2.0
DESCRIPTION OF ALTERNATIVES INCLUDING THE PROPOSED ACTION

2.1 INTRODUCTION

This section presents detailed descriptions of the Proposed Action and other alternatives, including the No Action alternative, for RGC's Price CBM Project EIS. In addition to the Proposed Action, seven other alternatives have been developed that describe varying degrees of development:

Alternative A -	field development, 80-acre well spacing
Alternative B1 -	critical areas avoidance, 160-acre well spacing
Alternative B2 -	critical areas avoidance, 80-acre well spacing
Alternative C1 -	security areas protection, 160-acre well spacing (BLM preferred alternative)
Alternative C2 -	security areas protection, 80-acre well spacing
Alternative D -	big game minimum disturbance corridors, 160-acre spacing
No Action Alternative -	development on state and private land, 160-acre spacing

Table 2.8-1, in Section 2.8, provides a summary comparison of the significant project features for the Proposed Action and each alternative.

The Proposed Action would entail ultimate development of (1) approximately 601 new wells, based on a 160-acre well spacing scenario, (2) associated transportation corridors (roads, pipelines, and utilities), and (3) ancillary facilities (compressor stations, injection wells, and storage/evaporation ponds) on leased federal, state, and private lands. Alternative A would entail development of 1,103 new wells, based on a 80-acre well spacing scenario, and associated facilities on leased federal, state, and private lands. Alternative B would restrict development of wells and transportation systems and surface facilities on federal lands (both 160-acre and 80-acre well spacing scenarios) to lands outside of critical deer and elk winter range. Alternative C would restrict development of wells and transportation systems and surface facilities on federal and UDWR lands (both 160-acre and 80-acre well spacing scenarios) to areas outside of those mapped as Security Areas Protection. Alternative D would restrict development of wells and transportation systems and surface facilities in the Gordon Creek Wildlife Management Area, and minimize activities within designated big game corridors. Alternative D would be based on a 160-acre well spacing scenario. The No Action alternative would limit additional well development to state and private lands (with appropriate state and local approvals) with grants of ROW across federal lands for access where necessary.

2.2 PROPOSED ACTION - FIELD DEVELOPMENT, 160-ACRE WELL SPACING

This section describes the Proposed Action, and features common to all alternatives. The Proposed Action and alternatives differ primarily in numbers of facilities. The discussion of permitting, methods of construction, operation procedures, and environmental protection measures applies to all alternatives. Differences between the Proposed Action and alternatives are presented in Sections 2.3 to 2.7.

RGC proposes to locate, drill, complete, and produce 601 CBM wells over 10 years or more in an approximately 294-square mile Project Area in Carbon and Emery counties, Utah (Plate 2). A maximum of four CBM gas wells per square mile (160-acre spacing) would be developed on leased acreage in accordance with procedures and guidelines of the Utah Division of Oil, Gas & Mining (UDOGM) and the BLM (Sections 2.2.1.1 and 2.2.5.3). The Proposed Action also includes the construction and operation of access roads, gas and water collection pipelines, high-pressure gathering pipelines, and electrical utilities within a transportation corridor system accessing all wells. Approximately 350 miles of transportation corridors would be constructed and operated. Total width of disturbance for a corridor would vary with type or class of road (width requirements per BLM requirements. Refer to the tables in Appendix 2A for a detailed breakdown of sources and extent of proposed disturbance. Additional ancillary facilities to be constructed and operated include 5 new compressor stations, 7 injection wells for the disposal of produced water, and 7 storage/ evaporation ponds (Table 2.2-1). The number and/or miles and associated acres of disturbance for the wells, transportation corridor, and ancillary facilities as distributed over federal, state-UDWR and Utah School and Institutional Trust Lands Administration (SITLA), and private lands are presented in Table 2.2-1. Disturbance areas for split estate lands (non-federal surface ownership with federal mineral ownership) are shown in Table 2.2-2.

Disturbance acreages shown in Table 2.2-1 identify both initial short-term disturbance and long-term disturbance. Short-term disturbance (one to three years) would include temporary construction disturbance. Long-term disturbance would include life-of-project facility disturbance.

Reclamation would beginning as soon as is appropriate after construction, in areas of short-term disturbance to return these areas to productive use, primarily livestock grazing and wildlife habitat. Construction work areas within the ROWs for both pipelines and electrical distribution lines comprise most of the disturbed areas that would be reclaimed.

RGC proposes to develop the 601 wells over approximately 10 or more years at a rate of up to 100 wells per year. A proposed field development scenario for the years 1996 to 2006 is presented in Plate 3. Project life is anticipated to be 30 or more years (10 or more years to develop all wells and 20 year life of a well).

A representative schedule of construction and operation disturbance is presented in Table 2.2-3, which shows how the construction, operation, and reclamation effects to the land surface could be distributed over the 30-year life of the project. As shown in Table 2.2-3, the total area disturbed at any one time would be substantially less than the total area of construction (short-term) disturbance presented in Table 2.2-1, and

would be equal to the operational facilities constructed up to that point plus the construction disturbance resulting from that year's activities. About 40 percent of the construction disturbance would be revegetated at the end of each construction year, and operational facilities would be reclaimed over an estimated 10-year period at the end of the project. A similar schedule of activities would occur with the other alternatives.

As of the end of 1995, RGC has developed 98 wells (89 producing wells and 8 coreholes [test wells] and one injection well), 58 miles of transportation access corridors, a single compressor facility, a single injection well, and a single evaporation pond on mostly state and private lands within the Drunkards Wash Unit within the Project Area. The Drunkards Wash Unit is a federal oil and gas administrative designation allowing multiple leases to be managed as one unit by an operator. For purpose of analysis, it is assumed that the coreholes would become producing wells, and they are counted as part of the existing environment. RGC initiated activity in the Unit in 1991 with the drilling of a single well, continuing with 12 new wells in 1992, 20 wells in 1993, 40 wells in 1994, and 25 wells in 1995. The number and/or miles and associated acres of disturbance for the existing wells, transportation corridor, and ancillary facilities as distributed over federal, state, and private lands are presented in Table 2.2-4. Approximately 7 acres of federal land have been disturbed as part of a well location and approved Grants of ROW previously provided by the BLM for access across federal land.

Specifics on the development of RGC's proposed field development project are discussed by phase of project development. The four phases of the project are:

1. Preconstruction planning and siting
2. Construction and drilling
3. Production
4. Reclamation and abandonment

The four project phases are described in Sections 2.2.1 through 2.2.4.

Raptor Restricted Wells and Winter Closure Areas

Two environmental protection measures to be implemented by BLM as part of the Proposed Action and other alternatives may have important effects on the project and on public use of the Project Area. These two measures are (1) restriction of construction on BLM lands within 0.5 miles of raptor nests known to have been occupied within the previous three years, and (2) closure of select roads during winter months (December 1 to April 1) to the general public to reduce disturbance of big game during the winter period.

Within the 0.5-mile buffer area surrounding a raptor nest active within the past three years, construction of new wells would be disallowed unless a variance were granted by the authorizing BLM officer. Proposed wells and associated transportation corridor segments on federal lands that are located within a 0.5-mile radius of raptor nests occupied during the period of 1993 to 1995 are identified in Plate 2 for the Proposed Action and in the plates for the alternatives. Numbers of affected wells and miles of affected transportation corridor are presented in Table 2.2-5 for the Proposed Action and alternatives.

Motorized vehicle access would be managed in portions of the big game winter range to reduce disturbance to wintering big game. Locked gates would be used to limit access to these areas to RGC and contractor personnel, land owners, and agency personnel. Motorized

vehicle access would be limited to necessary operational and maintenance activities for the production wells and compressor stations, to travel to private in-holdings or livestock allotments, and to agency activities. Proposed wells and transportation corridor segments located within the winter closure areas are identified in Plate 2 for the Proposed Action and in the figures for the alternatives. The following locations for winter access gates are listed by section, township, and range and are also presented in Plate 2 and the plates for each alternative.

Locations of Proposed Gates for Winter Closure of Big Game Critical Winter Range

Sec. 33, T16S, R8E	Sec. 15, T16S, R8E
Sec. 16, T15S, R9E	Sec. 14, T15S, R9E
Sec. 18, T15S, R9E	Sec. 31, T14S, R8E
Sec. 24, T14S, R8E	Sec. 18, T14S, R9E
Sec. 9, T14S, R9E	Sec. 3, T14S, R9E
Sec. 4, T14S, R9E	Sec. 31 (n), T13S, R9E
Sec. 31 (s), T13S, R9E	Sec. 36,(s) T13S, R8E
Sec. 36,(n) T13S, R8E	Sec. 31 (3rd), T12S, R9E
Sec. 35 (n), T13S, R8E	Sec. 35 (s), T13S, R8E
Sec. 27, T13S, R8E	

The wells, road segments and facilities affected by winter closure are also shown on Plate 2 and are summarized quantitatively in Table 2.2-6.

2.2.1 Preconstruction Planning and Siting

RGC would follow the procedure outlined below to gain approval for the Proposed Action on federal public lands within the EIS Project Area. Development activities on federal lands would be administered by the BLM. Development activities on private/fee and State of Utah lands would be administered by the UDOGM. UDOGM permitting requirements and procedures would be applied as well as the sequential federal permitting process and procedures defined in the following section.

2.2.1.1 Federal Permitting Process

A federal oil and gas lease issued by BLM, under the authority of the Mineral Leasing Act of 1920, grants the lessee the exclusive right to explore for and develop oil and gas resources on that lease, subject to the terms and conditions of the lease. Before exercising those rights and drilling a well, the lessee or lease operator must obtain approval from BLM. Details on this permitting process are identified in 43 CFR 3162 and Onshore Oil and Gas Order 1.

The operator is required to submit an APD to the BLM. A complete APD consists of a surface use plan, a drilling plan, evidence of bond coverage and other information that may be required by applicable regulations, Orders or Notices. A Surface Use Plan of Operations describes the surface uses, access, water supply, well site layout, production facilities, waste disposal, and restoration associated with the proposal. The Drilling Plan describes the technical drilling aspects of the proposal, including subsurface resource protection, public safety and royalty accountability. On split estate leases (federal minerals/non-federal surface ownership) the operator is responsible for making a good faith effort to reach an agreement with the landowner. In situations where RGC and the landowner cannot reach a satisfactory agreement, RGC can proceed to develop its lease right under UDOGM and any other applicable regulations.

The process of obtaining approval to drill is begun by filing a Notice of Staking (NOS) or APD with the BLM. The choice is the operator's, but eventually, a complete and acceptable APD must be filed. By filing a NOS, the operator triggers an onsite field inspection before filing an APD and is furnished appropriate surface use and reclamation requirements for incorporation into the APD. This may result in a more "complete" APD which can be approved in less time. If the APD option is selected, the onsite inspection is completed after filing of the application.

The purpose of the onsite inspection is to identify specific problems and potential environmental impacts associated with the proposal and to determine methods to mitigate these impacts. The APDs submitted by the operator should be consistent with the information provided in this EIS. Mitigation and approval conditions for individual APDs would be derived from protection measures developed in this EIS and would be consistent with lease rights.

After drilling, the BLM has approval authority for a variety of other related activities. Routine well operations do not require approval, but any changes to an approved APD, certain subsequent well operations, and all subsequent activities with new surface disturbance require prior approval. Complete details of subsequent well operations are contained in 43 CFR 3162.3-2. Disposal of produced water from Federal leases requires prior approval as outlined in Onshore Oil and Gas Order 7. BLM also approves well plugging and abandonment of wells, hydrogen sulfide protection measures, gas venting and certain production handling measures.

Access roads and pipelines on BLM managed lands outside a lease or unit require a ROW. A NOS or APD is acceptable as a ROW application for those off-lease facilities if the application details the entire proposal.

2.2.2 Construction and Drilling Phase

The following is a description of proposed construction techniques to be implemented by RGC as part of the second phase of development. The techniques and procedures outlined would be applicable to all wellpad, well drilling and development, access road, pipeline, electrical transmission line, and construction and development activities, associated with the Proposed Action and all alternatives.

Substantial quantities of water and sand/ gravel would be required to support the CBM well field development. Specific sources, needs, and estimated quantities are summarized by activity and alternative below.

Water

Fresh water needed for construction and operation would be purchased or leased through agreements with the PRWID, NELCO Contractors and other individual owners in the areas. RGC has installed a buried pipeline from the Carbon County Fairgrounds to the existing development that carries fresh water from PRWID. Water is also withdrawn directly from the Carbon Canal (Jensen 1996). All water being used by the project is backed by Scofield Reservoir.

RGC has filed for water rights on water produced from 84 existing production wells. RGC intends to file a Change in Nature of Use Application with the Division of Water Rights to include storage and evaporation from the evaporation ponds. RGC intends to file for similar consumptive use water rights for all proposed wells in accordance with the requirements of the Division of Water Rights.

RGC intends to limit fresh water consumption to road and pad construction, well drilling and completion; and post-construction magnesium chloride application. RGC intends to use magnesium chloride for dust suppression on all constructed roads. The roads must be pre-watered prior to applying magnesium chloride to promote maximum penetration and extend the life of the treatment. RGC estimates water needs to be 800 barrels per road mile (0.1 ac-ft/mi). The reapplication rate of magnesium chloride is not yet known. For roads with heavy traffic volumes, an annual application may be necessary to control dust.

Based on 1995 water use by RGC, the following is the estimated water consumption for the Proposed Action:

- Road and well pad construction - 0.36 ac-ft per mile of road
- Production well drilling and completion - 0.59 ac-ft per well
- Injection well drilling and completion - 1.26 ac-ft per well
- Compressor station construction - 0.24 ac-ft per site
- Evaporation pond construction - 0.14 ac-ft per site

Based on these water requirements, the total estimated fresh water consumption for the Proposed Action is 494 ac-ft. Some additional water may be needed for road maintenance such as re-grading. However, RGC intends to plan this activity to maximize use of storm water. No water was used for road maintenance in 1995 (Jensen 1996). Table 2.2-7 shows the estimated water demands by alternative.

Sand and Gravel

Sand and gravel would be used for constructing well pads, compressor stations and roads. The material would be obtained at market prices from existing, permitted gravel sites on private land. There are adequate existing sand and gravel supplies in the area to support the project and other users (Branson 1996). The estimated sand and gravel application rates for the different type of facilities is provided in Table 2.2-8. The rates are based on a depth of 4 inches of gravel for all facilities. All road travel ways would be covered with sand and gravel. An estimated half of the area of the well pads and compressor sites would be surfaced with gravel. Construction of each evaporation pond would require sand/gravel surfacing of approximately 0.3 acre of access road around each pond.

Based on these gravel requirements, the Proposed Action would require an estimated total of 641,046 yd^3 of gravel.

Labor Force and Traffic

Estimated employment requirements for CBM field development, operation, and reclamation are provided in Table 2.2-9, including type of work, timing requirements, number of personnel per crew, and number of crews to be active at the same time. These are identified for each of the facilities described in the remaining parts of Sections 2.2.2, 2.2.3, and 2.2.4.

Project-related vehicular traffic is presented in Appendix 2B, by facility/activity. A summary of traffic and comparison by alternatives is presented in Section 4.10.

2.2.2.1 Access Road Construction

Development of RGC's CBM field would require the construction of additional roads within transportation corridors to access wellsites and ancillary facilities (i.e., compressor stations, injection wells, evaporation ponds), and to facilitate construction of parallel pipelines for gas and produced water on one side of the access road and electrical utility transmission lines on the opposite side of the road. The adjacent and parallel linear siting of access roads, gas and water pipelines, and electrical cables form a transportation corridor; a network of transportation corridors connect wells, compressor facilities, and produced water disposal facilities.

Under the Proposed Action, 350 miles of transportation corridor would be constructed resulting in approximately 2,916 acres of initial disturbance (approximately 8 acres per mile of corridor). With the reclamation of disturbed areas above the pipelines and electrical cables, long-term disturbance associated with maintaining the access roads would total 1,402 acres (approximately 4 acres per mile of corridor).

An expanded road system consisting of three classes of roads would be constructed and maintained for the life of the field (Plate 2).

Access to the Project Area would come from the following main improved federal, state, county, and BLM roads (Plate 2):

I. Federal Highways - U.S. Routes 6 & 191

II. State of Utah Highways - State Routes 10, 139 (Gordon Creek Road), 122, and 155

III. Carbon County Roads

a) Wattis Road (60)

b) Pinnacle Creek Road (6571)

c) 1500 East Road

d) Miller Creek Road (6549)

e) 5600 S. Ridge Road (6569)

f) Stark Farm Road (6588)

g) Pleasant Creek Road (6584)

IV. Emery County Roads

a) Hiawatha Road (301)

b) North Elmo Highway (101)

c) 105 Road

V. BLM Roads

a) Haley Canyon Road (6572)

b) North Spring Canyon (6515)

Additional access would come from the extension of RGC's existing road network already in place on state and private lands (Plates 1 and 2).

The three classes of road to be constructed in addition to the road system already in-place (state, county, BLM, and RGC) include the following. Both existing and proposed roads for the Proposed Action are identified on Plate 2.

1. Collector Roads - defined as all existing or planned roads that are necessary for support of existing facilities. This type of road normally provides access to larger blocks of land and connects with, or is an extension of, an existing public road system. Collector roads receive a high volume of traffic and usually require application of the highest road construction and maintenance standards used by the BLM. The design speed is 25 miles per hour (mph) and the minimum travel way width is 20 feet (a minimum of 20 feet to a maximum of 30 feet; a 24-foot travel way width is used for analyses purposes; actual width would be determined on a site-specific basis in coordination with the BLM, state, or private landowners). The total construction width of the transportation corridor, including the road and adjacent pipeline and electrical lines, would be 93 feet (Figure 2.2-1).

2. Local Roads - defined as those existing or proposed roads that would serve the development of a depletable natural resource or temporary facility. These lower volume roads usually provide the internal access network within an oil/gas field. The design speed is 20 mph and the travel way width is 20 feet (a minimum of 20 feet to a maximum of 24 feet). The total construction width of the transportation corridor would be 85 feet.

3. Resource Roads - defined as those existing or proposed roads that serve the development of a limited area of a depletable natural resource. These minimal volume roads usually provide the final segment of access to a wellsite. The design speed is 15 mph and the travel way width is 16 feet (a minimum of 16 feet to a maximum of 20 feet). The total construction width of the transportation corridor would be 77 feet.

Specific survey, design, construction, and mitigative standards for Collector, Local, and Resource roads are presented in Appendix 2C.

Although some of the proposed new roads potentially follow segments of existing road or tracks, for the purposes of analysis, it is assumed that new construction would be required. Access roads across public lands would be designed and constructed in

accordance with BLM Manual 9113 standards. The design and staking of all permanent roads (i.e., those collector, local, and resource roads to be used by RGC for the life of the project) to be constructed across public lands would be conducted under the direction of a licensed, professional engineer. Road construction would be monitored by a qualified professional engineer or qualified inspector, as deemed appropriate by the BLM.

Construction equipment and techniques to be employed by RGC and their contractors would be standard for the industry (crown-and-ditch method). A typical roadway cross-section with width specifications for the three classes of road is presented in Figure 2.2-1. Heavy equipment and support vehicles would be required (bulldozer, grader, track hoe, front end loader, and heavy- and light-duty trucks). Clearing of vegetation and blading of soil materials would be limited to areas of construction; bladed vegetation and topsoil materials would be windrowed for future redistribution during interim and final reclamation. All roads would be constructed with appropriate, adequate drainage and erosion control features/ structures (e.g., cut and fill slope and drainage ditch stabilization, relief and drainage culverts, water bars, wing ditches, and rip-rap).

RGC proposes to place four inches of sand and gravel on all newly constructed collector and local class roads to provide a year-round travel way surface. Sand and gravel may not be applied to resource roads accessing exploration and new development wells prior to drilling; the need for surfacing would be determined in consultation with the BLM or other landowner based on site conditions including native soil material and moisture conditions, steepness of grade, and anticipated seasonal constraints. However, sand and gravel surfacing of roads is assumed for the purpose of analysis. Sand and gravel materials for all uses would be obtained from local permitted, commercial sources. RGC would maintain all lease roads periodically or as needed. Pre-existing county roads would be maintained by the respective County.

Water purchased from local sources would be used in initial road construction and sand/gravel surfacing at rates of approximately 253 and 240 bbl per acre, respectively. Water would be used to improve workability of the soil and sand and gravel.

2.2.2.2 Wellpad Construction

A leveled area of approximately 300 by 200 feet (1.4 acres) would be graded during wellpad construction by a bulldozer after construction of a rough access road to the wellsite. Vegetation would be cleared and topsoil stockpiled within the wellpad area, in contiguous berms upslope of the wellsite for future use in reclamation. Standard cut-and-fill construction techniques and machinery (bulldozer and/or grader) would be used to stockpile soil, which would occur before leveling activities. A drilling pit (50 by 50 by 6 feet deep) would be constructed on the wellpad to receive drill cuttings.

At well locations requiring minimal grading or where soils are saline and/or alkaline, topsoil would be salvaged only in areas of the drill cutting pit and where topsoil is to be stockpiled in berms to facilitate future reclamation. Wellpad surfacing with sand/gravel would not be required unless weather or soil moisture warrants surfacing to minimize soil disturbance and promote efficient well development and maintenance operations. However, sand and gravel surfacing of approximately one-half (0.7 acres) of each 1.4-acre wellpad is assumed for the purpose of analysis (Table 2.2-8). A wellpad would require 376 yd^3 of sand and gravel. Approximately 227,000 yd^3 of sand and

gravel would be required for the proposed 601 wellpads under the Proposed Action.

2.2.2.3 Pipeline Construction

Four types of pipelines would be constructed as part of the Proposed Action:

- Gas-gathering pipelines system
- Produced water-gathering pipelines system
- High pressure gas delivery pipelines (compressor station to existing Questar pipelines)
- High pressure gas interconnect pipeline

As part of the transportation corridor system, linking the CBM wells and ancillary facilities, gas-gathering pipelines and produced water-gathering pipelines would be constructed, placed together in the same trench/ditch, and buried to and parallel with the access road (Figure 2.2-1). Construction and installation of pipelines would immediately follow construction of the access road and wellpad and coincide with well drilling. They would conduct gas and produced water from the producing wells to the compressor facilities and produced water disposal facilities, respectively. Gas and water pipelines would be constructed of polyethylene or steel pipe with outside diameters (OD) of 2 to 18 inches for gas and 2 to 18 inches for water. Most would be constructed within transportation corridors; however, 35 miles of pipeline and utility lines would be installed in 40-ft ROWs adjacent to existing roads. The gas and water pipelines would be constructed with manholes to provide access for maintenance and operational purposes. The location of the manholes would vary depending on the specific pipeline characteristics. Each manhole would be protected by an above-ground barricade that is painted yellow for safety purposes.

High-pressure gas pipelines (6 to 16 inches OD) would be constructed to connect the five new gas compressor facilities to the two existing Questar Pipeline Company gas transmission pipelines which traverse portions of the Project Area (Plate 2). These existing transmission pipelines within the Project Area consist of (1) a 20-inch OD pipeline running roughly east-west just north of Price across the northern portions of townships T14S, R10&9E and the southern portion of T13S, R8E and (2) a 12- and 6-inch OD pipeline system (adjacent and parallel) west of Price, running roughly south-north across the eastern portions of townships T16, 15, & 14S, R9E to its intersection with the east-west 20-inch OD in Section 12, T14S, R9E. New high pressure pipeline would be installed in a separate ditch either within transportation corridors (Figure 2.1-1) or in 40-ft ROWs along existing roads.

To increase delivery capacity for the proposed field development, a new 12-inch OD high pressure interconnect pipeline would be constructed and operated in parallel and adjacent to the existing south-north 12- and 6-inch pipelines. The new pipeline would begin in Section 26, T16S, R9E, and terminate at its intersection with the east-west 20-inch OD Questar line in Section 12, T14S, R9E. This new 12-inch OD pipeline would be constructed in and placed in a separate ditch within a proposed 40-foot pipeline ROW of adjacent to the Questar pipeline ROW.

The exact pipeline location would be surveyed and staked prior to construction activities. Design plans for pipeline construction on steeper slopes would be submitted to the BLM for approval as required. The pipeline corridor would be cleared of trees and heavy brush by blading the surface prior to any activities. Where feasible, trees would be avoided. Brush

and woody vegetation would be left in-place and driven-over as necessary (crushed but potentially capable of redeveloping a vegetative canopy). Soils would be left relatively undisturbed for much of the construction work area, although some compaction may occur.

Pipeline construction would occur in a planned sequence of operations along the 40-foot-wide ROW (includes approximately 15 feet of previous road or pipeline disturbance and current road disturbance). Construction would be completed using the following steps: pipe stringing, trench excavation, pipe lowering, pipe padding, and trench backfilling materials, equipment, and techniques, including quality assurance/control checks, standard for the industry. The pipeline trench would be excavated mechanically with a track excavator to a depth that allows 3.5 feet of material to be placed on top of the pipeline. Trench width would likely range from approximately 18 to 36 inches depending on the number of pipelines and the diameter of pipe placed in the trench bottom. Soil would be backfilled promptly into the trench following installation. Each gathering pipeline would be tested with fresh water and/or air pressure to locate any leaks prior to the pipeline being placed into service. After completion of hydrostatic testing, waste water would be introduced into the water collection and disposal system for final disposal (injection or evaporation). Site regrading would occur where necessary. Reclamation of the portion of the construction ROW not to be retained as part of the adjacent road (approximately 25 feet) would be initiated per landowner requirements (BLM, state, or private) so as to return this temporary, short-term disturbance area to productive use and to stabilize soils.

2.2.2.4 Electrical Distribution Line Installation

Electricity would be used during well development and to initiate and maintain production.

Based on present power demands for existing facilities, anticipated monthly electricity usage in kilowatt hours (KWH) by facility is as follows:

Production well	2,877 KWH
Injection well	166,400 KWH
Compressor facility	5,353,635 KWH
Evaporation pond	14,385 KWH

The above-noted compressor facility is all electric (7 electricity-powered compressor units). RGC proposes that future compressor units be either electricity-powered or gas-fired. For purposes of analysis, it is assumed that half of the units would be gas-fired engines.

Electricity would be routed to wellsites and ancillary facilities within the transportation corridor. Electrical power cables or lines would be installed underground adjacent to the road on the side opposite the pipeline(s) ROW (Figure 2.2-1). Power line construction would follow access road surfacing and coincide with the completion of well drilling. Electrical junction boxes would be installed as necessary by the public utility. These boxes would be painted to blend with the surrounding environment after each wellsite begins operation.

Three-phase or single-phase distribution lines would connect well locations and other facilities with the existing transmission and distribution system within the Project Area. Underground installation would follow industry standard procedures and reclamation activities would be similar to those for underground pipeline installation. Installation would occur within a 20-foot-wide disturbance ROW, of which 10 feet overlaps with the adjacent access road and the remaining 10 feet is new disturbance.

2.2.2.5 Well Drilling and Casing

Following construction of the access road and wellpad, a mobile drilling rig would be transported to the wellsite and erected on the wellpad. Additional equipment and materials needed for drilling operations would be trucked into the wellsite. An approximate layout of the wellpad during drilling activities is presented in Figure 2.2-2.

The active phase of drilling would begin by setting the four tie down anchors to guy the derrick tower and digging a rectangular pit, called a cellar, where the hole would be drilled. The cellar would provide space for the casing head spools and blow-out preventers that would be installed under the rig. Drilling operations normally include (1) keeping a sharp bit on bottom drilling as efficiently as possible, (2)

adding a new joint of pipe as the hole deepens, (3) tripping the drill string out of the hole to put on a new bit and running it back to the bottom, and (4) casing installation and cementing in the hole. Typically, an 11-inch (diameter) hole would be drilled to a depth of 300 feet; a 7 7/8-inch hole would then be drilled to a depth 250 feet below the lowest target coal seam.

Completion of well drilling operations would involve the placement and cementing of well casing. Placement of casing (casing the hole) would entail the insertion of a continuous steel pipe into the drill hole from the bottom of the hole to the surface. Casing would be set in the hole one joint at a time and would be threaded at one end with a collar located at the other end, to connect each joint. Each well would be completed with 8 5/8-inch to 9 5/8-inch surface casing to a depth of 300 feet and 5 1/2-inch to 7-inch production casing to total well depth.

The casing would be cemented into place by pumping a slurry of dry cement and water into the casing head, down through the casing string to the bottom, and then up through the spacing between the casing and the wellbore (annulus) to the surface. A plug and acid rinse is pumped to the bottom of the wellbore to remove any residual cement from the inside walls of the casing. Sufficient cement would be pumped into the annulus to fill the space where it would be allowed to harden. A cement bond log would be run on the wellbore to ensure that no voids remain in the annulus. Cementing the annulus around the casing pipe:

I. Restores the original formation isolation by posing a barrier to the vertical migration of fluids between rock formations within the borehole

II. Protects the well by preventing formation pressures from damaging the casing

III. Retards corrosion by minimizing contact between the casing and corrosive formation fluids

Final well depths are anticipated by RGC to range from approximately 1,400 to 3,800 feet. Based on UGS data (UGS 1995b), the estimated well depths may be 1,000 to 4,500 feet. All drilling operations and other wellsite activities would be conducted in compliance with applicable BLM and UDOGM rules and regulations. RGC anticipates using two to six rigs during the drilling period on federal lands and when conditions permit on state and private lands. Each drilling rig would be rated to accommodate UDOGM rules and regulations.

All wells would be completed in the Ferron Formation using vertical air drilling techniques, unless special conditions arise requiring drilling mud (such as substantial water). To date, minimal drilling with mud has been required. With air drilling, compressed air and a slight amount of surfactant would be used to remove drill cuttings from the hole and control pressure. Excess surfactant and cuttings would be blown into the drilling pit for disposal (Figure 2.2-2). Single well completions per wellpad are projected for all wells.

Trucks would be used to transport drilling components to the work site. Rig components are designed for portability and are easily loaded and unloaded and mostly self-contained on the mobile drill rig. Auxiliary equipment for the supply of electricity, compressed air, and/or water would be trucked in for drilling operations. Drill pipe, drill bits, cement, water, wire rope, and other needed supplies would be trucked into the wellpad and stored temporarily until used.

The Proposed Action would require approximately 4,600 bbls (0.59 ac-ft) of water per well for cement preparation, well

stimulation, dust control and possibly drilling (as discussed above, drilling mud may be required to handle certain downhole problems).

During drilling operations, certain waste waters would be generated, including frac fluids, and potentially, drilling fluids, in addition to the produced water. During hydraulic fracturing (discussed in Section 2.2.3.1), approximately 1,000 to 2,000 bbls (0.13 to 0.26 ac-ft) of frac fluids, consisting primarily of culinary water and produced water, would be discharged to an unlined pit constructed at the wellsite. Drilling fluids are normally not needed to drill CBM wells because formation water provides adequate pressure control. RGC has used approximately 500 bbls (0.06 ac-ft) of drilling fluid while coring approximately ten wells. After logging the well, all drilling fluid was returned to the surface. Water discharged into the pit would be allowed to evaporate. After the drilling pit is completely dry, the pit would be backfilled.

Each well is expected to be drilled in a period of one to six days; an average of four days is anticipated. As many as six drill rigs would be operating during the proposed annual drilling and construction period set between April 15 and December 15.

2.2.3 Production Phase

The following is a description of proposed production techniques for the third phase of development. The techniques and procedures outlined would be applicable to well completion and stimulation activities, and installation and operation of production facilities associated with all alternatives.

2.2.3.1 Well Completion and Stimulation

In preparation for production of CBM gas from a drilled and cased well, a well completion program would be initiated to stimulate production of gas and to determine gas and water production characteristics. A mobile completion rig similar to the drill rig is used to complete a well. The well completion process, lasting 7 to 14 days, includes perforating the well's steel casing, hydraulically fracturing the producing formation, and installing a series of valves and fittings on the wellhead (called a "Christmas tree").

Well casing perforation involves the creation of holes in the casing wall to provide a flow path into the well from the target coal interval. Holes are produced by the explosion of a shaped charge placed within the well casing at the desired depth interval. Energy produced by detonating the shaped charge is directed through the well casing wall and hardened cement. The holes through the cement and well casing allow pumped fluids to enter the formations and stimulate the inflow of CBM gas and produced water. Each well would be stimulated using a standard process known as hydraulic fracturing, which stimulates production by increasing the permeability of the producing formation. In hydraulic fracturing, approximately 3,000 bbls (126,000 gallons) of frac fluid is pumped under extremely high pressure downward through the casing or tubing

and out through the perforations in the casing. Frac fluid consists of a mixture of water, guar gel, sand, and pH and bacteria control chemicals. The pressurized fluid enters the formation and parts or fractures it.

Sandgrains or other proppants (aluminum pellets, glass beads, or similar materials) are carried in suspension by the fluid into the fractures to "prop open" the fractures in the coal. When the pressure is released at the surface, the fracturing fluid returns to the well, and the fractures partially close on the proppants, leaving channels for gas to flow through them into the well. Following a frac job, approximately 1,000 to 2,000 bbls of fluid, consisting primarily of culinary water and produced water, is returned to the surface. Installing the Christmas tree and associated tubing is the final step of the wellbore work.

Even though the produced water and gas can flow into the casing after it is perforated, a small diameter pipe, called tubing, is placed in the well to serve as a way for the produced water to be brought to the surface. The tubing is run into the well. Typically, tubing is placed below the perforated interval to allow any fluid to be pumped up the tubing to the surface. At the surface, the collection of valves (Christmas tree) sits at the top of the well head. The tubing in the well is suspended from the Christmas tree, so as the well production flows up, it enters the Christmas tree. As a result, the production from the well can be controlled by opening and closing valves on the Christmas tree.

All completion activities would be limited to daylight hours, when possible. There would be minimal venting of gas at wellsites during completion and/or well connection to flowlines. The minimal amount of venting could occur when the well is flowed to surface following hydraulic fracturing. The flowing back of a well is necessary to purge the coalbed of fluids used in the fracturing process. During the process of flowing back the well, slight amounts of CBM gas are produced. The gas and water are flowed to the drilling pit, to temporary storage tanks on location, or to the gas and water gathering pipeline systems, if operational. Any gas entering the tanks with the water is separated and vented to the atmosphere. The venting would only occur during the recovery of the water and last for a matter of days. Any gas venting would be in accordance with BLM's Notice to Lessees 4A. After the water used in the fracturing is recovered, the well would be tied into the gas and water collection system.

Flaring may be necessary following completion of wells located distant from the existing pipeline infrastructure to determine whether the wells are capable of production in sufficient quantities to justify pipeline installation. It is assumed that RGC may flare up to five wells in the northwest of the Project Area and five wells in the south. Flaring would be done in accordance with all applicable laws, rules, and regulations, including as appropriate, compliance with Utah Administration Code Rule R-649-3-20(5) and BLM Notice to Lessees-4A.

All areas not needed for production facilities would be topped with the previously stored topsoil. The drill pit would be dried and backfilled prior to topsoil placement. Seeding of these areas would take place in the fall.

2.2.3.2 Production Facilities and Operations

Gas Production, Treatment, and Collection

Installed surface production facilities would include the Christmas tree, a pumping unit (either a walking beam pumping unit or a progressive cavity pump), separation facility, gas metering facility, and connections to the gas and water collection systems (Figure 2.2-3). All would occupy less than one acre. The pumping unit would be powered by an electric motor and would be used to lift the produced fluid stream from the production zone, allowing the gas to flow by reducing the hydrostatic pressure on the coals.

The produced fluid stream contains CBM gas and water. CBM gas production is a relatively new technology, and the application of this technology to CBM gas production from the Ferron Formation was only recently initiated. Therefore, no long-term production history exists to definitively state trends in production performance in this area. However it is assumed that the CBM gas production rate for each well should increase the first few years, then gradually decline (RGC 1995). Based on a zero-time plot analysis used by RGC for predicting gas production, the estimated peak gas production for the Proposed Action is 268 million cubic feet per day (MMcf/day).

The produced stream requires separating water in a two-phase separator at the wellsite that would yield gas and produced water. Following separation the gas is filtered, metered, and introduced into the gathering system for transport to a compressor facility. Separated, produced water would be transported via the produced water gathering system to approved disposal wells and/or evaporation ponds. The remaining on-site facilities on the surface are a progressive cavity pump or reciprocating pump (walking beam unit), a vertical separator and meter house to treat and measure the gas, and a free standing electric-powered computerized monitoring, control, and telemetry panel.

Leak detection measures would include the following three activities:

1. Field Balances - Field personnel would routinely calculate balances between wells and collection/transfer points (ponds and compressor sites) to insure that volumes match within acceptable tolerances.

2. Pressure Maintenance - Significant leaks in gas or water pipelines would cause a loss of pressure detectable by the automation system at the separator dump or static pressure on the meter run. If this is detected, a well would be shut-in automatically and an alarm would be sent to the main computer. The shut-in point is determined for each well based upon individual operating conditions. Field leaks would then be pinpointed using field pressures and the situation corrected.

3. Gas Sniffers - All gas pipelines would be surveyed annually with highly sensitive gas-leak detection equipment. This equipment is capable of detecting leaks as small as that produced by a cigarette lighter.

Gas Compression

Produced CBM gas under well head pressure would move through the flowlines gathering system to a compressor facility. Gas arriving at the compressor facility would be compressed to facilitate transport and introduction of the gas into an existing transmission pipeline. RGC projects that pressures at each well head would be about 10 to 40 pounds per square inch gauge (psig). Compression of the gas at the compressor facilities would increase the pressure to approximately 700 psig. Accounting for transport pressure loss, the gas would be delivered via high-pressure pipeline to a Questar Pipeline Company gas transmission line interconnect at a pressure of approximately 690 psig.

In addition to the existing electricity-powered compressor facility operated by RGC located in the N/2 of Section 1, T15S, R9E, RGC would construct and operate five additional compressor facilities. Location, capacities, and important components of the six compression facilities are presented in Table 2.2-10 and Plate 2. All of the compressor stations (existing and proposed) would be located on lands managed by SITLA. The layout of a proposed compressor facility would be similar to that presented in Figure 2.2-4. Each compressor station would be fenced with six feet of chain link with one foot of barbed wire on top. Long-term disturbance for the construction and operation of a compressor facility for the life of the project would total approximately 5 acres, including an adjoining one-third acre electrical substation.

For the purpose of air quality analysis, it is anticipated that compressor units would have 1,700 HP engines, either gas-fired or electricity-powered. Compressor units would be installed and operated at the five additional compressor facilities. The six facilities would use a total of 65 compressor units, with individual facilities using between 6 and 17 compressor units. Assuming a rate of 5 MMcf/day/unit (operating range between 3 and 8 MMcf/day), compressor capacity would total 325 MMcf/day. This capacity would accommodate the estimated peak gas production of 268 MMcf/day for the total 698 wells operating in the Project Area (97 existing and 601 proposed wells). Gas production forecasting for the Proposed Action and each alternative was developed based on a zero-time plot analysis of actual production from the Drunkards Wash Unit.

Individual gas-fired compressor units would be equipped with clean-burn control technology. Compressor facilities and individual compressor units would be inspected daily.

Eight 250-watt, clear lamp lights would be installed to light each compressor facility. Each light would be pole or building mounted and directed downward to illuminate key areas within the facility.

Noise associated with compressor station operation is described in Sections 3.14 and 4.14.

Produced Water Disposal Facilities

Based on the production characteristics of water from the current 89 production wells in the Project Area, peak water production from the entire field of up to 698 wells would not exceed 100,140 BWPD (12.9 ac-ft/day) at any point in time or for any number of wells for the approximately 30-year life of project. The water contains roughly 6,500 - 9,000 milligrams per liter (mg/L) TDS, including roughly 3,500 mg/L of bicarbonate and 1,500 mg/L of chloride. Produced water would be introduced directly into the water flowlines gathering system (Figure 2.2-1). Produced water would be disposed by injection wells and evaporation from adjacent evaporation ponds. Disposal of produced water would be in accordance with a plan approved by the BLM as provided for in Onshore Oil and Gas Order No. 7, Disposal of Ground Water, and the Underground Injection Control (UIC) permit program administered by UDOGM.

For the purposes of analysis, it is anticipated that seven injection well facilities would be drilled, constructed, and operated in addition to the single existing injection well facility currently operating in the Project Area (SW 1/4 of Section 31, T14S, R10E), and seven produced water evaporation ponds would be constructed and operated for the life of the project in addition to the existing evaporation pond in Section 1, T15S, R9E of the Project Area (Plate 2).

Approximate proposed locations of the injection well facilities and evaporation ponds are as follows (Plate 2):

NW 1/4 of Section 16, T14S, R8E
NE 1/4 of Section 3, T14S, R9E
SE 1/4 of Section 19, T14S, R9E
SW 1/4 of Section 31, T14S, R10E (existing injection well)
W 1/2 of Section 18, T15S, R10E
SE 1/4 of Section 2, T16S, R9E
SW 1/4 of Section 28, T16S, R9E
W 1/2 of Section 1, T15S, R96 (existing evaporation pond)
SW 1/4 of Section 34, T14S, R9E

Since operation began at the existing injection well in August 1994, the well has disposed produced water in the Navajo Formation at an average rate of 6,368 BWPD for the period August, 1994 through November, 1995. Since stimulation of the well in November, 1995, the average rate of injection has been 6,559 BWPD at approximately 750 pounds per square inch (psi). The seven proposed injection wells would be completed into the Navajo, Entrada, Wingate, and Curtis formations. Based on experience with rates of injection into the Navajo Formation and the thickness, porosity, and permeability modeling conducted by RGC for all of the formations, the proposed injection wells should handle 10,000 BWPD (1.3 ac-ft/day).

The seven produced water evaporation ponds would be constructed adjacent to the proposed injection well locations. Each pond would have dimensions of approximately 400 feet by 400 feet by 9 feet deep. The surface area of a pond would be approximately four acres and the volume approximately 33 ac-ft. Each pond would employ an active spray process to enhance evaporation to an annualized daily minimum average of 5,000 BWPD (0.6 ac-ft/day). This evaporation rate is based on pond size, volumes of water sprayed, and a nozzle manufacturer's test (10 percent evaporation factor). Weather monitoring equipment would be maintained at the ponds to monitor wind direction, wind speed, solar radiation, humidity and air temperature. The ponds would not be

operated during periods of high wind speeds or during the winter months.

Each pond would be constructed with a liner and leak detection system. During normal operation, each pond would have seven feet of freeboard and contain 156,700 barrels (20 ac-ft) of water. The ponds would be managed such that there would be a minimum freeboard at all times of two feet. Each evaporation pond would have a sloped floor. A pipeline would be connected to the bottom of the pond at the deep end to facilitate removal of concentrated water and transfer of this concentrate to an injection well for disposal. The evaporation pond would be surrounded by a six-foot chain link fence with one foot of barbed wire on top. The existing evaporation pond is 500 feet by 1,000 feet in dimension (13 acres). A network of spray nozzles are installed on piping manifold floating on the surface of the pond. The manifold consists of a series of 12 runs with 125 nozzles each capable of delivering 8-12 gallons per minute. The natural evaporation process is enhanced by releasing a large number of small droplets about six feet into the air thus increasing air-water interface. This pond was used by RGC as a pilot project to assess spray technology and size requirements for the proposed new evaporation ponds.

Based on a projected injection rate of 10,000 BWPD, the seven proposed injection wells would have a capacity to dispose 70,000 BWPD (9 ac-ft/day). The existing injection well completed into the Navajo Formation would add only another 6,000 BWPD (0.8 ac-ft/day) capacity to the project for a total injection capacity of 76,000 BWPD (9.8 ac-ft/day). Operation of the 7 proposed spray-evaporation ponds would add an additional water disposal capacity of 35,000 BWPD (4.5 ac-ft/day) to the 15,000 BWPD (1.9 ac-ft/day) disposal capacity of the existing evaporation pond for a total of 50,000 BWPD (6.4 ac-ft/day).

Based on an accepted approach for forecasting water production (zero-time plot based on actual production from the Drunkards Wash Unit), production from 698 wells on a daily basis under the Proposed Action would yield approximately 100,140 BWPD (12.9 acre-feet/day). Appendix 2E contains graphs showing water production projections associated with each alternative.

The projected disposal capacity for produced water would total 126,000 BWPD (16.2 ac-ft/day), 25,860 BWPD (3.3 ac-ft/day) more than peak water production. If the capacity of the water disposal system is exceeded during field development, RGC would follow the appropriate procedures (UDOGM and Onshore Oil and Gas Order 7) to have the additional Class II injection wells approved and drilled and/or to construct additional evaporation ponds. Water production and disposal requirements would decline after the peak.

Construction and installation of an injection well facility would require activities similar to those for a production well (Tables 2.2-9 and Appendix 2D). One exception is that both drilling and casing installation would likely require an additional two days each per well due to the greater depths in which the well would be completed. The completion depth of a production well ranges between 1,000 to 4,500 feet, while the depth of a disposal well is approximately 5,500 to 7,500 feet. An access road (produced water pipeline), and electrical distribution line would be constructed as part of a transportation corridor into the injection well facility. Construction of each injection well facility would require the sand/gravel surfacing of approximately one-half (4 acres) of the 8-acre facility. Disturbance from the injection well facility would total approximately 8 acres. Installed features of the injection well facility

would include the well, electricity-powered injection pump, and six 210-barrel water storage tanks, separator, and a collection pond (Figure 2.2-5). Two 250-watt lights would be installed on poles (directed downward) to illuminate key areas.

Construction of a produced water evaporation pond would require a work crew of five approximately 20 days to excavate and line (impermeable liner) a 400 feet by 400 feet by 9 feet deep impoundment (Table 2.2-9). Again, two 250-watt lights would be installed on poles (directed downward) to illuminate key areas. A disturbance area of approximately four acres would be created by the excavation and placement of excavated soil in berms.

Maintenance and Workover Operations

Routine production operations within the Project Area would occur on a year-long basis or as ground and site conditions permit. Operations would require use and maintenance of access roads and wellpads on a periodic, as-needed basis. Summer (late spring to early fall) maintenance would typically require gravel additions and/or blading consistent with graveled road maintenance operations in the area. Winter (late fall to early spring) maintenance would include blading of snow from access roads and facilities and some summer-like maintenance activities as necessary. RGC would maintain all project-related roads except pre-existing county roads and roads taken over by landowners at abandonment. Maintenance of the various mechanical components of CBM gas production would occur at intervals recommended by manufacturers, or as needed based on telemetry and on-site visits.

A pumper would visit each producing well on average once every three days to ensure that equipment is functioning properly. These efforts would be supplemented by a central off-site computer-based automation system which would allow monitoring of operations at each well. This system would monitor various operating conditions (such as gas and water production rates, pipeline pressure, separator pressure, etc.) to determine if abnormal conditions exist. The wellsite automation equipment power source is electricity provided by underground cable laid to the well site. The wellsite operating conditions are transmitted to RGC's Price operating center office. If a problem is identified maintenance personnel could be dispatched immediately. The combined efforts of the on-site visits by pumpers and the automation system allow for operations to be monitored continuously to expeditiously remedy any potential problem.

The computerized monitoring and control equipment would receive commands and information via radio signals. Production engineers would be able to control certain well parameters from computer terminals at the RGC office in Price. The radio controlled system would allow real-time signals and solutions in response to well production problems. Control and monitoring of well production by radio telemetry would reduce regular site inspections of each well and vehicular traffic to approximately once every three days.

Full-time RGC employees located at the operations office in Price would increase from a current figure of approximately 10 individuals to about 50 after approximately 10 years and full development of RGC's CBM gas field. An increase of about five persons per year is anticipated.

Periodically, a workover on the well may be required. A workover uses a unit, similar to a completion rig, to ensure that the well is

maintained in good condition and that it is capable of delivering production from the formation as efficiently as possible. Workovers can include repairs to the wellbore equipment (casing, tubing, rods, or pump), the wellhead, or the production formation itself. These workovers may require venting pressure relief, generating brief periods of noise. These repairs occur during daylight hours only and are usually completed in one day. There may be some limited situations that require several days to finish a workover. The frequency for this type of work cannot be accurately projected since workovers vary well by well, depending on the circumstances. One workover per year per well is anticipated for purposes of the EIS analysis.

Chemical Use and Management

The Proposed Action would use a variety of chemicals including solvents, lubricants, paints, and additives. Table 2.2-11 presents a list of chemicals proposed for use during well field development based on current CBM development requirements in the Project Area. The table identifies the chemical, whether or not the substance is stored in the field or at the warehouse in Price, the amount stored if applicable, and the chemical's common application. None of the chemicals proposed for use meet the criteria for a hazardous material/substance and the quantities criteria per BLM Instruction Memorandum No. 93-344.

Solid Waste Sources and Controls

The Proposed Action would produce a variety of waste, including drilling solids, steel drums, waste oils, spent oil filters, waste parts, cleaning solvents, spent water filters, waste triethylene glycol and spent glycol filters.

Drilling solids or cuttings would be produced. The cuttings are the bits of waste rock produced by the drill bit cutting through the Mancos shale interval commencing 3 to 4 feet from surface and ending at the top of the Ferron formation (target zone). The solids would be buried in the drilling pit after the drilling fluids are evaporated.

Emptied steel and plastic drums which held materials such as caustic soda, citric acid, lubricating oil, methanol, and drilling additives would require disposal. Empty metal or plastic drums would be returned to the supplier of the product (RGC would rent drums and should thereafter be able to return such drums to suppliers for refill only).

Waste lubricating oil generated at the compressor stations and production sites would be disposed by a third party contractor. RGC is currently using Indian Oil Company in Linden, Utah, but may use other contractors in the future. Some fluids would be generated at the compressor station during pipeline cleaning operations, referred to as pigging. Such fluid would be stored in a 200-barrel aboveground tank. The tank's contents would be removed by a contractor using a vacuum truck and transported to a permitted disposal/recycling site.

Each compressor station would create an additional oil waste product through the by-pass function. This waste is a combination of about 90 percent water and 10 percent light hydrocarbon. This compressor by-pass fluid would be piped to the 200-barrel storage tanks as discussed above.

RGC has prepared and implemented a Spill Prevention, Control and Countermeasure (SPCC) Plan for containment and control of oil and chemicals stored at the compressor stations and disposal wellsites. The materials are stored with secondary containment to handle any accidental release. In accordance with the SPCC Plan, RGC personnel are trained to

conduct routine inspections of the containment areas and promptly contain and clean up any accidental spills.

Waste lubricating oil to be produced at the production sites would be minimal because electric motors are planned for development. Oil in the gearboxes would be changed about every three years, as appropriate, based on analysis of the oil.

Solid wastes generated at the compressor stations would include spent gas filters and cleaning rags, which would be handled as general trash and sent to the regional landfill. Spent oil filters from the compressor lubrication systems would be removed and disposed in an approved disposal site or facility, such as Indian Oil Company.

The gas is separated from the produced water at each wellsite. This gas is recovered from coalbeds rather than petroleum deposits, and therefore does not include entrained petroleum condensates. There is no petroleum condensate tank, and only trace emissions of volatile organic compounds (VOCs) or hazardous air pollutants (HAPs) are expected, based on a review of the produced water analysis (see Table 4.2-2).

Several waste streams would be generated from the triethylene glycol dehydration line located at the compressor stations. The dehydration systems remove entrained water from the natural gas by contacting the gas with triethylene glycol. The glycol would be regenerated through the application of heat. The water would be "boiled off" and released as steam.

As necessary, triethylene glycol would be replaced due to the excessive accumulation of contaminants. An approved contractor would remove the spent glycol and replace fresh triethylene glycol in the system. However, on occasion, RGC may remove the spent glycol and temporarily store this glycol in drums on site. As required by appropriate regulations, an approved contractor would remove and properly dispose of the spent glycol.

In addition to the spent glycol, spent sock and charcoal filters would also be used in dehydration. Sock and charcoal filters would be removed from each unit approximately once every two months and be placed in the general trash for ultimate disposal.

2.2.4 Final Reclamation and Abandonment

The Proposed Action contemplates that each well would be produced through its economic life (RGC assumes for internal planning purposes that this would be approximately 20 years). RGC would reclaim and revegetate each of its facilities in accordance with accepted procedures as outlined in Section 2.2.5.

While subject to revision in accordance with appropriate standards, current reclamation plans are as follow:

- All surface equipment would be removed and either refurbished for installation at other RGC facilities or sold.

- Dry holes, depleted producers and injection wells would be abandoned in accordance with Onshore Oil and Gas Order No. 2.

- Wellsites would be plowed and seeded with native vegetation selected in coordination with the landowner and/or

land manager of each location. BLM seed mixes are provided in Appendix 2F.

- Pipelines would be abandoned in place to avoid renewed surface disturbance.
- Subsurface power lines would be abandoned in place.
- Access roads would be reclaimed by plowing and seeding unless the landowner and/or land manager wishes to make use of any roads and accept responsibility for future road maintenance.

Reclamation plans outlined above would apply to the Proposed Action and all alternatives. In addition to these proposed measure, additional environmental protection measures proposed by RGC (committed), and required by the BLM and state agencies are presented in Section 2.2.5.

2.2.5 Environmental Protection Measures

2.2.5.1 River Gas Corporation Committed Measures

RGC proposes to implement mitigation measures, design features, and procedures throughout the Project Area to avoid or minimize adverse effects to the human and natural environment. Many of these are described under the Proposed Action, and are included by reference as environmental protection measures. In addition to those design and construction procedures and features discussed in Sections 2.2.2 to 2.2.4, and compliance with all applicable environmental laws and regulations (Table 1.5-1), RGC would implement the following additional protective measures. These environmental protection measures would be applied as standard operating procedures and used on all lands, including federal, state, and private.

1. RGC would use magnesium chloride for dust suppression on roads during project operation.
2. RGC wells would be cased and cemented from surface to bottom, to prevent water migration up the well bore.
3. RGC would have a program in place involving three techniques to detect leaks: (i) material balance, (ii) pressure maintenance through its computerized automation system (in the event of a pressure drop, the well is shut in automatically), and (iii) annual survey of pipelines with leak detection equipment. In the event of a pipeline leak, the exact location is detected by either gas detection equipment or visible

trace of water. The appropriate part of the field is then shut-in, and the pipeline is shut down and repaired as soon as possible.

4. Ground disturbance in agricultural areas with spreader-dike or contour furrow systems would be avoided, where possible. In areas where these systems are dissected by roads or well locations, affected dikes and furrows would be restored to pre-disturbance conditions.

5. RGC would site roads and well locations in coordination with BLM, UDWR, and other landowners.

6. Roads constructed by the operator which are not required for routine operation and maintenance of producing wells and ancillary facilities, and disturbed areas associated with permanently plugged and abandoned wells, would be permanently blocked, recontoured, reclaimed, and revegetated by RGC, consistent with the requirements of BLM and state landowners. For private lands, RGC would turn the road over to the private landowner or reclaim it according to the terms of any surface use agreement that may then be in effect. Roads not required by BLM, State of Utah, or landowners for open access would be gated and locked to limit access per federal, state, and/or private ownership requirements.

7. RGC would reclaim disturbed areas, and would reseed using seed mixtures identified by BLM, UDWR, or other landowners.

8. RGC would train its employees with respect to noxious weed identification, and make arrangements for weed control upon positive identification of noxious weeds at its facilities.

9. RGC would comply with the Utah Noxious Weed Act and require contractors to clean equipment before bringing it to the project vicinity so as to prevent introduction and spread of noxious weeds.

10. RGC would not allow firearms or pets to be brought into the Project Area by employees or contractors during project work.

11. RGC would not allow harassment of wildlife by employees or contractors, and would arrange for training of its employees and contractors on this issue.

12. RGC would enforce adherence to speed limits by its employees and contractors while working on the project.

13. RGC would use a remote monitoring system that would limit the number of routine maintenance visits to wells.

14. RGC would maintain a seasonal restriction on construction within 1/2 mile of active raptor nests during the active nesting period, unless circumstances indicate that

such a limitation would not be necessary or if such limitation would not be applicable under existing laws, regulations or lease rights. (This environmental protection measure is superseded on federal land by BLM 40).

15. RGC would make every effort to complete drilling before the beginning of November on big game critical winter range, to reduce the potential for disturbance to wintering big game. While RGC plans to finish drilling in these areas by October, drilling lease schedules are, to some extent, beyond their control and their obligation as lessee to diligently develop the resource may necessitate the continuance of drilling into November or December. (This environmental protection measure is superseded on federal lands by BLM 37 and Alternative D).

16. RGC would paint all facilities they install to blend in with the surrounding landscape, except where safety concerns (such as manhole barriers) or equipment operations (such as portions of the compressors) do not allow this.

17. Existing range and livestock facilities, such as fences, corrals, wells, reservoirs, water pipelines, and water troughs would not be disturbed without prior notification and approval of the landowner. Where it is necessary to gain access across a fenceline for construction or operation purposes, a cattleguard or gate would be installed and the fence braced on each side of the gateway.

18. RGC would educate work crews as to the sensitivity of cultural resources, the protection they are afforded, and their responsibilities to avoid disturbance to sites and report any discoveries during construction activities.

2.2.5.2 BLM-Required Environmental Protection Measures

BLM environmental protection measures would be required on lands with federal surface ownership, and may be required on split estate lands with federal oil and gas mineral ownership. The list of BLM-required environmental protection measures has been assembled from the following relevant BLM regulations, guidelines and other documents:

- BLM surface operating standards for oil and gas exploration and development (USDI, BLM 1989)
- Regulations governing onshore oil and gas operations (43 CFR Part 3160), including Notices to Lessees and Onshore Oil and Gas Orders
- BLM standard lease stipulations and leasing categories
- BLM Price River Resource Area Management Framework Plan (USDI, BLM 1984a)
- BLM San Rafael Resource Management Plan (USDI, BLM 1988c)
- BLM Price River Resource Area Management Framework Plan Supplement on the Designation of

Hydrocarbon Lease Categories Outside Special Tar Sands Areas (USDI, BLM 1984b)

- BLM Environmental Assessment Supplement on Cumulative Impacts on Oil and Gas Categories (USDI, BLM 1988a). This document includes a list of standard operating procedures for oil and gas operations.

- BLM road construction standards (Appendix 2C)

Environmental protection measures would be implemented for individual wells as part of the BLM's review of APDs, and attached SUPO and Drilling Program. Examples of the SUPO and Drilling Program are provided in Appendix 2D.

Standard lease terms provide for reasonable measures to minimize adverse impacts to surface resources. The BLM's surface use rights in 43 CFR Part 3101.1-2 state, "A lessee shall have the right to use so much of the leased lands as is necessary to explore for, drill for, mine, extract, remove and dispose of all the leased resource in a leasehold subject to: stipulations attached to the lease; restrictions deriving from specific nondiscretionary statutes; and such reasonable measures as may be required by the authorized officer to minimize adverse impacts to other resource values, land uses or users not addressed in the lease stipulations at the time operations are proposed. To the extent consistent with lease rights granted, such reasonable measures may include, but are not limited to, modification to siting or design of facilities, timing of operations, and specification of interim and final reclamation measures. At a minimum, measures shall be deemed consistent with lease rights granted provided that they do not: require relocation of proposed operations by more than 200 meters; require that operations be sited off the leasehold; or prohibit new surface disturbing operations for a period in excess of 60 days in any lease year."

Measures inconsistent with these terms 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. The clear evidence and convincing need for such mitigation must be documented in a site-specific EA or EIS, if necessary, on the APD.

Operations must be conducted in a manner that minimizes adverse impacts to the land, air, water, cultural, biological, and visual elements of the environment, as well as other land uses or users. Federal environmental protection laws such as the Clean Water Act, Endangered Species Act, and Historic Preservation Act, would be applied to all lands and are included in the standard lease stipulations. If threatened or endangered species, objects of historic, cultural, or scientific value, or substantial unanticipated environmental effects are encountered during construction, all work affecting the resource would stop and the land management agency would be contacted. Surface-disturbing operations that would destroy or harm these species or objects are prohibited.

The environmental protection measures listed below may be waived on a case by case basis as determined by the BLM or other surface owner.

Location of Facilities and Timing of Construction

1. Final well locations and transportation corridor alignments would be selected and designed to avoid or minimize disturbances to sensitive areas, including areas of high wildlife value or critical habitat, grazing, and/or recreational value, including wetlands and riparian areas; and areas with high erosion potential, highly saline soils, rugged topography, and/or poor reclamation potential (i.e., steep slopes, eroded lands, floodplains, unstable soils), where possible.

2. New roads would be constructed so as to avoid areas with high erosion potential. Where roads must be allowed, new roads would be graded to spread drainage instead of channeling runoff. No road grades in excess of 15 percent would be allowed on slopes greater than 15 percent. No vehicle access would be allowed across slopes in excess of 25 percent.

3. Construction would not occur on frozen or saturated soils, or when watershed damage is likely, unless an adequate plan is submitted to the BLM that demonstrates potential impacts would be mitigated. BLM may limit cross-country travel or construction activity at times when soils are dry or frozen or have snow cover. BLM would determine what is "wet," "muddy," or "frozen" based on weather and field conditions at the time. The limitation does not apply to maintenance and operation of producing wells.

4. Occupancy or other surface disturbance would not be allowed within 330 feet of the centerline or within the 100-year recurrence interval floodplain of perennial streams, except where authorized in writing by the BLM (e.g., road crossings).

5. Occupancy or other surface disturbance would not be allowed within 660 feet of springs, whether flowing or not. No vibroseis, drilling or blasting associated with seismic exploration would be allowed within 0.25 mile of any spring or water well.

6. During project construction, surface disturbance and vehicle travel would be limited to the approved location and access routes. Any additional area needed must be approved by BLM prior to use.

7. Vegetation removal necessitated by a construction project would be confined to the limits of actual construction. Removed vegetation will be stockpiled for use in reclamation or removed from the construction site at the direction of the BLM.

Reclamation

A reclamation plan would be a part of the surface use plan of operations. The following are generally components of the reclamation plan:

1. All pits must be reclaimed to a natural condition similar to the rest of the reclaimed area, and must be restored to a safe and stable condition.

2. Reclamation would start immediately upon completion of construction, unless prevented by weather conditions. Disturbed areas would be restored to approximately the original contour.

3. Disturbed areas would be revegetated after the site has been satisfactorily prepared. Site preparation may include ripping, contour furrowing, terracing, reduction of steep cut and fill slopes, waterbarring, or other procedures.

4. Revegetation seed mixes have been established by BLM for the Project Area, and are provided in Appendix 2F. They are based on erosion control, forage production, elevation, soils, vegetation community composition, and precipitation requirements. Different seed mixes have been developed for temporary seedlings, and for final reclamation of sites in salt desert, sagebrush/grass, pinyon-juniper, mountain brush, and riparian habitats. Reclamation in riparian habitat would also involve sedge and rush root plugs, willow cuttings, and cottonwood bare root stock plantings. All seed mixes would be free of noxious weeds.

5. Seeding would be done by drilling on the contour whenever practical, or by other approved method. Where broadcast seeding is used, seeding would take place after the soil surface is recontoured and scarified. A harrow or similar implement would be dragged over the area to assure seed cover.

6. On all cut slopes, the seeding must extend from the bottom of the ditch to the top of the cut slope. On embankment slopes, the seeding must extend from the roadway shoulder to the toe of the slope. Seeding would also be done on all borrow pit areas and on all sidecast slopes in areas of full bench construction.

7. Seeding and/or planting would be repeated until satisfactory revegetation is accomplished, as determined by BLM. Mulching, fertilizing, fencing or other practices may be required.

8. Seeding would be done from October 1 to November 15, and from February 1 to March 31.

9. Sufficient topsoil to facilitate revegetation would be segregated from subsoils during all construction operations and would be returned to the surface upon completion of operations, where feasible. Topsoil stockpiles would

be revegetated or otherwise protected to prevent erosion and maintain some soil microflora and microfauna. Stockpiled topsoil would be spread evenly over the recontoured area. All disturbed areas and vehicle tracks from overland access would be ripped 4 to 12 inches deep within the contour.

10. Bonds are required for oil and gas operations on federal leases for protection of the environment, including surface reclamation. Revegetation must be successfully established for release of the bond.

11. Reclamation and abandonment of pipelines and flowlines may require replacing fill in the original cuts, reducing and grading cut and fill slopes to conform to the adjacent terrain, replacement of surface soil material, waterbarring, and revegetating in accordance with a reclamation plan.

12. Wellsite reclamation would include recontouring to re-establish natural contours where desirable and practical.

13. After well plugging and abandonment, roads constructed by the operator not required for the BLM transportation system would be closed and obliterated. Reclamation may include ripping, scarifying, waterbarring, and barricading. Stockpiled soil, debris and fill materials would be replaced on the roadbed to conform to the approved reclamation plan.

14. Water bars would be constructed on road grades or slopes, if required by BLM. Spacing of waterbreaks is dependent on slope and soil type. For most soil types, the following spacings would be used:

Slope	Spacing
2%	200 feet
2-4%	100 feet
4-5%	75 feet
>5%	50 feet

1. Revegetation on big game critical winter range would include hand-planting of seedling browse plants and use of seedling protectors to provide protection against browsing in the first two years after planting.

2. Temporary erosion control measures such as mulch, jute netting, or other appropriate methods would be used on unstable soils, steep slopes, and wetland areas to prevent erosion and sedimentation until vegetation becomes established.

General Requirements

1. Precautions must be taken at all times to prevent wildfire. Operators would be held responsible for suppression costs for any fires on public lands caused by operator's negligence. No burning of debris would be allowed without specific authorization from BLM.

2. Any campfires must be kept to a minimum size and utilize only downed dead wood.

3. Road construction must meet BLM class III standards (Appendix 2C).

4. With BLM approval, existing roads or trails may be improved (bladed) if impassable by vehicles or equipment. No widening or realignment would be allowed unless approved by BLM.

5. New trails may be constructed only when vehicle and equipment passage is impossible, and only with the concurrence of the BLM. Any pushed trees are to be readily retrievable without additional disturbance, if needed for reclamation.

6. Reserve pits for oil and gas drilling operations may be required to be lined with commercial-grade bentonite or plastic liners sufficient to prevent seepage. At least half of the capacity would be in a cut.

7. Prior to the use of insecticides, herbicides, fungicides, rodenticides, and other similar substances, an operator must obtain from BLM approval of a written plan. The plan must describe the type and quantity of material to be used, the pest to be controlled, the method of application, the location for storage and disposal of containers, and other information that BLM may require. A pesticide may be used only in accordance with its registered uses and within other agency limitations. Pesticides must not be permanently stored on public lands.

Water Resources

1. Existing fords would be used for drainage crossings where possible. Low-water crossings would use a cut-and-fill process or upgrade existing crossings unless use of culverts is specifically authorized.

2. Bridges and culverts would allow adequate fish passage where applicable. Take-down (or free-floating) panels or water gates would be installed on all fences that cross intermittent or perennial stream channels.

3. For construction projects lasting more than 30 days, portable chemical toilets would be provided at all staging areas, bases of operations, and storage areas.

4. Soaps, detergents, or other nondegradable foreign substances would not be used for washing in streams or rivers. Biodegradable soap may be used.

5. No oil, lubricants, or toxic substances may be drained onto the ground surface. Pads would be designed so that any oil, lubricants, etc., would drain into a collection system.

Wetlands and Riparian Areas

1. Construction, development, and rights-of-way in riparian areas would be minimized. Where these areas must be disturbed, stipulations would minimize impacts and require post-disturbance reclamation. Reclamation would be closely monitored, and not considered complete until the desired vegetation is established.

Wildlife

1. Exploration, drilling and other development would be allowed only during the period May 16 through October 31 in elk, mule deer, or moose winter range. This limitation does not apply to maintenance and operation of producing wells. Exceptions to this limitation in any year may be specifically authorized in writing by the Authorized Officer of the BLM. (For Alternative D BLM37 is replaced by the specified restrictions on construction phase activity.)

2. Where disturbance exceeds 10 acres in elk, mule deer or moose critical winter range, an equivalent acreage of adjacent habitat would be enhanced to accommodate increased use, and is to be completed commensurate with surface disturbing activity. All costs associated with project planning through completion would be the obligation of the lease holder.

3. Exploration, drilling or other development activity would only be allowed from June 16 to March 31 in sage grouse strutting/nesting areas. This limitation does not apply to maintenance and operation of producing wells.

4. Permanent surface disturbance and occupancy (i.e., oil and gas production facilities) is prohibited within 0.5 miles of raptor nests which have been documented as occupied within a 3-year period, and temporary surface disturbance and occupancy (i.e., seismic lines, oil and gas exploration, road construction) is prohibited within one-half mile buffer zones during the critical nesting period. Site-specific evaluations in coordination with the USFWS may allow for modifications to this requirement. This requirement does not apply to maintenance and operation of existing producing wells and access roads constructed prior to occupancy of a nest(s).

The proponent would be required to submit (at least 5 days in advance of proposed work) a sundry notice for all workover or maintenance operations requiring use of heavy equipment during the raptor breeding season (February 1 to July 15) and within the 0.5 mile buffer zone of any known raptor nest site. Upon receipt of this notification, BLM, in consultation

with USFWS and UDWR, would conduct a field evaluation and issue a determination on the activity status of the affected nest site. If the nest site is found to be occupied (defined below), site specific protection measures would be developed to protect the nesting raptors and prevent conditions or actions that may result or contribute to a "taking" as defined under the Bald Eagle Protection Act and the Migratory Bird Treaty Act.

a) An occupied raptor nest is defined for the purpose of this stipulation as any nest site exhibiting physical evidence of current use by raptors. Evidence may include but is to not limited to: presence of raptors (adults, eggs or young) at the nest or within the nesting territory, presence of greenery in the nest, and/or presence of current year's whitewash at the nest or in the immediate vicinity of the nest.

1. Raptor surveys would be required to determine the status of known nests and verify presence of additional nests for all federal leases within the Project Area. Surveys would be conducted by consultants qualified to conduct such surveys and approved by the authorized officer. All surveys would be conducted by helicopter during May of each year, prior to the proposed drilling and prior to APD approval. The surveys would be done in the same year as the proposed drilling so that current nest activity status data are available. Costs for surveys and preparation of a report of the findings of the survey would be the obligation of the lease holder.

BLM41A In order to protect bald eagle winter roost sites, a 0.5 mile radius buffer zone of no surface occupancy would be established around all winter night roost sites. This buffer zone applies to all above ground facilities such as wells, compressor stations, and roads, that require or encourage human visitation during the winter period. Exceptions to this stipulation would be considered on a case by case basis through consultation with the USFWS. Upon request for an exception to this stipulation, BLM would coordinate with the USFWS and UDWR to jointly develop a site-specific buffer zone based on topography and visual sight distances around the night roost site.

Cultural Resources

1. All areas subject to surface disturbance, or Areas of Potential Effect (APE), which have not been previously inventoried for cultural resources to BLM standards, must be inventoried prior to approval of an APD or other actions. The APE is defined as any area that may be subject to direct or indirect impacts to cultural resources by elements of the development project. The zone of the APE would vary in size in accordance with the projected levels of sensitivity for cultural resources at the location of any development. In low sensitivity areas, the APE would be defined as the area subject to direct impacts through surface disturbing activities. In areas of medium sensitivity, the APE would be expanded to account for potential indirect impacts: intensive inventory would occur on all well pads plus an additional 10 acres surrounding each pad; a 150-foot corridor centered on roads, flowlines, and other facilities would be inventoried as the APE. In high sensitivity areas, the APE would include the well pad and 10 acres surrounding the well location; and the APE for roads, flowlines, and other facilities would be the area of direct ground disturbance and a 300-foot zone on all sides of the facility.

a) Cultural resource inventories would be conducted in accordance with BLM Manual 8100 by authorized cultural resource professionals. Prior to field work, a records check must be conducted to identify previous inventories and recorded properties. During the course of inventories, previously unrecorded sites must be recorded on standard BLM forms, photographed, and mapped. Cultural resources would be evaluated, and a recommendation on eligibility to the National Register of Historic Places would be made. BLM would make all Determinations of Eligibility. A report would be prepared for each development or series of developments documenting the inventory methods, results, description of the sites within the APE, recommendations on National Register eligibility, and would include proposed mitigating measures

b) The BLM would consult with the State Historic Preservation Officer (SHPO) and the President's Advisory Council on Historic Preservation (ACHP) as mandated by the National Historic Preservation Act of 1966 (as amended), in accordance with guidelines set forth in a Programmatic Agreement among BLM, SHPO, ACHP and RGC. This document has been completed as a legally binding agreement and is referenced in the Record of Decision for the overall project. Site avoidance, detailed site recordation, and site protection would be the preferred treatments, but mitigation of National Register eligible properties through data recovery may take place where

avoidance is not prudent or feasible, after consultation as specified in the Programmatic Agreement. BLM would submit a treatment plan to SHPO, ACHP and to other affected parties as may be appropriate for a 30-day consultation prior to implementation of data recovery efforts.

2. BLM would notify, consult, and/or coordinate with Indian tribes, traditional leaders, and other interested parties as required by various statutes (NEPA, American Indian Religious Freedom Act [AIRFA], National Historic Preservation Act [NHPA], Federal Land Policy and Management Act [FLPMA], Archaeological Resources Protection Act [ARPA], and the Native American Graves Protection Act [NAGPRA]). In particular, BLM would attempt to elicit information concerning the potential effects of any action resulting from the Proposed Action on traditional cultural properties, including areas of traditional use and areas of religious or cultural importance to tribes. Indian tribes would be afforded a minimum of 30 days for review, comment, and consultation prior to issuance of a decision; under certain circumstances additional time must be afforded. A 30-day notification period is required by ARPA prior to issuance of any Cultural Resource Use Permits for the excavation and removal of cultural resources from public lands administered by BLM. NAGPRA requires notification and consultation with affected tribes regarding the potential to encounter human remains during the course of a project, and provides for cessation of work, and the notification and consultation with tribes, should inadvertent discovery of human remains occur during the course of a project. BLM would assure adherence to these statutes.

3. If a previously unknown property is encountered during construction or operation of the facilities, or if a previously planned undertaking would affect a known historic property in an unanticipated manner, all work that might adversely affect the property would cease until the BLM can evaluate the significance of the property and assess the effect of the undertaking. The BLM would consult with the SHPO on both a determination of eligibility and the assessment of effect in an expeditious manner. If the site is determined eligible and would be affected by the undertaking, the BLM would ensure that RGC prepares an avoidance or treatment plan for the property.

4. If human remains are discovered at any point during the project, they would be treated according to state and federal law, and according to the wishes of concerned Native American tribes, pursuant to the Native American Graves Protection and Repatriation Act. The county sheriff, coroner, land-

managing official, and State Archaeologist shall be notified. The remains shall not be disturbed until the appropriate officials have examined them.

Land Use

1. On split estate lands, where the surface is privately owned and the subsurface is federally owned, it is the policy of BLM to recommend the same environmental protection standards as would be used for federal surface. These standards have been set forth as BLM Required Environmental Protection Measures BLM1 through 56. The operator is responsible for making a good faith effort to reach an agreement with the private surface owner which considers the recommended BLM protection measures and formalizes requirements for the protection of surface resources and/or damages.

a) The BLM may request submission of the private agreement for the proposed well site or access road on federal mineral estate. If the agreement does not adequately protect surface values on adjacent federal lands, BLM may impose additional protective measures, while considering the needs and desires of the private surface owner.

b) Each application for permit to drill or application to conduct other surface disturbing activities shall contain the name, address and telephone number of the surface owner. The BLM would invite the surface owner to participate in any on-site inspection that is held. The operator is responsible for making access arrangements with the private surface owner prior to entry.

2. Incorporated cities are categorized by BLM as No Lease. Within the Project Area, BLM leases do not permit surface occupancy or other activity for Carbon County Airport, Carbon County Recreation Complex, and Carbon County sanitary landfill.

Livestock Management

1. Existing range and livestock management facilities, such as fences, wells, reservoirs, watering pipelines, troughs, and trailing systems, would not be disturbed without prior approval of BLM. Where disturbance is necessary, the facility would be returned to its original condition.

2. Newly constructed range improvements such as fences and reservoirs must meet BLM standards. When it is necessary to gain access across a fenceline for construction purposes, the fence must be braced. Four-inch timber or equivalent must be installed and the gateway kept closed when not in actual use.

3. All gates found closed during the course of the operation must be reclosed after each passage of equipment and personnel. Cattle guards would be installed in fences on all collector roads. Either a

cattleguard or a gate would be required on local and resource roads to control livestock movement or vehicular access.

4. If road construction cuts through natural topography that serves as a livestock barrier, a fence would be constructed to replace it. The fence would be installed with a cattle guard or gate to control livestock and vehicle movement or access.

5. Access to grazing areas would be maintained at all times. Livestock operators would have access to grazing and trailing areas where road closures are implemented during periods of authorized livestock use.

Visual Resources

1. Roads through timbered areas would take a curvilinear path to reduce sight distances.

2. Upon completion of the project, the area and access roads would be reclaimed to as near the original condition as possible. All disturbed areas would be recontoured to blend as nearly as possible with the natural topography. All berms would be removed and all cuts (including roads) filled.

3. Construction areas and access roads would be kept litter-free. The operator must provide a trash pit or trash cage, and trash must be collected and contained during the operation. All garbage, trash, flagging, lath, etc., would be removed from the area and hauled to an authorized dump site.

4. Construction and facilities would be in conformance with Visual Resource Management (VRM) objectives for the VRM classes on the Project Area. All surface facilities in the Project Area would be located to minimize disturbance of the visual horizon and painted to blend in with the surrounding landscape. Colors would be specified by BLM.

2.2.5.3 State of Utah

Measures Applicable to All Lands

The Utah Division of Oil, Gas and Mining (UDOGM) regulates oil and gas activities on all non-federal lands within the State of Utah, under the authority of the Utah Oil and Gas Conservation Act. Required environmental protection measures are described in R649: Oil, Gas and Mining; Oil and Gas, in the Utah Administrative Code, and in the Division's Environmental Handbook: Environmental Regulations for the Oil and Gas Exploration and Production Industry (Hunt 1996). Rules with environmental implications include: requirements for bonding, casing of the well, prevention of fire hazards on the surface, prevention of pollution, spill reporting and cleanup, inspection, on-site pre-drill evaluations which may include identification of special stipulations to be incorporated in the APD, establishment of surface use agreements with surface owners prior to commencement of well drilling, restoration of well sites after plugging and abandonment, reporting and recordkeeping requirements, pit lining, and waste disposal.

Under the Utah Noxious Weed Act, landowners are required to control state- and county-listed noxious weeds on lands under their control. If this is not done, county weed boards have the authority to perform control measures at the expense of the landowner, after notification and hearing. In addition, it is required that machinery be cleaned of noxious weed seeds before bringing it into the state; it is prohibited to sell or distribute seeds containing noxious weed seeds; and to sell or distribute hay, manure, soil, sod or nursery stock containing noxious weed seeds.

The Utah Stream Alteration Permit requires a written permit from the State Engineer to alter or change the banks of any natural stream, including utility line crossings and road construction. It does not apply if the project involves wetlands, threatened or endangered species, properties listed on the National Register of Historic Places, or channel relocations; alterations of those streams are under the jurisdiction of the U.S. Army Corps of Engineers and subject to Section 404 of the Clean Water Act. Measures used to protect water quality and related aquatic habitat would comply with the State of Utah "Nonpoint Source Management Plan for Hydrologic Modifications" (1995).

Other state permits, approvals and authorizing actions that address environmental protection are listed in Table 1.5-1.

Utah Division of Wildlife Resources Lands

Lands are acquired by the UDWR specifically to maintain, enhance or protect critical wildlife habitats. They are managed with the primary purpose of providing wildlife habitat. UDWR lands have been acquired using sportsmen's dollars through license sales and federal funds such as the excise taxes on hunting and fishing equipment. The Gordon Creek Wildlife Management Area was obtained to provide big game winter range for elk and deer. The area is managed to provided habitat for other species as well.

While providing wildlife habitat is the primary function of UDWR lands, other uses may be allowed through ROW, lease, or special use permits. UDWR has created Rule R657-28, Use of Division Lands, to protect the Division's interests while providing for consistent and equitable treatment of requests for uses of UDWR's lands. UDWR has published Guidelines for Applying: Rights-of-way, Leases, and Special Use Permits (8/92), which would be applicable to this project. Where the operator seeks a ROW or special use permit, UDWR

requires the applicant to fill out an application and provide a description of the proposed location and action. Alternatives to the Proposed Action must be identified, as well as; identification of impacts to wildlife and their habitat; identification of potential benefits to wildlife; and methods used to minimize and mitigate impacts to wildlife. In addition, UDWR requires a cultural/historic survey of the area to be affected, a survey of threatened and endangered plant and animal species and Utah wildlife species of special concern, consultation with the Natural Resource Conservation Service, and a biological assessment of all potential impacts to wildlife, its habitat, and user opportunity. The biological assessment must include the proposed avoidance, minimization and mitigation measures incorporated into the project to reduce project impacts. Applicants are responsible for restoring all structures (fences, roads etc.), revegetating disturbed areas; development of a plan to mitigate adverse impacts to wildlife; and bearing the costs of all surveys, restoration, revegetation, and mitigation.

According to the UDWR's "Policy on Mitigating Wildlife Losses," the term mitigation includes: avoiding the impact altogether by not taking a certain action or parts of an action; minimizing impacts by limiting the degree or magnitude of the action and its implementation; rectifying the impact by repairing, rehabilitating or restoring the affected environment; reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action; and, compensating for the impact by replacing or providing substitute resources or environments. Assessments of impact must emphasize habitat values. Every possible effort must be made to encourage the location of a proposed development or activity in an area of minimum or no impact to high interest wildlife. Compensation should, to the maximum extent possible, occur in the Project Area. However, flexibility is maintained to locate mitigation projects in other areas if no reasonable alternatives exist near the project site. Final judgments of reasonableness are made by the Director.

UDWR uses four levels to classify habitat values. The highest value is "critical habitat," which is defined as a sensitive use area that, because of limited abundance or unique qualities, constitute irreplaceable, critical requirements for high interest wildlife. The mitigation goal for "critical habitat" is no loss of existing value.

The next ranking classification is "high priority habitat." This is defined as intensive use areas that due to relatively wide distribution do not constitute critical values by which are highly important to high interest wildlife. The mitigation goals for "high priority habitat" is no net loss of in-kind habitat value, with out-of-kind compensation (trade-off) only as a last resort.

"Substantial value habitats" are existing areas used regularly by high interest wildlife but at moderate levels with little or no concentrated use. The mitigation goals for this classification is no net loss of habitat value with minimized loss of in-kind habitat values.

"Limited value habitats" are occasional use areas that either are sparsely populated or that show sporadic or unpredictable use by high interest wildlife. The mitigation goal for this classification is to minimize loss of habitat value.

UDWR requires that all impacts to wildlife habitat on UDWR lands must be mitigated. This includes direct impacts due to construction and indirect impacts due to increased human disturbance. Ways to avoid and minimize

impacts are considered first, such as seasonal closures in wintering areas (generally from December 1 to April 15), nesting areas (February 15 to July 15), and fawning/calving areas (May 5 to July 5). If impacts are unavoidable, impacted habitat in critical and high priority habitats must be replaced with similar values. If enhancing currently occupied habitat, mitigation must be on a 3:1 acre basis. Habitat Evaluation Procedure (HEP) analysis and experience has shown that from three to four acres of currently occupied habitat are needed to replace lost habitat units from each acre of impacted habitat. Habitat should be replaced in-kind, and mitigation should be as close to the Project Area as possible, and should benefit the impacted population.

Mitigation banking is an alternative that has been used to mitigate impacts from other projects. A fee is assessed that would pay for full replacement of habitat values from fragmented projects, such as a gas or oil field. This allows UDWR, or other management agency, to carry out a larger project to benefit wildlife. On UDWR lands, the fee would be set at a level to pay for habitat enhancement, project administration, and habitat acquisition if no suitable public land is available for enhancement.

UDWR would develop specific mitigation for this project after a careful review of the Proposed Action and identification of associated impacts, and after RGC's completion of the application and biological assessment required by R657-28, Use of Division Lands.

Utah School and Institutional Trust Lands

These state lands are managed to maximize the commercial gain from trust land uses, consistent with the long-term support of the beneficiaries. SITLA manages approximately 2,200 mineral acres under UDWR surface lands in the Project Area, in addition to the areas of SITLA surface and mineral estate shown on the Plates. Rules governing the management and use of these lands is provided in Rules Governing the Management and Use of School and Institutional Trust Lands (1996).

The agency may require lessees to provide cultural, paleontological, or biological surveys for lands under mineral lease, and to be responsible for reasonable mitigative measures as required by the agency. The SITLA has standard procedures for taking into account the effect of trust land uses on sites that are included or eligible for the State Register or National Register of Historic Places (NRHP), and for allowing the SHPO a reasonable opportunity to comment.

All pits and excavations must be shaped to facilitate drainage and control erosion. The agency may require that all topsoil in the affected area be removed, stockpiled, and stabilized until the completion of operations. Upon reclamation, the stockpiled topsoil would be redistributed on the affected area and the area revegetated. All mud pits must be filled, and material and debris removed from the site at the completion of operations.

At least 60 days prior to the land disturbing operations, a plan of operations must be submitted to the agency, which would review it, make an environmental assessment, and endorse or stipulate changes in the lessee's plan of operation. An on-site visit is made at the APD stage, to locate the facilities to minimize environmental impacts while staying within the drilling window. The on-site inspection is

conducted by representatives of UDOGM and RGC; representatives of UDWR and SITLA are also invited and may be present.

Bonds are required to cover costs of reclamation and other damages or costs.

2.2.5.4 Private Lands

The standard operating procedure used by RGC on private lands is to negotiate a surface use agreement with the landowner prior to starting construction, which would provide compensation for any damages. Operations and reclamation would be in accordance with the surface use agreement. In addition, RGC follows established industry practices and complies with applicable federal and state requirements.

In addition to UDOGM requirements (Section 2.2.5.3), county regulations would apply to CBM activities on private and other lands. In Carbon County, a conditional use permit would be required for CBM activities in areas with residential zoning but not in areas zoned for mining and grazing. A conditional use permit would also be required in Critical Environmental Zones (CE-1) above 7,000 feet. The Carbon County permit process includes submittal of a site plan and other information, review by the Planning Commission, review by the County Commissioners, and a public hearing. The County Commissioners may require conditions or mitigation to be added to the development plans. Emery County requires a conditional use permit for every well, regardless of zoning. The Emery County permitting process also includes submittal of a site development plan, review by the Planning Commission, review by the County Commissioners, and a public hearing. Developers must also submit an Application for Permit to Drill for each individual well, which may be approved by the Planning and Zoning Department without involvement of other parties, or may go through a more rigorous review if there are issues or concerns. Under both Emery County permitting procedures, the County may decide that certain conditions or mitigations are required, and a revised application would have to be submitted.

2.3 ALTERNATIVE A - FIELD DEVELOPMENT, 80-ACRE WELL SPACING

The future performance of wells proposed in the Project Area may indicate that additional wells would be required to ensure optimal recovery of CBM gas. Spacing requirements are established by UDOGM in order to prevent waste, maximize recovery, protect correlative rights, and prevent the drilling of unnecessary wells. Each drilling unit (unless specifically ordered) is to contain one well to produce from a common source of supply. The spacing or size of drilling units is determined and ordered by UDOGM after hearing and consideration of all technical evidence and testimony. Additional wells would decrease the overall well spacing and increase well density. This alternative consists of 80-acre well spacing (eight per square mile), or almost twice the number of wells described in the Proposed Action. RGC would locate, drill, complete, and produce 1,103 CBM wells over the same 10-year plus period in the same 290-square mile Project Area identified under the Proposed Action (Plate 4).

Project activities as described for the Proposed Action (Section 2.2) would be essentially the same under Alternative A. However, the number of wells and the associated miles of transportation corridor (access road, pipelines,

and electrical distribution lines) would increase roughly 83 percent and 48 percent, respectively, over totals for the Proposed Action (Tables 2.2-1 and 2.3-1). One thousand, one hundred and three production CBM gas wells, 514 miles of transportation corridor facilities, and 52 miles of high-pressure gathering pipeline would be developed in addition to the 97 existing wells, 58 miles of existing transportation corridor, and 2.2 miles of existing other pipeline (fresh water pipeline) (Table 2.3-1).

Wells and transportation corridor segments located within a 0.5-mile buffer area for an active raptor nest are identified in Plate 4. Numbers of affected wells and miles of affected transportation corridor are presented in Table 2.2-5.

Wells and transportation corridor segments located within winter closure areas are identified in Plate 4 and Figure 2.2-6. Locations for the gates comprising the closure system are the same as in the Proposed Action.

The number of compressor facilities and their locations would remain the same as described for the Proposed Action; however, numbers of compressor units and supporting equipment

would increase for most compressor facilities (Table 2.3-2) in response to the increased number of wells and increased quantity of produced CBM gas. The six facilities would use a total of 73 compressor units. Compressor capacity would total 365 MMcf/day for Alternative A. This capacity would accommodate the estimated peak gas production of 350 MMcf/day for the total 1,200 wells operating in the Project Area, (97 existing and 1,103 proposed wells).

The number of injection well facilities and adjacent evaporation ponds would increase by 1 (to 8) compared to the Proposed Action. Based on current water production characteristics for existing wells and anticipated rates for producing wells under an 80-acre spacing scenario, water production from the entire field of up to 1,200 wells would not exceed approximately 128,720 BWPD (16.6 ac-ft/day) at any point in time or for any number of wells for the approximate 30-year life of project. Refer to Appendix 2E for a plot of the water production projection.

Under Alternative A, sand/gravel requirements for the surfacing of well pads, roads, and other facilities would total approximately 1,002,900 yds^3. A total water requirement for implementation of Alternative A, including well pad construction and surfacing, well completion and stimulation, road construction and surfacing, and an application of magnesium chloride to all roads, would be 852 ac-ft/day.

Based on a projected injection rate of 86,000 BWPD for the eight new and one existing injection well and an anticipated disposal capacity of 55,000 BWPD for the eight proposed and one existing evaporation ponds, disposal capacity of 141,000 BWPD would exceed water production by 12,280 BWPD.

Numbers of work teams, individual workers, and vehicle trips per activity would also increase approximately 80 percent over activity detailed in Tables 2.2-9 for the Proposed Action with the exception of the construction of compressor facilities, which would not differ significantly from the Proposed Action. Proposed environmental protection measures defined for the Proposed Action would also apply to Alternative A.

2.4 ALTERNATIVE B - CRITICAL AREAS AVOIDANCE

The presence of critical winter range habitat for both mule deer and elk within portions of the Project Area is the basis for these alternatives.

Alternatives B1 and B2 would preclude CBM well development in the federal mineral estate within the combined deer and elk critical winter range under either the 160-acre or the 80-acre well spacing scenarios (Plates 5 and 6). Outside of the combined Critical Area for deer and elk, project activities would essentially be the same as described for the Proposed Action - 160-acre well spacing project development, and Alternative A - 80-acre well spacing project developments.

2.4.1 Alternative B1 - 160-acre Well Spacing

Differences between the actions for Alternative B1 - 160-acre spacing scenario (Plate 5) and the Proposed Action (Plate 2) would result from the roughly 28 percent decrease in number of production wells to be drilled and the 48 percent decrease in miles of transportation corridor in comparison to the Proposed Action (Tables 2.2-1 and 2.4-1). Four hundred and thirty-six CBM gas wells, 260 miles of transportation corridor facilities, and 52 miles of high-pressure gathering pipelines would be developed in addition to the 97 existing wells, 58 miles of existing

transportation corridor, and 2.2 miles of existing other pipeline (fresh water pipeline) (Tables 2.2-3 and 2.4-1).

Wells and transportation corridor segments located within a 0.5-mile buffer area for an active raptors nest are identified in Plate 5. Numbers of affected wells and miles of affected transportation corridor are presented in Table 2.2-5.

Wells and transportation corridor segments located within winter closure areas are identified in Plate 5 and Table 2.2-6. Locations for the gates comprising the closure system are the same as for the Proposed Action.

Compressor facilities and their locations would remain the same as described for the Proposed Action; however, numbers of compressor units and supporting equipment would likely decrease for several compressor facilities (Table 2.4-2) in response to the decreased number of wells and quantity of produced CBM gas. The six facilities would use a total of 50 compressor units. Compressor capacity would total 250 MMcf/day. This capacity would accommodate the estimated peak gas production of 227 MMcf/day for the total 533 wells (97 existing plus 436 proposed wells).

Based on current water production characteristics for existing wells and anticipated rates for producing wells under an 160-acre spacing scenario, water production from the field of up to 533 wells would not exceed approximately 90,300 BWPD (11.6 ac- ft/day) at any point in time or for any number of wells for the approximate 30-year life of project.

Under Alternative B1, the number of injection well facilities and adjacent evaporation ponds would each be reduced by two to five in comparison to the Proposed Action. The two injection facilities and ponds eliminated from the list of seven for the Proposed Action (Section 2.2.3.2) would be those located at NE 1/4 of Section 3, T14S, R9E and SW1/4 of Section 34, T14S, R9E on federal surface and mineral. Both injection well and evaporation pond facilities are eliminated due to their location on federal lands within the Critical Areas Avoidance area. The location of the remaining five new injection well facilities and evaporation ponds would be the same as described for the Proposed Action.

Based on a projected injection rate of 56,000 BWPD for the five new and one existing injection well and an anticipated disposal capacity of 40,000 BWPD for the five approved and one existing evaporation ponds, the six total injection well facilities and six ponds would have a disposal capacity of 96,000 BWPD. Excess capacity under Alternative B1 would total 5,700 BWPD.

Under Alternative B1, sand/gravel requirements would be about 476,338 yds^3. A total water requirement for implementation of Alternative B1, including well pad construction and

surfacing, well completion and stimulation, road construction and surfacing, and an application of magnesium chloride to all roads, would be 361 acre-feet (Table 2.2-5).

Numbers of workers and vehicle trips per activity would mostly decrease approximately 50 percent from projected activities detailed in Tables 2.2-9 for the Proposed Action. Exceptions would include the construction of compressor facilities, which would not differ substantially from the Proposed Action, and the construction of injection well facilities and evaporation ponds, which would result in a roughly 30 percent decrease in worker and vehicular activity. Environmental protection measures defined for the Proposed Action would also apply to this alternative.

2.4.2 Alternative B2 - 80-acre Well Spacing

Differences between the actions for Alternative B2 - 80-acre well spacing scenario (Plate 6) and Alternative A (Plate 4) would result from the roughly 25 percent decrease in number of production wells to be drilled and the 30 percent decrease in miles of transportation corridor in comparison to Alternative A (Tables 2.3-1 and 2.4-3). Eight hundred and thirty-one CBM gas wells, 357 miles of transportation corridor facilities, and 52 miles of high-pressure gathering pipeline would be developed in addition to the 97 existing wells, 58 miles of existing transportation corridor, and 2.2 miles of existing other pipeline (fresh water pipeline) (Tables 2.2-3 and 2.4-3).

Wells and transportation corridor segments located within a 0.5-mile buffer area of an active raptor nest are identified in Plate 6. Numbers of affected wells and miles of affected transportation corridor are presented in Table 2.2-5.

Wells and transportation corridor segments located within winter closure areas are identified in Plate 6 and Table 2.2-6. Locations for the gates comprising the closure system are the same as in the Proposed Action.

Compressor facilities and their locations would remain the same as described for the Proposed Action; however, numbers of compressor units and supporting equipment would likely decrease for several compressor facilities (Table 2.4-4) in response to the decreased number of wells and quantity of produced CBM gas. The six facilities would use a total of 64 compressor units. Compressor capacity would total 320 MMcf/day. This capacity would accommodate the estimated peak gas production of 315 MMcf/day for the total 928 wells (97 existing plus 831 proposed wells).

Under Alternative B2, the number of injection well facilities and adjacent evaporation ponds would be the same (seven) as described for the Proposed Action.

Two of the locations (federal lands) for water disposal facilities would be moved outside of the Critical Areas Avoidance exclusion area. The two injection facilities and nearby evaporation ponds locations eliminated from the list of seven for the Proposed Action (Section 2.2.3.2) and Alternative A are those located at NE 1/4 of Section 3, T14S, R9E and SW 1/4 of Section 34, T14S, R9E. New locations for two injection well facilities are NE 1/4 of Section 31, T13S, R9E and NW 1/4 of Section 24, T14S, R9E (Plate 6). Locations of the remaining five new injection well facilities and adjacent evaporation ponds would be the same as described for the Proposed Action and Alternatives A and B.

Under Alternative B2, sand/gravel requirements would be about 730,151 yd^3. A total water requirement for implementation of Alternative B1, including well pad construction and surfacing, well completion and stimulation, road construction and surfacing, and an application of magnesium chloride to all roads, would be 633 acre-feet.

Based on current water production characteristics for existing wells and anticipated rates for producing wells under an 80-acre spacing scenario, water production from the field of up to 928 wells would not exceed approximately 118,890 BWPD (15.3 ac-ft/day) at any point in time or for any number of wells for the approximate 30-year life of project.

Based on a projected injection rate of 76,000 BWPD for the seven new and one existing injection well and an anticipated disposal capacity of 50,000 BWPD for the seven proposed and one existing evaporation ponds, the total water disposal capacity would be 126,000 BWPD. Excess capacity under Alternative B2 would total 7,110 BWPD.

Numbers of workers and vehicle trips per activity would mostly increase approximately 18 percent from projected activities detailed in Table 2.2-9 for the Proposed Action. Exceptions would include the construction of compressor facilities, which would not differ substantially from the Proposed Action, and the construction of injection well facilities and evaporation ponds, which would require roughly 29 percent less worker and vehicular activity. Environmental protection measures defined for the Proposed Action would also apply to this alternative.

2.5 ALTERNATIVE C - SECURITY AREAS PROTECTION

As described for Alternative B (B1 and B2) in Section 2.4, the presence of critical mule deer and elk winter range within portions of the Project Area provided the basis for this alternative. CBM well development and transportation systems construction and operation would be precluded on federal lands within specific areas within the combined mule deer and elk critical winter range. Under this alternative, areas where deer and/or elk concentrate during the winter would be established as activity avoidance areas for CBM field development under both the 160-acre and the 80-acre well spacing scenarios (Plates 7 and 8). These areas would serve as security habitat areas within the critical winter range and all surface activity would be prohibited. Outside the delineated security protection areas, project activities would essentially be the same as described for the Proposed Action - 160-acre well spacing project development and Alternative A - 80-acre well spacing project developments.

The security areas identified for protection under these alternatives were developed by BLM in consultation with UDWR. They are traditional areas of concentrated use by wintering big game, and represent the highest valued lands for big game in the Project Area. These areas were selected for protection under these alternatives in order to protect the nucleus of the herds and to enable the project to proceed while retaining the function of the critical winter range. The security areas along the Gordon Creek drainage, together with restrictions on drilling on excessive slopes and near stream corridors, would also effectively protect the integrity of the primary migration corridor for this winter range. The security areas would also provide suitable areas for

mitigation of impacts (habitat enhancement) within the Project Area.

2.5.1 Alternative C1 - 160-acre Well Spacing

Differences between the actions for Alternative C1 - 160-acre spacing scenario (Plate 7) and the Proposed Action (Plate 2) would result from the roughly 8 percent decrease in number of production wells to be drilled and the 12 percent decrease in miles of transportation corridor in comparison to the Proposed Action (Tables 2.2-1 and 2.5-1). Five hundred and fifty CBM gas wells, 308 miles of transportation corridor facilities, and 52 miles of high-pressure gathering pipeline would be developed in addition to the 97 existing wells, 58 miles of existing transportation corridor, and 2.2 miles of existing other pipeline (fresh water pipeline) (Tables 2.2-3 and 2.5-1).

Wells and transportation corridor segments located within a 0.5-mile buffer area for an active raptors nest are identified in Plate 7. Numbers of affected wells and miles of affected transportation corridor are presented in Table 2.2-5.

Wells and transportation corridor segments located within winter closure areas are identified in Plate 7 and Table 2.2-6. Locations for the gates are the same as in the Proposed Action.

Compressor facilities and their locations would remain the same as described for the Proposed Action; however, numbers of compressor units and supporting equipment would likely decrease for several compressor facilities (Table 2.5-2) in response to the decreased number of wells and quantity of produced CBM gas. The six facilities would use a total of 60 compressor units. Compressor capacity would total 300 MMcf/day. This capacity would accommodate the estimated peak gas production of 257 MMcf/day for the total 647 wells (97 existing plus 550 proposed wells).

Under Alternative C1, sand/gravel requirements would be about 575,715 yd^3. A total water requirement for implementation of Alternative C1, including well pad construction and surfacing, well completion and stimulation, road construction and surfacing, and an application of magnesium chloride to all roads, would be 448 acre-feet.

Based on current water production characteristics for existing wells and anticipated rates for producing wells under a 160-acre spacing scenario, water production from the field of up to 647 wells would not exceed approximately 98,770 BWPD (12.7 ac-ft/day) at any point in time or for any number of wells for the approximate 30-year life of project.

The number of injection well facilities and adjacent evaporation ponds would remain as planned (7) for the Proposed Action.

Based on a projected injection rate of 76,000 BWPD for the seven new and one existing injection well and an anticipated disposal capacity of 50,000 BWPD for the seven proposed and one existing evaporation ponds, disposal capacity of 126,000 BWPD would exceed water production. Excess capacity under Alternative C1 would total 27,230 BWPD.

Numbers of workers and vehicle trips per activity would mostly decrease approximately 10 percent from projected activities detailed in Tables 2.2-9. Exceptions would include the construction of compressor facilities, injection well facilities, and evaporation ponds, which would not differ substantially from the Proposed Action, which would result in a roughly 30 percent decrease in worker and vehicular activity. Proposed environmental protection measures defined for the Proposed Action would also apply to this alternative.

2.5.2 Alternative C2 - 80-acre Well Spacing

Differences between the actions for Alternative C2 - 80-acre well spacing scenario (Plate 8) and Alternative A (Plate 4) would result from the roughly 8 percent decrease in number of production wells to be drilled and the 8 percent decrease in miles of transportation corridor in comparison to Alternative A (Tables 2.3-1 and 2.5-3). One thousand and thirteen CBM gas wells, 473 miles of transportation corridor facilities, 52 miles of high-pressure gathering pipeline would be developed in addition to the 97 existing wells, 58 miles of existing transportation corridor, and 2.2 miles of existing other pipeline (fresh water pipeline) (Tables 2.2-3 and 2.5-3).

Wells and transportation corridor segments located within a 0.5-mile buffer area for an active raptors nest are identified in Plate 8. Numbers of affected wells and miles of affected transportation corridor are presented in Table 2.2-5.

Wells and transportation corridor segments located within winter closure areas are identified in Plate 8 and Table 2.2-6. Locations for the gates are the same as in the Proposed Action.

Compressor facilities and their locations would remain the same as described for the Proposed Action; however, numbers of compressor units and supporting equipment would likely decrease for several compressor facilities (Table 2.5-4) in response to the decreased number of wells and quantity of produced CBM gas. The six facilities would use a total of 70 compressor units. Compressor capacity would total 350 MMcf/day. This capacity would accommodate the estimated peak gas production of 340 MMcf/day for the total 1,110 wells (97 existing plus 1,013 proposed wells).

Under Alternative C2, sand/gravel requirements would be about 925,695 yds^3. A total water requirement for implementation of Alternative C2, including well pad construction and surfacing, well completion and stimulation, road construction and surfacing, and an application of magnesium chloride to all roads, would be 784 acre-feet (Table 2.2-5).

Based on current water production characteristics for existing wells and anticipated rates for producing wells under an 80-acre spacing scenario, water production from the field of up to 1,110 wells would not exceed approximately 126,670 BWPD (16.3 ac-ft/day) at any point in time or for any number of wells for the approximate 30-year life of project.

The number of proposed injection well facilities and adjacent evaporation ponds would increase by one (to 8) compared to the Proposed Action.

Based on a projected injection rate of 86,000 BWPD for eight proposed and one existing injection well and an anticipated disposal

capacity of 55,000 BWPD for the eight new and one existing evaporation ponds, there would be a total disposal capacity of 141,000 BWPD. Excess capacity under Alternative C2 would total 14,330 BWPD.

Numbers of workers and vehicle trips per activity would mostly increase approximately 68 percent from projected activities detailed in Tables 2.2-9. Exceptions would include the construction of compressor facilities, injection well facilities, and evaporation ponds, which would not differ substantially from the Proposed Action. Environmental protection measures defined for the Proposed Action would also apply to Alternative C2.

2.6 ALTERNATIVE D - BIG GAME MINIMUM DISTURBANCE CORRIDORS (BLM PREFERRED ALTERNATIVE)

Alternative D has been developed through a collaborative effort between RGC and BLM in consultation with UDWR and UDOGM to address a wide array of public comments received on the DEIS. The alternative falls within the range of alternatives previously addressed in the DEIS, complies with the Price River and San Rafael Land Use Plans.

This alternative takes into consideration data provided by UGS as well as comments from UDOGM on coal thickness and feasibility of CBM development in portions of the Project Area, public concern expressed for the protection and management of the Gordon Creek Wildlife Management Area for wintering big game, and incorporates the wildlife mitigation objectives outlined in Appendix 4C (Wildlife Mitigation Plan).

This alternative provides for:

- protection for most of the Gordon Creek Wildlife Management Area from CBM development impacts
- protection of big game critical winter range by relocating CBM wells and facilities outside established corridors (key drainages and along canyon rims) critically valued for wintering big game
- cessation of all construction activity on big game winter range during the winter period
- mitigation of surface disturbance impacts in the form of one acre of habitat enhancement for each acre of surface disturbance
- development of the CBM resource with 160-acre well spacing on a major portion of the lease holdings.

Specific elements of this alternative that differ from the Proposed Action are described below.

Gordon Creek Wildlife Management Area Protection. Under this alternative RGC would not conduct any surface disturbing activity or propose any surface occupancy on the area in the northwest portion of the Project Area depicted in Plate 8A. This area includes approximately 75% of the Gordon Creek Wildlife Management Area, including all of the UDWR lands.

RGC would submit a written relinquishment to BLM within 90 days of issuance of the Record of Decision to surrender the federal mineral leases underlying the area depicted in Plate 8A back to BLM.

Big Game Minimum Disturbance Corridors. In order to provide winter range protection for mule deer, the following Site

Location Standard would be implemented by BLM, UDWR and UDOGM on state and federal land within big game minimum disturbance corridors (big game corridors).

These big game corridors include key drainages and canyon rims within big game winter range (Plate 8A). These corridors include Consumers Wash, Garley Canyon, Gordon Creek, Pinnacle Wash, North Spring-Serviceberry Creek, Miller Creek, North Rim of Poison Spring Bench and South Rim of Poison Spring Bench. The Site Location Standard would be implemented as follows:

At the time the proponent submits a permit application for a well or facility within a designated big game corridor, BLM/UDWR will complete a site specific evaluation of the proposal. As appropriate, under the guidelines listed below, the well/facility may be relocated (within limits of the 160-acre legal subdivision) to minimize surface disturbance and/or surface occupancy within the big game corridor. BLM would not recommend relocation of wells that would result in the wells being located off lease, or in the event of a unitized area, off the unit.

Plate 8A show the wells and transportation corridors within the big game corridors which are the same as for the Proposed Action. Plate 8B presents a visual depiction of possible alternate locations of wells and transportation corridors based on application of the Site Location Standards. As described in the Standards, no well was eliminated, or moved out of the 160-acre subdivision in which they were proposed, and no well was located within 920 feet from another well, in compliance with UDOGM well spacing requirements. Of the 72 wells located within the big game corridors, 55 were relocated outside of the big game corridors as shown on Plate 8B. The alternate locations were selected to minimize surface disturbance within the big game corridors and to illustrate possible alternate locations based on the Standards. The actual well locations would be determined during review of the APD in compliance with all applicable regulations. In addition to the BLM and UDWR, the actual location would be determined in coordination with RGC, the mineral owner, and the landowner. Selection of the actual well would consider other environmental and production factors such as recreation, visual impact, and well spacing.

Based on the relocation scenario presented in Plate 8B, there would be approximately seven fewer miles of transportation corridors, 11 fewer miles of pipelines adjacent to existing roads, and 80 fewer acres of long-term surface disturbance compared to the facilities shown in Plate 8A. The long-term surface disturbance would decrease by approximately four percent from the Plate 8A locations.

Details of the Site Location Standard are presented below:

Federal Interest Lands

I. Following receipt of a permit application for a well/facility proposed within a big game corridor (i.e., notice of staking, receipt of APD or right-of-way application) BLM would complete an evaluation of the proposal and identify, as needed, an alternate location for the well/facility.

II. After notification from BLM of the alternate location, the proponent would modify and resubmit their application to BLM to reflect the alternate location. In the event the alternate location falls outside the conventional spacing window, the proponent would also submit a request for an exception to UDOGM (where such approval is necessary), allowing for an unorthodox well location.

III. BLM would not recommend relocation of well/facilities that would require construction on slopes greater than 30 percent slope.

IV. BLM would not recommend relocation of wells that would prevent the proponent from hitting a specific geologic target with regard to presence and alignment of known fault lines. (Independent corroboration by BLM geologist/ petroleum engineers may be required for exceptions to the site location standard based on geologic concerns.)

V. In order to reduce unnecessary increases in surface disturbance, BLM would not recommend relocating wells, roads, and facilities outside the corridors in those circumstances where access roads already exist within big game corridors and these roads meet the following conditions:

VI. can be upgraded to UDOGM road standards to serve as oil and gas service roads,

VII. are logically located with regard for the overall access needs for oil and gas development.

Non-Federal Interest Lands

I. Following notification from UDOGM of receipt of a permit application for a well/facility proposed within a big game corridor (i.e., notice of staking, receipt of APD, etc.) UDWR would complete an evaluation of the proposal and identify, as needed, an alternate location for the well/facility.

II. After notification from UDWR of the alternate location, the proponent would modify and resubmit their application to UDOGM to reflect the alternate location. In the event the alternate location falls outside the conventional spacing window, the proponent would also submit a request for an exception to UDOGM (where such approval is necessary), allowing for an unorthodox well location.

III. UDWR would not recommend relocation of well/facilities which would require construction on slopes greater than 30 percent slope.

IV. UDWR would not recommend relocation of wells which would prevent the proponent from hitting a specific geologic target with regard to presence and alignment of known fault lines.

V. In order to reduce unnecessary increases in surface disturbance, UDWR would not recommend relocating wells, roads, and facilities outside the corridors in those circumstances where access roads already exist within big game corridors and these roads meet the following conditions:

VI. can be upgraded to UDOGM road standards to serve as oil and gas service roads,

VII. are logically located with regard for the overall access needs for oil and gas development.

Implementation of the Site Location Standard within big game corridors, would not eliminate any well as proposed in the Proposed Action.

The proponent may choose to alter the location of wells adjacent to the big game corridor to achieve desired drainage of the gas resource. It is also recognized that in some instances,

wells, roads and facilities would be located within big game corridors, but this should be the exception and not the rule.

Other constraints on well locations, as previously described for the Proposed Action in Chapter 2, that may be more restrictive within big game corridors, are not affected by this Site Location Standard.

Well Spacing. BLM would not authorize closer well density (spacing) than 160-acre spacing on big game critical winter range.

Wildlife Mitigation Fund. RGC would mitigate surface disturbance wildlife impacts on big game winter range for federal lands (federal surface and or federal subsurface ownership) by completing habitat enhancement work at the rate of one acre of habitat enhancement for each acre of surface disturbance. RGC would satisfy this mitigation requirement by contributing $1,250.00 (1996 dollars) per well drilled on federal surface and/or federal subsurface ownership in big game critical winter range into a Wildlife Habitat Mitigation Fund set up for this purpose.

The contribution would be made in annual increments with adjustments for inflation based on the Consumer Price Index (CPI). This fund would be used to complete habitat enhancement projects to directly benefit wildlife. Administration of this fund, including objectives for habitat enhancement, would be formalized in an agreement developed between the proponent and BLM in consultation with the UDWR.

Restrictions on Construction Phase Activity. RGC would refrain from construction phase activity, described below, on critical big game winter range during the period of closure without regard for land ownership.

The period of closure for all lands would be December 1 to April 15. This would not apply to normal maintenance and operation of producing wells (described below). On non-federal lands (where the federal government does not have either surface or subsurface ownership) RGC would be allowed to conduct construction phase activity if needed to avoid breech of contract or loss of lease rights. In the event construction phase activity proceeds into the winter closure period to avoid breech of contract or loss of lease rights, the proponent would make appropriate documentation available to the UDWR, upon request.

Construction Phase Activity: Construction phase activity is considered to include all work associated with initial drilling and construction of facilities through completion including installation of pumping equipment, connection with ancillary facilities and tie-in with pipelines necessary for product delivery.

Operator would not be allowed to initiate construction activity unless it is reasonable to believe that such work can be finished to a logical stopping point prior to December 1 of that year. Specific activities considered to be covered by the seasonal closure include all heavy equipment operation including but not limited to the following;

I. Mobilization/Demobilization or operation of heavy equipment (crawler tractor, front end loader, backhoe, road grader, etc.)

II. Construction activity (new road construction and/or road upgrading, pad, pipeline, powerline, ancillary facilities, etc.),

III. Drilling activity (operator would not propose or initiate drilling activity if the project could not reasonably be expected to be finished to a logical stopping point by December 1 of that year.)

IV. Seismic operations

V. Detonation of explosives

This seasonal closure would not apply to the following types of work associated with construction phase.

I. Reconnaissance, survey/design and/or flagging of project work or other similar activity not requiring actions listed for heavy equipment operation.

Production Phase: A CBM well is considered to be in production phase when the well and ancillary facilities are completed to the point that the well is capable of producing and delivering product for sale. It is recognized that heavy equipment operation may be necessary in the performance of maintenance and operation of producing wells.

Restrictions on Non-Emergency Workover Operations. RGC commits to conducting non-emergency workover operations on big game winter range outside the winter seasonal closure window. RGC agrees to submit Sundry Notices to BLM (or notification to UDWR for non-federal lands) in advance of workover operations proposed between December 1 and April 15. Sundry notices submitted as emergency work, may require independent corroboration by BLM geologist/ petroleum engineers (or by UDWR in coordination with UDOGM) prior to work proceeding. Should BLM object to the emergency designation of the sundry notice, BLM would make notification of the objection within five days of receipt of the sundry notice. In the absence of such notification or in the event of notification of BLM's corroboration with the sundry notice, RGC would be permitted to proceed with the workover operation as scheduled.

Non-emergency Workover Operations: Workover operations to correct or reverse a gradual loss of production over time (loss of production of five percent or less over a 60-day period) is considered to be routine or non-emergency workover operations.

Emergency Workover Operations: Emergency workover operations are defined as downhole equipment failure problems or workover operations necessary to avoid shut-in of the well or to avoid an immediate safety or

environmental problem. Loss of production greater than five percent within a 60 day period of time is indicative of pump failure and would be considered an emergency workover operation.

Reduction of Routine Well Visits. RGC agrees to continue to utilize remote sensing automation equipment at wells and facilities and to work toward improving efficiencies in the use of this equipment to reduce routine visits to wells on big game winter range during the period from December 1 to April 15.

Gate Closures on Public Land. Under the direction of BLM, RGC would construct gate closures on specific access roads on public land to reduce unauthorized vehicle access on critical winter range during the winter closure period (December 1 to April 15). Authorized vehicle access is considered to include access necessary for the administration of work associated with an approved federal permit or land use authorization.

2.6.1 Project Components

The following project components are based on the wells and facilities depicted in Plate 8A. Project activities as described for the Proposed Action (Section 2.2) would be essentially the same under Alternative D. However, the number of wells and the associated miles of transportation corridor (access road, pipelines, and electrical distribution lines) would decrease roughly 10 percent and 12 percent, respectively, over totals for the Proposed Action (Tables 2.2-1 and 2.63-1). A total of 545 production CBM gas wells, 313 miles of transportation corridor facilities, and 48 miles of pipelines paralleling existing roads would be developed in addition to the facilities existing as of 1995 (Tables 2.3-1 and 2.36-1).

Wells and transportation corridor segments located within a 0.5-mile buffer area for an active raptor nest are identified in Plate 8A. Numbers of affected wells and miles of affected transportation corridor are presented in Table 2.2-5.

Wells and transportation corridor segments located within winter closure areas are identified in Plate 8A and Table 2.2-6. Locations for the gates comprising the closure system are the same as in the Proposed Action.

The number of proposed compressor facilities units and supporting equipment would decrease by 1 (to 4) compared to the Proposed Action (Table 2.6-2). The compressor station located in T14S, R8E, Sec. 2 would be eliminated. The five existing and proposed facilities would use a total of 59 compressor units. Compressor capacity would total 295 MMcf/day for Alternative D. This capacity would accommodate the estimated peak gas production of 257 MMcf/day for the total 642 wells operating in the Project Area (97 existing and 545 proposed wells).

Under Alternative D, sand/gravel requirements for the surfacing of well pads, roads, and other facilities would total approximately 545,133 yd^3. Total water requirements for implementation of Alternative D, including well pad construction and surfacing, well completion and stimulation, road construction and surfacing, and an application of magnesium chloride to all roads, would be 446 ac-ft/day.

The number of new injection well facilities and adjacent evaporation ponds would decrease by 1 (to 6) compared to the Proposed Action. Based on current water production characteristics for existing wells and anticipated rates for producing wells under a 160-acre

spacing scenario, water production from the entire field of up to 642 wells would not exceed approximately 98,770 BWPD (12.7 ac-ft/day) at any point in time or for any number of wells for the approximate 30-year life of project. Refer to Appendix 2E for a plot of the water production projection.

Based on a projected injection rate of 66,000 BWPD for the six proposed and one existing injection well and an anticipated disposal capacity of 45,000 BWPD for the six proposed and one existing evaporation ponds, disposal capacity of 111,000 BWPD would exceed water production by 12,230 BWPD.

Numbers of work teams, individual workers, and vehicle trips per activity would also decrease approximately 10 percent over activity detailed in Tables 2.2-9 for the Proposed Action with the exception of the construction of compressor facilities, which would not differ significantly from the Proposed Action. Proposed environmental protection measures defined for the Proposed Action would also apply to Alternative D, except for BLM 37 which would have a shorter season of restricted construction activity in elk, mule, deer and moose winter range.

2.7 NO ACTION ALTERNATIVE

Denial of well development on federal mineral estate would preclude activity on much of the federal lands within the Project Area; however, development on state and private lands would likely occur (Plate 9). Although well development would be denied, access across federal surface to reach proposed well locations on state and private lands would likely be granted by the BLM as required by BLM policy and legal precedent for access across public lands (Cotter Decision, State of Utah v. Andrus, 486 F. SUPP. 995 [D. UT. 1979]).

Two hundred and twenty-eight production CBM gas wells, 154 miles of transportation corridor facilities, and 47 miles of high-pressure gathering pipeline would be developed in addition to the 97 existing wells, 58 miles of transportation corridor, and 2.2 miles of other existing pipelines (Tables 2.2-3 and 2.7-1).

Wells and transportation corridor segments located within a 0.5-mile buffer area for an active raptor nest are identified in Plate 9. Numbers of affected wells and miles of affected transportation corridor are presented in Table 2.2-5.

Compressor facilities and their locations would remain the same as described for the Proposed Action; however, numbers of compressor units

and supporting equipment would likely decrease for several compressor facilities (Table 2.7-2) in response to the decreased number of wells and quantity of produced CBM gas . The six facilities would use a total of 32 compressor units. Compressor capacity would total 160 MMcf/day. This capacity would accommodate the estimated peak gas production of 150 MMcf/day for the total 325 wells (97 existing plus 228 proposed wells).

Sand/gravel requirements would be approximately 276,658 yd^3. A total water requirement for implementation of the No Action alternative would be 198 acre-feet.

Under the No Action alternative, the number of injection well facilities and adjacent evaporation ponds would each be reduced by three to four in comparison to the Proposed Action. The three injection facilities and evaporation ponds dropped from the list of seven for the Proposed Action (Section 2.2.3.2) would be those located at NE 1/4 of Section 3, T14S, R9E; SW 1/4 of Section 34, T14S, R9E; and SW 1/4 of Section 28, T16S, R9E.

Locations of the remaining four new injection well facilities and evaporation ponds would be the same as described for the Proposed Action.

Based on current water production characteristics for existing wells and anticipated rates for producing wells under an 160-acre spacing scenario, water production from the field of up to 325 wells would not exceed approximately 69,940 BWPD (9.0 ac-ft/day) at any point in time or for any number of wells for the approximate 30-year life of project.

Based on a projected injection rate of 46,000 BWPD for the 4 new and one existing injection well and an anticipated disposal capacity of 35,000 BWPD for the four proposed and existing evaporation ponds, the five injection well facilities and five ponds would have a disposal capacity of 81,000 BWPD. Excess capacity under No Action would total 11,060 BWPD.

Numbers of workers and vehicle trips per activity would mostly decrease approximately 55 percent from projected activities detailed in Tables 2.2-9. Exceptions would include the construction of compressor facilities, which would not differ significantly from the Proposed Action, and the construction of injection well facilities and evaporation ponds, which would result in a roughly 43 percent decrease in worker and vehicular activity. Environmental protection measures defined for the Proposed Action, would also apply to this alternative.

2.8 SUMMARY OF ENVIRONMENTAL IMPACTS

Significant project features which vary by alternative are summarized and compared in Table 2.8-1. Impacts of the Proposed Action and Alternatives are summarized and compared in Table 2.8-2, based on the issues described in Chapter 1 and the assessment of impacts in Chapter 4.