

**ENVIRONMENTAL ASSESSMENT for the
Hay Reservoir Coalbed Natural Gas Pilot
Project, Sweetwater County, Wyoming
WY-030-05-EA-390**

BLM

Wyoming State Office — Rawlins Field Office



September 2005

MISSION STATEMENT

It is the mission of the Bureau of Land Management to sustain the health, diversity, and productivity of the public lands for the use and enjoyment of present and future generations.

BLM/WY/PL-05/021+1310

WY-030-05-EA-390



United States Department of the Interior



BUREAU OF LAND MANAGEMENT
Rawlins Field Office
P.O. Box 2407 (1300 North Third Street)
Rawlins, Wyoming 82301-2407

In Reply Refer To:
1790

September 14, 2005

Re: Environmental Assessment for the
Hay Reservoir CBNG Pilot Project

Dear Reader:

This is to inform you of the availability of the Hay Reservoir Coalbed Natural Gas (CBNG) Pilot Project Environmental Assessment (EA) at the Wyoming Bureau of Land Management's (BLM) website:

http://www.blm.gov/nhp/spotlight/state_info/planning.htm

The Hay Reservoir CBNG Pilot Project is a natural gas project that would explore and potentially develop natural gas resources within the jurisdiction of the Rawlins Field Office. In order to satisfy the requirements of the National Environmental Policy Act, this EA was prepared to analyze impacts associated with the construction, drilling, production, maintenance, and reclamation of natural gas wells northwest of Rawlins, Wyoming.

It is expected that this EA can be viewed at our website beginning September 15, 2005. This will begin the 30-day public review/comment period for the document. We will review all comments and will address substantive comments in the Decision Record. A substantive comment is one that would alter conclusions drawn from the analysis based on (1) new information, (2) why or how the analysis is flawed, (3) evidence of flawed assumptions, (4) evidence of error in data presented, and (5) requests for clarification that bear on conclusions presented in the analysis.

Your comments should be as specific as possible. Comments on the alternatives presented and on the adequacy of the impact analysis will be accepted by the BLM until October 17, 2005.

Comments may be submitted via regular mail to:

Travis Bargsten, Project Manager
Bureau of Land Management
Rawlins Field Office
P.O. Box 2407
Rawlins, Wyoming 82301

or may be submitted electronically at the address shown below (please refer to the Hay Reservoir CBNG Pilot Project):

e-mail: rawlins_wymail@blm.gov

Please note that comments, including names, e-mail addresses, and street addresses of respondents, will be available for public review and disclosure at the above address during regular business hours (7:45 a.m. to 4:30 p.m.), Monday through Friday, except holidays. Individual respondents may request confidentiality. If you wish to withhold your name, e-mail address, or street address from public review or from disclosure under the Freedom of Information Act, you must state this plainly at the beginning of your written comment. Such requests will be honored to the extent allowed by law. All submissions from organizations or businesses, and from individuals identifying themselves as representatives or officials of organizations or businesses, will be made available for public inspection in their entirety.

The EA may also be reviewed at the following locations:

Bureau of Land Management
Wyoming State Office
5353 Yellowstone Road
Cheyenne, Wyoming 82009

Bureau of Land Management
Rawlins Field Office
1300 N. Third Street
Rawlins, Wyoming 82301

If you require additional information regarding this project, please contact Travis Bargsten, Project Manger, at the Rawlins address or phone (307) 328-4387.

Sincerely,

A handwritten signature in black ink that reads "Mark Stoyen". The signature is written in a cursive style with a large, sweeping "M" and "S".

Field Manager

Enclosure

PURPOSE AND NEED

1.0 INTRODUCTION

Kennedy Oil (Applicant) of Gillette, Wyoming, has notified the Bureau of Land Management (BLM), Rawlins Field Office (RFO), that the company proposes an eight well exploratory pilot project (Project), known as the Hay Reservoir Coalbed Natural Gas Pilot Project, to explore for and develop coalbed natural gas (CBNG) resources on federal mineral leases. The proposed well sites are located on public lands within the administrative boundary of the RFO in Township 23 North, Range 97 West, Sweetwater County, Wyoming. The proposed Project is located in south central Wyoming (Figure 1).

The proposed action involves drilling and testing the commercial gas production potential of the Big Red Coal formation with 8 wells on 160-acre spacing. This well number and spacing is believed to be the minimum necessary to sufficiently de-water the coal, allowing for the determination as to whether natural gas production is economically viable in this coal at this location. Produced water will be reinjected into a sand formation containing water of lesser or equal quality as compared with the injected water under the terms of a permit issued by the State of Wyoming. This Project will also require the construction of access roads, utility corridors, completion of one injection well and related production facilities (including a compressor station and 12" gas-transportation pipeline). The Project area encompasses approximately 1,280 acres.

1.1 PURPOSE AND NEED FOR PROPOSED ACTION

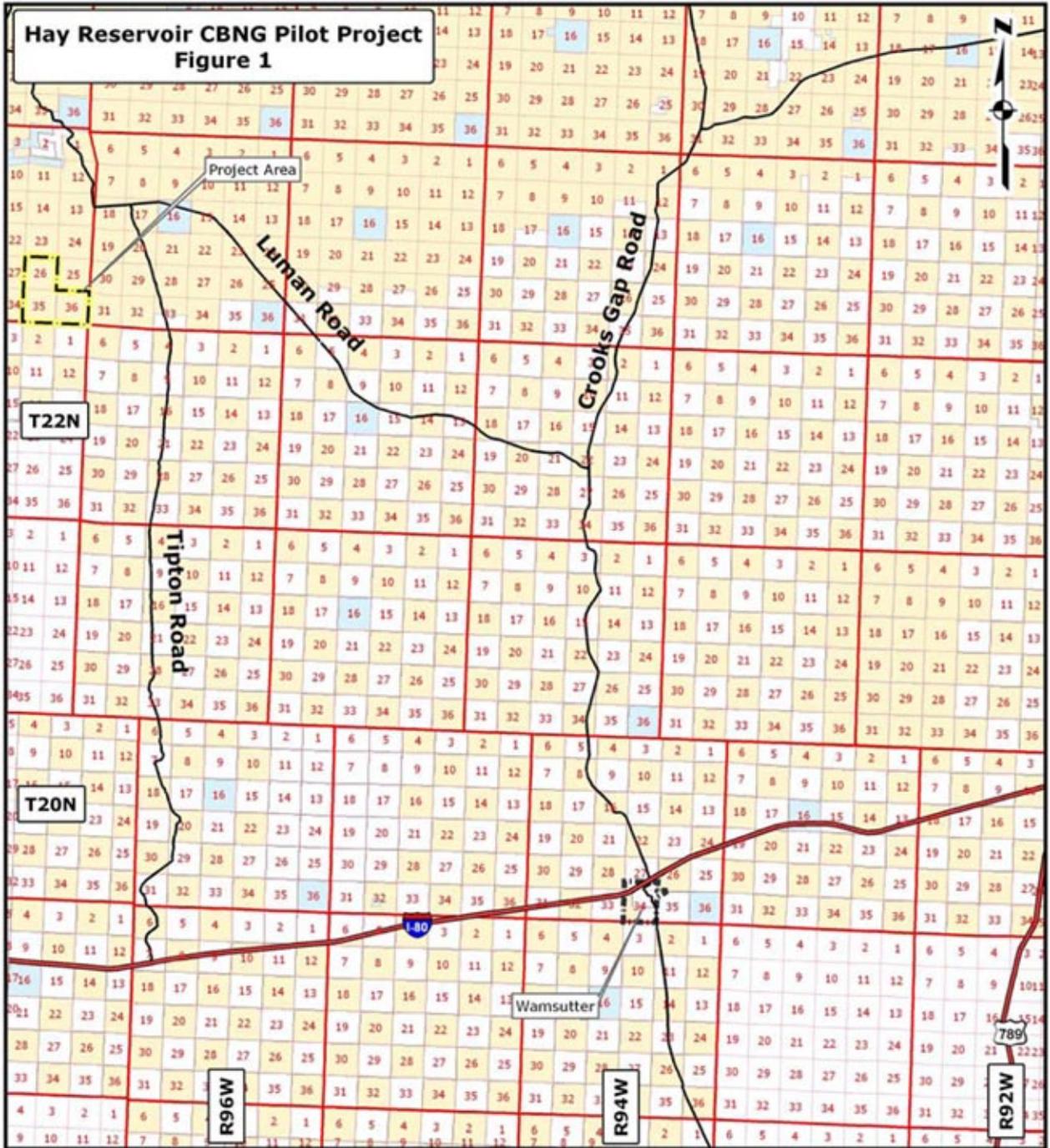
The Secretary of the Interior has entered into a lease agreement with the proponent that gives them the "exclusive right to drill for, mine, extract, remove and dispose of the oil and gas resources within the lease area. The applicant has submitted a proposed action to the BLM to at least partially exercise their rights under this agreement. This project would test the feasibility of commercial natural gas production from the Big Red Coal in the project vicinity. The BLM, under the requirements of the National Environmental Policy Act must review, disclose, and assess the proposal, its anticipated effects and the best management practices that will be used to reduce or avoid adverse environmental impacts. If approved, the proponent's proposal may result in the commercial production of natural gas and associated by-products. Natural gas and its by-products are an important element of the nation's energy program, and are used throughout the country's economy including for heating, electrical generation, formulation of plastics, and fertilizer production.

1.2 CONFORMANCE WITH THE LAND USE PLAN

The proposed action is consistent with the "*Great Divide Resource Area Record of Decision and Approved Resource Management Plan*" (RMP), dated 11/08/90. On page 30, under the title of "Oil and Gas" the RMP states the management objective is to provide opportunity for leasing, exploration, and development of oil and gas resources.

Relationship to Statutes, Regulations, or Other Plans

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



1 inch equals 20,833.33 feet
1:250,000

Drafted By: TDB 08/15/2005

The BLM can not guarantee the accuracy of these data.

Legend

- Highway
- Bureau of Land Management
- Private
- State
- Kennedy HR CBNG EA

PROPOSED ACTION AND ALTERNATIVES

2.0 INTRODUCTION

Kennedy proposes to drill eight production wells and one injection well to test the commercial potential for gas production from the Big Red Coal, a Fort Union Wyodak Coal natural gas reservoir. Should this testing indicate commercial production potential, Kennedy proposes to operate these wells. Kennedy would reclaim disturbed areas as the wells and other facilities are completed for production, and upon final abandonment. The eight Project production wells would be on 160-acre spacing and the injection well would be co-located with one of the eight production wells.

This proposed action would also require the construction of access roads, gas-gathering and water disposal pipelines, and a compressor to facilitate CBNG production. The Project Area, here defined as the sections directly affected by the Proposed Action and enclosed by lease boundaries, encompasses approximately 1,920 acres. Project development would be expected to occur over a 6 to 12 month period. Specific components of the Project are summarized in the following sections.

This pilot project is within the administrative boundary of the BLM’s Rawlins Field Office and is located in the north-central part of Sweetwater County, Wyoming, in Sections 26, 35, and 36 of Township 23 North, Range 97 West.

TABLE 2.1 PROJECT WELL INFORMATION

Project Area	Lease No.	Well Name	Location
Hay Reservoir Pilot	WYW153188	Kennedy Federal South SW 21-26	NENW Sec. 26, T23N R97W
		Kennedy Federal South SW 23-26	NESW Sec. 26, T23N R97W
		Kennedy Federal South SW 41-26	NENE Sec. 26, T23N R97W
		Kennedy Federal South SW 43-26	NESE Sec. 26, T23N R97W
	WYW153193	Kennedy Federal South SW 21-35	NENW Sec. 35, T23N R97W
		Kennedy Federal South SW 23-35	NESW Sec. 35, T23N R97W
		Kennedy Federal South SW 41-35	NENE Sec. 35, T23N R97W
		Kennedy Federal South SW 41-35i	NENE Sec. 35, T23N R97W
		Kennedy Federal South SW 43-35	NESE Sec. 35, T23N R97W

2.1 PLAN OF OPERATIONS (PROPOSED ACTION ALTERNATIVE)

2.1.1 Preconstruction Planning and Site Layout

Kennedy would obtain approval of the necessary applications, plans and permit prior to construction. Aquifer exemptions have been obtained for the injection well from WOGCC. Kennedy has submitted these required applications, plans and permits. A Master Surface Use Plan (MSUP) (Appendix A), Master Drilling Plan (MDP) (Appendix A), and a Project Map (Figure 2) have been submitted to the RFO. 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 from the BLM to ensure consistency with the approved GDRMP and oil and gas lease stipulations. On March 17, 2003 and July 21, 2003 the BLM and Kennedy conducted visits to the Project Area. At these onsite meetings, participants inspected existing and proposed infrastructure and considered the potential affects of the proposed Project on the resources. Alternative surface locations were considered and reviewed.

2.1.2 Construction and Drilling

Following is a general discussion of proposed construction techniques to be used in the proposed action. Roads and pipelines on BLM lands constructed in association with this Project could require BLM right-of-way (ROW) authorizations and/or Sundry Notices and could include additional mitigation to minimize environmental impacts.

2.1.2.1 Access Road Construction

To access the Project Area exit Interstate Highway 80 at Sweetwater County 67 (Tipton Road), approximately 56 miles west of Rawlins Wyoming. Travel 22.5 miles north, turn left and travel approximately 2.75 miles to the 41-35 location. These existing improved roads will be the primary access to the Project Area.

Construction and use of access roads would comply with specifications in the BLM Roads Standards Manual, Section 9113 (BLM 1985, 1991a), the Wyoming Supplement to the Manual, and the GDRMP. Kennedy proposes the use of existing crowned and ditched roads to and in the Project Area and the establishment of new roads.

New road construction in the Project Area would total approximately 4.0 miles of crowned and ditched roads. The traffic corridor for most Project roads would typically be 24-foot wide, with a maximum 80-foot width ROW. The ROW would be brush-hogged. To prevent roadbed flooding, rutting, and turnouts, roads would be built up a minimum of six inches to accommodate continued road use during periods of standing water. Topsoil would be stripped to a depth of six inches and windrowed to both edges of the road for later spreading over cut slopes if the well is productive or replacement on the roadway after recontouring if the well is considered non-productive. The roadbed sub grade would be scarified and flat bladed. A minimum of 12 inches of borrow from flat bladed ditching would be used as crown. Eleven culverts are proposed for construction on these roads. These drainage culverts and other upgrades would be added ensure environmentally sound access to facilities.

If the wells prove to have commercial production potential, access roads to the well sites would remain in place for well-servicing activities, such as maintenance and compliance monitoring, for the duration of the Project. Figure 1 indicates road locations. Also see Table 2.4 for details on disturbance. Details of the proposed road construction and transportation plan can be found in Appendix A, Master Surface Use Plan.

2.1.2.2 Well Pad Design and Construction

Seven well pads would be prepared by clearing an area approximately 295 feet by 210 feet (1.4 acre) for each individual well. One well pad, for the 41-35 and 41-35i, would be 580 feet by 210 feet (2.8 acres). This disturbance area would provide the borrow needed to build up each well pad a minimum of six inches and/or berm the pad in areas prone to accumulate standing water related to occasional seasonal flooding. 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.

Each well pad would include an earthen reserve pit with 12 mil-reinforced poly liner. The liner would have permeability of less than 10^{-7} cm/sec. or per stipulations. This type of liner will contain drilling fluids, cuttings, and water produced during drilling and completion operations. Kennedy estimates the reserve pits could be open for up to six months to allow for evaporation of fluids including water, bentonite (natural clay), and/or gel polymer. The reserve pit would be fenced on three non-working sides during drilling, and the fourth side at the time the rig is removed to prohibit wildlife or livestock from falling into the pit.

A separate unlined flare pit would be constructed on each well pad to vent any gas produced during the testing phase. In total, the reserve and flare pit areas would be approximately 110 feet long by 75 feet wide and 10 feet deep. All pits would be constructed per BLM requirements.

2.1.2.3 Drilling Operations and Well Completion

Drilling of the exploratory wells and the injection well 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. Depending on the depth of the coal seam, each producing well would be drilled to a depth of approximately 4,700 feet to 5,300 feet and would be exposed to the coal seam through open-hole completion. 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. Each well would be drilled within a period of four to ten days.

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 hydrologically isolated from shallow groundwater and surface water resources. Water used for drilling would come from the Kennedy State #1 (C/NE Sec 36, T23N R97W). Approximately 1500 barrels of water would be needed for drilling each well. Any additional water needed for cementing would be hauled from Tom Brown Inc. Hay Reservoir water source well in Section 5 of T23N R96W.

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.

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.

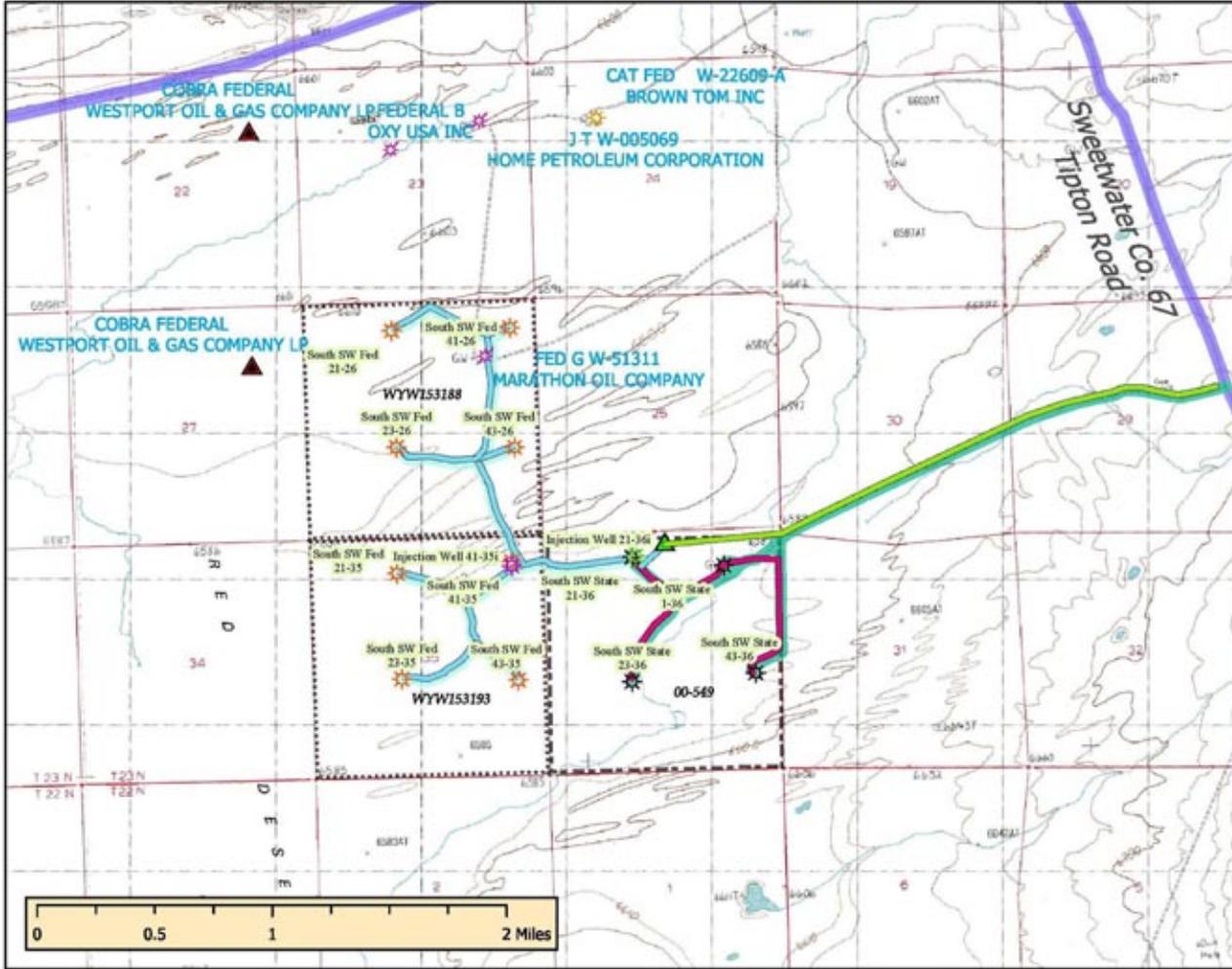
Methane gas would be vented over the flare pit or, rarely, flared. Water may be temporarily discharged and contained in the reserve pit for a short period of time during testing. If determined to be productive, wells would be shut-in until pipelines and other production facilities are constructed and any necessary permits obtained.

Drilling of the injection well would be accomplished with the equipment and personnel used to drill the CBNG production wells. Depth of the injection well is expected to be approximately 5,300 feet. Drilling and completion of the injection well is expected to take approximately seven to fourteen days and installation of surface equipment, holding tanks and pumping equipment, an additional fourteen days.

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

R 97 W R 96 W

T 23 N



**Kennedy Oil
South Sweetwater Project
Sections 26 and 35
T 23 N, R 97 W of 6th P.M.
Sweetwater County, Wyoming**

- proposed compressor
- proposed gas transmission line
- proposed utility corridor
- existing utility corridor

Kennedy Oil leases

- Federal
- State

roads

- existing resource
- proposed resource
- county

Kennedy Oil wells

- existing CBNG
- permitted CBNG
- existing injection
- permitted injection

other wells

- dry hole
- expired permit
- permanently abandoned
- producing gas

2.1.3 Production Operations

2.1.3.1 Well Production Facilities

Pumping units or progressive cavity pumps would be used to draw water during the initial de-watering. Should methane gas production ensue, a covered wellhead and measurement devices would be installed on each well pad.

Production testing has two phases. The first phase objective is zone pressure testing through controlled water production. These pressure tests provide an indicator of well potential. After completion activities, each well would be allowed to periodically flow water to the reserve pit over a period of up to 90 days to evaluate well performance. At no time would water be allowed to exceed the level allowing for 2' freeboard. If this first phase of well performance indicates potential gas production, the well would be capped until the injection well and water-gathering systems are completed.

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. 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.

In general, venting CBM gas from a wellhead does not release any regulated pollutants. CBM gas from the Big Red coal in this region is expected to be 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's 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.

2.1.3.2 Power Generation

No electric lines would be installed in the Project Area. Propane would be used initially to power pumping units during well development until natural gas begins to flow. Natural gas would be used to maintain the pumps once production is established. If the wells were productive and a compressor station was built, the compressor station would also be powered with natural gas.

2.1.3.3 Pipelines

Three types of pipelines would be constructed in the Project Area for productive wells:

1. Produced water gathering-pipeline system
2. Gas-gathering pipeline system (low pressure) from wellhead to the compressor station.
3. 12-inch high-pressure collector gas pipeline

Gathering systems for the produced water would link the wells to the injection well by buried water lines in the utility corridors parallel to the access corridors. The total length of utility corridors to be constructed is approximately 4.0 miles. This construction would take place in the months when the soil is dry. The construction of these pipelines would disturb areas within the access road ROW.

Gas gathering pipelines would be installed in the utility corridor at the same time the produced water gathering pipelines are constructed to avoid additional surface disturbance. These separate gathering lines would transport gas to production facilities outside the Project Area.

The two types of pipeline would typically be 3- to 4-inch inside diameter (ID) pipe for water and 4-inch ID for the gas-gathering line and 12-inch ID for gas collector pipeline. These lines would be placed together in the same trench and buried along access roads. These lines would be pressure-tested with air.

2.1.3.3.1 Gas-Gathering Pipeline Systems and Compression

In the event that gas production is viable, produced natural gas would move through a gas gathering system under wellhead pressure to a proposed screw compressor station. The proposed gas-powered three-screw compressor would be constructed in NW ¼ NW ¼ of Section 36. Gas arriving at the compressor station would be compressed from line pressure to facilitate transport and introduction of the gas into a proposed 12-inch high-pressure collector pipeline to deliver the gas 2.5 miles east to an existing pipeline corridor at Tipton Road in Section 29. Additional facilities needed to transport natural gas to outside the Project Area would be considered in subsequent NEPA documents.

2.1.3.3.2 Produced Water-Gathering System and Injection Facilities

After well completion, each exploratory well would periodically flow water to the reserve pit for up to 90 days to evaluate well performance (see Section 2.1.2.3). Following the water flow-testing period, and if the testing indicated commercial production potential, wells would be capped pending completion of the injection well and associated water-gathering system. There would be no surface discharge of water other than to the reserve pits, in accordance with BLM, WDEQ, and WOGCC rules and regulations.

If the initial water production indicates commercial viability, an injection well would be drilled to a Fort Union sand body. A number of sand bodies are found in this formation and it is expected that more than one would be tested for suitability for this use. Each exploratory well would produce approximately 1,600 to 4,000 barrels of water daily, resulting in a total daily volume of 12,800 to 32,000 barrels being injected through the injection well. Water would be hauled to the injection well until the construction of waterlines is completed.

Once the water pipelines were completed, gathering systems for the produced water would link the wells to the injection well by buried water lines in the utility corridors paralleling and adjacent to the access corridors. The total length of utility corridors to be constructed is approximately 4.0 miles. Refer to the Project map (Figure 2) for utility corridor and injection well locations. Refer to Appendix A for further details on rights-of-way for corridors.

Produced water from individual wells would be collected via the produced water gathering pipeline system and injected at the primary disposal well, the # 41-35i well in Section 35, T23N, R97W. This injection well would service all the Project wells. In particular, the injection well would meet the requirements of the 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), as regulated by WOGCC.

2.1.4 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.

2.1.5 Ancillary Facilities

No ancillary facilities are planned for this Project.

2.1.6 Workforce and Traffic

The drilling and completion operation for a CBM well normally requires approximately ten to fifteen people at a time, including personnel for logging and cementing activities. Subsequent to drilling and completion activity, this exploratory Project would require the use of fewer vehicles over a shorter period of time than full development projects. Lighter truck traffic would include the use of pickup trucks to visit each well daily. Heavy truck traffic could include:

- Water trucks hauling excess water to disposal wells making 1 trip per day. Such activity would be limited to time prior to completion of water line construction.
- Traffic associated with occasional workover activities.

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.

The expected traffic levels associated with the proposed Project are shown in Table 2.2. These estimates typical types and maximum frequencies of traffic that could be expected during ‘round-the-clock’ drilling and well completion phases. 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 external (i.e., outside the Project Area) and internal (i.e., inside the Project Area).

TABLE 2.2 PROJECT TRAFFIC – GENERAL ESTIMATES

Trip Type	Round-Trip Frequency
Drilling (2 rigs, 2 crews/rig)	External (to/from Project Area)
Rig supervisor	1/day
Rig crews	2/day
Engineers ^a	2/week
Mechanics	4/week
Supply delivery ^b	1/week
Water truck ^c	1/week
Fuel trucks	2 /well/week
Mud trucks ^d	1
Rig move ^e	8 trucks/well 1 event
Drill bit/tool delivery	1
Completion	
Small rig/crew	1/day
Cement crew	2 trips/well
Consultant	1/day
Well loggers	3 trips/well
Gathering systems construction	8/day
Power systems placement	2/day
Other field development	3/day
Testing and operations	2/day

2.1.7 Reclamation and Abandonment

When construction is completed, all disturbed areas beyond the road and drainage ditches would be restored to the original contour with topsoil, ripped 18-24” deep, and re-seeded within two years of construction. Access roads would be maintained as necessary to prevent soil erosion and accommodate year-round use. If wells are productive, those areas not required for production would be landscaped to the surrounding topography as soon as possible, but within two years. Reclamation of pipeline corridors would occur as soon as practical after construction is complete, but initiated no more than one year from construction. Roads would be closed and reclaimed by Kennedy when they are no longer required for operations, unless otherwise directed by the BLM. Following abandonment of a well, all surface disturbances shall be reclaimed within two years unless otherwise directed by the BLM.

The seed mix shown in Table 2.3 was recommended by the RFO for reclamation in the soil types found on the Project. Seeding rates assume drill seeding. Seeding rates would be doubled if seed were broadcast. Standard success criteria would be based on attainment of total vegetation cover and on attainment of 50% of predisturbance cover within three years and 80% of predisturbance cover within five years. These identified

seed mixes could be modified or added to by the BLM, as needed or required to meet the RFO objectives for reclamation.

TABLE 2.3 PROJECT SEED MIXTURES

Species	Scientific Name	Variety	Pounds PLS/Acre*
Grasses			
Slender wheatgrass	Agropyron techycaulum		2.0
Thickspike wheatgrass	Agropyron dasystachyum	Critana	4.0
Western wheatgrass	Agropyron smithii		2.0
Indian ricegrass	Oryzopsis hymenoides		1.0
Bottlebrush squirreltail	Sitanion hystrix		1.0
Needle-and-thread	Stipa comata		1.0
Shrubs			
Gardner's saltbush	Atriplex gardnerii		1.0
Total			12.0

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 would include ripping or chiseling to break up compacted soils, increase water penetration, promote root growth and control erosion.

2.1.8 Summary of Estimated Disturbances

Implementation of the proposed action would result in surface disturbance. Estimates of the extent of that disturbance are found in Table 2.4. Turn-outs could result in full use of an 80 foot ROW on the ROW for the roadway and buried utility corridors paralleling the road. A full ROW could be 80 feet, however use of the full ROW would be rare and limited to the construction phase. Reclamation would likely be necessary on only 30 to 50 feet of that ROW. For the analysis, a 80-foot wide area of disturbance was assumed.

Estimates of the extent of short-term disturbance are found in Table 2.4.

TABLE 2.4 PROJECT SURFACE DISTURBANCE SUMMARY *

Facility	Length (feet)	Width (feet-estimated maximum)	Acres
New roads (includes parallel water gathering line)	21,150	80	38.8
Well Pads (7)	295	205	9.7
41-35 & 41-35i Pad	580	210	2.8
Compressor facilities	400	200	1.9
12" gas transport pipeline	13,200	50	15.2
Total Disturbance			68.4

Pipelines would be reclaimed for the duration of production operations; upon abandonment of the project, the pipelines would be purged and left in-place. Access roads would incur maintenance and use until final reclamation, upon which they would be obliterated and reclaimed.

2.1.9 HAZARDOUS MATERIALS

The term "hazardous materials" as used here means: 1) any substance, pollutant, or contaminant (regardless of quantity) listed as hazardous under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended, 42 U.S.C. 9601 et seq., and the regulations issued under CERCLA; 2) any hazardous waste as defined in the Resource Conservation and Recovery Act (RCRA) of 1976, as amended; and 3) any nuclear or nuclear byproduct as defined by the Atomic Energy Act of 1954, as amended, 42 U.D.C. 2011 et seq.

The proponent will be required to comply with the Hazardous Materials Management Summary provided in the Continental Divide/Wamsutter II EIS for (1) the list of hazardous materials that could potentially be used, produced, transported, disposed of, or stored on the well location; (2) the approximate quantities of hazardous materials to be used during the life of the well; and (3) the management of the hazardous materials.

2.2 NO ACTION ALTERNATIVE

Section 1502.14(d) of the National Environmental Policy Act (NEPA) requires that the alternatives analysis “include the alternative of no action.” No action implies that on-going natural gas development activities would be allowed to continue in the area, but the proposed action would be disallowed. Additional APDs and ROW actions would be considered by the BLM on a case-by-case basis. Gas development activities could occur on private lands within the vicinity under APDs approved by the WOGCC.

2.3 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED STUDY

Under this alternative, the surface locations of the proposed action could be situated at different locations within the lease. Different surface locations may result in a deviation of effects from the proposed alternative, and may result in a net positive or net negative change in potential effects.

During the onsite inspection for these wells, alternative surface locations of the well pads, access roads, and pipeline locations were examined. It was determined that the proposed locations are the best feasible locations to minimize potential direct effects upon protected resources. This left no unresolved resource conflicts and no identified needs to consider additional alternatives.

AFFECTED ENVIRONMENT

3.0 INTRODUCTION

This chapter describes the affected environment for the proposed Hay Reservoir Coalbed Natural Gas Pilot Project (Project). The Project is located outside special status plant species areas, Big Game Crucial Winter Range and Parturition Areas, select cultural resource sites and historic trails, and any Areas of Critical Environmental Concern (ACECs). However, the Project Area is within the Lost Creek Wild Horse Herd Management Area.

The elements of the human environment, including critical elements as required by law or executive order, their status in the Project Area, and their potential to be affected by the proposed Project are listed in Table 3.1. Those items listed as 'none present' would not be affected or impacted by the Project or the No Action Alternative and are not addressed further in this document.

Table 3.1

Critical Elements of the Human Environment			
Element	Relevant Authority	Potentially Effected?	Address in Text
Air Quality	Clean Air Act	Yes	Yes
Areas of Critical Environmental Concern	FLPMA	No	No
Cultural Resources	NHPA	Yes	Yes
Farm Lands(prime or unique)	Surface MCRA	No	No
Floodplains	Floodplain Management	No	No
Native American Concerns	NHPA, ARPA, NAGPRA, EO 13007, others	Yes	Yes
Threatened or Endangered Species	Endangered Species Act	Yes	Yes
Wastes, Hazardous or Solid	CERCLA, RCRA	Yes	Yes
Water Quality Drinking/Ground	Clean Water Act	Yes	Yes
Wetlands/Riparian Zones	Protection of Wetlands	Yes	Yes
Wild and Scenic Rivers	Wild & Scenic Rivers	No	No
Wilderness	FLPMA Wilderness Act	No	No
Invasive, Nonnative Species	Lacey Act	Yes	Yes
Environmental Justice	Environmental Justice	No	No

3.1.1 Physiography, Topography, and Landforms

The proposed Project is located in the Great Divide Basin, so named for its position on the Continental Divide. 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 6,585 and 6,600 feet. Major water resources in this part of the Basin include the Chain Lakes area and numerous playas that serve as drainage basins for intermittent streams. There are no major drainages in the Project Area.

There is a large dry lakebed located in Sections 26, 35, and 36 of T23N, R97W of the Project Area. As a result of the arid nature of this location, the only water in the lake occurs from direct rainfall and snowmelt. In the event of a 100-year storm, the lake could potentially hold 593 acre-feet of runoff which would fill the lake to a depth of approximately six inches. The vast size of the ponded area compared to the contributing watershed area prevents the lake from filling any deeper (Applied Hydrology Associates, Inc. 2003).

3.1.2 Mineral and Energy Resources

There is a long history of oil and gas well development within the general vicinity of the project. Several wells have been drilled, produced, and abandoned over the years. Five natural gas wells on four locations were recently drilled in Section 36, T23W, R97N. All are currently shut-in.

3.1.3 Paleontology

The BLM has established categories for ranking areas based on potential to contain fossils of scientific interest. The Project Area has not been categorized as having a high potential for fossils of scientific interest. Although the Tipton Shale of the Green River Formation is a known rich source of fossils, it is not expected that fossils would be found in the Project Area, given the nature of the surface geology dominated by residuum and aeolian deposits. These deposits are by nature broken and shattered remnants of the bedrock.

3.2 AIR QUALITY

Although specific air quality monitoring has not been conducted within the project area, criteria pollutant background concentrations measured in the region are in attainment with the National, Wyoming, and Colorado ambient air quality standards indicating that the local air quality is good. Seasonal visibility conditions recorded at Bridger Wilderness shows visibility is very good, with an average annual visual range of 175 miles (Improve 2001).

3.3 SOILS

The primary soils in the Project Area are deep clays with low bearing strength. The soils are derived from marine shales, giving them a high salt content. Precipitation is not sufficient to leach salts below the rooting zone. These shales also produce finer-textured soils with low infiltration rates. The soils found in the Project Area have poorly developed structure and relatively weak internal cohesion. They typically show little to no development and have sparse vegetative communities. The water erosion hazard potential for these soils is severe and the wind erosion hazard potential is slight.

3.4 WATER RESOURCES

3.4.1 Surface Water

Surface water in the Project Area, is within the Great Divide Basin major drainage area. This is a closed basin of 3,959 square miles in which the topography prohibits outflow of surface water. Little runoff results from storm events in this semiarid region. Runoff yields range from 0.5 to 1 inch. 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. There are no major drainages in the Project Area, but there is a small unnamed ephemeral drainage on the east side of the Project.

3.4.2 'Waters of the U.S.'

No crossings or encroachments of 'waters of the U.S.', as defined by the U.S. Army Corps of Engineers (COE), will occur with this Project

3.4.3 Ground Water

The proposed Project 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 and are accessed through information and records from the Wyoming Oil and Gas Conservation Commission (WOGCC) oil and gas well records, Wyoming State Engineers Office (WSEO) water-well records, and the USGS. Potential groundwater sources are found in Quaternary, Tertiary, and Cretaceous formations. Groundwater in the Great Divide Basin is generally found confined in sands in formations including the Fort Union and Wasatch. Permitted water wells uses

are primarily related to oil and gas development. In addition a few wells are permitted for wildlife and livestock watering and other miscellaneous uses.

3.5 VEGETATION, SPECIAL STATUS PLANT SPECIES, WETLANDS, INVASIVE WEEDS

3.5.1 Vegetation Cover Types

The Great Divide Basin is within the Upper Sonoran zone. The most commonly seen plants in the Project Area are greasewood, Gardner's saltbush, squirreltail, bluegrass and *Polanisia* spp.

3.5.2 Threatened and Endangered Plant Species

Two species have been identified as having potential and occupied habitat in Wyoming. Ute ladies'-tresses (*Spiranthes diluvialis*), listed as threatened, has been found along Platte River drainages below Alcova, Cheyenne, and Niobrara drainages. Blowout penstemon (*Penstemon haydenii*), listed as endangered, has been found along the Killpecker Sand Dunes near Rawlins. Neither has potential habitat within the Project Area.

3.5.3 Candidate and BLM Sensitive Plant Species

A number of plant species found within the administrative area of the Rawlins Field Office have been identified as sensitive by the BLM State Director's Office. One, the large-fruited bladderpod (*Lesquerella macrocarpa*), is also a Candidate for federal listing. Floristic inventories have been conducted but complete information is lacking for many species. These special status species with potential for habitat in the region include large-fruited bladderpod (*Lesquerella macrocarpa*), Nelson's milkvetch (*Astragalus nelsonianus*), and persistent sepal yellowcress (*Rorippa calycina*).

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 is also a candidate for federal listing. Other populations have been identified in Lincoln and Sublette Counties in high rim and butte topography. The entire known range of the plant occupies an area of less than 25 square miles (Fertig 1995). This species does not have potential habitat in the Project Area. Large-fruited bladderpod occurs in gypsum-clay hills and benches, clay flats and barren hills at elevations between 7,200 and 7,700. Wyoming Natural Diversity Database does not track vegetation communities in the area. 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. The nearest population is about 20 miles northwest of the Project Area.

Nelson's milkvetch (*Astragalus nelsonianus*, syn. *Astragalus pectinatus* var. *platyphyllus*) is also an endemic that is found on alkaline, often seleniferous, clay flats, shale bluffs and gullies, and on pebbly slopes in sparsely vegetated sagebrush and cushion plant communities at elevations of 5200 to 7600 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 Wyoming Natural Diversity Database has recorded Nelson's milkvetch more than three miles from the Project Area, but none of the species has been sighted within the Project boundary.

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 3660 to 6800 feet. Populations tend to be found in semi-disturbed openings in small inlets or bays. Large populations of this species occur at Seminole Reservoir and along the Medicine Bow River. No potential habitat for this plant exists in the Project Area.

There is one plant species of special concern, Nelson's phacelia (*Phacelia salina*), and one plant species of potential concern, Nelson's milkvetch (*Astragalus nelsonianus*), in the proposed Project Area townships. They are regional endemics in a limited area of the Great Basin. The former is an annual of

western Utah, central and eastern Nevada and southwestern Wyoming that occupies alkaline flats or clay slopes. Its population numbers are strongly influenced by climate. The latter is restricted to Wyoming except for one occurrence in Colorado, and occupies silt slopes. Status surveys have been completed for it supporting its removal from the active tracking list but it remains on the “watch list” of regional endemics that are still vulnerable if there is large-scale change in their centers of distribution in Wyoming.

Well-developed dune habitat in the region may be potential habitat for Dune wild-rye (*Elymus simplex* var. *luxurians*), a variety of wheatgrass that is only known from two occurrences in the world and which needs further survey. The Project Area contains no suitable habitat for Dune wild-rye.

3.5.4 Wetlands

There are several lakes in the region, including Red Lake, Hay Reservoir and Lost Creek Lake. A few ephemeral streams are also present. There are no wetlands in the Project Area. There are small stock dams in the project vicinity that may have minimal wetland development. These dams are separated from Project activity by a topographic divide

3.5.5 Invasive Weeds/Invasive Species

No noxious weeds were observed in the Project Area. Annual goosefoot and Russian thistle are invasive weeds present along existing disturbed sites in this area.

3.6 RANGE RESOURCES AND OTHER LAND USES

The Project Area is within the Cyclone Rim Allotment (#10103). Acreage for this allotment is approximately 308,608 acres, of which approximately 291,954 acres are BLM-administered public lands. Grazing operators include Jolley Livestock Grazing Association, LLC, Curtis Rochelle, Peterson Livestock, LLC, Alkali Creek Grazing Association, LLC, Stratton Sheep Company, and Salisbury Livestock Co.

Animal Unit Months (AUMs) are determined by livestock type and season. Dormant season grazing is able to support more livestock: cattle use in the winter is approximately 12 acres per AUM versus cattle use in the summer which is approximately 20 acres per AUM; sheep use in the winter is approximately 10 acres per AUM versus summer grazing which is approximately 20 acres per AUM.

In 2002 a Standards and Guidelines evaluation was performed. Grazing management on this Allotment was evaluated by the RFO as satisfactory, and the overall trend of use and sustainability is static. In the Standards and Guides Report for the Great Divide Basin (Rawlins Field Office), the Cyclone Rim Allotment passed all standards except #2 Riparian/Wetland Health (USDI BLM 2003). The riparian/wetland health standards are currently being addressed in management plans or as range improvement projects. There are no riparian or wetland areas within the Project Area.

3.7 WILDLIFE

3.7.1 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. No big game crucial winter range occurs within the Project Area.

Pronghorn

For pronghorn antelope, the Project Area is within the Red Desert Herd unit, Wyoming Game and Fish Table Rock Hunt Area (Hunt Area 60). This hunt area encompasses approximately 1,250 square miles including 76,230 acres of public lands. The population objective for the Herd Unit is 12,000 animals.

Mule Deer

The Project Area is within the Steamboat Herd Unit, Wyoming Game and Fish Hunt Area 131. The Steamboat Herd Unit is very large (approximately 4200 square miles) including 574,800 publicly owned acres. The population objective for the herd unit is 4,000.

Elk

The Project Area is located within the Steamboat Herd Unit, Wyoming Game and Fish Hunt Area 100. This area encompasses approximately 4,000 square miles including 574,800 publicly owned acres. The population objective has been increased to 1,200.

3.7.2 Upland Game Birds

Sage Grouse

The greater sage-grouse is an important upland game bird in the State of Wyoming. The Project Area is not within suitable sage grouse habitat for breeding, nesting, brood rearing or winter occupation. According to WGF records and RFO records, no leks are located within 2 miles of the Project area.

3.7.3 Raptors

Several species of raptors occur or potentially occur within the Project Area and use the area for feeding and travel routes. They include the ferruginous hawk, burrowing owl, golden eagle, northern harriers, red-tailed hawk, prairie falcon, American kestrel, long-eared owl, short-eared owl, great horned owl and Swainson's hawk. No active nests are known within the Project Area.

3.7.4 Threatened and Endangered Species

Threatened and endangered species with habitat or potential habitat or that may occasionally be seen in the Great Divide Resource area include black-footed ferret and associated white-tailed prairie dogs, bald eagles, and whooping crane. None of these species or their habitat are found in the Project Area.

3.7.5 BLM Sensitive Species

No habitat for sensitive status species plants, amphibians or fish, as identified by the Wyoming State BLM office is found within the Project Area. Species' additional habitat requirements further restrict the potential for occurrence in the Project Area for some basin-prairie shrub species.

Basin-prairie shrub species include the following:

Townsend's big-eared bat (*Corynorhinus townsendii*) This bat roosts in caves, mines, and buildings. The preferred habitat of the species, basin-prairie shrub, exists in the Project Area; however no roost habitat occurs in the Project Area.

White-tailed prairie dogs (*Cynomys leucurus*) Prairie dogs typically live in towns or colonies established in shortgrass and sage steppe habitat. No colonies are found within the Project Area.

Swift fox (*Vulpes velox*) This species is found in shortgrass prairie with dens dug into ridge tops situated with broad views. Potential habitat for this species is limited in the Project Area. Wyoming Natural Diversity Database records do not include any occurrence of this species in the Project or two-mile Analysis areas.

Mountain Plover (*Charadrius montanus*) The Wyoming Natural Diversity Database contains records indicating that no mountain plover have been observed in the Project or two-mile analysis areas during general resource surveys and no suitable habitat appears to exist in those areas. A survey conducted in suitable habitat, which was more than five miles from the Project Area, did not result in the observation of individuals of that species.

Ferruginous hawks (*Buteo regalis*) are raptors primarily found in sagebrush steppe. Ferruginous hawks may frequent the area for hunting. No nests are located within one mile of the project area.

Burrowing owls (*Athene cunicularia*) in Wyoming are typically associated with prairie dog burrows and are generally found to be societal. Potential habitat for burrowing owls does not exist in the Project Area.

Loggerhead shrikes (*Lanius ludovicianus*) are habitat generalists but require shrubs or trees that offer structures for impaling their prey. Suitable habitat for this species is found within the Project Area.

Sage thrashers (*Oreoscoptes montanus*) occupy tall greasewood and sagebrush habitats which occur

within the Analysis area. Suitable habitat exists within the Project Area.

Brewer's sparrows (*Spizella breweri*) are sagebrush obligate species and could occur near any ephemeral wetlands within the Analysis area. No suitable habitat exists within the Project Area.

Sage sparrows (*Amphispiza belli*) are sagebrush obligate species and could occur near any ephemeral wetlands within the Analysis area. No suitable habitat exists within the Project Area.

3.8 WILD HORSES

The Project Area is within the Lost Creek wild horse Herd Management Area (HMA). The Lost Creek HMA encompasses 250,000 acres, of which 235,000 acres are BLM-administered public lands. The "appropriate management level" (AML) for this HMA is 70 horses. The current herd population is approximately 116 animals. The Project Area is in a portion of the Lost Creek HMA that historically has been used by wild horses which most likely came from the Divide HMA administered by the Rock Springs BLM Field Office.

3.9 RECREATION

Recreational activities occurring in or near the Project Area include hunting for small and big game, camping, hiking wildlife and wild horse viewing, ORV use and sightseeing. No developed recreational sites, facilities, or special recreational management areas exist within or near the Project Area.

Although data on recreational visitation is limited, overall use levels are relatively low. Trips to the area require long drives from major population centers, and visitation is limited because of the lack of publicized natural attractions. Road conditions limit vehicle access into many backcountry areas. The area is characterized and managed for a predominantly unmodified natural environment of moderate to large size. Availability of access to the area is due in large part to previous road construction and upgrading efforts of the mining and petroleum industries during the 1970's and 1980's.

3.10 VISUAL RESOURCES

The Project falls within a Class III area for visual resource management which includes areas where changes in the basic elements (form, line, color, or texture) caused by a management activity may be evident in the characteristic landscape, however the changes caused by management activity should not be evident in the characteristic landscape (GDRMP).

3.11 CULTURAL RESOURCES

Archaeological investigations in the Red Desert Basin indicate the area has been inhabited by people for at least 10,000 years from Paleoindian occupation to the present. The earliest known period of culture history in this area of Wyoming is that of Paleoindian, which has come to signify hunting and gathering adaptations of late Pleistocene and early Holocene age.

The oldest period for which there is archaeological evidence is the Paleoindian, beginning ca. 12,000 years BP and ending around 8,500 BP. This is the transition period from the periglacial conditions of the Wisconsin ice advance during the terminal Pleistocene to the warmer and drier climatic conditions of the Holocene. A savanna-like environment with higher precipitation than occurs today was prevalent in southwest Wyoming. Paleoindian sites are rare in southwest Wyoming. However, isolated surface finds of Paleoindian projectile points are not uncommon and suggest that site preservation may be a major factor affecting the number of known sites. The Paleoindian tool assemblage includes lanceolate points, gravers, and end-scrapers.

The archaic period corresponds to the Altithermal climatic episode (Antevs 1948, 1955). The Archaic is characterized by small bands of people employing a variety of hunting and gathering activities. Pit houses are present throughout the Plains Archaic period (Frison 1991). Most pit houses date to the Archaic period and have been recovered from stabilized sand dune areas. The change from the Paleoindian lanceolate and stemmed points to the Archaic side-notched types appears to have been

abrupt and easily detectable in the archaeological record.

The Late Prehistoric period is marked by the wide spread adoption of the bow and arrow and the appearance of pottery. During this period, communal hunting techniques such as game drives and arroyo traps seem to have increased in number. Dietary protein from meat consumption appears to have risen due to the communal hunting techniques. However, there was little change in the life ways of these people from the preceding Archaic peoples, both followed a traditional hunting and gathering subsistence strategy (Frison 1971).

The Protohistoric period of the local area corresponds to the introduction of horses and European trade goods after approximately 300 B.P. The arrival of both of these outside influences signaled a period of profound change in both the economic and social systems of Native Americans on the Northwestern Plains. The influx of European technology also changed patterns of trade and migration among groups (Holder 1920). The horse gave the Native Americans a wider range and a greater mobility enabling them to concentrate their hunting strategies on the largest of the plains animals, the bison.

3.11.1 Summary of Extant Cultural Resources

Prior to fieldwork, the Wyoming Cultural Records Office was contacted to request a file search. Cultural resources investigations for the proposed Project Area included block survey for 7 wells and linear survey of access road/utility corridors for those wells. A total of 129 acres were surveyed for cultural resources. The cultural resources inventory resulted in the recording of five isolated finds and six prehistoric lithic artifact scatters. The cultural resources recorded are considered not significant and not eligible for the National Register of Historic Places (NRHP). The environment and deposition in the area is not likely to have buried cultural remains. This inventory is sufficient to have recorded the cultural remains. No further work is required for any of the six recorded sites. The results of this inventory were within the expectations for cultural resources in this area.

3.12 SOCIOECONOMICS

The primary geographic area of analysis for socioeconomic effects is Sweetwater County, Wyoming, and the communities of Rock Springs and Rawlins. Sweetwater County has a natural resource-based economy. The oil and gas sector plays a important role, generating tax revenues and vendor / employment incomes. Oil and gas exploration and development in the region has been part of the economic base for Sweetwater County since 1915.

3.13 TRANSPORTATION

The regional transportation system serving the Project Area is well established and includes Interstate Highway 80, County Road 67 (Tipton Road), and BLM management roads. Improved and unimproved BLM roads serve also local traffic on federal land. County Road 67 currently provides access to recreationists, residents, and oil and gas field traffic in the area.

3.14 HEALTH AND SAFETY

Existing health and safety concerns in and adjacent to the Project Area include occupational hazards associated with oil and gas exploration and operations; risk associated with vehicular travel on improved and unimproved roads; and low probability events such as flash floods and range fires.

3.14.1 Occupational Hazards

Two types of workers would be employed by the Project: oil and gas workers, who had a 1998 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 CBNG drillers that worker safety standards and training used for conventional oil and gas activities may not be appropriate for the CBNG industry (Rock Springs Rocket

Miner 2001). During 2000, five workers died and six others were seriously injured in CBNG-related accidents in Campbell County, Wyoming. The Wyoming Occupational Safety and Health Administration, Worker's Safety Division (OSHA) is working with CBNG company officials to consider changes in worker safety standards and revised training requirements.

3.14.2 Other Risks and Hazards

Potential for firearms-related accidents would occur primarily during hunting season. No data was available to estimate or discuss likelihood of risk for CBNG workers to be injured by hunters. Risk of fire in the Project Area could occur but is expected to have a low potential. Solid waste will be managed in accordance with procedures detailed in the Project Surface Use Plan.

3.15 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, defined here as the Project 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 definitive data has been established concerning noise levels that affect animals. No regulations concerning quantitative noise levels have been established by the State of Wyoming.

ENVIRONMENTAL CONSEQUENCES

4.0 INTRODUCTION

This chapter provides an analysis of the potential environmental consequences that could result from implementation of the Hay Reservoir Coalbed Natural Gas Pilot Project and from a No Action alternative (denial of Proposed Action). This analysis of environmental consequences addresses those potential direct and indirect effects of the Proposed Action and any cumulative impacts that could result from past, present, and reasonably foreseeable future actions.

4.1 GEOLOGY/MINERALS/PALEONTOLOGY

Proposed Action

Long-term impacts may include permanent loss by production of oil and/or gas reserves. No other direct or indirect impacts are expected on geology or paleontology from this Project within the Project Area.

No Action

Under the No Action Alternative, utilization of any potential CBNG resources in the Project Area would not occur at this time. The nation's demand for this resource likely would result in exploration and development elsewhere. Information on CBNG reservoirs in this area would remain unknown and the collective knowledge base would not increase.

4.2 AIR QUALITY

Proposed Action

Under the Proposed Action, air emissions would occur during the construction, production testing and operation of the Project wells. An insignificant amount of particulate matter and exhausts emissions from vehicles and equipment necessary for the Proposed Action would be added to the atmosphere by a limited number of vehicles in the Project Area.

Construction emissions would include PM₁₀, SO₂, NO_x, CO, and VOCs, from 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 significantly interacting with adjacent wells. Loose road dust would also cause some temporary effects on air quality in the Project Area. Impacts to air quality and vegetation through increased dust are unknown and unquantified at this time. Dust would be dispersed locally by prevailing winds. The effects on air quality through increased particulates would be minimized through the application of dust abatement practices, including adherence to speed limits. Emissions from production wells would be negligible since the produced gas is nearly 100 percent methane which is not a regulated emission.

Based on the relative size of the Project (eight wells and one injection well) and short-term nature of the operations, no ambient air quality standards would be violated or adverse air quality conditions would be expected to result from the Proposed Action within the Project Area.

The BLM intends to make quantitative estimates of these impacts for project-specific EIS's and in the statewide air quality analyses. Pollutant emissions from the construction and operation of natural gas fields in the vicinity of the Hay Reservoir site have been analyzed in air quality studies performed under NEPA by the BLM. Studies conducted at Desolation Flats Natural Gas Development Project (BLM 2003) indicated potential near-field increases in CO, NO₂, PM-10, and SO₂ concentrations. The predicted maximum concentrations associated with the development of 592 wells were found to be well below applicable state and National Ambient Air Quality Standards. However, the cumulative impacts of all emission sources associated with RMP activities were found to significantly impact air quality in nearby Wilderness Areas including Bridger, Fitzpatrick, Mount Zirkel and Rawah Wilderness Areas (Table 4.2; Desolation Flats EIS BLM, 2003).

The Proposed Action comprises approximately 1.52% of the number of wells analyzed in the Desolation Flats EIS. Based on the relative size of the Proposed Action when compared to the magnitude of these projects, no ambient air quality standards would be violated or adverse air quality conditions would be expected to

result from the Proposed Action.

No Action

Potential air quality impacts would be less than those described under the Proposed Action, with impacts from existing field emissions sources remaining at the current levels.

4.3 SOILS

Proposed Action

An estimated maximum of 68.4 acres would temporarily be affected by surface-disturbing activities, mainly through loss of vegetation and structure in construction activities. Soil productivity would be affected at locations where well sites, pipelines, and access roads would be constructed. The level of soil disturbance would be greatest shortly after the start of the Proposed Action and would decrease over time due to reclamation. Implementation of best management practices in construction and operations would lessen the direct and indirect effects associated with soil disturbance and return the land to original productivity levels over the course of several years.

No Action

No effects on soils would be expected.

4.4 WATER RESOURCES

Proposed Action

Groundwater would be pumped out of the coal seam aquifer of the Big Red Coal, in the Fort Union Formation, to test gas production of, and, if commercially viable, to produce that target coal. This dewatering would lower the local hydraulic pressure head in the target coal seam. Relative to the available drawdown potential (reduction of hydraulic pressure head) within the aquifer and the extent of the proposed action, any effect on the aquifer is expected to be insignificant. There would be no direct or indirect impacts to existing wells in a one-mile Analysis Area.

Produced water from the Project wells would be disposed of in one injection well. The proposed injection target for the injection well is the sand of the Fort Union Formation, located approximately 5,300 feet below the surface. Background water quality analysis of the injection horizon has confirmed that the water quality of the injection zone has greater concentrations of solubles than the producing zone and is therefore suitable for injection of the produced water. Wyoming Department of Environmental Quality/Ground Water Division regulations require that the water of the injection zone be of equal or lesser quality than the water being injected. Injection of the produced water is not expected to result in any deterioration in groundwater quality within the injection horizon. 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 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. A direct potential effect on the injection horizon would be a localized 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 very limited. There are no indirect impacts to existing wells expected within the Project Area or a one-mile Analysis Area.

Water for use in drilling the initial CBNG well in the Project Area would be obtained from a Kennedy State well located in Section 36, T23N R97W. The Project would require approximately 84,000 gallons (0.26 acre-foot) of water per well for completion, well stimulation and dust control. This water requirement is relatively small and would not adversely affect existing surface or groundwater sources or rights.

There are no significant direct or indirect impacts would be expected on surface water resources from the Proposed Action. There are no perennial surface waters in the Analysis Area only ephemeral and intermittent streams that flow in response to spring runoff and summer storms. All water used in the Proposed Action will be managed as indicated above to minimize surface water runoff, off-site sedimentation due to soil disturbance associated with construction activities, water quality impairment of surface waters due

to increased sedimentation and stream channel morphology changes due to road and pipeline crossings. The Proposed Action meets resource management objectives for the area as defined in the GDRMP. Standards for healthy public rangelands require actions to comply with Wyoming State water quality standards (Standard #5) (BLM WY, 1998). With the use of proper construction techniques and drilling practices, and with the implementation of Best Management Practices (BMPs) these Standards would be met.

No Action

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

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

Proposed Action

Implementation of the Proposed Action would result in direct effects including the short-term loss of natural vegetation in areas where well sites, facilities, pipelines and access roads would be constructed. An estimated 68.4 acres of native shrubland / grassland would be affected by short-term surface-disturbing activities during drilling and testing.

The disturbance of black greasewood, Gardner's saltbush, squirreltail, bluegrass, and *Polanisia*, the predominant vegetation in the Project Area, is expected to be minor under the Proposed Action given that these vegetation types are commonly found across southwest Wyoming. The short-term or long-term loss in this cover type resulting from the Proposed Action would not impact the overall abundance and quality of this habitat. Implementation of the Proposed Action would incrementally result in direct or indirect impacts to these species.

Implementation of the Proposed Action may result in direct and indirect effects from an increase in weed populations. Monitoring and control of invasive (including noxious) weed infestations on project-related surface disturbance during the project will reduce this effect.

In general, the duration and extent of effects on vegetation in the Analysis Area would depend on the effectiveness of reclamation and time required for natural succession to return disturbed areas to pre-disturbance conditions of diversity. Grasses and forbs are expected to become established within the first several years following reclamation, while shrub communities will require more time to reestablish.

No Action

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

4.6 RANGE RESOURCES AND OTHER LAND USES

Proposed Action

Direct and indirect effects on rangeland vegetation associated with the Proposed Action are limited to a loss of forage, an increased potential for vehicle/livestock collisions, and an increased potential for the spread of noxious and invasive weeds. Livestock grazing activities would continue within the Cyclone Rim Grazing Allotment at the levels authorized by the current grazing permit. The Proposed Action would result in the short-term loss (68.4 acres potential) of approximately 4-7 AUMs.

No Action

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

4.7 WILDLIFE

Proposed Action

An estimated 68.4 acres would be affected by short-term surface-disturbing activities under the Proposed Action. During the production phase, the unused portion of well sites and pipelines would be reclaimed and

revegetated with an appropriate seed mix (Table 2.3). As production operations concluded, all well field and ancillary facilities would be reclaimed and abandoned decreasing the actual long-term disturbance. The potential effects of this disturbance on wildlife include displacement of wildlife, loss or temporary disturbance of wildlife habitats. 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.

In addition to the direct loss of habitat, there would be an increase in the potential for collisions between wildlife and motor vehicles, and disturbances from human activity and traffic would lower wildlife utilization of habitat immediately adjacent to the Project Area. Wildlife utilization would be lowest during the construction phase when human activities are more extensive and localized. Disturbance would be reduced during the testing and production phase of operations and animals would be expected to become accustomed to Project activities. A slight increase in mortality from increased vehicle use of roads in the Project Area would be expected, though quantification of these losses is unknown. Given the relatively small amount of habitat disturbed, the vegetation type and the abundance of nearby potentially suitable habitat, the Proposed Action is unlikely to have any long-term impacts to populations of general wildlife such as small mammals and songbirds.

4.7.1 Big Game

In general, the Proposed Action would include direct loss of habitat and forage, and increased disturbance of big game wildlife species. As noted previously (see Section 4.6), grasses and forbs are expected to become established within the first several years following reclamation; however, much more time would be required to achieve reestablishment of shrub communities. Consequently, disturbance of shrub communities, particularly mixed shrub communities that big game utilize during winter, would result in a long-term loss of those habitats. Disturbance of big game species during the parturition period and on winter range can increase stress and may influence species distribution (Hayden-Wing 1980, Morgantini and Hudson 1980). Big game would be expected to demonstrate some reduced use of the area for the life of the Project due to an increase in human presence; however, once construction is complete most big game would likely habituate to increased traffic volumes and machinery. A slight increase in mortality from increased vehicle use of roads in the Project Area would be expected, though quantification of these losses is unknown. There may also be a potential for an increase in poaching and harassment of big game, particularly pronghorn antelope, mule deer, and elk. No adverse impacts to big game populations are expected provided that mitigation measures and procedures contained in the proposed action are implemented.

No Action

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

4.7.2 Upland Game Birds

The Proposed Action will have no significant direct or indirect impacts on sage-grouse populations or habitat. Suitable habitat does not exist in the Project Area.

No Action

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

4.7.2 Raptors

No active raptor nests have been found within the Project Area. If active raptor nests were located on the Project Area in future years, appropriate avoidance and mitigation measures would be taken to avoid adverse impacts to breeding raptors. No significant direct, indirect impacts on raptors are expected given that there are no known raptor nests.

No Action

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

4.7.3 Threatened and Endangered Species

Threatened and endangered species with habitat or potential habitat or that may occasionally be seen in the Great Divide Resource area include black-footed ferret and associated white-tailed prairie dogs, and bald eagles. None of these species or their habitats is found in the Project Area. No direct or indirect impacts on any of these species are expected.

No Action

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

4.7.4 BLM Sensitive Species

Six special status species have no habitat in the Project Area. These six are Townsend's big-eared bat, white-tailed prairie dogs, sage grouse, burrowing owls, Brewers sparrow and sage sparrow. The Project Area contains or has potential habitat for the following species:

Swift fox (*Vulpes velox*) is a small canid found in shortgrass prairie with dens dug into ridge tops situated with broad views. Potential habitat for this species is limited in the Project Area. No occurrences of swift fox have been recorded in the Project Area.

Ferruginous hawk (*Buteo regalis*) is a raptor more commonly found in sagebrush steppe. Potential habitat for this species is limited in the Project Area. No occurrences of ferruginous hawks have been recorded within one mile of the Project Area. Individual birds may use or avoid the disturbed area, but population objectives will not be adversely affected.

Loggerhead shrike (*Lanius ludovicianus*) are habitat generalists but require shrubs or trees that offer structures for impaling their prey. There is suitable habitat in the Project Area, but given the small size of the project and the extent of the greasewood community, the proposed Project is not likely to threaten the population viability of loggerhead shrikes within the Project Area. No significant adverse effects are expected to result from the proposed Project.

Sage thrashers (*Oreoscoptes montanus*) occupy tall greasewood and sagebrush habitats. Suitable habitat exists within the Project Area/Analysis Area. There is suitable habitat in the Project Area, but given the small size of the project and the extent of the greasewood and sage community, it is not likely to threaten the population viability of sage thrasher within the Project Area. No significant adverse effects are expected to result from the proposed Project.

Direct and indirect effects on BLM wildlife species of concern 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 the species of concern, and abundance of nearby potentially suitable habitats, no noticeable effects are expected under the Proposed Action, provided that Project activities are conducted in accordance with the mitigation measures and procedures outlined in this document and the GDRMP.

No Action

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

4.8 WILD HORSES

Proposed Action

The proposed action would not interfere with planned horse gathers. Loss of forage associated with the proposed action is provided below.

No Action

No forage loss would occur. Wild horses would inhabit and utilize the area as currently exists.

4.9 RECREATION

Proposed Action

Undisturbed landscapes, isolation and solitude are important to some non-consumptive users (e.g. back packers, bird watchers, photographers) and hunters. Project-related activities could contribute to a decline in the recreation experience for these users, particularly during construction and drilling activities. Displaced game species and disturbance to the characteristic landscape could create an environment that detracts from the recreation experience. The effects would diminish once drilling and construction were completed (one season), but would persist at reduced levels and could contribute to a decline in the recreation experience for these users. Recreationist could relocate to other areas near the Project Area. Due to the abundance of nearby similar recreational opportunities for hunting, camping, and off-road vehicle use, no significant direct or indirect impacts on recreational experiences are expected from implementation of the Project.

The recreation resource within the Project Area, which is also the Analysis Area for this resource, would be directly affected by the Proposed Action. Overall impacts to the recreation resource would not be serious due to the short-term nature of drilling and construction activities, concentrated locations of activities, and small number of recreationists affected.

No Action

Under the No Action Alternative, the development of the Proposed Action would not occur. The recreation experience for those using the Project Area would be similar to the pre-disturbance conditions described in Chapter 3. No substantial impacts would be expected.

4.10 VISUAL RESOURCES

Proposed Action

As noted in Chapter 3, Affected Environment, and defined in the GDRMP resource management objectives, the Project Area is currently used by ranchers, the public, and mineral developers.

Short-term effects to the visual resource in the form of roads and well sites would be visible throughout the Project. Impacts would be greatest through the construction and drilling phases. Roads would create contrasts in line, color and texture to the current landscape, which is predominantly rural. Completion of construction activities and reclamation will reduce visual impacts and comply with the area's VRM Class III status.

Permanent production facilities, as described in Chapter 2, would remain once well drilling activities were completed. The presence of permanent production facilities would have continued impacts in the long term. These facilities would create contrasts in line, form, color, texture, and overall pattern in the landscape and would remain for the duration of the Project. However, with implementation of reclamation the long term impacts of contrast would not exceed Class III standards.

No Action

Under the No Action Alternative, the development of the Proposed Action would not occur. No effects upon visual resources would be expected to occur beyond the existing situation.

4.11 CULTURAL RESOURCES

Proposed Action

The consultation process under Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended, requires the BLM to consult with the Wyoming State Historic Preservation Office (SHPO) and others, as necessary, regarding potential impacts of the proposed undertaking upon historic properties. The environmental assessment is in conformance with NHPA.

Adverse effects to cultural properties would be avoided by recordation of sites. Any adverse direct effects would likely result from construction related activities. Activities considered to have the greatest effect on

cultural resources include blading of well pads and associated facilities and the construction of roads and pipelines.

Class III surveys have been completed in the Project Area. The Analysis Area for this resource is defined as the areas that will be subject to ground disturbing Project activities. Identification of important sites prior to disturbance will minimize impacts to cultural resources. No indirect impacts are expected with the implementation of Project-Wide Mitigation Measures and Procedures. The Project meets resource management objectives for the area as defined in the GDRMP.

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. The proposed action would provide information on cultural resources in the area that would remain unknown if the Proposed Action were not allowed.

4.12 SOCIOECONOMICS

Proposed Action

The Proposed Action would incrementally increase local and regional economic conditions and could result in the generation of local, state and federal government tax and royalty revenues. The relatively small, short-term drilling and field development workforce would not generate noticeable population effects or demand for temporary housing or local government services.

The Proposed Action 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 increased employee and contractor spending, would generate increased economic effects for Sweetwater County, and for Wyoming. Federal mineral royalties would potentially be gained from this Proposed Action.

No Action

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

4.13 TRANSPORTATION

Proposed Action

Federal and State Highways

The Proposed Action would generate incremental 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. The incremental increase in area traffic associated with the Proposed Action would not result in a measurable deterioration of level of service for any involved roads. Given the relatively small increment of traffic and the relatively short duration of the drilling and field development phase, it is unlikely that the Proposed Action would result in a increase in accident rates on highways or roads.

No Action

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

4.14.1 OCCUPATIONAL HAZARDS 4.14 HEALTH AND SAFETY

Proposed Action

Health and safety impacts of the Proposed Action would include a relatively low risk to Project workers from industrial accidents, and natural disasters. Refer to the Master Surface Use Plan for details.

The BLM, WOGCC, WDEQ, OSHA, and USDOT each regulate certain safety aspects of oil and gas development. Adherence to relevant safety regulations on Kennedy's part and enforcement by the respective agencies would reduce the probability of accidents.

4.14.2 Pipeline Hazards

Increasing the length of pipeline within the Analysis Area would increase the chance of pipe failure. Accident rates for gas transmission pipelines are historically low.

4.14.3 Other Risks and Hazards

The risks to public health and safety are not expected to increase under the Proposed Action. There would be no direct or indirect effects resulting from the Proposed Action within the Project Area, including the access between the Project Area and the County Road. The risk of fire in the Analysis Area would increase under the Proposed Action. There would be a small increase in risk to area fire suppression personnel associated with the Proposed Action.

No Action

Under the No Action Alternative, health or safety risks would remain essentially as they are unless other oil and gas leases within the area are developed.

4.15 NOISE

Proposed Action

Noise levels in excess of the 55 dBA maximum standards will occur during construction and production operations. Wildlife, and construction and operations personnel would be exposed to elevated noise levels.

No Action

Implementation of the No Action Alternative would not add to existing noise levels in the Project Area.

4.16 CUMULATIVE IMPACTS

Cumulative impacts are those that would result from the incremental impacts of the Proposed Action when added to past, present, and reasonably foreseeable future actions (RFFA's). Reasonably foreseeable development is that development likely to occur within the cumulative impact assessment area (CIA) within the next 5 years. The CIA for this analysis is the 84,701-acre HUC-12 watershed inclusive of the project area (North Red Desert Basin- see Figure 3).

Continental Divide/Wamsutter II Natural Gas Project EIS Project analyzed conventional gas development in several geologic formations (principally the Almond, Lewis, Mesa Verde). Analysis considered surface disturbance associated with the project, which was estimated to result in the drilling and development of approximately 3,000 wells. Recently, industry operators have proposed consideration of 80-acres spacing.

Lower Bush Creek Coalbed Methane Exploratory Pilot Project analysis will consider disturbance and effects of the drilling and production from 20 coalbed natural gas wells over 3,500 acres. DR/FONSI for this project was signed on August 22, 2003.

Hay Reservoir Unit Natural Gas Infill Drilling Project EA was prepared to consider additional infill development within the Hay Reservoir Unit. The project entails the drilling and development of up to 25 conventional well locations over 11,620 acres. DR/FONSI for this project was signed on December 22, 2004.

In total, the approval of this proposed action would add approximately 68.4 acres of surface disturbance to the area. There are 41 wells producing, shut-in, or in the process of being drilled within the watershed in which the project is located. There are, in addition, 6 proposed APD's on file (other than the proposed action) at the Wyoming Oil & Gas Conservation Commission as of August 15, 2005. In total, then, there are 47 existing and reasonably foreseeable APDs in the watershed.

In development of the Desolation Flats EIS, a natural gas project within south-central Wyoming, an analysis of the expected short-term disturbance area for typical oil & gas wells within the area provided an estimate of 12.0 acres per well (including well pad, access road, and pipeline for most wells). It should be noted that the short-term disturbance figure represents the disturbance associated with a typical well prior to any reclamation activities. Most of the producing wells have been reclaimed to their production facilities.

Using an assumption of 12.0 acres of disturbance per well, the proposed action (68.4 acres), in combination with the 47 existing and reasonably foreseeable wells (564.0 acres), would result in a total cumulative oil & gas development disturbance (short-term) of 632.4 acres within the watershed. This equals less than one percent of the watershed area. This proposed project, in combination with other reasonably foreseeable activities and actions within the assessment area, is not expected to cumulatively affect resources of consideration if the mitigations provided in the APDs and Conditions of Approval are implemented.

4.16.1 Geology/Minerals/Paleontology

No cumulative impacts are expected to occur to fossil resources.

4.16.2 Air Quality

There will be an incremental decrease in long term visibility from the proposed action.

4.16.3 Soils

Cumulative impacts upon the soil resources would be incrementally increased by 68.4 acres over the short term.

4.16.4 Water Resources

Cumulative impacts to surface water resources or groundwater sources within a one-mile Analysis Area of the Project Area are not anticipated.

4.16.5 Vegetation, Special Status Plant Species, Wetlands, Noxious Weeds

Cumulative effects would occur from the proposed action incrementally with the additional 68.4 acres of disturbance within the 84,701-acre assessment area.

4.16.6 Range Resources and Other Land Uses

There will be a reduction in grazing forage ability of about 4-7 AUMs under this proposal.

4.16.7 Wildlife

No cumulative impacts would be expected to result from this Proposed Action for any species.

4.16.8 Wild Horses

No cumulative impacts are expected to result from this project to wild horses.

4.16.9 Recreation

There will be an incremental cumulative impact on users from implementation of the Proposed Action.

4.16.10 Visual Resources

There will be an incremental cumulative impacts to visual resources within the Project Area would result from additional CBNG development.

4.16.11 Cultural Resources

No cumulative impacts to cultural resources are expected as a result of the Proposed Action.

4.16.12 Socioeconomics

There will be an incremental cumulative impact to area economics.

4.16.13 Transportation

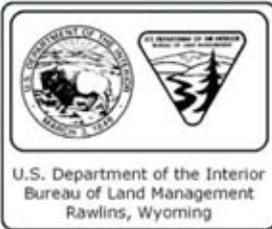
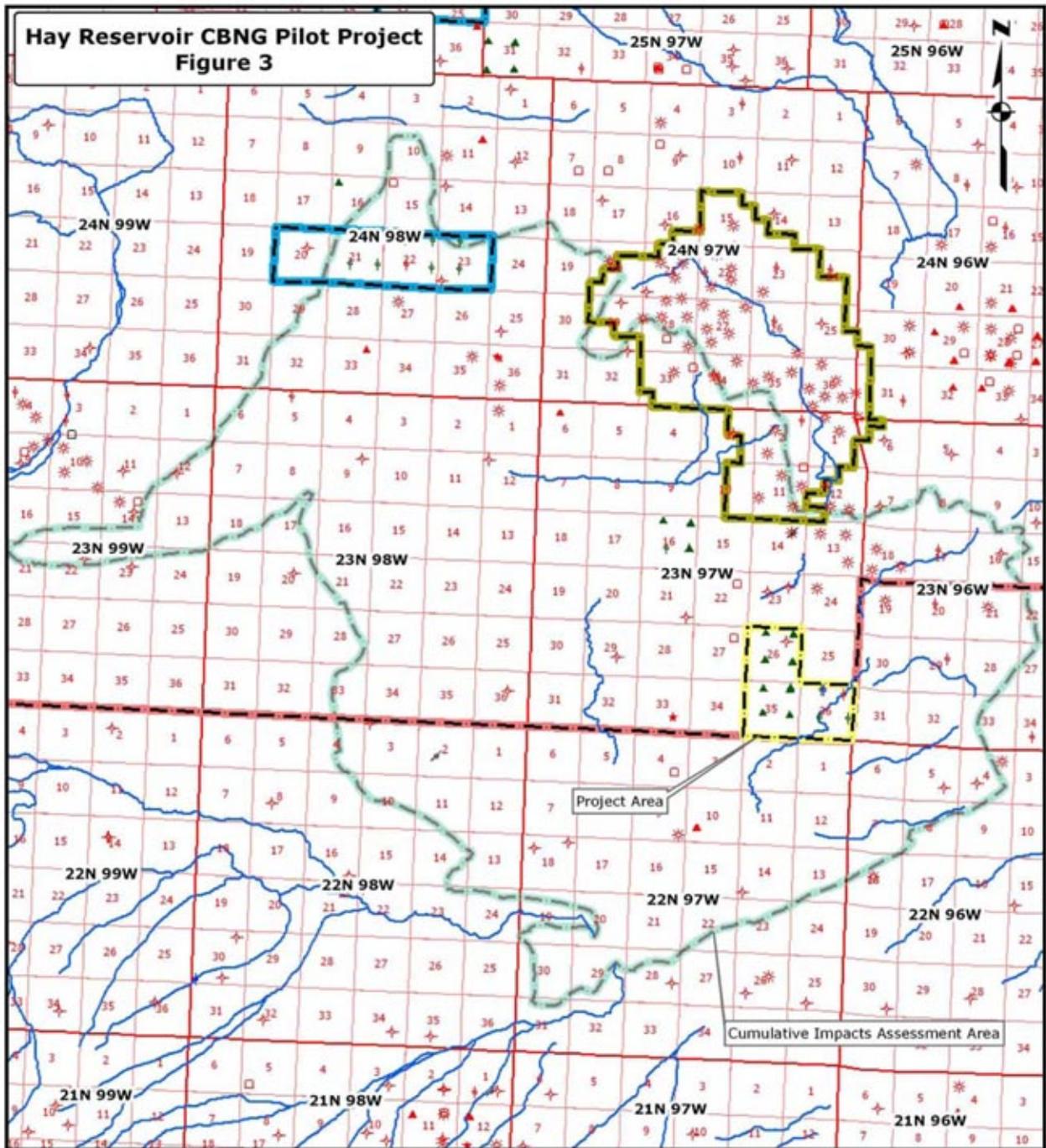
There will be an incremental cumulative impact as discussed earlier in this document.

4.16.14 Health and Safety

There will be an incremental increase in the risk and occurrence of accidents under the proposed action.

4.16.15 Noise

No cumulative impact from noise is expected.



1 inch equals 12,500 feet
1:150,000

Drafted By: TDB 08/15/2005

The BLM can not guarantee the accuracy of these data.

Legend

- North Red Desert Basin
- Continental Divide/Greater Warm
- TBI Hay Reservoir EA
- Kennedy LBC CBNG EA
- Kennedy HR CBNG EA

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