2.0 PROPOSED ACTION AND ALTERNATIVES

2.1 INTRODUCTION

Hudson Group, LLC (the Operator) has proposed a coalbed natural gas pilot project within the Scotty Lake CBNG Exploratory Unit consisting of the drilling, completion, and testing of up to 18 CBNG wells within the 2,880 acre pilot project area (see Figure 2.1). These wells would be drilled in three phases over a period of three years. A review of Figure 2.1 will reveal wells proposed in conjunction with the proposed pilot project as follows: Phase I - 4 potential new well locations; Phase II - 6 potential new well locations; and Phase III - 8 potential new well locations.

Although 21 well locations are depicted on Figure 2.1, only 18 total wells will be drilled in conjunction with the SLPP. The ultimate selection of those wells to be drilled during Phase III of the pilot project will be based upon the results of initial drilling and testing operations on wells previously drilled in Phases I and II with consideration given to contractual obligations for operations on leases within the Phase III project area boundary. Table 2.1 lists the wells proposed in conjunction with the SLPP.

Table 2.1

Wells Proposed in Conjunction with the SLPP

Well Name and Number	Legal Location of Well				Federal Lease Number	Project Phase	BLM Field Office
	Quarter	Section	Township	Range			
Scotty Lake Unit # 9	SE¼NW¼	24	26 North	97 West	WYW-14104A	I	Rawlins
Scotty Lake Unit #10	SE¼NE¼	24	26 North	97 West	WYW-14104A	I	Rawlins
Scotty Lake Unit #11	SE¼SE¼	24	26 North	97 West	WYW-14104A	I	Rawlins
Scotty Lake Unit #12	SE¼SW¼	24	26 North	97 West	WYW-14104A	I	Rawlins
Scotty Lake Unit # 7	NE¼NE¼	19	26 North	96 West	WYW-52013	II	Rawlins
Scotty Lake Unit #22	C SE¼	18	26 North	96 West	WYW-52012	II	Lander
Scotty Lake Unit #23	NW¼NW¼	20	26 North	96 West	WYW-131839	II	Rawlins
Scotty Lake Unit #24	C SW¼	17	26 North	96 West	WYW-152174	II	Lander
Scotty Lake Unit #25	NE¼NE¼	19	26 North	96 West	WYW-5201	II	Lander
Scotty Lake Unit # 8	NE¼NW¼	23	26 North	97 West	WYW-147468	III	Rawlins
Scotty Lake Unit #13	NW¼SW¼	14	26 North	97 West	WYW-147467	III	Rawlins
Scotty Lake Unit #14	NE¼NW¼	23	26 North	97 West	WYW-147468	III	Rawlins
Scotty Lake Unit #15	C SW¼	23	26 North	97 West	WYW-147468	III	Rawlins
Scotty Lake Unit #19	SE¼SE¼	22	26 North	97 West	WYW-147467	III	Rawlins
Scotty Lake Unit #20	C NE¼	22	26 North	97 West	WYW-147467	III	Rawlins
Scotty Lake Unit #26	C NE¼	23	26 North	97 West	WYW-147468	III	Rawlins
Scotty Lake Unit #27	C SE¼	14	26 North	97 West	WYW-147467	III	Rawlins
Scotty Lake Unit #28	SE¼SE¼	23	26 North	97 West	WYW-147468	III	Rawlins
Scotty Lake Unit #16 [1]	NE¼NW¼	26	26 North	97 West	WYW-158426	III	Rawlins
Scotty Lake Unit #17 [1]	NW¼NW¼	26	26 North	97 West	WYW-158426	III	Rawlins
Scotty Lake Unit #18 [1]	C NE¼	26	26 North	97 West	WYW-158426	III	Rawlins

[1] Optional wells

This environmental assessment (EA) addresses both the Proposed Action and the No Action alternative. Directional drilling operations were considered for wells proposed in conjunction with the SLPP but this alternative was not analyzed in detail (please refer to Section 2.5.2 for additional information in this regard).

- **Proposed Action.** This alternative would allow the Operator to construct 18 additional well locations and install related production (ancillary) facilities within the Scotty Lake Coalbed Natural Gas Pilot Project Area (SLPA). Approximately 106.05 (+/-) acres of initial (short-term) surface disturbance would occur in conjunction with the project proposal.

- **No Action Alternative.** This alternative implies that both ongoing and previously approved natural gas exploration, development, and production activities would be allowed to continue by the BLM in the overall project area, but additional activity would not be allowed. Future Applications for Permit to Drill (APD's) and Right-of-Way (ROW) applications would be evaluated by the BLM on a case-by-case basis through site specific environmental analyses in accordance with management direction contained in both the Great Divide and Lander Resource Area approved RMP's (BLM 1990, BLM 1987).

2.2 PROPOSED ACTION

The proposed action entails the initiation of a pilot project in the Scotty Lake CBNG Exploratory Unit designed to test the productive potential of coals in the Fort Union Formation for commercial CBNG production. Surface disturbing activities associated with Phase I of the proposed pilot project would commence in late summer of 2004 and would continue over a period of approximately 3 years, with Phases II and III of the proposed pilot project initiated in the summer of each successive year following 2004. Should commercial CBNG production be established in conjunction with this pilot project, the productive life of these wells is estimated to be somewhere between 15 and 25 years.

The statewide spacing pattern established by the Wyoming Oil and Gas Conservation Commission (WOGCC) for oil and natural gas wells in this area of Wyoming is 40 acres or 16 wells per 640-acre section. However, the operator is currently proposing to drill those wells proposed in conjunction with the SLPP on a 160-acre spacing pattern or 4 wells per section, with a fifth well drilled in (or close to) the center of selected sections (which equates approximately 120 acres/well).

Specific components of the proposed pilot project are contained in both the SLPP Plan of Development and Master Field Permit (see Appendix C) and the Water Management Plan (see Appendix D) and which are summarized below. Additional site-specific environmental analyses and resource information would be contained in each individual Application for Permit to Drill (APD) and/or Right-of-Way (ROW) application subsequently submitted to the BLM.

2.2.1 Well Pad Construction

As indicated in Section 1.1, the 18 wells proposed in conjunction with the SLPP are all situated on surface and mineral estate owned by the United States of America (USA) and administered by the BLM. A typical location layout for CBNG wells as proposed by the Operator is shown on Figure 2.2. Major components of each individual well pad would include:

- a leveled area suitable for placement/support of the drilling rig and related equipment; and

- an earthen reserve pit designed to contain drilling fluids, drilled cuttings, and fluids produced during the drilling operation.

The entire well pad area would be cleared of all vegetation and graded to the required specifications prior to moving in the drilling rig and subsequent commencement of actual drilling operations. Sufficient topsoil to facilitate revegetation would be segregated from subsoil material during construction operations and stockpiled for future reclamation of the disturbed area. The salvaged topsoil would be evenly distributed over those disturbed surfaces subject to reclamation upon termination of drilling and completion operations as part of the reclamation and revegetation program. Topsoil stockpiles would be stabilized with vegetation until used for reclamation purposes.

After the topsoil has been removed, the well pad would be graded to produce a level working platform around the drill hole for support of the rig substructure. The excavated soil material (subsoil) would be utilized in overall pad construction, with the finished well pad graded to allow for positive drainage of natural water (e.g., rain and/or snow melt) away from the drill site.

Generally, each individual well location would be designed so that the amount of soil material excavated (less the stockpiled topsoil) should "balance", thereby eliminating the need to store excess subsoil material(s) in large stockpiles adjacent to the well location until site reclamation. Balancing of the excavated soil material would apply to the leveled area of the pad and would not include any materials excavated from the reserve pit below the finished pad grade. Subsoil excavated from the reserve pit would be stockpiled directly adjacent to the reserve pit and would be utilized to backfill the pit once operations were completed and the pit was reclaimed.

The leveled area required for initial drilling and completion operations for each individual well would equal approximately 1.16 acres in size (including the reserve pit). Likewise, the area(s) required for cut/fill slopes and topsoil/subsoil stockpiles associated with the proposed pad design would average approximately 0.67 acres per well pad (based upon a 25-foot buffer zone surrounding the entire well pad to accommodate cut/fill slopes and topsoil/subsoil stockpiles). Overall surface disturbance associated with the construction of individual well pads would average approximately 1.83 acres per well location.

Erosion control would be maintained through prompt revegetation and by constructing surface water drainage controls such as berms and diversion ditches as necessary at each individual well location.

2.2.2 Access Roads

Exploration and development activities to date within and/or directly adjacent to the SLPA have resulted in the construction of approximately 26,579 feet (5.03 miles) of new access road therein.

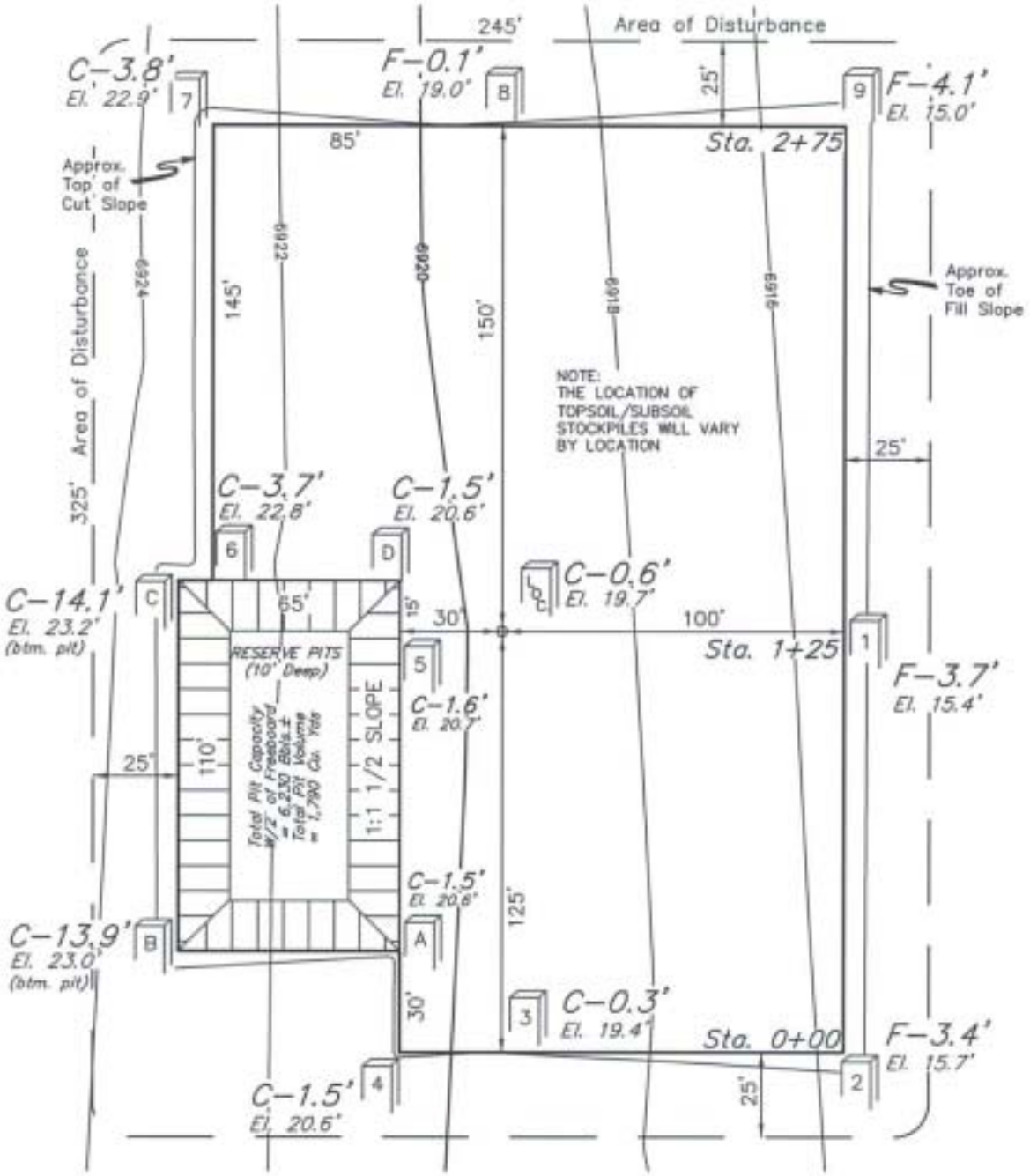

Figure 2.2: Typical Location Layout

Generally speaking, previous exploration activities within the SLPA have resulted in the construction of a road system that should be more than adequate to serve the needs of the Operator for arterial traffic into and within the overall project area.

New road construction associated with additional exploration and development in the project area would generally average approximately 1,477 feet (0.28 miles) of resource road per well location and would utilize existing two-track trails in the project area to the extent possible or feasible. Considering a total disturbed right-of-way (ROW) width which did not exceed forty (40) feet, this new road construction would result in additional surface disturbance equal to approximately 24.41 acres (or approximately 1.36 acres per well location). Whenever possible, access roads would be designed and constructed to disturb less than the 40 foot ROW width referenced above, as long as traffic and safety concerns could be satisfied. The existing access roads would be maintained as necessary to accommodate appropriate year-round traffic and prevent unnecessary erosion. These access roads would be constructed in accordance with roading guidelines established for oil & gas exploration and development activities as referenced in the joint BLM/USFS publication: *Surface Operating Standards for Oil and Gas Exploration and Development*, Third Edition and/or BLM Manual Section 9113 concerning road construction standards on federal lands (BLM 1985, 1991). Please refer to the SLPP Plan of Development and Master Field Permit (Appendix C) for additional information in this regard.

2.2.3 Drilling Operations

To facilitate the drilling of these proposed wells, the Operator would utilize a single rotary drilling rig rated for drilling operations to depths of approximately 5,000 feet. Rig transport and on-site assembly would be completed in approximately 4 days, involve approximately 15 people per well location, and require approximately 60 round trips per well location. Generally speaking, drilling operations would be expected to occur on a seasonal basis during the summer and early fall periods when weather conditions are generally more favorable for field operations in this area of Wyoming.

Drilling operations would require approximately 7 days per well location from the time the drilling rig is moved onto the location (move in-rig up) until such time as drilling operations have been completed and the rig is moved off of the location (rig down-move out).

After completion of the drilling phase of operations and prior to rig release, the well would be logged and production casing would be set to total depth and cemented into place. Setting and cementing the production casing string would serve to maintain hole integrity while isolating those formations downhole which could potentially contain either fresh water or hydrocarbons. Proper cementing of the production casing string would reduce or eliminate the possibility for fluid communication between hydrocarbon bearing zones and/or near surface fresh water aquifers.

Human waste generated at well locations would be collected in standard portable chemical toilets or service trailers and regularly transported off-site to a state-approved wastewater treatment site. Each well location would be provided with one or more such facilities during drilling and completion operations. A septic system would not be required. Non-human waste would be collected in enclosed containers and disposed of at a state-approved solid waste disposal facility.

2.2.3.1 Drilling Fluids System

The actual drilling operation would utilize a water-based mud system with additives for lost circulation, hole stabilization, and/or conditioning prior to logging and/or running casing. Basically, this system involves drilling with water and utilizing non-hazardous additives to minimize downhole problems. On the average, the Operator would utilize approximately 1.5 barrels of water (42 gallons/barrel) per foot of hole drilled. Fresh water for use in drilling operations would be obtained either from the Pickett Lake Unit #1 producing CBNG well located in the NW¼SE¼ of Section 24, Township 26 North, Range 97 West or from an existing storage reservoir constructed by the Operator in the NW¼SE¼ of Section 24, Township 26 North, Range 97 West (see Appendix C). No water would be used from either the North Platte River or the Colorado River or their tributaries for use in construction, drilling, cementing, or completion operations within the SLPA.

Water to be utilized in drilling operations would be contained in a "reserve pit" constructed on each location (refer to Figure 2.2) and would serve as the base medium for the drilling mud system. The reserve pit would be fenced on the three non-working sides during drilling, with the fourth side of the pit fenced immediately following removal of the drilling rig in order to protect wildlife and livestock. Fencing would be installed in accordance with guidelines contained in the joint BLM/USFS publication: *Surface Operating Standards for Oil and Gas Exploration and Development*, Third Edition and would be maintained until the reserve pit has been backfilled (see Appendix C).

Fluids that accumulate in the reserve pit during drilling and completion operations would be contained therein and would be allowed to evaporate prior to the reclamation of said pit. Once free of liquids, the reserve pit would be reclaimed by backfilling the pit with the sub-soil (spoil) material removed therefrom during construction. Once the pit has been backfilled, a portion of the stockpiled topsoil would be evenly distributed (spread) over the reclaimed area and reseeded in accordance with the specifications of the BLM (see Appendix C).

2.2.3.2 Casing & Cementing Operations

Surface casing would typically be set to a minimum depth of 450 feet and cemented back to the surface on each proposed well (see Appendix C). This would serve to isolate all near surface fresh water aquifers which could occur in the project area. Upon reaching total depth, production casing would be run and cement circulated to a minimum of 200 feet above the top of the shallowest coal in the Fort Union Formation, effectively isolating all geologic formations encountered down hole in compliance with *Onshore Oil and Gas Order Number 2*. This procedure would eliminate any possibility for fluid communication between potential hydrocarbon bearing zones and any near-surface fresh water aquifers which may be encountered downhole.

2.2.4 Completion and Evaluation Operations

Once the well has been drilled and cased, a completion (work-over) unit is moved onto the well location and completion operations are commenced. These completion operations generally require an average of 3 to 5 days per well location, consist of cleaning out the well bore with fresh water, pressure testing, and perforating the potentially productive formations downhole.

After the casing has been perforated, production tubing is run and dewatering operations commence. In certain instances, it may be necessary to hydraulically fracture the coals within the Fort Union Formation using fresh (produced) water. Should the initial hydraulic "frac" prove to be unsuccessful, a second "frac" would be performed utilizing a mixture of approximately 1,500 barrels of fresh water and 100,000 to 150,000 pounds of sand which would be pumped down the casing under extreme pressure and forced through the perforations into the formation. As the formation is fractured, the resultant fissures (fractures) are filled with sand which props them open and facilitates the flow of gas/water into the well bore and subsequently to the surface. Upon completion of the frac job, the well would be flowed back to the surface in an attempt to recover as much of the frac fluid as possible and to clean excess sand out of the perforations prior to setting production equipment on location and placing the well on line. All fluids utilized in the completion procedure are captured either in the reserve pit or in test tanks on the well location and ultimately disposed of in strict accordance with Wyoming Department of Environmental Quality (WDEQ) rules and regulations.

Once each well has been completed, a submersible/progressive cavity pump would be set and the evaluation (dewatering) phase of the project would commence. The operator would obtain approval of an Application for Permit to Appropriate Ground Water (form #UW-5) from the Wyoming State Engineer's office (WSEO) prior to beginning the dewatering process. In this regard, we would expect the continuous operations of these wells for a period ranging from approximately 6 months to 2 years in order to obtain a proper evaluation of the Fort Union Formation and subsequently determine the commercial feasibility of CBNG production therefrom. During this initial evaluation phase of operations, these wells could be expected to be on pump continuously twenty-four (24) hours a day. Each "producing" well would be monitored on a daily basis by a single contract pumper to ensure that the wells were functioning properly and that no leaks had occurred in the gas/water gathering system.

Generally speaking, natural gas within the coal is held in place by pressure from water contained in fractures within the coal seam. Mechanical pumping removes this water, lowering the formation pressure, and thus allowing the gas to "desorb" from the coal facies. An evaluation of the actual volume(s) of water removed prior to commencement of desorption, coupled with the resultant desorption rates will be extrapolated to calculate the commercial feasibility of additional exploration and/or development activity within the Scotty Lake CBNG Exploratory Unit and will also be used to refine a prediction of potential well densities required to accomplish economic recovery of the CBNG resource.

As the coal is depressured, desorption will occur and CBNG will commence flowing to the surface. Typically, there is an inverse relationship between water and gas production, with water volumes tending to decrease over time as the water pressure in the coal is lowered, while gas volumes tend to increase as the water is removed from the formation. Eventually, an equilibrium will be reached at which point maximum gas desorption will occur in association with diminished water production. However, this equilibrium can only be maintained as long as the well remains on pump. Should the well be "shut-in" for any period of time, the coal(s) could recharge with water, resulting in a loss of gas production as pressures rebuild.

2.2.5 Production Operations

Production equipment required at each individual well location would typically include the following equipment:

- a small christmas tree at the well head (a series of valves designed to control pressures and regulate flows from the well) with a submersible/progressive cavity pump;
- 50 horsepower (hp) generator powered by natural gas which would power the submersible/progressive cavity pump used to dewater the coal seam;
- a 50 hp screw compressor powered by natural gas; and
- a meter run for measurement of gas volumes produced into the pipeline.

All above ground production facilities installed at each producing well location would be painted a standard environmental color that blends with the surrounding landscape (see Appendix C).

The presence of very small quantities of liquid hydrocarbons (condensate) within the Fort Union Formation may necessitate the installation of tanks at selected well locations where condensate production is encountered. These tanks would be used to contain fluids produced from the well bore, allowing separation of the liquids prior to discharge. The collected condensate would either be introduced into the gas sales pipeline for capture downstream or be trucked to sales upon collection of a sufficient quantity to justify trucking. At this point, liquid hydrocarbon production from the three existing CBNG wells is nominal.

Pipelines would be installed for the transportation of natural gas and water produced from the well bore. Gas would be transported via buried pipeline to a connection with the closest existing line within the project area while the produced water would be transported to a discharge point for surface disposal.

No hydrogen sulfide (H_2S) is known to occur within the Fort Union Formation and none is expected to be encountered during project operations.

Water produced in association with the gas stream is expected to average approximately 700 barrels of water per day (bwpd) per well.

2.2.6 Pipeline Gathering System

Two types of pipelines would be installed as part of the proposed pilot project:

1) gas-gathering pipeline systems consisting of low pressure lines that would collect gas produced at the well head and transport said gas downstream to an existing central production facility (compressor site located in the SW¼NE¼SE¼ of Section 23 in Township 26 North, Range 97 West); and

2) produced water disposal lines.

In those cases where the gas and water lines are traveling in the same direction, both lines would typically be installed (buried) in a common trench. In most cases, however, produced water will be discharged to the surface in relatively close proximity to the well location and may involve a separate pipeline ROW that is divergent from the gas gathering system pipeline ROW.

2.2.6.1 Gas Gathering System

An existing gas gathering system within the project area would be augmented as necessary to transport CBNG produced from wells drilled in association with the SLPP to a pre-existing, compressor facility located approximately in the SW¼NE¼SE¼ of Section 23, Township 26 North, Range 97 West. These pipelines would follow existing and proposed roads within the SLPA to the greatest extent possible. Pipelines installed directly adjacent to existing/proposed access roads within the SLPA would typically require a slightly smaller overall right-of-way (ROW) width of 25 feet as the Operator would be able to utilize the existing access road running surface as a staging area for pipe assembly and installation, as opposed to cross-country lines which would require a ROW width of approximately 50 feet. Industry standard pipeline equipment, materials, techniques, and procedures conforming with all applicable regulatory requirements would be employed during construction, testing, operation, and maintenance of gathering system pipelines in order to ensure the safety and efficiency of all pipelines installed in the SLPA.

As indicated above, pipeline ROWs would generally be located adjacent to existing/proposed roads to the greatest extent possible in order to minimize surface disturbance and maximize construction and gas transport efficiency. Where major excavation is required, sufficient topsoil to facilitate reclamation would be removed from the pipeline ROWs before construction, as determined by the Authorized Officer. Where individual ROWs do not require major excavation, vegetation would be removed to ground level by mechanical treatments including either “brush-beating” or scalping, both of which leave the topsoil intact minimizing disturbance to plant root systems, thereby facilitating vegetative re-establishment. Brush beating or scalping would typically be limited to an area approximately 15 feet in width along the pipeline ROW. All pipeline ROW reclamation would be initiated as soon as practical following disturbance, but would be completed within a maximum of 1 year following completion of pipe installation.

All CBNG pipelines would be tested with either natural gas or water to ensure the integrity of newly constructed lines. This testing would consist of filling pipeline segments with the testing medium and pressurizing the segments to levels exceeding expected operating pressures. If leaks or ruptures occur, they would be repaired and testing would be repeated until successful. Natural gas used for testing would either be returned to the gathering system for sales or would be vented (released) to the surface in accordance with NTL-4A and/or WOGCC Rule 340. Water used in hydrostatic testing would be discharged to the surface in accordance with Wyoming Department of Environmental Quality rules and regulations governing surface water discharges.

Approximately 23,353 feet (4.42 miles) of 2 inch gas pipeline would be required to connect the 18 wells proposed in conjunction with the SLPP to an existing/proposed gas gathering system for transportation to the compressor site located in Section 23. Approximately 4,382 feet of the 2 inch line would be

installed in "cross-country" right-of-ways with the remaining 18,971 feet of pipeline installed directly adjacent to existing/proposed access roads within the SLPA. An additional 19,989 feet (3.79 miles) of 8 inch line would be installed as a gathering system to transport gas collected from individual wells in Phases II and III of the SLPA, with approximately 7,396 feet of the 8 inch line installed in "cross-country" right-of-ways and the remaining 12,592 feet of pipeline installed directly adjacent to existing/proposed access roads within the SLPA. These pipelines would be buried to a depth of approximately 6 feet within the ROW. Reclamation of pipeline right-of-ways (ROWs) would occur as soon as practical following pipe installation. Installation of 43,342 feet of buried pipeline to transport gas produced from the individual wells within the SLPA to the compressor site in Section 23 would result in short-term surface disturbance equal to approximately 31.63 acres (which includes 31,564 feet of pipeline in a 25 foot ROW and 11,778 feet of pipeline in a 50 foot ROW).

Gas delivered to the central compressor facility referenced above would be introduced into an existing gas transmission for transportation to market via a pre-existing connection therewith.

2.2.6.2 Water Discharge Lines

Water produced from each CBNG well would be transported via buried pipeline to a surface discharge point typically located in close proximity to the producing well. These produced water pipelines would generally consist of 3 inch polyethylene pipe buried at a maximum depth of 6 feet. In most cases these pipelines would be installed "cross-country" in order to achieve the most direct route from the well to the discharge point and minimize the amount of surface disturbance associated with pipe installation, as well as minimize the potential for freeze-up during the winter months.

The 22,597 feet (4.28 miles) of water discharge line would typically be installed with a small trencher (ditch witch or backhoe) resulting in a minimum of surface disturbance within the pipeline ROW. As a result, it is anticipated that no ROW preparation (i.e., topsoil salvage or blading) would be required prior to the commencement of actual trenching activities, pipe installation, and subsequent backfilling of the trench. Consequently, surface disturbance associated with the installation of these buried water discharge lines would be primarily limited to the actual trench itself (approximately six inches in width) and the travelway along the ROW route used for trenching activities and pipe staging. Considering a travelway width of 10 feet, short-term surface disturbance associated with the installation of these water discharge lines would result in approximately 5.19 acres of short-term disturbance.

2.2.7 Ancillary Facilities

The Proposed Action would utilize the existing ancillary facility infrastructure within the SLPA to the greatest extent possible for access to proposed well locations, gas gathering, and water disposal.

2.2.8 Transportation and Workforce Requirements

Estimated transportation and workforce requirements for drilling, completion, and evaluation operations on similar CBNG projects have been analyzed for numerous, similarly-sized CBNG projects throughout southwestern Wyoming in recent years. Consequently, the reader is directed to one or more of these documents for additional information in this regard:

- Decision Record, Finding of No Significant Impact and Environmental Assessment for Lower Bush Creek Coal Bed Methane Exploratory Pilot Project. Rock Springs Field Office, Bureau of Land Management. August 2003.

- Environmental Assessment for the Atlantic Rim Interim Drilling Project, Doty Mountain POD, Carbon County, Wyoming. Rawlins Field Office, Bureau of Land Management. October 2003.

- Environmental Assessment for the Atlantic Rim Coalbed Methane Project, Brown Cow POD, Carbon County, Wyoming. Rawlins Field Office, Bureau of Land Management. December 2003.

2.2.9 Water Production and Disposal

The operator has previously obtained approval of a National Pollutant Discharge Elimination System (NPDES) permit (permit #WY0049662) from the Wyoming Department of Environmental Quality (WDEQ) which allows for the surface discharge of water produced from both pre-existing wells as well as those wells proposed in conjunction with the SLPP within the approved parameters of said permit. NPDES Permit #WY0049662 currently allows the operator to discharge 0.81 million gallons of water per day (mgwpd) into Red Creek and ephemeral tributaries thereof. No produced water will be discharged into the West Alkali Creek drainage basin. The operator estimates that water production from wells drilled in conjunction with the SLPP would average approximately 550 barrels of water per day (bwpd) per well, for total water production from all 18 wells equivalent to 9,900 bwpd or 415,800 gallons per day (gpd), which is approximately one-half of the discharge currently approved under NPDES Permit #WY0049662 as amended.

Surface disposal methods that would be utilized in conjunction with the proposed SLPP would include the following or various combinations thereof:

1) Direct discharge of produced water to the surface via a “bubbler” or gravel envelope;

2) discharge into an unlined water retention pit with an overflow outlet; or

3) discharge into an unlined retention pit without an overflow outlet.

The appropriate disposal method would be selected at the time of the on-site inspection for each individual well location and would be included in the approval of each individual Application for Permit to Drill (APD) by BLM as a condition of approval. Please refer to the SLPP Water Management Plan (WMP)(Appendix D) for a full description of these discharge methods and diagrams depicting same.

Surface disturbances associated with direct surface discharge under discharge alternative 1 (above) would typically be minimal as compared to the construction of the water retention pits referenced under discharge alternatives 2 and 3. Water retention pits designed to contain the water produced from individual CBNG wells would typically be approximately 165’ X 100’ X 12’ in size and would result in the long-term (LOP) disturbance of approximately 0.66 acres/pit including a 20’ buffer around the perimeter of the retention pit. Installation of these pits would typically be limited to those particular instances where a suitable surface discharge point (ephemeral tributary to Red Creek) was not available

in close proximity to the discharge source. A suitable surface discharge point would be a location approved by the WDEQ that has both a suitable gradient and channel characteristics to allow for discharge to occur without excessive erosion and/or channel form changes such as vertical or lateral movement.

For the purposes of this environmental analysis, calculations of surface disturbance will assume that a water retention pit will be constructed at each of the 18 proposed well locations, which will overstate the surface disturbance associated with this aspect of the SLPP, yet will allow for a simplification of the impact analysis in Chapter 4, while including potential disturbances resulting from installation of bubblers or gravel envelopes under discharge alternative 1. On-site inspections conducted on the wells proposed in conjunction with Phase I of the SLPP did not identify the need for any water retention pits; consequently, the likelihood that numerous retention pits will be required in conjunction with Phases II and III is considered to be unlikely at best.

2.2.10 Hazardous Materials

Hudson Group, LLC has reviewed the EPA's Consolidated List of Chemicals Subject to Reporting Under Title III of the *Superfund Amendments and Reauthorization Act* (SARA) of 1986 (as amended) to identify any hazardous substances proposed for production, use, storage, transport, or disposal by this project, as well as the EPA's List of Extremely Hazardous Substances as defined in 40 CFR 355 (as amended) and has determined that none of the materials listed as hazardous and/or extremely hazardous would be used or generated by this project.

2.2.11 Abandonment

In the event that wells within the SLPA become commercially non-productive, the Operator would obtain the necessary authorization(s) from the appropriate regulatory agencies to abandon the non-productive well(s). All above ground facilities would be removed, the well bore would be physically plugged with cement as directed, and both the abandoned road and well location reclaimed according to BLM recommendations.

2.2.12 Reclamation

All disturbed surfaces would be reclaimed as soon as possible following the initial disturbance. This reclamation would consist primarily of backfilling the reserve pit, leveling and recontouring of disturbed areas, redistribution of stockpiled topsoil over the disturbed areas, installation of erosion control measures as appropriate, and reseeding as recommended by the BLM.

Reclamation of the reserve pit would be accomplished when the pit is no longer required for completion and/or testing operations. Free standing water in the pit would be allowed to evaporate through natural means to the greatest extent possible prior to the commencement of backfilling; however, in some instances the pit contents may be mixed with suitable solid materials and the pit backfilled, as approved by the BLM. Prior to the mixing of reserve pit contents with approved stabilizing materials, the contents of the reserve pit would be tested for total petroleum hydrocarbons (TPH) and toxicity characteristics leaching procedure (TCLP) constituents, and appropriate closure permits would be obtained from the WOGCC and/or WDEQ. If necessary, reserve pit contents would be removed and disposed of at an

approved disposal facility in a manner commensurate with all relevant county, state, and federal regulations and stipulations pertaining thereto.

Reclamation of the well location would be accomplished within a maximum of 2 years following the termination of drilling and completion operations (in the case of productive wells) or well abandonment (in the case of newly drilled dry holes).

2.2.12.1 Producing Well Location

During the production/testing phase of operations, the unneeded (non-working) area(s) of the well pad would be reclaimed as soon as possible after conclusion of drilling and completion operations, weather permitting. Reclamation would consist of backfilling the reserve pit, reducing the cut/fill slopes by pushing the fill material back up into the cut, redistributing the stockpiled topsoil over these reclaimed areas, installing erosion control measures as appropriate, and reseeding the reclaimed areas as recommended by the BLM. Restoration of these previously disturbed areas would result in the reclamation of approximately 60% of each individual well pad, or 1.10 acres/well location. As indicated above, this reclamation would be performed within 2 years of well completion and would reduce the long-term or life of project (LOP) disturbance resulting from well pad construction under this proposal to 13.14 acres.

2.2.12.2 Access Roads

A minimum of 6 inches of topsoil would be stripped from the access road corridor (new construction portions only) prior to the commencement of construction activities and would be redistributed on the "outslope" areas of the borrow ditch after completion of road construction activities. These borrow ditch areas would then be reseeded as soon as practical thereafter. Likewise, any surface disturbances on/along the "outslope" areas of existing roads within the project area resulting from implementation of the Proposed Action would be reseeded as well.

Restoration of those areas disturbed in conjunction with right-of-way clearing, topsoil salvage, and subsequent road construction would typically result in the reclamation of approximately 30% of the disturbed road ROW (for a road having a 16-foot unsurfaced running surface), not including any provision for the revegetation of the outslope portion of the borrow ditch. As indicated above, this reclamation would be performed within 2 years of well completion and would reduce the long-term or LOP disturbance resulting from access road construction under this proposal to approximately 17.09 acres.

2.2.12.3 Pipelines

A minimum of 6 inches of topsoil would be stripped from the gas pipeline ROWs prior to the commencement of construction activities. Once trenching and pipe installation operations have been completed, the trench would be backfilled with the subsoil materials previously removed therefrom, the trench will be compacted to avoid settling, and the stockpiled topsoil redistributed over the disturbed ROW. The gas pipeline ROW would then be reseeded as soon as practical thereafter.

Considering the negligible amount of surface disturbance associated with the installation of water discharge lines, wholesale reclamation would not be required unless blading and shaping of the ROW (on steep slopes) were required resulting in surface disturbance comparable to disturbances associated with gas line installation. In these instances, these water discharge ROWs would be reclaimed and reseeded as above.

Considering that all disturbances associated with pipeline construction would be reclaimed and reseeded as soon as practical following pipe installation, these disturbance are considered as short-term and are not included in the LOP cumulative disturbance totals.

2.2.12.4 Abandoned Well Location

Upon final abandonment, all existing surface facilities would be removed from the well location as stated in Section 2.2.9. The access road and remaining "work" areas of the well location would be scarified and recontoured, erosion control measures would be installed as necessary, and all recontoured (disturbed) areas would be reseeded as recommended by the BLM.

2.3 APPLICANT-COMMITTED ENVIRONMENTAL PROTECTION MEASURES

The following applicant-committed practices, design features, and procedures would be implemented by the Operator in order to minimize impacts to the environment. Each applicant-committed practice is listed only once, under the first resource where it applies; however, many practices apply to several resources and would reduce impacts to each. These practices, design features, and/or procedures may be waived when deemed inappropriate by the BLM if a thorough analysis determines that the resource(s) for which the measure was developed would not be impacted. Additional site-specific mitigation measures would be identified during the APD and ROW application review processes.

2.3.1 Preconstruction Planning and Design Measures

1. The Operator and BLM would conduct on-site inspections of each proposed disturbance site (e.g., well sites, roads, pipelines, etc.) to develop site-specific recommendations and mitigation measures.

2. Roads required for the proposed project would be constructed in accordance with BLM Manual 9113 standards (BLM 1985, 1991).

3. The Operator would prepare and submit individual drill site design plans to the BLM for approval prior to initiation of construction. These plans would show the layout of the well location over the existing topography, dimensions of the well pad, volumes and cross-sections of proposed cuts and/or fills, location and dimensions of reserve and flare pits, and access road design.

4. Prior to construction, the Operator would submit an addendum to the Plan of Development and Master Field Permit (Appendix C) which contains site-specific information concerning each proposed well site, pipeline segment, and access road project. These site-specific addendums would enumerate the measures and techniques to be used for erosion control, revegetation, and restoration, and would provide specific detail on project administration, time frames, responsible parties, objectives, characteristics of site predisturbance conditions, topsoil removal, storage and handling, runoff and erosion control, seed bed preparation, recommended seed mixtures, seed application, fertilization, mulching, site protection, weed and livestock or other herbivore control, and monitoring and maintenance.

5. The Operator would slope-stake construction activities on steep and/or unstable slopes when required by the BLM, and would receive approval by the BLM prior to initiating construction.

6. The Operator would identify aggregate and other road material sources for use in drill site and road construction. The appropriate surface management agency would approve these sources, including timing for extraction, prior to use.

2.3.2 Air Quality

1. The Operator would adhere to all applicable Wyoming Ambient Air Quality Standards (WAAQS) and Regulations including those for fugitive dust suppression presented in Wyoming Air Quality Regulations on Fugitive Dust Suppression Section 14(F) (WDEQ 2003a). If a fugitive dust problem is identified by the BLM as a result of this project, immediate abatement measures (e.g., applications of water or chemical dust suppressants to disturbed surfaces) would be initiated in consultation with the BLM and WDEQ to avoid exceeding ambient air quality standards.

2. The Operator would not allow open burning of garbage or refuse at well locations or other facilities in the SLPA. Any other open burning would be conducted under the permitting provisions of Section 13 of the Wyoming Air Quality Standards and Regulations (WDEQ 2003a).

2.3.3 Cultural Resources

1. The Operator would follow the Section 106 compliance process prior to any surface disturbing activity.

2. The Operator would halt construction activities if previously undetected cultural resource materials are discovered during construction. The BLM would be immediately notified, and consultation with the SHPO and Advisory Council would be initiated, as appropriate, to determine proper mitigation measures pursuant to 36 CFR 800.11. Construction would not resume until a Notice to Proceed is issued by the BLM.

2.3.4 Geology and Minerals

1. BLM/WOGCC casing and cementing criteria would be followed to protect all subsurface mineral and water-bearing zones.

2.3.5 Hydrology

1. Construction at drainage crossings would be limited to periods of low or no-flow.

2. The Operator would follow all practical alternatives and designs to limit disturbance within drainage channels, including ephemeral and intermittent draws.

3. A 100 foot wide buffer area of undisturbed land would be left between construction sites and ephemeral and intermittent channels, except for those construction activities designed to reduce erosion in conjunction with surface discharge locations.

4. Channel crossings by pipelines would be constructed so that the pipe is buried at least 4 feet below the channel bottom.

5. Channel crossings by roads and pipelines would be constructed perpendicular to flow.

6. Disturbed channel beds would be reshaped to their approximate original configuration.

7. All reserve pits would be constructed with a minimum of one-half (1/2) the total depth of the pit below the original ground surface on the lowest point within the pit.

8. All reserve pits would be designed with a minimum of 2 feet of freeboard.

9. The discharge of all water (storm water, produced water, etc.) would be done in conformance with applicable WDEQ, BLM and WOGCC rules and regulations.

10. An isotopic analysis will be conducted on a water sample to be taken from one CBNG well within the Scotty Lake Unit before production begins from Phase I of the SLPP.

2.3.6 Noise

1. All motorized equipment will be muffled and maintained in accordance with the manufacturer's specifications.

2. All areas of operations (drill sites, etc.) where noise levels may exceed federal OSHA safe limits, the operator will provide and require the use of proper personal protective equipment by workers.

2.3.7 Range Management

1. Removal or disturbance of vegetation would be kept to a minimum through construction site management (e.g., by utilizing previously disturbed areas, using existing ROWs, designating limited equipment/material storage yards and staging areas, scalping, etc.).

2. The Operator would seed and stabilize disturbed areas in accordance with management direction from the Authorized Officer, BLM.

3. The Operator would monitor for noxious and invasive weed species and would apply BLM-approved weed control techniques (e.g., soil sterilants, biological controls, etc.) as necessary to control infestations with the prior approval of the Authorized Officer, BLM.

4. The Operator would fence water retention pits as deemed necessary by and in accordance with management direction received from the Authorized Officer, BLM.

2.3.8 Soils

1. Prior to commencement of construction activities, all available topsoil (up to a maximum of 12 inches) would be stripped from areas of cut, fill, and subsoil storage, and stockpiled for future reclamation operations.

2. The Operator would keep the area of disturbance to the minimum necessary for drilling and subsequent production activities, while providing for worker safety on site.

3. The Operator would restrict off-road vehicle activity by employees and contract workers.

4. The Operator would restrict project-related travel and reclamation activities during periods when soils are saturated and excessive rutting could occur.

5. Where feasible, the Operator would locate pipelines immediately adjacent to roads or other pipelines to avoid creating separate areas of disturbance.

6. The Operator would minimize construction activities in areas of steep slopes and apply special slope stabilizing structures and techniques (e.g., mulch, matting, etc.) if construction cannot be avoided in these areas.

7. The Operator would not conduct construction and/or reclamation activities using frozen or saturated soils, unless an adequate plan is submitted and approved by the BLM that demonstrates potential impacts would be mitigated.

8. Runoff and erosion control measures such as water bars, berms, and interceptor ditches would be installed as necessary.

9. All drainage crossing structures would be designed to carry at least a 10 year storm event, pursuant to guidelines contained in BLM Manual, Section 9113 (BLM 1985, 1991).

10. Upon completion of drilling operations and/or production facility installation, the Operator would restore those areas disturbed in conjunction therewith to the approximate original contours.

11. The Operator would replace topsoil or suitable growth materials over all disturbed surfaces prior to reseeding.

12. The Operator would reseed all disturbed sites as soon as practical following initial disturbance.

2.3.9 Transportation

1. Existing roads and trails would be utilized to the greatest extent possible and upgraded as necessary to comply with BLM road construction specifications.

2. All roads not required for routine operation and maintenance of producing wells or ancillary facilities would be reclaimed as directed by the BLM. These roads would be permanently blocked, recontoured, reclaimed, and revegetated by the Operator, as would disturbed areas associated with permanently plugged and abandoned wells.

3. The Operator would comply with existing federal, state, and county requirements and restrictions to protect road networks and the traveling public.

4. Special arrangements would be made with the WDOT to transport oversize loads to the project area. Otherwise, load limits would be observed at all times to prevent damage to existing road surfaces.

5. All development activities along approved ROWs would be restricted to areas authorized in the approved ROW.

6. The Operator would be responsible for maintenance of roads in the project area and for closure of roads following production activities.

7. Where proposed roads would follow existing roads, those portions of existing roads not included in the new ROW would be reclaimed and revegetated by the Operator.

2.3.10 Wildlife

1. Reserve, workover, and production pits potentially hazardous to wildlife would be adequately protected (e.g., fencing, netting) to prohibit wildlife access as directed by the BLM, to ensure protection of migratory birds and other wildlife.

2. USFWS and WGFD consultation and coordination would be conducted for all mitigation activities relating to raptors, and T&E species and their habitats and all permits required for movement, removal, and/or establishment of raptor nests would be obtained.

2.4 NO ACTION ALTERNATIVE

The *National Environmental Policy Act* of 1969 (NEPA) requires that the "No Action" alternative be considered in all environmental documents. Under the No Action Alternative, the BLM would deny further CBNG exploration activities on federal lands within the SLPA as currently proposed by the Operator, while allowing other land and resource uses to continue without the impacts which would be associated with the pilot project proposal. Denial of this specific pilot proposal is not, however, a denial of all future CBNG exploration and development in the area. Under the No Action Alternative, development of lands in the Scotty Lake CBNG Exploratory Unit and adjoining areas could occur at levels similar to those which have occurred on the area in the past and could occur as authorized by existing management directives contained in the Great Divide and Lander RMP's, which includes the requirement for site-specific NEPA analysis on all proposals.

The decision to select the No Action Alternative for additional exploration within the SLPA is available to the BLM through denial of individual APD's; however, the right to drill and develop somewhere within the leasehold cannot be denied by the Secretary of the Interior. Consequently, the BLM's authority to implement the No Action Alternative is somewhat limited. This limitation is based upon the fact that valid leases have been issued which specifically grant the lessee (or his designated operator) the *"right to drill for, ...extract, remove and dispose of all oil and gas deposits"* in the leased lands subject to the terms and conditions of the respective leases. Because the Secretary of the Interior has the authority and responsibility to protect the environment within federal oil and gas leases, restrictions can be imposed on the lease terms (see *Cooper Valley Machinery Works, In*c. vs. *Andrus*, 474 F. Supp. 189, 191; D.D.C. 1973; 653 F. 2nd 595; D.D.C. 1981; *Natural Resources Defense Council vs. Berland*, 458 F. Supp. 925, 937; D.D.C. 1978), but the secretary can not deny development of the lease.

The Tenth Circuit Court of Appeals in *Sierra Club vs. Peterson* (717 F. 2nd 1409, 1983) found that "*on land leased without a No Surface Occupancy stipulation, the Department cannot deny the permit to drill...once the land is leased the Department no longer has the authority to preclude surface disturbing activity even if the environmental impact of such activity is significant. The Department can only impose mitigation measures upon a lessee who pursues surface disturbing exploration and/or drilling activities*". The court goes on to say "*...notwithstanding the assurance that a later site-specific environmental analysis will be made, in issuing these leases the Department has made an irrevocable commitment to allow some surface disturbing activities, including drilling and road building*".
This was clarified somewhat in Instruction Memorandum 92-67 issued by the Director, Bureau of Land Management on December 3, 1992 which states that *"...Because all oil and gas activities are subject to FLPMA, mitigation required to protect public lands from unnecessary and undue degradation is consistent with the lease rights granted. The caveat, however, is that...unnecessary and undue degradation implies that there is also necessary and due degradation"*. As a matter of policy, any mitigation measures *"...which would render a proposed operation uneconomic or technically unfeasible is not considered to be consistent with a lessee's rights and cannot be required absent a lease stipulation, unless it is determined that such mitigation is required to prevent unnecessary and undue degradation of public lands or resources..."*. To deny all activity would thus constitute a "taking" of the

Operators right to conduct exploration activities on the subject federal leases. As the court held in *Union Oil Company of California vs. Morton, "Congress itself can order leases forfeited, subject to payment of compensations. But without Congressional authorization, the Secretary of the executive branch in general has no intrinsic power of condemnation"*.

Based upon the above, selection of the No Action Alternative would deny the proposal as submitted, but would allow BLM to consider additional exploration and development of the federal mineral estate on a case by case basis through individual APD's and site specific environmental analysis. Off-lease access to drill sites and/or the transportation of natural gas products would also be considered on a case by case basis by BLM.

Many leases in the SLPA contain various stipulations addressing surface disturbance, steep slopes, wildlife, and other matters of concern. These stipulations would allow the BLM to preclude development in certain areas (e.g., where slopes exceed 25%) or at certain times of the year (e.g., to protect big game crucial winter habitat) if operations cannot be acceptably mitigated. However, there is no stipulation, such as a NSO, that would allow the BLM to preclude drilling operations everywhere on a lease at all times of the year. If any one of the stipulations cannot be acceptably implemented and impacts mitigated, then an exception would not be granted. A decision, therefore, of No Action, as authorized by the leases, would only be considered, given one of the following conditions:

- If there were no acceptable means of mitigating significant adverse impacts to stipulated surface resource values, then this would trigger denial of the APD and require consideration and analysis of another alternative(s). Effectively, exception(s) to one or more of the lease stipulations would not be approved.

- If the USFWS concluded that the Proposed Action and alternatives would likely jeopardize the continued existence of threatened or protected plant and animal species, then the APD and lease development may be denied in whole or in part.

This EA will help to determine whether the proposed project meets any of these conditions.

2.5 ALTERNATIVES CONSIDERED BUT NOT ANALYZED IN DETAIL

The BLM requires the development of alternatives when there are unresolved conflicts involving alternative uses of available resources. Based upon scoping comments received for the Scotty Lake Coalbed Natural Gas Pilot Project, two questions were raised regarding both the disposal of water produced from wells proposed in conjunction with the SLPP, as well as the issue of directional drilling to minimize surface impacts within the overall analysis area. These two alternatives will be discussed separately below.

2.5.1 Re-Injection of Produced Water

As indicated in Section 2.2.9, the operator has previously obtained approval from the WDEQ for the surface discharge of water produced from CBNG wells in the SLPA to Red Creek and ephemeral tributaries thereof. This NPDES permit presently allows for the discharge of up to 0.81 MGWPD so long as the water quality standards as set forth in the approved permit are maintained. Furthermore, information contained in Chapter 3.0 (Affected Environment) will disclose that the Great Divide Basin is a closed basin with no outside drainage; consequently, water produced in conjunction with the SLPP and subsequently discharged to the surface will not flow outside of said basin. Considering that the water being produced from the Fort Union Formation is of relatively good quality (see Appendix D), discharge of this water to the surface or containment in water retention pits represents a beneficial use to both livestock and wildlife within the overall analysis area as surface water sources within the area are limited at best.

Furthermore, as the project name implies, this is solely a pilot project designed to determine the economic feasibility of additional exploration and development of the CBNG resource within the Scotty Lake CBNG Exploratory Unit. At the present time, it is unknown if there is a sub-surface geologic formation below the Fort Union Formation that would be suitable for the disposal of water produced in conjunction with the SLPP. In the event that the pilot project proves to be successful, additional environmental analyses would be required before any additional activities would be allowed within the Scotty Lake CBNG Exploratory Unit. Geological investigations to determine the feasibility of re-injection may be implemented at that time as appropriate.

2.5.2 Directional Drilling

The proposed action includes the drilling of up to 18 exploratory wells within the SLPA on a 160-acre spacing pattern in order to evaluate the potential productivity of coals within the Fort Union Formation for commercial natural gas production. As indicated in Sections 1.1 and 2.1, these wells would be drilled to depths of up to 5,000 feet. Comments received in conjunction with the public scoping process have suggested that directional drilling operations could be utilized in conjunction with the proposed SLPP in order to reduce the environmental impacts of the project by reducing surface disturbing activities associated with well pad, access road, and pipeline construction. Directional drilling techniques are typically utilized to gain access to portions of an oil/gas lease that are not directly below the surface well location and where surface locations are expensive or prohibitive for a variety of reasons. Directional drilling techniques have been used extensively and successively, particularly in the development of off-shore oil/gas leases where reservoirs are typically extensive and the cost of installing submersible or semi-submersible drilling platforms represents a substantial investment. However, even in offshore exploration activities, the initial well is typically drilled vertically and directional drilling activities are not employed until a discovery has been made and development of the reservoir ensues.

The purpose of any pilot project, such as the on currently proposed by Hudson Group, LLC, is to gather the data necessary to determine the economic feasibility of a potentially larger exploration and development program. At this particular juncture, the operator has not gathered a sufficient amount of data to adequately assess the commercial feasibility of CBNG production from the Scotty Lake coal member of the Fort Union Formation. The SLPP is being proposed to collect additional data on the physical characteristics of the Scotty Lake coals including reservoir characteristics, coal thicknesses, gas

content, gas chemistry, recovery efficiency, coal permeability, and water quantities. This data would then be combined with economic factors such as drilling, completion and evaluation (production) costs to determine if additional exploration and/or development is warranted. This data must be collected before a reasonable assessment of commercial feasibility may be properly evaluated. To date, directional drilling methods have not been successful in low-pressure, shallow CBNG wells (such as the Scotty Lake coals) and particularly so in wells where some form of rod-pumping is required in conjunction with the depressurization of said coals. Furthermore, topography and/or other physical resource concerns (such as steep or unstable slopes, critical habitats, or other sensitive resources), which might suggest the need for directional drilling operations in order to fully evaluate the project, are not present in the SLPA. Due to these factors, mandating the use of directional drilling operations in conjunction with the SLPP was found to be unreasonable and will not be further evaluated herein.