could include direct loss of habitat and forage, and increased disturbance from project related activities. Disturbance of sage-grouse during the nesting and brood-rearing period and on winter concentration areas can increase stress and may influence species distribution. There may also be a potential for increased poaching and harassment or increased predation from raptors using facilities for perching. Greater sage-grouse would be expected to

demonstrate avoidance of the area for the life of the project depending upon the level of human activity and where it occurs in relation to suitable habitat. Noise and human disturbance in the project may lead to lek abandonment and reduced nesting.

Although no active leks are located in the project area, five leks are found within two miles. Although these leks have had little activity the last couple of years there is an abundant quantity of suitable greater sage grouse nesting habitat available. The amount of habitat disturbance should be minimal in proportion to that which is suitable. Sage grouse can be impacted by other activities associated with CBM development, including increased human and pet activity, increased traffic, and predation by birds of prey.

4.7.1.2.1 MITIGATION

The project would be conducted with adherence to committed practices as detailed in Section 2.1.9.8, Chapter 2.

Application of the mitigation measures found below would further reduce potential impacts.

- The GRRMP contains mitigating practices that protect the breeding, nesting and brood-rearing activities of the greater sage-grouse from February 1 to July 31. “No surface occupancy” stipulations apply within a 1/4 mile buffer around active leks. Road use would be limited within 1/4 mile of an active lek between 6:00 pm and 9:00 am February 1 through May 15.
- Construction of structures that could be used for raptor perches would be avoided or mitigated to prevent raptor perching. Exceptions may be granted if the activity would occur in unsuitable sage grouse nesting habitat.

4.7.1.3 RAPTORS

The principal potential effects of implementing the proposal on raptor species would be nest abandonment and/or reproductive failure caused by project-related activities and increased public access, and small, temporary reductions in prey populations for raptors. No active raptor nests were found within the project area during 2002. The only known nest is found at John Hay Reservoir, located over one mile to the north.

There is also potential for impacts to burrowing owls expected to nest in the area. No effects on other breeding raptors are expected, provided avoidance and mitigation measures are followed. Raptors could use facilities as perching sites for hunting resulting in additional impacts to small animals residing in the area. No cumulative effects are expected with the implementation of committed practices and mitigations.

4.7.1.3.1 MITIGATION

The project would be conducted with adherence to committed practices as detailed in Section

2.1.9.8, Chapter 2.

4.7.1.4 THREATENED AND ENDANGERED SPECIES

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

White-tailed prairie dog colonies provide essential habitat for black-footed ferrets. Ferrets depend almost exclusively on prairie dogs for food, and they depend upon prairie dog burrows for shelter, parturition, and raising young (Hillman and Clark 1980). Prairie dog towns or complexes must be greater than 200 acres and have a burrow density greater than or equal to 8 burrows/acres in order to be considered suitable for black-footed ferrets (Biggins, et al. 1989). Suitable habitat is found in the general area; however, the BLM has made a no effect determination for this action and the FWS concurred. Prairie dogs could be subject to predation by raptors if facilities are used for perching. Anti-perching devices would mitigate any impact.

The proposed water pipeline route which does not follow roads would disturb a white-tailed prairie dog town. To avoid impacts to the town, all proposed pipelines should follow the road or travel way. Road maintenance could result in disturbance to prairie dog towns if it were to occur outside of previously disturbed areas. Keeping disturbance within the permit boundary would protect the town.

Mountain Plover

The presence of prairie dog towns and other suitable habitat indicate that plovers use these areas during breeding and brood-rearing. The potential exists for adverse impacts if protective measures are not adhered to. This species has been observed in the project area. Standard avoidance and mitigation measures in accordance with FWS guidelines should ensure no adverse impact to mountain plovers would occur as long as the measures are adhered to. Based on such mitigation, this action has resulted in a no jeopardy determination, and a may affect, not likely to adversely effect determination should the plover be listed as threatened under the Endangered Species Act.

Bald Eagle

Since neither habitat, nor potential habitat exists within two miles of the project, the Proposed Action would have no effect on bald eagles. No mitigation is required.

4.7.1.4.1 MITIGATION

The project would be conducted with adherence to committed practices as detailed in Section 2.1.9.8, Chapter 2.

Adoption of the following measures would further reduce potential impacts.

- Pipelines should follow roads or travel ways to avoid disturbance to an existing prairie dog town.

- Should a mountain plover nest, chick, or egg be observed during construction, all work would be stopped within ½ mile and BLM notified immediately. In mountain plover habitat, reclamation seed mixes would include species that would not exceed 6 inches in height.
- Roads and pipelines should be designed to minimize the amount of disturbance to suitable plover habitat.
- Stopping and getting out of vehicles along roadways would not be allowed in suitable mountain plover habitat during the breeding and nesting period (April 10 to July 10) to prevent unnecessary disruption to mountain plover except in an emergency situation.
- Construction of structures that could be used for raptor perches should be avoided or mitigated to prevent raptor perching.

4.7.1.5 BLM SENSITIVE SPECIES

Direct and indirect effects on BLM sensitive species could occur due to impact with vehicles, loss of habitat or displacement due to project activities. Due to the relatively small size of the project area, the inherent mobility of these species and the abundance of potentially suitable habitats nearby, there should be no noticeable adverse effects from the proposed development. Project activities would be conducted in accordance with committed measures outlined in this document.

4.7.1.5.1 MITIGATION

The project would be conducted with adherence to committed practices as detailed in Section 2.1.9.8, Chapter 2. Also see Section 4.7.1.2.1 for mitigation for protection of the greater sage-grouse.

Adoption of the following measures would further reduce potential impacts.

- Road maintenance on the access road leading to the North Sweetwater pod would not occur outside the area previously disturbed within the existing white-tailed prairie dog town.
- Kennedy could adopt a policy restricting firearms and dogs at work locations.

4.7.1.7 MIGRATORY BIRDS

Migratory bird species nesting in the area may suffer habitat loss through shrub removal or could collide with vehicle traffic. The proposed activity may benefit some species of birds which feed on weed seeds (i.e., Horned Larks). Produced water could prove toxic to birds if levels of certain elements (i.e., sodium) were present in high concentrations. Kennedy has agreed to net reserve pits if sodium levels exceed 17,000 ppm. Seasonal restrictions stipulated for raptor and mountain plover protection should minimize adverse impacts to those species. These time limitation stipulations for construction should also benefit migratory bird species which use the project area.

4.7.1.7.1 MITIGATION

To further prevent impacts to migratory birds, the following measure could be adopted.

- All reserve pits would be netted prior to using the pits to store produced water if water quality testing shows water quality to be toxic to migratory birds. Toxicity levels would be determined using FWS' guidelines (i.e., selenium thresholds). Any netting would have a weave sufficiently small enough to prevent small migratory birds from entering the pits.

4.7.2 NO ACTION

Under the No Action Alternative, the development of the proposal would not occur. No additional effects on wildlife resources would be expected to occur beyond the current situation.

4.8 WILD HORSES

If the wild horse population found in the Great Divide Basin Wild Horse Herd Management Area were impacted to the extent that wild horse populations were reduced to well below the low-end of the appropriate management level identified in the GRRMP could be considered significant.

4.8.1 PROPOSED ACTION

Some forage loss is expected due to development. Although wild horses are accustomed to vehicles, traffic, and other human activity, vehicle/horse collisions could occur if traffic speeds are not kept to a minimum and the right of way is not given to the wild horses especially if drilling activity occurs at night. Temporary displacement of wild horses during construction may increase use on areas outside the project area. Horse gathers may occur within or around the project but should not conflict with the Proposed Action.

4.8.2 MITIGATION

The Proposed Action would adhere to committed practices as detailed in Chapter 2.

Application of the following mitigation would further reduce potential impacts.

- Wild horses would be given the right of way and reduced speed limits should be implemented especially if work is done at night.

4.8.3 NO ACTION

Under the No Action Alternative, the development of the Proposed Action would not occur. No additional effects on wild horses would be expected to occur beyond the current situation.

4.9 RECREATION

Any impact that would eliminate recreational opportunities in the Red Desert Watershed Area could be considered significant.

4.9.1 PROPOSED ACTION

Due to the abundance of nearby similar recreational opportunities for hunting, camping, and off-highway vehicle use, no noticeable effects on recreational experiences are expected under the project. Impact to the recreation use of the project area would involve a temporary displacement of some hunters, particularly if construction and drilling activities were to occur during hunting season. Some hunters perceive these activities as displacing game species and creating an environment that detracts from the hunting experience. The proposed drilling schedule could limit displacement to one season. Hunters could easily relocate to other areas outside the project area.

Undisturbed landscapes, isolation, and solitude are often important to recreationists. Project-related disturbances that adversely impact the characteristic landscape could also contribute to a decline in the recreation experience for these users. The recreation experience for those continuing to use the area could be less satisfying than use under the pre-disturbance conditions described in Chapter 3.

The effects described above would diminish substantially once drilling and construction are completed. However, they would persist at reduced levels. Overall effects on the recreation resource would be minimal due to the short-term nature of drilling and construction activities, and concentrated locations of activities.

4.9.2 MITIGATION

No mitigation is identified.

4.9.3 NO ACTION

Under the No Action Alternative, the development of the Proposed Action would not occur. No additional effects on recreation resources would be expected to occur beyond the current situation.

4.10 VISUAL RESOURCES

Impacts that would result in a change to the existing visual classification (Class III) or that would prevent a casual observer the opportunity of seeing areas with unobstructed views (from key observation points) could be considered significant.

4.10.1 PROPOSED ACTION

As noted in Chapter 3, Affected Environment, the project area is not pristine. Developed roads and

two-track roads exist throughout the area, and are used by ranchers, recreationists and mineral developers. No effects on the existing visual resource management class (Class III) are expected under the Proposed Action.

Digital analysis of key observation points, a 10-mile section of County Road 4-21 adjacent to the project area, was constructed using ArcView 3.2 with Spatial Analyst. Vertices were selected along the road at 100-yard intervals. The height of the casual observer was set at 1.524 meters (5 feet). Height of the observed was set at 0.0 meters (ground level). The outside distance was set at 8046.72 meters (5 miles or outer edge of the foreground of the viewing area). The computer generated results can be found on Figure 4.1. It should be noted that using this technique to conduct a settings analysis does not take into account the screening effect of vegetation. In addition, the areas shown as visible on Figure 4.1 are visible from some point along the travel way.

Short-term impacts to the visual resource associated with construction and drilling in the project area would include contrasts in line, form, color, and texture associated with drilling rigs, construction equipment, service trailers, and the general industrial character of drilling and testing activities. Additional impacts could occur from fugitive dust produced by construction activities. Thus, any impacts to the Class III viewshed would be temporary and considered necessary and due. Use of low-contrast, non-reflective paint and natural colors on structures would reduce the visual impacts to the extent possible and be in accordance with the GRRMP management actions for the Red Desert Watershed Management Area.. BLM approved colors would be used on any temporary (i.e., tanks) or permanent structures (i.e., wellhead covers) in accordance with the GRRMP.

Additional fixed facilities such as access roads (improved and unimproved roads and overland routes) would be required to service production facilities. Roads would create additional contrasts in line, color and texture to those described above. With appropriate mitigation, the level of contrast would not exceed Class III standards. However, contrasts could diminish the experience of motorists and recreationists in the immediate area.

4.10.2 MITIGATION

No additional mitigation is identified.

4.10.3 NO ACTION

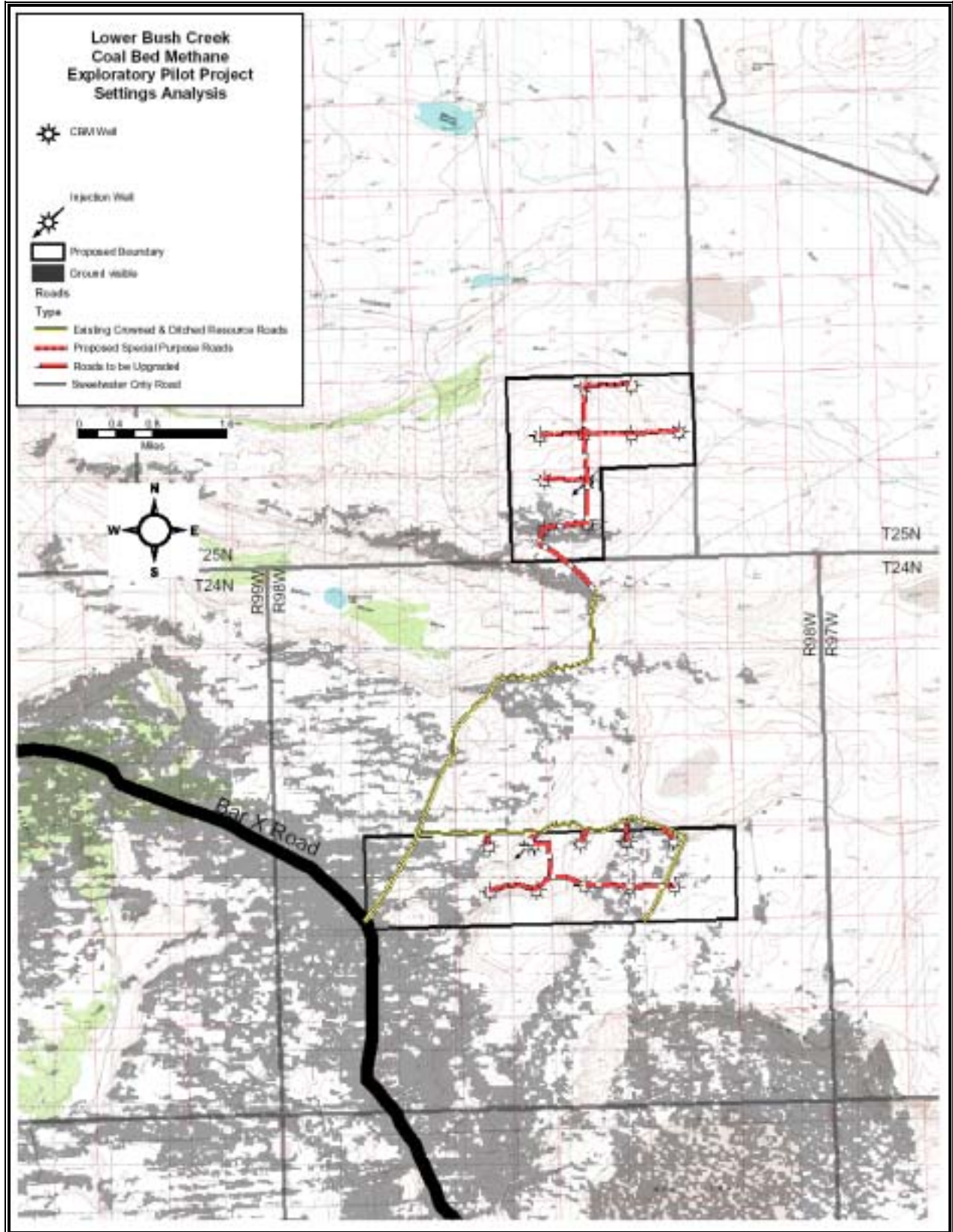
Under the No Action Alternative, the development of the Proposed Action would not occur. No additional effects on recreation resources would be expected to occur beyond the current situation.

4.11 CULTURAL RESOURCES

If actions were to adversely affect a National Register eligible property and could not be mitigated, resulting in an adverse effect determination, the impact could be considered significant.

Environmental Assessment, Lower Bush Creek Pilot Exploratory Coal Bed Methane Project

Figure 4.2 Viewshed Analysis of Project Area and Access



4.11.1 PROPOSED ACTION

Adverse effects to historic properties would be mitigated first by avoidance, then by other measures determined in consultation with the Wyoming State Historic Preservation Officer and affected Tribes as appropriate. Monitoring by a professional archaeologist of surface disturbing activity is useful to reduce to potential damage to cultural resources. Direct impacts would primarily result from construction related activities. Activities considered to have the greatest potential effect on cultural resources include blading of well pads and associated facilities and the construction of roads and pipelines. Sites located outside the project area would not be directly affected by the construction activities.

Some Class III surveys have been completed in the project area but others are yet to be fully completed. Identification of important sites prior to disturbance would minimize or eliminate impacts to important cultural resources. The likelihood exists that buried sites could be disturbed during construction. Indirect impacts to cultural sites not inventoried could be possible if unauthorized disturbances were to occur.

4.11.2 MITIGATION

Application of the mitigation identified below would minimize potential impacts to cultural resources.

- Individual cultural clearances would be approved prior to approving well APDs.
- All surface or vegetative disturbing activities associated with individual actions should be monitored by a professional archaeologist.
- If at any time during construction, maintenance, or use of in the project area, previously unanticipated or unknown cultural resources are discovered, all activities would be suspended in the area of discovery. Continued operation would be conducted in such a fashion as to permit no further damage to the discovered cultural resource. Protective measures could be implemented in consultation with BLM and the Wyoming State Historic Preservation Office. Work would not resume in the area of discovery until a written Notice to Proceed is issued by BLM's authorized officer.
- Mitigation of effects to cultural resources would be determined through consultation between the BLM and the Wyoming State Historic Preservation Officer and affected Tribes as appropriate. Protective measures may be required to preserve significant cultural resources outside the direct impact zones as well.

4.11.3 NO ACTION

Under the No Action Alternative, the development of the Proposed Action would not occur. No additional effects on cultural resources would be expected to occur beyond the current situation.

4.12 SOCIOECONOMICS

Impacts that result in a major increase to the population base of Sweetwater or Carbon Counties or major increases in needed social services could be considered significant.

4.12.1 PROPOSED ACTION

The project could enhance local and regional economic conditions and could result in the generation of local, state, and federal government tax and royalty revenues should production prove successful and ensue. The relatively small, short-term drilling and testing operations workforce would not generate noticeable population effects or demand for temporary housing or local government services. Work camps (office, sleeping trailers) could be required. Should work camps be required, it would be authorized as separate action since exact locations are unknown at this time.

The proposal would involve capital investment. Development and operation of the project would require goods and services from a variety of local and regional contractors and vendors, from the oil and gas service industry and from other industries. Expenditures by the proponent for these goods and services, coupled with employee and contractor spending, would generate economic effects for Sweetwater and possibly Carbon Counties, and for Wyoming in the form of taxes collected.

It is reasonable to assume that the direct and indirect economic benefits of the project would be positive. It would be expected that if testing proves successful, additional development would be proposed. The extent of any future proposed development is unknown at this time.

4.12.2 MITIGATION

See Chapter 2, Section 2.1.19.10 for committed practices.

- Any work camps would be authorized separately.

4.12.3 NO ACTION

Under the No Action Alternative, the development of the proposed project would not occur. No federal mineral royalties or local taxes would be obtained from this project. No additional socioeconomic effects would be expected to occur beyond the current situation.

4.13 TRANSPORTATION

Impacts that result in major changes to traffic patterns on highways or county roads or cause severe damage to permitted roads or adjacent resources could be considered significant.

4.13.1 PROPOSED ACTION

The project would generate increases in traffic volumes on highways and county and management roads providing access to and within the project area. These increases would result from the movement of project-related workers, equipment and materials to and from the project area to perform drilling, field development, well service, field operations, and reclamation activities.

Table 2-2 shows the estimated average number of trips associated with various well field activities. According to information provided by the proponent, drill rigs, water trucks, and other items of heavy equipment would be transported to the project area and remain within the project area until drilling is completed. Materials and supplies would be delivered on a weekly basis and stockpiled within the project area. Drilling and completion crews and other personnel would commute to the area daily. Based on these plans and the estimates contained in the table, the project would generate between 5 and 20 round trips per day during drilling and testing operations. After the drilling and testing phase is completed and if production ensues, Proposed Action-related traffic would average one or two trips per day, with slightly higher peak periods when maintenance activities are performed on wells.

Given the relatively small increment of traffic and the relatively short duration of the drilling and testing phase, it is unlikely that the project would result in a measurable increase in accident rates on highways or county roads.

Use of “Special Purpose” roads to access well sites during drilling and year-round access during testing could result in unnecessary and undue resource damage (see Soils and Water sections above) or damage to equipment.

4.13.2 MITIGATION

See mitigation sections for Soils and Water Resources for suggested mitigation for special purpose and resource roads.

4.13.3 NO ACTION

Under the No Action Alternative, the development of the Proposed Action would not occur. No additional transportation effects would be expected to occur beyond the current situation.

4.14 HEALTH AND SAFETY

Impacts due to intentional violation of standards or regulations pertaining to worker safety could be considered significant.

4.14.1 PROPOSED ACTION

Health and safety impacts of the project would include a relatively low risk to project workers from

industrial accidents, and natural disasters. There would be a slight increase in risk of traffic accidents during drilling and field development, and during field operations, particularly if “Special Purpose” roads were to be used.

Occupational Hazards

During the drilling and field development phase of the project the probability of injuries is low. The BLM, WOGCC, WDEQ, OSHA, and USDOT each regulate certain safety aspects of oil and gas development. Adherence to relevant safety regulations on the part of the proponent and enforcement by the respective agencies would reduce the probability of accidents. Additionally, given the remote nature of the project area, and the relatively low use of these lands by others, occupational hazards associated with the project would mainly be limited to employees and contractors rather than the public at large. Any cumulative impacts are limited to the analysis area.

Other Risks and Hazards

The risks to public health and safety are not expected to increase under the Proposed Action. Highway safety impacts are discussed under Transportation section. Sanitation impacts would be avoided or reduced by the implementation of the mitigation measures outlined in Chapter 2.

4.14.2 MITIGATION

See mitigation sections for Soils and Water Resources for suggested mitigation for special purpose roads.

4.14.3 NO ACTION

Under the No Action Alternative, the development of the Proposed Action would not occur. No additional effects on public health or safety would be expected to occur beyond the current situation.

4.15 HAZARDOUS MATERIALS

Intentional violation of any Federal or State regulation pertaining to the use, storage, transportation or disposal could be considered significant.

4.15.1 PROPOSED ACTION

Kennedy Oil would handle materials used for drilling as described in Section 2.1.9.6, Chapter 2 and Appendix D. Thus, any impacts would be expected to minor, especially if proper handling and use of such materials on the well site occurs. Placement of well locations away from drainages, proper cementing operations, properly designed reserve pits and on-site storage areas would keep any accidental spills or leaks localized. Prompt clean up would prevent further contamination of soils, surface or ground water. Project operations would comply with all relevant federal and state laws regarding hazardous wastes or materials and with directives identified in the SPCC plan.

Kennedy proposes to use drilling mud for road plating. Use of drilling mud for plating or mixing with soil for road surfacing is cause for concern. The BLM RSFO has not allowed the use of drilling mud for road plating or surfacing; thus, the impacts of constructing roads with drilling mud possibly containing additives is unknown.

4.15.2 MITIGATION

- A stipulation preventing use of drilling mud for road construction should be adopted.

4.15.3 NO ACTION

Under the No Action Alternative, potential for spills or leaks would not exist since drilling activity would be denied. However, selection of this alternative would not prevent future drilling proposals or the potential for spills or leaks from other activities (e.g., recreational vehicle use, on-going oil and gas activities).

4.16 NOISE

No significance criteria has been established for noise since drilling activity would be short term (10 days/well), no residences are nearby (closest residence is approximately 8 miles away), and a threshold for noise has not been identified by the State of Wyoming.

4.16.1 PROPOSED ACTION

Noise associated with construction and natural gas production operations can create a disturbance that affects human safety (at extreme levels) or comfort as well as modify animal behavior. Determining activities that exceed the maximum standards is not a simple issue since perception of sound varies with intensity and pitch of the source, air density, humidity, wind direction, screening/focusing by topography or vegetation, and distance to the observer. Noise levels in excess of the 55 dBA standard (EPA standard) would occur during construction and drilling operations. Construction-related effects would be short term.

Given the low human population densities in the project area, construction and development operations under the alternatives would be sufficiently distant from residences that none would likely be affected by construction or development operations. Overall noise produced by construction and support services equipment during peak activity periods would be moderate because of its dispersed and short-term nature.

4.16.2 MITIGATION

See committed practices detailed in Chapter 2, Section 2.1.9.4.

4.16.3 NO ACTION

Under the No Action Alternative, the Proposed Action would not advance.

4.17 CUMULATIVE IMPACTS

Cumulative impacts are those that would result from the incremental impacts of the proposed project added to past, present, and reasonably foreseeable development (RFD). Cumulative impact assessment areas (CIAAs) vary among resources and are generally based on relevant landscape, resource, project, and/or jurisdictional boundaries. The CIAA for individual resources affected by this action is found below.

Resource	Cumulative Impact Assessment Area	Number of Acres of Disturbance or Activity Level	Potential Cumulative Impacts from Lower Bush Creek Project
Air Quality	Regional airshed including portions of Wyoming, northern Colorado, and northeastern Utah		Emissions within the federal and state thresholds
	Geology/Paleontological Resources: project area + 2 miles; 33,280 acres	Approximately 9 miles (44 acres) of existing road	
Geology/Mineral/ Paleontological Resources	Mineral Resources: A portion of the “General and Mineral Cumulative Impact Assessment Areas” for the CD/WII ² (see Figures 3.3 & 4.1). 175,760 acres within the Red Desert Watershed Management Area outside of the Jack Morrow Hills planning area	Mineral Resources Approximately 90.00 acres disturbed (25 wells) and 15 miles Co Rd 4-21, approximately 17 miles of oil/gas road (82 acres disturbed)	Proposed Action of 22 wells (including injection wells) initially disturbing 101.94 acres (63.38 acres should production occur) and RFD of 7 wells within the vicinity of the project area resulting in 25.28 acres of disturbance. Known proposed development of 11 wells in the Rawlins Field Office ² (39.6 acres)
Soils/Vegetation/Invasive Species	Project Area + 2 mile buffer; 33,280 acres	Approximately 48 acres disturbed	Proposed Action of 22 wells (including injection wells) initially disturbing 101.94

² Assumes activity occurring in the Rawlins Field Office is within the cumulative impact assessment prepared for the CD/WII project and has been fully implemented. Assumes all disturbances associated with the minerals cumulative impact assessment area for the CD/WII has been implemented. Assumed disturbance per well (all facilities) is 3.6 acres (CD/WII EIS cumulative assessment assumption).

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Resource	Cumulative Impact Assessment Area	Number of Acres of Disturbance or Activity Level	Potential Cumulative Impacts from Lower Bush Creek Project
			acres (63.38 acres should production occur). No effect determination for Ute ladies' tresses (listed plant species) and RFD of 7 wells within the vicinity of the project area resulting in 25.28 acres of disturbance. Mitigation (stabilization, reclamation) required where soils are disturbed. Seeding with native species. Mitigation to prevent invasive species invasion/weed treatments required
Surface Water Resources	Affected watersheds Lower Bush Creek (38,954 acres), North Red Desert Basin 984,729 acres), Alkali Basin (40, 178 acres), Buffalo Hump Basin (25,516 acres); area within a closed basin - 189,377 Total Acres	Estimated acres of disturbance in Lower Bush Creek (196.2), North Red Desert Basin (337.8 acres), Alkali Basin (188.4 acres); Buffalo Hump (136 acres); 858.4 total disturbed acres ²	Surface water not impacted by Proposed Action. Existing disturbance (858.4 acres), PA and RFD would add 141 acres of disturbance. Mitigation (avoidance/ protection) required for all activities on public land. Closed basin
Ground Water Resources	General Cumulative Impact Assessment Area for the CD/WII includes all or portions of the Great Divide Basin Watershed/Fort Union Formation; 4,490,000 acres	106,300 surface acres ³	Proposed Action would move water from one horizon of the Fort Union to another. Impact localized and should production occur, further detailed study would be required. Proposed Action and RFD consumption of ground water by other actions is small compared to existing water supplies. Mitigation is required to prevent ground water contamination. Cumulative impact is expected to be within acceptable limits as outlined

Assumes 4.8 acres of disturbance per mile of road not associated with an individual well (i.e., collector road, GRRMP assumption).

³ Assumes all activity approved in the CD/WII project and general cumulative impact assessment area has been fully implemented.

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Resource	Cumulative Impact Assessment Area	Number of Acres of Disturbance or Activity Level	Potential Cumulative Impacts from Lower Bush Creek Project
			in the CD/WII (1999c)
Noise	Project Area + 2 mile buffer; 33,280 acres	1 producing well, 2 wells shut in, and 3 APDs (approved or under review)	The Proposed Action and RFD would not add to the existing level of noise (drilling is a temporary activity and would not occur at once - testing/production results in minor increases to existing background noise levels)
Land Use/Range Resources	Red Desert Allotment - 260,584 acres; 11,331 AUMs	1740 acres disturbed or 76 AUMs ³	Proposed Action and RFD would add 127.22 acres of disturbance or 8 AUMs
Pronghorn Antelope	<p>Portion of the Red Desert Herd Unit overlapping the general cumulative impact assessment area for CD/WII</p> <p><u>Crucial Winter/yearlong:</u> 272,704 acres;</p> <p><u>Winter/ yearlong:</u> 1,849,024 acres</p>	<p><u>Crucial Winter/yearlong</u> 14,234 acres of disturbance³</p> <p><u>Winter/yearlong -</u> 23,637 acres of disturbance³</p>	Proposed Action and RFD would add 127.22 acres of disturbance to winter/yearlong habitat
Mule Deer	<p>Portion of the Steamboat Mule Deer Herd Unit overlapping the general cumulative impact assessment area for CD/WII</p> <p><u>Winter/yearlong:</u> 642,688 acres</p>	8,600 acres of disturbance ³	No suitable habitat occurs in the project area; Proposed Action and RFD would add 0 acres of disturbance to winter/yearlong mule deer habitat
Elk	<p>Portion of the Steamboat Elk Herd Unit overlapping the general cumulative impact assessment area for CD/WII</p> <p><u>Crucial winter/yearlong:</u> 276,544 acres</p>	<p><u>Crucial winter/yearlong -</u> 703 acres of disturbance³</p> <p><u>Winter and winter/yearlong -</u> 5679 acres of</p>	Crucial or winter/yearlong ranges not affected by Proposed Action; RFD could add 3.6 acres of disturbance winter/yearlong elk habitat

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Resource	Cumulative Impact Assessment Area	Number of Acres of Disturbance or Activity Level	Potential Cumulative Impacts from Lower Bush Creek Project
	<u>Winter and winter/yearlong:</u> 438,656 acres	disturbance ³ .	
Sage Grouse	Project area + 2 mile buffer within the Red Desert Upland Game Bird Management Area (containing probable nesting, 571,000 acres; potential breeding, 31,000 acres)	Approximately 12.5 miles of existing roads resulting in 60 acres of disturbance in potential nesting habitat	Proposed Action – 15 wells (90 acres disturbance) could be located within potential nesting habitat. Stipulations apply; RFD - Proposals handled on a case-by-case basis. Mitigation would apply
Raptors	Lower Bush Creek project area + 1 mile buffer; 16,000 acres	Existing road resulting in approximately 9.6 acres of disturbance	Proposed Action would add 0 acres of disturbance; RFD 2 wells (7.2 acres) could occur within 1 mile of ferruginous hawk nest. Timing stipulations would apply
Wild Horses	Great Divide WHHMA; 723,100 acres	cumulative disturbance of 19,000 acres	Proposed Action and RFD would add 127.22 acres of disturbance ³
T&E	Black-footed ferret (within white-tailed prairie dog habitat), bald eagle, water depletions of the Platte River and Colorado River Basins, mountain plover		Proposed Action -No effect determination for black-footed ferret, bald eagle and water depletions. No jeopardy determination for mountain plover, mitigation applies. RFD -proposals handled on a case-by-case basis
Socioeconomics	Sweetwater & Carbon Counties		Continued employment opportunities; minor enhancement to local and state revenues; add to national energy supply
Cultural	Project area; 4,504 acres	Existing roads resulting in approximately 14 acres of disturbance	Proposed Action – no adverse effect determination; RFD - proposals handled on a case-by-case basis
Recreation	Project area + surrounding area	Mainly hunting related activities, some ORV use	Some temporary displacement of hunters and recreationists during periods of drilling and construction.

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Resource	Cumulative Impact Assessment Area	Number of Acres of Disturbance or Activity Level	Potential Cumulative Impacts from Lower Bush Creek Project
Visual Resources	Project area + 10 mile section of access road leading to the project area; area within the Class III VRM	Existing and proposed oil and gas activity, roads, pipelines, and other intrusions	There may be reduced levels of satisfaction with the recreational experience but more vehicle access The area is not pristine. Existing, proposed, and RFD would add to the visual impact. However, all activity would be mitigated (placement, painted). Large areas of unobstructed views remain

Reasonably Foreseeable Development

Reasonably foreseeable development is that development likely to occur within the CIAA for this action. Known reasonably foreseeable developments include the Proposed Action and development of other exploratory and production wells in the vicinity (Figure 3.3). All development proposed on public lands is subject to compliance with NEPA including cumulative impact assessment. The CIAA for this action lies within the northwest portion of the General Cumulative Impact Assessment Area for the CD/WII project (Figure 4.1).

Past actions on or in the vicinity of the project area that continue today and have major influences on the area include on-going natural gas exploration and development, livestock grazing, wild horse management, recreation, and use by wildlife and wild horses.

Air Quality

The Continental Divide/Wamsutter II air quality study (1999c) demonstrated that both short- and long-term total predicted TSP, PM₁₀, SO₂, CO, volatile organic compounds (VOC), hazardous air pollutants (HAPs), and NO₂ concentrations would comply with applicable air quality standards (i.e., WAAQS and NAAQS) as a result of direct, indirect, and cumulative project emissions (including construction and operation). Analyses presented in the Pinedale Anticline air quality studies (1999a) also found that the predicted emissions from cumulative sources continue to be in compliance with the NAAQS and WAAQS for all pollutants. The latest air quality study which covers the same airshed region as the CD/WII and Pinedale studies, known as the Desolation Flats Natural Gas Field Development EIS (2003), also determined that emissions remain below applicable federal and state standards.

Topography, Soils, Surface Water, and Vegetation

Past, proposed, and reasonably foreseeable actions would require restoration of disturbed areas

to predisturbance conditions on public lands. Topographic alterations from natural gas exploration generally affect a very small portion of the total land surface (<1 % of the 175,760 acres found in the Red Desert Watershed Management Area located outside of the Jack Morrow Hills planning area).

The project area lies within a portion of the Red Desert Watershed Management Area of the Great Divide Basin. Existing facilities found in the Divide Basin include the UPRR, Interstate 80, County roads, and numerous upgraded roads and two track trails, well pads, pipelines⁴, powerlines, etc. All of these developments affect surface water quality to a small degree - run off from gravel and two-track roads probably contribute most to any surface water impacts. However, stormwater runoff control plans are required by federal, state, or county entities so cumulative impacts to surface water quality are expected to be within acceptable levels. Standard stipulations and site-specific construction and reclamation procedures are required on federal lands to maintain surface drainage patterns. Procedures require implementation of reclamation including regrading and re-contouring disturbed areas to approximate original conditions, re-establishing appropriate vegetative cover, protecting soils from erosion, and stabilizing reclaimed landscapes. These precautions minimize cumulative impacts to topography, soils, surface water, and vegetation. Weed control would be implemented as necessary.

Geologic Hazards, Ground Water, Noise and Odors, Land Use, Range, Health/Safety, Transportation, and Hazardous Materials

Cumulative impacts from geologic hazards and to ground water, noise and odor, hazardous materials, transportation, health/safety, landownership, and land use are within the thresholds identified in the discussion of impacts for this project and the general cumulative impact assessment area for the CD/WII project (see cumulative impact discussion for each resource). Should testing prove producible quantity of natural gas, further environmental analysis would be conducted to assess the impacts of a full field development scenario.

Minerals and Socioeconomics

The proposed project could result in a depletion of CBM resources in the area but would not interfere with the potential recovery of other minerals. Natural gas production including CBM development is considered a primary industry that is important to the economic well-being of Sweetwater and Carbon Counties, the State of Wyoming (increased revenues) and the U.S. (energy availability).

Cultural Resources

Disturbance and/or loss of unidentified sites or artifacts may add to the cumulative loss of information about our heritage in the project area and throughout the region if these resources are not identified, inventoried, and/or appropriately protected or mitigated. However, such losses are not expected since mitigation measures as identified for the proposal would be implemented. Any potential future development projects with federal involvement would require the same level of analysis and protection. In the absence of cultural resource clearances and/or other federally

⁴ All pipelines are reclaimed

mandated cultural resource protection measures on private lands, increased impacts to cultural resources may occur.

Paleontology

With the application of appropriate mitigation cumulative impacts similar to those of cultural resources are anticipated for paleontological resources. The likelihood of disturbing paleontological resources would remain low; however, any fossils uncovered during construction might not be mitigated on private lands in the same way they would be under the Proposed Action, resulting in a loss of those fossils. In addition, natural erosion and illegal collection would continue at current levels.

Wildlife

Impacts to big game species would be as described for the Proposed Action yet increased due to other on-going activities including developments occurring on private land where protective stipulations are not applied. Most other mammal and bird populations would similarly be affected primarily by natural forces, especially the weather. Project developments (e.g., wells, roads, and water injection pipeline) could impact management of greater sage-grouse and raptor habitat. However, protection of greater sage-grouse leks and nesting habitat and raptor nests on public land is strictly enforced and would be applied on future projects to ensure existing populations are maintained. The proposed project may contribute some additional impacts (e.g., habitat loss and increased human presence) to the cumulative effects on prairie dog habitat (including that which may support black-footed ferrets and other species such as the burrowing owl) from livestock grazing, oil and gas, recreational use, and vehicle traffic through habitat loss and increased access. Coordination and consultation with the FWS is conducted on a case-by-case basis.

Cumulative impacts to the local mountain plover population, primarily through habitat loss and displacement, as a result of past, proposed, and future projects are unknown. Disturbance due to livestock or wildlife use, oil and gas, recreation, vehicle traffic, and other uses has either removed, modified, or created potential mountain plover breeding and nesting habitat. Application of mitigation measures in accordance with FWS' guidelines should minimize impacts so that plover reproduction is not jeopardized.

Wild Horses

Wild horses are very tolerant of human activity and no cumulative impact is expected from the Proposed Action or RFD.

Visual Resources and Recreation

As mentioned, the viewshed is not pristine. However large areas of unobstructed views occur in the Red Desert watershed management area. Additional impacts to visual resources from future proposals could further alter the viewshed (i.e., well locations, roads, gas and water lines, gas

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pipelines, and presence of dust) if not properly placed or disguised. Management prescriptions for the Red Desert require viewshed analysis for proposals on public lands and any impacts would be mitigated in order to meet the management objective of maintaining unobstructed views. Recreation is likely to continue at the same rate although some recreationists may not like the development and avoid the immediate area. Large areas of unobstructed views and open space remain.

CHAPTER 5

CONSULTATION AND COORDINATION

5.0 CONSULTATIONS AND COORDINATION

An environmental analysis is prepared when a federal government agency considers approving an action within its jurisdiction that may impact the human environment. An environmental analysis aids federal decision makers by presenting information on the physical, biological, and social environment of a proposed project and its alternatives. The first step in conducting an environmental analysis that meets the requirements of NEPA is to determine the scope of the project, the range of action alternatives, and the impacts to be included in the document.

The Council on Environmental Quality (CEQ) regulations (40 CFR 1500-1508) require an early scoping process to determine the issues related to the Proposed Action and alternatives that the analysis should address. The purpose of the scoping process is to identify important issues, concerns, and potential impacts that require analysis. The results of the scoping process are used to focus the analysis on the issues and concerns identified for the proposed project, so that alternatives or mitigation considered can be responsive to the issues and concerns. Alternatives that are not technically or economically feasible or responsive to the issues and concerns are not considered further in the analysis.

The environmental assessment documenting the NEPA analysis conducted for the Proposed Action was drafted by a third party contractor working under the direction of and in cooperation with the Bureau of Land Management (BLM), Rock Springs Field Office, Rock Springs, Wyoming.

5.1 PUBLIC PARTICIPATION

A scoping notice was prepared and submitted to the public by the BLM on February 28, 2002, requesting comments on the proposed Kennedy Oil Pilot Exploratory Coal Bed Methane Project. Individuals and entities on the direct mailing list included Federal, state, and local officials and agencies, Native American Tribes, public land users and groups, groups expressing an interest in public lands, and the media. Refer to Appendix E for a copy of the scoping notice including the mailing list.

The scoping period ended on April 1, 2002. During preparation of the EA, the BLM has communicated with, and received or solicited input from various federal, state, county, and local agencies, elected representatives, environmental and citizens groups, industries, and individuals potentially concerned with issues regarding the Proposed Action. The contacts made are summarized in the following sections. Issues identified during public scoping are listed in Section 1.3 of Chapter 1.

5.2 LIST OF PREPARERS

The following table identifies the core BLM interdisciplinary principally involved in preparing this EA.

**Table 5-1
BLM Interdisciplinary Team Members**

Name	Responsibility
BLM ID Team – Rock Springs Field Office	
George Schoenfeld	Natural Resource Specialist
Teri Deakins	Environmental Protection Specialist
Jim Dunder	Wildlife Biologist
Dennis Doncaster	Hydrologist
Jim Glennon	Botanist
Terry Del Bene	Archaeologist
Jo Foster	Outdoor Recreation Planner
Kevin Lloyd	Range Conservationist – Wild Horses
John Henderson	Fisheries Biologist
Bob Fischer	Civil Engineer
Sherry Blackburn	Geologist
Susan Davis	Petroleum Engineer
John Henderson	Fisheries Biologist/Water Depletion
John MacDonald	Natural Resource Specialist – Soils
Patricia Hamilton	Realty Specialist
Bernie Weynand	AFM – Resources
Ted Murphy	AFM – Lands and Minerals
Wyoming State Office	
Dale Hanson	Regional Paleontologist
Janet Kurman	Environmental Protection Specialist
Brenda Vosika Neuman	Physical Scientist
Roger Miller	Geologist, Reservoir Management Group (Casper)
Alan Shepherd	WH&B Program Lead
Rich Schuler	Soil/Water/Air Program Lead
Susan Caplan	Physical Scientist – Air Quality
Vickie Mistarka	Physical Scientist
Jeff Carroll	Botanist
Roy Allen	Economist

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CHAPTER 6

REFERENCES

- Advisory Council on Historic Preservation. 1966. National Historic Preservation Act. 16 USC 470.
- Albanese, J.P. 1982. Geological control of sites in the Powder River Basin. Paper presented to the Annual Meeting of the Wyoming Association of Professional Archaeologists, Casper.
- _____. 1980. Geologic Factors Affecting Site Preservation and Distribution in the Central Powder River Basin, Wyoming. Paper Presented at the 38th Annual Meeting of the Plains Conference, Iowa City. 1982. Geology of the Agate Basin Site. In *The Agate Basin Site: A Record of the Paleoindian Occupation of the Northwestern High Plains*, edited by G. Frison and D. Stanford. Academic Press, New York.
- Amoco Production Co. v. Southern Ute Indian Tribe 98-830. (10th Cir. 1999).
- Antevs, E. 1955. Geologic-Climatic Dating in the West. *American Antiquity* 20:317-335.
- _____. 1948. Climatic Change and Pre-White Man. *University of Utah Bulletin* 38:168-191. 1955. Geologic-Climatic Dating in the West. *American Antiquity* 20:317-335.
- Baker, E.C., D.C. Oyler, J.H. Perry, and G.L. Finfinger. 1984. Economic Evaluation of Directional Drilling for Methane Drainage From Coalbeds, U.S. Bureau of Mines Report of Investigations RI-8842, 11 pp.
- Baxter, G. T. and M. D. Stone. 1985. *Amphibians and Reptiles of Wyoming*. Second edition. Wyoming Game and Fish Department, Cheyenne, Wyoming.
- Biggins, D., B. Miller, B. Oakleaf, A. Farmer, R. Crete, and A. Dood. 1989. A System for Evaluating black-footed Ferret Habitat. Report prepared for The Interstate Coordinating Committee by The Reintroduction Site Group. 25 pages.
- Blackstone, D.L. 1991. Tectonic Relationships of the Southeastern Wind River Range, Southwestern Sweetwater Uplift, and Rawlins Uplift, Wyoming. Wyoming Geological Survey. Laramie.
- Blankenship Consulting LLC. Wyoming Department of Transportation. Cheyenne, Wyoming.

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- Bryson, R.A., D.A. Baerreis, and W.M. Wendland. 1970. The Character of Late Glacial and Post-glacial Climatic Changes. In *Pleistocene and Recent Environments of the Central Great Plains*, edited by W. Dort, Jr. and J.K. Jones, Jr., pp. 53-73. University of Kansas Press, Lawrence.
- Bureau of Land Management. 1983. Onshore Oil and Gas Order No. 1 - Approval of Operations on Onshore Federal and Indian Oil and Gas Leases. 43 CFR 3160. 48 FR 205. October 21, 1983.
- _____. 1985. Manual 9113: Roads. Engineering, Rel. 9-247. U.S. Department of the Interior, Bureau of Land Management.
- _____. 1988. National Environmental Policy Act Handbook (H-1790-1). U.S. Department of the Interior, Washington, D.C. 67 pages, 9 apps.
- _____. 1989. Surface operating standards for oil and gas exploration and development (The gold book). Third Edition. U.S. Department of the Interior, Bureau of Land Management.
- _____. 1991a. Oil and Gas Leasing. 43 CFR 3101.1-2.
- _____. 1991b. Wyoming supplement to the Bureau 9113 Manual. U.S. Department of the Interior, Bureau of Land Management, Wyoming State Office, Cheyenne, Wyoming. 16 pp.
- _____. 1992. Green River Resource Area Draft Environmental Impact Statement. U.S. Department of the Interior, Bureau of Land Management.
- _____. 1996a. Green River Resource Area Resource Management Plan and Final Environmental Impact Statement. U.S. Department of the Interior, Bureau of Land Management.
- _____. 1996b. Overview of BLM's NEPA Process. Bureau of Land Management, National Training Center Course Number 1620-02.
- _____. 1997. Record of Decision and Green River Resource Management Plan. U.S. Department of the Interior, Bureau of Land Management.
- _____. 1998. Implementation Plan. Standards for Healthy Rangelands and Guidelines for Livestock Grazing Management for Public Lands Administered by the Bureau of Land Management in the State of Wyoming. Updated January 15, 2003. <http://www.wy.blm.gov/range/sandgimp.htm>.
- _____. 1999a. Draft Environmental Impact Statement for the Pinedale Anticline oil and gas exploration and development project, Sublette County. Prepared by Bureau of Land Management, Pinedale Field Office, Pinedale, Wyoming, in Cooperation with the U.S. Army Corps of Engineers, USDA-Forest Service, and State of Wyoming. November 1999.
- _____. 1999b. Pinedale Anticline Oil and Gas Exploration and Development Project EIS Technical Report, Sublette County. Prepared by Bureau of Land Management, Pinedale Field Office, Pinedale, Wyoming, in Cooperation with the U.S. Army Corps of Engineers, USDA-Forest

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Service, and State of Wyoming. November 1999.

_____. 1999c. Draft Environmental Impact Statement for the Continental Divide/Wamsutter II Natural Gas Project, Sweetwater and Carbon Counties, Wyoming. Prepared by the Bureau of Land Management, Rawlins and Rock Springs Field Offices, Rawlins, Wyoming. April 1999.

_____. 2000. Biological Assessment for the Vermillion Basin Natural Gas Development Project. Bureau of Land Management, Rock Springs, Wyoming.

_____. 2003. Supplemental Draft Environmental Impact Statement for the Jack Morrow Hills Coordinated Activity Plan/Draft Green River Resource Management Plan Amendment. Prepared by Bureau of Land Management, Rock Springs Field Office, Rock Springs, Wyoming, in Cooperation with the State of Wyoming, Fremont County, and Sweetwater County. January 2003.

_____. 2003. Draft Environmental Impact Statement for the Desolation Flats Natural Gas Field Development Project, Prepared by Bureau of Land Management, Rawlins and Rock Springs Field Offices, Rawlins, Wyoming

Case, J.C. 1999. Basic Seismological Characterization for the Little Snake Supplemental Irrigation Water Supply Project, Southern Carbon County, Wyoming. Wyoming State Geological Survey, Laramie, Wyoming. 21 pp.

_____, Arneson, C.S., and Hallberg, L.L. 1998. Preliminary 1:500,000-scale digital surficial geology map of Wyoming: Wyoming State Geological Survey, Geologic Hazards Section Digital Map 98-1 (HDSM 98-1), scale 1:500,000.

_____ and J.A. Green. 2000. Earthquakes in Wyoming. Information Pamphlet 6, Wyoming State Geological Survey. Laramie, Wyoming.

_____, L.L. Larsen, C.S. Boyd, and J.C. Cannia (compilers). 1995. Earthquake epicenters and suspected active faults with surficial expression in Wyoming (1:1,000,000 scale map). Wyoming State Geological Survey, Laramie, Wyoming.

Dechant, J.A., J.L. Sondreal, D.H. Johnson, L.D. Igl, C.M. Goldade, P.A. Rabie, and B.R. Euliss. 2001. Effects of management practices on grassland birds: Burrowing Owl. Northern Prairie Wildlife Research Center, Jamestown, ND. Northern Prairie Wildlife Research Center Home Page. <http://www.npwrc.usgs.gov/resource/lieteratr/grasbird/buow/buow.htm> (Version 17FEB2000).

Department of the Army, Corps of Engineers. 1993. Definition of Waters of the United States. 33 CFR 328.3(a). 51 FR 41250, Nov. 13, 1986, as amended at 58 FR 45036, Aug. 25, 1993.

_____, March 22, 2002 response to T Deakins/RSFO, re scoping notice for Kennedy Oil Pilot Exploratory Coal Bed Methane Project.

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- Dickison, William R., M.A. Klute, M.J. Hayes, S.U. Janeke, E.R. Lundin, M. A. McKittrick and M.D. Olivares. 1988. Paleographic and paleotectonic setting of Larimide sedimentary basins in the central Rocky Mountain region. *Geological Society of America Bulletin*. 100:1023-1039.
- Environmental Protection Agency. 1976. Oil Pollution Prevention. 40 CFR 11238. FR 34165, Dec. 11, 1973, as amended at 41 FR 12657, Mar. 26, 1976.
- _____. 1983. Underground injection control program. 40 CFR 146. 45 FR 42500, June 24, 1980, as amended at 48 FR 14293, Apr. 1, 1983
- _____ 1991. State-administered program: Class II wells: Wyoming. 40 CFR 147.2551 56 FR 9421, Mar. 6, 1991.
- _____ 2002. Draft Evaluation of Impacts to Underground Sources of Drinking Water by Hydraulic Fracturing of Coalbed Methane Reservoirs, Water Quality Incidents. EPA 816-D-02-006.
- Fertig, W. 1995. Status report on *Lesquerella macrocarpa* in southwestern Wyoming. Unpublished report prepared for the BLM Wyoming State Office and the Rock Springs District by the Wyoming Natural Diversity Database, Laramie, Wyoming.
- Frison, G.C. 1991. *Prehistoric Hunters of the High Plains*. Second Edition. Academic Press, New York.
- Greiser, S.T. 1980. *Predictive Models of Hunter-Gather Subsistence and Settlement on the Central High Plains*. Ph.D dissertation University of Colorado, Boulder.
- Harrell, Lynn L. 1989. *The Buffalo Hump Site: Late Prehistoric Occupation in the Great Divide Basin, Wyoming*. Bureau of Land Management, Wyoming, Cultural Resource Series Number 7. Archaeological Services Western Wyoming College, Rock Springs, Wyoming.
- Hayden-Wing Associates. 2001. *Biological Survey Report, Blue Sky Pod of the Atlantic Rim Coalbed Methane Project Area*. Laramie, Wyoming. 14 pages.
- Heath, R.C. 1984. *Groundwater Regions of the United States*. U.S. Geological Survey Water-Supply Paper 2242. U.S. Government Printing Office, Washington, D.C. 78 pages.
- Hillman, C.N. and T.W. Clark. 1980. *Mustela nigripes*. *Mamm. Species No.* 126. 3 pages.
- Keith, Lorraine. Personal communication with U.S. Fish and Wildlife Service. May 29, 2003.
- MacCracken, J., D. Uresk, and R. Hansen, 1985. Habitat used by shrews in southeastern Montana. *Northwest Science* 59:24-27.
- Meyer, Joe. Personal communications. 2000.

*Environmental Assessment, Lower Bush Creek Pilot Exploratory
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- Migratory Bird Treaty Act of 1918 (16 U.S.C. 703-712; Ch. 128; July 13, 1918; 40 Stat. 755) as amended by: Chapter 634; June 20, 1936; 49 Stat. 1556; P.L. 86-732; September 8, 1960; 74 Stat. 866; P.L. 90-578; October 17, 1968; 82 Stat. 1118; P.L. 91-135; December 5, 1969; 83 Stat. 282; P.L. 93-300; June 1, 1974; 88 Stat. 190; P.L. 95-616; November 8, 1978; 92 Stat. 3111; P.L. 99-645; November 10, 1986; 100 Stat. 3590 and P.L. 105-312; October 30, 1998; 112 Stat. 2956.
- Morgantini, L.E., and R.J. Hudson. 1980. Human Disturbance and Habitat Selection in Elk. Pages 132-139 in M.S. Boyce and L.D. Hayden-Wing, editors. *North American Elk: Ecology, Behavior, and Management*. University of Wyoming, Laramie, Wyoming, 294 pages.
- Potter, Darla. Personal communication. March 4, 2003.
- The National Environmental Policy Act of 1969. Pub. L. 91-190, 42 USC. 4321-4347, January 1, 1970, as amended by Pub. L. 94-52, July 3, 1975, Pub. L. 94-83, August 9, 1975, and Pub. L. 97-258, § 4(b), Sept. 13, 1982
- Reeve, A.F. 1984. Environmental Influences on Male pronghorn Home Range and Pronghorn Behavior. Ph.D. Dissertation, University of Wyoming, Laramie, Wyoming. 172 pp.
- Reher, C.A. 1977. Adaptive Process on the Shortgrass Plains. In *For Theory Building in Archaeology*, edited by L. Binford. Academic Press, New York.
- Rock Springs Rocket Miner. 2001. Wamsutter officials asking for assistance. February 8, 2001.
- Roper, D.C., D.J. Weir, and T.R. Farmer 1983. Class III Archaeological Survey for the Proposed Frontier Pipeline: Uinta, Sweetwater, Fremont, and Natrona Counties, Wyoming. Prepared by Commonwealth Associates, Inc., Englewood, Colorado for Frontier Pipeline Company. Submitted to the Wyoming Bureau of Land Management, Rock Springs Field Office.
- Rosenberg, Robert G., and D. Peter Kvietok. 1981. *A Guide to Historic Artifacts*. Privately Published.
- Rounds, K. 2000. Aug 23, Dec 1 personal communications with George Blankenship.
- Solid Waste Agency of Northern Cook County v. U.S. Army Corps of Engineers, No. 99-1178 January 9, 2001.
- Sweetwater County Board of Commissioners. 1996. Sweetwater County Land Use Plan.
- U.S. Department of Labor, Bureau of Labor Statistics. 1998. *Incidence Rates of Nonfatal Occupational Injuries and Illnesses by Selected Industries and Case Types*. Washington, D.C. December 12, 2000.

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U.S. Fish and Wildlife Service. 2002. Mountain Plover Survey Guidelines.

University of Wyoming, College of Agriculture, Cooperative Extension Service, Agricultural Economics Department. 2000. Jack Morrow Hills Coordinated Activity Plan: Economic Analysis.

United States Geological Survey. Gap Analysis Program. Located at <http://biology.usgs.gov/state.partners/gap.html>. Last accessed February 5, 2003.

Upper Colorado River Endangered Fish Recovery Program. 1999. Upper Colorado River Endangered Fish Recovery Program. Located at <http://www.r6.fws.gov/coloradoriver>. Accessed September 27, 2002.

Wyoming Department of Environmental Quality, Air Quality Division. Located at <http://deq.state.wy.us/aqd/>. Last accessed February 5, 2003.

Wyoming Department of Environmental Quality. Great Divide Basin Waterbodies <http://deq.state.wy.us/wqd/305b/gtdv.htm> Accessed Sept. 20, 2002.

Wyoming Natural Diversity Database. 2002. Data compilation for K. Russell, completed July 15, 2002. Unpublished report. Wyoming Natural Diversity Database, University of Wyoming, Laramie, Wyoming.

Wyoming Oil and Gas Conservation Commission. Located at <http://wogcc.state.wy.us>.

Water pollution prevention and control: Permits and licenses. 33 USC 1344. June 30, 1948, ch. 758, title IV, Sec. 404, as added Pub. L. 92-500, Sec. 2, Oct. 18, 1972, 86 Stat. 884; amended Pub. L. 95-217, Sec. 67(a), (b), Dec. 27, 1977, 91 Stat. 1600; Pub. L. 100-4, title III, Sec. 313(d), Feb. 4, 1987, 101 Stat. 45.

Wyoming State Land Use Commission. 1979. State of Wyoming Land Use Plan.

**CRITERIA FOR MEETING “ACCEPTABLE PLAN”
FOR FEDERAL OIL AND GAS LEASE WYW153613**

Kennedy Oil Pilot Exploratory Coal Bed Methane Project
Red Desert Watershed Area

The following criteria are provided as guidance for preparing acceptable mitigative plans for any surface disturbing activity proposed on federal oil and gas lease WYW153613, located on:

T. 24 N, R. 98 W., 6th Principal Meridian
Section 22: All
Section 23: W1/2E1/2, W1/2

The federal lease location is in the Red Desert Watershed. The lease states that surface occupancy or use within the Red Desert Watershed will be restricted or prohibited unless the operator and surface managing agency arrive at an acceptable plan for mitigation of anticipated impacts for protecting watershed, visual resources, wildlife, and soils. In addition, a Native American Trail may exist in the area. Thus, criteria have been identified to protect cultural resources. These criteria are not all-inclusive but are identified as points that should be considered when developing mitigative plans.

Disturbance Areas

1. Pad location and associated road disturbance should be kept to the minimum needed to safely conduct operations.

Transportation Planning

1. Miles of roads should be kept to a minimum.
2. All roads should be reviewed and certified by a licensed professional engineer.
3. Roads should be engineered to avoid concentrating overland flow of water. Roads should be designed and placed to avoid drainage areas. If drainage areas cannot be avoided, then engineered and appropriate spacing of crossings with energy dispersion structures.
4. Reduce cut and fill areas where possible.
5. Reduce road standards when feasible (i.e., width).
6. Require durable surfacing (i.e., gravel). Gravel according to the Manual 9113 road standards unless analysis proves otherwise.
7. Layout location of main roads during transportation planning. Consider alternative routes including a main access between wells in southern pod and cherry stem to each well or cherry stem roads from existing oil and gas main access road.
8. Maintenance should include surveys of channel conditions below engineered portions of culvert discharges. Timely repair of problems when found.
9. Pipelines should be placed adjacent to roads where possible.

Cultural Resources

1. Follow BLM protocol for implementation of the Nationwide Programmatic Agreement.
2. Consultation with Native American groups should certain features be found (e.g. rock art, stone circles, burials, cairns, flat-top mesas). There is a potential Indian Trail in the general area. Should physical evidence of the Trail be found, consultation will be implemented immediately.

Geological Formations/Hazards (RMP)

1. Avoid slopes in excess of 25 percent.
2. Avoid highly erosive areas when possible, otherwise design and construction should be done in such a manner as to reduce erosion.

Visual/Class III VRM

1. All disturbance on public lands need to meet the Class III VRM objectives. The objective for Class III is to partially retain the existing character of the landscape. Level of change should be low. The level of change to the characteristic landscape should be moderate. Management activities may attract attention but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape (Manual 8410-1).
2. Roads should be designed to avoid straight lines where possible.
3. Pad locations should be hidden by topographical features or otherwise screened where possible.
4. Site specific visual resource reviews (inventories, viewshed analysis) should be conducted at the EA stage (in lieu of individual actions) that may affect visual resources.
5. Reduce production facility dimensions (i.e., height, width) so as to blend into the surrounding landscape.
6. Use low contrast, non-reflective paint for production facilities.
7. Reduce contrast of base material color and texture (i.e., use of native gravel if available).

Reclamation

1. Reclamation will be done as soon as possible after disturbance in accordance with an approved reclamation plan (as outlined in the EA and approved APD or ROW).
2. All actions on public lands will require an Erosion Control, Revegetation, and Restoration Plan (ERRP) and conform to the Wyoming policy on reclamation. Follow-up monitoring will be required to assure compliance.
3. Protect existing native vegetation by minimizing disturbance.
4. Stabilize disturbed areas and/or soil by establishing native vegetation or ground cover. Seek site stabilization within 3-5 years. Reclamation activity will be monitored to assure success.
5. Use native, certified weed-free seed in reclamation activities.
6. Prompt treatment of noxious weed infestations.
7. Restore original contours on pad and road construction.
8. Leave surface terrain rough as possible to catch and hold moisture to enhance seed

germination.

Wildlife/Special Status Species (Plant and Animal)

1. No crucial big game winter range is present. However, winter/yearlong elk habitat and year-round pronghorn antelope habitat is present. Activities should be designed to cause the least disruption of big game. The company may initiate policies of no game harassment by personnel.
2. Survey for raptors and avoid raptor concentration areas. Apply seasonal restriction for active individual raptor nests (2/1-7/31 nesting and 11/15-4/30 for winter concentration areas). Survey of prairie dog towns that do not meet USFWS black-footed ferret criteria for burrowing owls.
3. Suitable habitat for mountain plover will be surveyed in accordance with the U.S. Fish and Wildlife Service (USFWS) guidelines for survey for mountain plovers (March 2002). Avoidance of mountain plovers would be conducted in accordance with USFWS guidelines.
4. Survey prairie dog town/complexes that meet USFWS criteria for black-footed ferret habitat in accordance with USFWS guidelines.
5. Survey for greater sage grouse and implement seasonal stipulations (2/1-7/31 leks and nesting areas (2 miles)) and limit road use within project area to hours between 6:00pm and 9:00 am to protect greater sage grouse.
6. Protection of migratory birds (i.e., pit netting) in accordance with USFWS guidelines.
7. Conduct surveys for BLM sensitive species as outlined in IM WY-2001-040.

Soils/Watershed

1. Use of self-contained drilling systems if possible. If not, then reserve pits should not be located in areas where groundwater is less than 50 feet. Combination of reserve pit soil and liner should not have permeability greater than 10^{-7} cm/hr. Lining of pits should be decided on a case-by-case basis. Any reserve pits must be netted in such a fashion to prevent use by migratory birds.
2. Construction with frozen material or during periods when the soil is saturated or when watershed damage is likely to occur will be prohibited.
3. Avoid disturbance within 100 feet, or more at the discretion of the field manager, of inner gorge of intermittent or ephemeral drainages.
4. Erosion control plans would be required (see item 2 under Reclamation).
5. Salvage and the subsequent replacement of topsoil whenever possible (topsoil depth to be determined case by case).
6. Avoid erosive soils and steep slopes when possible.
7. Design and construction should be done in such a manner to reduce erosion.
8. Construction across ephemeral drainages would be restricted until after spring runoff.
9. Seeding of borrow areas with appropriate seed mixtures (see item 5 under Reclamation).
10. No surface disposal of produced water or surface discharge from wells although some beneficial uses may be allowed and permitted by the State of Wyoming, State Engineer's Office. Beneficial uses may include dust abatement, hydrostatic testing, drilling water, etc. All produced water not used for beneficial uses must be reinjected into aquifers of equal or

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lesser water quality and be permitted by the State Engineer's Office.

11. Pipeline placement would be determined based on site-specific conditions. Any surface pipelines crossing roads or trails should be buried. When buried pipelines are proposed, they should follow and be placed on the edge of roadways.

Other

1. Use of remote sensing devices when feasible to reduce number of well visits.
2. Protect integrity of cultural and other scientific values.

APPENDIX B

SUMMARY OF SPECIAL STATUS SPECIES Kennedy Oil Pilot Exploratory Coal Bed Methane Project

As noted under the section entitled “Scoping, Public Involvement, and Issues Identified”, listed, proposed for listing, and candidate species are not affected by the Proposed Action. The rationale for that determination follows. Other BLM-Wyoming species of concern are also addressed.

WILDLIFE/RESOURCE CONCERN	SUITABLE HABITAT	STIPULATION DATE	STIPULATION APPLIES
Raptor Nest (other than raptors listed below)	Yes	February 1 – July 31	Yes
Crucial Big Game Winter Range	No	November 15 – April 30	No
Elk Calving Areas	No	May 1 – June 30	No
Riparian Areas	No	Year Round 500 feet from perennial streams/live water	No

T&E SPECIES	NO EFFECT	MAY AFFECT	NOT LIKELY TO ADVERSELY AFFECT	AFFECT STIPULATION
black-footed ferret (<i>Mustela nigripes</i>) (E) FWS criteria	X			
Mountain Plover (<i>Charadrius montanus</i>)(P)		X		April 10 – July 10
Water Depletions (to the Green & N. Platte)	X			

Sensitive Species Common Name	Habitat	Potential Habitat	Stipulation Dates	Comments
MAMMALS				
Myotis, long-eared (<i>Myotis evotis</i>)	Conifer and deciduous forests, caves and mines	No		
Myotis, fringed (<i>Myotis thysanodes</i>)	Conifer forests, woodland-chaparral, caves and mines < 7,000 ft. elev.	No		
Bat, spotted (Euderma maculatum)	Cliffs over perennial water, basin-prairie shrub	No		
Bat, Townsend’s big-eared (<i>Corynorhinus townsendii</i>)	Forests, basin-prairie shrub, caves and mines	No		
Rabbit, pygmy (Brachylagus idahoensis)	Tall sagebrush	Yes		Avoid tall sage destruction
Prairie dog, white-tailed (<i>Cynomys leucurus</i>)	Basin-prairie shrub, grasslands	Yes		Avoidance
Pocket gopher, Wyoming (<i>Thomomys clusius</i>)	Dry ridge tops, gravelly loose soil, greasewood	No		
Pocket gopher, Idaho (<i>Thomomys idahoensis</i>)	Shallow stony soils	No		

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Sensitive Common Name	Species	Habitat	Potential Habitat	Stipulation Dates	Comments
Fox, swift	(<i>Vulpes velox</i>)	Grasslands	Yes		Avoid dens
BIRDS					
Ibis, white-faced	(<i>Plegadis chihi</i>)	Marshes, wet meadows	No		
Swan, trumpeter	(<i>Cygnus buccinator</i>)	Lakes, ponds, rivers	No		
Goshawk, northern	(<i>Accipiter gentiles</i>)	Old growth forests	No	Feb 1 – July 31	
Hawk, ferruginous	(<i>Buteo regalis</i>)	Basin-prairie shrub, grassland, rock outcrops	Yes	Feb 1 – July 31	Restrict activity within 1 mile.
Falcon, peregrine	(<i>Falco peregrinus</i>)	Tall cliffs	No	Feb 1 – July 31	
Sage-grouse, Greater	(<i>Centrocercus urophasianus</i>)	Sagebrush	Yes	Feb 1 – July 31	NSO within ¼ mile of lek year-round; seasonally avoid nest disturbance within 2 miles
Curlew, long-billed	(<i>Numenius americanus</i>)	Grasslands, plains, foothills, wet meadows	No		
Owl, burrowing	(<i>Athene cunicularia</i>)	Grasslands, basin-prairie shrub	Yes	Feb 1 – July 31	Restrict activity within 1 mile.
Thrasher, sage	(<i>Oreoscoptes montanus</i>)	Sagebrush	Yes		
Shrike, loggerhead	(<i>Lanius ludovicianus</i>)	Basin-prairie shrub, mountain-foothill shrub	Yes		
Sparrow, Brewer's	(<i>Spizella breweri</i>)	Sagebrush	Yes		
Sparrow, sage	(<i>Amphispiza belli</i>)	Sagebrush	Yes		
FISH					
Chub, roundtail	(<i>Gila robusta</i>)	CO River drainage, mostly large rivers, also streams and lakes	No		
Chub, leatherside	(<i>Gila copei</i>)	Bear, Snake, and Green drainages, clear cool streams and pools	No		
Sucker, bluehead	(<i>Catostomus discobolus</i>)	Bear, Snake and Green drainages, all waters	No		
Sucker, flannelmouth	(<i>Catostomus latipinnis</i>)	CO River drainage, large rivers, streams, and lakes	No		
Trout, Colorado river cutthroat	(<i>Oncorhynchus clarki pleuriticus</i>)	CO River drainage, clear mountain streams	No		

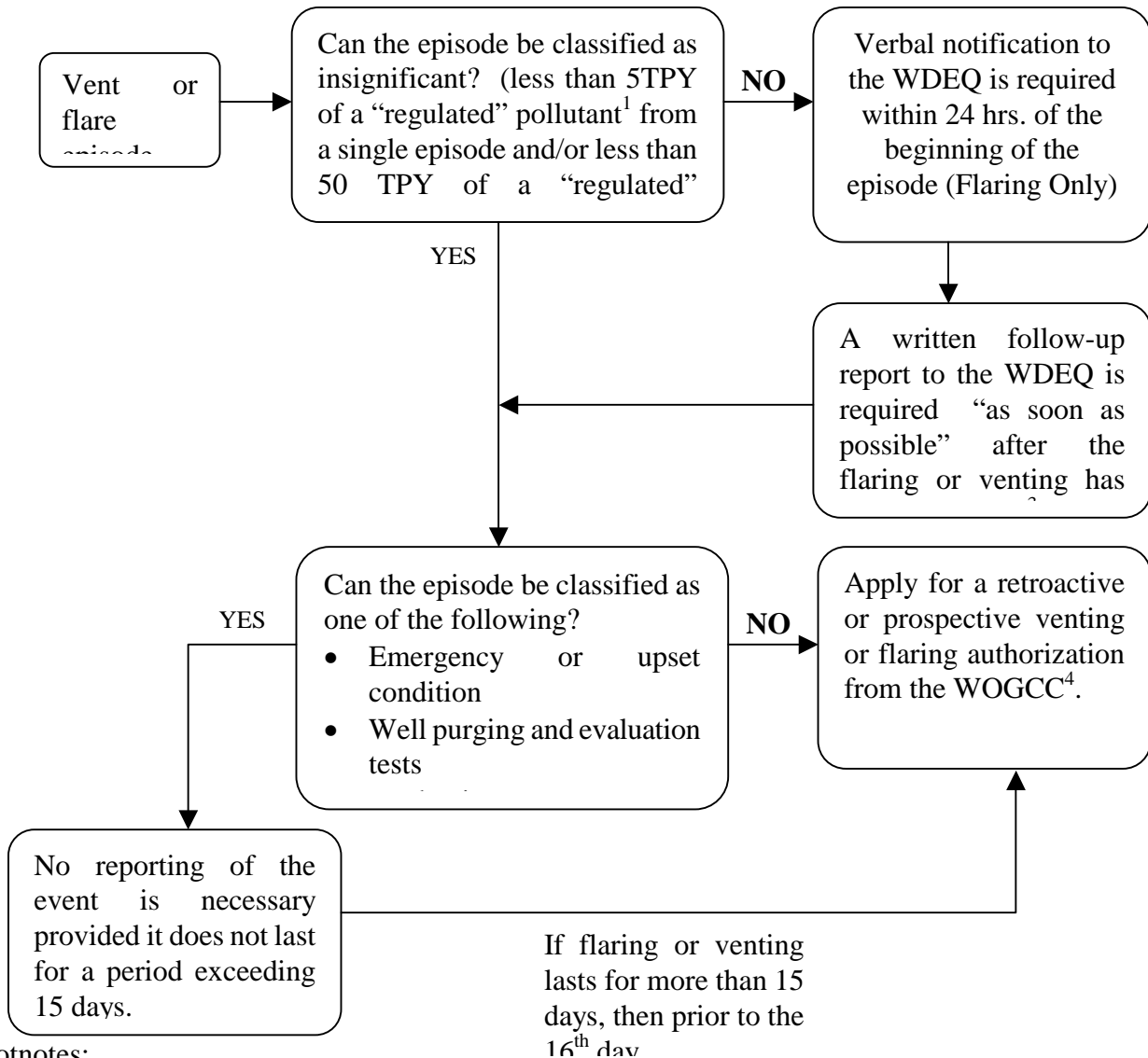
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Sensitive Common Name	Species	Habitat	Potential Habitat	Stipulation Dates	Comments
AMPHIBIANS					
Frog, northern leopard (<i>Rana pipiens</i>)		Close to permanent water up to 9,000 ft.	No		
Spadefoot, Great Basin (<i>Spea intermontana</i>)		Spring seeps, permanent and temporary waters, sagebrush areas below 7,000 ft.	Yes		
Toad, boreal (northern Rocky Mt. Population) (<i>Bufo boreas boreas</i>)		Mountains and foothills, relatively moist areas, high elevations. Found near water	No		
Frog, spotted (<i>Rana luteiventris</i>)		Ponds, small streams, mountains, and foothills	No		
PLANTS					
Small rock cress (<i>Arabis pusilla</i>)		Cracks, crevices in sparsely vegetated granite/pegmatite outcrops within sage/grasslands 8,000 – 8,100'	No		
Nelson's milkvetch (<i>Astragalus nelsonianus</i>)		On alkaline/seleniferous, clay flats, bluffs, gullies in sparse sage and cushion plant communities at 5200-7600 feet	No		
Wyoming tansymustard (<i>Descurainia torulosa</i>)		Sparsely vegetated sandy slopes at base of cliffs of volcanic breccia or sandstone 8,300 – 10,000'	No		
Large-fruited bladderpod (<i>Lesquerella macrocarpa</i>)		Gypsum-clay hills and benches, clay flats, and barren hills 7,200 – 7,700'	No		
Persistent sepal yellowcress (<i>Rorippa calycina</i>)		Regional endemic along moist sandy to muddy bank of stream, ponds, reservoirs near high-water line at 2660-6800 feet	No		
Green River greenthread (<i>Thelesperma caespitosum</i>)		White shale slopes and ridges of Green River Formation 6,300'	No		
Uinta greenthread (<i>Thelesperma pubescens</i>)		Sparsely vegetated benches and ridges on coarse, cobbly soils of Bishop Conglomerate 8,200 – 8,900'	No		
Cedar Mountain Easter daisy (<i>Townsendia microcephala</i>)		Rocky slopes of Bishop Conglomerate 8,500'	No		

APPENDIX C

AUTHORIZATION FOR THE VENTING OR FLARING OF GAS

Note: The Wyoming Oil and Gas Commission (WOGCC) and the Wyoming Department of Environmental Quality (WDEQ) are the two agencies that regulate venting and flaring from oil and gas operations in Wyoming



Footnotes:

The term “regulated pollutant” would not include methane or ethane. Regulated pollutants include NO_x, CO, SO_x, VOCs, Particulate Matter, and Lead

If the 50 TPY threshold is exceeded an annual summary report would be required by March 1 of each year.

The WDEQ will accept the WOGCC forms (Form 3 – Well Completing or Recompletion Report and

Log, and Form 4 – Sundry Notices and reports of Wells)

Application is a letter sent to the WOGCC requesting authorization to vent or flare with the details listed in Chapter 3, Section 40 (c) i vii.

Narrative

Venting or flaring at oil and gas facilities is regulated by two agencies. The Wyoming Department of Environmental Quality (WDEQ) and the Wyoming Oil and Gas Conservation Commission (WOGCC). Each agency regulates these activities with a slightly different objective. The WDEQ is concerned about the emission of regulated pollutants and the WOGCC is concerned about royalties of the vented gas. Both parties are concerned about safety of the public with regard to the venting of H₂S gas.

In general venting CBM gas from a well head does not release any regulated pollutants. Constituents of CBM gas usually include methane (CH₄), carbon dioxide (CO₂), and nitrogen. Therefore, in general, no notification is required for the WDEQ for venting CBM gas from a well head.

Flaring operation (combustion of the gas) does release regulated pollutants. The WDEQ's policy is to require verbal notification within 24 hours of the beginning of the episode (see attached memo dated December 7, 1999 for contact information). Notification is only required if the flare event emits more than 5 tons per year (TPY) of a regulated pollutant in a single event or 50 TPY annually.

Using emissions factors published by the EPA in AP-42 Chapter 13, more than 82,000 standard cubic feet of gas (900 btu/scf) would have to be consumed in a single event or more than 820,000 standard cubic feet of gas would have to be consumed over an entire year for the notification thresholds to be met.

The WOGCC requires a retroactive notice of venting or flaring operations that persist for a period exceeding 15 days. This notice requests an authorization to continue flaring or venting.

Chapter 3 Section 40. Authorization for Flaring and Venting of Gas (WOGCC Rules)

(a) Venting or flaring under the following circumstances has not and does not constitute waste and is authorized by the Commission:

(i) Emergencies or upset conditions: During temporary emergency situations, such as compressor or other equipment failures, relief of abnormal system pressures, or other conditions which result in the unavoidable short-term venting or flaring of gas at a lease, gas plant or other facility;

(ii) Well purging and evaluation tests: During the unloading or cleaning up of a well during routine purging or drillstem, producing, or evaluation tests;

(iii) Production tests: During initial or recompletion evaluation tests not exceeding a period of fifteen (15) days, unless a longer test period is authorized by the Supervisor.

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(b) Low rate casing head gas. Unless it is determined by the Supervisor or the Commission that waste is occurring, up to 60 MCF of gas per day is authorized to be vented or flared from individual oil wells. Venting or flaring is authorized either at the well or at a lease facility which serves several wells.

(c) Unless flaring or venting is authorized under paragraph (a) or (b) of this section, an owner must apply for retroactive or prospective venting or flaring authorization under (c) or (d) of this section. Authorization may be granted upon review of an application, provided that the venting or flaring does not constitute waste. An application to vent or flare shall contain the following items as a minimum:

(i) a statement of reason for venting or flaring;

(ii) the estimated duration of venting or flaring;

(iii) the estimated daily volume of gas in thousands of standard cubic feet per day (MCFD);

(iv) the estimated daily volume and type of associated produced fluids, gas or plant products in barrels, MCF's, gallons or tons per day, as applicable;

(v) a compositional analysis of the gas if hydrogen sulfide is present or if the gas stream has a low BTU content;

(vi) a legal description of the well(s), plant or facility and distance to the nearest potential sales point or pipeline(s); and

(vii) a discussion of applicable safety factors and plans such as use of a constant flare igniter, facility pressure release, or emergency protection practices.

(d) The Supervisor may grant temporary authorization of verbal requests, including plant start-up/shut down. Follow-up documentation of the request may be requested of the applicant containing, at a minimum, the items set forth in subsection (c) above within fifteen (15) days of the initial request.

(e) All operations shall be conducted in a safe and workmanlike manner. If the gas is sour and venting would present a safety hazard, a constant flare igniter system may be required.

MEMORANDUM

TO: The Oil and Gas Production Companies Operating in Wyoming
FROM: Dan Olson, Administrator, Air Quality Division
SUBJECT: Reporting Guidelines for Well Flaring or Venting
DATE: May 5, 1986 - Original Issuance
July 5, 1995 - Update *
December 7, 1999 - Update *

On April 11, 1986, the Air Quality Advisory Board approved and adopted as policy the reporting of well flaring under Chapter 1, Section 5 of the Wyoming Air Quality Standards and Regulations. The Board additionally approved the use of the procedures in this guideline for satisfying the reporting requirements of Chapter 1, Section 5. The flaring events which are covered by this guideline include well testing and completions, well work overs, and other uncontrollable events that the Division may determine to be applicable. The minimum reporting requirements necessary to comply with the provisions of Chapter 1, Section 5 are as follows:

1. The Air Quality Division must be verbally notified within 24 hours of the beginning of a flaring episode. For planned long term flaring operation, the Division may be notified in advance and the requirement of the "24-hour" notification will be waived. The verbal notification of flaring for all gas wells may be made to any of the following offices:

Cheyenne	Casper	Lander	Sheridan
(307) 777-7391	(307) 473-3455	(307) 332-6755	(307) 672-6457
Bob Gill	Chris Hanify	Tony Hoyt	Mike Warren
Diana Hulme	Jeff Hancock ¹	Dan Fauth	Judy Shamley
		Greg Meeker	
		Carl Disel	

2. A written follow-up notice must be sent to the Cheyenne office as soon as possible after the flaring has been completed. The Division will accept the Oil and Gas Commission forms (Form 3 - Well Completing or ReCompleting Report and Log, and Form 4 - Sundry Notices and Reports of Wells) to fulfill reporting requirements for gas flaring. The additional information noted below can be included on the forms if there is sufficient space. The

* Updates include only personnel and regulation reference changes. The reporting guidelines adopted by the Air Quality Advisory Board on April 11, 1986 remain unchanged.

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Memorandum
Reporting Guidelines for Well Flaring or Venting
December 7, 1999
Page 2

Division is primarily concerned with the reason for the required flaring, the amount of gas flared, the hydrogen sulfide content of the gas flared, the time period over which the gas is flared, the total sulfur dioxide emissions resulting from the flaring and the efforts made to minimize the emissions.

3. To minimize reporting requirements, the Division will not require verbal notification of insignificant emissions (less than 5 tons of a regulated pollutant from a single flaring episode and/or less than 50 tons of a regulated pollutant from a well or a well field over a one year period.) An annual summary report must be submitted to the Division by March 1 of the following year when the 50 ton per year figure is exceeded.
4. In addition to the information listed above, the company must maintain records of the significant flaring events including the height of the flare and general meteorological conditions associated with the flaring episode to allow for modeling of an event if it is deemed necessary.
5. All of the above requirements also apply to non-flared venting operations.

Due to safety concerns, the rules are more stringent if gas containing H₂S is vented or flared. In these cases it is best to consult the regulations or the agencies to ensure compliance.

APPENDIX D

**KENNEDY OIL
MASTER DRILLING PLAN
COALBED METHANE WELLS IN THE BIG RED FIELD AREA
SWEETWATER COUNTY, WYOMING**

DRILLING PROGNOSIS

THE FOLLOWING INFORMATION WILL BE PROVIDED WITH EACH INDIVIDUAL APPLICATION

Ground elevation, estimated tops of important geologic markers and estimated depths at which the top and bottom of anticipated water, oil, gas or other mineral bearing formations are expected to be encountered.

Shallow surface sands from the surface to the top of the Fort Union Coals may contain fresh water. Any shallow water zones encountered will be adequately protected and reported. All potentially productive hydrocarbon zones will be cemented off.

1. PRESSURE CONTROL EQUIPMENT (SEE ATTACHED DIAGRAM)

TYPE: 10" double gate hydraulic with 1 blind ram, 1 pipe ram and annular BOP; equipped with choke and manifold and 9"-10" casing head with annular preventer. There will be a fill line above uppermost preventer.

PRESSURE RATING: 3000 psi Annular Preventer, 3000 psi BOP, 3000 psi choke manifold and accumulator and 3000 psi casing head

TESTING PROCEDURE: Ram preventers and related control equipment (choke manifold, kelly cocks, etc.) will be pressure tested to 100% of their rated working pressure for a period of 10 minutes. The casing string will be tested to 70% of its internal yield strength.

BOP's will be tested when installed, every 30 days, or whenever any seal is broken, as per Onshore Order No. 2.

Fill line will be 2", kill line will be 2", choke relief line will be 3". BOP drills and tests will be recorded in the driller's log.

The choke manifold and BOP extension rods with handwheels will be located outside the sub-structure or the hydraulic BOP closing unit will be located at least 25 feet from the well head. Exact locations and configurations will depend upon the particular rig contracted to drill this hole.

The choke line (the line which connects the BOP stack to the choke manifold) will be as straight as possible and turns, if required, will have a targeted T block if the required BOP stack is three thousand pounds or greater.

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A flare line will be installed after the choke manifold, extending to 125 feet (minimum) from the center of the drill hole to the pit.

2. THE PROPOSED CASING AND CEMENTING PROGRAM (ALL NEW):

A. CASING PROGRAM

HOLE SIZE	CASING SIZE	WT./FT.	GRADE	JOINT	DEPTH SET
12 1/4"	9 5/8"	32#	H40	ST&C	*400'
8 3/4"	7"	20#	K55	ST&C/LT&C	TOP OF COAL
12"	open hole	N/A	N/A	N/A	BOTTOM OF COAL

*SURFACE PIPE WILL BE SET TO A MINIMUM DEPTH OF 400', OR AS PER REQUIREMENT OF WOGCC FOR THE INDIVIDUAL WELL

Casing string(s) will be pressure tested to .22 psi/ft. or 1500 psi, whichever is greater
Minimum design factors for tension, collapse and burst are:

- Tension: 1.6
- Collapse: 1.125
- Burst: 1.00

B. CEMENTING PROGRAM

SURFACE PIPE 9 5/8" surface pipe will be cemented back to surface, with 20% excess using Class G cement, 3% calcium chloride accelerator, w/additives

PRODUCTION CASING 7" production casing will be cemented back to surface with 20% excess using lite cement and 25sx Class G (tail)

Circulated to surface with 20% excess. If cement does not circulate, the annulus will be topped off with neat cement to the surface.

A sufficient amount of cement will be used to ensure that all potentially productive hydrocarbon zones are cemented off. In the event of lost circulation, a bond log will be run.

WOC TIME: WOC time minimum 12 hours, or until stabilized

CENTRALIZERS: 1 in surface pipe; 1 every 100' for bottom 500' or as required by BLM

3. MUD PROGRAM (VISUAL MONITORING AND FLOW SENSOR DEVICE):

INTERVAL	TYPE	WEIGHT	VISCOSITY
FLUID LOSS			
0 - TOP OF COAL	Native/surfactants/LCM*/bentonite	8.5-9.0	28-32 *
TOP OF COAL-TD	OPEN HOLE/UNDER REAM/water		

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*Mud material will consist of native materials, surfactants, LCM and bentonite as needed. Sufficient mud inventory will be maintained on location during drilling to handle any adverse conditions that may arise. Inventory will not be less than the required amount needed to drill this well.

4. WATER SOURCE:

Water for drilling and cementing will be trucked from a water well located in Sec 28, T23N, R96W (Harmel Jolly, owner) AND/OR Sec. 31, T24N, R97W (Tom Brown Inc., Owner). The water source will be properly permitted with the State Engineers Office. No new Federal ROW will be needed for access to this water well.

5. EVALUATION PROGRAM:

LOGS: DUAL INDUCTION
 SONIC (optional)
 NEUTRON-DENSITY (optional)

a gamma ray log shall be run from TD to the ground surface

DST'S: NONE ANTICIPATED

CORES: NONE ANTICIPATED

SAMPLES: 10' samples to bottom of production casing; 1' samples across coal

Evaluation program may change at the discretion of the well site supervisor

STIMULATION: no stimulation or frac treatment has been formulated for this test. The BLM will be notified by 'Sundry Notice' of any completion activity with a complete frac program. The drill site, as approved, will be of sufficient size to accommodate all completion activities.

6. ABNORMAL CONDITIONS:

None anticipated during drilling and completion

The surface sands and the Fort Union Coal are potential zones of lost circulation. This will be alleviated by the use of lost circulation materials, as needed.

Maximum anticipated bottom hole pressure equals 2400 psi. Maximum anticipated surface pressure equals 0 psi.

No H₂S gas is expected to be encountered, based on reports from previous drilling in the area at this depth.

7. DRILLING ACTIVITY:

A. Anticipated Commencement Date: BLM WILL BE NOTIFIED OF SPUD DATE, AT LEAST 24 HOURS IN ADVANCE FOR EACH INDIVIDUAL WELL

Drilling Days: APPROXIMATELY 5 DAYS

Completion Days: APPROXIMATELY 10 DAYS

B. Auxiliary Equipment

1. A kelly cock will be kept in the string at all times
2. Periodic checks will be made each tour of the mud system (refer to Item #5)
3. A stabbing valve will be kept on the derrick floor to be stabbed into the drill pipe whenever the kelly is not in the string
4. No bit float will be used

8. NOTIFICATION

Bureau of Land Management
Rock Springs Field Office

Specific contacts and phone numbers will be provided by the Rock Springs Field Office as an attachment to the approved permit.

The spud date will be orally reported to the Authorized Officer (AO) TWENTY-FOUR (24) HOURS PRIOR TO SPUDDING.

All wells, whether drilling, producing, suspended or abandoned shall be identified in accordance with 43 CFR 3162.6, which requires the name of the operator, lease number, well number and location of the well.

In accordance with *Onshore Oil & Gas Order No. 1*, all wells will be reported on MMS Form 3160-6, *Monthly Report of Operations and Production*, starting with the month in which operations commence and continuing each month until the well is physically plugged and abandoned.

All undesirable events (fires, accidents, blowouts, spills, discharges) as specified in NTL-3A will be reported to the Rock Springs Field Office Office. Major events will be reported verbally within twenty-four (24) hours and will be followed with a written report within fifteen (15) days. 'Other than Major Events' will be reported in writing within fifteen (15) days. 'Minor Event' will be reported on the *Monthly Report of Operations and Production* (Form #3160-6).

No well abandonment operations will be commenced without the prior approval of the AO. In the case of newly-drilled dry holes or failures, and in emergency situations, oral approval will be obtained from the Area Petroleum Engineer.

A *Notice of Intent to Abandon* (Form #3160-5) will be filed with the AO within fifteen (15) days following the granting of oral approval to plug and abandon. Upon completion of approved

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plugging, a regulation marker will be erected in accordance with 43 CFR 3162.6. The following information will be permanently placed on the marker with a plate or cap, or beaded-on with a welding torch: Operator Name, Well Name and Number, Location by Quarter/Quarter, Section, Township, Range and Federal Lease Number.

A *Subsequent Report of Abandonment* (Form #3160.5) will be submitted within thirty(30) days following the actual plugging of the well bore. This report will indicate where plugs were placed and the current status of surface restoration operations. If surface restoration has not been completed at that time, a follow-up report on Form 3160-5 will be filed when all surface restoration work has been completed and the location is considered ready for final inspection.

Pursuant to NTL-4A, lessees and operators are authorized to vent/flare gas during initial well evaluation tests, not exceeding a period of thirty (30) days or the production of fifty (50) MMCF of gas, whichever occurs first. An application must be filed with the AO, and approval received, for any venting/flaring of gas beyond the initial thirty (30) days or otherwise authorized test period.

Not later than the 5th business day after any well begins production on which royalty is due anywhere on a lease site or allocated to a lease site, or resumes production in the case of a well which has been off production for more than ninety (90) days, the operator shall notify the AO by letter or Sundry Notice of the date on which such production has begun or resumed.

The notification shall provide as a minimum, the following information:

Operator name, address, telephone number

Well name and number

Well location, i.e. ¼, ¼, Section , Township, Range, P.M.

Date well was placed in a producing status

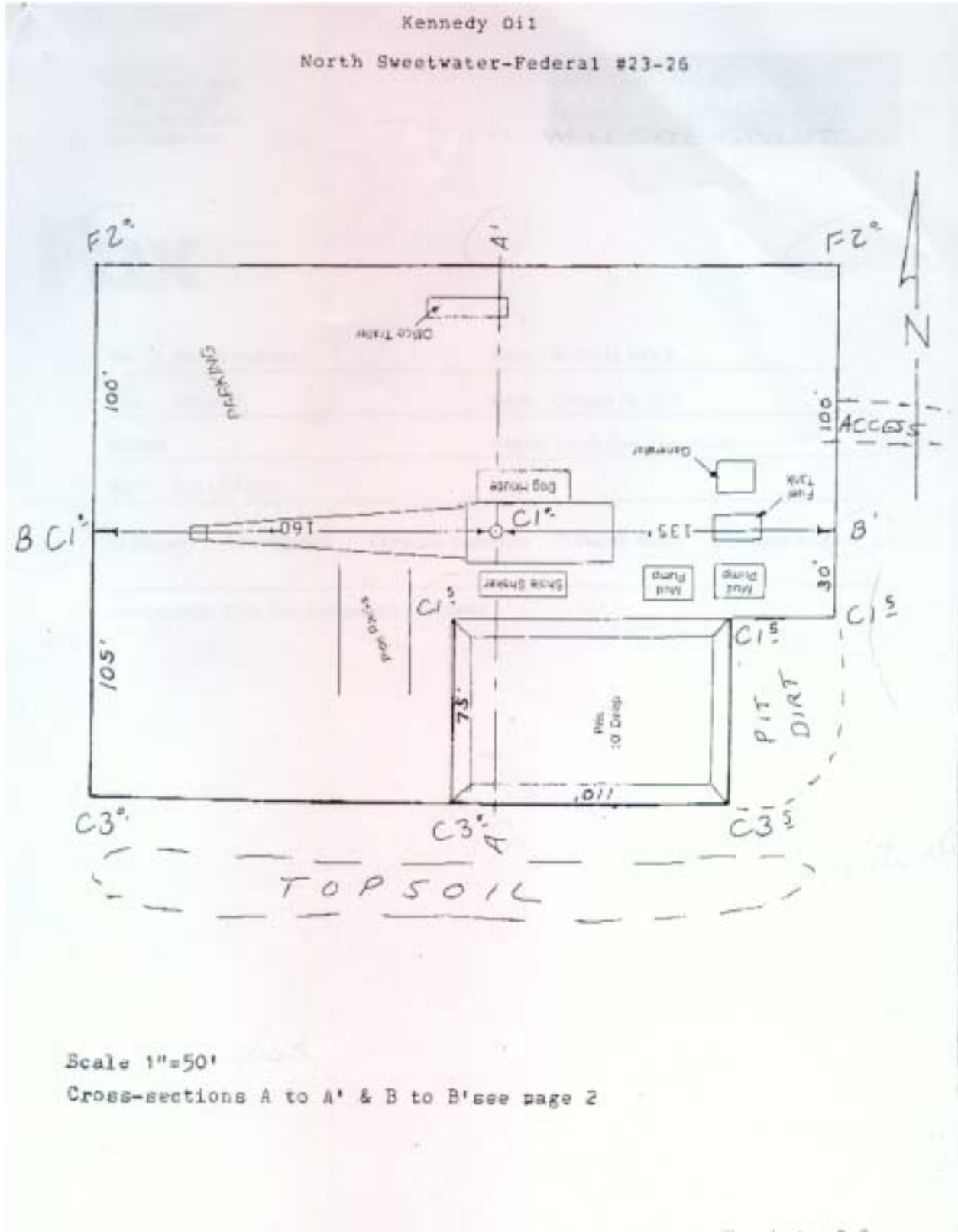
The nature of the well's production, i.e. crude oil, casing head gas, natural gas and entrained liquid hydrocarbons

The OCS, Federal or Indian lease prefix and number on which the well is located. Otherwise, the non-Federal or non-Indian land category, i.e. state or private

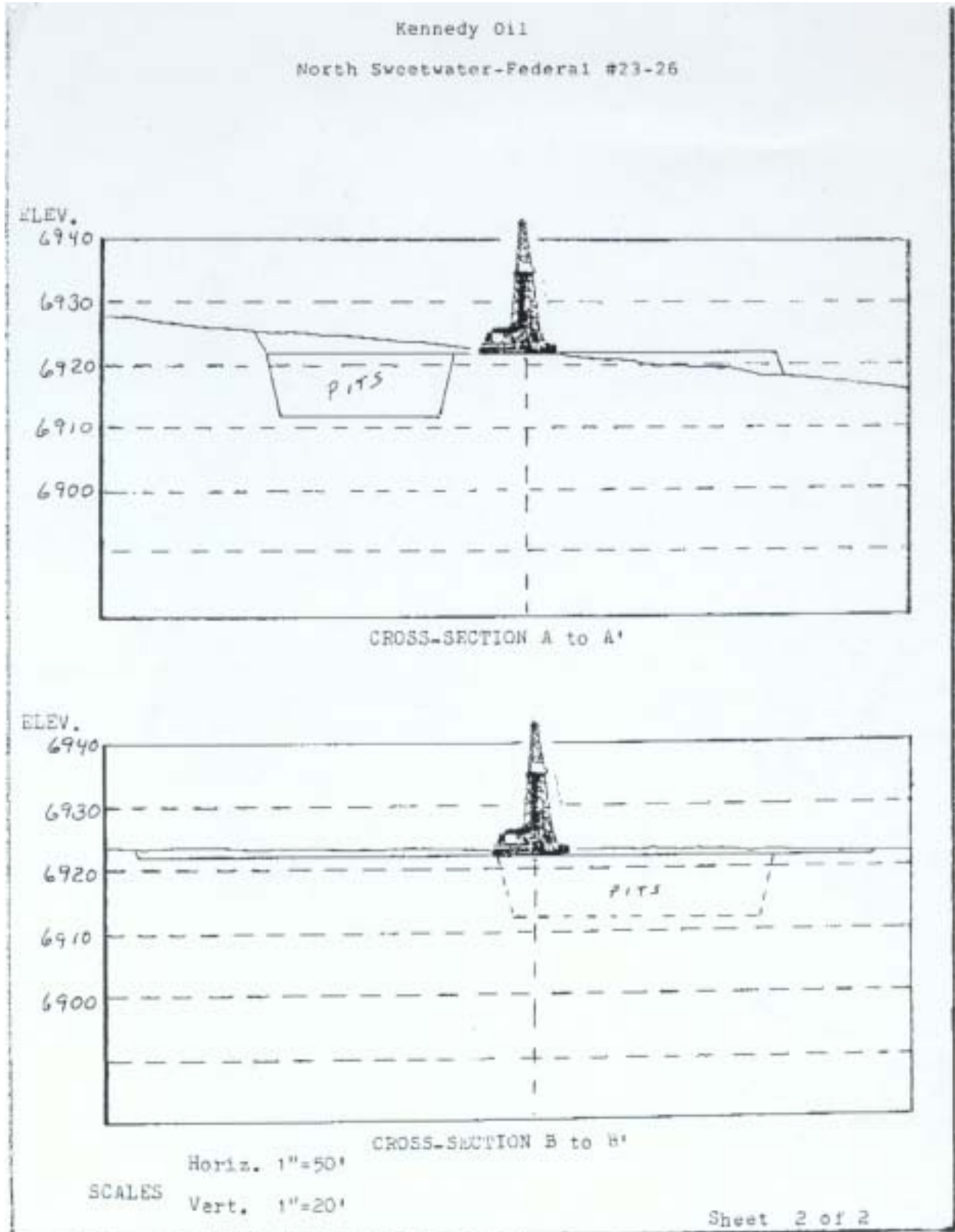
In accordance with 43 CFR 3162.7-4(d), within sixty (60) days following construction of a new tank battery, a site facility diagram of the battery showing actual conditions and piping must be submitted to the AO. Facility diagrams shall be filed within sixty (60) days after existing facilities are modified.

Pursuant to *Onshore Oil & Gas Order No. 1*, lessees and operators have the responsibility to see that their exploration, development, production and construction operations are conducted in such a manner which conforms with applicable Federal laws and regulations and with State and local laws and regulations to the extent that such State and local laws are applicable to operations on Federal and Indian lands.

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**KENNEDY OIL
MASTER SURFACE USE AND OPERATIONS PLAN
COALBED METHANE WELLS IN THE BIG RED FIELD AREA
SWEETWATER COUNTY, WYOMING**

MULTI-POINT SURFACE USE AND OPERATIONS PLAN

WELL LOCATIONS

The proposed well sites are staked.

A plat of the surveyed location, signed by a surveyor licensed in the State of Wyoming, will be attached to each individual APD.

EXISTING ACCESS ROADS (RESOURCE ROADS)

The project area is approximately 70 miles northeast of Rock Springs, Wyoming. To reach the project area, travel 40 miles east of Rock Springs on I80 to Point of Rocks Exit; turn north on County Road No. 21 and proceed approximately 32 miles to the turnoff which is identified on the attached map labeled *EXHIBIT S#1*.

Please refer to the map labeled *EXHIBIT S#1* for existing access roads. Existing roads that are not county roads are called ‘resource roads’ on the map and the mileage to the project area is clearly marked.

The existing access roads will be maintained in the same or better condition as existed prior to the commencement of operations, and said maintenance will continue until final abandonment and reclamation of the well location.

Travel will not be allowed during periods when severe rutting or resource damage might occur.

NEW/PROPOSED ACCESS ROADS (SPECIAL PURPOSE ROADS)

New access routes necessary to each well are shown on the maps labeled *EXHIBITS S#2A, B* submitted with this Plan. These have been marked by stakes every 300’ or within line-of-sight. New access roads are called ‘temporary roads’ on the map and the mileage to each well site is clearly marked.

FOR DRILLING: The new access to well sites will be 2-track trails, not exceeding 12 feet wide and flat-bladed only where necessary, in order to minimize surface disturbance. The equipment utilized to drill and complete these coalbed methane wells is not of a size or number to require crowned and ditched roadways for drilling and completion activities. Where necessary, native surfacing materials will be utilized to prevent rutting or other damage. Where possible, a blade or brush hog will be utilized to only take off surface vegetation without disturbing the root zone. Any other surface-disturbing activity (cuts or fills) that may be necessary for safe access to drill the well will be only as stipulated for that individual well by the BLM (surface owner).

Any fence cuts, cattle-guards or culverts necessary are shown on Exhibit S#2.

Travel will not be allowed during periods when severe rutting or resource damage might occur. Should severe rutting or resource damage occur as a result of drilling or completion operations, the BLM Authorized Officer may evaluate the damage and as a result of such evaluation may require subsequent new access roads to be crowned and ditched to BLM standards for drilling and completion activities.

FOR PRODUCTION: The wells covered by this plan are coalbed methane wells and there is little anticipated heavy truck traffic after drilling and completion activities. and 2) maintenance activities (very occasional). A light truck (pickup) will access each well 1 X per day under ordinary circumstances. For these reasons, excess surface disturbance to upgrade roads is unnecessary. The BLM AO may require upgrading of the road(s) to BLM standards if the conditions of the APDs are not adhered to by the operator and its contractors and/or if resource damage occurs.

Where necessary, the holder shall furnish and install culverts of the gauge, materials, diameters and lengths required by BLM. Culverts shall be free of corrosion, dents or other deleterious conditions. Culverts shall be placed on channel bottoms on firm, uniform beds which have been shaped to accept them and aligned to minimize erosion. Backfill shall be thoroughly compacted. No equipment shall be routed over a culvert until backfill depth is adequate to protect the culverts. The minimum diameter for culverts shall be 18 inches.

If snow removal activity is undertaken off traveled ways, equipment used shall be equipped with shoes to keep the blade six (6) inches above the natural ground surface. Special precautions shall be taken where the surface of the ground is uneven and at drainage crossings to ensure that equipment does not destroy vegetation. Location of snow stockpiles, if needed, shall be approved by the authorized officer in advance.

Any new up-graded, all-weather access roads required for central metering or compressor sites will be identified and approval applied for prior to construction.

LOCATION OF EXISTING WELLS

All wells (water, injection, disposal, producing, abandoned and drilling) within a one-mile radius of the BIG RED project area are identified on *EXHIBIT S#3* attached hereto.

WELLSITE LAYOUT

Wellsite/rig layout schematics will be attached to each individual APD.

Schematic will show the drill site layout as staked. Cross sections have been drafted to visualize the planned cuts and fills across the location (see Figure #2).

No permanent living facilities are planned. There may be three trailers on location; one each for the mud logger, geologist and toolpusher.

PADS AND PITS/CONSTRUCTION/OPERATIONS

All equipment and vehicles will be confined to the access road, pad, and area specified in the APD. Remove the top six inches of soil from the location including areas of cut, fill, and/or subsoil storage areas and stockpile at the site (see schematic for location of topsoil stockpiles). The topsoil will be clearly segregated from excess spoil material. If ground frost prevents the segregation and removal of

the topsoil material from the less desirable subsoil material, cross-ripping to the depth of the topsoil material may be necessary. If there is snow on the ground when construction begins, the operator will remove it before the soil is disturbed and pile it downhill from the topsoil stockpile location. The operator will not push soil material and overburden over side slopes or into drainages. All soil material disturbed will be placed in an area where it can be retrieved and where it doesn't impede watershed and drainage flows.

Construct the backslope no steeper than 1:1. Construct the foreslope no steeper than 1:1. A flare pit will be constructed on the well pad for use during drilling operations. It will be located at least 125-feet from the well head.

The reserve pit will be constructed with a minimum of one-half the total depth below the original ground surface on the lowest point within the pit, and oriented to prevent collection of surface runoff. After the drilling rig is removed, the operator may need to construct a trench on the uphill side of the reserve pit to divert surface drainage around it. If constructed, the trench will be left intact until the pit is closed.

The reserve pit will be lined with an impermeable liner. An impermeable liner is any liner having a permeability less than 10^{-7} cm/sec. The liner will be installed so that it will not leak and will be chemically compatible with all substances which may be put in the pit. Liners made of any man-made synthetic material will be of sufficient strength and thickness to withstand normal installation and pit use.

Construction is not permitted using frozen material, or during periods when the soil material is saturated, or when watershed damage is likely to occur. An 18" high berm of compacted subsoil shall be constructed at the top of all fill slopes and shall tie into the cut slopes.

The reserve pit will be fenced on three non-working sides during drilling, and the fourth side at the time the rig is removed, using woven wire and 2 top strands barbed wire held in place by line posts and wooden corner 'H' braces, to protect livestock and wildlife. Rat and mouse holes shall be filled and compacted from the bottom to top immediately upon release of the drilling rig from the location.

CONSTRUCTION MATERIALS

No construction materials will be needed for well pad construction.

No construction materials will be taken from Federal and/or Indian lands without prior approval from the appropriate Surface Management Agency.

If production is established, any construction materials needed will be purchased from a local supplier having a permitted source of materials.

No new access roads for construction materials will be required.

All construction equipment will be kept clean and weed-free so as to control any spread of noxious weeds.

LOCATION AND TYPE OF WATER SUPPLY

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Water for drilling and cementing will be obtained from a water well located in Sec 28, T23N, R96W (Harmel Jolly, owner) AND/OR Sec. 31, T24N, R97W (Tom Brown Inc., Owner). The water source will be properly permitted with the State Engineers Office. No new Federal ROW will be needed for access to this water well. Water for drilling will be transported by truck to the drill-site for each well.

Methods of Handling Waste Materials

Cuttings: deposited in the reserve pit

Drilling fluids: will be contained in the reserve pit and allowed to evaporate.

Sewage: Sewage and gray water will be disposed of into a portable, chemically-treated latrine and disposed of into a State of Wyoming DEQ approved disposal site. A portable, chemically-treated, self-contained latrine accessible to several well-sites will remain in the area of the wells being drilled and completed through termination of completion operations.

Garbage and other waste materials: Trash and other solid waste including cans, cable, etc. will be contained in portable trash containers. The trash containers will be disposed of into a State of Wyoming DEQ approved sanitary landfill as needed and/or upon completion of operations. No trash will be placed in the reserve pit.

Chemicals/Change Oil: Any chemical substances or any used motor oil (change oil) will be placed in closed containers and disposed of at an authorized disposal site. It will not be disposed of in the reserve pit or on the well location.

Other: Immediately after removal of the drilling rig, all debris and waste materials not contained in the trash cage will be cleaned up and removed from the well location. No adverse materials will be left on the location.

Hazardous Materials: The operator and their contractors shall ensure that all use, production, storage, transport and disposal of hazardous and extremely hazardous materials associated with the drilling, completion and production of this well will be in accordance with all applicable existing or hereafter promulgated federal, state and local government rules, regulations and guideline. All project-related activities involving hazardous materials will be conducted in a manner to minimize potential environmental impacts. A file will be maintained containing current Material Safety Data Sheets for all chemicals, compounds and/or substances which are used in the course of construction, drilling, completion and production operations.

Produced fluids: Hydrocarbons produced during completion operations will be placed in test tanks on the location. Water produced during completion operations will be put into the reserve pit as per NTL-2B. Any spills of oil, gas, salt water or other noxious fluids or solids will be cleaned up and removed to an approved disposal site.

Produced Water: Produced water will be trucked or piped to a properly permitted water disposal/injection facility for re-injection into an aquifer approved by the WOGCC.

ANCILLARY FACILITIES

None anticipated

LOCATION OF EXISTING AND/OR PROPOSED FACILITIES (FOR PRODUCTION)

ON WELL LOCATION: A schematic showing proposed well site configuration is attached to this plan, marked EXHIBIT S#4. Facilities include: a) pumping unit with a propane fired engine (convertible to natural gas) (SEE ATTACHED ENGINE SPECS); b) water storage tank(s) with

pump or off-loading system (isolated by dikes); and c) metering equipment.

OFF WELL LOCATION: New infrastructure (buried pipelines, water lines) will be necessary to each well and the proposed location of this infrastructure is identified marked as 'utility corridors' on EXHIBIT S#2 A,B. After construction, an 'as-built' map/schematic will be submitted to BLM. This 'as-built' map will show pipeline sizes and lengths, etc. Construction methods utilized will be industry standard, will minimize environmental impacts and will be in compliance with terms and conditions as stipulated by BLM (surface owner).

OTHER INFRASTRUCTURE: If the wells are commercial producers, proposed central metering sites and compressor sites will be submitted with a request for approval.

PLANS FOR RECLAMATION OF THE SURFACE:

IF THE WELL IS A DRY HOLE

Immediately after removal of the drilling rig, all debris and waste materials not contained in the trash cage will be cleaned up and removed from the well location. No adverse materials will be left on the location.

During reclamation of the site, the operator will push fill material into the cuts and up over the backslope to approximate the original topography. No depressions will be left that trap water or form ponds.

The fluids and mud must be dry in the reserve pit before recontouring pit area. The operator will be responsible for recontouring of any subsidence areas that develop from closing a pit before it is completely dry. The plastic pit liner will be cut off below grade and properly disposed of prior to beginning recontouring.

Before the location has been reshaped and prior to redistributing the topsoil, the operator will rip or scarify the drilling platform on the contour, to a depth of at least 12 inches. The rippers are to be no farther than 24 inches apart.

Distribute the topsoil evenly over the entire location and prepare the seedbed by disking to a depth of 4-to-6 inches following the contour.

Waterbars are to be constructed at least one (1) foot deep, on the contour with approximately two (2) feet of drop per 100 feet of waterbar to ensure drainage, and extended into established vegetation. All waterbars are to be constructed with the berm on the downhill side to prevent the soft material from silting in the trench. The initial waterbar should be constructed at the top of the backslope. Subsequent waterbars should follow the following general spacing guidelines:

% SLOPE	SPACING INTERVAL (feet)
2 or <	200
2 - 4	100
4 - 5	75
5 or >	50

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The operator will drill seed on the contour to a depth of .5 inches, followed by compaction of the seedbed, preventing soil and seed losses. To maintain quality and purity, certified seed with a minimum germination rate of 80% and a minimum purity of 90% will be used. The seed mixture used will be as per surface owners request.

Slopes too steep for machinery may be hand broadcast and raked with twice the specified amount of seed.

Complete fall seeding after September 15 and prior to ground frost. To be effective, complete spring seeding after the frost has left the ground and prior to May 15.

The operator will control noxious weeds on the location and along the access road. On BLM surface, this will require an authorized pesticide use permit.

All rehabilitation work, including seeding, will be completed as soon as feasible following plugging, BLM will not release the performance bond until the area has been successfully revegetated (evaluation will be made after the second growing season) and has met all other reclamation goals of the surface owner and surface management agency.

A Notice of Intent to Abandon and a Subsequent Report of Abandonment must be submitted for abandonment approval.

An above-ground tubular metal dry hole marker will be erected over the drill hole location upon cessation of drilling and/or testing operations. The marker will be inscribed with the operator's name, well number, well location, and federal lease number. Upon request from the surface owner,, the casing may be cut-off 3 feet below reclaimed ground surface (or below plow depth) with a metal plate affixed to the top providing the same well information as stated above. This monument must consist of a piece of pipe and not less than four inches in diameter and ten feet in length, of which 4 feet shall be above the general ground level and the remainder being imbedded in cement. The top of the pipe must be closed by a welded or screw cap, cement or other means.

IF THE WELL IS A PRODUCER

Landscape those areas not required for production to the surrounding topography as soon as possible. The fluids and mud must be dry in the reserve pit before recontouring pit area. The operator will be responsible for recontouring of any subsidence areas that develop from closing a pit before it is completely dry.

Distribute stockpiled topsoil evenly over those areas not required for production and reseed using the seeding method specified above.

The operator will control noxious weeds on the location and along the access road. On BLM surface, this will require an authorized pesticide use permit.

All permanent above-the-ground structures that will remain longer than six months will be painted

desert brown (Munsell standard color No. 10 YR 6/3) or other standard color required by the BLM. The exception being that Wyoming Occupation Health and Safety Act Rules and Regulations are to be complied with where special safety colors are required.

Vegetation will be controlled by mowing or cutting on the access road and around the well and production facilities to minimize fire hazard.

SURFACE OWNERSHIP:

All of the well locations in the project area are all on surface and mineral estate owned by the BLM.

OTHER INFORMATION:

An Environmental Assessment of the Project Area is being submitted. The EA will address all known potential impacts of this project.

A cultural survey of all of the well sites, access and utility corridors within the project area has been completed.

Rights-of-way grants necessary across off-lease BLM lands will be applied for from the authorized BLM Office concurrently with submittal of this plan.

Kennedy Oil agrees to comply with all stipulations found in the oil and gas leases covering the wells applied for under this Plan.

Kennedy Oil agrees to consider and, if necessary, mitigate any impacts to current land uses, rights-of-way or improvements near the proposed well sites and access that might be impacted or interfere with drilling or construction operations.

ADDITIONAL STIPULATIONS:

Should previously unknown or unanticipated cultural resources be discovered during project implementation all working the immediate area of said resources will halt. The Field Manager will be notified of the discovery. The discovery situation will then be evaluated and consulted upon as per the terms of the National Preservation Act of 1966, as amended, its implementing regulations, and the Wyoming State Protocol Agreement between the Bureau of Land Management and the Wyoming State Historic Preservation Officer. Should human remains or burial-related objects be discovered the terms of the Native American Graves and Repatriation Act and its implementing regulation may be invoked. Work in the area will not resume until the operator is notified in writing by the Field Manager that it is appropriate to do so.

The Operator shall protect all survey monuments found within the right-of-way. Survey monuments include, but are not limited to, general land office and Bureau of land Management cadastral survey corners, reference corners, witness points, U. S. coastal and geodetic benchmarks and triangulation stations, military control monuments and recognizable civil (both public and private) survey monuments. In the event of obliteration or disturbance of any of the above, report the incident, in writing, to the AO and respective installing authority, if known. Where General Land Office or BLM right-of-way monuments or references are obliterated during operations, the holder shall secure the services of a registered land surveyor or a Bureau cadastral surveyor to restore the damaged monuments and references, record such survey in the County and send a copy to the AO. If Bureau cadastral surveyors or other Federal surveyors are used to restore the disturbance, the holder shall be responsible for the survey cost.

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The Operator/holder is responsible for the weed control on disturbed areas within the exterior limits of the permit. The control methods must be undertaken in accordance with guidelines established by the BLM, State and local authorities. Prior approval is required and use of pesticides will be limited to those approved by the AO. Prior BLM approval is not required on split estate, however, compliance with EPA regulations and State Law is required.

The holder shall comply with all applicable Federal laws and regulations existing or hereafter enacted or promulgated. In any event, the holder shall comply with the Toxic Substances Control Act of 1976, as amended, with regard to any toxic substances that are used, generated by or stored on the right of way or on facilities authorized under this grant. Additionally, any release of toxic substances in excess of the reportable quantity established by 40 CFR 117 shall be reported as required, a copy of which shall be furnished to the AO concurrently.

The holder agrees to indemnify the United States against any liability arising from the release of any hazardous substance or hazardous waste, as defined in ERCLA Act of 1980 or the RCRA Act of 1976, on the right of way, unless the release or threatened release is wholly unrelated to the holder's activity on the right of way. This agreement applies without regard to whether a release is caused by the holder, its agent or unrelated third parties.

LESSEE'S OR OPERATOR'S REPRESENTATIVE AND CERTIFICATION:

Contact for additional information, if required:

Ruth M. Reile, Regulatory Affairs/Land
KENNEDY OIL
700 West Sixth Street
Gillette, Wyoming 82716
Telephone: 1-307-682-3107 or 682-8726

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 the 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 KENNEDY OIL and its contractors and sub-contractors 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.

/s/ Ruth Reile
OPERATOR/AGENT

June 14, 2002
DATE

Kennedy Oil
ADDENDUM TO MASTER SURFACE USE PLAN
SWEETWATER CBM PILOT PROJECT
Comprehensive Transportation Plan

Kennedy Oil wishes to clarify previously submitted plans for transportation/access in the Master Surface Use Plan for this project.

The theory of Kennedy Oil development is always to minimize environmental impact with proven techniques applicable to local climatic conditions and environment, including soils and topography. Other conditions that have an impact include Wyoming Department of Environmental Quality (DEQ) concerns over air quality and water quality and concerns for minimizing the “footprint” for shallow gas production. Practical engineering standards have been applied to this method of construction in the past. Experience drives us to pursue this practice wherever possible.

A qualified Company employee will design all roads in this project area.

A. UPGRADED ROADS

1. COLLECTOR ROADS (multi-purpose existing main roads)

Kennedy Oil will share maintenance on existing roads that access existing Oil & Gas in the area.

Kennedy Oil employs an aggressive cooperative policy with other Oil and Gas Companies for access for their development of deeper resources within Kennedy’s developed area. Shared construction and maintenance are encouraged with other industry entities.

Required upgrading of roads for access to company’s projects is acceptable to Kennedy Oil.

LOOP/RESOURCE ROADS (normal upgraded roads providing access to several individual lease roads; *see attached schematic*)

Resource roads or loop roads and roads along or across drainages or depressions that can hold water for long periods during wet seasons will be crowned and ditched with the fill removed from borrow ditches and from hills where limited sight distances are a factor.

Standard hydrological practices will be used to determine culvert size, and to minimize the effects on drainage patterns where necessary.

The road level will be elevated in low areas to prevent roadways from becoming submerged.

The travelway of the crowned and ditched roads will be 14 feet wide with a 12 feet surface of 4 inches of native gravel.

When available, drilling mud will be applied to bind the top of the road.

The sides of the road will have a minimum of 2:1 slope with ditches at a maximum of 12 feet wide. These borrows will be sloped to the natural surface outward at a 2:1 slope.

Crowning will be at a 2% slope to the center (approximately 2”).

Any disturbed surface requiring reclamation will be reseeded in the first planting time allowable.

Turns will be constructed with a minimum 400 feet radius allowing for maximum speeds of 30 mph.

Maximum speeds will be posted.

Signage will be utilized to minimize public access.

Access roads to compressors that may be applied for in this project area will be crowned and ditched resource roads

B. SPECIAL PURPOSE ROADS (Minimum Impact Access)

The Transportation Plan has been formulated to illustrate an understanding of the issues and mitigation of social and logistical issues that are specific to the Red Desert Watershed.

Findings of Fact

BLM and County roads accessing the area (crown and ditch design) are typically 25 to 30 feet wide with ten to twenty foot ditches on either side. Although these roads are regularly maintained, erosion, blowouts and drainage problems are evident.

Soils in this project area are granular with little or no clay to bind them together. These soils make poor roadbeds and require excessive maintenance.

Historical two track roads in the area exhibit stable condition of both vegetation and soils. Erosion on these roads is typically minor and traffic is confined to the road. Many of these roads are over ten years old.

Two track roads reduce maximum possible vehicular speed to far less than that seen on upgraded roads. Therefore, a safety benefit is realized and the possibility of endangering wildlife is greatly reduced.

Crown and ditch roads may fit circumstances where travel by heavy vehicles is frequent over long periods of time, but that is not the case with the shallow wells proposed in this project.

Two-track roads would minimize environmental damage, discourage public travel, and be more easily abandoned and rehabilitated upon completion of shallow natural gas production.

Two-track roads are suitable for occasional light vehicle travel. The nature of methane extraction from coal allows wells to be pumped as a group that is not affected greatly when an individual well

shuts down, therefore there is no need to access wells when weather conditions do not allow. Utilization of remote monitoring (telemetry) when possible would further reduce vehicular traffic.

This minimal type of construction has been shown not to interfere with runoff patterns in areas where the practice was applied in the Powder River Basin.

1. Policy Analysis

This practice is consistent with policy 911.06. This policy states that "... Bureau roads must be designed to an appropriate standard no higher than necessary to accommodate their intended functions adequately...."

NEPA regulations 40 CFR 1502.14 requires the Proposed Action and alternatives to be described in detail so that reviewers can evaluate their comparable merits.

Wyoming Road Manual Supplement 9113.16 C provides for a sub-category of "Special Purpose Road", which is designed for light travel and low speed through and within recreation areas and special use areas. The design criteria are intended to protect and enhance the existing aesthetic, ecological, environmental and cultural amenities within the area. The two-track roads identified by this proposal fit this description and serve these environmental objectives.

3. Plan for development of Special Purpose Roads (individual lease roads)

In accordance with the Green River RMP, whenever the topography allows, right-of-ways will be selected as to minimize visual intrusion of the landscape. Routes will follow contours and avoid deep cuts and fills wherever possible to prevent runoff and wind erosion. The appearance of a well-maintained road is not intrusive. Deep ruts or spoil piles destroy this illusion.

Turns will be situated with a minimum 300 feet radius allowing for maximum speeds of 10 mph.

Maximum speeds will be posted as needed.

Signage will be utilized and travel will be restricted during wet conditions when and where damage could occur. Kennedy Oil has a firm policy of immediate dismissal for offenders of this policy.

Two-track roads will be brush hogged (A mowing machine that cuts low brush near the ground without disturbing the soil) to a maximum of 30 feet width. This width allows the pipelines to be installed without further disturbance. Brush hogging allows the root system of native vegetation to hold the soil in place.

Brush will be removed from the sides of the road (utility corridor).

The roads will be routed to take advantage of prevailing winds to lessen snow drifting during winter months. Brush hogging minimizes drifting during periods of snow and wind. Snow fences may also be placed to redirect drifts.

*Environmental Assessment, Lower Bush Creek Pilot Exploratory
Coal Bed Methane Project*

Traffic on these roads will be reduced by burying of the water lines to disposal points reducing the need for the hauling of water as promptly as development permits.

Drilling pits are designed large enough to hold 30 days worth of produced water. Additional test pits may be applied for by Sundry Notice , if necessary, to hold water until pipelines to disposal wells can be constructed.

Mobile drilling rigs that minimize total number of heavy loads will be used.

Permits for watering of roads will be a priority for dust control.

Spot upgrading will be implemented, as the conditions require. Minor upgrading may require a 12-foot wide application of gravel 4 inches thick to stabilize any undesirable conditions. This practice minimizes the effects on natural drainage patterns and does not interfere with surface hydrology. (*see attached schematic*).

If conditions require more serious intervention, “plating” will be utilized (the practice of combing drilling mud or clay soils as a binder with native sand and/or native gravel) to build a stable “plate” base 2” to 8” thick. On these areas access roads will be graveled 12 feet wide with 20-foot wide pullouts 100 feet long at 1,000-foot intervals. Plating is a limited solution due to the lack of clay soils in the area and usage of drilling mud as a binder limits application to approximately 1,200 feet per well. (*see attached schematic*).

If greater intervention is required, the roads will be upgraded to the standard of a collector road. *Kennedy Oil will continually monitor the condition of all access roads.*

Signs will be posted restricting travel to authorized personnel. Denial of the use of these roads to the public will be beneficial to both the BLM and Kennedy Oil as damage beyond the right-of-way and vandalism of equipment are possible.

APPENDIX E

Scoping Notice

Kennedy Oil Pilot Exploratory Coal Bed Methane Project Kennedy Oil

Bureau of Land Management Rock Springs Field Office

Description of Project

Kennedy Oil (Kennedy) has notified the Bureau of Land Management (BLM), Rock Springs Field Office, that they want to initiate environmental review for a pilot exploratory coal bed methane project (CBM) on their federal oil and gas leases in Townships 24 and 25 North, Range 98 West, 6th Principal Meridian, Sweetwater County, Wyoming (see Map). The analysis area takes in approximately 10,240 acres of which 9,090 acres are federal surface and minerals and 1,150 acres State of Wyoming surface and minerals. No wells are proposed on lands owned by the State of Wyoming.

The project area is within the administrative boundary of the BLM's Rock Springs Field Office and is located in the north-central part of Sweetwater County, Wyoming. Access to the area is by Interstate Highway 80, Sweetwater County Road 4-21, and existing oil and gas field access roads.

Kennedy proposes to explore two CBM areas or pods. The northern exploratory pod would contain 10 wells and 1 water injection well. The southern pod would contain 10 wells and 1 injection well. The wells would be located on 160-acre spacing with the exception of the injection wells (see Map). All produced water would be reinjected into a water sand formation containing water of equal or lesser quality. No permanent surface discharge of produced water is proposed and all potable water would be protected. The size of these exploratory pods has been determined by the number of wells believed necessary to de-water the coal sufficiently to allow the gas to desorb (reduce pressure in the coal seam) and to determine whether gas production is economically viable.

Components of the proposal include:

- Approximately 10.75 miles of existing or newly constructed oil and gas field access road.
- 175 x 175-foot well pad for the initial drilling of each well. Reserve pits would be lined and once in operation, all unneeded disturbed areas would be reclaimed.
- Pumping units for initial de-watering. Each pumping unit would initially run on propane and then on natural gas. Pump units would be removed once the coal seam has been de-watered enough to allow testing of gas.
- Should methane gas production ensue, a covered wellhead and measurement devices would

5 Refer to Figure 2.1 in Chapter 2 for Map

remain on the well pad. Further reclamation of disturbed areas no longer needed would be completed.

- Pipelines would follow existing roads/pipeline corridors where possible.
- Kennedy would proceed with drilling and testing operations upon approval of the necessary permits by BLM and other agencies having jurisdiction.

Relationship to Land Use Plans

The *Green River Resource Management Plan and Record of Decision* (GRRMP, 1997) allows for oil and gas exploration and development. The GRRMP provides land use guidance for exploration and development of oil and gas reserves within the project area. The project area is located in an area known as the Great Divide Basin which lies within the Red Desert Watershed Management Area. Mineral exploration and development may be allowed subject to the management guidelines for fluid minerals and the Red Desert Watershed Management Area.

Lease Stipulations - All of the public lands managed by the BLM within the two pods are leased for oil and gas exploration and development. These leases may include stipulations restricting occupancy on some or all of the lease in order to protect important surface resources such as raptor breeding and nesting, or sage grouse leks and nesting habitat. One lease requires an acceptable plan for protection of visual, wildlife, watershed, and soils.

Use Authorizations - All facilities located off-lease or downstream of the gas metering points would require a right-of-way or sundry notice under the proper authority.

Compliance with the National Environmental Policy Act (NEPA)

This CBM project is subject to the appropriate level of environmental analysis. To comply with NEPA and the Council on Environmental Quality regulations which implement NEPA, BLM is required to conduct an environmental analysis.

Land and Resource Management Issues and Concerns

A BLM interdisciplinary team of resource specialists will be involved in the analysis of the environmental impacts of the Proposed Action and alternatives. Land and resource issues tentatively identified as potentially affected by this action include:

- Red Desert Watershed Management Area including Great Divide Basin
- Playa lakes and associated wetland areas
- Subsurface hydrology
- Class III visual resource management area
- Cultural resources and possibly Native American Religious Concerns
- BLM special status plant and animal species, including listed, proposed for listing, and candidate species, and other BLM sensitive species such as sage grouse leks and nesting habitat, raptor nesting, mountain plover habitat, and prairie dog towns
- Great Divide Basin Wild Horse Herd Management Area

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- Noise
- Road layout
- Cumulative impacts

Public input is important in establishing the level and scope of the analysis. BLM is requesting the public's help in identifying the level of analysis needed, alternatives for analysis, other issues or concerns that should be analyzed, mitigative opportunities, and any other comments or ideas to help ensure the completeness of the analysis process. BLM encourages your comments. Your comments are due by April 1, 2002. Please submit your comments to:

Address: Teri Deakins, Project Manager
BLM - Rock Springs Field Office
280 Highway 191 North
Rock Springs, WY 82901

Email: teri_deakins@blm.gov (Please reference Kennedy CBM Pilot Project in subject field)

Initial Mailing List

The scoping notice initial mailing distribution includes the following agencies, individuals, industries, organizations, and media:

Government Offices

Bureau of Land Management, Wyoming State Office (910, 912, 920, 930)
Bureau of Land Management, Rawlins Field Office
Office of the Governor
U.S. Department of the Army, Corps of Engineers
U.S. Fish and Wildlife Service
Wyoming State Clearinghouse
Wyoming Department of Environmental Quality
Wyoming Oil and Gas Conservation Commission
Wyoming Game and Fish Department (Cheyenne, Green River)

Elected and Other Officials

Mayors of Rock Springs, Green River, Superior, Wamsutter, Rawlins
Postmaster, Farson
State Senators: Rae Lynn Job, Mark Harris, Tex Boggs
State Representatives: John Eyre, Stephen Watt, Fred Parady, Bud Nelson, Bill Thompson
Sweetwater and Carbon County Commissioners
Sweetwater County Planner
Sweetwater County Libraries, Green River, Rock Springs
U.S. Congresswoman Barbara Cubin, Kate Legerski, Representative
U.S. Senator Mike Enzi, Lyn Shanaghy, Representative
U.S. Senator Craig Thomas, Pati Smith, Representative

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Public Land Users and User Groups

Affected grazing permittee in the Red Desert Allotment and affected interests

People for the West

Petroleum Association of Wyoming

Independent Petroleum Association of Mountain States

Native American Tribes: Eastern Shoshone, Northern Ute, Northern Arapaho, Shoshone-Bannock

Sierra Club, Northern Plains Representative

Southwest Wyoming Industrial Association

Wilderness Society

Rocky Mountain Elk Foundation

National Wildlife Federation

Wyoming Wildlife Federation

Wyoming Association of Professional Archaeologists

Wyoming Outdoor Council

Wyoming Public Lands Council

Wyoming Chapter of the Sierra Club

Environmental Defense Fund

Biodiversity Associates

Newspapers

Pinedale Roundup

Sublette County Journal

Kemmerer Gazette

Rock Springs Daily Rocket-Miner

Casper Star-Tribune

Green River Star

Wyoming State Journal

Uinta County Herald

Radio Stations

KQSW/KRKK. Rock Springs

KMKX - Rock Springs

KUGR - Green River

KYCS - Rock Springs

KMER - Kemmerer

KRAL - Rawlins

KUWR - University of Wyoming

Television Stations

KTWO-TV - Casper

KCWY-TV - Casper

KFNB-TV - Casper

KGWC-TV - Casper

Sweetwater Television